

PERPETUAL
TROUBLE SHOOTER'S MANUAL

Reg. U. S. Pat. Off.

VOLUME XXII



JOHN F. RIDER PUBLISHER, INC.

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PERPETUAL TROUBLE SHOOTER'S MANUALS
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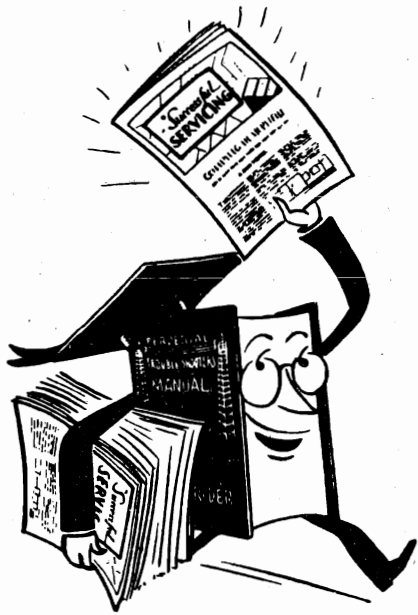
TV AND OTHER RECEIVING ANTENNAS (Theory and Practice) — by A. B. Bailey

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MODELS 4W18, 4W19, Ch. 4W1; 4T11, Ch. 4T1

REMOVING AND INSTALLING CHASSIS

To remove the chassis from the cabinet, remove the tuning knobs, cabinet bottom (base) and on the 4W1, the metal speaker grille. The speaker grille is removed by pulling it down away from the cabinet.

Release the chassis by removing the two mounting screws located in the top inside of the cabinet just below the handle brackets.

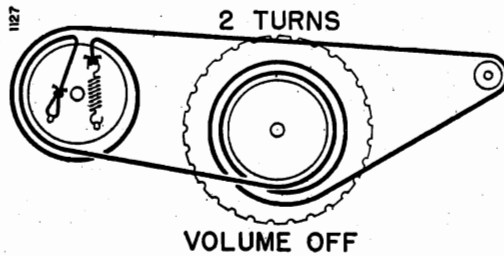
Install the chassis in cabinet in the same manner, being sure that the 1 5/16" diameter fibre washer (sleeve retainer) used on the 4W1 chassis is placed over the volume tuning sleeve just before sliding the 4W1 chassis into the cabinet.

Also, before tightening the two chassis mounting screws adjust the chassis for even spacing between all sides of the dial and the cut-out in the cabinet, otherwise binding may result.

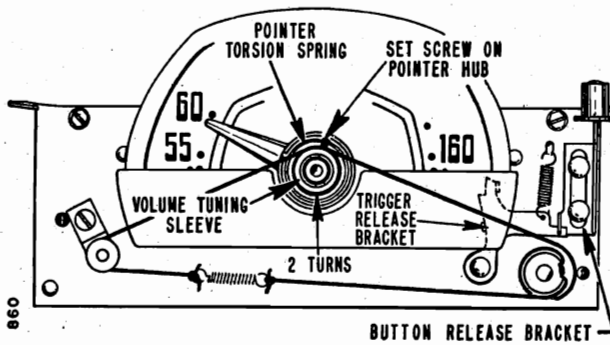
STRINGING VOLUME CONTROL DRIVE

The illustrations below show the volume cord stringing system used on each of the chassis.

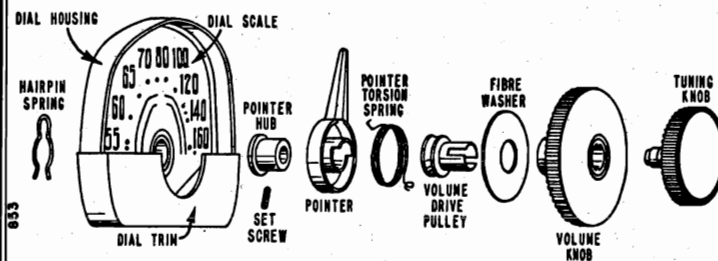
Before restringing the volume cord on these models, rotate volume control fully clockwise and, using a #6 Allen wrench, tighten the set screw on the volume control pulley, first being sure the cut-out slot (s) on the volume control pulley are in the position shown in each illustration. Loop the cord in the cut-out slots, winding 1 1/2 turns around the volume control pulley, and then winding 2 turns around the volume tuning sleeve on the 4W1 chassis or the volume-off knob on the 4T1 chassis. Loop the cord around the fibre pulley at other end of chassis. To prevent slipping, be sure that the volume control turns freely and that the dial cord tension spring has sufficient tension.



Chassis 4T1, Front View Showing Stringing



Chassis 4W1, Front View Showing Stringing



Chassis 4W1, Dial and Tuning Knob Assembly, Exploded View

"HIDE-A-WAY" DIAL ON CHASSIS 4W1

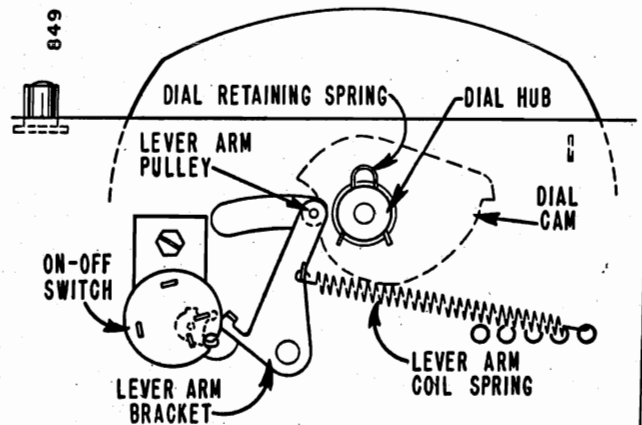
Illustrations below show front, rear and exploded views of dial mechanism. Follow the sequence shown in exploded view for disassembly or reassembly of the knobs, pointer or dial.

The "Hide-A-Way" dial mechanism is operated by the push button which works the trigger release bracket. The trigger bracket releases the dial assembly.

Thrust of the lever arm roller against the cam on back of the dial causes the dial to pop-up while a protruding edge on the lever arm simultaneously trips (turns on) the on-off switch.

Lever arm thrust is adjustable by attaching the far end of the lever arm spring to any of the holes spaced at different distances from the lever arm.

Rotating the dial fully to the left locks the dial into the cabinet and also trips (shuts-off) the on-off switch.

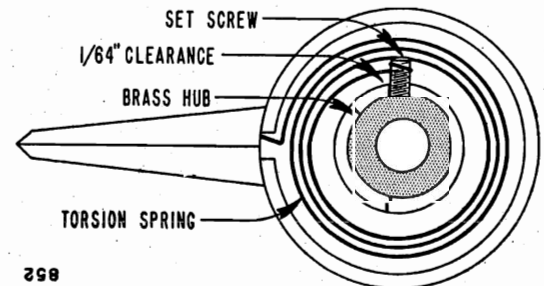


Chassis 4W1, "Hide-A-Way" Dial, Rear View

DIAL POINTER ON CHASSIS 4W1

The illustration shows an exploded view of the dial assembly and the sequence in which the pointer hub and torsion spring are to be assembled. When assembling the pointer torsion spring to the pointer, insert the rectangular end into the base of the pointer; compress the spring from about one-half to one turn in a clock-wise direction. Insert the rounded or looped end of the spring over the top end of the pointer set screw. Allow about 1/64" clearance between the inner turn of the pointer spring and pointer hub, or the pointer may bind or stick.

To adjust pointer, fully close the gang condenser. Set the end of the pointer over the two dots below 55 on the dial and tighten the pointer screw with a #4 Allen wrench. Important: Allow approximately 1/32" clearance between the hub on the pointer and the dial scale.



Chassis 4W1, Dial Pointer and Hub Assembly

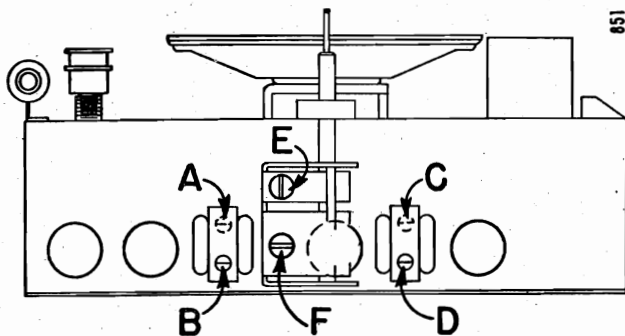
MODELS 4W18, 4W19, Ch.
4W1; 4T11, Ch. 4T1

ALIGNMENT PROCEDURE

- Use battery power for alignment if fresh batteries are available.
- When using AC power, an isolation transformer should be used if available. If not using an isolating transformer, connect a .1 mfd. condenser in series with the signal generator low side to B minus (pin 7 of 1U5 tube).
- Batteries should be held in chassis during alignment.
- Set volume control full on.
- Connect output meter across speaker voice coil.
- Use lowest setting of signal generator capable of producing adequate output meter indication.
- Use a non-metallic alignment tool for IF transformers.
- Repeat adjustments to insure good results.

| Step | Dummy Antenna in Series with Signal Generator | Connection of Signal Generator (High Side) | Signal Generator Frequency | Receiver Gang Setting | Trimmer Description | Trimmer Designation | Type of Adjustment |
|------------------------------|------------------------------------------------------------------------------------------------------|--------------------------------------------|----------------------------|--------------------------|----------------------|---------------------|--------------------|
| 1 | .001 mfd. when using A. C. .1 mfd. when using Battery | Antenna stator of tuning condenser | 455 KC | Gang fully open | 2nd IF 1st IF | *A, B *C, D | Maximum output |
| 2 | " | " | 1620 KC | " | Oscillator (on gang) | E | " |
| Install metal chassis cover. | | | | | | | |
| 3 | Loop of several turns of wire, or place generator lead close to receiver for adequate signal pickup. | No actual connection (signal by radiation) | 1400 KC | Tune in generator signal | Antenna (on gang) | F | " |

*Adjustments A and C are made from other side of chassis.



Trimmer Location, Underside of Chassis

REPLACING OF BATTERIES

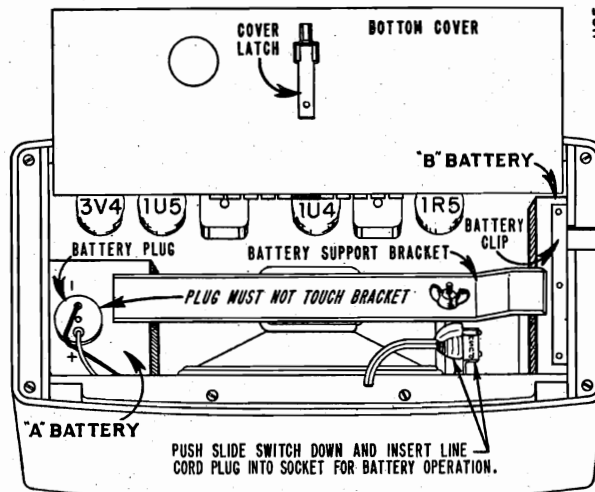
Use replacement "A" and "B" batteries of the following types:
A Battery (7½ Volts): General 31, Eveready 717, Burgess C5, Ray-o-Vac 751C or equivalent.

B Battery (67½ Volts): General 108, Eveready 467, Burgess XX45, Ray-o-Vac 4367 or equivalent.

Electrical characteristics of recommended batteries for these models provide for equal life for both the "A" and "B" batteries. "A" batteries may give satisfactory performance as low as 5.5 volts; "B" batteries as low as 49.5 volts. Replace batteries when reception is weak and voltage has dropped below values given above.

To install replacement batteries, slide the cover latch and open the hinged bottom cover. Then remove the wing nut which holds the battery support bracket in place.

Disconnect battery connectors from old batteries. Batteries can



Tube and Battery Location

easily be removed from the set by grasping them with long nose pliers or if necessary removing the cabinet bottom. Install new batteries so battery connectors are farthest away from the ends of the battery bracket. Batteries may become shorted if bracket touches connectors.

REPLACING TUBES

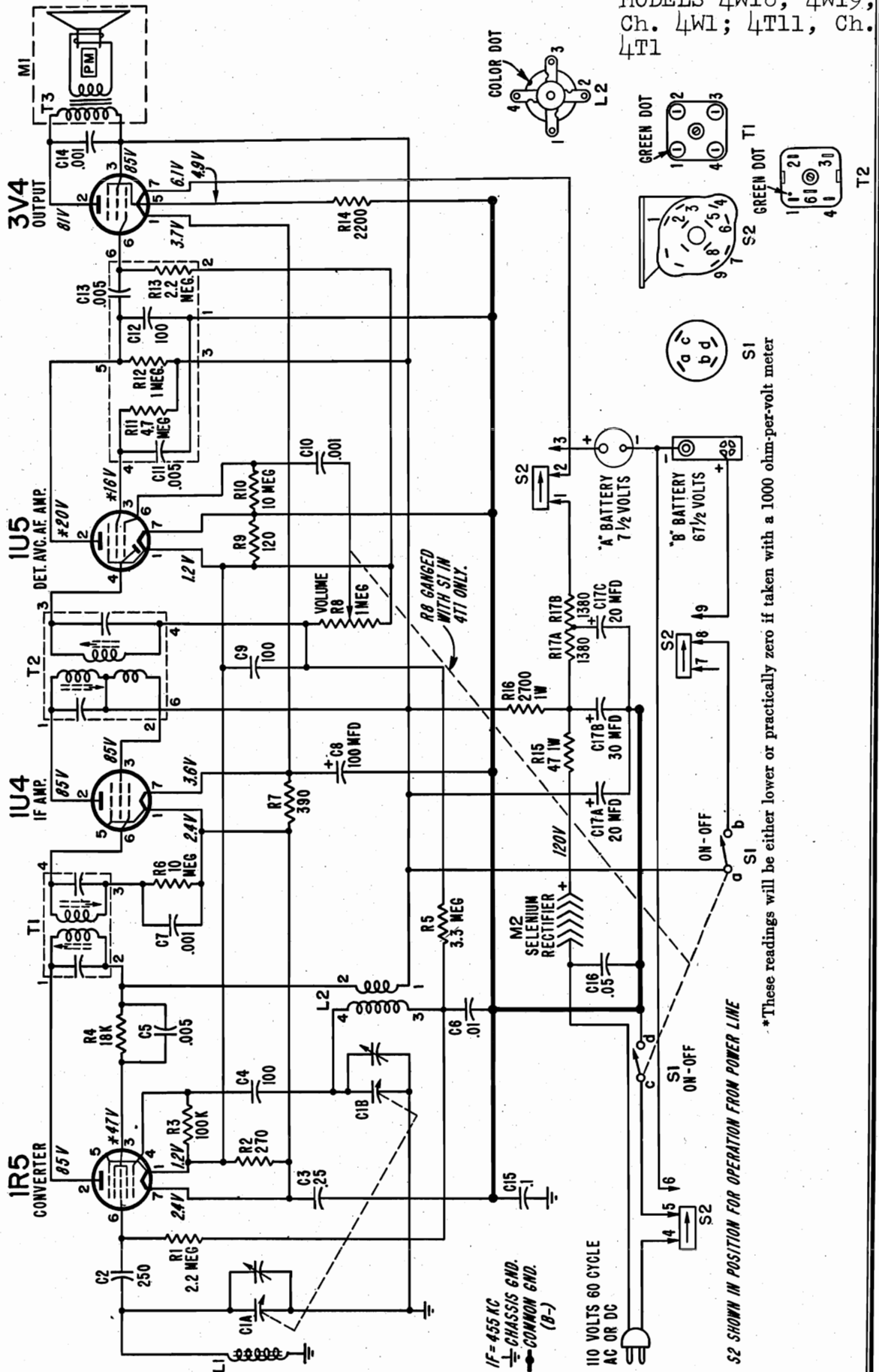
Tubes can most conveniently be removed or replaced by first removing the batteries and cabinet bottom. A miniature tube puller or extractor will be of help in facilitating tube replacement.

MODELS 4W18, 4W19,
Ch. 4W1; 4T11, Ch.
4T1

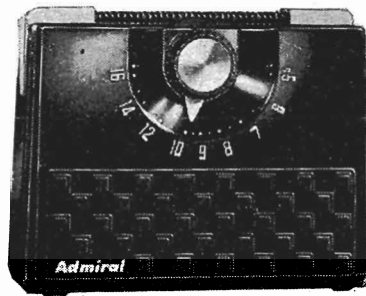
VOLTAGE DATA

Voltages shown on schematic diagram.

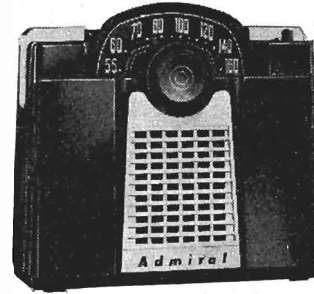
- All voltages taken between tube socket terminals and B minus (pin 7 of IU5 tube).
- Dial turned to low frequency end; volume control at minimum.
- Voltages measured with Vacuum Tube Voltmeter from 117 Volts AC line.



MODELS 4W18, 4W19, Ch.
4W1; 4T11, Ch. 4T1



4T11



4W18, 4W19

RESISTORS

| Symbol | Description | Part No. |
|--------|----------------------------|------------|
| R1 | 2.2 megohms, 1/2 watt | 60B 8-225 |
| R2 | 270 ohms, 1/2 watt | 60B 8-271 |
| R3 | 100,000 ohms, 1/2 watt | 60B 8-104 |
| R4 | 18,000 ohms, 1/2 watt | 60B 8-183 |
| R5 | 3.3 megohms, 1/2 watt | 60B 8-335 |
| R6 | 10 megohms, 1/2 watt | 60B 8-106 |
| R7 | 390 ohms, 1/2 watt | 60B 8-391 |
| R8 | 1 Megohm, Vol. Control | |
| | for 4T1 | 75B 1-43 |
| | for 4W1 | 75B 1-37 |
| R9 | 120 ohms, 1/2 watt | 60B 8-121 |
| R10 | 10 megohms, 1/2 watt | 60B 8-106 |
| *R11 | 4.7 megohms, 1/5 watt | |
| *R12 | 1 megohm, 1/5 watt | |
| *R13 | 2.2 megohms, 1/5 watt | |
| R14 | 2,200 ohms, 1/2 watt | 60B 8-222 |
| R15 | 47 ohms, 1 watt | 60B 14-470 |
| R16 | 2,700 ohms, 1 watt | 60B 14-272 |
| R17A | 1380 ohms } 5 watt, Tapped | |
| R17B | 1380 ohms } Candohm | 61A 5-7 |

CONDENSERS

| Symbol | Description | Part No. |
|--------|------------------------------|----------|
| C1A | 272 mmfd. max., Ant. } Gang† | |
| C1B | 107 mmfd. max., Osc. } | |
| C2 | 250. mmfd., ceramic | 65B 6-5 |
| C3 | .25 mfd, 200 volts, paper | 64B 1-28 |
| C4 | 100 mmfd. ceramic | 65B 6-3 |
| C5 | .005 mfd, ceramic | 65A 10-5 |
| C6 | .01 mfd, 400 volts, paper | 64B 1-25 |
| C7 | .001 mfd, min. ceramic | 65B 6-41 |
| C8 | 100 mfd, 25 volts, Elec. | 67A 4-6 |
| C9 | 100 mmfd, ceramic | 65B 6-3 |
| *C10 | .001 mfd, min. ceramic | 65B 6-41 |
| *C11 | .005 mfd, min. ceramic | |
| *C12 | 100 mmfd. ceramic | |
| *C13 | .005 mfd, ceramic | |
| C14 | .001 mfd, min. ceramic | 65B 6-41 |
| C15 | .1 mfd, 200 volts, paper | 64B 1-30 |
| C16 | .05 mfd, 400 volts, paper | 64B 8-28 |
| C17A | 20 mfd, 150 volts | |
| C17B | 30 mfd, 150 volts Elect. | 67C 7-41 |
| C17C | 20 mfd, 150 volts | |

COILS, TRANSFORMERS, ETC.

| Symbol | Description | Part No. |
|--------|---------------------------------------------------|-----------|
| L1 | Antenna, Rod | 69C 120-1 |
| L2 | Coil, Oscillator | 69A 39-5 |
| T1 | Transformer, 1st IF | 72B 28-1 |
| T2 | Transformer, 2nd IF | 72B 28-62 |
| T3 | Transformer, Output | 98A 21 |
| M1 | Speaker (3 1/2" PM) and Output Trans. | 78B 58-1 |
| M2 | Rectifier, Selenium | 93A 1-6 |
| S1 | Switch, On-Off, DPST, (less bracket) | 77A 23 |
| S2 | Switch, Power Change | 77A 19-1 |
| | *Couplate (includes R11, R12, R13, C11, C12, C13) | 63A 4-3 |

MISCELLANEOUS PARTS

| Description | Part No. |
|-----------------|----------|
| Baffle, Speaker | 43A 111 |

| Description | Part No. |
|-----------------------------------------------------------------------------|------------|
| Bracket (4W1 only) | |
| on-off switch mounting | 15A 602 |
| battery support | 15A 603 |
| button release | 15A 599 |
| trigger release bracket | 15A 600 |
| volume pulley and bracket ass'y. | A3316 |
| shield for gang | 15A 618 |
| cover for AC switch | 15A 595 |
| lever arm assembly | A3254 |
| Carton and Fillers | 44B 165 |
| Clip, IF Transformer mounting | 72B 28-10 |
| Clip "B" Battery Connector | 90A 5-3 |
| Cover, Metal for chassis | 14C 70 |
| Drum, Vol. control (4T1 only) | 17A 30 |
| Insulator, Fibre (for mtg. rectifier) | 32A 137 |
| Customers Instructions | |
| for 4W18, 4W19 | 41A 18 42 |
| for 4T11 | 41A 18-38 |
| Dial Cord (order length needed; 24" required for 4W1, 30" required for 4T1) | 50A 1-3 |
| Nut, Wing (#6/32 for battery support bracket) | 2A 5-4-71 |
| Plate, Electrolytic Mounting | 67A 2-1 |
| Plug, "A" Battery Connector | 88A 4-6 |
| Pulley, Brass | |
| mounts on volume control shaft (4W1 only) | 27A 150-1 |
| drive for volume control cord | 27A 149-1 |
| riveted to lever arm (4W1 only) | 27A 146 |
| Screw, Set | |
| for volume control pulley (#6-32x3/16) | 1A 48-3 |
| Socket, Tube | 87A 3-4 |
| Speed Nut, #5/32 (for trigger adjustment bracket) | 2B 10-12 |
| Speed Nut, #6 Escutcheon mtg. (4T1 only) | 2B 10-9-68 |
| Spring, Coil | |
| for 4W1 dial relase bracket (1/2"x3/16" dia.) | 19B 1-18 |
| for 4W1 lever arm (1 3/4" long) | 19A 64 |
| for 4W1 dial cord (tension) (7/16" x 1/8" dia.) | 19B 1-16 |
| for 4T1 dial cord (tension) (11/32" x 9/64" dia.) | 19B 1-17 |
| Washer, Spring (5/16" OD x 3/16" ID) | 4A 6-13 |

CABINET PARTS

| Description | Part No. |
|--------------------------------------|----------|
| Bottom, Cabinet (Base) | |
| Ebony for 4T11 | |
| complete with metal door | A3270 |
| plastic frame only | 34D 35-2 |
| Green for 4W18 | |
| complete with metal door | A3493 |
| plastic frame only | 34D 35-6 |
| Tan for 4W19 | |
| complete with metal door | A3494 |
| plastic frame only | 34D 35-8 |
| Bracket, Handle Support (metal ends) | 20B 14 |
| Button, Push | |
| Green for 4W18 | 33A 61-3 |
| Tan for 4W19 | 33A 61-4 |
| Cabinet (less bottom) | |
| Green for 4W18 | 34D 35-5 |
| Tan for 4W19 | 34D 35-7 |
| Ebony for 4T11 | 34D 44-1 |

| | |
|----------------------------------------------------------------|---------------|
| Grille Cloth, Speaker (4W1) | 36B 3-81 |
| Grille, Plastic (gold) (4W1) | 23C 95-1 |
| Grille, Plastic (black) (4T1) | 23C 94-1 |
| Handle, Carrying (plastic covering only) | |
| Ebony for 4T11 | 33A 58-1 |
| Green for 4W18 | 33A 58-3 |
| Tan for 4W19 | 33A 58-4 |
| Hinge, Bottom Cover | 37A 33 |
| Knob, Volume | |
| Green for 4W18 | 33C 56-8 |
| Tan for 4W19 | 33C 56-10 |
| Ebony for 4T11 | 33C 67-1 |
| Knob, Tuning (includes compression ring) | |
| Green for 4W18 | A3491 |
| Tan for 4W19 | A3492 |
| Ebony for 4T11 | A3473 |
| Pointer, Dial | |
| for 4T1 chassis | 25B 47-1 |
| for 4W1 chassis | 25A 40 |
| Ring, Compression (for tuning knob) | |
| for 4W18, 4W19 | 19A 31-6 |
| for 4T11 | 19A 31-7 |
| Ring, Compression (for Pointer, 4T1) | 19A 31-2 |
| Rivet, Shoulder | |
| with 5/64 shoulder | 6A 4-2-2 |
| with 7/64 shoulder | 6A 4-12-71 |
| with 15/64 shoulder | 6A 4-11-2 |
| with 3/32 shoulder | 6A 4-7-71 |
| Rubber Strap, for carrying handle | |
| upper, with 13/32" holes | 12A 38 |
| lower, with 1/4" holes | 12A 38-1 |
| Screw | |
| #4x5/8 self tapping; for mtg. plastic base to cabinet | 1A 69-6-71 |
| #6-32x7/16; for mtg. handle and chassis | 280-437-C2-71 |
| Slide Arm (for bottom door) | 15A 291 |
| Spring, Support (for carrying handle) | 18A 42 |
| Washer | |
| felt, for 4W1 volume knob | 5A 4-1-7 |
| felt, for 4T1 volume knob | 5A 4-8 |
| fibre, for retaining volume knob on 4W1 (15/16" OD x 7/16" ID) | 5A 1-17 |

PARTS FOR "HIDE-A-WAY" DIAL in 4W1 Chassis

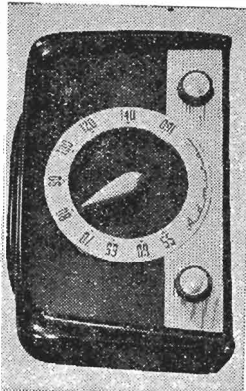
| Description | Part No. |
|----------------------------------------------------------------|------------|
| Dial Scale | |
| Green for 4W18 | 22C 25-5 |
| Tan for 4W19 | 22C 25-7 |
| Housing Assembly, Metal (for dial scale, includes hub and cam) | |
| Green for 4W18 | A3495 |
| Tan for 4W19 | A3496 |
| Hub, Brass (for dial pointer) | 27A 151 |
| Pointer, Dial | 25A 40 |
| Pulley, Brass (volume tuning sleeve) | 27A 149-1 |
| Screw (#6x5/6 S.T.B.H.—for mtg. dial trim) | 1A 71-9-71 |
| Screw, Set (#4-40x5/16—for dial pointer hub) | 1A 43-4 |
| Spring, Hairpin (for mtg. dial assembly) | 19A 2-6 |
| Spring, Pointer Torsion | 19A 63 |
| Trim, Plastic (front bottom of dial housing) | |
| Green for 4W18 | 33B 60-3 |
| Tan for 4W19 | 33B 60-4 |

†Use number 68B34-1 gang for 4W1 chassis, and number 68B41 gang for 4T1 chassis. Except for shaft lengths, these gang condensers are identical.
*Part of couplate (part #63A4-3). Replace with exact duplicate or individual components. Note that numbers 1, 2, 3, 4, 5, 6, on schematic correspond to lead numbers printed on face of couplate.

VOLTAGE DATA

Voltages shown on schematic diagram.

- All readings made between tube socket terminals and B minus (terminal of On-Off switch).
- Dial turned to low frequency end; volume control at minimum.
- Measured on 117 Volts AC line.
- Voltages measured with Vacuum Tube Voltmeter.



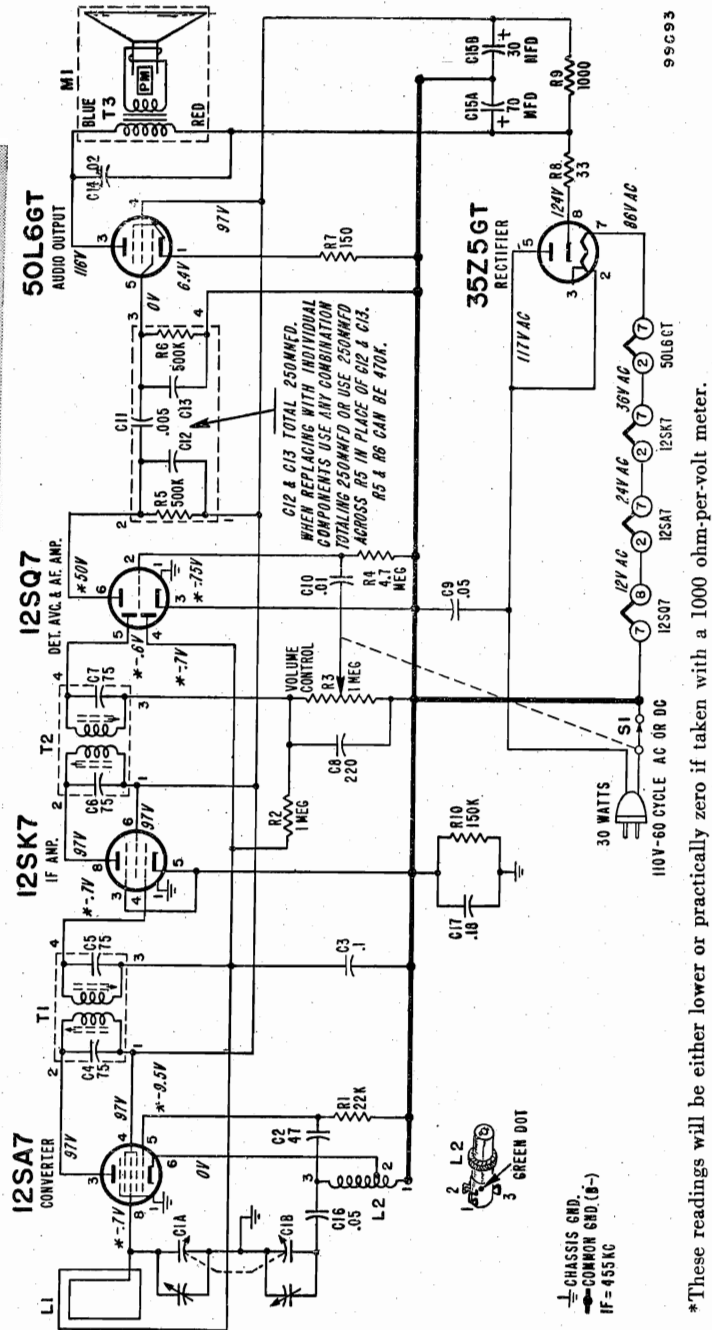
MISCELLANEOUS

| Description | Part No. |
|----------------------------------|----------|
| Cabinet | 34D 39-1 |
| Ebony (5E21) | 34D 39-2 |
| Mahogany (5E22) | 34D 39-3 |
| Ivory (5E23) | 44B 191 |
| Carton and fillers | 18A 10-6 |
| Clip, Elect. mtg. | 8A 45-71 |
| Cotter Pin (for carrying handle) | 50A 1-3 |
| Dial Cord (32" required) | |

| Description | Part No. |
|-------------------------------------|-------------|
| Drum, Dial Pointer | 17A 27 |
| Escutcheon, Dial Scale | 23C 77 |
| Grille, Speaker (Metal) | 16A 30-1 |
| Gold (for 5E21) | 16A 30-2 |
| Gold (for 5E22, 5E23) | |
| Handle, Plastic | |
| Ebony (for 5E21) | 37B 36-1 |
| Ivory (for 5E23) | 37B 36-3 |
| Mahogany (for 5E22) | 37B 36-2 |
| Knob, Tuning | |
| Ebony (for 5E21) | 33A 64-4 |
| Ivory (for 5E23) | 33A 64-3 |
| Mahogany (for 5E22) | 33A 64-2 |
| Pointer, Dial | |
| Gold (for 5E21) | 25A 45-1 |
| Ivory (for 5E23) | 25A 45-3 |
| Mahogany (for 5E22) | 25A 45-2 |
| Ring, Dial Pointer Compression | 19A 31-2 |
| Shaft, Dial Pointer | 28A 42-1 |
| Shaft, Tuning | 28A 26-4 |
| Sleeve, Dial Pointer Shaft | 27A 12A |
| Sleeve, Tuning Shaft | 27A 12A-1 |
| Snap Buttons (cabinet back) | 13A 1-5 |
| Snap Button, Escutcheon mtg. | 13A 1-2-71 |
| Socket; Tube | 87A 10-2 |
| Spacer, Tuning Shaft | 29A 2-7-71 |
| Speed Nut, Escutcheon Retaining | 2B 10-35-68 |
| Speed Nut (for tuning shaft spacer) | 2B 10-21-59 |
| Spring, Dial Cord Tension | 19B 1-5 |
| Spring (for carrying handle) | 19A 69 |
| Washer, "C" (tuning shaft) | 4A 4-6-0 |
| Washer, Felt (knob) | 5A 4-4 |
| Washer, Spring (tuning shaft) | 4A 4-6-0 |

RESISTORS

| Description | Part No. |
|-----------------------------------------------|------------|
| 22,000 ohms, 1/2 watt | 60B 8-223 |
| 1 megohm, 1/2 watt | 60B 8-105 |
| 1 megohm, Volume Control and On-Off switch S1 | 75B 1-40 |
| 4.7 megohms, 1/2 watt | 60B 8-475 |
| 500,000 ohms, 1/2 watt | |
| 500,000 ohms, 1/2 watt | |
| 150 ohms, 1/2 watt | 60B 8-151 |
| 33 ohms, 1 watt | 60B 8-33 |
| 1,000 ohms, 1 watt | 60B 8-28-2 |
| 150,000 ohms, 1/2 watt | 60B 8-154 |



COILS, TRANSFORMERS, Etc.

| | |
|----------------------------------------|------------|
| Antenna, Loop | 69C 142 |
| (mounted on cardboard back) | |
| Coil, Oscillator | 69A 52-3 |
| Transformer, 1st I.F. | 72B 50 |
| Transformer, 2nd I.F. | 72B 51 |
| Transformer, Output | 98A 4 |
| Speaker (5" PM) and Output Transformer | 78B 62-1 |
| Switch, On-Off | Part of R3 |
| †Couple | 63A 5-4 |
| (Includes R5, R6, C11, C12, C13). | |

CONDENSERS

| | |
|---------------------|---------------------------------|
| Ant., 420 mmfd. max | Gang 68B 38 |
| Osc. 108 mmfd. max | (Dial drum spot welded to gang) |
| †C11 | 65C 6-79 |
| †C12 | 64B 1-30 |
| †C13 | Part of T1 |
| C2 | 47 mmfd., ceramic |
| C3 | .1 mfd., 200 volts, paper |
| C4 | 75 mmfd., 3% |
| C5 | 75 mmfd., 3% |
| C6 | 75 mmfd., 3% |
| C7 | 75 mmfd., 3% |
| C8 | 220 mmfd., ceramic |
| C9 | .05 mfd., 400 volts, paper |
| C10 | .01 mfd., 400 volts, paper |
| †C11 | .005 mfd., 400 volts |
| †C12 | { See schematic |
| †C13 | { |
| C14 | .02 mfd., 400 volts, paper |
| C15a | 70 mfd., 150 volts |
| C15b | 30 mfd., 150 volts |
| C16 | .05 mfd., 400 volts, paper |
| C17 | .18 mfd., 200 volts, paper |

*These readings will be either lower or practically zero if taken with a 1000 ohm-per-volt meter.

†Part of couple (part 63A5-4). Replace with exact duplicate or individual components. Note that numbers 1, 2, 3, 4, on schematic correspond to couple lead numbers printed on face of couple 63A5-4.

MODELS 5E21, 5E22,
5E23, Ch. 5E2

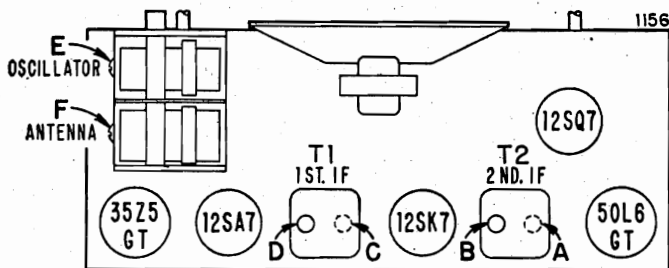
ALIGNMENT PROCEDURE

- Connect output meter across speaker voice coil.
 - Turn receiver volume control full on.
 - Use an isolation transformer if available, otherwise connect a .1 mfd. condenser in series with low side of signal generator and connect to chassis.
 - Use lowest output setting of signal generator capable of producing adequate output meter indication and then proceed as outlined in chart below.
 - Repeat adjustments to insure good results.
- Caution: Do not connect a ground wire directly to chassis.

| Step | Dummy Antenna in Series with Signal Generator | Connection of Signal Generator (High Side) | Signal Generator Frequency | Receiver Gang Setting | Trimmer Description | Trimmer Designation | Type of Adjustment |
|------|----------------------------------------------------------------------------------------------------------|--------------------------------------------|----------------------------|--------------------------|----------------------|---------------------|--------------------|
| 1 | 250 mmfd. condenser | Antenna stator of tuning condenser | 455 KC | Gang fully open | 2nd IF 1st IF | *A, B *C, D | Maximum Output |
| 2 | 250 mmfd. condenser | Antenna stator of tuning condenser | 1620 KC | Gang fully open | Oscillator (on gang) | E | Maximum Output |
| 3 | Loop of several turns of wire or place generator lead close to receiver loop for adequate signal pickup. | No actual connection (signal by radiation) | 1400 KC | Tune in generator signal | Antenna (on gang) | F | Maximum Output |
| 4 | Mount and set dial pointer as shown in Pointer Setting and Dial Cord Stringing Diagram. | | | | | | |

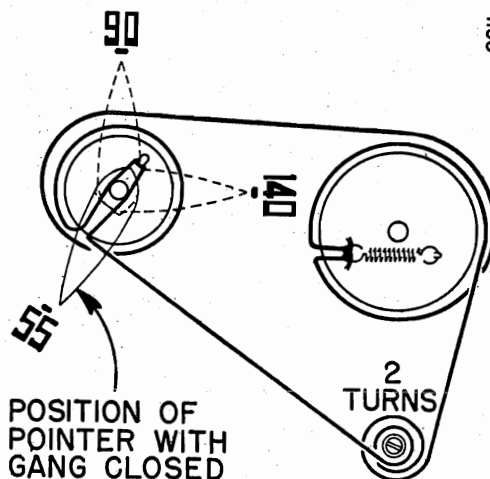
*Adjustments A and C made from the underside of the chassis. If IF transformers have hollow core slugs, these adjustments may all be made from the top of chassis, if you use alignment tool #98A30-7 obtainable from your Admiral distributor. The bottom IF slug adjustment may be reached through the hollow core in the upper slug.

TUBE AND TRIMMER LOCATION



Adjustments A and C are made from underside of chassis.

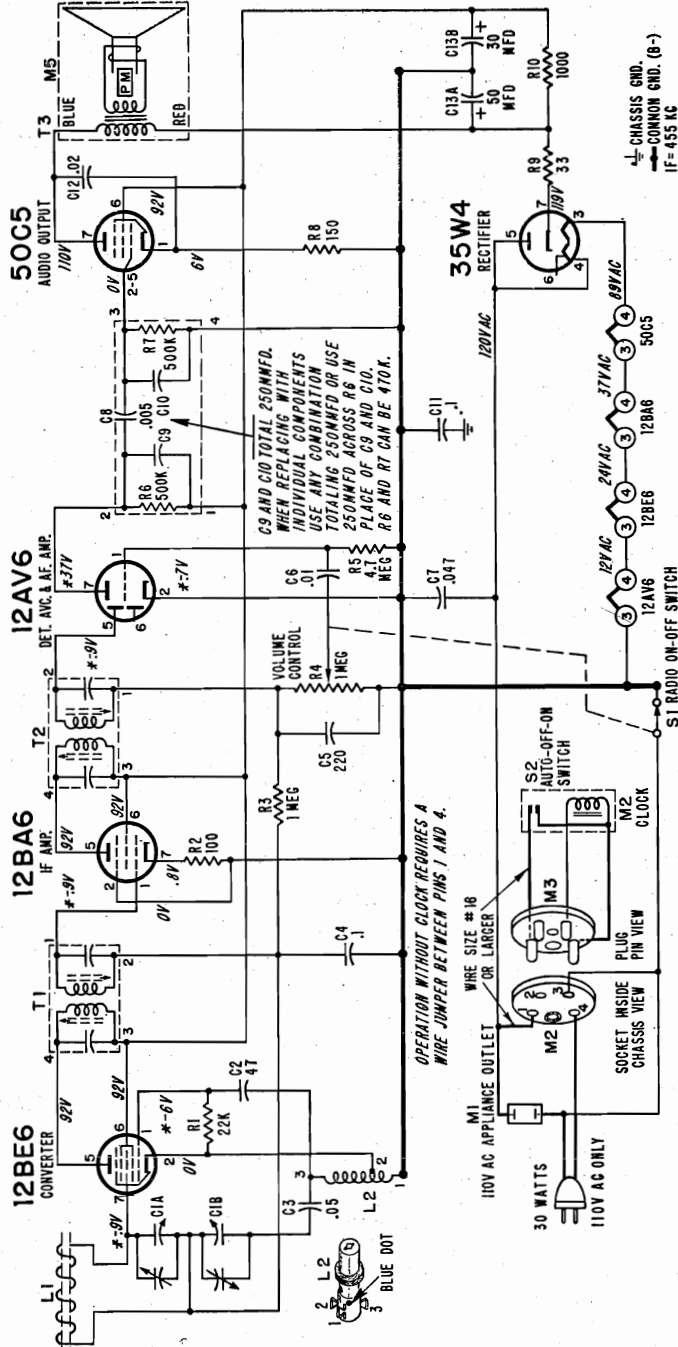
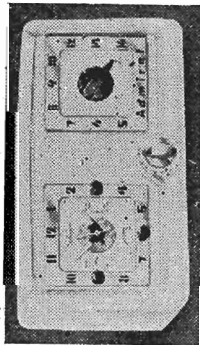
POINTER SETTING AND DIAL CORD STRINGING



MODELS 5G21, 5G21/15, 5G22, 5G22/15, 5G23, 5G23/15, Ch. 5G2

VOLTAGE DATA

- Voltages shown on schematic diagram
- All readings made between tube socket terminals and B minus (terminal of On-Off switch).
- Measured on 117 Volt AC line.
- Volume control minimum; dial turned to low frequency end.
- Voltages measured with Vacuum Tube Voltmeter.



*These readings will be either lower or practically zero if taken with a 1000 ohm-per-volt meter.

RESISTORS

| Symbol | Description | Part No. |
|--------|------------------------------------------------------------|-----------|
| R1 | 22,000 ohms, 1/2 watt | 60B 8-223 |
| R2 | 100 ohms, 1/2 watt | 60B 8-101 |
| R3 | 1 megohm, 1/2 watt | 60B 8-105 |
| R4 | 1 megohm, Volume Control (includes Radio On-Off Switch S1) | 75B 1-41 |
| R5 | 4.7 megohms, 1/2 watt | 60B 8-475 |
| R6 | 500,000 ohms, 1/2 watt | 60B 8-151 |
| R7 | 150 ohms, 1/2 watt | 60B 28-3 |
| R8 | 33 ohms, 1 watt | 60B 28-2 |
| R9 | 1,000 ohms, 1 watt | 60B 28-2 |
| R10 | | |

CABINET PARTS

| Symbol | Description | Part No. |
|--------|-----------------------------------|------------|
| L1 | Back | 89C 143 |
| L2 | Coil, Oscillator | 69A 52-4 |
| T1 | Transformer, 1st IF | 72B 28-7 |
| T2 | Transformer, 2nd IF | 72B 28-7 |
| T3 | Transformer, Output | 98A 21 |
| M1 | Apparatus Outlet | 98A 21-1 |
| M2 | Speaker (4" PM) and Output Trans. | 78B 65-1 |
| M3 | Switch, Radio On-Off | Part of R4 |
| S1 | Switch, Auto-Off-On (part of M4) | 91C 4-14 |
| S2 | | |

COIL, TRANSFORMERS, ETC.

| Symbol | Description | Part No. |
|--------|-----------------------------------|------------|
| L1 | Rod Antenna & Cabinet | |
| L2 | Coil, Oscillator | 89C 143 |
| T1 | Transformer, 1st IF | 69A 52-4 |
| T2 | Transformer, 2nd IF | 72B 28-7 |
| T3 | Transformer, Output | 98A 21 |
| M1 | Apparatus Outlet | 98A 21-1 |
| M2 | Speaker (4" PM) and Output Trans. | 78B 65-1 |
| M3 | Switch, Radio On-Off | Part of R4 |
| S1 | Switch, Auto-Off-On (part of M4) | 91C 4-14 |
| S2 | | |

CLOCK PARTS

| | | |
|----|------------------------------------------------------------------------|-----------|
| M2 | Socket, Clock, 4 contact | 87A 6-3 |
| M3 | Plug, Clock, 4 pin | 88B 22-5 |
| M4 | Shell and Insulator for Plug M3 | 88B 22-3 |
| M5 | Clock, Complete | **91C 4-1 |
| | 60 cycle, for 5G21, 5G22 | 91C 4-2 |
| | 50 cycle, for 5G23 | 91C 4-2 |
| | 50 cycle, for 5G21/15, 5G22/15 | **91C 4-3 |
| | 50 cycle, for 5G23/15 | 91C 4-4 |
| | Background, Clock Dial Bezel | 22A 27 |
| | Bezel, Clock (Frame) gold spray finish | 91C 4-12 |
| | Field and Coil Assembly polished brass finish for 110 V. 60 cycles | 91C 4-13 |
| | Field and Coil Assembly for 110 V. 50 cycles | 91C 4-15 |
| | Glass, Window | 91C 4-17 |
| | Knobs, Clock (Mahogany) | 91C 4-11 |
| | Rotor for 110 V. 60 cycles | 91C 4-16 |
| | for 110 V. 50 cycles | 91C 4-18 |
| | **Specify whether bezel is gold spray finish or polished brass finish. | |

CONDENSERS

| Symbol | Description | Part No. |
|--------|-----------------------------------------------------|-----------------|
| C1A | 290 mmid. max., Ant. | 68B 39 |
| C1B | 104 mmid. max., Osc. (Dial drum spotwelded to gang) | |
| C2 | 47 mmid. ceramic | 65C 6-79 |
| C3 | .05 mid. 400 volts, paper | 64B 1-22 |
| C4 | 1 mid. 200 volts, paper | 64B 1-30 |
| C5 | 220 mfd. ceramic | 65C 6-80 |
| C6 | .01 mfd. 400 volts, paper | 64B 1-25 |
| C7 | .047 mfd. 400 volts, paper | 64B 8-28 |
| C8 | .005 mfd. 450 volts | |
| C9 | See Schematic | |
| C10 | .1 mfd. 200 volts, paper | 64B 1-30 |
| C11 | .02 mfd. 400 volts, paper | 64B 1-24 |
| C12 | 50 mfd. 150 volts | Elect. 67A 22-1 |
| C13A | 30 mfd. 150 volts | |
| C13B | 30 mfd. 150 volts | |

MISCELLANEOUS PARTS

| Description | Part No. |
|-------------------------------------------|-------------|
| Bracket, Tuning Shaft | 15A 698 |
| Carbon and Filers | 42B 214 |
| Clamp, for Line Cord | 11A 4-4 |
| Clip, IF Transformer mtg. | 72B 28-10 |
| Compression Ring (for pointer) | 18A 91-2 |
| Dial Cord (30' length needed) | 50A 7-3 |
| Drum, Dial Pointer | 17A 219 |
| Grommet, Rubber (Gang mtg.) | 12A 119 |
| Line Cord and Plug | 89A 34-1 |
| Manual | 41A 18-41 |
| Customer Instructions | 5407 |
| Service Manual | |
| Socket, Tube plain type | 87A 24-2 |
| with grounding strap | 87A 24-3 |
| Plate, Pointer Support | 15A 496 |
| Pointer, Dial | 27A 19-1 |
| Sleeve, for pointer shaft | 27A 19-1 |
| Sleeve, Nut (for Brass) | 27A 19-1 |
| Speed Nut (for mtg. pointer start sleeve) | 28 10-28-59 |
| Spring, Dial, Cord Tension | 19B 1-5 |
| Washer, C (for pointer drum) | 4A 4-6 |

MODELS 5G21, 5G21/15,
5G22, 5G22/15, 5G23,
5G23/15, Ch. 5G2

ALIGNMENT PROCEDURE

- Connect a wire jumper between pins 1 and 4 on clock plug (M2) as shown in illustration below.
 - Turn receiver volume control full on (fully clockwise).
 - Use an isolation transformer if available, otherwise connect a .1 mfd. condenser in series with low side of signal generator and connect to chassis.
 - Connect output meter across speaker voice coil.
 - Use lowest output setting of signal generator capable of producing adequate output meter indication and proceed in the following sequence.
 - Repeat adjustments to insure good results.
- Caution: Do not connect a ground wire directly to chassis.

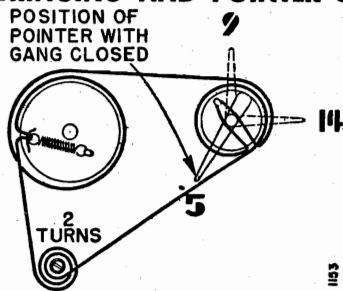
| Step | Dummy Antenna in Series with Signal Generator | Connection of Signal Generator (High Side) | Signal Generator Frequency | Receiver Gang Setting | Trimmer Description | Trimmer Designation | Type of Adjustment |
|------|-----------------------------------------------|--------------------------------------------|----------------------------|-----------------------|---------------------|---------------------|--------------------|
| 1 | 250 mmfd. condenser | Antenna stator of tuning condenser | 455 KC | Gang fully open | 2nd IF 1st IF | *A, B *C, D | Maximum output |
| 2 | 250 mmfd. condenser | Antenna stator of tuning condenser | 1620 KC | Gang fully open | Oscillator | E | Maximum output |

Mount and set dial pointer to horizontal position with tuning condenser tuned to 1400 KC generator signal; see illustration below.

| | | | | | | | |
|---|------------------------------------------------------------------------------------------------------------|--------------------------------------------|---------|--------------------------|---------|---|----------------|
| 3 | Loop of several turns of wire, or place generator lead close to receiver loop for adequate* signal pickup. | No actual connection (signal by radiation) | 1400 KC | Tune in generator signal | Antenna | F | Maximum output |
|---|------------------------------------------------------------------------------------------------------------|--------------------------------------------|---------|--------------------------|---------|---|----------------|

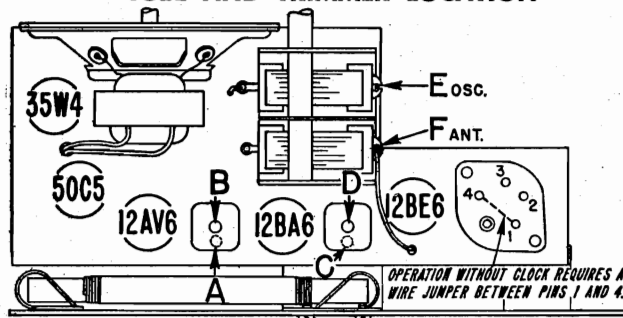
*Adjustments A and C made from the underside of the chassis. If IF transformers have hollow core slugs, these adjustments may be made from the top of the chassis, if you use alignment tool #98A30-7 obtainable from your Admiral distributor. The bottom IF slug adjustment may be reached through the hollow core in the upper slug.

DIAL STRINGING AND POINTER SETTING



Dial stringing and pointer with solid lines shown with gang closed. Dashed line pointer positions (1400 KC and 900 KC) shown when tuning condenser is tuned to generator signal.

TUBE AND TRIMMER LOCATION



Adjustments A and C made from underside of chassis.

TO REMOVE CLOCK from CABINET

(Radio chassis need not be removed when removing clock)

1. Remove the back from radio cabinet.
2. Remove the clock plug from the socket on top of the radio chassis, by removing screw from top of plug and gently prying plug out from socket.
3. Turn the slumber switch to the "60" position.
4. Remove the 3 nuts which hold the clock back cover to the clock.
5. Carefully pull the clock through the front of the cabinet while twisting it slightly to eliminate binding.

OPERATING RADIO MANUALLY

To operate the radio manually, the "Auto-Off-On" switch must be in the "On" position or the radio will not operate.

The radio on-off switch will turn the radio on or off, but will have no control over the appliance or the clock.

TO REMOVE FIELD and COIL ASSEMBLY or TO REMOVE ROTOR

The field and coil assembly and the rotor can be easily removed after the two screws which mount the nameplate are removed.

Note that when the rotor is replaced, the gear on the rotor must drop into the hole in the center of the gear plate and mesh with the clock gear.

MODELS 5J12,
5J13, Ch. 5J1

CIRCUIT

5 tube AC-DC Superheterodyne covering two bands, (540 KC—1730 KC) and (5.8 MC—18MC).

OPERATING VOLTAGE

110-120 Volts AC or 110-120 Volts DC. It can be operated on 220 Volts AC or DC only if a special line resistance cord is used. (See Parts List.)

ALIGNMENT PROCEDURE

- Connect output meter across voice coil.
- Turn receiver volume control full on.
- Use an isolation transformer if available, otherwise connect a .1 mfd. condenser in series with low side of signal generator and attach to B minus of chassis.
- Use lowest output setting of signal generator capable of producing adequate output meter indication and then proceed as outlined in chart below.
- Repeat adjustments to insure good results.

NOTE

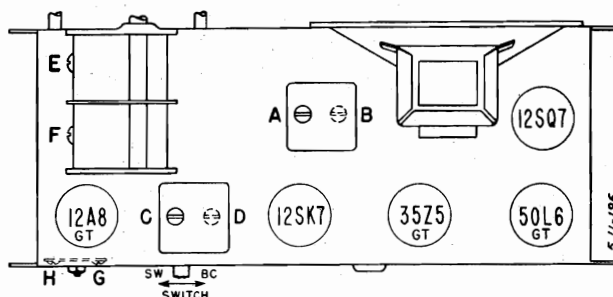
To avoid splitting the slotted head of powdered iron core tuning slugs in I.F. transformers, use an alignment tool having a blade 1/8" wide.

| Step | Dummy Antenna in Series with Signal Generator | Connection of Signal Generator (High Side) | Band Switch Position | Signal Generator Frequency | Receiver Gang Setting | Trimmer Description | Trimmer Designation | Type of Adjustment |
|--------------------------------------------------|-----------------------------------------------|--------------------------------------------|----------------------|----------------------------|--------------------------|---------------------------|-----------------------|-------------------------------------------|
| 1 | 250 mmfd. condenser | Grid Cap 12A8 Tube | B.C. | 455 K.C. | Gang fully open | 2nd IF 1st IF | A, B* C, D* | Maximum Output |
| 2 | 250 mmfd. condenser | End of Ant. Wire | B.C. | 1730 K.C. | Gang fully open | B.C. Oscillator (on gang) | E | Maximum Output |
| 3 | 250 mmfd. condenser | End of Ant. Wire | B.C. | 1400 K.C. | Tune in generator signal | B.C. Antenna (on gang) | F | Maximum Output |
| 4 | 250 mmfd. condenser | End of Ant. Wire | B.C. | 600 K.C. | Tune in generator signal | B.C. pad | G | Maximum Output. Rock gang while adjusting |
| Recheck alignment at 1400 K.C. (in step 3 above) | | | | | | | | |
| 5 | 400 ohm carbon resistor | End of Ant. Wire | S.W. | 15 M.C. | Tune in generator signal | S.W. Antenna | H (see caution below) | Maximum Output. Rock gang while adjusting |

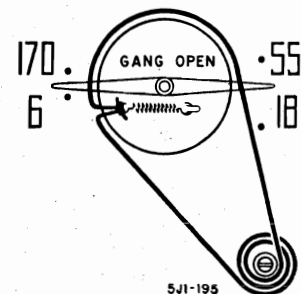
*Adjustments B and D are made from underside of chassis.

Caution: Be sure that trimmer "H" is aligned on correct frequency and not on image which is approximately 910 K.C. lower in frequency as indicated on dial.

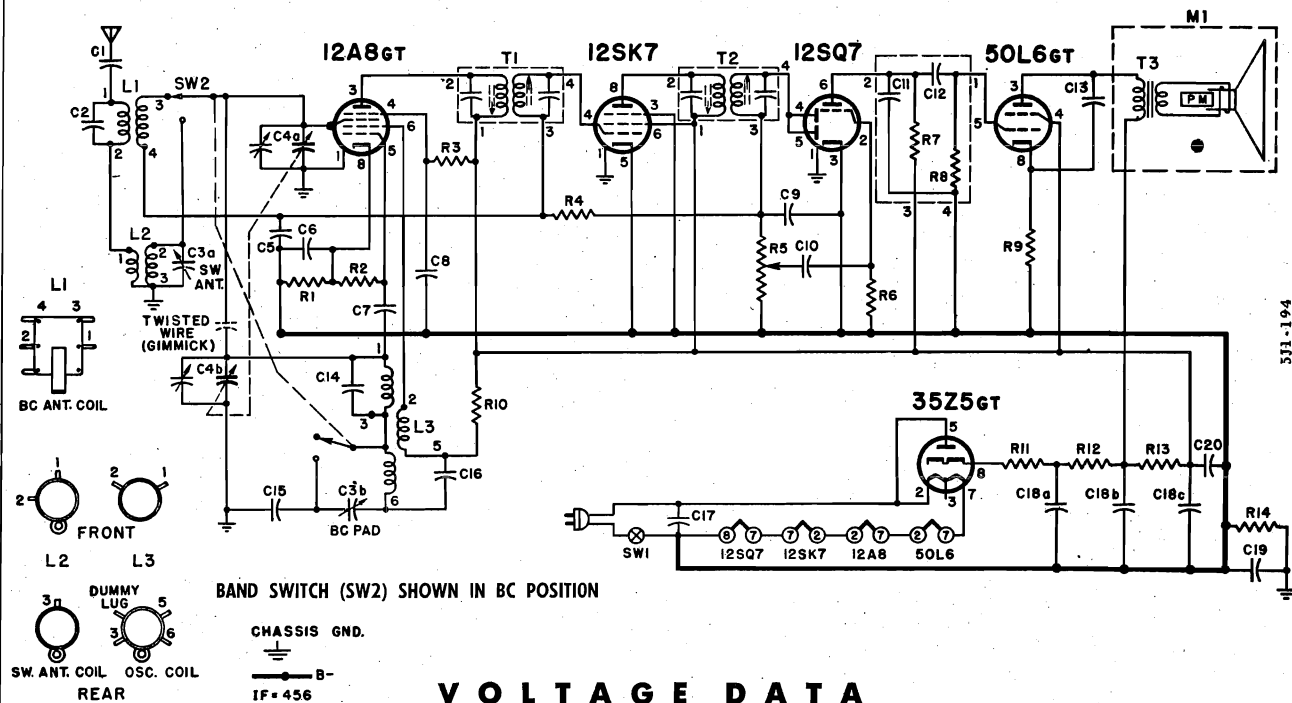
TUBE AND TRIMMER LOCATION



POINTER SETTING AND DIAL CORD STRINGING

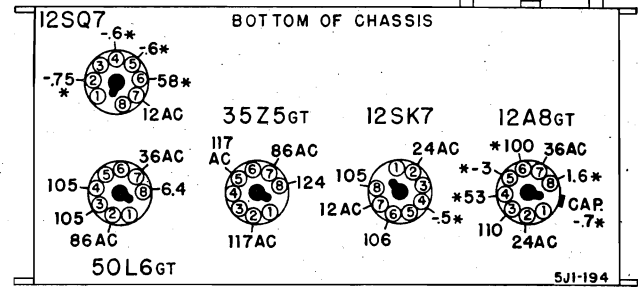


MODELS 5J12,
5J13, Ch. 5J1



VOLTAGE DATA

- All readings made between tube socket terminals and B minus (terminal of On-Off switch).
- Dial turned to low frequency end; volume control at minimum.
- Band switch set in "BC" position.
- Measured on 117 Volts AC line. When measured from DC line, voltages may be slightly lower.
- Voltages measured with Vacuum Tube Voltmeter. Readings taken with a 1,000 ohm per volt meter will be approximately the same except for those marked with an asterisk * in the voltage chart; these readings will either be lower or practically zero.



* If taken with a 1000 ohm-per-volt meter, readings will either be lower or practically zero.

RESISTORS

| Symbol | Description | Part No. |
|--------|-------------------------|-----------|
| R1 | 330 ohms, 1/2 Watt | 60B 8-331 |
| R2 | 47,000 Ohms, 1/2 Watt | 60B 8-473 |
| R3 | 39,000 ohms, 1/2 Watt | 60B 8-393 |
| R4 | 2.2 Megohms, 1/2 Watt | 60B 8-225 |
| R5 | 1 Megohm Volume Control | 75B 1-25 |
| R6 | 4.7 Megohms, 1/2 Watt | 60B 8-475 |
| *R7 | 470,000 ohms, 1/2 Watt | |
| *R8 | 470,000 ohms, 1/2 Watt | |
| R9 | 220 ohms, 1/2 Watt | 60B 8-221 |
| R10 | 3,300 ohms, 1/2 Watt | 60B 8-332 |
| R11 | 33 ohms, 1 Watt | 60B 28-3 |
| R12 | 150 ohms, 1 Watt | 60B 28-1 |
| R13 | 1,000 ohms, 1 Watt | 60B 28-2 |
| R14 | 150,000 ohms, 1/2 Watt | 60B 8-154 |

CONDENSERS

| Symbol | Description | Part No. |
|--------|------------------------------|------------------------|
| C1 | .001 mfd., 400 Volts, Paper | 65A 2-6 |
| C2 | 50 mmfd., Mica | 65B 5-11 |
| C3a | 3 to 30 mmfd. | Dual Trimmer. 66A 23-4 |
| C3b | 450 to 510 mmfd. | |
| C4a | 0 to 420 mmfd. | |
| C4b | 0 to 420 mmfd. | |
| | Dial drum spotwelded to gang | 68B 22 |
| C5 | .05 mfd., 400 Volts, Paper | 65A 2-9 |

| Symbol | Description | Part No. |
|--------|----------------------------------------------|--------------|
| C6 | .05 mfd., 400 Volts, Paper | 65A 2-9 |
| C7 | 100 mmfd., 10%, -00075 Temp. Coeff., Ceramic | 65B 6-19 |
| C8 | .05 mfd., 400 Volts, Paper | 65A 2-9 |
| C9 | 250 mmfd., Ceramic | 65B 6-5 |
| C10 | .01 mfd., 400 Volts, Paper | 65A 2-18 |
| *C11 | 250 mmfd., 500 Volts | |
| *C12 | .01 mfd., 400 Volts | |
| C13 | .01 mfd., 400 Volts, Paper | 65A 2-18 |
| C14 | 10 mmfd., 10%, Zero Temp. Coeff., Ceramic | 65B 6-44 |
| C15 | .003 mfd., 3%, Silver Mica | 65B 1-6 |
| C16 | .005 mfd. min., Ceramic Disc | 65A 10-1 |
| C17 | .05 mfd., 400 Volts, Paper | 65A 2-9 |
| C18a | 30 mfd., 150 Volts | Elect. 67A 8 |
| C18b | 30 mfd., 150 Volts | |
| C18c | 20 mfd., 150 Volts | |
| C19 | .18 mfd., 200 Volts, Paper | 65A 2-27 |
| C20 | .05 mfd., 400 Volts, Paper | 65A 2-9 |

COILS, TRANSFORMERS, ETC.

| Symbol | Description | Part No. |
|--------|----------------------------|----------|
| L1 | Coil, Antenna BC | 69A 74 |
| L2 | Coil, Antenna SW | 69A 75 |
| L3 | Coil, Oscillator BC and SW | 69A 76 |
| T1 | Transformer, 1st IF | 72B 50 |
| T2 | Transformer, 2nd IF | 72B 51 |

| Symbol | Description | Part No. |
|--------|-----------------------------------|------------|
| T3 | Transformer, Output | 98A 4 |
| SW1 | Switch, On-Off | Part of R5 |
| SW2 | Switch, Band | 77B 1-12 |
| MI | Speaker (5" PM) and Output Trans. | 78B 26-1 |
| | *Couplate | 63A 5-1 |

MISCELLANEOUS

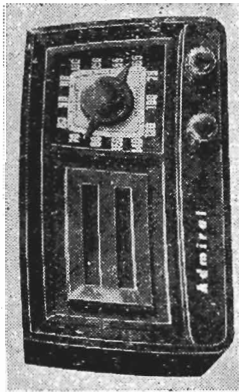
| Description | Part No. |
|---------------------------------------|-------------|
| Antenna Hank (20") | 89A 4-2 |
| Cabinet | |
| Mahogany (5J12) | 34D 22-6 |
| Ivory (5J13) | 34D 22-7 |
| Carton and Fillers | 44B 110 |
| Dial Cord | 50A 1-3 |
| Felt Washer (Knob) | 5A 4-3 |
| Felt Washer (Pointer) | 5A 4-8 |
| Knob | |
| Ivory | 33A 32-5 |
| Walnut | 33A 32-4 |
| Pointer | |
| Ivory | 25A 31-2 |
| Walnut | 25A 31-1 |
| Ring, Pointer Compression | 19A 31-1 |
| Shaft, Tuning | 28A 26-1 |
| Spacer, Tuning Shaft | 29A 2-7-21 |
| Speed Nut, Tuning Shaft | 2B 10-19-59 |
| Spring, Dial Cord Tension | 19B 1-2 |
| Washer, "C" (Tuning Shaft) | 4A 4-6-0 |
| Washer, Spring (Tuning Shaft) | 4A 6-3-0 |
| Resistance Cord, for 220 V. operation | |
| With American Male Plug | 89A 14 |
| With Continental Male Plug | 89A 14-1 |

* C11, C12, R7, and R8 are contained in a multiple-unit component called a couplate (part number 63A5-1). Although a defective section of the couplate can sometimes be replaced by individual components, we strongly recommend replacing the entire couplate. Note that numerals 1, 2, 3, 4, shown at schematic connections correspond to couplate lead numbers printed on face of couplate.

VOLTAGE DATA

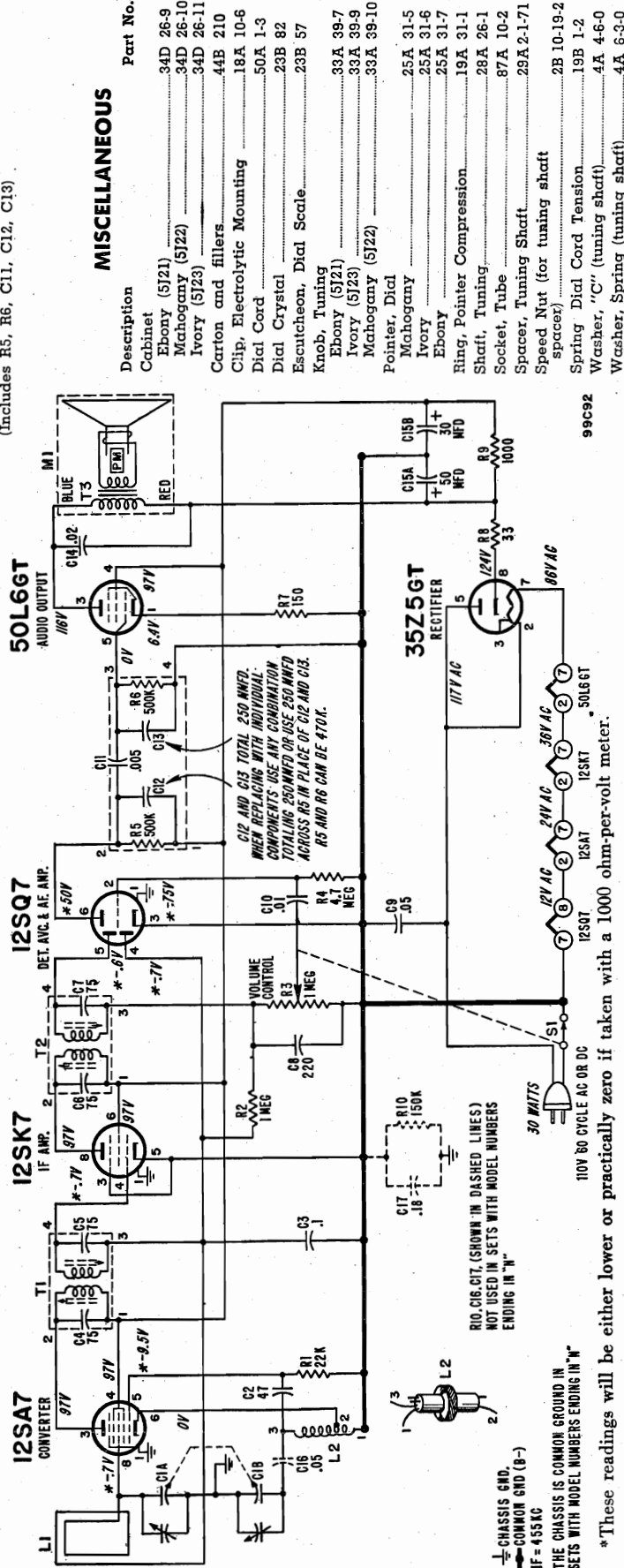
Voltages shown on schematic diagram.

- All readings made between tube socket terminals and B minus (terminal of On-Off switch).
- Dial turned to low frequency end; volume control at minimum.
- Measured on 117 Volts AC line.
- Voltages measured with Vacuum Tube Voltmeter.



COILS, TRANSFORMERS, Etc.

- L1 Antenna Loop 69C 60 (mounted on cardboard back)
- L2 Coil, Oscillator 69A 20-2
- T1 Transformer, 1st I.F. 72B 50
- T2 Transformer, 2nd I.F. 72B 51
- T3 Transformer, Output 98A 4
- S1 Switch, On-Off 78B 26-1
- †Part of R3 63A 5-4
- †Cuplate (includes R5, R6, C11, C12, C13)



MISCELLANEOUS

- | Description | Part No. |
|-------------------------------------|------------|
| Cabinet | 34D 26-9 |
| Ebony (5J21) | 34D 26-10 |
| Mahogany (5J22) | 34D 26-11 |
| Ivory (5J23) | 44B 210 |
| Carton and fillers | 18A 10-6 |
| Clip, Electrolytic Mounting | 50A 1-3 |
| Dial Cord | 23B 82 |
| Dial Crystal | 23B 82 |
| Escutcheon, Dial Scale | 23B 57 |
| Knob, Tuning | 33A 39-7 |
| Ebony (5J21) | 33A 39-9 |
| Ivory (5J23) | 33A 39-10 |
| Mahogany (5J22) | 25A 31-5 |
| Pointer, Dial | 25A 31-6 |
| Mahogany | 25A 31-7 |
| Ivory | 19A 31-1 |
| Ring, Pointer Compression | 28A 26-1 |
| Shaft, Tuning | 87A 10-2 |
| Socket, Tube | 29A 2-1-71 |
| Spacer, Tuning Shaft | 2B 10-19-2 |
| Speed Nut (for tuning shaft spacer) | 19B 1-2 |
| Spring Dial Cord Tension | 4A 4-6-0 |
| Washer, "C" (tuning shaft) | 4A 6-3-0 |
| Washer, Spring (tuning shaft) | 4A 6-3-0 |

CONDENSERS

- | Symbol | Description | Part No. |
|--------|---------------------------------|---------------------------------|
| C1a | Ant., 420 mmfd., max. | 65C 6-80 |
| C1b | Osc., 108 mmfd., max. | 64B 1-22 |
| C2 | (Dial drum spot welded to gang) | 64B 1-25 |
| C3 | 47 mmfd., ceramic | †C11 .005 mfd., 400 volts |
| C4 | .1 mfd., 200 volts, paper | †C12 .05 mfd., 400 volts |
| C5 | 75 mmfd., 3% | †C13 .65C 6-79 |
| C6 | 75 mmfd., 3% | †C14 .02 mfd., 400 volts, paper |
| C7 | 75 mmfd., 3% | †C15a 50 mfd., 150 volts elect. |
| | | †C15b 30 mfd., 150 volts |
| | | †C16 .05 mfd., 400 volts, paper |
| | | †C17 .18 mfd., 200 volts, paper |
- †Part of couplet (part 63A 5-4). Replace with exact duplicate or individual components. Note that numbers 1, 2, 3, 4, on schematic correspond to couplet lead numbers printed on face of couplet 63A 5-4.

RESISTORS

- | Symbol | Description | Part No. |
|--------|-----------------------------------------------|-----------|
| R1 | 22,000 ohms, 1/2 watt | 60B 8-223 |
| R2 | 1 megohm, 1/2 watt | 60B 8-105 |
| R3 | 1 megohm, Volume Control and On-Off switch S1 | 75B 1-25 |
| R4 | 4.7 megohms, 1/2 watt | 60B 8-475 |
| R5 | 500,000 ohms, 1/2 watt | 60B 8-151 |
| R6 | 500,000 ohms, 1/2 watt | 60B 8-154 |
| R7 | 150 ohms, 1/2 watt | 60B 28-3 |
| R8 | 33 ohms, 1 watt | 60B 28-2 |
| R9 | 1,000 ohms, 1 watt | 60B 28-2 |
| R10 | 150,000 ohms, 1/2 watt | 60B 8-154 |
- R10 not used in sets with model numbers ending in "N".

*These readings will be either lower or practically zero if taken with a 1000 ohm-per-volt meter.

MODELS 5J21, 5J22,
5J23, Ch. 5J2

ALIGNMENT PROCEDURE

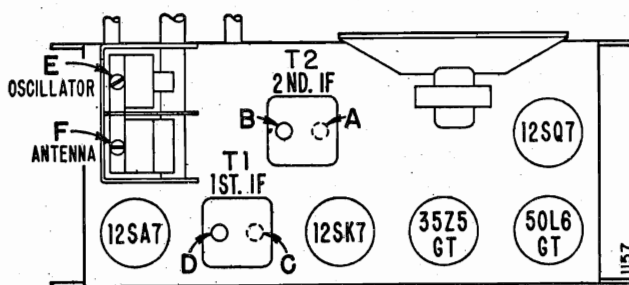
- Connect output meter across speaker voice coil.
- Turn receiver volume control full on.
- Use an isolation transformer if available, otherwise connect a .1 mfd. condenser in series with low side of signal generator and connect to chassis.
- Caution: Do not connect a ground wire directly to chassis.
- Use lowest output setting of signal generator capable of producing adequate output meter indication and then proceed as outlined in chart below.
- Repeat adjustments to insure good results.

| Step | Dummy Antenna in Series with Signal Generator | Connection of Signal Generator (High Side) | Signal Generator Frequency | Receiver Gang Setting | Trimmer Description | Trimmer Designation | Type of Adjustment |
|------|----------------------------------------------------------------------------------------------------------|--------------------------------------------|----------------------------|--------------------------|----------------------|---------------------|--------------------|
| 1 | 250 mmfd. condenser | Antenna stator of tuning condenser | 455 KC | Gang fully open | 2nd IF 1st IF | *A, B *C, D | Maximum Output |
| 2 | 250 mmfd. condenser | Antenna stator of tuning condenser | 1620 KC | Gang fully open | Oscillator (on gang) | E | Maximum Output |
| 3 | Loop of several turns of wire or place generator lead close to receiver loop for adequate signal pickup. | No actual connection (signal by radiation) | 1400 KC | Tune in generator signal | Antenna (on gang) | F | Maximum Output |
| 4 | Mount and set dial pointer as shown in Pointer Setting and Dial Cord Stringing Diagram. | | | | | | |

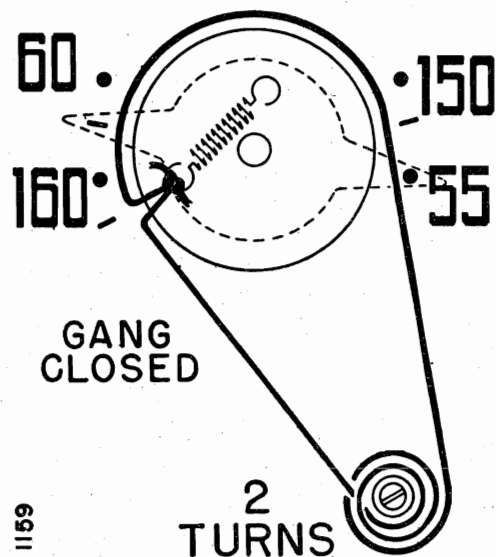
*Adjustments A and C made from the underside of the chassis. If IF transformers have hollow core slugs, these adjustments may all be made from the top of chassis, if you use alignment tool #98A30-7 obtainable from your Admiral distributor. The bottom IF slug adjustment may be reached through the hollow core in the upper slug.

TUBE AND TRIMMER LOCATION

POINTER SETTING AND DIAL CORD STRINGING

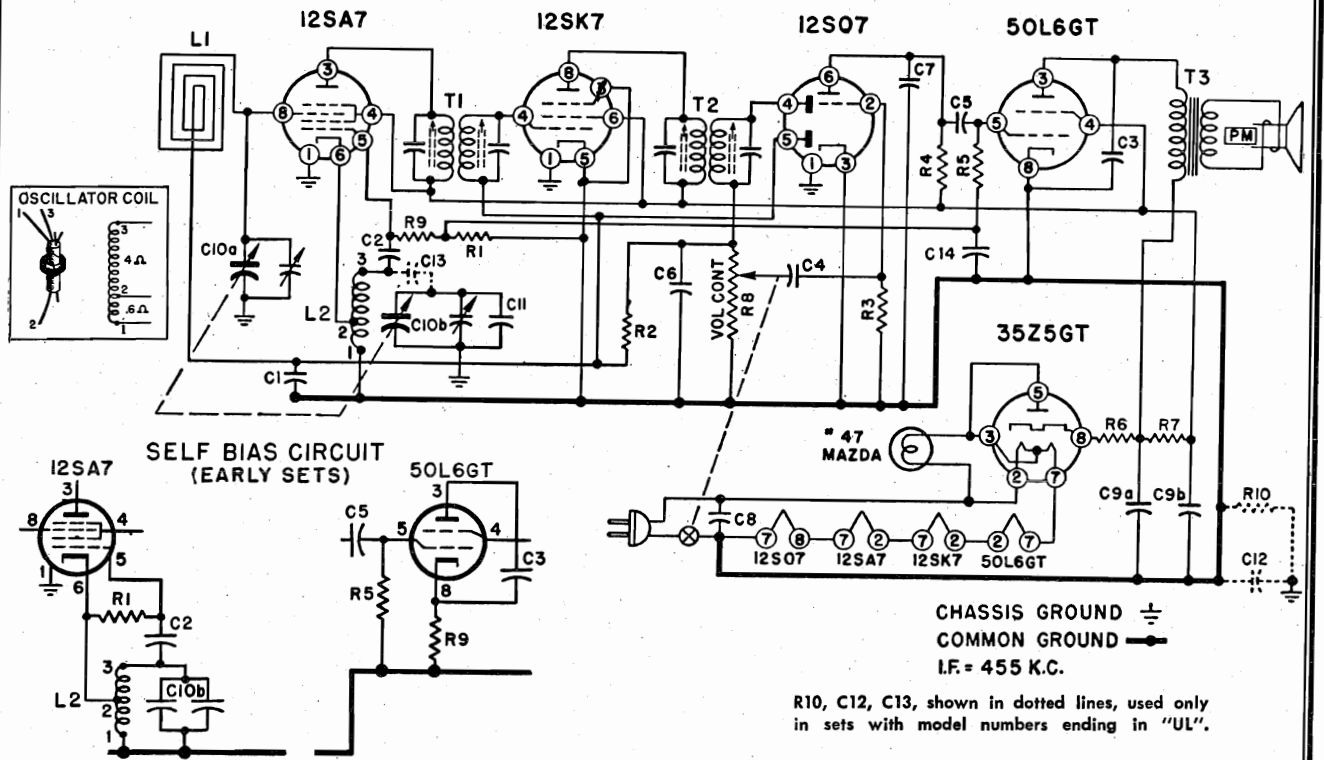


Adjustments A and C are made from underside of chassis.



1159

MODELS 5K11, 5K12, 5K13,
5K14; 7T10, 7T14, 7T15,
Rev.; Ch. 5K1



Loctal tubes 14B6, 50A5, 35Y4 used as alternates for 12SQ7,
50L6, 35Z5 respectively. See tube manual for pin numbers.

ALIGNMENT PROCEDURE

1. Check pointer setting: With gang closed, the pointer should be horizontal.
2. Connect Output Meter across Voice Coil.
3. Turn Receiver Volume Control full on.
4. Use lowest Output setting of Signal Generator capable of producing adequate Output Meter indication and then proceed as outlined in chart below.
5. Repeat adjustments to insure good results.

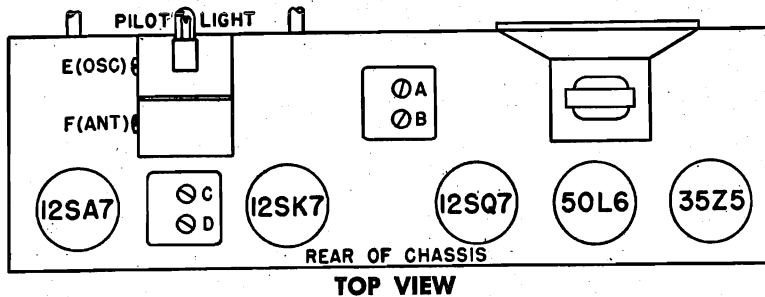
| Connect Signal Generator to— | Dummy Antenna Between Radio and Generator | Set Generator Frequency to— | Set Receiver Dial Frequency to— | Adjust Following Trimmers | Type of Adjustment |
|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------|-----------------------------|---------------------------------|----------------------------------------------------|--------------------------------|
| Tuning Condenser Antenna Stator | 250 mmfd. Condenser | 455 K.C. | High frequency end of Dial | A-B—2nd I. F. C-D—1st I. F. (See note below) | Adjust to maximum Output |
| Tuning Condenser Antenna Stator | 250 mmfd. Condenser | 1630 K.C. | High frequency end of Dial | E—Osc. | Adjust to maximum Output |
| Loop radiator (or place lead from generator close to loop of set to obtain adequate signal). | No actual connec- tion between set and generator. | 1400 K.C. | Tune in generator signal | F—Ant. | Adjust to maximum Output |

Note: In some sets, the B and D adjustments must be made from the underside of the chassis.

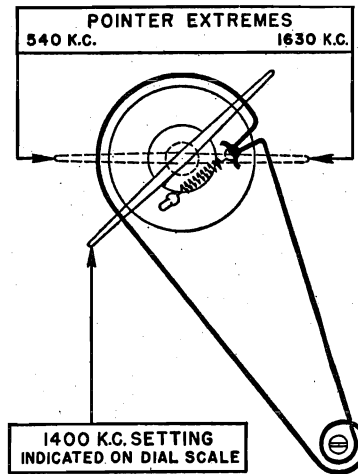
MODELS 5K11, 5K12, 5K13,
5K14; 7T10, 7T14, 7T15,
Rev.; Ch. 5K1

TUBE AND TRIMMER LOCATION

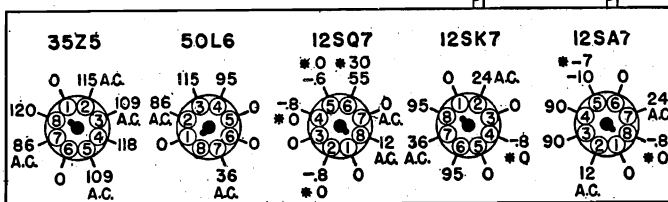
Loctal tubes 14B6, 50A5, 35Y4 used as alternates for 12SQ7,
50L6, 35Z5 respectively. See tube manual for pin numbers.



DIAL CORD STRINGING



VOLTAGE DATA



*Indicates second reading taken with 1000 ohm-per-volt meter.

- All readings made between tube socket terminals and B minus (Terminal of on-off switch).
- Voltages measured on a 117 Volt A.C. line.
- Dial turned to low frequency end, no signal.
- Voltages measured with a vacuum-tube voltmeter. A second voltage reading (marked with an asterisk *) indicates readings made with a 1000 ohm-per-volt meter when use of this instrument would result in appreciably lower readings.

RESISTORS

| Symbol | Description | Part No. |
|--------|------------------------------------|-----------|
| R1 | 12,000 ohms, 1/2 watt | 6088-123 |
| R2 | 1 Megohm, 1/2 Watt | 608 8-105 |
| R3 | 4.7 Megohms, 1/2 Watt | 608 8-475 |
| R4 | 470,000 Ohms, 1/2 Watt | 6088-474 |
| R5 | 150,000 Ohms, 1/2 watt | 6088-154 |
| R6 | 33 Ohms, 1 Watt | 60B 28-3 |
| R7 | 1000 Ohms, 1 Watt | 60B 28-2 |
| R8 | 1 Megohm Volume Control and Switch | 75B 1-16 |
| R9 | 12,000 Ohms, 1/2 watt | 6088-123 |
| R10 | 150,000 Ohms, 1/2 watt | 60B 8-154 |

(R10 used only in sets with model numbers ending in "UL")

R1 was 22,000, R5 was 470,000 and R9 was 150 ohms when self-bias circuit was employed. See schematic inset.

CONDENSERS

| | | |
|------|----------------------------|----------|
| C1 | .1 mfd., 200 Volts, Paper | 64B 1-30 |
| C2 | 50 mmfd., ±20%, Ceramic | 65B 6-4 |
| C3 | .02 mfd., 400 Volts, Paper | 64B 1-24 |
| C4 | .01 mfd., 400 Volts, Paper | 64B 1-25 |
| C5 | .01 mfd., 400 Volts, Paper | 64B 1-25 |
| C6 | 250 mmfd., ±20%, Ceramic | 65B 6-5 |
| C7 | 500 mmfd., ±20%, Ceramic | 65B 6-6 |
| C8 | .05 mfd., 400 Volts, Paper | 64B 1-22 |
| C9a | 50 mfd., 150 Volts Elec. | 67A 10 |
| C9b | 30 mfd., 150 Volts | |
| C10a | O-420 mmfd Stamped | A1460 |
| C10b | O-162 mmfd | 68B5 |
| | or | |
| | O-420 mmfd Stamped | 68B19 |
| | O-108 mmfd | 68B19 |

(Drums are spotwelded to gangs.)

C11..... 20 mmfd., ±20%, Ceramic.....65B 6-26
(Used in early sets only.)

CONDENSERS

| Symbol | Description | Part No. |
|--------|----------------------------|----------|
| C12 | .18 mfd., 200 Volts, paper | 64A2-2 |
| C13 | .05 mfd., 400 Volts, paper | 64B1-22 |

(C12 and C13 used only in sets with model numbers ending in "UL")

C14.....500 mmfd., ±20%, Ceramic.....65B6-6
(Added in later production to prevent R.F. oscillation.)

COILS, TRANSFORMERS, ETC.

| | | |
|-----|-----------------------------------------------------------------------------------|------------|
| L1 | Antenna, Loop | 69C 19 |
| L2 | Coil, Oscillator for gang stamped 68B5 | 69A20 |
| | for gang stamped 68B19 | 69A20-2 |
| T1 | Transformer, 1st I.F. | 72B50 |
| | Alternates 72B31 and 72B33 also used. Order part number stamped on original part. | |
| T2 | Transformer, 2nd I.F. | 72B51 |
| | Alternates 72B32 and 72B34 also used. Order part number stamped on original part. | |
| T3 | Transformer, Output | 98A 4 |
| | Speaker (5" PM) and Output Transformer | 78B 26-1 |
| SW1 | Switch, On-Off | Part of R8 |

MISCELLANEOUS

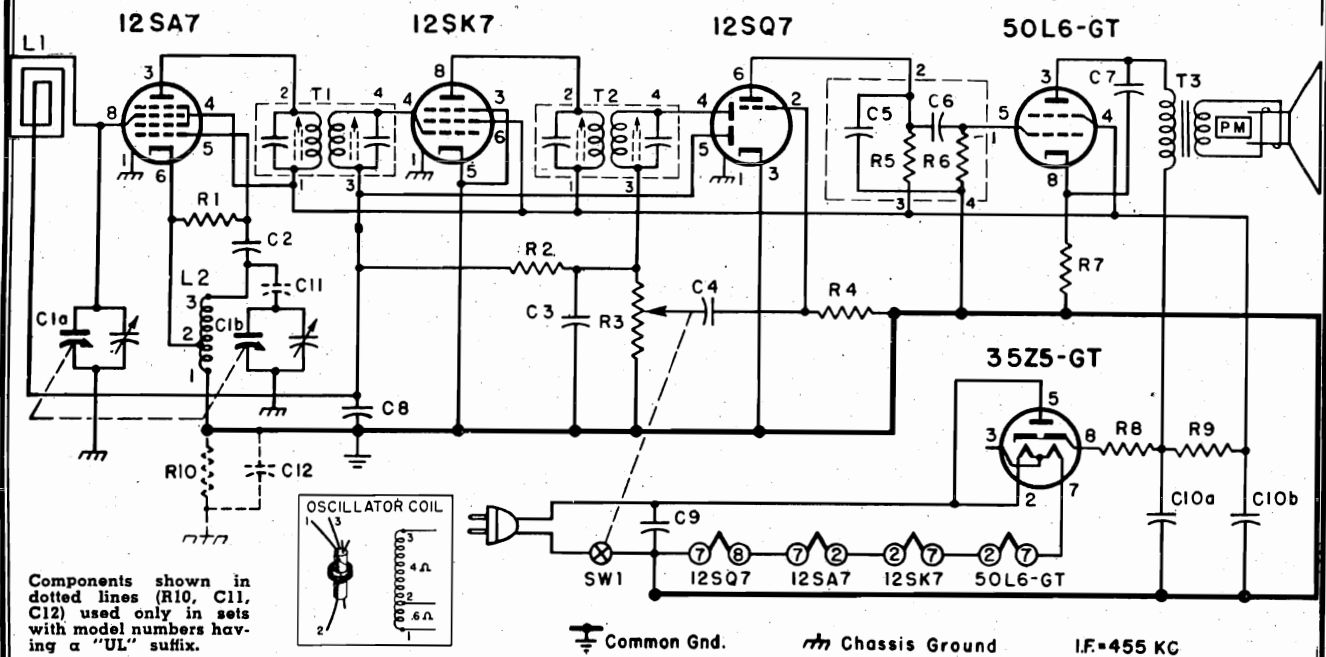
| | | |
|--------------------------------|----------|--|
| Cabinet | | |
| Plastic Ebony (7T10E) | 34D 14-1 | |
| Plastic Mahogany (7T10M) | 34D 14-2 | |
| Plastic Ivory (7T10C) | 34D 14-3 | |
| Wood (7T15) | * | |
| Plastic Ebony (5K11) | 34D 18-1 | |
| Plastic Mahogany (5K12) | 34D 18-2 | |
| Plastic Ivory (5K13) | 34D 18-3 | |
| Plastic Mahogany & Gold (5K14) | 34D 18-4 | |

MISCELLANEOUS

| Description | Part No. |
|-------------------------------------|------------|
| Carton and Fillers | 44B 98 |
| Dial Background | 15B 180 |
| Dial Cord | 50A 1-3 |
| Dial Crystal for 7T10, 7T14, 7T15 | 24A 4 |
| for 5K11, 5K12, 5K13, 5K14 | 24A 8 |
| Dial Drum | See C10 |
| Dial Light (#47 Mazda) | 81A 1-8 |
| Dial Light Socket and Leads | 82A 7-2 |
| Dial Scale | 21B 39-1 |
| Knob | |
| Plastic Ebony (7T10E) | 33A 18-6 |
| Plastic Mahogany (7T10M) | 33A 18-4 |
| Plastic Ivory (7T10C) | 33A 18-5 |
| Plastic Ebony (5K11) | 33A 32-3 |
| Plastic Mahogany (5K12) | 33A 32-1 |
| Plastic Mahogany & Gold (5K14) | 33A 32-7 |
| Plastic Ivory (5K13) | 33A 32-2 |
| Pointer, for 7T10, 7T14, 7T15 | 25A 26 |
| Pointer, for 5K11, 5K12, 5K13, 5K14 | |
| Brown | 25A 30-1 |
| Brown and Gold | 25A 30-2 |
| Shaft, Tuning | 28A 11-3 |
| Snap, Buttons (For dial scale) | 13A 1-3-47 |
| Snap Button, for dial crystal | 13A 1-1-47 |
| Snap Ring (For pointer) | 19A 31-1 |
| Socket, Tube | 87A 10-2 |
| Spring, Tension | 19B 1-2 |
| Washer, 'C' (for tuning shaft) | 4A 4-1 |
| Washer, Felt (for knobs) | 5A 4-3 |
| Washer, Fibre | 5A 2-1 |
| Washer, Spring (for tuning shaft) | 4A 6-3-0 |

*No longer available. Order plastic cabinet.

MODELS 5R10, 5R11,
5R12, 5R13, 5R14,
Ch. 5R1



5R1-143

ALIGNMENT PROCEDURE

- Connect output meter across voice coil.
- Turn receiver volume control full on.
- Use an isolation transformer if available, otherwise connect a .1 mfd. condenser in series with low side of signal generator and attach to B minus of chassis.
- Use lowest output setting of signal generator capable of producing adequate output meter indication and then proceed as outlined in chart below.
- Repeat adjustments to insure good results.

NOTE

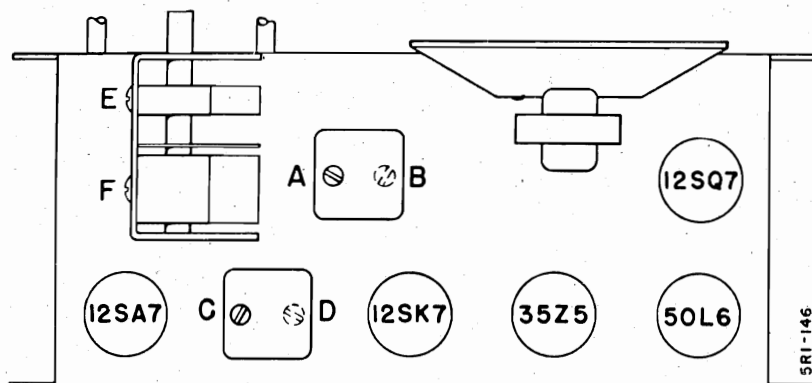
To avoid splitting the slotted head of powdered iron core tuning slugs in I.F. transformers, use an alignment tool having a blade 1/8" wide.

| Step | Dummy Antenna in Series with Signal Generator | Connection of Signal Generator (High Side) | Signal Generator Frequency | Receiver Gang Setting | Trimmer Description | Trimmer Designation | Type of Adjustment |
|------|----------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|----------------------------|--------------------------|-------------------------|---------------------|--------------------|
| 1 | 250 mmfd. condenser | Tuning condenser Antenna stator | 455 KC | Gang fully open | 2nd IF 1st IF | A, B C, D | Maximum Output |
| 2 | 250 mmfd. condenser | Tuning condenser Antenna stator | 1620 KC | Gang fully open | Oscillator (on gang) | E | Maximum Output |
| 3 | Loop of several turns of wire (or place generator lead close to receiver loop for adequate signal) | No physical connection (signal by radiation) | 1400 KC | Tune in generator signal | Antenna (on gang) | F | Maximum Output |
| 4 | Upon completion of alignment, install chassis in cabinet. Mount and set dial pointer as shown in Dial Stringing and Pointer Setting Diagram. | | | | | | |

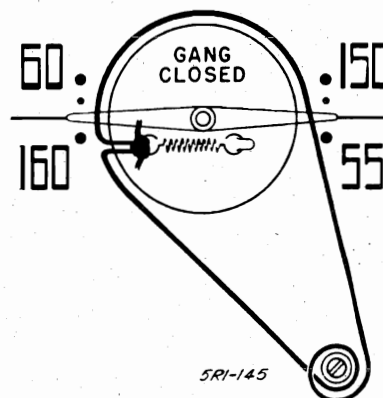
NOTE: Adjustments B and D are made from underside of chassis.

MODELS 5R10, 5R11,
5R12, 5R13, 5R14,
Ch. 5R1

TUBE AND TRIMMER LOCATION

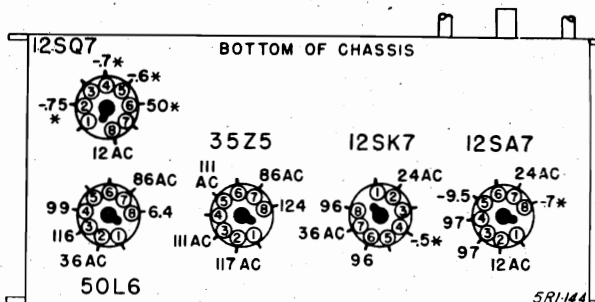


POINTER SETTING AND
DIAL CORD STRINGING



VOLTAGE DATA

- All readings made between tube socket terminals and B minus (terminal of On-Off switch).
- Dial turned to low frequency end; volume control at minimum.
- Measured on 117 Volts AC line. When measured from DC line, voltages may be slightly lower.
- Voltages measured with Vacuum Tube Voltmeter. Readings taken with a 1,000 ohm per volt meter will be approximately the same except for those marked with an asterisk * in the voltage chart; these readings will either be lower or practically zero.



RESISTORS

| Symbol | Description | Part No. |
|--------|-----------------------------------------------|-----------|
| R1 | 22,000 Ohms, 1/2 Watt | 60B 8-223 |
| R2 | 1 Megohm, 1/2 Watt | 60B 8-105 |
| R3 | 1 Megohm Volume Control and On-Off switch SW1 | 75B 1-25 |
| R4 | 4.7 Megohms, 1/2 Watt | 60B 8-475 |
| *R5 | 470,000 Ohms, 1/2 Watt | 60B 8-151 |
| *R6 | 470,000 Ohms, 1/2 Watt | 60B 8-151 |
| R7 | 150 Ohms, 1/2 Watt | 60B 28-3 |
| R8 | 33 Ohms, 1 Watt | 60B 28-2 |
| R9 | 1,000 Ohms, 1 Watt | 60B 28-2 |
| R10 | 150,000 Ohms, 1/2 Watt | 60B 8-154 |

CONDENSERS

| | | |
|-----|--------------------------------------------|----------|
| C1a | Gang, 0 to 420 mmfd. | 68B 19 |
| C1b | Gang, 0 to 162 mmfd. (Spot welded to drum) | |
| C2 | 50 mmfd., Ceramic | 65B 6-4 |
| C3 | 250 mmfd., Ceramic | 65B 6-5 |
| C4 | .01 mfd., 400 Volts, Paper | 64B 1-25 |

COILS, TRANSFORMERS, Etc.

| Symbol | Description | Part No. |
|--------|----------------------------|---------------|
| *C5 | 250 mmfd., 500 Volts | |
| *C6 | .01 mfd., 400 Volts | |
| C7 | .02 mfd., 400 Volts, Paper | 64B 1-24 |
| C8 | .1 mfd., 200 Volts, Paper | 64B 1-30 |
| C9 | .05 mfd., 400 Volts, Paper | 64B 1-22 |
| C10a | 50 mfd., 150 Volts | Elect. 67A 10 |
| C10b | 30 mfd., 150 Volts | |
| C11 | .05 mfd., 400 Volts, Paper | 64B 1-22 |
| C12 | .18 mfd., 200 Volts, Paper | 64A 2-2 |

COILS, TRANSFORMERS, Etc.

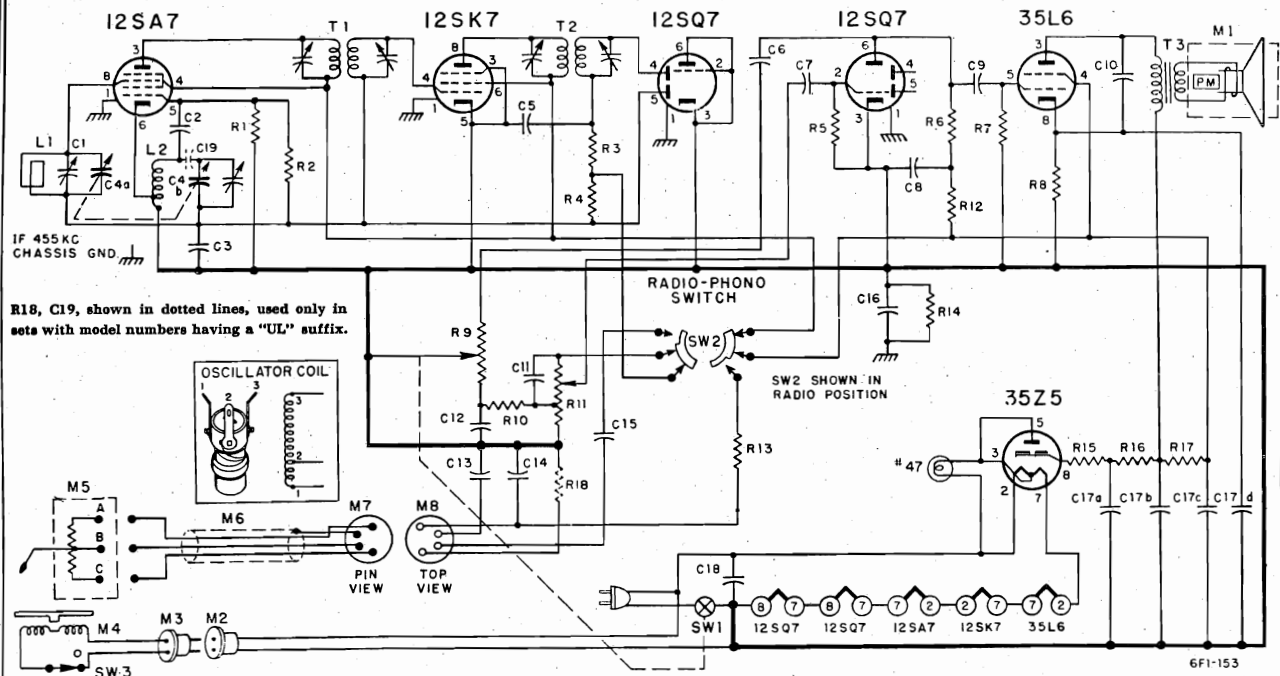
| | | |
|-----|-------------------------------------------|------------|
| L1 | Antenna, Loop (mounted on cardboard back) | 69C 60 |
| L2 | Coil, Oscillator | 69A 20-2 |
| T1 | Transformer, 1st I.F. | 72B 50 |
| T2 | Transformer, 2nd I.F. | 72B 51 |
| T3 | Transformer, Output | 98A 4 |
| | Speaker (5" PM) and Output Transformer | 78B 26-1 |
| SW1 | Switch, On-Off | Part of R3 |
| | *Couplate | 63A 5-1 |
| | (Includes R5, R6, C5, C6) | |

MISCELLANEOUS

| Description | Part No. |
|-------------------------------|----------|
| Cabinet | |
| Ebony | 34D 22-1 |
| Mahogany | 34D 22-2 |
| Ivory | 34D 22-3 |
| Walnut and Gold | 34D 22-4 |
| Cartons and fillers | 44B 110 |
| Dial Cord | 50A 1-3 |
| Felt Washer (Knob) | 5A 4-3 |
| Felt Washer (Pointer) | 5A 4-8 |
| Knob | |
| Ebony | 33A 32-6 |
| Ivory | 33A 32-5 |
| Walnut | 33A 32-4 |
| Walnut and Gold | 33A 32-7 |
| Pointer | |
| Ebony | 25A 31-3 |
| Ivory | 25A 31-2 |
| Walnut | 25A 31-1 |
| Ring, Pointer Compression | 19A 31-1 |
| Shaft, Tuning | 28A 26-1 |
| Spacer, Tuning Shaft | 29A 2-7 |
| Speed Nut, Tuning Shaft | 2B10-19 |
| Spring, Dial Cord Tension | 19B1-2 |
| Washer, "C" (tuning shaft) | 4A4-6-0 |
| Washer, Spring (tuning shaft) | 4A6-3-0 |

* C5, C6, R5, and R6 are contained in a multiple-unit component called a couplate (part number 63A5-1). Although a defective section of the couplate can sometimes be replaced by individual components, we strongly recommend replacing the entire couplate.
Note that numerals 1, 2, 3, 4, shown at schematic connections correspond to couplate lead numbers printed on face of couplate.

MODELS 6F10, 6F11,
6F12, Ch. 6F1



ALIGNMENT PROCEDURE

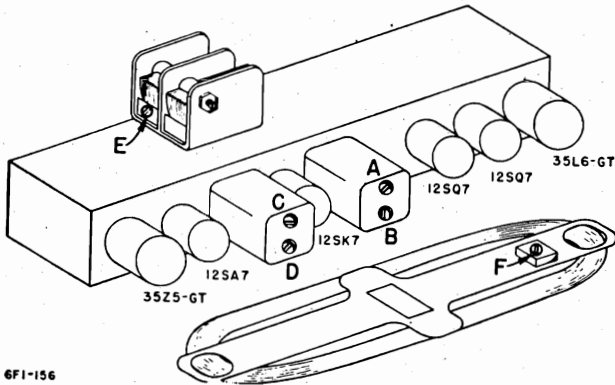
- Check pointer position. With tuning gang closed, the tip of the pointer clip should be over the 1/16" circular punch at the extreme left end of the dial background (see stringing diagram).
- Connect output meter across voice coil.
- Turn receiver volume control full on; set tone control at full treble.
- Loop antenna must be connected and placed in the same relative position to the chassis as when in cabinet.
- Use an isolation transformer if available, otherwise connect a .1 mfd. condenser in series with low side of signal generator and attach to B minus of chassis.
- Use lowest output setting of signal generator capable of producing adequate output meter indication and proceed in the following sequence.
- Repeat adjustments to insure good results.

| Step | Dummy Antenna in Series with Signal Generator | Connection of Signal Generator (High Side) | Signal Generator Frequency | Receiver Gang Setting | Trimmer Description | Trimmer Designation | Type of Adjustment |
|------|----------------------------------------------------------------------------------------------------|----------------------------------------------|----------------------------|--------------------------|---------------------|-----------------------|--------------------|
| 1 | 250 mmfd. condenser | Tuning condenser, antenna stator | 455 KC | Gang fully open | 2nd IF 1st IF | A, B C, D | Maximum output |
| 2 | 250 mmfd. condenser | Tuning condenser, antenna stator | 1630 KC | Gang fully open | Oscillator | E | Maximum output |
| 3 | Loop of several turns of wire, or place generator lead close to receiver loop for adequate signal. | No physical connection (signal by radiation) | 1400 KC | Tune in generator signal | Antenna | F (see note below) | Maximum output |

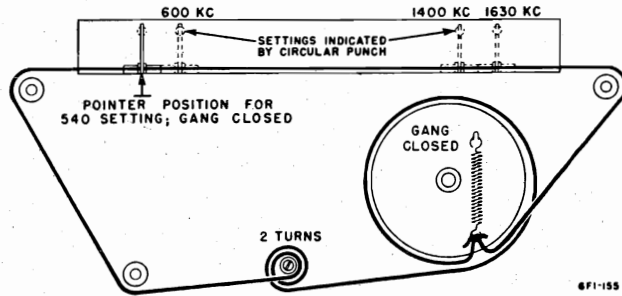
NOTE: Antenna Trimmer "F" must be aligned after chassis and loop are mounted in cabinet. Loop trimmer adjustment is located at the rear of the cabinet.

MODELS 6F10, 6F11,
6F12, Ch. 6F1

TUBE AND TRIMMER LOCATION



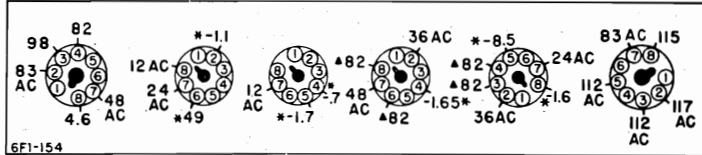
DIAL STRINGING AND POINTER SETTING



With the gang fully closed, the tip of the pointer clip should be in line with the 1/16" circular punch at the extreme left end of the dial background.

VOLTAGE DATA

35L6-GT 12SQ7 12SQ7 12SK7 12SA7 35Z5-GT



* If taken with a 1000 ohm-per-volt meter, readings will be lower or practically zero.
▲ On "Phono" these voltages will be zero. All other DC readings may be slightly higher.

- All readings made between tube socket terminals and B minus (terminal of On-Off switch).
- Switch in "Radio" position.
- Measured on 117 Volt AC line.
- Volume control minimum; dial turned to low frequency end.
- Voltages measured with Vacuum Tube Voltmeter. Readings taken with a 1000 ohm-per-volt meter will be approximately the same except for those marked with an asterisk * in the voltage chart; these readings will either be lower or practically zero.

RESISTORS

| Symbol | Description | Part No. |
|--------|----------------------------------------------|------------|
| R1 | 22,000 Ohms, 1/2 Watt | 60B 8-223 |
| R2 | 10 Megohms, 1/2 Watt | 60B 8-106 |
| R3 | 100,000 Ohms, 1/2 Watt | 60B 8-104 |
| R4 | 1 Megohm, 1/2 Watt | 60B 8-105 |
| R5 | 4.7 Megohms, 1/2 Watt | 60B 8-475 |
| R6 | 470,000 Ohms, 1/2 Watt | 60B 8-474 |
| R7 | 470,000 Ohms, 1/2 Watt | 60B 8-474 |
| R8 | 150 Ohms, 1/2 Watt | 60B 14-151 |
| R9 | 2 Megohms Tone Control and On-Off Switch SW1 | 75B 1-12 |
| R10 | 27,000 Ohms, 1/2 Watt | 60B 8-273 |
| R11 | 1 Megohm Volume Control | 75B 2-6 |
| R12 | 47,000 Ohms, 1/2 Watt | 60B 8-473 |
| R13 | 22,000 Ohms, 1/2 Watt | 60B 8-223 |
| R14 | 150,000 Ohms, 1/2 Watt | 60B 8-154 |
| R15 | 33 Ohms, 1 Watt | 60B 28-3 |
| R16 | 220 Ohms, 1 Watt | 60B 28-7 |
| R17 | 1,000 Ohms, 1 Watt | 60B 28-2 |
| R18 | 33,000 Ohms, 1/2 Watt | 60B 8-333 |

(R18 used only in sets with model numbers having a "UL" suffix)

CONDENSERS

| | | |
|-----|-----------------------------------|------------|
| C1 | Trimmer, 3 to 30 mmfd. | Part of L1 |
| C2 | 50 mmfd., Ceramic | 65B 6-4 |
| C3 | .1 mmfd., 200 Volts, Paper | 64B 1-30 |
| C4a | Gang-0 to 420 mmfd. | A1654 |
| | Gang-0 to 162 mmfd. | |
| C4b | (This gang stamped 68B5 or 68B20) | OR |
| | Gang-0 to 420 mmfd. | |
| C4b | Gang-0 to 108 mmfd. | A1726 |
| | Gang-0 to 108 mmfd. | |

(This gang stamped 68B20-1)
Note—Gang spot welded to dial drum.

| | | |
|-----|-----------------------------|----------|
| C5 | 250 mmfd., Ceramic | 65B 6-5 |
| C6 | .002 mfd., 600 Volts, Paper | 64B 1-14 |
| C7 | .01 mfd., 400 Volts, Paper | 64B 1-25 |
| C8 | .1 mfd., 200 Volts, Paper | 64B 1-30 |
| C9 | .01 mfd., 400 Volts, Paper | 64B 1-25 |
| C10 | .03 mfd., 400 Volts, Paper | 64B 1-23 |
| C11 | 500 mmfd., Ceramic | 65B 6-6 |
| C12 | .01 mfd., 400 Volts, Paper | 64B 1-25 |
| C13 | .05 mfd., 400 Volts, Paper | 64B 1-22 |
| C14 | .18 mfd. 200 Volts, Paper | 64A 2-2 |

COILS, TRANSFORMERS, Etc.

| Symbol | Description | Part No. |
|--------|-----------------------------|-----------------|
| C15 | .001 mfd., 600 Volts, Paper | 64B 1-15 |
| C16 | .18 mfd., 200 Volts, Paper | 64A 2-2 |
| C17a | 30 mfd., 150 Volts | Elect. 67A 1-41 |
| C17b | 30 mfd., 150 Volts | |
| C17c | 20 mfd., 150 Volts | |
| C17d | 20 mfd., 25 Volts | |
| C18 | .05 mfd., 400 Volts, Paper | 64B 1-22 |
| C-19 | .02 mfd., 400 Volts, Paper | 64B 1-24 |

(Used only in sets with model numbers having a "UL" suffix.)

| | | |
|-----|------------------------------------------------|------------|
| L1 | Antenna and Trimmer, Loop | 69B 13 |
| L2 | Coil, Oscillator | 69A 14 |
| | (Use with gang stamped 68B5 or 68B20) | |
| L2 | Coil, Oscillator | 69A 52 |
| | (Use with gang stamped 68B20-1) | |
| T1 | Transformer, 1st IF | 72B 3 |
| T2 | Transformer, 2nd IF | 72B 4 |
| T3 | Transformer, Output | 79A 11-2 |
| M1 | Speaker (5") with Output Trans. attached | 78B 19-2 |
| | Speaker (5") without output Trans. | 78B 39-1 |
| M2 | (Use when output trans. is mounted on chassis) | |
| | Socket, Phono input | 88A 8-6 |
| SW1 | Switch, On-Off | Part of R9 |
| SW2 | Switch, Radio-Phono | 77A 16-4 |

PHONOGRAPH PARTS

Note—See RC180 Record Changer Manual for complete parts list.

| | | |
|-----|--------------------------------|----------|
| M3 | Plug, AC Phono Motor | 88A 8-1 |
| M4 | Motor, 60 Cycles, 115 Volts AC | 407B 3-2 |
| M5 | Cartridge and Needle, Pickup | A1372-13 |
| M6 | Cable, Pickup (3 conductor) | 89A 18-4 |
| M7 | Plug, Pickup Cable | 88A 8-5 |
| SW3 | Switch, Motor On-Off | 408A 1 |

(See caution in changer manual)

| | |
|---------------------------------|-------------|
| Centerpost (includes speed-nut) | G400B 137-1 |
| Idler Wheel (407B 3-2 Motor) | G400A 23 |
| Idler Wheel (407B 1-2 Motor) | G400A 57 |

CABINET PARTS

| Description | Part No. |
|----------------------------------------|-----------|
| Bracket, Dial Scale Mtg. | 15A 169 |
| Cabinet, Plastic | |
| Bottom Less Lid (Mahog. 6F11) | 34D 11-12 |
| Lid only (Mahogony 6F11) | 34D 11-13 |
| Bottom Less Lid (Ebony 6F10) | 34D 11-14 |
| Lid only (Ebony 6F10) | 34D 11-15 |
| *Cabinet, Wood | |
| *Complete (Walnut 6F12) | 35D 81-1 |
| Lid only (Walnut 6F12) | 98A 43-1 |
| Dial Scale, Glass | 21B 35-2 |
| Escutcheon Overlay | 23C 23-1 |
| Grille Cloth and Baffle | A1688 |
| Hinge, Butt (for Walnut 6F12) | 98A 43-3 |
| Knobs, Radio | |
| "Volume" and "Tone" (Mahog. or Wal.) | 33A 21-5 |
| "Volume" and "Tone" (Ebony) | 33A 21-6 |
| "Tuning" (Mahog. or Wal.) | 33B 34-2 |
| "Tuning" (Ebony) | 33B 34-4 |
| "Radio-Phono" (Mahog. or Wal.) | 33B 34-1 |
| "Radio-Phono" (Ebony) | 33B 34-3 |
| Rubber Strip, Dial Scale Mtg. (8 1/2") | 12A 9-3 |
| Stay Arm (For Walnut 6F12) | 98A 43-2 |

MISCELLANEOUS

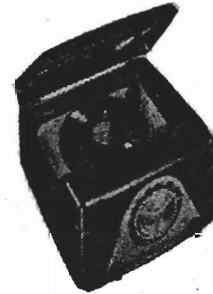
| | |
|------------------------------------|---------|
| Background, Dial | 22B 9-1 |
| Bracket, Tuning Sleeve | 15A 289 |
| Bracket, Dial Light | 15A 156 |
| Cartons and Fillers | |
| Models 6F11 and 6F10 | 44B 112 |
| Model 6F12 | 44B 116 |
| Pilot Light No. 47 | 81A 1-8 |
| Pilot Light Socket and Leads | 82A 2-4 |
| Pointer, Dial | 25A 21 |
| Sleeve, Tuning (Brass) | 27A 61 |
| Spring, Dial Drum Tension | 19B 1-3 |
| Washer, Felt ("Volume" and "Tone") | 5A 4-8 |
| Washer, Felt (Center Knob) | 5A 4-9 |

* Supplied only if old cabinet cannot be repaired. When ordering, describe condition of old cabinet in detail.

MODELS 6J21,
6J22, Ch. 6J2

RECORD CHANGER SERVICE DATA

The changer model number will be found stamped at the top rear of the changer base and also on the changer model label
RECORD CHANGER: See Model RC550,
 Pgs. RCD.CH.21-9 to RCD.CH.21-16.



ALIGNMENT PROCEDURE

- Turn receiver volume and tone controls full on.
- Antenna must be connected and placed in the same relative position to the chassis as when in cabinet.
- Use an isolation transformer if available, otherwise connect a .1 mfd. condenser in series with low side of signal generator and connect to chassis. Caution: Do not connect a ground wire directly to chassis.
- Connect output meter across speaker voice coil.
- Use lowest output setting of signal generator capable of producing adequate output meter indication and proceed in the following sequence.
- Repeat adjustments to insure good results.

| Step | Dummy Antenna in Series with Signal Generator | Connection of Signal Generator (High Side) | Signal Generator Frequency | Receiver Gang Setting | Trimmer Description | Trimmer Designation | Type of Adjustment |
|------|-----------------------------------------------|--------------------------------------------|----------------------------|-----------------------|---------------------|---------------------|--------------------|
| 1 | 250 mmfd. condenser | Tuning condenser, antenna stator | 455 KC | Gang fully open | 2nd IF 1st IF | *A, B *C, D | Maximum output |
| 2 | 250 mmfd. condenser | Tuning condenser, antenna stator | 1620 KC | Gang fully open | Oscillator | F | Maximum output |

Mount dial pointer. Set pointer to horizontal position with tuning condenser tuned to 1400 KC generator signal (see illustration below). Rotate the tuning condenser until the pointer is in a vertical position (900 KC), then slip chassis in cabinet, carefully guiding the pointer so that it locates between the dial escutcheon and the cabinet. Install antenna and chassis mounting bolts. The pointer and escutcheon may be mounted after installing the chassis in cabinet as follows: Set pointer to horizontal position with gang tuned to 1400 KC signal. Place escutcheon on cabinet. With long nose pliers slip the hairpin ends of the escutcheon mounting springs in holes of escutcheon tabs.

| | | | | | | | |
|---|--------------------------------------------------------------------------------------------------------------|--------------------------------------------|---------|--------------------------|---------|----|----------------|
| 3 | Loop of several turns of wire, or place generator lead close to receiver antenna for adequate signal pickup. | No actual connection (signal by radiation) | 1400 KC | Tune in generator signal | Antenna | †F | Maximum output |
|---|--------------------------------------------------------------------------------------------------------------|--------------------------------------------|---------|--------------------------|---------|----|----------------|

*Adjustments A and C made from the underside of the chassis. If IF transformers have hollow core slugs, these adjustments may all be made from the top of chassis, if you use alignment tool #98A30-7 obtainable from your Admiral distributor. The bottom IF slug adjustment may be reached through the hollow core in the upper slug.
 †Antenna Trimmer "F" should be aligned after chassis and antenna are mounted in cabinet.

VOLTAGE DATA

Voltages given on schematic diagram.

- All readings made between tube socket terminals and B minus (terminal of On-Off switch).
- Range Switch in "Radio" position.
- Measured on 117 Volt AC line.
- Volume control minimum; dial turned to low end.
- Voltages measured with Vacuum Tube Voltmeter.

CABINET PARTS

| | |
|----------------------------------|----------|
| Cabinet, Plastic | |
| Bottom, less lid (Ebony 6J21) | 34D 28-3 |
| Bottom, less lid (Mahogany 6J22) | 34D 28-5 |
| Lid only (Ebony 6J21) | 34D 28-4 |
| Lid only (Mahogany 6J22) | 34D 28-6 |

PHONOGRAPH PARTS

| Symbol | Description | Part No. |
|------------------------------------------------------|----------------------------------------|-----------|
| M2 | Cartridge Pickup (includes needle) | 409A 13 |
| M3 | Cable, Shielded Pickup (includes plug) | 413A 11-1 |
| M4 | Plug, Pickup Cable | 88A 23 |
| M6 | Motor, Phono (3 speed) | 407B 19 |
| M7 | Plug, Motor (Male) | 88A 8-1 |
| Adapter, 45 RPM (envelope of 12) | 48A 8-1 | |
| Button, Snap-in Plug | 13A 28-57 | |
| Centerpost, Record | G400B 505-1 | |
| Idle Wheel (Includes tire) | G400A 279 | |
| Needle, Pickup | 98A 15-19 | |
| for 409A13 cartridge | 98A 15-18 | |
| Needle, Retaining Nut (for 409A13 cartridge) | 98A 54-2 | |
| Service Manual, RC550 Changer | S327 | |
| Screw and Washer, Changer Mounting (10-32x1/4 RH MS) | AA210 | |
| Spring, Changer Float | 19A 10-3 | |

RESISTORS

| Symbol | Description | Part No. |
|--------|--------------------------|------------|
| R1 | 1,600 ohms, 1/2 watt, 5% | 60B 7-162 |
| R2 | 47,000 ohms, 1/2 watt | 60B 8-473 |
| R3 | 47,000 ohms, 1/2 watt | |
| R4 | 1 megohm, 1/2 watt | 60B 8-105 |
| R5 | 470,000 ohms, 1/2 watt | 60B 8-475 |
| R6 | 470,000 ohms, 1/2 watt | 60B 8-474 |
| R7 | 47,000 ohms, 1/2 watt | 60B 8-473 |
| R8 | 470,000 ohms, 1/2 watt | 60B 8-474 |
| R9 | 150 ohms, 1 watt | 60B 14-151 |
| R10A | 2 megohms, tone | 75B 11-8 |
| R10B | 1 megohm, volume | |
| R11 | 150,000 ohms, 1/2 watt | 60B 8-273 |
| R12 | 150,000 ohms, 1/2 watt | 60B 8-154 |
| R13 | 33 ohms, 1 watt | 60B 28-3 |
| R14 | 220 ohms, 1 watt | 60B 28-7 |
| R15 | 1,000 ohms, 1 watt | 60B 28-2 |

COILS, TRANSFORMERS, ETC.

| Symbol | Description | Part No. |
|--------|-------------------------------------|-------------|
| \$L1 | rod Antenna (includes board and Cf) | |
| L2 | Coil, Oscillator | 69A 113-1 |
| T1 | Transformer, 1st IF | 72B 50 |
| T2 | Transformer, 2nd IF | 72B 51 |
| T3 | Transformer, Output | 79A 11-3 |
| M1 | Speaker, (5" pm) | 78B 38-3 |
| M5 | Socket, Phono input | 88A 1 |
| M8 | Socket & Leads, Motor | 89A 6-3 |
| S1 | Switch, On-Off | Part of R10 |
| S2 | Switch, Radio-Phono | 77A 28-1 |
| S3 | Switch, Phono Motor | Part of S2 |
| | †Diode Filter | 63A 3-1 |

CONDENSERS

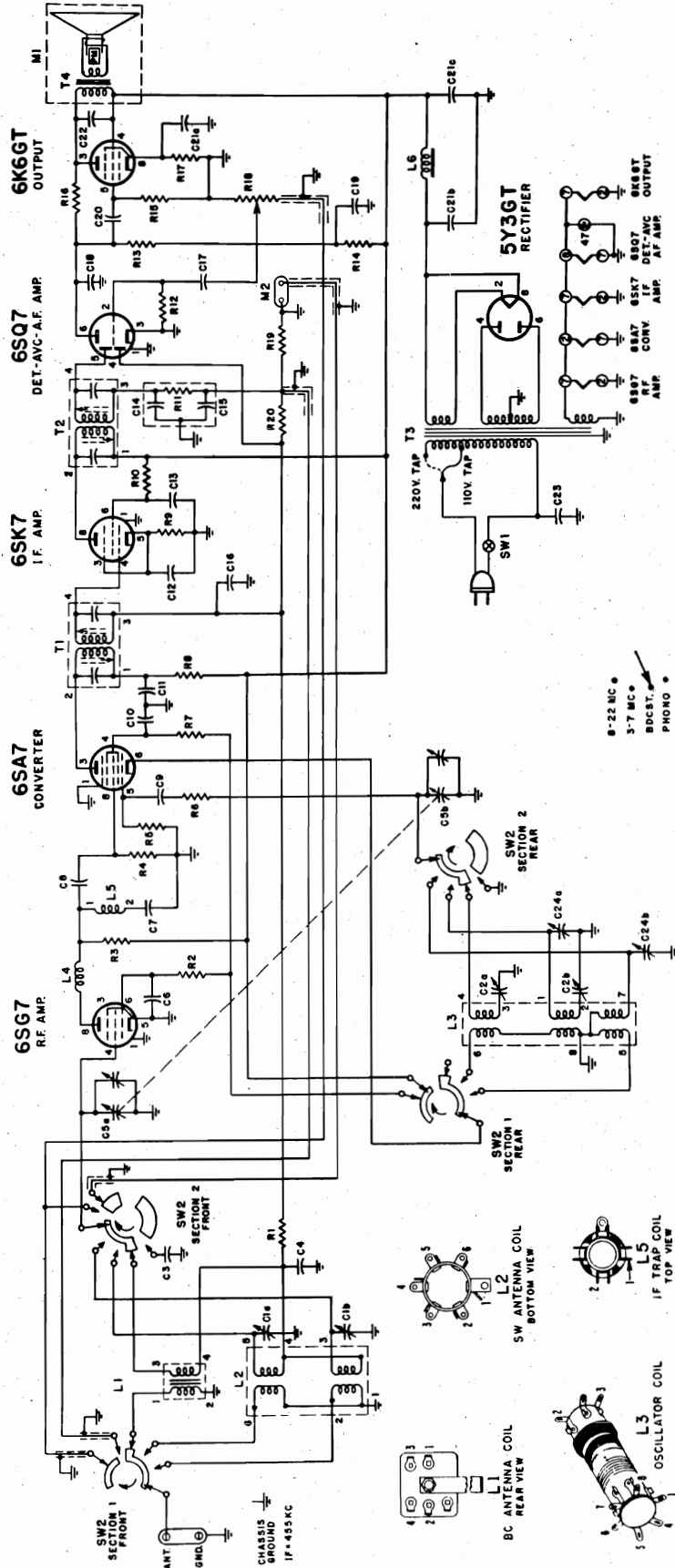
| Symbol | Description | Part No. |
|--------|-----------------------------|------------|
| C1 | Trimmer, 3 to 30 mmfd. | Part of L1 |
| \$C2 | Antenna and Oscillator gang | 65A 10-1 |
| C3 | .005 mfd., mica, Ceramic | 65B 6-4 |
| C4 | 50 mmfd., Ceramic | 65B 6-4 |
| C5 | .05 mfd., 400 volts, paper | 64B 1-20 |
| C6 | .1 mfd., 200 volts, paper | 64B 1-20 |
| C7 | 75 mmfd., 3%, Ceramic | Part of T1 |
| C8 | 75 mmfd., 3%, Ceramic | Part of T2 |
| C9 | 75 mmfd., 3%, Ceramic | Part of T2 |
| C10 | 100 mmfd., Ceramic | |
| †C11 | 100 mmfd., Ceramic | |
| †C12 | .002 mfd., 600 volts, paper | 64B 1-14 |
| C13 | .01 mfd., 400 volts, paper | 64B 1-25 |
| C14 | .1 mfd., 200 volts, paper | 64B 1-20 |
| C15 | .01 mfd., 400 volts, paper | 64B 1-25 |
| C16 | .01 mfd., 400 volts, paper | 64B 1-25 |
| C17 | .03 mfd., 400 volts, paper | 64B 1-25 |
| C18 | .01 mfd., 400 volts, paper | 64B 1-25 |
| C19 | .1 mfd., 200 volts, paper | 65B 6-30 |
| C20 | 500 mmfd., Ceramic | 65B 6-30 |
| C21 | .05 mfd., 400 volts, paper | 64B 1-22 |
| C22 | .18 mfd., 200 volts, paper | 64A 2-4 |
| C23a | 30 mfd., 150 volts | |
| C23b | 30 mfd., 150 volts | |
| C23c | 20 mfd., 150 volts | |
| C23d | 20 mfd., 25 volts | |
| | Elect | 67A 14-1 |

MISCELLANEOUS

| Description | Part No. |
|---------------------------------------------------|---------------|
| Carton and Fillers | 44B 145 |
| Clip, Electrolytic Mounting | 18A 10-6 |
| Speed Nut (esc. mtg.) | 2B 10-35-68 |
| Dial Cord | 50A 1-3 |
| Drum, Pointer | 17A 27 |
| Gasket, Sponge Rubber (mounts on Speaker) | 12B 43 |
| Grommet, Rubber (gang mtg.) | 12A 1-2 |
| Insulator, Phono Receptacle | 32A 46 |
| Manual | |
| Customer Instruction | 41A 18-33 |
| Service, for RC550 Changer | S327 |
| Pilot Light, #47 | 81A 1-8 |
| Pilot Light Socket and Leads | 82A 2-2 |
| Plate, Pointer Support | 15A 498 |
| Pointer, Dial | 25A 35-1 |
| Shaft, Pointer | 28A 42 |
| Shield, Pilot Light | 82A 15-1 |
| Sleeve, Tuning (Brass) | 27A 162-1 |
| Spacer, "T" (gang condenser mtg.) | 29A 2-1-71 |
| Spring, Dial Cord Tension | 19B 1-5 |
| Socket, Tube (12BA6) | 87A 33-2 |
| Washer, "C" (for pointer drum) | 4A 4-6 |
| Washer, Spring | 4A 6-10-0 |
| Clamp, Cable | 11A 2-2 |
| Escutcheon, Dial | 23C 81-1 |
| Escutcheon Ring (Gold trim) | 23A 53 |
| Hinge | 37A 8-1 |
| Hinge Screw (6/32x1/4 BH MS) | 365-250-C2-58 |
| Hinge Stud | 27A 17-1 |
| Jewel, Pilot Light | 82A 14-2 |
| Knobs, Radio, for Ebony 6J21 | |
| "Tuning" (outer knob) | 33C 55-15 |
| "Radio-Phono" (inner knob) | 33C 55-16 |
| "Off-On Volume" (inner knob) | 33C 55-18 |
| "Tone" (outer knob) | 33C 55-17 |
| Knobs, Radio, for Mahogany 6J22 | |
| "Tuning" (outer knob) | 33C 55-19 |
| "Radio-Phono" (inner knob) | 33C 55-20 |
| "Off-On Volume" (inner knob) | 33C 55-22 |
| "Tone" (outer knob) | 33C 55-21 |
| Rubber Bumpers for cabinet bottom for cabinet top | 12A 3-4 |
| for cabinet top | 12A 9-8 |
| Stacy Arm and Plate | 37A 9-1 |
| Washer, Felt (for tuning knobs) | 5A 4-9 |

† Part of Diode Filter 63A3-1. This unit consisting of C11, C12 and R3 may be replaced with individual components.
 § Early sets used part number 68E30 gang (antenna 420 mmfd. max., oscillator 108 mmfd. max.) with part number 69B141 rod antenna. Late sets use part number 68E30-1 gang (antenna 324 mmfd. max., oscillator 108 mmfd. max.) with part number 69B144 rod antenna; the model label on these sets is stamped "RUN 2". Interchangeable only as sets; part numbers are stamped on gang and board.

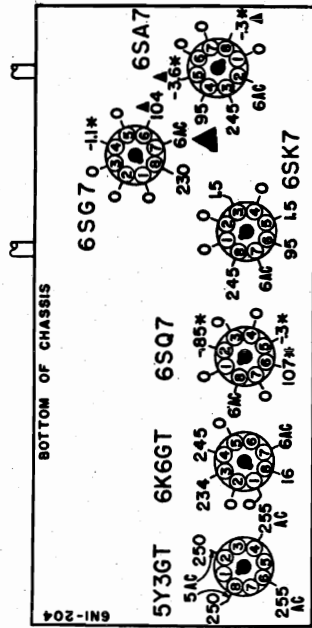
MODELS 6N12,
6N13, Ch. 6N1



BAND SWITCH (SW2) SHOWN IN BC POSITION

VOLTAGE DATA

- Measured on 117 Volts AC line.
- Voltages measured with Vacuum Tube Voltmeter. Readings taken with a 1,000 ohm per volt meter will be approximately the same except for those marked with an asterisk * in the voltage chart; these readings will either be lower or practically zero.
- All readings made between tube socket terminals and chassis ground, unless otherwise indicated.
- Dial turned to low frequency end; volume control at minimum.
- Band switch set in "BC" position.



* If taken with a 1000 ohm-per-volt meter, readings will be lower or practically zero.
 ▲ On "Phono" these voltages will be zero. All other DC readings may be slightly higher.

MODELS 6N12,
6N13, Ch. 6N1

ALIGNMENT PROCEDURE

- Be sure both set and signal generator are thoroughly warmed up before starting alignment.
- Turn gang condenser to wide open position and make sure that dial pointer is at position shown in illustration below.
- Connect output meter across voice coil.
- Turn receiver volume control full on.
- Use lowest output setting of signal generator capable of producing adequate output meter indication and then proceed as outlined in chart below.
- Repeat adjustments to insure good results.

NOTE

To avoid splitting the slotted head of powdered iron core tuning slugs in I.F. transformers, use an alignment tool having a blade $\frac{1}{8}$ " wide.

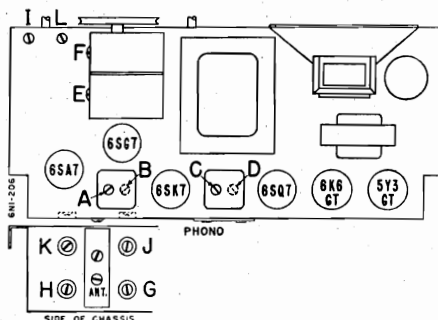
| Step | Dummy Antenna in Series with Signal Generator | Connection of Signal Generator (High Side) | Band Switch Position | Signal Generator Frequency | Receiver Gang Setting | Trimmer Description | Trimmer Designation | Type of Adjustment |
|------------------------------------------------|-----------------------------------------------|--------------------------------------------|----------------------|----------------------------|--------------------------|---------------------------|---------------------|---------------------------------------------|
| 1 | .02 mfd. condenser | † Pin No. 8 of 6SA7 | Broad-cast | 455 KC | Gang fully open | 2nd IF 1st IF | A, B* C, D* | Maximum Output |
| 2 | 200 mmfd. condenser | Antenna Terminal | Broad-cast | 1730 KC | Gang fully open | B.C. Oscillator (on gang) | E | Maximum Output |
| 3 | 200 mmfd. condenser | Antenna Terminal | Broad-cast | 1400 KC | Tune in generator signal | B.C. Antenna (on gang) | F | Maximum Output |
| 4 | 200 mmfd. condenser | Antenna Terminal | Broad-cast | 600 KC | Tune in generator signal | B.C. pad | G | Maximum Output. "Rock" gang while adjusting |
| Recheck alignment at 1400 KC (in step 3 above) | | | | | | | | |
| 5 | 400 ohm carbon resistor | Antenna Terminal | Medium | 7.5 MC | Gang fully open | M.B. Osc. Trimmer | H ** | Maximum Output |
| 6 | 400 ohm carbon resistor | Antenna Terminal | Medium | 6.2 MC | Tune in signal | M.B. Ant. Trimmer | I | Maximum Output |
| 7 | 400 ohm carbon resistor | Antenna Terminal | Medium | 3.2 MC | Tune in signal | M.B. Osc. Pad | J | Maximum Output "Rock" gang while adjusting |
| Recheck alignment in step 5 and 6 | | | | | | | | |
| 8 | 400 ohm carbon resistor | Antenna Terminal | Short Wave | 23 MC | Gang fully open | S.W. Osc. Trimmer | K ** | Maximum Output |
| 9 | 400 ohm carbon resistor | Antenna Terminal | Short Wave | 18 MC | Tune in signal | S.W. Ant. Trimmer | L | Maximum Output "Rock" gang while adjusting |

* Adjustments B and D are made from underside of chassis.

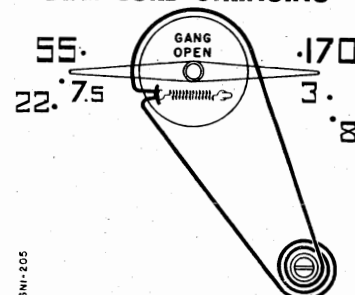
† If IF adjustments are very far off alignment, it may be necessary to feed signal through pin #4 of 6SK7, then through pin #8 of 6SA7.

** Be sure that trimmer is aligned at correct frequency and not on image which should be approximately 910 KC lower than correct frequency, as indicated on the dial. Check to see that image appears 910 KC lower than alignment frequency.

TUBE AND TRIMMER LOCATION



POINTER SETTING AND DIAL CORD STRINGING



MODELS 6N12,
6N13, Ch. 6N1

RESISTORS

| Symbol | Description | Part No. |
|--------|------------------------------------------------|-----------|
| R1 | 270,000 ohms, 1/2 Watt | 60B 8-274 |
| R2 | 47,000 ohms, 1/2 Watt | 60B 8-473 |
| R3 | 2,200 ohms, 1/2 Watt | 60B 8-222 |
| R4 | 100,000 ohms, 1/2 Watt | 60B 8-104 |
| R5 | 22,000 ohms, 1/2 Watt | 60B 8-223 |
| R6 | 100 ohms, 1/2 Watt | 60B 8-101 |
| R7 | 15,000 ohms, 1/2 Watt | 60B 8-153 |
| R8 | 1,000 ohms, 1/2 Watt | 60B 8-102 |
| R9 | 100 ohms, 1/2 Watt | 60B 8-101 |
| R10 | 47,000 ohms, 1/2 Watt | 60B 8-473 |
| *R11 | 47,000 ohms, 1/4 Watt | |
| R12 | 4.7 megohms, 1/2 Watt | 60B 8-475 |
| R13 | 270,000 ohms, 1/2 Watt | 60B 8-274 |
| R14 | 33,000 ohms, 1/2 Watt | 60B 8-333 |
| R15 | 470,000 ohms, 1/2 Watt | 60B 8-474 |
| R16 | 1 Megohm, 1/2 Watt | 60B 8-105 |
| R17 | 560 ohms, 1 Watt | 60B14-561 |
| R18 | 2 Megohm, Volume Control and On-Off Switch SW1 | 75B 1-29 |
| R19 | 680,000 ohms, 1/2 Watt | 60B 8-684 |
| R20 | 2.2 Megohms, 1/2 Watt | 60B 8-225 |

CONDENSERS

| | | | |
|--------------------------------|---------------------------------------------|--------------|----------|
| C1a | 3 to 40 mmfd | Dual Trimmer | 66A 23-7 |
| C1b | 3 to 40 mmfd | | |
| C2a | 410 to 500 mmfd | Dual | 66A 23-5 |
| C2b | 1700 to 3100 mmfd | | |
| C3 | .01 mfd., 450 Volts, Ceramic | Gang | 68B 23 |
| C4 | .05 mfd., 400 Volts, Paper | | |
| C5a | 0 to 420 mmfd., Ant. | Gang | 68B 23 |
| C5b | 0 to 420 mmfd., Osc. | | |
| (Dial drum spotwelded to gang) | | | |
| C6 | .05 mfd., 400 Volts, Paper | | 65A 2-9 |
| C7 | 60 mmfd., ±5%, -00075 Temp. Coeff., Ceramic | | 65B 6-8 |
| C8 | 100 mmfd., Mica | | 65B 5-17 |
| C9 | 50 mmfd., Mica | | 65B 5-11 |
| C10 | .05 mfd., 400 Volts, Paper | | 65A 2-9 |
| C11 | .05 mfd., 400 Volts, Paper | | 65A 2-9 |
| C12 | .05 mfd., 400 Volts, Paper | | 65A 2-9 |
| C13 | .05 mfd., 400 Volts, Paper | | 65A 2-9 |
| *C14 | 100 mmfd., Ceramic | | |
| *C15 | 100 mmfd., Ceramic | | |
| C16 | .05 mfd., 400 Volts, Paper | | 65A 2-9 |
| C17 | .01 mfd., 400 Volts, Paper | | 65A 2-8 |
| C18 | 250 mmfd., Ceramic | | 65B 6-5 |
| C19 | .05 mfd., 400 Volts, Paper | | 65A 2-9 |
| C20 | .01 mfd., 400 Volts, Paper | | 65A 2-8 |
| C21a | 20 mfd., 25 Volts | Elect | 67C 6-25 |
| C21b | 30 mfd., 350 Volts | | |
| C21c | 30 mfd., 350 Volts | | |
| C22 | .005 mfd., 400 Volts, Paper | | 65A 2-17 |
| C23 | .01 mfd., 400 Volts, Paper | | 65A 2-8 |
| C24a | 3 to 40 mmfd. | Dual Trimmer | 66A 23-6 |
| C24b | 3 to 30 mmfd. | | |

* Part of Diode Filter Unit 63A3-1. This unit consists of R11, C14, C15 (see schematic). If a section of the unit becomes defective, replace with exact duplicate or individual components of proper value.

CIRCUIT

Six tube AC operated Superhetrodyne receiver, covering three bands. Broadcast: 540 KC—1730 KC. Medium: 2.75 MC—7.5 MC. Short Wave: 7.2 MC to 23 MC. A phono-jack has been provided on rear of set to plug in phonograph.

ANTENNA

Since this set is highly sensitive, for best results do not use an antenna longer than necessary.

COILS, TRANSFORMERS, ETC.

| Symbol | Description | Part No. |
|--------|-----------------------------------------|-------------|
| L1 | Coil, Antenna (BC) | 69A 78 |
| L2 | Coil, Antenna (MB and SW) | 69A 79 |
| L3 | Coil, Osc. (BC, MB and SW) | 69A 67 |
| L4 | Coil, Peaking (RF) | 69A 80 |
| L5 | Coil, Trap (455 KC) | 69A 77 |
| L6 | Filter Choke | 74A 10 |
| T1 | Transformer, 1st IF | 72B 71 |
| T2 | Transformer, 2nd IF | 72B 72 |
| T3 | Transformer, Power (117 V and 220 V) | 80B 14 |
| T4 | Transformer, Speaker Output | 38A 55-1 |
| M1 | Speaker (5" PM) with Output Transformer | 78B 42 |
| M2 | Jack, Phono Input | 86A 1 |
| SW1 | Switch, On-Off | Part of R18 |
| SW2 | Band Switch | 76B 15 |
| | Diode Filter | 63A 3-1 |

DIAL PARTS

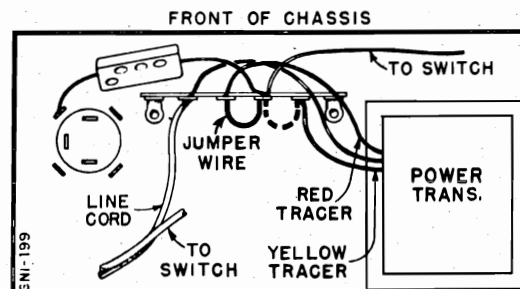
| | |
|-------------------------------------|------------|
| Bracket, Dial Background | 15A 180-1 |
| Dial Cord | 50A 1-3 |
| Dial Crystal | 24A 8 |
| Dial Scale | 21B 53 |
| Pilot Light #47 | 81A 1-8 |
| Pointer, Dial | 25A 30-1 |
| Ring, Compression (Pointer) | 19A 31-1 |
| Sleeve, Tuner (Brass) | 27A 93 |
| Snap Button (for mtg. dial crystal) | 13A 1-1-47 |
| Snap Button (for mtg. dial scale) | 13A 1-3-47 |
| Socket and Leads, Pilot Light | 82A 7-2 |
| Spring, Tension (Dial Cord) | 19B 1-2 |

MISCELLANEOUS

| | |
|-----------------------------------------------|------------|
| Back, Cabinet | 43B 63 |
| Bag, Waxed Paper Shipping | 45A 4-12 |
| Bracket, Band Switch | 15A 393 |
| Cabinet, Plastic Ivory (6N13) | 34D 18-3 |
| Mahogany (6N12) | 34D 18-2 |
| Carton and Fillers | 44B 133 |
| Decal, Band Switch | 26A 26 |
| Knobs "Band Switch" (Mahog., 6N12) | 33B 38-11 |
| "Band Switch" (Ivory, 6N13) | 33B 38-12 |
| "On-Off Volume" (Mahog., 6N12) | 33B 38-6 |
| "On-Off Volume" (Ivory 6N13) | 33B 38-9 |
| "Station Selector" (Mahog., 6N12) | 33B 38-5 |
| "Station Selector" (Ivory, 6N13) | 33B 38-8 |
| Screw, Mounting (for cabinet back, #6x1/4 ST) | 1A 51-2-21 |
| Socket Tube (Octal) | 87A 10-2 |
| Terminal Board, Antenna | 10A 6-2 |
| Washer, Felt (for knobs) | 5A 4-10 |

OPERATING VOLTAGE

110-120 Volts AC, 50 or 60 cycle. 220 Volts AC may be used by changing the connection on terminal strip (see illustration).



For 220 Volt operation, move jumper wire as indicated by dotted line connection.

MODELS 6RT44,
6RT44A, Ch. 7B1

ALIGNMENT PROCEDURE

1. Loop must be connected during alignment.
Check the set screws that hold the tuning drum to the shaft to see that they are tight and that the drum has not slipped on the shaft. The correct position of the drum can be seen on the stringing diagram.
2. In the closed position the stop on the rear of the dial drum must be against the stop post.
3. With the gang wide open, all slugs should be $1\frac{3}{8}$ inches out of their coil forms. If there is any serious deviation or if there has been any tampering, turn the adjusting screws until this distance is correct.
4. Be sure both the set and the signal generator are thoroughly warmed up before starting alignment.
5. Turn receiver Volume Control full on.
6. Use lowest output setting of signal generator that gives a satisfactory reading on meter.
7. Proceed in sequence as outlined below.

| STEP | CONNECT SIGNAL GENERATOR TO | DUMMY ANTENNA BETWEEN RADIO AND SIGNAL GENERATOR | SIGNAL GENERATOR FREQUENCY | TUNING GANG SETTING | ADJ. TRIMMERS IN FOLLOWING ORDER TO MAX. |
|------|-----------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|----------------------------|----------------------------------------|------------------------------------------|
| 1 | Set Band Change Switch to Broadcast Position. 6SA7 Grid (Pin #8) | .1 MFD. | 455 K.C. | Set Pointer to Upper Limit | A, B, C, D |
| 2 | Before proceeding to step 3 check pointer travel as outlined under paragraph below headed "Pointer Adjustment." | | | | |
| 3 | Black Loop Lead | 20 MMFD. If not available wrap several turns of the generator lead around the black loop lead. | 1605 K.C. | Set Pointer to Upper Limit | E, F, G |
| 4 | Black Loop Lead | | 1300 K.C. | Set Pointer to 1300 Mark on Slide Rail | H, I, J |
| 5 | Set Band Change Switch to Short Wave Position. | | | | |
| 6 | Black Loop Lead | 400 Ohms | 12.5 M.C. | Set Pointer to Upper Limit | K, L, M |
| 7 | Black Loop Lead | 400 Ohms | 12.0 M.C. | Set Pointer to 1300 Mark on Slide Rail | N, O, P |

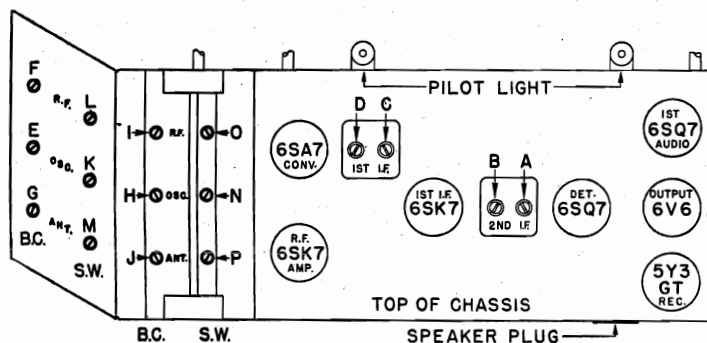
POINTER ADJUSTMENT

Move the dial pointer by means of the tuning control knob to see that it reaches the upper and lower limits as shown on the stringing diagram. In the upper limit position measure the distance D-E and in the lower limit position measure the distance A-B. The distance from A and B must be the same as the distance from D to E. If these distances are not equal, unclamp and move the pointer slide on the string until they are the same. The pointer should be checked again at the upper and lower limit to be sure that it is right. Take care to see that the pointer does not slip during this operation. Reclamp the pointer slide tightly to the string and seal with any quick-drying cement. Set the tuning gang wide open and proceed with operation 3.

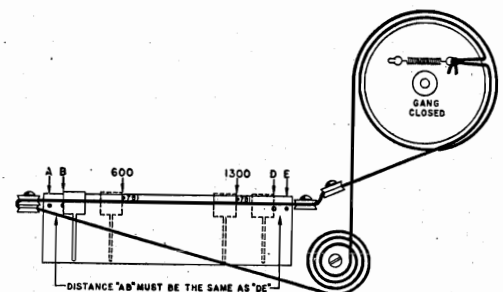
REPLACING TUNING SLUG

If it becomes necessary to change a tuning slug proceed in the following manner: Set the gang to its wide open position, unsolder and remove the old slug. Set the slug adjusting screw about half way down. Place the new slug in such a position that $1\frac{3}{8}$ inches of its length is above the coil form. Solder it in this position making sure that it does not slip during the operation and that the slug wire is straight. Proceed to realign the set as shown in the chart.

TUBE AND TRIMMER LAYOUTS



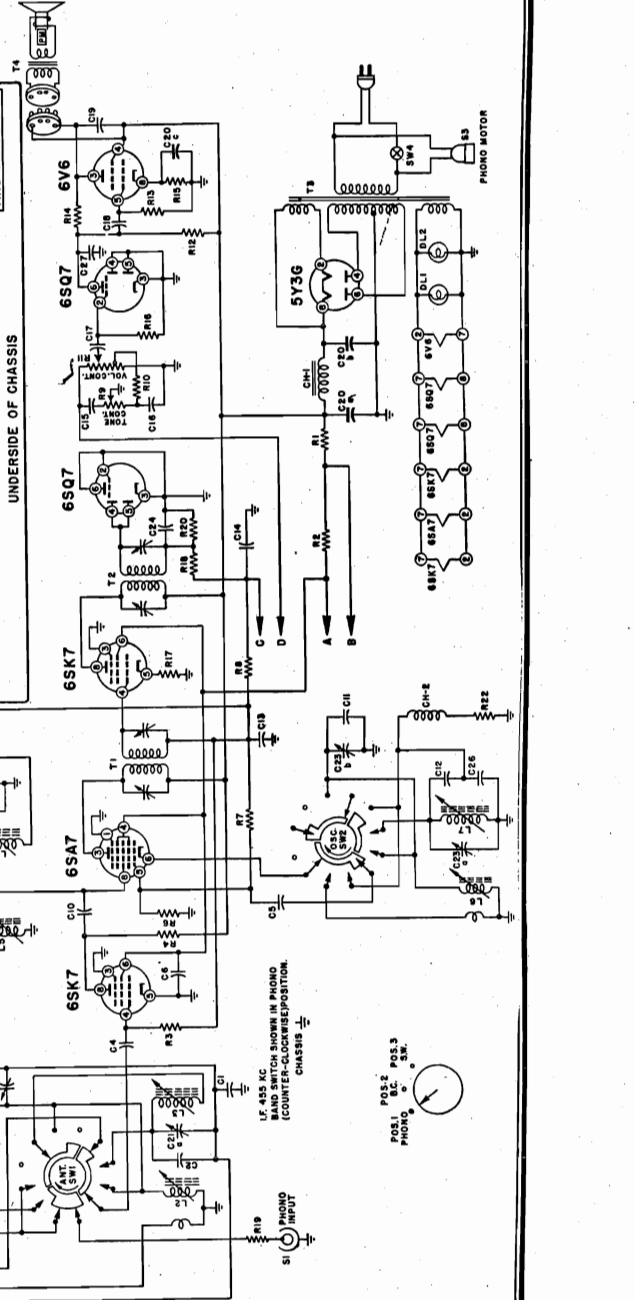
STRINGING DIAGRAM



MODELS 6RT44,
6RT44A, Ch. 7B1

| RESISTORS | | CONDENSERS (Cont'd) | | TRANSFORMERS and COILS | |
|-----------|--------------------------------|---------------------|--------------------------------|------------------------|---------------------------|
| Symbol | Description | Part No. | Description | Symbol | Description |
| R1 | 12,000 Ohms 5 Watt | 61A1-1 | 20 Mmfd., Mica | L1 | Antenna, Loop |
| R2 | 170,000 Ohms 1/2 Watt | 6088-154 | 65 Mmfd., Silver Mica 3% | L2 | Coil, S.W. Antenna |
| R3 | 470,000 Ohms 1/2 Watt | 6088-474 | 200 Mmfd., Silver Mica 2% | L3 | Coil, B.C. Antenna |
| R4 | 10,000 Ohms 2 Watt | 6088-103 | 1 Mfd., 400 Volts | L4 | Coil, B.C. R.F. |
| R5 | 22,000 Ohms 1/2 Watt | 6088-223 | 250 Mmfd., Mica | L5 | Coil, S.W. R.F. |
| R6 | 10 Megohms 1/2 Watt | 6088-106 | 1,000 Mmfd., Mica | L6 | Coil, S.W. Oscillator |
| R7 | 1 Megohm 1/2 Watt | 6088-105 | .02 Mfd., 400 Volts | L7 | Coil, B.C. Oscillator |
| R8 | 10 Megohms, Tone Control | 7581-5 | .01 Mfd., 400 Volts, Condenser | T1 | Transformer, 1st I.F. |
| R9 | 27,000 Ohms 1/2 Watt | 6088-273 | 6481-25 | T2 | Transformer, 2nd I.F. |
| R10 | 1 Megohm, Volume Control | 7582-1 | .01 Mfd., 400 Volts, Condenser | T3 | Transformer, Power |
| R11 | Tapped at Approx. 500,000 ohms | | 6481-10 | T4 | Choke, Filter |
| R12 | 270,000 Ohms 1/2 Watt | 6088-274 | 30 Mfd., 350 Volts | CH1 | Choke, Oscillator Cathode |
| R13 | 470,000 Ohms 1/2 Watt | 6088-474 | 20 Mfd., 25 Volts | CH2 | Choke, Oscillator Cathode |
| R14 | 1 Megohm 1/2 Watt | 6088-105 | 3-40 Mmfd. Trimmer | | |
| R15 | 390 Ohms 1 Watt | 60814-391 | 3-40 Mmfd. Trimmer | | |
| R16 | 10 Megohms 1/2 Watt | 6088-106 | 3-40 Mmfd. Trimmer | | |
| R17 | 100 Ohms 1/2 Watt | 6088-101 | 3-40 Mmfd. Trimmer | | |
| R18 | 47,000 Ohms 1/2 Watt | 6088-473 | 3-40 Mmfd. Trimmer | | |
| R19 | 100,000 Ohms 1/2 Watt | 6088-104 | 1,200 Mmfd., Mica | | |
| R20 | 270,000 Ohms 1/2 Watt | 6088-274 | 100 Mmfd., Mica | | |
| R21 | 100 Ohms 1/2 Watt | 6088-101 | 100 Mmfd., Mica | | |
| R22 | 100 Ohms 1/2 Watt | 6088-101 | | | |

| CONDENSERS | | SWITCHES, PLUGS and SOCKETS | |
|------------|---------------------------|-----------------------------|------------------------------|
| Symbol | Description | Symbol | Description |
| C1 | 1,000 Mmfd., Mica | S1 | Socket, Phone |
| C2 | 140 Mmfd., Silver Mica 3% | S2 | Socket, Speaker |
| C3 | 25 Mmfd., Silver Mica 3% | S3 | Socket and Card, Phono Motor |
| C4 | 100 Mmfd., Mica | SW1 | Switch, Antenna |
| C5 | 50 Mmfd., Mica | SW2 | Switch, Oscillator |
| C6 | 05 Mfd., 400 Volts | SW3 | Switch, R.F. |
| C7 | 65 Mmfd., Silver Mica 3% | SW4 | Switch (on-off) S.P.S.T. |
| C8 | 420 Mmfd., Silver Mica 2% | | |



MODELS 6T01,
6T04X, Ch. 5A1

CIRCUIT

Chassis 5A1—A.C.-D.C. 5 tube Superheterodyne covering two bands, (540 K.C.—1730 K.C.) and 5.45 Megacycles—17.5 Megacycles.

POWER SUPPLY

110-120 Volts A.C. or 110-120 Volts D.C. It can be operated on 220 Volts A.C. or D.C. only if a special line resistance cord is used.

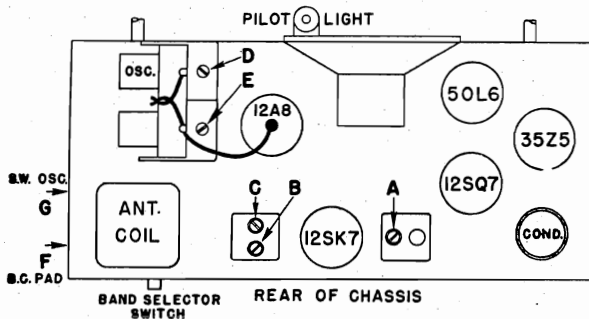
ALIGNMENT PROCEDURE

1. Be sure both set and signal generator are thoroughly warmed up before starting alignment.
2. Turn gang condenser to wide open position and make sure that dial pointer is at position marked "pointer extremes" on the dial diagram (see below).
3. Connect Output Meter across the Voice Coil.
4. Turn receiver Volume Control full on.
5. Use *lowest* output setting of signal generator that will give a satisfactory reading on the Output Meter.
6. Proceed in sequence as indicated in the chart.

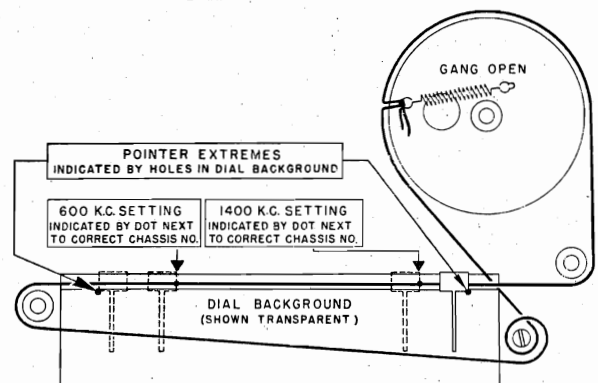
| Dummy Antenna in Series with Signal Generator | Signal Generator Frequency | Connect Signal Generator to | Band Switch Position | Receiver Dial Pointer Setting | Adjust Following Trimmers | Type of Adjustment |
|-----------------------------------------------|----------------------------|-----------------------------|----------------------|-------------------------------------------------|------------------------------------------------------|---------------------------------|
| .00025 Mica | 455 K.C. | Grid Cap 12A8 Tube | B.C. | Gang-Condenser Wide open | (A) 2nd I.F. (B) 1st I.F. (C) 1st I.F. | Maximum Deflection Output Meter |
| .00025 Mica | 1730 K.C. | End of Ant. Wire | B.C. | Set to Black dot at extreme upper end of scale. | (D) B.C. Osc. | Maximum Deflection Output Meter |
| .00025 Mica | 1400 K.C. | End of Ant. Wire | B.C. | Tune in Generator Signal | (E) B.C. Ant. | Maximum Deflection Output Meter |
| .00025 Mica | 600 K.C. | End of Ant. Wire | B.C. | Tune in Generator Signal | (F) B.C. Pad Rock Condenser gang while adjusting. | Maximum Deflection Output Meter |
| Recheck Alignment at 1400 Kc (2nd step above) | | | | | | |
| 400 ohm Carbon | 15 Mc. | End of Ant. Wire | S.W. | Tune in Generator Signal | (G) S.W. Antenna | Maximum Deflection Output Meter |

TUBE and TRIMMER LAYOUT

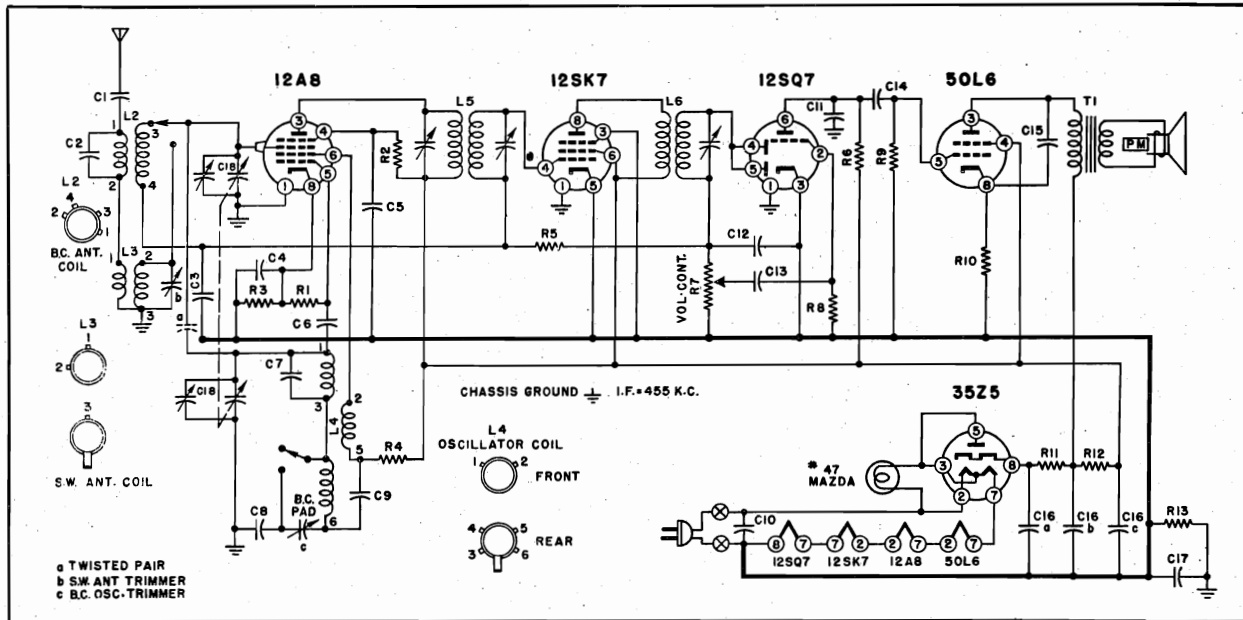
Top View



DIAL STRINGING



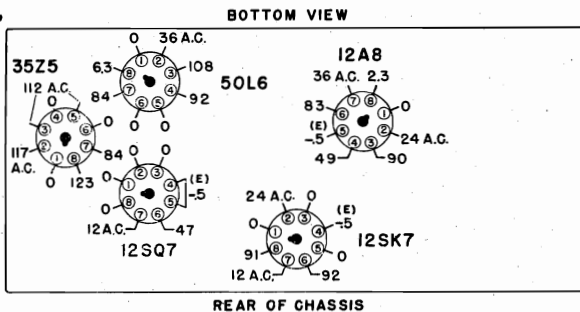
MODELS 6T01,
6T04X, Ch. 5A1



a TWISTED PAIR
b SW ANT TRIMMER
c BC OSC. TRIMMER

VOLTAGE CHART

VOLTAGE DATA



1. All readings made between Tube Socket Terminals and Terminal No. 8 on the 12SQ7 Socket.
2. Measured on a 117 Volt A.C. line.
3. Volume control full on.
4. Dial tuned to low frequency end, no signal.
5. Voltages indicated (E) obtained on Vacuum Tube volt meter.
6. All other readings shown are made with a 1000 ohm per volt meter.

REPLACEMENT PARTS

| CONDENSERS | | | RESISTORS | | | MISCELLANEOUS | |
|------------|-------------------------------|----------|---------------------------------|------------------------------|-----------|---------------------------------------|----------|
| Symbol | Description | Part No. | Symbol | Description | Part No. | Description | Part No. |
| C1 | .001 Mfd., paper, 400 V. | 65A2-5 | R1 | 47,000 Ohms, Carbon, 1/2 W. | 60B8-473 | Band Change Switch | 77B1-4 |
| C2 | .00005 Mfd., mica, 500 V. | 65B5-11 | R2 | 22,000 Ohms, Carbon, 1/2 W. | 60B8-223 | Buttons, Snap for Dial Background | 13A1-3-2 |
| C3 | .05 Mfd., paper, 400 V. | 65A2-4 | R3 | 470 Ohms, Carbon, 1/2 W. | 60B8-471 | Cabinet, Ivory Plastic | 34D1-1 |
| C4 | .05 Mfd., paper, 400 V. | 65A2-4 | R4 | 3,300 Ohms, Carbon, 1/2 W. | 60B8-332 | Cabinet, Mahogany Plastic | 34D1-2 |
| C5 | .05 Mfd., paper, 400 V. | 65A2-4 | R5 | 2.2 Meg Ohms, Carbon, 1/2 W. | 60B8-225 | Collar for Line Cord Connector | 32A19 |
| C6 | .0001 Mfd., mica, 500 V. | 65B5-17 | R6 | 220,000 Ohms, Carbon, 1/2 W. | 60B8-224 | Connector for Line Cord (female plug) | 88A6-2 |
| C7 | .00001 Mfd., mica, 500 V. | 65B5-1 | R7 | .5 Meg. Ohms, Volume Control | 75B1-7 | Cord, Line, 220 V. | 89A3 |
| C8 | .003 Mfd., mica, 500 V. | 65B1-6 | R8 | 4.7 Meg Ohms, Carbon 1/2 W. | 60B8-475 | Dial Background | 22B7-1 |
| C9 | .005 Mfd., paper, 400 V. | 65A2-2 | R9 | 470,000 Ohms, Carbon, 1/2 W. | 60B8-474 | Dial Cord (42 inches) | 50A1-1 |
| C10 | .05 Mfd., paper, 400 V. | 65A2-4 | R10 | 220 Ohms, Carbon, 1/2 W. | 60B8-221 | Dial Pointer Strip | 25A3 |
| C11 | .0005 Mfd., mica, 500 V. | 65B5-27 | R11 | 150 Ohms, Carbon, 1 W. | 60B28-1 | Dial Pointer Slide | 25A2 |
| C12 | .00025 Mfd., mica, 500 V. | 65B5-22 | R12 | 1,000 Ohms, Carbon, 1 W. | 60B28-2 | Drive Drum Assembly | A1012 |
| C13 | .01 Mfd., paper, 400 V. | 65A2-3 | R13 | 150,000 Ohms, Carbon, 1/2 W. | 60B28-154 | Fibre Dial Pulley | 17A1-3 |
| C14 | .002 Mfd., paper, 400 V. | 65A2-1 | COILS & TRANSFORMERS | | | Knob, Ivory | 33A1-1 |
| C15 | .01 Mfd., paper, 400 V. | 65A2-3 | | | | Knob, Mahogany or Walnut | 33A1-2 |
| C16a | 30 Mfd., electrolytic, 150 V. | 67C7-41 | Symbol | Description | Part No. | Pilot light, Mazda No. 47 | 81A1-8 |
| C16b | 30 Mfd., electrolytic, 150 V. | | L2 | BC, Antenna coil | 69A1 | Pilot light Socket & leads | 82A2-2 |
| C16c | 20 Mfd., electrolytic, 150 V. | | L3 | SW, Antenna coil | 69A2 | Shaft, Tuning | 28A1-1 |
| C17 | .2 Mid., paper, 400 V. | 65A2-10 | L4 | BC & SW, Oscillator coil | 69A3 | Scale, Dial | 21C1-1 |
| b, c | Trimmer Condenser | 66A1-1 | L5 | 1st I.F. Trans. | 72B2 | Speaker & Output Transformer | 78B1-1 |
| C18 | Tuning Condenser Gang | 68A1 | L6 | 2nd I.F. Trans. | 72B1 | Tension Spring, Dial cord | 19A1-3 |

CIRCUIT

Six tube AC operated Superheterodyne receiver, covering three bands. Medium: 540 KC—1730 KC. Short Wave 1: 2.75 MC—7.5 MC. Short Wave 2: 7.2 MC to 23 MC. Set has a three-speed Record Changer (RC222).

CONVERSION INSTRUCTIONS

CONVERTING THE SET FOR 220 VOLT OPERATION

To convert this set for 220 volt operation, a conversion kit must be ordered. Be sure to read all of the information for 220 volt operation.

CONVERTING THE RADIO To convert the radio from 110 volts to 220 volts, unsolder one end of the Jumper Wire at point "A" and solder it to point "B". See figure 1. To convert from 220 volts to 110 volts, reverse the procedure.

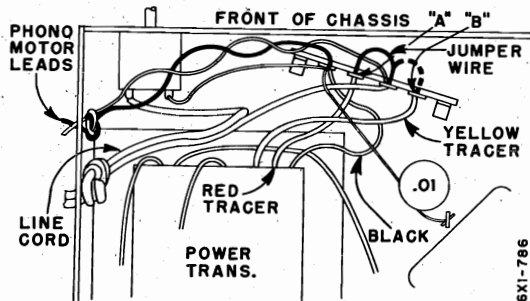


Figure 1. Bottom View of Chassis Showing Jumper Wire

CONVERTING THE PHONOGRAPH A step-down transformer (included in conversion kit, part #98A15-17) must be mounted on the inside back of the cabinet to operate this changer on 220 volts. This kit consists of a step-down transformer, a mounting plate, socket and plug, and the necessary bolts and nuts to mount the plate to the cabinet back.

Mount the transformer to the cabinet back as shown in figure 2. Disconnect the phono plug "C", and insert it into the socket "D" provided for it on the conversion transformer. Also, insert the conversion transformer plug "E" into the radio socket "F".

To convert the phono from 220 volts to 110 volts, merely unplug the transformer connections, and insert the phono plug "C" into the radio socket "F".

Conversion Transformer Kit

| | |
|---------------------------------------------------------|--------|
| Transformer, Step-down (includes socket and plug) | 80B20 |
| Mounting Plate | 15B544 |
| Plug | 88A8-1 |
| Socket and Leads | 89A6-3 |

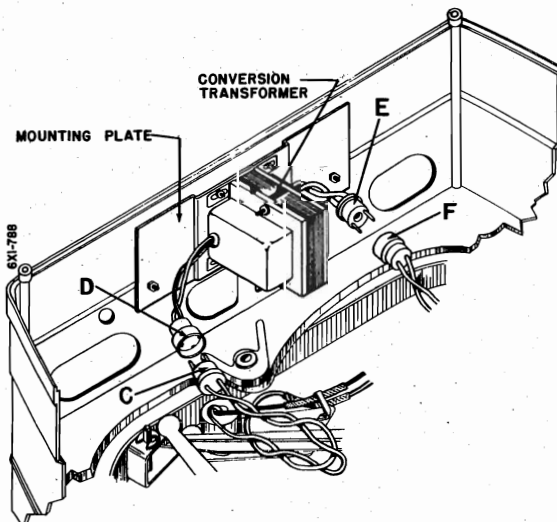


Figure 2. Bottom View of Cabinet

CONVERTING THE PHONOGRAPH MOTOR FROM 60 CYCLES TO 50 CYCLE OPERATION

To convert an Admiral (60 cycle) three-speed phono-graph for 50 cycle operation, first remove the turntable retaining clip by slipping it off of the turntable hub and then remove the turntable by lifting it straight up.

NOTE: Make certain that the record changer is not in change cycle before attempting to lift the turntable. Then proceed as follows:

1. Remove the two rubber drive belts. Do not handle these belts excessively or get grease or oil on them.
2. Remove the original 78 RPM - 60 cycle coil spring from the motor drive shaft (smallest diameter shaft). Then slip the 50 cycle conversion spring (part #405A113, inside diameter 11/64") in its place.
3. Install the 33-1/3 RPM 50 cycle conversion spring (part #405A112, inside diameter 15/64") by slipping it over the 33-1/3 RPM brass drive shaft (smaller diameter of the two brass drive shafts).

IMPORTANT

The conversion springs can best be installed by turning the springs counterclockwise (to the left) while pushing down until the top of the spring is flush with the top of the shaft.

4. Remove the 45 RPM, 60 cycle drive shaft (largest diameter shaft) by lifting it straight up and off. Do not remove the oil retaining felt washer under the brass drive shaft. Then install the 45 RPM, 50 cycle conversion drive shaft (part #98A15-15) by sliding it down on the mounting stud.
5. Carefully reinstall the two rubber drive belts.
6. Reinstall the turntable. No force is needed to seat the turntable. Be sure that indented portion of the record changer drive wheel (near turntable hub) faces the turntable hub. Also, it will be necessary to push the idler wheel in toward the center of the turntable as the turntable is lowered on the hub. When the turntable is seated, replace the turntable retaining clip or ring, if used.

RECORD CHANGER: Model RC222, Pgs. RCD.CH.20-9 to RCD.Ch. 20-20.

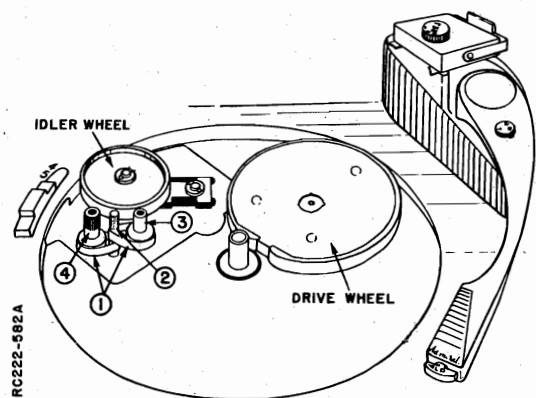


Figure 3. Top of Record Changer, Turntable Removed.

MODEL 6X12,
Ch. 6X1

ALIGNMENT PROCEDURE

- Be sure both set and signal generator are thoroughly warmed up before starting alignment.
- Turn gang condenser to wide open position and make sure that dial pointer is at position shown in illustration below.
- Connect output meter across voice coil.
- Turn receiver volume and tone controls full on.
- Use lowest output setting of signal generator capable of producing adequate output meter indication and then proceed as outlined in chart below.
- Repeat adjustments to insure good results.

NOTE

To avoid splitting the slotted head of the powdered iron core tuning slugs in IF transformers, use an alignment tool having a blade 1/8" wide. Since this tool must be inserted into the underside of the IF transformers across the chassis, it must be NON-METALLIC and at least 7" long.

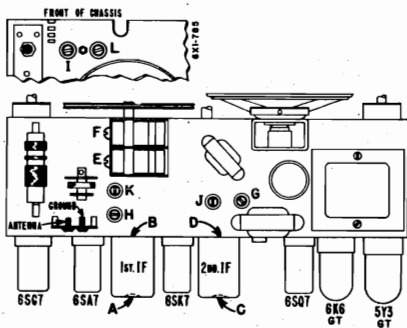
| Step | Dummy Antenna in Series with Signal Generator | Connection of Signal Generator (High Side) | Band Switch Position | Signal Generator Frequency | Receiver Gang Setting | Trimmer Description | Trimmer Designation | Type of Adjustment |
|------------------------------------------------|-----------------------------------------------|--------------------------------------------|----------------------|----------------------------|--------------------------|---------------------------|---------------------|----------------------------------------------|
| 1 | .02 mfd. condenser | †Pin No. 8 of 6SA7 | "BC" Medium Band | 455 KC | Gang fully open | 2nd IF 1st IF | A, B* C, D* | Maximum output. |
| 2 | 200 mmfd. condenser | Antenna Terminal | "BC" Medium Band | 1725 KC | Gang fully open | M.B. Oscillator (on gang) | E | Maximum output. |
| 3 | 200 mmfd. condenser | Antenna Terminal | "BC" Medium Band | 1400 KC | Tune in generator signal | M.B. Antenna (on gang) | F | Maximum output. |
| 4 | 200 mmfd. condenser | Antenna Terminal | "BC" Medium Band | 600 KC | Tune in generator signal | M.B. pad | G | Maximum output. "Rock" gang while adjusting. |
| Recheck alignment at 1400 KC (in step 3 above) | | | | | | | | |
| 5 | 400 ohm carbon resistor | Antenna Terminal | "SW1" Short Wave | 7.5 MC | Gang fully open | SW1 Osc. Trimmer | H ** | Maximum output. |
| 6 | 400 ohm carbon resistor | Antenna Terminal | "SW1" Short Wave | 6.2 MC | Tune in signal | SW1 Ant. Trimmer | I | Maximum output. |
| 7 | 400 ohm carbon resistor | Antenna Terminal | "SW1" Short Wave | 3.2 MC | Tune in signal | SW1 Osc. Pad | J | Maximum output. "Rock" gang while adjusting. |
| Recheck alignment in step 5 and 6 | | | | | | | | |
| 8 | 400 ohm carbon resistor | Antenna Terminal | "SW2" Short Wave | 23 MC | Gang fully open | SW2 Osc. Trimmer | K ** | Maximum output. |
| 9 | 400 ohm carbon resistor | Antenna Terminal | "SW2" Short Wave | 18 MC | Tune in signal | SW2 Ant. Trimmer | L | Maximum output. "Rock" gang while adjusting. |

* Adjustments B and D are made from underside of chassis.

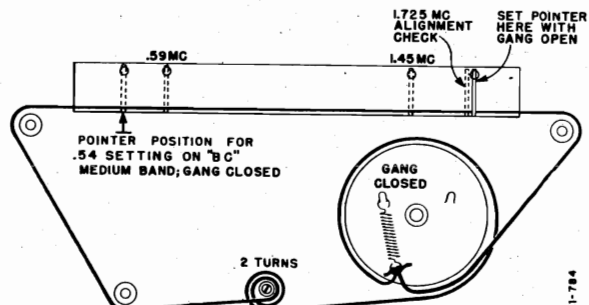
† If IF adjustments are very far off alignment, it may be necessary to feed signal through pin #4 of 6SK7, then through pin #8 of 6SA7.

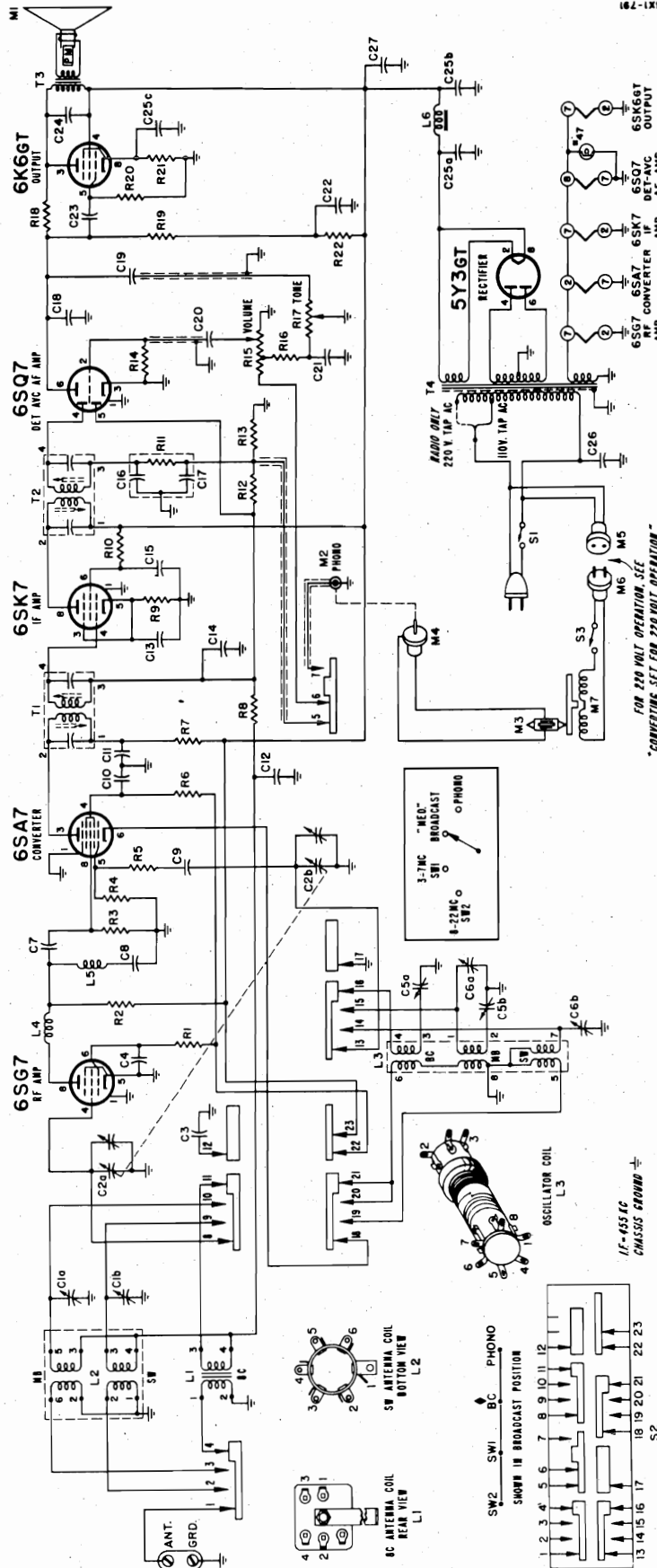
** Be sure that trimmer is aligned at correct frequency and not on image which should be approximately 910 KC lower than correct frequency, as indicated on the dial. Check to see that image appears 910 KC lower than alignment frequency.

TUBE AND TRIMMER LOCATION



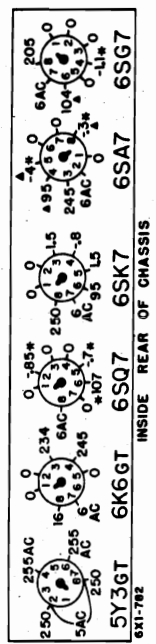
POINTER SETTING AND DIAL CORD STRINGING





VOLTAGE DATA

- Measured on 117 Volts AC line.
- Voltages measured with Vacuum Tube Voltmeter. Readings taken with a 1,000 ohm per volt meter will be approximately the same except for those marked with an asterisk * in the voltage chart; these readings will either be lower or practically zero.
- All readings made between tube socket terminals and chassis ground, unless otherwise indicated.
- Dial turned to low frequency end; volume and tone controls at minimum.
- Band switch set in "BC" position.



* If taken with a 1000 ohm-per-meter, readings will be lower or practically zero.
 ▲ On "Phono" these voltages will be zero. All other DC readings may be slightly higher.

MODEL 6X12,
Ch. 6X1

OPERATING VOLTAGE AND FREQUENCY

These sets are wired at the factory to operate on 110 volts, AC. To operate on 220 volts, a conversion kit must be obtained (part number 98A15-17) and all instructions under "Converting The Set For 220 Volt Operation" must be followed. In some sets, the phonograph has been converted to operate on 50 cycles; in other sets the phonograph operates on 60 cycles. To convert the phonograph to operate on either 50 cycles or 60 cycles, see the conversion instructions

PARTS LIST

RESISTORS

| Symbol | Description | Part No. |
|--------|-----------------------------------------|------------|
| R1 | 47000 ohms, 1 Watt | 60B 14-473 |
| R2 | 2,200 ohms, 1/2 Watt | 60B 8-222 |
| R3 | 100,000 ohms, 1/2 Watt | 60B 8-104 |
| R4 | 22,000 ohms, 1/2 Watt | 60B 8-223 |
| R5 | 47 ohms, 1/2 Watt | 60B 8-470 |
| R6 | 15,000 ohms, 1 Watt | 60B 14-153 |
| R7 | 1,000 ohms, 1/2 Watt | 60B 8-102 |
| R8 | 270,000 ohms, 1/2 Watt | 60B 8-274 |
| R9 | 100 ohms, 1/2 Watt | 60B 8-101 |
| R10 | 47,000 ohms, 1/2 Watt | 60B 8-473 |
| †R11 | 47,000 ohms, 1/2 Watt | 60B 8-473 |
| R12 | 2.2 megohms, 1/2 Watt | 60B 8-225 |
| R13 | 680,000 ohms, 1/2 Watt | 60B 8-684 |
| R14 | 4.7 megohms, 1/2 Watt | 60B 8-475 |
| R15 | 2 megohms, Volume Control | 75B 2-15 |
| R16 | 27,000 ohms, 1/2 Watt | 60B 8-273 |
| R17 | 2 megohm Tone Control and on-off Switch | 75B 1-35 |
| R18 | 1 megohm, 1/2 Watt | 60B 8-105 |
| R19 | 270,000 ohms, 1/2 Watt | 60B 8-274 |
| R20 | 470,000 ohms, 1/2 Watt | 60B 8-474 |
| R21 | 560 ohms, 1 Watt | 60B 14-561 |
| R22 | 33,000 ohms, 1/2 Watt | 60B 8-333 |

CONDENSERS

| Symbol | Description | Part No. |
|--------|-------------------------------|----------|
| C1a | 3 to 40 mmfd. } Dual | 66A 23-7 |
| C1b | 3 to 40 mmfd. } Trimmer | |
| C2a | 13 to 420 mmfd., Ant. } Gang | 68B 31 |
| C2b | 13 to 420 mmfd., Osc. } | |
| C3 | .01 mfd., 450 Volts, Ceramic | 65A 10-3 |
| C4 | .05 mfd., 400 Volts, Paper | 64B 5-22 |
| C5a | 410 to 500 mmfd. } Dual | 66A 23-5 |
| C5b | 1700 to 3100 mmfd. } Trimmer | |
| C6a | 3 to 40 mmfd. } Dual | 66A 23-8 |
| C6b | 3 to 30 mmfd. } Trimmer | |
| C7 | 100 mmfd., Mica | 65B 5-17 |
| C8 | 60 mmfd., ± 3%, Mica | 65B 1-49 |
| C9 | 120 mmfd., Mica | 65B 5-18 |
| C10 | .05 mfd., 400 Volts, Paper | 64B 5-22 |
| C11 | .05 mfd., 400 Volts, Paper | 64B 5-22 |
| C12 | .05 mfd., 400 Volts, Paper | 64B 5-22 |
| C13 | .05 mfd., 400 Volts, Paper | 64B 5-22 |
| C14 | .05 mfd., 400 Volts, Paper | 64B 5-22 |
| C15 | .05 mfd., 400 Volts, Paper | 64B 5-22 |
| †C16 | 100 mmfd., Ceramic | |
| †C17 | 100 mmfd., Ceramic | |
| C18 | 250 mmfd., Ceramic | 65B 6-5 |
| C19 | .005 mfd., 450 Volts, Ceramic | 65A 10-5 |
| C20 | .01 mfd., 450 Volts, Ceramic | 65A 10-3 |
| C21 | .01 mfd., 450 Volts, Ceramic | 65A 10-3 |
| C22 | .05 mfd., 400 Volts, Paper | 64B 5-22 |
| C23 | .01 mfd., 450 Volts, Ceramic | 65A 10-3 |
| C24 | .005 mfd., 450 Volts, Ceramic | 65A 10-5 |
| C25a | 30 mfd., 350 Volts } Elect. | 67C 7-15 |
| C25b | 30 mfd., 350 Volts } | |
| C25c | 20 mfd., 25 Volts } | |
| C26 | .01 mfd., 450 Volts, Ceramic | 65A 10-3 |
| C27 | .05 mfd., 400 Volts, Paper | 64B 5-22 |

COILS, TRANSFORMERS, ETC.

| Symbol | Description | Part No. |
|--------|------------------------------------|-------------|
| L1 | Coil, Antenna (BC) | 69A 78 |
| L2 | Coil, Antenna (SW1 and SW2) | 69A 112 |
| L3 | Coil, Osc. (BC, SW1 and SW2) | 69A 111 |
| L4 | Coil, Peaking (RF) | 69A 80 |
| L5 | Coil, Trap (455 KC) | 69A 77 |
| L6 | Choke, Filter | 74A 10 |
| T1 | Transformer, 1st IF | 72B 71 |
| T2 | Transformer, 2nd IF | 72B 72 |
| T3 | Transformer, Speaker Output | 79A 25-2 |
| T4 | Transformer, Power (117V and 220V) | 80B 14-1 |
| M1 | Speaker, 5" PM | 78B 39-2 |
| M2 | Jack, Phono Input | 88A 1 |
| S1 | Switch, On-off | Part of R17 |
| S2 | Switch, Band (4 position) | 77B 30 |
| | Diode Filter | 63A 3-1 |

† Part of Diode Filter Unit 63A3-1. This unit consists of R11, C16, C17 (see schematic). If a section of the unit becomes defective, replace with exact duplicate or individual components of proper value.

CABINET PARTS

| Description | Part No. |
|---------------------------------------------|-----------|
| Bracket, Dial Scale Mtg. | 15A 169 |
| Cabinet, Plastic (Complete) Mahogany (6X12) | 34D 11-2 |
| Dial Glass | 21B 54-1 |
| Escutcheon Overlay | 23C 23-4 |
| Grille Cloth and Baffle | A1688 |
| Hex Nut, Escutcheon Mtg. (#4-40) | 2A 1-6-71 |
| Hinge | 37A 9-1 |
| Hinge Stud | 27A 17-1 |
| Knobs, Radio | |
| On-Off Tone | 33C 40-27 |
| Volume | 33C 40-27 |
| Band Switch | 33C 40-29 |
| Tuning | 33C 40-31 |
| Lid, Cabinet Mahogany (6X12) | 34D 11-13 |
| Rubber Bumper (for cabinet lid) | 12A 3-2 |
| Rubber Strip, Dial Scale Mtg. (1 1/4" long) | 12A 9-4 |
| Screw, Escutcheon Mtg. (#4-40x3/4) | 1A 80-4 |

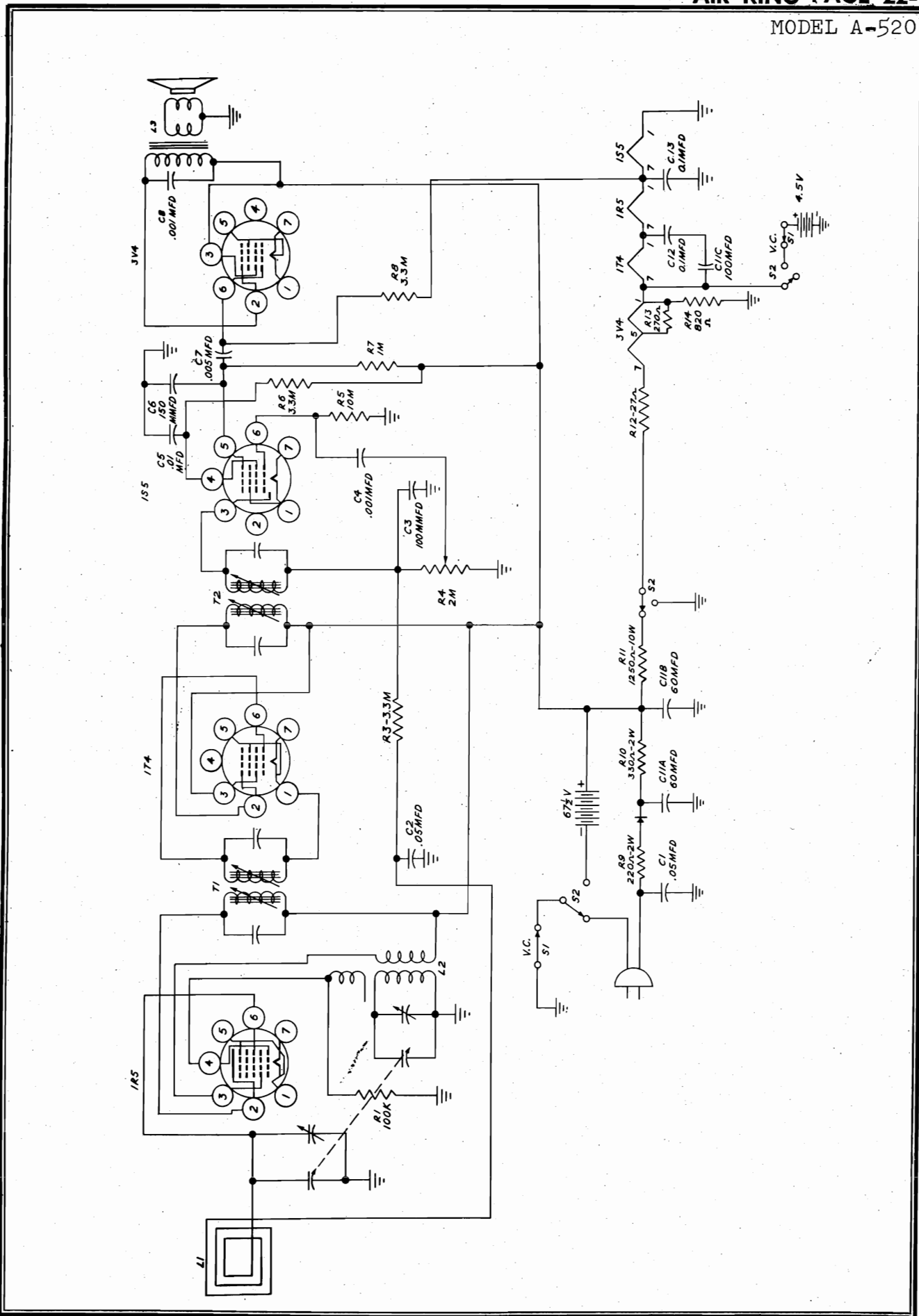
MISCELLANEOUS

| Description | Part No. |
|--------------------------------|-----------|
| Bracket, Pilot Light | 15A 535 |
| Cable, 3 Wire (10" long) | 89A 1-3 |
| Carton and Fillers | 44B 112 |
| Dial Background | 22B 9-1 |
| Dial Cord | 50A 1-3 |
| Grommet, Gang Mounting | 12A 1-2 |
| Line Cord | 89A 1-1 |
| Manual | |
| Customer Instruction (English) | 41A 17-47 |
| Customer Instruction (Spanish) | 41A 17-48 |
| Service, for 6X1 Chassis | S282 |
| Service, for RC221, RC222 | |
| Record Changers (English) | S256 |
| Service, for RC322 | S256A |
| Phono Jack | 88A 1 |
| Pilot Light | 81A 1-8 |
| Pointer | 25A 21 |
| Pulley, Dial Cord | 17A 1-3 |
| Sleeve, Tuning | 27A 145 |
| Socket and Leads (Pilot light) | 82A 2-2 |
| Spring, Dial Cord Tension | 19B 1-3 |
| Washer, Tuning Shaft "E" | 4B 12-24 |

PHONOGRAPH PARTS

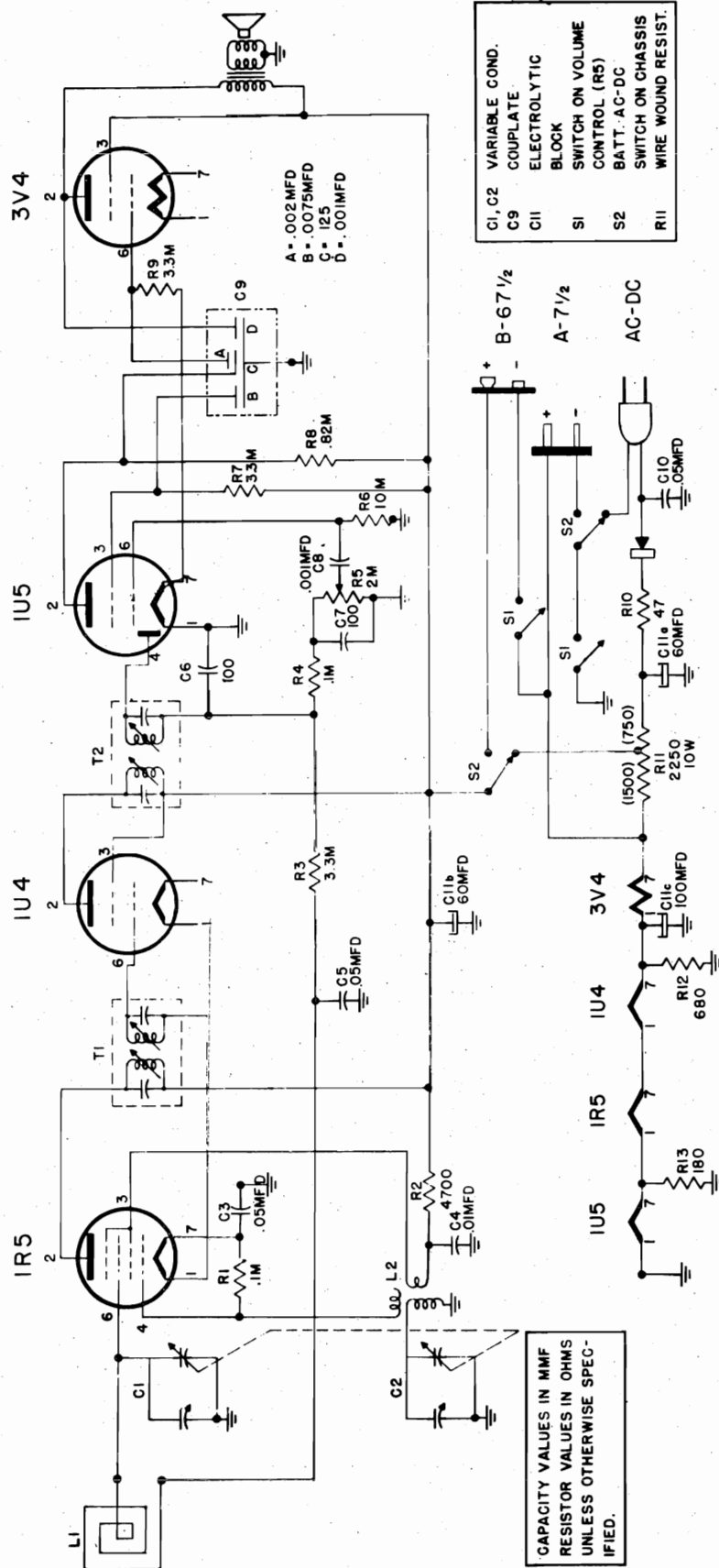
NOTE: See Record Changer Service Manual (form S256) and its supplement (form S256A) for complete parts list.

| | | |
|----|------------------------------------|-----------|
| M3 | Cartridge (includes needle) | 409A 12 |
| | Needle, Phonograph | |
| | Long Play | 98A 15-6 |
| | Standard 78 RPM | 98A 15-7 |
| M4 | Plug, Pickup Shielded Cable | 88A 2-3 |
| M5 | Phono Motor Socket and Leads | 89A 6-3 |
| M6 | Motor Plug | 88A 8-1 |
| M7 | 3 Speed Motor | 407B 17 |
| S3 | Switch, Phono Motor On-Off | 408A 1 |
| | (See Caution in Changer Manual) | |
| | Centerpost (for 10" & 12" records) | G400B 311 |
| | Centerpost (for 7" 33 RPM records) | G400B 310 |
| | Centerpost for 7" 45 RPM records) | G400B 29 |



PAGE 22-2 AIR KING

MODEL A-520-A



- C1, C2 VARIABLE COND.
- C9 COUPLATE
- C11 ELECTROLYTIC
- S1 BLOCK
- S2 SWITCH ON VOLUME CONTROL (RS)
- BATT. AC-DC SWITCH ON CHASSIS
- R11 WIRE WOUND RESIST.

CAPACITY VALUES IN MMF
RESISTOR VALUES IN OHMS
UNLESS OTHERWISE SPEC-
IFIED.

HOW TO INSTALL THE RADIO

MODEL 5G-563

POWER SUPPLY: This receiver is designed to operate from a power source of 110 to 125 volts AC current at 60 cycles only.

Always predetermine the type of power in your location by consulting the local power company for this information.

CAUTION: Never plug this unit into a 220 Volt or a DC power source as you will seriously damage the component parts, which have been designed for 110 to 125 volts AC current at 60 cycles only.

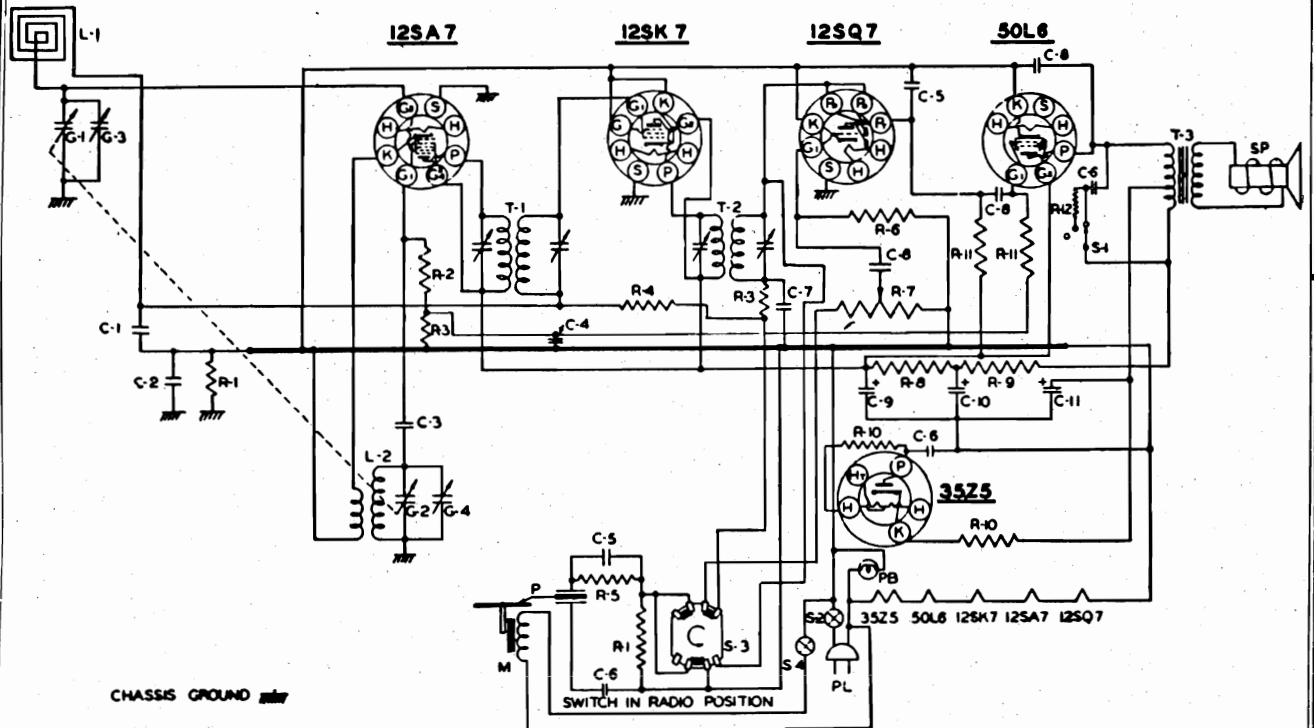
ANTENNA: This receiver is equipped with a sensitive loop antenna and will require no external antenna or ground. However, due to the directional qualities of the loop antenna, the reception of some stations may be improved by turning the receiver in different directions.

CONTROL KNOBS: This instrument is equipped with four knobs to control the operation. The extreme left knob is the "Tone" control. This control has three positions. The left hand position is "Normal" usually used for speech. The center position is "Medium" and is used for music. The right hand position is "Low" and is used to attenuate the high notes and increase the low notes. The second knob is the "Tuning" selector. This knob may be moved to the right or left to select the desired station. By mentally adding a zero to the numbers on the dial, the result will be read directly in kilocycles, i. e. $60 + 0 = 600$ KC or $170 + 0 = 1700$ KC.

The first knob to the right of the speaker opening is the "Volume" control and also the "OFF-ON" switch. In the extreme left hand position the switch is in "OFF" position. Turn this knob to the right and a click will be heard. This indicates that the power has been turned on. Allow about 30 seconds for the tubes to heat up and the instrument will be ready for operation. To increase volume, turn this knob to the right.

The extreme right hand knob is the "Radio-Phono" switch. The right hand position is for "Radio" operation and the left hand position is for "Phono" operation.

SD-77 U



MODEL 5G-563

ALIGNMENT DATA

Remove the chassis from the cabinet. A Signal Generator with the following frequencies is required: 455 KC, 1400 KC and 1720 KC.

The receiver volume control should be turned to maximum during the I.F. and all subsequent alignments to keep the A.V.C. from working and giving false readings. Turn the tone control to complete left hand position. Keep the generator output as low as possible to prevent overloading.

Connect an output meter across the voice coil of the speaker.

Connect a 20,000 ohm resistor across the loop connector terminals to reflect proper loop impedance.

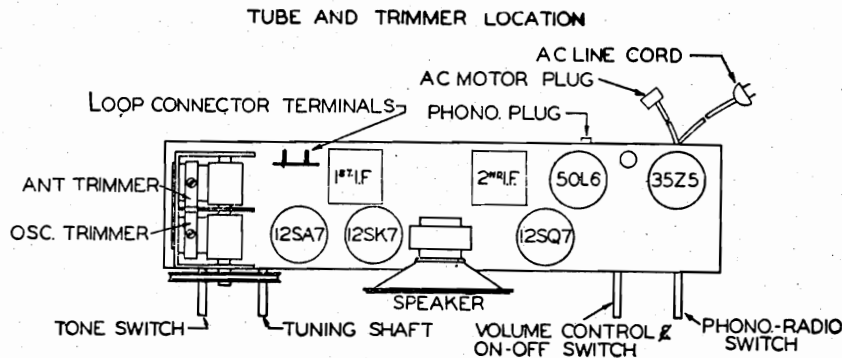
FIRST STEP: Connect the hot lead from the generator to the "ANT." section of the gang condenser through a .1 MFD. condenser. The ground lead must be connected to the floating ground buss under the chassis. Turn the gang condenser to complete minimum capacity. Adjust the generator to 455 KC and adjust the trimmers of the 1st and 2nd I.F. transformers until a maximum reading is noted on the output meter.

SECOND STEP: With the leads from the generator connected in the same manner as in I.F. alignment, adjust the signal generator to 1720 KC. The "O.S.C." trimmer is located on the front section of the gang condenser. Adjust this trimmer until the signal is tuned in. The gang condenser should be at complete minimum capacity for this setting.

THIRD STEP: Remove the generator leads from the chassis. Remove the 20,000 ohm resistor from the loop connector terminals. Reinstall the chassis in the cabinet, connect the loop leads, motor plug and phono pickup leads.

Connect the generator leads to a transmitting loop, made of a few turns of wire, and loosely couple to the receiver loop antenna which is located on the back end of the cabinet. Adjust the generator to 1400 KC. Rotate the tuning control until this signal is tuned in. The "ANT." trimmer is located on the rear section of the gang condenser. Adjust this trimmer until a maximum signal is noted on the output meter.

No further adjustment should be necessary, unless the receiver has been damaged, as the coils and tuning condenser have been specially handled at the factory to insure proper alignment at the lower frequencies.

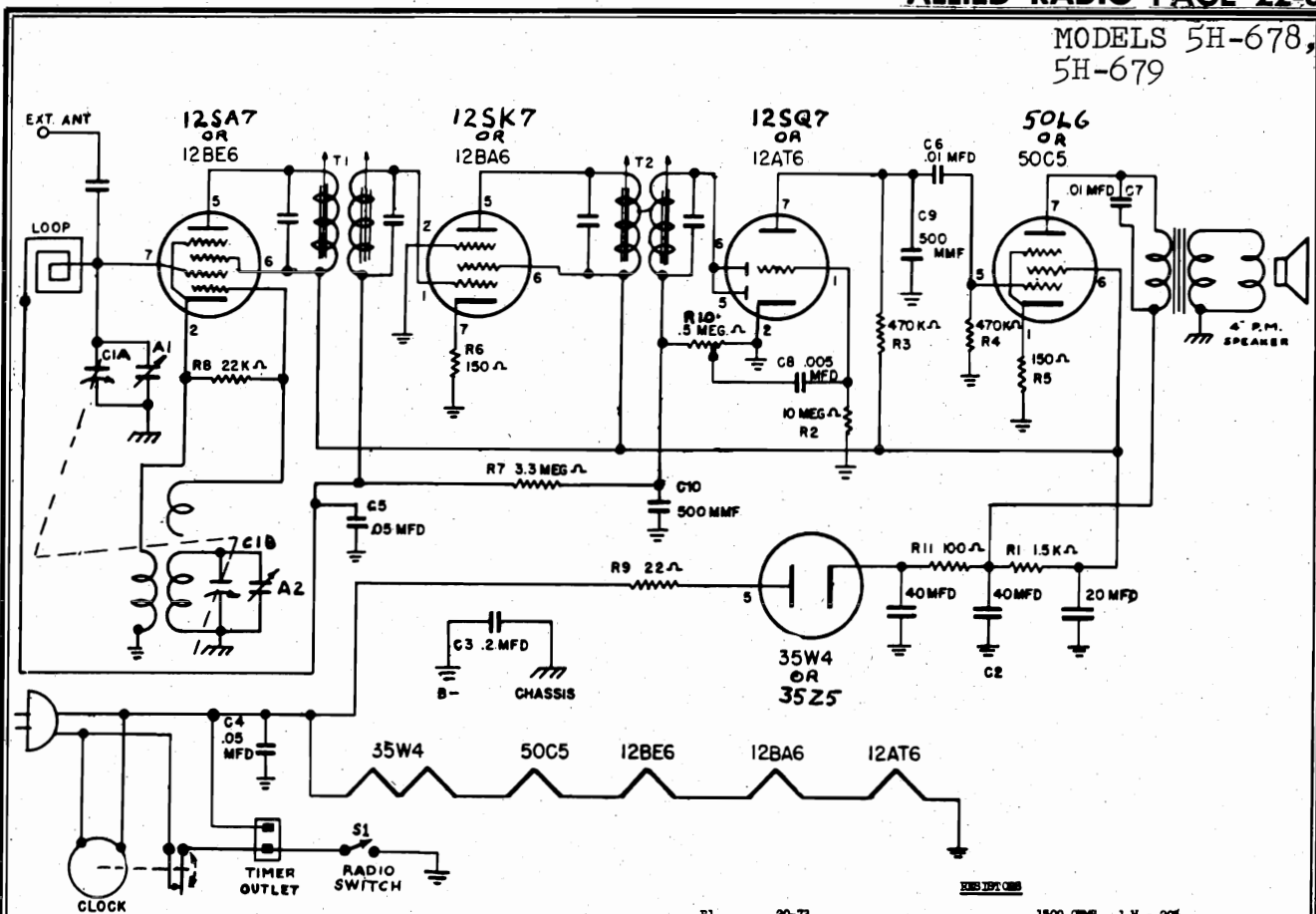


TL-77-U

FIGURE - 1

| PART NO. | DESCRIPTION | PART NO. | DESCRIPTION | PART NO. | DESCRIPTION |
|----------|---------------------------------------|----------|--------------------------------------|----------|----------------------------------------|
| PC-2 | C-1 .05MFD. CONDENSER 200V | IR-1 | R-8 470 Ω RESISTOR 1/2W 20% | SW-2 | S-1 TONE SWITCH |
| PC-8 | C-2 .1MFD. CONDENSER 400V | IR-42 | R-9 1000 Ω RESISTOR 1W 10% | | S-2 SWITCH ON VOLUME CONTROL |
| MC-4 | C-3 .00005MFD. MICA | IR-17 | R-10 33 Ω RESISTOR 1/2W 20% | SW-1 | S-3 PHONO-RADIO SWITCH |
| PC-4 | C-4 .25MFD. CONDENSER 200V | IR-11 | R-11 470M Ω RESISTOR 1/2W 20% | | S-4 SWITCH ON RECORD CHANGER |
| MC-5 | C-5 .0005MFD. MICA | IR-15 | R-12 2200 Ω RESISTOR 1/2W 20% | AC-M-7 | M RECORD CHANGER MOTOR |
| PC-5 | C-6 .05MFD. CONDENSER 400V | GC-5 | G-1 GANG CONDENSER | AC-RJ-7 | P CRYSTAL PICKUP ARM CARTRIDGE S-1 |
| MC-2 | C-7 .0001MFD. MICA | | G-2 ANT. TRIMMER | PB-2 | PB 110V. 7 $\frac{1}{2}$ W. PILOT BULB |
| PC-7 | C-8 .01MFD. CONDENSER 400V | | G-3 OSC. TRIMMER | CO-2 | PL LINE CORD |
| PC-7 | C-9 20MFD. | | | | |
| EC-14 | C-10 .40MFD. 150WV. ELECTROLYTIC | LI-6 | T-1 INPUT I.F. TRANSFORMER | | |
| | C-11 .40MFD. J. | LI-7 | T-2 OUTPUT I.F. TRANSFORMER | | |
| IR-20 | R-1 220M Ω RESISTOR 1/2W 20% | | T-3 OUTPUT TRANSFORMER | | |
| IR-9 | R-2 22 M Ω RESISTOR 1/2W 20% | LL-17 | L-1 LOOP ANT. | | |
| IR-10 | R-3 47 M Ω RESISTOR 1/2W 20% | LO-14 | L-2 OSC. COIL | | |
| IR-23 | R-4 .33MEG Ω RESISTOR 1/2W 20% | SPH-12 | SP 5" PM. SPEAKER | | |
| IR-12 | R-5 .1MEG Ω RESISTOR 1/2W 20% | | | | |
| IR-13 | R-6 .22MEG Ω RESISTOR 1/2W 20% | | | | |
| VC-4 | R-7 .1MEG. VOLUME CONTROL | | | | |

MODELS 5H-678,
5H-679



| SYMBOL NO. | PART NO. |
|------------|----------|
| C1 | 30-26 |
| C2 | 31-30A |
| C3 | 32-13 |
| C4 | 32-25 |
| C5 | 32-4 |
| C6,7 | 32-1 |
| C8 | 32-20 |
| C9,10 | 35-13 |

REPLACEMENT PARTS LIST

COMPONENTS

- VARIABLE CONDENSER, 2 GANG, 400 & 162 MMF.
- ELECTROLYTIC CONDENSER, 4000/20 MFD/150 V
- TUBULAR PAPER CONDENSER, .2 MFD/400 V
- PERMOLITE, .05 MFD/400V
- RESISTOR, .05 MFD/200 V
- RESISTOR, .01 MFD/400 V
- RESISTOR, .005 MFD/500 V
- MILA CONDENSER, 500 MMFD/500 V

| R1 | 20-73 |
|------|----------|
| R2 | 20-27 |
| R3,4 | 20-92 |
| R5 | 20-81 |
| R6 | 20-29 |
| R7 | 20-26 |
| R8 | 20-22 |
| R9 | 20-93 |
| R10 | 50-27 |
| R11 | 20-40 |
| T1,2 | 60-12 |
| | 61-11 |
| | 125-34-B |
| S1 | 65-11 |
| | 80-25A |
| | 120-54 |
| | 120-43 |
| | 122-21 |
| | 140-7 |

- 1500 OHMS - 1 V - 20%
- 10 MEG. - 1/4 V - 20%
- 470 K - 1/4 V - 20%
- 150 OHMS - 1/2 V - 20%
- 150 OHMS - 1/4 V - 20%
- 3.2 MEG. - 1/4 V - 20%
- 22 K - 1/4 V - 20%
- 22 OHMS - 1/2 V - 20%
- VOLUME CONTROL, 0.5 MEG.
- 100 OHMS - 1/2 V - 20%
- OSCILLATOR COIL
- IF TRANSFORMER
- BACK ASSEMBLY, INCL. LOOP
- RADIO SWITCH
- 4" P.M. SPEAKER WITH OUTPUT TRANSFORMER
- CABINET (WITHOUT CLOCK INSERT)
- CLOCK
- CLOCK INSERT
- KNOB (2)
- CLOCK

ALIGNMENT PROCEDURE

- Output meter across voice coil (3.2 ohm)
- Volume control at maximum for all adjustments.
- Align for maximum output. Reduce input as needed to keep output near 1.28 volts (0.5 watt).

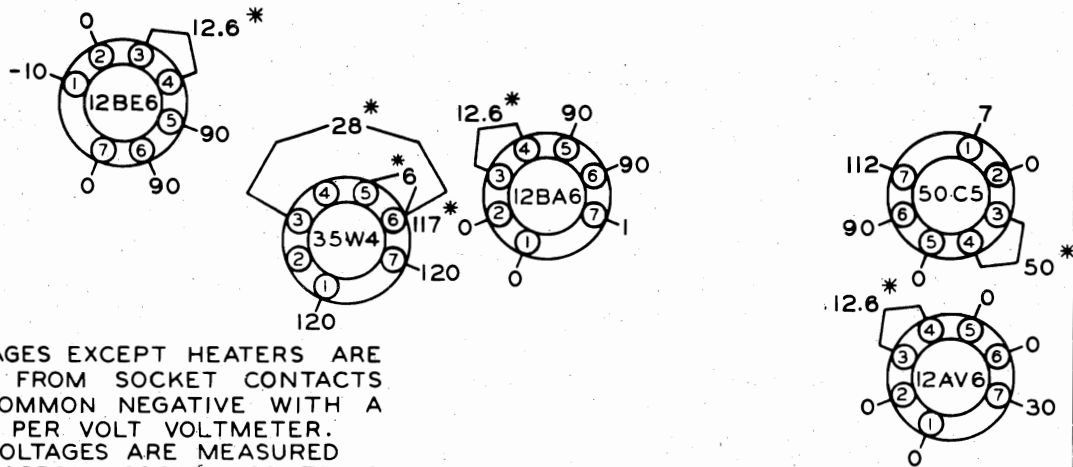
| SIGNAL GENERATOR | | | | TUNER SETTING | ADJUST TRIMMERS TO MAXIMUM OUTPUT (in order shown) |
|------------------|--------------------|-------------------------|-------------------|--------------------------------------|----------------------------------------------------|
| Frequency | Coupling Capacitor | Connections to Receiver | Ground Connection | | |
| 455 kc | 0.1 mfd. | 12BE6 grid | B- | Rotor full open (Plates out of mesh) | Input and output slugs of IF cans |
| 1650 kc | 0.1 mfd. | 12BE6 grid | B- | Rotor full mesh (Plates out of mesh) | Oscillator trimmer A2 |
| 1500 kc | | Radiating Loop | | 1500 kc* | Antenna trimmer A1 |

*Nine markings on the dial represent respectively 540KC, 600KC, 700KC, 800KC, 900KC, 1100KC, 1300KC, 1500KC, and 1650KC reading from left to right. These points are to be used for the alignment of the receiver.

PAGE 22-4 ALLIED RADIO

MODELS 5H-570,
5H-571, Ch. YHU

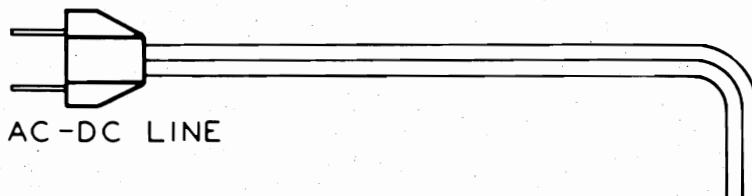
REAR OF CHASSIS



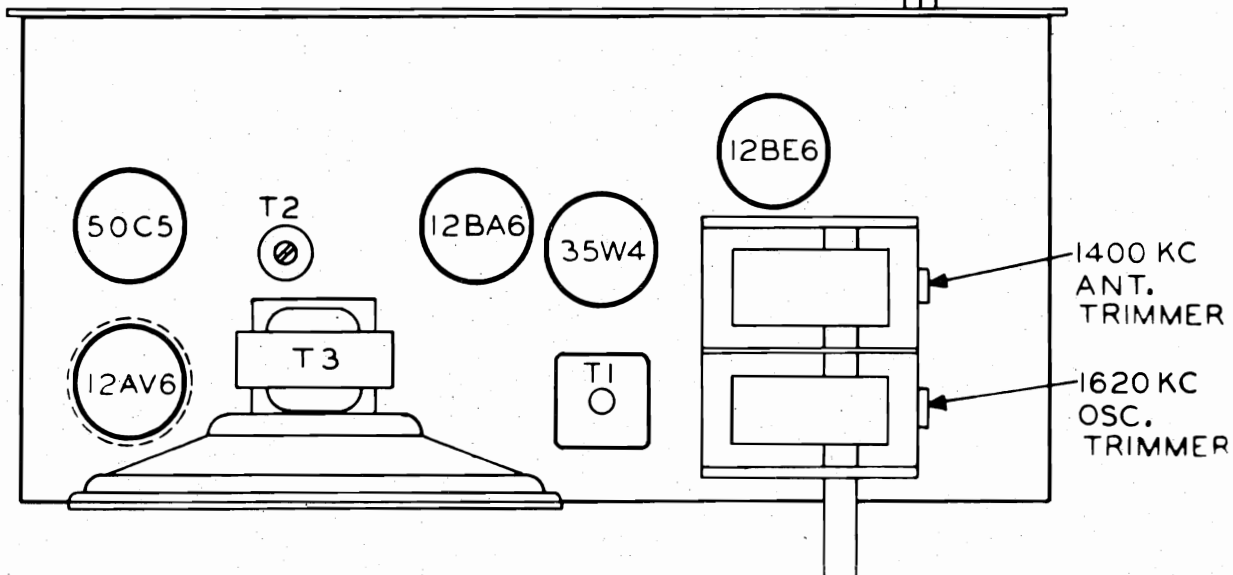
ALL VOLTAGES EXCEPT HEATERS ARE MEASURED FROM SOCKET CONTACTS TO THE COMMON NEGATIVE WITH A 1000 OHM PER VOLT VOLTMETER. HEATER VOLTAGES ARE MEASURED DIRECTLY ACROSS SOCKET CONTACTS.
* A.C. EXCEPT WHEN SET IS USED ON D.C.

VOLTAGE TABLE
(BOTTOM VIEW OF CHASSIS)

PART NO. 4-A-90

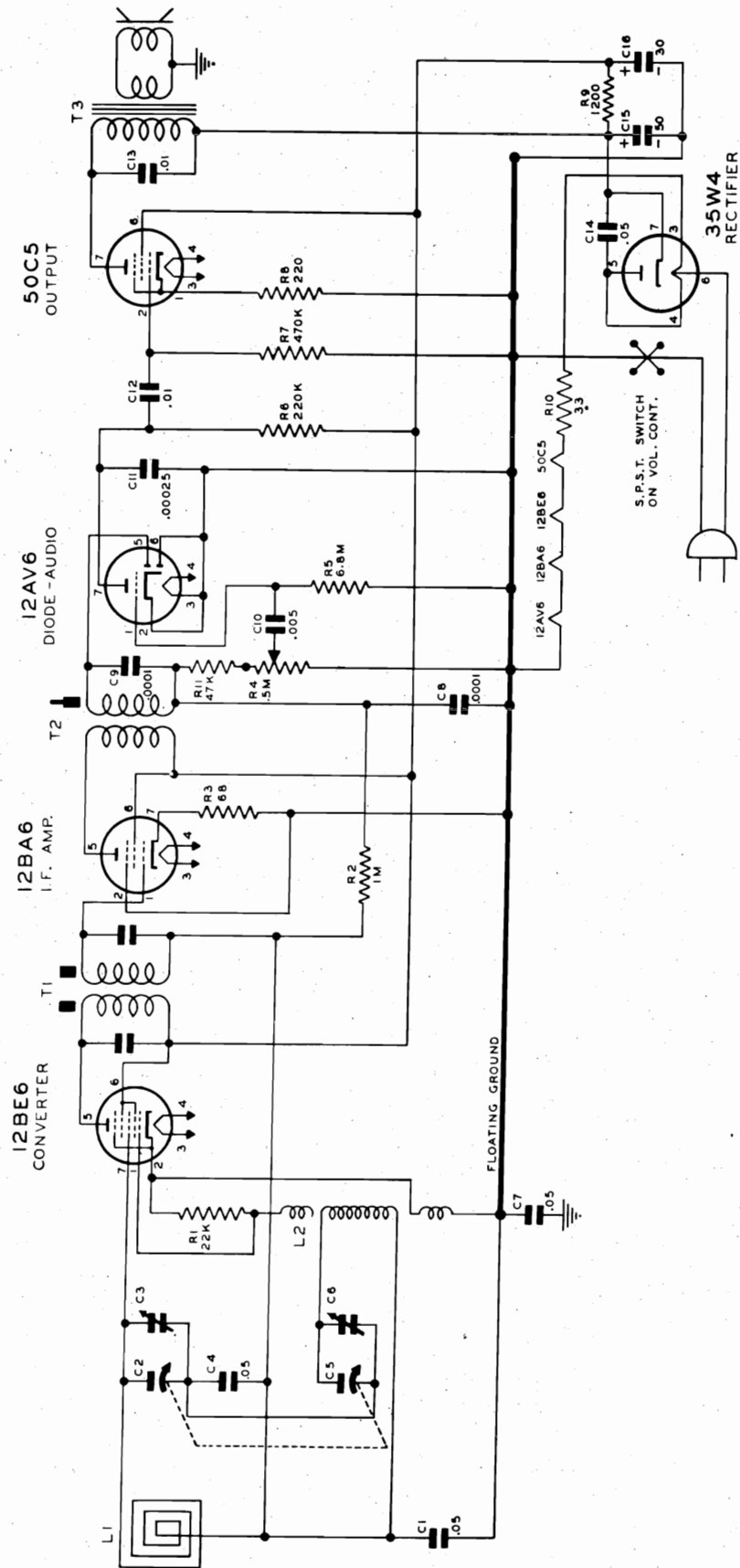


AC-DC LINE



PART NO. 4-A-90

MODELS 5H-570,
5H-571, Ch. YHU



MODELS 5H-570, -571,
Ch. YHU, YHAU

ALIGNMENT PROCEDURE

For alignment procedure read tabulations from left to right and make the adjustments marked (1) first, (2) next, (3) third.

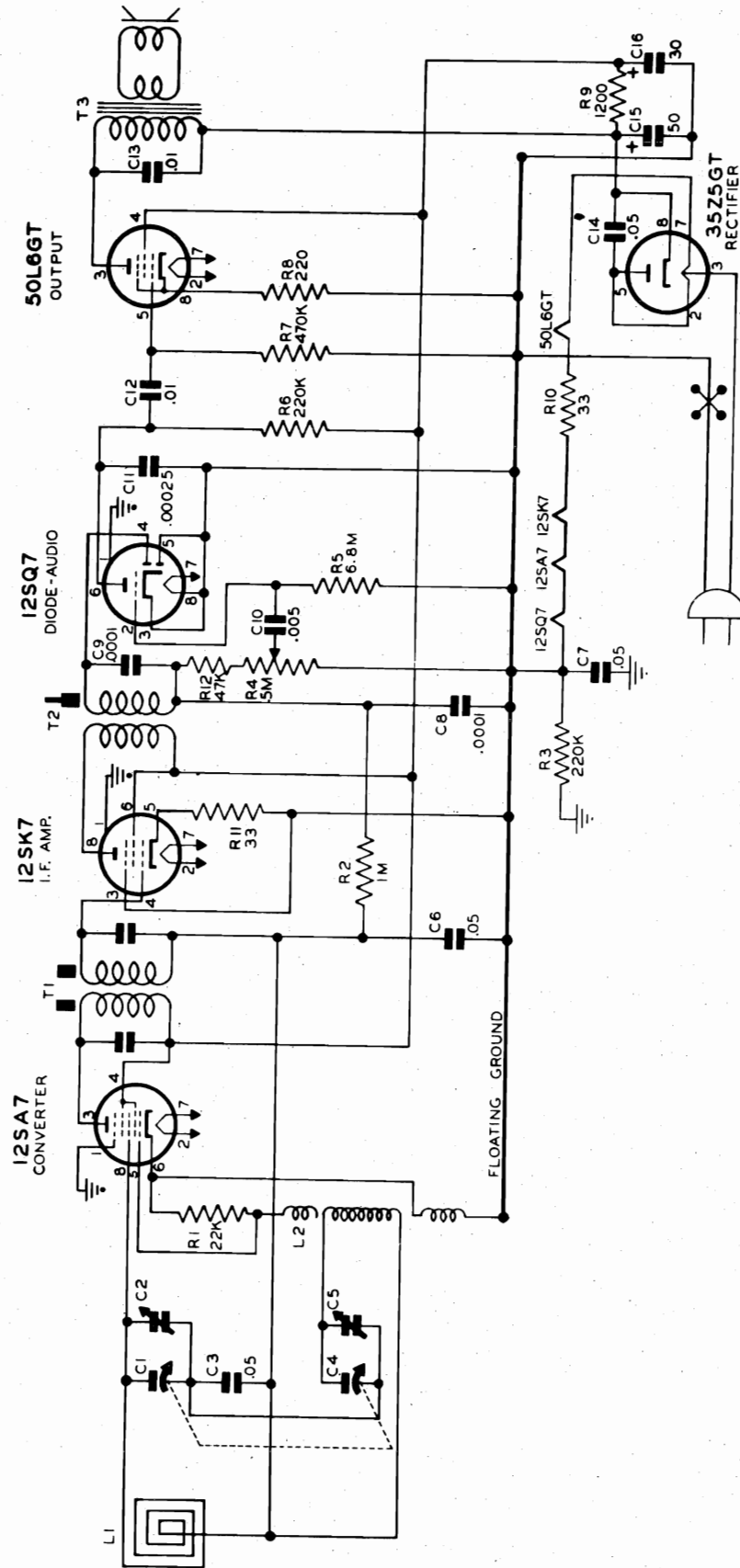
BEFORE STARTING ALIGNMENT:

- (A) Remove the chassis and loop antenna from the cabinet at the same time by removing the two screws on the rear apron of the chassis which fasten the chassis to cabinet.
- (B) Use an accurately calibrated test oscillator with some type of output measuring device.

| STEPS | Set Receiver dial to: | TEST OSCILLATOR | | Dummy Antenna | Refer to parts designations in schematic drawing for trimmers mentioned below: |
|-------|----------------------------------------------------|--------------------------------------|------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
| | | Adjust test Oscillator Frequency to: | Attach Output of test oscillator to: | | |
| 1 | Any point where no interfering signal is received. | EXACTLY 455 KC | High side to grid of Converter tube (*). Low side to common negative | .1 MFD CONDFN-SER | Adjust 2nd. I. F. (T2) and then each of the slugs of the 1st. I.F. (T1) for maximum output. |
| 2 | Exactly 1620 KC | Exactly 1620 KC | Dummy Antenna | 2 Turns of Hookup Wire 6" in Dia. (Place Approx. a Foot from and in Same Plane as Loop) | Adjust 1620 KC oscillator trimmer for maximum output. |
| 3 | Approx. 1400 KC | Approx. 1400 KC | Dummy Antenna | | Adjust 1400 KC antenna trimmer for maximum output. |

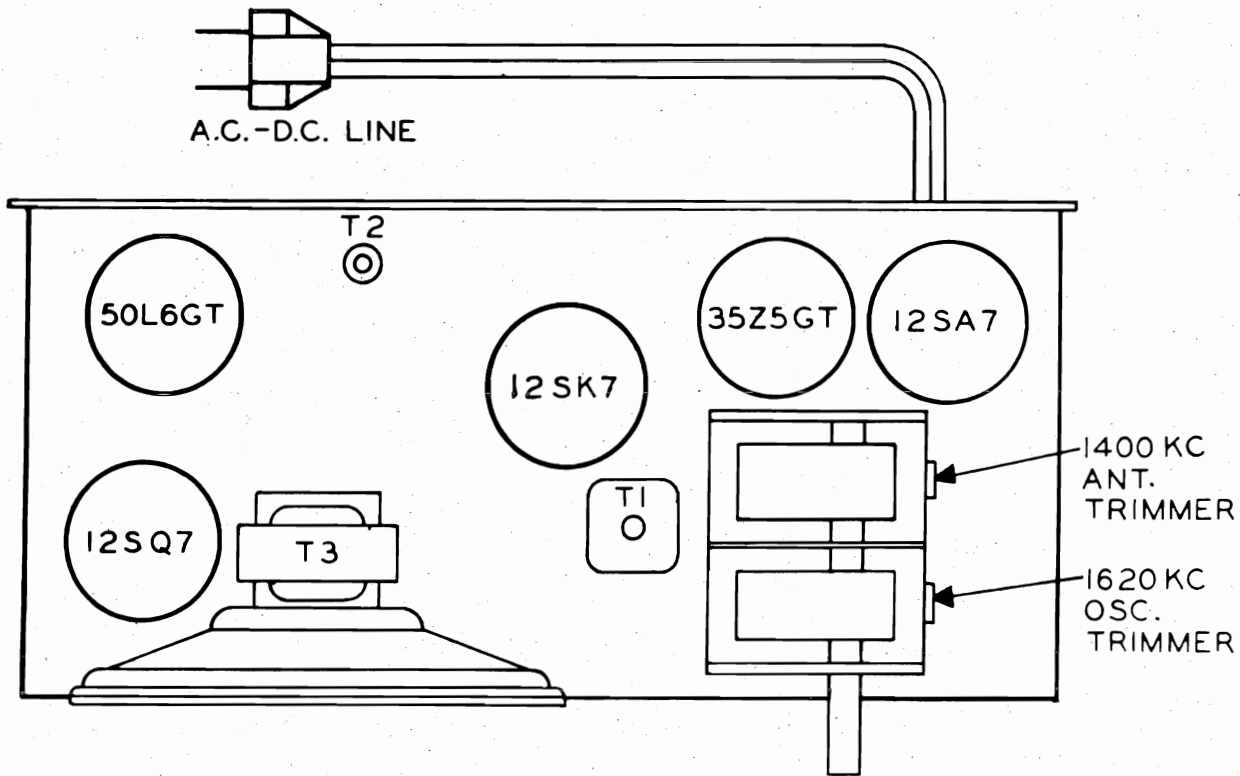
* Insert 12AU6 for No. YHU. Insert 12SA7 for No. YHAU

MODELS 5H-570,
5H-571, Ch. YHAU

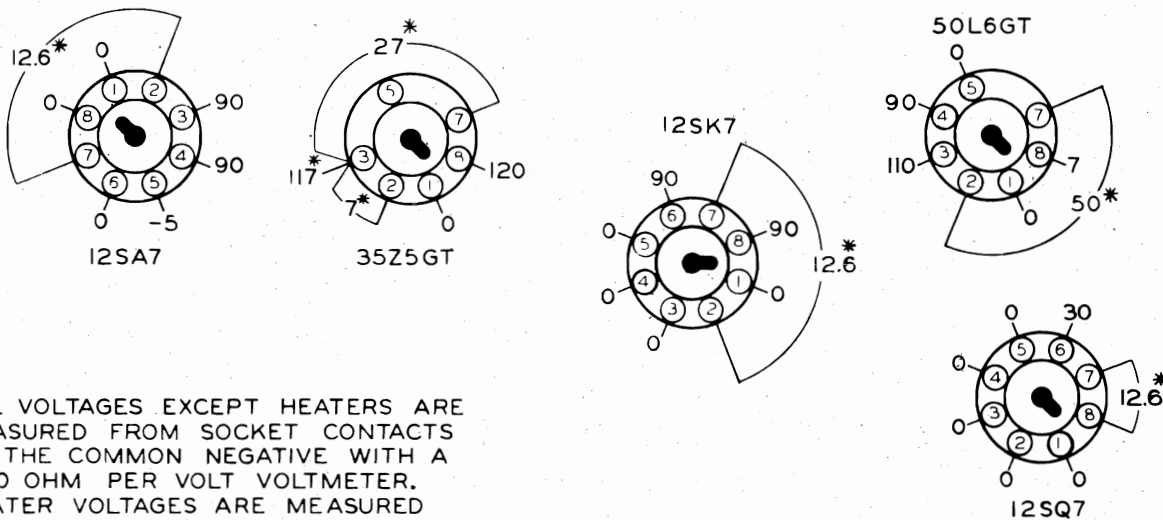


PAGE 22-8 ALLIED RADIO

MODELS 5H-570,
5H-571, Ch. YHAU



REAR OF CHASSIS



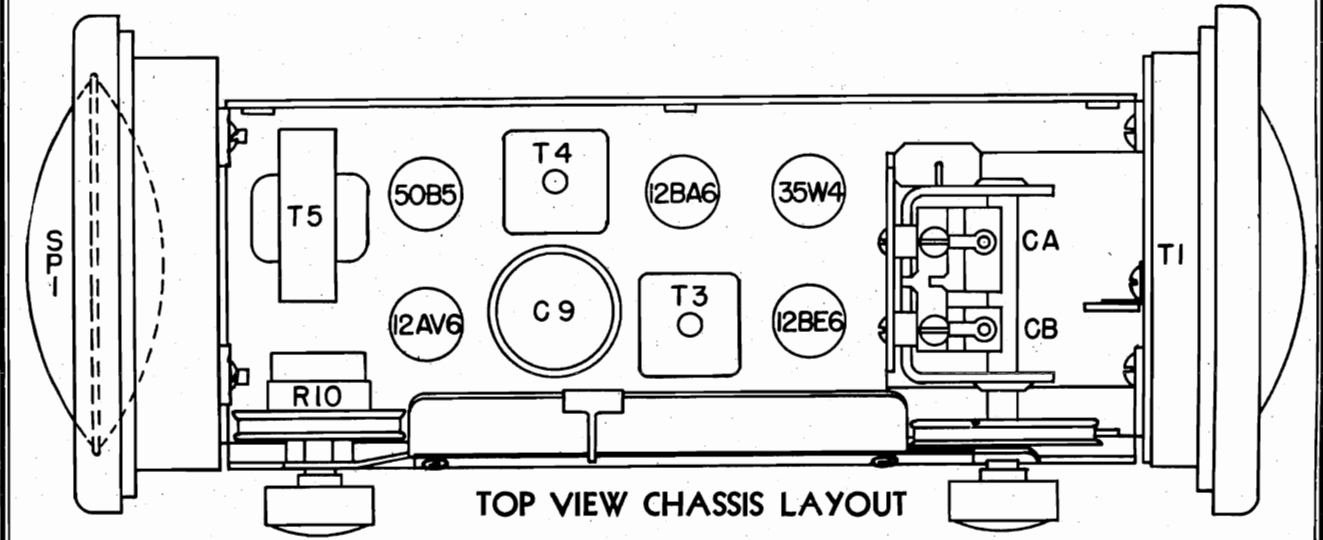
ALL VOLTAGES EXCEPT HEATERS ARE MEASURED FROM SOCKET CONTACTS TO THE COMMON NEGATIVE WITH A 1000 OHM PER VOLT VOLTMETER. HEATER VOLTAGES ARE MEASURED DIRECTLY ACROSS SOCKET CONTACTS.

* A.C. EXCEPT WHEN SET IS USED ON D.C.

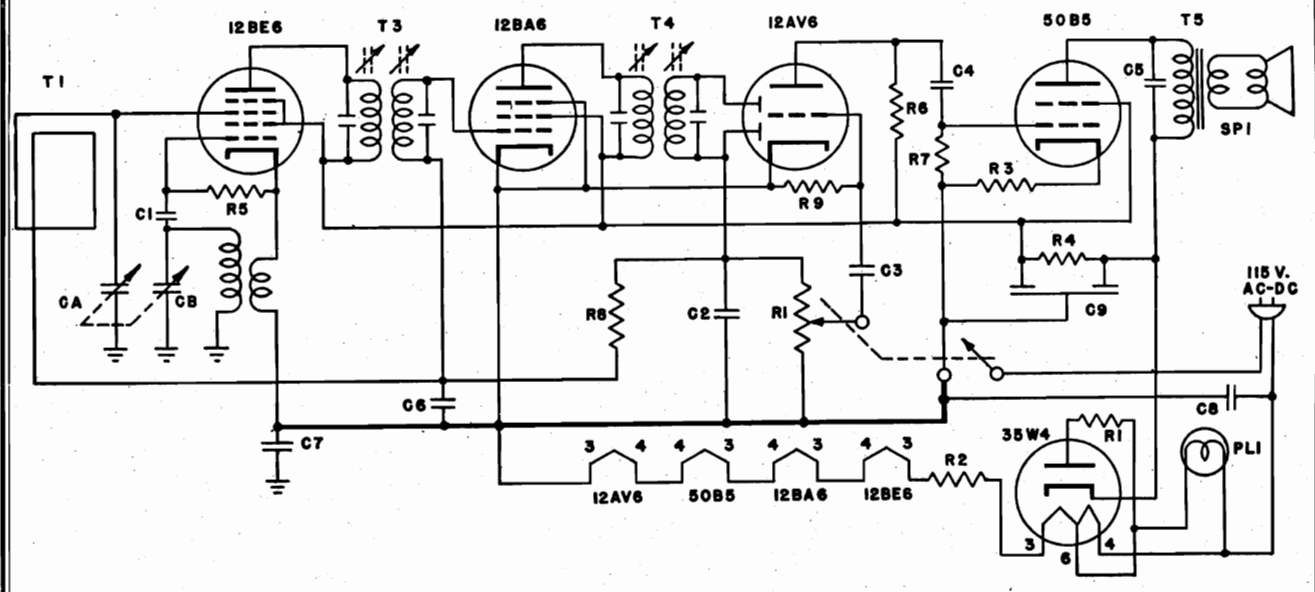
VOLTAGE TABLE
(BOTTOM VIEW OF CHASSIS)

MODELS 5H-607,
5H-608

- Band Coverage: 1750 KC to 535 KC.
- Operates on 115 Volts—A. C. or D. C.
- Four tubes plus rectifier { 1-12BE6 Def. Osc., 1-12BA6 I. F. Amp.,
1-12AV6 2nd Det. 1st Audio, 1-50B5 Output,
1-35W4 Rect.



TOP VIEW CHASSIS LAYOUT



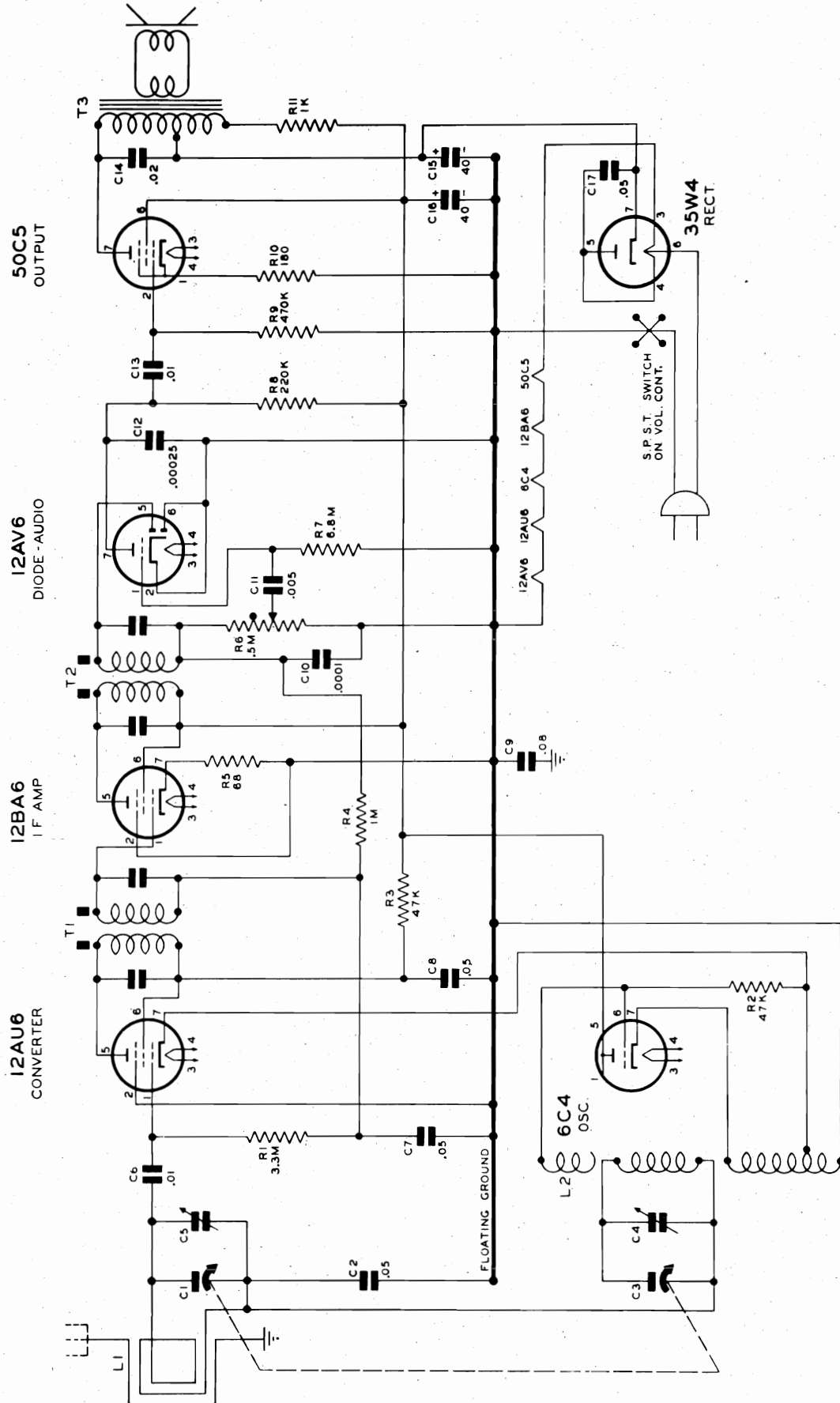
| | | |
|--------------|-----|------------------|
| R1 - 25 OHM | 1/2 | WATT RESISTOR |
| R2 - 100 " | 5 | " " |
| R3 - 180 " | 1/2 | " " |
| R4 - 1500 " | " | " " |
| R5 - 25M " | " | " " |
| R6 - 500M " | " | " " |
| R7 - 500M " | " | " " |
| R8 - 5MEG. " | " | " " |
| R9 - 5MEG. " | " | " " |
| R10 - 500M " | " | POT. WITH SWITCH |

| | | |
|-----------------|-------|-----------|
| C1 - .0001 MFD. | 400V. | CONDENSER |
| C2 - .0001 " | " | " " |
| C3 - .01 " | " | " " |
| C4 - .01 " | " | " " |
| C5 - .01 " | " | " " |
| C6 - .05 " | 200V. | " " |
| C7 - .1 " | 400V. | " " |
| C8 - .1 " | " | " " |
| C9 - 50+50 " | 150V. | " " |

- T1 - LOOP ANTENNA
- T2 - OSC. COIL
- T3 - 455 KC. I.F.
- T4 - 455 KC. I.F.
- T5 - O. P. TRANSFORMER
- PL1 - NO. 4.4 PILOT LAMP
- SPI - PILLOW SPEAKER

PAGE 22-10 ALLIED RADIO

MODELS 6H-580,
6H-581



ALIGNMENT PROCEDURE

For alignment procedure read tabulations from left to right and make the adjustments marked (1) first, (2) next, (3) third.

Before starting alignment:

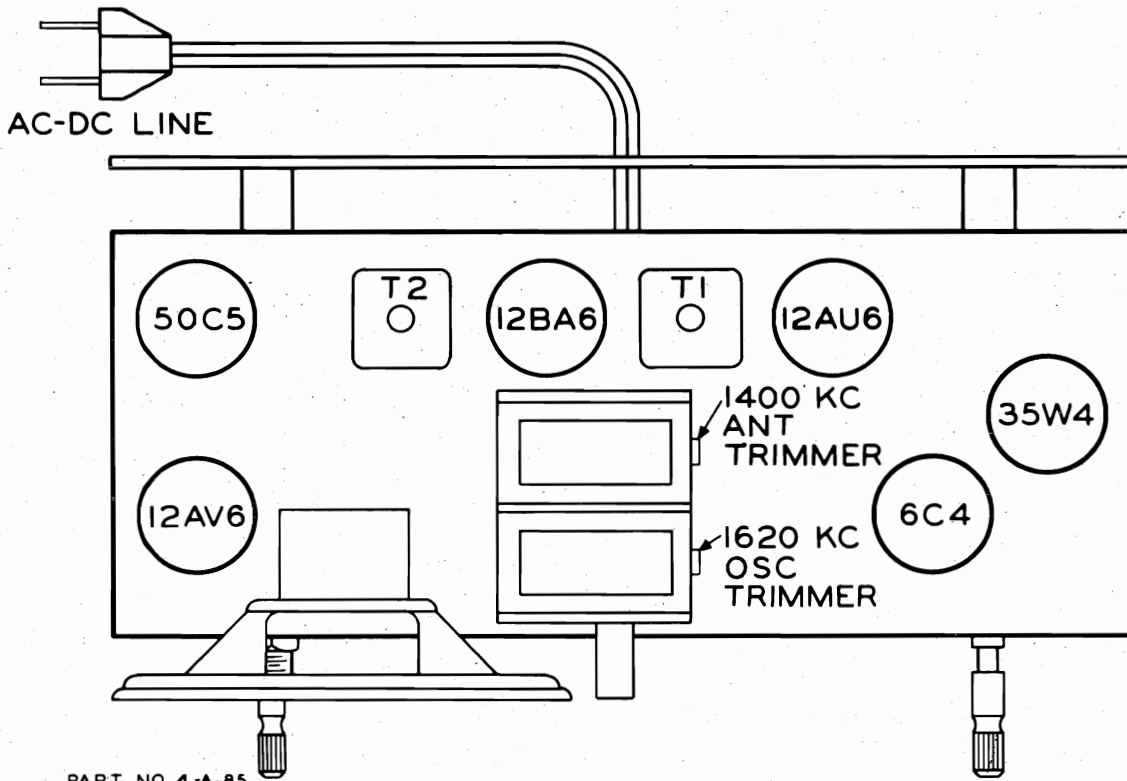
(A) Remove the chassis and loop antenna from the cabinet at the same time. To accomplish this, remove the two fasteners holding the top of the back to the cabinet and remove the two screws on the rear apron of the chassis which fasten the chassis to the cabinet.

(B) Use an accurately calibrated test oscillator with some type of output measuring device.

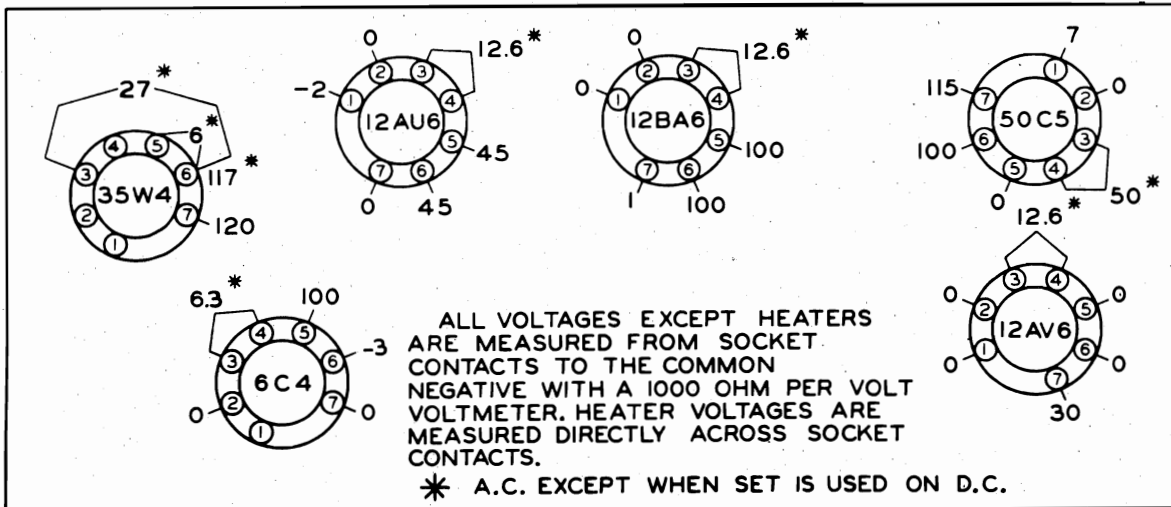
| S T E P S | Set Receiver dial to: | TEST OSCILLATOR | | DUMMY ANTENNA | ADJUSTMENT |
|-----------------------|----------------------------------------------------|--------------------------------------|------------------------------------------------------------------|----------------------------|-----------------------------------------------------------------------------------------------------------------------|
| | | Adjust test oscillator Frequency to: | Attach output of test oscillator to: | | |
| 1 | Any point where no interfering signal is received. | Exactly 455 KC. | High side to grid of 12AU6 Tube. Low side to common negative. | .05 MFD Conden- ser. | Adjust slugs at top and bottom of 2nd. I.F. (T2) and then each of the slugs of the 1st. I.F. (T1) for maximum output. |
| 2 | Exactly 1620 KC. | Exactly 1620 KC. | External Antenna. Blue lead on loop. | 100 MMFD Conden- ser | Adjust 1620 KC Oscillator trimmer for maximum output. |
| 3 | Approx. 1400 KC. | Approx. 1400 KC. | External Antenna. Blue lead on loop. | 100 MMFD Conden- ser | Adjust 1400 KC Antenna trimmer for maximum output. |

PAGE 22-12 ALLIED RADIO

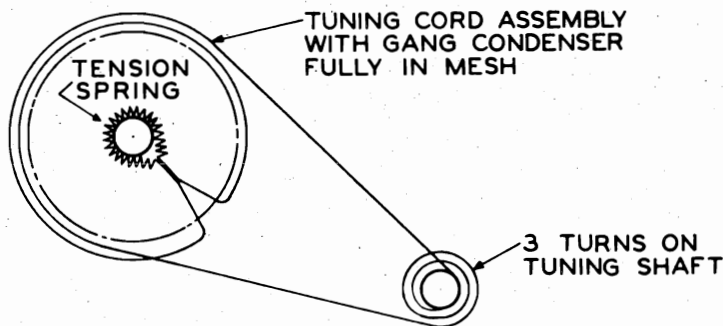
MODELS 6H-580,
6H-581



REAR OF CHASSIS



VOLTAGE TABLE
(BOTTOM VIEW OF CHASSIS)



MODEL C-351,
1951 Chevrolet

DESCRIPTION

Your new Automobile Receiver is a 6-tube (including rectifier) superhetrodyne, designed to operate from the 6-volt storage battery in your car. It is custom-built to mount behind the instrument panel in the place provided for a radio by the automobile manufacturer. It has a self-contained PM speaker and covers the frequency range 538 to 1600 KC. Two simple controls are provided for operating the receiver. (See Fig. 1.)

This receiver has been designed with a tuned RF stage and a 3-gang tuning condenser thereby insuring the finest in sensitivity and selectivity. Any standard two or three section whip or "fish pole" antenna will provide good reception of distant or weak stations. The unit is simple to install and requires no electrical adjustment after installation.

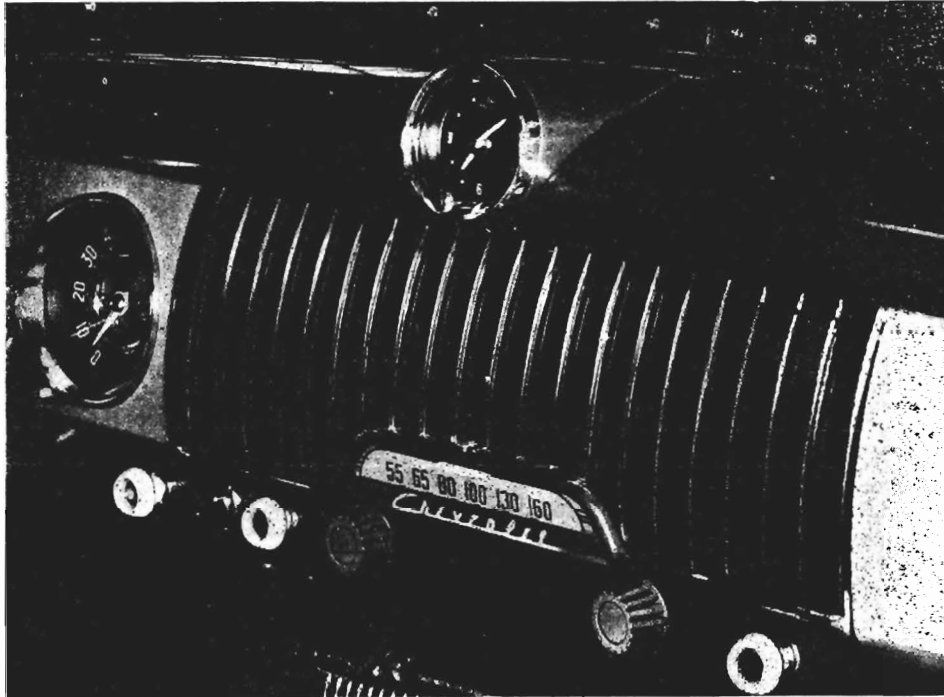


Fig. 1

OPERATION

VOLUME CONTROL KNOB

This knob is located on the left side of the radio. Turning this knob slightly to the right until a slight click is heard will put the radio into operation. Turning this knob further to the right will increase the volume and turning it to the left will decrease the volume. After a station has been selected, the volume control should be adjusted to desired level. The volume should never be reduced by detuning the station selector knob.

STATION SELECTOR KNOB

This knob is located on the right side of the radio. This knob should be turned until a desired station has been selected. Adjust this knob very carefully until the station comes in with the most natural tone.

INSTALLATION

1. Remove two speed nuts securing dummy control cover plate. Discard dummy plate and speed nuts.
2. Remove 12-24 hex nuts securing dummy radio opening cover plate. Save hex nuts but discard dummy plate.
3. Referring to Fig. 2 (rear view), place mounting brackets over 12-24 stud bolts and attach with #12 lockwashers, contained in kit of mounting hardware, and 12-24 hex nuts previously removed.
4. Remove knobs, cup washers, hex nuts, washers and control cover plate from control shafts and mounting bushings.
5. Referring to Fig. 2 (front view), position the receiver behind the instrument panel so that the shafts and mounting bushings protrude through the instrument panel and the stud bolts on the sides of the receiver slide into the slotted ends of the mounting brackets.
6. Secure the mounting brackets to receiver with $\frac{1}{4}$ " lockwashers and $\frac{1}{4}$ -20 hex nuts.

MODEL C-351,
1951 Chevrolet

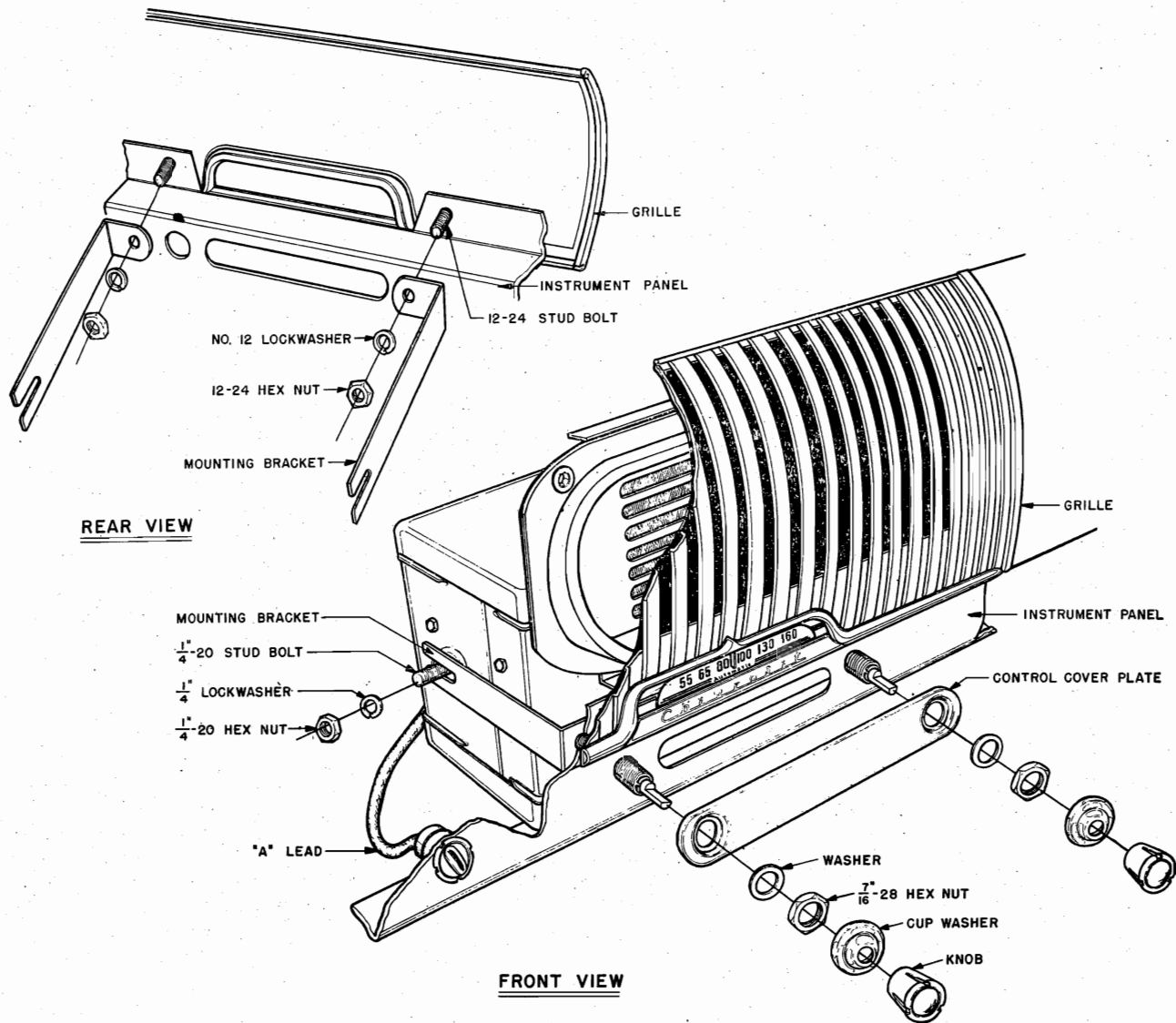


Fig. 2

DETAIL ASSEMBLY

INSTALLATION (Continued)

7. Place control cover plate over mounting bushings.
8. Replace washers and hex nuts on mounting bushings.
9. Replace cup washers and knobs on control shafts.
10. Connect the "A" lead to ignition switch.
11. Plug antenna cable into receptacle located on the back of the receiver.

ACCESSORIES FURNISHED FOR INSTALLATION

The following mounting hardware parts are shipped attached to the receiver. (See Detail Assembly drawing Fig. 2.)

| | |
|--------------------|-----------------------|
| 2 Knobs | 1 Control Cover Plate |
| 2 Cup washers | 2 1/4" Lockwashers |
| 2 7/16-28 Hex nuts | 2 1/4-20 Hex Nuts |
| 2 Washers | |

An envelope containing additional mounting hardware is supplied with this receiver. It contains the following parts:

- 2 No. 12 Lockwashers
- 2 Mounting Brackets

MOTOR NOISE ELIMINATION

SUPPRESSION KIT

A suppression kit is shipped with this receiver. It contains the following parts:

- 1 Generator Condenser.
- 1 Distributor Suppressor.

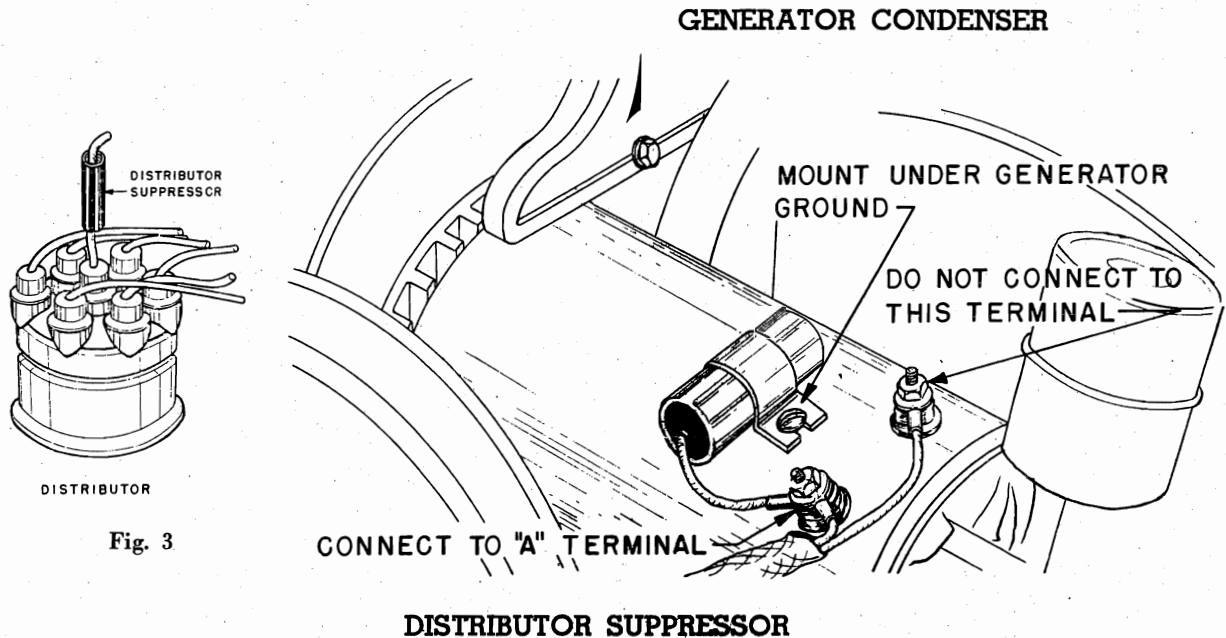


Fig. 3

Disconnect the center lead in the distributor head of the motor. Cut lead approximately 2 inches back from metal tip end. Screw suppressor into cut end of long lead. Screw cut end of short lead into suppressor. Plug lead, with attached suppressor, back into distributor head.

The generator condenser and distributor suppressor will normally eliminate all objectionable motor noise. If the motor noise persists, a .5 MFD by-pass condenser may be connected to either side of the ammeter with the ground lug fastened to a good ground nearby.

WHEEL STATIC

Wheel static is a form of interference caused by the rotation of the front wheels of the car, and it is, of course, only noticed when the car is in motion. If this form of interference is present, it can be eliminated by installing wheel static collector springs between the inner hub cap and the spindle shaft.

ELECTRICAL ACCESSORIES

In some cases, it may be found that car accessories such as electric heaters, lighters, automatic relays or gauges, may cause interference while in operation. Proper procedure in such cases is to connect a .5 MFD by-pass condenser from ground to the suspected accessory until the source of interference is found. The condenser then should be permanently mounted in this location.

MODEL C-351,
1951 Chevrolet

HOW TO ORDER PARTS

Always give the part No. (No. printed on the part if different from that shown on this list) and the name of the part. When No. is not available, give complete description of part and the Model No. of this receiver.

ELECTRICAL SPECIFICATIONS

| | |
|----------------------|----------------------------------------------|
| Power Supply..... | 6.3 Volts DC |
| Current..... | 5.5 Amp. average |
| Frequency Range..... | 538-1600 KC |
| Speaker..... | 5 1/4" PM |
| Power Output..... | 2 watts, undistorted 3 watts, maximum |
| Sensitivity..... | 2-3 microvolts average for 1 watt output |
| Selectivity..... | 40 KC broad at 1000 times signal, at 1000 KC |

This receiver contains the following:
 1—6BA6—RF Amplifier
 1—6BE6—Converter
 1—6BA6—L. F. Amplifier
 1—6AT6—Detector—AVC—1st Audio
 1—6AQ5—Power Output
 1—6X4—Rectifier
 (6AV6 used in place of 6AT6 on some models.)

SERVICE NOTES

Voltage taken from the different points of the circuit to the chassis are measured with volume control in maximum position, all tubes in their sockets, no signal applied, and with a volt meter having a resistance of 20,000 Ohms per volt. These voltages are clearly shown on the voltage chart, (Fig. 4).
 All voltages should be measured with an input voltage of 6.3 volts DC.
 To check for open by-pass condensers, shunt each condenser with another one having the same capacity and voltage rating which is known to be good until the defective unit is located.

ALIGNING INSTRUCTION

Never attempt any adjustments on this receiver unless it becomes necessary to replace a coil or transformer, or the adjustments have been tampered with in the field. Always make certain that other circuit components, such as tubes, condensers, resistors, etc., are normal before proceeding with realignment.
 If realignment is necessary follow the instructions given under the heading "Alignment Procedure". After realignment has been completed repeat the procedure as final check.

INSTRUCTIONS FOR SERVICING RECEIVER COMPONENTS

The novel design of this receiver permits servicing all components without removing the chassis from the case. The top cover can be removed by removing the four (4) screws securing it to the case. This exposes all tube sockets, connections, resistors and condensers for observation and service.
 Removing the bottom cover makes it possible to service tubes, vibrator, and volume control.

PARTS LIST

CONDENSERS

| Schematic Diagram Reference | Part No | Description |
|-----------------------------|---------|---------------------------------------------------------------------------------------------------------------------------|
| C2, C3, C4 | C207 | .05 MFD 2C volt condenser |
| C5 | CC200 | 100 MMFD ceramic condenser |
| C6, C13, C14 | CC201 | 200 MMFD ceramic condenser |
| C7 | C203 | .002 MFD 400 volt condenser |
| C8, C9 | C206 | .01 MFD 600 volt condenser |
| C10, C11 | C209 | .5 MFD 100 volt condenser |
| C12 | C205 | .008 MFD 1600 volt condenser |
| CE-86 | CE-86 | 20 MFD 350 volt electrolytic condenser 20 MFD 350 volt electrolytic condenser 20 MFD 25 volt electrolytic condenser |
| CV-200 | CV-200 | 3 section variable tuning condenser |

RESISTORS

| | | |
|----------|--------|---------------------------------------|
| R1 | R309 | 1 megohm 1/2 watt 20% resistor |
| R2 | R306 | 20K ohm 1/2 watt 20% resistor |
| R3 | R314 | 1.5K ohm 1/2 watt 20% resistor |
| R4 | R310 | 2 megohm 1/2 watt 20% resistor |
| R5 | R311 | 10 megohm 1/2 watt 20% resistor |
| R6 | R307 | 250K ohm 1/2 watt 20% resistor |
| R7 | R308 | 500K ohm 1/2 watt 20% resistor |
| R8, R13 | R303 | 330 ohm 1/2 watt 20% resistor |
| R9 | R313 | 20K ohm 2 watt 20% resistor |
| R10, R11 | R301 | 100 ohm 1/2 watt 20% resistor |
| R12 | R312 | 1K ohm 1 watt 20% resistor |
| RV-200 | RV-200 | Volume control 3/4 megohm with switch |

COILS AND TRANSFORMERS

| | | |
|-------|------------------|---------------------------------------------------------------|
| LI-C1 | L200 | Motor noise elimination unit |
| L2 | 57FB-3 | Antenna Coil |
| L3 | 57FB-4 | RF coil |
| L4 | L201 | RF Oscillator coil |
| L5 | L202 | Choke, vibrator hash |
| L6 | L203 | Choke, "A" line |
| T1 | 1655-16 | 1st IF transformer |
| T2 | 1655-16 | 2nd IF transformer |
| T3 | | Output transformer (Part of speaker not furnished separately) |
| T4 | TV-100 or TV-86A | Vibrator transformer |

MISCELLANEOUS

| | |
|--------|------------------------------------------------|
| A351 | "A" lead assembly |
| H352 | Bracket, mounting |
| H353 | Case, (less covers) |
| H207 | Clip, anti-rattle |
| H208 | Clip, coil mounting |
| H209 | Cover, bottom case |
| H354 | Control Cover Plate |
| H355 | Cover, top case |
| H311 | Cup washers, shaft |
| A201 | Fuse, 15 amp |
| H211 | Grommet, rubber, gang mounting |
| H310 | Knob |
| H212 | Receptacle, antenna cable |
| PM-250 | Speaker, 5 1/4" PM includes output transformer |
| | Vibrator |
| H113 | 7/8-28 Hex nut |
| C100 | .5 MFD Generator condenser |
| R100 | Distributor suppressor |

DIAL PARTS

| | |
|-------|-----------------------------------|
| D351 | Dial Scale |
| PS351 | Dial Pointer |
| DS200 | Drive shaft assembly |
| H201 | Grommet, rubber drive |
| T51 | Pilot light |
| H202 | Pilot light socket |
| H203 | Pulley, idler |
| H204 | Spring, Dial Drive String Tension |
| H205 | String, Dial Drive |

ALIGNMENT PROCEDURE

The following equipment is necessary for proper alignment:
Signal generator that will provide the test frequencies as listed, modulated 400 cycles, 30%.
Non-metallic screwdriver.
Output meter. (1.8 volt for 1 watt output.)
Dummy antennas—1 MFD, 100 MMFD.
For alignment points refer to Schematic Diagram.

Volume control—Maximum, all adjustments.
No signal applied to antenna.
Power input—6.3 volts.
Connect dummy antenna in series with output lead of signal generator.
Connect ground lead of signal generator to chassis.
Repeat alignment procedure as a final check.

| Dial Setting | Generator Frequency | Dummy Ant. | Generator Connection | Trimmer Reference | Trimmer Adjustment | Trimmer Function |
|----------------------------------|---------------------|------------|----------------------|-------------------|--------------------|------------------|
| 1) Fully open | 455 KC | .1 MFD | 6BE6 Grid | T2 Top & bottom | Maximum | Output I.F. |
| 2) Fully open | 455 KC | .1 MFD | 6BE6 Grid | T1 Top & bottom | Maximum | Input I.F. |
| 3) Fully open | 1600 KC | 100 MMFD | Ant. lead | CV2 | Maximum | Oscillator |
| 4) Tune in signal from generator | 1400 KC | 100 MMFD | Ant. lead | CV3 | Maximum | RF Stage |
| 5) Tune in signal from generator | 1400 KC | 100 MMFD | Ant. lead | CV1 | Maximum | Antenna |
| 6) Tune in signal from generator | 600 KC | 100 MMFD | Ant. lead | L3 | Maximum | RF Stage |
| 7) Tune in signal from generator | 600 KC | 100 MMFD | Ant. lead | L2 | Maximum | Antenna |

8) Repeat steps 4 and 5

BOTTOM VIEW OF CHASSIS

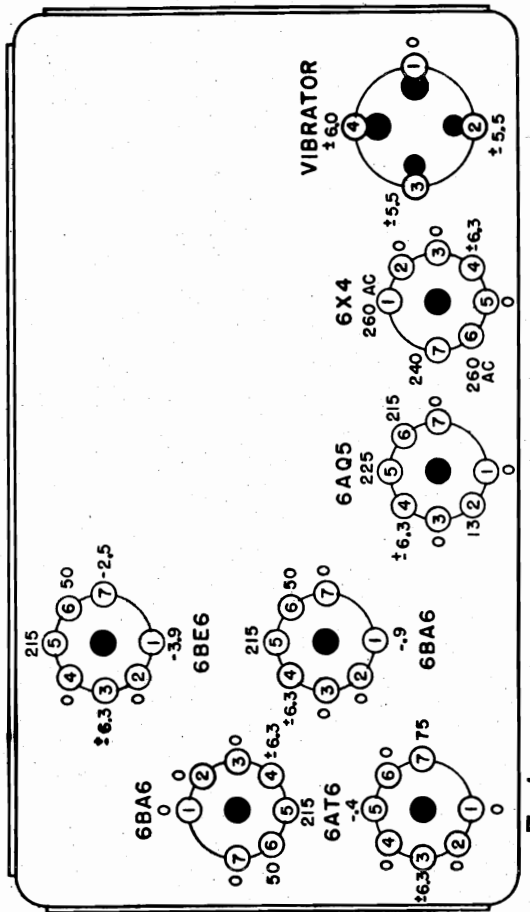


Fig. 4

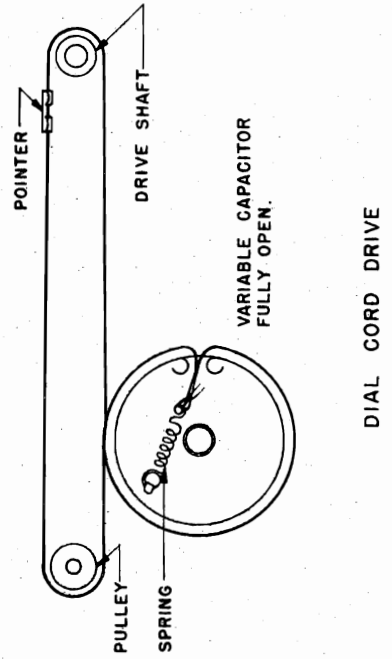
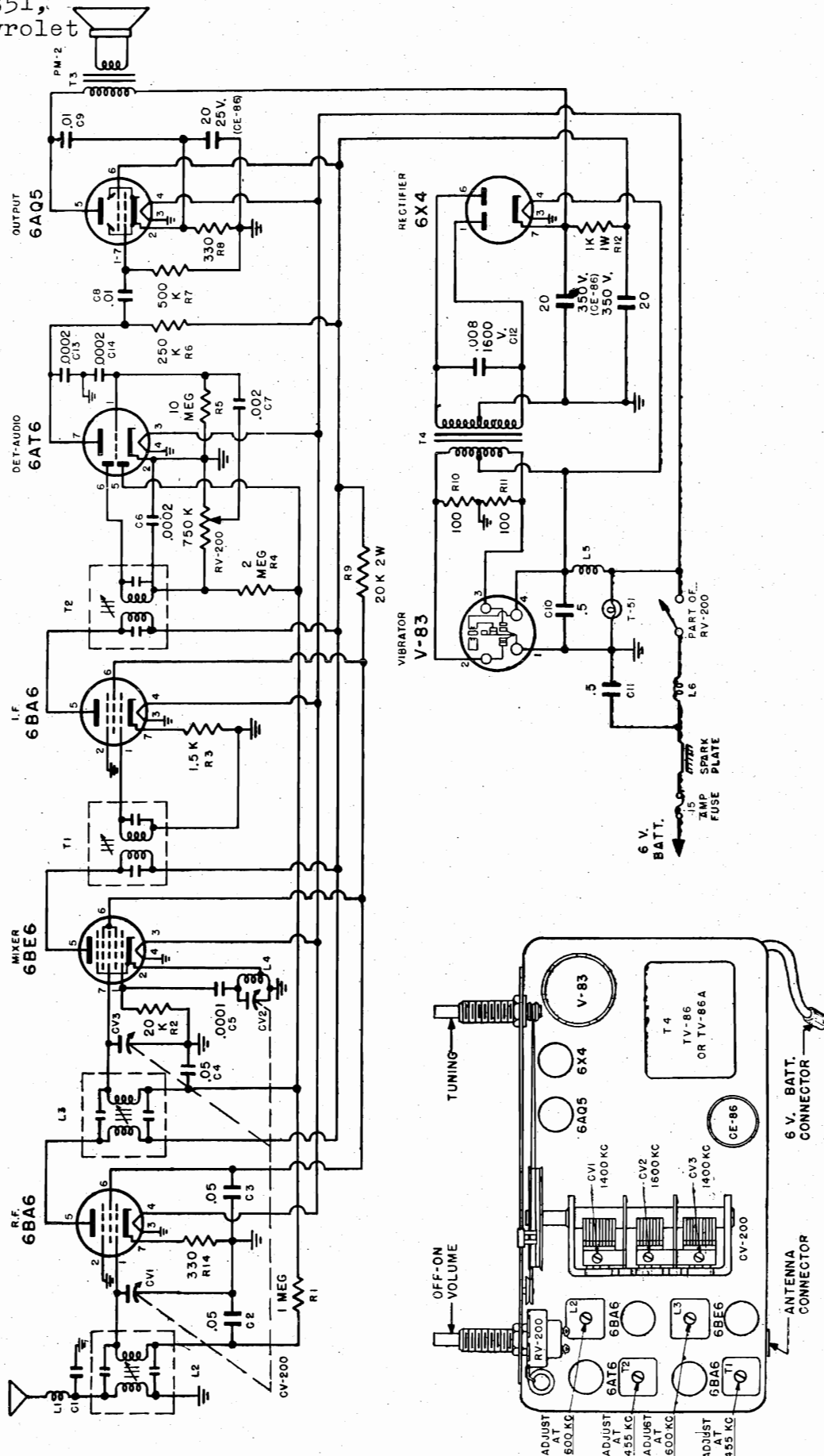


Fig. 5

MODEL C-351,
1951 Chevrolet



Note: 6AV6 used in place of 6AT6 on some models.

Fig. 6

DESCRIPTION

Your new Automobile Receiver is a 6-tube (including rectifier) superheterodyne, designed to operate from the 6-volt storage battery in your car. It is custom-built to mount behind the instrument panel in the place provided for a radio by the automobile manufacturer. It has a self-contained PM speaker and covers the frequency range 538 to 1600 KC. Two simple controls are provided for operating the receiver. (See Fig. 1.)

This receiver has been designed with a tuned RF stage and a 3-gang tuning condenser thereby insuring the finest in sensitivity and selectivity. Any standard two or three section whip or "fish pole" antenna will provide good reception of distant or weak stations. The unit is simple to install and requires no electrical adjustment after installation.

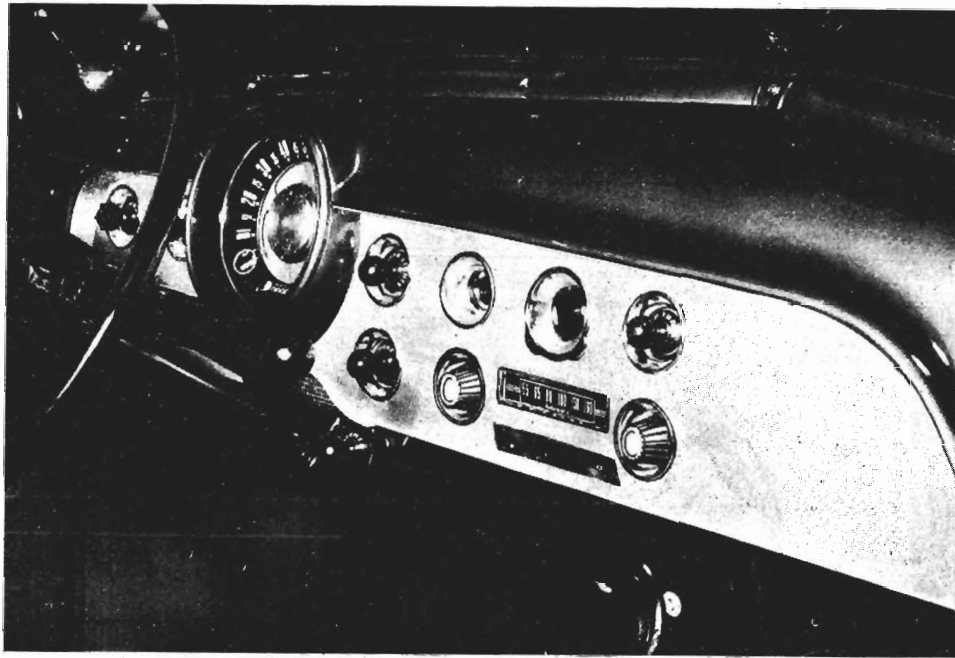


Fig. 1

OPERATION

VOLUME CONTROL KNOB

This knob is located on the left side of the radio. Turning this knob slightly to the right until a slight click is heard will put the radio into operation. Turning this knob further to the right will increase the volume and turning it to the left will decrease the volume. After a station has been selected, the volume control should be adjusted to desired level. The volume should never be reduced by detuning the station selector knob.

STATION SELECTOR KNOB

This knob is located on the right side of the radio. This knob should be turned until a desired station has been selected. Adjust this knob very carefully until the station comes in with the most natural tone.

INSTALLATION

1. Remove the radio opening cover plate by removing the speed nuts at the rear of the instrument panel.
2. Remove and discard radio bezel cups on car by removing hex nuts securing bezel cups to instrument panel.
3. Remove knobs, hex nuts, and bezel cups from tuning unit.
4. Carefully position tuning unit behind instrument panel so the mounting bushings and shafts protrude through the front panel.
5. Place bezel cups over mounting bushings.
6. Attach tuning unit and bezel cups to instrument panel with a hex nut on each mounting bushing.
7. Replace knobs.
8. Position mounting bracket over mounting stud located behind instrument panel and secure with a $\frac{1}{4}$ " lockwasher and a $\frac{1}{4}$ - 20 nut.
9. Secure mounting bracket to side of tuning unit with hex head No. 8 self tapping screw, as shown in Fig. 2
10. Place speaker and power pack unit over three threaded stud bolts behind the instrument panel. (Position power pack unit so that power cable is located near the tuning unit.) See Fig. 2.
11. Secure power pack into position with the wing nuts supplied in the kit of mounting hardware.

MODEL F-151,
1951 Ford

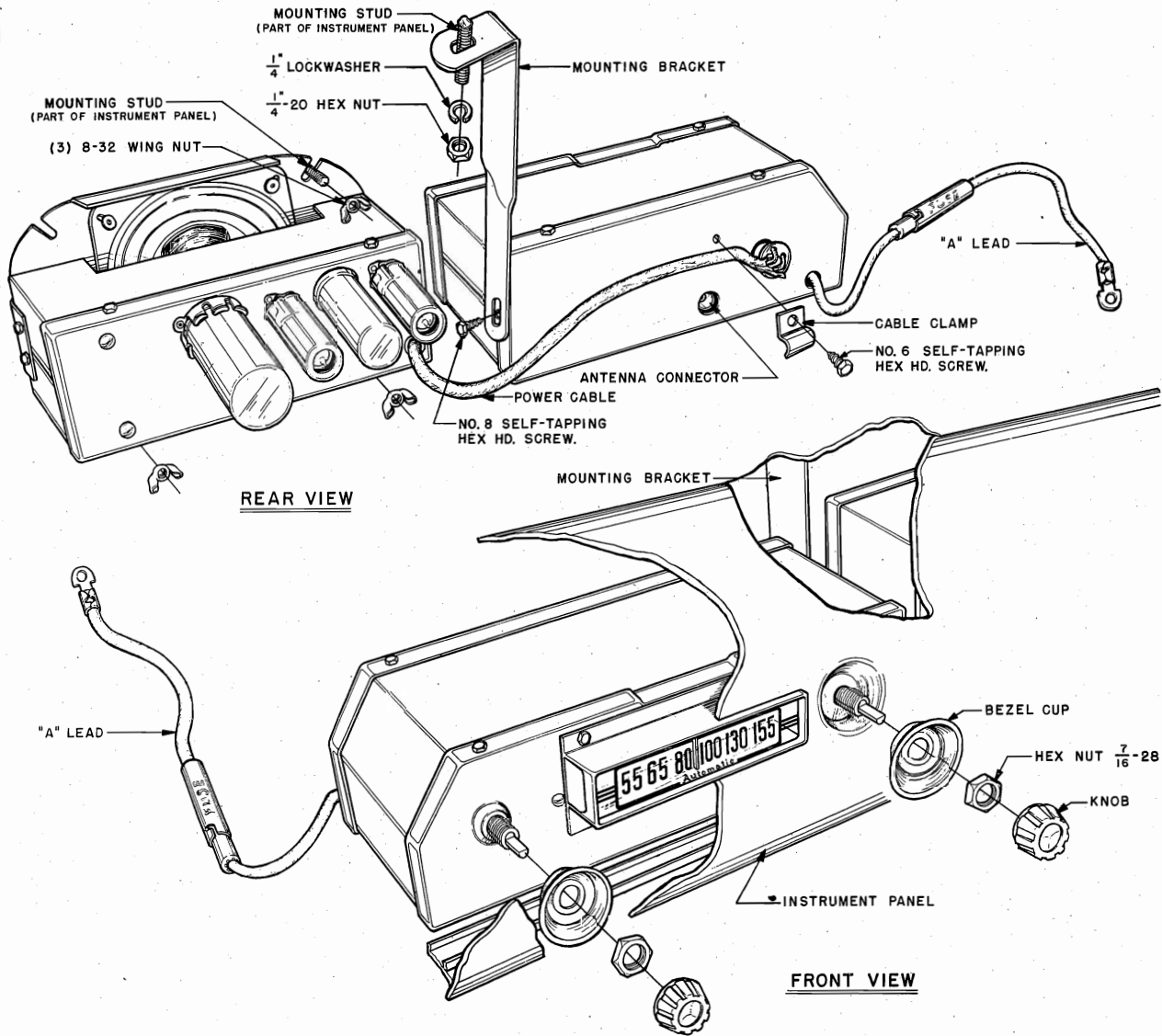


Fig. 2

DETAIL ASSEMBLY

INSTALLATION (Continued)

12. Insert power cable plug into socket on rear of tuning unit.
13. Secure power cable under cable clamp and tighten clamp screw.
14. Plug antenna cable into tuning unit.
15. Connect "A" lead to terminal on ignition switch.

ACCESSORIES FURNISHED FOR INSTALLATION

MOUNTING PARTS KIT

The following mounting hardware parts are shipped attached to the receiver.

(See detail assembly drawing FIG. 2)

- 2 Bezel cups
- 2 7/16 — 28 hex nuts
- 2 Knobs
- 1 Cable clamp

An envelope containing additional mounting hardware is supplied with this receiver. It contains the following parts:

- 1 Supporting bracket
- 1 No. 8 self-tapping screw
- 1 1/4" lockwasher
- 1 1/4 — 20 nut
- 3 No. 8 — 32 wing nuts

MOTOR NOISE ELIMINATION SUPPRESSION KIT

A suppression kit is shipped with this receiver. It contains the following parts:

- 1 Generator Condenser
- 1 Distributor suppressor

DISTRIBUTOR SUPPRESSOR

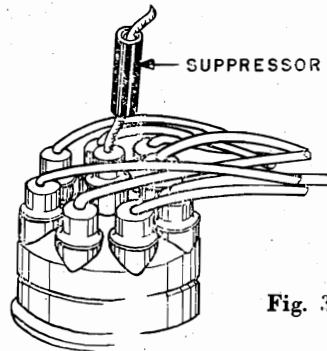


Fig. 3

DISTRIBUTOR 8 CYLINDER

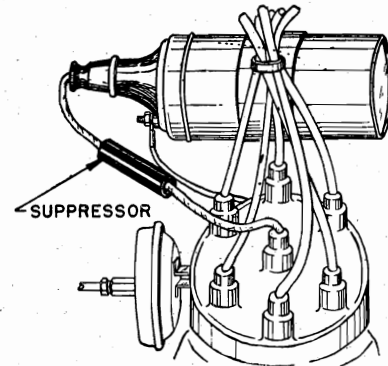


Fig. 4

DISTRIBUTOR-6 CYLINDER

Disconnect high tension wire that runs from the ignition coil to the center hole of the distributor head. Cut lead one and one-half inches back from metal tip end for 8 cylinder Ford or two and one-half inches back for 6 cylinder Ford. Screw suppressor into cut end of long lead. Plug lead with attached suppressor, back into distributor head.

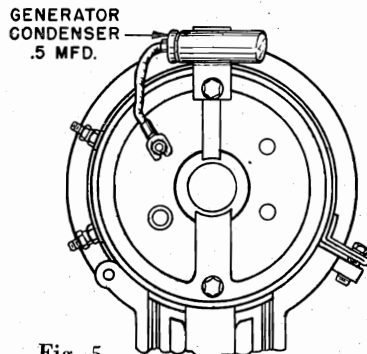


Fig. 5

GENERATOR CONDENSER

Loosen the top assembly bolt from the rear end plate of the generator. **DO NOT REMOVE.** Mount .5 MFD generator condenser under this bolt. Tighten bolt and connect condenser lead to the armature terminal of the generator.

The generator condenser and distributor suppressor will normally eliminate all objectionable motor noise. If the motor noise persists, a .5 MFD by-pass condenser may be connected to either side of the ammeter with the ground lug fastened to a good ground nearby.

WHEEL STATIC

Wheel static is a form of interference caused by the rotation of the front wheels of the car, and it is, of course, only noticed when the car is in motion. If this form of interference is present, it can be eliminated by installing wheel static collector springs between the inner hub cap and the spindle shaft.

ELECTRICAL ACCESSORIES

In some cases, it may be found that car accessories such as electric heaters, lighters, automatic relays or gauges, may cause interference while in operation. Proper procedure in such cases is to connect a .5 MFD by-pass condenser from ground to the suspected accessory until the source of interference is found. The condenser then should be permanently mounted in this location.

HOW TO ORDER PARTS

Always give the part No. (No. printed on the part if different from that shown on this list) and the name of the part. When No. is not available, give complete description of part and the Model No. of this receiver.

ALIGNMENT PROCEDURE

Volume control—Maximum, all adjustments.
 No signal applied to antenna.
 Power input—6.3 volts.
 Connect dummy antenna in series with output lead of signal generator.
 Connect ground lead of signal generator to chassis.
 Repeat alignment procedure as a final check.

The following equipment is necessary for proper alignment:
 Signal generator that will provide the test frequencies as listed, modulated 400 cycles, 30%.
 Non-metallic screwdriver.
 Output meter. (1.8 volt for 1 watt output.)
 Dummy antennas—.1 MFD., 100 MMFD.
 For alignment points refer to Schematic Diagram.

| Dial Setting | Generator Frequency | Dummy Ant. | Generator Connection | Trimmer Reference | Trimmer Adjustment | Trimmer Function |
|----------------------------------|---------------------|------------|----------------------|-------------------|--------------------|------------------|
| 1) Fully open | 455 KC | .1 MFD | 6BE6 Grid | T2 Top & bottom | Maximum | Output I.F. |
| 2) Fully open | 455 KC | .1 MFD | 6BE6 Grid | T1 Top & bottom | Maximum | Input I.F. |
| 3) Fully open | 1600 KC | 100 MMFD | Ant. lead | CV2 | Maximum | Oscillator |
| 4) Tune in signal from generator | 1400 KC | 100 MMFD | Ant. lead | CV3 | Maximum | RF Stage |
| 5) Tune in signal from generator | 1400 KC | 100 MMFD | Ant. lead | CV1 | Maximum | Antenna |
| 6) Tune in signal from generator | 600 KC | 100 MMFD | Ant. lead | L3 | Maximum | RF Stage |
| 7) Tune in signal from generator | 600 KC | 100 MMFD | Ant. lead | L2 | Maximum | Antenna |

8) Repeat steps 4 and 5

BOTTOM VIEW OF CHASSIS

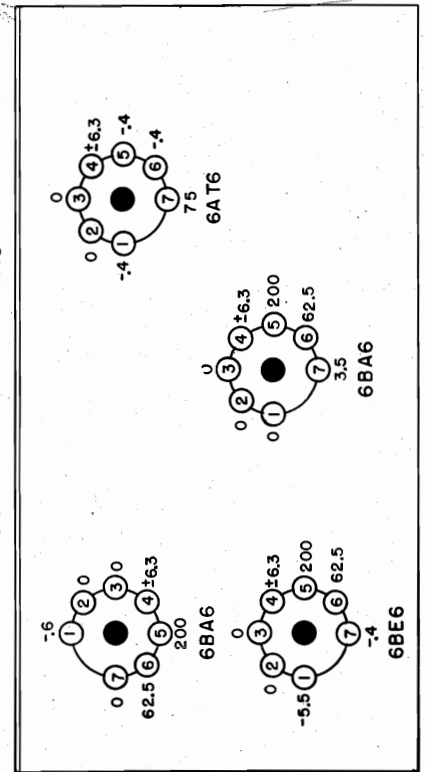


Fig. 7 FRONT OF CHASSIS

BOTTOM VIEW OF POWER PACK

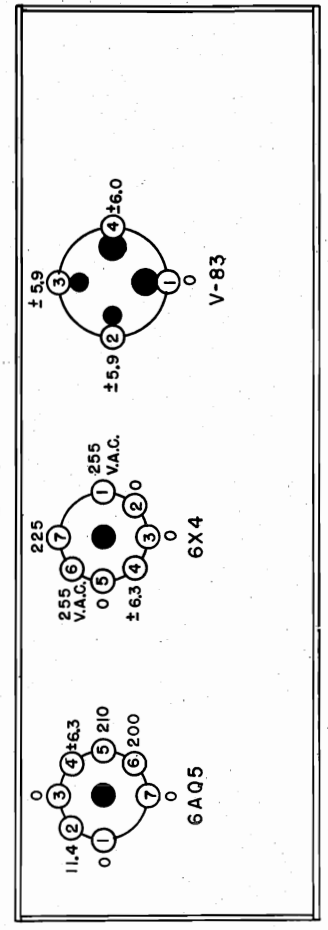
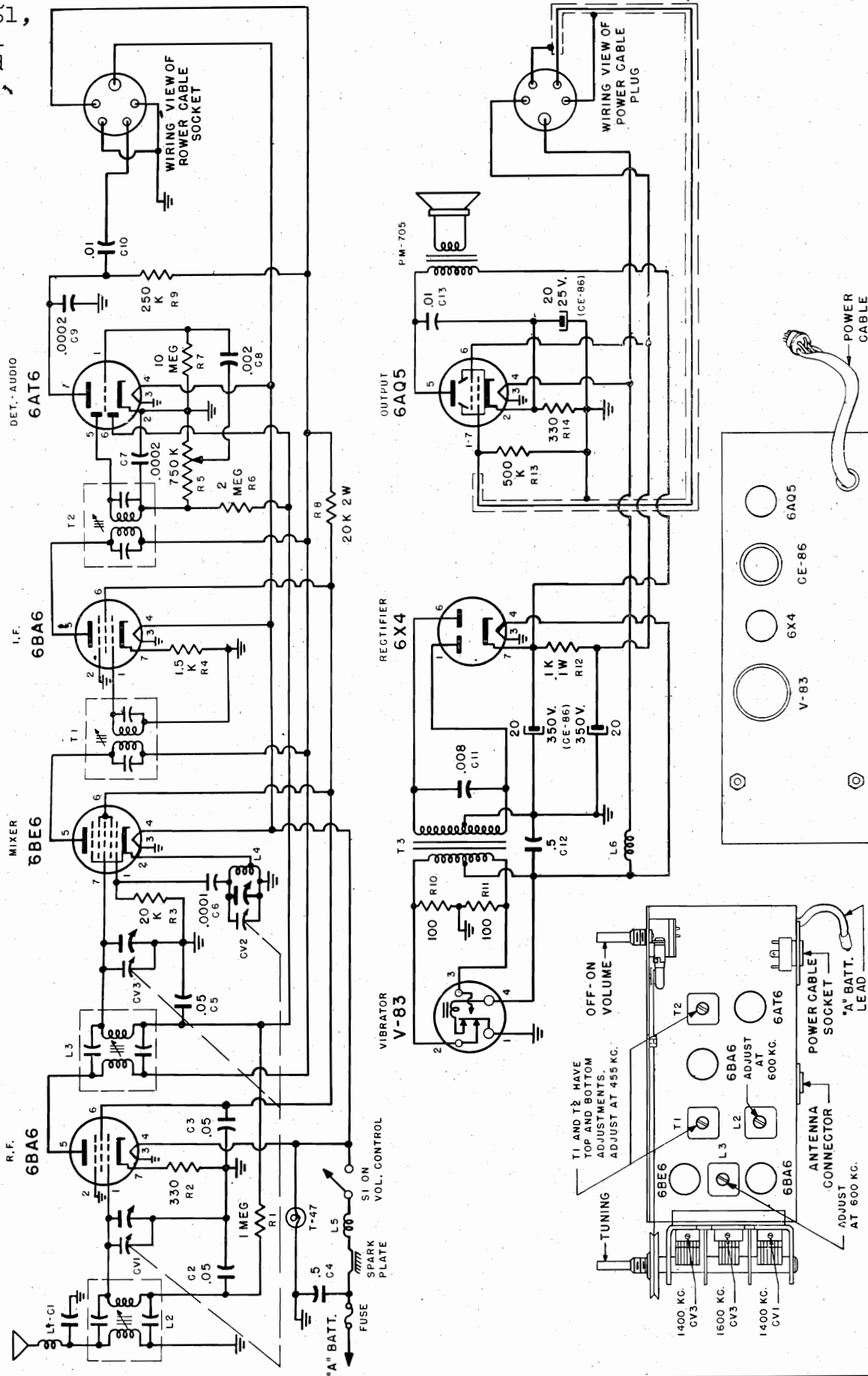


Fig. 7A

SOCKET VOLTAGES

MODEL
F-151,
1951
Ford



(NOTE: 6AV6 Tube used in place of 6AT6 on some models.)

Fig. 8

DESCRIPTION

Your new Automobile Receiver is a 6-tube (including rectifier) superhetrodyne, designed to operate from the 6-volt storage battery in your car. It is custom-built to mount behind the instrument panel in the place provided for a radio by the automobile manufacturer. It has a self-contained PM speaker and covers the frequency range 538 to 1600 KC. Two simple controls are provided for operating the receiver. (See Fig. 1.)

This receiver has been designed with a tuned RF stage and a 3-gang tuning condenser thereby insuring the finest in sensitivity and selectivity. Any standard two or three section whip or "fish pole" antenna will provide good reception of distant or weak stations. The unit is simple to install and requires no electrical adjustment after installation.

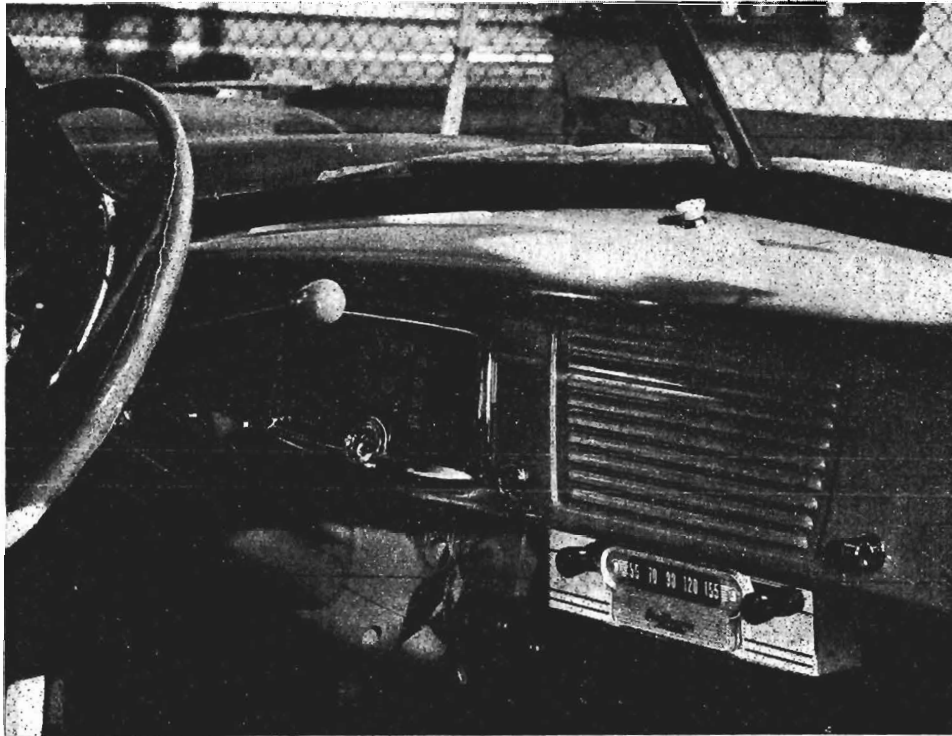


Fig. 1

OPERATION

VOLUME CONTROL KNOB

This knob is located on the left side of the radio. Turning this knob slightly to the right until a slight click is heard will put the radio into operation. Turning this knob further to the right will increase the volume and turning it to the left will decrease the volume. After a station has been selected, the volume control should be adjusted to desired level. The volume should never be reduced by detuning the station selector knob.

STATION SELECTOR KNOB

This knob is located on the right side of the radio. This knob should be turned until a desired station has been selected. Adjust this knob very carefully until the station comes in with the most natural tone.

INSTALLATION (See Fig. 2)

1. Remove ash tray and holder and discard.
2. Lift hood of car and push out upper spring button fastener by compressing with a pair of pliers and pushing forward. This fastener is located on the firewall directly behind the speaker grill and is used to secure the wall mat to the firewall.
3. Insert hook bolt through the spring button fastener hole from the engine side.
4. Place a 12-24 hex nut approximately one inch up on threaded end of hook bolt.
5. Remove mounting plate from radio by removing the two flat head 10-32 screws under the tuning head.
6. Attach mounting plate to instrument panel with two 10-32 flat head screws, lockwashers, and nuts.
7. Position radio behind instrument panel so that bushings on mounting bracket protrude into holes on die-cast tuning head. Insert threaded end of hook bolt through hole on bracket attached to back of radio.
8. Screw 12-24 hex nut on hook bolt.

MODEL K700,
Henry J

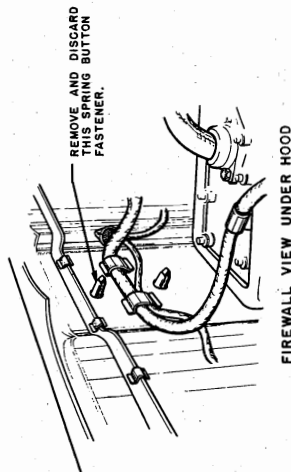
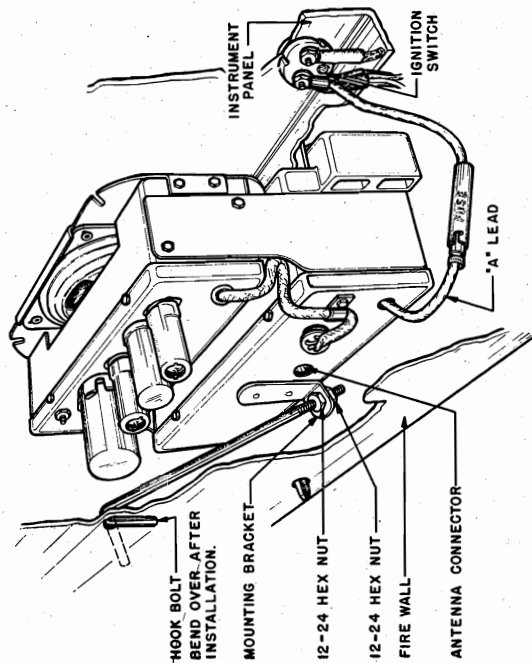
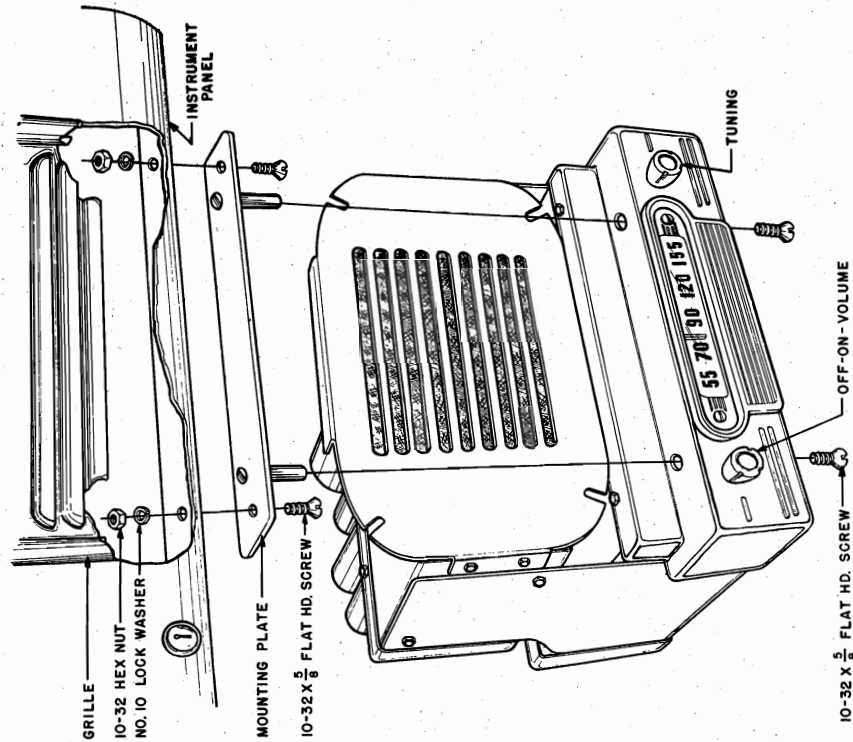
ACCESSORIES

FURNISHED

FOR

INSTALLATION

- 1 Mounting plate
- 2 12-24 hex nuts
- 4 10-32 x 5/8" flat head screws
- 2 No. 10 lockwashers
- 2 10-32 hex nuts
- 1 Hook bolt



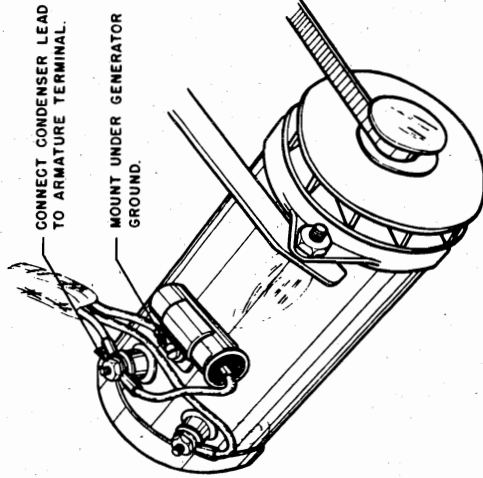
DETAIL MOUNTING ASSEMBLY
INSTALLATION (Continued)

9. Insert two 10-32 flat head screws through bottom edge of radio and screw into bushings attached to mounting bracket.
10. Adjust position of the two 12-24 hex nuts on hook bolt so that radio is mounted parallel to the instrument panel. Tighten bottom hex nut. Bend over end of hook bolt on engine side.
11. Connect "A" lead to terminal on ignition switch.
12. Plug antenna cable into receiver.

Fig. 2

GENERATOR CONDENSER

Loosen screw on top surface of generator near terminals. Insert slotted generator condenser bracket under screw head and tighten screw. Connect generator condenser lead to armature terminal. *Do not connect to field terminal.*



GENERATOR CONDENSER
Fig. 4

MOTOR NOISE ELIMINATION

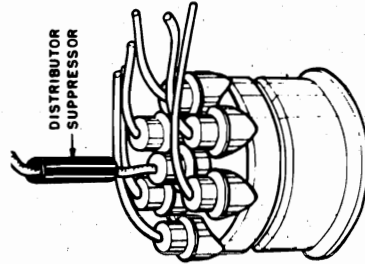
SUPPRESSION KIT

A suppression kit is shipped with this receiver. It contains the following parts:

- 1 Generator Condenser.
- 1 Distributor suppressor.

DISTRIBUTOR SUPPRESSOR

Disconnect the high tension wire that runs from the ignition coil to the center hole of the distributor cap. Cut lead one inch back from the metal tip end. Screw suppressor into cut end of long lead. Screw cut end of short lead into suppressor. Plug lead with attached suppressor back into distributor cap.



DISTRIBUTOR
Fig. 3

The generator condenser and distributor suppressor will normally eliminate all objectionable motor noise in most cases. If the motor noise persists the following steps should be taken. Check operation of radio as each step is made.

WHEEL STATIC

Wheel static is a form of interference caused by the rotation of the front wheels of the car, and it is, of course, only noticed when the car is in motion. If this form of interference is present, it can be eliminated by installing wheel static collector springs between the inner hub cap and the spindle shaft.

AMMETER CONDENSER

A .5 MFD by-pass condenser should be connected to either side of the ammeter with the ground lug fastened to a good ground nearby.

ELECTRICAL ACCESSORIES

In some cases, it may be found that car accessories such as electric heaters, lighters, automatic relays or gauges, may cause interference while in operation. Proper procedure in such cases is to connect a .5 MFD by-pass condenser from ground to the suspected accessory until the source of interference is found. The condenser then should be permanently mounted in this location.

MODEL
K700,
Henry J

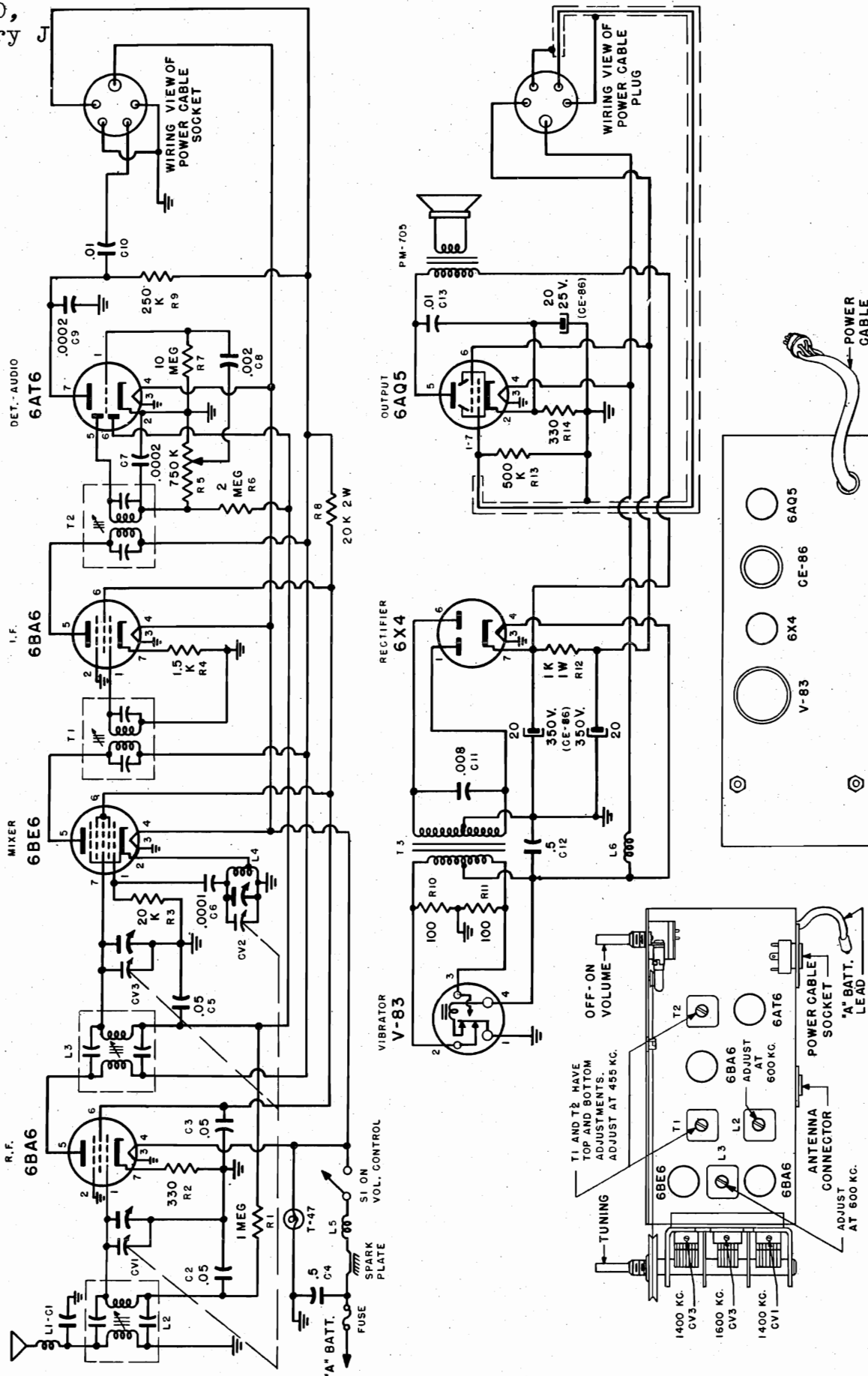


Fig. 7

PARTS LIST

CONDENSERS

| Schematic Diagram Reference | Part No. | Description |
|-----------------------------|----------|----------------------------------------|
| C2, C3, C5 | C207 | .05 MFD 200 volt condenser |
| C4, C12 | C209 | .5 MFD 100 volt condenser |
| C6 | CC200 | 100 MMFD ceramic condenser |
| C7, C9 | CC201 | 200 MMFD ceramic condenser |
| C8 | C203 | .002 MFD 400 volt condenser |
| C10, C13 | C206 | .01 MFD 400 volt condenser |
| C11 | C205 | .008 MFD 1600 volt condenser |
| CE86 | CE-86 | 20 MFD 350 volt electrolytic condenser |
| | | 20 MFD 350 volt electrolytic condenser |
| | | 20 MFD 25 volt electrolytic condenser |
| CV1-CV2-CV3 | CV-400 | 3 section variable |

RESISTORS

| Reference | Part No. | Description |
|-----------|----------|---------------------------------------|
| R1 | R309 | 1 megohm 1/2 watt 20% resistor |
| R2, R14 | R303 | 330 ohm 1/2 watt 20% resistor |
| R3 | R306 | 20K ohm 1/2 watt 20% resistor |
| R4 | R314 | 1.5 K ohm 1/2 watt 20% resistor |
| R5 | RV-570 | Volume control 3/4 megohm with switch |
| R6 | R310 | 2 megohm 1/2 watt 20% resistor |
| R7 | R311 | 10 megohm 1/2 watt 20% resistor |
| R8 | R313 | 20K ohm 2 watt 20% resistor |
| R9 | R307 | 250K ohm 1/2 watt 20% resistor |
| R10, R11 | R301 | 100 ohm 1/2 watt 20% resistor |
| R12 | R312 | 1K ohm 1 watt 20% resistor |
| R13 | R308 | 500K ohm 1/2 watt 20% resistor |

COILS AND TRANSFORMERS

| Reference | Part No. | Description |
|-----------|------------------|---------------------------------------------------------------|
| L1-C1 | L200 | Motor noise elimination unit |
| L2 | 15053 or 57FB-3 | Antenna coil |
| L3 | 15054 or 57FB-4 | R.F. coil |
| L4 | L201 | R.F. oscillator coil |
| L5 | L203 | Choke "A" line |
| L6 | L202 | Choke, vibrator hash |
| T2 | 14977 or 1655-16 | 2nd IF transformer |
| T1 | 14977 or 1655-16 | 1st IF transformer |
| T3 | TV-100 or 318V-2 | Vibrator transformer |
| T4 | | Output transformer (Part of speaker not furnished separately) |

MISCELLANEOUS

| | |
|-----------|-----------------------------------------------------------------|
| A300 | "A" lead assembly |
| H521 | Case, less covers for Power Supply Unit |
| H520 | Case, complete with covers for R.F. tuning unit |
| H207 | Clip, Anti-rattle |
| H208 | Clip, coil mounting |
| H102 | Cover, power supply unit mounting (with speaker louvres) |
| K700 | Cover, RF tuning unit, front (complete with plastic escutcheon) |
| A201 | Fuse 15 Amp. |
| K701 | Hook bolt |
| 504PC-300 | Power Cable Assembly (complete with plug) |
| H212 | Receptacle, Antenna cable |
| 504-FC | Socket, power cable |
| PM-705 | Speaker, 5 1/4" PM (includes output transformer) |
| V-83 | Vibrator |
| H310 | Knob |
| H311 | Cup washer |
| C100 | .5 MFD generator condenser |
| R100 | Distributor suppressor |
| K702 | Mounting Bracket |

DIAL PARTS

| | |
|-------|-----------------------------------|
| H523 | Dial Scale Escutcheon, Plastic |
| PS100 | Dial Pointer |
| T47 | Pilot Light |
| H114 | Pilot Light Socket |
| H203 | Pulley, idler |
| H204 | Spring, Dial drive String Tension |
| H115 | String, dial drive |

Operating Instructions

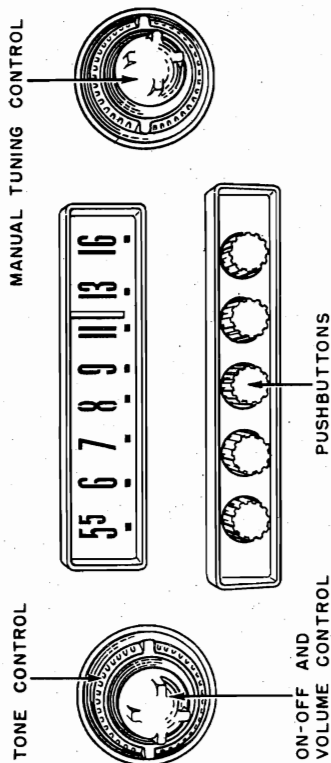


Figure 1—Operating Controls

Dial Illumination

The radio dial lamp is independent of radio operation, and is turned on and off with the car lights. Its brilliance is adjusted by means of the Instrument Panel Lighting intensity control.

Receiver Installation

1. Install the antenna in accordance with the instructions packed in the antenna kit.
2. Remove and discard the radio opening coverplates from the instrument panel by removing the speed nuts at the rear of the panel.
3. CAREFULLY, from the underside of the instrument panel, position the speaker baffle and speaker on the three threaded stud bolts so that the speaker lead is on the left when viewed from the front, and tighten securely with the three #8-32 wing nuts provided in the installation kit (see figures 2 and 3).
4. Using the 1/4-inch lock washers and nuts supplied in the installation kit, attach the tops of the right-hand and left-hand rear mounting brackets loosely to the studs on the underside of the instrument panel, near the windshield, as shown in figures 2 and 3.
5. Place the receiver in position behind the instrument panel, with the radio head centered in the panel openings (see figure 3). Secure the control shafts with two hex nuts supplied in the installation kit.

Attach the lower ends of the mounting brackets loosely to the studs on the sides of the case, using the serrated washers, lock washers, and hex nuts provided in the installation kit (see figures 2 and 3). Tighten the upper ends of the brackets securely. Adjust the serrated washers at the lower ends of the bracket to make fine adjustments on the position of the unit, then tighten the hex nuts securely.

6. Place the bezel cups over the Tuning and Volume control shafts, and secure with the 1/2-inch hex nuts supplied (see figure 3). Slip the disc and knob on the Volume control shaft, and the knob on the Tuning control shaft.

7. Connect the speaker by inserting its plug into the receptacle on the rear of the receiver. Connect the antenna by inserting its cable plug into the receptacle on the right side of the case (see figure 2).

8. Plug the "A" lead bullet-connector (see figure 3) into the female receptacle that terminates the Blue-White tracer of the double connector at the end of the main wiring harness, behind the circuit breaker.

9. Plug the dial light bullet-connector (see figure 3) into the female receptacle that terminates the Blue-Red tracer of the double connector at the end of the main wiring harness, behind the circuit breaker.

10. VERY IMPORTANT: Turn the receiver on and allow it to operate for approximately 15 minutes in order for each part to reach its normal operating temperature. Tune in a weak station at the high end of the broadcast band (near 1300 kilocycles) and, with fingers, rotate the antenna trimmer (see figure 2) for maximum volume.

Setting Pushbuttons

Manually tune in a local station of your choice, so that, with volume turned down, its signal is heard without distortion. With finger pressure, loosen a pushbutton by rotating it in a counterclockwise direction. (IMPORTANT: DO NOT ROTATE PUSHBUTTON MORE THAN ONE FULL TURN TO THE LEFT.) Press in the loosened pushbutton, and release. Tighten the button with fingers by turning to the right. The pushbutton is now set up for the station which was tuned in manually. Use the same procedure for setting up the remaining pushbuttons, manually tuning in the desired station for each button. (Preferably set up pushbuttons during daytime, due to high sensitivity of the set.)

PAGE 22-2 BENDIX

MODEL M-2, Ford Part
No. 1A-18805-A1

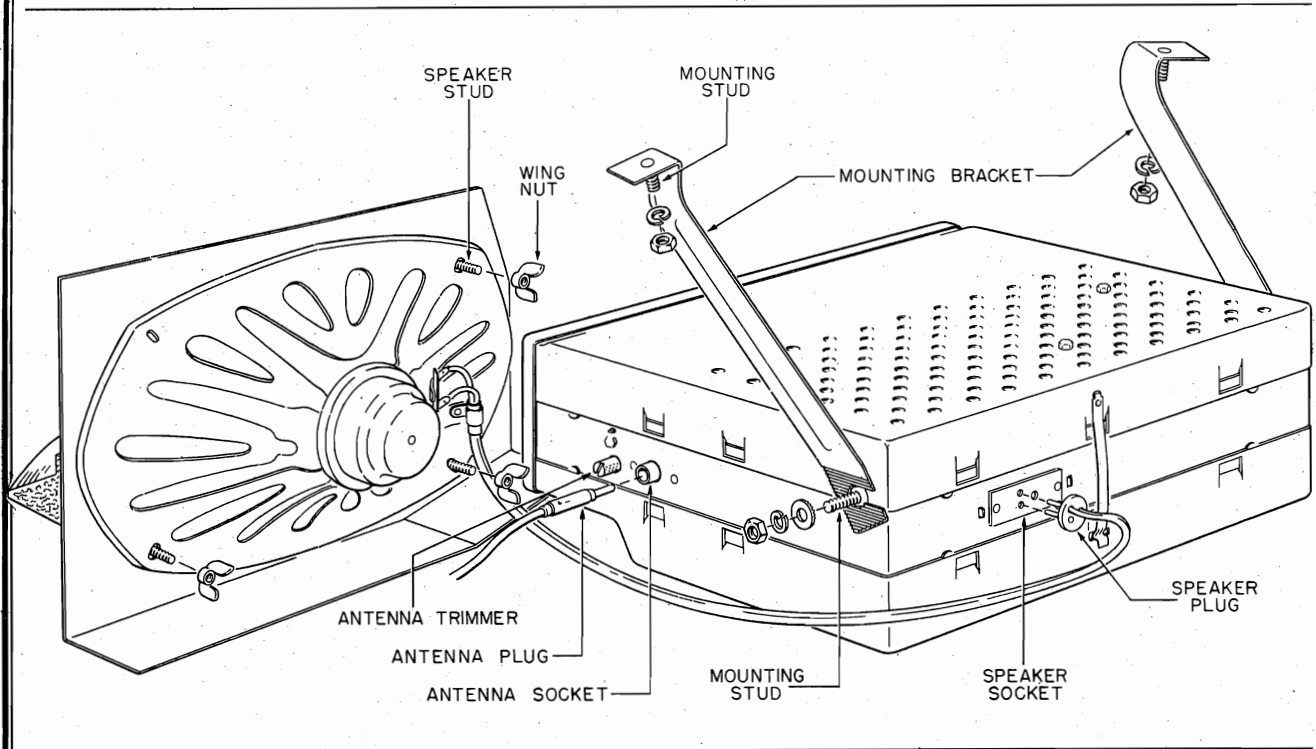


Figure 2—Installation Procedure, Rear View of Receiver

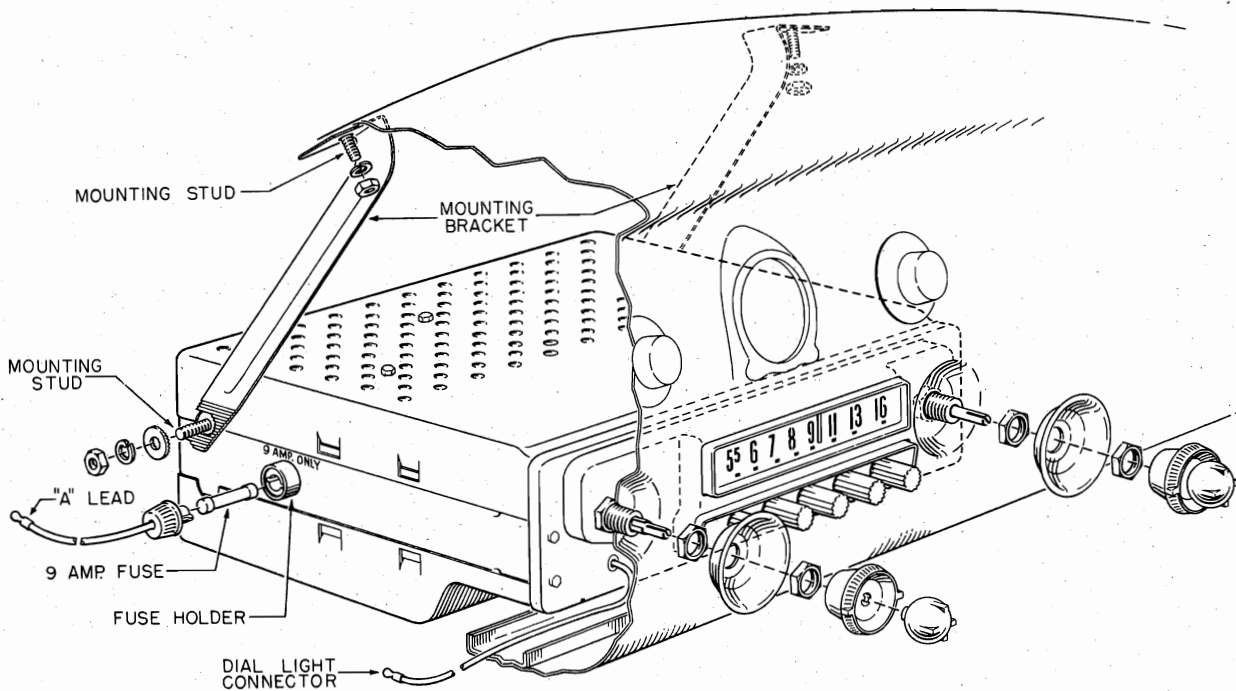


Figure 3—Installation Procedure, Front View of Receiver

Interference Elimination

Extraneous radio-frequency noises from ignition systems and other sources that might interfere with reception on your Ford Radio Receiver can be eliminated by installing the suppression parts, packed in the installation kit, in accordance with the directions given herein.

IMPORTANT: Use the utmost care in cleaning away paint and dirt where parts are to be installed to insure good electrical contacts. Tighten all nuts and bolts securely.

1. Loosen (do not remove) the top assembly bolt on the rear end plate of the Generator. Slide the bracket of Condenser 51AF-18827 under the bolt and tighten (see figure 1). Connect the lug end of the Condenser lead to the Armature terminal of the Generator.

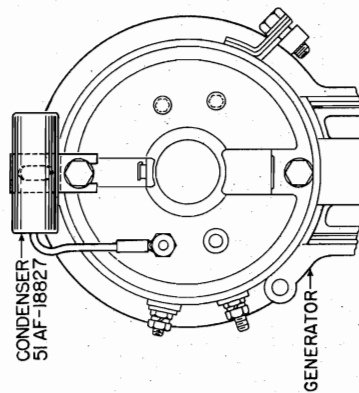


Figure 1

2. Cut the high tension wire that runs from the Ignition Coil to the center hole of the Distributor Cap (make the cut 2 1/2-inches from the coil on six cylinder cars, and 1 1/2-inches on eight cylinder cars). See figure 2. Remove the wire from the Coil and screw the cut end of the wire into Suppressor 1GA-18811-A. Screw the other end of the Suppressor on the cut end of the Distributor wire, and replace the wire in the Ignition Coil.

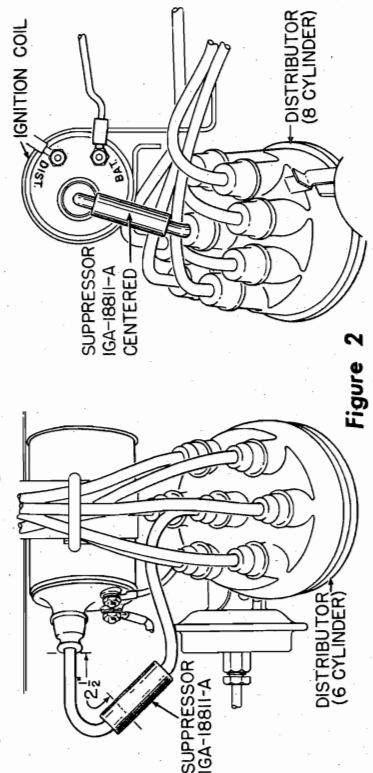


Figure 2

Condenser Installation

3. Condenser 8M-18826 is furnished with a bracket which fits around the Oil Pressure Gauge Unit. Mount and connect the Condenser as shown in figure 3.



Figure 3

4. Mount Condenser 8M-18832 on the Voltage Regulator as shown in figure 4. Connect its lead to the "ARM" terminal on the Regulator. Be careful that Condenser bracket does not short on the terminal.

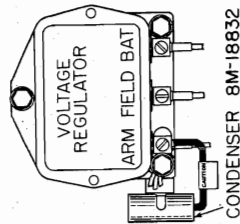


Figure 4

5. Remove the Fuel Tank Gauge cover plate located in the luggage compartment floor. Mount and connect Condenser 51AF-18871 as shown in figure 5. Fasten cover plate and apply sealing compound to insure a good seal for the cover.

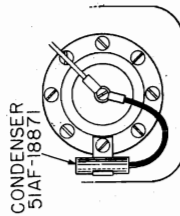


Figure 5

Wheel Static

6. Remove inner and outer hub caps from each front wheel. Clean inner cups and spindles. Snap Static Collector Springs (Part No. 8A-18938) in inner hub caps (see figure 6). **IMPORTANT: BEND COTTER KEY AWAY FROM SPINDLE CENTER HOLE SO THAT IT WILL NOT INTERFERE WITH STATIC COLLECTOR.** Replace inner and outer hub caps.

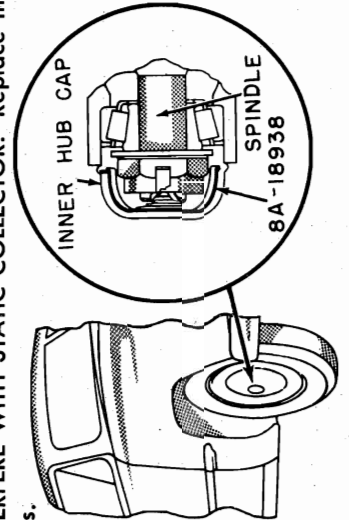


Figure 6

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MODEL M-2, Ford Part
No. 1A-18805-A1

GENERAL

The Bendix Model M-2, Ford Model 1A-18805-A1 Auto Radio is a six-tube super-heterodyne receiver with vibrator power supply and full wave rectifier. The antenna, radio, frequency, and oscillator circuits are inductively tuned, by means of push buttons and or the manual tuning control, over a frequency range of 540 to 1606 kilocycles, by means of iron cores.

The On-Off, Volume and Tone Controls are on concentric shafts at the left of the receiver. The Manual Tuning Control is at the right. The Speaker is a separate unit.

TUBE COMPLEMENT

| | | | |
|---------|----------------|---------|-----------------------|
| 6SK7/GT | R.F. Amplifier | 6SQ7/GT | Det., AVC and AF ampl |
| 6SA7/GT | Converter | 6V6/GT | AF Amplifier |
| 6SK7/GT | I.F. Amplifier | 6X5/GT | Rectifier |

POWER SUPPLY

The Power Supply uses a 6X5/GT full wave rectifier tube in conjunction with a four prong full wave non-synchronous type vibrator.

ALIGNMENT

Recommended Test Equipment

Signal Generator - 260 to 1700 KC range. Output from 1, to 100,000 microvolts. Modulation 30% at 400 cycles.

Output meter - 2 watt capability with 4.0 ohm termination or, P. M. Speaker, for alignment by ear as an alternate.

Dummy Antenna - Constructional circuit included in the rear section of this manual.
General:

Make all alignment adjustments to the receiver with "A" lead connected to a 7.2 volt negative source, and ground the chassis to the positive side of this source. Rotate the volume and tone controls to their maximum clockwise position. Connect the output meter across the speaker voice coil. Use an insulated screw driver for making all adjustments. Use shielded cables for connections between signal generator, dummy antenna and receiver. For each adjustment, the signal level should be set as low as possible while still obtaining a reasonable output indication. The signal level should be controlled at the signal generator, and not with the receiver controls.

I. I.F. Alignment

- (a) Set the signal generator frequency to 265.0 KC. Connect the signal lead thru the standard test dummy antenna to the receiver antenna connection.
- (b) Turn the receiver manual tuning control for the high frequency end of the dial
- (c) Adjust the I.F. iron cores L-6A, L-6B, L7A and L7B for maximum output. Repeat this operation to assure accurate alignment.

2. R.F. Alignment

Note: Before commencing RF alignment, turn the manual tuning control until the dial pointer travels as far towards the low frequency end of the dial as possible. This should be about one quarter of an inch to left of the 5.5 marker. Reset the dial pointer if necessary.

- (a) Set the signal generator to 1606 KC, and connect the signal lead thru the dummy antenna to the receiver antenna socket.
- (b) Turn the receiver tuning control until the receiver is set to the highest frequency as indicated by the pointer.
- (c) Adjust the trimmers C1, C7 and C9 for maximum output. Repeat this to assure accurate alignment.

3. Sensitivity Control Adjustment

- (a) Using the dummy antenna, the signal generator should be connected to the receiver as in the R. F. alignment procedure. Make sure the receiver volume control is fully clockwise.
- (b) Apply a signal, 30 percent modulated at 400 cycles, of sufficient strength to produce one watt output, when tuned in on the receiver.
- (c) Remove modulation and adjust the sensitivity control R14 for 100 milliwatts of noise, maximum, at the worst point in the band. This will usually be found at the high frequency end of the dial.

4. Alignment with Car Antenna

With the antenna fully extended, tune in a weak station near 1600 KC and adjust the antenna trimmer C1 for maximum volume.

5. Tuner Iron Core Alignment

Note: The following procedure is only required when a coil or iron tuning core is replaced.

- (a) Be sure the I.F. coils are properly aligned as outlined in Section 1.
- (b) Set the tuner core carriage at the position which tunes the receiver to the highest frequency. Adjust the position of the iron tuning cores so that they do not extend inside the coil, but remain well within the coil form.
- (c) Introduce a 1606 KC signal into the set through the dummy antenna and adjust trimmers C1, C7 and C9 for maximum output.
- (d) Use the manual control to tune the receiver until the position is centered on the 1300 KC dial frequency marker. Tune the signal generator to 1300 KC. Adjust the iron tuning cores separately for maximum output.
- (e) Set the tuner again to the highest frequency position and introduce 1606 KC. Tune trimmers C1, C7 and C9 for maximum output.
Note: Make no further adjustment of the iron tuning cores at 1606 KC.
- (f) Repeat sections (d) and (e).
- (g) Use glyptol or equivalent cement to cement the iron core screws securely to the tuner core carriage.

MODEL M-2, Ford Part
No. 1A-18805-A1

DETAILS FOR CONSTRUCTING DUMMY ANTENNA

The purpose of the dummy antenna is to properly match the output of the signal generator to the receiver input.

Material Required

- 1 - 30 mmf Ceramic Capacitor plus or minus 1 mmf.
- 1 - 30 mmf Ceramic Capacitor plus or minus 1 mmf.
- 1 - Antenna Connector, Male, C223183.
- 3 ft. Shielded Wire.
- A shield can, or other material for a shielded housing.

TO SIGNAL GENERATOR

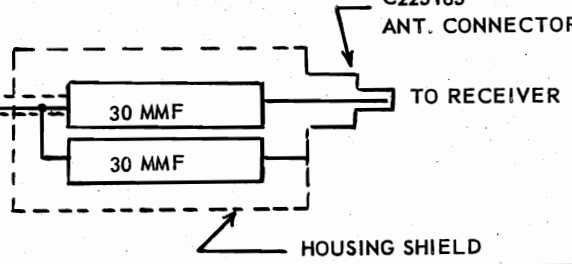


GND.

C223183
ANT. CONNECTOR

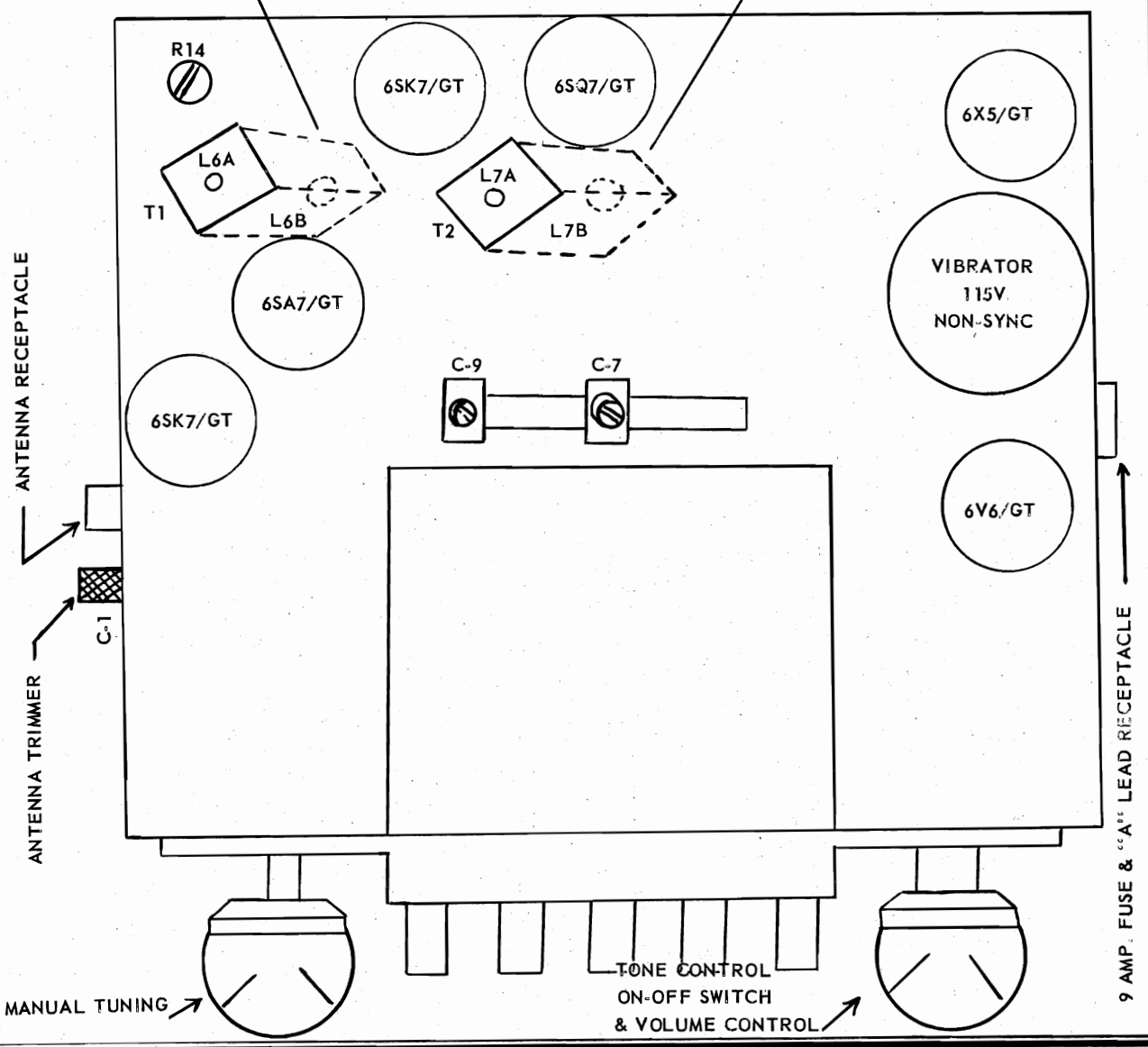
TO RECEIVER

SHIELDED WIRE

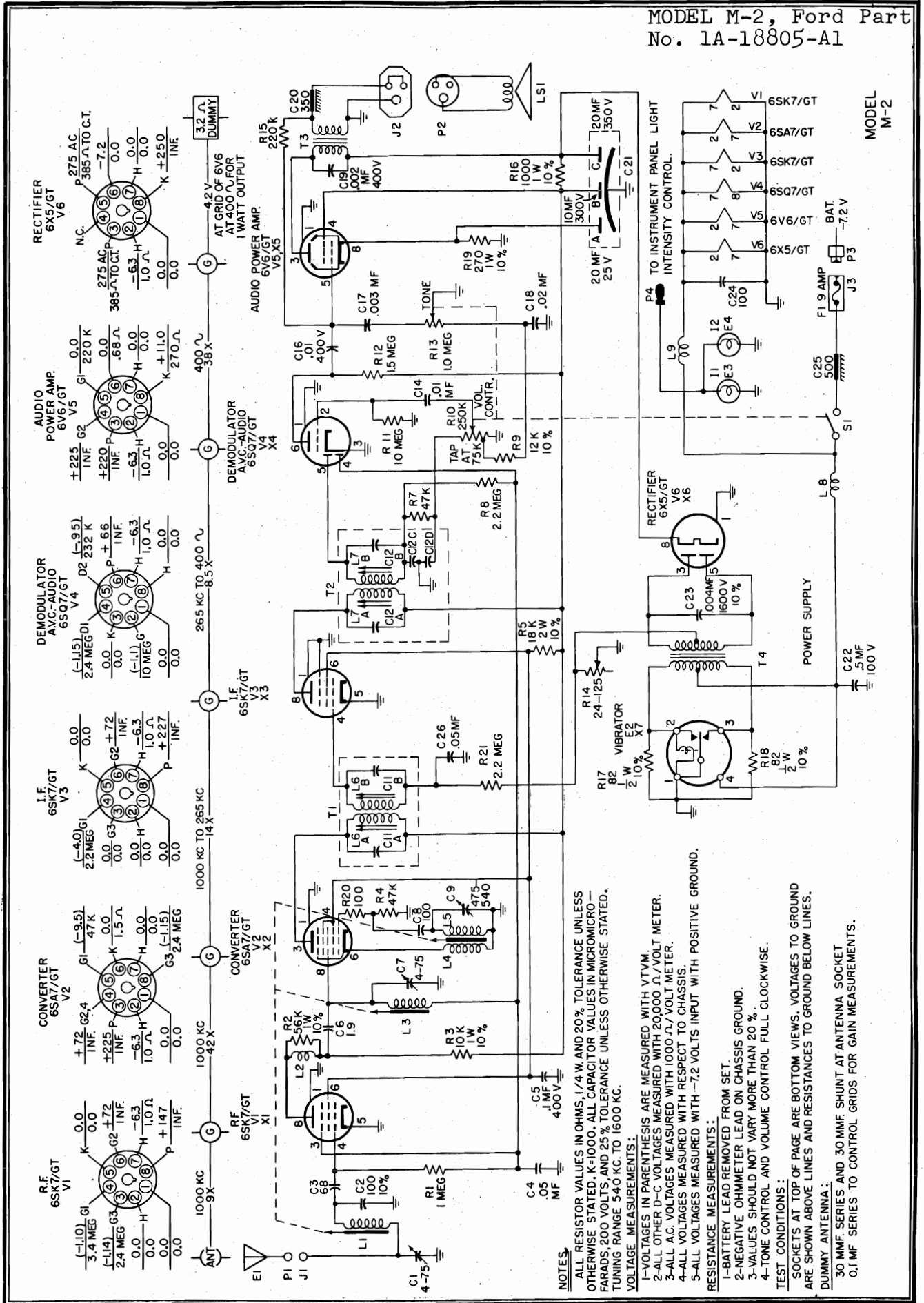


HOUSING SHIELD

BOTTOM OF I.F. CANS



MODEL M-2, Ford Part No. 1A-18805-A1



MODEL M-2

PAGE 22-8 BENDIX

MODEL M-2, Ford Part
No. 1A-18805-A1

| Bendix Radio Part Number | Description |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| HSC-775-S-23 | Nut, 1/2 x 28 |
| HN-799-G16-E | Lock Washer, 1/4" |
| HC-897-S-08-6 | Self Tapping Screw #6 - 1/4" |
| HC-897-S-08-8 | Self Tapping Screw #8 - 1/4" |
| HC-897-S-24-8 | Self Tapping Screw #8 - 3/4" |
| A-17028-13 | Grommet for "A" Lead |
| L-201564-1 | Escutcheon Assy. Complete |
| C-203458 | Clutch and Gear Assy. (Tuner) |
| L-203683-1 | Speaker Baffle Assembly |
| R-203684-1 | Push Button Tuner & Coil Plate Assy. |
| R-203684-2 | Pinion Shaft & Drive Assy. (Tuner) |
| R-203684-3 | Manual Drive Shaft Assy. (Tuner) |
| C-204412-1 | Knob - Volume and ON-OFF |
| C-204419-1 | Knob - Tuning Control |
| C-204858-1 | Wheel Static Collector Assy. |
| L-206690-1 | Top Cover Assembly |
| L-206691-1 | Bottom Cover Assembly |
| C-207001-1 | Capacitor - Volt Regulator- Cond. Assy. |
| L-207070-1 | Installation Kit of Parts (Includes complete set of knobs, wheel static collector assy., generator condenser, fuel gauge condenser, oil gauge condenser, ten (10) ignition suppressors, two (2) bezel plates, volt regulator cond., three (3) wing nuts and miscellaneous hardware |
| L-207097-1,2-3-4 | Speaker Assembly |
| C-207746 | Manual Drive Shaft (Tuner Assembly) |
| A-207747 | Push Button Reset Screw Assembly (Tuner Assy.) |
| C-215521-2 | Coil - Hash Choke |
| A-215705 | Iron Core Slug (Tuner) |
| C 215734 | R.F. Coil with Iron Core Slug |
| C-215739-2 | Filament Choke Assembly |
| C-215785 | Oscillator Coil with Iron Core Slug |
| C-215787 | Antenna Coil with Iron Core Slug |
| C-215818-1 | Image Trap Assembly (alternate C-215818-2) |
| C-217453-1 | Transformer - Power |
| C-217465 | Transformer - Audio Output |
| C-219046-2 | Antenna Trimmer |
| C-219057 | Special Trimmer Capacitor - 430-500 mmf. |
| C-219555-5 | Sensitivity Control - 200 ohm |
| C-219586-2 | Dual Potentiometer, Volume Tone On-Off Sw |
| C-220098-1 | Capacitor - Paper - .003 mfd. - 600 V |
| C-220098-3 | Capacitor - Paper - .01 mfd. - 200 V |
| C-220098-4 | Capacitor - Paper - .02 mfd. - 200 V |
| C-220098-5 | Capacitor - Paper - .05 mfd. - 200 V |
| C-220098-6 | Capacitor - Paper - .1 mfd. - 400 V |
| C-220098-10 | Capacitor - Paper - .5 mfd. - 100 V |
| C-220098-11 | Capacitor - Paper - .002 mfd. - 600 V |
| C-220098-12 | Capacitor - Paper - .01 mfd. - 400 V |
| C-220098-17 | Capacitor - Paper - .004 mfd. - 1600 V |
| C-220099-3 | Capacitor - Mica - 100 mmfd. - 20% - 500 V |
| C-220099-11 | Capacitor - Mica - 100 mmf. - 10% - 500 V |
| C-220106 | Capacitor - Generator - 1.0 mfd. - 200 V |
| C-220108-1 | Capacitor - Dry Electrol - Triple - 20 mfd. 350V 20 mfd. - 25V - 10 mfd. - 300 V |
| C-220173 | Capacitor - Special Temp. Coef - 43 mmf. |
| C-220183-1 | Capacitor - Fuel Gauge Cond.Assy. - .0 mfd.-200V |
| C-220184 | Capacitor - Voltage Regulator Condenser (part of C-207001-1) |

| Bendix Radio Part Number | Description |
|-----------------------------|-----------------------------------------------------------------------------------------------|
| C-220185 | Capacitor - Oil Gauge Cond.Assy.--.5 mfd. 200 V |
| C-220186-3 | Capacitor - Mica - 68 mmf. - 20% - 500 V |
| C-220551A-101M | Resistor - 100 ohm - 1/4 W - 10% |
| C-220551A-105M | Resistor - 1.0 megohm - 1/4 W - 20% |
| C-220551A-106M | Resistor - 10 megohm - 1/4 W - 20% |
| C-220551A-123K | Resistor - 12,000 ohm - 1/4 W - 10% |
| C-220551A-155M | Resistor - 1.5 meg. - 1/4 W - 20% |
| C-220551A-224M | Resistor - 220,000 ohm - 1/4 W - 20% |
| C-220551A-225M | Resistor - 2.2 megohm - 1/4 W - 20% |
| C-220551A-473M | Resistor - 47,000 ohm - 1/4 W - 20% |
| C-220551B-820M | Resistor - 82 ohm - 1/2 W - 10% |
| C-220551C-102K | Resistor - 1000 ohm - 1 W - 10% |
| C-220551C-103K | Resistor - 10,000 ohm - 1 W - 10% |
| C-220551C-271K | Resistor - 270 ohm - 1 W - 10% |
| C-220551D-183K | Resistor - 18,000 ohm - 2 W - 10% |
| C-220554 | Suppressor Resistor - 10,000 ohm |
| C-221319-2 | Pilot Lamp - 6 V - Mazda - Type #55 |
| C-221613-9 | Fuse - 9 amp. - SFE Fast Blow |
| C-222118-1-3 | "A" Lead Assembly |
| C-222810-1 | Vibrator - 115 cycles |
| A-223012-3 | Octal Socket, Lugs 1 & 7 Gnded. |
| A-223012-4 | Octal Socket, Lugs 1 & 4 Gnded. |
| A-223012-5 | Octal Socket, Lugs 1, 2, 3 & 5 Gnded. |
| A-223012-7 | Octal Socket, Lugs 1, 3 & 8 Gnded. |
| G-223182-2 | Vibrator Socket - 4 prong |
| C-223183 | Antenna Socket |
| C-223184-1 | Speaker Socket |
| N-230182 | Tuner Coil Assy. (Includes osc. & ant. coils, RF Coils, Iron Core Slugs, Capacitors, etc.) |
| L-230840 | R.H. Support Bracket |
| L-230841 | L.H. Support Bracket |
| A-233499-1-2-4 | Fuse Holder Assembly (Alternate C-233775-1-2-4) |
| A-234668 | Clip (I.F. Mtg.) |
| C-235233 | Bezel - (Trim) |
| L-235234 | Knob - Tone |
| A-238531 | Spring - Tension (Manual Shaft) |
| C-238533 | Spring - Backlash (Pointer) |
| A-239702 | Knob Retaining Spring |
| A-240354 | Bushing (Manual Drive) |
| C-241709-6 | Nut 1/4 - 20 |
| A-241710-1 | Tinnerman Nut Lock (for fuse holder) |
| A-241736 | Wing Nut |
| C-243223 | Hash Shield |
| A-243398-1 | Capacitor - Spark Plate |
| A-243398-2 | Capacitor - Spark Plate |
| A-243399-1 | Capacitor - Spark Plate Insulator |
| A-243399-2 | Capacitor - Spark Plate Insulator |
| A-245602 | Neoprene Torque Washer (for tuner) |
| A-245631 | "C" Washer (for manual shaft assy.) |
| A-245692 | Stop Washer (for manual shaft assy.) |
| A-245770 | "C" Washer (for securing pointer) |
| A-245886 | Serrated Washer (installation kit) |
| L-246968 | Calibrated Dial Glass |
| L-246980 | Sub-Dial (Black Plate) |
| C-249615 | Pointer Arm |
| CH-263010-1 | Iron Core (I.F. Can) |
| C-287055 | Lamp Holder |
| L-291701 | Transformer - L.F. - Input |
| L-291702-1 | Transformer - I.F. - Output |
| C-293168-1 | R.F. Coupling - 1.9 mmf. (Capacitor) |

REPLACEMENT PARTS LIST

Models 951 & 951W

| Stock No. | Symbol No. | Description | Stock No. | Symbol No. | Description |
|------------------------------|------------------------------------|-----------------------------------------------------------------------------|------------------------------------------|------------|-------------------------------|
| ELECTRICAL COMPONENTS | | | ELECTRICAL COMPONENTS (Continued) | | |
| CV0F00 | C1a,b,2a,b, c,d | CAPACITOR-Variable | T10D27 | T4 | TRANSFORMER-IF Output AM |
| CP2T40 | C3 | CAPACITOR-Paper .05mfd 200V | TR0R00 | T5 | TRANSFORMER-Ratio Detector |
| CM22A101M | C4,29 | CAPACITOR-Mica 100 mmf 500V | TA0025 | T6 | TRANSFORMER-Output |
| CC9M42 | C5 | CAPACITOR-Ceramic 470 mmf Min 500V | TP0H03 | T7 | TRANSFORMER-Power |
| CP6T20 | C6,12,13,14, 22,24,25,27, 28 | CAPACITOR-Paper .006mfd 600V | LF0A11 | L2 | COIL-RF Choke |
| CC9A34 | C7,8 | CAPACITOR-Ceramic 100 mmf 500V | LA0F02 | L3,R2 | COIL-Antenna FM Input |
| CC9A14 | C9 | CAPACITOR-Ceramic 2.2mmf 500V | LI0F02 | L4 | COIL-RF FM |
| CC8B28 | C10 | CAPACITOR-Ceramic 33mmf 500V | LF0A13 | L5 | COIL-RF Filament Choke 2.2 mh |
| CC9R80 | C11 | CAPACITOR-Ceramic .01 mfd Min 500V | LO7F01 | L6 | COIL-Osc FM |
| CM6S16 | C15 | CAPACITOR-Mica 18 mmf 500V | LI0F03 | L7 | COIL-2nd IF FM |
| CM22A220M | C16 | CAPACITOR-Mica 22 mmf 500V | LF0A00 | L8,9 | COIL-RF Choke Filament |
| CE1T06 | C18 | CAPACITOR-Electrolytic 5 mfd 50V | LF0A12 | L10 | COIL-RF Choke |
| CC9M50 | C19 | CAPACITOR-Ceramic 1000 mmf Min 500V | 744 | | LAMP-Bayonet Base |
| CP6T12 | C17,21,23 | CAPACITOR-Paper .002mfd 600V | BT3S06 | | MECHANICAL COMPONENTS |
| CM22A101M | C20 | CAPACITOR-Mica 100 mmf 500V (Use only with 6T8-V5-tube) | BT4S05 | | |
| CM22A221K | C20 | CAPACITOR-Mica 220 mmf 500V (Use only with 6V8-V5-tube) | BT5S03 | | |
| CE3A06 | C26a,b,c | CAPACITOR-Electrolytic 40-450, 10-450, 100-200 | CD0N04 | | |
| CT1B06 | C31 | CAPACITOR-Trimmer FM | CL2A08 | | |
| CC6B22 | C33 | CAPACITOR-Ceramic 10 mmf 500V N330 | HC0S00 | | |
| CC9A34 | C34 | CAPACITOR-Ceramic 100 mmf 500V | HC0S60 | | |
| CP9T21 | C35 | CAPACITOR-Paper .0068 mfd 600V | HP0D05 | | |
| CC9A16 | C36 | CAPACITOR-Ceramic 3.3 mmf 500V (Use only with 6V8-V5- tube) | HR0S14 | | |
| RC22A221M | R1,7,11 | RESISTOR-Comp 220 ohms 1/4W | H50C75 | | |
| RC22A474M | R4 | RESISTOR-Comp 470K 1/4W | H56F00 | | |
| RC22A470M | R5 | RESISTOR-Comp 47 ohms 1/4W | ID0M29 | | |
| RC22A223M | R6 | RESISTOR-Comp 22K 1/4W | JR2016 | J3 | |
| RC22A335M | R8,17 | RESISTOR-Comp 3.3 meg 1/4W | JR1S00 | J2 | |
| RC25A103M | R9 | RESISTOR-Comp 10K 2W | MP0I00 | | |
| RC22A270K | R10 | RESISTOR-Comp 27 ohms 1/4W +10% | S00D05 | | |
| RC22A104M | R12,21 | RESISTOR-Comp 100K 1/4W | S07M16 | | |
| RC22A333M | R13,18 | RESISTOR-Comp 33K 1/4W | S07M17 | | |
| RC22A224M | R14 | RESISTOR-Comp 220K 1/4W | S09M01 | | |
| RC23A273K | R15 | RESISTOR-Comp 27K 1/2W +10% | S08S07 | | |
| RC22A680M | R16 | RESISTOR-Comp 68 ohms 1/4W | | | |
| RC22A153M | R19 | RESISTOR-Comp 15K 1/4W | | | |
| RC22A106M | R20 | RESISTOR-Comp 10 meg 1/4W | | | |
| *RV4D00 | R22p,r | POTENTIOMETER-Tandem 4 meg Min 1/4W Tone; 2 meg 1/4W Vol. with switch | | | |
| RC23A274K | R23 | RESISTOR-Comp 270K 1/2W +10% | | | |
| RC24A682M | R24 | RESISTOR-Comp 6800 ohms 1W | | | |
| RC22A102M | R25 | RESISTOR-Comp 1000 ohms 1/4W | | | |
| RC22A154M | R26 | RESISTOR-Comp 150K 1/4W | | | |
| RC22A472M | R27 | RESISTOR-Comp 4700 ohms 1/4W | | | |
| SR3D00 | S1 | SWITCH-Rotary 4 Pole 3 Pos | | | |
| T00B00 | T1 | TRANSFORMER-Osc BC | | | |
| T10C15 | T2 | TRANSFORMER-1st IF Input FM | | | |
| T10C14 | T3 | TRANSFORMER-IF Input AM | | | |
| | | | CABINET COMPONENTS | | |
| | | Stock No. | Description | | |
| | | AL0Z23 | ANTENNA-Loop AM | | |
| | | BT2T01 | BOARD-Terminal 2 Lug with Bracket | | |
| | | BZ0B39 | BACK-Cabinet Cover | | |
| | | DS0C18 | DIAL-Scale 540-1620 KC, 88-108 MC | | |
| | | HC0D02 | CLAMP-Dial Retainer | | |
| | | HZ0C12 | CATCH-Bullet | | |
| | | HZ0G01 | GLIDE-Metal | | |
| | | HZ0H23 | HINGE-Door R.H. | | |
| | | HZ0H24 | HINGE-Door L.H. | | |
| | | HZ0H25 | HANDLE-Door | | |
| | | KC0B31 | KNOB-Control, Tone | | |
| | | KC0B32 | KNOB-Control, Volume | | |
| | | KC0B33 | KNOB-Control, Tuning | | |
| | | KC0B34 | KNOB-Control, Bandswitch | | |
| | | SP1R03 | SPEAKER-12" PM Round | | |
| | | ZW7G12 | CABINET-Console Combination | | |

* Receivers coded "D" and "E" use a 1.5 meg pot. for Volume in conjunction with a 68K resistor (R21) and a .004 mfd capacitor (C23). This 1.5 meg pot. is not a replaceable item. Please reorder by stock no. KR0T00, which includes a 2 meg pot. (R22r), a 100K resistor (R21) and a .002 mfd capacitor (C23).

Chassis Description

The C-300 chassis used in the Model T-30 is a five tube radio chassis designed for reception of AM (Broadcast band) signals. The chassis contains a single ended 50L6 Power Output amplifier in conjunction with a 5" speaker for sound reproduction. It can be operated on either AC or DC.

Parts List C-300 (T-30)

| Ref. No. | Part Description | Part No. |
|-----------------|--------------------------------------------|------------|
| -Transformers- | | |
| L101 | Loop Antenna (T-30) | 750219A-1 |
| T101 | Oscillator Coil | 452242A-1 |
| T102 | IF Transformer | 452243A-1 |
| T103 | IF Transformer | 452243A-1 |
| T104 | Output Transformer part of Printed Circuit | 750220A-1 |
| -Resistors- | | |
| R102 | 22K $\frac{1}{2}$ W 10% | 3229A-223 |
| R103 | 1 meg $\frac{1}{2}$ W 10% | 3229A-105 |
| R104 | 3.3 meg $\frac{1}{2}$ W 10% | 3229A-335 |
| R105 | Control (Volume & Switch) | 452312A-1 |
| R106 | 220K $\frac{1}{2}$ W 10% | 3229A-224 |
| R107, R109 | 150 ohms $\frac{1}{2}$ W 10% | 3229A-151 |
| R108 | 1500 ohms 1W 10% | 3232A-152 |
| | Printed Circuit | 452244A-1 |
| -Condensers- | | |
| C101, C110 | (2) 470 mmf $\frac{1}{2}$ 20% Ceramic | 2239A-103 |
| C102 | 56 mmf $\frac{1}{2}$ 10% Ceramic | 2241A-554 |
| C103, ABCD | Tuning Gang | 650349A-1 |
| C104 | .047 mfd 200V MOPT | 2246A-4730 |
| C105 | 150 mmf $\frac{1}{2}$ 20% Ceramic | 2240A-021 |
| C106, AB | Electrolytic | |
| | (a) 50 mfd 150V | 650326A-1 |
| | (b) 50 mfd 150V | |
| C107 | .01 mfd 600V MOPT | 2248A-1030 |
| C108 | .022 mfd 600V MOPT | 2244A-2230 |
| C112 | .1 mfd 600V MOPT | 2244A-1040 |
| -Miscellaneous- | | |
| | Cabinet | 950090A-1 |
| | Knobs (2) | 452321A-1 |
| | Back Cover | 850135A-1 |
| | Speaker, PM 5" | 750220A-1 |
| | Line Cord | 650171A-4 |
| | Mounting Clips for IF Transformers | 58514 |

MODEL T-30,
Ch. C-300

Alignment Instructions

Equipment required:

1. Calibrated RF Signal Generator (Signal from 455 KC to 1620KC).
2. Low Range Output Meter.

Alignment:

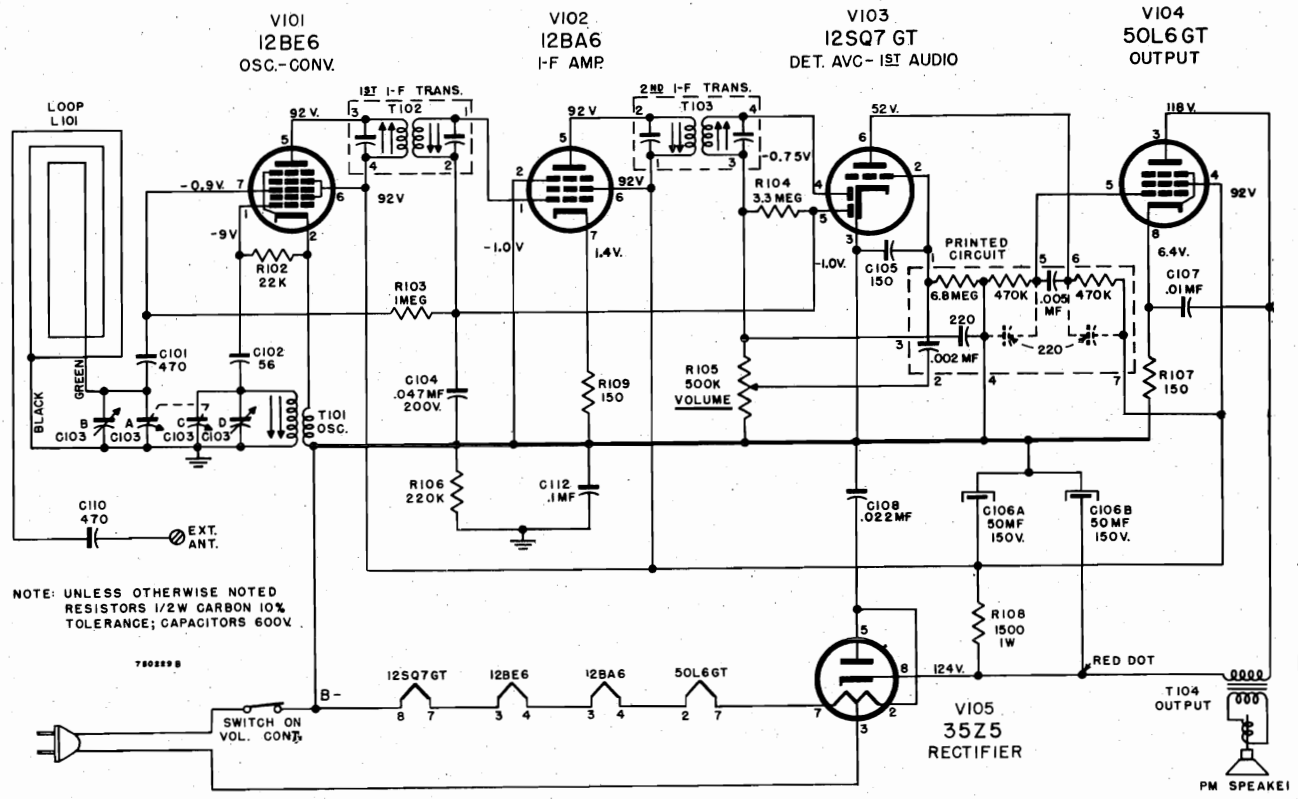
- a. Turn set on, adjust volume to maximum.
- b. See that dial pointer coincides with calibration marks at extremes of dial scale.
- c. Connect output meter across the speaker voice coil.
- d. Make a loop of the RF Generator leads (connect the leads together through a .01 mfd capacitor) and loosely couple to the Loop Antenna.

| Step | Set RF Generator at | Set Condenser gang at | Adjust | To Obtain |
|------|---------------------|--------------------------------|---------------------------------|----------------|
| 1 | 455KC | Fully Open at some quiet point | IF Slugs T103 T102 | Maximum Output |
| 2 | 1620KC | 1620KC | Osc. Trimmer C103D | Same |
| 3 | 1500 | 1500 | Ant. Trimmer C103B (on Loop) | Same |
| 4 | 537KC | 537KC | T101 Osc. Slug | Same |

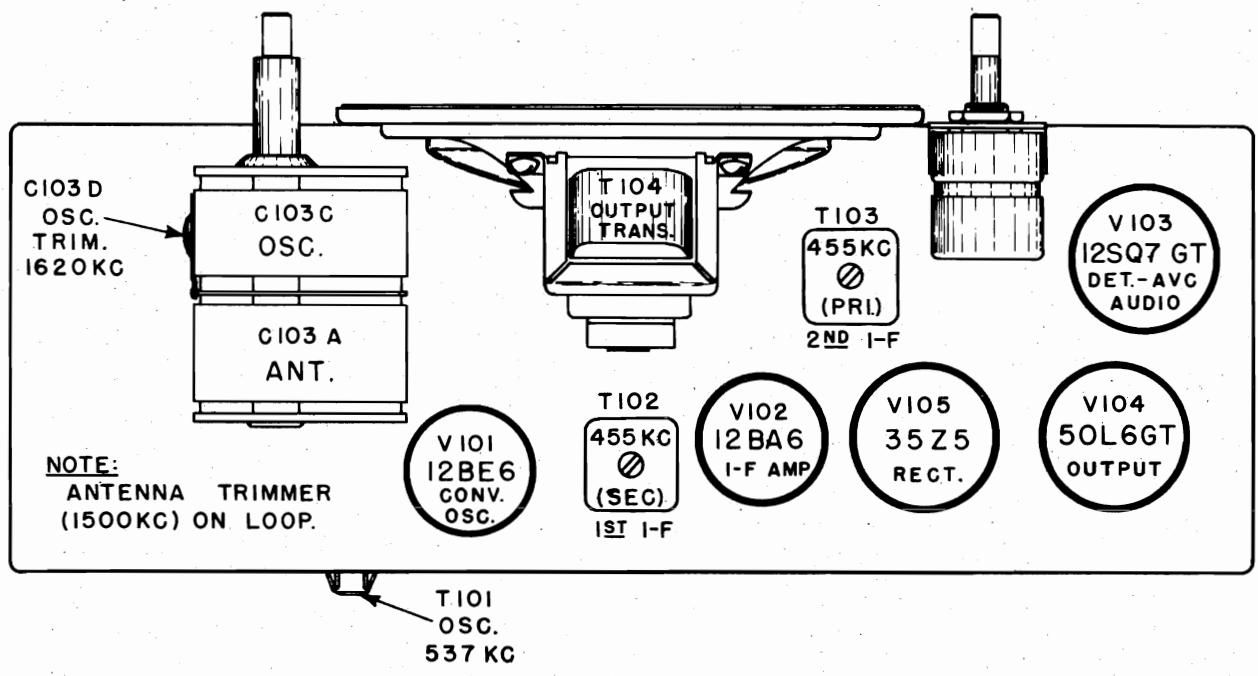
SPECIFICATIONS

| | | |
|-------------------------------------|-----------------------------------------------------------------|----------------|
| Tube Complement: | Loudspeaker: | |
| Type | Size & Type | 5 inch PM |
| 12BE6 Oscillator-Converter | Voice Coil Impedance | 3.2 ohms |
| 12BA6 IF Amplifier | | |
| 12SQ7 Detector, AVC & 1st Aud. Amp. | Power Output: | 1.75 watts |
| 50L6 Power Output | Antenna: | |
| 35Z5 Rectifier | Built-in Loop in rear of cabinet | |
| Frequency Range: | (Terminal on rear of cabinet for connection of outdoor aerial.) | |
| AM Broadcast Band 540KC to 1620KC | Cabinet Dimensions: | |
| Power Source: | Height 6 5/8", | Width 12 1/2", |
| Rating 105-125 volts, AC-DC | Depth 5 7/16". | |
| Power Consumption 35 watts | | |

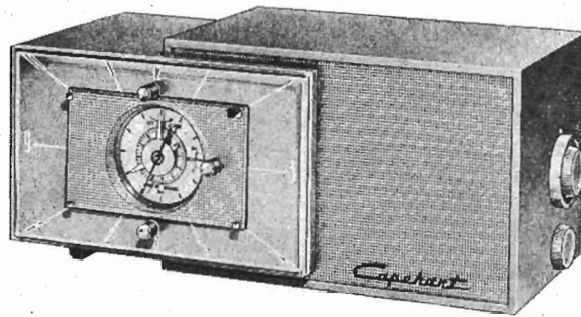
SCHEMATIC DIAGRAM



CHASSIS LAYOUT



MODEL TC-20,
Ch. C-297



MODEL TC-20

CHASSIS DESCRIPTION

The C-297 is a 5 tube radio chassis, designed for reception of AM (Broadcast Band) signals only. Since the chassis is operated in conjunction with an electric clock mechanism, it is to be operated only from an alternating current (AC) source.

The power source for the chassis is turned "on" and "off" by the Control Knob on the clock. When the Control Knob is in the **Manual** position, the radio chassis power source is on and it cannot be turned on or off automatically by the clock. When the Control Knob is in the **Off** position, the power source to the chassis is off and it cannot be turned on by the clock. However, with the Control in the **Off** position the power source can be turned on by

adjusting the Sleep Knob for a time period up to 60 minutes and at the expiration of this time period, the power source will be turned off. (The Sleep control is a mechanical timing device which mechanically actuates the "on-off" switch which is also manually actuated by the Control Knob). When the Control Knob is in the **Wake-Up** position, the power source is off, however, it will be turned on automatically by the clock mechanism at the time to which the clock alarm is set. The function of the Sleep Knob is the same in this Control Knob position as it is in the **Off** position.

NOTE: The clock motor will be energized at all times when the line cord is connected to the power source.

SPECIFICATIONS

Tube Compliment:

| Type | Purpose |
|-------------|-------------------------------------|
| 12BE6 | Oscillator-Converter |
| 12BA6 | I-F Amplifier |
| 12AV6.. | Detector, AVC & 1st Audio Amplifier |
| 50C5 | Power Output |
| 35W4 | Rectifier |

Frequency Range:

AM Broadcast Band540KC to 1620KC

Power Source:

Rating105-125 volts, 60 cycle AC only
Power Consumption35 watts

Appliance Outlet:

Maximum Rating1100 watts

Loudspeaker:

Size and type4 inch PM
Voice Coil Impedance3.2 ohms

Power Output:

.....1.5 watts

Antenna:

Built-in loop in rear of cabinet
(terminal on rear of cabinet for connection of outdoor aerial.)

Cabinet Dimensions:

Height 5 7/16 inches, Width 12 3/8 inches,
Depth 5 1/2 inches.

OPERATING INSTRUCTIONS

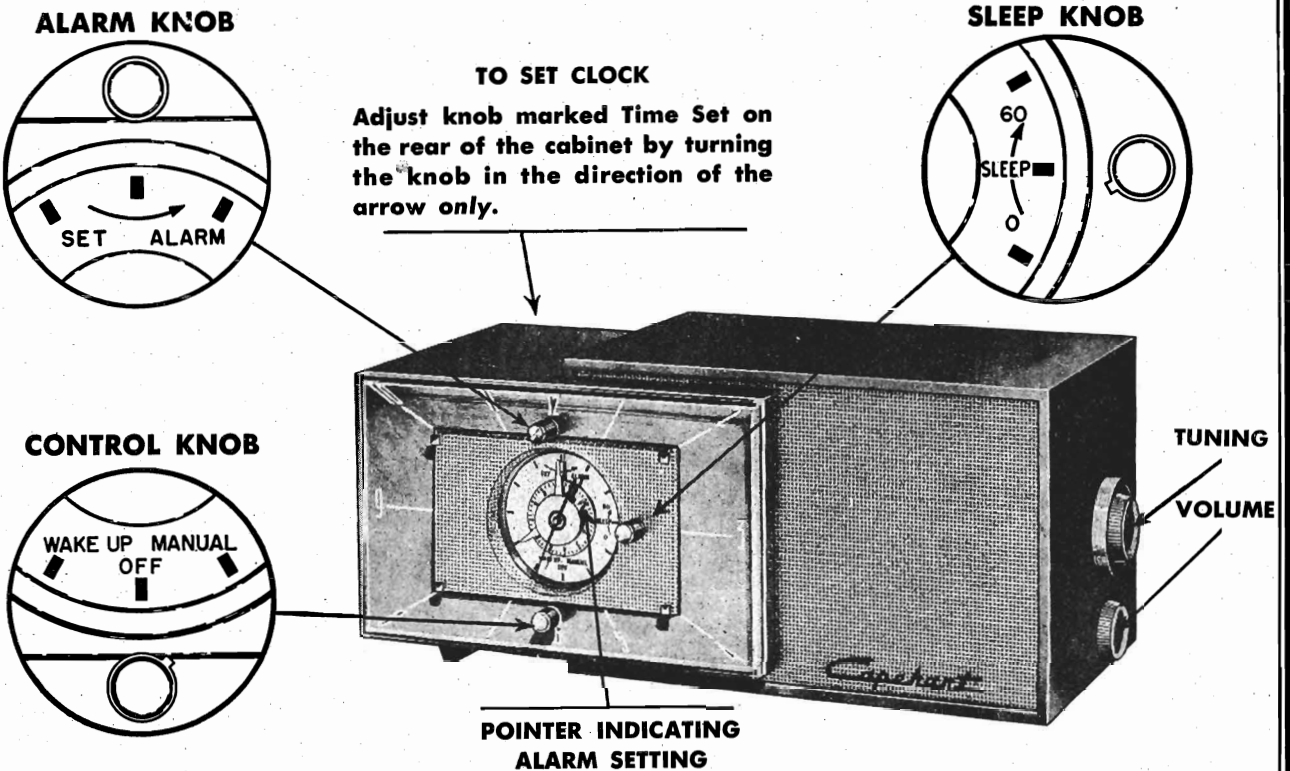
TO SET ALARM FOR EITHER AUTOMATIC RADIO OPERATION OR "BUZZER" OR COMBINATION OF BOTH

Pull out Alarm Knob and turn to the left, this motion will rotate the small disk in the center of the clock face. Set the pointer attached to the hour hand to the desired time indicated on the disk. When the Control Knob is on **Wake-Up** the radio will turn on automatically. Of course, the radio should be pre-tuned to a station and the Volume Control should be pre-set to the proper level to obtain proper automatic radio operation.

If the Alarm Knob is in the out position the "buzzer" will be sounded shortly after the radio goes on.

If it is desired to have the alarm only, independent of the radio pull the Alarm Knob out and set the Control Knob to **Off**.

Another combination of operations is provided with the Sleep Knob, which will turn off the radio automatically at night (see "TO TURN RADIO AND APPLIANCE OFF AUTOMATICALLY") and, provided that Control Knob is in **Wake-Up** position, the radio will turn on automatically in the morning.



TO TURN RADIO AND APPLIANCE OFF AUTOMATICALLY

Turn the Sleep Knob to the right and if the small projection on the Sleep Knob is used as a rough indicator for a reasonable degree of accuracy can be obtained in adjusting for any period of operation up to 60 minutes. For instance, if 15 minutes of operation is desired the Sleep Knob should be adjusted approximately one-quarter of its full rotation. If it is not desired to have the radio turned on automatically in the morning, then set the Control Knob to **Off** before you set the Sleep Knob for automatic turnoff.

TO TURN ON APPLIANCE AUTOMATICALLY

Plug electrical appliance into outlet on rear of radio, set Control Knob at **Wake-Up** position and the appliance will be turned on at the time determined by the setting of the Alarm Knob. The radio will operate at the same time, but if radio music is not desired the Volume Knob should be turned fully to the left.

TO PLAY RADIO MANUALLY

1. Set the Control Knob to the manual position.
2. Adjust Tuning Knob for desired station.
3. Set the Volume Control for desired sound volume.

MODEL TC-20,
Ch. C-297

REMOVAL AND SERVICE OF CLOCK MECHANISM

SERVICE

The clock mechanism used in this unit is not to be serviced by anyone other than an authorized Telechron Service Agency (see pages 7 and 8 of this manual for a listing of these agencies). When it is determined that the clock requires adjustment or repair, remove the clock mechanism from the cabinet (as per the following instructions) and return the clock mechanism to your Capehart distributor or an agency specified by him. If the clock mechanism is to be shipped by mail or express, be certain that it is adequately protected and properly packed.

TO REMOVE CLOCK

1. Remove (pull off) the three knobs from the front of the clock.
2. Remove the six (6) Phillips-head screws which fasten the back of the cabinet.

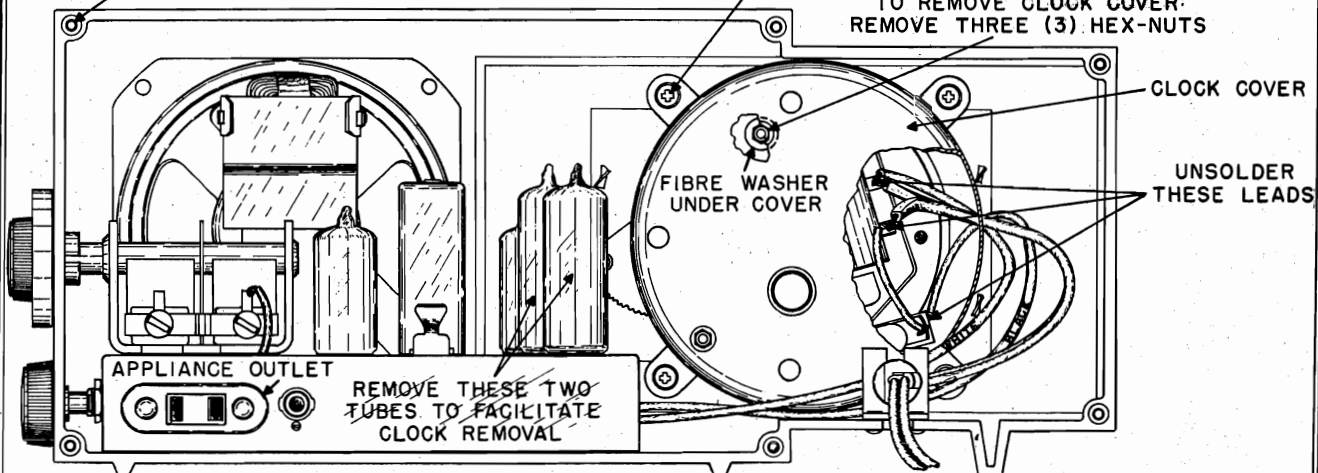
3. Remove the four (4) Phillips-head screws which secure the clock to the inside of the cabinet.
4. Remove the 35W4 and 50C5 tubes to facilitate removal of the clock.
5. Pull clock out of the cabinet by sliding it to the left and back.
6. Remove the three hex nuts which fasten the metal cover to the clock. Keep the metal cover and hardware (4 Phillips screws, 3 hex nuts, and 3 fibre washers) with the cabinet, do not return this material with the clock.
7. Unsolder four (4) electrical leads from the clock.

NOTE: To re-install the clock follow the above procedure in reverse.

TO REMOVE CABINET BACK:
REMOVE SIX (6) PHILLIPS SCREWS

TO REMOVE CLOCK FROM CABINET:
REMOVE FOUR (4) PHILLIPS SCREWS

TO REMOVE CLOCK COVER:
REMOVE THREE (3) HEX-NUTS



ALIGNMENT INSTRUCTIONS

Equipment required:

1. Calibrated R.F. Signal Generator (Signal from 455KC to 1620KC).
2. Low Range Output Meter.

- b. See that dial pointer coincides with calibration marks at extremes of dial scale.
- c. Connect output meter across the speaker voice coil.
- d. Make a loop of the R-F Generator leads (connect the leads together through a .01mfd capacitor) and loosely couple to the Loop Antenna.

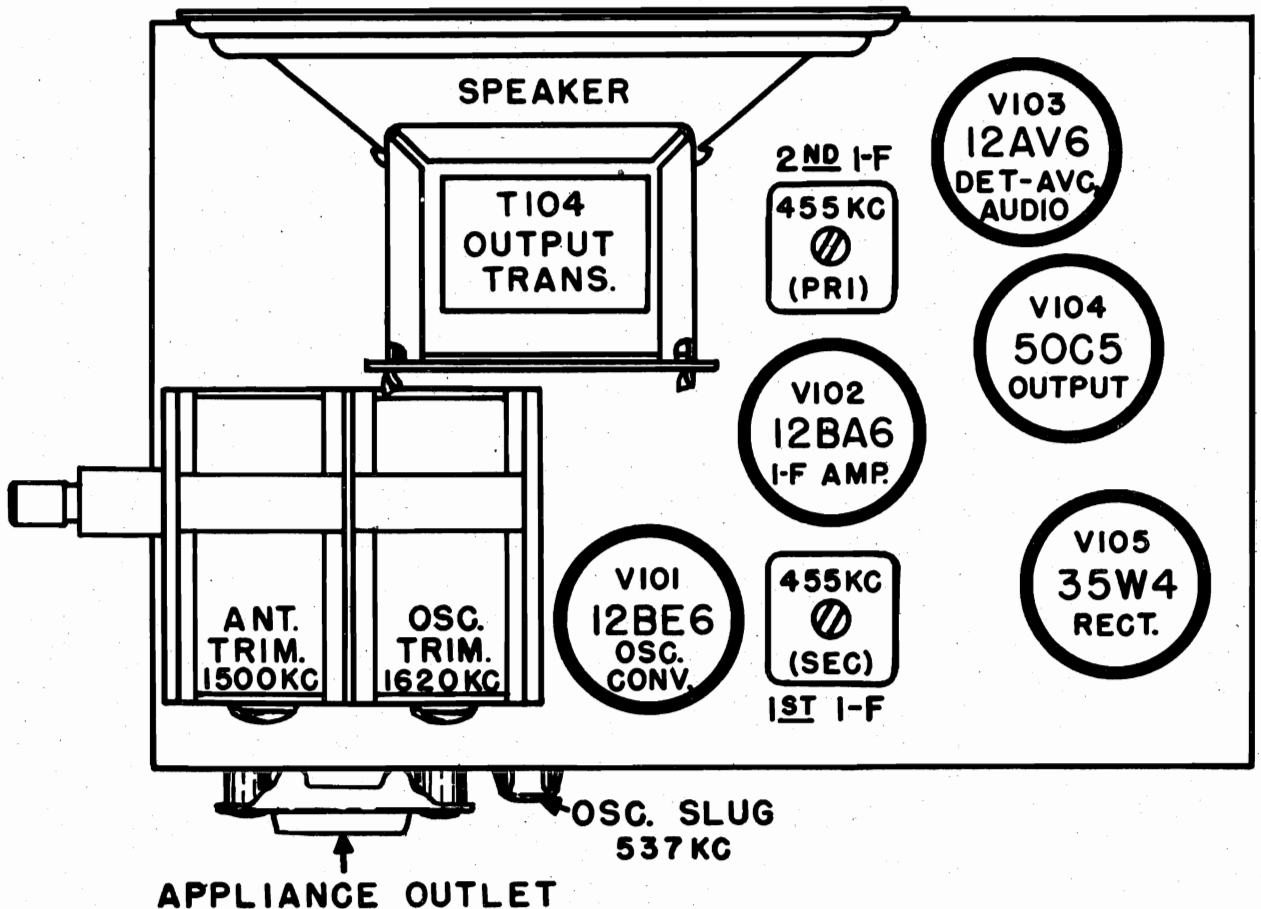
Alignment:

- a. Turn set on, adjust volume to maximum.

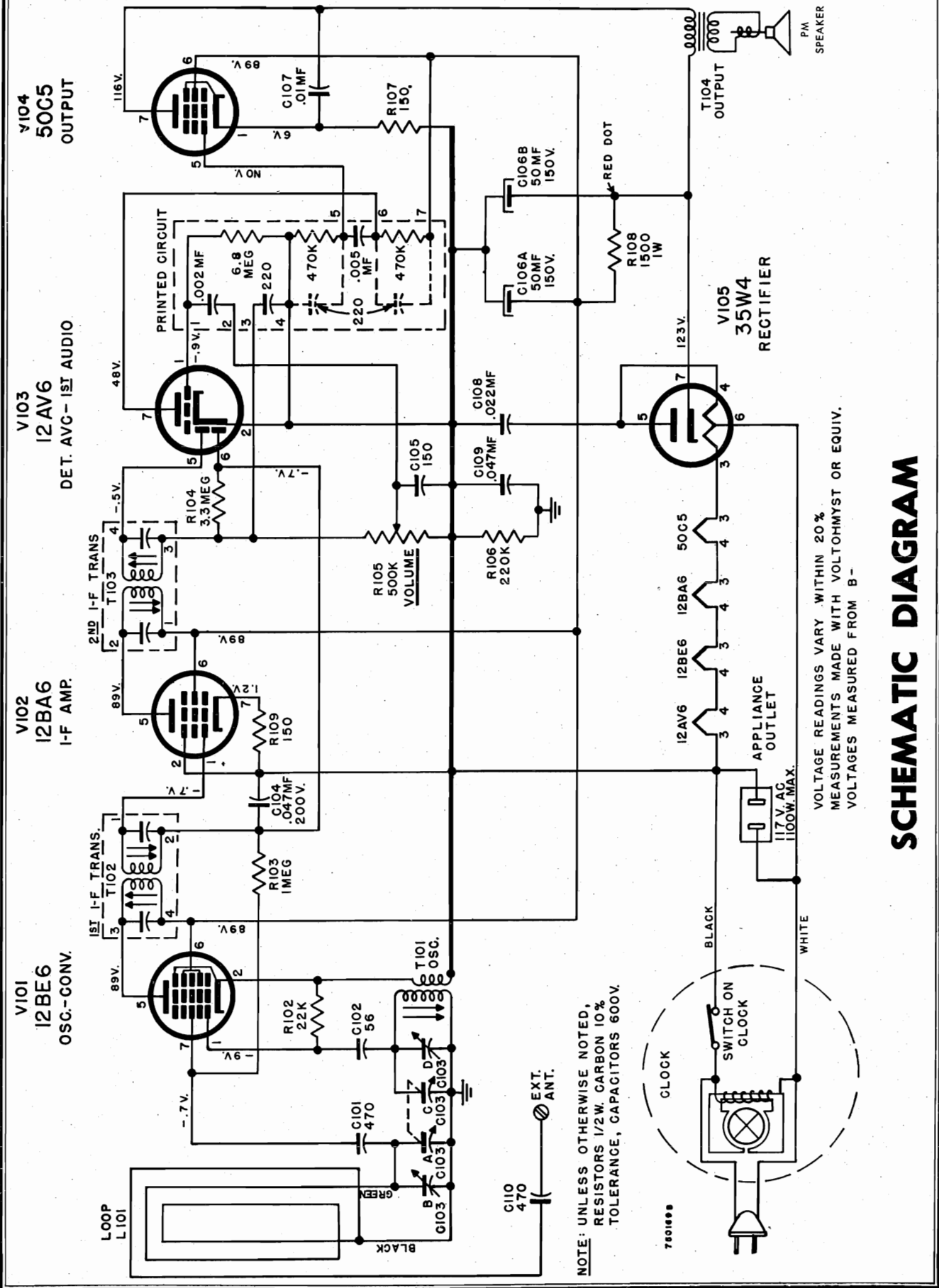
| Step | Set RF Generator At | Set Condenser Gang At | Adjust | To Obtain |
|------|---------------------|-------------------------------------------------|--------------------|-------------|
| 1 | 455KC | Fully Open. Disable Osc. Section of Tuning Gang | IF Slugs T103 T102 | Max. Output |
| 2 | 1620KC | 1620KC | Osc. Trimmer C103D | Same |
| 3 | 1500 | 1500 | AF Trimmer C103D | Same |
| 4 | 537KC | 537KC | *T101 Osc. Slug | Same |

* Adjust as Tuning Gang is Rocked

CHASSIS LAYOUT



MODEL TC-20,
Ch. C-297



PARTS PRICE LIST MODEL TC-20

| Ref. No. | Description | Part No. |
|----------------------|--------------------------------------------------------------------|------------|
| INDUCTANCES | | |
| L101 | Loop Antenna | 750207A-1 |
| T101 | Oscillator Coil | 452242A-1 |
| T102 | 1st IF Transformer | 452243A-1 |
| T103 | 2nd IF Transformer | 452243A-1 |
| T104 | Output Transformer (part of assembly No. 750204A-1) | |
| RESISTORS | | |
| R102 | 22K, 1/2w, 10% | 3229A-223 |
| R103 | 1 meg. 1/2w, 10% | 3229A-105 |
| R104 | 3.3 meg, 1/2w, 10% | 3229A-335 |
| R105 | 500K volume control | 452241A-1 |
| R106 | 220K, 1/2w, 10% | 3229A-224 |
| R107 & R109 | 150 ohm, 1w, 10% | 3229A-151 |
| R108 | 1500 ohm, 1w, 10% | 3229A-152 |
| | Printed Circuit | 452244A-1 |
| CAPACITORS | | |
| C103A,B,C,D | Variable Tuning Capacitor | 650327A-1 |
| C101 & C110 | 470 mmf 20% Ceramic | 2239A-013 |
| C102 | 56 mmf 10% Ceramic | 2241A-554 |
| C104 | .047 mf 200V (MOPT) | 2246A-4730 |
| C105 | 150 mmf 20% Ceramic | 2240A-021 |
| C106 | (a. 50 mf 150V electrolytic) (b. 50 mf 150V electrolytic) | 650326A-1 |
| C107 | .01 mf 600V paper | 2248A-1030 |
| C108 | .022 mf 600V (MOPT) | 2244A-2230 |
| C109 | .047 mf 600V (MOPT) | 2244A-4730 |
| | P.M. Speaker and Output Trans. Assy. | 750204A-1 |
| | Clock Mechanism | 750206A-1 |
| | Appliance Outlet 117V AC 1100 Watts Maximum | 450427A-1 |
| | Line Cord | 650171A-3 |
| MISCELLANEOUS | | |
| | Cabinet Assembly | 452234A-G1 |
| | Cabinet Back | 850130A-1 |
| | Grille (speaker) | 650324A-1 |
| | Grille (clock) | 650323A-1 |
| | Capehart Insignia | 452188A-2 |
| | Escutcheon, Clock | 750198A-1 |
| | Stud Decorative | 452235A-1 |
| | Knob (dial) | 650325A-1 |
| | Pointer Hub Clamp | 58549 |
| | Knob Radio | 452240A-1 |
| | Knob Clock | 452233A-1 |

PAGE 22-10 CAPEHART-FARNSWORTH

MODELS 1005-B, 1005-M,
1005-W, Ch. C-296;
1006-B, 1006-M, 1006-W,
Ch. C-287

SPECIFICATIONS

Tuning Range

Radio IF Frequencies

AM Band 540 KC to 1620 KC AM IF 455KC
FM Band 88 mc to 108 mc FM IF 10.7 mc

Chassis Tube Complement

Description

6BA6^{Type} AM, FM RF Amplifier
6J6 AM, FM Mixer, Oscillator
6BA6 FM, AM IF Amplifier
6BA6 FM Driver
6AL5 FM Ratio Detector
6SQ7 1st Audio, AM Detector---FM AVC Clamp
6V6GT Power Amplifier
6X5 Full Wave Rectifier

Total: 8 tube, including one rectifier.
Speaker 12 inch PM
Audio Output 4 watts
Power Source 105 to 125 volts, 60 cycle AC only

ALIGNMENT INSTRUCTIONS

Equipment Required

AM (broadcast band) IF and RF Alignment

1. Calibrated RF Signal Generator (range, 455KC to 1620KC)
2. Low Range Output Meter

FM (Frequency Modulation) IF & RF Alignment

1. FM Sweep Generator (range 10.7 mc to 108.5 mc)
2. Oscilloscope
3. RF Signal Generator (range 10.7 mc to 108.5 mc)
4. Vacuum tube Voltmeter

AM Alignment (IF & RF)

- a. Set Operation Selector to AM position
- b. See that the dial pointer coincides with the calibration marks at the extremes of the dial scale.
- c. Connect the Output Meter cable to Speaker socket on receiver.
- d. Turn set on and adjust Volume to maximum.

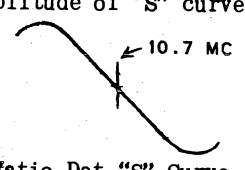
| STEP | CONNECT GENERATOR | SET GENERATOR AT | SET GANG AT | ADJUST | TO OBTAIN |
|------|---------------------------|------------------|--------------|---------------------------------------------------|---------------------------------|
| 1 | Green lead on mixer coil | 455KC | fully open | T105 & T107 top & Bottom slugs | M A X I M U M |
| 2 | Loose Couple to loop Ant. | 1620 KC | 1620KC | C102E, AM Osc. coil Trimmer | M U M |
| 3 | Same | 1500KC | 1500KC | C102B, Ant. Trimmer, C102C, AM Mixer coil Trimmer | M O U T |
| 4 | Same | 600KC | 600KC | T103, AM Mixer coil Slug | T P U T |
| 5 | Same | 537KC | fully closed | T102, AM Osc. coil Slug | U T |

MODELS 1005-B, 1005-M,
1005-W, Ch. C-296;
1006-B, 1006-M, 1006-W,
Ch. C-287

FM Alignment

- a. Connect the oscilloscope and FM or RF Generator as shown in the chart.
- b. Set the Operation Selector in the FM position.
- c. Turn the Receiver on.
- d. During alignment, reduce the generator output to keep the signal just above noise level to avoid overloading.
- e. For maximum signal transfer, Signal Generator should be balanced to 300 ohm FM Antenna terminal input.

IF SECTION

| STEP | CONNECT FM (SWEEP) GENERATOR | SET GENERATOR AT | SET GANG AT | CONNECT OSCILLOSCOPE | ADJUST | REMARKS |
|------|------------------------------------|-------------------------|-------------|------------------------------------------------------------------------------|----------------------------|-------------------------------------------------------------------------------------------------------------|
| 1 | Grid 6BA6 (FM Driver) pin #1, V104 | 10.7 MC ± 100KC dev. | fully open | Across C127 hot lead to junction R129 C127, C130 & C134, Grd lead to chassis | Top & bottom slugs of T108 | Adjust for "S" curve and centered so that the two curved portions are symmetrically spaced from the center. |
| 2 | Grid of 6BA6 (IF amp) pin #1, V103 | 10.7 MC ± 100KC dev. | open | Same | Top & bottom slugs of T106 |  |
| 3 | Grid of 6J6 (Mixer) pin #5, V102A | 10.7 MC ± 100KC dev. | open | Same | Top & bottom slugs of T104 | |

RF SECTION

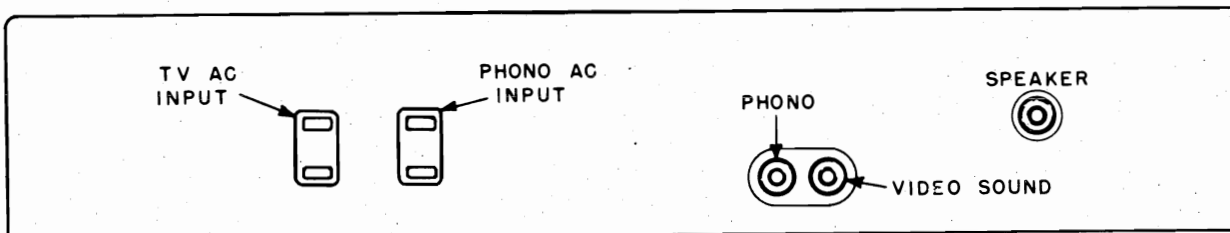
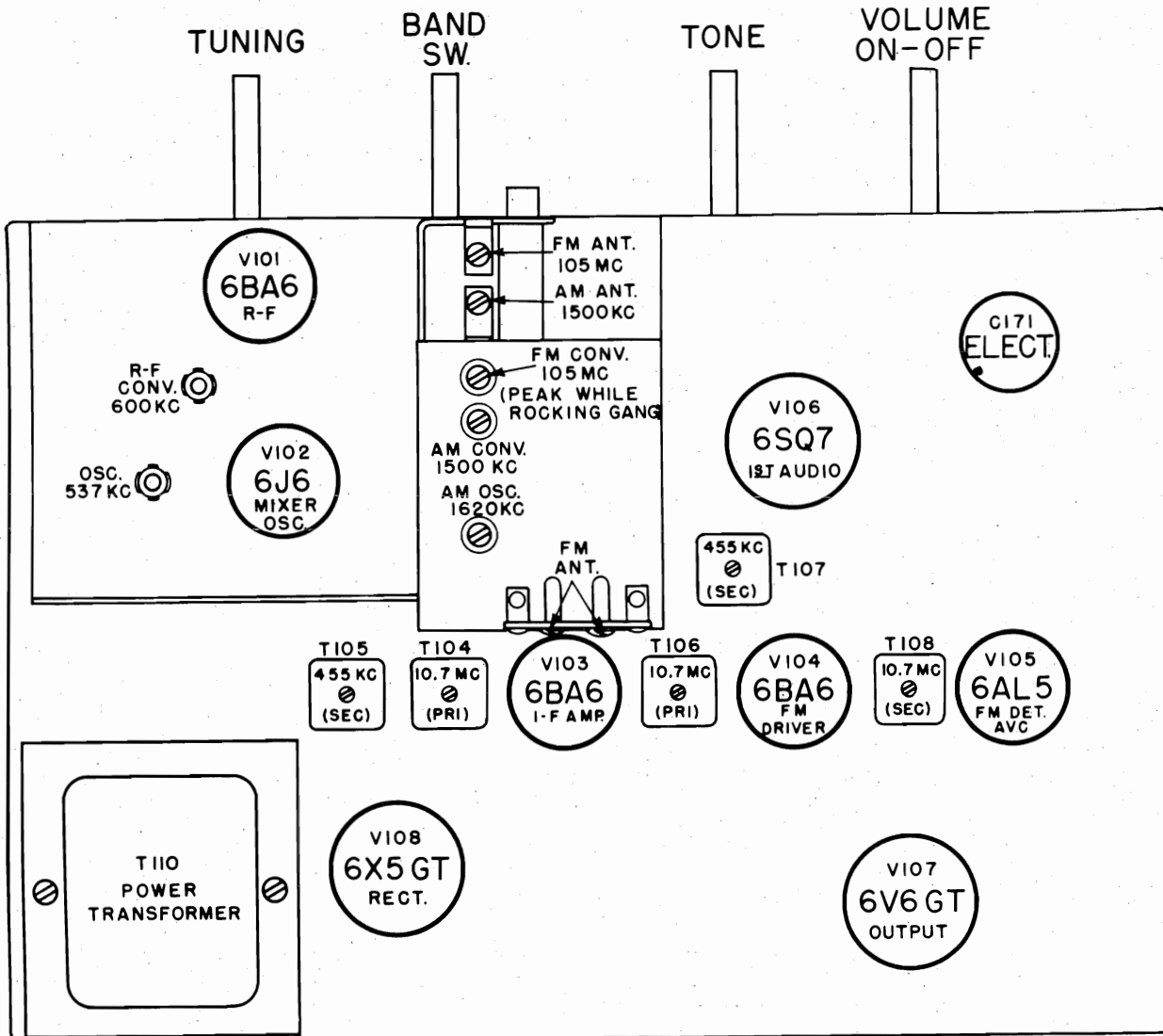
| STEP | CONNECT RF GENERATOR | SET GENERATOR AT | SET POINT-ER OR GANG AT | ADJUST | REMARKS |
|------|--------------------------------------------------------------------------------------------------------------------------------|------------------------|-------------------------|------------------------------------------|--------------------------------|
| 1. | To FM Ant. Terminals | Modulated 106MC signal | dial point at 106 MC | *L103 osc. coil by adj. spacing of turns | For Max. Sound Output |
| 2. | Same | Modulated 90 MC Signal | gang at 90 MC | Plates of FM tuning capacitor | Same |
| 3. | Repeat steps 1 and 2 until signals are heard with dial pointer set to ½ a pointer's width below 90 MC and 106 MC respectively. | | | | |
| 4. | To FM Ant. terminals | Modulated 106 MC | dial to 106 MC | C102D FM trimmer on Mix. Sec. | Max. output while rocking gang |
| 5. | Same | Same | Same | C102A FM trimmer on Ant. section | Maximum Output |
| 6. | Same | Same | Same | L103 (mixer) | Maximum Output |
| 7. | Same | Same | Same | L102 FM Ant. Coil | Maximum Output |

* Cement both coils on L103 after adjusting.

Check calibration of dial against known AM and FM stations.

MODELS 1005-B, 1005-M,
1005-W, Ch. C-296;
1006-B, 1006-M, 1006-W,
Ch. C-287

RADIO CHASSIS C-287 & C-296



CHASSIS
C-296, C-287

TUBE SOCKET TERMINAL VOLTAGES

Voltages measured with voltohmmyst or equiv. from indicated Terminal to chassis. No signal input, all controls set for normal operation, Band Switch in AM position except where otherwise noted.

| Tube No. | Tube Socket Terminal Numbers | | | | | | | |
|----------|------------------------------|-------|-------|-------|-------|----------------|-------|-----|
| | #1 | #2 | #3 | #4 | #5 | #6 | #7 | #8 |
| V-101 | -.85 | 0 | 0 | 6.3AC | 170 | 90 | 0.7 | |
| V-102 | 77 | 160 | 0 | 6.3AC | -1.6 | -5.6* -7.5† | 0 | |
| V-103 | -1. | 0 | 0 | 6.3AC | 170 | 80 | 0.6 | |
| V-104 | 0 | 0 | 0 | 6.3AC | 175 | 90 | 0.55 | |
| V-105† | -.45 | -.45 | 6.3AC | .0 | 0 | 0 | -.7 | |
| V-106 | 0 | -.8 | 0 | -.5 | -1 | 87 | 6.3AC | 0 |
| V-107 | 0 | 0 | 225 | 180 | 0 | 87 | 6.3AC | 9.5 |
| V-108 | 0 | 6.3AC | 205AC | | 205AC | 0 | 0 | 240 |

- * Reading at low frequency end of band.
- + Reading at high frequency end of band.
- † Band Switch in FM position.

PARTS LIST RADIO CHASSIS C-287 and C-296

- RESISTORS -

| Ref. No. | Description | Part no. |
|------------------------------------|----------------------------|------------|
| R101 | Carbon, 650 ohm, 1/2w, 10% | 3229A-561 |
| F102 | Carbon, 27K, 1/2w, 10% | 3229A-273 |
| R103, R129 | Carbon, 100 ohm 1/2w, 10% | 3229A-101 |
| R104 | Carbon 18K 1/2w, 10% | 3229A-183 |
| R105 | Carbon 8.2K, 1/2w, 10% | 3229A-822 |
| R106, R113, R118 } R133, R135 } | --- Carbon 1K 1/2w, 10% | 3229A-102 |
| R107, R111, R112 | Carbon 2.2 meg, 1/2w, 10% | 3229A-225 |
| R108, R127 | Carbon 10 meg, 1/2w, 10% | 3229A-106 |
| R109 | Carbon 33k, 1/2w, 10% | 3229A-333 |
| R110, R116, R131 | Carbon 68 ohm, 1/2w, 10% | 3229A-680 |
| R114 | Carbon 1.5K, 7w, 10% | 650101A-12 |
| R117, R132, R141 | Carbon 39K, 1/2w, 10% | 3229A-393 |
| R120 | Carbon 229K, 1/2w, 10% | 3229A-224 |
| R121 | Carbon 330 ohm, 1w, 10% | 3232A-331 |
| R122, R134 | Carbon 22k, 1/2w, 10% | 3229A-223 |
| R125 | Carbon 100K 1/2w, 10% | 3229A-104 |
| R136 | Carbon 330K, 1/2w, 10% | 3229A-334 |
| R138, R140 | Carbon 470K 1/2w, 10% | 3229A-474 |
| R123 | Control (tone) 3.2 meg. | 78153 |
| R124 | Control (volume) 1.5 meg. | 650290A-1 |

- CAPACITORS -

| | | |
|--------------------------------------------------------------------------------------|---------------------------------------------|-------------------|
| C101 | Tuning Gang Capacitor Assembly | 650278A-1 |
| C102 | Trimmer Condensers | Part of 650278A-1 |
| C103, C107, C112 } C114, C115, C117 } C118, C125, C128 } C129, C133, C138 } | ----- Ceramic Disc 5000 mmf, 10% 500V | 450469A-1 |
| C104 | Ceramic N330 56 mmf 10% 500V | 2241A-554 |
| C105 | Ceramic 50 mmf 10%, 500V | 25493 |
| C106 | Ceramic 4.7 mmf 10% 500V | 650030A-10 |

PAGE 22-14 CAPEHART-FARNSWORTH

MODELS 1005-B, 1005-M,
1005-W, Ch. C-296;
1006-B, 1006-M, 1006-W,
Ch. C-287

| | | |
|------------------|-------------------------------|-----------------|
| C108 | Ceramic N750 100 mmf 10% 500V | 2241A-766 |
| C109 | Ceramic N330 68 mmf 10% 500V | 2241A-558 |
| C110 | Ceramic N750 4.7 mmf 10% 500V | 650030A-12 |
| C111 | Ceramic N750 20 mmf 10% 500V | 2241A-722 |
| C113 | Ceramic 240 mmf 10% 500V | 25427 |
| C116 | OPT .047 mfd 20% 200V | 2246A-4730 |
| C119, C120, C126 | OPT .01 mfd 20% 600V | 2248A-1030 |
| C121 | Ceramic N750 33 mmf 10% 500V | 2241A-337 |
| C122, C131, C136 | OPT .0033 mfd 20% 600V | 2248A-3320 |
| C127, C130 | Mica 330 mmf 10% 500V | 650162A-9 |
| C132 | Elect 2 mfd 50V | 452132A-1 |
| C135 | OPT .022 mfd 20% 600V | 2248A-2230 |
| C134 | Mica 100 mmf 10% 500V | 25188 |
| C139, C140 | OPT .0047 mfd 20% 600V | 2244A-4720 |
| C142 | Mica 150 mmf 10% 500V | 650162A-8 |
| C171A, C171B | Elect 30 mfd 350V) | -----750090B-18 |
| C171C | Elect 20 mfd 25V) | |

- INDUCTANCES -

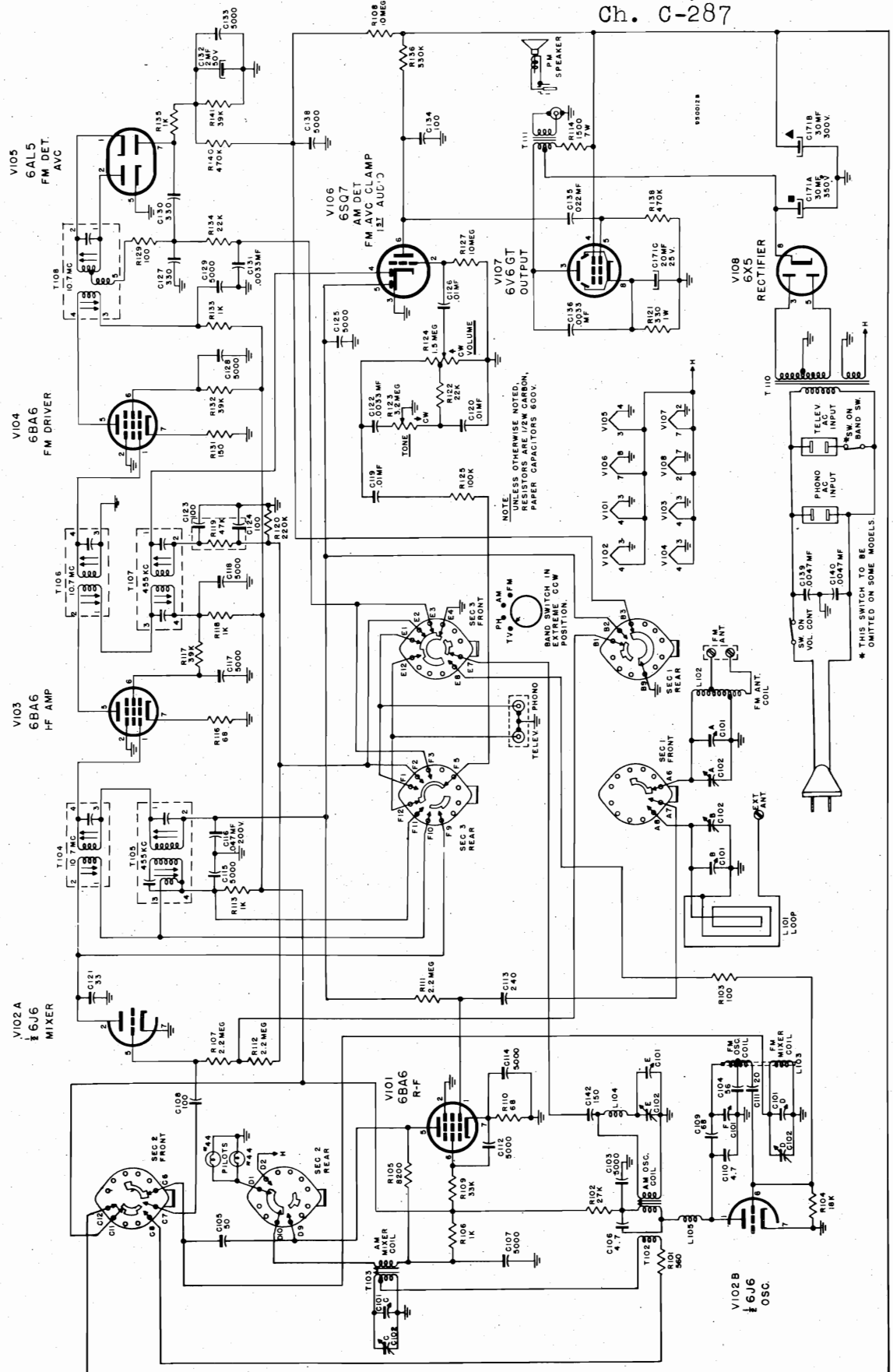
| | | |
|------------|-----------------------------|-----------|
| T102 | Am Osc Coil Assembly | 452174A-1 |
| T103 | AM Mixer Coil Assembly | 452175A-1 |
| T104 | Transformer, 1st FM IF | 452178A-1 |
| T105 | Transformer, 1st AM IF | 452176A-1 |
| T106 | Transformer, 2nd FM IF | 452179A-1 |
| T107 | Transformer, 2nd AM IF | 452177A-1 |
| T108 | Transformer, Ratio Detector | 452028A-1 |
| T110 | Transformer, Power | 750178A-1 |
| T111 | Transformer, Output | 650307A-1 |
| L102 | FM Antenna Coil | 452189A-1 |
| L103 | FM Mixer and Osc. Coil | 452100A-1 |
| L104, L105 | RF Choke | 38884 |

- MISCELLANEOUS -

| | | |
|------|------------------------------------|-----------|
| | Dial Glass, Vertical (1005) | 750189A-1 |
| | Dial Glass, Horizontal (1006) | 650309A-1 |
| | Dial Backplate | 750188A-1 |
| | Clips, Dial Mounting | 452180A-1 |
| | Pointer (Dial) | 452208A-1 |
| | Band Switch | 750190A-2 |
| L101 | Loop Antenna Assembly | 750194A-1 |
| | Knob (off-on) | 650186A-8 |
| | Knob (tone) | 650186A-7 |
| | Knob (tuning) | 650186A-6 |
| | Knob (program) | 650186A-5 |
| | Speaker 12" PM | 850129A-1 |
| | Mounting Clips for IF & Detector | |
| | Transformers | 58514 |
| | Printed Circuit (R119, C123, C124) | |
| | Diode Filter | 452171A-1 |

MODELS 1005-B, 1005-M,
1005-W, Ch. C-296;
1006-B, 1006-M, 1006-W,
Ch. C-287

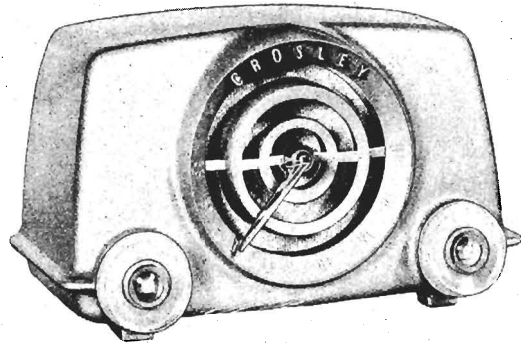
SCHEMATIC DIAGRAM RADIO CHASSIS C-287 & C-296



NOTE: UNLESS OTHERWISE NOTED, RESISTORS ARE 1/2W CARBON, PAPER CAPACITORS 500V.

* THIS SWITCH TO BE OMITTED ON SOME MODELS

| Model No. | Color |
|-----------|------------|
| D10BE | Blue |
| D10CE | Chartreuse |
| D10GN | Green |
| D10TN | Tan |
| D10RD | Red |
| D10WE | White |

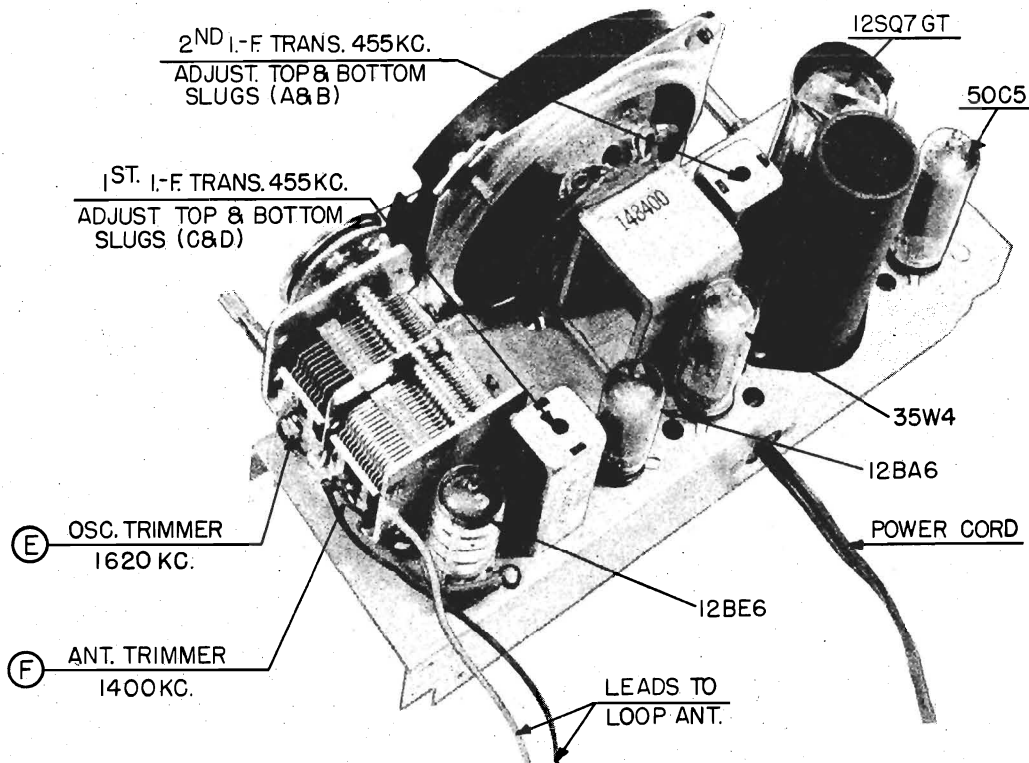


DESCRIPTION

TYPE: Five-tube, single band, Superheterodyne.
FREQUENCY RANGE: 540 to 1600 kc.
INTERMEDIATE FREQUENCY: 455 kc.
POWER SUPPLY: a.c.-d.c.
VOLTAGE RATING: 105-125 volts.
POWER CONSUMPTION: 30 watts.
POWER OUTPUT: 1.5 watts maximum.

TUBE COMPLEMENT:

| Type | Function |
|---------|-------------------------------------|
| 12BE6 | Converter |
| 12BA6 | I. F. Amplifier |
| 12SQ7GT | Detector, AVC, 1st. A. F. Amplifier |
| 50C5 | A. F. Power Output |
| 35W4 | Rectifier |



CHASSIS, TOP VIEW

When using direct current it may be necessary to reverse the position of the power plug in electric outlet for correct polarity.

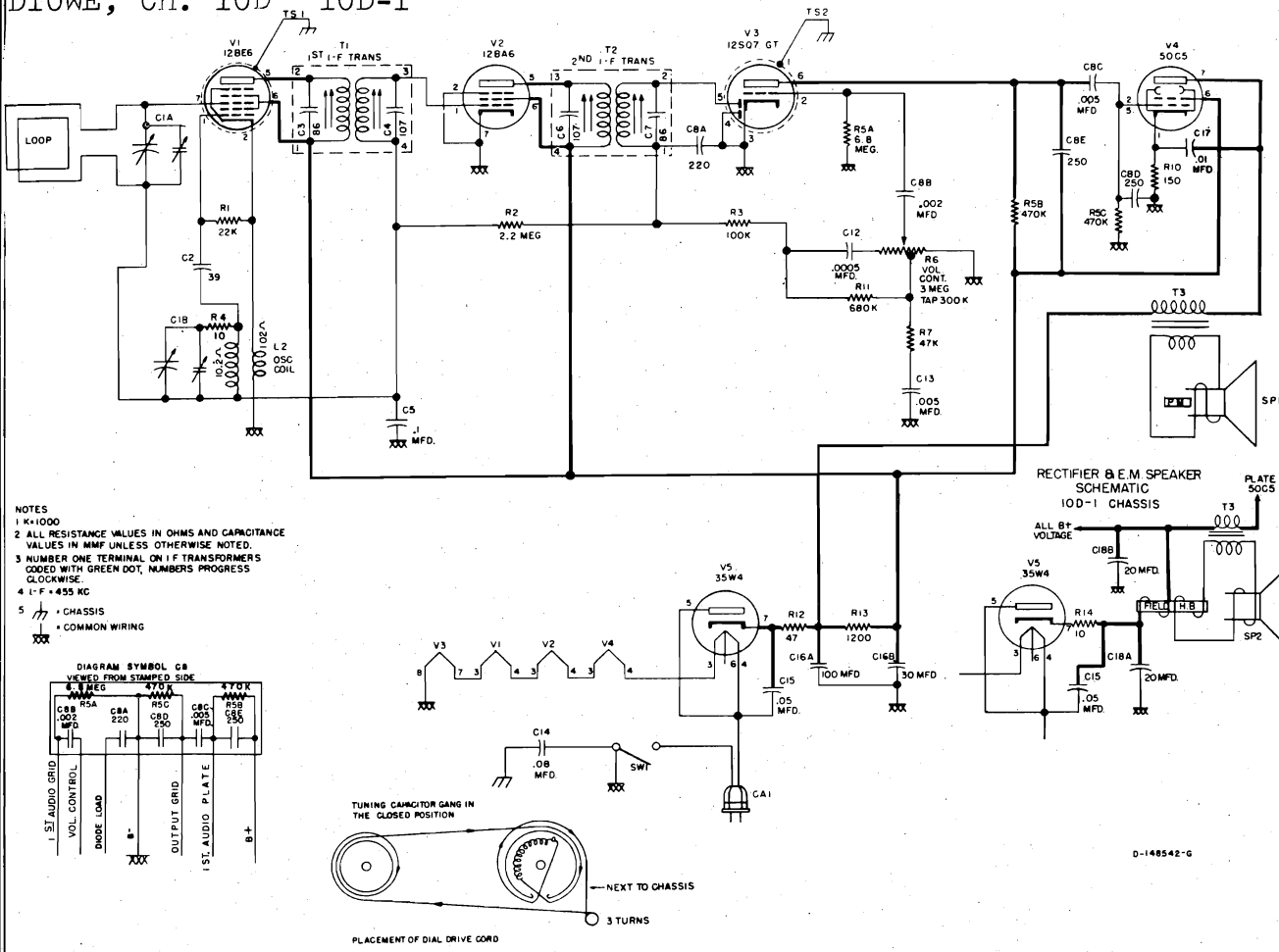
Reversing the position of the power plug when alternating current is used may reduce hum.

Under no circumstances should a ground be connected to this receiver.

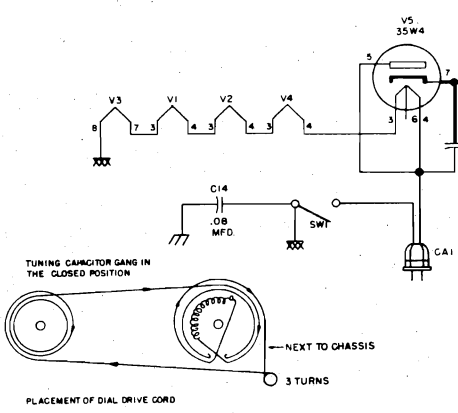
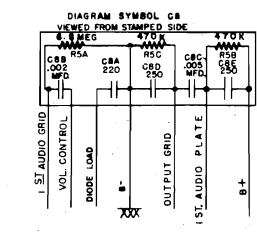
April, 1951

PAGE 22-2 CROSLY

MODELS D10BE, D10CE,
D10GN, D10TN, D10RD,
D10WE, Ch. 10D 10D-1

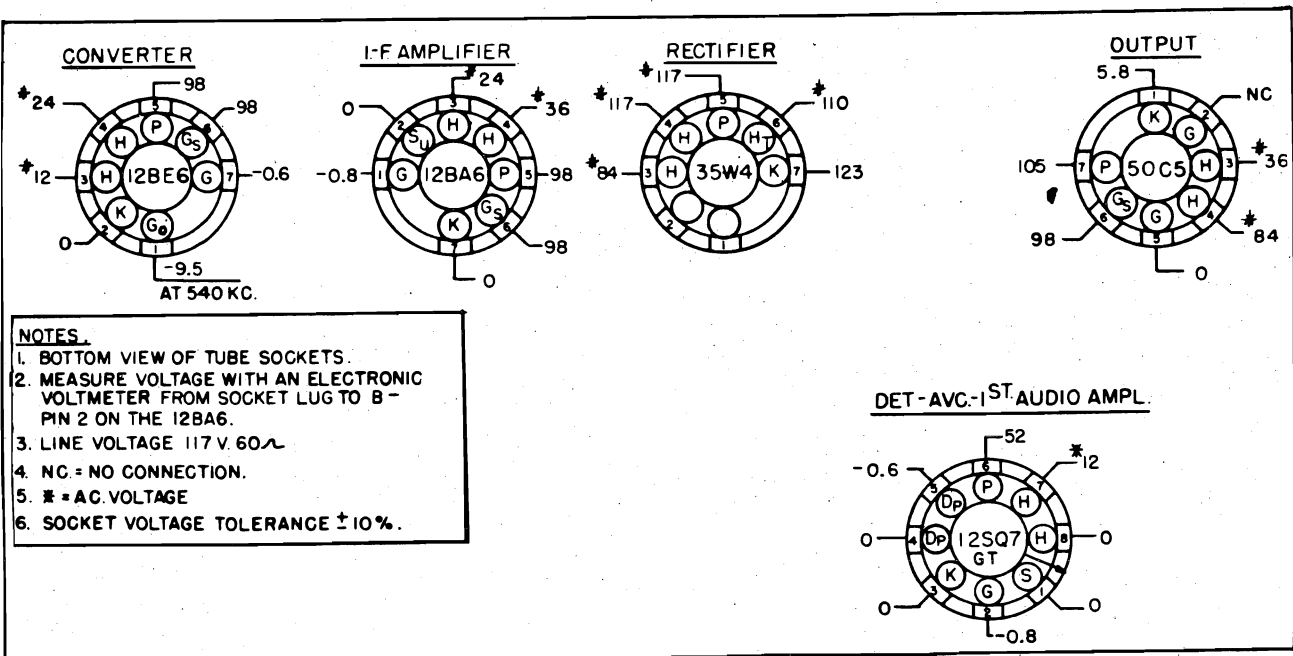


- NOTES**
- 1 K=1000
 - 2 ALL RESISTANCE VALUES IN OHMS AND CAPACITANCE VALUES IN MMF UNLESS OTHERWISE NOTED.
 - 3 NUMBER ONE TERMINAL ON I-F TRANSFORMERS CODED WITH GREEN DOT, NUMBERS PROGRESS CLOCKWISE.
 - 4 I-F = 455 KC
 - 5 --- CHASSIS
 - 6 --- COMMON WIRING



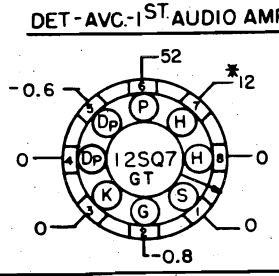
SCHEMATIC DIAGRAM

D-148542-G



- NOTES**
1. BOTTOM VIEW OF TUBE SOCKETS.
 2. MEASURE VOLTAGE WITH AN ELECTRONIC VOLTMETER FROM SOCKET LUG TO B - PIN 2 ON THE 12BA6.
 3. LINE VOLTAGE 117 V. 60 \sim
 4. NC = NO CONNECTION.
 5. * = AC VOLTAGE
 6. SOCKET VOLTAGE TOLERANCE $\pm 10\%$.

SOCKET VOLTAGE CHART



ALIGNMENT PROCEDURE

MODELS D10BE, D10CE,
D10GN, D10TN, D10RD,
D10WE, Ch. 10D,
10D-1

1. Connect an output meter across the speaker voice coil.
2. The r.f. signal input from the signal generator should be connected as indicated in the alignment chart. Connect the signal generator ground through a 0.1 mfd. condenser to B - (pin 2 on 12BA6 tube socket).
3. Turn the volume control on full and adjust the signal generator output to produce approximately midscale deflection of the output meter, but maintain signal generator output as low as possible to prevent AVC action in the receiver.

ALIGNMENT CHART

Alignment adjustment locations are shown on "CHASSIS, TOP VIEW."

| Alignment Sequence | Signal Generator Output | | | Position of Dial pointer | Adjust for Maximum Output |
|--------------------|-------------------------|------------------|-------------------|--------------------------|---------------------------|
| | Frequency in KC | In Series with | To | | |
| 1 | 455 | 200 mmf. | High Side of Loop | 1620 | A, B, C & D (See Note 1.) |
| 2 | 1620 | Radiated to Loop | | 1620 | E (See Note 2.) |
| 3 | 1400 | Radiated to Loop | | Tune to Signal | F (See Note 2.) |

ALIGNMENT NOTES

1. Repeat adjustments (A, B, C & D) in sequence, until maximum output is obtained.
2. Place signal generator output lead near the loop antenna. The loop antenna must be positioned with respect to the chassis to simulate its position when chassis and loop are fastened in cabinet.

REPLACEMENT PARTS LIST

| Symbol No. | Part No. | Description | Symbol No. | Part No. | Description |
|------------|--------------|---------------------------------------------|------------|-------------|------------------------------------|
| C1A | B-148350 | Capacitor, Variable | L1 | C-148399 | Loop & Back Assy. |
| C1B | | Capacitor, Variable | L2 | AW-148259 | Coil, Oscillator |
| C2 | C-137727-109 | Capacitor, 39 mmf., 10%, 200 v., ceramic | *SP1 | AD-148400 | Speaker (4" P.M.) |
| C3 | Part of T1 | Capacitor, 86 mmf. | **SP2 | AD-151244 | Speaker (4" E.M. 680 ohm) |
| C4 | Part of T1 | Capacitor, 107 mmf. | SW1 | Part of R6 | Switch, Power |
| C5 | 39001-19 | Capacitor, .1 mfd., 600 v., paper | TS1 | W-147784 | Shield, Tube (V1) |
| C6 | Part of T2 | Capacitor, 107 mmf. | TS2 | W-46447-1 | Shield, Tube (V3) |
| C7 | Part of T2 | Capacitor, 86 mmf. | T1 | C-139919-5 | Transformer, 1st I.F. |
| C8A | C-151550-1 | Capacitor, 220 mmf., 450 v. | T2 | C-139919-5 | Transformer, 2nd I.F. |
| C8B | | Capacitor, .002 mfd., 450 v. | | 138131-1 | Transformer, Output |
| C8C | | Capacitor, .005 mfd., 450 v. | | AB-152185 | Baffle & Grille Cloth Assy. |
| C8D | | Capacitor, 220 mmf., 450 v. | | AB-152241-1 | Cabinet (D10BE) |
| C8E | | Capacitor, 220 mmf., 450 v. | | AB-152241-4 | Cabinet (D10CE) |
| C12 | 39001-5 | Capacitor, .005 mfd., 600 v., paper | | AB-152241-2 | Cabinet (D10GN) |
| C13 | 39001-11 | Capacitor, .005 mfd., 600 v., paper | | AB-152241-5 | Cabinet (D10TN) |
| C14 | 39001-85 | Capacitor, .08 mfd., 600 v., paper | | AB-152241-3 | Cabinet (D10RD) |
| C15 | 39001-17 | Capacitor, .05 mfd., 600 v., paper | | AB-148465-1 | Cabinet (D10WE) |
| *C16A | B-148357 | Capacitor, 100 mfd., 150 v. | | W-148434 | Clip, I.F. Transformer Mtg. |
| C16B | | Capacitor, 30 mfd., 150 v. | | W-131154-1 | Cotter (External), Tuning Shaft |
| C17 | 39001-13 | Capacitor, .01 mfd., 600 v., paper | | AB-150661 | Gasket & Bushing Assy., Speaker |
| **C18A | B-151617 | Capacitor, 20 mfd., 150 v. | | W-148390-2 | Grommet (3 used), chassis |
| C18B | | Capacitor, 20 mfd., 150 v. | | AB-152532-2 | Knob (D10BE) |
| R1 | 39373-60 | Resistor, 22,000 ohm, 1/2 w. | | AB-152532-6 | Knob (D10CE) |
| R2 | 39373-97 | Resistor, 2.2 megohm, 1/2 w. | | AB-152532-3 | Knob (D10GN) |
| R3 | 39373-74 | Resistor, 100,000 ohm, 1/2 w. | | AB-152532-5 | Knob (D10TN) |
| R4 | 39373-1 | Resistor, 10 ohm, 1/2 w. | | AB-152532-4 | Knob (D10RD) |
| R5A | Part of C8 | Resistor, 6.8 megohm, 1/5 w. | | AB-152532-1 | Knob (D10WE) |
| R5B | Part of C8 | Resistor, 470,000 ohm, 1/5 w. | | S-148555 | Pad (Foot), Cabinet |
| R5C | Part of C8 | Resistor, 470,000 ohm, 1/5 w. | | B-152176 | Pointer, Dial |
| R6 | B-148327 | Control, Volume (3 megohm, Tap 300,000 ohm) | | AA-151144 | Pulley & Shaft Assy., Dial Pointer |
| R7 | 39373-67 | Resistor, 47,000 ohm, 1/2 w. | | 39176-59 | Screw Chassis Mtg. |
| R10 | 39373-16 | Resistor, 150 ohm, 1/2 w. | | W-148379 | Shaft, Tuning |
| R11 | 39373-90 | Resistor, 680,000 ohm, 1/2 w. | | 39462-2 | Socket, Tube (V1, V2, V4, V5) |
| *R12 | 39374-97 | Resistor, 47 ohm, 10%, 1 w. | | W-149987 | Socket, Tube (V3) |
| *R13 | 39374-114 | Resistor, 1200 ohm, 10%, 1 w. | | W-51752 | Spring, Drive Cord |
| R14 | 39373-1 | Resistor, 10 ohm, 1/2 w. | | A-151085 | Spring (Idler), Drive Cord |
| CA1 | C142769-1 | Cable & Plug Assy., Power | | W-132124 | Stud (Trimount), Cabinet Back |
| | | | | W-134916 | Washer (Spring), Tuning Shaft |

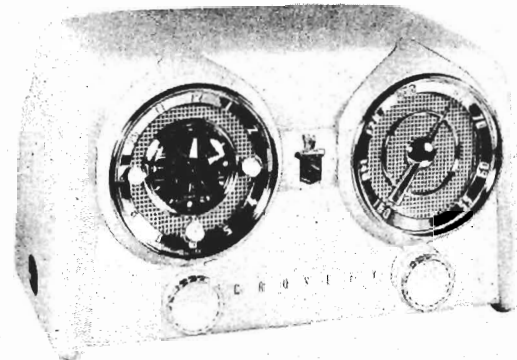
* Used on Chassis 10D, which is equipped with a P.M. speaker

** Used on Chassis 10D-1, which is equipped with an E.M. speaker.

PAGE 22-4 CROSLLEY

MODELS D-25BE, D-25GE,
D-25GN, D-25MN, D-25TN,
D-25WE, Ch. 311, 311-1

| Model No. | Color |
|-----------|----------------|
| D - 25 WE | White |
| D - 25 TN | Tan |
| D - 25 CE | Chartreuse |
| D - 25 MN | Maroon |
| D - 25 BE | Metallic Blue |
| D - 25 GN | Metallic Green |

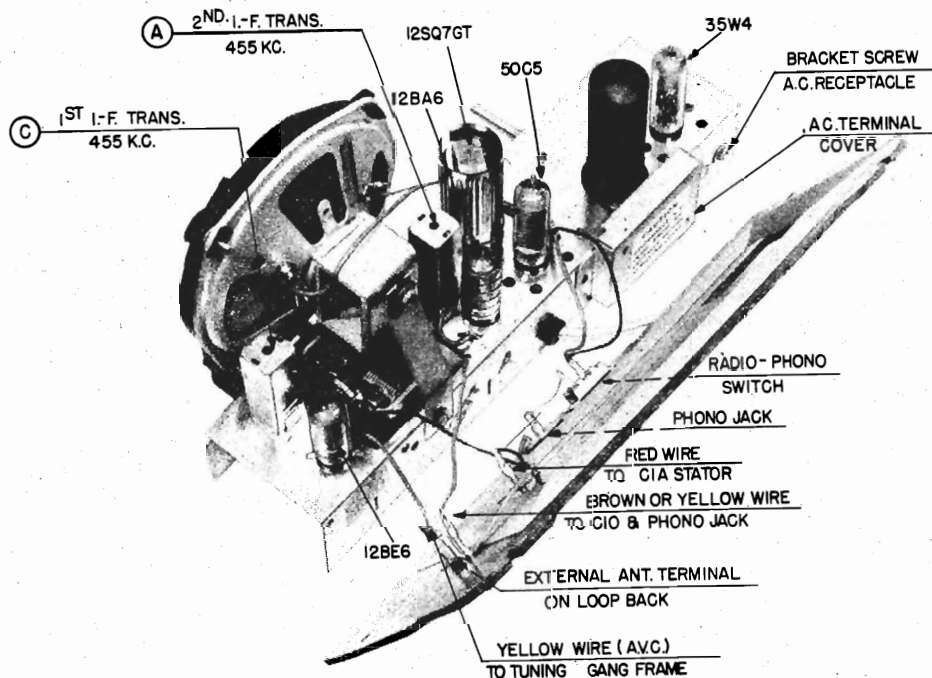


DESCRIPTION

TYPE: Five-tube, single band, Superheterodyne.
FREQUENCY RANGE: 540 to 1600 kc.
INTERMEDIATE FREQUENCY: 455 kc.
POWER SUPPLY: 60 cycle, a.c. only.
VOLTAGE RATING: 105-125 volts.
POWER OUTPUT: 1 watt maximum.
POWER CONSUMPTION:
 Radio and Clock..... 35 watts
 Clock 2 watts

TUBE COMPLEMENT:

| Type | Function |
|---------|----------------------------------------|
| 12BE6 | Converter |
| 12BA6 | I. F. Amplifier |
| 12SQ7GT | Detector, AVC, 1st. A. F. Amplifier |
| 50C5 | A. F. Power Output |
| 35W4 | Rectifier |



CHASSIS, TOP VIEW

MODELS D-25BE, D-25CE,
D-25GN, D-25MN, D-25TN,
D-25WE, Ch. 311, 311-1

Under no circumstances should a ground be connected to this receiver.

Phonograph connection — To use a record player with this receiver insert the pickup plug of the record player into the Phono jack on back of receiver. Then slide the Radio-Phono Switch on the back of the receiver to the "Phono" position. Connect the power cord of the record player to a convenient electric outlet of the correct voltage and frequency. Operate the record player in the normal manner. The controls of the receiver operate the same as for radio programs.

ALIGNMENT PROCEDURE

1. To remove the chassis from the cabinet, proceed as follows:

- a. Turn the tuning control completely counter-clockwise to close the gang.
- b. Remove the volume and tuning control knobs, and the dial pointer.
- c. Remove the cabinet back and loosen the screw on the terminal cover behind the electrolytic capacitor. Lift up the cover and disconnect the three leads to the clock.
- d. Connect a jumper between the terminal coded yellow and the center terminal on the terminal board.
- e. Remove the two screws in the top corners of the chassis apron that secure the chassis to the cabinet.
- f. Loosen the slotted hex head screw on the right rear of the chassis and slide the screw toward the center of the chassis to release power receptacle from opening in side of cabinet.
- g. Slide the chassis from the cabinet.

2. Connect an output meter across the speaker voice coil.

3. The r.f. signal input from the signal generator should be connected as indicated in the alignment chart. Connect the signal generator ground to the top lug on loop antenna back (See Chassis Top View, page 1).

4. Turn the volume control on full and adjust the signal generator output to produce approximately midscale deflection of the output meter, but maintain signal generator output as low as possible to prevent AVC action in the receiver.

ALIGNMENT CHART

Alignment adjustment locations are shown on "Chassis, Top View,"
and on "Socket Voltage Chart".

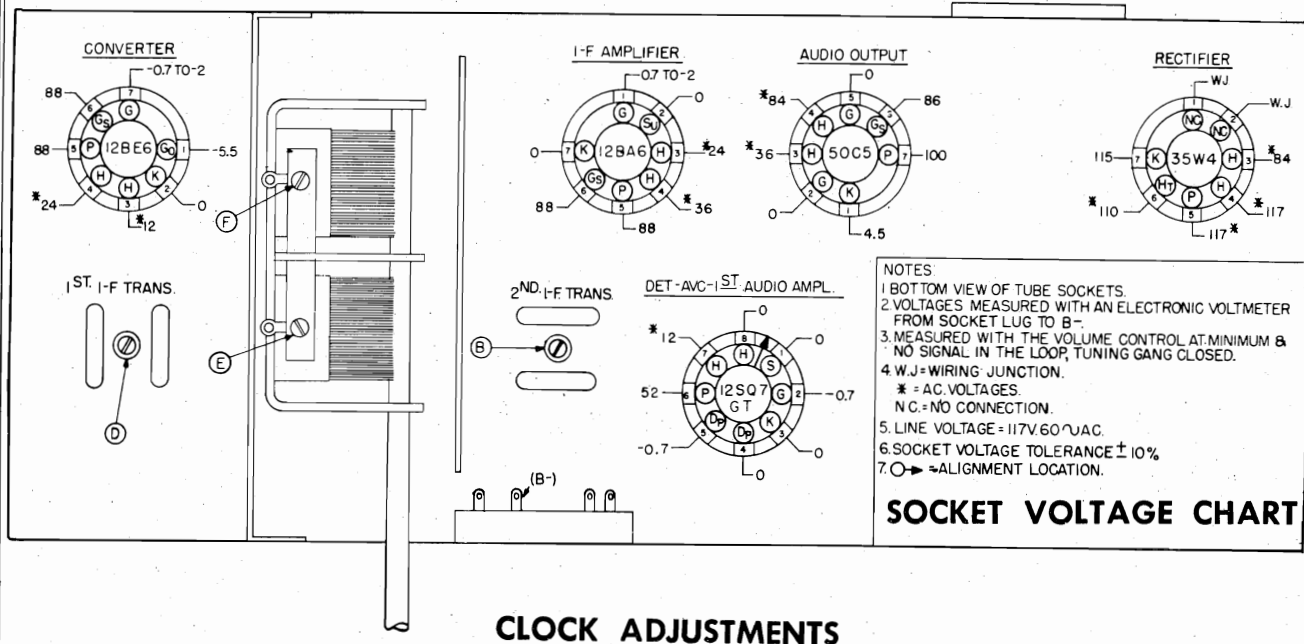
| Alignment Sequence | Signal Generator Output | | | Position of Dial pointer | Adjust for Maximum Output |
|--------------------|-------------------------|----------------|---------------------|--------------------------|---------------------------|
| | Frequency in KC | In Series with | To | | |
| 1 | 455 | 200 mmf. | External Ant. Screw | 1620 | A, B, C & D (See Note 1.) |
| 2 | 1620 | 200 mmf. | External Ant. Screw | 1620 | E |
| 3 | 1400 | 200 mmf. | External Ant. Screw | 1400 | F (See Note 2.) |

ALIGNMENT NOTES

Repeat adjustments (A, B, C & D) in sequence, until maximum output is obtained.

After the chassis and loop antenna have been replaced in the cabinet, repeat alignment sequence "3". Adjust "F" by inserting screw driver through the hole provided in the bottom of the cabinet.

MODELS D-25BE, D-25CE,
D-25GN, D-25MN, D-25TN,
D-25WE, Ch. 311, 311-1



PROCEDURE FOR CHECKING TIMER SWITCH AND VIBRATOR:

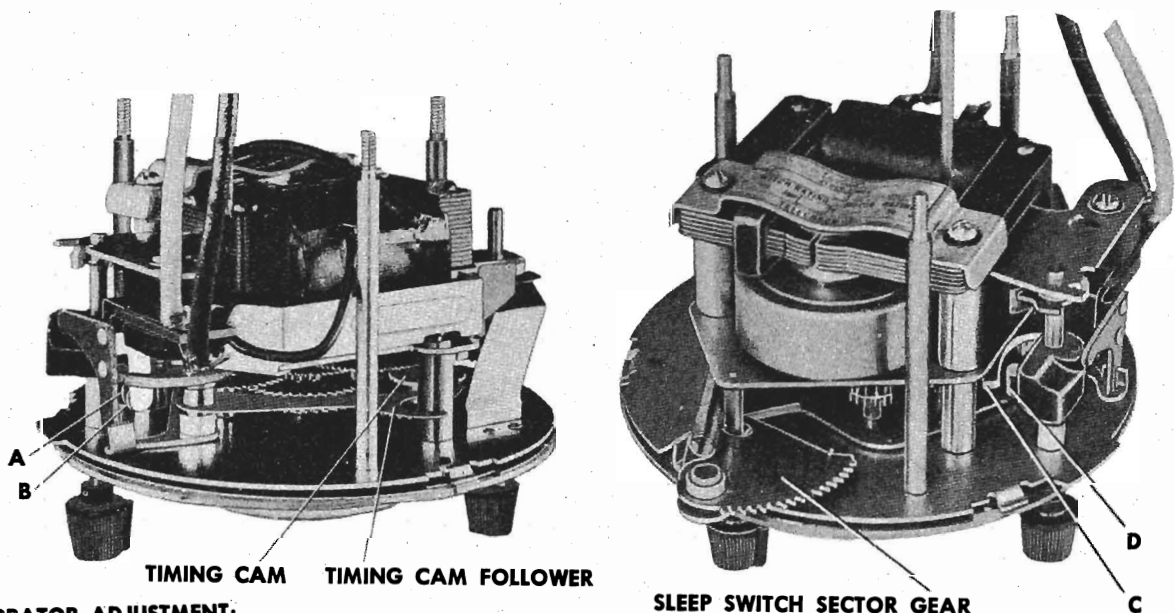
1. With the time set knob, turn the clock hands so as to advance the time at least one (1) hour. (For ease in checking, it is recommended that the time be set to the hour.)
2. Attach test light to black and yellow switch leads.
3. Turn switch knob to "Radio" position - light must go on.
4. Turn switch knob to "Off" position - light must go out.
5. Set alarm disc so that small pointer on hour hand reads two (2) hours in advance of the time of the clock. **EXAMPLE:** If the clock hands are set to read 7 o'clock, set the alarm disc to read 9 o'clock.
6. Turn sleep switch to "60" - test light must go on.
7. Turn time set knob advancing clock hands to next hour - light must go out and **SLEEP SWITCH SECTOR GEAR** must be completely disengaged within one (1) hour plus or minus eight (8) minutes.
8. Manually push **SLEEP SWITCH SECTOR GEAR** in until it touches its mating pinion **WITHOUT** meshing - light must go on.
9. Turn switch knob to "Radio Alarm" position.
10. Turn time set knob to advance clock hands so they read 15 minutes until the next hour. Then slowly advance the hands until the test light lights, which indicates the contacts are closed. The contacts must close somewhere between 14 minutes to the hour and 4 minutes past the hour.
11. Remove test light and connect 110 volt supply to the black and red leads.
12. Turn time set knob to advance the clock hands 4 minutes - vibrator must **NOT** buzz. Then advance the hands 14 minutes - vibrator **MUST** buzz within this 14 minute period.

ADJUSTING CONTACTS:

1. Set the alarm disc so that the time indicated by the small pointer on the hour hand is different (at least 1 hour) from the time indicated by the hands of the clock. Then set switch to "Radio Alarm" position so that the **TIMING CAM FOLLOWER** rests on the **TIMING CAM**. Contacts shall be adjusted at .020" minimum gap.
2. With switch in "OFF" position contacts shall remain open as in step one and there shall be clearance between **TIMING CAM FOLLOWER** and **TIMING CAM**.
3. With switch in "Radio" position, contacts shall be closed. Check for proper contact pressure by depressing **CONTACT (A)**, using a small pointed tool. If **CONTACT (B)** follows **CONTACT (A)**, a noticeable amount before the contacts separate, the pressure is sufficient.
4. Set the switch to "Radio Alarm" position; pull out and turn alarm set knob counter-clockwise until the **TIMING CAM FOLLOWER** drops into the slot of **TIMING CAM**. The contacts shall be closed. Check contact pressure as previously described in step three.
5. **SWITCH ARM (C)** should clear **CAM (D)** by .008" minimum when in the "Radio Alarm" position.

TIMING:

1. Adjust timer for contact closure at 6:55 o'clock. On repeat tests, contacts shall close at 6:55 plus or minus 3 minutes. At all other settings the contacts shall close between 12 minutes before and 2 minutes after the setting time.
2. Check time keeping for a minimum of twelve hours with power applied to the motor. Clock must be run with vibrator (buzzer) shut off.

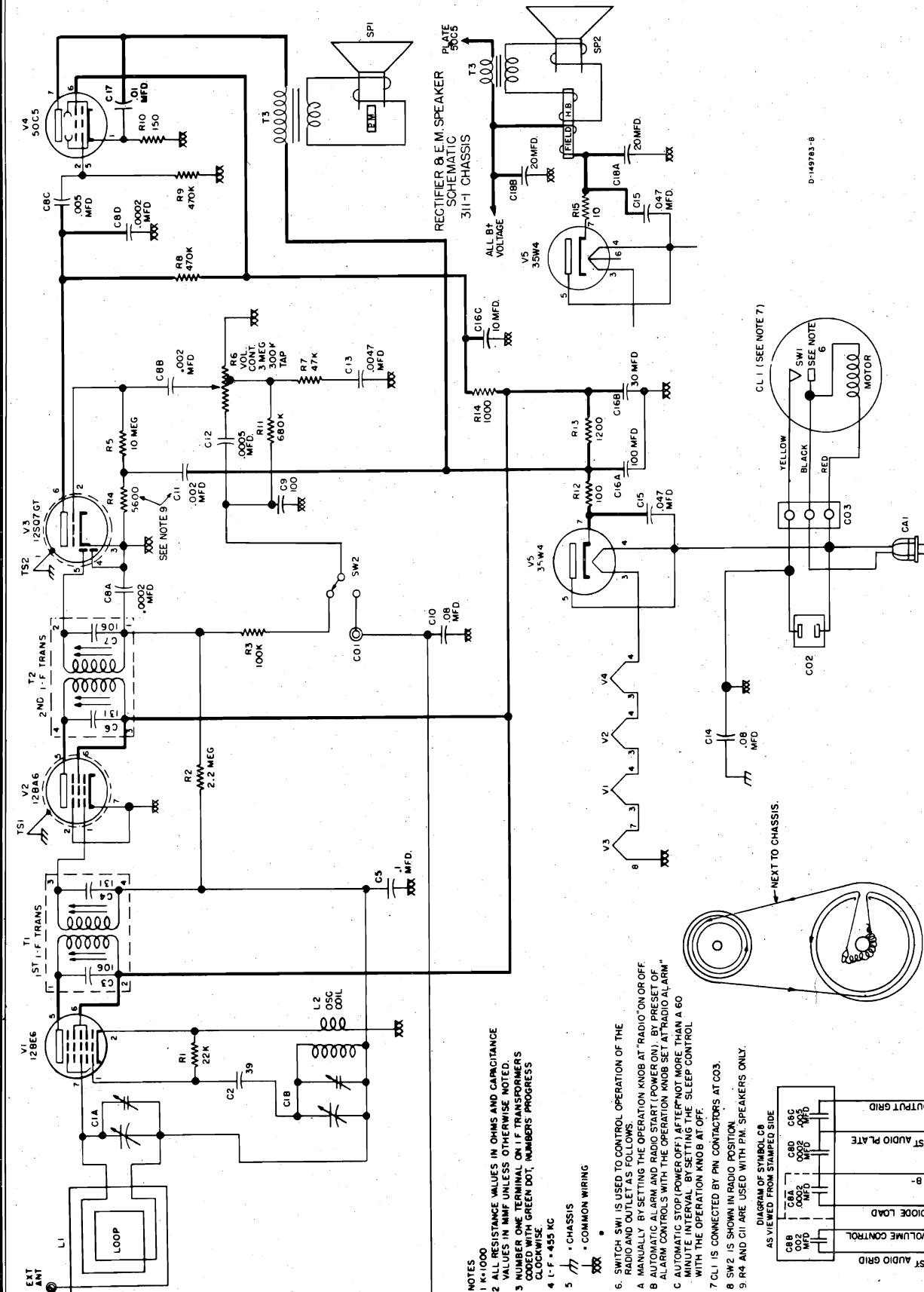
**VIBRATOR ADJUSTMENT:**

1. Vibrator shall start buzzing 10 minutes plus or minus 5 minutes after contact closure occurs.
2. When the alarm set knob is pushed in ("shut-off" position of vibrator) the shut-off spring shall lift the vibrator sufficiently above the cam, so that the cam will not contact the vibrator in any position.
3. Adjust vibrator for good sounding position.
4. Vibrator shall be manually shut off before completion of buzzing period.

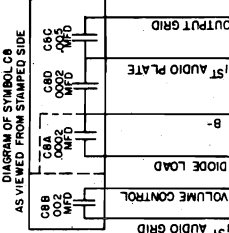
CLOCK LUBRICATION

1. Center stack bearing in base plate and hole in back gear pinion should be lubricated with Nye watch oil or equivalent.
2. Path of switch locating spring on bracket should be lubricated with Dixon graphite grease.

MODELS D-25BE, D-25CE,
D-25GN, D-25MN, D-25TN,
D-25WE, Ch. 311, 311-1



- NOTES
- 1 K=1000
 - 2 ALL RESISTANCE VALUES IN OHMS AND CAPACITANCE VALUES IN MMF UNLESS OTHERWISE NOTED.
 - 3 NUMBER ONE TERMINAL ON I-F TRANSFORMERS CLOCKWISE
 - 4 I-F = 455 KC
 - 5 * CHASSIS
 - 6 * COMMON WIRING
 7. SWITCH SW1 IS USED TO CONTROL OPERATION OF THE RADIO AND OUTLET AS FOLLOWS.
 A MANUALLY BY SETTING THE OPERATION KNOB AT "RADIO" ON OR OFF
 B AUTOMATIC ALARM AND RADIO START (POWER ON). BY PRESET OF ALARM CONTROLS WITH THE OPERATION KNOB SET AT "RADIO ALARM"
 C AUTOMATIC STOP (POWER OFF) AFTER NOT MORE THAN A 60 MINUTE INTERVAL BY SETTING THE SLEEP CONTROL WITH THE OPERATION KNOB AT OFF.
 - 8 CL1 IS CONNECTED BY PIN CONTACTORS AT CO3.
 - 9 SW2 IS SHOWN IN RADIO POSITION.
 - 9, R4 AND C11 ARE USED WITH P.M. SPEAKERS ONLY.



PLACEMENT OF DIAL DRIVE CORD TUNING CAPACITOR IN THE CLOSED POSITION.

SCHEMATIC DIAGRAM

D-149783-8

REPLACEMENT PARTS LIST
(Clock)

MODELS D-25BE, D-25CE,
D-25GN, D-25MN, D-25TN,
D-25WE, Ch. 311, 311-1

| Part No. | Description | Part No. | Description |
|------------|----------------------------------|-------------|-------------------------|
| B-151389-1 | Crystal, Dial | B-151389-6 | Hands, Hour & Minute |
| B-151389-2 | Rivet, Dial Crystal (3 required) | B-151389-8 | Knob, Time Set (Bronze) |
| B-151389-3 | Dial | B-151389-9 | Field & Coil (60 cycle) |
| B-151389-4 | Disc, Alarm | B-151389-10 | Rotor Unit (60 cycle) |
| B-151389-5 | Hand, Sweep Second (Gold) | | |

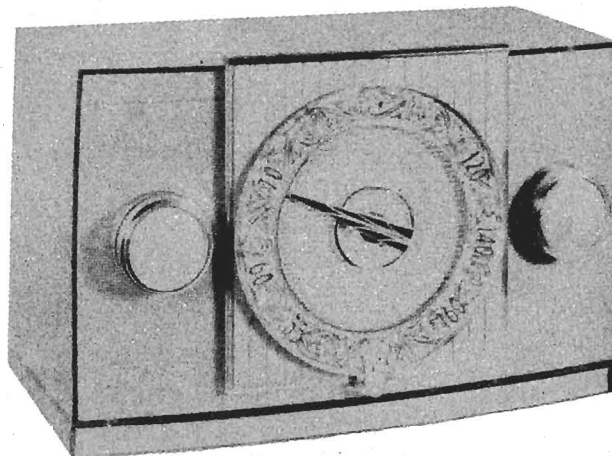
REPLACEMENT PARTS LIST

| Symbol No. | Part No. | Description | Symbol No. | Part No. | Description |
|------------|--------------|---------------------------------------------------|------------|-------------|--------------------------------------------|
| C1A | B-149437 | Capacitor, Variable | T2 | AC-139919-3 | Transformer, 2nd I.F. |
| C1B | | Capacitor, Variable } Two Section | T3 | B-147171 | Transformer, Output |
| C2 | C-137727-109 | Capacitor, 39 mmf., 10%, 200 v., ceramic | CO2 | AB-149562 | Outlet & Bracket Assy. |
| C3 | Part of T1 | Capacitor, 106 mmf. | | | |
| C4 | Part of T1 | Capacitor, 131 mmf. | CO3 | W-149673 | Contact Strip |
| C5 | 39001-19 | Capacitor, .1 mfd., 600 v., paper | | W-149366 | Bracket, Speaker Support |
| C6 | Part of T2 | Capacitor, 131 mmf. | | AD-149598-1 | Cabinet & Medallion Assy.(D-25WE) |
| C7 | Part of T2 | Capacitor, 106 mmf. | | AD-149598-7 | Cabinet & Medallion Assy.(D-25GN) |
| C8A | C-144675-1 | Capacitor, .0002 mfd., 500 v. } Four Section | | AD-149598-3 | Cabinet & Medallion Assy.(D-25CE) |
| C8B | | Capacitor, .002 mfd., 500 v. } disc | | AD-149598-4 | Cabinet & Medallion Assy.(D-25MN) |
| C8C | | Capacitor, .005 mfd., 500 v. } ceramic | | AD-149598-8 | Cabinet & Medallion Assy.(D-25BE) |
| C8D | | Capacitor, .002 mfd., 500 v. } | | AD-149598-9 | Cabinet & Medallion Assy.(D-25TN) |
| C9 | B-143686-3 | Capacitor, 100 mmf., 500 v., molded disc ceramic | | W-139921 | Clip, I.F. Transformer Mtg. |
| C10 | 39001-85 | Capacitor, .08 mfd., 600 v., paper | | W-131154-1 | Cotter (External), Pointer Pulley |
| C11 | 39001-74 | Capacitor, .002 mfd., 600 v., paper (Chassis 311) | | B-149398 | Cover, Clock |
| C12 | 39001-5 | Capacitor, .0005 mfd., 600 v., paper | | W-147216 | Cups, Suction |
| C13 | 39477-39 | Capacitor, .0047 mfd., 600 v., molded paper | | B-149667-1 | Escutcheon, Outlet |
| C14 | 39001-85 | Capacitor, .08 mfd., 600 v., paper | | D-149963-1 | Escutcheon, Radio |
| C15 | 39477-45 | Capacitor, .047 mfd., 600 v., molded paper | | C-149964-1 | Escutcheon, Clock |
| C16A | B-149541 | Capacitor, 100 mfd., 150 v. } Three Sec- | | D-149742 | Gasket, Speaker |
| C16B | | Capacitor, 30 mfd., 150 v. } tion Elec- | | W-149341 | Gasket, Clock Dial Grille & Ring |
| C16C | | Capacitor, 10 mfd., 150 v. } trolytic | | AC-149962-1 | Grille & Ring Assy., Clock Dial(D-25WE) |
| C17 | 39477-41 | Capacitor, .01 mfd., 600 v., molded paper | | AC-149962-7 | Grille & Ring Assy., Clock Dial(D-25GN) |
| C18A | B-151617 | Capacitor, 20 mfd., 150 v. } Two Section | | AC-149962-3 | Grille & Ring Assy., Clock Dial(D-25CE) |
| C18B | | Capacitor, 20 mfd., 150 v. } Electrolytic | | AC-149962-4 | Grille & Ring Assy., Clock Dial(D-25MN) |
| | | (Chassis 311-1) | | AC-149962-8 | Grille & Ring Assy., Clock Dial(D-25BE) |
| R1 | 39373-60 | Resistor, 22,000 ohm, 1/2 w. | | AC-149962-9 | Grille & Ring Assy., Clock Dial(D-25TN) |
| R2 | 39373-97 | Resistor, 2.2 megohm, 1/2 w. | | AB-149524-1 | Grille, Radio Dial (D-25WE) |
| R3 | 39373-74 | Resistor, 100,000 ohm, 1/2 w. | | AB-149524-7 | Grille, Radio Dial (D-25GN) |
| R4 | 39374-34 | Resistor, 5600 ohm, 10%, 1/2 w. (Chassis 311) | | AB-149524-3 | Grille, Radio Dial (D-25CE) |
| R5 | 39373-107 | Resistor, 10 megohm, 1/2 w. | | AB-149524-4 | Grille, Radio Dial (D-25MN) |
| R6 | B-149382 | Control, Volume (3 meg., Tap 300 K ohm) | | AB-149524-8 | Grille, Radio Dial (D-25BE) |
| R7 | 39373-67 | Resistor, 47,000 ohm, 1/2 w. | | AB-149524-9 | Grille, Radio Dial (D-25TN) |
| R8 | 39373-87 | Resistor, 470,000 ohm, 1/2 w. | | W-45580-2 | Grommet (Rubber), Speaker Mtg. |
| R9 | 39373-87 | Resistor, 470,000 ohm, 1/2 w. | | AC-149952-1 | Knob, Volume-Tuning (D-25WE) |
| R10 | 39373-16 | Resistor, 150 ohm, 1/2 w. | | AC-149952-7 | Knob, Volume-Tuning (D-25GN) |
| R11 | 39373-90 | Resistor, 680,000 ohm, 1/2 w. | | AC-149952-3 | Knob, Volume-Tuning (D-25CE) |
| R12 | 39374-189 | Resistor, 100 ohm, 10%, 2 w. (Chassis 311) | | AC-149952-4 | Knob, Volume-Tuning (D-25MN) |
| R13 | 39374-114 | Resistor, 1200 ohm, 10%, 1 w. (Chassis 311) | | AC-149952-8 | Knob, Volume-Tuning (D-25BE) |
| R14 | 39373-33 | Resistor, 1000 ohm, 1/2 w. (Chassis 311) | | AC-149952-9 | Knob, Volume-Tuning (D-25TN) |
| R15 | 39373-1 | Resistor, 10 ohm, 1/2 w. (Chassis 311-1) | | B-149311-1 | Knob, Switch (D-25WE) |
| TS1 | W-147784 | Shield, Tube (V2) | | B-149311-7 | Knob, Switch (D-25GN) |
| TS2 | W-46447-1 | Shield, Tube (V3) | | B-149311-3 | Knob, Switch (D-25CE) |
| CA1 | C-149780 | Cable & Plug Assy., Power | | B-149311-4 | Knob, Switch (D-25MN) |
| CO1 | W-136998 | Connector, Phono | | B-149311-8 | Knob, Switch (D-25BE) |
| L1 | AC-149557 | Loop Antenna & Back Assy. | | B-149311-9 | Knob, Switch (D-25TN) |
| L2 | AW-148259 | Coil, Oscillator | | B-149339-1 | Knob, Alarm Set (D-25WE) |
| SP1 | AD-145956-2 | Speaker, 5 1/4" P.M.(Chassis 311) | | B-149339-7 | Knob, Alarm Set (D-25GN) |
| SP2 | AD-151190-2 | Speaker, 5 1/4" E.M. 680 ohm (Chassis 311-1) | | B-149339-3 | Knob, Alarm Set (D-25CE) |
| SW1 | Part of CL1 | Switch, On-Off | | B-149339-4 | Knob, Alarm Set (D-25MN) |
| SW2 | W-148260 | Switch, Radio-Phono | | B-149339-8 | Knob, Alarm Set (D-25BE) |
| CL1 | AW-149689 | Clock Assy. | | B-149339-9 | Knob, Alarm Set (D-25TN) |
| T1 | AC-139919-3 | Transformer, 1st I.F. | | B-150140-1 | Medallion (D-25WE, D-25GN, D-25MN, D-25TN) |
| | | | | B-150140-2 | Medallion (D-25CE, D-25BE) |
| | | | | C-149621-1 | Pointer, Tuning |
| | | | | W-149368 | Pulley, Pointer Mtg. |
| | | | | W-51752 | Spring, Drive Cord |
| | | | | W-148469 | Spring, Pointer Pulley |
| | | | | 39462-2 | Socket, Tube (V1, V2, V4, V5) |
| | | | | W-149987 | Socket, Tube (V3) |
| | | | | AB-149438 | Support & Bushing Assy., Pointer Pulley |
| | | | | W-149676 | Washer (Rubber), Speaker Mtg. |

PAGE 22-10 CROSLEY

MODELS 11-110U, 11-111U,
11-112U, 11-113U, 11-
130U, 11-132U, Ch. 299

| Model No. | Color |
|-----------|------------------|
| 11-110U | White Pearl |
| 11-111U | Malay Gray |
| 11-112U | Horizon Gray |
| 11-113U | Peruvian Gold |
| 11-130U | Versailles Red |
| 11-132U | Antique Sterling |



DESCRIPTION

TYPE: Five-tube, single band, Superheterodyne.

FREQUENCY RANGE: 540 to 1600 kc.

INTERMEDIATE FREQUENCY: 455 kc.

POWER SUPPLY: a.c.-d.c.

VOLTAGE RATING: 105-125 volts.

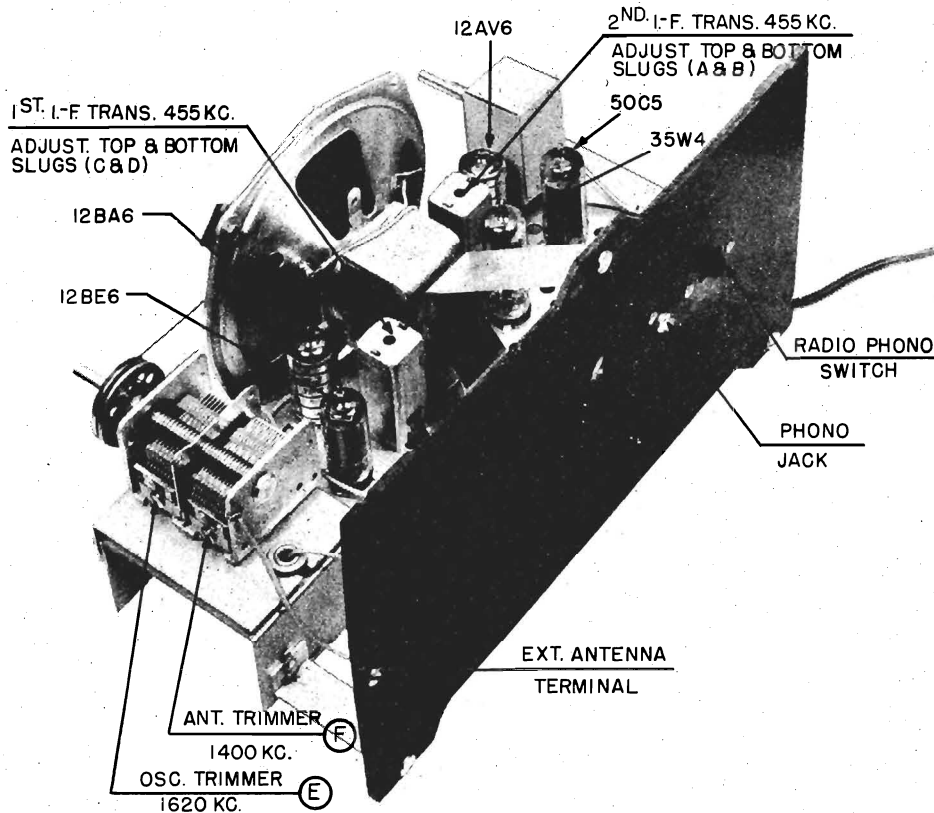
POWER CONSUMPTION: 30 watts maximum.

POWER OUTPUT: 1 watt maximum.

TUBE COMPLEMENT:

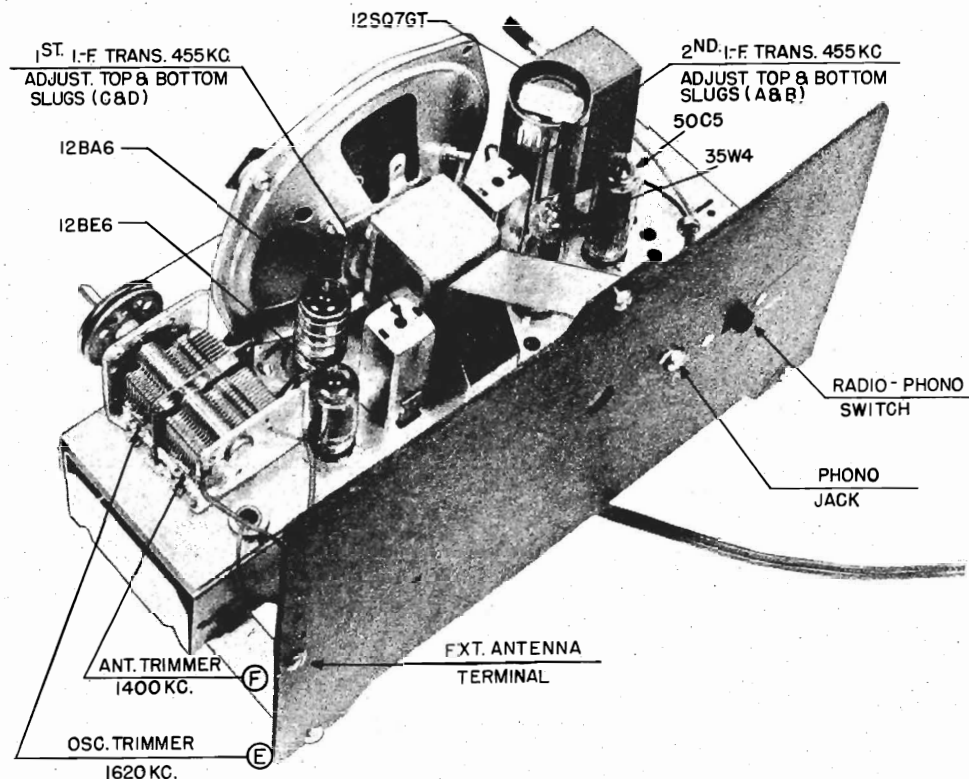
| Type | Function |
|--------|---------------------------------------|
| 12BE6 | Converter |
| 12BA6 | I. F. Amplifier |
| *12AV6 | Detector, AVC, 1st A. F. Amplifier |
| 50C5 | A. F. Power Output |
| 35W4 | Rectifier |

* Some sets are equipped with a 12SQ7GT tube.



CHASSIS, TOP VIEW (Sets equipped with 12AV6 Tube)

MODELS 11-110U, 11-111U,
11-112U, 11-113U, 11-
130U, 11-132U, Ch. 299



CHASSIS, TOP VIEW (Sets equipped with 12SQ7GT Tube)

When using direct current it may be necessary to reverse the position of the power plug in the electric outlet for correct polarity.

Reversing the position of the power plug when alternating current is used may reduce hum.

Under no circumstances should a ground be connected to this receiver.

Phonograph connection —To use a record player with this receiver insert the pickup plug of the record player into the Phono jack on back of receiver. Then slide the Radio-Phono Switch on the back of the receiver to the "Phono" position. Connect the power cord of the record player to a convenient electric outlet of the correct voltage and frequency. Operate the record player in the normal manner. The controls of the receiver operate the same as for radio programs.

ALIGNMENT PROCEDURE

1. Connect an output meter across the speaker voice coil.
2. The r.f. signal input from the signal generator should be connected as indicated in the alignment chart. Connect the signal generator ground to the top lug on loop antenna back.
3. Turn the volume control on full and adjust the signal generator output to produce approximately midscale deflection of the output meter, but maintain signal generator output as low as possible to prevent AVC action in the receiver.

MODELS 11-110U, 11-111U,
11-112U, 11-113U, 11-
130U, 11-132U, Ch. 299

ALIGNMENT CHART

Alignment adjustment locations are shown on "CHASSIS, TOP VIEW."

| Alignment Sequence | Signal Generator Output | | | Position of Dial pointer | Adjust for Maximum Output |
|--------------------|-------------------------|----------------|---------------------|--------------------------|---------------------------|
| | Frequency in KC | In Series with | To | | |
| 1 | 455 | 200 mmf. | External Ant. Screw | 1620 | A, B, C & D (See Note 1.) |
| 2 | 1620 | 200 mmf. | External Ant. Screw | 1620 | E (See Note 2.) |
| 3 | 1400 | 200 mmf. | External Ant. Screw | Tune to Signal | F (See Note 2.) |

ALIGNMENT NOTES

1. Repeat adjustments (A, B, C & D) in sequence, until maximum output is obtained.
2. The loop antenna must be positioned with respect to the chassis to simulate its position when chassis and loop are fastened in cabinet.

DIAL POINTER CALIBRATION

If it is necessary to calibrate the dial pointer after the chassis has been installed in the cabinet, remove the pointer and with a proper size screwdriver inserted into the screwdriver slots (notches on opposite sides at end of pointer pulley bushing), rotate clockwise or counter-clockwise as required.

CONVERTER

RECTIFIER

AUDIO OUTPUT

I-F AMPLIFIER

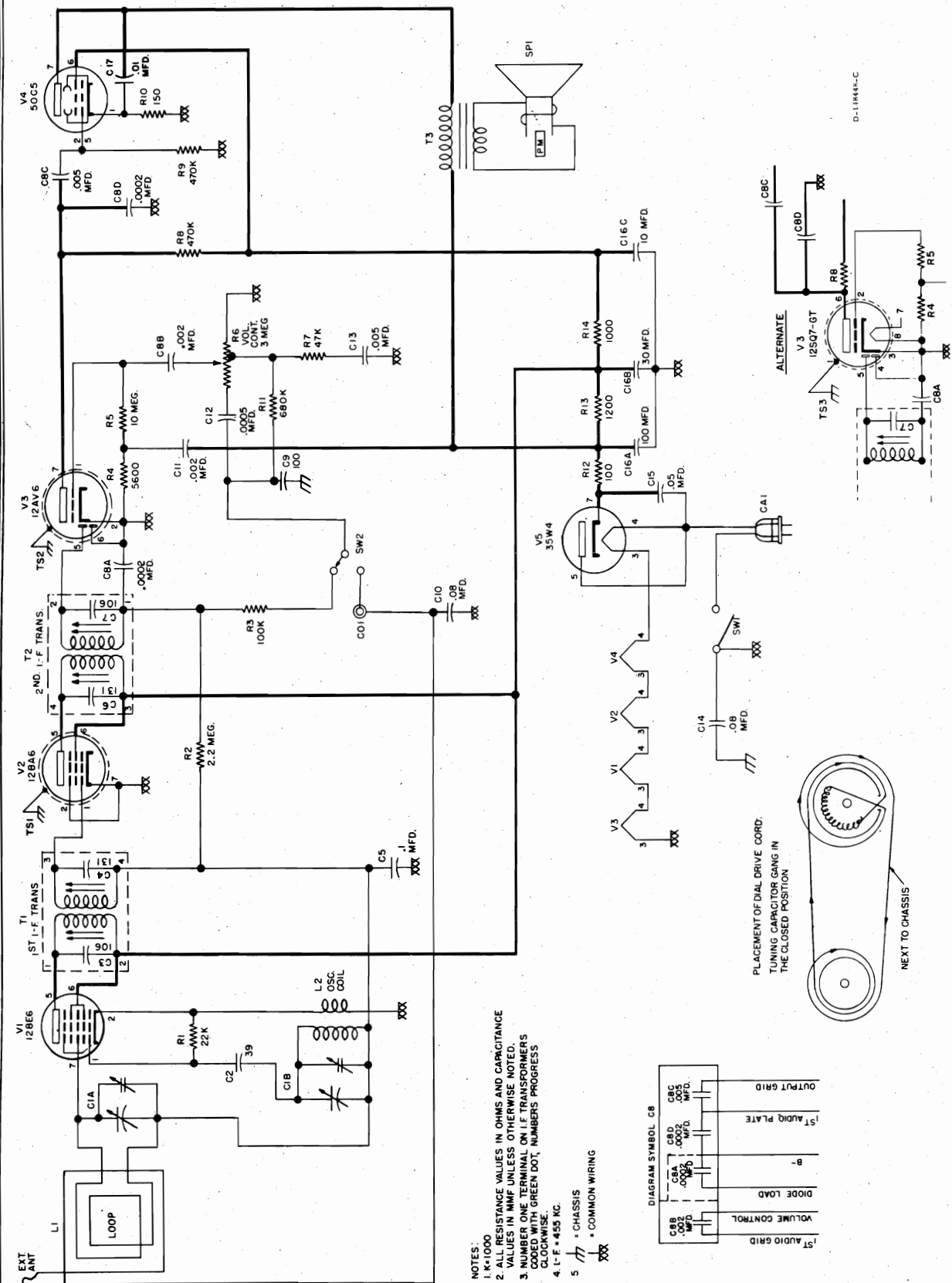
DET.-AVC. & 1ST AUDIO AMPL.

***NOTES:**

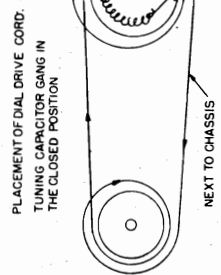
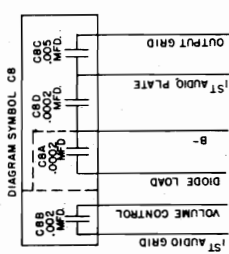
1. BOTTOM VIEW OF TUBE SOCKETS.
2. VOLTAGES MEASURED WITH AN ELECTRONIC VOLTMETER FROM SOCKET LUG TO B- (PIN 7 OF 12BA6)
3. MEASURED WITH THE VOLUME CONTROL AT MINIMUM & NO SIGNAL INTO THE LOOP, TUNING GANG CLOSED.
4. W.J.= WIRING JUNCTION.
- * = AC VOLTAGES. NC= NO CONNECTION.
5. LINE VOLTAGE = 117V., 60~AC.
6. SOCKET VOLTAGE TOLERANCE ± 10%

SOCKET VOLTAGE CHART (Sets equipped with 12AV6 Tube)

MODELS 11-110U, 11-111U,
11-112U, 11-113U, 11-
130U, 11-132U, Ch. 299



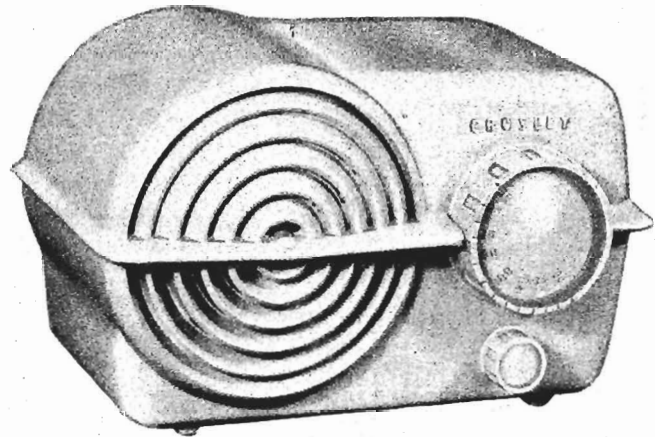
- NOTES:
1. K=1000
 2. RESISTANCE VALUES IN OHMS AND CAPACITANCE VALUES IN MMF UNLESS OTHERWISE NOTED.
 3. NUMBER ONE TERMINAL ON I-F TRANSFORMERS COILED WITH GREEN DOT, NUMBERS PROGRESS CLOCKWISE.
 4. 1" F = 455 KC.
 5. --- = CHASSIS
- XXX = COMMON WIRING



SCHEMATIC DIAGRAM

MODELS 11-114U, 11-115U,
11-116U, 11-117U, 11-118U,
11-119U, Ch. 330, 330-1

| Model No. | Color |
|-----------|--------------|
| 11-114U | India Ivory |
| 11-115U | Firebird Red |
| 11-116U | Mist Gray |
| 11-117U | Gulf Green |
| 11-118U | Bahama Beige |
| 11-119U | Smoke Blue |

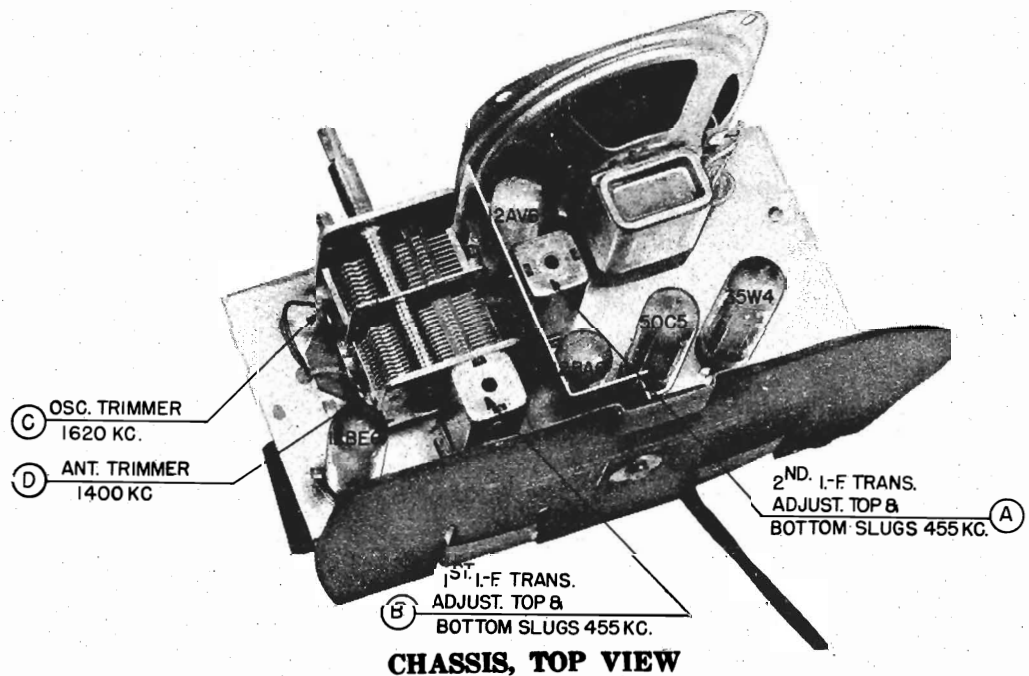


DESCRIPTION

TYPE: Five-tube, single band, Superheterodyne.
FREQUENCY RANGE: 540 to 1600 kc.
INTERMEDIATE FREQUENCY: 455 kc.
POWER SUPPLY: a.c.-d.c.
VOLTAGE RATING: 105-125 volts.
POWER CONSUMPTION: 30 watts.
POWER OUTPUT: 1.5 watts maximum.

TUBE COMPLEMENT:

| Type | Function |
|-------|----------------------------------------|
| 12BE6 | Converter |
| 12BA6 | I. F. Amplifier |
| 12AV6 | Detector, AVC, 1st. A. F. Amplifier |
| 50C5 | A. F. Power Output |
| 35W4 | Rectifier |



MODELS 11-114U, 11-115U,
11-116U, 11-117U, 11-118U,
11-119U, Ch. 330, 330-1

ALIGNMENT CHART

Alignment adjustment locations are shown on "CHASSIS, TOP VIEW."

| Alignment Sequence | Signal Generator Output | | | Position of Dial pointer | Adjust for Maximum Output |
|--------------------|-------------------------|------------------|-------------------|--------------------------|---------------------------|
| | Frequency in KC | In Series with | To | | |
| 1 | 455 | 200 mmf. | High Side of Loop | 1620 | A & B (See Note 1.) |
| 2 | 1620 | Radiated to Loop | | 1620 | C (See Note 2.) |
| 3 | 1400 | Radiated to Loop | | Tune to Signal | D (See Note 2.) |

ALIGNMENT NOTES.

1. Repeat adjustments (A & B) until maximum output is obtained.
2. Place signal generator output lead near the loop antenna.

When using direct current it may be necessary to reverse the position of the power plug in the electric outlet for correct polarity.

Reversing the position of the power plug when alternating current is used may reduce hum.

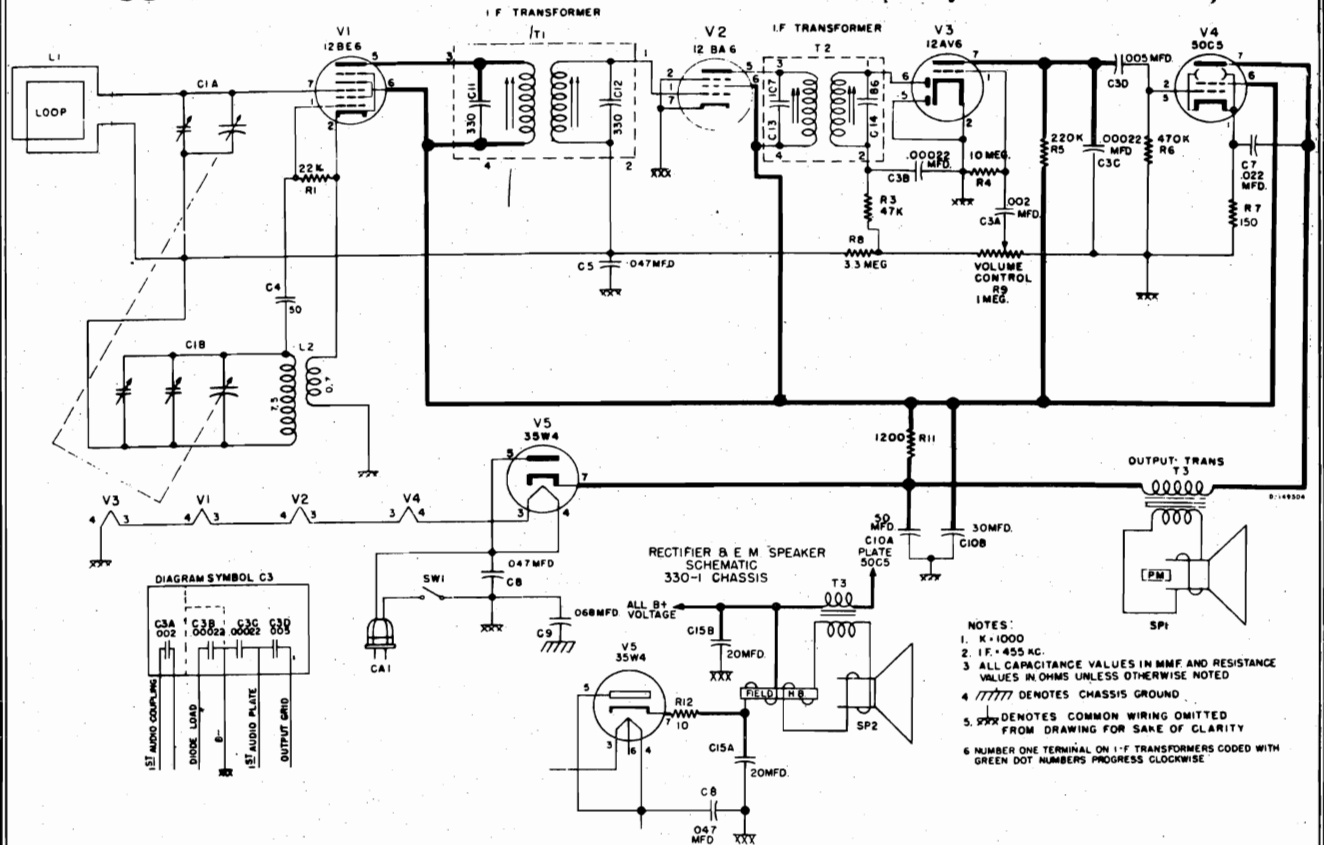
Under no circumstances should a ground be connected to this receiver.

ALIGNMENT PROCEDURE

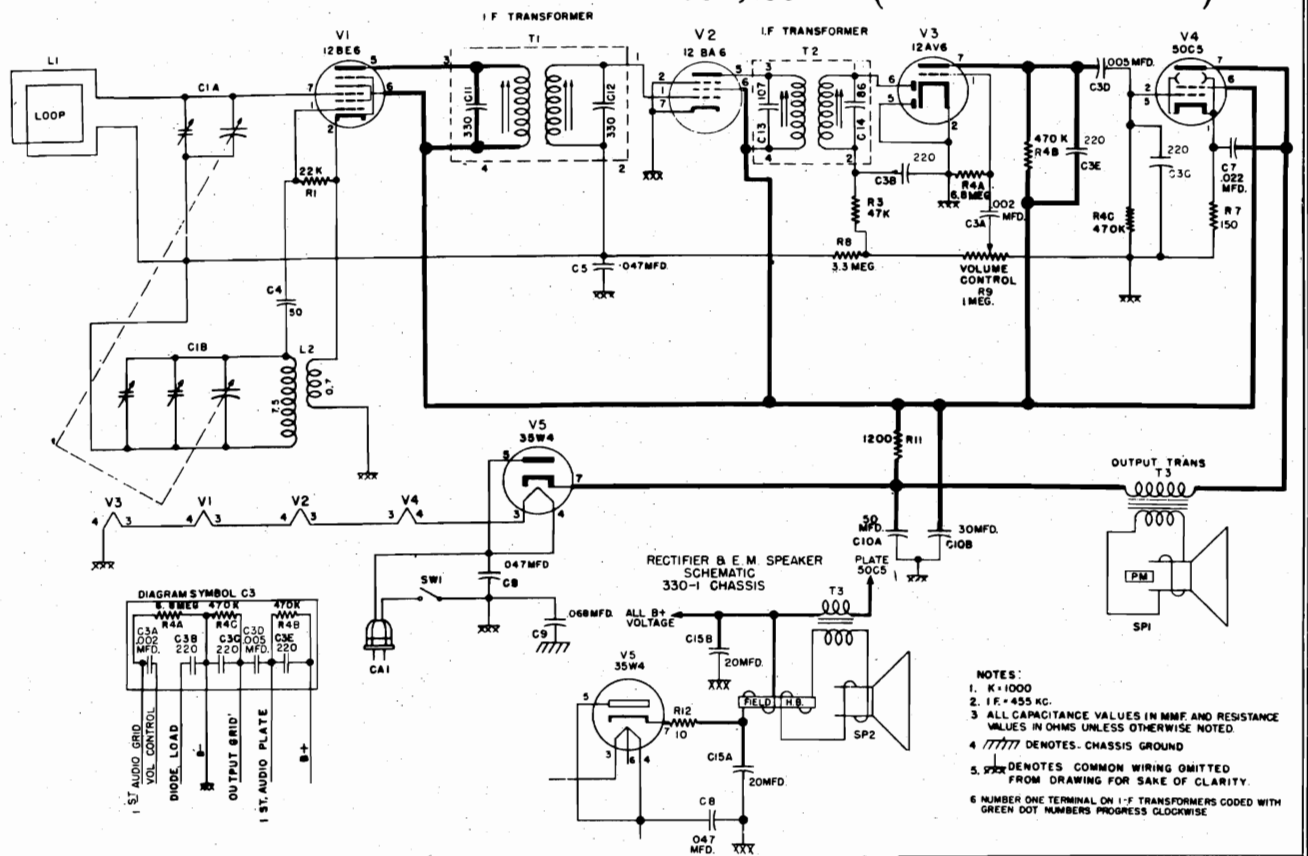
1. Connect an output meter across the speaker voice coil.
2. The r.f. signal input from the signal generator should be connected as indicated in the alignment chart. Connect the signal generator ground through a 0.1 mfd. condenser to B - (pin 2 on 12BA6 tube socket).
3. Turn the volume control on full and adjust the signal generator output to produce approximately midscale deflection of the output meter, but maintain signal generator output as low as possible to prevent AVC action in the receiver.

MODELS 11-114U, 11-115U,
11-116U, 11-117U, 11-118U,
11-119U, Ch. 330, 330-1

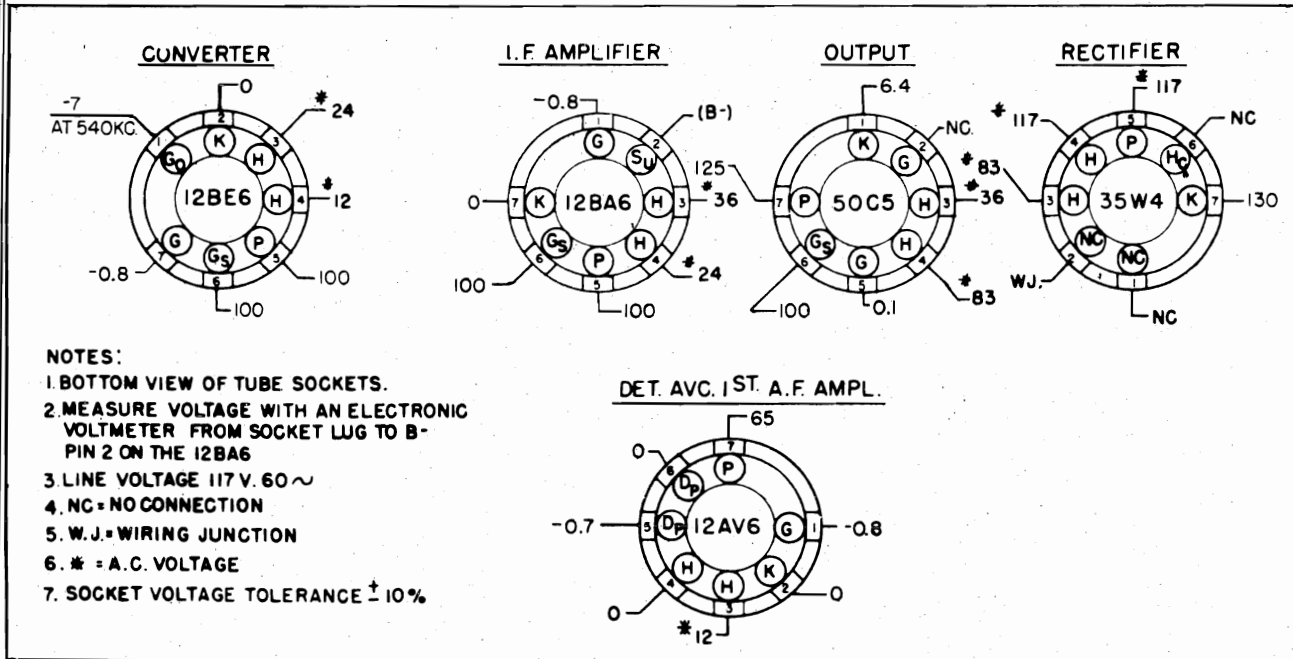
SCHEMATIC DIAGRAM: CHASSIS 330, 330-1 (Early Production Sets)



SCHEMATIC DIAGRAM: CHASSIS 330, 330-1 (Later Production Sets)



MODELS 11-114U, 11-115U,
11-116U, 11-117U, 11-118U,
11-119U, Ch. 330, 330-1



- NOTES:**
1. BOTTOM VIEW OF TUBE SOCKETS.
 2. MEASURE VOLTAGE WITH AN ELECTRONIC VOLTMETER FROM SOCKET LUG TO B-PIN 2 ON THE 12BA6
 3. LINE VOLTAGE 117 V. 60 ~
 4. NC = NO CONNECTION
 5. W.J. = WIRING JUNCTION
 6. * = A.C. VOLTAGE
 7. SOCKET VOLTAGE TOLERANCE ± 10%

SOCKET VOLTAGE CHART

REPLACEMENT PARTS LIST

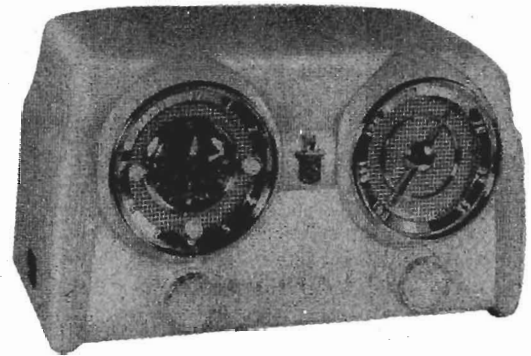
MODELS: 11-114U, 11-115U, 11-116U, 11-117U, 11-118U, 11-119U-Chassis 330, 330-1

| Symbol No. | Part No. | Description | Symbol No. | Part No. | Description |
|------------|-------------|------------------------------------------------------------------|-------------|-------------|----------------------------------|
| C1-A | B-149473 | Capacitor, Variable } Two Section | R8 | 39373-100 | Resistor, 3.3 megohm, 1/2 w. |
| C1-B | | Capacitor, Variable } Two Section | R9 | 39368-14 | Control, Volume (1 megohm) |
| †C3-A | C-144675-1 | Capacitor, .002 mfd., 500 v. } Four Section | ▲R11 | 39374-114 | Resistor, 1200 ohm, 10%, 1 w. |
| †C3-B | | Capacitor, .00022 mfd., 500 v. } disc ceramic | ▲▲R12 | 39373-1 | Resistor, 10 ohm, 1/2 w. |
| †C3-C | | Capacitor, .00022 mfd., 500 v. } disc ceramic | CA1 | C-142769-1 | Cable & Plug Assy., Power |
| †C3-D | | Capacitor, .005 mfd., 500 v. } disc ceramic | L1 | AC-149480 | Loop Antenna & Black Assy. |
| ††C3-A | C-151550-1 | Capacitor, .002 mfd., 450 v. } Resistor-Capacitor Unit; Includes | L2 | AW-148259 | Coil, Oscillator |
| ††C3-B | | Capacitor, 220 mmf., 450 v. } Resistor-Capacitor Unit; Includes | SW1 | 39369-1 | Switch, Power |
| ††C3-C | | Capacitor, 220 mmf., 450 v. } Resistor-Capacitor Unit; Includes | ▲SP1 | 139631 | Speaker (4" P.M.) |
| ††C3-D | | Capacitor, .005 mfd., 450 v. } Resistor-Capacitor Unit; Includes | ▲▲ | C-151996 | Speaker (4" E.M., 680 ohm Field) |
| ††C3-E | | Capacitor, 220 mmf., 450 v. } Resistor-Capacitor Unit; Includes | T1 | AC-139919-4 | Transformer, 1st. I. F. |
| C4 | C-137727-21 | Capacitor, 50 mmf., 500 v., ceramic | T2 | AC-139919-5 | Transformer, 2nd. I. F. |
| C5 | 39477-45 | Capacitor, .047 mfd., 600 v., molded paper | 138131-1 | | Transformer, Output |
| C7 | 39477-43 | Capacitor, .022 mfd., 600 v., molded paper | AB-149495-1 | | Cabinet (11-114U) |
| C8 | 39477-45 | Capacitor, .047 mfd., 600 v., molded paper | AB-149495-2 | | Cabinet (11-115U) |
| C9 | 39477-46 | Capacitor, .068 mfd., 600 v., molded paper | AB-149495-3 | | Cabinet (11-116U) |
| ▲C10A | B-149457 | Capacitor, 50 mfd., 150 v. } Two Section | AB-149495-4 | | Cabinet (11-117U) |
| ▲C10B | | Capacitor, 30 mfd., 150 v. } Electrolytic | AB-149495-5 | | Cabinet (11-118U) |
| C11 | Part of T1 | Capacitor, 330 mmf. | AB-149495-6 | | Cabinet (11-119U) |
| C12 | Part of T1 | Capacitor, 330 mmf. | W-145837 | | Clip, Spring |
| C13 | Part of T2 | Capacitor, 107 mmf. | B-149433-1 | | Knob, Volume (11-114U) |
| C14 | Part of T2 | Capacitor, 86 mmf. | B-149433-2 | | Knob, Volume (11-115U) |
| ▲▲C15A | B-151645 | Capacitor, 20 mfd., 150 v. } Two Section | B-149433-3 | | Knob, Volume (11-116U) |
| ▲▲C15B | | Capacitor, 20 mfd., 150 v. } Electrolytic | B-149433-4 | | Knob, Volume (11-117U) |
| R1 | 39373-80 | Resistor, 22,000 ohm, 1/2 w. | B-149433-5 | | Knob, Volume (11-118U) |
| R3 | 39373-87 | Resistor, 47,000 ohm, 1/2 w. | B-149433-6 | | Knob, Volume (11-119U) |
| †R4 | 39373-107 | Resistor, 10 megohm, 1/2 w. | C-149434-1 | | Knob, Tuning (11-114U) |
| †R5 | 39373-80 | Resistor, 220,000 ohm, 1/2 w. | C-149434-2 | | Knob, Tuning (11-115U) |
| †R6 | 39373-87 | Resistor, 470,000 ohm, 1/2 w. | C-149434-3 | | Knob, Tuning (11-116U) |
| ††R4A | Part of C3 | Resistor, 6.8 megohm, 1/5 w. | C-149434-4 | | Knob, Tuning (11-117U) |
| ††R4B | Part of C3 | Resistor, 470,000 ohm, 1/5 w. | C-149434-5 | | Knob, Tuning (11-118U) |
| ††R4C | Part of C3 | Resistor, 470,000 ohm, 1/5 w. | C-149434-6 | | Knob, Tuning (11-119U) |
| R7 | 39373-16 | Resistor, 150 ohm, 1/2 w. | 39462-1 | | Socket, Tube |

▲ Used on Chassis 330 only. † Used on early production sets.
▲▲ Used on Chassis 330-1 only. †† Used on later production sets.

MODELS 11-120U, 11-121U,
11-122U, 11-123U, 11-
124U. 11-125U, Ch. 311

| Model No. | Color |
|-----------|---------------|
| 11-120U | Dulux White |
| 11-121U | Ebony |
| 11-122U | Chartreuse |
| 11-123U | Maroon |
| 11-124U | Regal Blue |
| 11-125U | Sumatra Green |

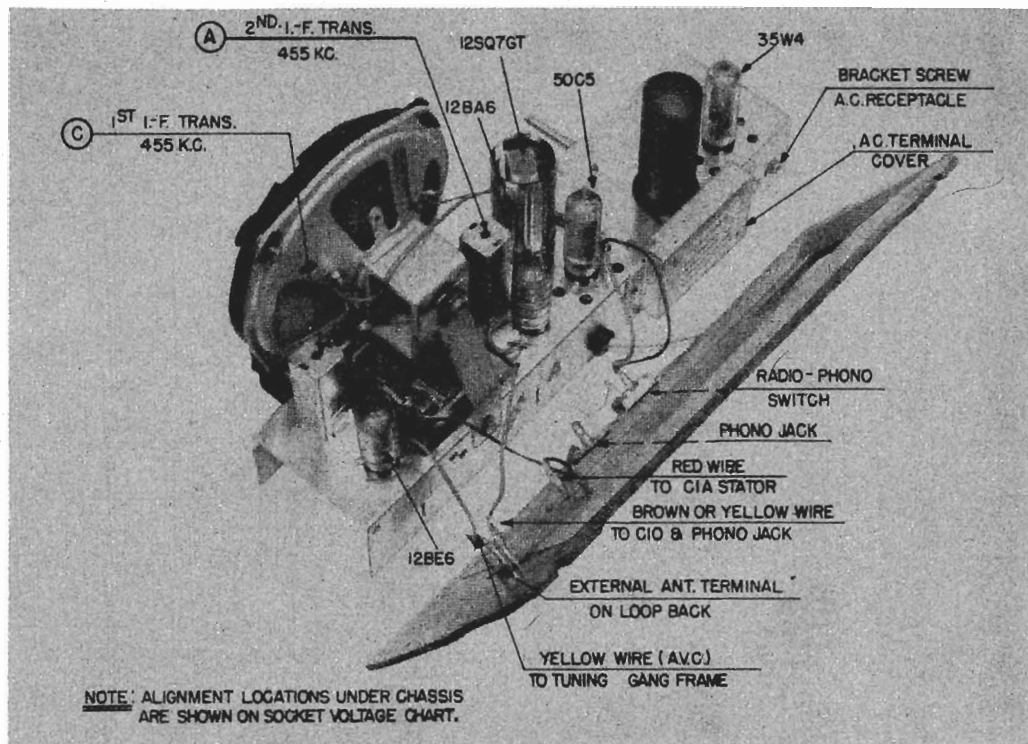


DESCRIPTION

TYPE: Five-tube, single band, Superheterodyne.
FREQUENCY RANGE: 540 to 1600 kc.
INTERMEDIATE FREQUENCY: 455 kc.
POWER SUPPLY: 60 cycle, a.c. only.
VOLTAGE RATING: 105-125 volts.
POWER OUTPUT: 1 watt maximum.
POWER CONSUMPTION:
 Radio and Clock..... 35 watts
 Clock 2 watts

TUBE COMPLEMENT:

| Type | Function |
|---------|----------------------------------------|
| 12BE6 | Converter |
| 12BA6 | I. F. Amplifier |
| 12SQ7GT | Detector, AVC, 1st. A. F. Amplifier |
| 50C5 | A. F. Power Output |
| 35W4 | Rectifier |



CHASSIS, TOP VIEW

PAGE 22-20 CROSLLEY

MODELS 11-120U, 11-121U,
11-122U, 11-123U, 11-
124U, 11-125U, Ch. 311

Under no circumstances should a ground be connected to this receiver.

Phonograph connection — To use a record player with this receiver insert the pickup plug of the record player into the Phono jack on back of receiver. Then slide the Radio-Phono Switch on the back of the receiver to the "Phono" position. Connect the power cord of the record player to a convenient electric outlet of the correct voltage and frequency. Operate the record player in the normal manner. The controls of the receiver operate the same as for radio programs.

ALIGNMENT PROCEDURE

1. To remove the chassis from the cabinet, proceed as follows:
 - a. Turn the tuning control completely counter-clockwise to close the gang.
 - b. Remove the volume and tuning control knobs, and the dial pointer.
 - c. Remove the cabinet back and loosen the screw on the terminal cover behind the electrolytic capacitor. Lift up the cover and disconnect the three leads to the clock.
 - d. Connect a jumper between the terminal coded yellow and the center terminal on the terminal board.
 - e. Remove the two screws in the top corners of the chassis apron that secure the chassis to the cabinet.
 - f. Loosen the slotted hex head screw on the right rear of the chassis and slide the screw toward the center of the chassis to release power receptacle from opening in side of cabinet.
 - g. Slide the chassis from the cabinet.
2. Connect an output meter across the speaker voice coil.
3. The r.f. signal input from the signal generator should be connected as indicated in the alignment chart. Connect the signal generator ground to the top lug on loop antenna back (See Chassis Top View, page 1).
4. Turn the volume control on full and adjust the signal generator output to produce approximately midscale deflection of the output meter, but maintain signal generator output as low as possible to prevent AVC action in the receiver.

ALIGNMENT CHART

Alignment adjustment locations are shown on "Chassis, Top View,"
and on "Socket Voltage Chart".

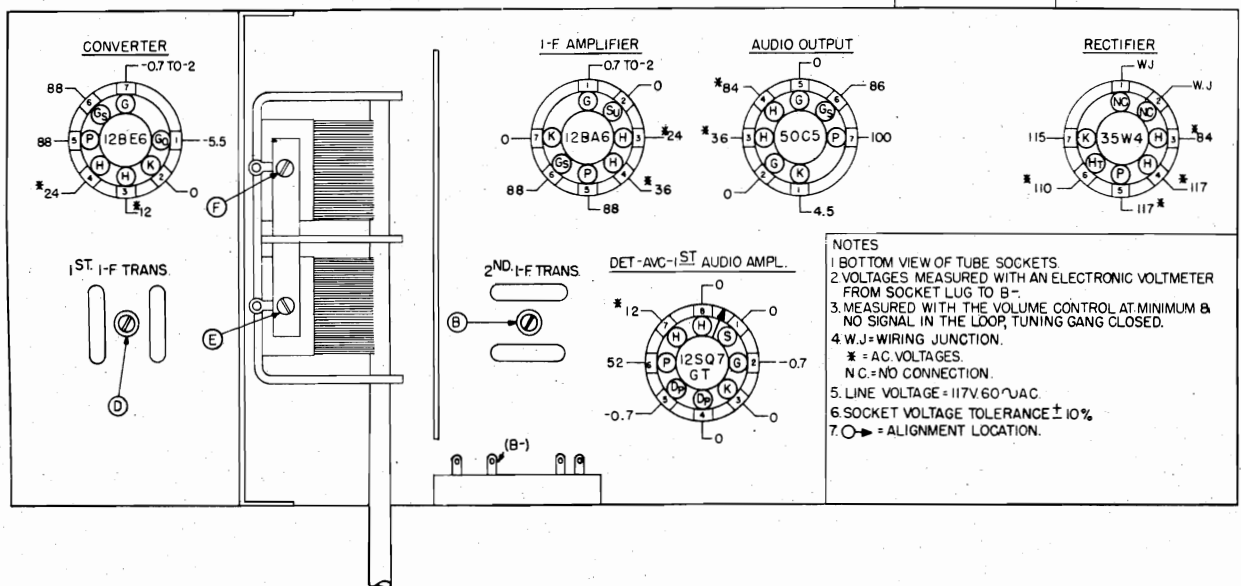
| Alignment Sequence | Signal Generator Output | | | Position of Dial pointer | Adjust for Maximum Output |
|--------------------|-------------------------|----------------|---------------------|--------------------------|---------------------------|
| | Frequency in KC | In Series with | To | | |
| 1 | 455 | 200 mmf. | External Ant. Screw | 1620 | A, B, C & D (See Note 1.) |
| 2 | 1620 | 200 mmf. | External Ant. Screw | 1620 | E |
| 3 | 1400 | 200 mmf. | External Ant. Screw | 1400 | F (See Note 2.) |

ALIGNMENT NOTES

1. Repeat adjustments (A, B, C & D) in sequence, until maximum output is obtained.
2. After the chassis and loop antenna have been replaced in the cabinet, repeat alignment sequence "3". Adjust "F" by inserting screw driver through the hole provided in the bottom of the cabinet.

MODELS 11-120U, 11-121U,
11-122U, 11-123U, 11-
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SOCKET VOLTAGE CHART

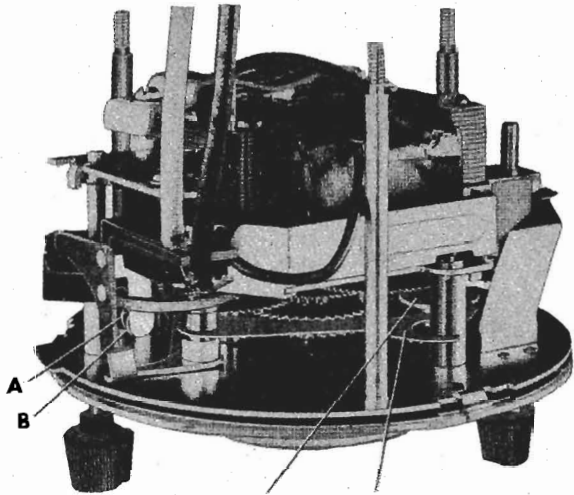


CLOCK ADJUSTMENTS

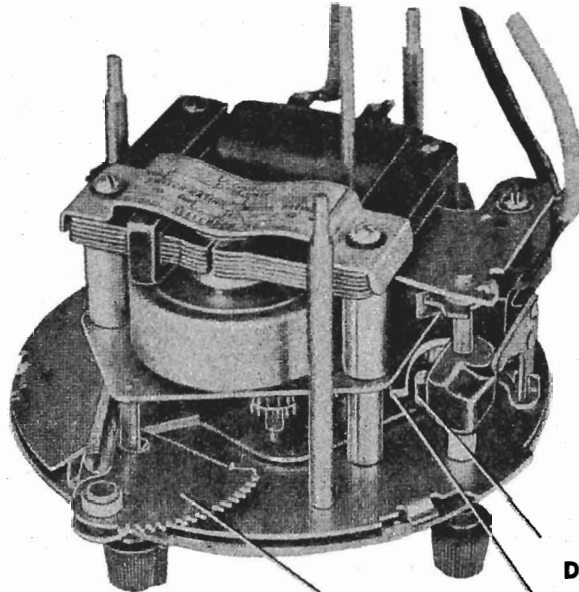
PROCEDURE FOR CHECKING TIMER SWITCH AND VIBRATOR:

1. With the time set knob, turn the clock hands so as to advance the time at least one (1) hour. (For ease in checking, it is recommended that the time be set to the hour.)
2. Attach test light to black and yellow switch leads.
3. Turn switch knob to "Radio" position - light must go on.
4. Turn switch knob to "Off" position - light must go out.
5. Set alarm disc so that small pointer on hour hand reads two (2) hours in advance of the time of the clock. **EXAMPLE:** If the clock hands are set to read 7 o'clock, set the alarm disc to read 9 o'clock.
6. Turn sleep switch to "60" - test light must go on.
7. Turn time set knob advancing clock hands to next hour - light must go out and **SLEEP SWITCH SECTOR GEAR** must be completely disengaged within one (1) hour plus or minus eight (8) minutes.
8. Manually push **SLEEP SWITCH SECTOR GEAR** in until it touches its mating pinion **WITHOUT** meshing - light must go on.
9. Turn switch knob to "Radio Alarm" position.
10. Turn time set knob to advance clock hands so they read 15 minutes until the next hour. Then slowly advance the hands until the test light lights, which indicates the contacts are closed. The contacts must close somewhere between 14 minutes to the hour and 4 minutes past the hour.
11. Remove test light and connect 110 volt supply to the black and red leads.
12. Turn time set knob to advance the clock hands 4 minutes - vibrator must **NOT** buzz. Then advance the hands 14 minutes - vibrator **MUST** buzz within this 14 minute period.

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11-122U, 11-123U, 11-
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TIMING CAM TIMING CAM FOLLOWER



SLEEP SWITCH SECTOR GEAR

ADJUSTING CONTACTS:

1. Set the alarm disc so that the time indicated by the small pointer on the hour hand is different (at least 1 hour) from the time indicated by the hands of the clock. Then set switch to "Radio Alarm" position so that the **TIMING CAM FOLLOWER** rests on the **TIMING CAM**. Contacts shall be adjusted at .020" minimum gap.
2. With switch in "OFF" position contacts shall remain open as in step one and there shall be clearance between **TIMING CAM FOLLOWER** and **TIMING CAM**.
3. With switch in "Radio" position, contacts shall be closed. Check for proper contact pressure by depressing **CONTACT (A)**, using a small pointed tool. If **CONTACT (B)** follows **CONTACT (A)**, a noticeable amount before the contacts separate, the pressure is sufficient.
4. Set the switch to "Radio Alarm" position; pull out and turn alarm set knob counter-clockwise until the **TIMING CAM FOLLOWER** drops into the slot of **TIMING CAM**. The contacts shall be closed. Check contact pressure as previously described in step three.
5. **SWITCH ARM (C)** should clear **CAM (D)** by .008" minimum when in the "Radio Alarm" position.

TIMING:

1. Adjust timer for contact closure at 6:55 o'clock. On repeat tests, contacts shall close at 6:55 plus or minus 3 minutes. At all other settings the contacts shall close between 12 minutes before and 2 minutes after the setting time.
2. Check time keeping for a minimum of twelve hours with power applied to the motor. Clock must be run with vibrator (buzzer) shut off.

VIBRATOR ADJUSTMENT:

1. Vibrator shall start buzzing 10 minutes plus or minus 5 minutes after contact closure occurs.
2. When the alarm set knob is pushed in ("shut-off" position of vibrator) the shut-off spring shall lift the vibrator sufficiently above the cam, so that the cam will not contact the vibrator in any position.
3. Adjust vibrator for good sounding position.
4. Vibrator shall be manually shut off before completion of buzzing period.

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11-122U, 11-123U, 11-
124U, 11-125U, Ch. 311

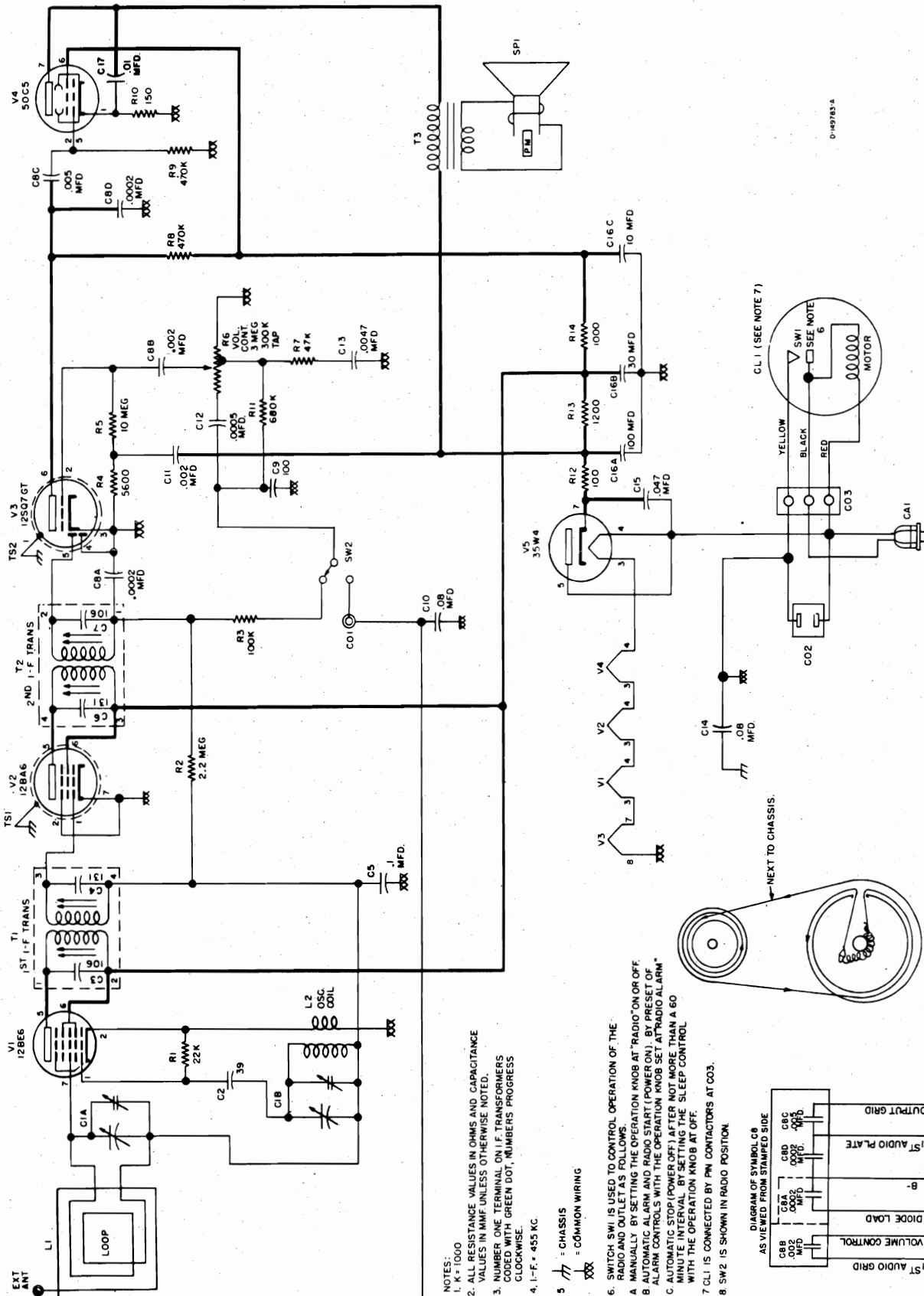
CLOCK LUBRICATION

1. Center stack bearing in base plate and hole in back gear pinion should be lubricated with Nye watch oil or equivalent.
2. Path of switch locating spring on bracket should be lubricated with Dixon graphite grease.

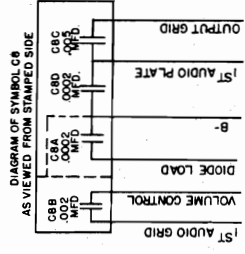
REPLACEMENT PARTS LIST

| Symbol No. | Part No. | Description | Symbol No. | Part No. | Description |
|------------|--------------|--------------------------------------------------|------------|-------------|---------------------------------------------------------|
| C1A | B-149437 | Capacitor, Variable] Two Section | | AD-149598-4 | Cabinet & Medallion Assy.(11-123U) |
| C1B | | Capacitor, Variable] | | AD-149598-5 | Cabinet & Medallion Assy.(11-124U) |
| C2 | C-137727-109 | Capacitor, 39 mmf., 10%, 200 v., ceramic | | AD-149598-6 | Cabinet & Medallion Assy.(11-125U) |
| C3 | Part of T1 | Capacitor, 106 mmf. | | W-139921 | Clip, I.F. Transformer Mtg. |
| C4 | Part of T1 | Capacitor, 131 mmf. | | W-131154-1 | Cotter (External), Pointer Pulley |
| C5 | 39001-19 | Capacitor, .1 mfd., 600 v., paper | | B-149398 | Cover, Clock |
| C6 | Part of T2 | Capacitor, 131 mmf. | | W-147216 | Cups, Suction |
| C7 | Part of T2 | Capacitor, 106 mmf. | | B-149667-1 | Escutcheon, Outlet |
| C8A | C-144675-1 | Capacitor, .0002 mfd., 500 v.] | | D-149963-1 | Escutcheon, Radio |
| C8B | | Capacitor, .002 mfd., 500 v.] | | C-149964-1 | Escutcheon, Clock |
| C8C | | Capacitor, .005 mfd., 500 v.] | | D-149742 | Gasket, Speaker |
| C8D | | Capacitor, .0002 mfd., 500 v.] | | W-149341 | Gasket, Clock Dial Grille & Ring |
| C9 | B-143686-3 | Capacitor, 100 mmf., 500 v., molded disc ceramic | | AC-149962-1 | Grille & Ring Assy., Clock Dial (11-120U) |
| C10 | 39001-85 | Capacitor, .08 mfd., 600 v., paper | | AC-149962-2 | Grille & Ring Assy., Clock Dial (11-121U) |
| C11 | 39001-74 | Capacitor, .002 mfd., 600 v., paper | | AC-149962-3 | Grille & Ring Assy., Clock Dial (11-122U) |
| C12 | 39001-5 | Capacitor, .0005 mfd., 600 v., paper | | AC-149962-4 | Grille & Ring Assy., Clock Dial (11-123U) |
| C13 | 39477-39 | Capacitor, .0047 mfd., 600 v., molded paper | | AC-149962-5 | Grille & Ring Assy., Clock Dial (11-124U) |
| C14 | 39001-85 | Capacitor, .08 mfd., 600 v., paper | | AC-149962-6 | Grille & Ring Assy., Clock Dial (11-125U) |
| C15 | 39477-45 | Capacitor, .047 mfd., 600 v., molded paper | | AB-149524-1 | Grille, Radio Dial (11-120U) |
| C16A | B-149541 | Capacitor, 100 mfd., 150 v.] | | AB-149524-2 | Grille, Radio Dial (11-121U) |
| C16B | | Capacitor, 30 mfd., 150 v.] | | AB-149524-3 | Grille, Radio Dial (11-122U) |
| C16C | | Capacitor, 10 mfd., 150 v.] | | AB-149524-4 | Grille, Radio Dial (11-123U) |
| C17 | 39477-41 | Capacitor, .01 mfd., 600 v., molded paper | | AB-149524-5 | Grille, Radio Dial (11-124U) |
| R1 | 39373-60 | Resistor, 22,000 ohm, 1/2 w. | | AB-149524-6 | Grille, Radio Dial (11-125U) |
| R2 | 39373-97 | Resistor, 2.2 megohm, 1/2 w. | | W-45580-2 | Grommet (Rubber), Speaker Mtg. |
| R3 | 39373-74 | Resistor, 100,000 ohm, 1/2 w. | | AC-149952-1 | Knob, Volume-Tuning (11-120U) |
| R4 | 39374-34 | Resistor, 5600 ohm, 10%, 1/2 w. | | AC-149952-2 | Knob, Volume-Tuning (11-121U) |
| R5 | 39373-107 | Resistor, 10 megohm, 1/2 w. | | AC-149952-3 | Knob, Volume-Tuning (11-122U) |
| R6 | B-149382 | Control, Volume (3 meg., Tap 300 K ohm) | | AC-149952-4 | Knob, Volume-Tuning (11-123U) |
| R7 | 39373-67 | Resistor, 47,000 ohm, 1/2 w. | | AC-149952-5 | Knob, Volume-Tuning (11-124U) |
| R8 | 39373-87 | Resistor, 470,000 ohm, 1/2 w. | | AC-149952-6 | Knob, Volume-Tuning (11-125U) |
| R9 | 39373-87 | Resistor, 470,000 ohm, 1/2 w. | | B-149311-1 | Knob, Switch (11-120U) |
| R10 | 39373-16 | Resistor, 150 ohm, 1/2 w. | | B-149311-2 | Knob, Switch (11-121U) |
| R11 | 39373-90 | Resistor, 680,000 ohm, 1/2 w. | | B-149311-3 | Knob, Switch (11-122U) |
| R12 | 39374-189 | Resistor, 100 ohm, 10%, 2 w. | | B-149311-4 | Knob, Switch (11-123U) |
| R13 | 39374-114 | Resistor, 1200 ohm, 10%, 1 w. | | B-149311-5 | Knob, Switch (11-124U) |
| R14 | 39373-33 | Resistor, 1000 ohm, 1/2 w. | | B-149311-6 | Knob, Switch (11-125U) |
| TS1 | W-147784 | Shield, Tube (V2) | | B-149339-1 | Knob, Alarm Set (11-120U) |
| TS2 | W-46447-1 | Shield, Tube (V3) | | B-149339-2 | Knob, Alarm Set (11-121U) |
| CA1 | C-149780 | Cable & Plug Assy., Power | | B-149339-3 | Knob, Alarm Set (11-122U) |
| CO1 | W-136998 | Connector, Phono | | B-149339-4 | Knob, Alarm Set (11-123U) |
| L1 | AC-149557 | Loop Antenna & Back Assy. | | B-149339-5 | Knob, Alarm Set (11-124U) |
| L2 | AW-148259 | Coil, Oscillator | | B-149339-6 | Knob, Alarm Set (11-125U) |
| SP1 | AD-145956-2 | Speaker, 5-1/4" P.M. | | B-150140-1 | Medallion (11-120U, 11-121U, 11-123U, 11-124U, 11-125U) |
| SW1 | Part of CL1 | Switch, On-Off | | B-150140-2 | Medallion (11-122U) |
| SW2 | W-148260 | Switch, Radio-Phono | | C-149621-1 | Pointer, Tuning |
| CL1 | AW-149689 | Clock Assy. | | W-149368 | Pulley, Pointer Mtg. |
| T1 | AC-139919-3 | Transformer, 1st I.F. | | W-51752 | Spring, Drive Cord |
| T2 | AC-139919-3 | Transformer, 2nd I.F. | | W-148469 | Spring, Pointer Pulley |
| T3 | B-147171 | Transformer, Output | | 39462-2 | Socket, Tube (V1,V2,V4,V5) |
| CO2 | AB-149562 | Outlet & Bracket Assy. | | W-149987 | Socket, Tube (V3) |
| CO3 | W-149673 | Contact Strip | | AB-149438 | Support & Bushing Assy., Pointer Pulley |
| | W-149366 | Bracket, Speaker Support | | W-149676 | Washer (Rubber), Speaker Mtg. |
| | AD-149598-1 | Cabinet & Medallion Assy.(11-120U) | | | |
| | AD-150015 | Cabinet & Medallion Assy.(11-121U) | | | |
| | AD-149598-3 | Cabinet & Medallion Assy.(11-122U) | | | |

MODELS 11-120U, 11-121U,
11-122U, 11-123U, 11-
124U, 11-125U, Ch. 311



- NOTES:
1. K = 1000
 2. ALL RESISTANCE VALUES IN OHMS AND CAPACITANCE VALUES IN MMF UNLESS OTHERWISE NOTED.
 3. NUMBER ONE TERMINAL ON I-F TRANSFORMERS CODED WITH GREEN DOT, NUMBERS PROGRESS CLOCKWISE.
 4. I-F = 455 KC
 5. --- = CHASSIS
 6. --- = COMMON WIRING
 7. SWITCH SW1 IS USED TO CONTROL OPERATION OF THE RADIO AND OUTLETS FOR ALARMS.
 8. MANUALLY BY SETTING THE OPERATION KNOB AT "RADIO" ON OR OFF.
 9. AUTOMATIC ALARM AND RADIO CONTROL.
 10. ALARM CONTROLS WITH THE OPERATION KNOB SET AT "RADIO ALARM".
 11. AUTOMATIC STOP (POWER OFF) AFTER NOT MORE THAN A 60 MINUTE INTERVAL BY SETTING THE "SLEEP CONTROL" WITH THE OPERATION KNOB AT OFF.
 12. CL1 IS CONNECTED BY PIN CONTACTORS AT CO3.
 13. SW2 IS SHOWN IN RADIO POSITION.

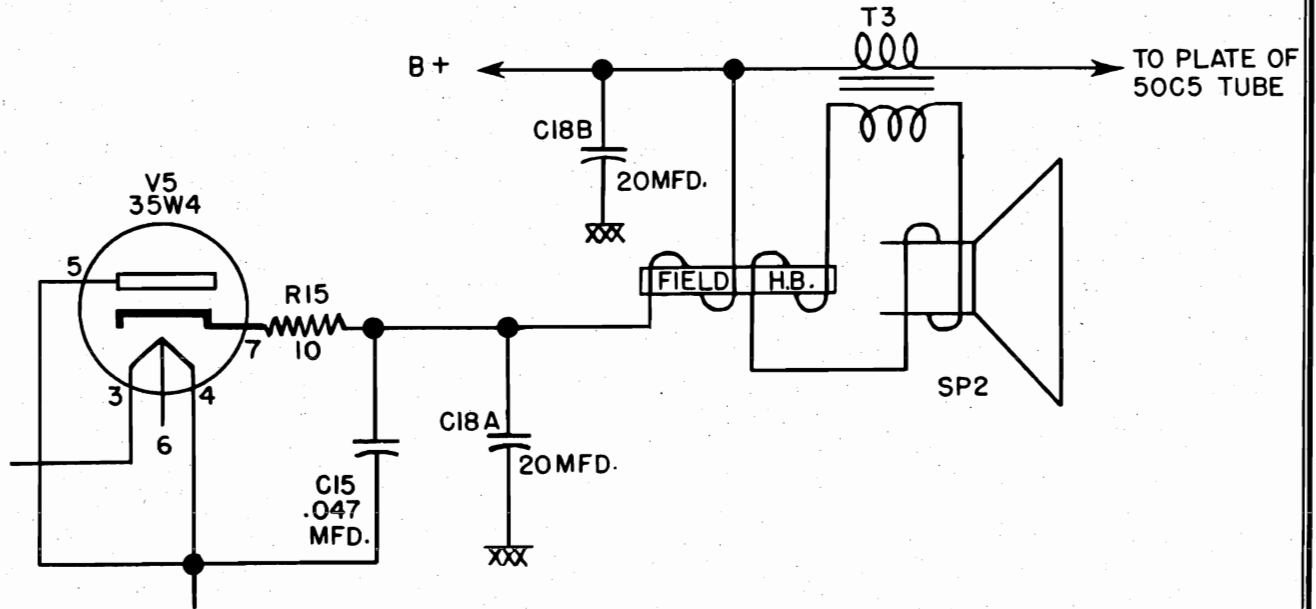


PLACEMENT OF DIAL DRIVE COORD
TUNING CAPACITOR IN THE CLOSED POSITION.

SCHEMATIC DIAGRAM

MODELS 11-120U, 11-121U,
11-122U, 11-123U, 11-124U,
11-125U, Ch. 311-1

To service the chassis 311-1, which is equipped with an E.M. speaker, refer to the following schematic sketch and parts list.



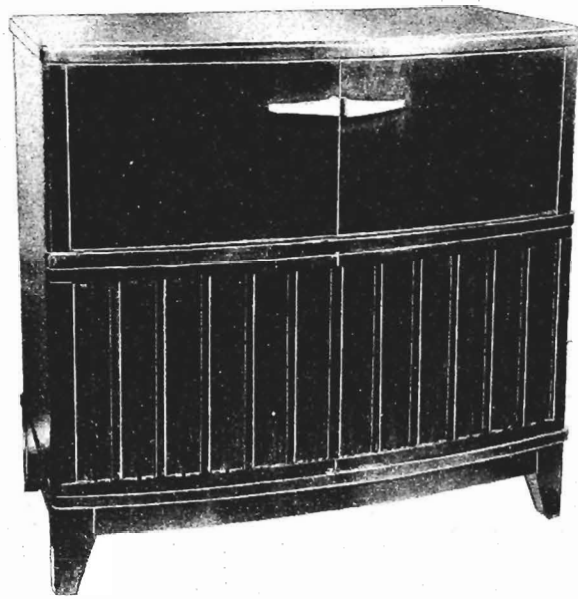
PARTS LIST

| Symbol No. | Part No. | Description |
|------------|----------|-------------------------------------------|
| C15 | 39477-45 | Capacitor, .047 mfd. 600 V, molded paper |
| C18A | B-151617 | Capacitor, 20 mfd., 150 V. } Two Section |
| C18B | | Capacitor, 20 mfd., 150 V. } Electrolytic |
| R15 | 39373-1 | Resistor, 10 ohm, 1/2 w. |
| SP2 | 151190-2 | Speaker (5 " E.M., 680 ohm field) |
| T3 | B-147171 | Transformer, Output |

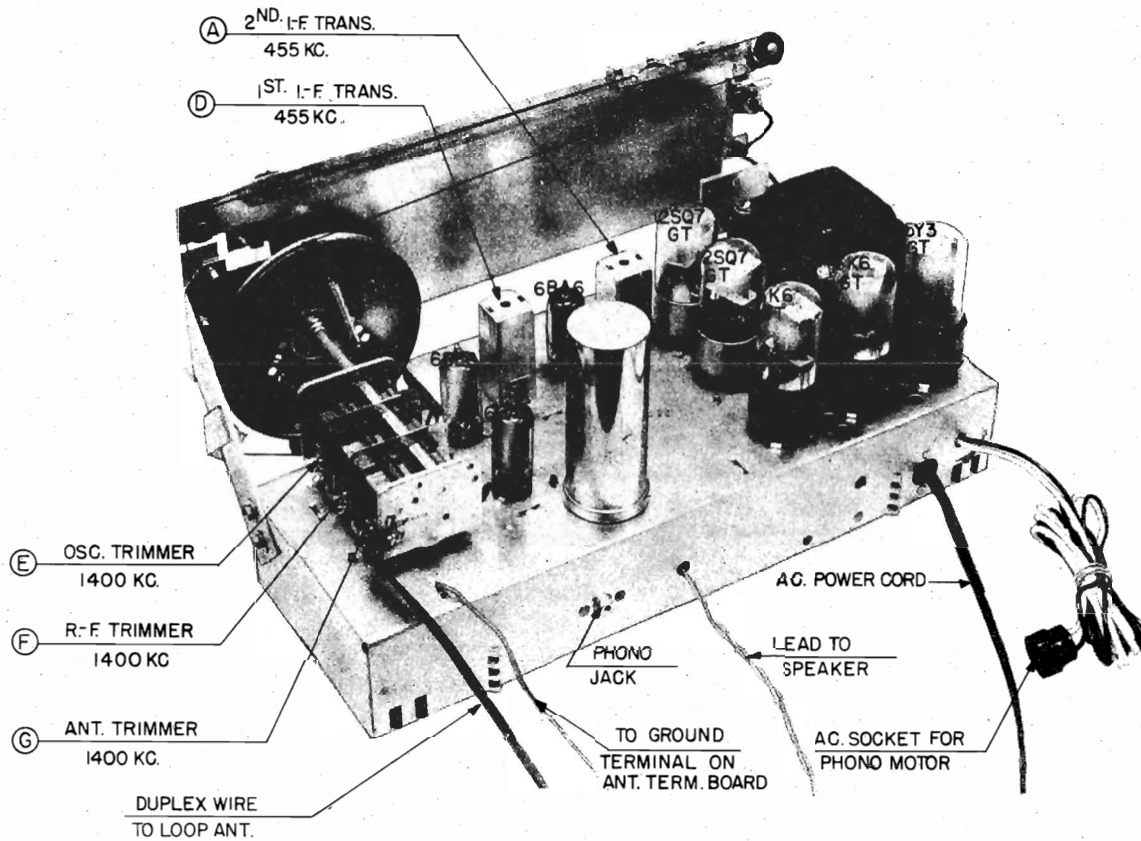
ELECTRIC CLOCK PARTS LIST

| Part No. | Description |
|-----------|-----------------------------|
| 151389-1 | Crystal, Dial |
| 151389-2 | Rivet, Crystal (3 Required) |
| 151389-3 | Dial |
| 151389-4 | Disc, Alarm |
| 151389-5 | Hand, Sweep Second (Gold) |
| 151389-6 | Hands, Hour & Minute |
| 151389-8 | Knob, Time Set (Bronze) |
| 151389-9 | Field & Coil, 60 Cycle |
| 151389-10 | Rotor Unit, 60 Cycle |

MODELS 11-207MU,
11-208BU, Ch. 333



Model 11-207MU (Mahogany) — Model 11-208BU (Blond)



CHASSIS, TOP VIEW

DESCRIPTION

TYPE: Eight-tube, single band, Superheterodyne.

FREQUENCY RANGE: 540 to 1600 kc.

INTERMEDIATE FREQUENCY: 455 kc.

POWER SUPPLY: 60 cycle, a.c. only.

VOLTAGE RATING: 105-125 volts.

POWER CONSUMPTION:

Radio Position 65 watts

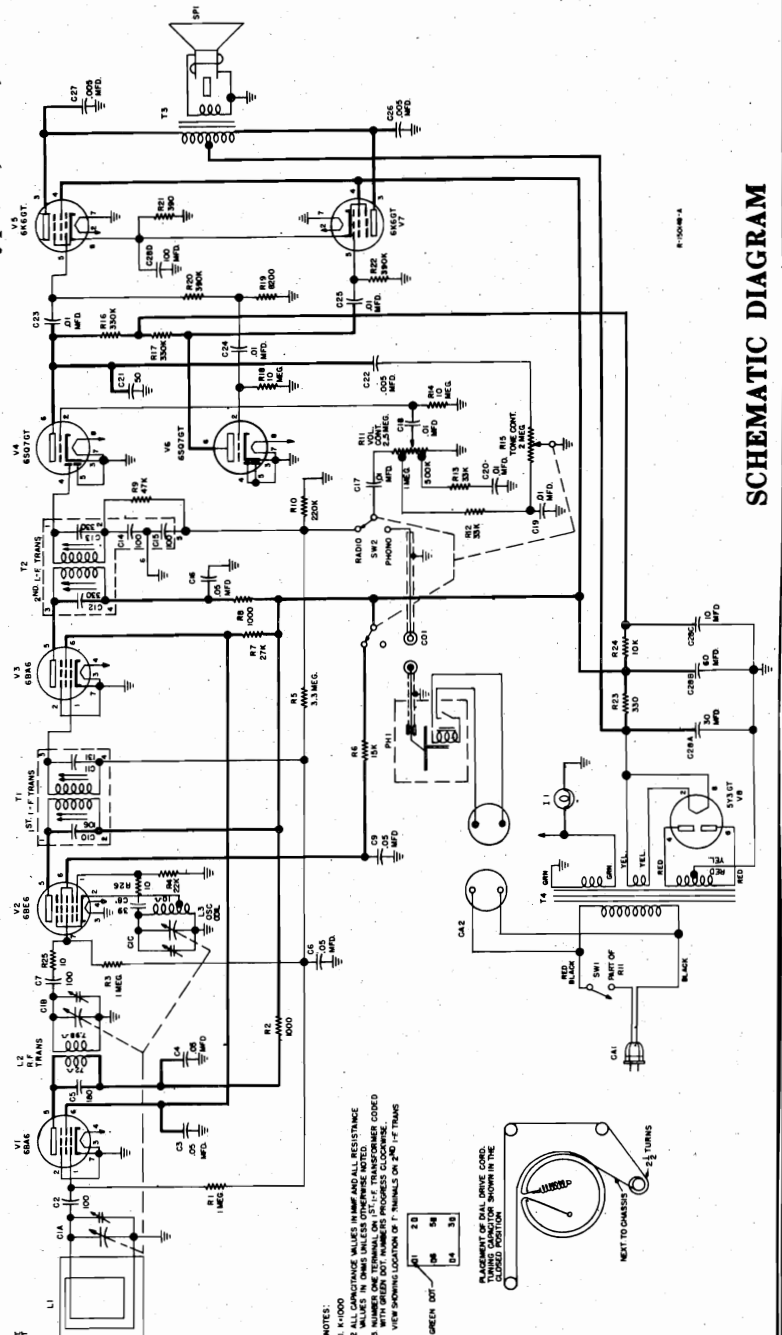
Phono Position..... 85 watts

Phono Motor only..... 20 watts

TUBE COMPLEMENT:

| Symbol No. | Type | Function |
|------------|--------|-------------------------------------|
| V1 | 6BA6 | R.F. Amplifier |
| V2 | 6BE6 | Converter |
| V3 | 6BA6 | I.F. Amplifier |
| V4 | 6SQ7GT | Diode Det., AVC, Audio Amplifier |
| V5 | 6K6GT | Audio Output |
| V6 | 6SQ7GT | Phase Inverter |
| V7 | 6K6GT | Audio Output |
| V8 | 5Y3GT | Rectifier |

DIAL BULB: Type 47, 6.3V., .15 amp.



SCHEMATIC DIAGRAM

MODELS 11-207MU,
11-208BU, Ch. 333

ALIGNMENT PROCEDURE

1. Turn the tuning capacitor to full mesh against stop and set the dial pointer to the reference point on the dial to the left of "55".
2. Connect output meter across speaker voice coil leads.
3. Feed an r.f. signal modulated 30% at 400 cycles to the receiver as indicated in the Alignment chart. Connect the signal generator ground terminal to the chassis of the receiver.
4. Turn the volume control to maximum clockwise position and the tone control to maximum treble position. Adjust the signal generator output to produce a noticeable output meter reading, keeping the signal generator output as low as possible to prevent AVC action in the receiver.
5. For all alignments the loop antenna must remain connected.

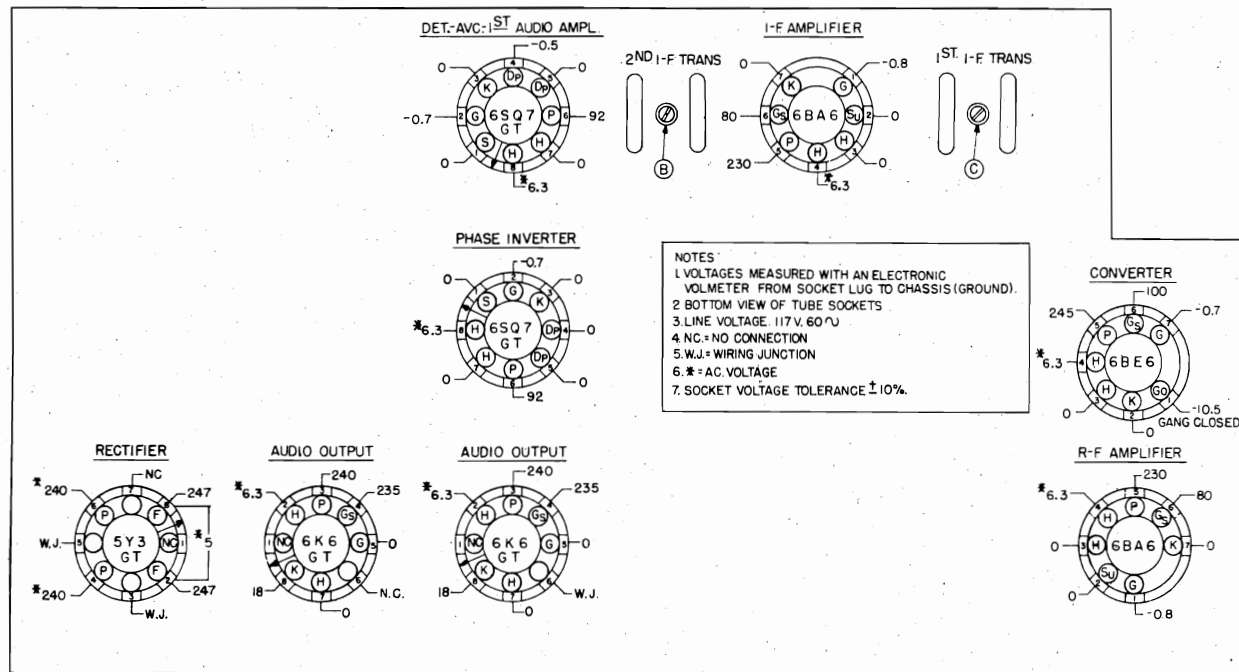
ALIGNMENT CHART

Alignment adjustment locations are shown on "CHASSIS, TOP VIEW."

| Alignment Sequence | Signal Generator Output | | | Position of Tuning Dial or Tun. Cap. | Adjust for Maximum Output |
|--------------------|-------------------------|----------------|-------------------------------------|--------------------------------------|---------------------------|
| | Frequency in kc. | In Series with | To | | |
| 1 | 455 | .05 mfd. | Stator plates of C1B (center sect.) | Gang open | A & B |
| 2 | 455 | .05 mfd. | Stator plates of C1B (center sect.) | Gang open | C & D |
| 3 | 1400 | 200 mmf. | Ext. Ant. Term. | 1400 | E (See Note 1) |
| 4 | 1400 | 200 mmf. | Ext. Ant. Term. | 1400 | F (See Note 1) |
| 5 | 1400 | 200 mmf. | Ext. Ant. Term. | 1400 | G (See Notes 1 & 2) |

ALIGNMENT NOTES

1. Rock gang while adjusting r.f. and antenna trimmers for maximum sensitivity.
2. Antenna trimmer must be realigned at 1400 kc., after chassis is installed in its cabinet. A weak signal must be used so that the trimmer can be adjusted to maximum receiver sensitivity.



SOCKET VOLTAGE CHART

REPLACEMENT PARTS LIST

MODELS 11-207 MU, 11-208 BU (Chassis No. 333)

| Symbol No. | Part No. | Description | Symbol No. | Part No. | Description |
|------------|--------------|------------------------------------------------------|-------------|-------------|-------------------------------------------------|
| C1A | B-150011 | Capacitor, Variable | SW1 | Part of R11 | Switch, Power (ON-OFF) |
| C1B | | Capacitor, Variable } Three Section | SW2 | Part of R15 | Switch, Radio-Phono |
| C1C | | Capacitor, Variable } | T1 | AC-139919-3 | Transformer, 1st. I.F. |
| C2 | C-137727-25 | Capacitor, 100 mmf., 500 v., ceramic | T2 | D-145025-5 | Transformer, 2nd. I.F. |
| C3 | 39001-17 | Capacitor, .05 mfd., 600 v., paper | T3 | B-150028 | Transformer, Output |
| C4 | 39001-17 | Capacitor, .05 mfd., 600 v., paper | T4 | B-150029 | Transformer, Power |
| C5 | C-137727-24 | Capacitor, 180 mmf., 500 v., ceramic | PH1 | D-148279-1 | Record Changer (V950) |
| C6 | 39001-17 | Capacitor, .05 mfd., 600 v., ceramic | CA1 | C-132300-2 | Cable & Plug Assy., Power |
| C7 | C-137727-25 | Capacitor, 100 mmf., 500 v., ceramic | CA2 | B-139727-7 | Cable & Plug Assy., Phono Motor |
| C8 | C-137727-109 | Capacitor, 39 mmf., 10%, 200 v., ceramic | CO1 | W-136998 | Connector, Phono |
| C9 | 39001-17 | Capacitor, .05 mfd., 600 v., paper | SPI | 138762-5 | Speaker, 10" P.M. |
| C10 | Part of T1 | Capacitor, 106 mmf., 5%. | AB-150013 | AB-150013 | Background Assy., Dial |
| C11 | Part of T1 | Capacitor, 131 mmf., 5%. | 148824 | 148824 | Baffle, Speaker (11-207MU) |
| C12 | Part of T2 | Capacitor, 330 mmf., 5%. | 150308 | 150308 | Baffle, Speaker (11-208BU) |
| C13 | Part of T2 | Capacitor, 330 mmf., 5%. | W-149709 | W-149709 | Bracket, Drive Shaft Support |
| C14 | Part of T2 | Capacitor, 100 mmf. | R-148738 | R-148738 | Cabinet, (11-207MU) |
| C15 | Part of T2 | Capacitor, 100 mmf. | R-150299 | R-150299 | Cabinet, (11-208BU) |
| C16 | 39001-17 | Capacitor, .05 mfd., 600 v., paper | W-136201 | W-136201 | Clip, Dial Glass |
| C17 | 39001-13 | Capacitor, .01 mfd., 600 v., paper | W-139921 | W-139921 | Clip, I.F. Transformer |
| C18 | 39001-13 | Capacitor, .01 mfd., 600 v., paper | W-136999-1 | W-136999-1 | Connector (Male), Shielded Wire |
| C19 | 39001-13 | Capacitor, .01 mfd., 600 v., paper | W-131154-1 | W-131154-1 | Cotter (External), Drive Shaft |
| C20 | 39001-13 | Capacitor, .01 mfd., 600 v., paper | W-136853 | W-136853 | Cushion (Rubber), Dial Glass |
| C21 | B-143686-1 | Capacitor, 50 mmf., 500 v., molded disc ceramic | 150009 | 150009 | Decal (Off-On-Volume, Tone-Radio-Phono, Tuning) |
| C22 | 39001-11 | Capacitor, .005 mfd., 600 v., paper | C-149991 | C-149991 | Dial Glass |
| C23 | 39001-13 | Capacitor, .01 mfd., 600 v., paper | 148825 | 148825 | Drawer Assy., Record Changer (11-207MU) |
| C24 | 39001-13 | Capacitor, .01 mfd., 600 v., paper | 150302 | 150302 | Drawer Assy., Record Changer (11-208BU) |
| C25 | 39001-13 | Capacitor, .01 mfd., 600 v., paper | C-148995-1 | C-148995-1 | Escutcheon |
| C26 | 39001-11 | Capacitor, .005 mfd., 600 v., paper | 149097 | 149097 | Grille Cloth (11-207MU) |
| C27 | 39001-11 | Capacitor, .005 mfd., 600 v., paper | 149939 | 149939 | Grille Cloth (11-208BU) |
| C28A | B-150035 | Capacitor, 30 mfd., 350 v. | W-148390 | W-148390 | Grommet, Variable Capacitor Mtg. |
| C28B | | Capacitor, 60 mfd., 350 v. } Four Section | 148828 | 148828 | Hinge, Door (11-207MU) |
| C28C | | Capacitor, 10 mfd., 350 v. } Electrolytic | 150306 | 150306 | Hinge, Door (11-208BU) |
| C28D | | Capacitor, 100 mfd., 25 v. } | C-148708 | C-148708 | Knob |
| R1 | 39373-92 | Resistor, 1 megohm, 1/2 w. | 148831 | 148831 | Leg, Left Rear |
| R2 | 39373-33 | Resistor, 1000 ohm, 1/2 w. | 148832 | 148832 | Leg, Right Rear |
| R3 | 39373-92 | Resistor, 1 megohm, 1/2 w. | 148829 | 148829 | Leg, Left Front |
| R4 | 39373-60 | Resistor, 22,000 ohm, 1/2 w. | 148830 | 148830 | Leg, Right Front |
| R5 | 39373-100 | Resistor, 3.3 megohm, 1/2 w. | 148833 | 148833 | Leg & Base Assy. } 11-207MU Cabinet |
| R6 | 39374-215 | Resistor, 15,000 ohm, 10%, 2 w. | 150300 | 150300 | Leg, Left Rear |
| R7 | 39374-130 | Resistor, 27,000 ohm, 10%, 1 w. | 150301 | 150301 | Leg, Right Rear |
| R8 | 39373-33 | Resistor, 1000 ohm, 1/2 w. | 150304 | 150304 | Leg, Left Front |
| R9 | 39373-67 | Resistor, 47,000 ohm, 1/2 w. | 150303 | 150303 | Leg, Right Front |
| R10 | 39373-80 | Resistor, 220,000 ohm, 1/2 w. | 150305 | 150305 | Leg & Base Assy. } 11-208BU Cabinet |
| R11 | B-150018 | Control, Volume (2.5 meg. Taps 1 meg. & 500,000 ohm) | W-148788-2 | W-148788-2 | Name (CROSLY) |
| R12 | 39373-64 | Resistor, 33,000 ohm, 1/2 w. | C-149431 | C-149431 | Pointer, Dial |
| R13 | 39373-64 | Resistor, 33,000 ohm, 1/2 w. | W-137939-1 | W-137939-1 | Pulley, Drive Cord Idler |
| R14 | 39373-107 | Resistor, 10 megohm, 1/2 w. | 148827 | 148827 | Pull, Door Handle |
| R15 | B-150019 | Control, Tone (2 megohm) & Radio-Phono Switch | W-137170 | W-137170 | Retainer, Record Changer Mtg. |
| R16 | 39374-55 | Resistor, 330,000 ohm, 10%, 1/2 w. | W-137940-1 | W-137940-1 | Rivet, Drive Cord Idler Pulley |
| R17 | 39374-55 | Resistor, 330,000 ohm, 10%, 1/2 w. | W-150083 | W-150083 | Shaft, Dial Pointer Drive |
| R18 | 39373-107 | Resistor, 10 megohm, 1/2 w. | AC-143896-9 | AC-143896-9 | Shielded Wire Assy., Phono |
| R19 | 39374-36 | Resistor, 8200 ohm, 10%, 1/2 w. | W-33055-2 | W-33055-2 | Sleeve (Rubber) Chassis Mtg. |
| R20 | 39374-56 | Resistor, 390,000 ohm, 10%, 1/2 w. | 143478 | 143478 | Slide, Record Changer |
| R21 | 39374-196 | Resistor, 390 ohm, 10%, 2 w. | D-136565-16 | D-136565-16 | Socket, Dial Light |
| R22 | 39374-56 | Resistor, 390,000 ohm, 10%, 1/2 w. | 39462-2 | 39462-2 | Socket, Tube (V1, V2, V3) |
| R23 | 39374-107 | Resistor, 330 ohm, 10%, 1 w. | W-149987 | W-149987 | Socket, Tube (V4, V5, V6, V7, V8) |
| R24 | 39373-54 | Resistor, 10,000 ohm, 1/2 w. | W-145757 | W-145757 | Spring, Dial Drive Cord |
| R25 | 39373-1 | Resistor, 10 ohm, 1/2 w. | 1393198B | 1393198B | Strike & Catch Assy., Door (11-207MU) |
| R26 | 39373-1 | Resistor, 10 ohm, 1/2 w. | 149951 | 149951 | Strike & Catch Assy., Door (11-208BU) |
| L1 | B-150260 | Antenna Loop Assembly | W-143552 | W-143552 | Strip, Dial Pointer |
| L2 | AW-150151 | Transformer, R.F. | AW-150208 | AW-150208 | Terminal Assy., Antenna |
| L3 | AW-150150 | Coil, Oscillator | W-134916 | W-134916 | Washer (Spring), Drive Shaft |
| I1 | 138437-1 | Bulb (Dial), Type 47, 6.3 v., .15 amp. | | | |

MODELS 11-550MU,
11-560BU, Ch. 337



Model 11-550MU (Mahogany) — Model 11-560BU (Blond)

DESCRIPTION

TYPE: Five-tube, single band, Superheterodyne.

FREQUENCY RANGE: 540 to 1600 kc.

INTERMEDIATE FREQUENCY: 455 kc.

POWER SUPPLY: 60 cycle, a.c. only.

VOLTAGE RATING: 105-125 volts.

POWER OUTPUT: 1 watt maximum.

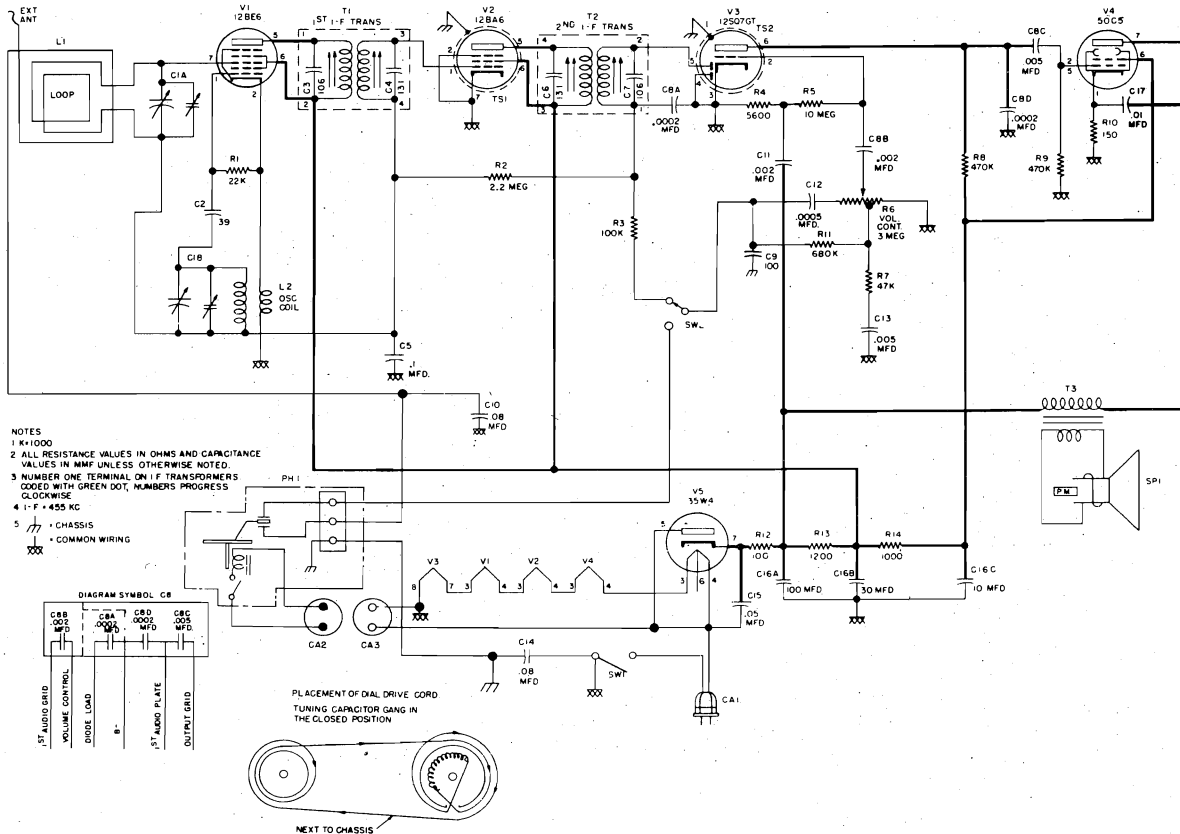
POWER CONSUMPTION:

Radio Position 35 watts

Phono Position..... 55 watts

TUBE COMPLEMENT:

| Type | Function |
|---------|----------------------------------------|
| 12BE6 | Converter |
| 12BA6 | I. F. Amplifier |
| 12SQ7GT | Detector, AVC, 1st. A. F. Amplifier |
| 50C5 | A. F. Power Output |
| 35W4 | Rectifier |



Under no circumstances should a ground be connected to this receiver.

ALIGNMENT PROCEDURE

1. Connect an output meter across the speaker voice coil.
2. The r.f. signal input from the signal generator should be connected, through a 200 mmf. capacitor, to the external antenna screw. Connect the signal generator ground to the top lug on loop antenna (see Chassis Top View)
3. Turn the volume control on full and adjust the signal generator output to produce approximately midscale deflection of the output meter, but maintain signal generator output as low as possible to prevent AVC action in the receiver.

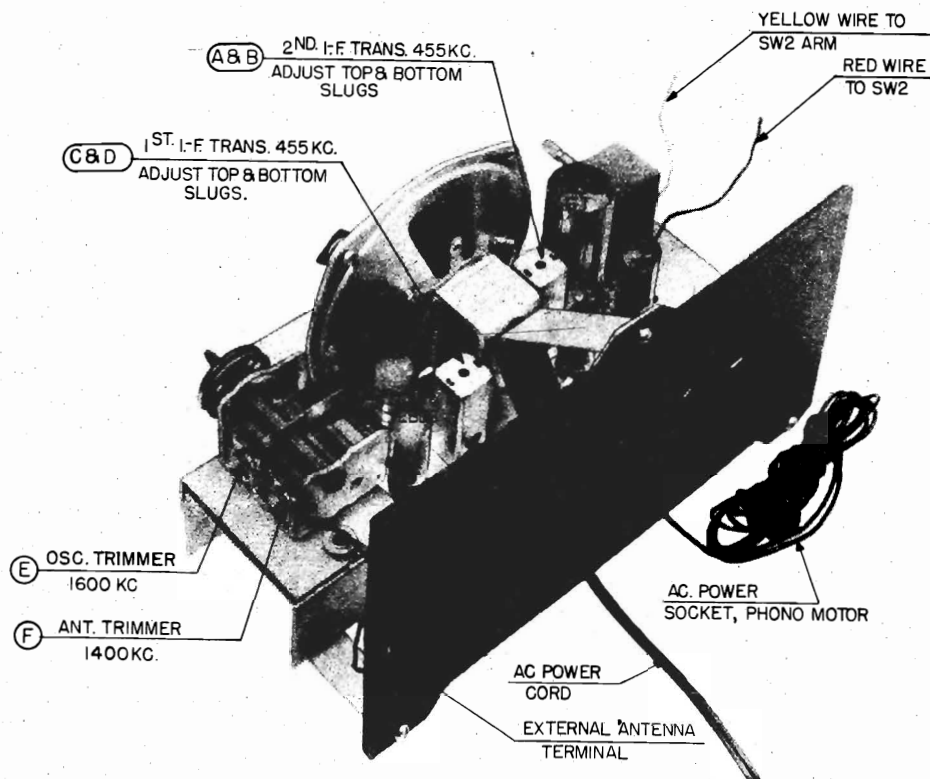
ALIGNMENT CHART

Alignment adjustment locations are shown on "CHASSIS, TOP VIEW."

| Alignment Sequence | Signal Generator Output | | | Position of Dial Pointer | Adjust for Maximum Output |
|--------------------|-------------------------|----------------|---------------------|--------------------------|---------------------------|
| | Frequency in kc. | In Series with | To | | |
| 1 | 455 | 200 mmf. | External Ant. Screw | 1620 | * A, B, C & D |
| 2 | 1620 | 200 mmf. | External Ant. Screw | 1620 | E |
| 3 | 1400 | 200 mmf. | External Ant. Screw | 1400 | F |

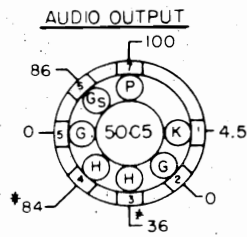
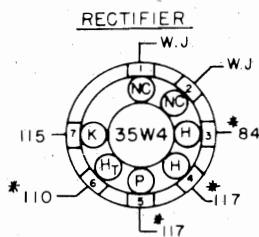
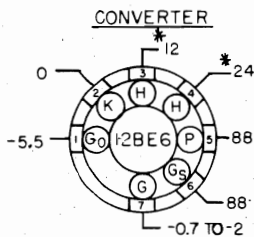
* Repeat adjustments until maximum output is obtained.

SCHEMATIC DIAGRAM



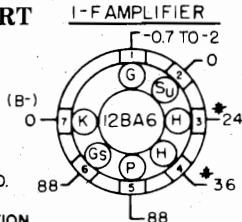
CHASSIS, TOP VIEW

MODELS 11-550MU,
11-560BU, Ch. 337

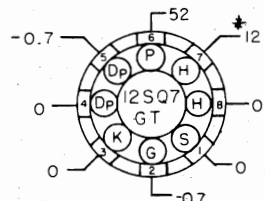


SOCKET VOLTAGE CHART

- NOTES:
1. BOTTOM VIEW OF TUBE SOCKETS.
2. VOLTAGES MEASURED WITH AN ELECTRONIC VOLTMETER FROM SOCKET LUG TO B- (PIN 7 OF 12BA6)
3. MEASURED WITH THE VOLUME CONTROL AT MINIMUM & NO SIGNAL INTO THE LOOR TUNING GANG CLOSED.
4. W.J. = WIRING JUNCTION.
* = AC VOLTAGES. NC = NO CONNECTION.
5. LINE VOLTAGE = 117 V., 60~AC.
6. SOCKET VOLTAGE TOLERANCE ± 10%

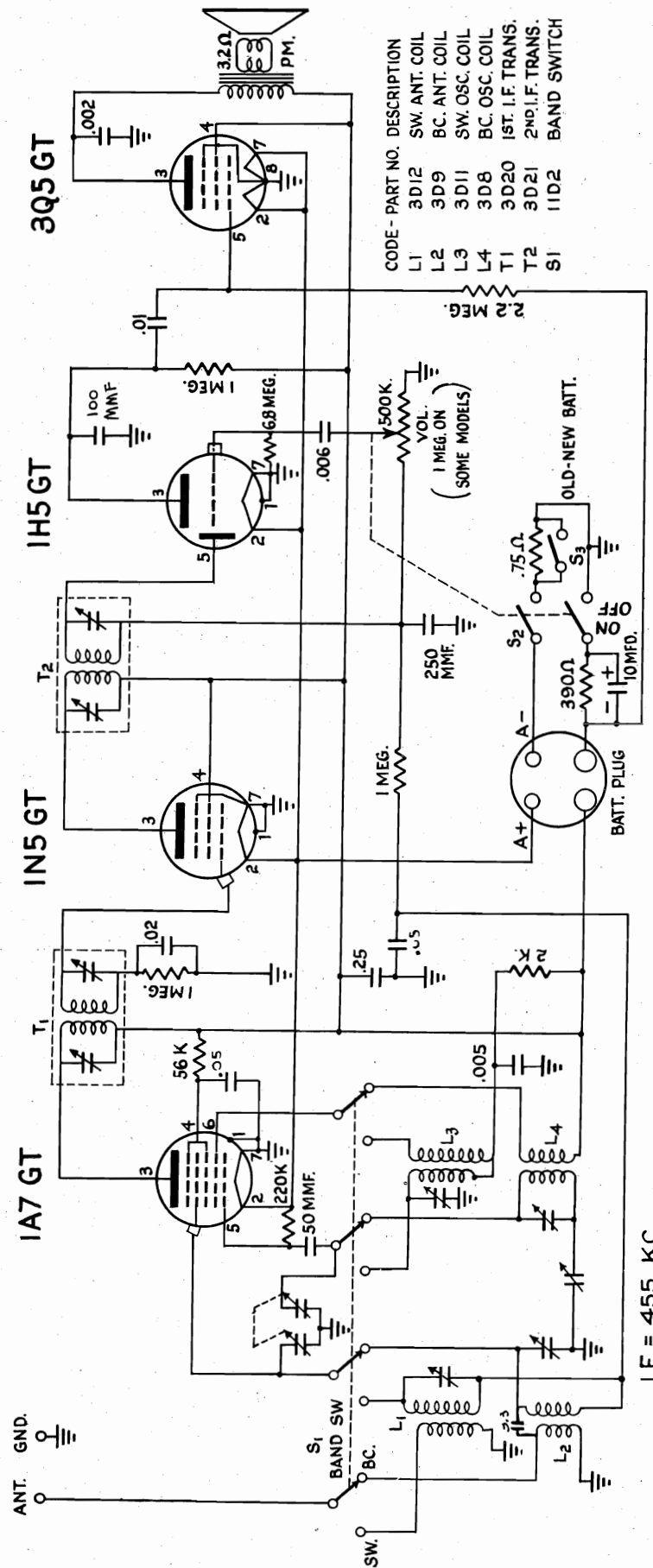


DET-AVC & 1ST AUDIO AMPL.



REPLACEMENT PARTS LIST

| Symbol No. | Part No. | Description | Symbol No. | Part No. | Description |
|------------|--------------|--------------------------------------------------|--------------|----------|-----------------------------------------------------------------------------|
| C1A | B-150043 | Capacitor, Variable } Two Section | R-150254 | | Base, 11-552M: with Doors (11-550MU) |
| C1B | | Capacitor, Variable } Two Section | R-150182 | | Base, 11-561B: Solid Front (11-560BU) |
| C2 | C-137727-109 | Capacitor, 39 mmf., 10%, 200 v. ceramic | R-150311 | | Base, 11-562B: with Doors (11-560BU) |
| C3 | Part of T1 | Capacitor, 106 mmf. | W-147967 | | Bracket, Back Mtg. |
| C4 | Part of T1 | Capacitor, 131 mmf. | B-147968 | | Bracket, Speaker Support |
| C5 | 39001-19 | Capacitor, .1 mfd., 600 v., paper | W-147184 | | Bracket, Volume Control |
| C6 | Part of T2 | Capacitor, 131 mmf. | AW-148203 | | Bushing & Support, Pointer Pulley |
| C7 | Part of T2 | Capacitor, 106 mmf. | R-150070 | | Cabinet (11-550MU) |
| C8A | C-144675-1 | Capacitor, .0002 mfd., 500 v. } | R-150268 | | Cabinet (11-560BU) |
| C8B | | Capacitor, .002 mfd., 500 v. } | AC-143896-12 | | Cable Assembly (53"-Shielded) |
| C8C | | Capacitor, .005 mfd., 500 v. } | W-131154-1 | | Cotter (External), Pointer Pulley |
| C8D | | Capacitor, .0002 mfd., 500 v. } | 150233 | | Doors, 1 pair (11-550MU) |
| C9 | B-143686-3 | Capacitor, 100 mmf., 500 v., molded disc ceramic | 150255 | | Doors, 1 pair (11-552M Base) |
| C10 | 39001-85 | Capacitor, .08 mfd., 600 v., paper | 150270 | | Doors, 1 pair (11-560BU) |
| C11 | 39001-74 | Capacitor, .002 mfd., 600 v., paper | 150312 | | Doors, 1 pair (11-562B Base) |
| C12 | 39001-5 | Capacitor, .0005 mfd., 600 v., paper | 150236 | | Drawer, Record Changer (11-550MU) |
| C13 | 39001-11 | Capacitor, .005 mfd., 600 v., paper | 150271 | | Drawer, Record Changer (11-560BU) |
| C14 | 39001-85 | Capacitor, .08 mfd., 600 v., paper | D-150195 | | Escutcheon |
| C15 | 39001-17 | Capacitor, .05 mfd., 600 v., paper | B-147160 | | Gasket, Speaker |
| C16A | B-147174 | Capacitor, 100 mfd., 150 v. } | AB-150062-1 | | Grille & Cloth Assy. (11-550MU) |
| C16B | | Capacitor, 30 mfd., 150 v. } | AB-150062-2 | | Grille & Cloth Assy. (11-560BU) |
| C16C | | Capacitor, 10 mfd., 150 v. } | 160273-1 | | Hinge, Upper L & Lower R (11-550MU, 11-552M Base) |
| C17 | 39001-13 | Capacitor, .01 mfd., 600 v., paper | 160273-2 | | Hinge, Upper R & Lower L (11-550MU, 11-552M Base) |
| R1 | 39373-60 | Resistor, 22,000 ohm, 1/2 w. | 150269 | | Hinge, Upper L & Lower R (11-560BU, 11-562B Base) |
| R2 | 39373-97 | Resistor, 2.2 megohm, 1/2 w. | 150273 | | Hinge, Upper R & Lower L (11-560BU, 11-562B Base) |
| R3 | 39373-74 | Resistor, 100,000 ohm, 1/2 w. | C-148708 | | Knob, Volume-Tuning |
| R4 | 39374-34 | Resistor, .5600 ohm, 10%, 1/2 w. | W-139925-4 | | Knob, Radio-Phono (11-550MU) |
| R5 | 39373-107 | Resistor, 10 megohm, 1/2 w. | W-139925-3 | | Knob, Radio-Phono (11-560BU) |
| R6 | B-150044 | Control, Volume (3 megohm) | W-147275 | | Mounting (Rubber), Speaker Support |
| R7 | 39373-67 | Resistor, 47,000 ohm, 1/2 w. | W-45580-2 | | Mounting (Rubber), Speaker |
| R8 | 39373-87 | Resistor, 470,000 ohm, 1/2 w. | W-147149-3 | | Pointer, Tuning |
| R9 | 39373-87 | Resistor, 470,000 ohm, 1/2 w. | W-147181 | | Pulley, Pointer |
| R10 | 39373-16 | Resistor, 150 ohm, 1/2 w. | 150232 | | Pull, Door (11-550MU Cabinet, 11-552M Base, 11-560BU Cabinet, 11-562B Base) |
| R11 | 39373-90 | Resistor, 680,000 ohm, 1/2 w. | 149977 | | Pull, Record Changer Drawer |
| R12 | 39374-189 | Resistor, 100 ohm, 10%, 2 w. | W-137170 | | Retainer, Record Changer |
| R13 | 39374-114 | Resistor, 1200 ohm, 10%, 1 w. | 143478 | | Slide, Record Changer Drawer |
| R14 | 39373-33 | Resistor, 1000 ohm, 1/2 w. | 39462-2 | | Socket, Tube (V1, V2, V4, V5) |
| CA1 | C-132300-10 | Cable & Plug Assy., Power | W-149987 | | Socket, Tube (V3) |
| CA2 | Part of PH1 | Cable & Connector (Male), Phono Motor | W-51752 | | Spring, Drive Cord |
| CA3 | B-139727-1 | Cable & Connector (Female), Phono Motor | 1393198B | | Strike & Catch, Door (11-550MU, 11-552M Base) |
| L1 | C-147961 | Loop Antenna & Back Assy. | 149951 | | Strike & Catch, Door (11-560BU, 11-562B Base) |
| L2 | AW-148259 | Coil, Oscillator | 150235 | | Top, Cabinet (11-550MU) |
| PH1 | D-148279-2 | Record Changer (V950) | 150272 | | Top, Cabinet (11-560BU) |
| SP1 | AD-145956-2 | Speaker | 150313 | | Top, Base (11-562B) |
| SW1 | Part of R6 | Switch, Power | | | |
| SW2 | B-150042 | Switch, Phono | | | |
| T1 | AC-139919-3 | Transformer, 1st I.F. | | | |
| T2 | AC-139919-3 | Transformer, 2nd I.F. | | | |
| T3 | B-147171 | Transformer, Output | | | |
| TS1 | W-147784 | Shield, Tube (V2) | | | |
| TS2 | W-46447-1 | Shield, Tube (V3) | | | |
| | R-150181 | Base, 11-551M: Solid Front (11-550MU) | | | |

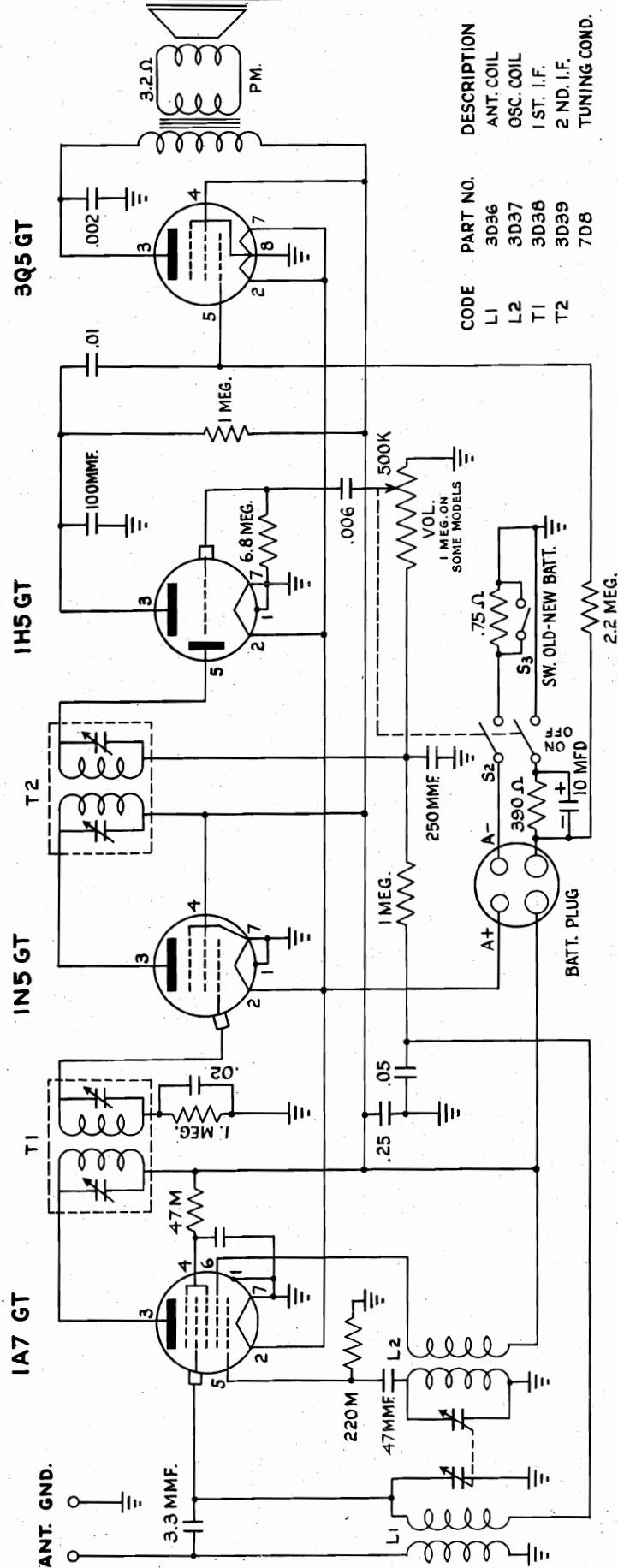


CODE - PART NO. DESCRIPTION

| | | |
|----|------|------------------|
| L1 | 3D12 | SW. ANT. COIL |
| L2 | 3D9 | BC. ANT. COIL |
| L3 | 3D11 | SW. OSC. COIL |
| L4 | 3D8 | BC. OSC. COIL |
| T1 | 3D20 | 1ST. I.F. TRANS. |
| T2 | 3D21 | 2ND. I.F. TRANS. |
| S1 | 11D2 | BAND SWITCH |

I.F. = 455 KC.

MODEL 505



| CODE | PART NO. | DESCRIPTION |
|------|----------|--------------|
| L1 | 3D36 | ANT. COIL |
| L2 | 3D37 | OSC. COIL |
| T1 | 3D38 | 1 ST. I.F. |
| T2 | 3D39 | 2 ND. I.F. |
| | 7D8 | TUNING COND. |

Model E-520 is a three band superheterodyne receiver, having one broadcast range and two short wave ranges. This receiver is designed to operate at 105-125 volts, 50-60 cycles AC or DC unless otherwise specified.

B.C. BAND.....1680-525 K.C.178-570 METERS
 S.W. 2 BAND.....8.0-2.5 M.C.37.5-120 "
 S.W. 1 BAND.....24.2-7.5 M.C.12.4-40 "

INSTALLATION: Make certain that all tubes are in place and pressed down in their sockets. A label showing the location of each tube will be found underneath the cabinet. A loop-tenna is incorporated which makes the use of an antenna unnecessary, in most localities, for broadcast reception. If it is found that additional pick-up is desired on the standard broadcast band, an antenna may be connected to the red lead extending from the rear of the chassis, and the black lead connected to an external ground. On short wave reception an external antenna and ground should be used.

VOLUME CONTROL AND POWER SWITCH: The second knob from the left is the power switch and volume control. When the control is in the extreme counterclockwise position, the power is "off". From this position, a slight clockwise rotation will turn the power "on", and by further rotation in this direction, volume may be increased to any degree until the full output of the receiver is obtained.

TUNING CONTROL: The knob on the right is the tuning control knob which operates the pointer and tuning condenser through a reduction drive to insure ease and accuracy in the selection of stations.

WAVE BAND SWITCH: The second knob from the right of the receiver is the wave band switch. This switch has three positions. When in the extreme counter-clockwise position, Standard Broadcast stations may be tuned in. When the switch is in the extreme clockwise position, Short Wave Band #1 may be tuned in. The intermediate position is for tuning in Short Wave Band #2.

TONE CONTROL SWITCH: The extreme left knob is the tone control which allows the selection of two degrees of tone response.

To calibrate receiver, connect the output of signal generator in series with a 200 MMFD fixed condenser to the flexible antenna lead attached to the loop. Connect the low side of generator through a 0.1 MFD condenser to receiver chassis. The wave band switch should be in broadcast position. Adjust the generator to 455 K.C. and adjust both I.F. transformers (both top and bottom) for maximum signal. Open the variable condenser for minimum capacity. Turn the wave band switch to short wave #1 position. Set generator at 24.2 M.C. Peak the short wave #1 oscillator trimmer screw (C5) for maximum signal. Next set generator at 23 M.C. Tune in this signal. Adjust short wave #1 R.F. trimmer screw (C2) for maximum turn band switch to short wave #2 position. Rotate drive shaft until variable condenser is all the way open. Adjust generator to 8 M.C. Adjust the short wave #2 oscillator trimmer screw (C4) until maximum signal is heard. Next set generator at 7 M.C. Tune in this signal and adjust short wave #2 R.F. trimmer screw (C1) for maximum signal strength. The low frequency end of the dial is automatically adjusted by a fixed padder condenser. Next turn band switch to broadcast position. Adjust generator to 1500 K. C. and tune in this signal. Adjust the broadcast oscillator trimmer position. Adjust generator to 600 K.C. and the low end of the dial, set the generator and receiver at 600 K.C.. Peak the broadcast padder (C7) for maximum output. The variable condenser should be rocked slightly during the operation. Keep the signal generator output as low as possible when making all these adjustments. It is extremely necessary in making the short wave adjustments, that the fundamental oscillator signal be tuned in and not the image frequency which will fall below the fundamental.

REPLACEMENT PARTS

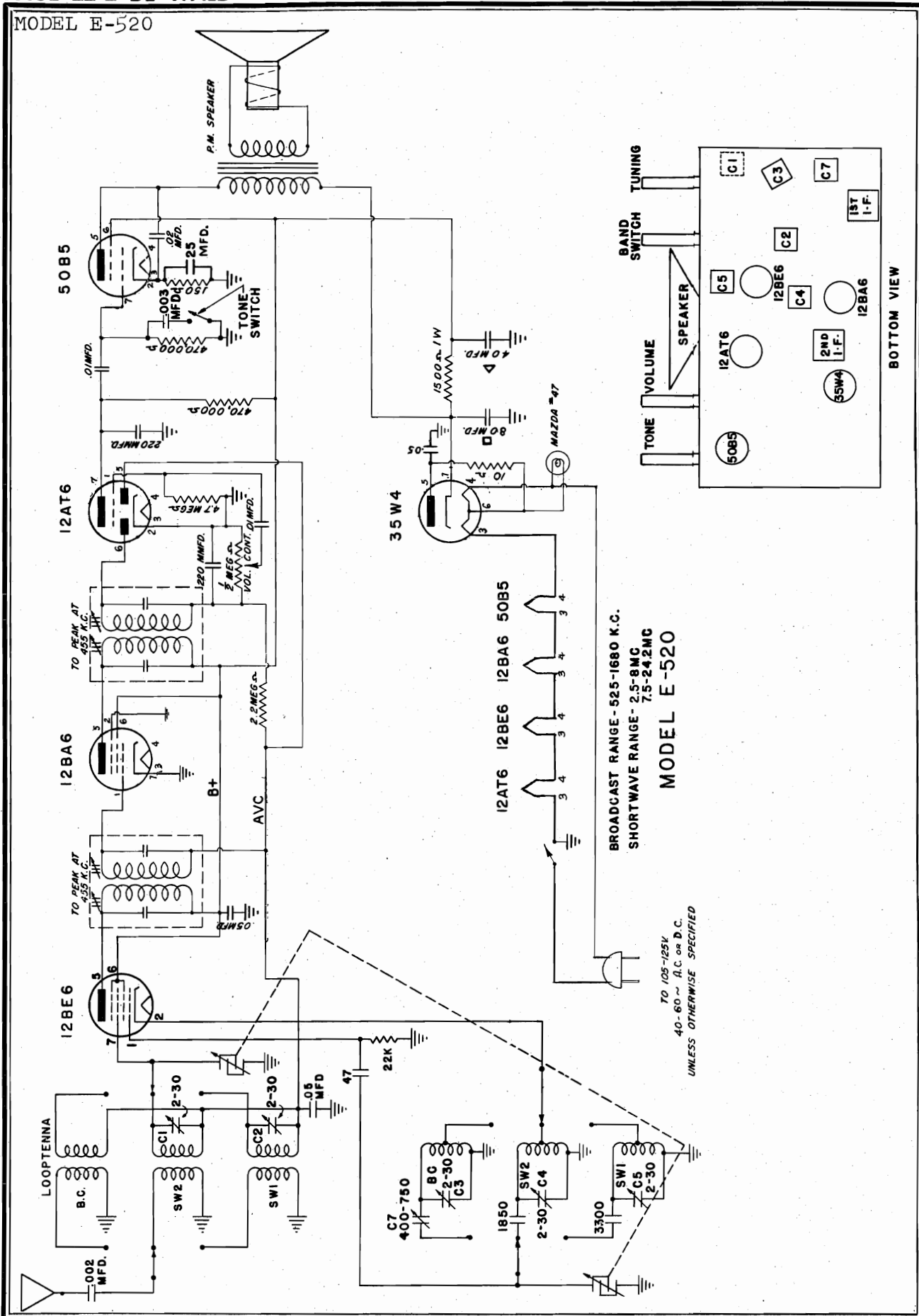
LOOP ANTENNA
 1093A B.C. OSC COIL
 1094-1 S.W.1 ANT COIL
 1095-1 S.W.1 OSC COIL
 1094-2 S.W.2 ANT COIL
 1095-2 S.W.2 OSC COIL
 1091A-1 2ND I.F. COIL

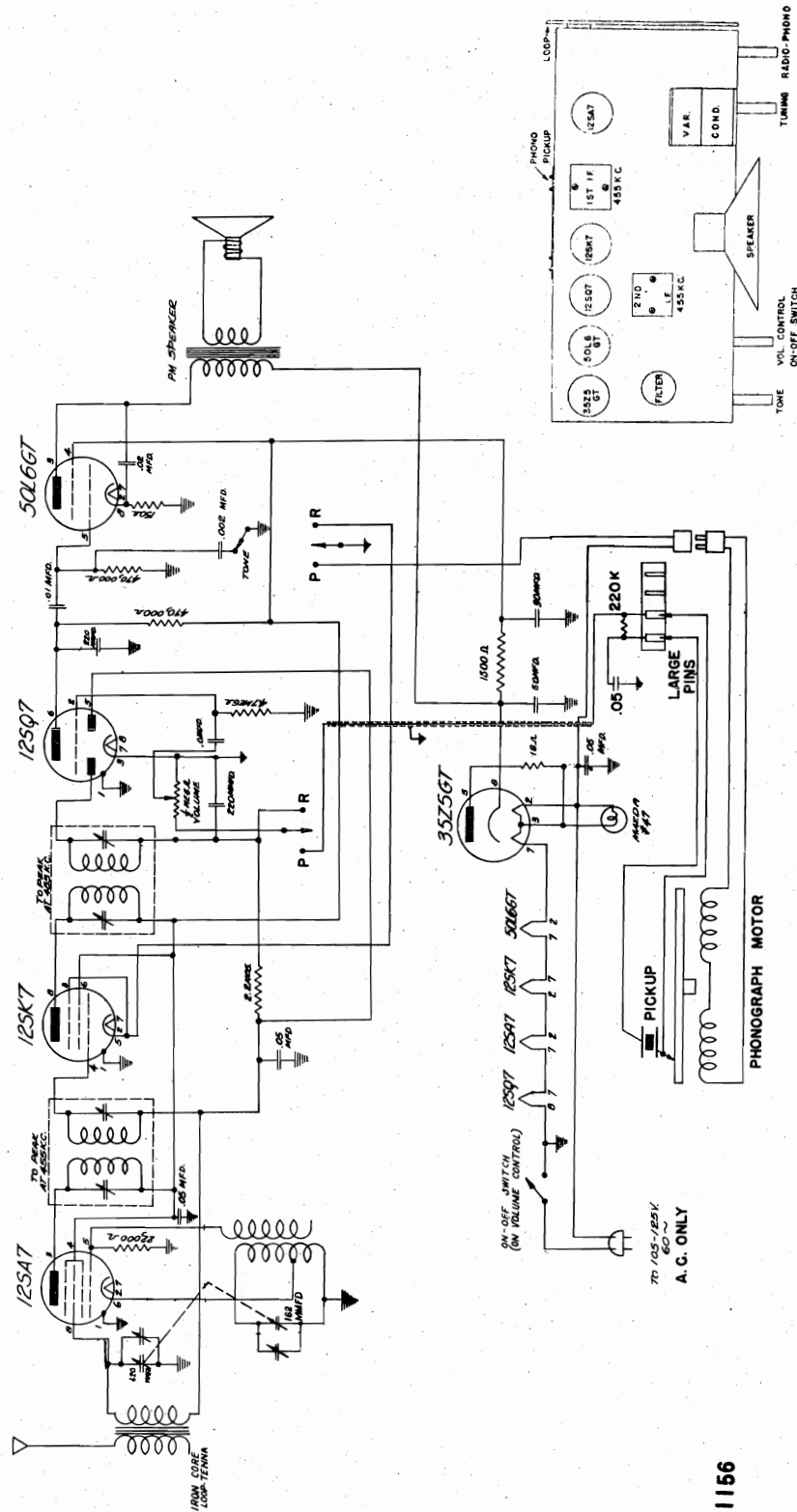
1091A-4 1ST I.F. COIL
 2014-4 VARIABLE CONDENSER
 2049-2 ELECTROLYTIC CONDENSER
 CAN
 6022A-2 DIAL SCALE
 8001-7 PILOT LAMP ASSEMBLY
 9123-3 DRIVE SHAFT

7017-2 P.M. SPEAKER WITH OUTPUT TRANS.
 8017-B-4 WAVE BAND SWITCH
 2050 PADDER CONDENSER (BROADCAST)
 8043-2 TONE CONTROL SWITCH
 3013-4 VOL CONTROL & "ON-OFF" SWITCH
 4093-C CABINET
 4132-1 KNOB

TUBES: 12BA6 - 12BE6 - 12AT6 - 35W4 - 50B5

MODEL E-520





F-1156

- REPLACEMENT PARTS**
- 1137 ANT. LOOP
 - 1028-2 OSCILLATOR COIL
 - 1136 1ST I.F. COIL
 - 1136 2ND DETECTOR COIL
 - 2000A PAPER CONDENSER
 - 2012B CERAMIC CONDENSER
 - 2005-8 COMB. ELECTROLYTIC
 - 2003C VAR. CONDENSER
 - 3029 1/2 W. RESISTOR
 - 3004 2 W. RESISTOR
 - 3002-2 VOL. CONTR. AND SWITCH
 - 8003-1 TONE CONTROL SWITCH
 - 8004-1 PHONO. SWITCH
 - 5000 LINE CORD
 - 6007 DIAL SCALE
 - 7001-1 SPEAKER
 - 8001-2 PILOT LAMP SOCKET
 - AUTOMATIC RECORD CHANGER
 - 9032-2 SHAFT
 - 9818C BUSHING
 - 9069-3 DRIVE SPRING
 - DIAL CORD
 - #47 PILOT LAMP
 - 4132-3 KNOB

- TUBES**
- 1 12SA7 - 1
 - 1 12SK7 - 1
 - 1 12SQ7 - 1
 - 1 50L6GT - 1
 - 1 3Z5GT

- PHONOGRAPH MOTOR**
- 1 12SA7 - 1
 - 1 12SK7 - 1
 - 1 12SQ7 - 1
 - 1 50L6GT - 1
 - 1 3Z5GT

- REPLACEMENT PARTS**
- 3029 1/2 W. RESISTOR
 - 3004 2 W. RESISTOR
 - 3002-2 VOL. CONTR. AND SWITCH
 - 8003-1 TONE CONTROL SWITCH
 - 8004-1 PHONO. SWITCH
 - 5000 LINE CORD
 - 6007 DIAL SCALE

- TUBES**
- 1 12SA7 - 1
 - 1 12SK7 - 1
 - 1 12SQ7 - 1
 - 1 50L6GT - 1
 - 1 3Z5GT

Range: 535-1720 Kilocycles
 A. C. Volts Cycles Watts
 105-125 60 45

MODEL 653B,
Ch. 120136-BMODEL 653B
Chassis 120136-B

DESCRIPTION

TYPE: Single-band superheterodyne.

FREQUENCY RANGE: 540-1620 kc.

TYPE OF TUBES:

V-1-12SA7—pentagrid oscillator-modulator

V-2-12SK7—first i-f amplifier

V-3-12SQ7—diode detector, a-f amplifier, a.v.c.

V-4-50L6GT—beam power output

V-5-35Z5GT—half-wave rectifier

POWER SUPPLY: A.C. or D.C.

VOLTAGE RATING: 105-125 volts.

POWER CONSUMPTION: 30 watts.

CURRENT DRAIN: 0.24 amp. at 117 volts a.c.

GENERAL NOTES

1. If replacements are made or the wiring disturbed in the r-f section of the circuit, the receiver should be carefully realigned.
2. In operating the receiver on d.c., it may be necessary to reverse the line plug for correct polarity.
3. Model 653B has a self-contained antenna and does not require additional antenna connections. For permanent home installations, however, if it is desired to improve reception of weak stations, an additional outdoor antenna may be used. For this purpose a lead has been brought out in the rear near the line cord. Use no ground connection.
4. The self-contained loop antenna operates at maximum efficiency when its position is at right angles to the broadcasting source. It is important, therefore, once the station is tuned in, to rotate the cabinet back and forth through a quarter of a circle (90 degrees), leaving it at the position where the station is received with maximum volume.

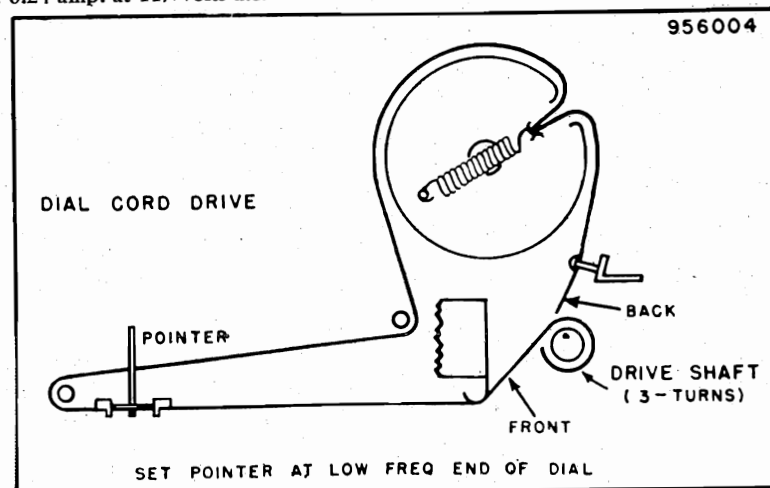


Fig. 2—Dial Cord Stringing, Model 653B

MODEL 653B,
Ch. 120136-B

ALIGNMENT

To set pointer, turn variable condenser fully closed and set pointer at mark near left end of dial backplate. Use isolation transformer if available. If not, connect a 0.1 mfd. condenser in series with low side of signal generator and chassis. Volume control should be at maximum position; output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

| | DUMMY ANTENNA | SIGNAL GENERATOR COUPLING | SIGNAL GENERATOR FREQUENCY | RADIO DIAL SETTING | METER OUTPUT | ADJUST | REMARKS |
|---|---------------|-------------------------------------------------------------------------------|----------------------------|--------------------------------|--------------------|----------------|-------------------------------------------------------------------------------------------------------------------------------|
| 1 | 0.1 mfd. | High side to stator of rear section of tuning condenser. Low side to chassis. | 455 kc | Variable condenser fully open. | Across voice coil. | A1, A2, A3, A4 | Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to 0.001 mfd. to reduce hum modulation. |
| 2 | 200 mmfd. | High side to external antenna lead. Low side to external ground lead. | 1620 kc | Variable condenser fully open. | Across voice coil. | A5 | Adjust for maximum output. |
| 3 | 200 mmfd. | High side to external antenna lead. Low side to external ground lead. | 1400 kc | Tune for maximum output. | Across voice coil. | A6 | Adjust for maximum output. |

VOLTAGE READINGS FOR CHASSIS 120136-B

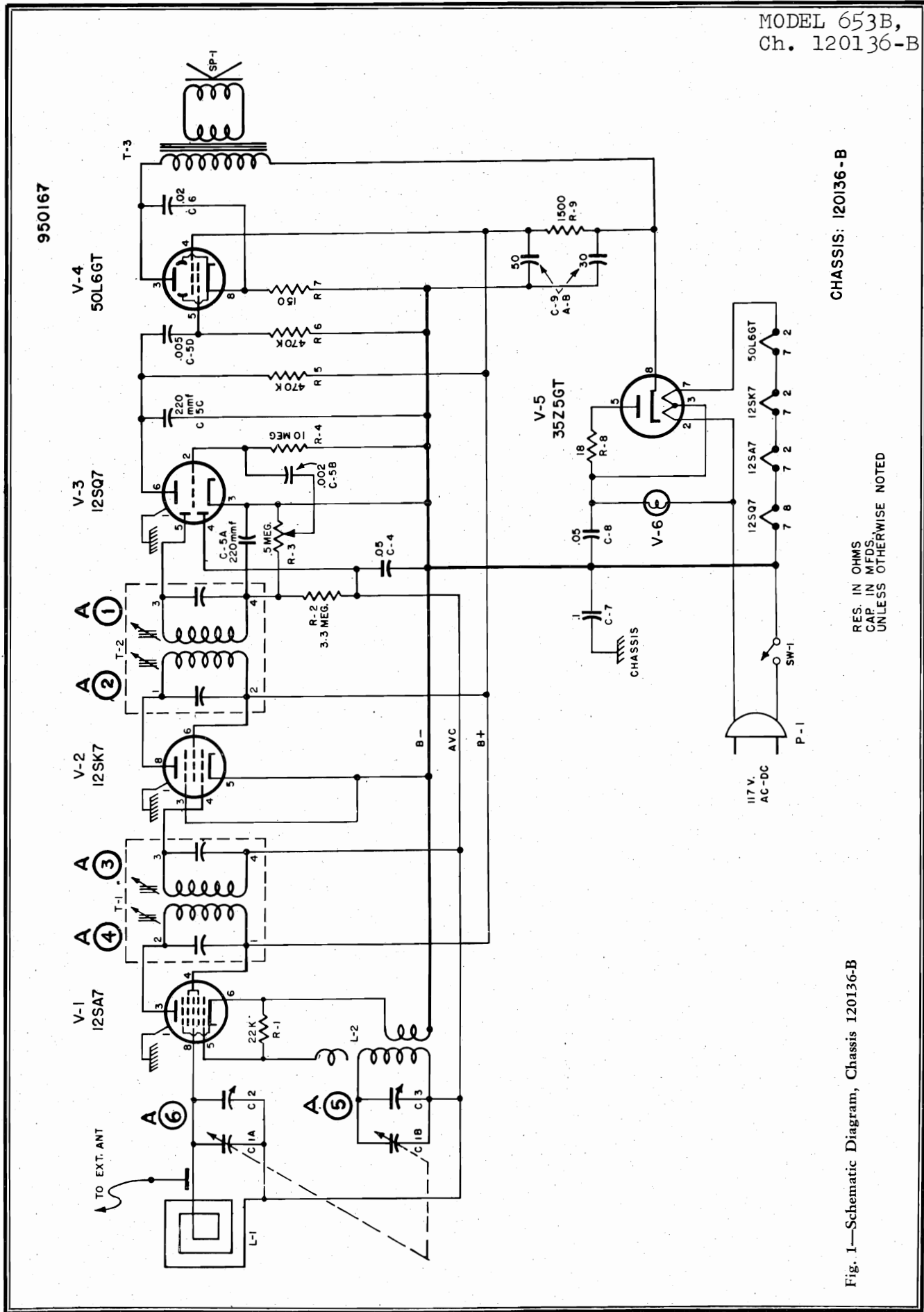
| SYMBOL | TUBE | PIN 1 | PIN 2 | PIN 3 | PIN 4 | PIN 5 | PIN 6 | PIN 7 | PIN 8 |
|--------|--------|-------|--------|--------|-------|--------|-------|-------|--------|
| V-1 | 12SA7 | —3 DC | 24 AC | 80 DC | 80 DC | —6 DC | 0 | 12 AC | —7 DC |
| V-2 | 12SK7 | —3 DC | 36 AC | 0 | —1 DC | 0 | 80 DC | 24 AC | 80 DC |
| V-3 | 12SQ7 | —3 DC | —7 DC | 0 | —7 DC | —5 DC | 50 DC | 0 | 12 AC |
| V-4 | 50L6GT | 0 | 80 AC | 110 DC | 80 DC | 0 | 0 | 36 AC | 5 DC |
| V-5 | 35Z5GT | 0 | 117 AC | 110 AC | 0 | 110 AC | 0 | 80 AC | 110 DC |

RESISTANCE READINGS FOR CHASSIS 120136-B

| SYMBOL | TUBE | PIN 1 | PIN 2 | PIN 3 | PIN 4 | PIN 5 | PIN 6 | PIN 7 | PIN 8 |
|--------|--------|-------|---------|---------|---------|---------|---------|-------|---------|
| V-1 | 12SA7 | Inf. | 28 | 500,000 | 500,000 | 24,000 | .5 | 14 | 4 meg. |
| V-2 | 12SK7 | Inf. | 45 | 0 | 4 meg. | 0 | 500,000 | 28 | 500,000 |
| V-3 | 12SQ7 | Inf. | 10 meg. | 0 | 4 meg. | 500,000 | 1 meg. | 0 | 14 |
| V-4 | 50L6GT | N.C. | 95 | 500,000 | 500,000 | 500,000 | 0 | 44 | 150 |
| V-5 | 35Z5GT | N.C. | 130 | 120 | N.C. | 140 | N.C. | 95 | 500,000 |

VOLTAGE AND RESISTANCE READING INSTRUCTIONS

1. Voltage readings are in volts and resistance readings in ohms unless otherwise specified.
2. D-C voltage measurements are at 20,000 ohms per volt; a-c voltage measured at 1,000 ohms per volt.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of $\pm 15\%$ in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.



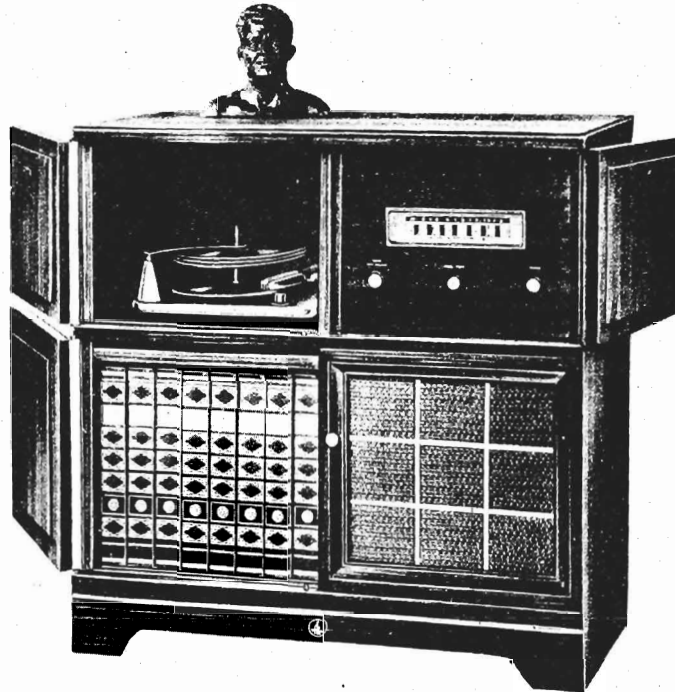
MODEL 653B,
Ch. 120136-B

CHASSIS PARTS LIST (Chassis 120136-B)

| ITEM | PART NO. | DESCRIPTION | ITEM | PART NO. | DESCRIPTION | |
|--------------------------------------|-------------|------------------------------------------------|----------|----------|----------------------------------------|-------------------|
| C-1A } C-1B } | 900071 | Variable Capacitor—R.F. Section | R-4 | 351450 | 10 megohm $\frac{1}{2}$ W $\pm 20\%$ | |
| | | Variable Capacitor—Osc. Section | R-5 | 351130 | 470,000 ohm $\frac{1}{2}$ W $\pm 20\%$ | |
| C-2 | Pt. of C-1A | Trimmer—R.F. Section | R-6 | 351130 | 470,000 ohm $\frac{1}{2}$ W $\pm 20\%$ | |
| C-3 | Pt. of C-1B | Trimmer—Osc. Section | R-7 | 340292 | 150 ohm $\frac{1}{2}$ W $\pm 10\%$ | |
| C-4 | 920539 | .05 mf. 400V | R-8 | 340072 | 18 ohm $\frac{1}{2}$ W $\pm 10\%$ | |
| C-5A } C-5B } C-5C } C-5D } | 923023 | } Multiple Condenser | R-9 | 380532 | 1,500 ohm 1W $\pm 20\%$ | |
| | | | 220 mmf. | SP-1 | 180045 | Speaker—PM—5" |
| | | | .002 mf. | | | |
| | | | 220 mmf. | SW-1 | Pt. of R-3 | On-Off Switch |
| C-6 | 920540 | .02 mf. 400V | T-1 | 720525 | 1st I.F. Transformer | |
| C-7 | 920040 | .1 mf. 200V | T-2 | 720021 | 2nd I.F. Transformer | |
| C-8 | 920539 | .05 mf. 400V | T-3 | 734057 | Output Transformer | |
| C-9A } C-9B } | 925000 | 50 mf. Electrolytic } 30 mf. Electrolytic } | V-1 | 800000 | Vacuum Tube—12SA7 | |
| | | | | V-2 | 800020 | Vacuum Tube—12SK7 |
| L-1 | 700051 | Loop Antenna & Back | V-2 | 800030 | Vacuum Tube—12SK7GT | |
| L-2 | 716026-2 | Oscillator Coil | V-3 | 800040 | Vacuum Tube—12SQ7 | |
| P-1 | 583032 | Line Cord & Plug | V-3 | 800050 | Vacuum Tube—12SQ7GT | |
| R-1 | Pt. of L-2 | 22,000 ohm $\frac{1}{2}$ W $\pm 10\%$ | V-4 | 800070 | Vacuum Tube—50L6GT | |
| R-2 | 351330 | 3.3 megohm $\frac{1}{2}$ W $\pm 20\%$ | V-5 | 800090 | Vacuum Tube—35Z5GT | |
| R-3 | 390145 | 500,000 ohm Volume Control | V-6 | 807000 | Pilot Light—.15 amp. | |

CABINET PARTS LIST (Model 653B)

| PART NO. | DESCRIPTION |
|----------|--------------------------|
| 140345 | Cabinet—Bakelite—Walnut |
| 140377 | Cabinet—Urea—Ivory |
| 460162S | Knob |
| 470608 | Baffle & Grille Cloth |
| 583032 | Line Cord |
| 531323 | Drive Pulley |
| 180045 | Speaker |
| 530002 | Drive Cord (30" approx.) |
| 410904 | Dial Back Plate |
| 525022-2 | Pointer |
| 700051 | Loop Antenna & Back |

MODEL 670B,
Ch. 120139-B

Model—670B
Chassis—120139-B

DESCRIPTION

TYPE: Single band (AM) superhétérodyne
FREQUENCY RANGE: 540-1620 KC.

TYPES OF TUBES:

V-1-6BJ6 converter
V-2-6BJ6 oscillator
V-3-6BJ6 1st i.f. amplifier
V-4-6BJ6 2nd i.f. amplifier
V-5-12AT6 Detector, a.v.c., a-f amplifier
V-6-50C5 Power output
V-7-35W4 Rectifier

POWER SUPPLY: A.c. or d.c.

VOLTAGE RATING: 115 volts

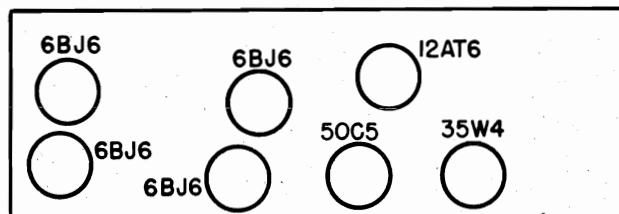
POWER CONSUMPTION: 30 watts

CURRENT DRAIN: 0.26 amp. at 117 volts a.c.

GENERAL NOTES

1. If replacements are made or the wiring disturbed in the r-f section of the circuit, the receiver should be carefully realigned.
2. In operating the receiver on d.c., it may be necessary to reverse the line plug for correct polarity.
3. The receiver has a self-contained antenna, and does not require additional antenna connections. For permanent home installations, however, if it is desired to improve reception of weak stations, an additional outdoor antenna may be used. For this purpose a lead has been brought out in the rear. Use no ground connection.
4. The self-contained loop antenna operates at maximum efficiency when its position is at right angles to the broadcasting source. It is important, therefore, once the station is tuned in, to rotate the cabinet back and forth through a quarter of a circle (90 degrees), leaving it at the position where the station is received with maximum volume.

FRONT



TUBE LOCATIONS

955323

MODEL 670B,
Ch. 120139-B

INSTRUCTIONS FOR VOLTAGE AND RESISTANCE READINGS

1. Voltage readings are in d.c. volts and resistance readings in ohms unless otherwise specified.
2. A.C. and D.C. measurements are taken with a V.T.V.M.
3. Measured values are from socket pin to common negative (B—).
4. Line voltage maintained at 115V A.C. for voltage readings.
5. Nominal tolerance on component values makes possible a variation of $\pm 15\%$ in voltage and resistance readings.
6. Volume control at maximum with no signal applied, for voltage measurements.
7. Measurements taken with radio-phono switch in radio position.

VOLTAGE READINGS FOR CHASSIS 120139-B

| SYMBOL | TUBE | PIN 1 | PIN 2 | PIN 3 | PIN 4 | PIN 5 | PIN 6 | PIN 7 |
|--------|-------|-----------|----------|---------|----------|----------|----------|----------|
| V-1 | 6BJ6 | —1 D.C. | 1 D.C. | 18 A.C. | 12 A.C. | 90 D.C. | 35 D.C. | 0 |
| V-2 | 6BJ6 | —7.2 D.C. | 0 | 24 A.C. | 18 A.C. | 90 D.C. | 90 D.C. | 0 |
| V-3 | 6BJ6 | 0 | 1.4 D.C. | 30 A.C. | 36 A.C. | 70 D.C. | 90 D.C. | 0 |
| V-4 | 6BJ6 | —1 D.C. | .75 D.C. | 30 A.C. | 24 A.C. | 90 D.C. | 90 D.C. | 0 |
| V-5 | 12AT6 | —8 D.C. | 0 | 0 | 12 A.C. | 0 | —3 D.C. | 45 D.C. |
| V-6 | 50C5 | 5.8 D.C. | 0 | 36 A.C. | 80 A.C. | 0 | 90 D.C. | 105 D.C. |
| V-7 | 35W4 | 115 A.C. | 110 D.C. | 80 A.C. | 115 A.C. | 112 A.C. | 110 A.C. | 120 D.C. |

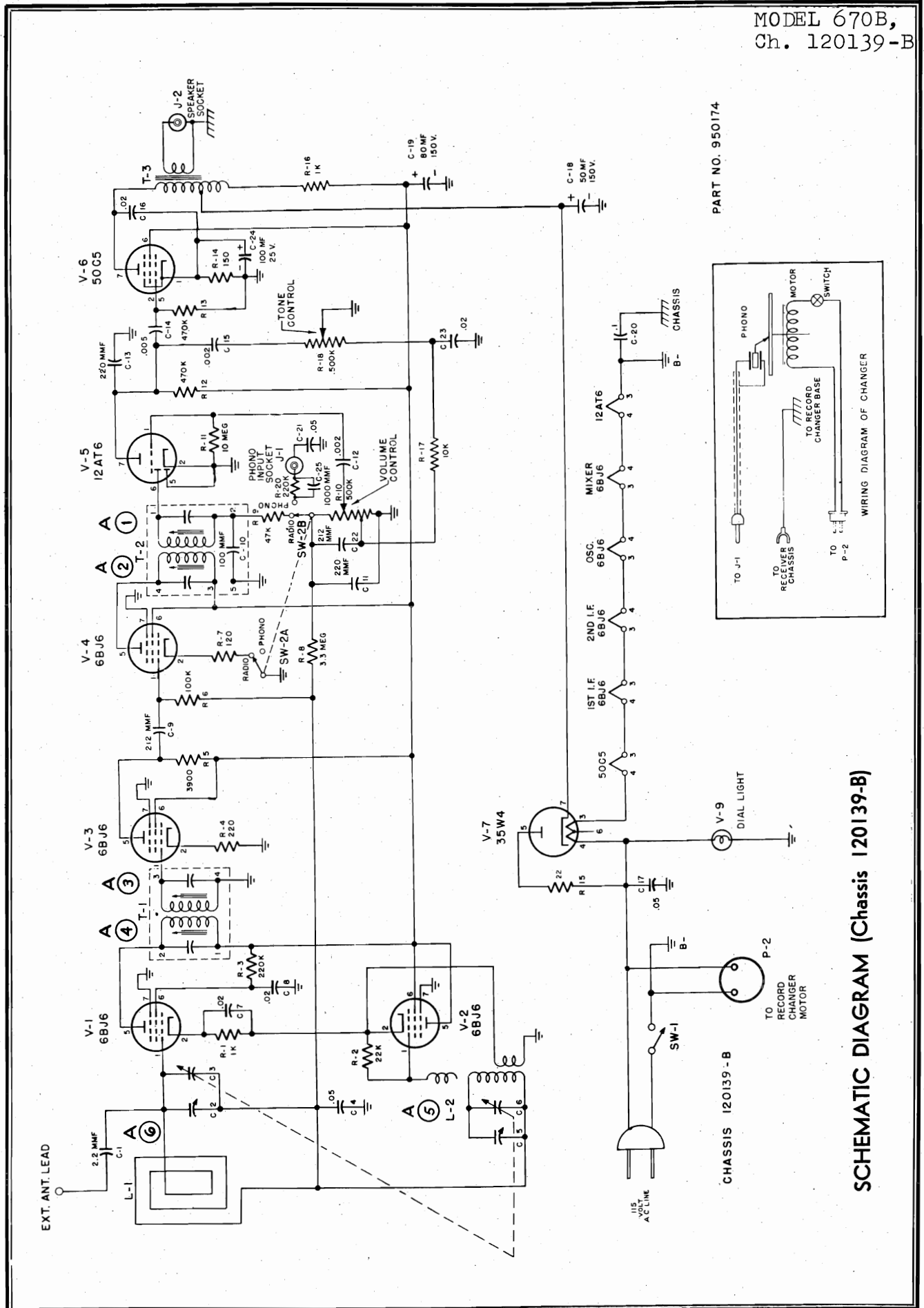
RESISTANCE READINGS FOR CHASSIS 120139-B

| SYMBOL | TUBE | PIN 1 | PIN 2 | PIN 3 | PIN 4 | PIN 5 | PIN 6 | PIN 7 |
|--------|-------|----------|---------|-------|-------|---------|---------|---------|
| V-1 | 6BJ6 | 4.2 meg. | 1000 | 22 | 16 | 500,000 | 1 meg. | 0 |
| V-2 | 6BJ6 | 22,000 | 1 | 30 | 22 | 500,000 | 500,000 | 0 |
| V-3 | 6BJ6 | 20 | 220 | 38 | 46 | 500,000 | 500,000 | 0 |
| V-4 | 6BJ6 | 4.3 meg. | 120 | 38 | 30 | 500,000 | 500,000 | 0 |
| V-5 | 12AT6 | 10 meg. | 0 | 0 | 16 | 0 | 550,000 | 1 meg. |
| V-6 | 50C5 | 150 | 500,000 | 46 | 100 | 500,000 | 500,000 | 500,000 |
| V-7 | 35W4 | 135 | 500,000 | 100 | 135 | 155 | 130 | 500,000 |

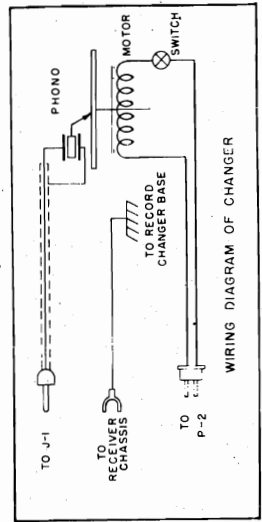
ALIGNMENT PROCEDURE

1. To set pointer, turn variable condenser fully closed and set pointer at mark near left end of dial backplate.
2. Use isolation transformer if available. If not, connect a 0.1 mfd. condenser in series with low side of signal generator and B minus bus.
3. Volume control should be at maximum position; output of signal generator should be not higher than necessary to obtain an output reading.
4. Use an insulated alignment screwdriver for adjusting.

| STEPS | DUMMY ANTENNA | SIGNAL GENERATOR COUPLING | SIGNAL GENERATOR FREQUENCY | RADIO DIAL SETTING | METER OUTPUT | ADJUST | REMARKS |
|-------|---------------|---------------------------------------------------------------------|----------------------------|--------------------------------|--------------------|----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| 1 | 0.1 mfd. | High side to pin 1 (grid) of 6BJ6 (V1). Low side to B minus Bus. | 455 kc | Variable condenser fully open. | Across voice coil. | A1, A2 (2nd i-f trans. T2) A3, A4 (1st i-f trans. T1) | Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to 0.001 mfd. to reduce hum modulation. |
| 2 | 200 mmfd. | High side to external antenna lead. Low side to B minus Bus. | 1620 kc | Variable condenser fully open. | Across voice coil. | A5 (Trimmer cond. C5). | Adjust for maximum output. |
| 3 | 200 mmfd. | High side to external antenna lead. Low side to B minus Bus. | 1400 kc | Tune for maximum output. | Across voice coil. | A6 (Trimmer cond. C2). | Adjust for maximum output. |



PART NO. 950174



SCHEMATIC DIAGRAM (Chassis 120139-B)

MODEL 670B,
Ch. 120139-B

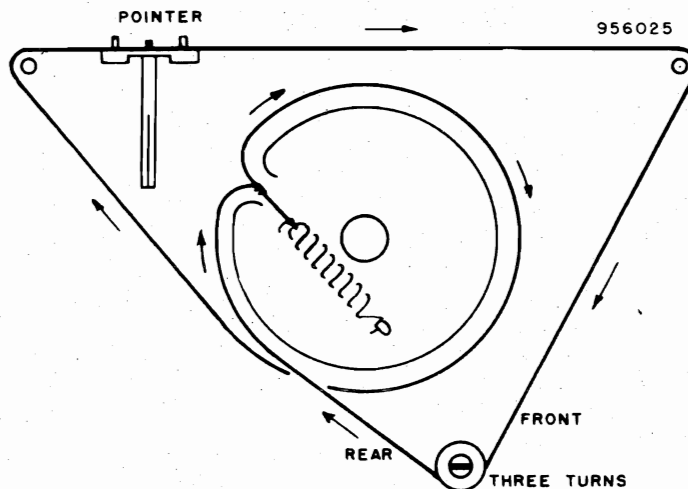
CHASSIS PARTS LIST (Chassis 120139-B)

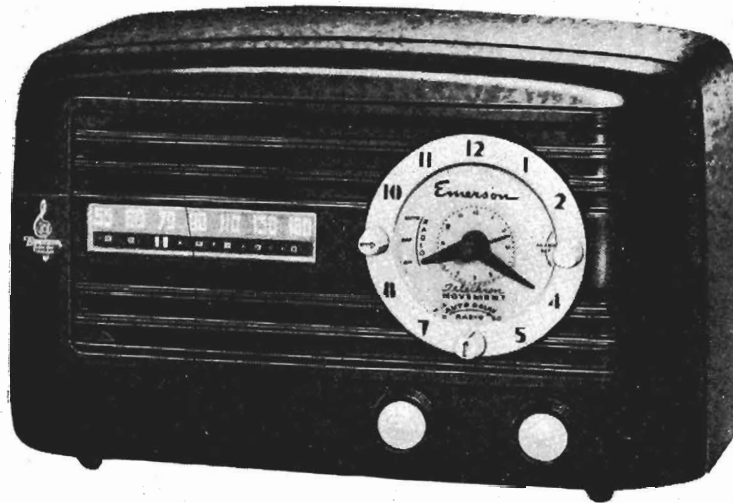
| Symbol | Part No. | Description | Symbol | Part No. | Description |
|--------|---------------|-----------------------------------|----------|---------------|----------------------------------|
| C-1 | Pt. of L-1 | 2.2 mmf. | R-5 | 340632 | 3,900 ohm carbon 1/2W ±10% |
| C-2 | Pt. of 900079 | Trimmer — r.f. | R-6 | 350970 | 100,000 ohm carbon 1/2W ±20% |
| C-3 | Pt. of 900079 | Variable capacitor — r.f. section | R-7 | 340272 | 120 ohm carbon 1/2W ±10% |
| C-4 | 920030 | .05 mf paper 400v | R-8 | 351330 | 3.3 megohm carbon 1/2W ±20% |
| C-5 | Pt. of 900079 | Trimmer — osc. | R-9 | 340890 | 47,000 ohm carbon 1/2W ±10% |
| C-6 | Pt. of 900079 | Variable capacitor — osc. section | R-10 | 390178 | 500,000 ohm volume control |
| C-7 | 920020 | .02 mf paper 400v | R-11 | 351450 | 10 megohm carbon 1/2W ±20% |
| C-8 | 920020 | .02 mf paper 400v | R-12 | 351130 | 470,000 ohm carbon 1/2W ±20% |
| C-9 | 928104 | 212 mmf ceramic | R-13 | 351130 | 470,000 ohm carbon 1/2W ±20% |
| C-10 | Pt. of T-2 | 100 mmf | R-14 | 340292 | 150 ohm carbon 1/2W ±10% |
| C-11 | Pt. of 470310 | 220 mmf | R-15 | 370092 | 22 ohm carbon 1W ±10% |
| C-12 | Pt. of 470310 | .002 mf | R-16 | 370490 | 1,000 ohm carbon 1W ±10% |
| C-13 | Pt. of 470310 | 220 mmf | R-17 | 340732 | 10,000 ohm carbon 1/2W ±10% |
| C-14 | Pt. of 470310 | .005 mf | R-18 | Pt. of 390178 | 500,000 ohm tone control |
| C-15 | 920545 | .002 mf paper 400v | R-20 | 341050 | 220,000 ohm carbon 1/2W ± |
| C-16 | 920020 | .02 mf paper 400v | J-1 | Pt. of 508002 | Phono input socket |
| C-17 | 922101 | .05 mf molded 400v | J-2 | Pt. of 508002 | Speaker socket |
| C-18 | Pt. of 925195 | 50 mf electrolytic 150v | SW-1 | Pt. of 390178 | On-off switch |
| C-19 | Pt. of 925195 | 80 mf electrolytic 150v | SW-2A, B | 510077 | Phono-radio switch |
| C-20 | 920040 | .1 mf paper 200v | T-1 | 720033 | 1st i.f. transformer |
| C-21 | 920030 | .05 mf paper 400v | T-2 | 720125 | 2nd i.f. transformer |
| C-22 | 928104 | 212 mmf ceramic | T-3 | 734063 | Output transformer |
| C-23 | 920020 | .02 mf paper 400v | P-2 | 585067 | Phono motor plug and cable assy. |
| C-24 | Pt. of 925195 | 100 mf electrolytic 25v | V-1 | 800023 | Vacuum tube - 6BJ6 |
| C-25 | 928003 | 1000 mmf ceramic | V-2 | 800023 | Vacuum tube - 6BJ6 |
| L-1 | 700054 | Loop antenna | V-3 | 800023 | Vacuum tube - 6BJ6 |
| L-2 | 716063 | Oscillator — coil | V-4 | 800023 | Vacuum tube - 6BJ6 |
| R-1 | 340492 | 1,000 ohm carbon 1/2W ±10% | V-5 | 800523 | Vacuum tube - 12AT6 |
| R-2 | Pt. of L-2 | 22,000 ohm | V-6 | 800032 | Vacuum tube - 50C5 |
| R-3 | 341050 | 220,000 ohm carbon 1/2W ±10% | V-7 | 800526 | Vacuum tube - 35W4 |
| R-4 | 340332 | 220 ohm carbon 1/2W ±10% | V-9 | 807003 | Pilot light dial |

Prices subject to change without notice.

CABINET PARTS LIST (Model 670B)

| Part No. | Description | Part No. | Description |
|----------|-------------------------|----------|-------------------------------|
| 140397 | Cabinet | 587011 | Spring Insert (Knobs) |
| 411115 | Metal Grille | 585067 | Motor Plug and Cable Assembly |
| 520064 | Escutcheon | 508002 | Phono and Speaker Socket |
| 520142 | Glass Dial | 510077 | Phono-Radio Switch |
| 180077 | Speaker (12") | 280162 | Drive Shaft |
| 505040 | Speaker Plug | 411022 | Dial Support Bracket |
| 819060 | G.I. 3-Speed Changer | 411064 | Dial Back Plate |
| 560151 | 45 R.P.M. Adaptor | 530002 | Drive Cord (50") |
| 450068S | Knob — Tuning and Phono | 700054 | Loop Antenna |
| 450089 | Knob — Tone | 411024 | Loop Bracket |
| 450099S | Knob — Volume | 525056 | Dial Pointer |



MODEL 671D,
Ch. 120137-DMODEL: 671D
CHASSIS: 120137-D

DESCRIPTION

TYPE: Single-band superheterodyne, with clock-timer and appliance outlet.

FREQUENCY RANGE: 540-1620 kc.

TYPE OF TUBES:

- V-1—12BE6, oscillator mixer
- V-2—12BA6, first i-f amplifier
- V-3—12AT6, detector, a-f amplifier
- V-4—50C5, A. F. output
- V-5—35W4, rectifier

POWER SUPPLY: A.C. 60 cycles only

VOLTAGE RATING: 115 volts.

POWER CONSUMPTION: 32 watts.

GENERAL NOTES

1. If replacements are made or the wiring disturbed in the r-f section of the circuit, the receiver should be carefully realigned.
2. This model has a self-contained antenna and does not require additional antenna connections. For permanent home installations, however, if it is desired to improve reception of weak stations, an additional outdoor antenna may be used. For this purpose a lead has been brought out in the rear. Use no ground connection.
3. The self-contained loop antenna operates at maximum efficiency when its position is at right angles to the broadcasting source. It is important, therefore, once the station is tuned in, to rotate the cabinet back and forth through a quarter of a circle (90 degrees), leaving it at the position where the station is received with maximum volume.
4. Appliance outlet and radio on-off switch located in back of chassis. For information on clock applications see instructions supplied with set.

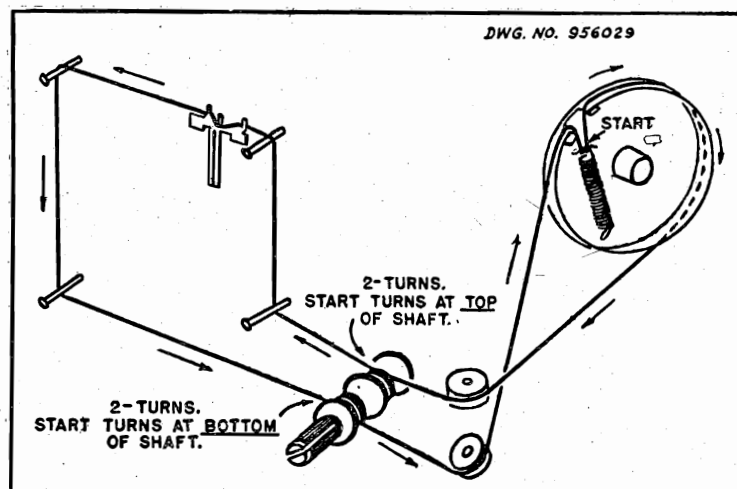


Fig. 2—Dial Cord Stringing, Model 671D

MODEL 671D,
Ch. 120137-D

ALIGNMENT

To set pointer, turn variable condenser fully closed and set pointer at mark near left end of dial backplate. Use isolation transformer if available. If not, connect a 0.1 mfd. condenser in series with low side of signal generator and chassis. Volume control should be at maximum position; output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

| | DUMMY ANTENNA | SIGNAL GENERATOR COUPLING | SIGNAL GENERATOR FREQUENCY | RADIO DIAL SETTING | METER OUTPUT | ADJUST | REMARKS |
|---|---------------|-------------------------------------------------------------------------------|----------------------------|--------------------------------|--------------------|----------------|----------------------------|
| 1 | 0.001 mfd. | High side to stator of rear section of tuning condenser. Low side to chassis. | 455 kc | Variable condenser fully open. | Across voice coil. | A1, A2, A3, A4 | Adjust for maximum output. |
| 2 | 200 mmfd. | High side to external antenna lead. Low side to external ground lead. | 1620 kc | Variable condenser fully open. | Across voice coil. | A5 | Adjust for maximum output. |
| 3 | 200 mmfd. | High side to external antenna lead. Low side to external ground lead. | 1400 kc | Tune for maximum output. | Across voice coil. | A6 | Adjust for maximum output. |

VOLTAGE READING FOR CHASSIS 120137-D

| SYMBOL | TUBE | PIN 1 | PIN 2 | PIN 3 | PIN 4 | PIN 5 | PIN 6 | PIN 7 |
|--------|-------|---------|-------|-------|--------|--------|--------|--------|
| V-1 | 12BE6 | -6.3 DC | 0 | 24 AC | 12 AC | 90 DC | 90 DC | -8 DC |
| V-2 | 12BA6 | -8 DC | 0 | 24 AC | 36 AC | 90 DC | 90 DC | 1 DC |
| V-3 | 12AT6 | -9 DC | 0 | 0 | 12 AC | -7 DC | -8 DC | 38 DC |
| V-4 | 50C5 | 5.5 DC | 0 | 80 AC | 36 AC | 0 | 90 DC | 110 DC |
| V-5 | 35W4 | 0 | 0 | 80 AC | 117 AC | 115 AC | 110 AC | 120 DC |

RESISTANCE READING FOR CHASSIS 120137-D

| SYMBOL | TUBE | PIN 1 | PIN 2 | PIN 3 | PIN 4 | PIN 5 | PIN 6 | PIN 7 |
|--------|-------|---------|---------|-------|-------|---------|---------|---------|
| V-1 | 12BE6 | 2,400 | 0.4 | 26 | 14 | 300,000 | 300,000 | 4 meg. |
| V-2 | 12BA6 | 4 meg. | 0 | 26 | 38 | 300,000 | 300,000 | 120 |
| V-3 | 12AT6 | 10 meg. | 0 | 0 | 14 | 500,000 | 4 meg. | 800,000 |
| V-4 | 50C5 | 150 | 470,000 | 90 | 38 | 470,000 | 300,000 | 350,000 |
| V-5 | 35W4 | N.C. | N.C. | 90 | 125 | 150 | 120 | 350,000 |

VOLTAGE AND RESISTANCE READING INSTRUCTIONS

1. Voltage readings are in volts and resistance readings in ohms unless otherwise specified.
2. D-C voltage measurements are at 20,000 ohms per volt; a-c voltage measured at 1,000 ohms per volt.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts, 60 cycles for voltage readings.
5. Normal tolerance on component values makes possible a variation of $\pm 15\%$ in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

NOTE: The radio and clock mechanism of MODEL 671D are covered by the Emerson warranty. If it should be necessary to have the clock mechanism repaired after the warranty has expired, it should be sent to the nearest authorized Telechron service station.

TO REMOVE THE CLOCK MECHANISM FROM THE CABINET THE FOLLOWING STEPS SHOULD BE TAKEN:

1. Remove radio chassis from cabinet.
2. Unsolder 3-wires at terminal strip coming from clock.
3. Remove three nuts located on back of clock and remove clock cover.
4. Carefully remove clock from front of cabinet.

MODEL 671D,
Ch. 120137-D

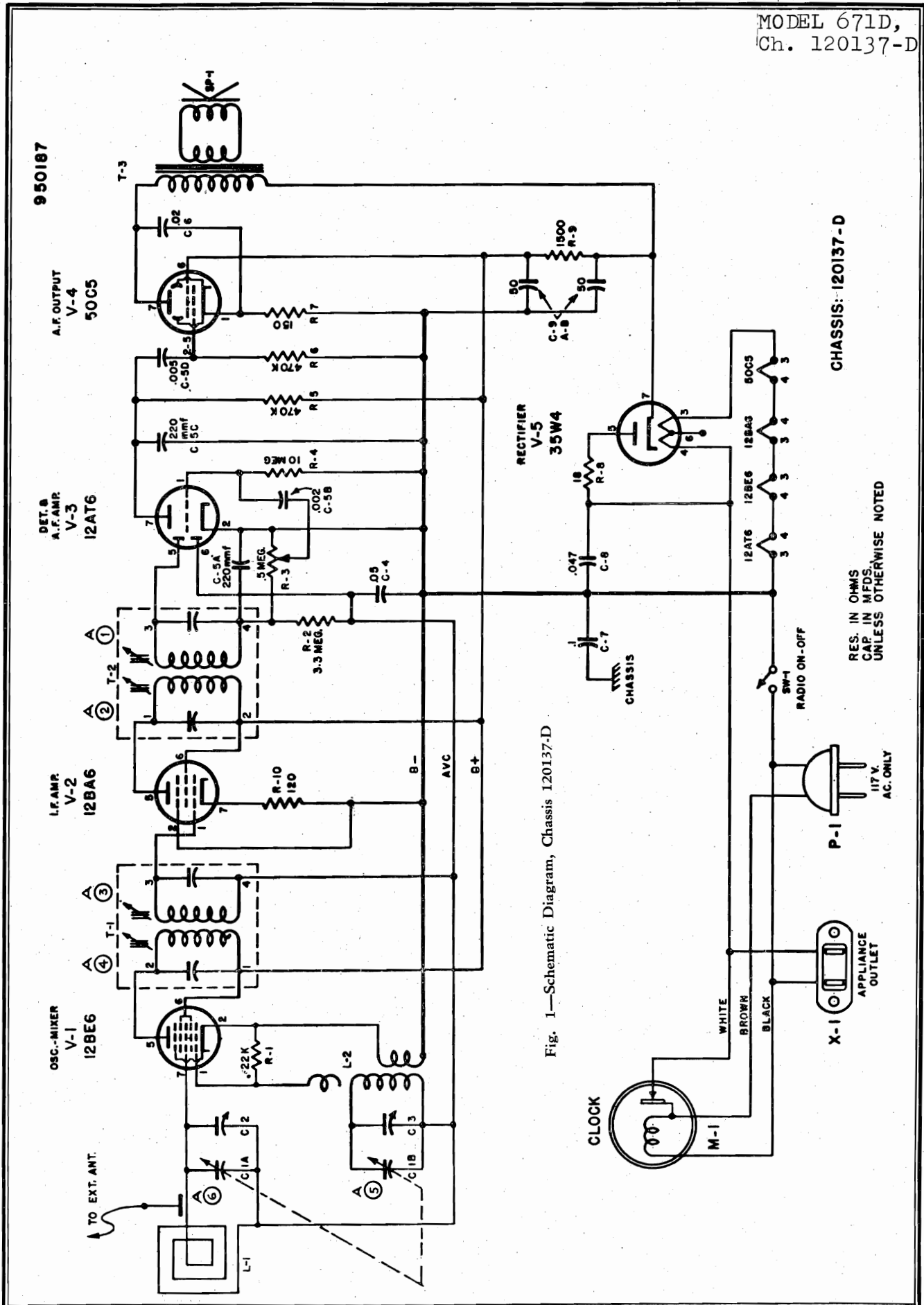


Fig. 1—Schematic Diagram, Chassis 120137-D

CHASSIS: 120137-D

RES. IN OHMS
CAP. IN MFDS.
UNLESS OTHERWISE NOTED

MODEL 671D,
Ch. 120137-D

CHASSIS PARTS LIST (Chassis 120137-D)

| Item | Part No. | Description | Item | Part No. | Description |
|------|------------|--------------------------------------------|------|----------|---------------------------------------------|
| C1A | 900082 | Variable Capacitor - r.f. Section | R5 | 351132 | 470,000 ohm. Carbon $\frac{1}{2}W \pm 20\%$ |
| C1B | | Variable Capacitor - osc. Section | R6 | 351132 | 470,000 ohm. Carbon $\frac{1}{2}W \pm 20\%$ |
| C2 | Pt. of C1A | Trimmer - r.f. Section | R7 | 340292 | 150 ohm. Carbon $\frac{1}{2}W \pm 10\%$ |
| C3 | Pt. of C1B | Trimmer - osc. Section | R8 | 340072 | 18 ohm. Carbon $\frac{1}{2}W \pm 10\%$ |
| C4 | 923554 | .05 mf. Paper 400V | R9 | 380532 | 1,500 ohm. Carbon $1W \pm 20\%$ |
| C5A | | 220 mmf. Multiple Condenser | R10 | 340272 | 120 ohm. Carbon $\frac{1}{2}W \pm 10\%$ |
| C5B | 470310 | .002 mf. | SP1 | 180079 | Speaker — PM — 5" |
| C5C | | 220 mmf. | SW1 | 510083 | On—Off Switch—Radio |
| C5D | | .005 mf. | T1 | 720033 | 1st I.F. Transformer |
| C6 | 923524 | .02 mf. Paper 400V | T1 | or | |
| C7 | 923315 | .1 mf. Paper 200V | T1 | 720124 | 1st I.F. Transformer |
| C8 | 922101 | .047 mf. Paper Molded 400V | T2 | 720033 | 2nd I.F. Transformer |
| C9A | 925201 | 50 mf. Electrolytic 150V | T2 | or | |
| C9B | | 50 mf. Electrolytic 150V | T2 | 720124 | 2nd I.F. Transformer |
| L1 | 700061 | Loop Antenna & Back | T3 | 734065 | Output Transformer |
| L2 | 716064 | Oscillator Coil | V1 | 800525 | Vacuum Tube—12BE6 |
| M1 | 470668 | Clock Movement | V2 | 800524 | Vacuum Tube—12BA6 |
| P1 | 583035 | Line Cord & Plug | V3 | 800523 | Vacuum Tube—12AT6 |
| R1 | Pt. of L2 | 22,000 ohm. Carbon $\frac{1}{2}W \pm 10\%$ | V4 | 800032 | Vacuum Tube—50C5 |
| R2 | 351332 | 3.3 megohm. Carbon $\frac{1}{2}W \pm 20\%$ | V5 | 800526 | Vacuum Tube—35W4 |
| R3 | 390177 | 500,000 ohm. Volume Control | X1 | 500029 | Appliance Outlet |
| R4 | 351452 | 10 megohm. Carbon $\frac{1}{2}W \pm 20\%$ | | | |

CABINET PARTS LIST (Model 671D)

| MODEL 671D | DESCRIPTION |
|------------|--------------------------------|
| 140387 | Cabinet (Bakelite—Walnut) |
| 140407 | Cabinet (Urea—Ivory) |
| 470668 | Clock Movement |
| 411108 | Housing—Clock |
| 520141 | Crystal—(For Radio Dial) |
| 460162S | Knob—Radio |
| 960170 | Knob—Clock (With Indicator) |
| 960171 | Knob—Clock (Without Indicator) |
| 960172 | Knob—Clock (For Setting Hands) |
| 960173 | Crystal (For Clock Face) |

MODEL 679B,
Ch. 120116-B



MODEL 679B
CHASSIS 120116-B

DESCRIPTION

TYPE: Amplitude modulation (AM) and frequency modulation (FM) superheterodyne.

FREQUENCY RANGE:

Broadcast band (AM)—540-1620 kilocycles
Frequency modulation band (FM)—88-108 megacycles

TYPE OF TUBES:

- 1—6BJ6 FM r-f amplifier
- 1—12AT7 FM converter
- 1—12BE6 AM converter
- 1—6BJ6 FM and AM i-f amplifier
- 1—6BJ6 2nd i-f FM amplifier
- 1—6BH6 FM limiter
- 1—19T8 FM discriminator, AM det., AVC and audio ampl.
- 1—50L6 power output
- 1—Selenium rectifier

POWER SUPPLY: 60 cycles

VOLTAGE RATING: 115v. a.c.

POWER CONSUMPTION: 75 watts

CURRENT DRAIN: 0.70 amps. at 115 volts a.c.

GENERAL NOTES

1. If replacements are made or the wiring disturbed in the R-F section of the circuit, the receiver should be carefully realigned.
2. A self-contained loop antenna is provided for broadcast band reception. For permanent home installation, however, if it is desired to improve reception of weak stations, an additional outdoor antenna may be used. Connect the outdoor antenna to the terminal strip marked (A.M.—"A") located at the back of the cabinet.
3. An internal power line antenna is provided for F.M. operation in relatively strong signal areas. For improved reception in weak signal areas, connect an external dipole antenna to the terminal strip on the back of the cabinet. Disconnect the link from screw (F.M.—"A") and connect the dipole to terminals marked (F.M.—"A" and "G").

INSTRUCTIONS FOR VOLTAGE AND RESISTANCE READINGS

1. Voltage readings are in d.c. volts and resistance reading in ohms, unless otherwise specified.
2. D.c. voltage measurements are made at 20,000 ohms-per-volt and a.c. voltages are measured at 1000 ohms-per-volt.
3. Line voltage maintained at 115 volts a.c. for voltage readings.
4. Nominal tolerance on component values makes possible a variation of $\pm 15\%$ in readings.
5. Volume control at maximum, with no signal applied and bandswitch in broadcast position (unless otherwise noted), for voltage measurements.

VOLTAGE READINGS (CHASSIS 120116-B)

| SYMBOL | TUBE | PIN 1 | PIN 2 | PIN 3 | PIN 4 | PIN 5 | PIN 6 | PIN 7 | PIN 8 | PIN 9 |
|--------|-------|--------|----------|---------|---------|---------|--------|---------|---------|-------|
| V-1 | 6BJ6 | 0 | .6 V.* | 35 V.AC | 41 V.AC | 78 V.* | 78 V.* | 0 | — | — |
| V-2 | 12AT7 | 86 V.* | -2.8 V.* | 0 | 53 V.AC | 41 V.AC | 80 V.* | 0 | 1.7 V.* | N.C. |
| V-3 | 6BJ6 | -4 V | .8 V. | 35 V.AC | 30 V.AC | 100 V. | 100 V. | 0 | — | — |
| V-4 | 12BE6 | -7.6 V | 0 | 53 V.AC | 64 V.AC | 100 V. | 100 V. | -4 V | — | — |
| V-5 | 6BJ6 | 0 | .7 V.* | 30 V.AC | 24 V.AC | 86 V.* | 86 V.* | 0 | — | — |
| V-6 | 6BH6 | -3 V. | 0 | 24 V.AC | 18 V.AC | 50 V.* | 50 V.* | 0 | — | — |
| V-7 | 19T8 | -5 V.* | -6 V.* | -.1 V.* | 0 | 18 V.AC | -5 V. | 0 | -.5 V. | 40 V. |
| V-8 | 50L6 | N.C. | 115V.AC | 110 V. | 105 V. | 0 | N.C. | 64 V.AC | 7.2 V. | — |

N.C. Denotes "No Connection."

*Bandswitch in F.M. Position Only.

RESISTANCE READINGS (CHASSIS 120116-B)

| SYMBOL | TUBE | PIN 1 | PIN 2 | PIN 3 | PIN 4 | PIN 5 | PIN 6 | PIN 7 | PIN 8 | PIN 9 |
|--------|-------|----------|--------|---------|--------|---------|---------|----------|----------|--------|
| V-1 | 6BJ6 | 0 | 68 | 42 | 50 | 200 K.* | 200 K.* | 0 | — | — |
| V-2 | 12AT7 | 200 K.* | 10 K. | 0 | 62 | 50 | 200 K. | 0 | 2200 | N.C. |
| V-3 | 6BJ6 | 3.2 meg. | 82 | 42 | 35 | 200 K.* | 200 K.* | 0 | — | — |
| V-4 | 12BE6 | 22 K. | .5 | 62 | 75 | 200 K. | 200 K. | 2.7 meg. | — | — |
| V-5 | 6BJ6 | .6 | 82 | 35 | 28 | 200 K.* | 200 K.* | 0 | — | — |
| V-6 | 6BH6 | 100 K. | 0 | 28 | 20 | 200 K.* | 200 K.* | 0 | — | — |
| V-7 | 19T8 | 100 K. | 100 K. | 175 K.* | 0 | 20 | 500 K. | 0 | 4.7 meg. | 500 K. |
| V-8 | 50L6 | N.C. | 130 | 200 K. | 200 K. | 470 K. | N.C. | 75 | 150 | — |

N.C. Denotes "No Connection."

*Bandswitch in F.M. Position Only.

MODEL 679B,
Ch. 120116-B

ALIGNMENT INSTRUCTIONS

1. To position pointer, turn variable condenser fully closed and set pointer to reference mark on dial backplate at the low frequency end of the dial.
2. Volume control should be set at maximum position. The output of the signal generator should be no higher than necessary to obtain an output reading. Attenuate the signal input as alignment proceeds. Use an insulated alignment tool for all adjustments.
3. Use isolation transformer if available; otherwise connect a .1 mfd. condenser in series with low side of signal generator to chassis.

AM ALIGNMENT

| | DUMMY ANTENNA | SIGNAL GENERATOR COUPLING | SIGNAL GENERATOR FREQUENCY | BAND SWITCH POSITION | RADIO DIAL SETTING | OUTPUT METER | ADJUST | REMARKS |
|---|---------------|----------------------------------------------------------|----------------------------|----------------------|------------------------------|--------------------|-------------------------------------------|---------------------------------------------------------------------------------------------------|
| 1 | .1 mfd. | High side to Pin 7 (grid) of 12BE6. Low side to chassis. | 455 KC. | Broadcast | Tuning condenser fully open. | Across voice coil. | A1, A2, (Trans. T4), A3, A4, (Trans. T2). | Adjust for maximum output. Reduce dummy antenna to .001 mfd. if isolation trans. is not used. |
| 2 | | Loop | 1620 KC. | Broadcast | Tuning condenser fully open. | Across voice coil. | A5, (Trimmer cond. C6). | Form loop of several turns of wire. Radiate signal into receiver loop. Adjust for maximum output. |
| 3 | | Loop | 1400 KC. | Broadcast | Tune for max. outpt. | Across voice coil. | A6, (Trimmer cond. C5). | Adjust for maximum output. |

FM I-F and Disc. Alignment Using AM Signal Generator and VTVM

| | DUMMY ANTENNA | SIGNAL GENERATOR COUPLING | SIGNAL GENERATOR FREQUENCY | BAND SWITCH POSITION | RADIO DIAL SETTING | CONNECT VTVM | ADJUST | REMARKS |
|---|---------------|----------------------------------------------------------------------|----------------------------|----------------------|------------------------------|-----------------------------------------------------|------------------------|---------------------------------------------------------|
| 1 | .01 mfd. | High side to Pin 1 (grid) of 6BJ6 2nd i-f (V5). Low side to chassis. | 10.7 mc. (Unmodulated) | Frequency modulation | Tuning condenser fully open. | Connect d.c. probe to point "A". Common to chassis. | A7, (Trans. T5). | Adjust for maximum output. |
| 2 | .01 mfd. | High side to Pin 1 (grid) of 6BJ6 1st i-f (V3). Low side to chassis. | 10.7 mc. (Unmodulated) | Frequency modulation | Tuning condenser fully open. | Connect d.c. probe to point "A". Common to chassis. | A8, A9, (Trans. T3). | Adjust for maximum output. |
| 3 | .01 mfd. | High side to Pin 7 of 12AT7 conv. (V2). Low side to chassis. | 10.7 mc. (Unmodulated) | Frequency modulation | Tuning condenser fully open. | Connect d.c. probe to point "A". Common to chassis. | A10, A11, (Trans. T1). | Adjust for maximum output. |
| 4 | .01 mfd. | High side to Pin 1 (grid) of 6BJ6 2nd i-f (V5). Low side to chassis. | 10.7 mc. (Unmodulated) | Frequency modulation | Tuning condenser fully open. | Connect d.c. probe to point "B". Common to chassis. | A12, (Trans. T6). | Adjust for maximum output. |
| 5 | .01 mfd. | " | 10.7 mc. (Unmodulated) | Frequency modulation | Tuning condenser fully open. | Connect d.c. probe to point "C". Common to chassis. | A13, (Trans. T6). | Adjust for zero output. Continue with FM r-f alignment. |

FM I-F AND DISC. ALIGNMENT USING SWEEP SIGNAL GENERATOR AND OSCILLOSCOPE. Use frequency modulated signal, with 60 cycle modulation and 450 kc. sweep. Use 120 cycle sawtooth sweep voltage in oscilloscope for horizontal deflection.

| | DUMMY ANTENNA | SIGNAL GENERATOR COUPLING | SIGNAL GENERATOR FREQUENCY | BAND SWITCH POSITION | RADIO DIAL SETTING | CONNECT OSCILLOSCOPE | ADJUST | REMARKS |
|---|---------------|----------------------------------------------------------------------|----------------------------|----------------------|------------------------------|-------------------------------------------------|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | .01 mfd. | High side to Pin 1 (grid) of 6BJ6 1st i-f (V3). Low side to chassis. | 10.7 mc. (Unmodulated). | Frequency modulation | Tuning condenser fully open. | Vertical input to Point "A". Ground to chassis. | A7, A8, A9, (Trans. T5 and T3). | Adjust for maximum output (height) and symmetry as per i-f alignment curve shown (page 3). |
| 2 | .01 mfd. | High side to Pin 7 of 12AT7 of conv. (V2). Low side to chassis. | 10.7 mc. (Unmodulated). | Frequency modulation | Tuning condenser fully open. | Vertical input to Point "A". Ground to chassis. | A10, A11, (Trans. T1) | Adjust for maximum output (height) and symmetry as per i-f alignment curve shown (page 3). |
| 3 | .01 mfd. | High side to Pin 1 (grid) of 6BJ6 2nd i-f (V5). Low side to chassis. | 10.7 mc. (Unmodulated). | Frequency modulation | Tuning condenser fully open. | Vertical input to Point "C". Ground to chassis. | A12, A13, (Trans. T6). | Alternately adjust A12 for maximum amplitude and A13 for maximum straightness of cross-over lines, with cross-over occurring at center of pattern as per discriminator alignment curve (page 3). Continue with FM r-f alignment. |

FM R-F ALIGNMENT

| | DUMMY ANTENNA | SIGNAL GENERATOR COUPLING | SIGNAL GENERATOR FREQUENCY | BAND SWITCH POSITION | RADIO DIAL SETTING | CONNECT VTVM | ADJUST | REMARKS |
|---|--------------------------------------------|-------------------------------------------------|----------------------------|----------------------|------------------------------|-----------------------------------------------------|-----------------|----------------------------|
| 1 | 300 ohm resistor in series with gen. lead. | High side to FM ant. term. Low side to chassis. | 109.0 mc. (Unmodulated). | Frequency modulation | Tuning condenser fully open. | Connect d.c. probe to point "A". Common to chassis. | A14 (Iron Core) | Adjust for maximum output. |
| 2 | " | " | 106.0 mc. | Frequency modulation | Tune for maximum output. | " | A15 (Iron Core) | Adjust for maximum output. |

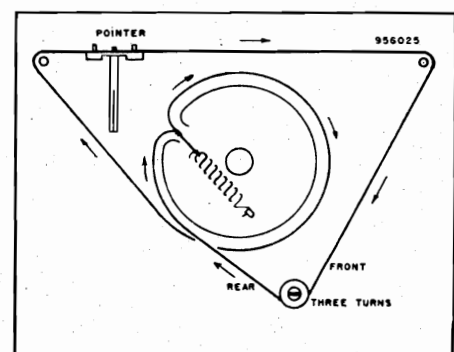
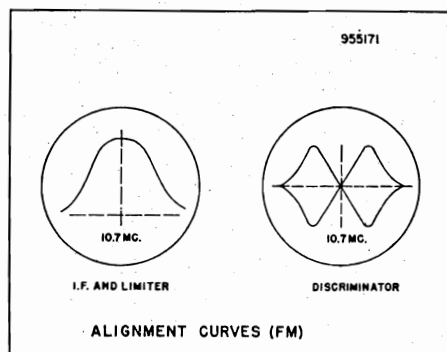
CHASSIS PARTS LIST (CHASSIS 120116-B)

| Symbol | Part No. | DESCRIPTION | Symbol | Part No. | DESCRIPTION |
|--------|--------------|--------------------------------|--------|--------------|------------------------------------|
| C1 | 928006 | 1,500 MMF | R10 | 340332 | 220 Ohms 1/2W ±10% |
| C2 | 928006 | 1,500 MMF | R11 | 340970 | 100,000 Ohms 1/2W ±10% |
| C3 | 928053 | .001 MF | R12 | 340770 | 15,000 Ohms 1/2W ±10% |
| C4 | 928027 | .01 MF | R13 | 340970 | 100,000 Ohms 1/2W ±10% |
| C5 | 915029 | .5 MMF 500V ±10% | R14 | 340970 | 100,000 Ohms 1/2W ±10% |
| C6 | 928053 | .001 MF | R15 | 340930 | 68,000 Ohms 1/2W ±10% |
| C7 | 928102 | 50 MMF | R16 | Pt. of L5) | 22,000 Ohms |
| C8 | 928027 | .01 MF | R17 | 351290 | 2.2 Megohms 1/2W ±20% |
| C9 | 928027 | .01 MF | R18 | 340332 | 220 Ohms 1/2W ±10% |
| C10 | 928027 | .01 MF | R19 | 340890 | 47,000 Ohms 1/2W ±10% |
| C11 | 928055 | .01 MF | R20 | 341210 | 1 Megohm 1/2W ±10% |
| C12 | 928109 | .01 MF | R21 | 351370 | 4.7 Meg. 1/2W ±20% |
| C13 | 928110 | 25 MMF | R22 | 390153 | 1.0 Meg. Vol. Control |
| C14 | 928027 | .01 MF | R23 | Pt. of R-22) | 400,000 Ohms Tone Control |
| C15 | 928006 | 1,500 MMF | R24 | 340810 | 22,000 Ohms 1/2W ±10% |
| C16 | 928013 | 100 MMF ±20% | R25 | 351130 | 470,000 Ohms 1/2W ±20% |
| C17 | 928059 | 300 MMF ±20% | R26 | 351130 | 470,000 Ohms 1/2W ±20% |
| C18 | Part of Loop | 2.2 MMF | R27 | 340292 | 150 Ohms 1/2W ±10% |
| C19 | 920060 | .05 MF 200V ±25% | R28 | 394042 | 1000 Ohms 3W ±10% |
| C20 | | | R29 | 394027 | 22 Ohms 2W ±10% |
| C21 | Pt of T6 | 100 MMF | R30 | 340810 | 22,000 Ohms 1/2W ±10% |
| C22 | 920180 | .005 MF 400V ±25% | L1 | 713026 | FM Ant. Coil |
| C23 | 928013 | 100 MMF ±20% | L2 | 713027 | FM R.F. Coil |
| C24 | 920090 | .01 MF 400V ±25% | L3 | 716059 | FM Osc. Coil |
| C25 | 920545 | .002 MF 400V ±25% | L4 | 700054 | AM Loop Ant. |
| C26 | 920090 | .01 MF 400V ±25% | L5 | 716058 | AM Osc. Coil |
| C27 | 928104 | 212 MMF | L6 | 705002 | Filament Choke |
| C28 | 920020 | .02 MF 400V ±25% | L7 | 705002 | Filament Choke |
| C29 | 925191 | 80 MF 150V | J1, J2 | 508002 | Dual Jack (Phono.-Speaker) |
| C30 | 925191 | 50 MF 150V | P1 | 585081 | Female Con. Cable (Phono. Motor) |
| C31 | 928013 | 100 MMF ±20% | P2 | 505014 | Interlock Plug |
| C32 | 920030 | .05 MF 400V ±25% | SW1 | (Pt. of R22) | On-Off Switch |
| C33 | 928006 | 1,500 MMF | SW3 | 510078 | Band Switch |
| C34 | 928006 | 1,500 MMF | T1 | 720126 | 1st. FM I.F. Transformer |
| C35 | 928006 | 1,500 MMF | T2 | 720067 | 2nd. FM I.F. Transformer |
| C36 | 900081 | AM Var. Cond. & FM Tuning Ass. | T3 | 720077 | 3rd FM I.F. |
| C37 | (Pt. of C36) | AM RF Trimmer | T4 | 708062 | FM Discriminator Transformer |
| C38 | (Pt. of C36) | AM OSC. Trimmer | T5 | 720075 | 1st. AM I.F. Transformer |
| C39 | (Pt. of T4) | | T6 | 720076 | 2nd AM I.F. Transformer |
| C40 | 920030 | .05 MF 400V ±25% | T7 | 734064 | Output Transformer |
| C41 | 920030 | .05 MF 400V ±25% | V1 | 800023 | 6BJ6, FM RF Amplifier |
| R1 | 340212 | 68 Ohms 1/2W ±10% | V2 | 800047 | 12AT7, FM Osc.-Mixer |
| R2 | 340332 | 220 Ohms 1/2W ±10% | V3 | 800023 | 6BJ6, FM AM 1st I.F. Amplifier |
| R3 | 340572 | 2,200 Ohms 1/2W ±10% | V4 | 800525 | 12BE6, AM Osc.-Mixer |
| R4 | 340732 | 10,000 Ohms 1/2W ±10% | V5 | 800023 | 6BJ6, FM 2nd I.F. Amplifier |
| R5 | 340332 | 220 Ohms 1/2W ±10% | V6 | 800054 | 6BH6, FM Limiter |
| R6 | 340212 | 68 Ohms 1/2W ±10% | V7 | 800029 | 19T8, FM Discriminator, AM Det |
| R7 | 340232 | 82 Ohms 1/2W ±10% | V8 | 800070 | 50L6, Power Output |
| R8 | 340492 | 1,000 Ohms 1/2W ±10% | V9 | 817102 | |
| R9 | 340232 | 82 Ohms 1/2W ±10% | V10 | 817101 | Selenium Rectifier, 100 MA. |
| | | | | 807003 | Pilot Bulb, 110V., 10W. Cand. Base |

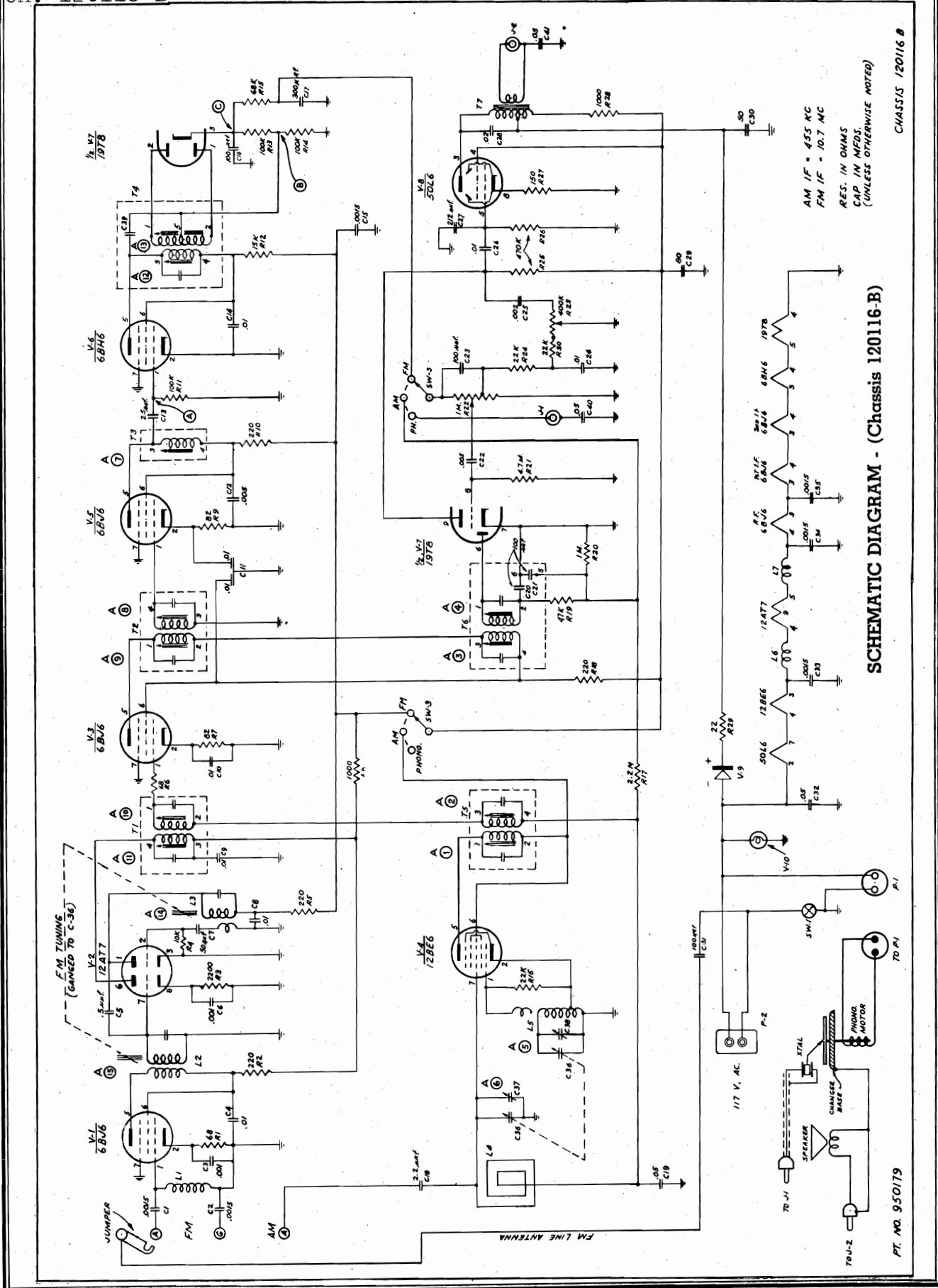
CABINET PARTS LIST (MODEL 679B)

| Part No. | DESCRIPTION |
|----------|-------------------------------|
| 140403 | Cabinet |
| 411115 | Metal Grille |
| 520064 | Escutcheon |
| 520144 | Glass Dial |
| 445032 | Rubber Channel for Glass Dial |
| 413559 | Mounting Strip for Glass Dial |
| 180077 | Speaker—12" |
| 505040 | Speaker Plug |
| 819060 | G.I. 3-Speed Changer |

| Part No. | DESCRIPTION |
|----------|-------------------------|
| 560151 | 45 RPM Adaptor |
| 560216 | Masonite Bottom |
| 560227 | Masonite Back |
| 583206 | Line Cord |
| 450088S | Knob—AM-FM-Phono. |
| 450068S | Knob—Tuning |
| 450089 | Knob—Tone |
| 450099S | Knob—Volume |
| 587011 | Spring Insert for Knobs |



MODEL 679B,
Ch. 120116-B



AM IF = 455 KC
FM IF = 10.7 MC
RES. IN OHMS
CAP. IN MFD.
(UNLESS OTHERWISE NOTED)

SCHEMATIC DIAGRAM - (Chassis 120116-B)

CHASSIS 120116 B

PT. NO. 950179

MODEL 691B,
Ch. 120145-B



MODEL 691B
Chassis 120145-B

DESCRIPTION

TYPE: Two-band superheterodyne.

FREQUENCY RANGE: Broadcast 540-1620 kc
Short Wave 6-18 mc.

TYPE OF TUBES:

- V-1--12BE 6, oscillator mixer
- V-2--12BA6, first i-f amplifier
- V-3--12AT6, detector, a-f amplifier
- V-4--50C5, A. F. output
- V-5--35W4, rectifier

POWER SUPPLY: A.C. or D.C.

POWER CONSUMPTION: 30 watts.

CURRENT DRAIN: 0.26 amp. at 117 volts a.c.

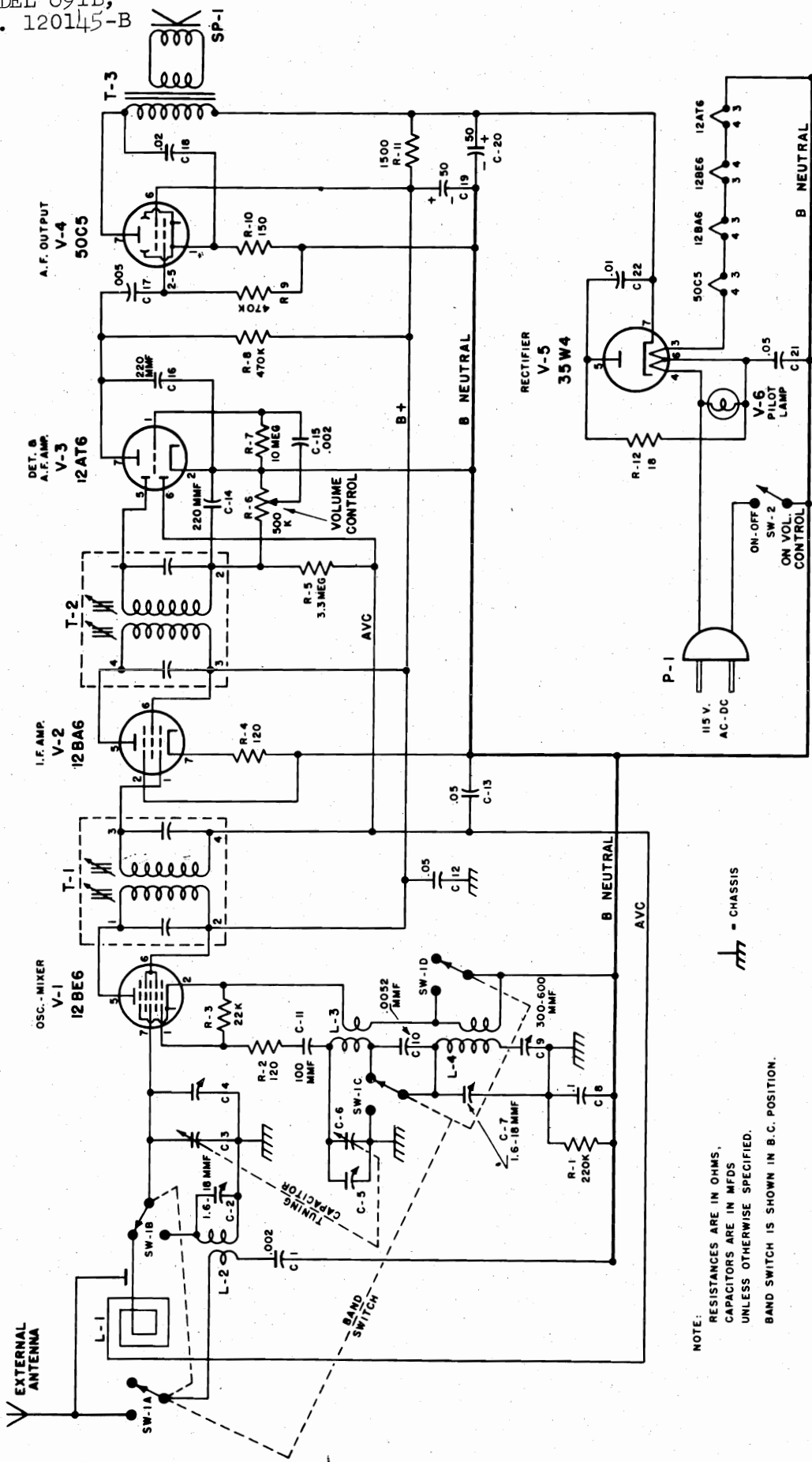
GENERAL NOTES

1. If replacements are made or the wiring disturbed in the r-f section of the circuit, the receiver should be carefully realigned.
2. In operating the receiver on d.c., it may be necessary to reverse the line plug for correct polarity.
3. Model 691B has a self-contained antenna and does not require additional antenna connections. For permanent home installations, however, if it is desired to improve reception of weak stations, an additional outdoor antenna may be used. For this purpose a lead has been brought out in the rear near the line cord. Use no ground connection.
4. The self-contained loop antenna operates at maximum efficiency when its position is at right angles to the broadcasting source. It is important, therefore, once the station is tuned in, to rotate the cabinet back and forth through a quarter of a circle (90 degrees), leaving it at the position where the station is received with maximum volume.

CHASSIS PARTS LIST (Chassis 120145-B)

| SYM-BOL | PART NO. | DESCRIPTION | | | |
|---------|------------|---------------------------------|--------|------|--------------------------------------|
| C-1 | 912723 | .002 MF Paper | 600 V. | C-14 | 923023 220 mmf |
| C-2 | Pt. of L-2 | 1.6-18 mmf Trimmer | | C-15 | Pt. of C-14 .002 mf |
| C-3 | 900083 | Variable Capacitor - R.F. Sect. | | C-16 | Pt. of C-14 220 mmf |
| C-4 | Pt. of C-3 | Trimmer R.F. Sect. | | C-17 | Pt. of C-14 .005 mf |
| C-5 | Pt. of C-3 | Trimmer Osc. Sect. | | C-18 | 921524 .02 mf Paper 400 V |
| C-6 | Pt. of C-3 | Variable Capacitor - Osc. Sect. | | C-19 | 925206 50 mf Electrolytic 150 V |
| C-7 | Pt. of L-2 | 1.6-18 mmf Trimmer | | C-20 | Pt. of C-19 50 mf Electrolytic 150 V |
| C-8 | 923515 | .1 mf Paper | 400 V | C-21 | 921554 .05 mf Paper 400 V |
| C-9 | 900210 | 300-600 mmf Padder | | C-22 | 921514 .01 mf Paper 400 V |
| C-10 | 915031 | .0052 mf Mica | ±5% | L-1 | 700058 Loop Antenna & Back |
| C-11 | 928010 | 100 mmf Ceramic | | L-2 | 710030 Antenna Coil - S.W. |
| C-12 | 921554 | .05 mf Paper | 400 V | L-3 | 716065 Oscillator Coil - S.W. |
| C-13 | 921554 | .05 mf Paper | 400 V | L-4 | Pt. of L-3 Oscillator Coil - B.C. |
| | | | | P-1 | 583032 Line Cord & Plug |

MODEL 691B,
Ch. 120145-B



NOTE:
RESISTANCES ARE IN OHMS,
CAPACITORS ARE IN MFDS
UNLESS OTHERWISE SPECIFIED.
BAND SWITCH IS SHOWN IN B.C. POSITION.

PART NO. 950186

CHASSIS NO. 120145-B

Fig. 1—Schematic Diagram, Chassis 120145-B

| SYM-BOL | PART NO. | DESCRIPTION | | | |
|---------|------------|------------------------------------------|----------------|---------|--|
| R-1 | 341052 | 220,000 ohm | Carbon | ½W ±10% | |
| R-2 | 340272 | 120 ohm | Carbon | ½W ±10% | |
| R-3 | 350812 | 22,000 ohm | Carbon | ½W ±20% | |
| R-4 | 340272 | 120 ohm | Carbon | ½W ±10% | |
| R-5 | 351332 | 3.3 megohm | Carbon | ½W ±20% | |
| R-6 | 390145 | 500,000 ohm | Volume Control | | |
| R-7 | 351452 | 10 megohm | Carbon | ½W ±20% | |
| R-8 | 351132 | 470,000 ohm | Carbon | ½W ±20% | |
| R-9 | 351132 | 470,000 ohm | Carbon | ½W ±20% | |
| R-10 | 340292 | 150 ohm | Carbon | ½W ±10% | |
| R-11 | 380532 | 1,500 ohm | Carbon | 1W ±20% | |
| R-12 | 340072 | 18 ohm | Carbon | ½W ±10% | |
| SP-1 | 180080 | Speaker - with Output Transformer | | | |
| SP-1 | 180045 | Speaker - less Output Transformer | | | |
| SW-1 | 510082 | Band- Switch | | | |
| SW-2 | Pt. of R-6 | On-Off Switch | | | |
| T-1 | 720525 | 1st I.F. Transformer | | | |
| T-2 | 720055 | 2nd I.F. Transformer | | | |
| T-3 | 734067 | Output Transformer (with Pt. No. 180045) | | | |
| V-1 | 800525 | Vacuum Tube - 12BE6 | | | |
| V-2 | 800524 | Vacuum Tube - 12BA6 | | | |
| V-3 | 800523 | Vacuum Tube - 12AT6 | | | |
| V-4 | 800032 | Vacuum Tube - 50C5 | | | |
| V-5 | 800526 | Vacuum Tube - 35W4 | | | |
| V-6 | 807000 | Pilot Light | | | |

CABINET PARTS LIST (Model 691B)

| PART NO. | DESCRIPTION |
|----------|-------------------------|
| 140426 | Cabinet—Bakelite—Walnut |
| 140427 | Cabinet—Urea—Ivory |
| 460162S | Knob |
| 460162 | Knob—Band Switch |
| 411164 | Dial Plate—Calibrated |
| 411182 | Dial Back Plate |
| 583032 | Line Cord |
| 180080 | Speaker with Trans. |
| 180045 | Speaker less Trans. OR |
| 530002 | Drive Cord |
| 525022-2 | Pointer |
| 700058 | Loop Antenna & Back |
| 470608 | Baffle & Grille Cloth |

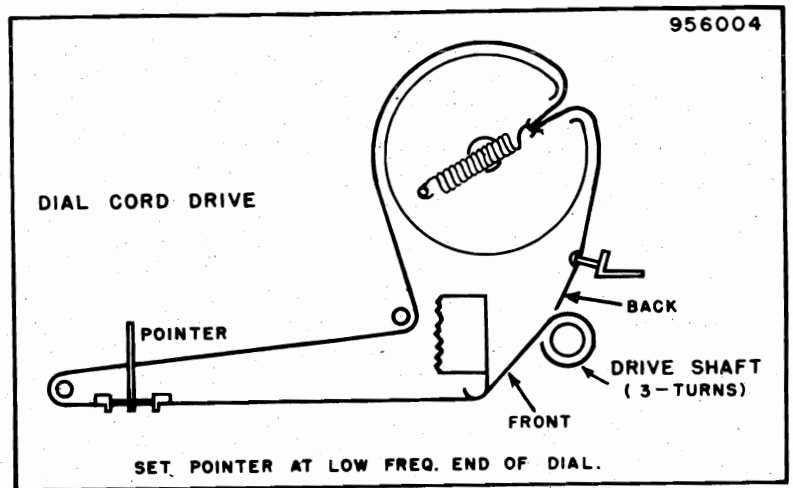


Fig. 2—Dial Cord String, Model 691

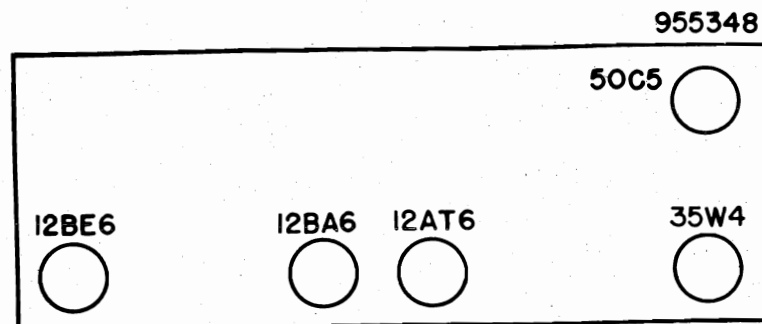


Fig. 3 Tube Location Diagram of Chassis 120145-B

JUNE 28, 1951

MODEL 691B,
Ch. 120145-B

ALIGNMENT PROCEDURE

1. To set pointer, turn variable condenser fully closed and set pointer at mark near upper left end of dial backplate.
2. Use isolation transformer if available. If not, connect a 0.1 mfd. condenser in series with low side of signal generator and B neutral.
3. Volume control should be at maximum position; output of signal generator should be not higher than necessary to obtain an output reading.
4. Use an insulated alignment screwdriver for adjusting.

| STEP | DUMMY ANTENNA | SIGNAL GENERATOR COUPLING | SIGNAL GENERATOR FREQUENCY | RADIO DIAL SETTING | OUTPUT METER | ADJUST | REMARKS | SW-1 |
|------|---------------|--------------------------------------------------------------|------------------------------------------|-------------------------------------------------|-------------------|-------------------------|---------------------------------------------------------------------------------------------------------------------|------------|
| 1 | .1 MFD. | High side to pin #7 of V-1 (12BE6) Low side to B neutral. | 455 KC 400 ~ Amplitude Modulation | Variable Condenser fully opened | Across Voice Coil | T-1, T-2 top and bottom | Adjust for maximum meter reading | Broadcast |
| 2 | 400 ~ | High side to external antenna lead. Low side to B neutral. | 18.2 MC 400 ~ Amplitude Modulation | Variable Condenser fully opened (min. capacity) | " | C-5 | Adjust for maximum meter reading | Short Wave |
| 3 | 200 MMF. | High side to external antenna lead. Low side to B neutral. | 1620 KC 400 ~ Amplitude Modulation | " | " | C-7 | " | Broadcast |
| 4 | " | " | 1420 KC 400 ~ Amplitude Modulation | Variable Condenser tuned to 1420 KC. | " | C-4 | " | " |
| 5 | " | " | 600 KC 400 ~ Amplitude Modulation | Variable Condenser tuned to 600 KC. | " | C-9 | Rock variable slightly back & forth while adjusting C-9 for a true maximum indication. Check step #3 Repeat #4 & #5 | " |
| 6 | 400 | Same as in Step #2 | 17.2 MC 400 ~ Amplitude Modulation | Variable Condenser tuned to 17.2 MC. | " | C-2 | Adjust for max. signal while slightly rocking dial | Short Wave |

VOLTAGE READINGS FOR CHASSIS 120145-B

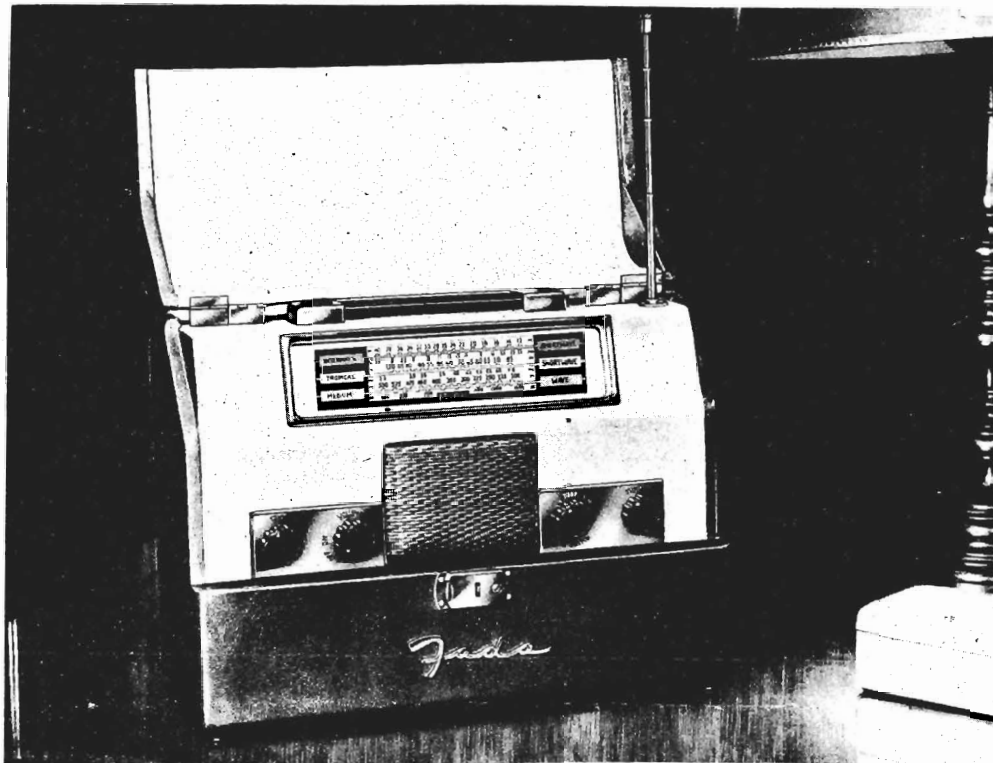
| SYMBOL | TUBE | PIN 1 | PIN 2 | PIN 3 | PIN 4 | PIN 5 | PIN 6 | PIN 7 |
|--------|-------|-------|-------|-------|--------|--------|--------|-------|
| V-1 | 12BE6 | -7.2 | 0 | 24 AC | 12 AC | 86 | 86 | -.4 |
| V-2 | 12BA6 | -.5 | 0 | 24 AC | 34 AC | 86 | 86 | 1 |
| V-3 | 12AT6 | -.4 | 0 | 0 | 12 AC | -.4 | -.4 | 34 |
| V-4 | 50C5 | 5.2 | 0 | 34 AC | 82 AC | 0 | 86 | 110 |
| V-5 | 35W4 | N.C. | N.C. | 82 AC | 115 AC | 110 AC | 112 AC | 112 |

RESISTANCE READINGS FOR CHASSIS 120145-B

| SYMBOL | TUBE | PIN 1 | PIN 2 | PIN 3 | PIN 4 | PIN 5 | PIN 6 | PIN 7 |
|--------|-------|---------|-------|-------|-------|-------|-------|---------|
| V-1 | 12BE6 | 22K | 1.3 | 28 | 14 | 500K | 500K | 3.8 MEG |
| V-2 | 12BA6 | 3.8 MEG | 0 | 28 | 42 | 500K | 500K | 120 |
| V-3 | 12AT6 | 10 MEG | 0 | 0 | 14 | 500K | 500K | 1 MEG |
| V-4 | 50C5 | 150 | 500K | 42 | 95 | 500K | 500K | 500K |
| V-5 | 35W4 | N.C. | N.C. | 95 | 130 | 150 | 125 | 500K |

VOLTAGE AND RESISTANCE READING INSTRUCTIONS

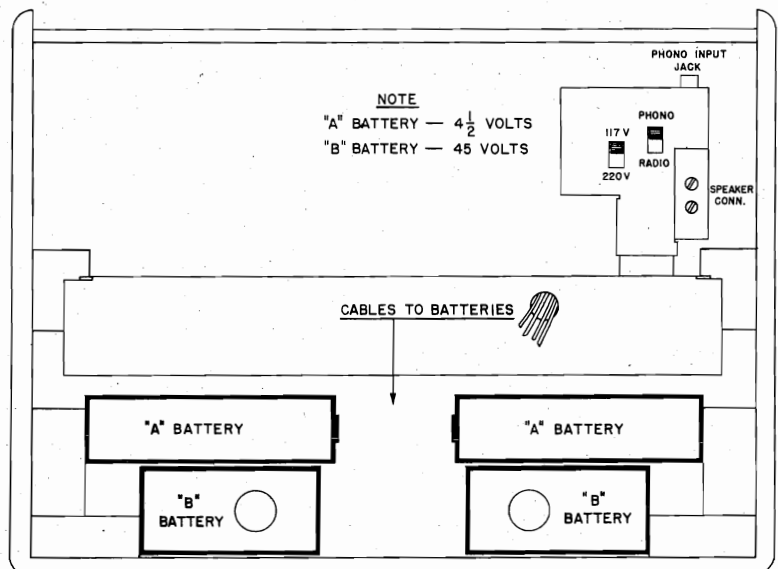
1. Line voltage maintained at 115 volts for voltage readings
2. D.C. and A.C. voltages measured with V.T.V.M.
3. Measured values are from socket pin to B neutral.
4. All measurements measured with band switch on broadcast
5. Volume control at maximum, no signal applied for voltage measurements.



Power Supply: 105-125 V. 40-60 cycles AC; Same voltage DC; and
 180-220 V. 40-60 cycles AC
 15 Watts Power Consumption at 117 volt line operation
 30 Watts Power Consumption at 220 volt line operation
 Battery Operation: 9 V.A — 90 V.B
 (570-182 meters); 2.3-7.6 MC (130-39.5 meters);
 and 7.4-23.5 MC (40.5-12.8 meters)

Range: 530-1650 KC
 I.F. Circuits: 456 KC
 Speaker: 5" P.M., 1.47 oz. Alnico V Magnet
 Speaker Transformer: 10,000 ohms — 400 cycles
 Speaker Voice Coil: 3.2 ohms

Tubes: 1U4 R.F. Amplifier
 1R5 Osc. Converter
 1U4 I.F. Amplifier
 1U5 Det. AVC. A.F
 3V4 Power Output
 Selenium Rectifier



BATTERY LAYOUT P130

ALIGNMENT PROCEDURE

No attempt should be made to realign the various circuits until all other causes have been checked, unless the condition is so obvious as to indicate that realignment is necessary. Then proceed as follows:

Volume Control full on. Low range AC meter connected across voice coil to indicate output. Keep signal generator attenuated so as to maintain ½ scale reading on output meter. Make certain that the dial pointer is exactly on index line (top left side of dial plate) when variable condenser is fully meshed.

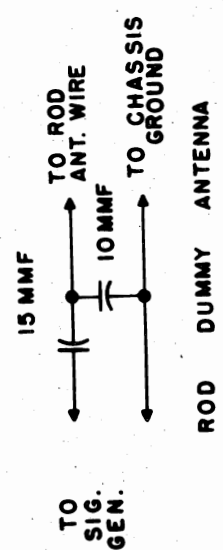
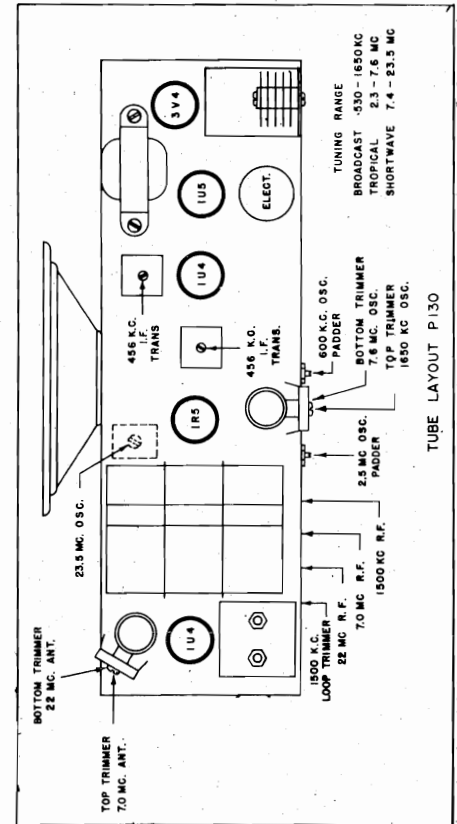
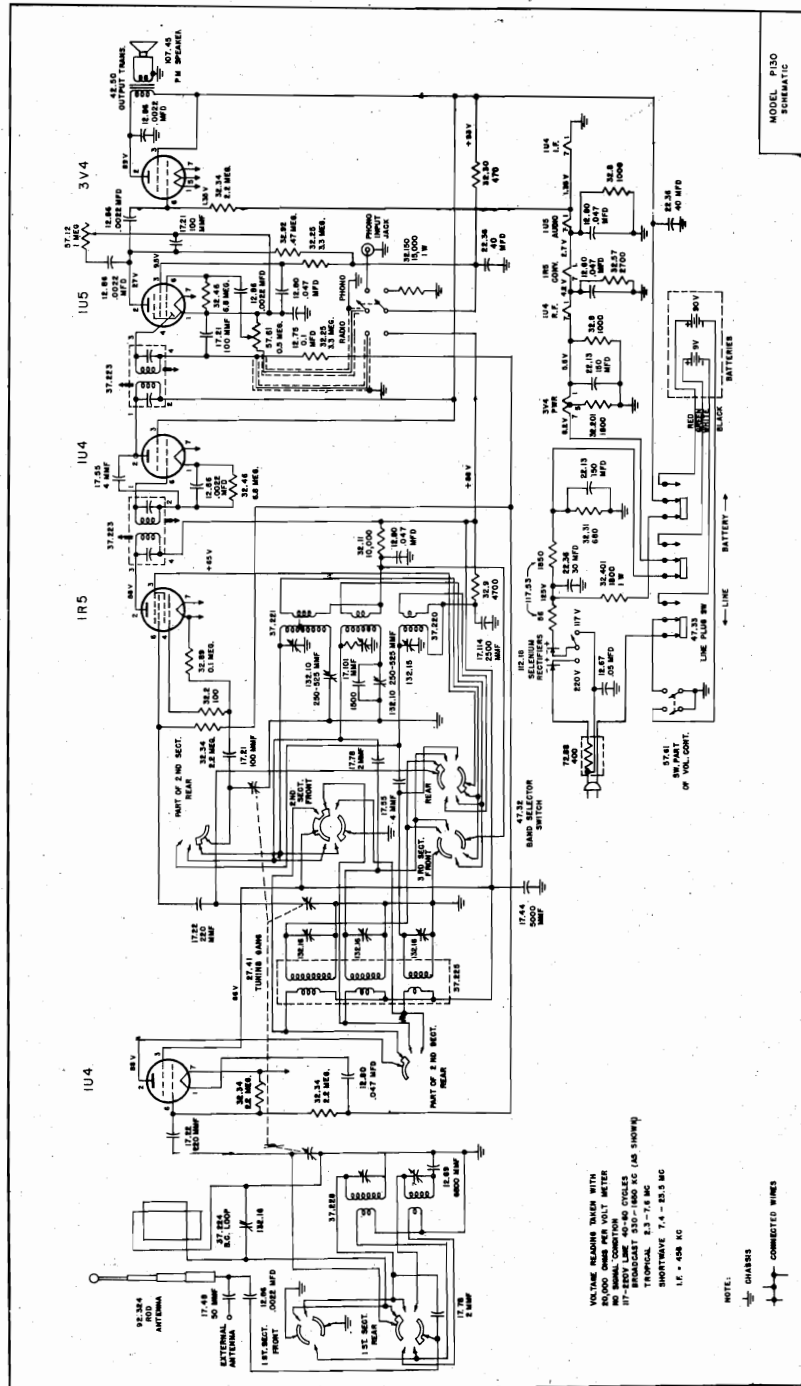
CAUTION:

The S.W. Oscillator Trimmers can be adjusted for maximum output at two positions, namely; above and below the signal frequency.

This receiver has been designed so that the oscillator frequency is always above the signal frequency.

Check the oscillator frequency carefully against the signal generator calibration and tune the R.F. Trimmers to the lower signal generator frequency.

| Receiver Dial At: | Signal Generator | Dummy Antenna | Connect Signal Generator Across | Refer to Chassis Layout for Location of Trimmers |
|-------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|---------------------------------|------------------------------------------------------------------------------------------|
| 1 Fully open on Medium Wave Band | 456 KC (658 Meters) | 0.1 Mf | 1500 K.C. R.F. Trimmer | Adjust I.F. coil cores for maximum output. |
| 2 Fully open on Medium Wave Band | 1650 KC (182 Meters) | 0.1 Mf | Loop Wires | Adjust 1650 KC Oscillator trimmer for maximum output. |
| 3 600 KC (500 Meters) | 600 KC (500 Meters) | | Loop Wires | Adjust 600 KC Oscillator Padder for Maximum output while rocking the variable condenser. |
| 4 Repeat step 2 | | | | |
| 5 1500 KC (200 Meters) | 1500 KC (200 Meters) | 0.1 Mf | Loop Wires | Adjust 1500 KC R.F. Trimmer for maximum output. |
| 6 Fully open on S.W. II Band | 7.6 MC (39.5 Meters) | Rod dummy antenna | Rod antenna input | Adjust 7.6 Mc oscillator trimmer for maximum output. |
| 7 2.5 Mc (120 Meters) | 2.5 Mc (120 Meters) | Rod dummy antenna | Rod antenna input | Adjust 2.5 Mc oscillator padder for maximum output while rocking the variable condenser. |
| 8 Repeat step 6 | | | | |
| 9 7.0 Mc (42.8 Meters) | 7.0 Mc (42.8 Meters) | Rod dummy antenna | Rod antenna input | Adjust 7.0 Mc R.F. and antenna trimmers for maximum output. |
| 10 Fully open S.W.I. on Band | 23.5 (12.8 Meters) | Rod dummy antenna | Rod antenna input | Adjust 23.5 Mc oscillator trimmer for maximum output. |
| 11 22.0 Mc (13.6 Meters) | 22.0 Mc (13.6 Meters) | Rod dummy antenna | Rod antenna input | Adjust 22.0 Mc R.F. and antenna trimmers for maximum output. |
| 12 | Radiate a sufficient amount of signal to readjust the respective antenna trimmers for maximum output on 7 and 22 Megacycles. This is accomplished by connecting a one foot piece of wire between the rod antenna and the rod antenna wire attached to the chassis. Connect a two foot piece of wire to the signal generator "hot" terminal. Locate the signal generator approximately five feet away and extend the rod antenna. Adjust the respective trimmers for maximum output. | | | |

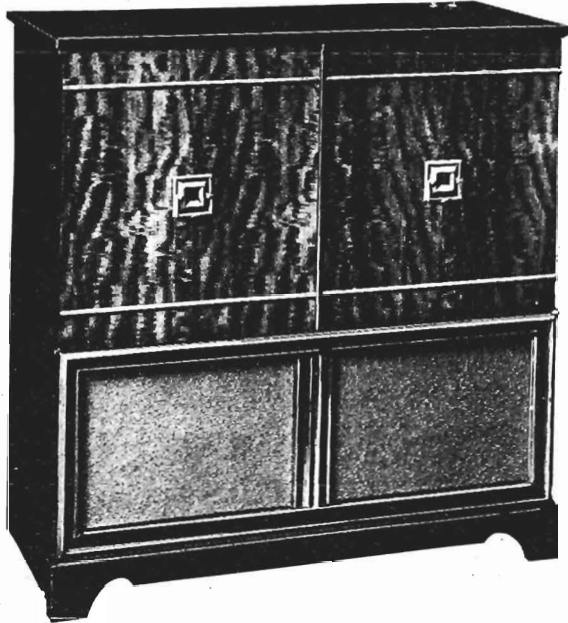


MODEL P-130

PARTS LIST

| Part No. | Description |
|-----------------|-----------------------------------------------------------|
| 12.86 | Molded Tubular Condenser .0022 Mf 400 V. |
| 12.89 | Molded Tubular Condenser .0068 Mf 400 V. |
| 12.80 | Molded Tubular Condenser .047 Mf 200 V. |
| 12.67 | Molded Tubular Condenser .047 Mf 400 V. |
| 12.75 | Molded Tubular Condenser .1 Mf 400 V. |
| 17.78 | Ceramic Condenser 2.0 Mmf |
| 17.55 | Ceramic Condenser 4.0 Mmf |
| 17.49 | Ceramic Condenser 50 Mmf $\pm 10\%$ |
| 17.22 | Ceramic Condenser 220 Mmf $\pm 20\%$ |
| 17.21 | Ceramic Condenser 100 Mmf $\pm 20\%$ |
| 17.44 | Ceramic Condenser 5000 Mmf + 100%, - 10% |
| 17.101 | Mica Condenser 1500 Mmf $\pm 5\%$ |
| 17.114 | Mica Condenser 2500 Mmf $\pm 5\%$ |
| 22.13 | Electrolytic Condenser 150 Mfd. 15 W.V. |
| 22.36 | Electrolytic Condenser 30-40-40 Mfd. 150 W.V. |
| 27.41 | 3 Section Variable Condenser 441 Mmf. |
| 37.224 | Loop Antenna |
| 37.223 | I.F. Transformer |
| 37.221 | B.C. — Tropical Oscillator Coil |
| 37.220 | S.W. Oscillator Coil |
| 37.225 | R.F. Coil |
| 37.228 | S.W. Antenna Coil |
| 47.33 | Battery Electric Changeover Switch |
| 47.35 | Radio-Phono Switch |
| 47.34 | 117 Volt — 220 Volt Line Switch |
| 52.61 | Volume Control |
| 57.12 | Tone Control |
| 62.272 | Whip Antenna Lock |
| 72.88 | Resistance Line Cord (117-220V. A.C. line operation only) |
| 77.185 | Dial Pointer |
| 77.186 | Dial Scale (Calibrated) |
| 92.138 | Phono Plug |
| 92.377 | Battery Retainer Block |
| 92.324 | Rod Antenna Assembly |
| 92.380 | Handle Cover |
| 92.389 | Phono Jack |
| 97.311 | Cabinet |
| 42.50 | Output Transformer |
| 107.45 | 5" P.M. Speaker |
| 112.24 | Selenium Rectifier |
| 112.22 | Battery Harness Assembly |
| 117.53 | 56 — 1850 ohm 10 W W.W. Resistor |
| 132.10 | Padder Condenser |
| 132.15 | Oscillator Trimmer |
| 132.16 | Trimmer Assembly |
| 142.70 | Tuning or Tone Knob |
| 142.71 | Volume Knob |
| 142.72 | Band Selector Knob |

THE WESTMORELAND



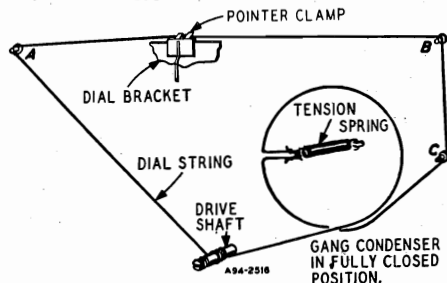
MODELS 4-A-86 Rev., 4-A-95, The Westmoreland

ELECTRICAL SPECIFICATIONS

- Power Supply 105-125 volts AC 60 cycles, 40 watts. 60 watts with record changer.
- Frequency Ranges ... Broadcast 540-1600 KC
Frequency Modulation 88-108 MC
- Intermediate Frequency AM—455 KC
FM—10.7 MC
- Selectivity AM—45 KC broad at 1000 times signal, measured at 1000 KC
I.F. FM—200 KC broad at 2 times down
I.F. FM—950 KC broad at 200 times down
- AM Sensitivity (For .5 watt output with external antenna) 25 microvolts average
- FM Sensitivity (For .5 watt output) 25 microvolts average
- Power Output 1.9 watts maximum
0.8 watts 10% distortion
- Loud Speaker 10" PM Dynamic
- Voice Coil Impedance. .3.2 ohms 400 cycles

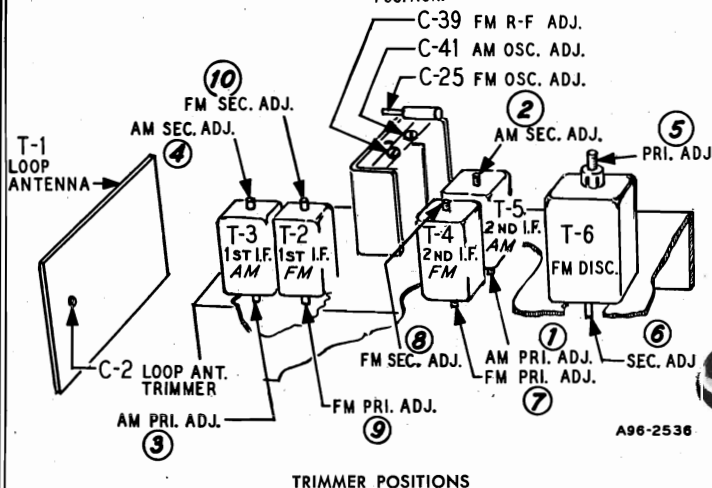
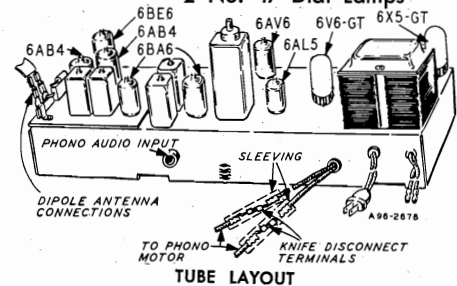
DRIVE CORD REPLACEMENT

Replacement of the drive cord may be accomplished as shown in the illustration. For this purpose use the new drive cord assembly listed in the Replacement Parts List. Turn the gang condenser until the plates are fully meshed. Then install the string as shown, winding three turns clockwise around the tuning shaft with the turns progressing away from the chassis. After the cord is installed, rotate the tuning shaft several times in order to take up any slack in the cord.



Tube and Dial Lamp Complement

- 1 6BE6 AM Converter & FM Osc.
- 1 6BA6 1st I-F Amplifier
- 1 6BA6 2nd I-F Amplifier
- 1 6AL5 FM Discriminator
- 1 6AV6 Audio Amplifier, AM 2nd Detector and AVC
- 1 6V6GT Audio Output
- 1 6X5GT Rectifier
- 1 6AB4 R-F Amplifier
- 1 6AB4 Mixer
- 2 No. 47 Dial Lamps



2-51 69X2225B

VM No. 950 RECORD CHANGER

MODELS 4-A-86 Rev., 4-A-95, The Westmoreland

ALIGNMENT PROCEDURES AM STAGES

The following is required for aligning:
An All Wave Signal Generator Which Will Provide an Accurately Calibrated Signal at the Test Frequencies as Listed.
Output Indicating Meter, Non-Metallic Screwdriver, Dummy Antennas — .1 mf, and 50 mmf.

Volume Control Maximum all Adjustments.
Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.
Allow Chassis and Signal Generator to "Heat Up" for Several Minutes.

| SIGNAL GENERATOR | | | | GANG CONDENSER SETTING | ADJUST | ADJUST FOR |
|-------------------|--------------------------------------------|-----------------------|-------------------|--------------------------------------------------------------------|--------------------------------|----------------|
| FREQUENCY SETTING | CONNECT GENERATOR OUTPUT TO | THROUGH DUMMY ANTENNA | CONNECT GROUND TO | | | |
| 455 KC | Control Grid 1st 6BA6 Pin No. 1 | .1 mf | Chassis Base | Rotor Fully Open | 2nd I.F. Pri. (1) and Sec. (2) | Maximum Output |
| 455 KC | Control Grid 6BE6 Pin No. 7 1st Det. | .1 mf | Chassis Base | Rotor Fully Open | 1st I.F. Pri. (3) and Sec. (4) | Maximum Output |
| 455 KC | Control Grid 6BE6 Pin No. 7 | .1 mf | Chassis Base | Rotor Fully Open | 2nd I-F Pri. (1) and Sec. (2) | Maximum Output |
| 1620 KC | Control Grid 6BE6 Pin No. 7 | .1 mf | Chassis Base | Rotor Fully Open | Oscillator C-41 | Maximum Output |
| 1400 KC | External Antenna Terminal | 50 mmf | Chassis Base | Turn Rotor to Max. Output. Set Pointer to 1400 KC See Note A | Antenna C-2 | Maximum Output |

NOTE A—If the pointer is not at 1400 KC on the dial, reset pointer to the 1400 KC mark on the dial scale.

FM STAGES

The following is required for aligning:

An accurately calibrated signal generator providing unmodulated signals at the test frequencies listed below.

Non-metallic screwdriver.

Dummy Antennas and I-F Loading Resistor—2500 mmf, 300 ohms

Zero center scale DC vacuum tube voltmeter having a range of approximately 3 volts.

(If a zero center scale meter is not available, a standard scale vacuum tube voltmeter may be used by reversing the meter connections for negative readings).

Allow chassis and signal generator to "Heat Up" for several minutes.

| SIGNAL GENERATOR | | THROUGH DUMMY ANTENNA | BAND SWITCH SETTING | GANG CONDENSER SETTING | ADJUST | ADJUST FOR | |
|-------------------|-----------------------------|-----------------------------------------------------------|---------------------|------------------------|------------------|-----------------------------------------------------------------------------------------------------------------|--------------------|
| FREQUENCY SETTING | CONNECT GENERATOR OUTPUT TO | | | | | | |
| Discriminator | 10.7 MC | 6BA6 2nd I-F Pin 1 and Chassis | 2500 mmf | FM | Rotor Fully Open | Disc. Pri. (5) Note A | Maximum Deflection |
| | 10.7 MC | 6BA6 2nd I-F Pin 1 and Chassis | 2500 mmf | FM | Rotor Fully Open | Disc. Sec. (6) Note B | |
| I-F | 10.7 MC Note C | 6BA6 1st I-F Pin 1 and Chassis | 2500 mmf | FM | Rotor Fully Open | 2nd I-F Pri. (7) Sec. (8) Note D | Maximum Deflection |
| Discriminator | 10.7 MC | 6BA6 1st I-F Pin 1 and Chassis | 2500 mmf | FM | Rotor Fully Open | Disc. Pri. (5) Note D | Maximum Deflection |
| I-F | 10.7 MC | Junction C-32A & B (Dual 100 mmf cond.) And chassis | 2500 mmf | FM | Rotor Fully Open | 1st I-F Pri. (9) & Sec. (10) 2nd I-F Pri. (7) & Sec. (8) Disc. Pri. (5) In Order Shown Note D | Maximum Deflection |
| | 10.7 MC | Same as above | 2500 mmf | FM | Rotor Fully Open | Disc. Sec. (6) Note B | |

RECHECK I-F ADJUSTMENTS IN ORDER GIVEN

| | | | | | | | |
|------------|-------|-------------------------------------------------------------------------------------------------------|----------|----|---------------------------------|-----------|--------------------|
| Oscillator | 108.5 | Disconnect built-in dipole antenna and connect generator to dipole terminals with resistor in series. | 300 ohms | FM | Rotor Fully Open | Osc. C-25 | Deflection Maximum |
| Antenna | 104.5 | Same as above | 300 ohms | FM | Tune rotor for max. AVC voltage | Ant. C-39 | Maximum Deflection |

RECHECK ANTENNA & OSC. ADJUSTMENTS IN ORDER GIVEN

FM ALIGNMENT NOTES

NOTE A—The zero center scale DC vacuum tube voltmeter is to be connected between chassis ground and the AVC line. A signal of .1 volt must be fed into the receiver for this adjustment.
Note output voltage on the zero center DC vacuum tube voltmeter.

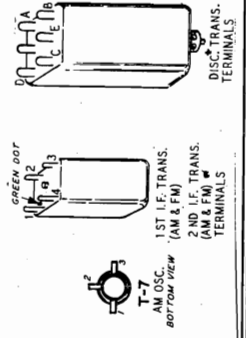
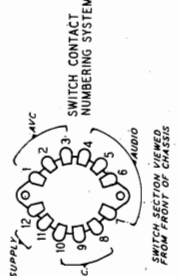
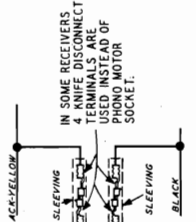
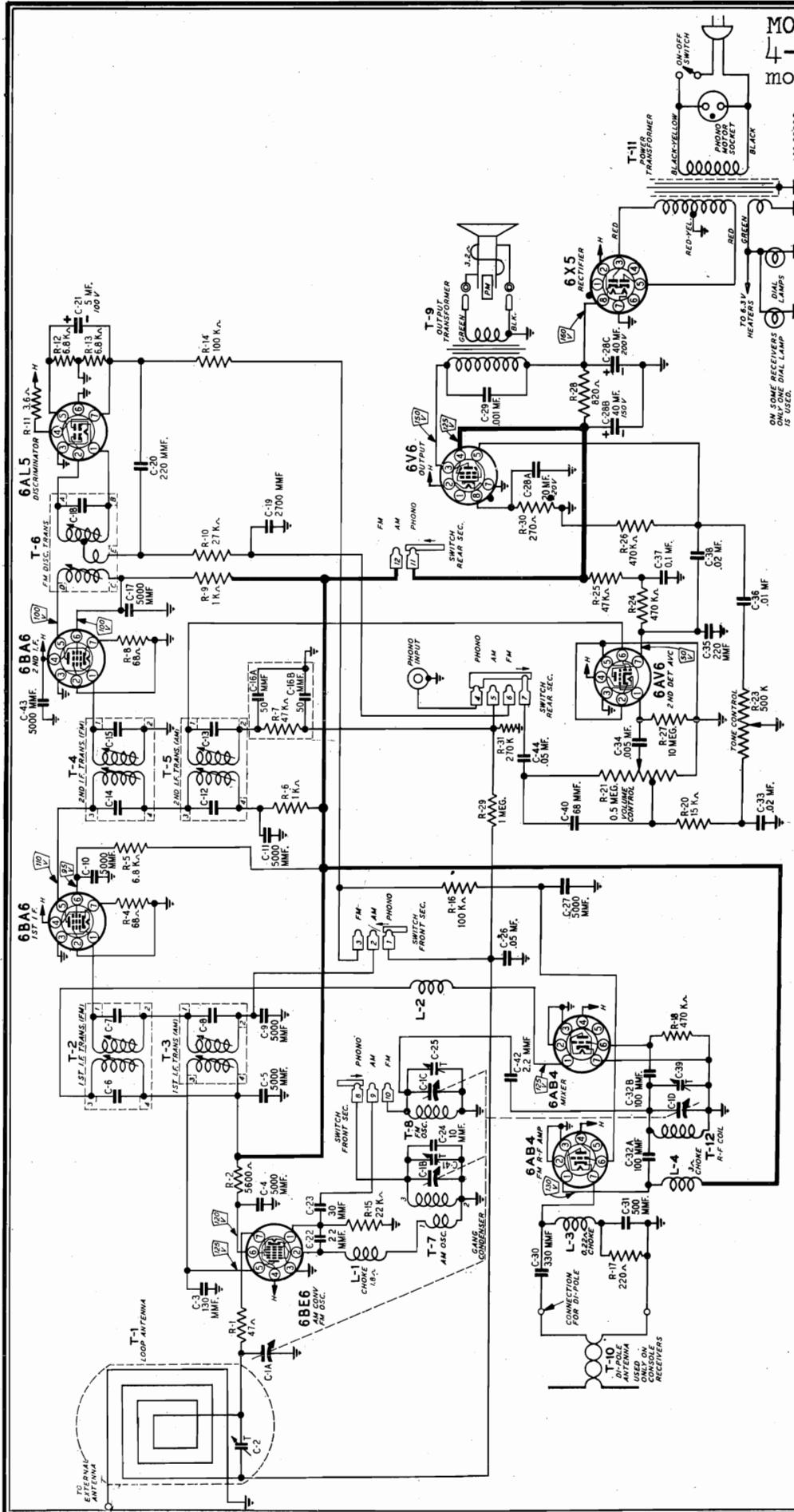
NOTE B—Disconnect zero center DC vacuum tube voltmeter from AVC and connect it at the audio takeoff point at the

27 K ohm resistor (R-10) and its junction with the terminal strip. Adjust for zero voltage indication.

NOTE C—AM I-F coils must be aligned before attempting to align the FM I-F coils.

NOTE D—Connect zero center DC vacuum tube voltmeter as in Note A. Adjust input to give same output on the zero center DC vacuum tube voltmeter as in Note A.

MODELS 4-A-86 Rev.,
4-A-95, The West-
moreland



NOTE - C-33 is .01 mf.

MODELS 4-A-86 Rev., 4-A-95, The Westmoreland

REPLACEMENT PARTS LIST

MISCELLANEOUS

| | | |
|--------|---------------------------|-------|
| 12A480 | 10" P.M. Speaker | ..... |
| 4X1082 | Escutcheon | ..... |
| 10A759 | Knob (Mahogany) | ..... |
| 10A765 | Knob (White Oak) | ..... |
| 13X546 | Line Cord & Plug Assembly | ..... |
| 2A393 | Band Change Switch | ..... |
| 3A435 | Molded Octal Tube Socket | ..... |
| 3A305 | Phono Socket | ..... |
| 3A426 | Tube Socket (1st 6BA6) | ..... |
| 3A427 | Tube Socket (6BE6) | ..... |
| 3A439 | Tube Socket (Miniature) | ..... |

CAPACITORS

| | | | |
|-------|--------|------------------------------------|------------------------|
| C-1 | 14A209 | Gang Condenser Assembly | ..... |
| C-2 | 17A256 | 2-24 mmf | Trimmer..... |
| C-3 | 47X559 | 130 mmf | Ceramic..... |
| C-4 | | | |
| C-5 | | | |
| C-9 | | | |
| C-10 | | | |
| C-11 | 47X507 | 5000 mmf | Ceramic..... |
| C-17 | | | |
| C-27 | | | |
| C-43 | | | |
| C-6 | | Part of T-2 (1st I-F Trans. FM) | |
| C-7 | | Part of T-3 (1st I-F Trans. AM) | |
| C-8 | | Part of T-5 (2nd I-F Trans. AM) | |
| C-12 | | Part of T-4 (2nd I-F Trans. FM) | |
| C-13 | | | |
| C-14 | | | |
| C-15 | | | |
| C-16A | | | |
| C-16B | 47X112 | 50-50 mmf | Dual Mica.... |
| C-18 | | Part of T-6 (Discriminator Trans.) | |
| C-19 | 47X492 | 2700 mmf | Molded Mica.. |
| C-20 | 47X468 | 220 mmf | Ceramic..... |
| C-35 | | | |
| C-21 | 45X361 | 5 mf | 100 V Dry Electrolytic |
| C-22 | 47X557 | 2.2 mmf | Ceramic..... |
| C-42 | | | |
| C-23 | 47X558 | 30 mmf | Ceramic..... |
| C-24 | 47X523 | 10 mmf | Ceramic..... |
| C-25 | 17A255 | 1-8 mmf | Trimmer..... |
| C-26 | B66503 | .05 mf | 200 V Tubular..... |
| C-44 | | | |
| C-28A | | 20 mf | 20 V |
| C-28B | 45X360 | 40 mf | 150 V Dry Electrolytic |
| C-28C | | 40 mf | 200 V |
| C-29 | H66102 | .001 mf | 800 V Tubular..... |
| C-30 | 47X470 | 330 mmf | Molded Mica.. |
| C-31 | 47X508 | 500 mmf | Ceramic..... |
| C-32A | | | |
| C-32B | 76X4 | 100 mmf | Dual Ceramic.. |
| C-33 | | | |
| C-36 | B66103 | .01 mf | 200 V Tubular..... |
| C-34 | D66502 | .005 mf | 400 V Tubular..... |
| C-37 | D66104 | .1 mf | 400 V Tubular..... |
| C-38 | D66203 | .02 mf | 400 V Tubular..... |
| C-39 | | Part of C-1 (Gang Condenser) | |
| C-41 | | | |
| C-40 | 47X471 | 68 mmf | Ceramic..... |

RESISTORS

| | | Ohms | Watts | |
|------|--------|---------|-------|----------------|
| R-1 | B85470 | 47 | 0.5 | Carbon..... |
| R-2 | B85562 | 5600 | 0.5 | Carbon..... |
| R-4 | | | | |
| R-8 | B84680 | 68 | 0.5 | Carbon..... |
| R-5 | | | | |
| R-12 | B84682 | 6800 | 0.5 | Carbon..... |
| R-13 | | | | |
| R-6 | B85102 | 1000 | 0.5 | Carbon..... |
| R-9 | | | | |
| R-7 | B85473 | 47 K | 0.5 | Carbon..... |
| R-25 | B85273 | 27 K | 0.5 | Carbon..... |
| R-10 | B85273 | 27 K | 0.5 | Carbon..... |
| R-11 | 43X233 | 3.6 | 0.5 | Wirewound... |
| R-14 | B85104 | 100 K | 0.5 | Carbon..... |
| R-16 | | | | |
| R-15 | B85223 | 22 K | 0.5 | Carbon..... |
| R-17 | B84221 | 220 | 0.5 | Carbon..... |
| R-18 | | | | |
| R-24 | B85474 | 470 K | 0.5 | Carbon..... |
| R-26 | | | | |
| R-20 | B85153 | 15 K | 0.5 | Carbon..... |
| R-21 | 36X372 | .5 meg. | | Volume Control |
| R-23 | 40X310 | .5 meg. | | Tone Control |
| R-27 | B85106 | 10 meg. | 0.5 | Carbon..... |
| R-28 | D84821 | 820 | 2.0 | Carbon..... |
| R-29 | B85105 | 1 meg. | 0.5 | Carbon..... |
| R-30 | B84271 | 270 | 0.5 | Carbon..... |
| R-31 | B84274 | 270 K | 0.5 | Carbon..... |

TRANSFORMERS AND COILS

| | | | |
|------|--------|---------------------------|-------|
| L-1 | 35A5 | Insulated Choke | ..... |
| L-2 | 9A2103 | Parasitic Choke | ..... |
| L-3 | 35A9 | Insulated Choke | ..... |
| L-4 | 35A8 | Insulated Choke | ..... |
| T-1 | 9A2146 | "B" Range Loop Antenna | ..... |
| T-2 | 9A2060 | 1st I-F Trans. (FM) | ..... |
| T-3 | 9A2062 | 1st I-F Trans. (AM) | ..... |
| T-4 | 9A2061 | 2nd I-F Trans. (FM) | ..... |
| T-5 | 9A2063 | 2nd I-F Trans. (AM) | ..... |
| T-6 | 9A2161 | Discriminator Transformer | ..... |
| T-7 | 9A2065 | Oscillator Coil (AM) | ..... |
| T-8 | 9A2067 | Oscillator Coil (FM) | ..... |
| T-9 | 51X134 | Output Transformer | ..... |
| T-10 | 9A2209 | Dipole Antenna | ..... |
| T-11 | 53X322 | Power Transformer | ..... |
| T-12 | 9A2066 | Antenna Coil (FM) | ..... |

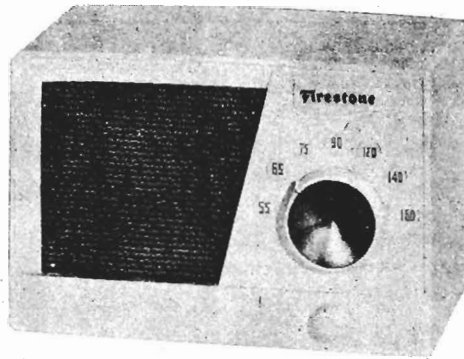
DIAL AND DRIVE ASSEMBLY

| | | |
|---------|-------------------------------|-------|
| 58X739 | Dial Glass | ..... |
| 15X251 | Pointer | ..... |
| 19X192 | "C" Washer (Mtg. Drive Shaft) | ..... |
| 6X66 | Rubber Grommet | ..... |
| 25X1616 | Dial Bracket | ..... |
| 28X113 | Drive Cord Tension Spring | ..... |
| 7A103 | No. 47 Pilot Light | ..... |
| 7A199 | Pilot Light Socket Assembly | ..... |
| 10X38 | Drive Cord Assembly | ..... |
| 26X486 | Drive Shaft | ..... |

VM No. 950 RECORD CHANGER PARTS

| | | |
|-------|----------------------------------------|-------|
| P-81 | Crystal Cartridge with Unipoint Needle | ..... |
| 85-35 | Unipoint Needle | ..... |
| P-77 | Crystal Cartridge with Needles | ..... |
| 85-18 | Needle, Microgroove (Red) | ..... |
| 85-16 | Needle, Regular | ..... |

MODELS 4-A-90,
4-A-91



Cabinet Dimensions - 8-3/4"x4-7/16"x5-11/16"
 Weight - 4lbs.
 Power Supply - 110 to 120 Volt AC-DC
 Tuning Range - 540 to 1600 KC
 Intermediate Freq. - 455 KC
 Loud Speaker - 4 Inch P.M.
 Voice Coil Impedance - 3.2 Ohm at 400 Cycles

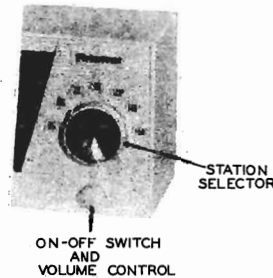
Power Output - Undistorted- 0.8 Watts
 Maximum - 1.3 Watts

Tube Complement- (Code No. 297-0-3212A)

- 12SA7 - Converter
- 12SK7 - I.F. Amplifier
- 12SQ7 - Diode-Audio
- 50L6GT - Output
- 35Z5GT - Rectifier

Tube Complement- (Code 297-0-3212)

- 12BE6 - Converter
- 12BA6 - I.F. Amplifier
- 12AV6 - Diode-Audio
- 50C5 - Output
- 35W4 - Rectifier



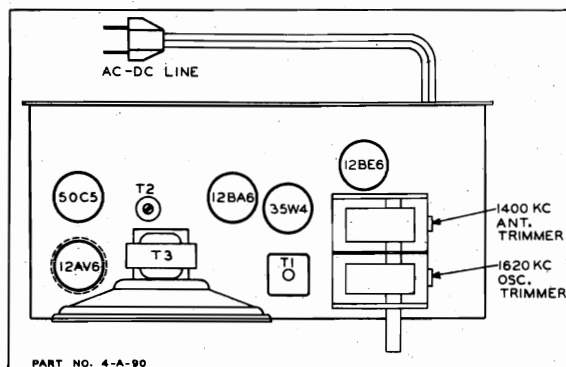
ALIGNMENT PROCEDURE

For alignment procedure read tabulations from left to right and make the adjustments marked (1) first, (2) next, (3) third.

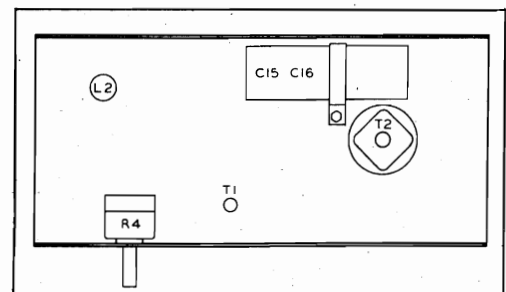
Before starting alignment:

- (A) Remove the chassis and loop antenna from the cabinet at the same time by removing the two screws on the rear apron of the chassis which fasten the chassis to the cabinet.
- (B) Use an accurately calibrated test oscillator with some type of output measuring device.

| Steps | Set Receiver dial to: | TEST | OSCILLATOR | DUMMY ANTENNA | Refer to parts layout diagram for location of trimmers mentioned below: |
|-------|----------------------------------------------------|--------------------------------------|-------------------------------------------------------------------|---------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| | | Adjust test oscillator frequency to: | Attach output of test oscillator to: | | |
| 1 | Any point where no interfering signal is received. | EXACTLY 455 KC | High side to grid of converter Tube. Low side to common negative. | 1. MFD. CONDENSER. | Adjust 2nd I.F. (T2) and then each of the slugs of the 1st I.F. (T1) for maximum output. |
| 2 | Exactly 1620 KC | Exactly 1620 KC | DUMMY ANTENNA | 2 turns of Hookup wire 6" in Dia. Place Approx. 3 foot from & parallel to loop. | Adjust 1620 KC oscillator trimmer for maximum output. |
| 3 | Approx. 1400 KC | Approx. 1400 KC | DUMMY ANTENNA | | Adjust 1400 KC antenna trimmer for maximum output. |

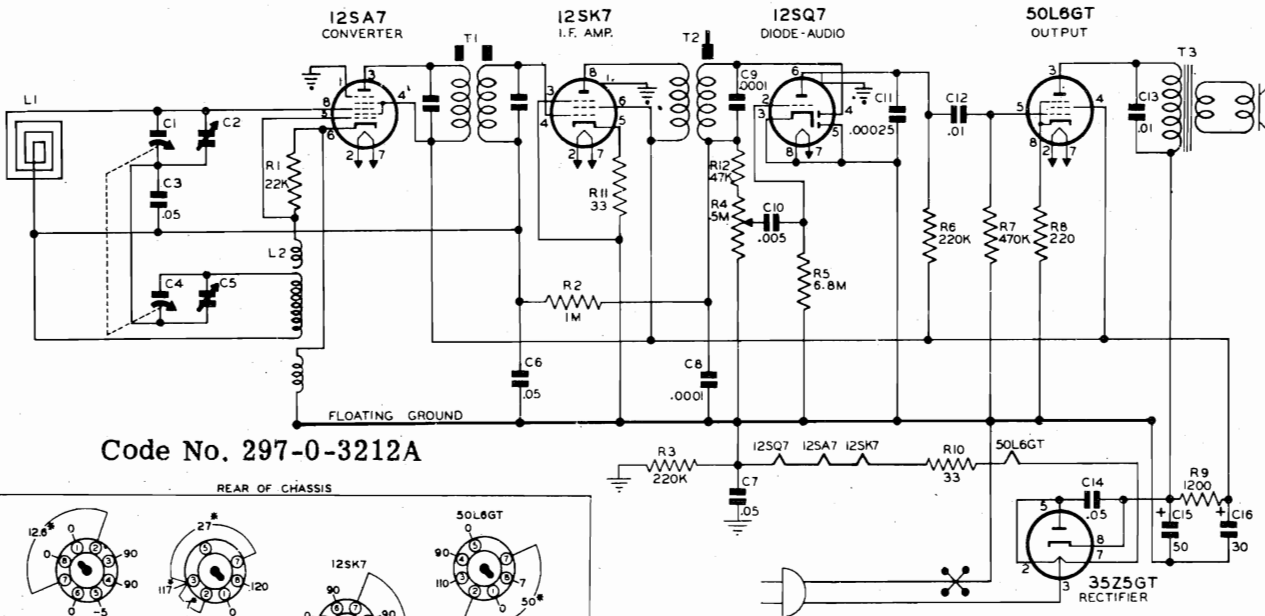


Top View of Chassis
Code No. 297-0-3212

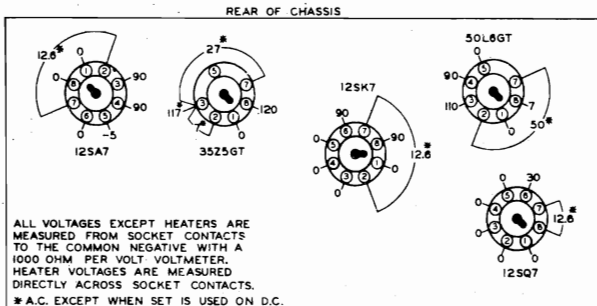


Bottom View of Chassis
Code No. 297-0-3212

MODELS 4-A-90,
4-A-91



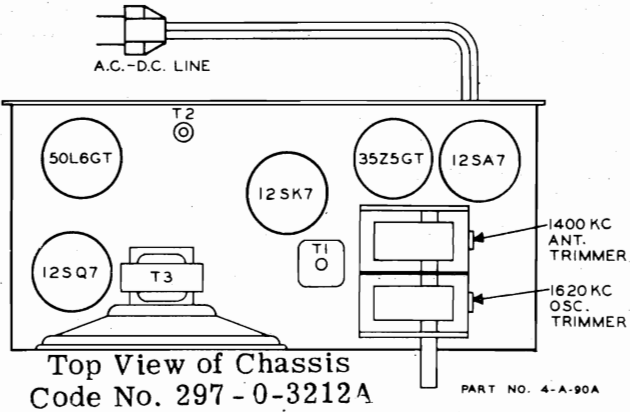
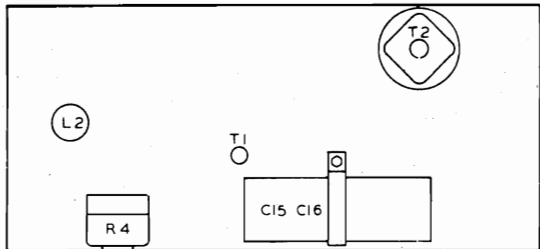
Code No. 297-0-3212A



PARTS LIST FOR CODE NO. 297-0-3212A

| ILLUS. NO. | PART NUMBER | PART NAME | DESCRIPTION |
|------------|---------------------------|---------------------|---------------------------------|
| C3, C6, C7 | N-1345 | Condenser | Paper .05 MFD. 200V |
| C8 | N-6015 | Condenser | Ceramic .0001 MFD. 500 V. 20% |
| C9 | N-7549 | Condenser | Ceramic .0001 MFD. 500 V. 10% |
| C10 | N-4894 | Condenser | Paper .005 MFD. 600 V. |
| C11 | N-6488 | Condenser | Ceramic .00025 MFD. 500 V. 20% |
| C12, C13 | N-1344 | Condenser | Paper .01 MFD. 400 V. |
| C14 | N-1346 | Condenser | Paper .05 MFD. 400 V. |
| C15 | N-7889 | Condenser | Electrolytic (50 MFD. 150V.) |
| C16 | N-7889 | Condenser | Electrolytic (30 MFD. 150V.) |
| R1 | N-4025 | Resistor | Carbon 22,000 Ohm 1/2W 20% |
| R2 | N-1262 | Resistor | Carbon 1.0 Megohm 1/2W 20% |
| R3, R6 | N-4026 | Resistor | Carbon 220,000 Ohm 1/2W 20% |
| R4 | N-7890 | Volume Control | 500,000 Ohm with Switch |
| R5 | N-4028 | Resistor | Carbon 6.8 Megohm 1/2W 20% |
| R6 | N-4026 | Resistor | Carbon 220,000 Ohm 1/2W 20% |
| R7 | N-4027 | Resistor | Carbon 470,000 Ohm 1/2W 20% |
| R8 | N-4024 | Resistor | Carbon 220 Ohm 1/2W 10% |
| R9 | N-4900 | Resistor | Carbon 1,200 Ohm 1.0 W 10% |
| R10 | N-4068 | Resistor | Carbon 33 Ohm 1.0 W 20% |
| R11 | N-4022 | Resistor | Carbon, 33 Ohm 1/2W 20% |
| *R12 | N-4063 | Resistor | Carbon 47,000 Ohm 1/2W 20% |
| L1 | N-8138 | Coil | Loop Antenna and Cabinet Back |
| L2 | N-7139 | Coil | Oscillator |
| T1 | N-7981 | Coil | 1st I.F. Transformer |
| T2 | N-7542 | Coil | 2nd I.F. Transformer |
| T3 | (Part of N-7824 Assembly) | Transformer, Output | Speaker and Output Transformer |
| | N-7824 | Assembly | Speaker and Output Transformer |
| | N-7141 | Condenser | Variable - 2 Gang |
| | N-8270 | Assembly | Cabinet Front Panel |
| | #321 | Cabinet | White, Plastic) For Stock No. |
| | N-8191 | Knob | Tuning, White) 4-A-90 Only |
| | N-8192 | Knob | Volume, White) 4-A-91 Only |
| | #322 | Cabinet | Walnut, Plastic) For Stock No. |
| | N-8140 | Knob | Tuning, Walnut) 4-A-90 Only |
| | N-8144 | Knob | Volume, Walnut) 4-A-91 Only |
| | N-1090 | Line Cord | 6 Foot, Rubber |

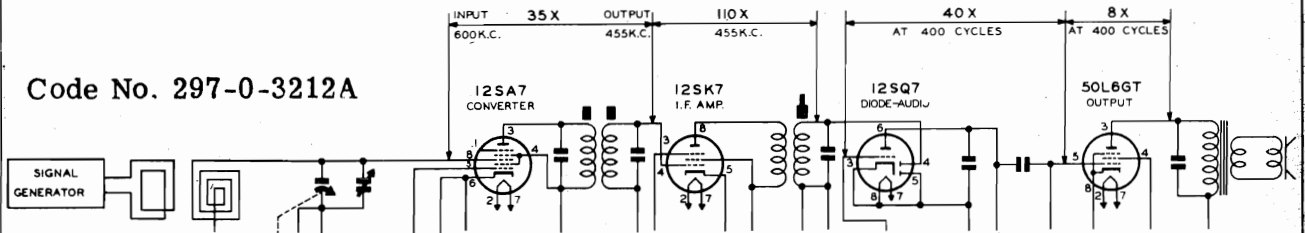
** R11 Resistor (47,000 Ohm 1/2 W. 20%) is included in R4 Volume Control in some receivers.



Be sure R.F. and I.F. stages are accurately aligned before measuring gain. R.F. gains can be measured with a "channel" type instrument containing a tuned and calibrated R.F. amplifier. A vacuum tube voltmeter may be used for audio gain measurements. Observe following precautions:

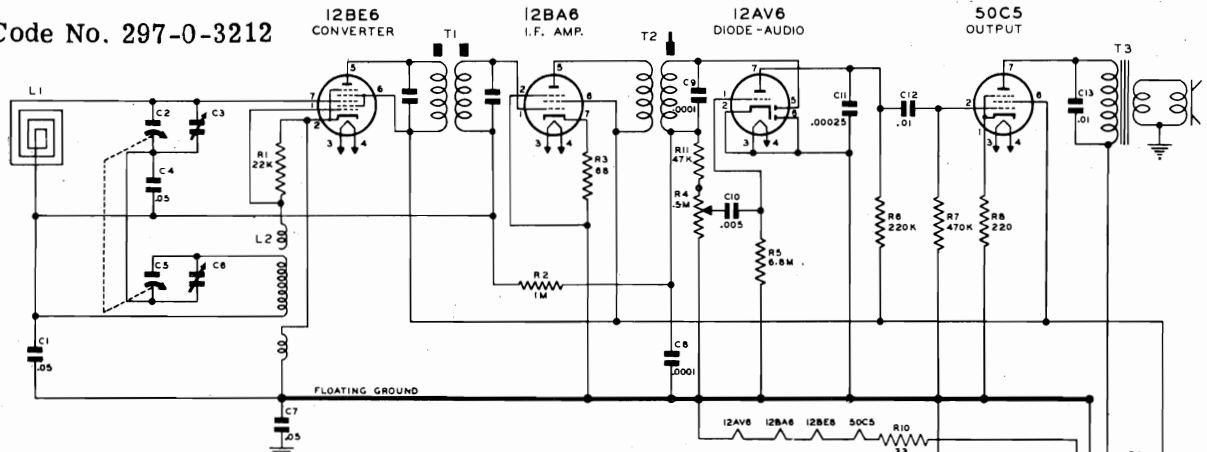
1. For all gain measurements connect signal generator as shown. Use 600 KC. signal with 400 cycle modulation (use nearby frequency if local station interferes.)
2. Be sure radio is carefully tuned to generator signal (use weak signal for sharp tuning.)
3. When using a "channel" type instrument carefully tune it for maximum output at desired frequency before making measurements.

Code No. 297-0-3212A



Differences in tube characteristics, tolerance of parts, adjustment of tuned circuits, and variations of line voltage will influence stage gain. Accuracy of measurements is dependent upon careful tuning of receiver to generator signal and experience in using your test equipment. These factors may create considerable variation in gain measurements.

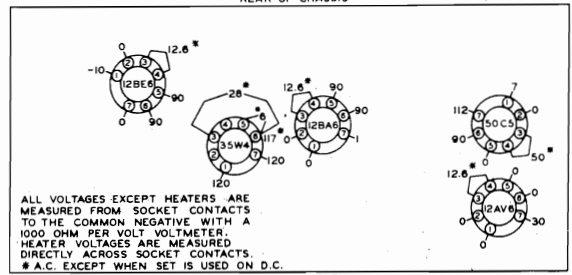
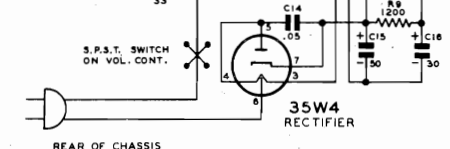
Code No. 297-0-3212



PARTS LIST FOR CODE NO. 297-0-3212

| ILLUS. NO. | PART NUMBER | PART NAME | DESCRIPTION |
|------------|---------------------------|----------------|------------------------------------------|
| C1,C4,C7 | N-1345 | Condenser | Paper .05 MFD. 200V |
| C8 | N-6015 | Condenser | Ceramic .0001 MFD. 500 V.20% |
| C9 | N-7549 | Condenser | Ceramic .0001 MFD. 500 V.10% |
| C10 | N-4894 | Condenser | Paper .005 MFD. 600 V. |
| C11 | N-6488 | Condenser | Ceramic .00025 MFD. 500 V.20% |
| C12,C13 | N-1344 | Condenser | Paper .01 MFD. 400 V. |
| C14 | N-1346 | Condenser | Paper .05 MFD. 400 V. |
| C15 | N-7889 | Condenser | Electrolytic (50 MFD. 150V.) |
| C16) | N-7889 | Condenser | Electrolytic (30 MFD. 150V.) |
| R1 | N-4025 | Resistor | Carbon 22,000 Ohm 1/2W 20% |
| R2 | N-1262 | Resistor | Carbon 1.0 Megohm 1/2W 20% |
| R3 | N-6485 | Resistor | Carbon 68 Ohm 1/2W 10% |
| R4 | N-7890 | Volume Control | 500,000 Ohm with Switch |
| R5 | N-4028 | Resistor | Carbon 6.8 Megohm 1/2W 20% |
| R6 | N-4026 | Resistor | Carbon 220,000 Ohm 1/2W 20% |
| R7 | N-4027 | Resistor | Carbon 470,000 Ohm 1/2W 20% |
| R8 | N-4024 | Resistor | Carbon 220 Ohm 1/2W 10% |
| R9 | N-4900 | Resistor | Carbon 1,200 Ohm 1.0 W 10% |
| R10 | N-4068 | Resistor | Carbon 33 Ohm 1.0 W 20% |
| R11 | N-4063 | Resistor | Carbon 47,000 Ohm 1/2W 20% |
| L1 | N-8138 | Coil | Loop Antenna and Cabinet Back Oscillator |
| L2 | N-7139 | Coil | Oscillator |
| T1 | N-7888 | Coil | 1st I.F. Transformer |
| T2 | N-7542 | Coil | 2nd I.F. Transformer |
| T3 | (Part of N-7824 Assembly) | Transformer | Output |
| | N-7824 | Assembly | Speaker and Output Transformer |
| | N-7141 | Condenser | Variable - 2 Gang |
| | N-8270 | Assembly | Cabinet Front Panel |

PART NO. 297-0-3212



ALL VOLTAGES EXCEPT HEATERS ARE MEASURED FROM SOCKET CONTACTS TO THE COMMON NEGATIVE WITH A 1000 OHM PER VOLT VOLTMETER. HEATER VOLTAGES ARE MEASURED DIRECTLY ACROSS SOCKET CONTACTS. * A.C. EXCEPT WHEN SET IS USED ON D.C.

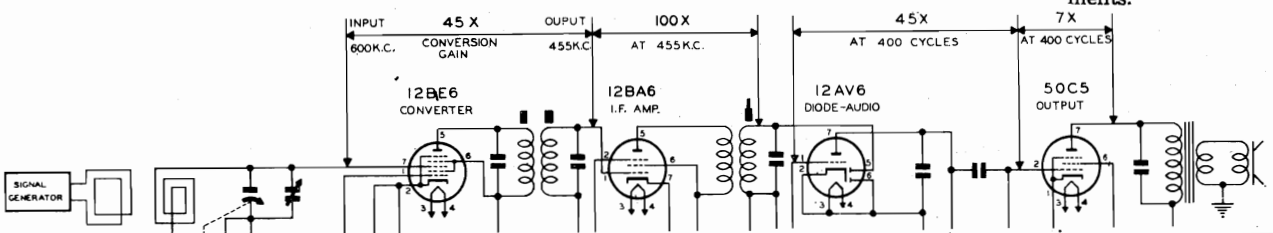
VOLTAGE TABLE (BOTTOM VIEW OF CHASSIS)

| | | | |
|--------|-----------|-----------------|---------------|
| #321 | Cabinet | White, Plastic | For Stock No. |
| N-8191 | Knob | Tuning, White | 4-A-91 Only |
| N-8192 | Knob | Volume, White | 4-A-91 Only |
| #322 | Cabinet | Walnut, Plastic | For Stock No. |
| N-8140 | Knob | Tuning, Walnut | 4-A-90 Only |
| N-8144 | Knob | Volume, Walnut | 4-A-90 Only |
| N-1090 | Line Cord | 6 Foot, Rubber | |

** R11 Resistor (47,000 Ohm 1/2 W. 20%) is included in R4 Volume Control in some receivers.

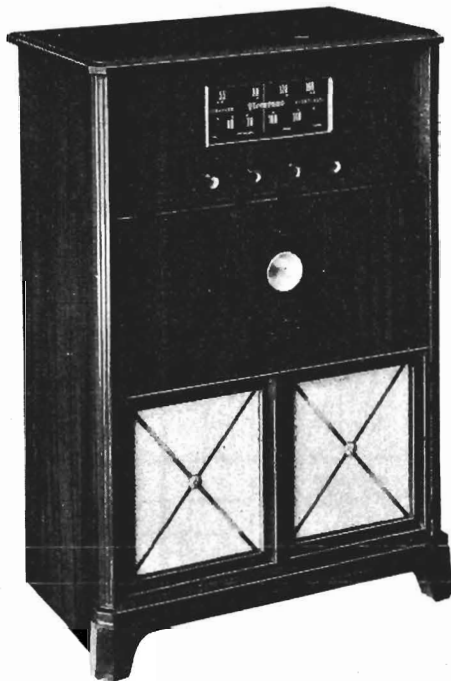
Be sure R.F. and I.F. stages are accurately aligned before measuring gain. R.F. gains can be measured with a "channel" type instrument containing a tuned and calibrated R.F. amplifier. A vacuum tube voltmeter may be used for audio gain measurements. Observe following precautions:

- For all gain measurements connect signal generator as shown. Use 600 KC. signal with 400 cycle modulation (use nearby frequency if local station interferes.)
- Be sure radio is carefully tuned to generator signal (use weak signal for sharp tuning.)
- When using a "channel" type instrument carefully tune it for maximum output at desired frequency before making measurements.



MODEL 4-A-96,
The New Waverly

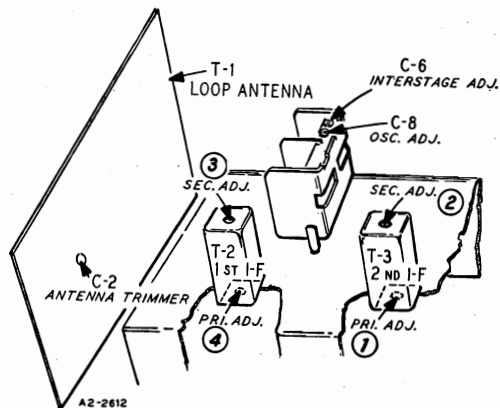
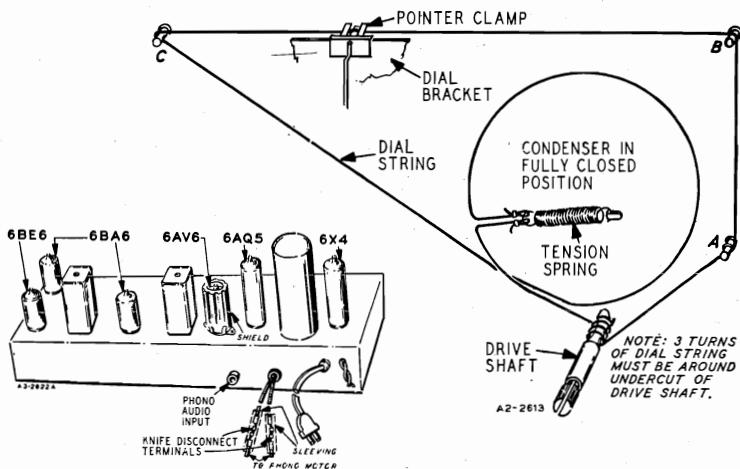
THE NEW WAVERLY



DRIVE CORD REPLACEMENT

DIAL POINTER CORD

Use a new S-10X77 drive cord assembly or a new length of cord 48 inches long for the installation. Install the cord as shown in the illustration, winding three turns counterclockwise around the drive shaft with the turns progressing away from the chassis. After completing the installation rotate the drive shaft a few turns to take up the slack in the cord.



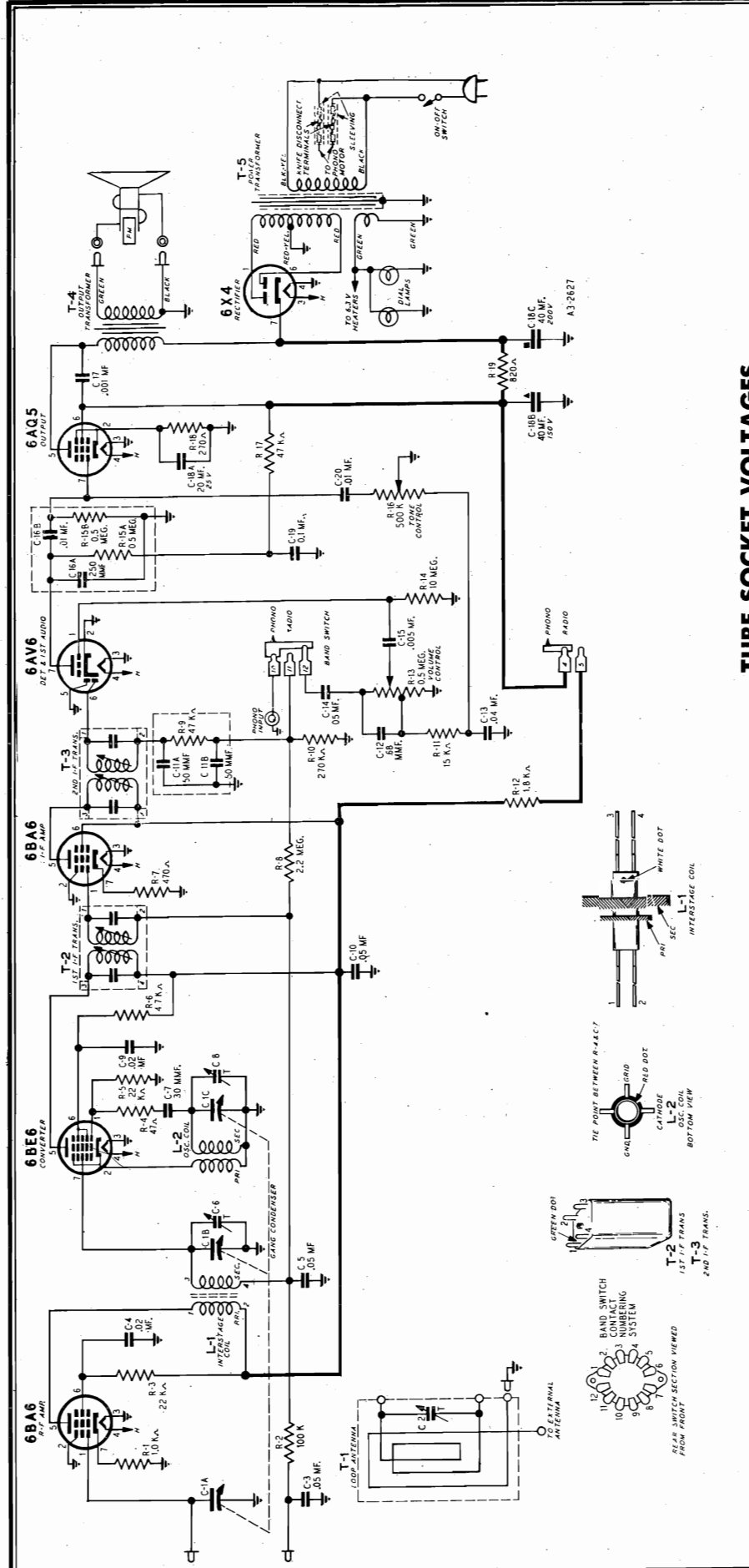
ELECTRICAL SPECIFICATIONS

6 Tube Superhetrodyne, including Rectifier Tube.
 Tuning Frequency Range 540 to 1600 KC
 Power Consumption . . . (Radio) 35 watts (At 117 volts AC)
 (Phono) 20 watts, 60 cycles only
 Power Output 2.0 watt maximum, 1.1 watt (10% distortion)
 Intermediate Frequency 455 KC
 Sensitivity 10 Microvolts Average
 Selectivity 45 KC Wide at 1000 Times Signal
 Speaker (3.2 ohm Voice Coil) 8" PM Dynamic

Tube and Dial Lamp Complement

- 1 6BA6 R-F Amplifier
- 1 6BE6 Converter
- 1 6BA6 I-F Amplifier
- 1 6AV6 Det. & 1st Audio
- 1 6AQ5 Output
- 1 6X4 Rectifier
- 1 No. 47 Dial Lamp

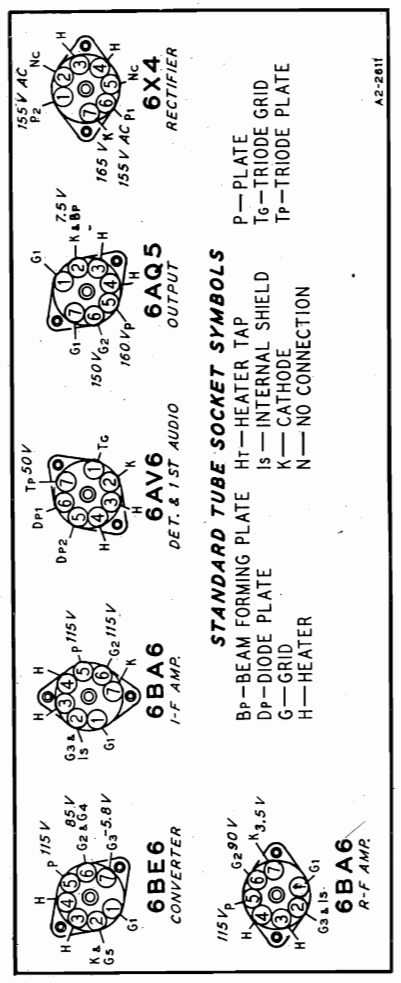
MODEL 4-A-96,
The New Waverly



TUBE SOCKET VOLTAGES

Socket voltages are shown on the Bottom Socket diagram at the tube socket terminals. All voltages are between the socket terminal and chassis ground. Plate, screen and cathode voltages were taken with a 1000 ohm-per-volt meter with a 300 volt scale used for plate and screen voltages. Audio grid voltages were read with a vacuum tube volt-meter. Conditions of measurement are:

- Line voltage 117 Volts AC
- Signal Input None
- A Variation of $\pm 10\%$ is usually permissible.



MODEL 4-A-96,
The New Waverly

ALIGNMENT PROCEDURE

The following is required for aligning:
An All Wave Signal Generator Which Will Provide an Accurately Calibrated Signal at the Test Frequencies as Listed.
Output Indicating Meter, Non-Metallic Screwdriver, Dummy Antennas, — .1 mf, and 50 mmf.

Volume Control Maximum all Adjustments.
Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.
Allow Chassis and Signal Generator to "Heat Up" for Several Minutes.

| SIGNAL GENERATOR | | | | GANG CONDENSER SETTING | ADJUST | ADJUST FOR |
|-------------------|--------------------------------------|-----------------------|-------------------|--------------------------------------------------------------|---------------------------------|----------------|
| FREQUENCY SETTING | CONNECT GENERATOR OUTPUT TO | THROUGH DUMMY ANTENNA | CONNECT GROUND TO | | | |
| 455 KC | Control Grid I-F 6BA6 Pin No. 1. | .1 mf | Chassis Base | Rotor Fully Open | 2nd I.F. -Pri. (1) and Sec. (2) | Maximum Output |
| 455 KC | Control Grid 6BE6 Pin No. 7 1st Det. | .1 mf | Chassis Base | Rotor Fully Open | 1st I.F. Pri. (4) and Sec. (3) | Maximum Output |
| 455 KC | Control Grid 6BE6 Pin No. 7 | .1 mf | Chassis Base | Rotor Fully Open | 2nd I.F. Pri. (1) and Sec. (2) | Maximum Output |
| 1620 KC | Control Grid 6BE6 Pin No. 7 | .1 mf | Chassis Base | Rotor Fully Open | Oscillator C-8 | Maximum Output |
| 1400 KC | Control Grid R-F 6BA6 Pin No. 1 | .1 mf | Chassis Base | Turn Rotor to Max. Output. Set Pointer to 1400 KC See Note A | Interstage C-6 See Note B | Maximum Output |
| 1400 KC | External Antenna Terminal | 50 mmf | Chassis Base | Turn Rotor to Max. Output. Set Pointer to 1400 KC See Note A | Antenna C-2 See Note B | Maximum Output |

NOTE A—If the pointer is not at 1400 KC on the dial, reset pointer to the 1400 KC mark on the dial scale.
NOTE B—Turn the rotor back and forth and adjust the trimmer until the peak of greatest intensity is obtained.

RESISTORS

| MISCELLANEOUS | | Ohms | Watts | |
|---------------|--------------------------------|--------------------|--------|-------------------------------------------|
| 12A477 | 8" P.M. Speaker | R-1 | B84102 | 1K 0.5 Carbon |
| 10A759 | Knobs | R-2 | B85104 | 100K 0.5 Carbon |
| 4X1082 | Escutcheon | R-3 } R-5 } | B85223 | 22K 0.5 Carbon |
| 2A405 | Radio-Phono Switch | R-4 | B85470 | 47 0.5 Carbon |
| 13X546 | Line Cord & Plug Assembly | R-6 | B84472 | 4.7K 0.5 Carbon |
| 3A458 | Tube Socket (6AV6) | R-7 | B84471 | 470 0.5 Carbon |
| 3A426 | Tube Socket (miniature) | R-8 | B85225 | 2.2 meg. 0.5 Carbon |
| 30X560 | Line Cord Clamp | R-9 | | Part of 76X1 Assembly (See Miscellaneous) |
| 3A305 | Phono Socket | R-10 | B84274 | 270K 0.5 Carbon |
| 32X403 | Tube Shield (6AV6) | R-11 | B84153 | 15K 0.5 Carbon |
| 76X1 | Capacitor-Resistor Combination | R-12 | C84182 | 1.8K 1.0 Carbon |
| 76X5 | Capacitor-Resistor Combination | R-13 | 36X372 | .5 meg. Volume Control |
| | | R-14 | B85106 | 10 meg. 0.5 Carbon |
| | | R-15A } R-15B } | | Part of 76X5 Assembly (See Miscellaneous) |
| | | R-16 | 40X310 | .5 meg. Tone Control |
| | | R-17 | B85473 | 47K 0.5 Carbon |
| | | R-18 | B84271 | 270 0.5 Carbon |
| | | R-19 | D84821 | 820 2.0 Carbon |

CAPACITORS

| | | | |
|-------------------------------|--------|-------------------------------------------|-----------------------------------------|
| C-1A } C-1B } C-1C } | 14A213 | Gang Condenser Assembly | |
| C-2 | 17A235 | 2-24 mmf | Trimmer |
| C-3 } C-5 } C-10 } | B66503 | .05 mf | 200 V Tubular |
| C-4 } C-9 } C-13 } | B66203 | .02 mf | 200 V Tubular |
| C-6 } C-8 } | | Part of Gang Condenser Assembly | |
| C-7 | 47X558 | 30 mmf | Ceramic |
| C-11A } C-11B } | | Part of 76X1 Assembly (See Miscellaneous) | |
| C-12 | 47X471 | 68 mmf | Ceramic |
| C-14 | B65503 | .05 mf | 200 V Tubular |
| C-15 | D66502 | .005 mf | 400 V Tubular |
| C-16A } C-16B } | | Part of 76X5 Assembly (See Miscellaneous) | |
| C-17 | F66102 | .001 mf | 600 V Tubular |
| C-18A } C-18B } C-18C } | 45X381 | 20 mf 40 mf 40 mf | 25 V 150 V 200 V Dry Electrolytic |
| C-19 | B66104 | .1 mf | 200 V Tubular |
| C-20 | B66103 | .01 mf | 200 V Tubular |

TRANSFORMERS AND COILS

| | | |
|-----|--------|-----------------|
| L-1 | 9A2117 | Interstage Coil |
| L-2 | 9A2113 | Oscillator Coil |
| T-1 | 9A2152 | Loop Antenna |
| T-2 | 9A2112 | 1st I-F Trans. |
| T-3 | 9A2063 | 2nd I-F Trans. |
| T-4 | 51X134 | Output Trans. |
| T-5 | 53X291 | Power Trans. |

DIAL AND DRIVE ASSEMBLY

| | |
|---------|-------------------------------|
| S-10X77 | Drive Cord Assembly |
| 15X251 | Pointer |
| 25X1616 | Dial Bracket |
| 58X740 | Dial Glass |
| 26X515 | Drive Shaft |
| 7A199 | Pilot Light Socket Assembly |
| 28X113 | Drive Cord Tension Spring |
| 41X88 | Dial Light Reflector |
| 7A103 | No. 47 Dial Light |
| 19X192 | "C" Washer (Mtg. Drive Shaft) |

VM No. 950 RECORD CHANGER PARTS

| | |
|-------|----------------------------------------|
| P-81E | Crystal Cartridge with Unipoint Needle |
| 85-38 | Unipoint Needle for P81E Cartridge |
| P-77 | Crystal Cartridge with Needles |
| 85-18 | Needle, Microgroove (Red) |
| 85-16 | Needle, Regular |

NOTE — C-13 is .02 mf in issue "B" receivers
Use only GENUINE factory tested parts to insure service jobs you can depend on and to obtain original set performance.

SPECIFICATIONS

MODELS 4-A-97,
4-A-98

| | | |
|----------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Frequency Range 535 to 1620 KC | Intermediate Frequency 455 KC Power Output 1.1 watts max. .7 watts 10% distortion. Tube Complement | Power Supply 105 to 125 volts A. C. 60 cycle, 50 watts with record player operating. Record Player 3 Speed Automatic Changer (4-A-98) 3 Speed Manual Player (4-A-97) |
| Loud Speaker 5" PM dynamic Alnico magnet, voice coil impedance 3.2 ohms at 400 cycles. | 1 - 12SA7 Mixer 1 - 12SK7 I. F. Amplifier 1 - 12SQ7 Det. & A. F. | 1 - 50L6 Power Amp. 1 - 35Z5 Rectifier 1 - No. 47 Dial Lamp |

ALIGNMENT PROCEDURE

The following equipment is required for aligning: A signal generator which will provide an accurately calibrated signal at the indicated test frequencies; an output indicating meter; a non-metallic screwdriver.

Radiation Loop: 2-turn loop, 6 inches in diameter.

Conditions for Alignment:

Tone - Treble

Volume - Maximum

Selector Switch - "Radio" position

Test loop coupled loosely to receiver by spacing - receiver loop in same position as it will be with chassis in cabinet.

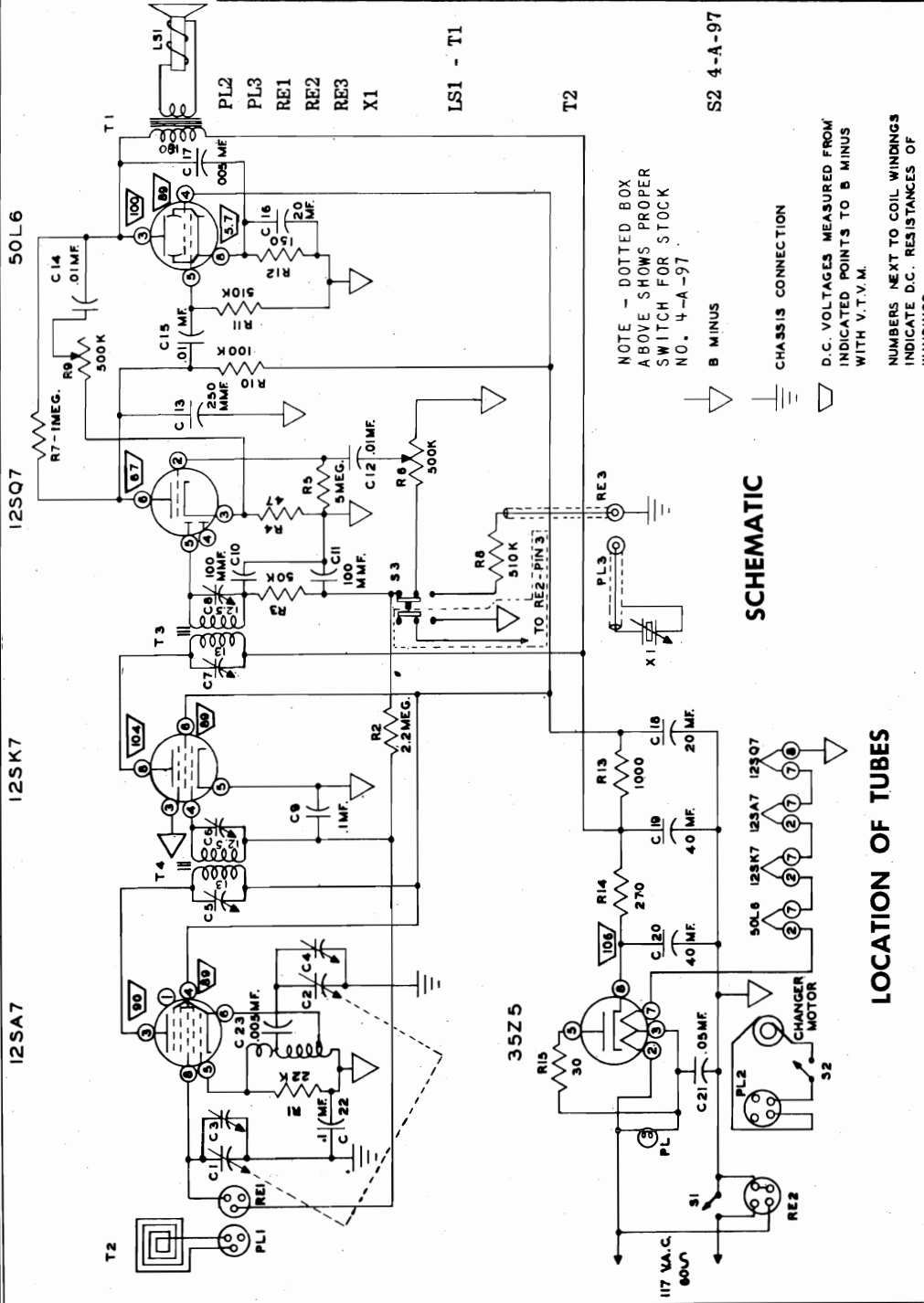
| SIGNAL GENERATOR COUPLING | SIGNAL GENERATOR FREQUENCY | RADIO DIAL SETTING | OUTPUT METER | ADJUST MAXIMUM OUTPUT |
|---------------------------------|----------------------------------|--------------------------|----------------------|-----------------------------|
| LOOP | 455 KC | Low End of Band | Across Voice Coil | C-8, C-7, C-6, C-5 |
| LOOP | 1620 KC | High End of Band | | C-4 |
| LOOP | 1400 KC | 1400 KC | | C-3 |

RADIO REPLACEMENT PARTS

| SCHEMATIC LOCATION | PART NO. | DESCRIPTION | SCHEMATIC LOCATION | PART NO. | DESCRIPTION |
|-----------------------|-------------|-----------------------------------------|-----------------------|-------------|------------------------------------------------------|
| RESISTORS | | | | | |
| R1 | 517 | 22,000 OHM ½ Watt | C14 | 825 | .01 MF. Ceramic |
| R2 | 615 | 2.2 Meg OHM ½ Watt | C15 | | See Capristors |
| R3 | | See Capristors | C17 | 824 | .005 MF. Ceramic |
| R4 | 520 | 47 OHM ½ Watt | C18, C19 | 1003 | 40-40-20 MFD/150 Volts |
| R5 | | See Capristors | C20, C16 | | 20 MFD/25 Volts |
| R6 | 401 | 500,000 OHM Vol. Control with Switch | C21 | 803A | .05 400 V. Tubular |
| R7 | 516 | 1 Meg OHM ½ Watt | CAPRISTORS | | |
| R8, R11 | 502 | 510,000 OHM ½ Watt | R3, C10 | 811 | 100 MMF. 50,000 OHM 100 MMF Dual Shunt Connection |
| R10 | | See Capristors | C11 | | |
| R12 | 505 | 150 OHM ½ Watt | R5, C12 | 813 | .01 MF Meg OHM Common Terminal Connection |
| R13 | 607 | 1000 OHM 1 Watt | R10, C15 | 814 | .01 MF 100,000 OHM Common Terminal Connection |
| R14 | 602 | 270 OHM 1 Watt | TRANSFORMERS | | |
| R15 | 534 | 30 OHM 1/2 Watt | T1 | 1201 | Output Transformer |
| CAPACITORS | | | | | |
| C1, C2 | 1004A | Tuning Gang and Trimmer Assembly | T3, T4 | 1402 | I.F. Transformers |
| C3, C4 | | Trimmer Condensors in I. F. Cans | MISCELLANEOUS | | |
| C5, C6 | | .1 MFD. 200 V. | S1 | 401 | On-Off Switch on Volume Control |
| C7, C8 | | See Capristors | R9 | 408 | 500,000 OHM Tone Control |
| C9, C22 | 804 | See Capristors | S2 | 407 | Motor Switch on Changer Assembly |
| C10, C11 | | See Capristors | S3 | 1892 | Radio-Phono Slide Switch |
| C12 | | See Capristors | PL1 | 307A | Loop Antenna Plug |
| 4-249 | C13 | 250 MMF. Ceramic | | | |

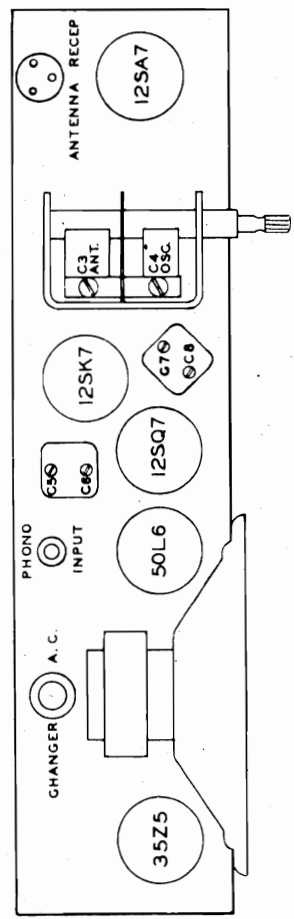
MODELS 4-A-97,
4-A-98

| | |
|-------|-----------------------------------|
| 307 | Changer A. C. Plug |
| 305 | Pickup Plug |
| 106A | Loop Antenna Receptacle |
| 106 | Changer A.C. Receptacle |
| 104 | Pickup Receptacle |
| 2534 | Pickup Cartridge EV-334 |
| 2541 | .0023 Needle |
| 2607 | Tone Arm Only |
| | 5" Speaker and Output Transformer |
| 2108 | Port. Carrying Case 4-A-98 |
| 2411 | Knob |
| 1512 | Loop Antenna |
| 1736A | Dial Pointer |
| 2307 | Dial Bezel |
| 2127C | Front Panel 4-A-98 |
| 1722B | Dial |
| 1892A | Radio-Phono Switch 4-A-97 |
| 2108A | Port. Carrying Case 4-A-97 |
| 1896 | Record Adaptor 4-A-97 |
| 1896A | Record Adaptors 4-A-98 |
| 1888 | Ventilating Bezel |
| 2115 | Motor Board for 4-A-97 |
| 2116C | Back Board for 4-A-98 |
| 3302 | Carton with Fillers for 4-A-97 |
| 3303B | Carton with Fillers for 4-A-98 |
| 2134A | Speaker Grill |



SCHEMATIC

LOCATION OF TUBES

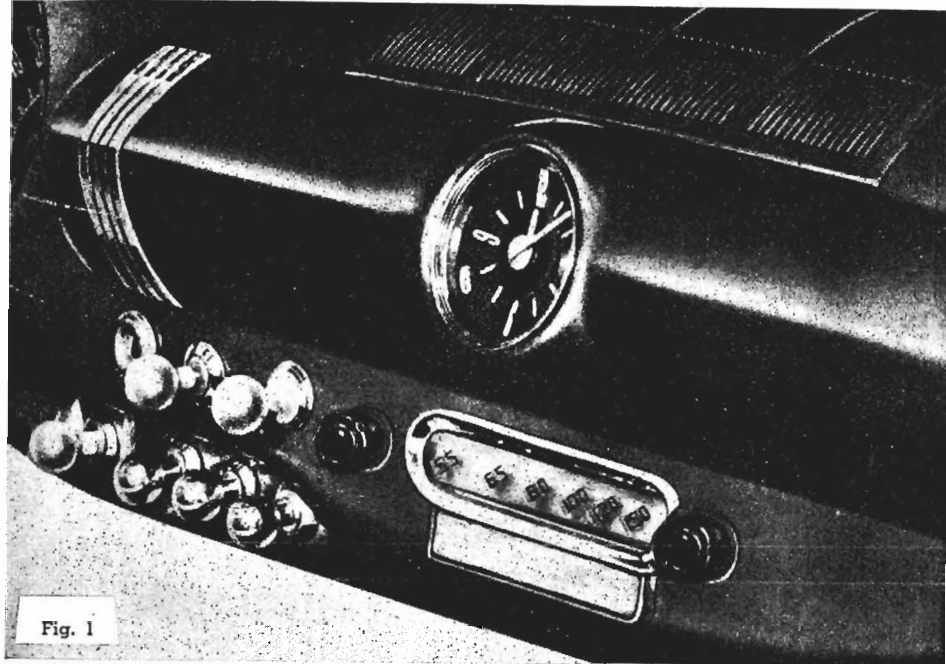


MODEL 4-B-56,
1949-50 Ford

DESCRIPTION

Your new Automobile Receiver is a 6-tube (including rectifier) superhetrodyne, designed to operate from the 6-volt storage battery in your car. It is custom-built to mount behind the instrument panel in the place provided for a radio by the automobile manufacturer. It features a novel two-piece construction and covers the frequency range 538 to 1600 KC. Two simple controls are provided for operating the receiver. (See Fig. 1.)

This receiver has been designed with a tuned RF stage and a 3-gang tuning condenser thereby insuring the finest in sensitivity and selectivity. For best results we recommend Firestone Top Cowl Aerial Stock No. 4-B-30. The unit is simple to install and requires no electrical adjustment after installation.



OPERATION

VOLUME CONTROL KNOB

This knob is located on the left side of the radio. Turning this knob slightly to the right until a slight click is heard will put the radio into operation. Turning this knob further to the right will increase the volume and turning it to the left will decrease the volume. After a station has been selected, the volume control should be adjusted to desired level. The volume should never be reduced by detuning the station selector knob.

STATION SELECTOR KNOB

This knob is located on the right side of the radio. This knob should be turned until a desired station has been selected. Adjust this knob very carefully until the station comes in with the most natural tone.

INSTALLATION

1. Remove two speed nuts securing radio opening cover plate to instrument panel.
2. Remove cover plate.
3. Place speaker and power pack unit over four threaded stud bolts located on the underside of the instrument panel. (Position power pack unit so that power cable is located on the left hand side.) See Fig. 2.
4. Secure power pack into position with four 8-32 nuts and washers supplied in kit of mounting hardware. Note: It may be necessary to clean threads on studs before mounting.
5. Remove knobs, grommets, cup washers and hex mounting nuts from tuning unit. *Do not remove escutcheon.*
6. Place tuning unit behind instrument panel so that mounting bushings and shafts protrude through the front panel.
7. Attach tuning unit with a hex nut on each mounting bushing.
8. Replace cup washers, grommets and knobs over shafts.
9. Secure a supporting bracket (2 supplied in kit of hardware) to each side of the power pack unit by means of two No. 8 self tapping screws. Use end of supporting bracket with round hole. If more convenient, these brackets may be attached before power pack unit is positioned in place.
10. Swing supporting brackets so that slotted holes are in line with the holes on each side of the tuning unit.
11. Secure to tuning unit with two No. 8 self tapping screws.
12. Insert power cable plug into socket on rear of tuning unit.
13. Plug antenna cable into tuning unit.
14. Secure power cable under cable clamp and tighten clamp screw.
15. Connect "A" lead to accessory terminal marked RAD. GA, on the ignition switch.

MODEL 4-B-56,
1949-50 Ford

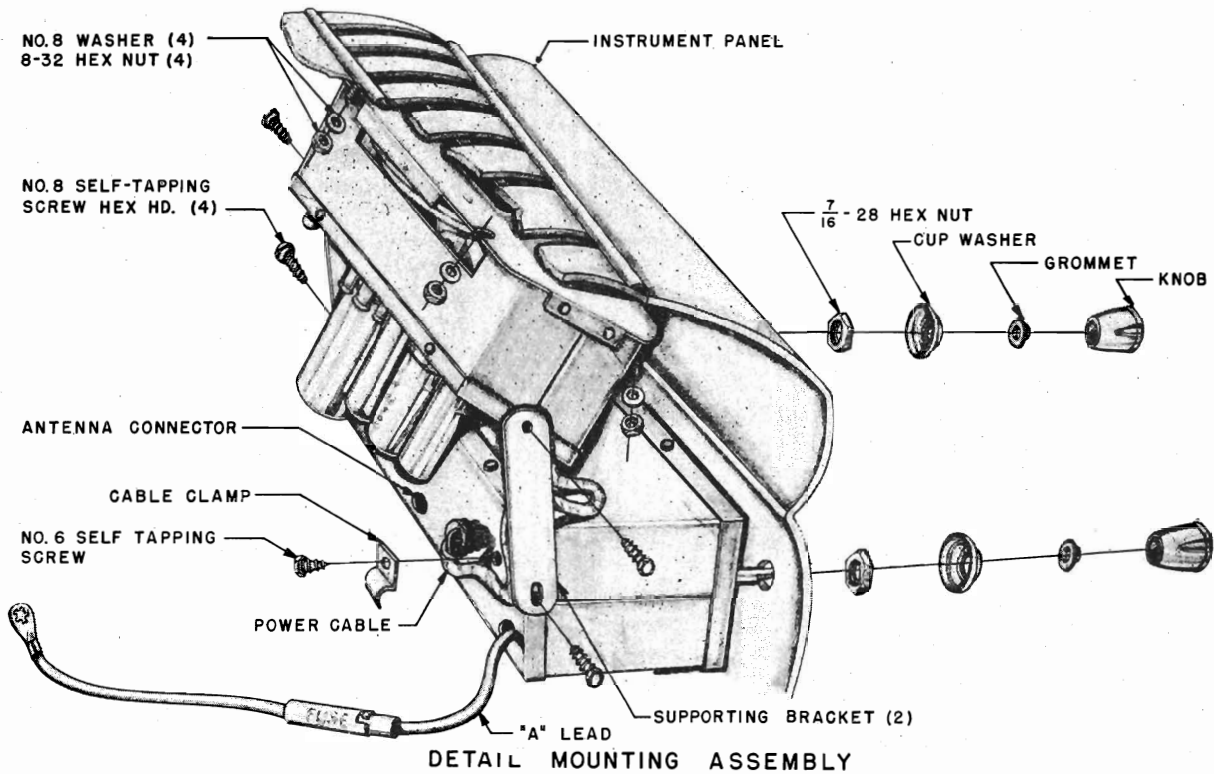


Fig. 2

ACCESSORIES FURNISHED FOR INSTALLATION

MOUNTING PARTS KIT

The following mounting hardware parts are shipped attached to the receiver.
(See detail assembly drawing FIG. 2)

- 2 7/16-28 hex nuts
- 2 Cup washers
- 2 Grommets
- 2 Knobs
- 1 Cable clamp

An envelope containing additional mounting hardware is supplied with this receiver. It contains the following parts:

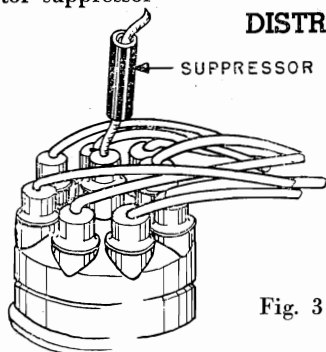
- 2 Supporting brackets
- 4 No. 8 self-tapping screws
- 4 8-32 nuts
- 4 No. 8 washers

MOTOR NOISE ELIMINATION

SUPPRESSION KIT

A suppression kit is shipped with this receiver. It contains the following parts:

- 1 Generator Condenser
- 1 Distributor suppressor

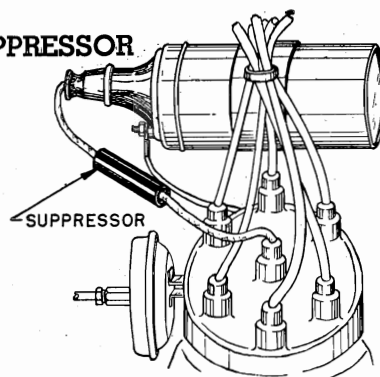


DISTRIBUTOR SUPPRESSOR

SUPPRESSOR

Fig. 3

DISTRIBUTOR 8 CYLINDER



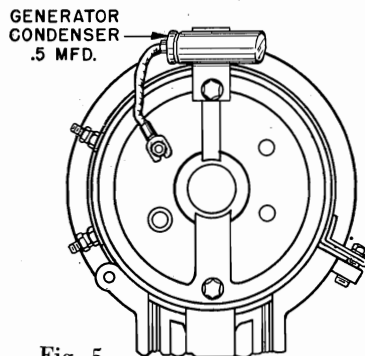
SUPPRESSOR

Fig. 4

DISTRIBUTOR-6 CYLINDER

MODEL 4-B-56,
1949-50 Ford

Disconnect high tension wire that runs from the ignition coil to the center hole of the distributor head. Cut lead one and one-half inches back from metal tip end for 8 cylinder Ford or two and one-half inches back for 6 cylinder Ford. Screw suppressor into cut end of long lead. Screw cut end of short lead into suppressor. Plug lead with attached suppressor, back into distributor head.



GENERATOR CONDENSER

Loosen the top assembly bolt from the rear end plate of the generator. **DO NOT REMOVE.** Mount .5 MFD generator condenser under this bolt. Tighten bolt and connect condenser lead to the armature terminal of the generator.

Fig. 5

The generator condenser and distributor suppressor will normally eliminate all objectionable motor noise. If the motor noise persists, a .5 MFD by-pass condenser may be connected to either side of the ammeter with the ground lug fastened to a good ground nearby.

WHEEL STATIC

Wheel static is a form of interference caused by the rotation of the front wheels of the car, and it is, of course, only noticed when the car is in motion. If this form of interference is present, it can be eliminated by installing wheel static collector springs between the inner hub cap and the spindle shaft.

ELECTRICAL ACCESSORIES

In some cases, it may be found that car accessories such as electric heaters, lighters, automatic relays or gauges, may cause interference while in operation. Proper procedure in such cases is to connect a .5 MFD by-pass condenser from ground to the suspected accessory until the source of interference is found. The condenser then should be permanently mounted in this location.

ELECTRICAL SPECIFICATIONS

| | |
|----------------------|----------------------------------------------|
| Power Supply..... | 6.3 Volts DC |
| Current..... | 5.5 Amp. average |
| Frequency Range..... | 538-1600 KC |
| Speaker..... | 5 1/4" PM |
| Power Output..... | 2 watts, undistorted 3 watts, maximum |
| Sensitivity..... | 2-3 microvolts average for 1 watt output |
| Selectivity..... | 40 KC broad at 1000 times signal, at 1000 KC |

This receiver contains the following:
 1—6BA6—RF Amplifier
 1—6BE6—Converter
 1—6BA6—I. F. Amplifier
 1—6AT6—Detector—AVC—1st Audio
 1—6AQ5—Power Output
 1—6X4—Rectifier

SERVICE NOTES

Voltage taken from the different points of the circuit to the chassis are measured with volume control in maximum position, all tubes in their sockets, no signal applied, and with a voltmeter having a resistance of 20,000 Ohms per volt. These voltages are clearly shown on the voltage chart, (Fig. 7 and 7A).

All voltages should be measured with an input voltage of 6.3 volts DC.

To check for open by-pass condensers, shunt each condenser with another one having the same capacity and voltage rating which is known to be good until the defective unit is located.

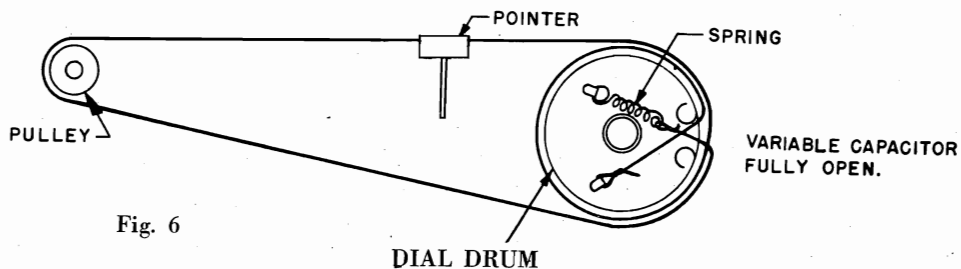
ALIGNING INSTRUCTION

Never attempt any adjustments on this receiver unless it becomes necessary to replace a coil or transformer, or the adjustments have been tampered with in the field. Always make certain that other circuit components, such as tubes, condensers, resistors, etc., are normal before proceeding with realignment.

If realignment is necessary follow the instructions given under the heading "Alignment Procedure." After realignment has been completed repeat the procedure as final check.

MODEL 4-B-56,
1949-50 Ford

DIAL CORD DRIVE



ALIGNMENT PROCEDURE

Volume control—Maximum, all adjustments.
No signal applied to antenna.
Power input—6.3 volts.
Connect dummy antenna in series with output lead of signal generator.
Connect ground lead of signal generator to chassis.
Repeat alignment procedure as a final check.

The following equipment is necessary for proper alignment:
Signal generator that will provide the test frequencies as listed, modulated 400 cycles, 30%.
Non-metallic screwdriver.
Output meter. (1.8 volt for 1 watt output.)
Dummy antennas—.1 MFD., 100 MMFD.
For alignment points refer to Schematic Diagram.

| Dial Setting | Generator Frequency | Dummy Ant. | Generator Connection | Trimmer Reference | Trimmer Adjustment | Trimmer Function |
|----------------------------------|---------------------|------------|----------------------|-------------------|--------------------|------------------|
| 1) Fully open | 455 KC | .1 MFD | 6BE6 Grid | T2 Top & bottom | Maximum | Output I.F. |
| 2) Fully open | 455 KC | .1 MFD | 6BE6 Grid | T1 Top & bottom | Maximum | Input I.F. |
| 3) Fully open | 1600 KC | 100 MMFD | Ant. lead | CV2 | Maximum | Oscillator |
| 4) Tune in signal from generator | 1400 KC | 100 MMFD | Ant. lead | CV3 | Maximum | RF Stage |
| 5) Tune in signal from generator | 1400 KC | 100 MMFD | Ant. lead | CV1 | Maximum | Antenna |
| 6) Tune in signal from generator | 600 KC | 100 MMFD | Ant. lead | L3 | Maximum | RF Stage |
| 7) Tune in signal from generator | 600 KC | 100 MMFD | Ant. lead | L2 | Maximum | Antenna |
| 8) Repeat steps 4 and 5 | | | | | | |

BOTTOM VIEW OF CHASSIS

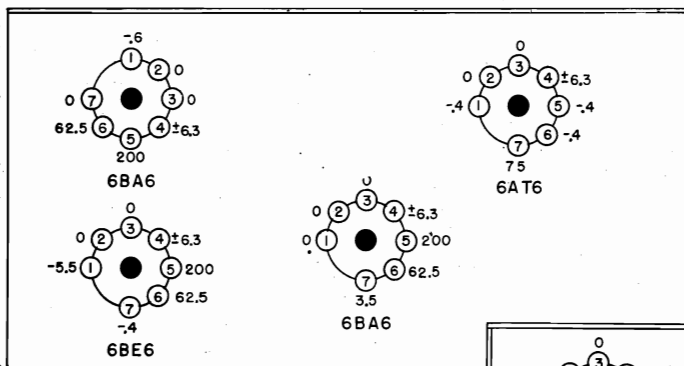


Fig. 7 FRONT OF CHASSIS

BOTTOM VIEW OF POWER PACK

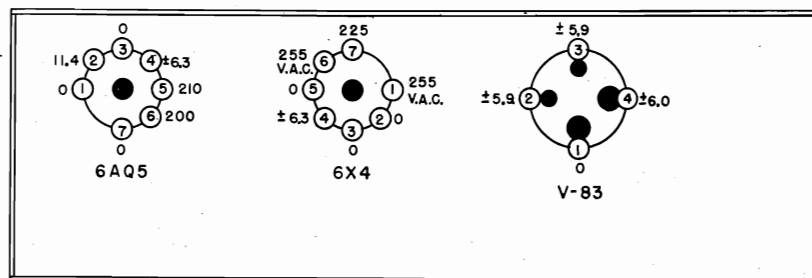


Fig. 7A

SOCKET VOLTAGES

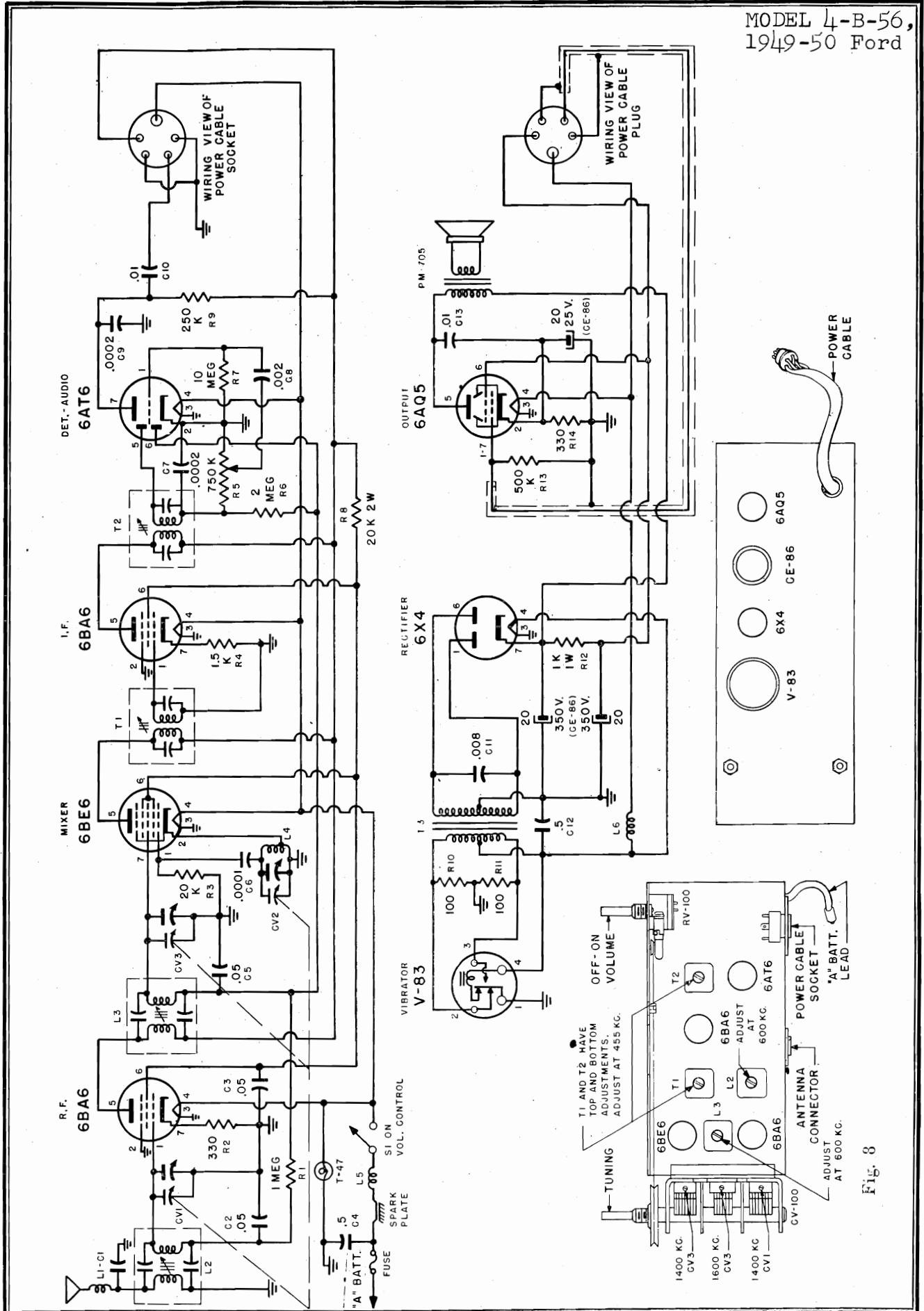


Fig. 8

MODEL 4-B-56,
1949-50 Ford

PARTS LIST

CONDENSERS

| Schematic Diagram Reference | Part No. | Description |
|-----------------------------|----------|----------------------------------------|
| C2, C3, C5 | C207 | .05 MFD 200 volt condenser |
| C4, C12 | C209 | .5 MFD 100 volt condenser |
| C6 | CC200 | 100 MMFD ceramic condenser |
| C7, C9 | CC201 | 200 MMFD ceramic condenser |
| C8 | C203 | .002 MFD 400 volt condenser |
| C10, C13 | C206 | .01 MFD 400 volt condenser |
| C11 | C205 | .008 MFD 1600 volt condenser |
| CE86 | CE-86 | 20 MFD 350 volt electrolytic condenser |
| | | 20 MFD 350 volt electrolytic condenser |
| | | 20 MFD 25 volt electrolytic condenser |
| CV1-CV2-CV3 | CV-100A | 3 section variable |

RESISTORS

| | | |
|----------|--------|---------------------------------------|
| R1 | R309 | 1 megohm 1/2 watt 20% resistor |
| R2, R14 | R303 | 330 ohm 1/2 watt 20% resistor |
| R3 | R306 | 20K ohm 1/2 watt 20% resistor |
| R4 | R314 | 1.5K ohm 1/2 watt 20% resistor |
| R5 | RV-100 | Volume control 3/4 megohm with switch |
| R6 | R310 | 2 megohm 1/2 watt 20% resistor |
| R7 | R311 | 10 megohm 1/2 watt 20% resistor |
| R8 | R313 | 20K ohm 2 watt 20% resistor |
| R9 | R307 | 250K ohm 1/2 watt 20% resistor |
| R10, R11 | R301 | 100 ohm 1/2 watt 20% resistor |
| R12 | R312 | 1K ohm 1 watt 20% resistor |
| R13 | R308 | 500K ohm 1/2 watt 20% resistor |

COILS AND TRANSFORMERS

| | | |
|-------|------------------|---------------------------------------------------------------|
| L1-C1 | L200 | Motor noise elimination unit |
| L2 | 15053 or 57FB-3 | Antenna coil |
| L3 | 15054 or 57FB-4 | R.F. coil |
| L4 | L201 | R. F. oscillator coil |
| L5 | L203 | Choke "A" line |
| L6 | L202 | Choke, vibrator hash |
| T2 | 14977 or 1655-16 | 2nd IF transformer |
| T1 | 14977 or 1655-16 | 1st IF transformer |
| T3 | TV-100 or 318V-2 | Vibrator transformer |
| T4 | | Output transformer (Part of speaker not furnished separately) |

MISCELLANEOUS

| | |
|-----------|-------------------------------------------------------------|
| A300 | "A" lead assembly |
| H301 | Case, less covers for Power Supply Unit |
| H100 | Case, complete with covers for R.F. tuning unit |
| H207 | Clip, Anti-rattle |
| H208 | Clip, coil mounting |
| H102 | Cover, power supply unit mounting (with speaker louvres) |
| A201 | Fuse 15 Amp. |
| 504PC-300 | Power Cable Assembly (complete with plug) |
| H212 | Receptacle, Antenna cable |
| 504-FC | Socket, power cable |
| PM-705 | Speaker, 5 1/4" PM (includes output transformer) |
| V-83 | Vibrator |
| H310 | Knob |
| H311 | Cup washer |
| H113 | 7/16-28 Hex nut |
| C100 | .5 MFD generator condenser |
| R100 | Distributor suppressor |

DIAL PARTS

| | |
|-------|--------------------------------------|
| D100 | Dial Scale Escutcheon, Plastic |
| PS100 | Dial Pointer |
| T47 | Pilot Light |
| H114 | Pilot Light Socket |
| H203 | Pulley, idler |
| H204 | Spring, Dial drive String Tension |
| H115 | String, dial drive |

MODEL 4-B-60,
1951 Ford

DESCRIPTION

Your new Automobile Receiver is a 6-tube (including rectifier) superheterodyne, designed to operate from the 6-volt storage battery in your car. It is custom-built to mount behind the instrument panel in the place provided for a radio by the automobile manufacturer. It has a self-contained PM speaker and covers the frequency range 538 to 1600 KC. Two simple controls are provided for operating the receiver. (See Fig. 1.)

This receiver has been designed with a tuned RF stage and a 3-gang tuning condenser thereby insuring the finest in sensitivity and selectivity. For best results we recommend Firestone Top Cowl Aerial Stock No. 4-B-30. The unit is simple to install and requires no electrical adjustment after installation.

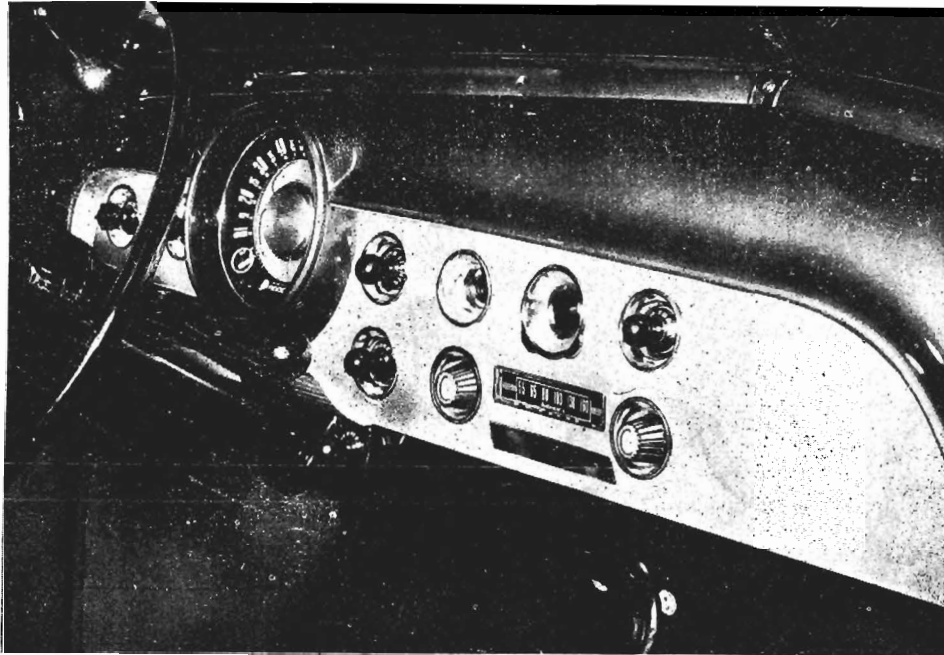


Fig. 1

OPERATION

VOLUME CONTROL KNOB

This knob is located on the left side of the radio. Turning this knob slightly to the right until a slight click is heard will put the radio into operation. Turning this knob further to the right will increase the volume and turning it to the left will decrease the volume. After a station has been selected, the volume control should be adjusted to desired level. The volume should never be reduced by detuning the station selector knob.

STATION SELECTOR KNOB

This knob is located on the right side of the radio. This knob should be turned until a desired station has been selected. Adjust this knob very carefully until the station comes in with the most natural tone.

INSTALLATION

1. Remove the radio opening cover plate by removing the speed nuts at the rear of the instrument panel.
2. Remove and discard radio bezel cups on car by removing hex nuts securing bezel cups to instrument panel.
3. Remove knobs, hex nuts, and bezel cups from tuning unit.
4. Carefully position tuning unit behind instrument panel so the mounting bushings and shafts protrude through the front panel.
5. Place bezel cups over mounting bushings.
6. Attach tuning unit and bezel cups to instrument panel with a hex nut on each mounting bushing.
7. Replace knobs.
8. Position mounting bracket over mounting stud located behind instrument panel and secure with a $\frac{1}{4}$ " lockwasher and a $\frac{1}{4}$ - 20 nut.
9. Secure mounting bracket to side of tuning unit with hex head No. 8 self tapping screw, as shown in Fig. 2
10. Place speaker and power pack unit over three threaded stud bolts behind the instrument panel. (Position power pack unit so that power cable is located near the tuning unit.) See Fig. 2.
11. Secure power pack into position with the wing nuts supplied in the kit of mounting hardware.

MODEL 4-B-60,
1951 Ford

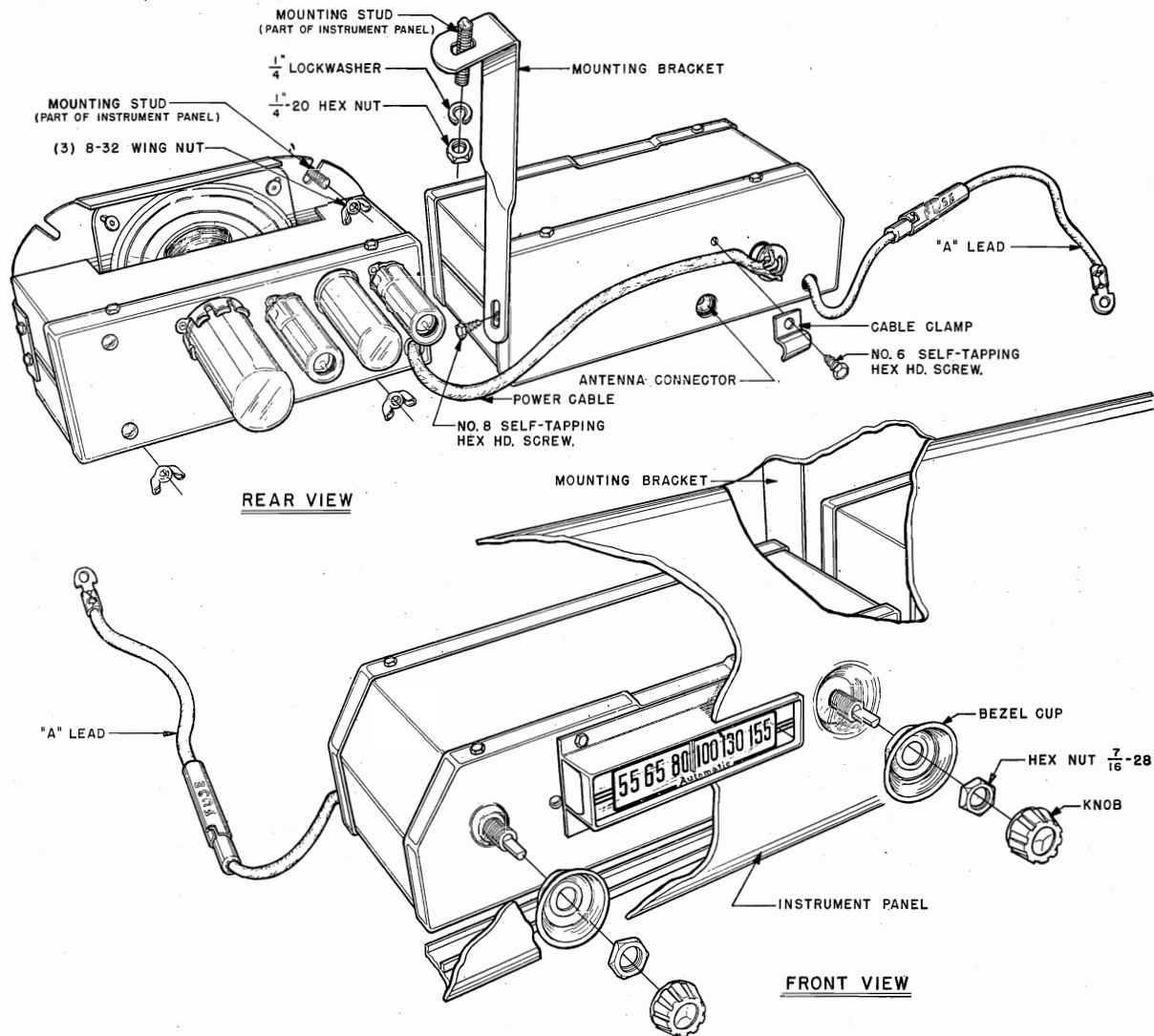


Fig. 2

DETAIL ASSEMBLY

INSTALLATION (Continued)

12. Insert power cable plug into socket on rear of tuning unit.
13. Secure power cable under cable clamp, and tighten clamp screw.
14. Plug antenna cable into tuning unit.
15. Connect "A" lead to terminal on ignition switch.

ACCESSORIES FURNISHED FOR INSTALLATION

MOUNTING PARTS KIT

The following mounting hardware parts are shipped attached to the receiver.

(See detail assembly drawing FIG. 2)

- 2 Bezel cups
- 2 7/16 — 28 hex nuts
- 2 Knobs
- 1 Cable clamp

An envelope containing additional mounting hardware is supplied with this receiver. It contains the following parts:

- 1 Supporting bracket
- 1 No. 8 self-tapping screw
- 1 1/4" lockwasher
- 1 1/4 — 20 nut
- 3 No. 8 — 32 wing nuts

MOTOR NOISE ELIMINATION

MODEL 4-B-60,
1951 Ford

SUPPRESSION KIT

A suppression kit is shipped with this receiver. It contains the following parts:

- 1 Generator Condenser
- 1 Distributor suppressor

DISTRIBUTOR SUPPRESSOR

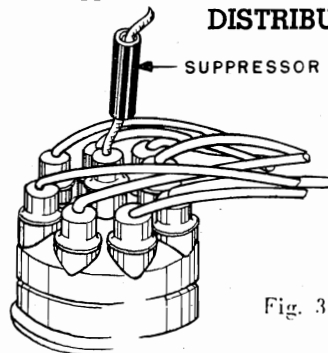


Fig. 3

DISTRIBUTOR 8 CYLINDER

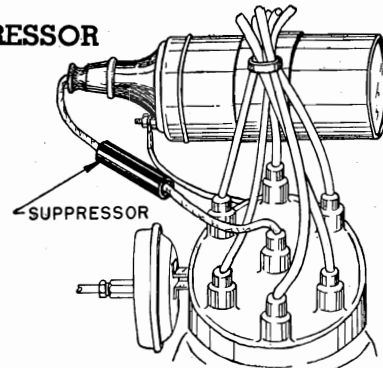


Fig. 4

DISTRIBUTOR-6 CYLINDER

Disconnect high tension wire that runs from the ignition coil to the center hole of the distributor head. Cut lead one and one-half inches back from metal tip end for 8 cylinder Ford or two and one-half inches back for 6 cylinder Ford. Screw suppressor into cut end of long lead. Screw cut end of short lead into suppressor. Plug lead with attached suppressor, back into distributor head.

GENERATOR
CONDENSER
.5 MFD.

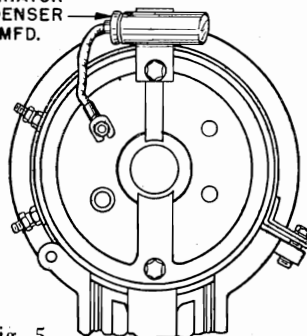


Fig. 5

GENERATOR CONDENSER

Loosen the top assembly bolt from the rear end plate of the generator. **DO NOT REMOVE.** Mount .5 MFD generator condenser under this bolt. Tighten bolt and connect condenser lead to the armature terminal of the generator.

The generator condenser and distributor suppressor will normally eliminate all objectionable motor noise. If the motor noise persists, a .5 MFD by-pass condenser may be connected to either side of the ammeter with the ground lug fastened to a good ground nearby.

WHEEL STATIC

Wheel static is a form of interference caused by the rotation of the front wheels of the car, and it is, of course, only noticed when the car is in motion. If this form of interference is present, it can be eliminated by installing wheel static collector springs between the inner hub cap and the spindle shaft.

ELECTRICAL ACCESSORIES

In some cases, it may be found that car accessories such as electric heaters, lighters, automatic relays or gauges, may cause interference while in operation. Proper procedure in such cases is to connect a .5 MFD by-pass condenser from ground to the suspected accessory until the source of interference is found. The condenser then should be permanently mounted in this location.

SERVICE DATA

ELECTRICAL SPECIFICATIONS

| | |
|----------------------|----------------------------------------------|
| Power Supply..... | 6.3 Volts DC |
| Current..... | 5.5 Amp. average |
| Frequency Range..... | 538-1600 KC |
| Speaker..... | 5¼" PM |
| Power Output..... | 2 watts, undistorted |
| | 3 watts, maximum |
| Sensitivity..... | 2-3 microvolts average for 1 watt output |
| Selectivity..... | 40 KC broad at 1000 times signal, at 1000 KC |

This receiver contains the following:

- 1—6BA6—RF Amplifier
- 1—6BE6—Converter
- 1—6BA6—I. F. Amplifier
- 1—6AT6—Detector—AVC—1st Audio
- 1—6AQ5—Power Output
- 1—6X4—Rectifier
- (6AV6 used in place of 6AT6 on some models)

MODEL 4-B-60,
1951 Ford
SERVICE NOTES

Voltage taken from the different points of the circuit to the chassis are measured with volume control in maximum position, all tubes in their sockets, no signal applied, and with a voltmeter having a resistance of 20,000 Ohms per volt. These voltages are clearly shown on the voltage chart. (Fig. 7 and 7A).

All voltages should be measured with an input voltage of 6.3 volts DC.

To check for open-by-pass condensers, shunt each condenser with another one having the same capacity and voltage rating which is known to be good until the defective unit is located.

ALIGNING INSTRUCTION

Never attempt any adjustments on this receiver unless it becomes necessary to replace a coil or transformer, or the adjustments have been tampered with in the field. Always make certain that other circuit components, such as tubes, condensers, resistors, etc., are normal before proceeding with realignment.

If realignment is necessary follow the instructions given under the heading "Alignment Procedure." After realignment has been completed repeat the procedure as final check.

DIAL CORD DRIVE

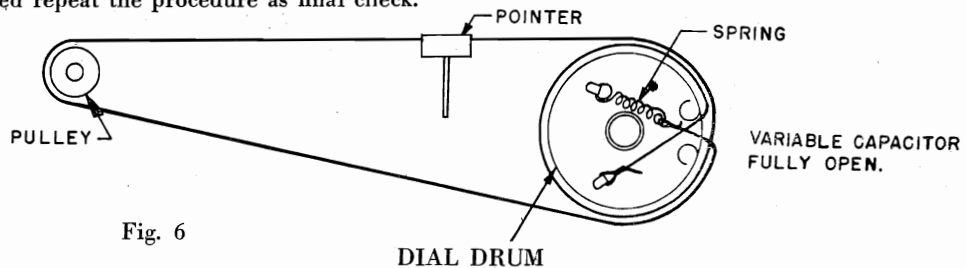


Fig. 6

REPLACEMENT PARTS LIST

| SCHEMATIC DIAGRAM REF. NO. | PART NO. | DESCRIPTION | PART NO. | DESCRIPTION |
|-------------------------------|-----------------|----------------------------------------------|-------------------|--------------------------------------------------------------------|
| CONDENSERS | | | | |
| C2, C3, C5 | C207 | .05 MFD 200 volt condenser..... | L6 | L202 Choke, vibrator hash |
| C4, C12 | C209 | .5 MFD 100 volt condenser..... | T2 | 14977 or 1655-16 2nd IF transformer |
| C6 | CC200 | 100 MMFD ceramic condenser..... | T1 | 14977 or 1655-16 1st IF transformer |
| C7, C9 | CC201 | 200 MMFD ceramic condenser..... | T3 | TV-100 or 318V-2 Vibrator transformer |
| C8 | C203 | .002 MFD 400 volt condenser..... | T4 | Output transformer (Part of speaker not furnished separately)..... |
| C10, C13 | C206 | .01 MFD 400 volt condenser..... | DIAL PARTS | |
| C11 | C205 | .008 MFD 1600 volt condenser..... | DI51 | Dial Scale |
| CE-86 | CE-86 | 20 MFD 350 volt electrolytic condenser | H151 | Dial Scale Holder |
| | | 20 MFD 350 volt electrolytic condenser | PS151 | Dial Pointer |
| | | 20 MFD 25 volt electrolytic condenser | T47 | Pilot Light |
| CV1-CV2-CV3 | CV-100A | 3 section variable | H114 | Pilot Light Socket |
| | | | H203 | Pulley, idler |
| | | | H204 | Spring, Dial drive String Tension..... |
| | | | H115 | String, dial drive |
| RESISTORS | | | | |
| R1 | R309 | 1 megohm 1/2 watt 20% resistor.... | A300 | "A" lead assembly |
| R2, R14 | R303 | 330 ohm 1/2 watt 20% resistor..... | H152 | Bezel Cup |
| R3 | R306 | 20K ohm 1/2 watt 20% resistor..... | H153 | Case, less covers for Power Supply Unit |
| R4 | R314 | 1.5K ohm 1/2 watt 20% resistor..... | H154 | Case, complete with covers for R.F. tuning unit |
| R5 | RV-100 | Volume control 3/4 megohm with switch | H207 | Clip, Anti-rattle |
| R6 | R310 | 2 megohm 1/2 watt 20% resistor..... | H208 | Clip, coil mounting |
| R7 | R311 | 10 megohm 1/2 watt 20% resistor.... | H102 | Cover, power supply unit mounting (with speaker louvres) |
| R8 | R313 | 20K ohm 2 watt 20% resistor..... | A201 | Fuse 15 Amp. |
| R9 | R307 | 250K ohm 1/2 watt 20% resistor..... | H155 | Knob |
| R10, R11 | R301 | 100 ohm 1/2 watt 20% resistor..... | H156 | Mounting Bracket |
| R12 | R312 | 1K ohm 1 watt 20% resistor..... | 504PC-300 | Power Cable Assembly (complete with plug) |
| R13 | R308 | 500K ohm 1/2 watt 20% resistor..... | H212 | Receptacle, Antenna cable |
| COILS AND TRANSFORMERS | | | | |
| L1-C1 | L200 | Motor noise elimination unit..... | 504-FC | Socket, power cable |
| L2 | 15053 or 57FB-3 | Antenna coil | PM-705 | Speaker, 5 1/4" PM (includes output transformer) |
| L3 | 15054 or 57FB-4 | R.F. coil | V-83 | Vibrator |
| L4 | L201 | R.F. oscillator coil | H311 | Cup washer |
| L5 | L203 | Choke "A" line | H113 | 7/16-28 Hex nut |
| | | | C100 | .5 MFD generator condenser |
| | | | R100 | Distributor suppressor |
| MISCELLANEOUS | | | | |

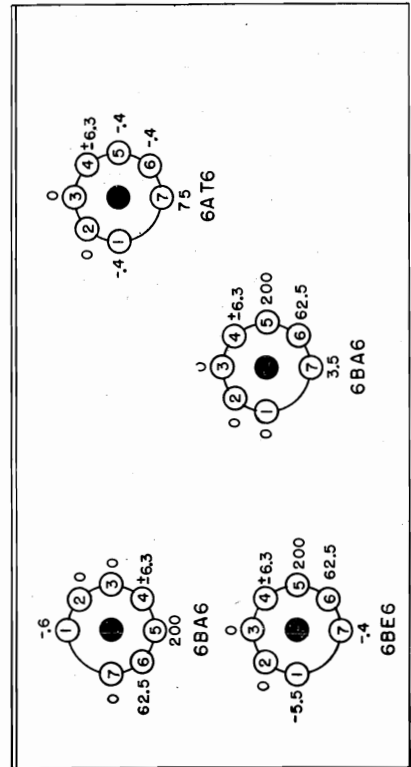
ALIGNMENT PROCEDURE

Volume control—Maximum, all adjustments. The following equipment is necessary for proper alignment:
 No signal applied to antenna. Signal generator that will provide the test frequencies as listed, modulated 400 cycles, 30%.
 Power input—6.3 volts. Non-metallic screwdriver.
 Connect dummy antenna in series with output lead of signal generator. Output meter. (1.8 volt for 1 watt output.)
 Connect ground lead of signal generator to chassis. Dummy antennas—.1 MFD., 100 MMFD.
 Repeat alignment procedure as a final check. For alignment points refer to Schematic Diagram.

| Dial Setting | Generator Frequency | Dummy Ant. | Generator Connection | Trimmer Reference | Trimmer Adjustment | Trimmer Function |
|----------------------------------|---------------------|------------|----------------------|-------------------|--------------------|------------------|
| 1) Fully open | 455 KC | .1 MFD | 6BE6 Grid | T2 Top & bottom | Maximum | Output I.F. |
| 2) Fully open | 455 KC | .1 MFD | 6BE6 Grid | T1 Top & bottom | Maximum | Input I.F. |
| 3) Fully open | 1600 KC | 100 MMFD | Ant. lead | CV2 | Maximum | Oscillator |
| 4) Tune in signal from generator | 1400 KC | 100 MMFD | Ant. lead | CV3 | Maximum | RF Stage |
| 5) Tune in signal from generator | 1400 KC | 100 MMFD | Ant. lead | CV1 | Maximum | Antenna |
| 6) Tune in signal from generator | 600 KC | 100 MMFD | Ant. lead | L3 | Maximum | RF Stage |
| 7) Tune in signal from generator | 600 KC | 100 MMFD | Ant. lead | L2 | Maximum | Antennas |

8) Repeat steps 4 and 5

BOTTOM VIEW OF CHASSIS



FRONT OF CHASSIS

BOTTOM VIEW OF POWER PACK

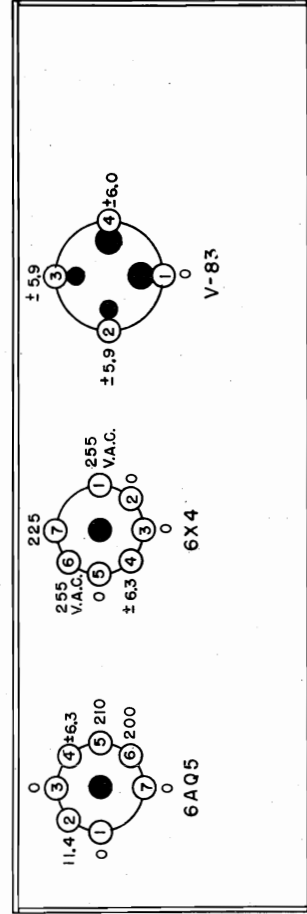
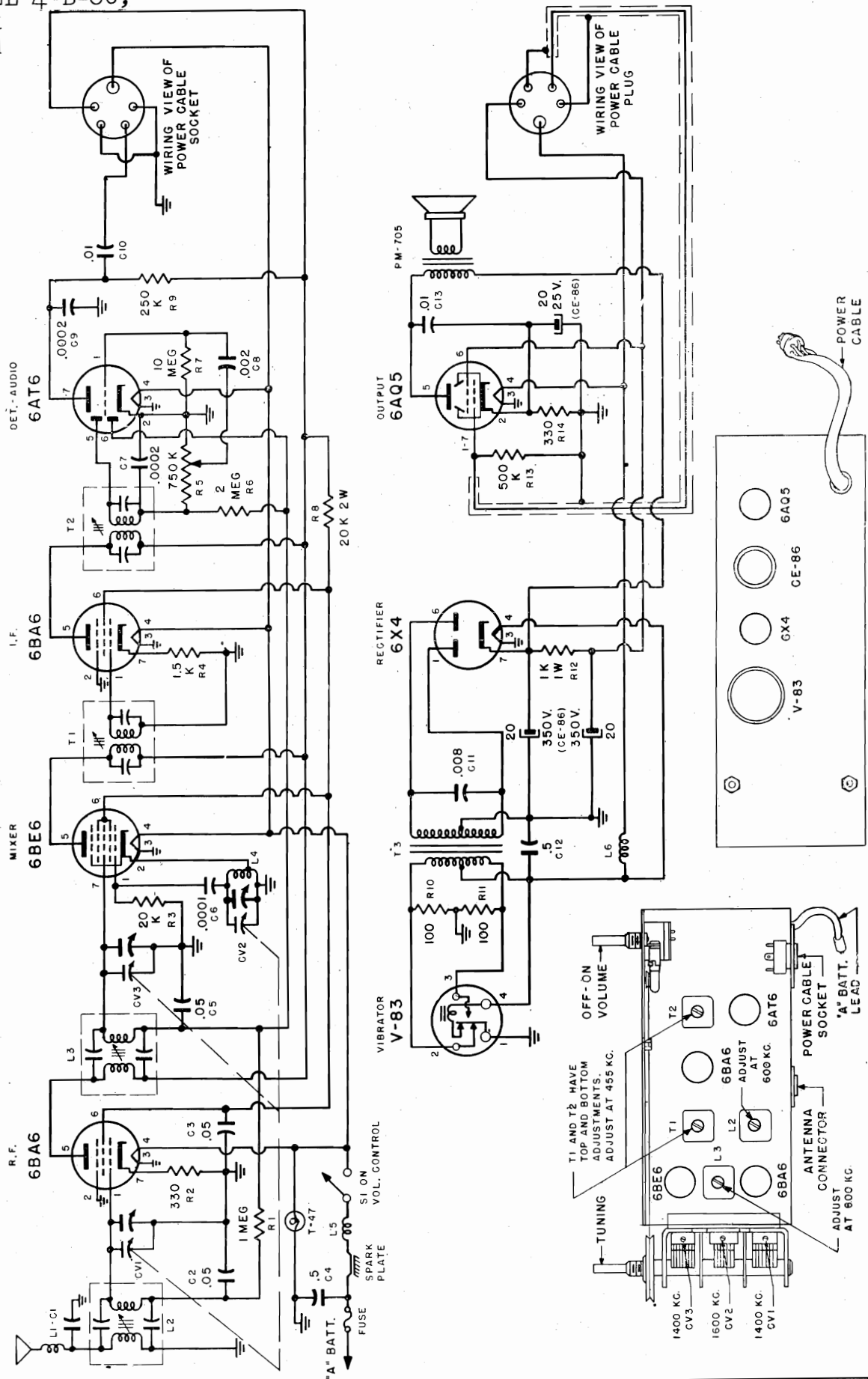


Fig. 7

SOCKET VOLTAGES

Fig. 7A

MODEL 4-B-60,
1951
Ford

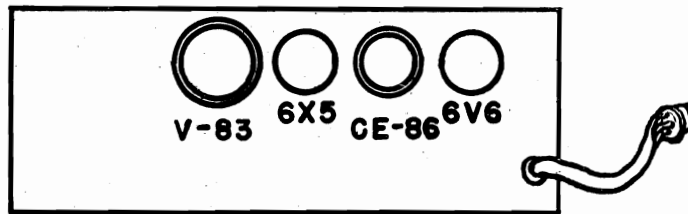
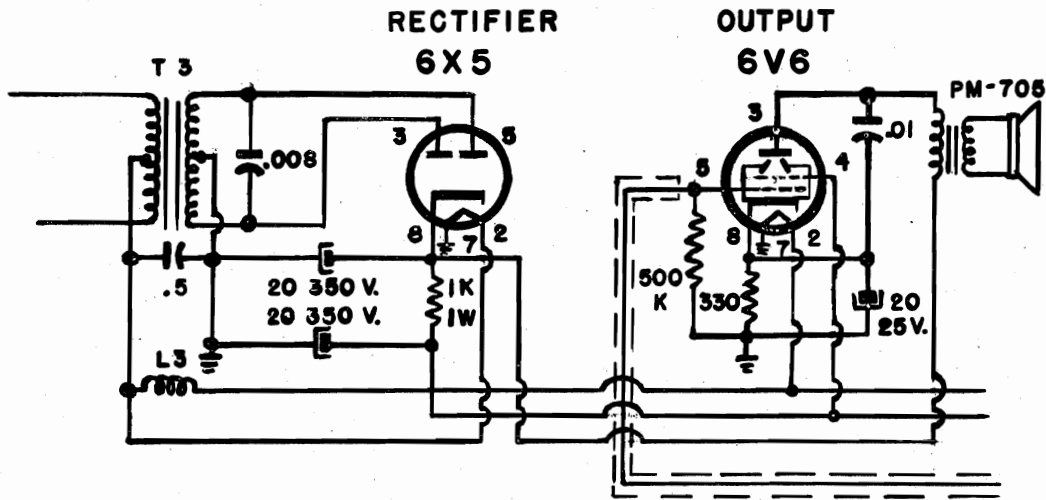


(NOTE: 6AV6 Tube used in place of 6AT6 on some models.)

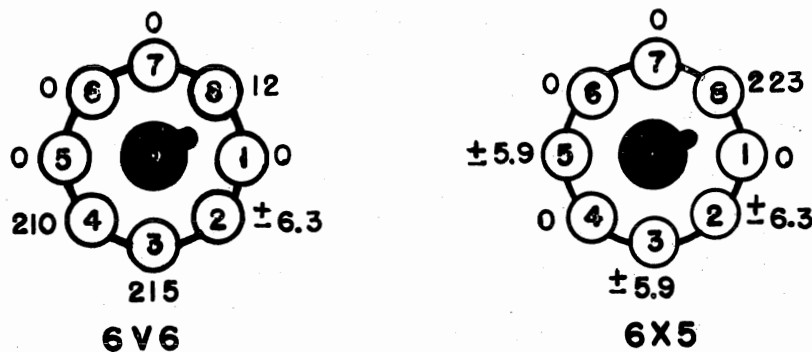
Fig. 8

MODEL 4-B-60,
1951 Ford

SUBSTITUTION OF 6X5 TUBE IN PLACE OF 6X4 AND 6V6 TUBE IN PLACE OF 6AQ5.



TUBE LOCATION CHART



SOCKET VOLTAGES CHART

MODEL 4-B-61,
1951 Chevrolet

DESCRIPTION

Your new Automobile Receiver is a 6-tube (including rectifier) superheterodyne, designed to operate from the 6-volt storage battery in your car. It is custom-built to mount behind the instrument panel in the place provided for a radio by the automobile manufacturer. It has a self-contained P.M. speaker and covers the frequency range 538 to 1600 KC. Two simple controls are provided for operating the receiver. (See Fig. 1.)

This receiver has been designed with a tuned RF stage and a 3-gang tuning condenser thereby insuring the finest in sensitivity and selectivity. For best results we recommend Firestone disappearing fender-well aerial stock No. 4-B-21. The unit is simple to install and requires no electrical adjustment after installation.

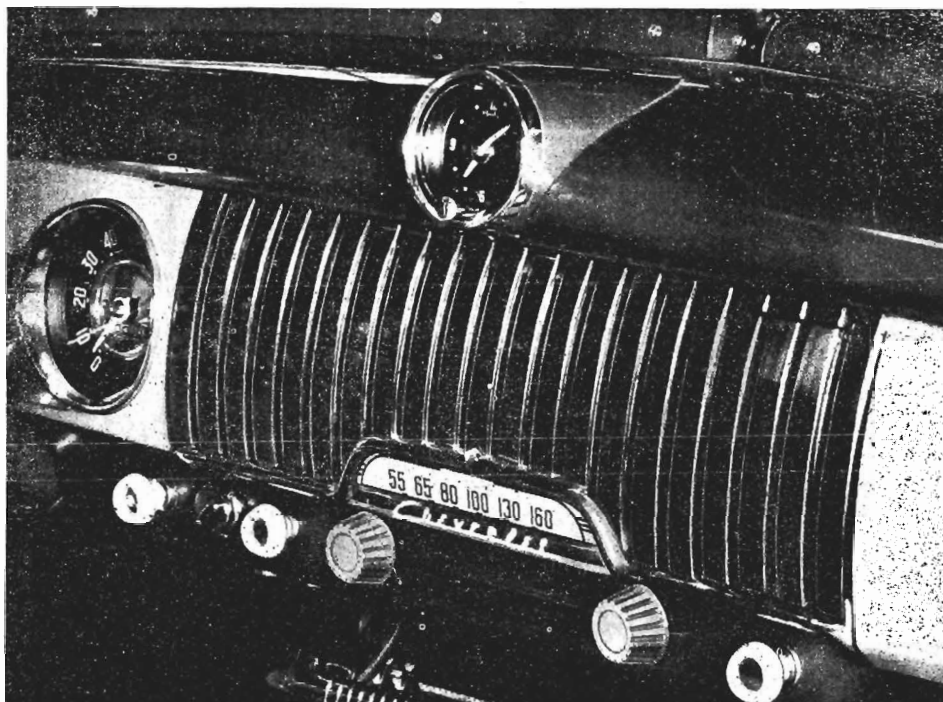


Fig. 1

OPERATION

VOLUME CONTROL KNOB

This knob is located on the left side of the radio. Turning this knob slightly to the right until a slight click is heard will put the radio into operation. Turning this knob further to the right will increase the volume and turning it to the left will decrease the volume. After a station has been selected, the volume control should be adjusted to desired level. The volume should never be reduced by detuning the station selector knob.

STATION SELECTOR KNOB

This knob is located on the right side of the radio. This knob should be turned until a desired station has been selected. Adjust this knob very carefully until the station comes in with the most natural tone.

INSTALLATION

1. Remove two speed nuts securing dummy control cover plate. Discard dummy plate and speed nuts.
2. Remove 12-24 hex nuts securing dummy radio opening cover plate. Save hex nuts but discard dummy plate.
3. Referring to Fig. 2 (rear view), place mounting brackets over 12-24 stud bolts and attach with #12 lockwashers, contained in kit of mounting hardware, and 12-24 hex nuts previously removed.
4. Remove knobs, cup washers, hex nuts, washers and control cover plate from control shafts and mounting bushings.
5. Referring to Fig. 2 (front view), position the receiver behind the instrument panel so that the shafts and mounting bushings protrude through the instrument panel and the stud bolts on the sides of the receiver slide into the slotted ends of the mounting brackets.
6. Secure the mounting brackets to receiver with $\frac{1}{4}$ " lockwashers and $\frac{1}{4}$ -20 hex nuts.

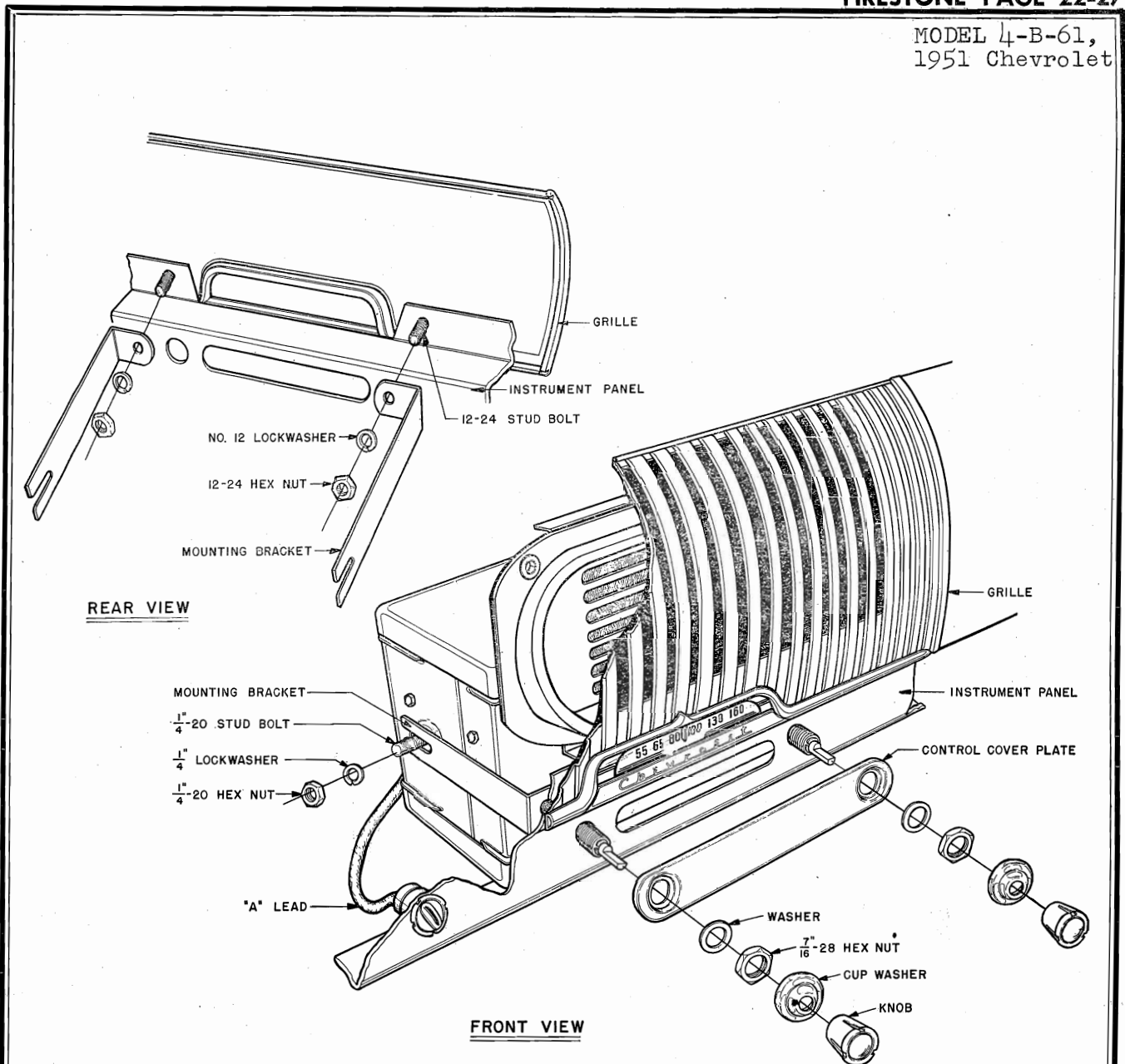


Fig. 2

DETAIL ASSEMBLY

INSTALLATION (Continued)

7. Place control cover plate over mounting bushings.
8. Replace washers and hex nuts on mounting bushings.
9. Replace cup washers and knobs on control shafts.
10. Connect the "A" lead to ignition switch.
11. Plug antenna cable into receptacle located on the back of the receiver.

ACCESSORIES FURNISHED FOR INSTALLATION

The following mounting hardware parts are shipped attached to the receiver. (See Detail Assembly drawing Fig. 2.)

- | | |
|--------------------|-----------------------|
| 2 Knobs | 1 Control Cover Plate |
| 2 Cup washers | 2 1/4" Lockwashers |
| 2 7/16-28 Hex nuts | 2 1/4-20 Hex Nuts |
| 2 Washers | |

An envelope containing additional mounting hardware is supplied with this receiver. It contains the following parts:

- 2 No. 12 Lockwashers
- 2 Mounting Brackets

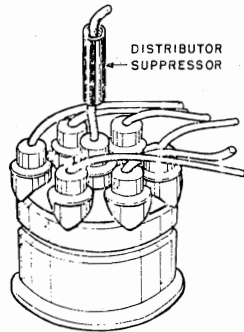
MODEL 4-B-61,
1951 Chevrolet

MOTOR NOISE ELIMINATION

SUPPRESSION KIT

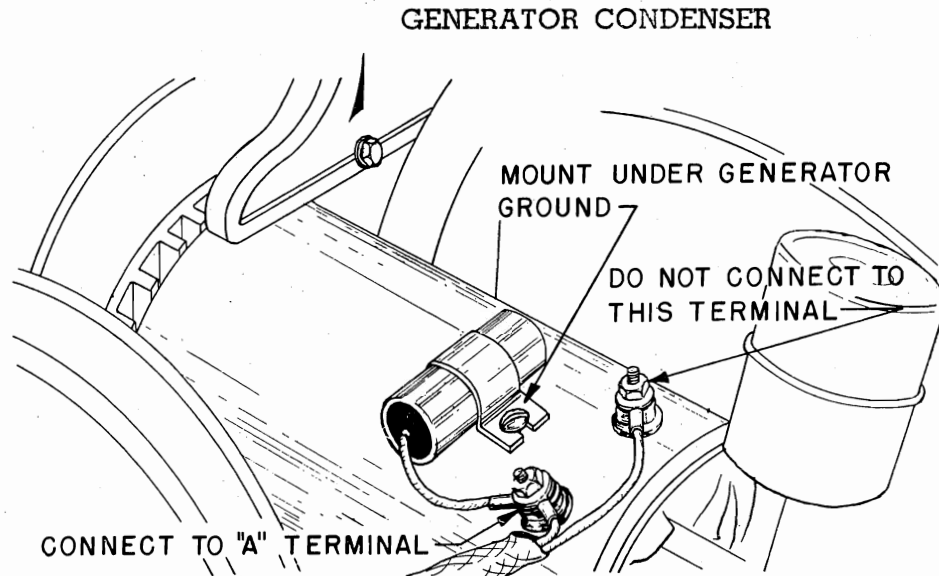
A suppression kit is shipped with this receiver. It contains the following parts:

- 1 Generator Condenser.
- 1 Distributor Suppressor.



DISTRIBUTOR

Fig. 3



GENERATOR CONDENSER

DISTRIBUTOR SUPPRESSOR

Disconnect the center lead in the distributor head of the motor. Cut lead approximately 2 inches back from metal tip end. Screw suppressor into cut end of long lead. Screw cut end of short lead into suppressor. Plug lead, with attached suppressor, back into distributor head.

The generator condenser and distributor suppressor will normally eliminate all objectionable motor noise. If the motor noise persists, a .5 MFD by-pass condenser may be connected to either side of the ammeter with the ground lug fastened to a good ground nearby.

WHEEL STATIC

Wheel static is a form of interference caused by the rotation of the front wheels of the car, and it is, of course, only noticed when the car is in motion. If this form of interference is present, it can be eliminated by installing wheel static collector springs between the inner hub cap and the spindle shaft.

ELECTRICAL ACCESSORIES

In some cases, it may be found that car accessories such as electric heaters, lighters, automatic relays or gauges, may cause interference while in operation. Proper procedure in such cases is to connect a .5 MFD by-pass condenser from ground to the suspected accessory until the source of interference is found. The condenser then should be permanently mounted in this location.

SERVICE DATA

ELECTRICAL SPECIFICATIONS

| | |
|----------------------|----------------------------------------------|
| Power Supply..... | 6.3 Volts DC |
| Current..... | 5.5 Amp. average |
| Frequency Range..... | 538-1600 KC |
| Speaker..... | 5¼" PM |
| Power Output..... | 2 watts, undistorted |
| | 3 watts, maximum |
| Sensitivity..... | 2-3 microvolts average for 1 watt output |
| Selectivity..... | 40 KC broad at 1000 times signal, at 1000 KC |

This receiver contains the following:

- 1—6BA6—RF Amplifier
- 1—6BE6—Converter
- 1—6BA6—I. F. Amplifier
- 1—6AT6—Detector—AVC—1st Audio
- 1—6AQ5—Power Output
- 1—6X4—Rectifier
- (6AV6 used in place of 6AT6 on some models.)

SERVICE NOTES

Voltage taken from the different points of the circuit to the chassis are measured with volume control in maximum position, all tubes in their sockets, no signal applied, and with a volt meter having a resistance of 20,000 Ohms per volt. These voltages are clearly shown on the voltage chart, (Fig. 4).
All voltages should be measured with an input voltage of 6.3 volts DC.
To check for open by-pass condensers, shunt each condenser with another one having the same capacity and voltage rating which is known to be good until the defective unit is located.

ALIGNING INSTRUCTION

Never attempt any adjustments on this receiver unless it becomes necessary to replace a coil or transformer, or the adjustments have been tampered with in the field. Always make certain that other circuit components, such as tubes, condensers, resistors, etc., are normal before proceeding with realignment.
If realignment is necessary follow the instructions given under the heading "Alignment Procedure". After realignment has been completed repeat the procedure as final check.

INSTRUCTIONS FOR SERVICING RECEIVER COMPONENTS

The novel design of this receiver permits servicing all components without removing the chassis from the case. The top cover can be removed by removing the four (4) screws securing it to the case. This exposes all tube sockets, connections, resistors and condensers for observation and service.
Removing the bottom cover makes it possible to service tubes, vibrator, and volume control.

PARTS LIST

| Schematic Diagram Reference | Part No. | Description | Part No. | MISCELLANEOUS |
|-----------------------------|------------------|---------------------------------------------------------------|--------------|----------------------------------------------|
| C2, C3, C4 | C207 | .05 MFD 200 volt condenser | H351 | "A" lead assembly |
| C5 | CC200 | 100 MMFD ceramic condenser | H352 | Bracket, mounting |
| C6, C13, C14 | CC201 | 200 MMFD ceramic condenser | H353 | Case, (less covers) |
| C7 | C203 | .002 MFD 400 volt condenser | H207 | Clip, anti-rattle |
| C8, C9 | C204 | .01 MFD 600 volt condenser | H208 | Clip, coil mounting |
| C10, C11 | C209 | .5 MFD 100 volt condenser | H209 | Cover, bottom case |
| C12 | C205 | .008 MFD 1600 volt condenser | H354 | Control Cover Plate |
| CE-86 | CE-86 | 20 MFD 350 volt electrolytic condenser | H355 | Cover, top case |
| CV-200 | CV-200 | 20 MFD 350 volt electrolytic condenser | H311 | Cup washers, shaft |
| | | 20 MFD 25 volt electrolytic condenser | A201 | Fuse, 15 amp |
| | | 3 section variable tuning condenser | H211 | Grommet, rubber, gang mounting |
| | | | H310 | Knob |
| | | | H212 | Receptacle, antenna cable |
| | | | PM-250 | Speaker, 5/4" PM includes output transformer |
| | | | V-83 or V-94 | Vibrator |
| | | | H113 | 7/8-28 Hex nut |
| | | | C100 | .5 MFD Generator condenser |
| | | | R100 | Distributor suppressor |
| R1 | R309 | 1 megohm 1/2 watt 20% resistor | | |
| R2 | R306 | 20K ohm 1/2 watt 20% resistor | | |
| R3 | R314 | 1.5K ohm 1/2 watt 20% resistor | | |
| R4 | R310 | 2 megohm 1/2 watt 20% resistor | | |
| R5 | R311 | 10 megohm 1/2 watt 20% resistor | | |
| R6 | R307 | 250K ohm 1/2 watt 20% resistor | | |
| R7 | R308 | 500K ohm 1/2 watt 20% resistor | | |
| R8, R13 | R303 | 330 ohm 1/2 watt 20% resistor | D351 | Dial Scale |
| R9 | R313 | 20K ohm 2 watt 20% resistor | PS351 | Dial Pointer |
| R10, R11 | R301 | 100 ohm 1/2 watt 20% resistor | DS200 | Drive shaft assembly |
| R12 | R312 | 1K ohm 1 watt 20% resistor | H201 | Grommet, rubber drive |
| RV-200 | RV-200 | Volume control 3/4 megohm with switch | T51 | Pilot light |
| | | | H202 | Pilot light socket |
| | | | H203 | Pulley, idler |
| | | | H204 | Spring, Dial Five String Tension |
| | | | H205 | String, Dial Drive |
| LI-C1 | L200 | Motor noise elimination unit | | |
| L2 | 57FB-3 | Antenna Coil | | |
| L3 | 57FB-4 | RF coil | | |
| L4 | L201 | RF Oscillator coil | | |
| L5 | L202 | Choke, vibrator hash | | |
| L6 | L203 | Choke, "A" line | | |
| T1 | 1655-16 | 1st IF transformer | | |
| T2 | 1655-16 | 2nd IF transformer | | |
| T3 | | Output transformer (Part of speaker not furnished separately) | | |
| T4 | TV-100 or TV-86A | Vibrator transformer | | |

MODEL 4-B-61,
1951 Chevrolet

ALIGNMENT PROCEDURE

Volume control—Maximum, all adjustments.

No signal applied to antenna.

Power input—6.3 volts.

Connect dummy antenna in series with output lead of signal generator.

Connect ground lead of signal generator to chassis.

Repeat alignment procedure as a final check.

The following equipment is necessary for proper alignment:

Signal generator that will provide the test frequencies as listed, modulated 400 cycles, 30%.

Non-metallic screwdriver.

Output meter. (1.8 volt for 1 watt output.)

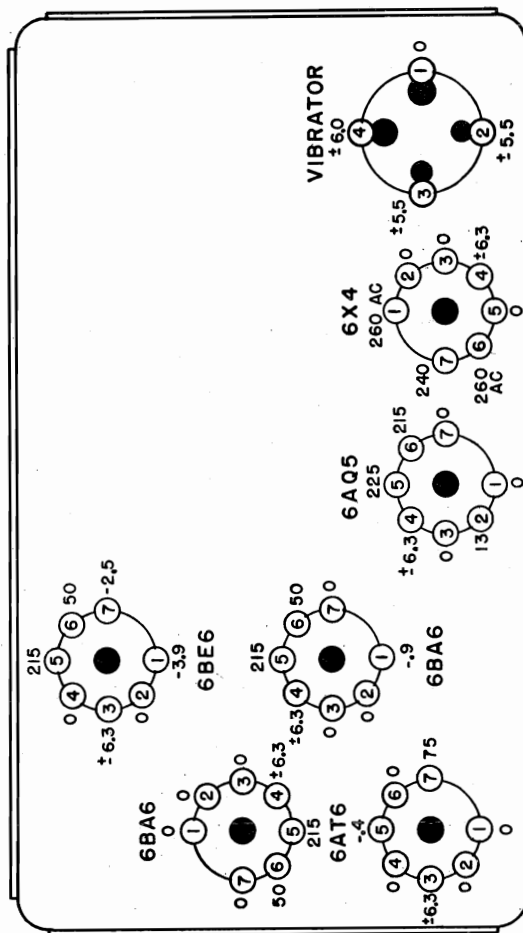
Dummy antennas—.1 MFD., 100 MMFD.

For alignment points refer to Schematic Diagram.

| Dial Setting | Generator Frequency | Dummy Ant. | Generator Connection | Trimmer Reference | Trimmer Adjustment | Trimmer Function |
|----------------------------------|---------------------|------------|----------------------|-------------------|--------------------|------------------|
| 1) Fully open | 455 KC | .1 MFD | 6BE6 Grid | T2 Top & bottom | Maximum | Output I.F. |
| 2) Fully open | 455 KC | .1 MFD | 6BE6 Grid | T1 Top & bottom | Maximum | Input I.F. |
| 3) Fully open | 1600 KC | 100 MMFD | Ant. lead | CV2 | Maximum | Oscillator |
| 4) Tune in signal from generator | 1400 KC | 100 MMFD | Ant. lead | CV3 | Maximum | RF Stage |
| 5) Tune in signal from generator | 1400 KC | 100 MMFD | Ant. lead | CV1 | Maximum | Antenna |
| 6) Tune in signal from generator | 600 KC | 100 MMFD | Ant. lead | L3 | Maximum | RF Stage |
| 7) Tune in signal from generator | 600 KC | 100 MMFD | Ant. lead | L2 | Maximum | Antenna |

8) Repeat steps 4 and 5

BOTTOM VIEW OF CHASSIS



FRONT VIEW OF CHASSIS

SOCKET VOLTAGES

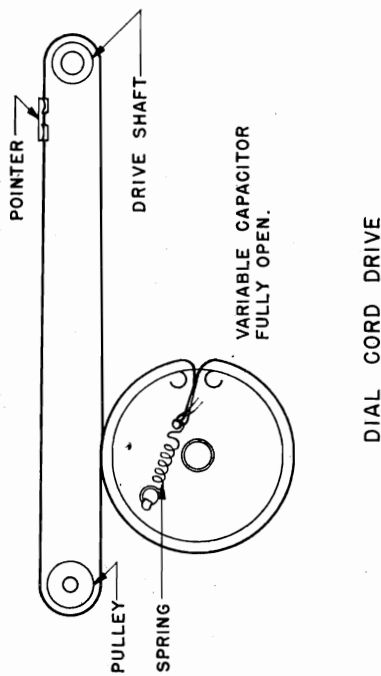
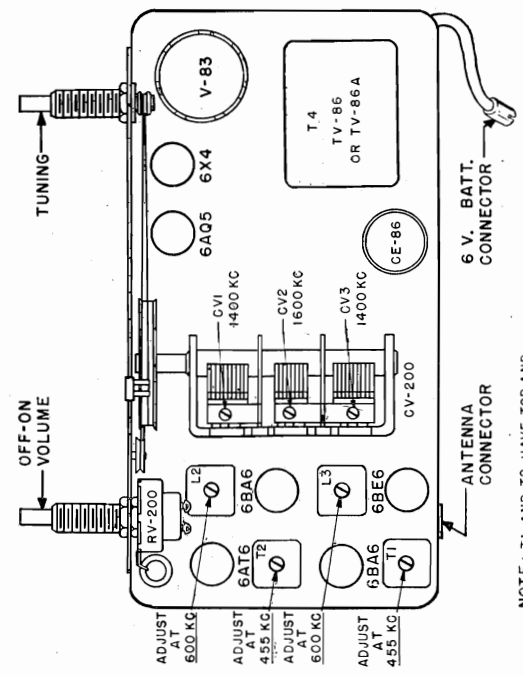
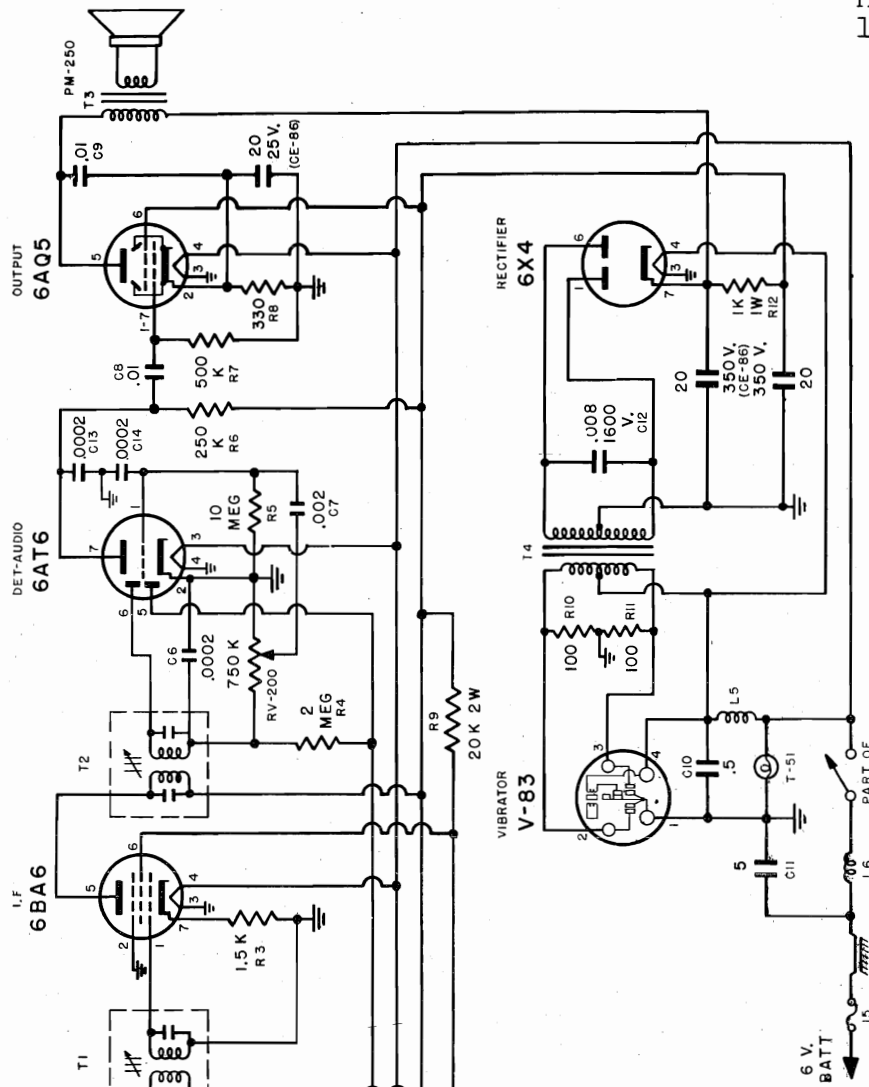


Fig. 5

MODEL 4-B-61,
1951 Chevrolet



NOTE: T1 AND T2 HAVE TOP AND BOTTOM ADJUSTMENTS. ADJUST AT 455 KC.

Note: 6AV6 used in place of 6AT6 on some models.

Fig. 6

MODEL 4-B-62,
1950-1951
Studebaker

DESCRIPTION

Your new Automobile Receiver is a 6-tube (including rectifier) superhetrodyne, designed to operate from the 6-volt storage battery in your car. It is custom-built to mount behind the instrument panel in the place provided for a radio by the automobile manufacturer. It has a self-contained PM speaker and covers the frequency range 538 to 1600 KC. Two simple controls are provided for operating the receiver. (See Fig. 1.)

This receiver has been designed with a tuned RF stage and a 3-gang tuning condenser thereby insuring the finest in sensitivity and selectivity. For best results we recommend Firestone Top Cowl Aerial Stock No. 4-B-30. The unit is simple to install and requires no electrical adjustment after installation.

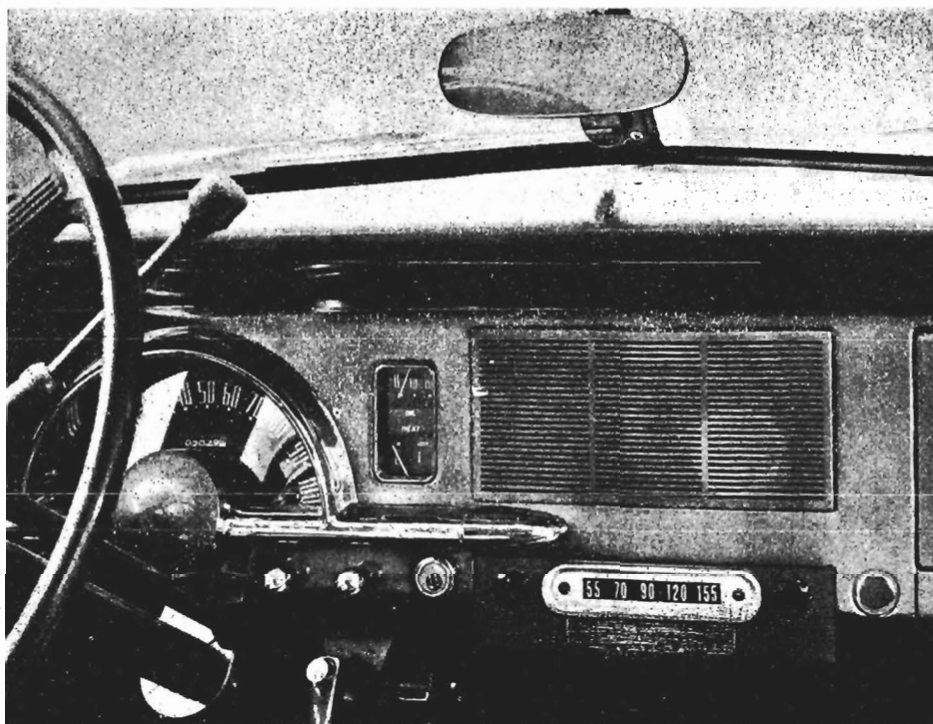


Fig. 1

OPERATION

VOLUME CONTROL KNOB

This knob is located on the left side of the radio. Turning this knob slightly to the right until a slight click is heard will put the radio into operation. Turning this knob further to the right will increase the volume and turning it to the left will decrease the volume. After a station has been selected, the volume control should be adjusted to the desired level. The volume should never be reduced by detuning the station selector knob.

STATION SELECTOR KNOB

This knob is located on the right side of the radio. This knob should be turned until a desired station has been selected. Adjust this knob very carefully until the station comes in with the most natural tone.

INSTALLATION (See Fig. 2)

1. Attach rubber gasket baffle assembly to speaker grille on radio with 4 snap fasteners supplied in kit of mounting hardware.
2. Remove two screws securing radio opening cover plate to instrument panel.
3. Discard cover plate.
4. *Important:* Some car models have a cover over the speaker opening at the back of the instrument panel. Remove and discard this cover.
5. Lift hood of car and locate the two 5/16" holes which are in the Fire Wall just below the windshield wiper motor. Insert hook bolt through the right hand hole on the engine side.
6. Place a 1/4-20 hex nut approximately one inch up on threaded end of hook bolt.

MODEL 4-B-62,
1950-51,
Studebaker

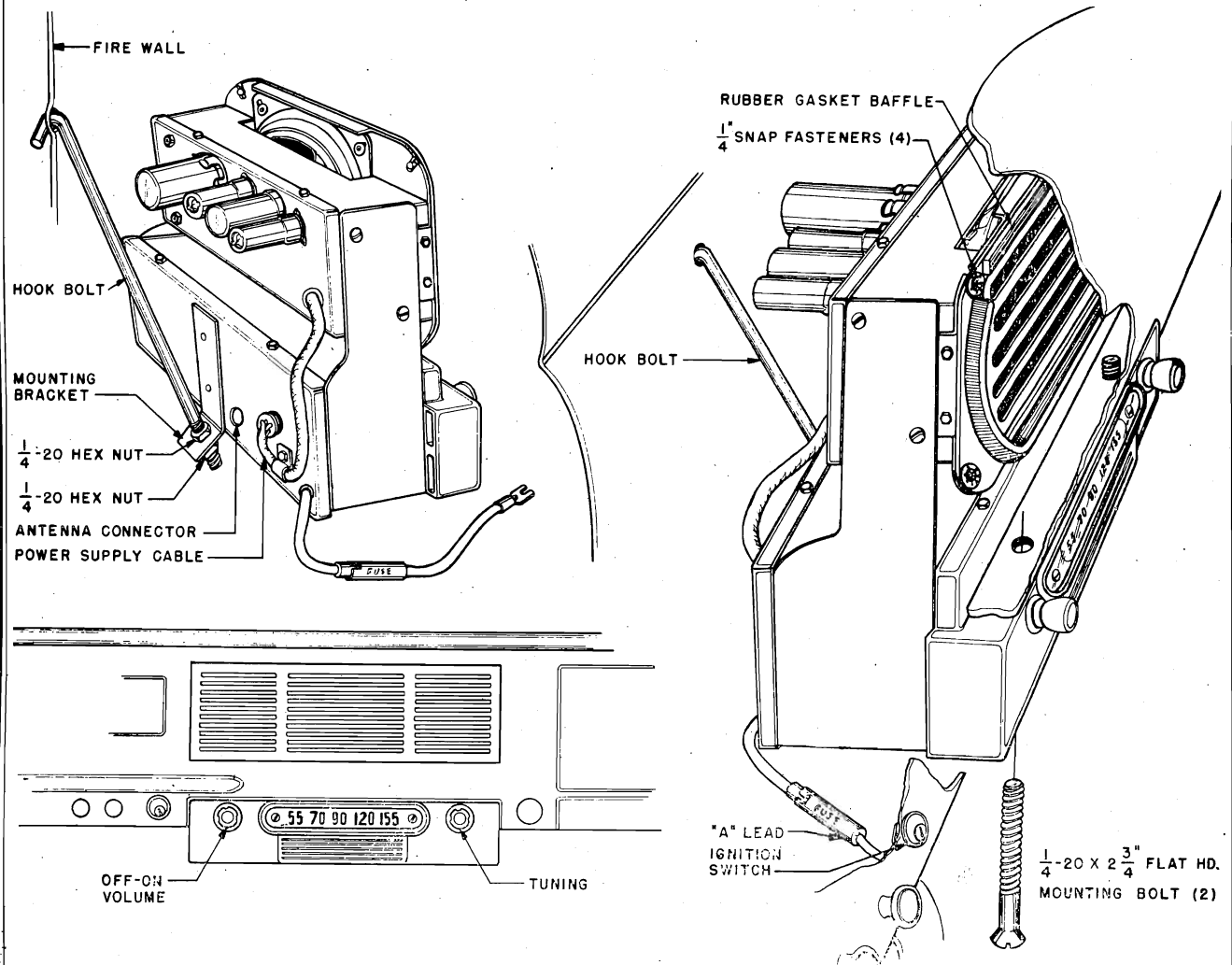


Fig. 2
**DETAIL MOUNTING ASSEMBLY
INSTALLATION (Continued)**

7. Position radio with attached rubber gasket baffle behind instrument panel and insert threaded end of hook bolt through hole on bracket attached to back of radio.
8. Screw $\frac{1}{4}$ -20 hex nut on hook bolt. Adjust position of the two $\frac{1}{4}$ -20 hex nuts so that the radio is mounted parallel to instrument panel. Tighten bottom hex nut.
9. Insert two $\frac{1}{4}$ -20 Flat head bolts supplied in mounting kit through bottom edge of radio and screw into edge of instrument panel.
10. Connect "A" lead to terminal on ignition switch.
11. Plug antenna cable into receiver.

MOUNTING PARTS KIT

ACCESSORIES FURNISHED FOR INSTALLATION

- 1 Rubber Gasket baffle assembly
- 4 $\frac{1}{4}$ " snap fasteners
- 1 Hook bolt
- 2 $\frac{1}{4}$ -20 hex nuts
- 2 $\frac{1}{4}$ -20 x $2\frac{3}{4}$ " flat head mounting bolts

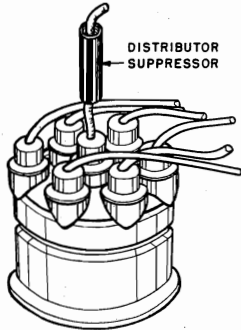
MODEL 4-B-62,
1950-1951
Studebaker

MOTOR NOISE ELIMINATION

SUPPRESSION KIT

A suppression kit is shipped with this receiver. It contains the following parts:

- 1 Generator Condenser.
- 1 Distributor suppressor.



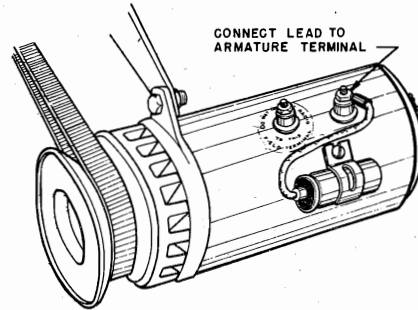
DISTRIBUTOR
Fig. 3

DISTRIBUTOR SUPPRESSOR

Disconnect the high tension wire that runs from the ignition coil to the center hole of the distributor cap. Cut lead one inch back from the metal tip end. Screw suppressor into cut end of long lead. Screw cut end of short lead into suppressor. Plug lead with attached suppressor back into distributor cap.

GENERATOR CONDENSER

Loosen screw on top surface of generator near terminals. Insert slotted generator condenser bracket under screw head and tighten screw. Connect generator condenser lead to armature terminal. *Do not connect to field terminal.*



GENERATOR CONDENSER
Fig. 4

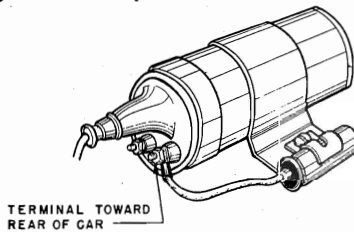
The generator condenser and distributor suppressor will normally eliminate all objectionable motor noise in most cases. If the motor noise persists the following steps should be taken. Check operation of radio as each step is made.

WHEEL STATIC

Wheel static is a form of interference caused by the rotation of the front wheels of the car, and it is, of course, only noticed when the car is in motion. If this form of interference is present, it can be eliminated by installing wheel static collector springs between the inner hub cap and the spindle shaft.

AMMETER CONDENSER

A .5 MFD by-pass condenser should be connected to either side of the ammeter with the ground lug fastened to a good ground nearby.



IGNITION COIL CONDENSER
Fig. 5

IGNITION COIL CONDENSER

In some cases it may be necessary to connect a .5 MFD by-pass condenser from the rear terminal of the ignition coil to ground.

ELECTRICAL ACCESSORIES

It may be found that car accessories such as electric heaters, lighters, automatic relays or gauges, may cause interference while in operation. Proper procedure in such cases is to connect a .5 MFD by-pass condenser from ground to the suspected accessory until the source of interference is found. The condenser then should be permanently mounted in this location.

SERVICE DATA

ELECTRICAL SPECIFICATIONS

| | |
|----------------------|----------------------------------------------|
| Power Supply..... | 6.3 Volts DC |
| Current..... | 5.5 Amp. average |
| Frequency Range..... | 538-1600 KC |
| Speaker..... | 5 1/4" PM |
| Power Output..... | 2 watts, undistorted |
| | 3 watts, maximum |
| Sensitivity..... | 2-3 microvolts average for 1 watt output |
| Selectivity..... | 40 KC broad at 1000 times signal, at 1000 KC |

This receiver contains the following:

- 1—6BA6—RF Amplifier
- 1—6BE6—Converter
- 1—6BA6—I. F. Amplifier
- 1—6AT6—Detector—AVC—1st Audio
- 1—6AQ5—Power Output
- 1—6X4—Rectifier
- (6AV6 used in place of 6AT6 on some models)

MODEL 4-B-62,
1950-1951
Studebaker

SERVICE NOTES

Voltage taken from the different points of the circuit to the chassis are measured with volume control in maximum position, all tubes in their sockets, no signal applied, and with a voltmeter having a resistance of 20,000 Ohms per volt. These voltages are clearly shown on the voltage chart, (Fig. 7 and 7A).

All voltages should be measured with an input voltage of 6.3 volts DC.

To check for open by-pass condensers, shunt each condenser with another one having the same capacity and voltage rating which is known to be good until the defective unit is located.

ALIGNING INSTRUCTION

Never attempt any adjustments on this receiver unless it becomes necessary to replace a coil or transformer, or the adjustments have been tampered with in the field. Always make certain that other circuit components, such as tubes, condensers, resistors, etc., are normal before proceeding with realignment.

If realignment is necessary follow the instructions given under the heading "Alignment Procedure." After realignment has been completed repeat the procedure as final check.

DIAL CORD DRIVE

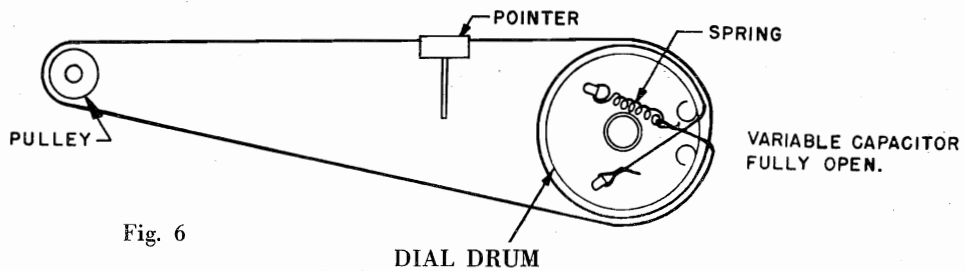


Fig. 6

PARTS LIST
CONDENSERS

| Schematic Diagram Reference | Part No. | Description |
|-----------------------------|----------|----------------------------------------|
| C2, C3, C5 | C207 | .05 MFD 200 volt condenser |
| C4, C12 | C209 | .5 MFD 100 volt condenser |
| C6 | CC200 | 100 MMFD ceramic condenser |
| C7, C9 | CC201 | 200 MMFD ceramic condenser |
| C8 | C203 | .002 MFD 400 volt condenser |
| C10, C13 | C206 | .01 MFD 400 volt condenser |
| C11 | C205 | .008 MFD 1600 volt condenser |
| CE86 | CE-86 | 20 MFD 350 volt electrolytic condenser |
| | | 20 MFD 350 volt electrolytic condenser |
| | | 20 MFD 25 volt electrolytic condenser |
| CV1-CV2-CV3 | CV-400 | 3 section variable |
| R1 | R309 | 1 megohm 1/2 watt 20% resistor |
| R2, R14 | R303 | 330 ohm 1/2 watt 20% resistor |
| R3 | R306 | 20K ohm 1/2 watt 20% resistor |
| R4 | R314 | 1.5 K ohm 1/2 watt 20% resistor |
| R5 | RV-570 | Volume control 3/4 megohm with switch |
| R6 | R310 | 2 megohm 1/2 watt 20% resistor |
| R7 | R311 | 10 megohm 1/2 watt 20% resistor |
| R8 | R313 | 20K ohm 2 watt 20% resistor |
| R9 | R307 | 250K ohm 1/2 watt 20% resistor |
| R10, R11 | R301 | 100 ohm 1/2 watt 20% resistor |
| R12 | R312 | 1K ohm 1 watt 20% resistor |
| R13 | R308 | 500K ohm 1/2 watt 20% resistor |

RESISTORS

MISCELLANEOUS

| | |
|-----------|-----------------------------------------------------------------|
| A300 | "A" lead assembly |
| H521 | Case, less covers for Power Supply Unit |
| H520 | Case, complete with covers for R.F. tuning unit |
| H207 | Clip, Anti-rattle |
| H208 | Clip, coil mounting |
| H102 | Cover, power supply unit mounting (with speaker louvres) |
| H522 | Cover, RF tuning unit, front (complete with plastic escutcheon) |
| A201 | Fuse 15 Amp. |
| H524 | Hook bolt |
| 504PC-300 | Power Cable Assembly (complete with plug) |
| H212 | Receptable, Antenna cable |
| 504-FC | Socket, power cable |
| PM-705 | Speaker, 5 1/4" PM (includes output transformer) |
| V-83 | Vibrator |
| H310 | Knob |
| H311 | Cup washer |
| C100 | .5 MFD generator condenser |
| R100 | Distributor suppressor |

COILS AND TRANSFORMERS

| | | |
|-------|------------------|---------------------------------------------------------------|
| L1-C1 | L200 | Motor noise elimination unit |
| L2 | 15053 or 57FB-3 | Antenna coil |
| L3 | 15054 or 57FB-4 | R.F. coil |
| L4 | L201 | R.F. oscillator coil |
| L5 | L203 | Choke "A" line |
| L6 | L202 | Choke, vibrator hash |
| T2 | 14977 or 1655-16 | 2nd IF transformer |
| T1 | 14977 or 1655-16 | 1st IF transformer |
| T3 | TV-100 or 318V-2 | Vibrator transformer |
| T4 | | Output transformer (Part of speaker not furnished separately) |

DIAL PARTS

| | |
|-------|-----------------------------------|
| H523 | Dial Scale Escutcheon, Plastic |
| PS100 | Dial Pointer |
| T47 | Pilot Light |
| H114 | Pilot Light Socket |
| H203 | Pulley, idler |
| H204 | Spring, Dial drive String Tension |
| H115 | String, dial drive |

MODEL 4-B-62,
1950-1951
Studebaker

ALIGNMENT PROCEDURE

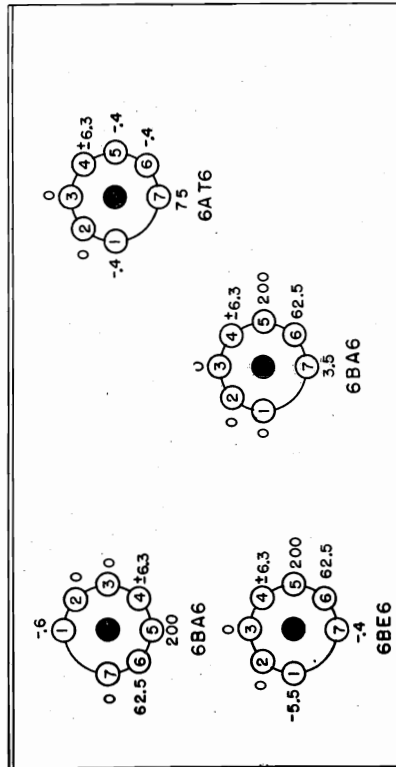
Volume control—Maximum, all adjustments.
 No signal applied to antenna.
 Power input—6.3 volts.
 Connect dummy antenna in series with output lead of signal generator.
 Connect ground lead of signal generator to chassis.
 Repeat alignment procedure as a final check.

The following equipment is necessary for proper alignment:
 *Signal generator that will provide the test frequencies as listed, modulated 400 cycles, 30%.
 Non-metallic screwdriver.
 Output meter. (1.8 volt for 1 watt output.)
 Dummy antennas—1 MFD., 100 MMFD.
 For alignment points refer to Schematic Diagram.

| Dial Setting | Generator Frequency | Dummy Ant. | Generator Connection | Trimmer Reference | Trimmer Adjustment | Trimmer Function |
|----------------------------------|---------------------|------------|----------------------|-------------------|--------------------|------------------|
| 1) Fully open | 455 KC | .1 MFD | 6BE6 Grid | T2 Top & bottom | Maximum | Output I.F. |
| 2) Fully open | 455-KC | .1 MFD | 6BE6 Grid | T1 Top & bottom | Maximum | Input I.F. |
| 3) Fully open | 1600 KC | 100 MMFD | Ant. lead | CV2 | Maximum | Oscillator |
| 4) Tune in signal from generator | 1400 KC | 100 MMFD | Ant. lead | CV3 | Maximum | RF Stage |
| 5) Tune in signal from generator | 1400 KC | 100 MMFD | Ant. lead | CV1 | Maximum | Antenna |
| 6) Tune in signal from generator | 600 KC | 100 MMFD. | Ant. lead | L3 | Maximum | RF Stage |
| 7) Tune in signal from generator | 600 KC | 100 MMFD | Ant. lead | L2 | Maximum | Antenna |

8) Repeat steps 4 and 5

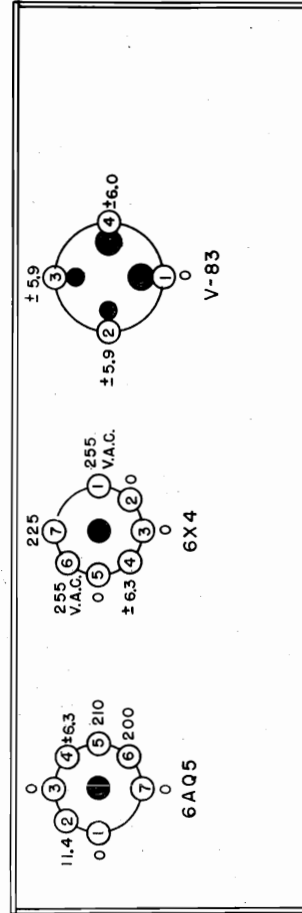
BOTTOM VIEW OF CHASSIS



FRONT OF CHASSIS

Fig. 7

BOTTOM VIEW OF POWER PACK



SOCKET VOLTAGES

Fig. 7A

MODEL 4-B-62,
1950-1951
Studebaker

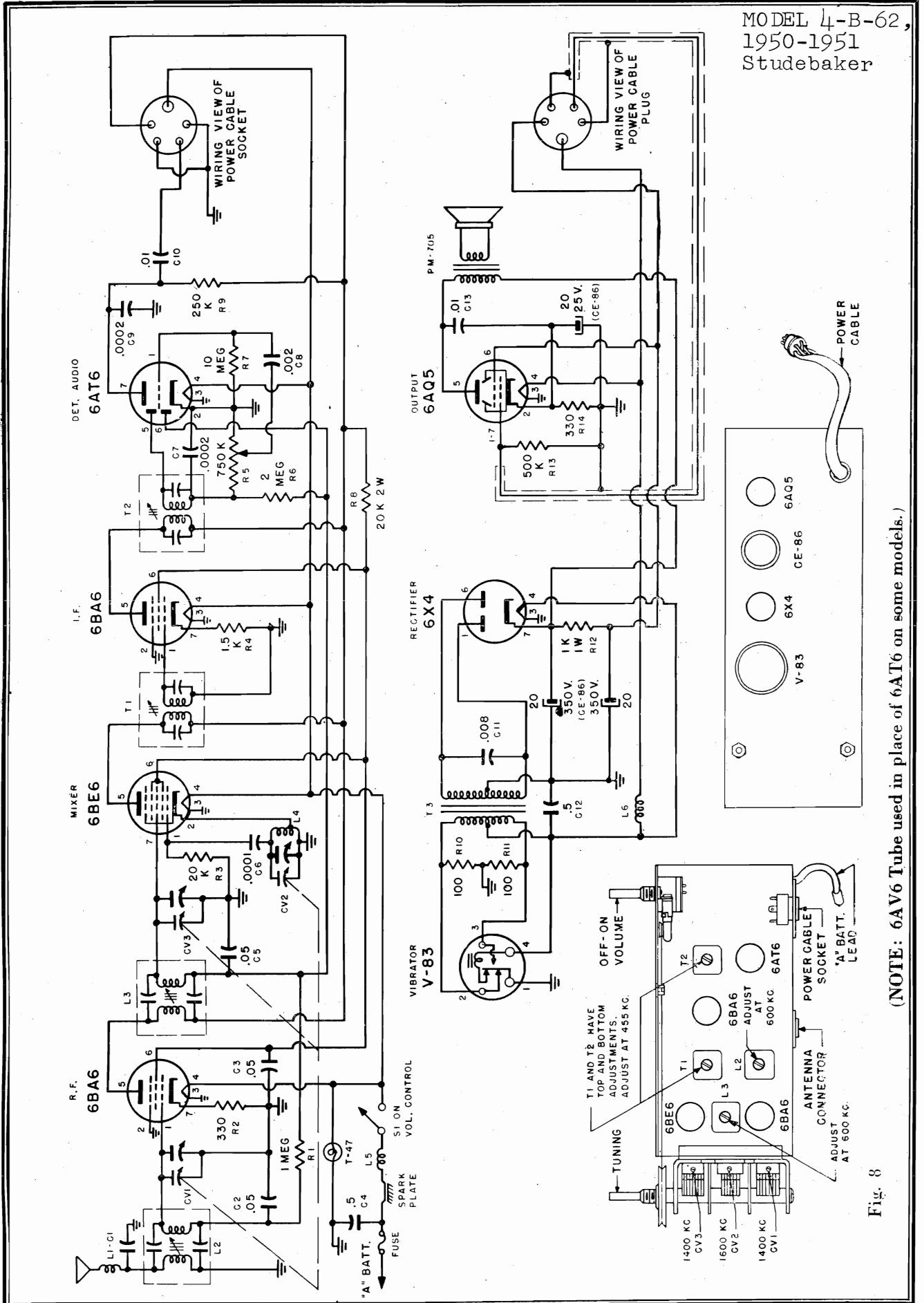
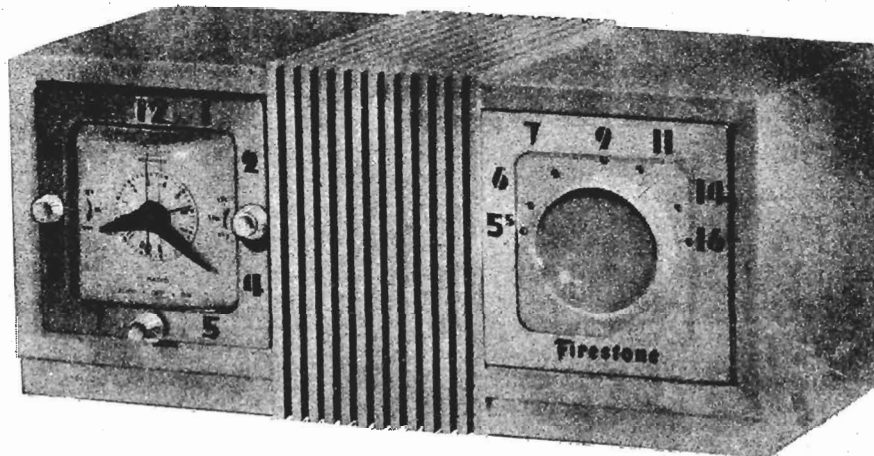


Fig. 8

MODEL 4-A-92,
The New Slumbertone



SPECIFICATIONS

| | | |
|-----------------------------|----------------------------------------|--------------------------|
| Cabinet Dimensions | - 11-1/8" x 5-1/16" x 5-1/8" | Power Output - |
| Weight | - 6-1/4 Lbs. | Undistorted - 0.8 Watt |
| Power Supply | - 110 to 120 Volt 60 Cycle AC only. | Maximum - 1.3 Watts |
| Tuning Range | - 540 to 1600 KC | Tube Complement - |
| Intermediate Freq. | - 455 KC | 12SA7 -- Converter |
| Loud Speaker | - 3-1/2" P.M. | 12SK7 - I.F. Amplifier |
| Voice Coil Impedance | - 3.2 Ohm at 400 Cycles | 12SQ7 - Diode-Audio |
| | | 50L6GT - Output |
| | | 35Z5GT - Rectifier |

ALIGNMENT PROCEDURE

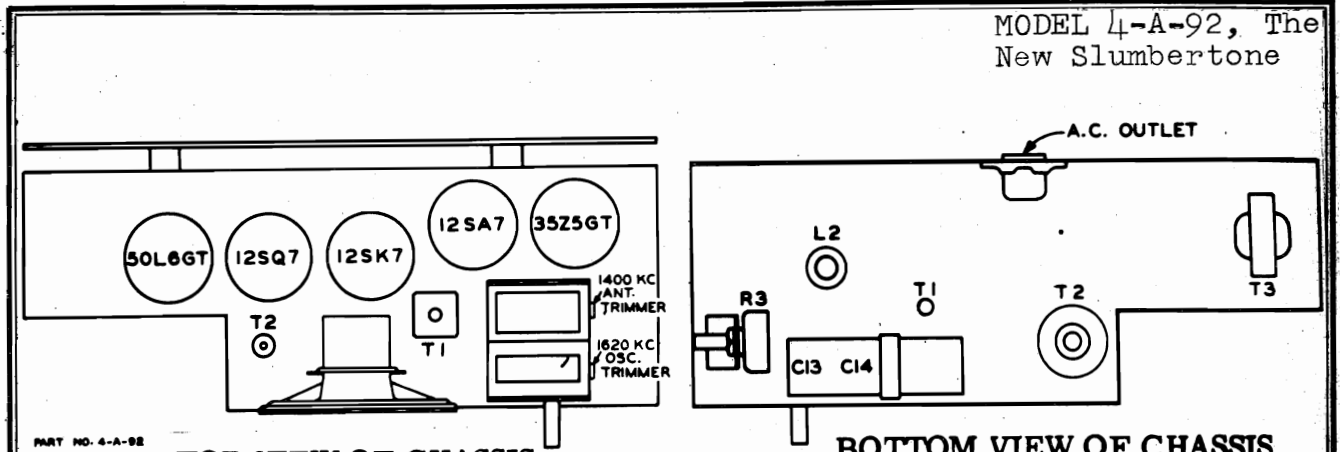
For alignment procedure read tabulations from left to right and make the adjustments marked (1) first, (2) next, (3) third.

Before starting alignment:

- (A) Remove the chassis and loop antenna from the cabinet at the same time by removing the two screws on the rear apron of the chassis which fasten the chassis to the cabinet.
- (B) Use an accurately calibrated test oscillator with some type of output measuring device.

| Steps | Set Receiver dial to: | TEST | OSCILLATOR | DUMMY ANTENNA | Refer to parts layout diagram for location of trimmers mentioned below: |
|-------|----------------------------------------------------|--------------------------------------|-------------------------------------------------------------------|--------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| | | Adjust test oscillator frequency to: | Attach output of test oscillator to: | | |
| 1 | Any point where no interfering signal is received. | EXACTLY 455 KC | High side to grid of converter Tube. Low side to common negative. | 1. MFD CONDENSER | Adjust 2nd I.F. (T2) and then each of the slugs of the 1st I.F. (T1) for maximum output. |
| 2 | Exactly 1620 KC | Exactly 1620 KC | DUMMY ANTENNA | 2 turns of Hookup Wire 6" in Diam. (Place approx. one foot from & parallel to loop.) | Adjust 1620 KC oscillator trimmer for maximum output. |
| 3 | Approx. 1400 KC | Approx. 1400 KC | DUMMY ANTENNA | | Adjust 1400 KC antenna trimmer for maximum output. |

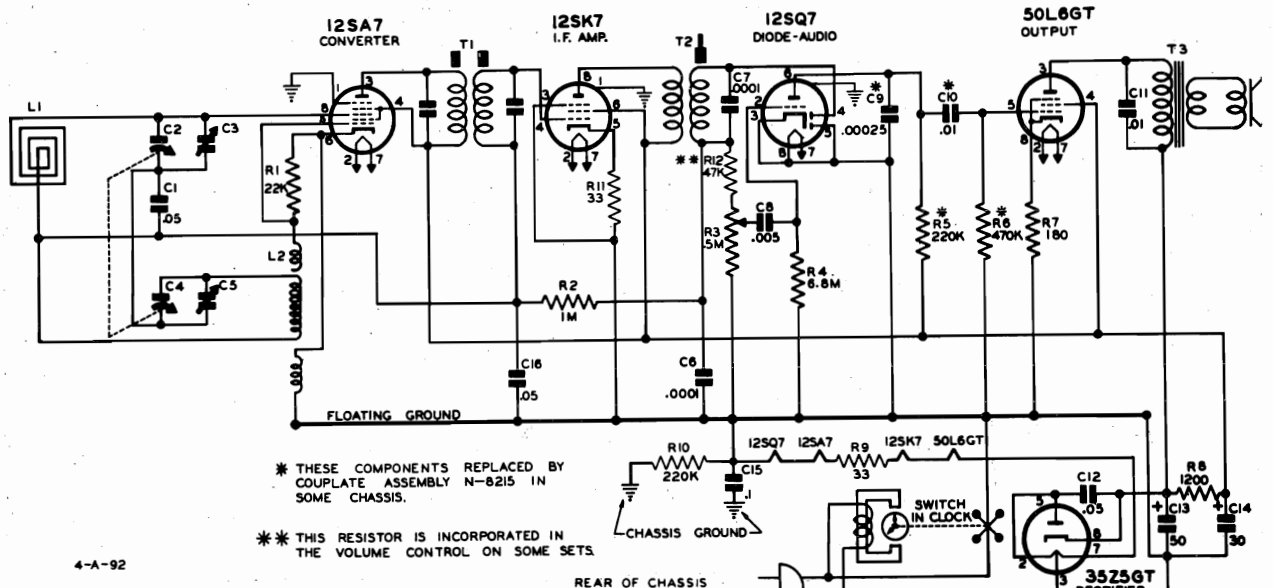
MODEL 4-A-92, The New Slumbertone



PART NO. 4-A-92

TOP VIEW OF CHASSIS

BOTTOM VIEW OF CHASSIS

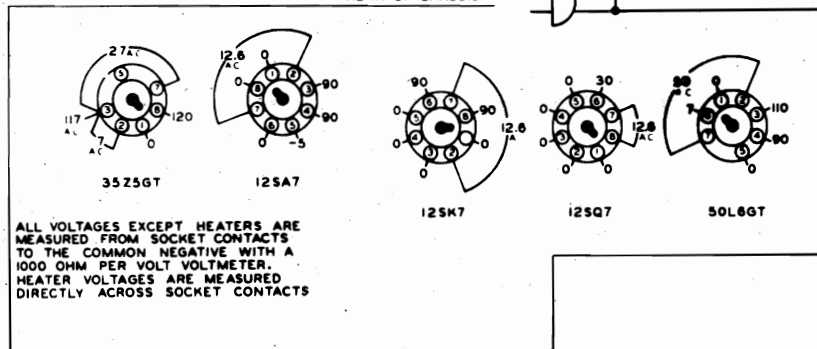


* THESE COMPONENTS REPLACED BY COUPLATE ASSEMBLY N-8215 IN SOME CHASSIS.

** THIS RESISTOR IS INCORPORATED IN THE VOLUME CONTROL ON SOME SETS

4-A-92

REAR OF CHASSIS



ALL VOLTAGES EXCEPT HEATERS ARE MEASURED FROM SOCKET CONTACTS TO THE COMMON NEGATIVE WITH A 1000 OHM PER VOLT VOLTMETER. HEATER VOLTAGES ARE MEASURED DIRECTLY ACROSS SOCKET CONTACTS

VOLTAGE TABLE (BOTTOM VIEW OF CHASSIS)

| ILL. NO. | PART NUMBER | PART NAME | DESCRIPTION |
|-----------|-------------|-----------------------|-------------------------------|
| C1, C16 | N-1345 | Condenser, | Paper .05 Mfd. 200 V. |
| C6 | N-6015 | Condenser, | Ceramic 100 Mmfd. 500 V. 20% |
| C7 | N-7549 | Condenser, | Ceramic 100 Mmfd. 500 V. 10% |
| C8 | N-4894 | Condenser, | Paper .005 Mfd. 600 V. |
| *C9 | N-6488 | Condenser, | Ceramic 250 Mmfd. 500 V. 20% |
| *C10, C11 | N-1344 | Condenser, | Paper .01 Mfd. 490 V. |
| C12 | N-1346 | Condenser, | Paper .05 Mfd. 400 V. |
| C13 | N-7889 | Condenser | Electrolytic (50 Mfd. 150 V.) |
| C14 | | | (30 Mfd. 150 V.) |
| C15 | N-1351 | Condenser | Paper .1 Mfd. 200 V. |
| R1 | N-4025 | Resistor | Carbon 22,000 Ohm 1/2W. 20% |
| R2 | N-1282 | Resistor | Carbon 1.0 Megohm 1/2W. 20% |
| ** R3 | N-8250 | Volume Control | 500,000 Ohm |
| R4 | N-4028 | Resistor | Carbon 6.8 Megohm 1/2W. 20% |
| *R5, R10 | N-4026 | Resistor | Carbon 220,000 Ohm 1/2W. 20% |
| R6 | N-4027 | Resistor | Carbon 470,000 Ohm 1/2W. 20% |
| R7 | N-4067 | Resistor | Carbon 180 Ohm 1/2W. 10% |
| R8 | N-4900 | Resistor | Carbon 1,200 Ohm 1.0W. 10% |
| R9 | N-4068 | Resistor | Carbon 33 Ohm 1.0W. 20% |
| R11 | N-4022 | Resistor | Carbon .33 Ohm 1/2W. 20% |
| **R12 | N-4063 | Resistor | Carbon 47,000 Ohm 1/2W. 20% |
| L1 | N-8246 | Coil, | Loop Antenna & Cabinet Back |
| L2 | N-7139 | Coil, | Oscillator |
| T1 | N-7981 | Transformer 1st. I.F. | |
| T2 | N-7877 | Transformer 2nd. I.F. | |
| T3 | N-7281 | Transformer Output | |
| | N-8247 | Speaker | 3-1/2" P.M. |
| | N-7141 | Condenser | Variable - 2 Gang |
| | N-8253 | Escutcheon | Dial |
| | #327 | Cabinet | White - (In Carton) |
| | N-8254 | Knob | Tuning - White |
| | N-8251 | Knob | Volume - White |
| | N-8257 | Power Cord | |

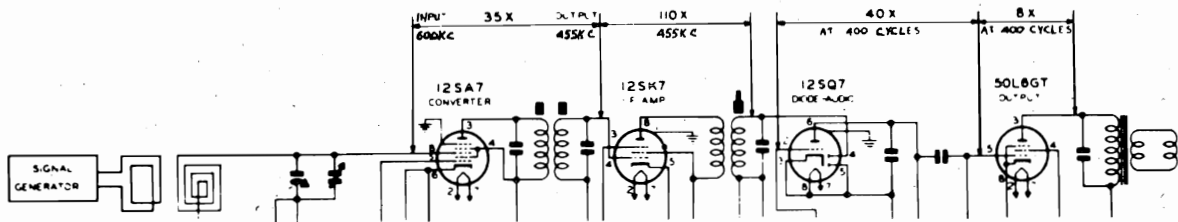
NOTES -

- * In some receivers, the following components (C9, C10, R5 and R6) are replaced by the assembly listed below:
N-8215 Assembly Audio Coupling Plate
- ** R12 (Carbon Resistor 47,000 Ohm 1/2W. 20%) is included in the volume control of some receivers.
- *** Excise Tax Included.

MODEL 4-A-92, The
New Slumbertone

Be sure R.F. and I.F. stages are accurately aligned before measuring gain. R. F. gains can be measured with a "channel" type instrument containing a tuned and calibrated R. F. Amplifier. A vacuum tube voltmeter may be used for audio gain measurements. Observe the following precautions:

1. For all gain measurements connect signal generator as shown. Use 600 KC. signal with 400 cycle modulation (use nearby frequency if local station interferes.)
2. Be sure radio is carefully tuned to generator signal (use weak signal for sharp tuning.)
3. When using a "channel type instrument" carefully tune it for maximum output at desired frequency before making measurements.



Differences in tube characteristics, tolerance of parts, adjustment of tuned circuits, and variations of line voltage will influence stage gain. Accuracy of measurements is dependent upon careful tuning of receiver to generator signal and experience in using your test equipment. These factors may create considerable variation in gain measurements.

ORDERING PARTS

Order parts from your nearest Firestone Tire and Auto Supply Warehouse. When ordering parts, it is important that the correct code number and stock number, be given with the correct part name and part number as shown in the parts list. You will find the stock number and code number marked on the radio. The stock and code number also appears on the front cover of this booklet.

IMPORTANT:-

This receiver is equipped with a special heavy duty power cord because of the added wattage rating of the appliance outlet.

When replacing power cord be sure to use one of adequate rating.

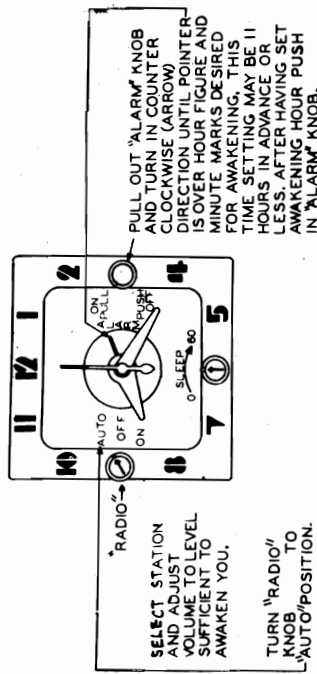
RETURNING DEFECTIVE PARTS

All parts on adjustments must be returned to your District Office Service Department with claim form completely filled out. This radio is so constructed that it can be repaired locally by an experienced repairman.

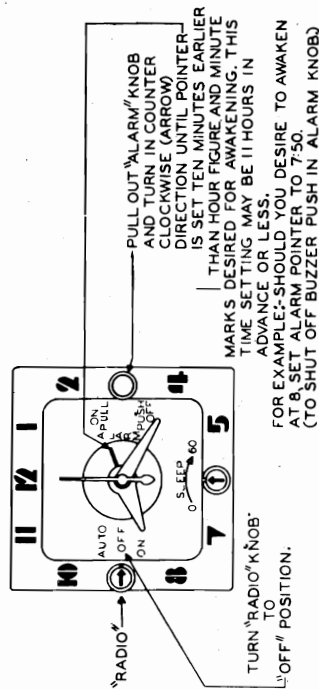
INSTRUCTIONS FOR USE OF CLOCK WITH RADIO OR EXTERNAL APPLIANCE

By carefully following the instructions illustrated below, the clock may be used to perform any of the following functions:

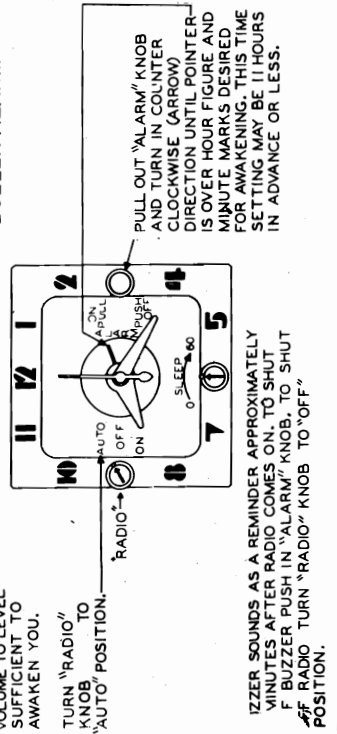
(1) TO AWAKEN TO MUSIC



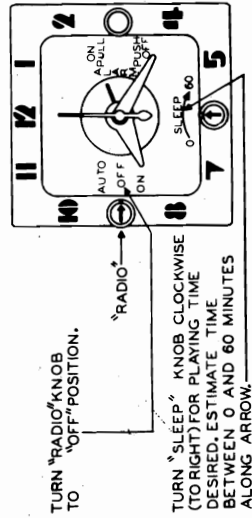
(2) TO AWAKEN TO BUZZER ALARM



(3) TO AWAKEN TO MUSIC AND BUZZER ALARM



(4) TO TURN RADIO OFF AUTOMATICALLY WHEN RETIRING



To use this feature, simply plug in the appliance, turn the AUTO-OFF-ON SWITCH KNOB to the "OFF" position rotate the "Sleep" knob in a clockwise direction for the length of time required.

Precise time setting with this "Sleep" control will require practice.

- (5) TO TURN RADIO OFF AUTOMATICALLY WHEN RETIRING AND AWAKEN TO MUSIC. Set controls as in Illustration 1 and set "Sleep" knob as in Illustration 4.
 - (6) TO TURN RADIO OFF AUTOMATICALLY WHEN RETIRING AND AWAKEN TO BUZZER ALARM. Set controls as in Illustration 2 and set "Sleep" knob as in Illustration 4.
 - (7) TO TURN RADIO OFF AUTOMATICALLY WHEN RETIRING, AWAKEN TO MUSIC AND BUZZER ALARM. Set controls as in Illustration 3 and set "Sleep" knob as in Illustration 4.
 - (8) TO AUTOMATICALLY TURN ON RADIO AND EXTERNAL ELECTRICAL APPLIANCE. Insert plug of appliance into the electrical outlet provided at rear of receiver and set clock controls as in Illustration 1.
- This feature may be used with any electrical appliance which operates on a 110-120 volt, 60 cycle power supply and which DOES NOT EXCEED THE WATTAGE RATING FOR THE OUTLET SHOWN ON THE CABINET BACK.
- Current is available at this outlet whenever the radio is turned on.
- (9) TO TURN RADIO AND APPLIANCE OFF AUTOMATICALLY. The controls may be set to turn off the radio and appliance at any time up to 60 minutes after the original starting time

MODEL 4-A-92, The
New Slumbertone

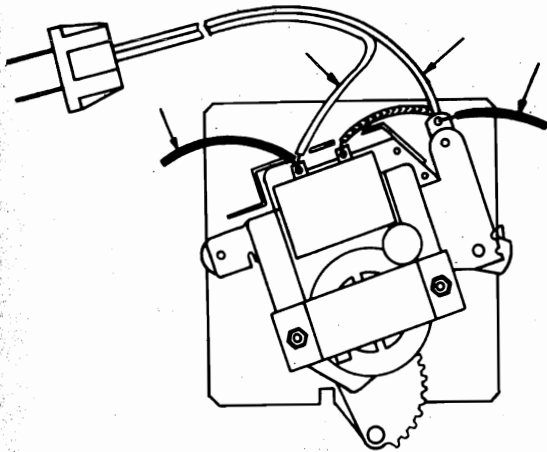


FIGURE "A"

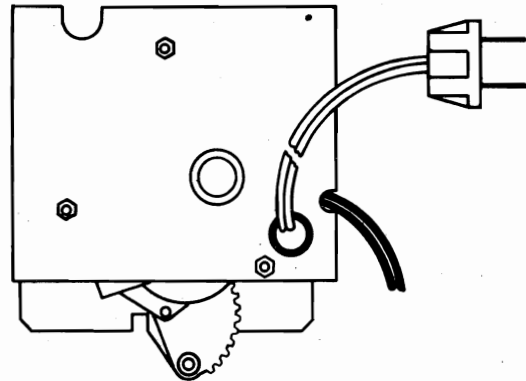


FIGURE "B"

REMOVAL OF CLOCK FROM CABINET

The clock movement may be removed from the cabinet by following the procedure listed below:

1. Remove plug of power cord from wall outlet.
2. Remove tuning and volume control knobs.
3. Remove two chassis retaining screws at rear of receiver, and slide chassis from cabinet to permit access to rear of clock.
4. Remove 3 nuts holding clock retaining bracket illustrated in figure "B" above.
5. After shield is removed, unsolder the power cord and the two wires leading from the clock to the chassis. (These wires are indicated by arrows in figure "A" above.)
6. Rotate "Sleep" knob to the 60 minute position and remove clock by sliding straight forward.

SHIPPING OF CLOCK FOR REPAIR

When it is necessary to ship the clock to a Telechon Service Station for repair make certain that it is suitably packed to withstand transportation. Particular care must be given to the glass crystal so that it is not subject to strain during shipment.

MODEL 05RA4-43-9876B

Model 05RA4-43-9876B is the same as Model 05RA4-43-9876A except for the Battery/AC/DC change-over system and the substitution of 1L4 tubes for 1U4's. The hand-operated switch is replaced by a type which is operated by plugging the power cord into a chassis socket. This socket is near the back edge of the chassis. There is a slot for only one prong of the power cord plug; the other prong hangs over the back apron. The detachable power cord and the socket for it on the chassis are replaced by a conventional power cord.

The Replacement Parts List for Model 05RA4-43-9876B is the same as the List for Model 05RA4-43-9876A except for the following changes:

REMOVE:

- 84-77 Cord, power, AC/DC.....
- 52-196 Knob, AC/DC/battery switch
- 45-121 Plug, AC/DC.....
- R8 60-676 Resistor, 30,000 ohm, 1/2 w...
- R19 60-726 Resistor, 2.2 megohm, 1/2 w...
- 69-173 Switch, AC/DC/battery.....

ADD:

- 23-151 Cord, power, AC/DC.....
- R8 60-745 Resistor, 27,000 ohm, 1/2 w.....
- R19 60-799 Resistor, 820,000 ohm, 1/2 w.....
- R20 60-744 Resistor, 22,000 ohm, 1/2 w. 10%
- C23 16-157 Capacitor, .1 mfd. 200 volt.....
- 69-196 Switch, AC/DC/battery.....

NOTE: For additional data, See Model 05RA4-43-9876A, Pgs. 21-22 through 21-24.

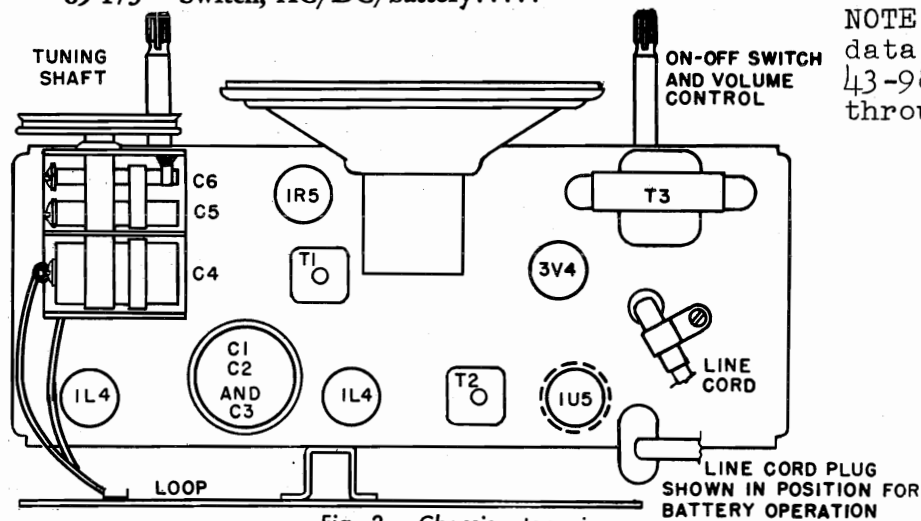


Fig. 2. Chassis—top view

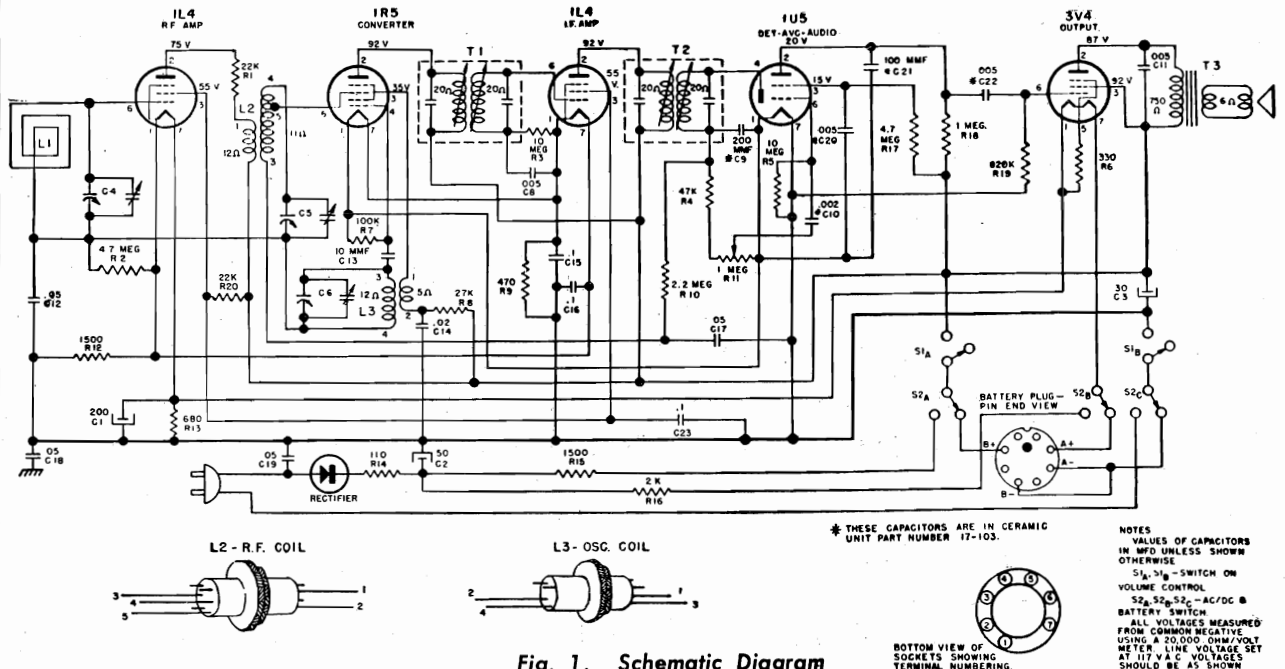


Fig. 1. Schematic Diagram

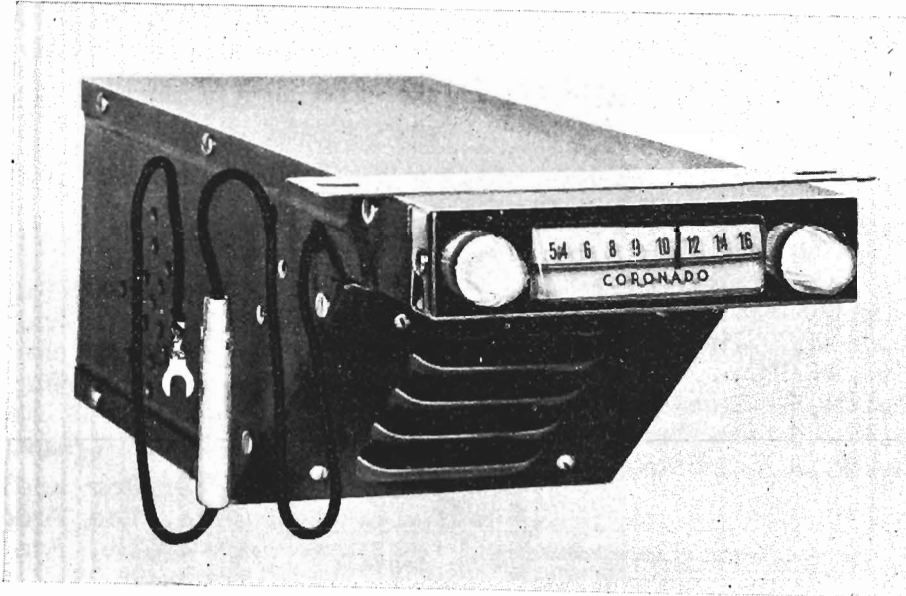
* THESE CAPACITORS ARE IN CERAMIC UNIT PART NUMBER 17-103.

NOTES
VALUES OF CAPACITORS IN MFD UNLESS SHOWN OTHERWISE
S1A, S1B—SWITCH ON VOLUME CONTROL
S2A, S2B—AC/DC & BATTERY SWITCH
ALL VOLTAGES MEASURED FROM COMMON NEGATIVE USING A 20,000 OHM/VOLT METER. LINE VOLTAGE SET AT 117 V A C. VOLTAGES SHOULD BE AS SHOWN ± 20 PER CENT.

BOTTOM VIEW OF SOCKETS SHOWING TERMINAL NUMBERING.

PAGE 22-2 GAMBLE-SKOGMO

MODEL 05RA33-43-5016A



SPECIFICATIONS

| | |
|------------------------|----------------------------------------------|
| Power Supply | 6.3 volts DC |
| Frequency Range | 540 KC to 1600 KC |
| Intermediate Frequency | 257.5 KC |
| Antenna | Whip type |
| Tuning | Permeability |
| Speaker | 4", P.M. voice coil impedance 3.2 ohms |
| Power Output | 2.5 watts undistorted, 3.5 watts maximum |
| Sensitivity | 1 uv for 500 milliwatts output |
| Selectivity | 40 KC broad at 1000 times, signal at 1000 KC |
| Signal to Noise Ratio | 10 to 1 |

Tubes used are as follows:

- 6BA6 R.F. Amplifier
- 6BE6 Oscillator-Converter
- 6BA6 I.F. Amplifier
- 6AV6 A.V.C., Detector, and Audio Amplifier
- 6AQ5 Power Output
- 6X4 Power Rectifier

UNPACK CAREFULLY, YOU WILL FIND:

Radio

1 Mounting bracket

1 Bag mounting parts:

Hardware, generator condenser, and distributor resistor.

MOUNTING

The chassis contains the complete radio, power supply, and speaker. This unit may be mounted to, and directly below, the instrument panel at any convenient location. Two holes must be drilled in the stiffening lip of the instrument panel about 3/4 inch back from the front of the panel and spaced approximately 6 inches apart. These holes must be large enough to pass the two No. 8 machine screws provided in the bag of mounting parts for fastening the radio in place. After the holes are drilled, insert the mounting screws through the holes in the mounting plate of the radio and in the instrument panel lip, and place lock washers and nuts on screws. These nuts must be securely fastened. It is also very important that the paint be removed from the instrument panel lip directly under the nut so that a good ground connection is made.

Drill a hole to pass a No. 10 machine screw in the fire wall or some other convenient place, and bolt one end of the metal strap with series of holes to this place. Insert the 1/4-20 stud in tapped hole in the back of the radio, and fasten the mounting strap to the back of the radio by means of this stud, lock washer, and nut. This is the back support for the radio, and good ground connections must also be considered in this assembly.

CONNECTIONS

Connect the fused power lead from the radio to the ammeter or circuit breaker of the vehicle. A 10 ampere fuse is provided in this lead; never replace this fuse with one of another value.

The antenna lead is plugged into the antenna jack.

If a second, or external, speaker is desired, a speaker socket is provided. Just connect the proper plug onto this second speaker, and insert plug in the external speaker socket.

After installation, tune in a weak station near 1600 KC, and adjust antenna trimmer, TC1, for maximum volume. If, for any reason, the set is out of alignment, these adjustments must be made by a competent service man and with the use of a good signal generator.

ALIGNMENT PROCEDURE

The following is for use only by competent service men having the proper equipment:

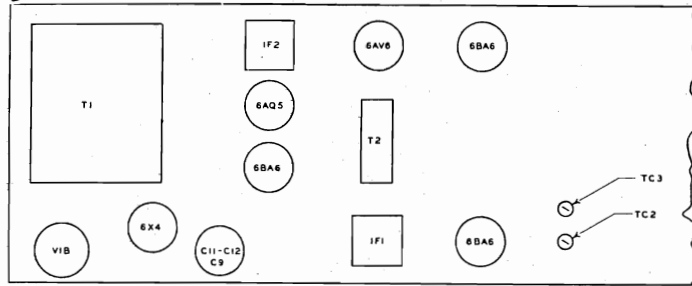
The alignment should be made with volume control fully on and the output voltage from the signal generator as low as possible to prevent A.V.C. action from interfering with the proper alignment. With the output meter connected across the voice coil of the speaker, the output meter reading for 50 milliwatts is 0.4 volts using a signal which is modulated at 400 c.p.s.

Adjust all trimmers for maximum output. After adjusting IF1 and IF2, "rock" the tuner to make sure that the I.F. coils are not tuned to an image. Repeat the alignment procedure given below as a final check.

SIGNAL GENERATOR

| Frequency | Dummy Antenna | Connection To Radio | Position Of Tuner | Adjust for Max. Output |
|-----------|---------------|---------------------|---------------------|------------------------|
| 257.5 KC | 100 MMFD | 6BE6 Grid Pin No. 7 | Slugs Out | IF1 & IF2 |
| 1610 KC | 100 MMFD | Ant. Jack | Slugs Out | TC3 |
| 1610 KC | 100 MMFD | Ant. Jack | Slugs Out | TC2 |
| 1610 KC | 100 MMFD | Ant. Jack | Slugs Out | TC1 |
| 1400 KC | 100 MMFD | Ant. Jack | Tune in Signal Gen. | LA Slug & LR Slug |

MODEL 05RA33-43-5016A



CHASSIS LAYOUT TOP VIEW

43-5016
K-1276

(Cut GS402, Chassis layout)

ELIMINATION OF INTERFERENCE

Remove the coil-to-distributor high-tension lead from the distributor. Cut the lead two inches from the end, and screw the distributor resistor onto the coil lead. Then screw the short length onto the resistor, and plug the cable into the distributor cap.

One noise-filter condenser is furnished. Condenser must be connected to the output terminal of the generator (never to the field terminal). The generator-condenser bracket should be fastened to the generator housing, under the screw that holds the field. In some particularly stubborn cases of motor interference, one or more of the following procedures may be necessary:

A condenser can often be used to advantage on the electrically operated oil gauge or gas gauge. Connect the condenser lead to the terminal of the gauge, and bolt the condenser case securely to the frame or some other grounded part of the car.

Bonding the steering column to the fire wall with a short braid may also be effective. Clean the paint from the steering column at the fire wall where the column enters the motor compartment, and solder on a short piece of braid. Ground the end of the braid to the fire wall.

In some cases it may be necessary to ground the tubes and rods coming through the fire wall in order to reduce the interference. Clean them with emery cloth and spot-solder the braid, fastening the end under a convenient screw.

In some cases it may be necessary to connect an additional condenser to the ammeter or to the ignition switch.

It may be necessary to use a condenser on the voltage regulator. The condenser case should be mounted under one of the voltage-regulator mounting screws, or at some other convenient location, and the lead connected to the battery terminal of the voltage regulator.

Interference from electric clocks can be eliminated by connecting a condenser to the ammeter terminal. The case of the condenser must be securely grounded.

If tire-static interference is noted in a particular installation, static collector springs should be obtained and installed in the front wheels of the car.

MODEL 05RA33-43-5016A

PARTS NUMBERS

CIRCUIT COMPONENTS

| SYMBOL | PART NO. | DESCRIPTION | VALUE | RATING |
|--------------|-------------------|----------------------------------|---------------------|------------------|
| TC2-TC3 | VC1276-2 | Dual Trimmer | | |
| TC1 | VC1276-1 | Trimmer | | |
| C9, C11, C12 | C-15-15-25-3.5-25 | Electrolytic | 15-15-25 MFD | 350-350-25 volts |
| | C5G | Generator, capacitor | .5 MFD | |
| C14, C15 | C52 | Capacitor, paper | .5 MFD | 200 volts |
| C1 | CO472 | Capacitor, paper | .047 MFD | 200 volts |
| C2 | CO474 | Capacitor, paper | .047 MFD | 400 volts |
| C8 | CO156 | Capacitor, paper | .015 MFD | 600 volts |
| C7, C10 | CO16 | Capacitor, paper | .01 MFD | 600 volts |
| C13 | COO5616 | Capacitor, buffer | .0056 MFD | 1600 volts |
| C5 | C14205M | Capacitor, mica | 1420 MMFD | 500 volts |
| C4 | C3005M | Capacitor, mica | 300 MMFD | 500 volts |
| C6 | C505M | Capacitor, mica | 50 MMFD | 500 volts |
| C3 | C105M | Capacitor, mica | 10 MMFD | 500 volts |
| C16 | C2002OM | Capacitor, spark | 200 MMFD | 2000 volts |
| LA | 1276LA | Antenna coil | | |
| LR | 1276LR | R.F. coil | | |
| LO | 1276LO | Oscillator coil | | |
| | LV-1276 | Permeability tuner, complete | | |
| CH2 | L16 | A choke | | |
| CHI | L47 | Spark choke | 4.7 MH | |
| T1 | PT1276 | Vibrator transformer | | |
| T2 | OT1276 | Output transformer | | |
| IF1, IF2 | IF1276 | I.F. transformer | | |
| R12, R13 | R680.5 | Resistor | 68 ohms | 1/2 watt |
| R5 | R122.5 | Resistor | 1200 ohms | 1/2 watt |
| R1, R3 | R223.5 | Resistor | 22K ohms | 1/2 watt |
| R4 | R333.5 | Resistor | 33K ohms | 1/2 watt |
| R9 | R474.5 | Resistor | 470K ohms | 1/2 watt |
| R2 | R185.5 | Resistor | 1.8 megohm | 1/2 watt |
| R6 | R225.5 | Resistor | 2.2 megohm | 1/2 watt |
| R8 | R106.5 | Resistor | 10 megohm | 1/2 watt |
| R10 | R4511 | Resistor | 450 ohms | 1 watt |
| R11 | R1021 | Resistor | 1000 ohms | 1 watt |
| R7 | R2731 | Resistor | 27K ohms | 1 watt |
| | R1035 | Resistor, suppressor | 10K ohms | |
| VR1 | VR1276 | Volume control | 1 megohm | |
| S1 | VR1276 | Switch SP.S.T. on volume control | | |
| E2 | CR2 | Capristor | 270K ohm/100 MMFD | |
| E1 | CR1 | Diode filter unit | 100-100 MFD/47K ohm | |
| SPKR | SPK1276 | Speaker | | |
| VIB | E659 | Vibrator | | |
| Fuse | | Fuse 10 ampere | | |
| | | Pilot light No. 47 | | |

MECHANICAL PARTS

| PART NO. | DESCRIPTION | PART NO. | DESCRIPTION |
|----------|---------------------|------------|-----------------------|
| M-1801 | Chassis and wrapper | H-81651 | Dial rivet |
| M-1802 | Top cover | P-1802 | Knob |
| M-1803 | Speaker cover | GRI4 | Rubber grommet |
| M-1804 | Panel | H-81644-5 | Vibrator socket |
| M-1805 | Dial plate | H-81644-6 | Miniature tube socket |
| H-1801 | I.F. Mounting clip | H-81644-9 | Pilot light socket |
| H-1802 | Speed nut | H-81644-6 | Antenna jack |
| H-1803 | Eyelet | H-81644-7 | Speaker socket |
| H-1804 | Spade lug No. 10 | H-81644-8 | Fuse holder |
| P-1801 | Dial scale | H-81641-8 | Terminal board No. 8 |
| A-1801 | Dial cord assembly | H-81641-3 | Terminal board No. 3 |
| M-1806 | Dial pointer | H-81641-27 | Terminal board No. 27 |
| | | H12754 | Vibrator clamp |

MODELS 05RA33-43-8136A,
05RA33-43-8137A



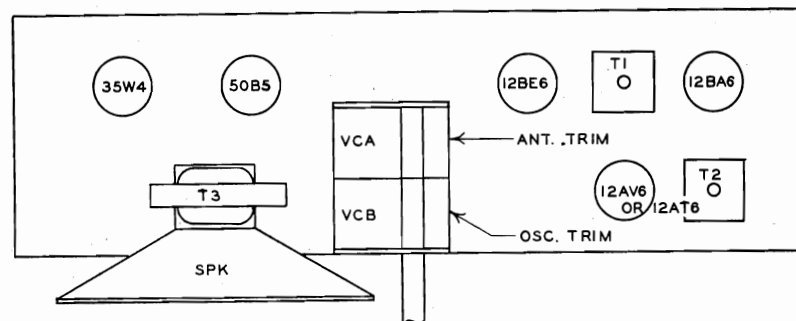
GS 505

SPECIFICATIONS

| | |
|------------------------|-----------------------------------------------|
| Power Supply | 117 volts 60 cycle AC, 117 volts DC, 29 watts |
| Frequency Range | 535 KC to 1630 KC |
| Intermediate Frequency | 455KC |
| Antenna | Built-in Loop |
| Tuning | Variable Capacity |
| Speaker | 4", P.M. voice coil impedance 3.2 ohms |
| Power Output | 0.8 watt undistorted, 1.8 watts maximum |
| Sensitivity | 400 uv/m average for 50 milliwatts output |
| Selectivity | 55 KC broad at 1000 times, signal at 1000KC |

Tubes used are as follows:

| | |
|-----------------------------------------|----------------------|
| 12BE6 Oscillator-Converter | 50B5 Power Output |
| 12AV6 or 12AT6 AVC, Detector, and Audio | 35W4 Power Rectifier |
| 12BA6 I.F. Amplifier | |

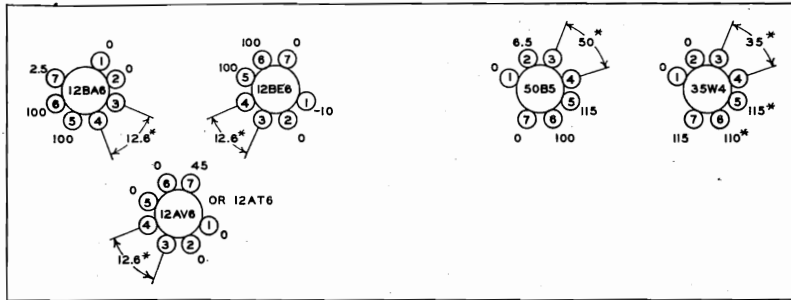


CHASSIS LAYOUT TOP VIEW

CSH502

PAGE 22-8 GAMBLE-SKOGMO

MODELS 05RA33-43-8136A,
05RA33-43-8137A

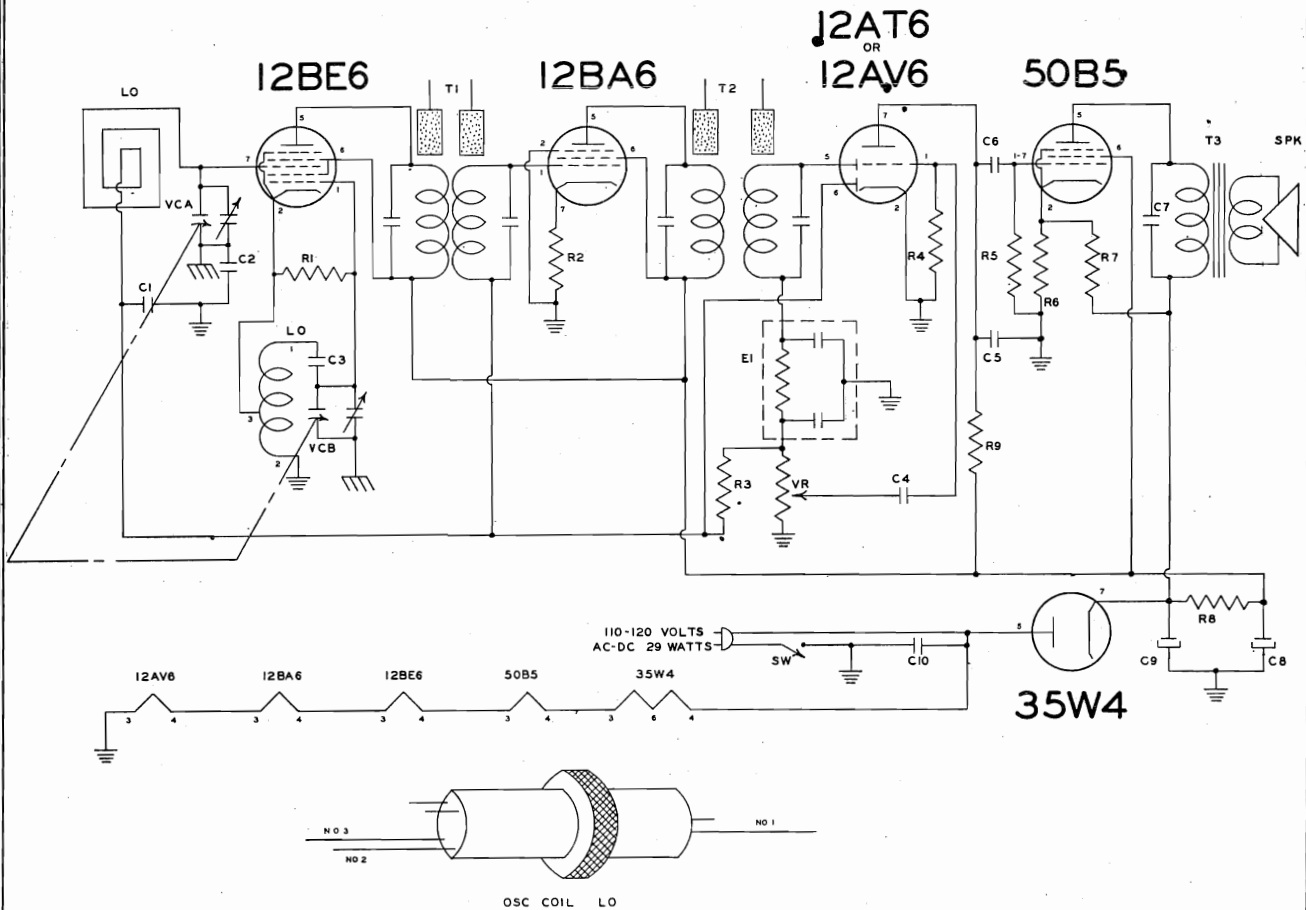


ALL DC VOLTAGES IN REFERENCE TO COMMON GROUND

* AC EXCEPT WHEN USED ON DC

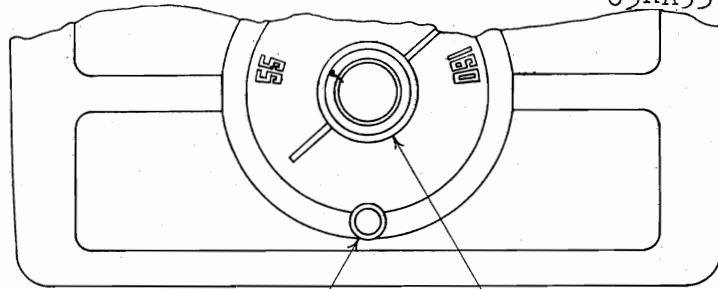
VOLTAGE CHART CHASSIS BOTTOM VIEW

G3H503



G3H501

MODELS 05RA33-43-8136A,
05RA33-43-8137A



ON-OFF SWITCH &
VOLUME CONTROL

TUNING

FRONT VIEW

G5504

ALIGNMENT PROCEDURE

The following procedure is for use only by competent servicemen having the proper equipment.

The alignment should be made with volume control fully on, and the output from the signal generator as low as possible, to prevent AVC action from interfering with proper alignment.

With the output meter connected across the voice coil of the speaker, the output meter reading for 50 milliwatts is 0.4 volts, using a signal which is modulated 400 c.p.s.

Adjust all trimmers for maximum output. Repeat the alignment procedure given below as a final check.

CAUTION: This is an AC/DC receiver, and when aligning the set it is necessary to isolate the signal generator or the receiver from the line by use of a transformer, or to place a .2 MFD condenser in each test lead of the signal generator.

| Frequency | SIGNAL GENERATOR | | POSITION OF VARIABLE | ADJUST FOR MAXIMUM OUTPUT |
|-----------|------------------|-------------------------|--------------------------|---------------------------|
| | Dummy Antenna | Connection to Radio | | |
| 455 KC | .1 MFD | 12BE6 Grid Stator VCA | Fully Open | T1 & T2 |
| 1625 KC | | 12BE6 Grid Stator VCA | Fully Open | VCB Oscillator |
| 1400 KC | .1 MFD | Loosely Coupled to Loop | Tune in Signal Generator | VCA Antenna |

Connect low side of signal generator to common negative.

PARTS VALUES FOR T67G GAMBLE'S AC/DC CLIPPER

| CIRCUIT SYMBOL | COMPONENTS PART NO. | DESCRIPTION | VALUE | RATING |
|----------------|---------------------|-----------------------------------|--------------------|-----------|
| VCA-VCB | VCT67G | Condenser, 2-gang | | |
| C1 | CO52 | Condenser, paper | .05 MFD | 200 volts |
| C2 | C12 | Condenser, paper | .1 MFD | 200 volts |
| C3 | CO26 | Condenser, paper | .02 MFD | 600 volts |
| C4-C6-C7 | C0056 | Condenser, paper | .005 MFD | 600 volts |
| C5 | C2505M | Condenser, mica | 250 MMFD | 500 volts |
| C8 | C40-20-1.5 | Condenser, electrolytic | 20 MFD | 150 volts |
| C9 | C40-20-1.5 | Condenser, electrolytic | 40 MFD | 150 volts |
| C10 | CO54 | Condenser, paper | .05 MFD | 400 volts |
| R1 | R223.5 | Resistor | 22K ohm | 1/2 watt |
| R2 | R391.5 | Resistor | 390 ohm | 1/2 watt |
| R3 | R105.5 | Resistor | 1 megohm | 1/2 watt |
| R4 | R106.5 | Resistor | 10 megohm | 1/2 watt |
| R5-R9 | R474.5 | Resistor | 470K ohm | 1/2 watt |
| R6 | R121.5 | Resistor | 120 ohm | 1/2 watt |
| R7 | R1031 | Resistor | 10K ohm | 1 watt |
| R8 | R1021 | Resistor | 1000 ohm | 1 watt |
| E1 | CRI | Diode filter unit | 2X100 MMFD-47K ohm | |
| VR | VRT67G | Volume control | 1 megohm | |
| LA | LT67A | Antenna loop | | |
| LO | LOT67 | Oscillator coil | | |
| T1-T2 | T111-31-A | I.F. transformer | | |
| T3 | E-81645-T | Output transformer | | |
| SW | VRT67G | Switch S.P.S.T. on volume control | | |
| SPK | SPKT67 | 4" P.M. speaker | | |

MECHANICAL PARTS

| PART NO. | DESCRIPTION | PART NO. | DESCRIPTION | PART NO. | DESCRIPTION |
|-----------|--------------------|-----------|-----------------------|----------|----------------------|
| M-1801 | Chassis | H-1805 | Ground lug | P-18011 | Cabinet, ivory |
| M-1802 | Chassis cover | H-81644-6 | Miniature tube socket | P-1704AW | Pointer knob, walnut |
| H-1601 | Trimount 5/8" | W-1802 | Line cord and plug | P-1704AI | Pointer knob, ivory |
| H-1802 | Trimount 1/4" | SR-3P | Strain relief | P-1704W | Round knob, walnut |
| T111-31-B | I.F. mounting clip | P-1801W | Cabinet, walnut | P-1704I | Round knob, ivory |

MODEL 15RA1-43-7654A



GENERAL DESCRIPTION

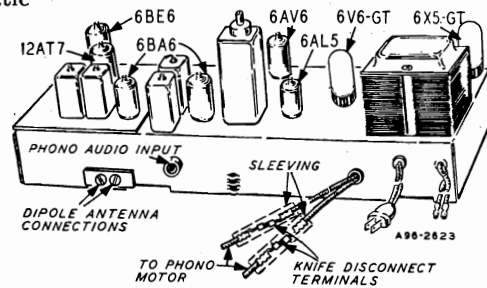
This radio is an 8 tube (including rectifier tube) AC receiver with automatic record changer, designed for reception of stations in the standard broadcast band between 540 and 1600 kilocycles and FM (Frequency Modulation) stations in the FM Band of 88-108 megacycles. Controls are provided on the front panel for tuning, tone, volume and band or phono selection. Special features include two built-in antennas, a grounded grid R-F amplifier stage on the FM Band, automatic volume control, compensator circuits to prevent oscillator drift, beam power output stage, permanent magnet dynamic speaker and an electrostatic shield in the power transformer to reduce power line noise.

Tube and Dial Lamp Complement

- 1 6BE6 AM Converter & FM Osc.
- 1 6BA6 1st I-F Amplifier
- 1 6BA6 2nd I-F Amplifier
- 1 6AL5 FM Discriminator
- 1 6AV6 Audio Amplifier, AM 2nd Detector and AVC
- 1 6V6GT Audio Output
- 1 6X5GT Rectifier
- 1 12AT7 R-F Amplifier & Mixer
- 2 No. 47 Dial Lamps

ELECTRICAL SPECIFICATIONS

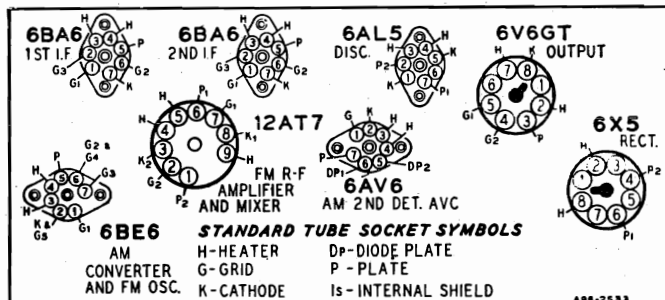
- Power Consumption —
117 volts AC—60 cycles 40 Watts
60 watts phono operating
- Power Output —
1.5 watts maximum
.8 watts 10% distortion
- Speaker—8" PM dynamic
- Frequency Ranges —
Broadcast 540-1600 KC
Frequency modulation 88-108 MC
- Intermediate Frequency —
AM 455 KC — FM 10.7 MC
- Selectivity — AM — 45 KC broad at 1000 times signal, measured at 1000 KC
I.F. FM—200 KC broad at 2 times down
I.F. FM — 950 KC broad at 200 times down
- AM Sensitivity—(For .5 watt output with external antenna)
25 microvolts average
- FM Sensitivity—(For .5 watt output)
25 microvolts average
- Record Changer —
See Manual No. 619-12



TUBE SOCKET VOLTAGES

Socket voltages are shown on the Schematic diagram at the tube socket terminals. All voltages are between the socket terminal and chassis ground. Plate, screen and cathode voltages were taken with a 1000 ohm-per-volt meter with a 300 volt scale used for plate and screen voltages. Audio grid voltages were read with a vacuum tube volt-meter. Conditions of measurement are:

- Line voltage117 Volts AC
- Signal InputNone
- A Variation of $\pm 10\%$ is usually permissible.



ALIGNMENT PROCEDURES

AM STAGES

The following is required for aligning:
 An All Wave Signal Generator Which Will Provide an Accurately
 Calibrated Signal at the Test Frequencies as Listed.
 Output Indicating Meter, Non-Metallic Screwdriver, Dummy Antennas
 — .1 mf, and 50mmf.

Volume Control Maximum all Adjustments.
 Connect Radio Chassis to Ground Post of Signal Generator with a
 Short Heavy Lead.
 Allow Chassis and Signal Generator to "Heat Up" for Several
 Minutes.

| SIGNAL GENERATOR | | | | GANG CONDENSER SETTING | ADJUST | ADJUST FOR |
|----------------------|--------------------------------------------|-----------------------------|-------------------------|--------------------------------------------------------------------|-----------------------------------|-------------------|
| FREQUENCY SETTING | CONNECT GENERATOR OUTPUT TO | THROUGH DUMMY ANTENNA | CONNECT GROUND TO | | | |
| 455 KC | Control Grid 1st 6BA6 Pin No. 1 | .1 mf | Chassis Base | Rotor Fully Open | 2nd I.F. Pri. (1) and Sec. (2) | Maximum Output |
| 455 KC | Control Grid 6BE6 Pin No. 7 1st Det. | .1 mf | Chassis Base | Rotor Fully Open | 1st I.F. Pri. (3) and Sec. (4) | Maximum Output |
| 455 KC | Control Grid 6BE6 Pin No. 7 | .1 mf | Chassis Base | Rotor Fully Open | 2nd I.F. Pri. (1) and Sec. (2) | Maximum Output |
| 1620 KC | Control Grid 6BE6 Pin No. 7 | .1 mf | Chassis Base | Rotor Fully Open | Oscillator C-41 | Maximum Output |
| 1400 KC | External Antenna Terminal | 50 mmf | Chassis Base | Turn Rotor to Max. Output. Set Pointer to 1400 KC See Note A | Antenna C-2 | Maximum Output |

NOTE A—If the pointer is not at 1400 KC on the dial, reset pointer to the 1400 KC mark on the dial scale.

FM STAGES

The following is required for aligning:
 An accurately calibrated signal generator providing unmodu-
 lated signals at the test frequencies listed below.
 Non-metallic screwdriver.
 Dummy Antennas and I-F Loading Resistor—2500 mmf, 300 ohms

Zero center scale DC vacuum tube voltmeter having a range of
 approximately 3 volts.
 (If a zero center scale meter is not available, a standard scale
 vacuum tube voltmeter may be used by reversing the meter connec-
 tions for negative readings).
 Allow chassis and signal generator to "Heat Up" for several minutes.

| SIGNAL GENERATOR | | THROUGH DUMMY ANTENNA | BAND SWITCH SETTING | GANG CONDENSER SETTING | ADJUST | ADJUST FOR |
|----------------------|-----------------------------------|-----------------------------------------------------------|---------------------------|------------------------------|----------------------|-----------------------------------------------------------------------------------------------------------------|
| FREQUENCY SETTING | CONNECT GENERATOR OUTPUT TO | | | | | |
| Discriminator | 10.7 MC | 6BA6 2nd I-F Pin 1 and Chassis | 2500 mmf | FM | Rotor Fully Open | Disc. Pri. (5) Note A |
| | 10.7 MC | 6BA6 2nd I-F Pin 1 and Chassis | 2500 mmf | FM | Rotor Fully Open | Disc. Sec. (6) Note B |
| I-F | 10.7 MC Note C | 6BA6 1st I-F Pin 1 and Chassis | 2500 mmf | FM | Rotor Fully Open. | 2nd I-F Pri. (7) Sec. (8) Note D |
| Discriminator | 10.7 MC | 6BA6 1st I-F Pin 1 and Chassis | 2500 mmf | FM | Rotor Fully Open | Disc. Pri. (5) Note D |
| I-F | 10.7 MC | Junction C-32A & B (Dual 100 mmf cond.) And chassis | 2500 mmf | FM | Rotor Fully Open | 1st I-F Pri. (9) & Sec. (10) 2nd I-F Pri. (7) & Sec. (8) Disc. Pri. (5) In Order Shown Note D |
| | 10.7 MC | Same as above | 2500 mmf | FM | Rotor Fully Open | Disc. Sec. (6) Note B |

RECHECK I-F ADJUSTMENTS IN ORDER GIVEN

| | | | | | | | |
|------------|-------|------------------------------------------------------------------------------------------------------------------|----------|----|------------------------------------|-----------|-----------------------|
| Oscillator | 108.5 | Disconnect built-in dipole antenna and connect gen- erator to dipole terminals with resistor in series. | 300 ohms | FM | Rotor Fully Open | Osc. C-25 | Maximum Deflection |
| Antenna | 104.5 | Same as above | 300 ohms | FM | Tune rotor for max. AVC voltage | Ant. C-39 | Maximum Deflection |

RECHECK ANTENNA & OSC. ADJUSTMENTS IN ORDER GIVEN

FM ALIGNMENT NOTES

NOTE A—The zero center scale DC vacuum tube voltmeter is to be
 connected between chassis ground and the AVC line.
 A signal of .1 volt must be fed into the receiver for
 this adjustment.
 Note output voltage on the zero center DC vacuum
 tube voltmeter.

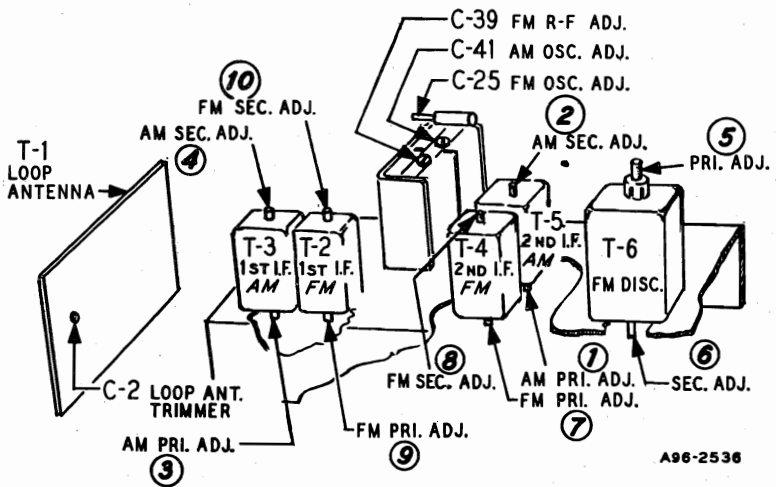
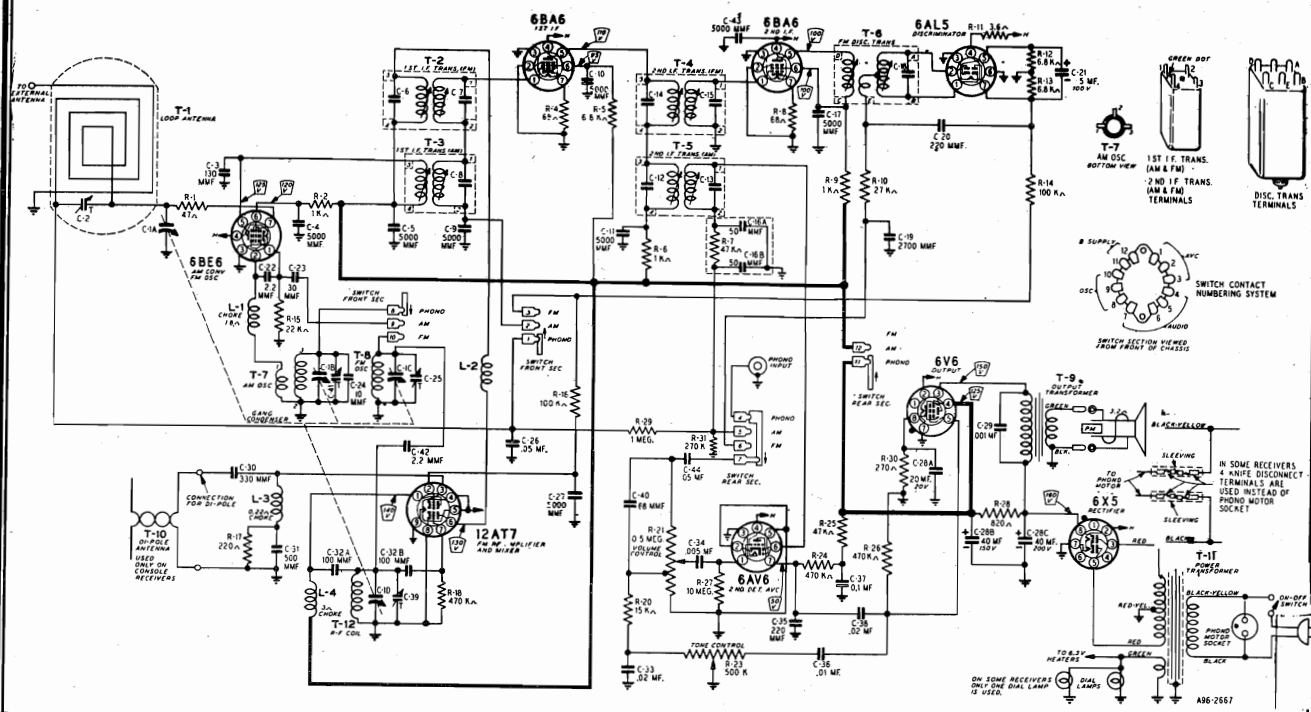
NOTE B—Disconnect zero center DC vacuum tube voltmeter from
 AVC and connect it at the audio takeoff point at the

27 K ohm resistor (R-10) and its junction with the terminal
 strip. Adjust for zero voltage indication.

NOTE C—AM I-F coils must be aligned before attempting to align
 the FM I-F coils.

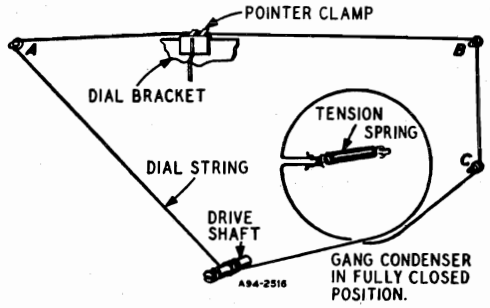
NOTE D—Connect zero center DC vacuum tube voltmeter as in Note
 A. Adjust input to give same output on the zero center DC
 vacuum tube voltmeter as in Note A.

MODEL 15RA1-43-7654A



DRIVE CORD REPLACEMENT

Replacement of the drive cord may be accomplished as shown in the illustration. For this purpose use the new drive cord assembly listed in the Replacement Parts List. Turn the gang condenser until the plates are fully meshed. Then install the string as shown, winding three turns clockwise around the tuning shaft with the turns progressing away from the chassis. After the cord is installed, rotate the tuning shaft several times in order to take up any slack in the cord.



REPLACEMENT PARTS LIST

| Ref. No. | DESCRIPTION | Part No. |
|-------------------|------------------------------------------|----------|
| CAPACITORS | | |
| C-1 | Gang Condenser Assembly | 14A209 |
| C-2 | Capacitor, Trimmer; 2-24 mmf | 17A256 |
| C-3 | Capacitor, Ceramic; 130 mmf | 47X559 |
| C-4 | | |
| C-5 | | |
| C-9 | | |
| C-10 | | |
| C-11 | | |
| C-17 | Capacitor, Ceramic; 5000 mmf | 47X507 |
| C-27 | | |
| C-43 | | |
| C-6 | | |
| C-7 | Part of T-2 (1st I-F Trans. F.M.) | |
| C-8 | Part of T-3 (1st I-F Trans. AM) | |
| C-12 | Part of T-5 (2nd I-F Trans. AM) | |
| C-13 | | |
| C-14 | Part of T-4 (2nd I-F Trans. FM) | |
| C-15 | | |
| C-16A | Capacitor, Dual Mica; 50-50 mmf | 47X112 |
| C-16B | Part of T-6 (Discriminator Trans.) | |
| C-18 | | |
| C-19 | Capacitor, Molded Mica; 2700 mmf | 47X492 |
| C-20 | Capacitor, Ceramic; 220 mmf | 47X468 |
| C-35 | Capacitor, Dry Electrolytic; 5 mf 100 V | 45X361 |
| C-21 | Capacitor, Ceramic; 2.2 mmf | 47X557 |
| C-22 | Capacitor, Ceramic; 30 mmf | 47X558 |
| C-23 | Capacitor, Ceramic; 10 mmf | 47X523 |
| C-24 | Capacitor, Trimmer; 1-8 mmf | 17A255 |
| C-25 | Capacitor, Tubular; .05 mf 200 V | B66503 |
| C-26 | 20 mf 20 V | |
| C-44 | | |
| C-28A | Capacitor; Dry Electrolytic; 40 mf 150 V | 45X360 |
| C-28B | 40 mf 200 V | |
| C-28C | Capacitor, Tubular; .001 mf 800 V | H66102 |
| C-29 | Capacitor, Molded Mica; 330 mmf | 47X470 |
| C-30 | Capacitor, Ceramic; 500 mmf | 47X508 |
| C-31 | Capacitor, Dual Ceramic; 100 mmf | 76X4 |
| C-32A | Capacitor, Tubular; .02 mf 200 V | B66203 |
| C-32B | Capacitor, Tubular; .005 mf 400 V | D66502 |
| C-33 | Capacitor, Tubular; .01 mf 200 V | B66103 |
| C-34 | Capacitor, Tubular; .1 mf 400 V | D66104 |
| C-36 | Capacitor, Tubular; .02 mf 400 V | D66203 |
| C-37 | Part of C-1 (Gang Condenser) | |
| C-38 | | |
| C-39 | Capacitor, Ceramic; 68 mmf | 47X471 |
| C-41 | | |
| C-40 | | |
| RESISTORS | | |
| R-1 | Resistor, Carbon; 47 ohms 0.5 W | B85470 |
| R-2 | Resistor, Carbon; 1000 ohms 0.5 W | B85102 |
| R-6 | | |
| R-9 | | |
| R-4 | Resistor, Carbon; 68 ohms 0.5 W | B84680 |
| R-8 | | |
| R-5 | Resistor, Carbon; 6800 ohms 0.5 W | B84682 |
| R-12 | | |
| R-13 | | |
| R-7 | Resistor, Carbon; 47 K ohms 0.5 W | B85473 |
| R-25 | Resistor, Carbon; 27 K ohms 0.5 W | B85273 |
| R-10 | Resistor, Wirewound; 3.6 ohms 0.5 W | 43X233 |
| R-11 | Resistor, Carbon; 100 K ohms 0.5 W | B85104 |
| R-14 | | |
| R-16 | Resistor, Carbon; 22 K ohms 0.5 W | B85223 |
| R-15 | Resistor, Carbon; 220 ohms 0.5 W | B85221 |
| R-17 | | |

| Ref. No. | DESCRIPTION | Part No. |
|----------|------------------------------------|----------|
| R-18 | Resistor, Carbon; 470 K ohms 0.5 W | B85474 |
| R-24 | | |
| R-26 | | |
| R-20 | Resistor, Carbon; 15 K ohms 0.5 W | B85153 |
| R-21 | Volume Control & Switch; .5 megohm | 36X372 |
| R-23 | Tone Control; .5 megohm | 40X310 |
| R-27 | Resistor, Carbon; 10 megohms 0.5 W | B85106 |
| R-28 | Resistor, Carbon; 820 ohms 2.0 W | D84821 |
| R-29 | Resistor, Carbon; 1 megohm 0.5 W | B85105 |
| R-30 | Resistor, Carbon; 270 ohms 0.5 W | B84271 |
| R-31 | Resistor, Carbon; 270 K ohms 0.5 W | B84274 |

TRANSFORMERS AND COILS

| | | |
|------|---------------------------|--------|
| L-1 | Choke, Insulated | 35A5 |
| L-2 | Choke, Parasitic | 9A2103 |
| L-3 | Choke, Insulated | 35A9 |
| L-4 | Choke, Insulated | 35A8 |
| T-1 | "B" Range Loop Antenna | 9A2099 |
| T-2 | 1st I-F Trans. (FM) | 9A2060 |
| T-3 | 1st I-F Trans. (AM) | 9A2062 |
| T-4 | 2nd I-F Trans. (FM) | 9A2061 |
| T-5 | 2nd I-F Trans. (AM) | 9A2063 |
| T-6 | Discriminator Transformer | 9A2161 |
| T-7 | Oscillator Coil (AM) | 9A2065 |
| T-8 | Oscillator Coil (FM) | 9A2067 |
| T-9 | Output Transformer | 51X134 |
| T-10 | Dipole Antenna | 9A2003 |
| T-11 | Power Transformer | 53X291 |
| T-12 | Antenna Coil (FM) | 9A2066 |

DIAL AND TUNING PARTS

| | |
|-----------------------------------|---------|
| No. 47 Pilot Light | 7A103 |
| Pilot Light Socket Assembly | 7A199 |
| Escutcheon | 4X1060 |
| Rubber Grommets (mtg. Gang Cond.) | 6X66 |
| Drive Cord Assembly | 10X72 |
| Pointer | 15X251 |
| "C" Washer (Drive Shaft) | 19X192 |
| Condenser Cushion Stud | 20X260 |
| Dial Bracket | 25X1650 |
| Drive Shaft | 26X486 |
| Drive Cord Tension Spring | 28X113 |
| Spring (Dial Glass) | 28X564 |
| Dial Glass | 58X744 |

MISCELLANEOUS

| | |
|-----------------------------|--------|
| Band Change Switch | 2A393 |
| Phono Socket (Single Pin) | 3A305 |
| Tube Socket (1st 6BA6) | 3A426 |
| Tube Socket (6BE6) | 3A427 |
| Tube Socket, Molded (Octal) | 3A435 |
| Tube Socket (Miniature) | 3A439 |
| Tube Socket (12AT7) | 3A443 |
| Knob (Tuning) | 10A699 |
| Knob (Off-Volume) | 10A700 |
| Knob (Tone) | 10A701 |
| Knob (FM-BC-PH) | 10A702 |
| Speaker, 8" P.M. | 12A477 |
| Record Changer - 3 speed | 28A171 |
| Line Cord & Plug Assembly | 13X546 |
| Line Cord Clamp | 30X560 |

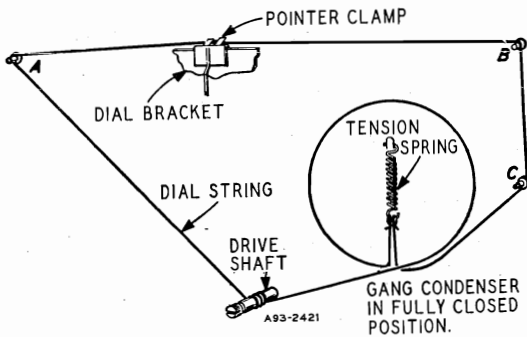
MODEL 15RA1-43-7902A



MODERN OAK RADIO PHONO CONSOLE

DRIVE CORD REPLACEMENT

Use a new 10X38 drive cord assembly or a new length of cord 46 inches long for the installation, winding three turns clockwise around the drive shaft with the turns progressing away from the chassis. After completing the installation, rotate the drive shaft a few turns to take up the slack in the cord.

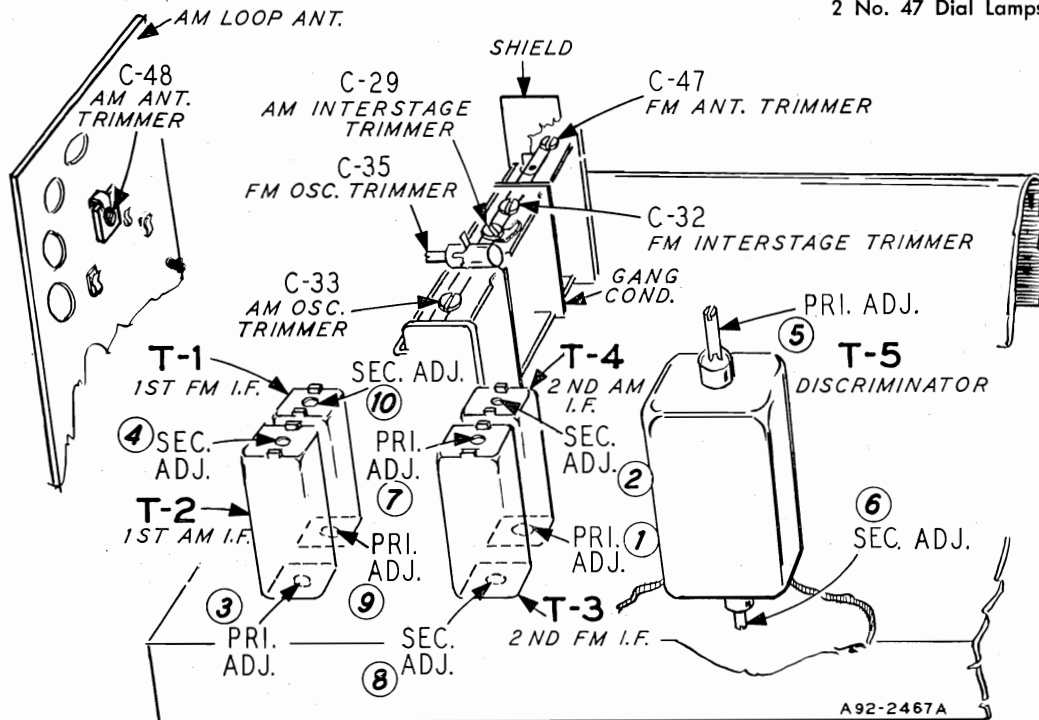


ELECTRICAL SPECIFICATIONS

- Power Supply 105-125 volts AC 60 cycles, 80 watts, 100 watts with record changer
- Frequency Ranges..... Broadcast 540-1600 KC
Frequency Modulation 88-108-MC
- Intermediate Frequency. AM—455 KC
FM—10.7 MC
- Selectivity AM—43 KC broad at 1000 times signal, measured at 1000 KC
I.F. FM—200 KC broad at 2 times down
I.F. FM—760 KC broad at 200 times down
- AM Sensitivity (For .5 watt output with external antenna)
10 microvolts average
- FM Sensitivity (For .5 watt output)
30 microvolts average
- Power Output 8.5 watts maximum
6.0 watts 10% distortion
- Loud Speaker 12" PM Dynamic
- Voice Coil Impedance.. 3.2 ohms 400 cycles
- Record Changer See Manual No. 619-12

Tube and Dial Lamp Complement

- 1 6BA6 AM-FM R-F Amplifier
- 1 12AT7 FM & AM Osc. & Mixer
- 1 6BA6 FM-AM 1st I-F Amplifier
- 1 6BA6 FM 2nd I-F Amplifier
- 1 6AL5 FM Detector
- 1 6AV6 Audio Amplifier, AM 2nd Detector and AVC
- 2 6K6-GT Audio Output
- 1 5Y3-GT Rectifier
- 1 6AV6 Phase Inverter
- 2 No. 47 Dial Lamps



ALIGNMENT PROCEDURE AM STAGES

The following is required for aligning:
An All Wave Signal Generator Which Will Provide an Accurately Calibrated Signal at the Test Frequencies as Listed.
Output Indicating Meter, Non-Metallic Screwdriver, Dummy Antennas
—1 mf, 200 mmf.

Volume Control—Maximum all Adjustments
Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.
Allow Chassis and Signal Generator to "Heat Up" for Several Minutes.

| SIGNAL GENERATOR | | CONNECT GENERATOR OUTPUT TO | THROUGH DUMMY ANTENNA | BAND SWITCH SETTING | GANG CONDENSER SETTING | ADJUST | ADJUST FOR |
|------------------|-------------------|-----------------------------|-----------------------|---------------------|-------------------------------------------------------------------|--------------------------------------------------------|----------------|
| | FREQUENCY SETTING | | | | | | |
| I-F | 455 kc | 12AT7 Pin 7 and Chassis | .1 mf | Broadcast | Rotor Fully Open | 2nd I-F Pri. & Sec. ① & ② 1st I-F Pri. & Sec. ③ & ④ | Maximum Output |
| Broadcast | 1620 kc | External ant. term. | 200 mmf | Broadcast | Rotor Fully Open | Broadcast Oscillator C-33 Broadcast Interstage C-29 | |
| | 1400 kc | External ant. term. | 200 mmf | Broadcast | Turn Rotor to Max. Output Set pointer to 1400 kc See Note A | | |
| | 1400 kc | External ant. term. | 200 mmf | Broadcast | | Loop Antenna C-48 | |

Note A—If the pointer is not at 1400 KC on dial, reset pointer at the 1400 KC mark on the dial scale.

FM STAGES

The following equipment is required for aligning:
An accurately calibrated signal generator providing unmodulated signals at the test frequencies listed below.
Non-metallic screwdriver.
Dummy Antennas and I-F Loading Resistor—.01 mf, 300 ohms and 1000 ohms.

Zero center scale DC vacuum tube voltmeter having a range of approximately 3 volts.
(If a zero center scale meter is not available, a standard scale vacuum tube voltmeter may be used by reversing the meter connections for negative readings.)
Allow chassis and signal generator to warm up for several minutes.

| SIGNAL GENERATOR | | CONNECT GENERATOR OUTPUT TO | THROUGH DUMMY ANTENNA | BAND SWITCH SETTING | GANG CONDENSER SETTING | ADJUST | ADJUST FOR |
|------------------|-------------------|--------------------------------|-----------------------|---------------------|------------------------|------------------------------------------------------------|--------------------|
| | FREQUENCY SETTING | | | | | | |
| Discriminator | 10.7 MC Note B | 6BA6 2nd I-F Pin 1 and Chassis | .01 mf | FM | Rotor Fully Open | Disc. Pri. ⑤ Note A | Maximum Deflection |
| | 10.7 MC Note B | 6BA6 2nd I-F Pin 1 and Chassis | .01 mf | FM | Rotor Fully Open | Disc. Sec. ⑥ Note C | Zero Center |
| I-F | 10.7 MC Note F | 6BA6 1st I-F Pin 1 and Chassis | .01 mf | FM | Rotor Fully Open | 2nd I-F Pri. Note A and D ⑦ 2nd I-F Sec. Note A and E ⑧ | Maximum Deflection |
| Discriminator | 10.7 MC Note F | 6BA6 1st I-F Pin 1 and Chassis | .01 mf | FM | Rotor Fully Open | Disc. Pri. ⑤ Note A | Maximum Deflection |
| | 10.7 MC Note F | 6BA6 1st I-F Pin 1 and Chassis | .01 mf | FM | Rotor Fully Open | Disc. Sec. ⑥ Note C | Zero Center |
| | 10.7 MC Note F | FM-RF Gang Condenser terminal | .01 mf | FM | Rotor Fully Open | 1st I-F Pri. ⑨ 1st I-F Sec. ⑩ Notes A, D & E | Maximum Deflection |

Recheck I-F Adjustments in order given

| | | | | | | | |
|------------|-----------------|-------------------------------------------------------------------------------------|----------|----|---------------------------------|---------------------------|--------------------|
| R-F & Osc. | 108.4 Note H | Disconnect dipole and connect generator to dipole terminals with resistor in series | 300 ohms | FM | Rotor Fully Open | Oscillator C-35 Note G | Maximum Deflection |
| | 104.5 | Disconnect dipole and connect generator to dipole terminals with resistor in series | 300 ohms | FM | Tune Rotor for Max. AVC voltage | FM Interstage C-32 | Maximum Deflection |
| | 104.5 | Disconnect dipole and connect generator to dipole terminals with resistor in series | 300 ohms | FM | Tune Rotor for Max. AVC voltage | Ant. C-47 | Maximum Deflection |

Recheck R-F and Osc. Adjustments in order given

NOTE A—Test Equipment connections are as given in the table. The zero center scale DC vacuum tube voltmeter is to be connected between chassis ground and the AVC line at the junction of resistor R-22 and condenser C-18 for all adjustments except the discriminator secondary adjustment, for which See Note C.

NOTE B—A signal of .1 volt must be fed into the receiver for this adjustment.

NOTE C—Disconnect zero center DC vacuum tube voltmeter from AVC and connect to junction of R-18 and C-62. Adjust for zero voltage indication.

NOTE D—Before adjusting Pri. core connect 1000 ohm load resistor across the 2nd I.F. secondary terminals. Input may have to be increased to .1 volt if receiver is badly mis-aligned.

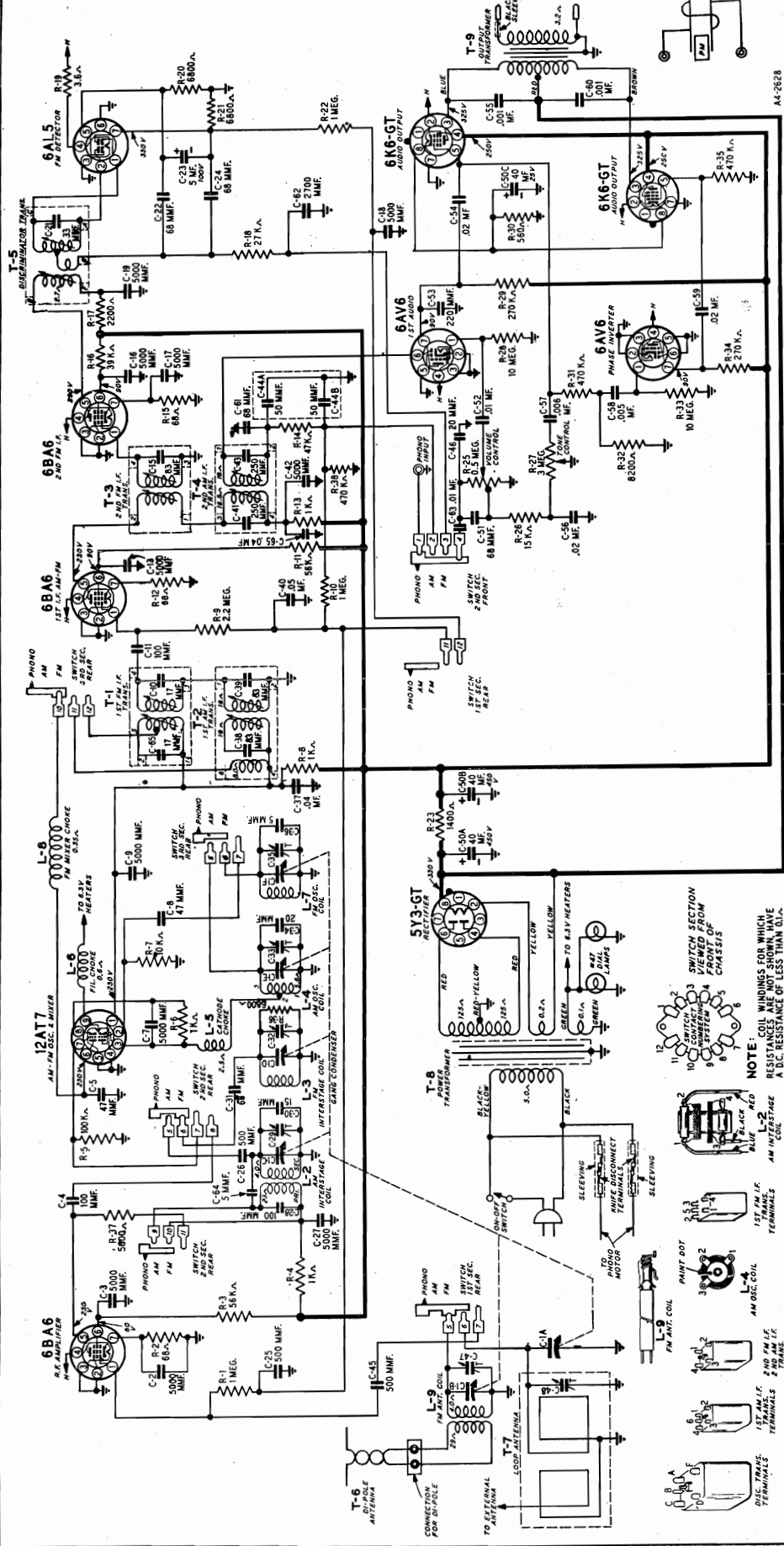
NOTE E—Disconnect 1000 ohm load resistor from secondary terminals and connect across the 2nd I.F. primary terminals. Input may have to be increased to .1 volt if receiver is badly mis-aligned.

NOTE F—Input can be reduced to 10,000 microvolts.

NOTE G—Oscillator frequency above signal frequency.

NOTE H—Remove the 1000 ohm load resistor before attempting to check the R-F and oscillator adjustments.

MODEL 15RA1-43-7902A

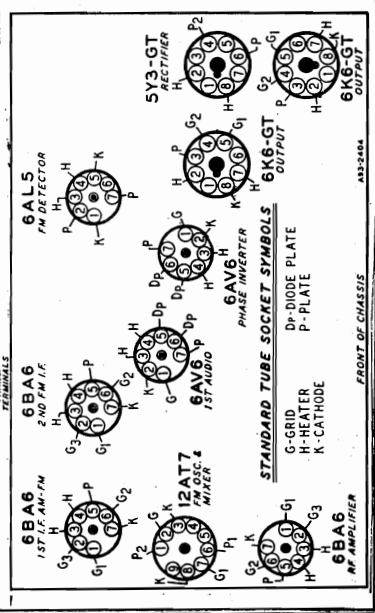


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TUBE SOCKET VOLTAGES

Socket voltages are shown on the Schematic diagram at the tube socket terminals. All voltages are between the socket terminal and chassis ground. Plate, screen and cathode voltages were taken with a 1000 ohm-per-volt meter with a 300 volt scale used for plate and screen voltages. Audio grid voltages were read with a vacuum tube volt-meter. Conditions of measurement are:

- Line voltage 117 Volts AC
- Signal Input None
- A variation of $\pm 10\%$ is usually permissible.



REPLACEMENT PARTS LIST

| Ref. No. | DESCRIPTION | Part No. | Ref. No. | DESCRIPTION | Part No. |
|--------------------------------------|----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|--------------------------------------------|----------|
| CAPACITORS | | | | | |
| C-1 | Gang Condenser and Pulley | 14A207 | C-52 | Capacitor, Tubular, .01 mf 600 V. | F66103 |
| C-2 | Capacitor, Silvered Mica, 5000 mmf | 47X507 | C-53 | Capacitor, Ceramic, 220 mmf ± 20% | 47X468 |
| C-3 | | | C-54 } C-59 } | Capacitor, Tubular, .02 mf 600 V | F66203 |
| C-7 | | | C-55 } C-60 } | Capacitor, Tubular, .001 mf 600 V..... | F66102 |
| C-9 | | | C-56 | Capacitor, Tubular, .02 mf 200 V..... | B66203 |
| C-13 | | | C-57 | Capacitor, Tubular, .006 mf 600 V..... | F66602 |
| C-16 | | | C-58 | Capacitor, Tubular, .005 mf 200 V..... | B66502 |
| C-17 | | | C-61 | Capacitor, Ceramic, 68 mmf ± 20% | 47X471 |
| C-18 | | | C-62 | Capacitor, Molded Mica, 2700 mmf ± 10% .. | 47X492 |
| C-19 | | | C-63 | Capacitor, Tubular, .01 mf 120 V..... | 46X328 |
| C-27 | | | | | |
| C-42 | | | | | |
| C-4 | Capacitor, Ceramic, 100 mmf ± 20% | 47X497 | RESISTORS | | |
| C-5 | Capacitor, Ceramic, 47 mmf ± 5% | 47X499 | R-1 | Resistor, Carbon 1 Megohm .5 W. | B85105 |
| C-8 | Capacitor, Ceramic 47 mmf ± 10% | 47X498 | R-10 } R-22 } | | |
| C-10 } C-65 } | Part of T-1 | | R-2 } R-12 } R-15 } |  |  | Resistor, Carbon 68 Ohms .5 W. .... | B83680 |
| C-11 } C-28 } | Capacitor, Ceramic, 100 mmf ± 10% | 47X550 | R-3 } R-11 } | Resistor, Carbon 56K Ohms .5 W. | B84563 |
| C-15 | Part of T-3 | | R-4 } R-6 } R-8 } R-13 } | Resistor, Carbon 1000 Ohms .5 W. | B84102 |
| C-21 | Part of T-5 | | R-5 | Resistor, Carbon 100K Ohms .5W. | B85104 |
| C-22 } C-24 } C-31 } C-51 } | Capacitor, Ceramic, 68 mmf ± 10% | 47X501 | R-7 | Resistor, Carbon 10K Ohms .5 W. | B84103 |
| C-23 | Capacitor, Dry Electrolytic, 5 mf 100 V..... | 45X361 | R-9 | Resistor, Carbon 2.2 Megohm .5 W. | B85225 |
| C-25 } C-26 } C-45 } | Capacitor, Ceramic, 500 mmf ± 20% | 47X496 | R-14 | Resistor, Carbon 47K Ohms .5 W. | B85473 |
| C-29 } C-32 } C-33 } C-47 } | Part of C-1 | | R-16 | Resistor, Carbon 39K Ohms 1.0 W..... | C84393 |
| C-30 | Capacitor, Ceramic, 15 mmf ± 10% | 47X552 | R-17 | Resistor, Carbon 2200 Ohms .5 W. | B85222 |
| C-34 } C-46 } | Capacitor, Ceramic 20 mmf ± 10% | 47X516 | R-18 | Resistor, Carbon 27K Ohms .5 W. | B84273 |
| C-35 | Capacitor, Trimmer, 1-8 mmf | 26A489 | R-19 | Resistor, Wire Wound 3.6 Ohms .5 W. | 43X233 |
| C-36 } C-64 } | Capacitor, Ceramic, 5 mmf ± 10% | 47X549 | R-20 } R-21 } | Resistor, Carbon 6800 Ohms .5 W. | B83682 |
| C-37 } C-65 } | Capacitor, Tubular, .04 mf 600 V | F66403 | R-23 | Resistor, Wire Wound 1400 Ohms 5.0 W. | 43X242 |
| C-38 } C-39 } | Part of T-2 | | R-25 | Volume Control & Switch .5 meg. | 36X379 |
| C-40 | Capacitor, Tubular, .05 mf 200 V..... | B66503 | R-26 | Resistor, Carbon 15K Ohms .5 W. | B85153 |
| C-41 } C-43 } | Part of T-4 | | R-27 | Tone Control 3 meg. | 40X288 |
| C-44A } C-44B } | Capacitor, Dual Mica, 50-50 mmf. | 47X112 | R-28 } R-33 } | Resistor, Carbon 10 Megohm .5 W. | B85106 |
| C-48 | Part of T-7 | | R-29 } R-34 } | Resistor, Carbon 270K Ohms .5 W. | B85274 |
| C-50A } C-50B } C-50C } | Capacitor, 3 section Electrolytic | $\begin{cases} 40 \text{ mf } 450 \text{ V.} \\ 40 \text{ mf } 450 \text{ V.} \\ 40 \text{ mf } 25 \text{ V.} \end{cases}$ 45X374 | R-30 | Resistor, Carbon 560 Ohms 2.0 W. | D83561 |
| | | | R-31 } R-35 } R-38 } | Resistor, Carbon, 470 K Ohms .5 W | B85474 |

The Model 15RA2-43-9105A is a television, AM radio and phonograph combination. The television chassis is in no way connected to the radio or phonograph, as the phono TV switch and audio input plug on the rear of the television chassis is not utilized.

The phonograph obtains its AC power through a connection to the radio chassis and also uses the audio section for amplification.

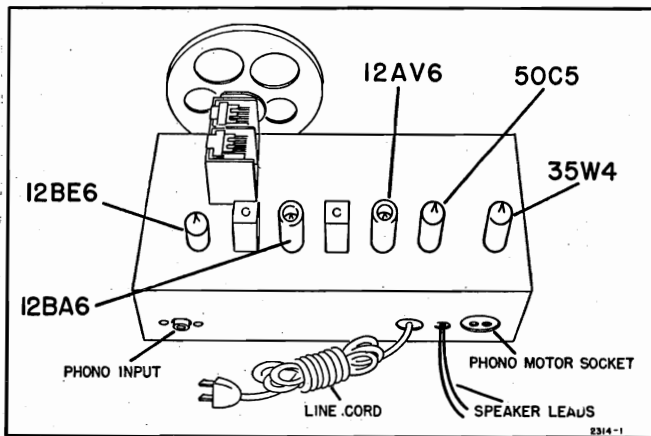
This manual covers only the service and repair parts information for the radio chassis. For service and repair parts information for the television receiver refer to television service manual

SERVICE DATA

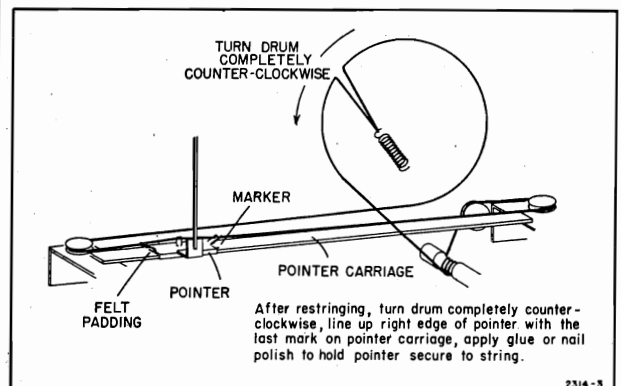
ELECTRICAL SPECIFICATIONS

- Power Supply..... 115 volts; 60-cycles AC, 60 watts.
(Including phonograph)
- Frequency Range..... 540 to 1600 kc.
- Intermediate Freq..... 455 kc.
- Selectivity..... At 1000 kc. 50 kc. at 1000 x signal.
- Sensitivity..... 20 microvolts average for .05 watts output.

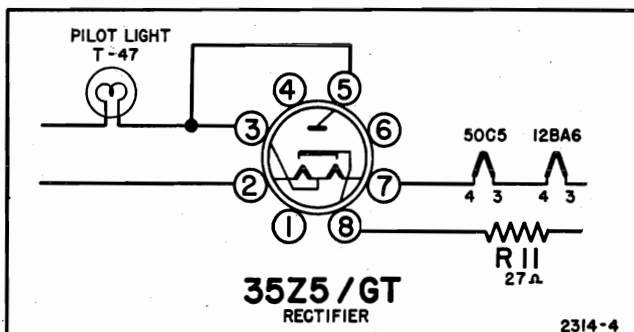
- #### MAINTENANCE
- DIAL LIGHT**— If the dial lamp burns out, the set should not be operated until a new lamp has been installed. Failure to heed this caution may result in a burned-out rectifier tube. To replace the lamp, pull out the back cover inside the changer compartment. Use only a type T-47 lamp for replacement.
- Power Output..... 0.75 watts undistorted, 1.25 watts maximum.
 - Loud Speaker..... 12" P.M., v.c. impedance 3.2 ohms.
 - Tube Complement..... 12BE6, converter.
12BA6, I.F. amplifier.
12AV6, detector, AVC, audio amplifier.
50C5, output amplifier.
35Z5 or 35W4, rectifier.
Pilot lite, 6-8 volts, T-47.



Chassis View



Dial Cord Stringing



PRODUCTION CHANGE

Due to procurement difficulties the 35W4 rectifier tube was replaced by a 35Z5. The only change in parts list is a A-15B-10440 octal tube socket. Refer to the drawing at the left for the 35Z5 wiring diagram.

MODEL 15RA2-43-9105A

ALIGNMENT PROCEDURE AND RECEIVER STAGE SENSITIVITIES

Alignment must be done in the cabinet.

The signal source must be an accurately calibrated signal generator capable of supplying both RF and 455 kc signals modulated 30% with a 400-cycle audio signal. Variations of plus or minus 25% are usually permissible.

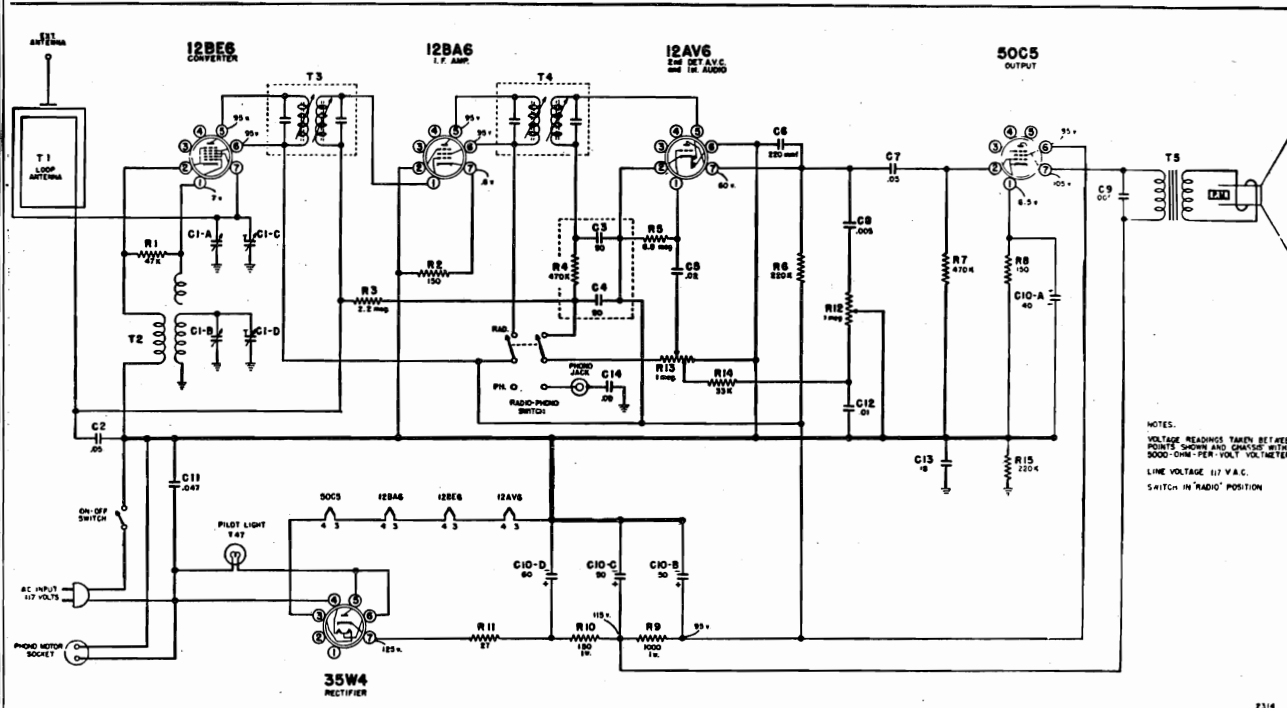
The table below lists the sensitivity at the input of each stage. All measurements are based on an output of 50 milliwatts. This may be measured by disconnecting the speaker voice coil and substituting a 3.2-ohm, 5-watt resistor across the secondary winding of the out-

put transformer. A reading of 0.4 volts AC across this resistor will be equivalent to a 50-milliwatt output with the speaker connected.

- Volume control at maximum for all adjustments.
- Align for maximum output. Reduce input as needed to keep output near 0.4 volts.
- Loop antenna should be connected to receiver and in its proper position when making adjustments.

| SIGNAL GENERATOR | | | | TUNER SETTING | ADJUST FOR MAXIMUM OUTPUT | INPUT FOR 50 MILLIWATT OUTPUT |
|------------------|--------------------|-----------------------------------------------|----------------------------|------------------------------------------------|----------------------------------------------------------|-------------------------------|
| Frequency | Coupling Capacitor | Connection to Radio | Ground Connection | | | |
| 455 kc. | .1 mf. | 12BE6, Pin 7 | B MINUS POINT BUSS LEAD | (Capacitor fully open) (plates out of mesh) | Top and bottom Cores in output and input I.F. cans | 60 microvolts |
| 1620 kc. | .1 mf. | 12BE6, Pin 7 | | (Capacitor fully open) (plates out of mesh) | Oscillator trimmer C1-D on gang | 67 microvolts |
| 535 kc. | .1 mf. | 12BE6, Pin 7 | | Capacitor fully closed | Check for adequate range | 61 microvolts |
| 1400 kc. | — | Lay Generator lead near back of cabinet | | Set dial pointer at 1400 kc. | Antenna trimmer C1-C on gang | 200 to 400 microvolts |
| 400 cycles | .1 mf. | 12AV6, Pin 1 | | — | — | .03 volts |

SCHEMATIC DIAGRAM WITH VOLTAGES



NOTES.
VOLTAGE READINGS TAKEN BY KEEN
POINTS, SHOWS AND CHECKED WITH A
3000-OHM PER-VOLT VOLTMETER.
LINE VOLTAGE 117 V.A.C.
SWITCH IN "RADIO" POSITION

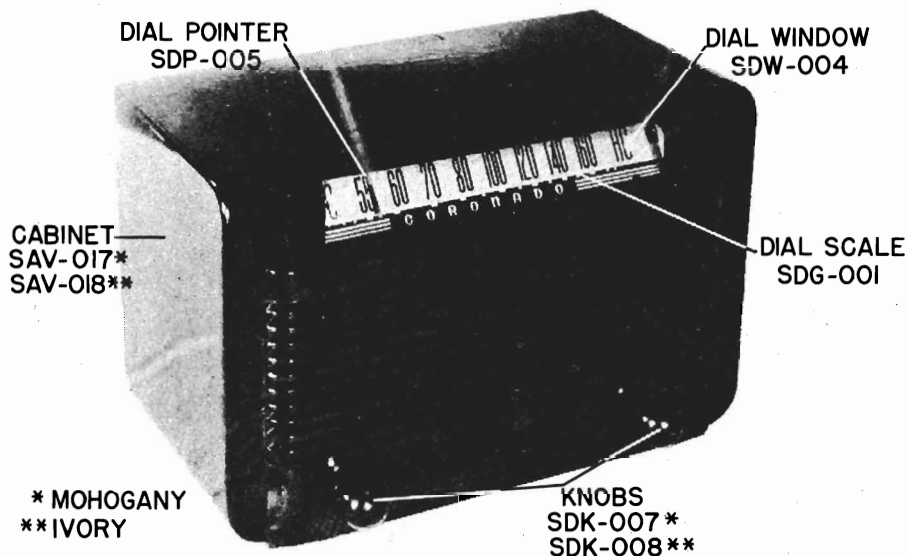
NOTE: Either 12AV6 or 12AT6 tubes may be used.

Please specify PART number and chassis model number when ordering replacements.

REPLACEMENT PARTS LIST

| Ref. No. | Part No. | Description | Ref. No. | Part No. | Description |
|-------------------------------|---------------|-------------------------------------|----------------------|----------|---------------------------|
| CAPACITORS | | | | | |
| C1A-B | B-8A-18997 | Gang tuning condenser | 3129-H | | Motor assembly |
| C1C, D | | Trimmers on gang | | | Electro voice 33-4 |
| C2-7 | C-8D-10770 | .05 mfd x 200 volts | | | crystal cartridge |
| C3-4 & R4 | A-201-15005 | Filpec | | | Electro voice 0-2, needle |
| C5 | C-8D-11304 | .02 mfd x 200 volts | MISCELLANEOUS | | |
| C6 | C-8G-14459 | 220 mmf, ceramic | B-2C-19053 | | Background plate |
| C8-9 | C-8D-10935 | .005 mfd x 600 volts | A-3A-19003 | | Tuning shaft |
| C10-A-B-C-D | A-8C-19085 | Electrolytic condenser | B-47A-19060 | | Pilot light assembly |
| C11 | C-8J-16081 | .047 mfd x 400 volts | A-46A-10793 | | Pilot light, T-47 |
| C12 | C-8D-10761 | .07 mfd x 400 volts | A-2H-10974 | | Tube shield |
| C13 | C-8D-11111 | .18 mfd x 400 volts | A-15C-16007 | | 7-prong socket |
| C14 | C-8D-11251 | .09 mfd x 400 volts | A-23A-10344 | | Line cord lock |
| RESISTORS | | | B-14M-11479-5 | | A.C. line cord and plug |
| R1 | C-9B1-82 | 47K ohms, 1/2 watt, 10% | A-19B-12170 | | Phono socket |
| R2-8 | C-9B1-52 | 150 ohms 1/2 watt, 10% | A-19B-12468 | | Phono motor socket |
| R3 | C-9B1-33 | 2.2 megohms, 1/2 watt, 20% | B-2D-15432-1 | | Loop mounting bracket |
| R5 | C-9B1-36 | 6.8 megohms, 1/2 watt, 20% | CABINET PARTS | | |
| R6-15 | C-9B1-90 | 220K ohms, 1/2 watt, 10% | R-24D-19482 | | Cabinet |
| R7 | C-9B1-29 | 470K ohms, 1/2 watt, 20% | C-2M-18944 | | Escutcheon |
| R9 | C-9B2-62 | 1000 ohms, 1 watt, 10% | D-2M-18943 | | Escutcheon mask |
| R10 | C-9B2-52 | 150 ohms, 1 watt, 10% | C-30M-18966 | | Picture glass |
| R11 | C-9B1-43 | 27 ohms, 1/2 watt, 10% | B-2M-18768 | | Channel indicator plate |
| R12 | A-11A-19004 | Tone control and radio phono switch | B-2M-17068 | | Contrast off volume plate |
| R13 | A-10A-19005 | Volume control and switch | B-18A-19130 | | 12" PM speaker |
| R14 | C-9B1-80 | 33K ohms, 1/2 watt, 10% | A-2G-18788 | | Pointer |
| TRANSFORMERS AND COILS | | | B-5B-18781-76 | | Tuning knob |
| T1 | C-13E-19087-1 | Loop antenna assembly | B-5B-17761-76 | | Off-on volume knob |
| T2 | B-13D-19064 | Oscillator coil | B-5B-17762-76 | | Contrast knob |
| T3 | B-13B-17731 | Input IF transformer | A-25M-18172 | | White rubber knob |
| T4 | B-13B-17731 | Output IF transformer | A-25M-18177 | | Red rubber knob |
| T5 | B-12C-19009 | Output transformer | A-25M-18178 | | Blue rubber knob |
| DIAL PARTS | | | C-23J-19178 | | Cabinet back |
| | A-2D-17627 | Pointer bar bracket | B-14M-17758 | | Line cord and plugs |
| | B-2M-19006 | Pointer bar | N-43E-15569 | | Wing nut, 6-32 |
| | A-3H-10299 | Pulley | N-201-18519-2 | | T.V. inside antenna |
| | B-2G-19433 | Dial pointer | B-5B-18382-36 | | Antenna knob |
| | B-53A-18547 | Dial string | A-3M-19398 | | Centering adjusting rod |
| | A-49A-11324 | Tension spring | B-2C-19362 | | Cover plate |
| RECORD CHANGER | | | B-30A-19481 | | Radio dial scale |
| | B-201-18874 | Record changer (VM Model 950) | B-2G-18928 | | Radio escutcheon |
| | | | B-201-18874-1 | | Record changer |
| | | | B-5B-18876-76 | | Radio knob (line) |
| | | | B-5B-18877-76 | | Radio knob |
| | | | B-23M-19163 | | Bottom cover |
| | | | A-55L-16671 | | Plug receptacle |
| | | | B-14M-11479 | | Radio line cord |
| | | | A-23A-10344 | | Line cord lock |

MODELS 43-37I-1, 43-37I-2,
43-8175, 43-8176



Model 43-37I-1 Mahogany Cabinet (Illustrated),
Model 43-37I-2 Ivory Cabinet (Not illustrated)

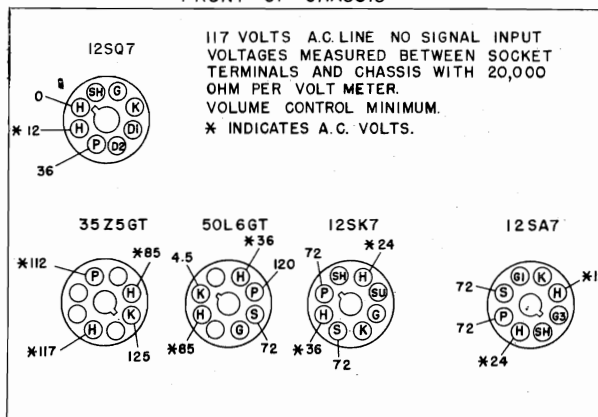
CAUTION: One side of the power line is connected to the chassis. Avoid any ground connection to the radio unless an isolating transformer is used in the power line.

SPECIFICATIONS

5 Tube Superheterodyne, including rectifier tube
Speaker--4 inch P.M. Dynamic, voice coil impedance 3.2
Antenna----Self contained loop antenna, also provision for external antenna
Tuning-----Two gang capacitor
Power supply-----105-125 v. AC or DC
Frequency on AC-----40 to 60 cycles

Power Consumption-----30 watts
Power Output-----0.8 watts undistorted, 1.4 w. maximum
Frequency range-----540 to 1725 KC
Intermediate Frequency-----455 KC
Antenna Sensitivity---140. mv. average for 0.5 w output
Selectivity 70 KC at 1000 times signal at 1000 KC

FRONT OF CHASSIS



BOTTOM VIEW OF CHASSIS
SOCKET VOLTAGE DIAGRAM

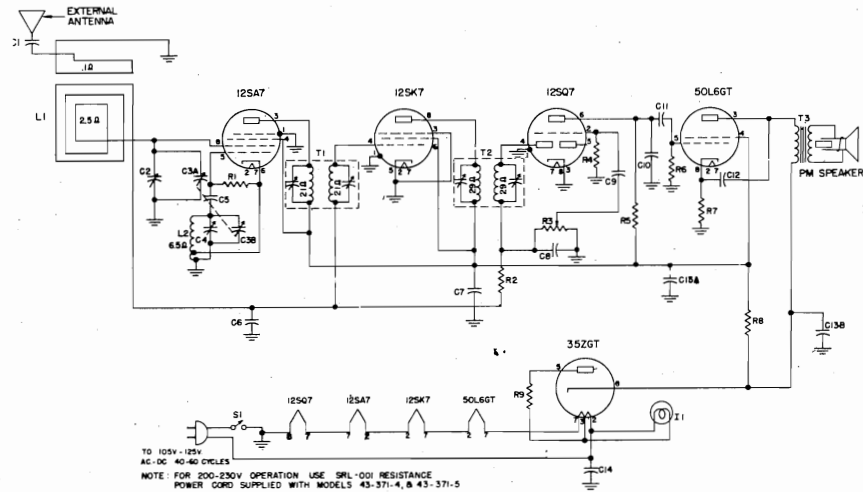
ALIGNMENT PROCEDURE

Allow unit to heat for a few minutes before starting alignment.
Volume control set to maximum.
Output meter across speaker.
Align for maximum output.
Keep input as low as readable meter reading of output will permit.

Note: If signal generator is AC operated, use an isolating transformer between the power supply and the radio receiver power input. The use of an isolating capacitor is not recommended as AC through the capacitor will introduce hum and/or create the possibility of a burned out signal generator attenuator.

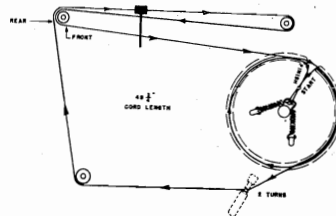
| FREQUENCY | SIGNAL GENERATOR COUPLING CAPACITOR | GENERATOR CONNECTION TO RADIO | GROUND CONNECTION | TUNING CONDENSER SETTING | ADJUST TRIMMERS FOR MAXIMUM OUTPUT (in order shown) |
|-----------|-------------------------------------|-------------------------------|-------------------|--------------------------|------------------------------------------------------------|
| 455 KC | 0.1 mf | Converter grid | Chassis | Wide open | 2nd IF transformer trimmers 1st IF transformer trimmers |
| 1725 KC | 200 mmf | Receiver antenna post | Chassis | Wide open | Oscillator trimmer C4 |
| 1500 KC | 200 mmf | Receiver antenna post | Chassis | Tune for maximum output | Antenna trimmer C2 |

MODELS 43-371-1, 43-371-2, 43-8175, 43-8176

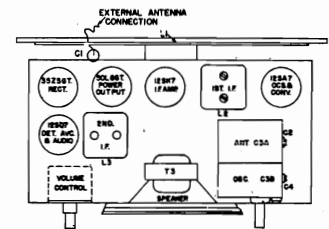


SCHMATIC DIAGRAM

DRIVE CORD
REPLACEMENT

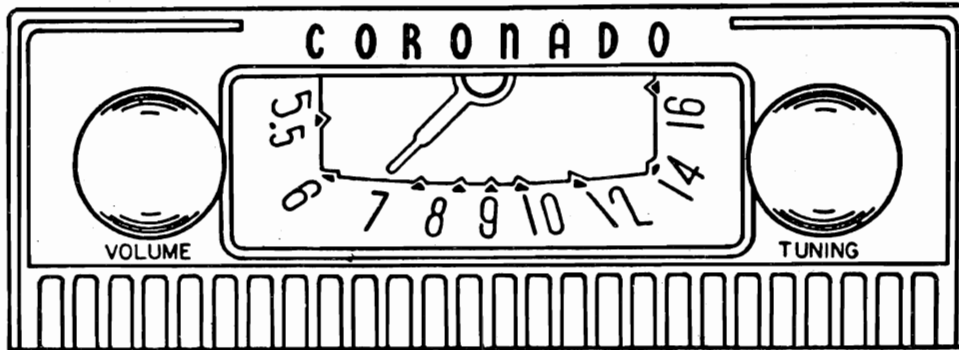


TUBE AND
TRIMMER
LOCATION



| SYMBOL | TITLE | VALUE | RATING | PART NO. |
|--------|---------------------------------|-------------|--------|-----------------|
| C1 | Paper capacitor | .02 mf. | 400 V. | UCC-026 |
| C2 | Antenna trimmer | | | Part of SCT-015 |
| C3 | 2 Gang variable condenser | | | SCT-015 |
| C4 | Oscillator trimmer | | | Part of SCT-015 |
| C5 | Mica capacitor | 220 mmf. | | UCU-036 |
| C6 | Paper capacitor | .05 mf. | 400 V. | UCC-028 |
| C7 | Paper capacitor | .05 mf. | 400 V. | UCC-028 |
| C8 | Paper capacitor | 220 mmf. | | UCU-036 |
| C9 | Paper capacitor | .01 mf. | 400 V. | UCC-040 |
| C10 | Mica capacitor | 220 | | UCC-036 |
| C11 | Paper capacitor | .01 mf. | 400 V. | UCC-025 |
| C12 | Paper capacitor | .02 | 400 V. | UCC-026 |
| C13A | Electrolytic capacitor | 30 mf. | 150 V. | SCE-022 |
| C13B | Electrolytic capacitor | 30 mf. | 150 V. | SCE-022 |
| C14 | Paper capacitor | .05 mf. | 400 V. | UCC-028 |
| R1 | Carbon resistor | 22,000 ohm | W. | URD-081 |
| R2 | Carbon resistor | 2.2 megohm | W. | URD-129 |
| R3 | Volume control & switch (SI) | 1.0 megohm | W. | SRC-045 |
| R4 | Carbon resistor | 4.7 megohm | W. | URD-137 |
| R5 | Carbon resistor | 470,000 ohm | W. | URD-113 |
| R6 | Carbon resistor | 470,000 ohm | W. | URD-113 |
| R7 | Carbon resistor | 150 ohm | W. | URD-029 |
| R8 | Carbon resistor | 2,700 ohm | W. | URF-059 |
| R9 | Carbon resistor | 18 ohm | W. | URD-007 |
| SI | Switch, on-off part of R3 | | | SAB-015 |
| L1 | Loop antenna assembly | | | SAB-015 |
| L2 | Coil, oscillator | | | SLC-013 |
| T1 | Transformer, 1st I.F. | | | STL-001 |
| T2 | Transformer, 2nd I.F. | | | STL-002 |
| T3 | Transformer output, part of LSI | | | SOP-004 |
| LS1 | Speaker, 4 inch P.M. | | | UDL-018 |
| I1 | Lamp, pilot | 3E 47 | 6-8V. | SJS-003 |
| | Socket, tube, octal-base | | | SWL-002 |
| | Cord-power cord | | | RHH-002 |
| | Back fasteners | | | SJS-001 |
| | Pilot light socket assembly | | | |

MODELS 43-5006B,
43-5006C



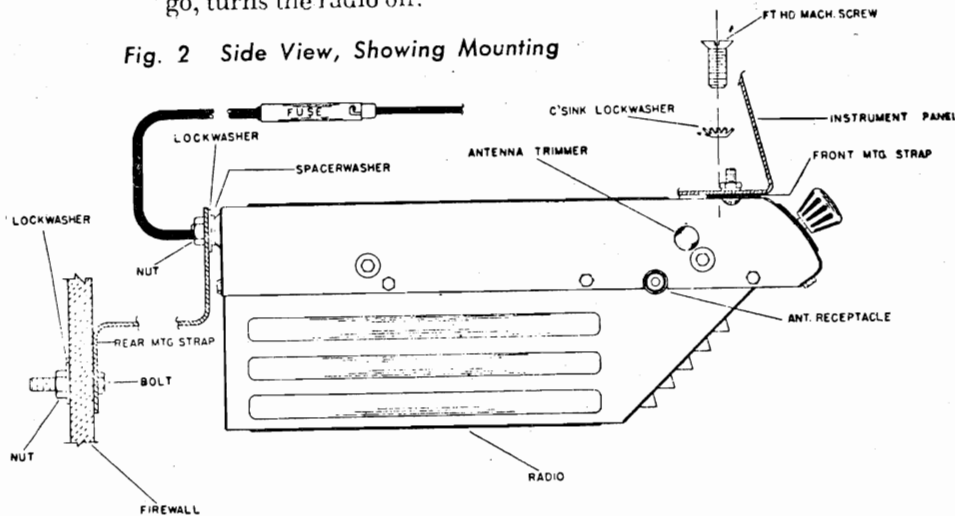
A52-257 KNOBS D40-141 ESCUTCHEON
B67-522 DIAL SCALE A58-55 DIAL POINTER

Fig. 1 Front View

OPERATION

To turn the receiver on, rotate the volume control and switch knob (left hand knob) to the right about half its range. After allowing about 30 seconds for the tubes to warm up, the desired station may be tuned by rotating the tuning control (right hand knob) to the desired frequency. The dial scale is calibrated in kilocycles minus the final two zeros. After the station has been properly tuned, the volume may be adjusted by means of the volume control knob. To increase the volume, turn the control to the right; to decrease the volume, turn it to the left. Turning this control to the left as far as it will go, turns the radio off.

Fig. 2 Side View, Showing Mounting



ELECTRICAL SPECIFICATIONS

The tube compliment of this receiver is as follows:

- 1—6SK7GT—R. F. Amplifier.
- 1—6SA7GT—Converter.
- 1—6SK7GT—I.F. Amplifier.
- 1—6SQ7—Detector—AVC—1st audio.
- 1—6V6GT—Power output.
- 1—6X5GT—Rectifier.

| | |
|----------------------|----------------------------------------------|
| Power Supply..... | 6.3 volts DC |
| Current | 4.8 amp. average |
| Frequency Range..... | 540 to 1600 KC |
| I. F. Frequency..... | 455 KC |
| Speaker..... | 4" P. M. |
| Power Output..... | 1.2 watts, undistorted 2.5 watts, maximum |
| Sensitivity..... | 10 microvolts average for 1 watt output |
| Selectivity... .. | 20 KC broad at 1000 times signal, at 1000 KC |

MODELS 43-5006B,
43-5006C

SERVICE NOTES

Voltages taken from the different points of the circuit to the chassis are measured with volume control in maximum position, all tubes in their sockets, no signal applied, and with a volt meter having a resistance of 20,000 ohms per volt. These voltages are clearly shown on the voltage chart, (Fig. 5).

All voltages should be measured with an input voltage of 6.3 volts DC.

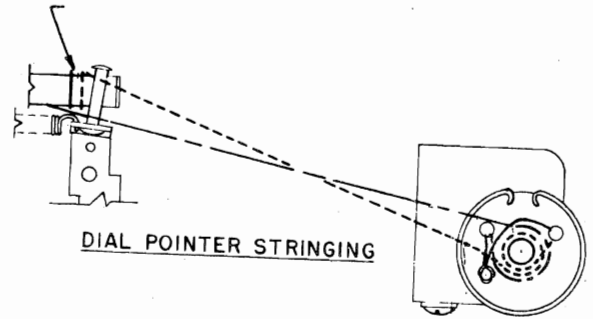
INSTRUCTIONS FOR REMOVING CHASSIS FROM THE CASE

The bottom cover (the one with the speaker louvers) can be removed to permit servicing of major components, such as tubes and vibrator, by removing the eight (8) screws holding it to the top cover. There are three (3) screws on each side, one (1) in the rear, and one (1) in the front.

FINAL ADJUSTMENTS

The input circuit has been especially designed to be used with a low capacity antenna, of the fish pole or whip type.

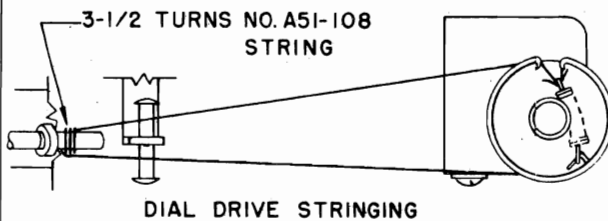
To adjust the antenna trimmer condenser, carefully tune the receiver to a weak station at approximately 600 kilocycles (K.C.). Remove the snap button covering the antenna trimmer (See Figure 2) and adjust the trimmer for maximum volume. A small screw driver will be needed for this purpose.



DIAL POINTER STRINGING

Dial Pointer Stringing

43-5006B & 43-5006C



DIAL DRIVE STRINGING

Dial Stringing 43-5006B & 43-5006C

ALIGNING INSTRUCTION

Never attempt any adjustments on this receiver unless it becomes necessary to replace a coil or transformer, or the adjustments have been tampered with in the field. Always make certain that other circuit components, such as tubes, condensers, resistors, etc., are normal before proceeding with realignment.

CAUTION: Before attempting to remove the top cover, to service condensers, resistors, etc., the screw connecting the spark plate to the "A" terminal (inside case) must be removed. This is a round head screw, and is located on the rear of the case, close to the mounting stud bolt. It is recessed in a 1/2 inch hole in the case itself, thereby permitting contact with the spark plate.

After removing the spark plate screw, remove the two knobs by pulling forward and remove the eight (8) screws securing the cover to the chassis. Lift the chassis at the rear, at the same time moving it away from the front of the case so that the volume and tuning shafts will clear the holes in the cover.

NOTE: When reinstalling the chassis into the case, be sure the screw connecting the spark plate to the "A" terminal (inside case) is tightened very securely, otherwise the receiver will not operate properly.

MODELS 43-5006B,
43-5006C

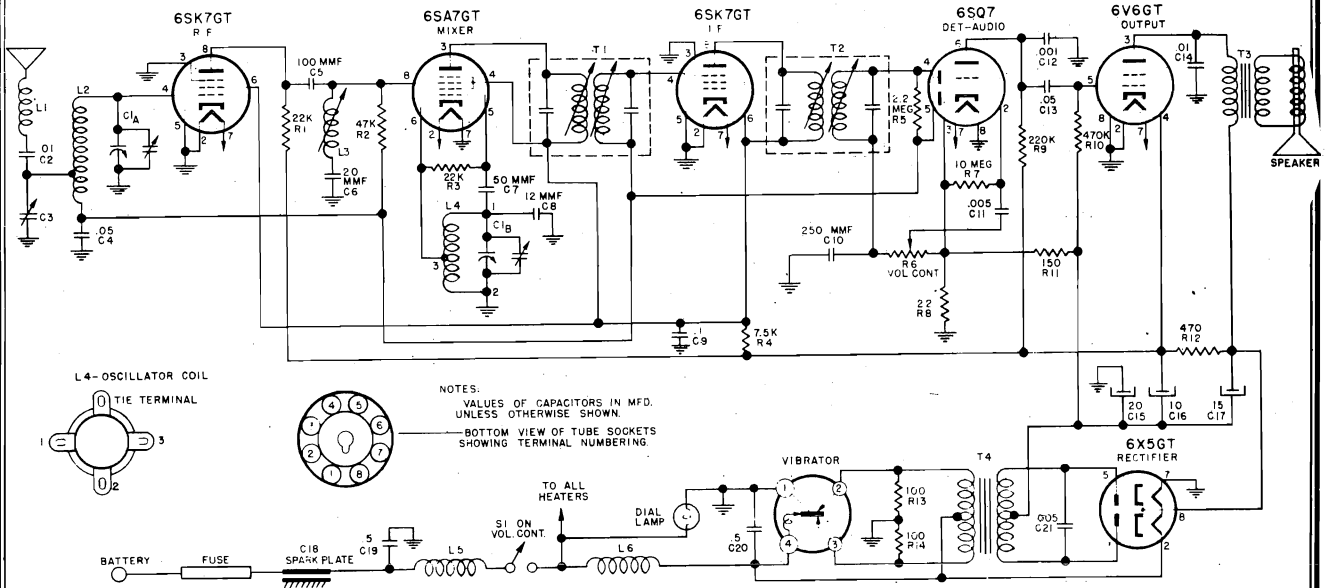


Figure 3 Schematic Drawing 43-5006B

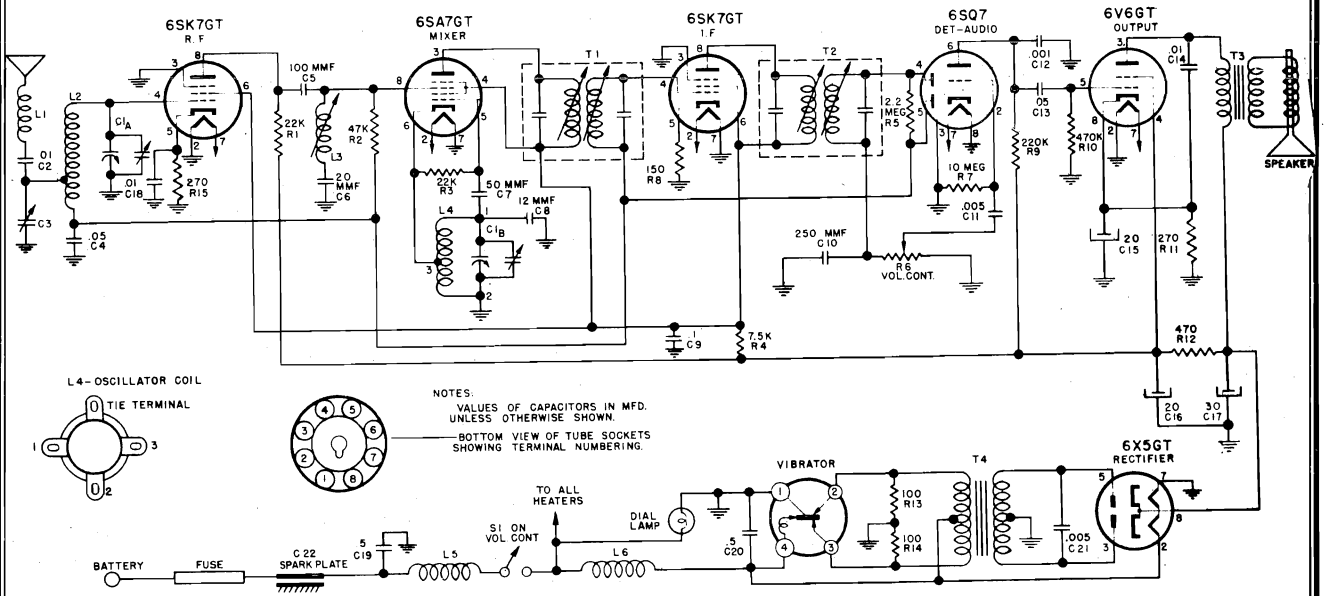
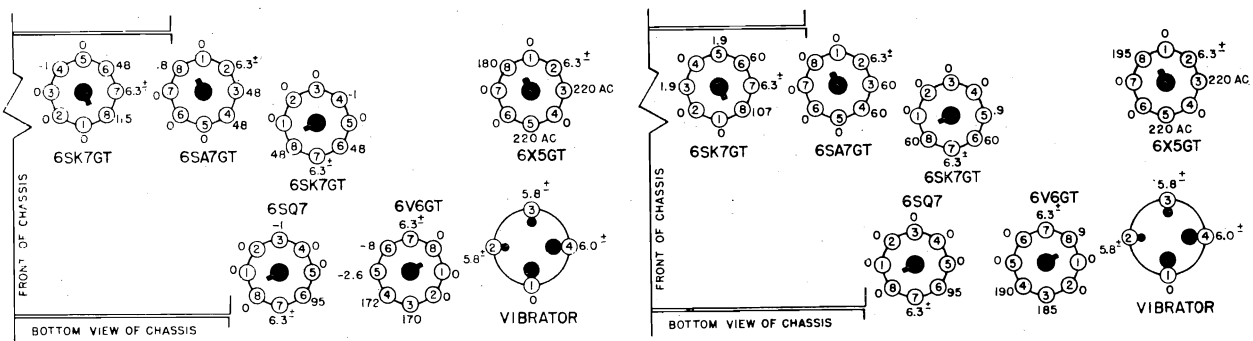


Figure 4 Schematic Drawing 43-5006C



43-5006B

Figure 5 Socket Voltages

43-5006C

MODELS 43-5006B,
43-5006C

ALIGNMENT PROCEDURE

Volume control—Maximum, all adjustments.

No signal applied to antenna.

Power input—6.3 volts.

Connect dummy antenna in series with output lead of signal generator.

Connect output meter across voice coil.

Connect ground lead of signal generator to chassis.

Repeat alignment procedure as a final check.

The following equipment is necessary for proper alignment:

Signal generator that will provide the test frequencies as listed, modulated 400 cycles, 30%.

Non-metallic screwdriver.

Output meter.

Dummy antennas—.1 MFD., 75 MMFD.

For alignment points refer to Figures 5 and 6.

| Dial Setting | Generator Frequency | Dummy Ant. | Generator Connections | Trimmer Reference | Trimmer Adjustment | Trimmer Function |
|-------------------------------|---------------------|------------|-----------------------|-------------------|--------------------|------------------|
| Fully Open | 455 KC | .1 MFD. | 6SA7 Grid | T2 | Maximum | Output I.F. |
| Fully Open | 455 KC | .1 MFD. | 6SA7 Grid | T1 | Maximum | Input I.F. |
| Fully Open | 455 KC | 75 MMFD. | Ant. lead | L3 | Minimum | Wave trap |
| Fully Open | 1600 KC | 75 MMFD. | Ant. lead | C1B | Maximum | Oscillator |
| Tune in signal from generator | 1400 KC | 75 MMFD. | Ant. lead | C3 | Maximum | Antenna |

NOTE: The antenna trimmer condenser, C3, (see Fig. 2) should be adjusted after the radio is installed in the car. Tune the receiver to a weak station at about 1100 KC and adjust this trimmer for maximum volume.

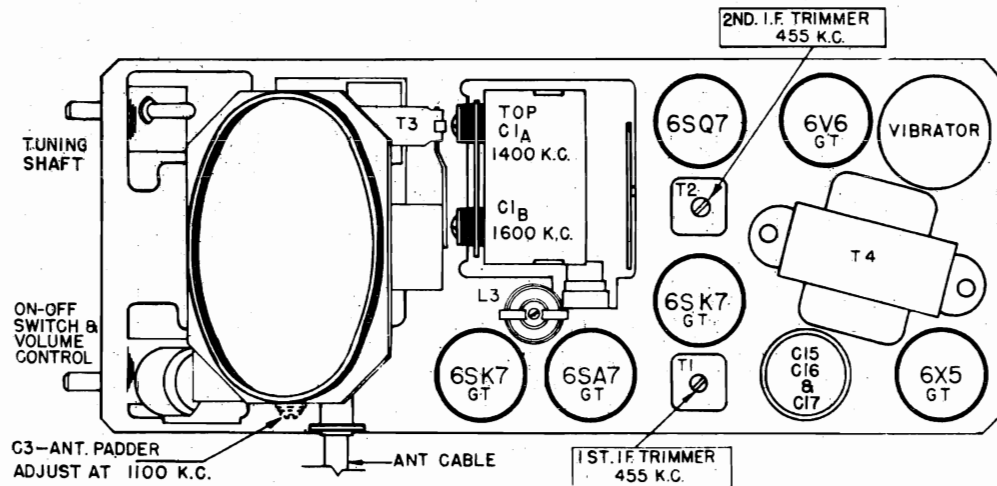


Figure 6 Tube & Trimmer Locations 43-5006B & 43-5006C

CONDENSERS Model 5006B 5006C

| Ref. No. | Description | Part Number | |
|----------|-----------------------------------------|-------------|---------|
| C1A, C1B | Variable condenser | A19-201 | A19-201 |
| C2, C14 | .01 MFD 400 volt condenser | A16-192 | A16-192 |
| C3 | Trimmer condenser | A20-145 | A20-145 |
| C4 | .05 MFD 400 volt condenser | A16-189 | A16-189 |
| C5 | 100 MMFD ceramic condenser | A15-196 | A15-196 |
| C6 | 20 MMFD ceramic condenser | A15-202 | A15-202 |
| C7 | 50 MMFD ceramic condenser | A15-204 | A15-204 |
| C8 | 12 MMFD ceramic condenser, temp. comp. | A15-205 | A15-205 |
| C9 | .1 MFD 400 volt condenser | A16-187 | A16-187 |
| C10 | 250 MMFD mica condenser | A15-176 | A15-176 |
| C11 | .005 MFD 600 volt condenser | A16-190 | A16-190 |
| C12 | .001 MFD ceramic condenser | A16-195 | A16-195 |
| C13 | .05 MFD 600 volt condenser | A16-193 | A16-193 |
| C15 | 20 MFD 25 volt electrolytic condenser | A18-293 | |
| C16 | 10 MFD 350 volt electrolytic condenser | | |
| C17 | 15 MFD 350 volt electrolytic condenser | | |
| C15 | 20 MFD 25 volt electrolytic condenser | A18-289 | |
| C16 | 20 MFD 350 volt electrolytic condenser | | |
| C17 | 30 MFD 350 volt electrolytic condenser | | |
| C18 | .01 MFD 400 volt condenser | A16-192 | A16-192 |
| C19, C20 | .5 MFD 100 volt condenser | A16-184 | A16-184 |
| C21 | .005 MFD 1600 volt oil filled condenser | A16-185 | A16-185 |

MODELS 43-5006B,
43-5006C

| Ref. No. | Description | Model 5006B | 5006C |
|------------------------|-------------------------------------------------------------------|-------------|---------|
| RESISTORS | | | |
| R1, R3 | 22K ohm $\frac{1}{2}$ watt 20% resistor | A60-659 | A60-659 |
| R2 | 47K ohm $\frac{1}{2}$ watt 20% resistor | A60-685 | A60-685 |
| R4 | 7.5K ohm 2 watt 10% resistor | A60-769 | A60-769 |
| R5 | 2.2 megohm $\frac{1}{2}$ watt 20% resistor | A60-726 | A60-726 |
| R6 | Volume control, 500,000 ohm, with switch | A24-177 | A24-177 |
| R7 | 10 megohm $\frac{1}{2}$ watt 20% resistor | A60-728 | A60-728 |
| R8 | 22 ohm $\frac{1}{2}$ watt 10% resistor | A60-768 | |
| R8 | 150 ohm $\frac{1}{2}$ watt 10% resistor | | A60-767 |
| R9 | 220K ohm $\frac{1}{2}$ watt 20% resistor | A60-667 | A60-667 |
| R10 | 470K ohm $\frac{1}{2}$ watt 20% resistor | A60-731 | A60-731 |
| R11 | 150 ohm $\frac{1}{2}$ watt 10% resistor | A60-767 | |
| R11 | 270 ohm $\frac{1}{2}$ watt 10% resistor | | A60-771 |
| R12 | 470 ohm $\frac{1}{2}$ watt 10% resistor | A60-770 | A60-770 |
| R13, R14 | 100 ohm $\frac{1}{2}$ watt 10% resistor | A60-752 | A60-752 |
| R15 | 270 ohm $\frac{1}{2}$ watt 10% resistor | | A60-771 |
| COILS AND TRANSFORMERS | | | |
| L1 | Antenna Loading Coil | A10-527 | A10-527 |
| L2 | Antenna Coil | B10-511 | B10-511 |
| L3 | I. F. Trap Coil | A10-510 | A10-510 |
| L4 | Oscillator Coil | A10-512 | A10-512 |
| L5 | Choke "A" Line | A33-229 | A33-229 |
| L6 | Choke vibrator hash | A33-228 | A33-228 |
| T1 | 1st I. F. Transformer | A10-508 | A10-508 |
| T2 | 2nd I. F. Transformer | A10-509 | A10-509 |
| T3 | Output Transformer (Part of Speaker, not furnished separately) | B80-242 | B80-242 |
| T4 | Power transformer | B80-243 | B80-243 |
| DIAL PARTS | | | |
| | | 5006B | 5006C |
| | Bracket, Dial Scale | A11-303 | A11-303 |
| | Bracket, String Guide | B11-328 | B11-328 |
| | Bushing, Tuning Shaft Bearing | A72-29 | A72-29 |
| | Clip, Spring, for Tuning Shaft | A70-130 | A70-130 |
| | Dial Escutcheon | D40-141 | D40-141 |
| | Dial Pointer | A58-55 | A58-55 |
| | Dial Scale | B67-522 | B67-522 |
| | Gasket for Speaker | A28-101 | A28-101 |
| | Knob | A52-257 | A52-257 |
| | Link, String Guide | A11-329 | A11-329 |
| | Pilot Light, No. 47 Bayonet | A89-10 | A89-10 |
| | Rivet, Shoulder, for Dial Pointer | | |
| | Stringing | A65-37 | A65-37 |
| | Rivet, Shoulder, for String Guide Brkt. and Link | A65-41 | |
| | Rivet, Shoulder, for String Guide Brkt. and Link | | A65-42 |
| | Rivet, Shoulder, for Dial Drive Stringing | A65-12 | A65-12 |
| | Shaft, tuning | A75-70 | A75-70 |
| | Shaft, for Dial Pointer | A75-74 | A75-74 |
| | Spring, for Pilot Light Socket | A70-132 | A70-132 |
| | Spring, Dial Drive String Tension | A70-135 | A70-135 |
| | Spring, Pointer Drive String Tension | | A70-137 |
| | Spring, Pointer Drive String Tension | A70-142 | |
| | String, Pointer Travel, 17" | | A51-105 |
| | String, Condenser Drive, 19" | | A51-108 |
| MISCELLANEOUS | | | |
| | "A" lead assembly | S84-233 | S84-233 |
| | Clip, I. F. Transformer Mounting | A83-421 | A83-421 |
| | Clip, Oscillator Coil Mounting | A83-517 | A83-517 |
| | Fuse, 15 Amp. | A43-10 | A43-10 |
| | Grommet, rubber, (Spkr. & Gang Mounting) | A47-112 | A47-112 |
| | Mounting strap, rear | B31-134 | B31-134 |
| | Mounting Plate, Front | B31-139 | B31-139 |
| | Mounting parts kit | S84-192 | S84-192 |
| | Receptacle, Antenna Cable | A87-38 | A87-38 |
| | Speaker, 4" P.M. (includes Output Trans- former) | B79-362 | B79-362 |
| | Suppression Kit Assembly | S84-322 | S84-322 |
| | Vibrator | A34-105 | A34-105 |
| | Wiper, grounding, for case covers | A83-519 | A83-519 |

DESCRIPTION

Model 12801 is a superheterodyne receiver, designed for use on 105-125 volt 60 cycle AC or DC current.

The tubes used are:

- 12SA7—Oscillator-Mixer
- 12SQ7—Detector and first Audio
- 50L6—Power Output
- 35Z5—Rectifier

This receiver covers the frequency range from 540 to 1625 KC. The dial scale is calibrated in kilocycles, minus the final zero.

ALIGNMENT PROCEDURE

The following alignment procedure is for use only by competent servicemen having the proper equipment.

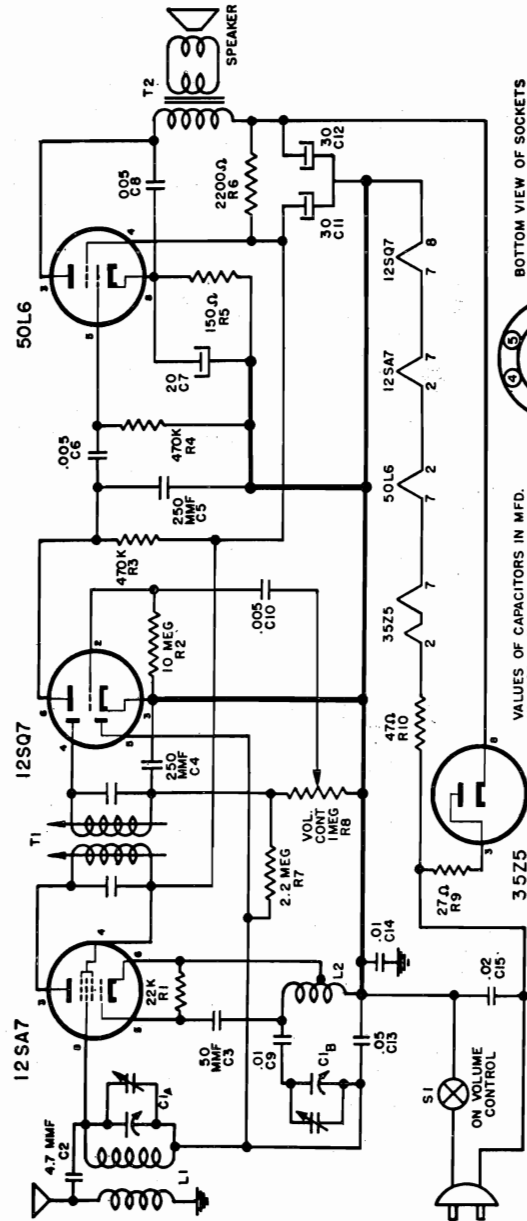
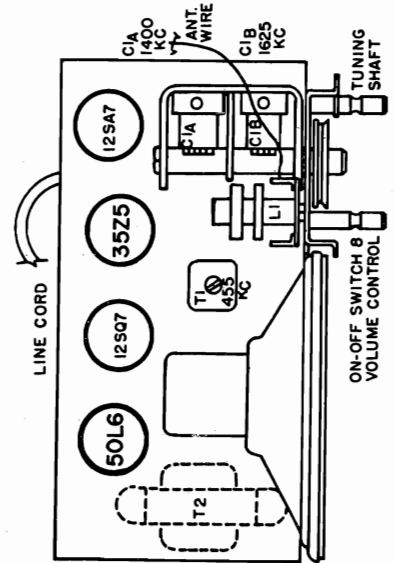
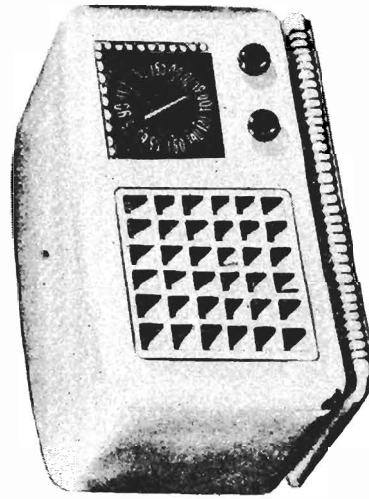
The alignment should be made with volume control fully on, and the output from the signal generator as low as possible, to prevent A.V.C. action from interfering with correct alignment.

Adjust all trimmers for maximum output. Repeat alignment procedure given below as a final check.

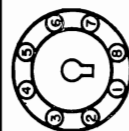
CAUTION: This is an A.C.-D.C. receiver and when aligning the set it is necessary to isolate the Signal Generator or the Receiver from the line by use of a transformer, or place a 2 MFD. condenser in both test leads of the Signal Generator.

| Position of Variable | Generator Frequency | Dummy Ant. Mid. | Generator Connections | Trimmer Adjustment | Trimmer Function |
|-------------------------------|---------------------|-----------------|-----------------------------|--------------------|------------------|
| Fully open | 455 KC | .1 | *12SA7 Grid (Stator of CIA) | T1 | IF. |
| Fully open | 1625 KC | .00025 | *Antenna Wire | C1B | Oscillator |
| Tune in signal from generator | 1400 KC | .00025 | *Antenna Wire | C1A | Antenna |

*Connect ground lead of signal generator to chassis.



VALUES OF CAPACITORS IN MFD. UNLESS OTHERWISE NOTED.
 ⚡ CHASSIS GROUND.



PARTS LIST

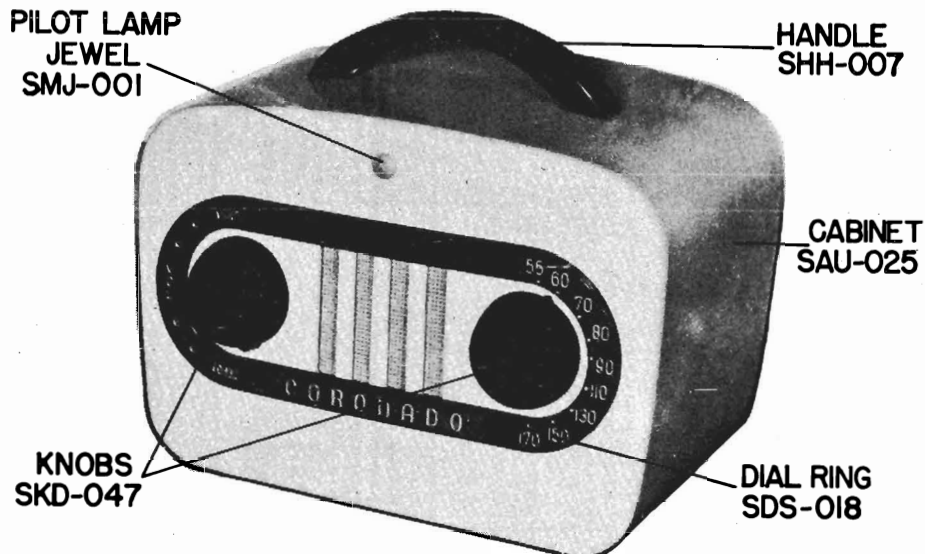
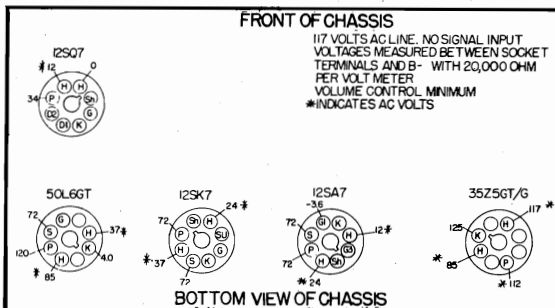
| CODE | PART NO. | DESCRIPTION | CODE | PART NO. | DESCRIPTION | CODE | PART NO. | DESCRIPTION |
|----------|----------|-------------------------------------------|------|----------|------------------------------|--------|----------|------------------------|
| C1A, C1B | B19-194 | Variable Condenser | R1 | 461-553 | 25K Ohm 1/2 watt Resistor | S | B31-330 | Speaker, 7" P. 20 feet |
| C2 | A83-355 | 4.7 Mfd Mica Condenser | R2 | A66-663 | 10 Megohm 1/2 watt Resistor | T1 | A91-57 | Antenna Wire, 20 feet |
| C3 | A15-175 | 20 Mfd Mica Condenser | R3 | A66-662 | 470K Ohm 1/2 watt Resistor | T2 | A91-57 | Antenna Wire, 20 feet |
| C4 | A16-153 | 500 Mfd 600 Volt Condenser | R4 | A66-727 | 220 Ohm 1/2 watt Resistor | C1-116 | A21-116 | Cabinet Back |
| C5, C6 | A16-153 | .005 Mfd 600 Volt Condenser | R5 | A66-594 | 2.2 Megohm 1/2 watt Resistor | C1-117 | A42-453 | Cabinet, Black |
| C7, C8 | A18-278 | 20 Mfd 25 Volt Electrolytic Condenser | R6 | A66-594 | 2.2 Megohm 1/2 watt Resistor | C1-118 | A42-434 | Cabinet, Red |
| C9, C10 | A18-186 | .01 Mfd 200 Volt Electrolytic Condenser | R7 | A66-750 | 47 Ohm 1/2 watt Resistor | C1-119 | A48-456 | Dial Scale |
| C11 | A18-283 | 30x30 Mfd 150 Volt Electrolytic Condenser | R8 | B10-502 | 10 Megohm 1/2 watt Resistor | C1-120 | A48-456 | Dial Scale |
| C12 | A18-283 | .01 Mfd 200 Volt Electrolytic Condenser | R9 | A66-594 | 2.2 Megohm 1/2 watt Resistor | C1-121 | A48-456 | Dial Scale |
| C13 | A18-151 | .02 Mfd 600 Volt Condenser | R10 | A66-594 | 2.2 Megohm 1/2 watt Resistor | C1-122 | A48-456 | Dial Scale |
| C14 | A18-151 | .02 Mfd 600 Volt Condenser | L1 | A10-479 | Oscillator Coil | C1-123 | A48-456 | Dial Scale |
| C15 | A18-151 | .02 Mfd 600 Volt Condenser | L2 | A10-479 | Oscillator Coil | C1-124 | A48-456 | Dial Scale |
| | | | T1 | A10-479 | I.F. Transformer | C1-125 | A48-456 | Dial Scale |
| | | | T2 | A10-479 | I.F. Transformer | C1-126 | A48-456 | Dial Scale |
| | | | | A10-239 | Output Transformer | C1-127 | A48-456 | Dial Scale |

MODEL 43-8190

SPECIFICATIONS

5 Tube Superheterodyne, including rectifier tube
 Speaker ----- 4 inch "Alnico 5" Magnet Dynamic, voice coil impedance 3.5 ohms (400 cycles)
 Antenna ---- Self contained loop antenna, also provision for external antenna
 Tuning ----- Direct drive—2 gang condenser
 Power supply ----- 105 to 125 Volts, AC or DC
 Frequency on AC ----- 40 to 60 cycles
 Power Consumption ----- 25 watts
 Power Output ---- 0.6 w undistorted, 1.5 w minimum full power output
 Frequency range ----- 540 to 1720 KC
 Intermediate Frequency ----- 455 KC
 Antenna Sensitivity ---- 300 mv. average for 0.5 w output
 Selectivity -- 75 KC broad at 1000 times signal at 1000 KC

SOCKET VOLTAGE DIAGRAM

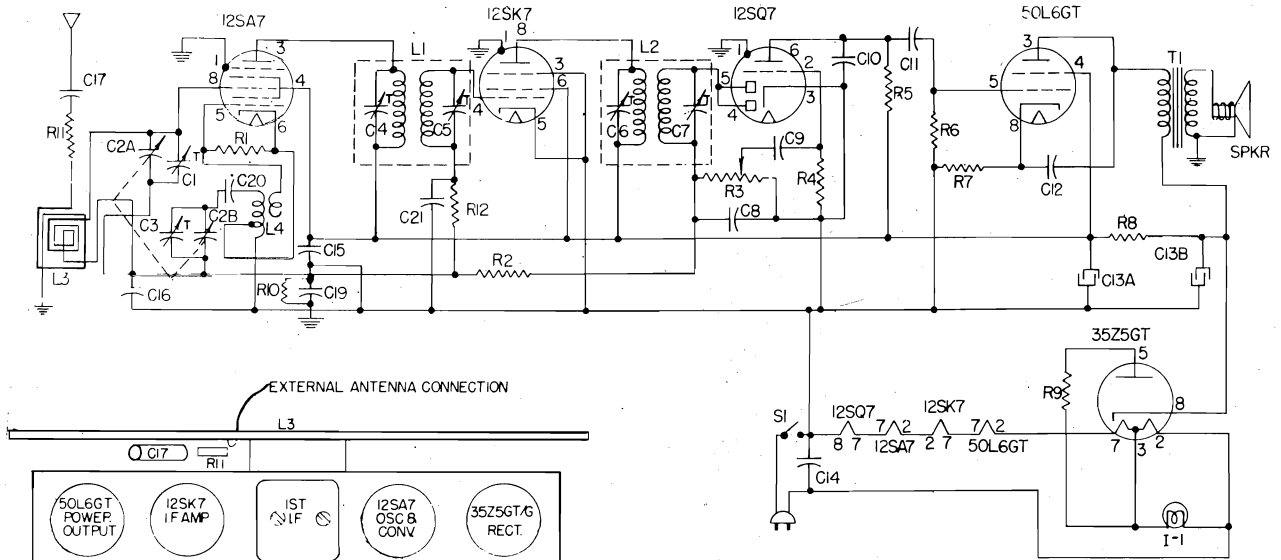


ALIGNMENT PROCEDURE

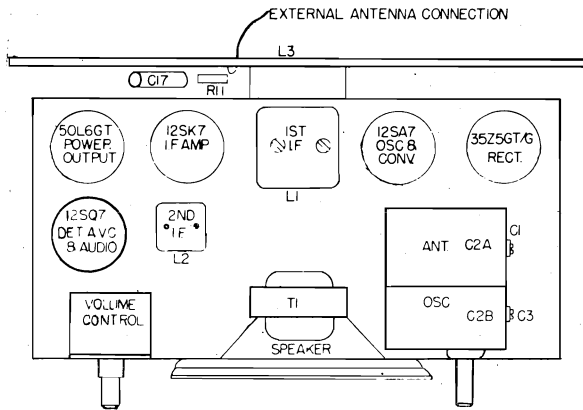
Allow unit to heat for a few minutes before starting alignment.
 Volume control set to maximum.
 Output meter across speaker.
 Align for maximum output.
 Keep input as low as readable meter reading of output will permit.

Note: If signal generator is AC operated, use an isolating transformer between the power supply and the radio receiver power input. The use of an isolating capacitor is not recommended as AC through the capacitor will introduce hum and/or create the possibility of a burned out signal generator attenuator.

| FREQUENCY | SIGNAL GENERATOR COUPLING CAPACITOR | SIGNAL GENERATOR CONNECTION TO RADIO | GROUND CONNECTION | TUNING CONDENSER SETTING | ADJUST TRIMMERS FOR MAXIMUM OUTPUT (in order shown) |
|-----------|-------------------------------------|--------------------------------------|-------------------|--------------------------|----------------------------------------------------------|
| 455 KC | 0.1 mf | Converter grid | B- | Wide open | 2nd IF transformer trimmer 1st IF transformer trimmer |
| 1720 KC | 200 mmf | Receiver antenna post | Chassis | Wide open | Oscillator trimmer C3 |
| 1500 KC | 200 mmf | Receiver antenna post | Chassis | Tune for maximum output | Antenna trimmer C1 |



SCHEMATIC DIAGRAM



TUBE AND TRIMMER LOCATION

PARTS DESCRIPTION LIST

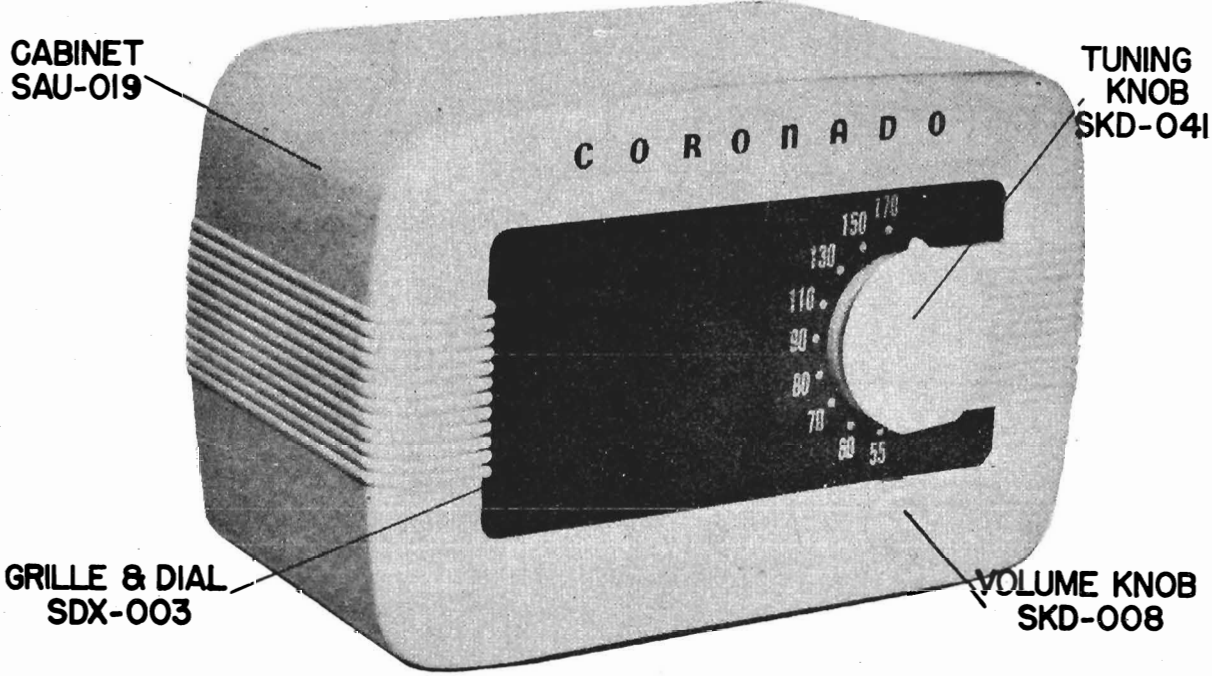
| SYMBOL | TITLE | VALUE | RATING | TOLERANCE | PART NO |
|-----------|-----------------------------------------------------------------------------------------|-------------|-----------|-----------|-----------|
| C1 | Antenna trimmer | | | | * SCT-013 |
| C2A | Variable Condenser ant. section | | | | SCT-013 |
| C2B | Variable Condenser osc. section | | | | SCT-013 |
| C3 | Oscillator trimmer | | | | * |
| C8 | Mica capacitor | 220 mmf | 500WVDC | ±20% | UCU-036 |
| C9 | Paper capacitor | .005mf | 600WVDC | +40-15% | UCC-044 |
| C10 | Mica capacitor | 220 mmf | 500WVDC | ±20% | UCU-036 |
| C11 | Paper capacitor | .01mf | 600WVDC | ±20% | UCC-040 |
| C12 | Paper capacitor | .02mf | 600WVDC | ±20% | UCC-041 |
| C13A | Electrolytic capacitor | 30mf | 150WVDC | | SCE-026 |
| C13B | Electrolytic capacitor | 30mf | 150WVDC | | SCE-026 |
| C14 | Paper capacitor | .05mf | 600WVDC | ±20% | UCC-045 |
| C15 | Paper capacitor | .05mf | 600WVDC | ±20% | UCC-045 |
| C16 | Paper capacitor | .05mf | 600WVDC | ±20% | UCC-045 |
| C17 | Paper capacitor | .01 mf | 600WVDC | ±20% | UCC-040 |
| C19 | Paper capacitor | .1mf | 600WVDC | +20-10% | UCC-048 |
| C20 | Paper capacitor | .02mf | 600WVDC | ±20% | UCC-041 |
| C21 | Paper capacitor | .005mf | 600WVDC | +40-15% | UCC-044 |
| R1 | Carbon resistor | 22,000 ohm | ½ W | ±20% | URD-081 |
| R2 | Carbon resistor | 2.2 megohm | ½ W | ±20% | URD-129 |
| R3 | Volume control | 0.5 megohm | | | SRC-070 |
| R4 | Carbon resistor | 4.7 megohm | ½ W | ±20% | URD-137 |
| R5 | Carbon resistor | 470,000 ohm | ½ W | ±20% | URD-113 |
| R6 | Carbon resistor | 470,000 ohm | ½ W | ±20% | URD-113 |
| R7 | Carbon resistor | 150 ohm | ½ W | ±20% | URD-029 |
| R8 | Carbon resistor | 2700 ohm | ½ W | ±20% | URE-059 |
| R9 | Carbon resistor | 18 ohm | ½ W | ±10% | URD-007 |
| R10 | Carbon resistor | 470,000 ohm | ½ W | ±10% | URD-113 |
| R11 | Carbon resistor | 470 ohm | ½ W | ±20% | URD-041 |
| R12 | Carbon resistor | 470,000 ohm | ½ W | ±20% | URD-113 |
| L1 | 1st IF Transformer | | | | STL-016 |
| L2 | 2nd IF Transformer | | | | STL-015 |
| L3 | Antenna loop | | | | SLL-002 |
| L4 | Oscillator coil | | | | SLC-001 |
| S1 | Power switch, with R3 | | | | SRC-070 |
| I1 | Pilot lamp | GE 47 | 6.8v-.15A | | UDL-013 |
| T1 | No. P104J58 output transformer | | | | STO-004 |
| SPKR | No. P104J59 speaker | | | | SOP-005 |
| SPKR & T1 | Speaker and output transformer assembly for models not covered by previous two listings | | | | SOP-006 |
| | Octal base tube socket | | | | SJS-003 |

*Part of SCT-013

MODEL 43-8201

SPECIFICATIONS FOR CORONADO RADIO MODEL 43-8201

5 Tube Superheterodyne, including rectifier tube
 Speaker ----- 4 inch "Alnico 5" Magnet Dynamic, voice coil impedance 3.5 ohms (400 cycles)
 Antenna ----- external hank antenna
 Tuning ----- Direct drive—2 gang condenser
 Power supply ----- 105 to 125 Volts, AC or DC
 Frequency on AC ----- 40 to 60 cycles
 Power Consumption ----- 28 watts at 117V
 Power Output ----- 0.8 w undistorted, 1.5 w minimum full power output
 Frequency range ----- 540 to 1720 KC
 Intermediate Frequency ----- 455 KC
 Antenna Sensitivity ----- 50 mv. average for 0.5 w output
 Selectivity -- 50 KC broad at 1000 times signal at 1000 KC



PARTS DESCRIPTION LIST

| SYMBOL | TITLE | VALUE | RATING | TOLERANCE | PART NO. |
|--------|-------------------------------------------|-------------|---------|-----------|----------|
| C1 | Paper capacitor | .05mf | 600WDVC | +40-10% | UCC-045 |
| C2A | Electrolytic capacitor | 40mf | 150WVDC | +100-10% | SCE-003 |
| C2B | Electrolytic capacitor | 40mf | 150WVDC | +100-10% | SCE-003 |
| C3 | Paper capacitor | .02mf | 600WDVC | +40-10% | UCC-041 |
| C4 | Mica capacitor | 330mmf | 500WVDC | ±20% | UCU-1040 |
| C5 | Paper capacitor | .01mf | 600WDVC | +40-10% | UCC-040 |
| C6 | Paper capacitor | .005mf | 600WDVC | +40-10% | UCC-039 |
| C7 | Mica capacitor | 330mmf | 500WVDC | ±20% | UCU-1040 |
| C8 | Mica capacitor | 47mmf | 500WVDC | ±20% | UCU-1020 |
| C9 | Antenna Trimmer | | | | * |
| C10A | Variable condenser, ant. sect. | | | | SCT-003 |
| C10B | Variable condenser, osc. sect. | | | | SC T-003 |
| C11 | Oscillator trimmer | | | | * |
| C12 | Paper capacitor | .05mf | 600WDVC | +40-10% | UCC-045 |
| C18 | Paper capacitor | .05mf | 600WDVC | +40-10% | UCC-045 |
| C19 | Paper capacitor | .005mf | 600WDVC | +40-10% | UCC-039 |
| R1 | Carbon resistor | 18 ohm | 1w | ±20% | URE-007 |
| R2 | Carbon resistor | 150 ohm | 2w | ±20% | URF-053 |
| R3 | Carbon resistor | 150 ohm | ½w | ±20% | URD-029 |
| R4 | Carbon resistor | 470,000 ohm | ½w | ±20% | URD-113 |
| R5 | Carbon resistor | 220,000 ohm | ½w | ±20% | URD-105 |
| R6 | Carbon resistor | 10 megohm | ½w | ±20% | URD-145 |
| R7 | Volume control | .5 megohm | | | SRC-004 |
| R8 | Carbon resistor | 2.2 megohm | ½w | ±20% | URD-129 |
| R9 | Carbon resistor | 22,000 ohm | ½w | ±20% | URD-081 |
| L2 | 1st IF transformer | | | | STL-003 |
| L3 | 2nd IF transformer | | | | STL-004 |
| L4 | Oscillator coil | | | | SLC-002 |
| L5 | Antenna coil | | | | SLA-001 |
| T1 | Output transformer | | | | SOP-001 |
| S1 | Power switch, with R7 | | | | SRC-004 |
| SPKR | 4" PM speaker | | | | SOP-001 |
| | Back Cover for cabinet | | | | SAB-009 |
| | Baffle for speaker | | | | SAE-001 |
| | Socket-octal base tube socket | | | | SJS-002 |
| | Speed nuts—for fastening grill in cabinet | | | | SMC-003 |
| | Fasteners—for fastening back cover | | | | SMF-003 |

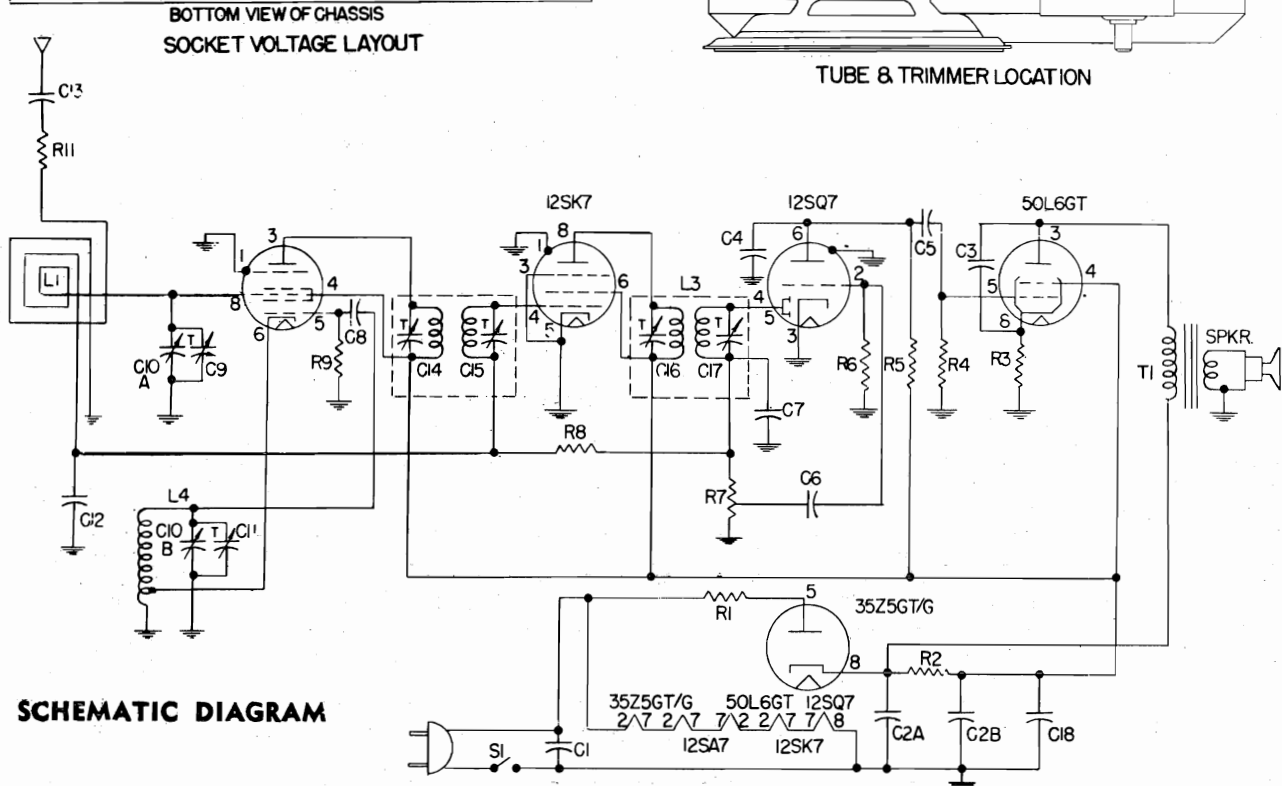
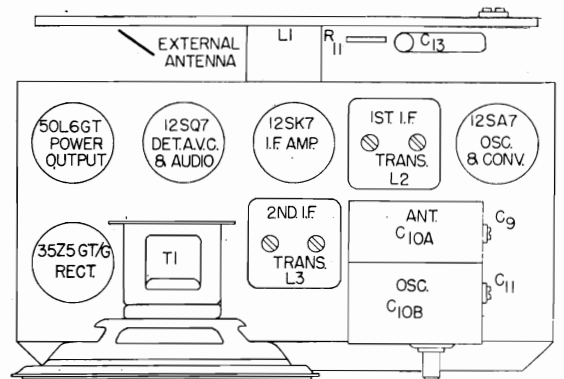
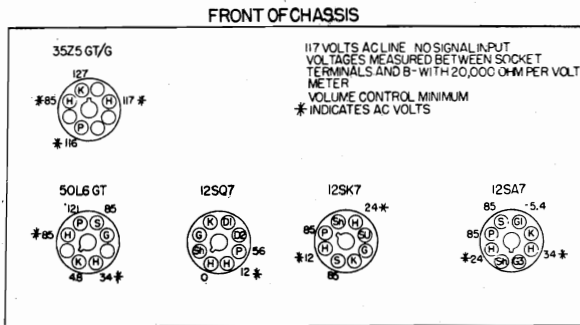
*Part of SCT-003

ALIGNMENT PROCEDURE

Allow unit to heat for a few minutes before starting alignment.
 Volume control set to maximum.
 Output meter across speaker.
 Align for maximum output.
 Keep input as low as a readable meter reading of output will permit.

Note: If signal generator is AC operated, use an isolating transformer between the power supply and the radio receiver power input. The use of an isolating capacitor is not recommended as AC through the capacitor will introduce hum and/or create the possibility of a burned out signal generator attenuator.

| FREQUENCY | SIGNAL COUPLING CAPACITOR | GENERATOR CONNECTION TO RADIO | GROUND CONNECTION | TUNING CONDENSER SETTING | ADJUST TRIMMERS FOR MAXIMUM OUTPUT (in order shown) |
|-----------|---------------------------|-------------------------------|-------------------|--------------------------|----------------------------------------------------------|
| 455 KC | 0.1 mf | Converter grid | Chassis | Wide open | 2nd IF transformer trimmer 1st IF transformer trimmer |
| 1720 KC | 200 mmf | Receiver antenna post | Chassis | Wide open | Oscillator trimmer C11 |
| 1500 KC | 200 mmf | Receiver antenna post | Chassis | Tune for maximum output | Antenna trimmer C9 |

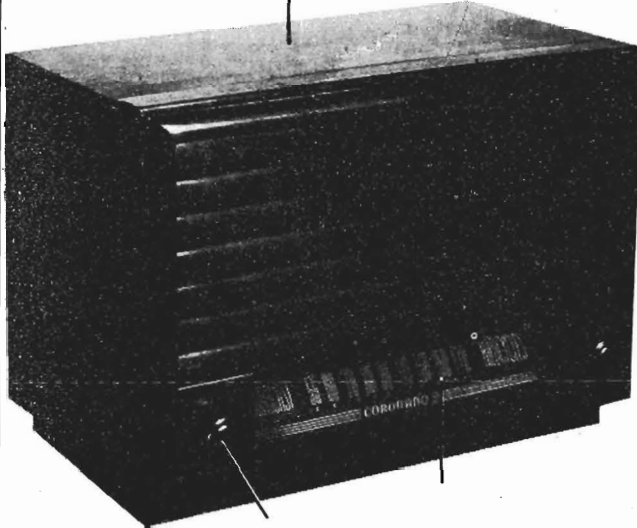


MODELS 43-8330,
43-8420

SPECIFICATIONS

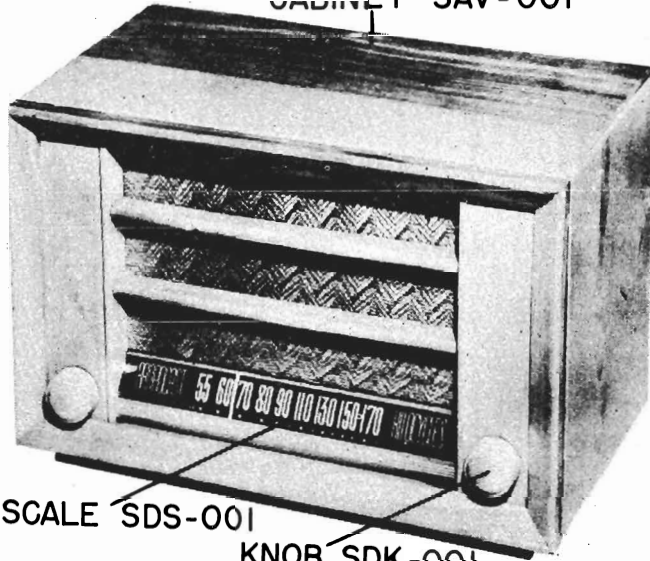
5 Tube Superheterodyne, including rectifier tube
 Speaker--5 1/4 inch "Alnico 5" Magnet Dynamic, voice coil impedance 3.5 ohms (400 cycles)
 Antenna----Self contained loop antenna, also provision for external antenna
 Power supply-----105-125 V. AC or DC
 Frequency on AC-----40 to 60 cycles
 Power Consumption-----25 watts
 Power Output-----0.8 watts undistorted, 1.5 w. minimum full power output
 Frequency range-----540 to 1720 KC
 Intermediate Frequency-----455 KC
 Antenna Sensitivity---170 uv. average for 0.5 w output
 Selectivity-----60 KC at 1000 times signal at 1000 KC

CABINET SAV-002



SCALE SDS-002
 KNOB SDK-002
43-8330

CABINET SAV-001



SCALE SDS-001
 KNOB SDK-001
43-8420

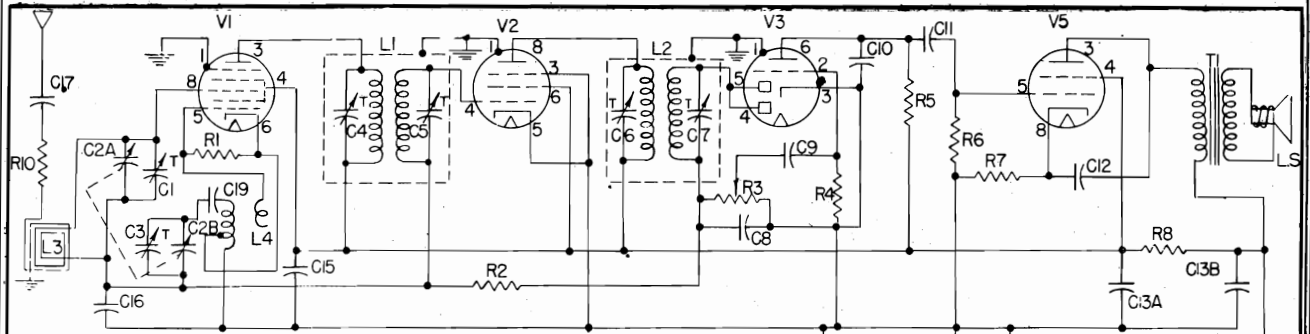
ALIGNMENT PROCEDURE

Allow unit to heat for a few minutes before starting alignment.
 Volume control set to maximum.
 Output meter across speaker.
 Align for maximum output.
 Keep input as low as readable meter reading of output will permit.

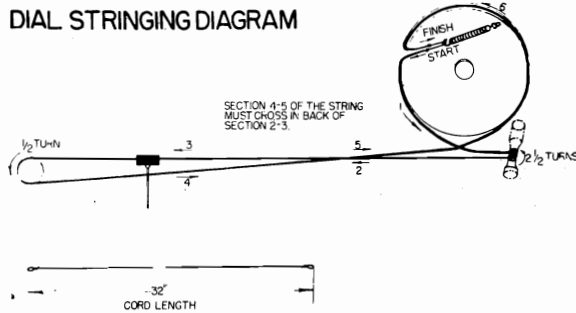
Note: If signal generator is AC operated, use an isolating transformer between the power supply and the radio receiver power input. The use of an isolating capacitor is not recommended as AC through the capacitor will introduce hum and/or create the possibility of a burned out signal generator attenuator.

| FREQUENCY | SIGNAL GENERATOR COUPLING CAPACITOR | GENERATOR CONNECTION TO RADIO | GROUND CONNECTION | TUNING CONDENSER SETTING | ADJUST TRIMMERS FOR MAXIMUM OUTPUT (in order shown) |
|-----------|-------------------------------------|-------------------------------|-------------------|--------------------------|----------------------------------------------------------|
| 455 KC | 0.1 mf | Converter grid | B- | Wide open | 2nd IF transformer trimmer 1st IF transformer trimmer |
| 1720 KC | 200 mmf | Receiver antenna post | Chassis | Wide open | Oscillator trimmer C3 |
| 1500 KC | 200 mmf | Receiver antenna post | Chassis | Tune for maximum output | Antenna trimmer C1 |

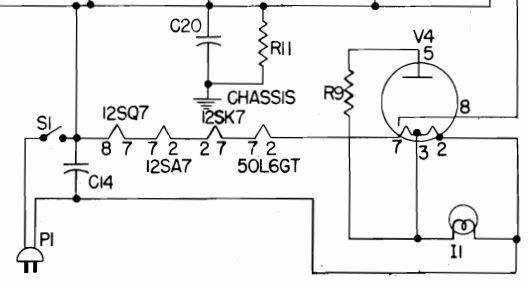
MODELS 43-8330,
43-8420



DIAL STRINGING DIAGRAM

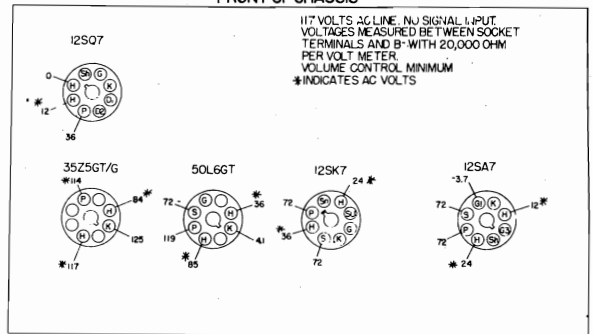


SOCKET VOLTAGE DIAGRAM

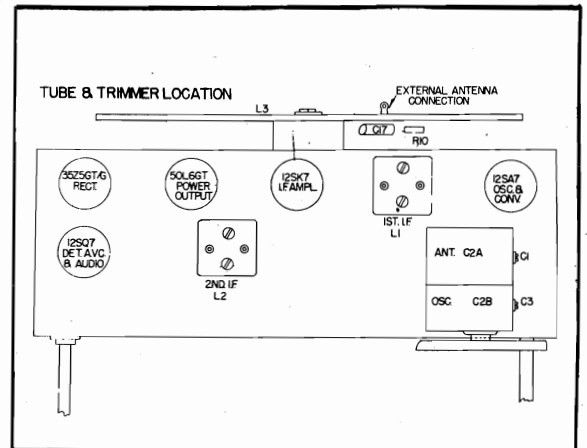


| SYMBOL | TITLE | VALUE | TOLERANCE | RATING | PART NO. |
|--------|----------------------------------|----------|-----------|--------|----------|
| C1 | Ant. Trimmer | | | | SCT-002 |
| C2A | Variable Cond. Ant. Sect. | | | | SCT-002 |
| C2B | Variable Cond. Osc. Sect. | | | | SCT-002 |
| C3 | Osc. Trimmer | | | | SCT-002 |
| C4 | Trimmer 1st I.F. | | | | STL-007 |
| C5 | Trimmer 1st I.F. | | | | STL-007 |
| C6 | Trimmer 2nd I.F. | | | | STL-008 |
| C7 | Trimmer 2nd I.F. | | | | STL-008 |
| C8 | Capacitor, Mica | 330 uuf | 20% | 500 V | UCU-040 |
| C9 | Capacitor, Paper | .005 uf | 40-15% | 500 V | UCU-039 |
| C10 | Capacitor, Mica | 330 uuf | 20% | 500 V | UCU-040 |
| C11 | Capacitor, Paper | .01 uf | 40-10% | 400 V | UCC-025 |
| C12 | Capacitor, Paper | .02 uf | 20% | 500 V | UCC-041 |
| C13A | Electrolytic Capacitor | 30 uf | | 150 V | SCE-022 |
| C13B | Electrolytic Capacitor | 30 uf | | 150 V | SCE-022 |
| C14 | Capacitor, Paper | .05 uf | 20% | 500 V | UCC-045 |
| C15 | Capacitor, Paper | .05 uf | 40-10% | 400 V | UCC-026 |
| C16 | Capacitor, Paper | .05 uf | 40-10% | 400 V | UCC-026 |
| C17 | Capacitor, Paper | .01 uf | 40-10% | 400 V | UCC-025 |
| C19 | Capacitor, Paper | .02 uf | 40-10% | 400 V | UCC-026 |
| C20 | Capacitor, Paper | .1 uf | 40-10% | 400 V | UCC-030 |
| R1 | Resistor, Carbon | 22 Kohm | 20% | 1/2 W | URD-081 |
| R2 | Resistor, Carbon | 2.2 Meg | 20% | 1/2 W | URD-129 |
| R3 | Volume Control | .5 Meg | 20% | 1/2 W | SRC-008 |
| R4 | Resistor, Carbon | 4.7 Meg | 20% | 1/2 W | URD-137 |
| R5 | Resistor, Carbon | 470 Kohm | 20% | 1/2 W | URD-113 |
| R6 | Resistor, Carbon | 470 Kohm | 20% | 1/2 W | URD-113 |
| R7 | Resistor, Carbon | 150 Ohm | | 1/2 W | URD-029 |
| R8 | Resistor, Carbon | 2700 Ohm | 10% | 2 W | URF-059 |
| R9 | Resistor, Carbon | 22 Ohm | 20% | 1/2 W | URD-009 |
| R10 | Resistor, Carbon | 470 Ohm | 20% | 1/2 W | URD-041 |
| R11 | Resistor, Carbon | 470 Kohm | 20% | 2 W | URD-113 |
| L1 | 1st I.F. Transformer | | | | STL-007 |
| L2 | 2nd I.F. Transformer | | | | STL-006 |
| L3 | Loop Assembly | | | | SLL-001 |
| L4 | Oscillator Coil | | | | SLL-001 |
| S1 | Power Switch | | | | SRC-008 |
| PI | Pilot Light, GE 51 | | | | UDL-013 |
| LS | Speaker 5-1/4 Pi | | | | UOP-528 |
| T1 | Output Transformer | | | | SFO-005 |
| V1 | 12SA7 | | | | |
| V2 | 12SK7 Metal Tube | | | | |
| V3 | 12SQ7 Metal Tube | | | | |
| V4 | 5Z5CT/G | | | | |
| V5 | 50L6GT | | | | |
| | Dial Cord | | | | SBC-001 |
| | Terminal Strip | | | | SJ2-914 |
| | Socket-Octal Base Tube Socket | | | | SJS-003 |
| | Drum Spring | | | | SHS-013 |
| | Drive Shaft & Bushing Assembly | | | | SHU-005 |
| | Cabinet Jack | | | | SA2-002 |
| | Tee Pins | | | | SHF-003 |
| | Cabinet Used on Model 43-8420 | | | | SAV-001 |
| | Knob Used on Model 43-8420 | | | | SDX-001 |
| | Dial Scale Used on Model 43-8420 | | | | SDS-001 |
| | Cabinet Used on Model 43-8330 | | | | SAV-002 |
| | Knob Used on Model 43-8330 | | | | SDK-002 |
| | Dial Scale Used on Model 43-8330 | | | | SDS-002 |
| | Tuning Condenser | | | | SCT-002 |
| | Dial Pointer | | | | SEP-001 |
| | Output Terminals | | | | SJP-002 |
| | Pilot Light Assembly | | | | SJP-001 |
| | Idler Pulley | | | | SMW-001 |
| | Power Cord | | | | SWL-001 |

FRONT OF CHASSIS



BOTTOM VIEW OF CHASSIS

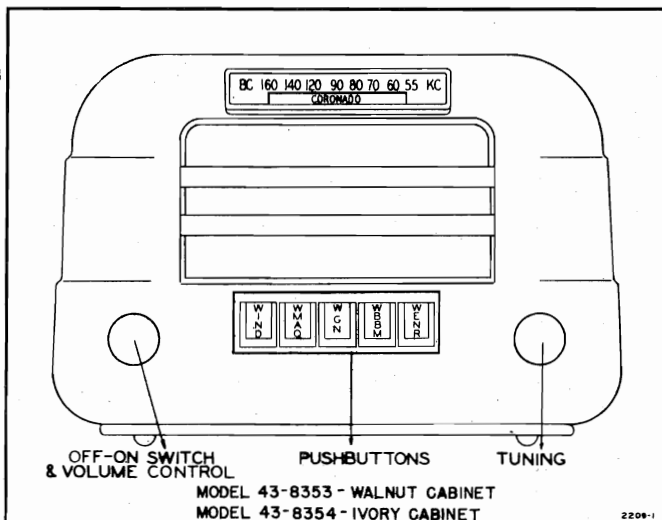
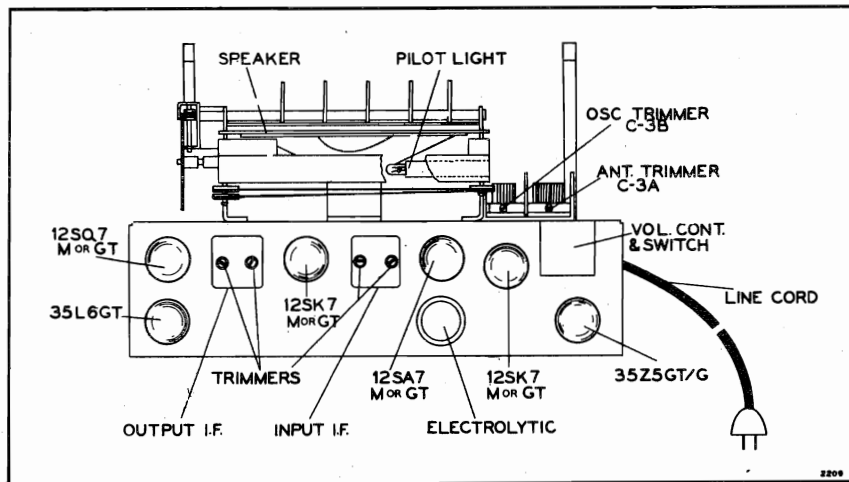


MODELS 43-8353,
43-8354

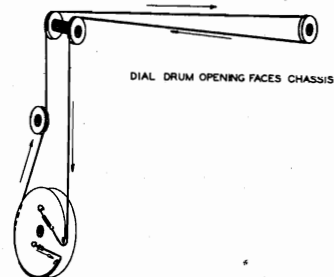
SPECIFICATIONS

| | |
|---------------------------------------------|----------------------------------------------------|
| 6 tube superheterodyne, including rectifier | |
| Intermediate Frequency | 455KC |
| Power Output | .65W. undistorted |
| Frequency Range | 530 to 1650 KC |
| Tuning | two-gang capacitor |
| Power Supply | 105-125 Volts ac/dc |
| Power Consumption | 35W |
| Speaker | 4" by 6" oval P.M. Voice Coil 3.2 ohms |
| Antenna | Built-in loop, also provision for external antenna |

CHASSIS VIEW

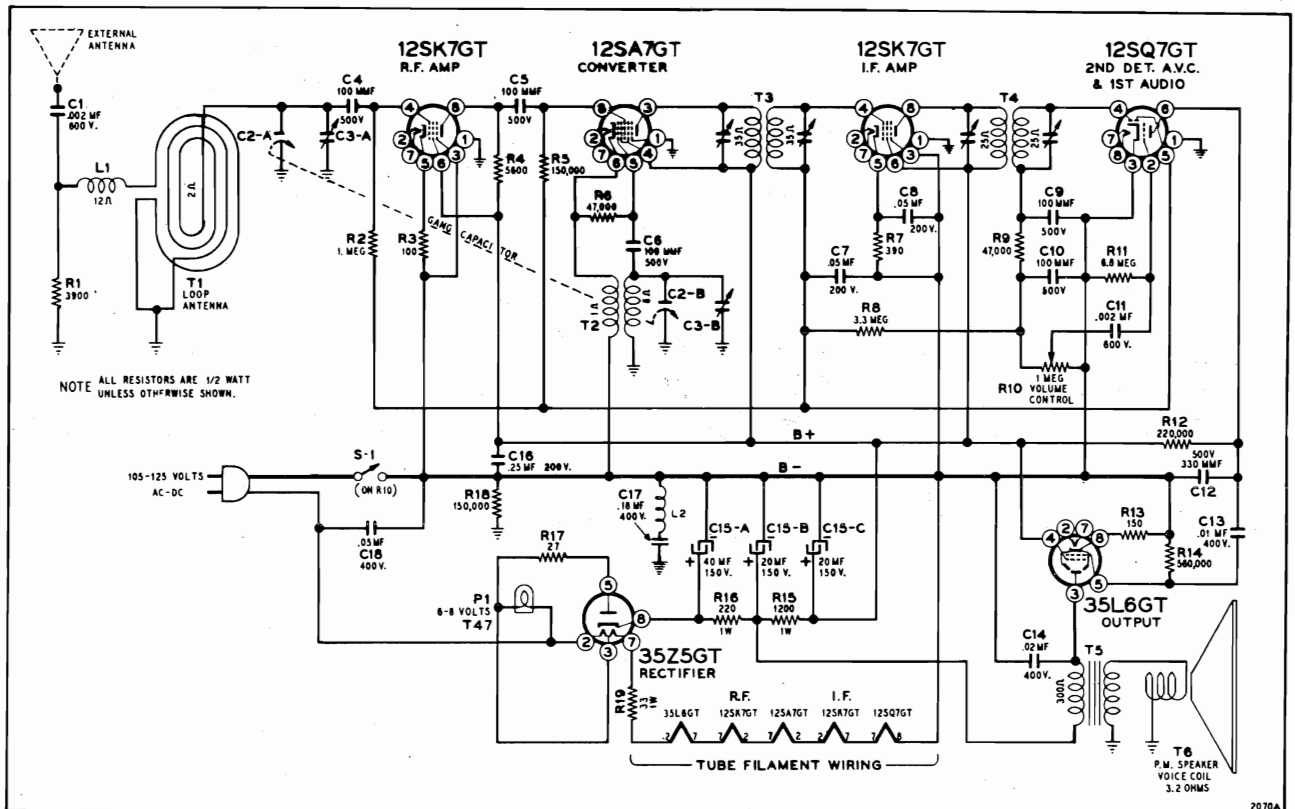


DRIVE CORD REPLACEMENT



MODELS 43-8353,
43-8354

SCHEMATIC DIAGRAM



X-1045 GAMBLES 43-8353,54

ALIGNMENT PROCEDURE

(Refer to Chassis View)

- Output meter across 3.2-ohm output load.
- Volume control at maximum.
- Connect ground post of signal generator to B— of radio.
- Align for maximum output. Reduce input as needed to keep output near 0.4 volts.

| SIGNAL GENERATOR | | | TUNER SETTING | ADJUST FOR MAXIMUM OUTPUT (in order shown) |
|------------------|---------------|-----------------------------------|--------------------------------------|--------------------------------------------|
| Frequency | Dummy Antenna | Connection to Radio | | |
| 455 kc | 0.1 mf | Stator of antenna section of gang | Rotor full open (plates out of mesh) | Trimmers on output and input I.F. cans |
| 1650 kc | 0.1 mf | Stator of antenna section of gang | Rotor full open (plates out of mesh) | Oscillator trimmer C3B |
| 1400 kc | 200 mmf | External antenna clip | 1400 kc | Antenna trimmer C3A |

MODELS 4A-1B,
4A-2B

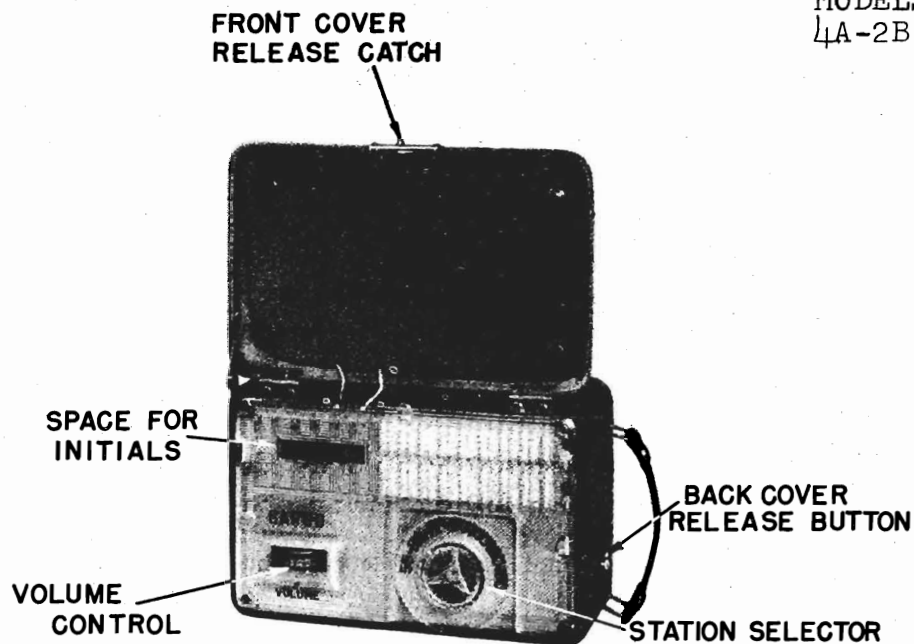


FIG.1 RECEIVER IN OPERATING POSITION

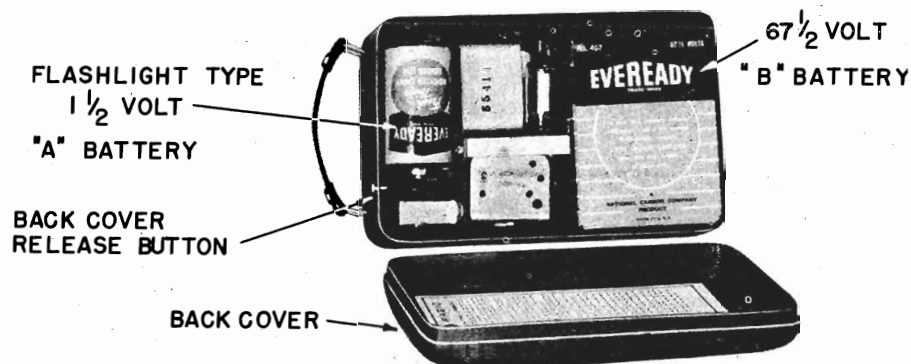


FIG 2 REAR VIEW - BACK COVER REMOVED SHOWING
LOCATION OF BATTERIES

BATTERY REQUIREMENTS: The following batteries are required:

| QUANTITY | TYPE | MANUFACTURER |
|----------|-----------------|---------------------------------------------------------------------|
| 1 | 1 1/2 volt "A" | Eveready size "D", Burgess No. 2, Ray-C Vac size "D" or equivalent. |
| 1 | 67 1/2 volt "B" | Eveready #467, Burgess Type XXD, Ray O-Vac Type 4367 or equivalent. |

TUNING RANGE: Broadcast 540 to 1650 Kilocycles (180 to 555 meters).

DIAL SCALE: The dial scale is calibrated in kilocycles. Example: Read "60" as 600 Kc.

TUBES: The tubes used and their functions are as follows:

| | |
|--------------------|----------------------------------|
| 1R5 Converter | 1S5 Detector, AVC and Audio Amp. |
| 1T4 I.F. Amplifier | 3S4 Power Amplifier |

MODELS 4A-1B,
4A-2B

INSTALLATION: The Model 4A is a complete personal receiver for broadcast reception, after battery installation. The complete receiver is housed in a small attractive case with a self-contained loop antenna concealed in the recessed portion of the hinged plastic front cover. A plastic handle located at one end of the case is provided for ease in carrying. The receiver is automatically turned on when the hinged front cover is opened, and in addition is instantaneous in its operation. Space is provided on the plastic front panel for inserting your initials if desired. The following procedure should be followed for the installation of the "A" and "B" batteries (see Fig. 2).

- (a) Remove the back cover by depressing the back cover release button adjacent to the handle while sliding the back upward and out.

CAUTION: In removing the back cover, raise the lock end of the back cover only enough to clear the case edge before sliding the cover toward the strap handle to release the opposite end from the two protruding bottom case tabs that hold it down. Failure to observe this precaution may result in breaking out the two bottom holes from the cover.

- (b) Insert the 1½ volt "A" battery into the spring holder with the protruding center contact at the top of the "A" battery always facing the position shown on the diagram rear of back cover or Fig. 2, opposite page. Do not insert the "A" battery in the opposite position in the spring holder.

- (c) Connect the "B" battery contact strip fitted with snap fasteners to the corresponding contacts on the "B" battery.

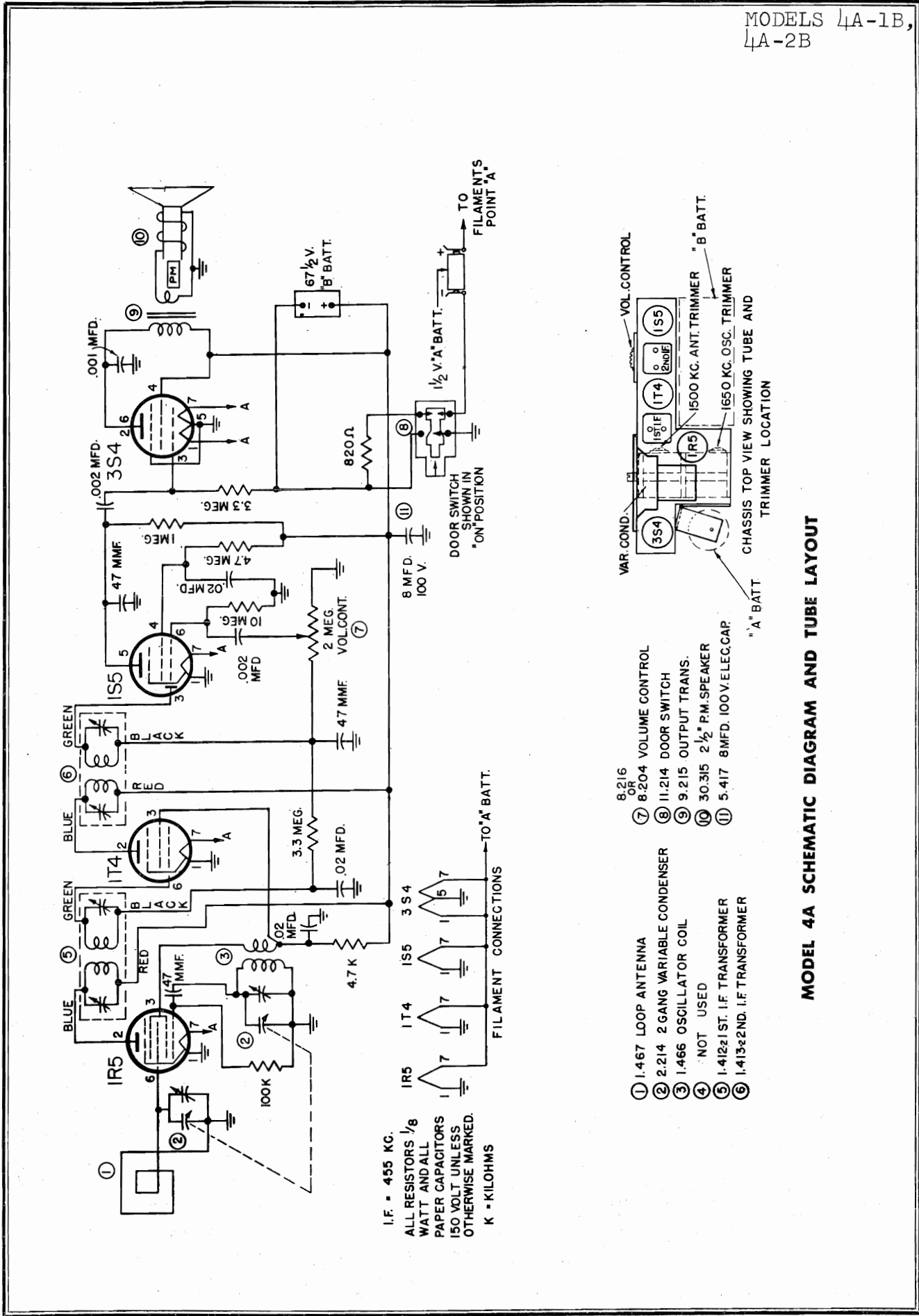
- (d) Insert the "B" battery into the compartment provided as shown on the diagram rear of back cover or Fig. 2, opposite page.

- (e) Replace back cover by inserting the two holes at the bottom edge of the back cover into the two protruding case tabs at the rear edge of the case and slide forward while depressing the back cover release button. The receiver is now ready for operation.

ALIGNMENT: (Receiver removed from cabinet.) Should it become necessary at any time to check the alignment of this receiver, proceed as follows:

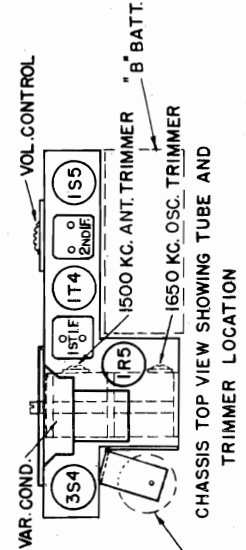
- (1) Set the signal generator to 455 KC and connect to the stator lug (rear section) of variable capacitor. Extend the loop leads and solder to the original points. Connect the signal generator ground lead to the chassis. Connect a suitable output meter across the speaker voice coil connections. Turn the volume control to the maximum position. Turn the variable capacitor to the extreme clockwise position (minimum capacity).
- (2) Adjust the trimmers located at the top of the first and second I.F. Transformers for maximum output, as indicated on the output meter.
- (3) Loosely couple the signal generator lead to the loop and set to 1650 KC.
- (4) With the variable capacitor set at minimum capacity, tune in the 1650 KC signal by means of the oscillator trimmer on the variable capacitor (rear section).
- (5) Set the signal generator to 1500 KC and turn the tuning control until this frequency is heard. Adjust the antenna trimmer on the variable capacitor (front section) for maximum output.
- (6) Install the chassis into the cabinet and re-adjust the antenna trimmer at 1500 KC. No other adjustments are necessary.

MODELS 4A-1B,
4A-2B



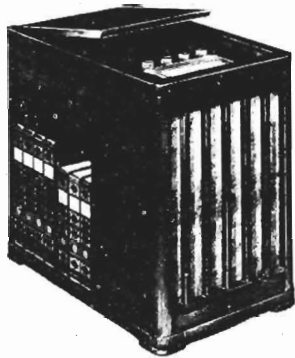
I.F. - 455 KG.
ALL RESISTORS 1/8
WATT AND ALL
PAPER CAPACITORS
150 VOLT UNLESS
OTHERWISE MARKED.
K - KILOHMS

- ① 1.467 LOOP ANTENNA
- ② 2.214 2 GANG VARIABLE CONDENSER
- ③ 3.466 OSCILLATOR COIL
- ④ NOT USED
- ⑤ 1.412&1ST. I.F. TRANSFORMER
- ⑥ 1.413&2ND. I.F. TRANSFORMER
- 8.216 OR 8.204 VOLUME CONTROL
- ⑦ 11.214 DOOR SWITCH
- ⑧ 9.215 OUTPUT TRANS.
- ⑨ 30.315 2 1/2" P.M. SPEAKER
- ⑩ 5.417 8MFD. 100V. ELECCAP.



MODEL 4A SCHEMATIC DIAGRAM AND TUBE LAYOUT

MODEL 6DCP-2,
The Chairside



CONTROLS:

A description of the four controls from left to right on the front panel is given below:

(A) On-Off Switch and Volume Control: This control combines the line On-Off Switch and Volume Control.

(B) Tone Control: When turned to the right (clockwise), a deep bass effect is produced, while rotation to the left (counter-clockwise) produces a more brilliant tone. Various shadings between the extremes may be obtained at intermediate settings of the control.

(C) Band Selector Switch: This three-position control selects the frequency band to be used, and also connects the "Phono" pickup into the circuit for use of the record changer. The extreme left hand position is the "Broadcast" band, the middle position the "Short Wave" band, and the extreme right hand position is the "Phono" position.

(D) Tuning Control: This control is coupled to the tuning capacitor through a reduction drive and serves to select the desired broadcast or short wave station along the slide-rule dial, the frequency of which is indicated by the dial pointer.

LINE VOLTAGE: This receiver is designed for operation on 105-125 Volts, 60 Cycles, Alternating Current (AC) only.

POWER CONSUMPTION INCLUDING RECORD CHANGER: 85 Watts.

TUNING RANGE: Broadcast: 540 to 1650 Kilocycles (180 to 555 Meters)
Short Wave: 5.7 to 18.5 Megacycles (16 to 53 Meters)

DIAL: The dial scale is calibrated in Kilocycles times 10 for the Broadcast Band, and in Megacycles for the Short Wave Band, corresponding with newspaper or periodical listings.

TUBES: The tubes used, and their functions, are as follows:

- 6SG7 R. F. Amplifier
- 6SA7 Converter
- 6SK7 I. F. Amplifier
- 6SQ7 Detector, Avc and Audio Amplifier
- 6V6 Beam Power Amplifier
- 5Y3GT Rectifier

ALIGNMENT:

Realignment of this receiver should not be attempted unless all other possible causes have been thoroughly investigated. An accurately calibrated signal generator, which will cover the necessary bands, and an output meter for indicating the effect of adjustments are required.

During the alignment procedure, all adjustments should be made under the following conditions (refer to Trimmer and Tube Location Diagram below for trimmer location):

- (a) Line voltage as indicated on instruction sheet.
- (b) Volume Control at maximum position.
- (c) Tone Control at extreme left position (brilliant).
- (d) Minimum input from signal generator. This procedure should be adhered to, otherwise adjustments will be broad, due to the action of the automatic volume control.

BROADCAST (Band Switch in extreme left position)

I. F. Adjustment:

(1) Set the signal generator to 455 KC and connect to the lower side of the Loop Antenna Trimmer through a .1 MFD capacitor. Connect the signal generator ground lead to the chassis. Connect a suitable output meter across the speaker voice coil connections. Turn the Variable Capacitor to the extreme clockwise position (minimum capacity).

(2) Adjust the trimmers located at the top of the first and second I. F. Transformers for maximum output as indicated on the output meter.

BC. R. F. Adjustment: It is desirable to align this band on the loop.

(1) Couple the signal generator to the receiver loop by means of a two or three turn loop.

(2) With the Variable Capacitor set at the extreme clockwise position (minimum capacity), tune in the 1650 KC signal by means of the broadcast oscillator trimmer (C2).

(3) Set the signal generator to 1500 KC and turn the Tuning Control so that this frequency is indicated on the dial. Adjust the Antenna Trimmer (C1) on the loop for maximum output.

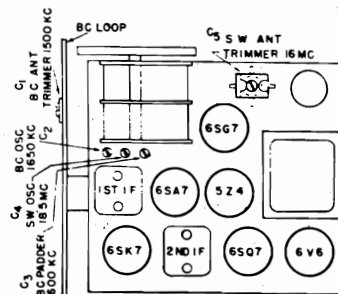
(4) Set the signal generator to 600 KC and turn the Tuning Control so that this frequency is indicated on the dial. Adjust the broadcast oscillator padder capacitor (C3) for maximum response while "rocking" the Variable Capacitor. Recheck the 1500 KC high frequency adjustment trimmer (C2).

SHORT WAVE (Band Switch in the middle position)

(1) Connect the signal generator through a standard short wave dummy antenna to the antenna (green wire) and the ground lead to the chassis of the receiver. Set the signal generator to 18.5 MC.

(2) With the Variable Capacitor set at the extreme clockwise position (minimum capacity), tune in the 18.5 MC signal by means of the S. W. oscillator trimmer (C4).

(3) Set the signal generator to 16 MC and turn the tuning control so that this frequency is indicated on the dial. Adjust the Antenna Trimmer (C5) on the short wave coil for maximum output while rocking the Variable Capacitor from left to right for maximum output. No other adjustments are necessary.



TRIMMER AND TUBE LOCATION DIAGRAM

NOTE: The receiver chassis is assembled to a shelf and may be removed for servicing purposes by removing the knobs and four screws. Two screws and washers are located on the inside panel of the record changer compartment. The two other screws and washers are located on the same panel below the changer compartment. Reverse the above procedure for installation to cabinet and reconnect changer cables to chassis sockets.

MODELS 414, 415,
416, 430,

SPECIFICATIONS

CABINET:

| MODEL | MATERIAL | COLOR |
|-------|----------|----------|
| 414 | Plastic | Mahogany |
| 415 | Plastic | Ivory |
| 416 | Plastic | Maroon |
| 430 | Wood | Mahogany |

ELECTRICAL RATING: Voltage..105-125, 50-60 cycles or DC
Watts..... 26

OPERATING FREQUENCIES: Standard Wave Band..... 540-1600 KC
I-F Amplifier..... 455 KC

POWER OUTPUT: Undistorted..... 1 watt
Maximum..... 1.75 watts

LOUDSPEAKER: Type..... Alnico PM
Outside Cone Diameter..... 4 inches
Voice Coil Impedance @ 400 cycles..... 3.2 ohms

TUBE COMPLEMENT: V1 Oscillator-Converter..... 12SA7
V2 I-F Amplifier..... 12BA6
V3 Detector-Audio..... 12SQ7
V4 Rectifier..... 35W4
V5 Audio Power Amplifier.... 50C5
I1 Dial Light..... GE Mazda No. 47

ELECTRICAL CIRCUIT ALIGNMENT

EQUIPMENT REQUIRED

1. Test oscillator, tone amplitude-modulated.
2. A-C output meter, 1 1/2 volts full scale.
3. .05 mfd., paper capacitor.
4. Insulated screwdriver.
5. Coupling loop for test oscillator (see text).
6. Isolation power transformer.

ALIGNMENT PROCEDURE

The alignment steps are given in the table form of the Alignment Chart. Adjustment points are shown in the illustration of Fig. 1.

1. The chassis is removed from the cabinet with the antenna loop and back attached and the speaker leads reconnected.
2. An isolation transformer should be used for the receiver power source when aligning or servicing AC-DC receivers, to prevent short circuiting of equipment and shock hazard.
3. The output meter is connected across the terminals of the loudspeaker voice coil.
4. The receiver volume control should be turned to maximum and test oscillator signal output attenuated during alignment to develop not more than 1 1/4 volts output meter reading at the loudspeaker.
5. For i-f alignment, the high side of the signal generator output cable should be connected through a .05 mfd. paper capacitor to the points indicated in the Alignment Chart. The low side of the output cable is connected to the receiver B-Bus.
6. To align the oscillator and r-f trimmers, the signal generator output is inductively coupled to the radio loop, L1, by connecting a four-turn, six-inch diameter loop of bell wire across the generator's output terminals and then locating the loop about one foot from the radio loop antenna.

To prevent possible errors in comparative readings, the position of signal generator loop with respect to the radio loop antenna should not be changed during measurement.

7. Relocate dial pointer on tuning shaft at 1500 KC on the dial to correspond to the tuning capacitor setting in Step 5.

ALIGNMENT CHART

| Step | Connect Test Oscillator to | Test Osc. Setting | Radio Dial Setting | Adjust for Maximum |
|---------------|-------------------------------------------------|-------------------|---------------------------|----------------------------------------------|
| I-F ALIGNMENT | | | | |
| 1 | V2, 12BA6 grid (Pin 1), in series with .05 mfd. | 455 KC | ..... | Cores of second i-f transformer T3 |
| 2 | V1, 12SA7 grid (Pin 8), in series with .05 mfd. | 455 KC | ..... | Cores of first i-f transformer T2 |
| 3 | V1, 12SA7 grid (Pin 8), in series with .05 mfd. | 455 KC | ..... | Recheck adjustment of T1 and T2, for maximum |
| R-F ALIGNMENT | | | | |
| 4 | Inductively coupled to radio loop | 1620 KC | Minimum capacity C2A, C2B | C3, oscillator trimmer |
| 5 | Inductively coupled to radio loop | 1500 KC | For Maximum | C1, r-f trimmer |
| 6 | Set pointer to 150. See Note 7. | | | |

STAGE GAINS AND VOLTAGE CHECKS

Stage gain measurements by vacuum tube voltmeter or similar measuring device may be used to check circuit performance and isolate trouble. The gain values listed may have tolerances of 20 per cent. Readings are taken with low signal input so that AVC is not effective.

1. I-F GAIN
12SA7 Grid to 12BA6 Grid 50 @ 455 KC
12BA6 Grid to 12SQ7 Diode Plate 100 @ 455 KC
2. AUDIO GAIN
Input of 0.15 volts at 400 cycles across volume control (R4) with control set at maximum will develop approximately 1/2 watt output across the speaker voice coil terminals.
3. OSCILLATOR GRID BIAS
D-C voltage developed across the oscillator grid leak (R1) averages 7.5 volts at 1000 kc dial setting (no signal).
4. TUBE SOCKET PIN VOLTAGES
The schematic diagram of Fig. 3 shows voltages from tube pins' to B-. Voltage readings differing greatly from those specified may help localize defective components

MODELS 414,
415, 416, 430

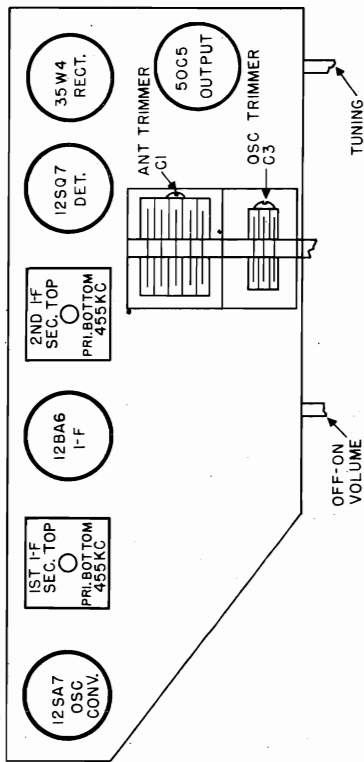
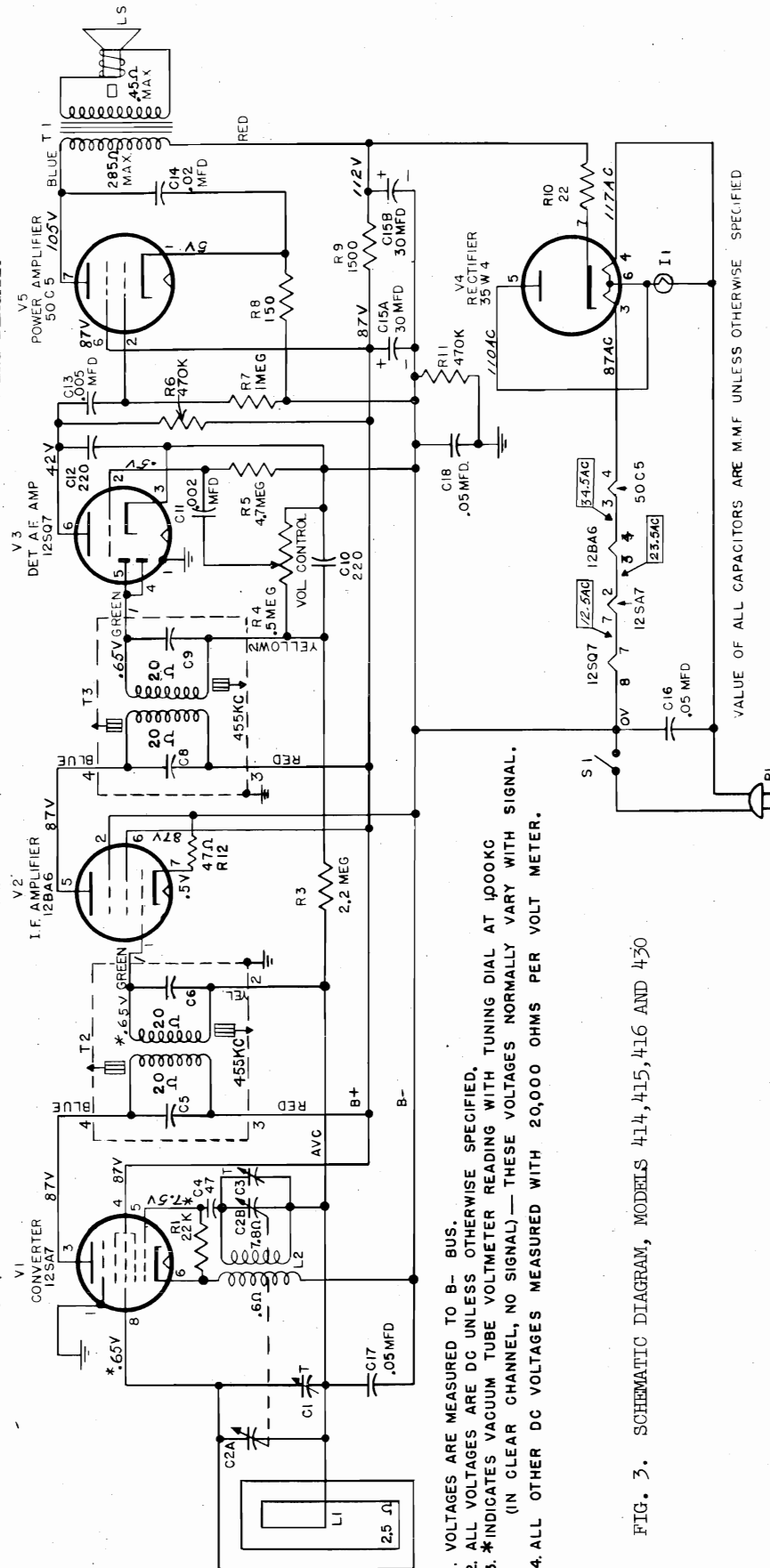


FIG. 1. LOCATION OF TUBES AND ADJUSTMENTS

FIG. 2. DIAL CORDING DIAGRAM



1. VOLTAGES ARE MEASURED TO B- BUS.
2. ALL VOLTAGES ARE DC UNLESS OTHERWISE SPECIFIED.
3. *INDICATES VACUUM TUBE VOLTMETER READING WITH TUNING DIAL AT 1000KC (IN CLEAR CHANNEL, NO SIGNAL)— THESE VOLTAGES NORMALLY VARY WITH SIGNAL.
4. ALL OTHER DC VOLTAGES MEASURED WITH 20,000 OHMS PER VOLT METER.

FIG. 3. SCHEMATIC DIAGRAM, MODELS 414, 415, 416 AND 430

MODELS 414,
415, 416, 430

REPLACEMENT PARTS LIST
MODELS 414, 415, 416 and 430

| Cat. No. | Symbol | Description | Cat. No. | Symbol | Description |
|--------------------------|---------------------------|-----------------------------------------------------------------------------------------------|-----------------------------------|--------|--------------------------------------------------------------------------------------------------------|
| CAPACITORS | | | MISCELLANEOUS MECHANICAL (cont'd) | | |
| *RCE-127 | C15A,B | 30 mf., 150 v.; 30 mf. 150 v., electrolytic | *RHC-034 | | CLIP - For mounting I-F can assembly to chassis |
| RCT-058 | C2A,B, C1,C3 | Tuning capacitor with trimmers | RHG-006 | | GROMMET - For 110 v. line cord, in back apron of chassis |
| *RCW-3025 | C10,11, 12,13 | 220 mmf., .002 mf., 220 mmf., .005 mf., 450 v., ceramic | *RHG-018 | | GROMMET - Rubber, for mounting tuning capacitor |
| *UCU-020 | C4 | 47 mmf., ceramic | *RHH-004 | | FASTENER - Snap fastener for Models 414, 415, or 416, holds cabinet back to cabinet |
| *UCC-041 | C14 | .02 mf., 600 v., paper | | | SPACER - Metal, in grommet mounting tuning capacitor |
| *UCC-045 | C16,17, 18 | .05 mf., 600 v., paper | *RHJ-007 | | SCREW - #4 x 1/4 in. stove head shake-proof type #25, mounts speaker in Models 414, 415 or 416 cabinet |
| RESISTORS (carbon) | | | RHS-004 | | CLIP - Female speaker connector on audio output leads |
| *URD-009 | R10 | 22 ohms, 1/2 w. | *RJC-004 | | CLIP - Osc. coil mounting clip, United carr #521D7 |
| *URD-017 | R12 | 47 ohms, 1/2 w. | *RMC-002 | | SPRING - Dial cord tension spring |
| *URD-029 | R8 | 150 ohms, 1/2 w. | RMS-118 | | CLIP - Metal clip used on plastic dial |
| *URD-081 | R1 | 22,000 ohms, 1/2 w. | RMS-214 | | SHAFT - Tuning shaft and bushing assembly |
| *URD-113 | R6,11 | 470,000 ohms, 1/2 w. | RMX-195 | | |
| *URD-121 | R7 | 1 meg., 1/2 w. | | | |
| *URD-129 | R3 | 2.2 meg., 1/2 w. | | | |
| *URD-137 | R5 | 4.7 meg., 1/2 w. | | | |
| *URF-053 | R9 | 1500 ohms, 2 w. | | | |
| POTENTIOMETER | | | | | |
| RRC-172 | R4,S1 | 500,000 ohms, composition, volume control and ON-OFF switch | | | |
| COILS AND TRANSFORMERS | | | | | |
| *RLC-090 | L2 | COIL - Oscillator coil for V1 | | | |
| *RTL-133 | T2,C5, C6,T3, C8,C9 | TRANSFORMER - 1st or 2nd i-f, with tuning cores (capacitors are part of molded base assembly) | | | |
| *RTO-069 | T1 | TRANSFORMER - Audio output | | | |
| MISCELLANEOUS ELECTRICAL | | | | | |
| *RJS-003 | | SOCKET - 8-pin wafer, 1 3/8 in. hole mount spacing, for 12SA7 or 12SQ7 | RAB-172 | L1 | CABINET BACK - Antenna loop on cabinet back cover. |
| RJS-092 | | SOCKET - 7-pin wafer 1 1/4 in. hole mount spacing for 35W4 or 50C5 tubes | *RAG-033 | | GRILLE CLOTH - Maroon, behind speaker grille, in Model 414 or 416 cabinet |
| *RJS-141 | | SOCKET - 8-pin wafer 1 3/8 in. hole mount spacing for 12BA6 tube | *RAG-034 | | GRILLE CLOTH - Ivory, behind speaker grille on Model 415 cabinet |
| RWL-009 | P1 | POWER CORD - A-C power cord and plug (brown) for Models 414, 416, 430 | RAU-350 | | CABINET - Plastic, Ivory, for Model 415 |
| *RWL-016 | P1 | POWER CORD - A-C power cord & plug (white) for Model 415 | RAU-351 | | CABINET - Plastic, Maroon, for Model 416 |
| *RWX-040 | | SOCKET - Dial light socket with leads | RAU-352 | | CABINET - Plastic, Mahogany, for Model 414 |
| *S403D7 | LS1 | LOUDSPEAKER - 4 inch PM | RAV-177 | | CABINET - Wood, Mahogany for Model 430 |
| MISCELLANEOUS MECHANICAL | | | *RDK-003 | | KNOB - Plastic, two tone fawn and gold leaf finish, volume or tuning for Model 430 |
| RDC-032 | | CORD - Dial cord, bulk quantity 25 yds. | RDK-260 | | KNOB - Plastic, fawn color, volume or tuning for Model 414, 415 or 416 |
| RDP-063 | | DIAL POINTER - Plastic pointer may be furnished in lieu of brass | RDW-052 | | DIAL WINDOW - Formed plastic with mounting tabs for Models 414, 415 or 416 |
| RDS-109 | | DIAL SCALE - Plastic dial plate, gold finish, translucent numerals | RDW-053 | | DIAL WINDOW - 6 9/32" x 3 3/4" glass for Model 430 |
| *RHC-024 | | CLIP - 7/8 inch, mounts C15A, B | *RHF-008 | | FOOT - Cabinet foot rest, 1/2 inch, metal and felt composition, for Model 430 |

*Parts used on previous receivers

MODELS 422, 423

SPECIFICATIONS

| | | | |
|------------------------|------------------------------------------------------------------------------------------------------------------|----------------------|-----------------|
| CABINET: | Model 422.....Mahogany plastic Model 423.....Ivory plastic | | |
| POWER SUPPLY: | Voltage.....105-120 volts a-c or d-c Frequency.....50 or 60 cycles Wattage.....30 watts | | |
| OPERATING FREQUENCIES: | Broadcast Band.....540-1600 KC I.F. Amplifier.....455 KC | | |
| POWER OUTPUT: | Undistorted.....1 watt Maximum.....1.75 watts | | |
| LOUDSPEAKER: | Type.....Alnico 5 PM Outside cone Diameter... 5 1/4 inches Voice coil impedance at 400 cycles.....3.2 ohms | | |
| TUBE COMPLEMENT: | SYMBOL | PURPOSE | TYPE |
| | V1 | RF Amplifier | 12SK7 |
| | V2 | Oscillator Converter | 12SA7 |
| | V3 | IF Amplifier | 12BA6 |
| | V4 | Detector-Audio Ampl. | 12SQ7 |
| | V5 | Rectifier | 35Z5 |
| | V6 | Audio Power Ampl. | 35L6GT |
| | I1 | Pilot Lamp | GE Mazda No. 47 |

GENERAL INFORMATION

The Models 422 or 423 is a five-tube (plus rectifier tube) a-c or d-c superheterodyne AM standard broadcast receiver equipped with an efficient built-in antenna loop and incorporating automatic volume control, a permanent magnet speaker, and beam power output.

CAUTION: USE ISOLATION TRANSFORMER TO ISOLATE THE RECEIVER FROM THE POWER LINE.

ELECTRICAL CIRCUIT ALIGNMENT

Equipment required:

1. Test oscillator with tone modulation.
2. AC voltmeter, 1 1/2 volts full scale.
3. Paper capacitor, 0.05 mf.
4. Insulated screwdriver.
5. Coupling loop for test oscillator (see text).
6. Isolation transformer.

Alignment Procedure:

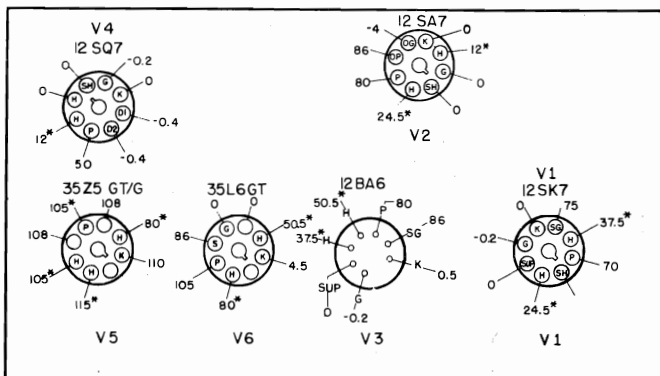
The alignment steps are given in table form of Alignment Chart. Adjustment trimmers are shown in the illustration of Fig. 3.

1. The chassis is removed from the cabinet with the antenna loop and back attached and the speaker leads reconnected.
2. An isolation transformer should be used for the receiver power source when aligning or servicing AC-DC receivers to prevent short circuiting of equipment and shock hazard.
3. The output meter is connected across the terminals of the loudspeaker voice coil.
4. The receiver volume control should be turned to maximum and test oscillator signal output attenuated during alignment to develop not more than 1 1/4 volts output meter reading at the loudspeaker.
5. For i-f alignment, the high side of the signal generator output cable should be connected through a .05 mfd. paper capacitor to the points indicated in the Alignment Chart. The low side of the output cable is connected to the receiver chassis.
6. To align the oscillator and r-f trimmers, the signal generator output is inductively coupled to the radio loop, L1, by connecting a four-turn, six-inch diameter loop of bell wire across its output terminals and then locating the loop about one foot from the radio loop antenna. To prevent possible errors in comparative peak readings, the position of signal generator loop with respect to the radio loop antenna should not be changed during measurement.

ALIGNMENT CHART

| Step | Connect Test Oscillator to: | Test Osc. Setting | Radio Dial Setting | Adjust Trimmers for Maximum |
|---------------|-------------------------------------------------|-------------------|--------------------------|---------------------------------------------------|
| I-F ALIGNMENT | | | | |
| 1 | V3, 12BA6 grid (Pin 1), in series with 0.5 mfd. | 455 KC | ..... | C9 and C8 of second i-f transformer T3. |
| 2 | V2, 12SA7 grid (Pin 8) in series with .05 mfd. |  | ..... | C7 and C6 of first i-f transformer, T2. |
| 3 |  |  | ..... | Recheck adjustment of C9, C8, C7, C6, for maximum |
| R-F ALIGNMENT | | | | |
| 4 | Inductively coupled to radio loop. | 1620 KC | Minimum capacity C1A,C1B | C3, oscillator trimmer |
| 5 | | 1500 KC | Tune for Maximum | C1, r-f trimmer C2, ant. trimmer |

FRONT OF CHASSIS



117 VOLTS AC LINE, NO SIGNAL INPUT.
VOLTAGES MEASURED BETWEEN SOCKET TERMINALS AND B WITH 20,000 OHMS PER VOLT METER. VOLUME CONTROL MINIMUM
* INDICATES AC VOLTS.

BOTTOM VIEW OF CHASSIS

FIG. 2. SOCKET VOLTAGE DIAGRAM

S-422

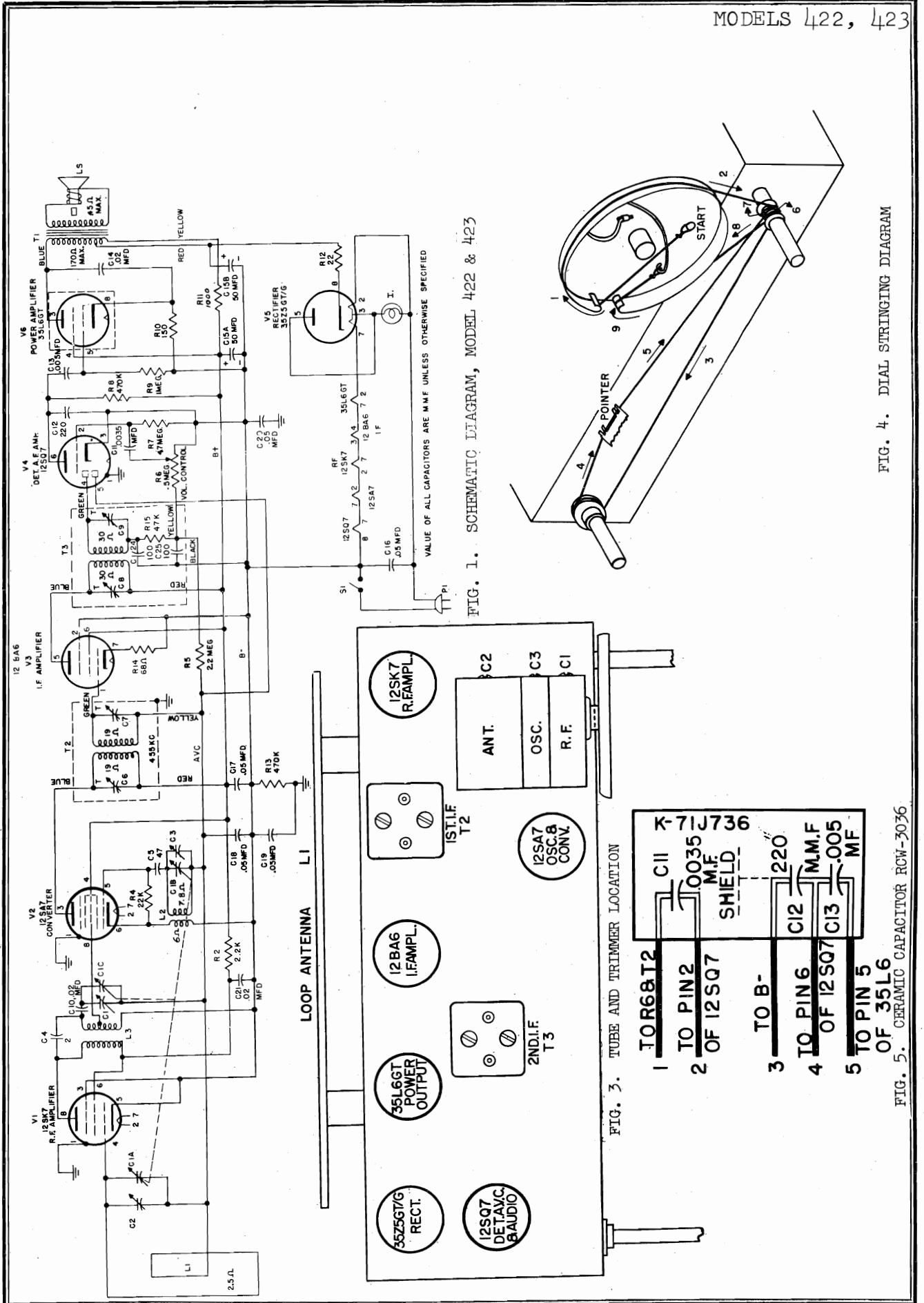


FIG. 1. SCHEMATIC DIAGRAM, MODEL 422 & 423

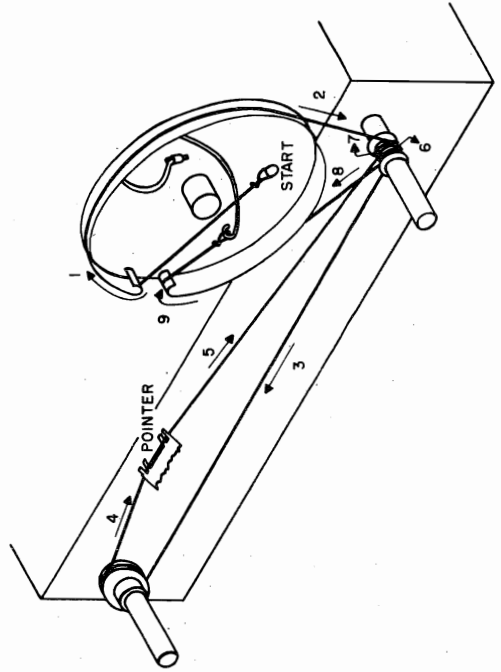


FIG. 4. DIAL STRINGING DIAGRAM

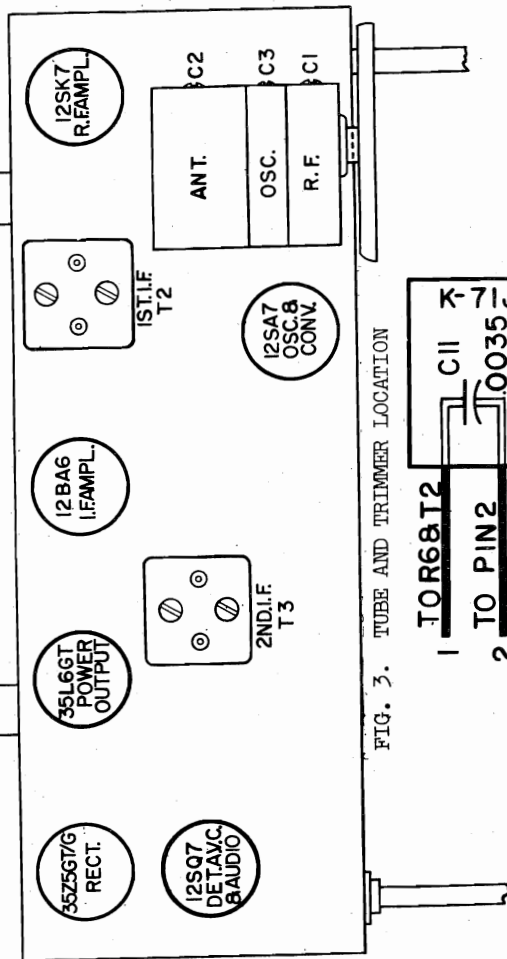


FIG. 3. TUBE AND TRIMMER LOCATION

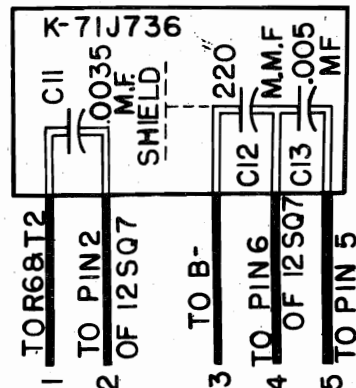


FIG. 5. CERAMIC CAPACITOR RCW-3036

PAGE 22-6 GENERAL ELECTRIC

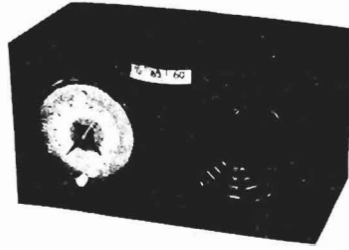
MODELS 422, 423

MODELS 422 AND 423 REPLACEMENT PARTS LIST

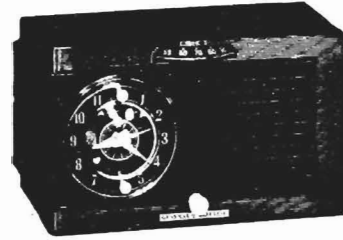
| CAT. NO. | SYMBOL | DESCRIPTION | CAT. NO. | SYMBOL | DESCRIPTION |
|---------------------------|-----------------------|---------------------------------------------------------------------------------------|--------------------------|--------|-------------------------------------------------------------------|
| CAPACITORS | | | MISCELLANEOUS ELECTRICAL | | |
| RCE-050* | C15A,B | 50 mf., 150 v., 50 mf., 150 v.; dry electrolytic | RWL-009 | | POWER CORD - A-C power cord and plug |
| RCN-039* | C4 | 2 mmf., mica | RWL-016* | | POWER CORD - Model 423 |
| RCT-046* | C1A,B,C, C2,C3 | Tuning capacitor with trimmers | RWX-043 | | ASSEMBLY - Pilot light socket |
| RCW-3036* | C11,C12, C13 | .0035 mf., 220 mmf., .005 mf., three section ceramic (see UCC-037, UCC-039, UCU-1036) | MISCELLANEOUS MECHANICAL | | |
| UCC-037* | C11 | .003 mf., 600 v., paper (alternate replacement for RCW-3036) | RDC-032* | | CORD - Bulk dial cord |
| UCC-039* | C13 | .005 mf., 600 v., paper (alternate replacement for RCW-3036) | RDP-064 | | POINTER - Dial scale |
| UCC-041* | C14,C21 | .02 mf., 600 v., paper | RHC-018 | | CLIP - Loop clip |
| UCC-045* | C16,C17, C18, C19,C20 | .05 mf., 600 v., paper | RHC-024* | | CLIP - Capacitor clip |
| UCU-020* | C5 | 47 mmf., mica | RHC-038* | | CLIP - For R-F coil |
| UCU-1036* | C10,C12 | 220 mmf., mica (alternate replacement for RCW-3036) | RHG-006* | | GROMMET - On tuning shaft |
| RESISTORS & POTENTIOMETER | | | RHG-018* | | GROMMET - Cushion mounting for tuning capacitor |
| RRC-149* | R6,S1 | POTENTIOMETER - 500,000 ohms; volume control and switch S1 | RHG-032* | | GROMMET - Speaker lead ins. |
| URD-009* | R12 | RESISTOR - 22 ohms, 1/2 w., carbon | RHI-017* | | STRAIN RELIEF |
| URD-021* | R14 | RESISTOR - 68 ohms, 1/2 w., carbon | RHJ-007* | | SPACER - Spacer bushing for mounting tuning capacitor |
| URD-029* | R10 | RESISTOR - 150 ohms, 1/2 w., carbon | RHR-010* | | RIVET - For terminal board |
| URD-057* | R2 | RESISTOR - 2.2 K ohms, 1/2 w., carbon | RHR-013* | | RIVET - For output transf. |
| URD-081* | R4 | RESISTOR - 22,000 ohms, 1/2 w., carbon | RHS-061* | | SCREW - For loop back mounting |
| URD-113* | R8,R13 | RESISTOR - 470,000 ohms, 1/2 w., carbon | RHS-062* | | SCREW - For chassis mounting |
| URD-121* | R9 | RESISTOR - 1 meg., 1/2 w., carbon | RHS-063 | | SCREW - For tuning capacitor mounting |
| URD-129* | R5 | RESISTOR - 2.2 meg., 1/2 w., carbon | RJC-004* | | CONNECTOR - Antenna loop lead connecting clip |
| URD-157* | R7 | RESISTOR - 4.7 meg., 1/2 w., carbon | RMC-002* | | CLIP - For oscil. coil |
| URF-049* | R11 | RESISTOR - 1000 ohms, 2 w., carbon | RMM-035* | | SHIELD - Tube shield |
| COILS & TRANSFORMERS | | | RMM-200* | | HOOD - Pilot light hood |
| RLC-105* | L2 | COIL - Oscillator | RMS-118* | | SPRING - Dial cord tension spring |
| RLI-125* | L3 | COIL - R-F | RMW-070* | | PULLEY - Idler pulley |
| RTL-115* | T2 | TRANSF. - First I-F | RMX-196 | | SHAFT AND BUSHING - Tuning shaft and mounting bushing, late prod. |
| RTL-116* | T3 | TRANSF. - Second I-F | RMX-200 | | DRIVE SHAFT AND BUSHING ASSEMBLY, early prod. |
| RTO-083* | T1 | TRANSF. - Audio output | CABINET & CABINET PARTS | | |
| MISCELLANEOUS ELECTRICAL | | | RAB-142* | L1 | CABINET BACK - With antenna loop |
| RJS-003* | | SOCKET - Tube socket | RAG-038* | | ASSEMBLY - Grill cloth assembly, Model 422 |
| RJS-141* | | SOCKET - Tube, for 12BA6 | RAG-039* | | ASSEMBLY - Grill cloth assembly, Model 423 |
| ROP-020* | | SPEAKER - PM, 5 1/4" | RAU-353 | | CABINET - Mahogany cabinet (plastic) for Model 422 |
| | | | RAU-354 | | CABINET - Ivory cabinet (plastic), for Model 423 |
| | | | RDE-124 | | ESCUTCHEON - Dial esc. |
| | | | RDS-110 | | SCALE - Dial scale |
| | | | RDK-181* | | KNOB - For Model 422 |
| | | | RDK-229* | | KNOB - For Model 423 |

*Parts used on previous models.

MODELS 510F, 511F, 512F, 513F, 515F, 516F, 517F, 518F, 521F, 522F



MODEL 510F (Brown)
MODEL 511F (Ivory)



MODEL 512F (Mahogany Mottle)
MODEL 513F (Antique Ivory)



MODEL 515F (Brown Mottle)
MODEL 517F (Maroon)
MODEL 516F (Ivory)
MODEL 518F (White)



MODEL 521F (Dark Mahogany)
MODEL 522F (Blonde Mahogany)

SPECIFICATIONS

| | | | | |
|------------------------------------|-----------------------------------|------------------|------------------------|------------------------|
| OVER-ALL CABINET DIMENSIONS | Model | 510F, 511F | 515E, 516F, 517F, 518F | 521F, 522F, 512F, 513F |
| | Height | 6 1/4 in. | 6 3/16 in. | 6 3/16 in. |
| | Width | 11 3/8 in. | 11 1/8 in. | 10 1/2 in. |
| | Depth | 5 5/16 in. | 4 1/4 in. | 6 in. |
| ELECTRICAL RATING | Voltage | 105-120 | | |
| | Frequency | 60 cycles (only) | | |
| | Watts | 30 | | |
| OPERATING FREQUENCIES | R-F Broadcast | 540-1600 kc | | |
| | I-F Amplifier | 455 kc | | |
| POWER OUTPUT | Undistorted | 1 watt | | |
| | Maximum | 1.75 watts | | |
| LOUDSPEAKER | Type | Alnico PM | | |
| | Outside Cone Diameter | 4 inches | | |
| | Voice Coil Impedance @ 400 Cycles | 3.5 ohms | | |
| | | | | |
| TUBE COMPLEMENT | Purpose | | Type | |
| | Oscillator-Converter | | 12BE6 | |
| | I-F Amplifier | | 12BA6 | |
| | Detector-1st Audio | | 12AV6 | |
| | Audio Output | | 50C5 | |
| | Rectifier | | 35W4 | |

GENERAL INFORMATION

The Models 510F, 511F, 512F, 513F, 515F, 516F, 517F, 518F, 521F and 522F clock-radio receivers employ four tubes, plus rectifier tube in an a-c/d-c superheterodyne circuit using a Beam-a-scope antenna. Each model has an electric time clock with wake-up alarm. The cabinets are of plastic composition in the finishes and design shown in the photos.

A special feature of the Model 515F, 516F, 517F, 518F, 521F and 522F receivers includes a receptacle at the rear of the receiver which is controlled by the clock to provide automatic power control to an external appliance. The slide switch adjacent to the receptacle is used to turn off the radio if desired, while using the appliance. *When radio operation is to be resumed, this switch must be set to the "ON" position.* In addition, the

clocks of this group of receivers are equipped with a sleep control which may be used to automatically turn off the radio and/or appliance.

The Models 510F, 511F, 512F, 513F, 515F, 516F, 517F, 518F, 521F and 522F receivers employ a new type chassis construction and change of tube type from that of other General Electric clock radios, described in ER-S-510, ER-S-515 and ER-S-521, bearing the same model number but without the suffix "F."

The distinguishing feature of this new type chassis construction may be noted in the connection to components and layout. Resistors and capacitors are connected directly by their leads to special tube sockets or terminal board in contrast to previous conventional methods using conventional tube sockets.

The cabinets and clocks of this series receivers whose model numbers are suffixed by "F" are identical to respective model numbers which do not bear the letter "F" as shown upon the identification label.

CAUTION: One side of the power line is connected to B-. Avoid any ground connections direct to B-. Use an isolating transformer when making service adjustments with the chassis removed from the cabinet.

COMPONENT REPLACEMENT—Except for tube socket replacement, it should not be necessary to remove the doughnut shaped shields over the tube sockets in servicing the chassis. The time and effort otherwise spent to remove shields and heat connections to free components may be spared and a neater job done without the risk of damage to the socket, by using the following method in wiring a replacement.

Clip the defective unit out, leaving enough of its leads to remain attached to the tube socket or terminal strip so an eye loop may be formed in each lead. Each lead of the new component may then be passed through the proper loop, pruned to length, crimped and soldered.

PRODUCTION WIRING CHANGE—Some early receivers will be found with one lead of the power cord connected to the pin 2 socket connection of the 35W4 rectifier tube. This connection has been known to be the cause of damage to the rectifier tube due to a 110 volt a-c arc within the tube between pin 2 and one of the tube elements. For this reason, it is recommended that the following change in wiring be made when the receiver is in the shop for service.

MODELS 510F, 511F, 512F, 513F, 515F, 516F, etc.

The power cord lead is removed from pin 2 of the rectifier tube socket by clipping it off close to the socket connection. The a-c power lead to the clock is similarly removed from pin 8 of the 50C5 output tube socket. Strip, splice, and solder the two leads together, properly taping the connection for adequate insulation. At least two wraps of standard friction tape is required. The remaining bus wire between pin 2 of the 35W4 tube and pin 8 of the 50C5 should then be clipped off close to the socket connection and removed. Some later sets have both leads inserted in pin No. 8 of the 50C5 socket and still later sets utilize pin No. 8 of the 35W4 socket and pin No. 8 of the 12AV6 socket for this connection. Both of these methods are satisfactory and should cause no trouble.

It is only when a solid B- connection is made to pins 1 or 2 of the 35W4 that the arc occurs. A direct short to one of these pins might by coincidence cause this phenomena.

OSCILLATOR COIL, T4—The oscillator coil is wired to be self-supporting through the use of solid bus wire connections. With the exception of some early receivers, the coil lugs are spaced sixty degrees from each other so that they are grouped over one half of the coil circumference as shown in Figure 2. An early type coil may occasionally be found whose lug spacing is eighty degrees. However this presents no difficulty in lug identification, if one bears in mind that the wider space of one hundred and twenty degrees is to be oriented with that half of the coil form which is bare of lugs in the illustration.

CLOCK SERVICE AND REPLACEMENT PARTS—For clock service data and repair parts, contact your local Wholesale General Electric Radio Distributor.

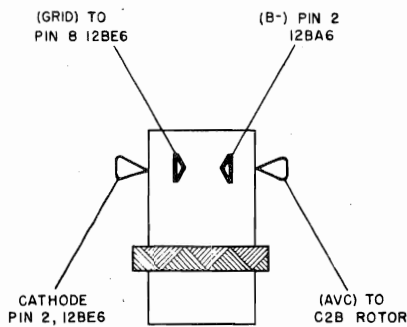


Fig. 1. Oscillator Coil Connections

C17, C19, C20, AND C26

The lead identification for the four-section ceramic capacitor RCW-3048 (K71J670) can be observed from the illustration of Figure 2.

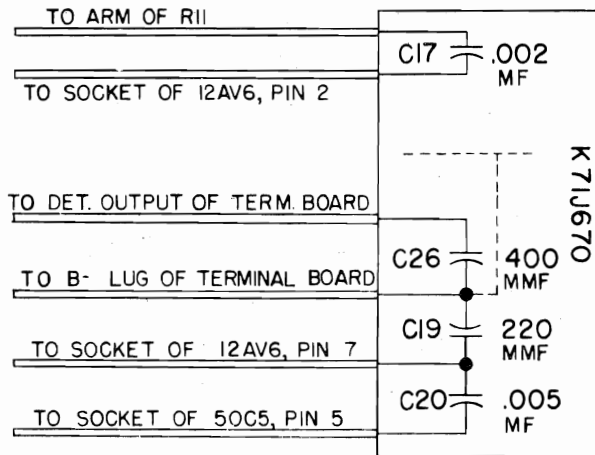


Fig. 2. Capacitor RCW-3048

RADIO CIRCUIT ALIGNMENT

ALIGNMENT FREQUENCIES:

| | |
|-----------|---------|
| R-F | 1500 kc |
| R-F | 1620 kc |
| I-F | 455 kc |

EQUIPMENT REQUIRED:

1. Test oscillator with tone modulation.
2. A-c output meter, 1½ volts full scale.
3. 0.05 mf. paper capacitor.
4. Loop. (See note 6.)
5. Insulated screwdriver.

PROCEDURE—GENERAL:

1. With the tuning scale control wheel turned so that the gang condenser plates are fully meshed, the last calibration mark on the scale (low frequency side of 550 kc) should face directly to the front of the chassis so that the mark will align with the index tab or mark located on the cabinet over the tuning control wheel. If it does not, remove the control wheel from the gang condenser shaft and replace it for correct position. **CAUTION:** Do not attempt to correct the position by rotating the wheel on the shaft as this will cause the knob to slip.
2. For i-f alignment, it is necessary to remove the chassis from the cabinet.
3. Connect the output meter across the loudspeaker voice coil terminals.
4. Keep radio volume control at maximum and attenuate the test oscillator signal output so that the output meter reading never exceeds 1.0 volt.
5. Connect the capacitor, listed in column 2 of the alignment chart, between the output "High Side" of the test oscillator and the point of input specified. The oscillator output cable ground lead is connected to receiver chassis.
6. For alignment of the oscillator and antenna trimmers, the input signal should be inductively coupled to the radio loop antenna, L1, by connecting a four-turn, six-inch diameter loop of bell wire across the signal generator output terminals, and then locating the loop to face the radio antenna loop about one foot away.

ALIGNMENT CHART

| Step | Connect Test Oscillator to | Test Osc. Setting | Dial Drum Setting | Adjust for Maximum Output |
|------|---------------------------------------------|-------------------|-------------------|---------------------------|
| 1 | 12BA6 grid (1) in series with 0.05 mf. cap. | 455 kc | Minimum Capacity | 2nd I-F transformer cores |
| 2 | 12BE6 grid (7) in series with 0.05 mf. cap. | 455 kc | Minimum Capacity | 1st I-F transformer cores |
| 3 | Inductively coupled to radio loop | 1620 kc | Minimum Capacity | C4 (oscillator) |
| 4 | Inductively coupled to radio loop | 1500 kc | Tune for Maximum | C3 (antenna) |

STAGE GAIN AND VOLTAGE CHECKS

Stage gain measurements by vacuum tube voltmeter or similar measuring devices may be used to check circuit performance and isolate trouble. The gain values listed may have tolerances of 20%. Readings taken with low signal input so that AVC is not effective.

- (1) I-F Stage Gains.
 - 12BE6 Grid to 12BA6 Grid..... .50 @ 455 kc
 - 12BA6 Grid to 12AV6 Diode Plate..... .50 @ 455 kc
- (2) Audio Gain.
 - 0.15 volts at 400 cycles across the volume control (R11) with control set at maximum will give approximately ½-watt output across the loudspeaker, LS1, voice coil.
- (3) Oscillator Grid Bias.
 - D-c voltage developed across the oscillator grid leak (R1) averages 6 volts at 1000 kc.
- (4) Socket Pin Voltages.
 - Figure 4 shows voltages from all tube pins to B- unless otherwise specified. Voltage readings much higher or lower than those specified may help localize defective components or tubes.

PAGE 22-10 GENERAL ELECTRIC

MODELS 510F, 511F, 512F,
513F, 515F, 516F, 517F,
518F, 521F, 522F

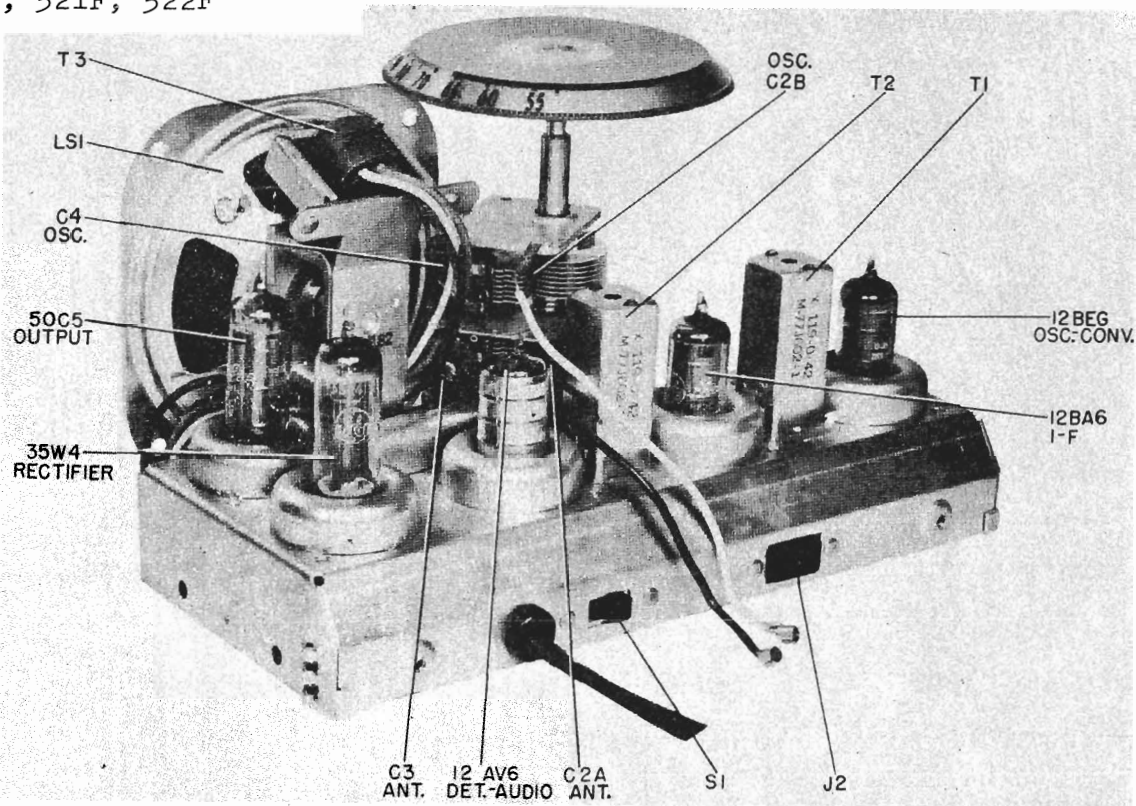


Fig. 6. Photo of Chassis (Top View)

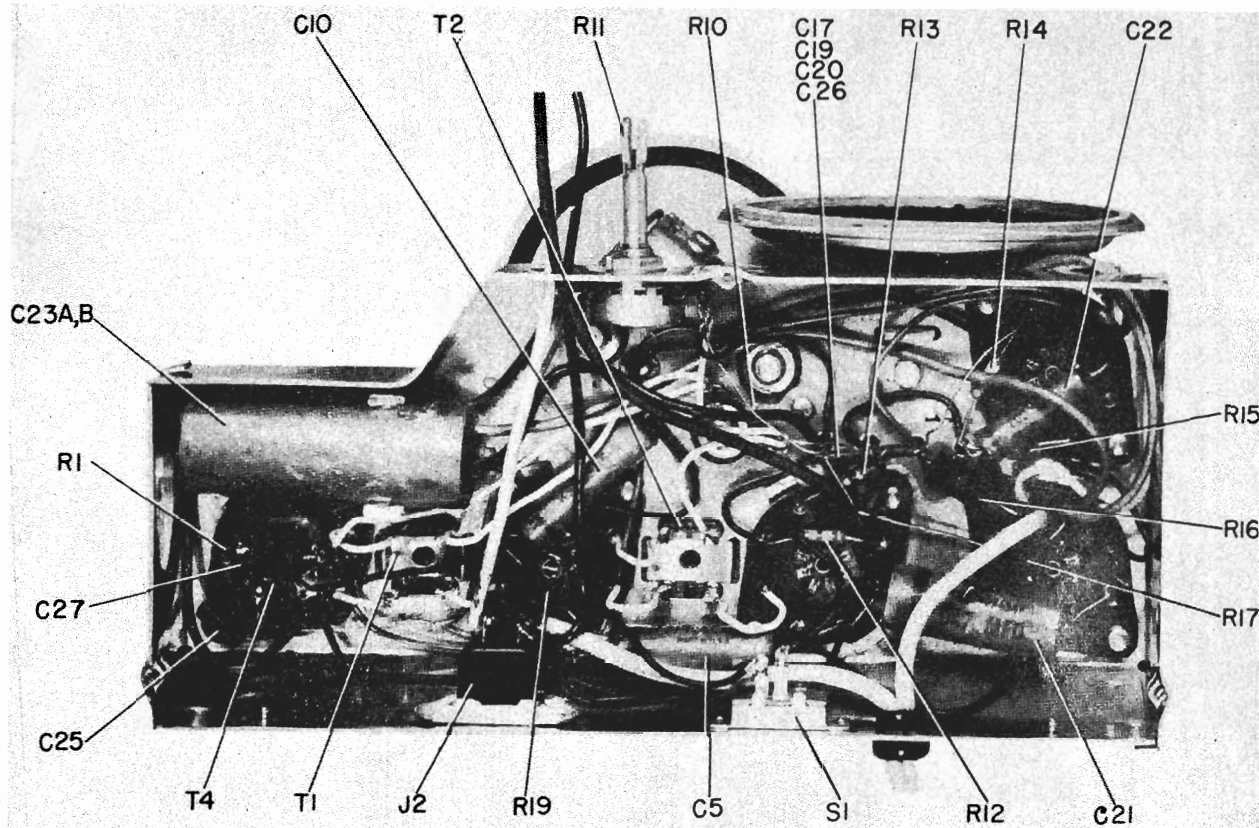


Fig. 7. Photo of Chassis (Bottom View)

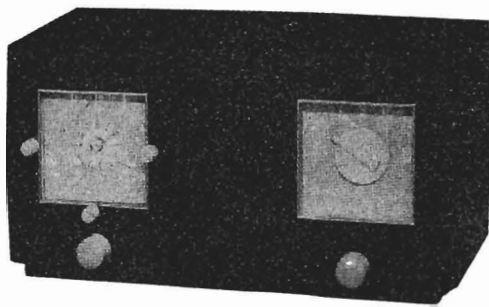
MODELS 510F, 511F, 512F, 513F, 515F, 516F, 517F, 518F, 521F, 522F

REPLACEMENT PARTS LIST—MODELS 510F, 511F, 512F, 513F, 515F, 516F, 517F, 518F, 521F, AND 522F

| Cat. No. | Symbol | Description |
|----------|-----------------|--------------------------------------------------------------------------------------------------|
| RAB-149 | L1 | CABINET BACK—Back cover to cabinet, includes antenna loop, L1, for Models 510F, 511F |
| RAB-150 | L1 | CABINET BACK—Back cover to cabinet, includes antenna loop, L1, for Models 515F, 516F, 517F, 518F |
| *RAB-151 | L1 | CABINET BACK—Back cover to cabinet, includes antenna loop, for Models 512F, 513F, 521F, 522F |
| *RAC-085 | | BRACKET—Clock mounting bracket (metal shield cover over back of clock) |
| *RAG-033 | | GRILLE—Cabinet grille cloth (dark maroon) for Models 510F, 515F, 517F |
| *RAG-034 | | GRILLE—Cabinet grille cloth (ivory) for Models 511F, 516F |
| *RAG-035 | | GRILLE—Cabinet grille cloth (white) for Model 518F |
| RAG-037 | | GRILLE—Cabinet grille cloth (gold finish) for Models 521F or 522F |
| *RAU-336 | | CABINET—Brown, plastic cabinet for Model 510F |
| *RAU-337 | | CABINET—Ivory plastic cabinet for Model 511F |
| *RAU-338 | | CABINET—Brown mottle, plastic cabinet for Model 515F |
| *RAU-339 | | CABINET—Ivory, plastic cabinet for Model 516F |
| *RAU-340 | | CABINET—Maroon, plastic cabinet for Model 517F |
| *RAU-341 | | CABINET—White, plastic cabinet for Model 518F |
| *RAU-342 | | CABINET—Dark mahogany, plastic cabinet for Model 521F |
| *RAU-343 | | CABINET—Blonde mahogany, plastic cabinet for Model 522F |
| RAU-348 | | CABINET—Mahogany mottle, plastic cabinet for Model 512F |
| RAU-349 | | CABINET—Antique ivory, plastic cabinet for Model 513F |
| RCC-107 | C21 | CAPACITOR—.047 mf., 600 v., paper |
| RCC-108 | C22 | CAPACITOR—.003 mf., 600 v., paper |
| RCE-127 | C23A, B | CAPACITOR—50-50 mf., 150 v., electrolytic |
| *RCT-045 | C2A, B | CAPACITOR—420-126 mmf., dial tuning capacitor |
| RCW-3048 | C17, 19, 20, 26 | CAPACITOR—.002 mf., 220 mmf., .005 mf., 400 mmf., four section ceramic unit |
| RCW-3049 | C27 | CAPACITOR—6 mmf. $\pm 5\%$, 1400 to 2200 neg. temp. coefficient, ceramic |
| *RDK-215 | | KNOB—Volume control knob (white) for Model 518F |
| *RDK-216 | | KNOB—Dial tuning control knob (maroon) for Models 510F, 511F |
| *RDK-217 | | KNOB—Dial tuning control knob (gold bronze color) for Models 515F, 516F, 517F, 521F, 522F |
| *RDK-218 | | KNOB—Volume control knob (maroon) for Model 517F |
| *RDK-219 | | KNOB—Dial tuning control knob (aluminum color) for Model 518F |
| *RDK-230 | | KNOB—Volume control knob (ivory) for Models 510F, 511F, 513F, 515F, 516F, 517F, 521F, 522F |
| RDK-243 | | KNOB—Volume control knob (fawn) for Model 512F |
| RDK-245 | | KNOB—Dial tuning control knob (ivory scale, maroon numerals) for Model 513F |
| RDK-246 | | KNOB—Dial tuning control knob (brown scale, gold numerals) for Model 512F |
| *RHC-024 | | CLIP—Mounting clip for electrolytic capacitor, C23A, B |
| *RHC-034 | | CLIP—Metal clip fastener used to mount 1st and 2nd i-f transformer can assemblies to chassis |
| *RHG-015 | | GROMMET—Rubber grommet used to insulate and shock mount tuning capacitor (C2A, B) to chassis |

| Cat. No. | Symbol | Description |
|-----------|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| *RHH-004 | | FASTENER—Snap-on fastener for holding cabinet back to cabinet (used only on Models 521F, 522F) |
| *RHI-010 | | GROMMET—Strain relief and insulating grommet in chassis back apron for power cord for Models 515F, 516F, 517F, 518F, 521F, 522F |
| *RHJ-005 | | SPACER—Metal spacer bushing in grommet mounting tuning capacitor (C2A, B) to chassis |
| *RHS-048 | | SHIELD—Metal tube shield for V3, 12-AV6 |
| RHS-073 | | SHIELD—Doughnut shaped metal cover over soldered pin connections of tube sockets |
| RHS-074 | | SHIELD—Metal protective shield cover on top of chassis over wiring terminal board |
| RHS-075 | | SCREW—Screw No. 6 x $\frac{3}{8}$ -in. long used to fasten chassis in cabinet |
| *RJJ-008 | J2 | RECEPTACLE—AC power receptacle on chassis back apron used for automatic control of electrical appliances for Models 515F, 516F, 517F, 518F, 521F, 522F |
| RJS-158 | | SOCKET—Tube socket for V2, 12BA6 |
| RJS-162 | | SOCKET—Tube socket for V1, 12BE6 |
| RJS-163 | | SOCKET—Tube socket for V3, 12AV6; V4, 50C5; V5, 35W4 |
| RLC-109 | T4 | COIL—Oscillator coil |
| *RMS-214 | | SPRING—Spring retaining ring for hub of dial tuning knob |
| *RRC-054 | R11 | POTENTIOMETER—500,000 ohms, composition volume control |
| *RSW-067 | S1 | SWITCH—Radio ON-OFF switch (slide type) on chassis back apron for Models 515F, 516F, 517F, 518F, 521F, 522F |
| *RTL-117 | T1, 2 | TRANSFORMER—1st or 2nd i-f coupling |
| RTO-099 | T3 | TRANSFORMER—Audio output |
| *RWL-009 | P1 | CORD—AC power cord and plug (brown) for Models 510F or 512F |
| *RWL-016 | P1 | CORD—AC power cord and plug (ivory) for Models 511F or 513F |
| *RWL-024 | P1 | CORD—AC power cord and plug (white) for Model 518F |
| *RWL-025 | P1 | CORD—AC power cord and plug (brown) for Models 515F, 517F, 521F, 522F |
| *RWL-026 | P1 | CORD—AC power cord and plug (ivory) for Model 516F |
| *RYN-005 | | NAMEPLATE—General Electric monogram (metal, on cabinet) for Models 512F, 513F, 521F or 522F |
| *RZC-009 | M1 | CLOCK—60 cycle, 105-125 v., clock assembly for Models 515F, 516F, 517F, 521F, 522F |
| *RZC-011 | M1 | CLOCK—60 cycle, 105-125 v. clock assembly for Model 518F |
| *RZC-012 | M1 | CLOCK—60 cycle, 105-125 v. clock assembly for Models 510F, 511F |
| RZC-014 | M1 | CLOCK—60 cycle, 105-125 v., clock assembly for Model 512F |
| RZC-015 | M1 | CLOCK—60 cycle, 105-125 v., clock assembly for Model 513F |
| *ROP-022 | | LOUDSPEAKER—4 inch PM |
| *UCC-036 | C17 | CAPACITOR—.002 mf., 600 v., paper |
| *UCC-039 | C20 | CAPACITOR—.005 mf., 600 v., paper |
| *UCC-045 | C5, 10 | CAPACITOR—.05 mf., 600 v., paper |
| *UCG-020 | C25 | CAPACITOR—47 mmf., 500 v., silver mica |
| *UCU-1036 | C19 | CAPACITOR—220 mmf., mica |
| *URD-009 | R17 | RESISTOR—22 ohms, $\frac{1}{2}$ w., carbon |
| *URD-021 | R19 | RESISTOR—68 ohms, $\frac{1}{2}$ w., carbon |
| *URD-029 | R15 | RESISTOR—150 ohms, $\frac{1}{2}$ w., carbon |
| *URD-081 | R1 | RESISTOR—22,000 ohms, $\frac{1}{2}$ w., carbon |
| *URD-113 | R13, 14 | RESISTOR—470,000 ohms, $\frac{1}{2}$ w., carbon |
| *URD-129 | R10 | RESISTOR—2.2 meg., $\frac{1}{2}$ w., carbon |
| *URD-141 | R12 | RESISTOR—6.8 meg., $\frac{1}{2}$ w., carbon |
| *URF-049 | R16 | RESISTOR—1000 ohms, 2 w., carbon |

MODEL 535



SPECIFICATIONS

CABINET

Color..... Mottled Mahogany
 Height, inches..... 5¾
 Width, inches..... 11¼
 Depth, inches..... 6

ELECTRICAL

Voltage..... 105-125 volts
 Frequency..... 60 cycles
 Wattage..... 35 watts

OPERATING FREQUENCIES

Broadcast Band..... 540-1620 kc
 Intermediate Frequency..... 455 kc

AUDIO POWER OUTPUT

Undistorted..... .75 watt
 Maximum..... 1.5 watts

LOUDSPEAKER

Type..... Alnico PM
 Size..... 4-inch cone
 Voice Coil Impedance at 400 cycles..... 3.2 ohms

TUBES

R-F Amplifier..... Type 12BA6
 Oscillator-Converter..... Type 12BE6
 I-F Amplifier..... Type 12BA6
 Detector and 1st Audio..... Type 12AV6
 Power Output..... Type 35C5
 Rectifier..... Type 35W4

CLOCK

Motor..... 60 cycles, 110 volts, self-starting
 Hands..... Luminous, except sweep second hand
 Switch..... "Wake-up" and "Sleep" type
 Dial..... Square dial, luminous Arabic numerals

GENERAL INFORMATION

The Model 535 is an a-c/d-c superheterodyne receiver which uses five amplifier tubes, and one rectifier tube. The sensitivity of the r-f amplifier stage plus provisions for using an external antenna make this radio especially suitable for use in low signal strength areas.

Special features include an electric alarm clock, with a "wake-up" and "sleep" control switch. In addition, the timer receptacle at the rear of the receiver provides an outlet connection for external appliances consuming up to 1100 watts, which is controlled by alarm and "sleep" control mechanism of the clock. The radio ON-OFF switch adjacent to the timer outlet permits the radio to be turned off if so desired while using the external appliance.

STAGE GAIN AND VOLTAGE CHECKS

CAUTION: One side of the power line is connected to B— Avoid any direct connections to ground. Use an isolating transformer when making service adjustments with the chassis removed from the cabinet.

Stage gain measurements, using a vacuum tube voltmeter or similar measuring device, may be used to check circuit performance and isolate trouble. The gain values listed may have tolerances of ±20 per cent. Readings should be taken with low signal input so that AVC is not effective.

R-F and I-F GAIN

12BA6 R-F Grid to 12BE6 Grid..... 6 @ 1000 kc
 12BE6 Grid to 12BA6 I-F Grid..... 50 @ 455 kc
 12BA6 I-F Grid to 12AV6 Diode..... 100 @ 455 kc

AUDIO GAIN

0.15 volts at 400 cycles across the volume control with the control set at maximum will produce approximately 1.2 volts (½ watt) at the speaker voice coil.

AUDIO POWER

With a 400 cycle signal driving the 35C5 sufficiently to begin to overload the output circuit as shown by distortion of the wave-shape on an oscilloscope, an output meter at the speaker terminals should read about 1.5 volts (.75 watt). Maximum output should be about 2.2 volts or 1.5 watts.

OSCILLATOR GRID BIAS

The d-c voltage developed across the oscillator grid leak resistor (R4) averages 6 volts at 1000 kc using a 20K ohms/volt meter.

HUM MEASUREMENT

With the volume control at minimum, an oscilloscope connected through a 0.25 mfd. capacitor across C18A shows a 14-volt sawtooth wave; across C18B, a 0.7-volt rounded-hump wave (both peak-to-peak).

Hum measured across C18A with a 1000 ohms/volt output meter in series with a 1.0 mf. capacitor should not exceed 4.0 volts RMS. Hum at the speaker voice coil should not exceed .007 RMS volts.

ALIGNMENT FREQUENCIES

R-F..... 1500 kc and 1620 kc
 I-F..... 455 kc

EQUIPMENT REQUIRED

1. Signal generator with 400 cycle modulation.
2. A-C output meter.
3. 0.05 mf. paper capacitor.
4. Loop. (See note 3.)
5. Insulated screwdriver.
6. Isolation transformer.

PROCEDURE—GENERAL

1. With the tuning condenser plates fully meshed, set the tuning dial pointer at the index line just below the 550 mark on the dial.

2. Connect an output meter across the loudspeaker voice coil terminals. Keep the volume control at maximum and attenuate the signal generator output so that the output meter never exceeds 1 volt.

3. For alignment of the oscillator and antenna trimmers, the input signal should be inductively coupled to the radio loop antenna by connecting a four-turn, six-inch diameter loop of bell wire across the signal generator output terminals. Locate the loop parallel to the radio antenna about one foot away.

CAUTION: One side of the power line is connected to B—. Avoid any ground connections direct to B—. Use an isolating transformer when making service adjustments with the chassis removed from the cabinet.

MODEL 535

TEST CONDITIONS

- All readings to B— ground
- D-C readings taken with 20K ohms/volt meter
- Line voltage 120 volts, 60 cycles
- No signal applied or received during test

Pin #8 on each socket is a dummy pin used for a spare terminal. A small hole in the tube socket between pins #1 & #8 is used to key these pins.

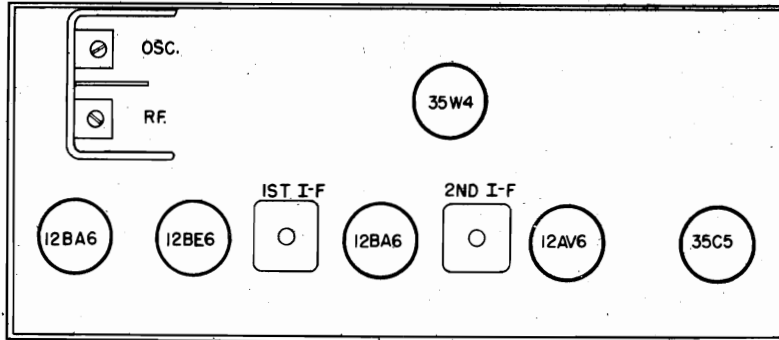


Fig. 3 Tube and Trimmer Location

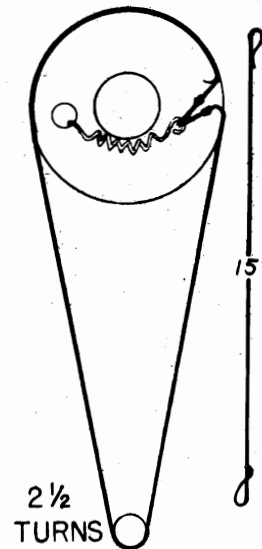


Fig. 4 Dial Stringing

SERVICE SUGGESTIONS

COMPONENT REPLACEMENT

Except for tube socket replacement, it should not be necessary to remove the doughnut-shaped shields over the tube sockets. The following method of wiring replacement parts is recommended:

Cut the defective unit out, leaving enough wire attached to the socket or terminal strip to form a small loop. Pass the lead of the new component through the loop, trim excess wire, crimp, and solder.

CLOCK SERVICE

To remove the clock from the cabinet, remove the metal shield which covers the clock mechanism. Four screws holding the clock to the cabinet then become accessible.

Clock parts and service instructions may be obtained from your General Electric Distributor or any Telechron Service Store.

PRODUCTION CHANGES

Early production sets omitted R1, a 68-ohm resistor in the cathode circuit of the R-F amplifier. R4 osc. grid leak went directly to B—.

Due to procurement difficulties, it may be necessary to use I-F transformers from two manufacturers. The electrical ratings are identical, the primary leads of one are reversed internally, requiring special hook-up considerations. The transformer having its No. 1 lug coded green should have its primary lugs wired in reverse order from that shown on the schematic.

REPLACEMENT PARTS LIST

| Cat. No. | Symbol | Description |
|----------|--------|---------------------------------------------------------|
| RAB-157 | | BACK—Cabinet back and loop antenna |
| RAC-090 | | COVER—Metal cover for clock mechanism |
| RAC-091 | | SHIELD—Metal plate shields bottom of chassis |
| RAG-040 | | CLOTH—Maroon grille cloth mounted on cardboard |
| RAU-347 | | CABINET—Mahogany plastic cabinet for Model 535 |
| *RDC-032 | | CORD—Dial cord (25 yards bulk) |
| RDE-109 | | BEZEL—Dial window escutcheon bezel |
| RDK-242 | | KNOB—Alarm set knob (fawn) |
| RDK-243 | | KNOB—Volume control and tuning knob (fawn) |
| RDK-254 | | KNOB—Sleep and manual switch knob (fawn with white dot) |
| RDP-059 | | POINTER—Dial pointer |
| RDS-104 | | SCALE—Dial scale and mounting plate |
| RDW-046 | | WINDOW—Dial window |
| *RHC-024 | | CLIP—Electrolytic capacitor mounting clip |
| *RHC-034 | | CLIP—I-F transformer mounting clip |
| *RHC-048 | | CLIP—Dial scale mounting clip |
| *RHG-015 | | GROMMET—Tuning gang mounting grommet |
| *RHI-010 | | INSULATOR—Power cord strain relief insulator |
| *RHJ-005 | | SPACER—Tuning gang mounting spacer |
| *RHS-048 | | SHIELD—Short tube shield for converter V2 |
| *RHS-073 | | SHIELD—Tube socket pin cover shield |
| *RHS-074 | | SHIELD—Terminal board cover shield |
| *RHS-075 | | SCREW—Chassis mounting screw |
| RHS-085 | | SHIELD—1 3/4" long tube shield for 2nd detector V4 |
| *RJC-004 | J2 | CONNECTOR—Loop lead connector |
| *RJJ-008 | | OUTLET—110 v., appliance outlet |
| *RJS-158 | | SOCKET—V3 (I-F) tube socket with center shield pin |
| *RJS-162 | | SOCKET—V2 (conv.) impregnated tube socket |
| *RJS-163 | | SOCKET—V1, V4, V5 and V6 tube socket |
| RLC-110 | T1 | TRANSFORMER—Oscillator transformer |
| RMC-002 | | CLIP—Oscillator coil mounting clip |
| RMS-243 | | SPRING—Dial cord tension spring |
| RMX-180 | | SHAFT—Tuning shaft and bushing assembly |

| Cat. No. | Symbol | Description |
|-------------------|-----------------|-----------------------------------------------------------------------|
| ROP-021 | | SPEAKER—4-inch PM loudspeaker |
| *RSW-067 | S1 | SWITCH—ON-OFF switch (slide type) |
| *RTL-117 | T2, 3 | TRANSFORMER—1st or 2nd I-F transformer |
| RTO-100 | T4 | TRANSFORMER—Output transformer |
| *RWL-025 | P1 | CORD—Brown heavy-duty AC power cord |
| †RZC-013 | | CLOCK ASSEMBLY—Includes all appearance items, less metal cover |
| RESISTORS | | |
| RRC-153 | R7 | POTENTIOMETER—0.5 meg., volume control |
| *URD-009 | R13 | RESISTOR—22 ohms, 1/2 w., carbon |
| *URD-021 | R6 | RESISTOR—68 ohms, 1/2 w., carbon |
| *URD-29 | R11 | RESISTOR—150 ohms, 1/2 w., carbon |
| *URD-065 | R2 | RESISTOR—4700 ohms, 1/2 w., carbon |
| *URD-081 | R3, 4 | RESISTOR—22K ohms, 1/2 w., carbon |
| *URD-113 | R9, 10 | RESISTOR—470K ohms, 1/2 w., carbon |
| *URD-129 | R5 | RESISTOR—2.2 meg., 1/2 w., carbon |
| *URD-141 | R8 | RESISTOR—6.8 meg., 1/2 w., carbon |
| *URF-049 | R12 | RESISTOR—1000 ohms, 2 w., carbon |
| CAPACITORS | | |
| *RCC-108 | C17 | CAPACITOR—.003 mf., 600 v., paper |
| *RCE-127 | C18A, B | CAPACITOR—50-50 mf. @ 150 v., electrolytic capacitor |
| *RCN-053 | C4, 7 | CAPACITOR—.047 mf., 600 v., paper |
| RCT-050 | C1, C2A, B, C7 | CAPACITOR—126 and 420 mmf., tuning capacitor and trimmers |
| *RCW-3048 | C13, 14, 15, 16 | CAPACITOR—400 mmf., .002 mf., 220 mmf., .005 mf., ceramic "bullplate" |
| RCW-3049 | . | CAPACITOR—6 mmf. ±10%, ceramic |
| *UCC-045 | C20 | CAPACITOR—.05 mf., 600 v., paper |
| *UCG-020 | C6 | CAPACITOR—47 mmf., 500 v., silver mica |
| *UCG-028 | C3 | CAPACITOR—100 mmf., 500 v., silver mica |

SPECIFICATIONS

CABINET

| | |
|-----------------------------|------------------------------------|
| Model 605 | Maroon Plastic |
| Model 606 | Green Plastic |
| Height, inches | 6 ³ / ₄ |
| Width, inches | 10 ¹ / ₈ |
| Depth, inches | 3 ⁹ / ₁₆ |
| Weight with batteries | 5 ¹ / ₂ lbs. |



ELECTRICAL

| | |
|-----------------------|---------------|
| Voltage (AC-DC) | 105-125 volts |
| Frequency (AC) | 50-60 cycles |
| Wattage | 10 watts |

BATTERY REQUIREMENTS

| | |
|-----------------|-----------------------------------------------------|
| A Battery | 7 ¹ / ₂ volts, Eveready #717 |
| B Battery | 67 ¹ / ₂ volts, Eveready #467 |

OPERATING FREQUENCIES

| | |
|----------------------|-------------|
| Broadcast Band | 540-1600 KC |
| I-F Amplifier | 455 KC |

POWER OUTPUT:

| | |
|-------------------|----------------|
| Undistorted | 100 milliwatts |
| Maximum | 125 milliwatts |

LOUDSPEAKER:

| | |
|-----------------------------------------|-----------|
| Type | Alinco PM |
| Cone Diameter | 4 inches |
| Voice Coil Impedance (400 Cycles) | 3.2 ohms |

TUBE COMPLEMENT:

| | |
|------------------------------|-----|
| Oscillator-Converter | 1R5 |
| I-F Amplifier | 1T4 |
| Detector and 1st Audio | 1U5 |
| Power Amplifier | 3V4 |

GENERAL INFORMATION

The Models 605 and 606 portable radios utilize the new ferrite antenna, a long tuning coil with a powdered iron core. Its small size facilitates mounting without the necessity of flexible connections. Because of its construction, its signal pick-up is principally electro-magnetic, resulting in reduced electrostatic interference.

This receiver has a "floating" chassis, connected to the power line only thru a resistor and a capacitor. All chassis voltages are in reference to the internal B- circuit except the speaker voice coil, which is grounded to the chassis. The use of an isolation transformer is recommended to protect line-powered test equipment.

STAGE GAIN AND VOLTAGE CHECKS

CAUTION: One side of the power line is connected to B— Avoid any direct connections to ground. Use an isolating transformer when making service adjustments with the chassis removed from the cabinet.

Stage gain measurements, using a vacuum tube voltmeter or similar measuring device, may be used to check circuit performance and isolate trouble. The gain values listed may have tolerances of ±20 per cent. Readings should be taken with low signal input so that AVC is not effective.

I-F GAIN

| | |
|-----------------------------|--------------|
| 1R5 Grid to 1T4 Grid | .40 @ 455 kc |
| 1T4 Grid to 1S5 Diode | .65 @ 455 kc |

AUDIO GAIN

.03 volts at 400 cycles across the volume control with the control set at maximum will produce approximately .4 volts (50 mw) at the speaker voice coil.

AUDIO POWER

With a 400 cycle signal driving the 3V4 sufficiently to begin to overload the output circuit as shown by distortion of the wave-shape, an oscilloscope at the speaker terminals should read 1.5 volts (peak-to-peak), which equals about 0.1 of a watt. Maximum possible output is about 1.8 volts (peak-to-peak) or 0.13 of a watt.

OSCILLATOR GRID BIAS

The d-c voltage developed across the oscillator grid leak resistor (R1) averages 5 volts as calculated by measuring the grid current (.0002 amp) through R1 (100K ohms).

HUM MEASUREMENT

With the volume control at minimum, an oscilloscope connected through a 0.25 mfd capacitor across C8A shows a 14-volt sawtooth wave; across C8B, a 0.4-volt rounded, hump wave (both peak-to-peak).

Hum measured across C8A with a 1000 ohm/volt output meter in series with a 1 mfd capacitor should not exceed 5 volts RMS. Hum at the speaker voice coil should not exceed .007 RMS volts.

MODELS 605, 606

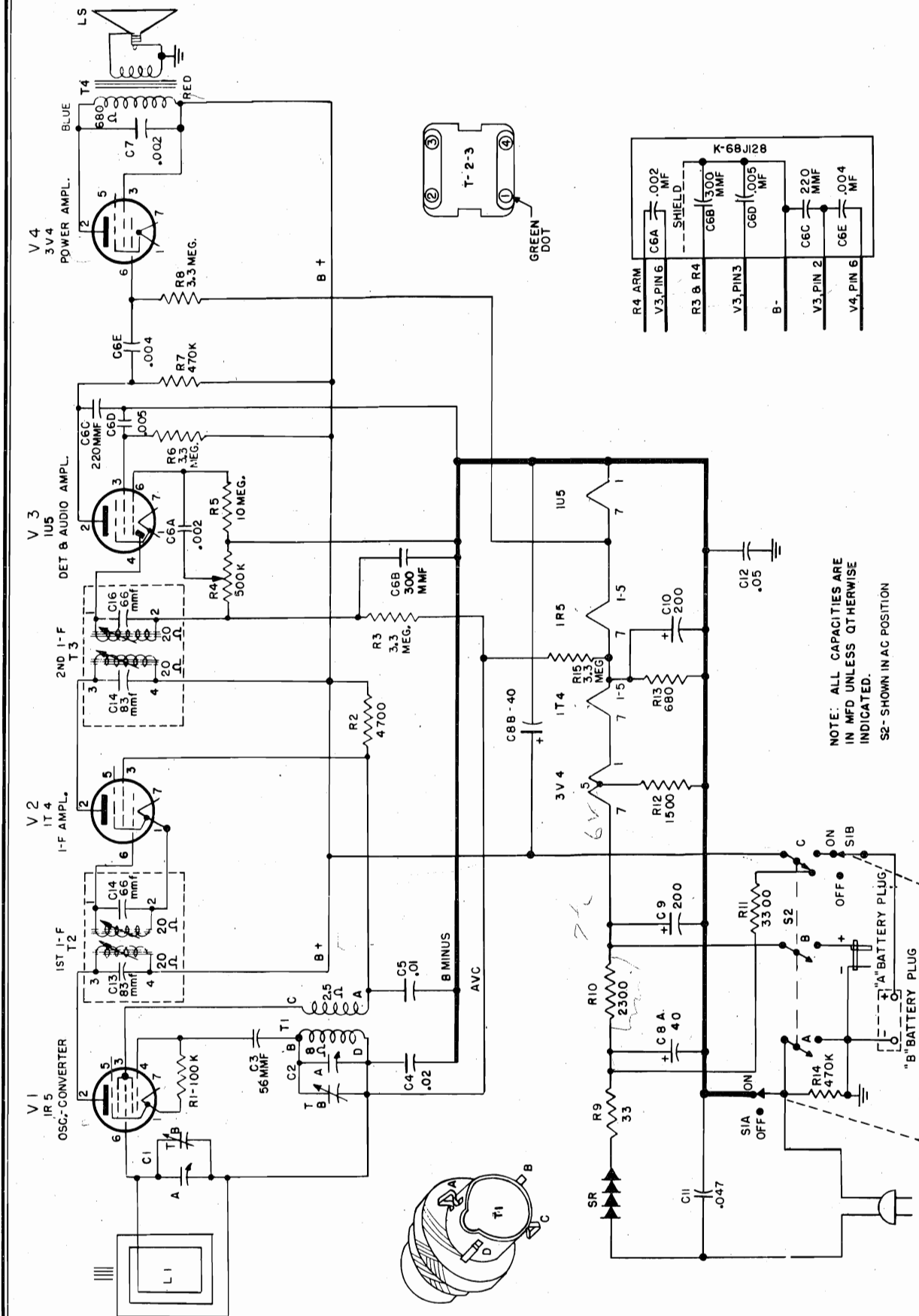


Fig. 1. Schematic Diagram

REPLACEMENT PARTS LIST—MODELS 605 AND 606

| Cat. No. | Symbol | Description |
|-------------------|--------------------|--------------------------------------------------------------|
| CAPACITORS | | |
| *RCE-051 | C8, A, B | 40-40 mfd., 150 w.v., electrolytic filter capacitor |
| RCE-132 | C9, 10 | 200 mfd., 10 w.v., electrolytic filter capacitor |
| RCT-053 | C1A, C1B, C2A, C2B | Tuning capacitor |
| *RCW-3015 | C6A, B, C, C6D, E | .002 mfd., .004 mfd., .005 mfd., 220 mmf., 300 mmf., ceramic |
| *RCW-3018 | C7 | .002 mfd., ceramic |
| *RCW-3054 | C5 | .01 mfd., ceramic |
| *UCC-041 | C4 | .02 mfd., 600 v., paper |
| *RCN-053 | C11 | .047 mfd., 600 v., molded paper |
| *UCC-045 | C12 | .05 mfd., 600 v., paper |
| *UCG-0.2 | C3 | 56 mmf., silver mica |

| RESISTORS | | |
|------------------|-----------|----------------------------------------------------|
| RRW-042 | R10 | 2300 ohms, 10 w., w.w. |
| *URD-013 | R9 | 33 ohms $\pm 10\%$, $\frac{1}{2}$ w., carbon |
| *URD-045 | R13 | 680 ohms $\pm 10\%$, $\frac{1}{2}$ w., carbon |
| *URD-053 | R12 | 1500 ohms $\pm 10\%$, $\frac{1}{2}$ w., carbon |
| *URD-065 | R2 | 4700 ohms $\pm 10\%$, $\frac{1}{2}$ w., carbon |
| *URD-097 | R1 | 100,000 ohms $\pm 10\%$, $\frac{1}{2}$ w., carbon |
| *URD-113 | R7 | 470,000 ohms $\pm 10\%$, $\frac{1}{2}$ w., carbon |
| *URD-133 | R6, 8, 15 | 3.3 meg. $\pm 10\%$, $\frac{1}{2}$ w., carbon |
| *URD-145 | R5 | 10 meg. $\pm 10\%$, $\frac{1}{2}$ w., carbon |
| *URE-061 | R11 | 3300 ohms $\pm 10\%$, 1 w., carbon |

| MISCELLANEOUS ELECTRICAL PARTS | | |
|---------------------------------------|------------------------|--------------------------------------------------------------------------------------|
| REX-005 | SR | RECTIFIER—Selenium rectifier |
| RJC-022 | | CONNECTOR—"B" battery connector |
| RJP-033 | | PLUG—"A" battery plug |
| *RJS-100 | | SOCKET—7 pin miniature tube socket, tan, wax impregnated |
| *RJS-124 | | SOCKET—7 pin miniature tube socket, dark brown, unimpregnated |
| *RJS-125 | | SOCKET—7 pin miniature tube socket, unimpregnated, dark brown with center shield pin |
| *RLC-101 | T1 | TRANSFORMER—Oscillator transformer |
| RLI-046 | L1 | ANTENNA—Ferrite antenna |
| RRC-166 | R4, S1A, B | CONTROL—0.5 meg., volume control with ON-OFF switch |
| *RSW-088 | S2A, B, C | SWITCH—Battery-line changeover switch |
| *RTL-052 | T2, 3, C13, 14, 15, 16 | TRANSFORMER—1st or 2nd i-f transformer with capacitors molded in base |
| *RTO-108 | T4 | TRANSFORMER—Audio output transformer |
| RWL-005 | | POWER CORD—A-C line cord and plug |
| *S400D | L5 | SPEAKER—4-inch PM loudspeaker |

| MISCELLANEOUS MECHANICAL PARTS | | |
|---------------------------------------|--|-----------------------------------------------|
| RAD-078 | | BRACKET—Ferrite antenna mounting bracket |
| RAX-028 | | BRACKET—Latch bracket and spring |
| *RDC-032 | | DIAL CORD—Fine nylon dial cord, 25 yards bulk |
| RDP-061 | | POINTER—Dial pointer |

| Cat. No. | Symbol | Description |
|------------------------------------------------|--------|-------------------------------------------------------------|
| MISCELLANEOUS MECHANICAL PARTS (Cont'd) | | |
| RDS-107 | | DIAL SCALE |
| RHB-016 | | STUD—Chassis cover mounting stud |
| *RHC-008 | | CLIP—1 inch electrolytic filter capacitor mounting clip |
| RHI-017 | | INSULATOR—Power cord strain relief insulator |
| *RHM-001 | | WASHER "C" washer for tuning shaft |
| *RHM-052 | | CLIP—Tinnerman speaker mounting clip |
| RHS-083 | | SCREW—Round-head Phillips screw for mounting latch clip |
| RII-060 | | INSULATOR—Tuning gang mounting insulator (top) |
| RII-061 | | INSULATOR—Tuning gang mounting insulator (bottom) |
| RII-065 | | INSULATOR—Fiber bushing for mounting handle ends to chassis |
| RMC-002 | | CLIP—Oscillator coil mounting clip |
| *RMC-053 | | CLIP—Back cover latch clip |
| *RMS-130 | | SPRING—Dial cord tension spring |
| RMX-183 | | SHAFT—Tuning shaft and bushing |

| CABINET PARTS | | |
|----------------------|--|-----------------------------------------------------------------------------|
| RAB-163 | | BACK—Maroon plastic cabinet back for Model 605 |
| RAB-164 | | BACK—Green plastic cabinet back for Model 606 |
| RAC-095 | | CABINET—Maroon plastic cabinet less back cover, hinges, etc., for Model 605 |
| RAC-096 | | CABINET—Green plastic cabinet less back cover, hinges, etc., for Model 606 |
| RAC-097 | | COVER—Front dial cover, plastic |
| RAG-044 | | GRILLE CLOTH—Maroon grille cloth mounted on cardboard |
| RAG-045 | | GRILLE CLOTH—Green grille cloth mounted on cardboard |
| RAI-008 | | COVER STOP—Black rubber block |
| RDK-252 | | KNOB—Green plastic knob with clip |
| RDK-253 | | KNOB—Fawn plastic knob with clip |
| *RHC-036 | | CLIP—Tinnerman cover mounting clip |
| *RHE-010 | | EYELET—For mounting front cover |
| *RHI-016 | | HINGE—Back hinge |
| *RHN-020 | | POST—Mounts handle bar to handle end |
| *RHR-013 | | RIVET—For cabinet back hinge |
| *RHS-081 | | SCREW—Mounts handle bar to handle end |
| RHS-084 | | SCREW—For mounting cabinet catch |
| *RHY-034 | | HANDLE END—Chromium plated end |
| *RHY-035 | | HANDLE BAR—Fawn plastic rod for handle |
| *RHY-036 | | HANDLE BAR—Green plastic rod for handle |
| RML-051 | | LATCH—Front cover release |
| RMP-031 | | PIVOT ROD—Brass rod, .062 in. x $1\frac{1}{4}$ in. long for latch |
| RMS-244 | | SPRING—Left spring for front cover |
| RMS-245 | | SPRING—Right spring for front cover |

RADIO CIRCUIT ALIGNMENT

EQUIPMENT REQUIRED:

- | | |
|------------------------|-----------------------|
| Signal generator | Insulated screwdriver |
| Output meter | Isolation transformer |
| .05 mf paper capacitor | A battery* |

PROCEDURE:

R-F and Oscillator adjustments can be easily made with the chassis in the cabinet; to make I-F adjustments, remove the chassis from the cabinet, unsolder the AVC wires from the antenna and the tuning capacitor frame, remove the metal shield from the bottom of the chassis, resolder the AVC wires to the antenna and tuning capacitor again before aligning.

With the tuning gang condenser fully closed, slip the dial pointer along the dial string until it points to the small index mark on the dial just below the 550 kc position.

Connect the output meter across the voice coil terminals of the speaker. If the lowest range on your output meter is greater than 3 volts, better peak indications can be had by connecting

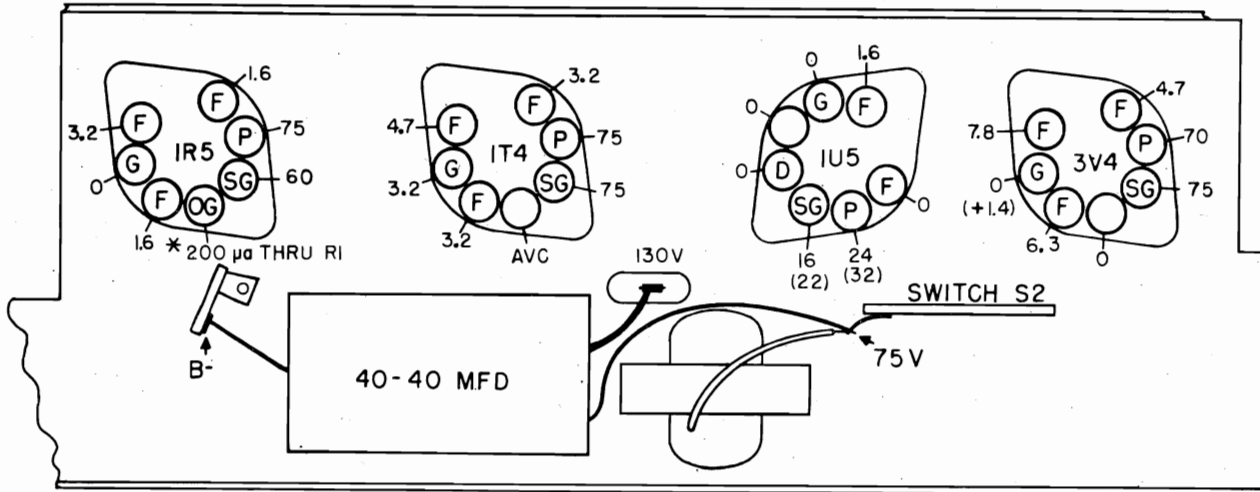
the output meter to the plate of the output tube (pin 2 of 3S4 tube) through a series .05 capacitor and using the 50-volt scale. Since the bottom shield must be in place for the RF section, alignment, connect the .05 capacitor to the tube pin as follows: Slip a piece of spaghetti over one lead of the capacitor, leaving about $\frac{3}{16}$ " of bare wire at the end; carefully bend the bare end around pin 2 of the 3S4 in a tight-fitting loop; re-insert the tube in its socket.

During I-F alignment, the ground lead from the signal generator should be connected to B-, and the signal lead to the proper grid through a .05 capacitor. For R-F adjustments the input signal should be inductively coupled to the receiver antenna by connecting a 4-turn, 6-inch diameter loop of bell wire to the signal generator terminals. The loop and the antenna should be spaced about a foot apart, and arranged coaxially: that is, the antenna points through the center of the loop.

The volume control should be at maximum during all adjustments, and the signal generator output should be adjusted so that the output meter never reads more than .4 volt at the speaker, or about 20 volts at the plate of the output tube. Tune all adjustments for maximum output.

* Make the final ANT. trimmer adjustment with the chassis installed in the cabinet and an "A" battery in position and connected, since the battery affects the tuning of the antenna.

MODELS 605, 606



VOLTAGES MEASURED WITH 20,000Ω/VOLT METER TO B-; NO RF OR IF SIGNAL, SET OPERATING FROM 60 ~ 120 VOLT LINE.
 * DIRECT VOLTAGE READING UNRELIABLE. (22) INDICATES VTVM READING.

Fig. 2. Socket Voltages

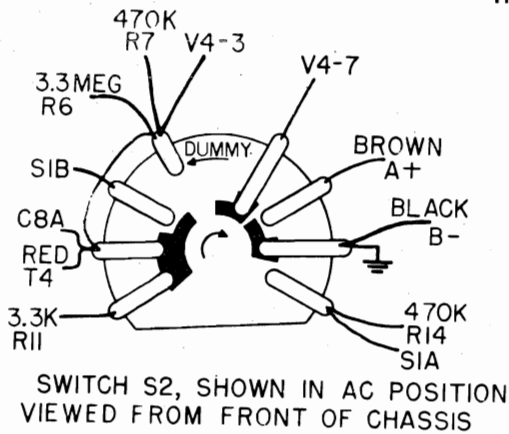


Fig. 3. Battery-line Switch Wiring

ALIGNMENT CHART

| Step | Sig. Gen. Connected to | Sig. Gen. Frequency | Dial Setting | Adjust For Max. Output |
|------|------------------------|---------------------|------------------|------------------------|
| 1 | 1T4 Grid Pin 6 | 455 kc | 550 kc | Cores of I-F Trans. T3 |
| 2 | IR5 Grid Pin 6 | 455 kc | 550 kc | Cores of I-F Trans. T2 |
| 3 | IR5 Grid Pin 6 | 455 kc | 550 kc | Re-adjust T2 and T3 |
| 4 | Inductively Coupled | 1620 kc | 1620 kc | Osc. trimmer C2B |
| 5 | Inductively Coupled | 1500 kc | Tune for maximum | R-F trimmer C1B |

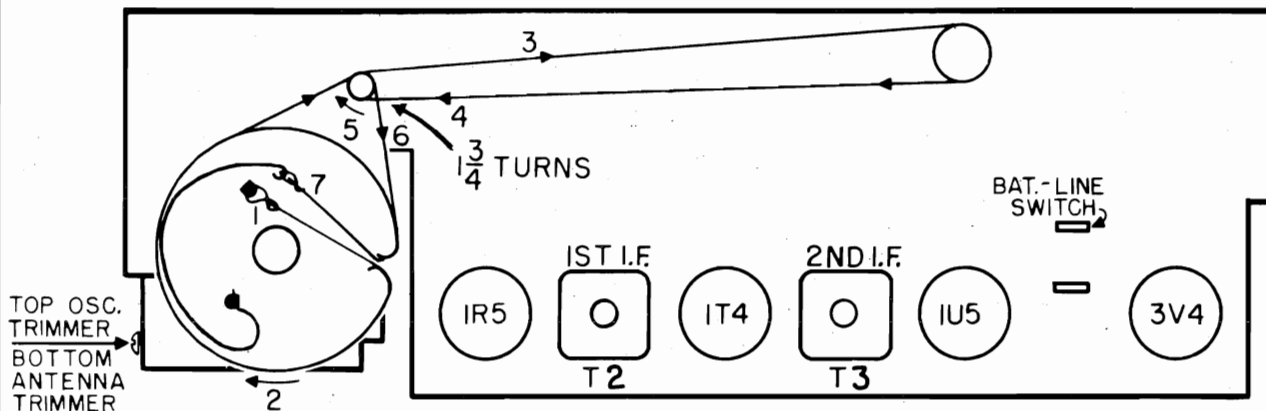


Fig. 4. Dial Stringing and Tube and Trimmer Location



Model 610 Maroon
Model 611 Green

SPECIFICATIONS

| | |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CABINET: | Composition Plastic Height 8 7/8 inches Depth 5 7/8 inches Width 12 inches Weight (with batteries) 11 pounds |
| POWER SUPPLY: | Battery Eveready No. 756, or equivalent AC or DC operation 105-115 volts Frequency (on AC) 60 cycles Power Consumption 25 watts |
| OPERATING FREQUENCIES: | Broadcast Band 540-1600 kc I-F Amplifier 455 kc |
| POWER OUTPUT: | Undistorted 180 milliwatts Maximum 250 milliwatts |
| LOUDSPEAKER: | Type Alnico PM Outside Cone Diameter 4 inches Voice Coil Impedance (400 cycles) 3.2 ohms |
| TUBE COMPLEMENT: | R-F Amplifier 1T4 Oscillator-Converter 1R5 I-F Amplifier 1T4 Detector Audio Amplifier 1U5 Power Amplifier 3V4 Dial Lamp Mazda No. 49 |

GENERAL INFORMATION

These portable radios are five-tube superheterodyne broadcast receivers with a range of 540 to 1600 kc. The power source may be either 105-115 volts, 50-60 cycles a-c, or d-c, when a power outlet is available. The receiver will also operate from its battery source, thus making it independent of external electrical power, providing excellent operation in any location where external power is not available.

If the dial light is burnt out or missing, reduced performance will be noted on AC and DC operation. However, battery operation will be normal.

When this receiver is stored for long periods of time, the power plug should be removed from the chassis outlet.

BATTERY—AC OR DC OPERATION.

The center knob turns on the battery, provided that the power plug is well inserted into the socket in the chassis.

For a-c or d-c supply (105-115 volts, 50- to 60-cycle operation), the same knob switches on the power when the power plug is pulled out of its socket in the chassis and inserted into the house outlet.

ELECTRICAL CIRCUIT ALIGNMENT

EQUIPMENT REQUIRED:

1. Test Oscillator with Tone Modulation.
2. A-C Output Meter.
3. Paper Capacitor .05 Mf.
4. Insulated Screwdriver.
5. Coupling Loop for Test Oscillator (see text).
6. Isolation Transformer.

PROCEDURE—GENERAL.

1. The Alignment Chart gives the alignment procedure with

correct sequence of trimmer adjustments. The chassis must be removed from the cabinet during i-f alignment. The locations of the i-f and r-f adjustments are shown in Figure 2.

2. The "low" side of the test oscillator output should be connected to B minus; the "high" side should be connected as indicated in the alignment chart. The test oscillator output signal should be attenuated so that the output meter reading never exceeds 1/2 volt. Connect the capacitor listed in column 2 of the alignment chart between the "high" side of the test oscillator and the point of input specified.

PRECAUTION: Use an isolating transformer between the power supply and the radio receiver input. The use of an isolating capacitor is not recommended, as a-c through the capacitor will introduce hum modulation and/or create the possibility of a burned out signal generator attenuator.

3. The output meter should be connected across the voice coil terminals of the speaker.

4. During the entire alignment procedure the volume control should be rotated clockwise to its maximum position.

5. For alignment of the antenna trimmer, the input signal should be inductively coupled to the radio loop antenna by connecting a 4-turn, 6-inch diameter loop of bell wire across the signal generator output terminals, and locate the loop about one foot from the radio loop for alignment. The position of the loop with respect to the radio loop should not be changed during any one set of adjustments to prevent possible errors in peak readings.

6. The antenna loop acquires a different inductance when the back is closed. Therefore, the adjustment of the antenna trimmer has to be made with the back closed, through the opening on the right side of the cabinet which normally is closed by a plug button. After adjustments have been completed, the plug button has to be put in place again.

ALIGNMENT CHART

| Step | Test-Osc. Connected to: | Test-Osc. Setting | Pointer Setting | Adjust for Maximum Output |
|-----------------------------------------------------|-------------------------------------------------------------------------|-------------------|---------------------------|---------------------------------------------------------------|
| 1 | 1T4 (V3) I-F grid (pin 6) in series with .05 mfd. and B- bus. | 455 KC | 550 KC | Iron cores of I-F Transformer T2. |
| 2 | 1R5 (V2) converter grid (pin 6) in series with .05 mfd. and B- bus. | 455 KC | 550 KC | Iron cores of I-F Transformer T1. |
| 3 | | 1670 KC | Gang condenser fully open | C1B oscillator trimmer for maximum. |
| 4 | 1T4 (V1) R-F amplifier grid (pin 6) in series with .05 mfd. and B- bus. | 1500 KC | For maximum output | C1C R-F trimmer for maximum. |
| 5 | | 580 KC | | Core of T4 for maximum. |
| 6 Repeat steps 4 and 5 to give maximum performance. | | | | |
| 7 | Inductively coupled. See note 5. | 1500 KC | For maximum output | C1A trimmer for maximum with cabinet back closed. See Note 6. |

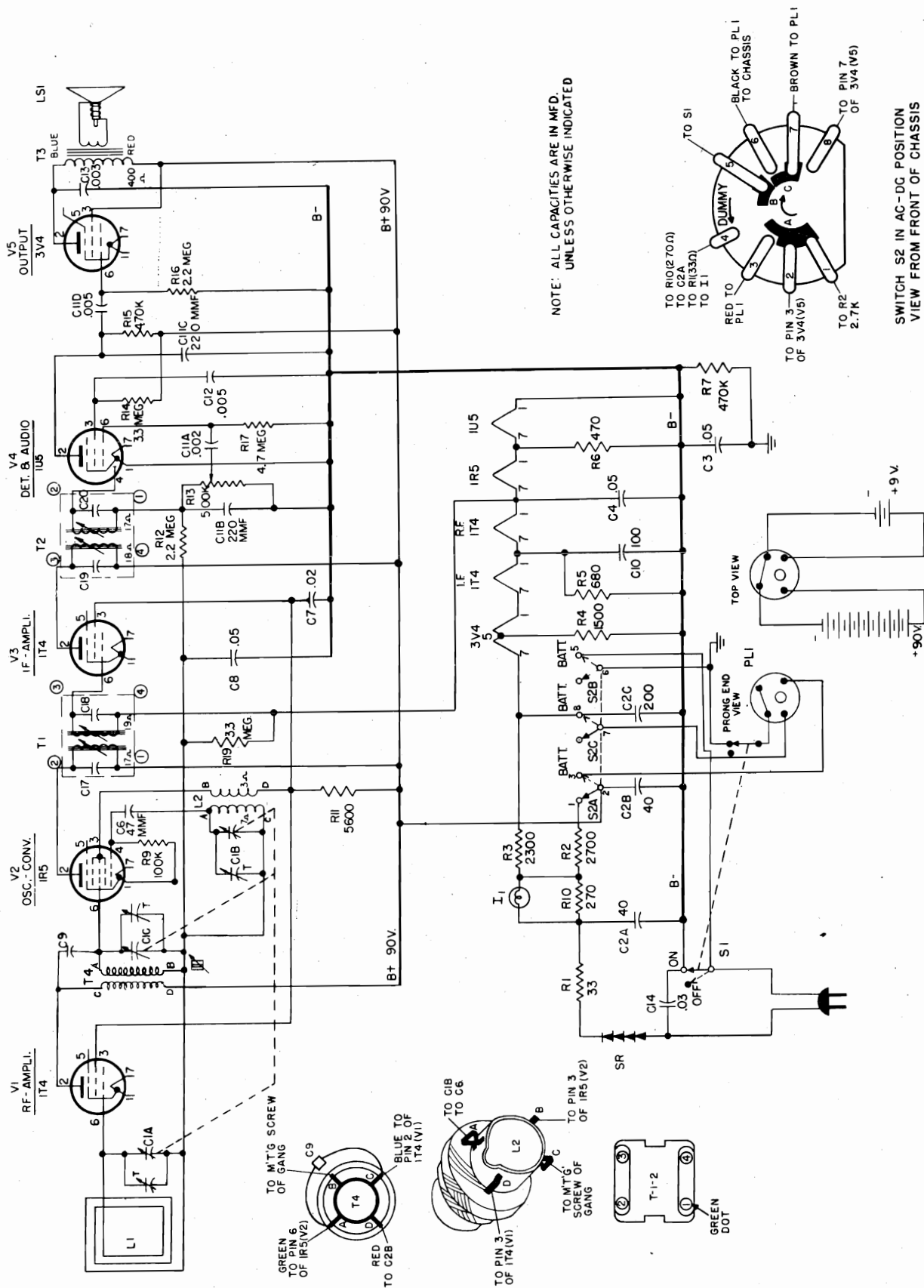


Fig. 1. Schematic Diagram

STAGE GAINS AND VOLTAGE CHECKS

In order to check circuit performance and facilitate trouble shooting, the measurement of stage gain by means of a vacuum voltmeter or similar measuring device is recommended. The gain values listed may have tolerances of 20%. Readings should be taken with low signal input so that the AVC is not effective.

(1) R-F STAGE GAINS.

- 1T4 R-F Grid (Pin 6) to 1R5 Grid (Pin 6)12 @ 1000 KC
- 1R5 Grid (Pin 6) to 1T4 Grid (Pin 6)18 @ 1000 KC
- 1T4 Grid (Pin 6) to 1U5 Diode Plate (Pin 4) . . .45 @ 455 KC

(2) AUDIO GAIN.

.020 volt at 400 cycles across volume control (R13) with control set at maximum will give approximately .05 watts output across speaker voice coil.

(3)

D-C voltage developed across oscillator grid resistor (R9) averages -8 volts at 1000 kc with respect to B-.

(4) SOCKET PIN VOLTAGES.

Figure 4 shows voltages from all tube pins to B-. Voltage readings much lower than those specified may help localize defective components or tubes.

(5) MULTIPLE CERAMIC CAPACITOR.

This multiple capacitor unit is of the ceramic capacitor type and contains five capacitors C11A, B, C, D and C12. This unit, RCW-3015, is illustrated in Figure 2 for lead identification. If during service the ceramic capacitor unit is found to be defective, the entire unit may be replaced by the identical part, RCW-3015, or the defective section may be located and disconnected from the receiver circuit and a single universal capacitor of equivalent electrical value used in its place.

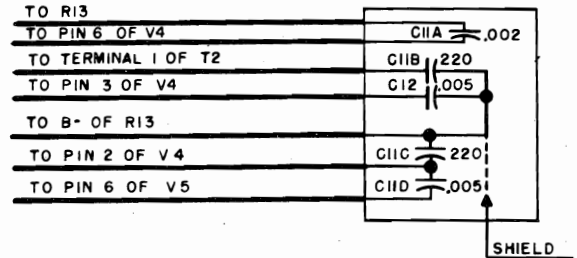


Fig. 2. Connections for Capacitor RCW-3015

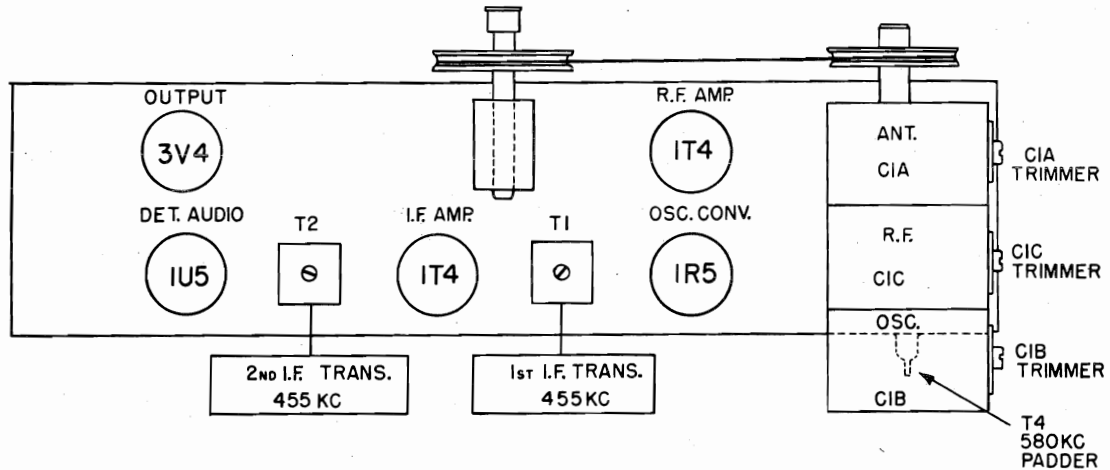
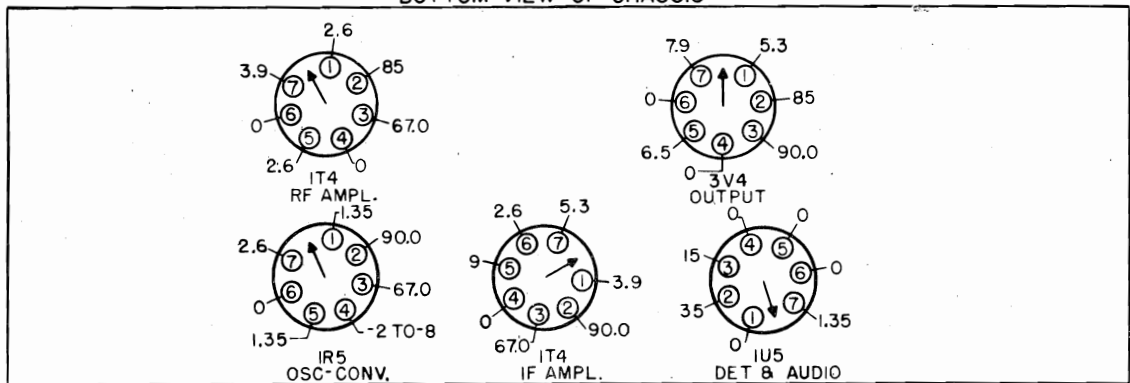


Fig. 3. Tube and Trimmer Location

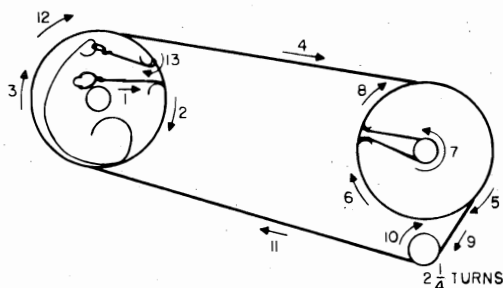
BOTTOM VIEW OF CHASSIS



DC VOLTAGES TO B- UNLESS OTHERWISE SPECIFIED. ALL ALL RATINGS ARE A.C. OPERATION MEASURED WITH REFERENCE TO B-. RATINGS FOR BATTERY ARE SIMILAR TO AC RATINGS. VOLTAGE IS MEASURED WITH 20,000 OHMS PER VOLT METER.

Fig. 4. Socket Voltages

MODELS 610, 611



GANG FULLY OPEN

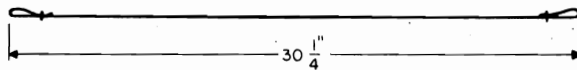


Fig. 5. Dial Stringing

REPLACEMENT PARTS LIST

| Cat. No. | Symbol | Description | Cat. No. | Symbol | Description |
|---------------------------------------|-----------------------|----------------------------------------------------------------------------|------------------------------------------------|--------|---------------------------------------------------------------|
| CAPACITORS | | | MISCELLANEOUS MECHANICAL PARTS (Cont'd) | | |
| *RCE-095 | C2A, B, C | 40, 40, 200 mfd., 150, 150; 25 volts, electrolytic | RHB-015 | | PLUG BUTTON—For 611 |
| RCE-131 | C10 | 100 mfd., 6 v., electrolytic | *RHC-015 | | CLIP—For oscillator coil |
| RCT-051 | C1A, B, C | Tuning capacitor | RHE-010 | | EYELET—For cabinet catch |
| *RCW-1073 | C6 | 47 mmf., ceramic | *RHG-018 | | GROMMET—For mounting tuning condenser |
| RCW-3015 | C11A, B, C, C11D, C12 | Ceramic | *RHI-011 | | STRAIN RELIEF—On power cord |
| *RCW-3056 | C9 | 4.7 mmf., ceramic | RHI-016 | | HINGE—Cabinet hinge |
| *UCC-037 | C13 | .003 mf., 600 v., paper | RHJ-005 | | SPACER—For mounting gang |
| *UCC-041 | C7 | .02 mf., 600 v., paper | *RHM-043 | | RING—Retaining ring for pointer shaft |
| *UCC-042 | C14 | .03 mf., 600 v., paper | RHN-020 | | POST—Screw post for handle |
| *UCC-045 | C3, 4, 8 | .05 mfd., 600 v., paper | *RHR-002 | | RIVET—For cabinet back catch |
| RESISTORS | | | RHR-013 | | RIVET—For cabinet hinge |
| RRC-155 | R13, S1A, S1B | VOLUME CONTROL AND SWITCH | *RHS-005 | | SPACER—For mounting tuning condenser |
| *RRW-027 | R3 | 2300 ohms, 10 w., w.w. | RHS-081 | | SCREW—Handle screw extends through handle |
| *URD-041 | R6 | 470 ohms, 1/2 w., carbon | RHS-082 | | SCREW—Hex-head screw #6 x 5/8 in. long for cabinet back catch |
| *URD-045 | R5 | 680 ohms, 1/2 w., carbon | *RJS-024 | | PLATE—Mounting plate for electrolytic capacitor (C2) |
| *URD-053 | R4 | 1500 ohms, 1/2 w., carbon | RMC-053 | | CATCH—For cabinet back |
| *URD-067 | R11 | 5600 ohms, 1/2 w., carbon | *RMS-120 | | SPRING—Dial cord tension spring |
| *URD-097 | R9 | 100,000 ohms, 1/2 w., carbon | RMU-074 | | SHAFT—Tubular shaft for tuning control |
| *URD-113 | R7, 15 | 470,000 ohms, 1/2 w., carbon | CABINETS AND CABINET PARTS | | |
| *URD-129 | R12, 16 | 2.2 meg., 1/2 w., carbon | RAB-161 | | BACK—Cabinet back (maroon) for 610 |
| *URD-133 | R14, 19 | 3.3 meg., 1/2 w., carbon | RAB-162 | | BACK—Cabinet back for Model 611 |
| *URD-137 | R17 | 4.7 meg., 1/2 w., carbon | RAC-092 | | FRONT—Cabinet front (maroon) for 610 |
| *URE-013 | R1 | 33 ohms, 1 w., carbon | RAC-093 | | FRONT—Cabinet front (green) for Model 611 |
| *URE-059 | R2 | 2700 ohms, 1 w., carbon | RAC-094 | | COVER—Chassis cover |
| *URF-035 | R10 | 270 ohms, 2 w., carbon | RAD-077 | | BRACKET—For mounting cabinet handle |
| MISCELLANEOUS ELECTRICAL PARTS | | | RAG-042 | | GRILLE CLOTH—Maroon, for Model 610 |
| *RER-001 | SR | RECTIFIER—Selenium rectifier | RAG-043 | | GRILLE CLOTH—Gray, for Model 611 |
| *RHS-010 | | SHIELD—Tube shield for V4 | *RDC-032 | | DIAL CORD |
| RII-065 | | INSULATOR—For handle | RDE-116 | | ESCUTCHEON—Cabinet escutcheon for Model 610 |
| *RJP-025 | PL1 | PLUG—Battery plug (male) | RDE-117 | | ESCUTCHEON—For Model 611 |
| *RJS-100 | | SOCKET—Tube socket for V2 | RDK-248 | | KNOB—ON-OFF-VOLUME for Model 610, fawn color |
| *RJS-124 | | SOCKET—Tube socket for V4 and V5 | RDK-249 | | KNOB—ON-OFF-VOLUME knob for Model 611, green color |
| *RJS-125 | | SOCKET—Tube socket for V1, V3 | RDK-250 | | KNOB—Tuning knob for Model 610, fawn color |
| RJX-031 | | SOCKET—Dial light socket | RDK-251 | | KNOB—Tuning knob for Model 611, green color |
| *RLB-030 | T4 | TRANSFORMER—RF coupling | RHF-011 | | FOOT—Cabinet foot button (maroon) for Model 610 |
| *RLC-068 | L2 | LOOP | RHF-012 | | FOOT—Cabinet foot button (gray) for Model 611 |
| RLL-045 | L1 | LOOP | RHY-034 | | HANDLE END |
| RSW-088 | S2A, B, C | SWITCH—AC, DC to battery switch | RHY-035 | | HANDLE—Fawn colored for Model 610 |
| *RTL-052 | T1 | TRANSFORMER—1st IF transformer | RHY-036 | | HANDLE—Green, for Model 611 |
| *RTL-079 | T2 | TRANSFORMER—2nd IF transformer | | | |
| *RTO-050 | T3 | TRANSFORMER—Output transformer | | | |
| *RWL-005 | | POWER CORD | | | |
| *S-400C-19 | | SPEAKER—4-inch speaker | | | |
| MISCELLANEOUS MECHANICAL PARTS | | | | | |
| RDS-106 | | DIAL SCALE | | | |
| RDP-060 | | DIAL POINTER | | | |
| RDX-047 | | DRUM—Pointer drum and shaft assembly, fastened with retaining ring RHM-043 | | | |
| RHB-006 | | PLUG BUTTON—For 610 | | | |

*PARTS USED ON PREVIOUS MODELS.

Even if the "A" battery is not connected to the circuit it should be in place in the cabinet for optimum RF pick-up. The loop has been tuned with the battery in place and becomes detuned if the battery is removed.



SPECIFICATIONS

CABINET:

Model.....755
 Material.....Wood
 Color.....Mahogany
 Height.....34 1/8 in.
 Width.....33 1/8 in.
 Depth.....16 in.

ELECTRICAL RATING:

Voltage.....105-125
 Frequency.....60 cycles
 Wattage (Radio only).....85 watts
 (With phono).....100 watts

OPERATING FREQUENCIES:

AM Band.....540-1600 kc
 FM Band.....88-108 mc

INTERMEDIATE FREQUENCIES:

AM.....455 kc
 FM.....10.7 mc

AUDIO POWER OUTPUT (120 VOLTS LINE):

Undistorted.....6.5 watts
 Maximum.....8 watts

LOUDSPEAKER:

Type.....Alnico PM
 Size.....12 inches
 Voice Coil Impedance at 400 cycles.....3.2 ohms

RECORD CHANGER.....Model P15 (33 1/3, 45 and 78 RPM)

PHONOGRAPH PICKUP:

Type.....Dual stylus, variable reluctance
 DC Resistance.....340 ohms

ANTENNA:

AM.....Built-in loop
 FM.....Cabinet antenna or 300-ohm FM ant.
 If it is necessary to install an external FM antenna, the brown wire extending from the rear of the cabinet should be disconnected from the antenna terminal strip.

TUBE COMPLEMENT:

(V1) R-F Amplifier.....6BA6
 (V2) Osc. and FM Converter.....12AT7
 (V3) AM Converter and 1st FM I-F Amplifier.....6BA6
 (V4) I-F Amplifier.....6BA6
 (V5) FM Limiter.....6AU6
 (V6) FM Discriminator, AM Detector and Audio Amplifier.....6T8
 (V7) Phono Preamplifier.....6AU6
 (V8) Phase Inverter.....6J5
 (V9) and (V10) Power Amplifier.....6V6 (2)
 (V11) Rectifier.....5Y3GT
 Dial Lamps.....Two Mazda No. 44

RECORD CHANGER SERVICE DATA:

Complete service information for the Model P15 record changer can be found in ER-S-P15.

STAGE GAINS

Stage gain measurements using a vacuum tube voltmeter or oscilloscope with a calibrated signal generator may be used to check circuit performance and isolate trouble. Use small signals to eliminate AVC action. Tolerance $\pm 20\%$. Signal applied through 3.3 K resistor and 1000 mmfd. capacitor in series.

| STAGE | GAIN AM | GAIN FM |
|-----------------|--------------|--------------|
| Ant. to V1 Grid | ..... | 1 (98 MC) |
| V1-V2 Grid | ..... | 6 (98 MC) |
| V1-V3 Grid | 14 (1000 KC) | ..... |
| V2-V3 Grid | ..... | 10 (10.7 MC) |
| V3-V4 Grid | 70 (455 KC) | 45 (10.7 MC) |
| V4-V5 Grid | ..... | 20 (10.7 MC) |
| V4-V6 Grid | 80 (455 KC) | ..... |

AUDIO GAIN:

0.1 volt at 400 cps across the volume control will give approximately 1/2 watt (1.25 v. a-c) across the speaker voice coil.

OSCILLATOR GRID BIAS:

D-C voltage developed across R28. Use 100K resistor to isolate meter. Tolerance $\pm 20\%$.

| | | |
|---------|---------|---------------------|
| | VTVM | 20K ohms/volt meter |
| 1000 KC | 7 volts | 4 volts |
| 98 MC | 3 volts | 2 volts |

HUM MEASUREMENT:

Hum measured across the voice coil of the speaker with the volume control set at minimum and band switch in the AM position should not exceed 7 millivolts.

On FM position, ground the limiter grid through a .01 mfd. capacitor. Hum should not exceed 15 millivolts.

MODEL 755

METER ALIGNMENT CHART

| Step No. | Signal Generator Frequency | Signal Input Point | Band Switch Setting | Dial Setting | Adjust | See Note |
|---------------------|----------------------------------------------------------------------|-------------------------------------------|---------------------|---------------------|----------------------------------------------------------------------------|--------------------------------------------------|
| AM ALIGNMENT | | | | | | |
| 1 | 455 KC | Lug on C1E. Conv. tuning condenser | AM | C1 completely open. | Primary and secondary cores of T5 and T2 for maximum. | 3, 4 |
| 2 | 1620 KC | Loop Ant. See Note 5. | | | Adjust OSC. C16 for maximum. | 3, 4, 5, 7, 8 |
| 3 | 1500 KC | Loop Ant. See Note 5. | | | Rock C1 for max. signal | Adjust RF C25, and ANT. C9 trimmers for maximum. |
| FM ALIGNMENT | | | | | | |
| 4 | 10.7 MC AM or FM See Note 9. | 6BA6 grid (Pin 1 of V4) thru .01 mfd. | FM | ..... | T6 secondary (top core) for minimum. | 3, 4, 6, 9 |
| 5 | | | | | T6 primary (bottom core) for maximum. | |
| 6 | Retune signal generator for null point obtained in step 4 (10.7 MC). | | | | | |
| 7 | 10.7 MC unmodulated. | 6BA6 grid (Pin 1 of V4) thru .01 mfd. | FM | ..... | Core of L10 for maximum. | 1, 2, 10 |
| 8 | | 6BA6 grid (Pin 1 of V3) thru .01 mfd. | | | Primary and secondary cores of T3 for maximum. | |
| 9 | | 12AT7 cathode (Pin 8 of V2) thru .01 mfd. | | | Primary and secondary cores of T1 for maximum. | |
| 10 | 88 MC unmodulated | Dipole terminals. | FM | 88 MC | FM oscillator slug (T9) for maximum. | 1, 2, 7, 11 |
| 11 | 108 MC unmodulated | Dipole terminals. | | 108 MC | Adjust FM oscillator trimmer C13 to 1st peak. | |
| 12 | 108 MC unmodulated | Dipole terminals. | | 108 MC | Adjust FM R-F trimmer (C18) for max. while rocking dial across 108 signal. | |
| 13 | Repeat Steps 10, 11. | | | | | |

EQUIPMENT REQUIRED

1. Signal Generator, General Electric YGS-3 or equivalent.
2. 20,000 ohm-per-volt meter or vacuum tube voltmeter.
3. Output meter.
4. .01 mfd., paper capacitor.
5. 200,000 ohm resistor.
6. Loop of wire. See Note 5.

ALIGNMENT NOTES

1. Use unmodulated signal.
2. Connect 20,000 ohm-per-volt meter or VTVM from the limiter grid Test Point (J5) near V5 to the chassis. Test voltage will be negative. Use 2.5 volt scale. Keep signal generator output low so that meter indicates not more than 1 volt.
3. Use 400 cycle modulation.
4. Connect a standard output meter across speaker voice coil. Turn volume control full on. Keep signal generator output down so that output meter indicates not more than 1/2 watt output during alignment (approximately 1.25 volts a-c).

5. For alignment of the AM oscillator and R-F trimmer, the signal should be inductively coupled to the loop antenna by connecting a four turn, six inch diameter loop of wire across the signal generator terminals, located about one foot from the radio loop antenna.

6. When tuning the secondary of T6, two peaks will be obtained. The center null between the two peaks is the correct setting. As the transformer is tuned either side of 10.7 MC, the meter reading should increase.

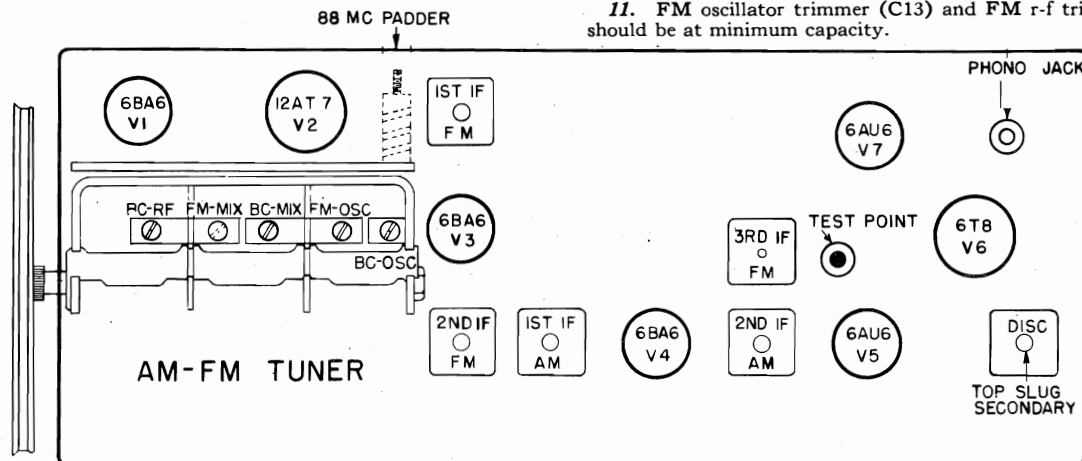
7. Before adjusting oscillator for proper dial calibration, set pointer at index line near 88 MC mark by slipping along dial spring as required. Have tuning gang completely closed.

8. C9 ANT. trimmer to be readjusted after chassis and loop are installed in cabinet. Peak on weak station at approximately 1400 KC.

9. When detuning the signal generator in step 5, two maximum meter readings will be obtained, one on each side of 10.7 MC. The primary of T6 should be aligned to maximum when the signal generator is tuned to the smaller of these two peaks.

10. Make all chassis connections for FM-IF alignment as short as possible.

11. FM oscillator trimmer (C13) and FM r-f trimmer (C9) should be at minimum capacity.



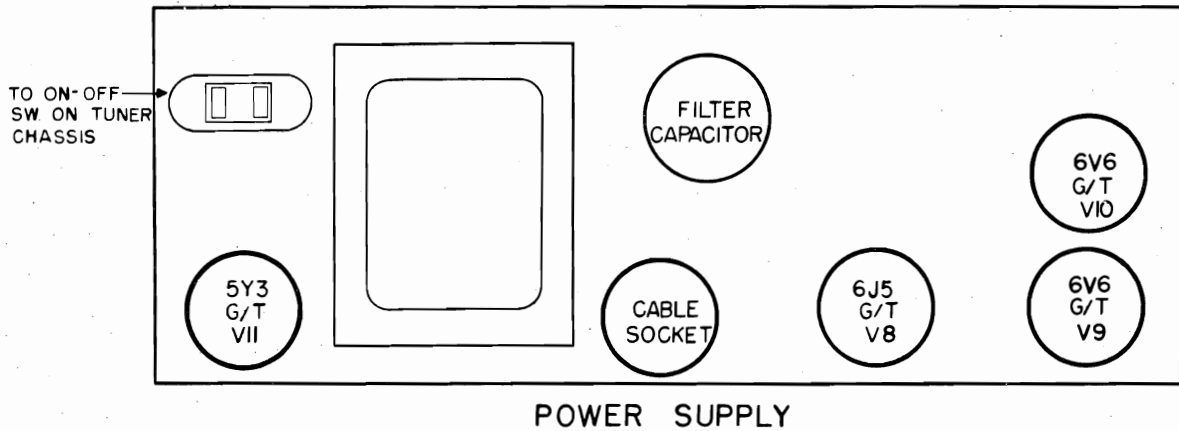


Fig. 1. Tube and trimmer location

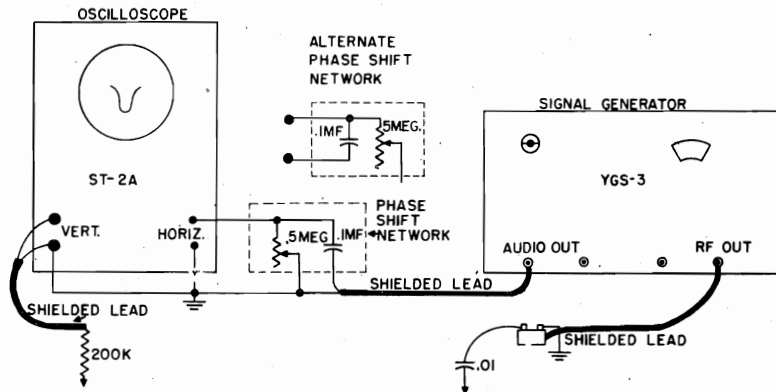


Fig. 2. Visual alignment equipment

PHASE SHIFT NETWORK

Connect 60 cps audio signal from the signal generator to the HORIZONTAL AMPLIFIER terminals on the scope through a phase shift network, as shown in Fig. 2, which permits the

double traces on the scope to be joined together. The alternate phase shift network may be required on scopes other than General Electric Model ST-2A.

VISUAL ALIGNMENT CHART

| Step No. | Signal Generator Frequency | Signal Input Point | Band Switch Setting | Dial Setting | Adjust | See Note |
|---------------------|---------------------------------------------|--------------------------------------|---------------------|--------------------------------------|---------------------------------------------------------------------------|------------|
| AM ALIGNMENT | | | | | | |
| 1 | 455 kc FM mod. ± 20 kc at 60 cps rate | Lug on C1E conv. tuning cond. | AM | ..... | T2 and T5 for max. amplitude of curve. See Fig. 3-A. | 3 |
| 2 | 1620 kc AM mod. with 60 cps. | Inductively coupled to antenna loop. | | Gang C1 completely open. | C16 (BC-Osc.) for steepest slope of straight line on scope. See Fig. 3-C. | 3, 6 |
| 3 | 1500 kc FM mod. ± 20 kc at 60 cps rate. | | | Gang C1 for max. amplitude of curve. | C25 (BC-Mix.) for max. amplitude of curve. See Fig. 3-A. | 3, 4, 5, 6 |

MODEL 775

FM ALIGNMENT

| | | | | | | | |
|----|---------------------------------------------|--------------------------|---------------------|-----------------------------------------------------------------------------|---------------------------------------------------------------------|------|--|
| 4 | | | | | Cores of T1, T3, and L10 for max. amplitude of curve. See Fig. 3-A. | 1 | |
| 5 | 10.7 mc FM mod. \pm .3 mc at 60 cps rate. | Lug on C1B thru .01 mfd. | FM | | Secondary of T6 for symmetry of curve of Fig. 3-B. | 3 | |
| 6 | | | | | Primary of T6 for max. amplitude of positive and negative peak. | 3 | |
| 7 | Repeat Step 5. | | | | | | |
| 8 | 88 mc AM mod. at 60 cps. | FM antenna terminals. | | At 88 mc | Core of T9 for steepest slope. See Fig. 3-C. | 1, 2 | |
| 9 | 108 mc AM mod. at 60 cps. | | At 108 mc | C39 (FM-OSC.) for steepest slope of straight line trace on scope. Fig. 3-C. | 1, 2, 4 | | |
| 10 | 108 mc FM mod. \pm .3 mc at 60 cps rate. | | Rock in C1 for max. | Adjust C18 (FM-MIX) for max. amplitude of response. See Fig. 3-A. | 1, 2, 4 | | |
| 11 | Repeat Steps 8, 9. | | | | | | |

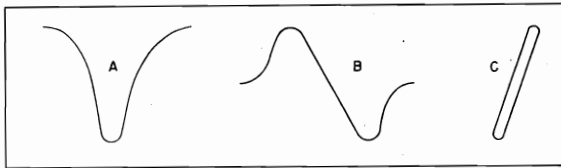


Fig. 3. Alignment curves

EQUIPMENT REQUIRED FOR VISUAL ALIGNMENT

1. General Electric YGS-3 or equivalent sweep generator.
2. General Electric ST-2A scope or equivalent.
3. 200 K, 1/2 watt resistor.
4. 1/2 meg., potentiometer.
5. One .1 paper capacitor.

NOTES FOR VISUAL ALIGNMENT

1. Connect vertical plates of scope to the grid of the limiter

tube (pin 1 of V5) through the Test Point and to chassis. Reduce input from signal generator until "grass" begins to appear on scope.

2. Set pointer at index line near 88 mc mark by slipping pointer along dial string as required. Have tuning gang completely closed.

3. Connect vertical plates of scope at junction of C57 and TONE SW. S2B through 200 K res. Reduce input from signal generator until "grass" begins to appear on scope.

4. In some cases tuning of the converter grid will cause "pulling in" of the oscillator and will change the oscillator frequency. If peaking C9 or C18 as in steps 3 or 10 causes the curve to move off the screen, it is necessary to recalibrate the oscillator as in steps 2 and 9.

5. C9 (BC-RF) trimmer to be adjusted after chassis and loop are installed in cabinet. Peak on weak station at approximately 1400 kc.

6. For alignment of the AM oscillator and r-f trimmers, the signal should be inductively coupled to the loop antenna, by connecting a four-turn, six-inch diameter loop of wire to the signal generator terminals. Locate this loop about one foot from the radio loop antenna.

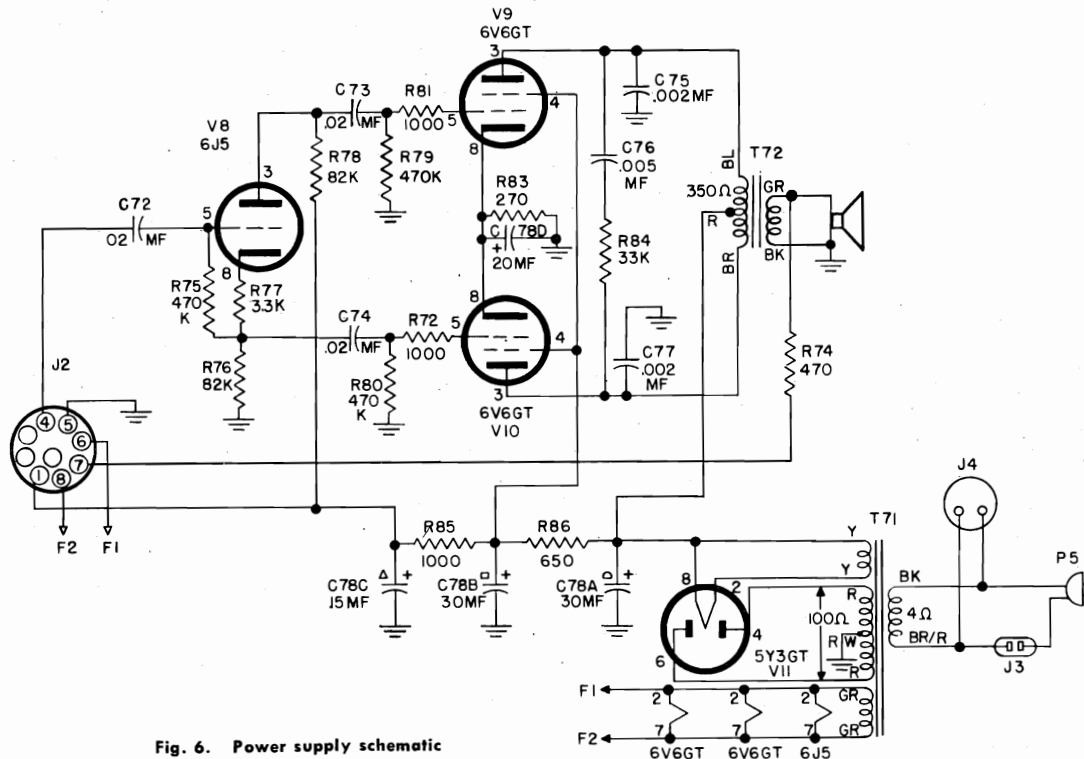


Fig. 6. Power supply schematic

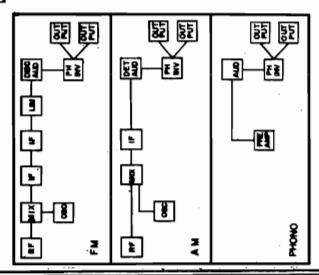
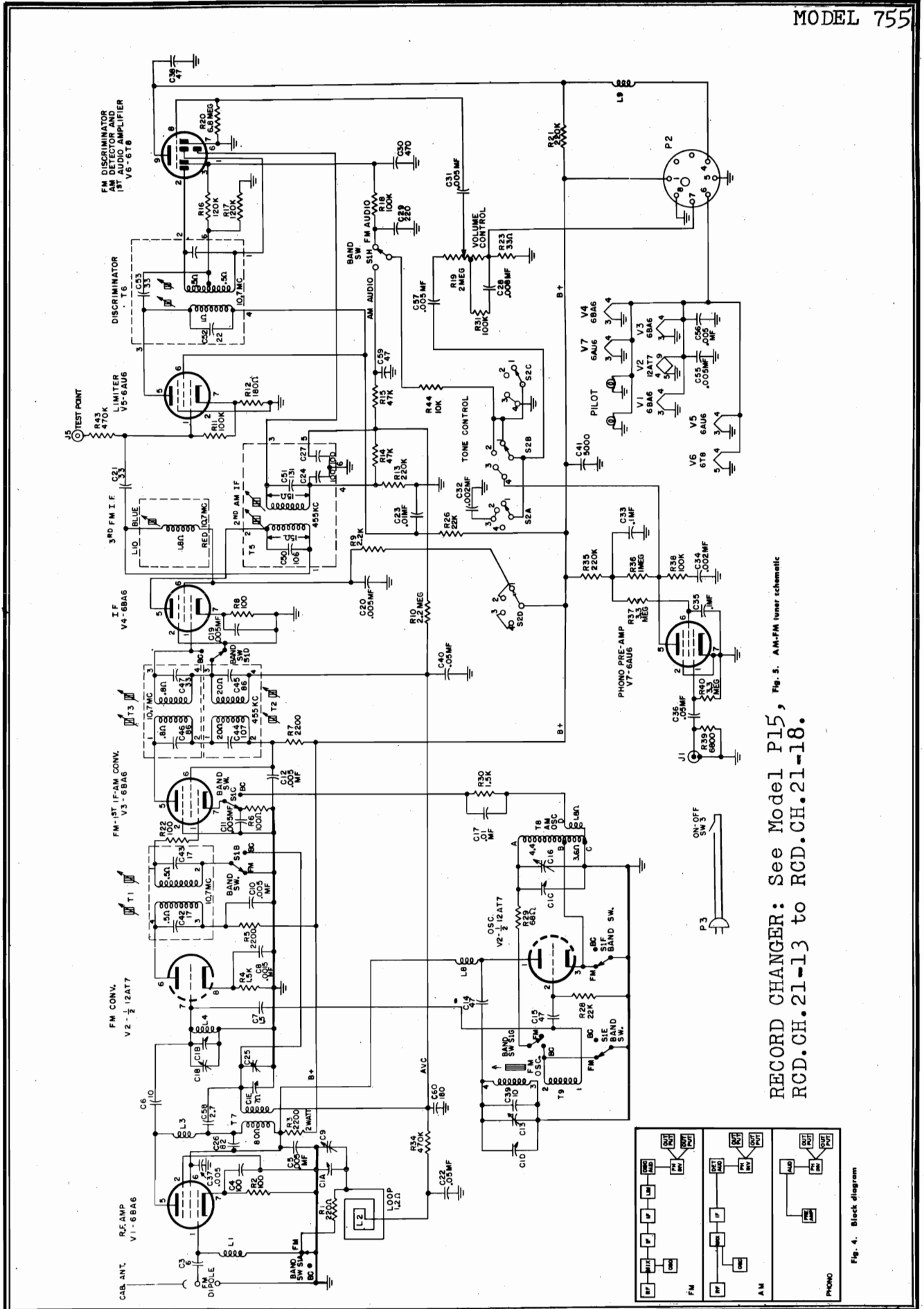


Fig. 4. Block diagram

RECORD CHANGER: See Model P15, Fig. 5. AM-FM tuner schematic RCD.CH.21-13 to RCD.CH.21-18.

MODEL 755

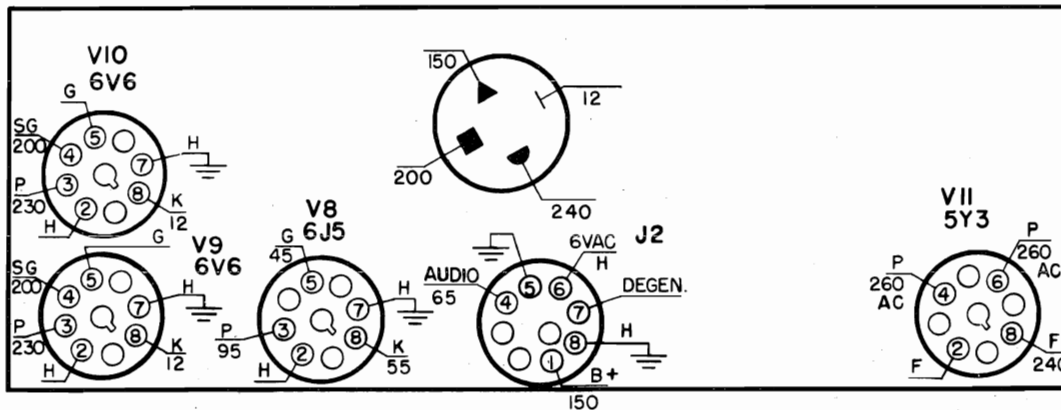
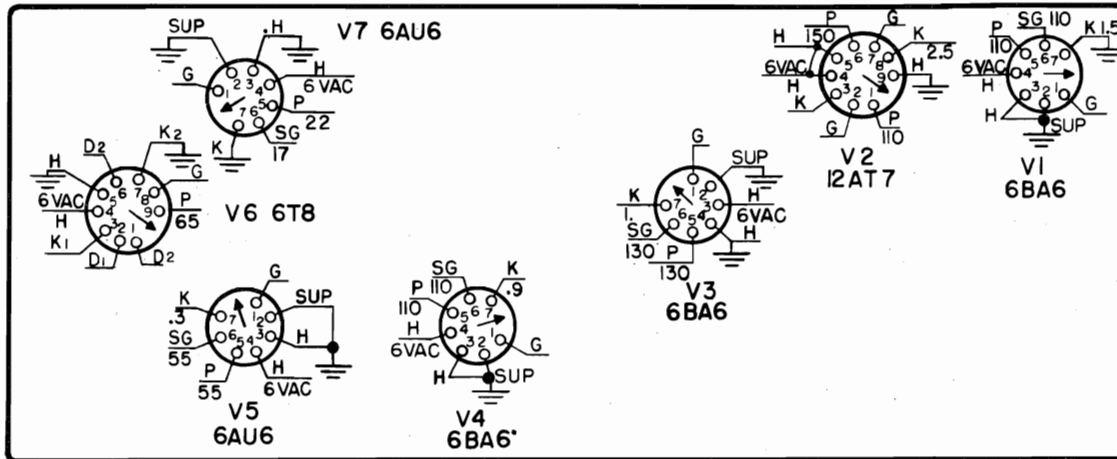


Fig. 7. Socket voltages

SOCKET VOLTAGES—TEST CONDITIONS: Band switch on FM—Tone switch on Radio—117 volts AC line—No signal input—Measured to chassis with 20,000 ohm-per-volt meter, volume

control minimum.

NOTE: 6 volt heater circuit actually grounded at Tuner chassis only.

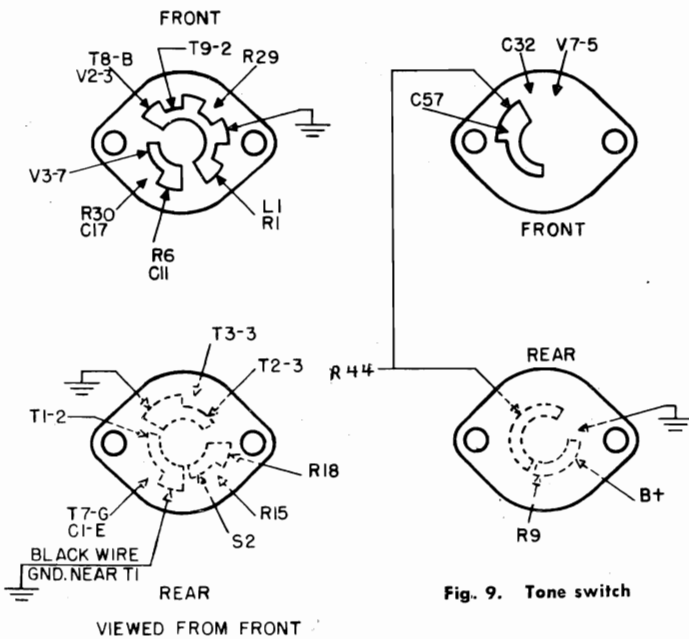


Fig. 8. Band switch

Fig. 9. Tone switch

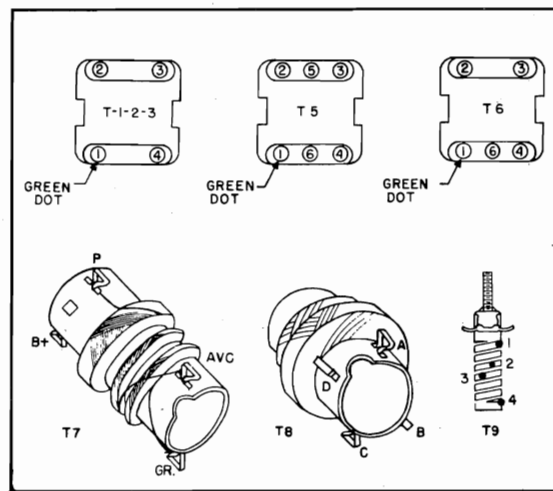


Fig. 10. Transformer connections

MODEL 757

SPECIFICATIONS

CABINET:

Material..... Wood
 Color..... Mahogany
 Height..... 34 in.
 Width..... 32 in.
 Depth..... 16 in.



ELECTRICAL RATING:

Voltage..... 105-125
 Frequency..... 60 cycles
 Wattage (Radio only)..... 85 watts
 (With phono)..... 100 watts

AUDIO POWER OUTPUT (120 VOLTS LINE):

Undistorted..... 6.5 watts
 Maximum..... 8 watts

OPERATING FREQUENCIES:

AM-RF..... 540-1600 kc
 FM-RF..... 88-108 mc
 AM-IF..... 455 kc
 FM-IF..... 10.7 mc

LOUDSPEAKER:

Type..... Alnico PM
 Size..... 12 inches
 Voice Coil Impedance at 400 cycles..... 3.2 ohms

RECORD CHANGER:

Model P16..... 33 $\frac{1}{3}$, 45 and 78 RPM
 Complete service information for the Model P16 record changer can be found in ER-S-P16.

PHONOGRAPH PICKUP:

Type..... Dual stylus, variable reluctance
 DC Resistance..... 340 ohms

ANTENNA:

AM..... Built-in-loop
 FM..... Cabinet antenna or 300-ohm FM ant.
 If it is necessary to install an external FM antenna, the built-in cabinet antenna should be disconnected from the antenna terminals.

TUBE COMPLEMENT:

(V1) R-F Amplifier..... 6BA6
 (V2) Osc. and FM Converter..... 12AT7
 (V3) AM Converter and 1st FM I-F Amplifier..... 6BA6
 (V4) I-F Amplifier..... 6BA6
 (V5) FM Limiter..... 6AU6
 (V6) FM Discriminator, AM Detector and Audio Amplifier..... 6T8
 (V7) Phono Preamplifier..... 6AU6
 (V8) Phase Inverter..... 6J5
 (V9) and (V10) Power Amplifier..... 6V6 (2)
 (V11) Rectifier..... 5Y3GT
 Dial Lamps..... Two Mazda No. 47

STAGE GAINS

Stage gain measurements using a vacuum tube voltmeter or oscilloscope with a calibrated signal generator may be used to check circuit performance and isolate trouble. Use small signals to eliminate AVC action. Tolerance 20%. Signal applied through 3.3K resistor and 1000 mmfd. capacitor in series.

| STAGE | GAIN AM | GAIN FM |
|-----------------|--------------|--------------|
| Ant. to V1 Grid | ..... | 1 (98 MC) |
| V1-V2 Grid | ..... | 6 (98 MC) |
| V1-V3 Grid | 14 (1000 KC) | ..... |
| V2-V3 Grid | ..... | 10 (10.7 MC) |
| V3-V4 Grid | 70 (455 KC) | 45 (10.7 MC) |
| V4-V5 Grid | ..... | 20 (10.7 MC) |
| V4-V6 Grid | 80 (455 KC) | ..... |

OSCILLATOR GRID BIAS:

D-C voltage developed across R28. Use 100K resistor to isolate meter. Tolerance 20%.

| | VTM | 20K ohms/volt meter |
|---------|---------|---------------------|
| 1000 KC | 7 volts | 4 volts |
| 98 MC | 3 volts | 2 volts |

AUDIO GAIN:

0.1 volt at 400 cps across the volume control will give approximately $\frac{1}{2}$ watt (1.25 v. a-c) across the speaker voice coil.

AUDIO POWER:

With a 400-cycle signal driving the 6V6GT output tubes sufficiently to begin to overload the output circuit as shown by distortion of the waveshape on an oscilloscope, an output meter at the speaker terminals should read about 4.5 volts. Maximum possible output is about 5 volts.

HUM MEASUREMENT:

With the volume control at minimum, an oscilloscope connected through a 0.25 mfd. capacitor across C78A shows a 12-volt sawtooth wave; across C78B, 1 volt rounded hump wave. (Both peak-to-peak.)

Hum measured across C78A with a 1000 ohms/volt output meter in series with a 1.0 mf capacitor should not exceed 5 volts RMS; across C78B .2 of a volt.

Hum at the speaker voice coil should not exceed .007 volt RMS.

METER ALIGNMENT CHART

| Step No. | Signal Generator Frequency | Signal Input Point | Band Switch Setting | Dial Setting | Adjust | See Note |
|---------------------|----------------------------------------------------------------------|-------------------------------------------|---------------------|---------------------|----------------------------------------------------------------------------|--------------------------------------------------|
| AM ALIGNMENT | | | | | | |
| 1 | 455 KC | Lug on C1E. Conv. tuning condenser | AM | C1 completely open. | Primary and secondary cores of T5 and T2 for maximum. | 3, 4 |
| 2 | 1620 KC | Loop Ant. See Note 5. | | | Adjust OSC. C16 for maximum. | 3, 4 5, 7, 8 |
| 3 | 1500 KC | Loop Ant. See Note 5. | | | Rock C1 for max. signal | Adjust RF C25, and ANT. C9 trimmers for maximum. |
| FM ALIGNMENT | | | | | | |
| 4 | 10.7 MC AM or FM See Note 9. | 6BA6 grid (Pin 1 of V4) thru .01 mfd. | FM | ..... | T6 secondary (top core) for minimum. | 3, 4, 6, 9 |
| 5 | | | | | T6 primary (bottom core) for maximum. | |
| 6 | Retune signal generator for null point obtained in step 4 (10.7 MC). | | | | | |
| 7 | 10.7 MC unmodulated. | 6BA6 grid (Pin 1 of V4) thru .01 mfd. | FM | ..... | Core of L10 for maximum. | 1, 2, 10 |
| 8 | | 6BA6 grid (Pin 1 of V3) thru .01 mfd. | | | Primary and secondary cores of T3 for maximum. | |
| 9 | | 12AT7 cathode (Pin 8 of V2) thru .01 mfd. | | | Primary and secondary cores of T1 for maximum. | |
| 10 | 88 MC unmodulated | Dipole terminals. | FM | 88 MC | FM oscillator slug (T9) for maximum. | 1, 2, 7, 11 |
| 11 | 108 MC unmodulated | Dipole terminals. | | 108 MC | Adjust FM oscillator trimmer C13 to 1st peak. | |
| 12 | 108 MC unmodulated | Dipole terminals. | | 108 MC | Adjust FM R-F trimmer (C18) for max. while rocking dial across 108 signal. | |
| 13 | Repeat Steps 10, 11. | | | | | |

METER ALIGNMENT

EQUIPMENT REQUIRED

1. Signal Generator, General Electric YGS-3 or equivalent.
2. 20,000 ohm-per-volt meter or vacuum tube voltmeter.
3. Output meter.
4. .01 mfd., paper capacitor.
5. 200,000 ohm resistor.
6. Loop of wire. See Note 5.

ALIGNMENT NOTES

1. Use unmodulated signal.
2. Connect 20,000 ohm-per-volt meter or VTVM from the limiter grid Test Point (J5) near V5 to the chassis. Test voltage will be negative. Use 2.5 volt scale. Keep signal generator output low so that meter indicates not more than 1 volt.
3. Use 400 cycle modulation.
4. Connect a standard output meter across speaker voice coil. Turn volume control full on. Keep signal generator output down so that output meter indicates not more than 1/2 watt output during alignment (approximately 1.25 volts a-c).

5. For alignment of the AM oscillator and R-F trimmer, the signal should be inductively coupled to the loop antenna by connecting a four turn, six inch diameter loop of wire across the signal generator terminals, located about one foot from the radio loop antenna.

6. When tuning the secondary of T6, two peaks will be obtained. The center null between the two peaks is the correct setting. As the transformer is tuned either side of 10.7 MC, the meter reading should increase.

7. Before adjusting oscillator for proper dial calibration, set pointer at index line near 88 MC mark by slipping along dial string as required. Have tuning gang completely closed.

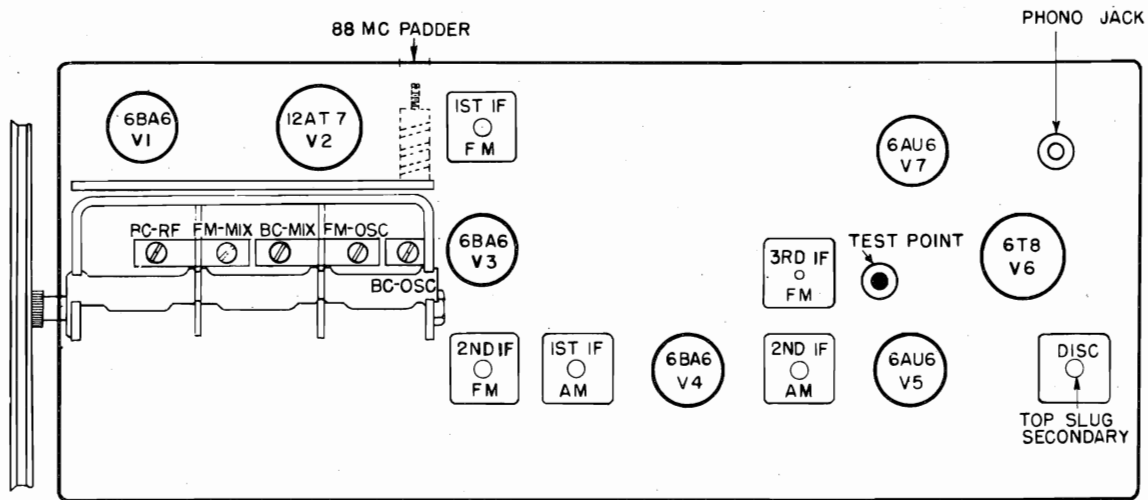
8. C9 ANT. trimmer to be readjusted after chassis and loop are installed in cabinet. Peak on weak station at approximately 1400 KC.

9. When detuning the signal generator in step 5, two maximum meter readings will be obtained, one on each side of 10.7 MC. The primary of T6 should be aligned to maximum when the signal generator is tuned to the smaller of these two peaks.

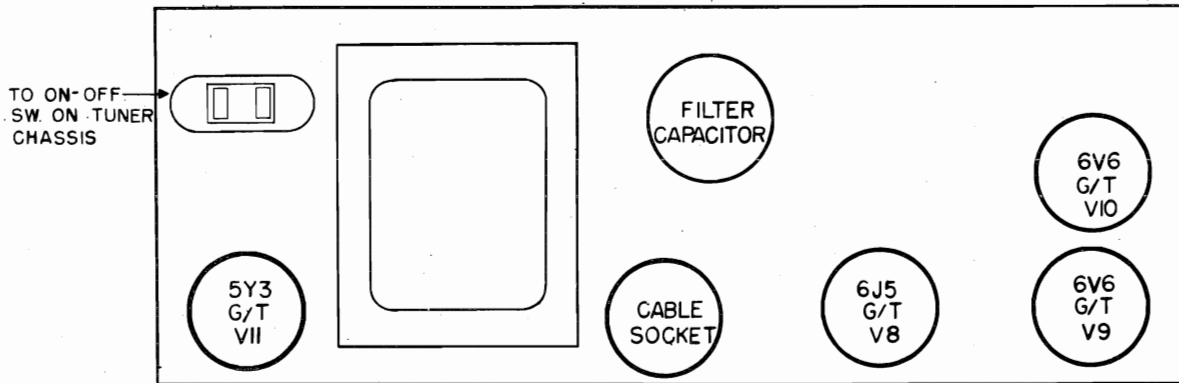
10. Make all chassis connections for FM-IF alignment as short as possible.

11. FM oscillator trimmer (C13) and FM r-f trimmer (C9) should be at minimum capacity.

MODEL 757



AM-FM TUNER



POWER SUPPLY

Fig. 1. Tube and Trimmer Location

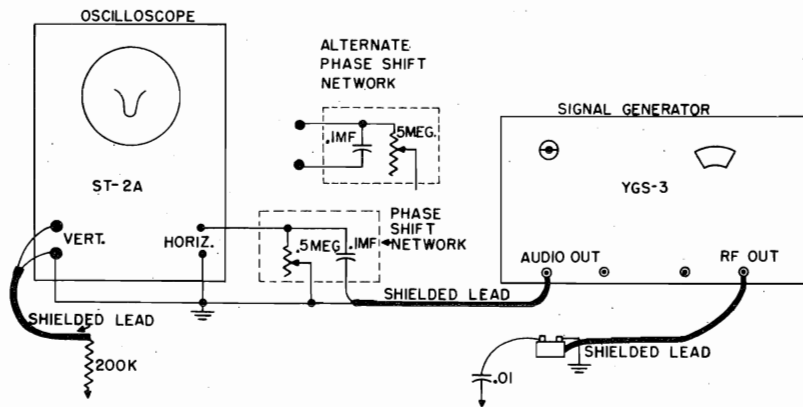


Fig. 2. Visual Alignment Equipment

PHASE SHIFT NETWORK

Connect 60 cps audio signal from the signal generator to the HORIZONTAL AMPLIFIER terminals on the scope through a phase shift network, as shown in Fig. 2, which permits the

double traces on the scope to be joined together. The alternate phase shift network may be required on scopes other than General Electric Model ST-2A.

VISUAL ALIGNMENT CHART

| Step No. | Signal Generator Frequency | Signal Input Point | Band Switch Setting | Dial Setting | Adjust | See Note |
|---------------------|---------------------------------------------|--------------------------------------|---------------------|--------------------------------------|-----------------------------------------------------------------------------|------------|
| AM ALIGNMENT | | | | | | |
| 1 | 455 kc FM mod. ± 20 kc at 60 cps rate | Lug on C1E conv. tuning cond. | AM | | T2 and T5 for max. amplitude of curve. See Fig. 3-A. | 3 |
| 2 | 1620 kc AM mod. with 60 cps. | Inductively coupled to antenna loop. | | Gang C1 completely open. | C16 (BC-Osc.) for steepest slope of straight line on scope. See Fig. 3-C. | 3, 6 |
| 3 | 1500 kc FM mod. ± 20 kc at 60 cps rate. | | | Gang C1 for max. amplitude of curve. | C25 (BC-Mix.) for max. amplitude of curve. See Fig. 3-A. | 3, 4, 5, 6 |
| FM ALIGNMENT | | | | | | |
| 4 | | Lug on C1B thru .01 mfd. | FM | | Cores of T1, T3, and L10 for max. amplitude of curve. See Fig. 3-A. | 1 |
| 5 | 10.7 mc FM mod. $\pm .3$ mc at 60 cps rate. | | | | Secondary of T6 for symmetry of curve of Fig. 3-B. | 3 |
| 6 | | | | | Primary of T6 for max. amplitude of positive and negative peak. | 3 |
| 7 | Repeat Step 5. | | | | | |
| 8 | 88 mc AM mod. at 60 cps. | FM antenna terminals. | | At 88 mc | Core of T9 for steepest slope. See Fig. 3-C. | 1, 2, |
| 9 | 108 mc AM mod. at 60 cps. | | | At 108 mc | C39 (FM-OSC.) for steepest slope of straight line trace on scope. Fig. 3-C. | 1, 2, 4 |
| 10 | 108 mc FM mod. $\pm .3$ mc at 60 cps rate. | | | Rock in C1 for max. | Adjust C18 (FM-MIX) for max. amplitude of response. See Fig. 3-A. | 1, 2, 4 |
| 11 | Repeat Steps 8, 9. | | | | | |

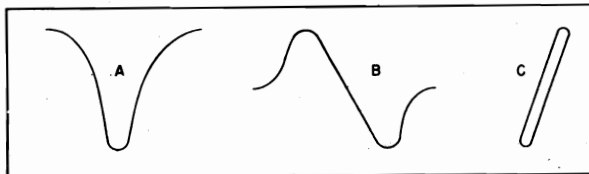


Fig. 3. Alignment Curves

EQUIPMENT REQUIRED FOR VISUAL ALIGNMENT

1. General Electric YGS-3 or equivalent sweep generator.
2. General Electric ST-2A scope or equivalent.
3. 200 K, $\frac{1}{2}$ watt resistor.
4. $\frac{1}{2}$ meg., potentiometer.
5. One .1 paper capacitor.

NOTES FOR VISUAL ALIGNMENT

1. Connect vertical plates of scope to the grid of the limiter

tube (pin 1 of V5) through the Test Point and to chassis. Reduce input from signal generator until "grass" begins to appear on scope.

2. Set pointer at index line near 88 mc mark by slipping pointer along dial string as required. Have tuning gang completely closed.

3. Connect vertical plates of scope at junction of C57 and TONE SW. S2B through 200 K res. Reduce input from signal generator until "grass" begins to appear on scope.

4. In some cases tuning of the converter grid will cause "pulling in" of the oscillator and will change the oscillator frequency. If peaking C9 or C18 as in steps 3 or 10 causes the curve to move off the screen, it is necessary to recalibrate the oscillator as in steps 2 and 9.

5. C9 (BC-RF) trimmer to be adjusted after chassis and loop are installed in cabinet. Peak on weak station at approximately 1400 kc.

6. For alignment of the AM oscillator and r-f trimmers, the signal should be inductively coupled to the loop antenna, by connecting a four-turn, six-inch diameter loop of wire to the signal generator terminals. Locate this loop about one foot from the radio loop antenna.

MODEL 757

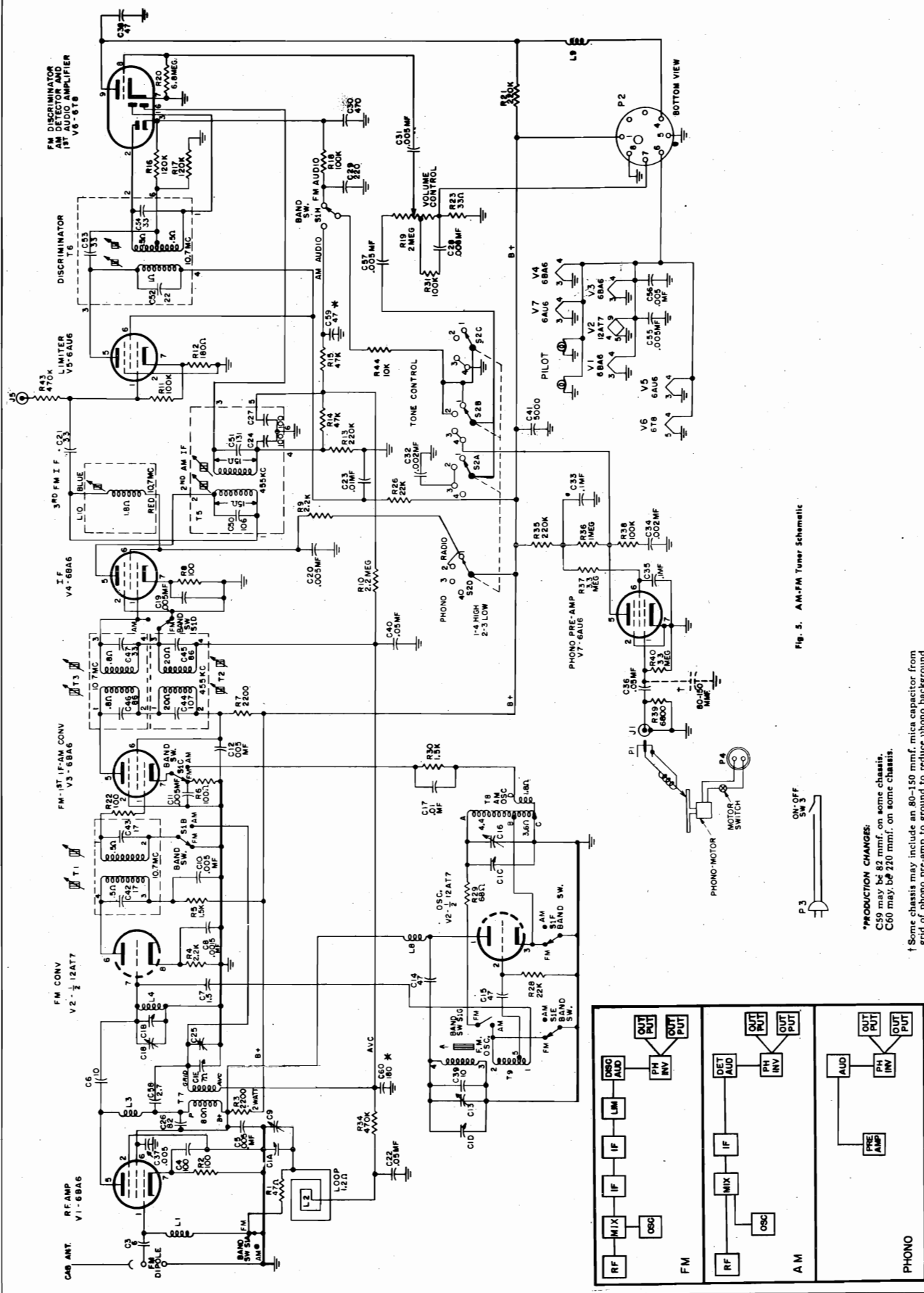


Fig. 5. AM-FM Tuner Schematic.

*PRODUCTION CHANGES:
 C59 may be 82 mmf. on some chassis.
 C60 may be 220 mmf. on some chassis.
 † Some chassis may include an 80-150 mmf. mica capacitor from grid of phono pre-amp to ground to reduce phono background noise when band switch is on FM.

Fig. 4. Block Diagram

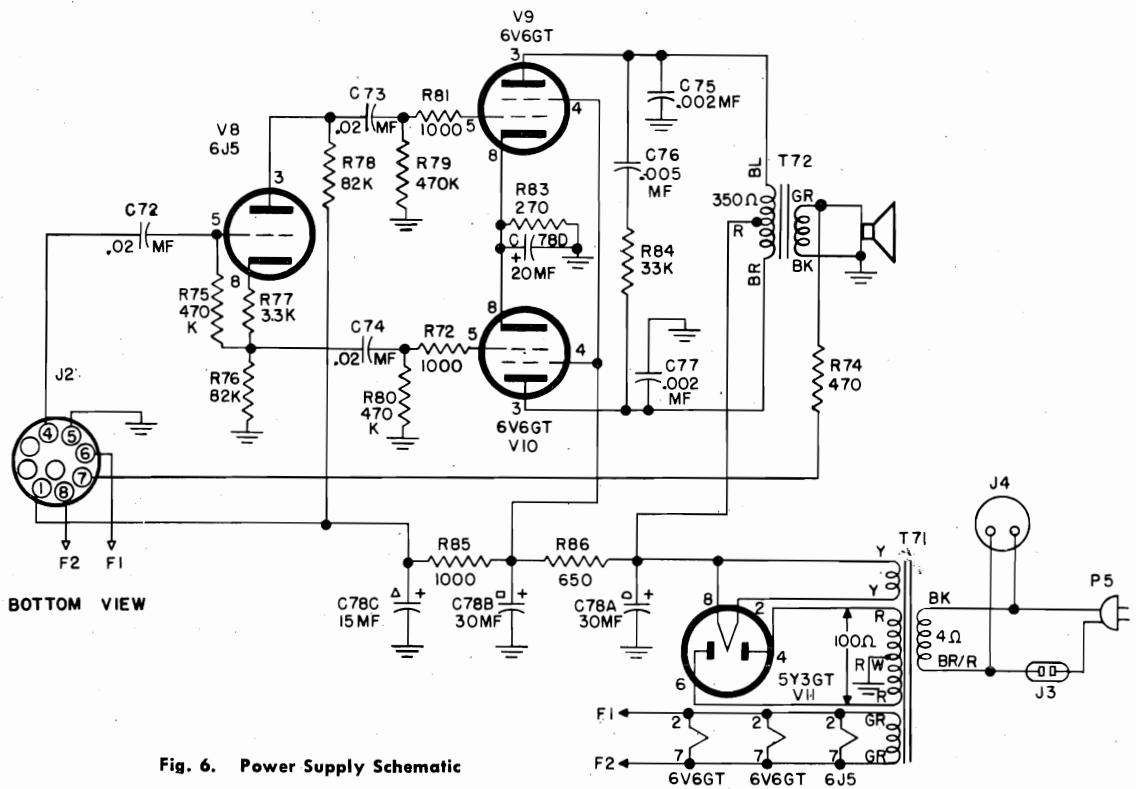
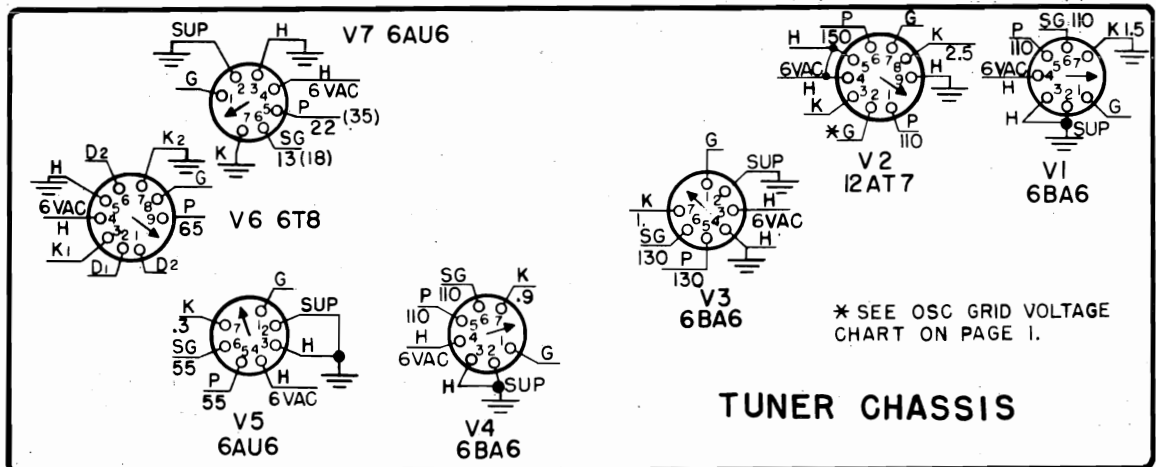


Fig. 6. Power Supply Schematic



TUNER CHASSIS

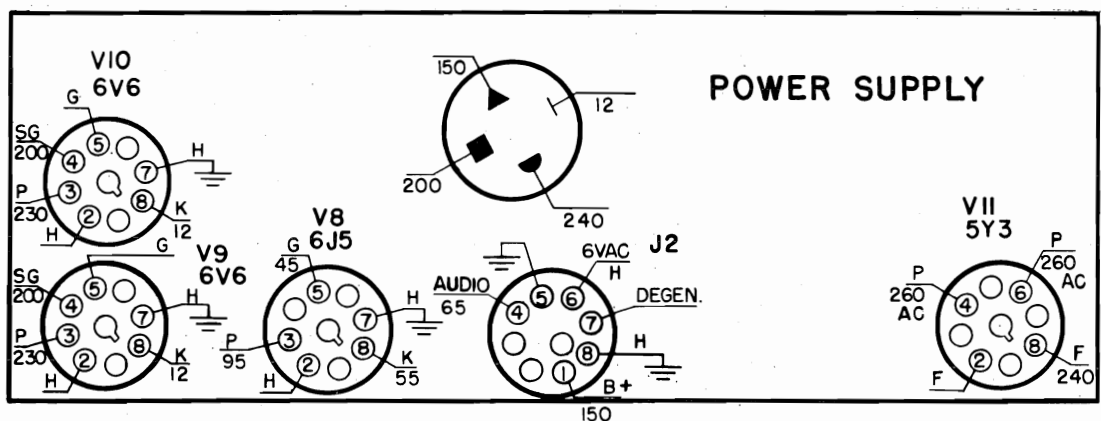


Fig. 7. Socket Voltages

SOCKET VOLTAGES—TEST CONDITIONS: Band switch on FM—Tone switch on Radio—117 volts AC line—No signal input—Measured to chassis with 20,000 ohm-per-volt meter, volume control mini-

mum. (35) indicates VTVM reading. NOTE: 6 volt heater circuit actually grounded at Tuner chassis only.

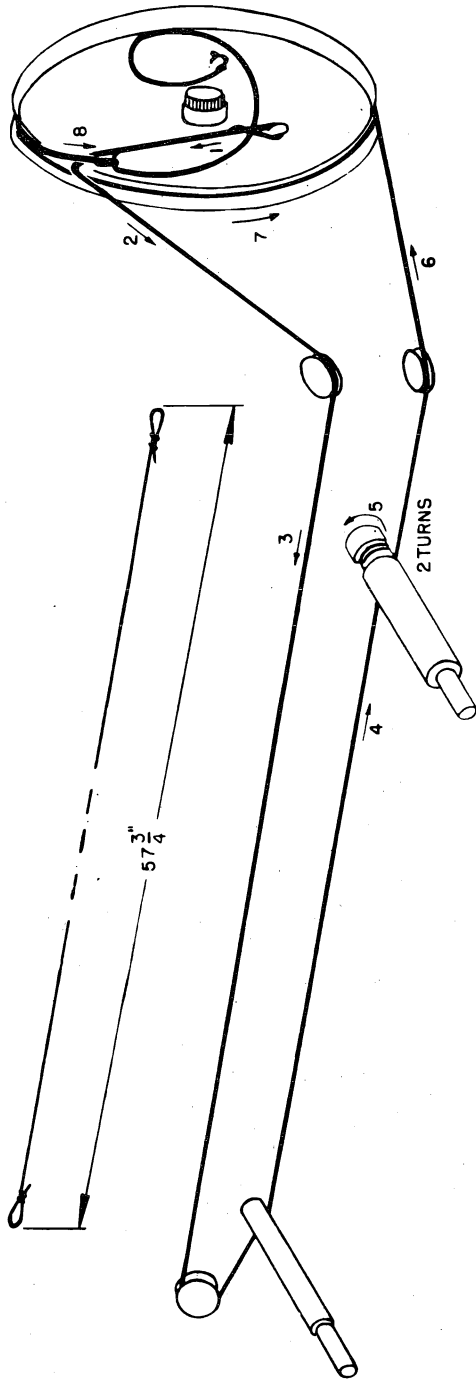


Fig. 11. Dial Stringing Diagram

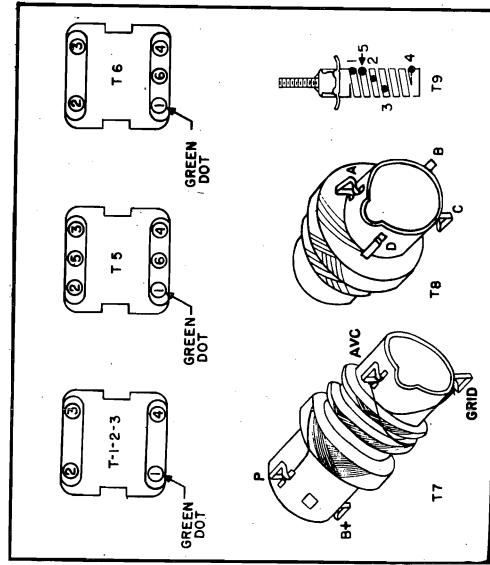


Fig. 10. Transformer Connections

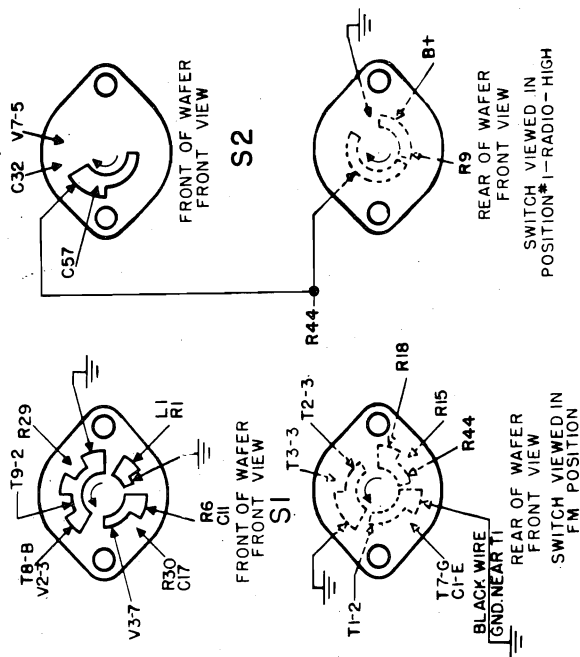


Fig. 8. Single Wafer Band Switch Fig. 9. Single Wafer Tone Switch

MODEL 757
REPLACEMENT PARTS LIST

| Cat. No. | Symbol | Description |
|------------------------------|--------------------------------|-----------------------------------------------------------|
| CAPACITORS | | |
| Values are ±10% unless noted | | |
| *RCE-039 | C78 | Filter, 30-30 mfd @ 300 v., 20 mfd. @ 25 v. electrolytic. |
| *RCN-040 | C3 | 6 mmf., silver mica |
| *RCN-048 | C7 | 1.5 mmf., ceramic |
| RCT-052 | C1 | Tuning gang capacitor (insulated shaft) |
| *RCW-026 | C8 | .0015 mfd., ceramic |
| RCW-1058 | C37 | 10 mmf., ceramic |
| *RCW-3014 | C5, 10, 11, 12, 19, 41, 55, 56 | .005 mfd., ceramic |
| *RCW-3029 | C4 | 100 mmf., ceramic |
| *RCW-3039 | C58 | 2.7 mmf., ceramic |
| *UCC-036 | C32, 34 | .002 mfd., 600 v., paper |
| *UCC-039 | C20, 31 | .005 mfd., 600 v., paper |
| *UCC-040 | C17 | .01 mfd., 600 v., paper |
| *UCC-041 | C72, 73, 74 | .02 mfd., 600 v., paper |
| *UCC-045 | C22, 36, 40 | .05 mfd., 600 v., paper |
| *UCC-048 | C35, 35 | .1 mfd., 600 v., paper |
| *UCC-056 | C75, 77 | .002 mfd., 1000 v., paper |
| *UCC-059 | C76 | .005 mfd., 1000 v., paper |
| *UCC-070 | C28 | .008 mfd., 600 v., paper |
| *UCG-044 | C6 | 10 mmf., silver mica |
| *UCG-016 | C21 | 33 mmf., silver mica |
| *UCG-020 | C14, 15, 38, 59 | 47 mmf., silver mica |
| *UCG-1026 | C26 | 82 mmf., silver mica |
| *UCU-044 | C30 | 470 mmf., 500 v., mica |
| *UCU-536 | C29 | 220 mmf., 500 v., mica |
| *UCU-1034 | C60 | 180 mmf., mica |

| RESISTORS | | |
|---------------------|---------------------|----------------------------------------------------------|
| *RRW-056 | R85, 86 | Filter resistor, 650 ohms, 10 w., 1000 ohms, 8 w., w. w. |
| ½ watt, carbon ±10% | | |
| *URD-013 | R23 | 33 ohms |
| *URD-017 | R1 | 47 ohms |
| *URD-021 | R29 | 68 ohms |
| *URD-025 | R2, 6, 8, 22 | 100 ohms |
| *URD-031 | R12 | 180K ohms |
| *URD-033 | R41 | 220 ohms |
| *URD-041 | R74 | 470 ohms |
| *URD-049 | R72, 81 | 1000 ohms |
| *URD-053 | R5, 30 | 1500 ohms |
| *URD-057 | R4, 7, 9 | 2200 ohms |
| *URD-061 | R77 | 3.3K ohms |
| *URD-069 | R39 | 6.8K ohms |
| *URD-073 | R44 | 10K ohms |
| *URD-081 | R28 | 22K ohms |
| *URD-089 | R14, 15 | 47K ohms |
| *URD-095 | R76, 78 | 82K ohms |
| *URD-097 | R11, 18, 31, 38 | 100K ohms |
| *URD-099 | R16, 17 | 120K ohms |
| *URD-105 | R13, 21, 35 | 220K ohms |
| *URD-113 | R34, 43, 75, 79, 80 | 470K ohms |
| *URD-121 | R36 | 1 meg. |
| *URD-129 | R10 | 2.2 meg. |
| *URD-133 | R37, 40 | 3.3 meg. |
| *URD-141 | R20 | 6.8 meg. |
| *URE-081 | R26 | 22K ohms—1 watt, carbon, ±10% |
| *URE-085 | R84 | 33K ohms—1 watt, carbon, ±10% |
| *URF-035 | R83 | 270 ohms—2 watt, carbon, ±10% |
| *URF-057 | R3 | 2200 ohms—1 watt, carbon, ±10% |

| MISCELLANEOUS ELECTRICAL | | |
|---------------------------------|----|-------------------------------------------------|
| *RJC-001 | | CONNECTOR—Loop wire connector |
| *RJC-019 | | CONNECTOR—Speaker wire connector |
| *RJJ-008 | J3 | RECEPTACLE—AC power outlet receptacle |
| *RJP-003 | P4 | PLUG—AC plug for phono motor |
| *RJP-004 | P1 | PLUG—Phono audio input plug |
| *RJP-031 | P2 | PLUG—Inter-chassis cable plug |
| *RJS-003 | | SOCKET—Octal wafer socket, for V8, V9, V10, V11 |
| *RJS-049 | J4 | RECEPTACLE—Phono motor power receptacle |
| *RJS-092 | | SOCKET—7 pin impregnated wafer socket |
| *RJS-101 | | JACK—Phono jack |
| *RJS-118 | | SOCKET—9 pin socket for V6 |
| *RJS-143 | | SOCKET—9 pin socket for V2 |
| *RJS-145 | | SOCKET—7 pin socket for V1, V3, V4, V5 |
| *RJS-147 | | SOCKET—Pilot light socket |
| *RJS-152 | J2 | SOCKET—Inter-chassis cable socket |
| *RJS-154 | | SHELL—Cable plug shell |

| Cat. No. | Symbol | Description |
|------------------------------------------|------------------------|------------------------------------------------------------------------------|
| MISCELLANEOUS ELECTRICAL (Cont'd) | | |
| *RLC-106 | T8 | TRANSFORMER—BC oscillator transformer |
| *RLC-111 | T9 | TRANSFORMER—FM oscillator transformer |
| *RLI-122 | L8 | CHOKE—Oscillator plate choke, red, molded, 2.2 uh. |
| *RLI-124 | L3, 9 | CHOKE—Audio filter choke, RF plate choke, 18 turns |
| *RLI-128 | L4 | CHOKE—FM RF grid choke, 6 turns |
| *RLI-129 | T7 | TRANSFORMER—BC RF transformer |
| RLI-047 | L2 | LOOP—BC Antenna loop |
| *RRC-152 | R19, S2, S3 | CONTROL—On-off switch, tone switch, and volume control, 2 meg. |
| RSW-087 | S1 | SWITCH—Band switch |
| *RTD-010 | T6, C52, C53, C54 | TRANSFORMER—FM discriminator transformer, 10.7 mc, capacitors molded in base |
| *RTL-079 | T2, C44, C45 | TRANSFORMER—BC 1st IF transformer, 455 kc, capacitors molded in base |
| *RTL-111 | T5, C24, C27, C50, C51 | TRANSFORMER—BC 2nd IF transformer, 455 kc, capacitors molded in base |
| *RTL-112 | T1, C42, C43 | TRANSFORMER—FM 1st IF transformer, 10.7 mc, capacitors molded in base |
| *RTL-113 | T3, C46, C47 | TRANSFORMER—FM 2nd IF transformer, 10.7 mc, capacitors molded in base |
| *RTL-124 | L10 | CHOKE—3rd IF FM choke |
| *RTO-094 | T72 | TRANSFORMER—Output transformer |
| *RTP-306 | T71 | TRANSFORMER—Power transformer |
| *RWL-009 | P3, 5 | CORD—AC line cord and plug |
| *S-1212D-7 | | SPEAKER—12 inch PM speaker |

| MISCELLANEOUS MECHANICAL | | |
|---------------------------------|--|------------------------------------------------------------------------------|
| *RAA-002 | | ARM—Switch arm (for shaft) |
| *RAA-003 | | ARM—Switch arm (for switch) |
| *RAD-057 | | BRACKET—FM oscillator transformer mounting bracket |
| *RAD-032 | | CORD—Nylon dial cord, 25 yds. bulk |
| *RDM-025 | | WIRE—Dial pointer guide wire |
| *RDP-058 | | POINTER—Dial pointer and slide assembly |
| RDS-105 | | SCALE—Dial scale printed on chassis cover plate |
| *RHC-017 | | CLIP—Mounting clip for BC oscillator transformer |
| *RHC-034 | | CLIP—Mounting clip for I-F transformers |
| *RHC-038 | | CLIP—Mounting clip for BC RF trans. |
| *RHG-010 | | GROMMET—Preamp. socket mounting grommet |
| *RHG-015 | | GROMMET—Tuning gang mounting grommet |
| *RHG-029 | | GROMMET—Speaker lead insulating grommet |
| *RHI-011 | | INSULATOR—Strain relief insulator for power chassis power cord, 52" diameter |
| *RHI-017 | | INSULATOR—Strain relief insulator for tuner chassis power cord, 47" diameter |
| *RHJ-006 | | SLEEVE—Tuning gang mounting sleeve |
| *RHM-001 | | WASHER—"C" washer for tuning shaft |
| *RHN-015 | | NUT—Dial guide wire retaining nut |
| *RHS-066 | | SCREW—Hex head screw for tuning gang mounting |
| *RJS-012 | | PLATE—Mounting plate for filter capacitor |
| *RMS-119 | | SPRING—Dial cord tension spring |
| *RMS-221 | | SPRING—Record changer pan slide spring |
| *RMU-066 | | SHAFT—Band switch drive shaft |
| *RMU-067 | | SHAFT—Tuning shaft |
| *RQB-001 | | BRUSH—Stylus brush |

| CABINET PARTS | | |
|----------------------|--|---------------------------------------------------------------|
| RAB-166 | | BACK—Cabinet back for Model 757 |
| RAC-098 | | PAN—Record changer base pan |
| RAV-168 | | CABINET—Mahogany cabinet for Model 757 |
| *RDE-098 | | ESCUTCHEON—Plastic dial escutcheon, includes dial window |
| *RDK-212 | | KNOB—Changer pan pull-out knob |
| *RDK-233 | | KNOB—Tuning knob |
| *RDK-234 | | KNOB—Band switch knob, with arrow |
| *RDK-235 | | KNOB—Volume control knob |
| *RDK-236 | | KNOB—Tone switch knob, with dot |
| *RHS-057 | | SCREW—Wood screw for cabinet back |
| *RHS-058 | | SCREW—7/16 inch brass plated wood screw for top of escutcheon |
| *RHS-064 | | SCREW—½ inch brass plated wood screw for bottom of escutcheon |
| *RHS-077 | | SCREW—Wood screw for mounting loop |
| *RMM-153 | | SLIDE—Phono drawer slide |

GENERAL

This receiver is a superheterodyne radio, phonograph combination. The receiver employs five tubes and a rectifier. The I-F amplifier V3 (6AU6) is also used as a phono preamplifier.

This receiver uses a new high output variable reluctance pickup RPX-048. When replacing the pickup it must be replaced with an RPX-048 pickup to insure proper operation of the phonograph. When replacing the dual stylus assembly replace only with an RPJ-014 dual stylus assembly.

CAUTION

One side of the power line is connected to B-. Use an isolation transformer when making service adjustments with the chassis removed from the cabinet.

STAGE GAINS AND VOLTAGE CHECKS

Stage gain measurements by vacuum tube voltmeter or similar measuring device may be used to check circuit performance and isolate trouble. The gain values listed may have tolerances of ±20 per cent. Readings are taken with low signal input so that AVC is not effective.

1. I-F Gain

- 12SA7 Grid to 6AU6 Grid.....50 @ 455 KC
- 6AU6 Grid to 12SQ7 Diode Plate...50 @ 455 KC

2. Audio Gain

Input of 0.15 volts at 400 cycles across volume control (R22) with control set at maximum will develop approximately 1/2 watt output across the speaker voice coil terminals.

3. Oscillator Grid Bias

DC voltage developed across the oscillator grid leak (R3) averages 8.5 volts at 1000 kc.

4. Hum Measurement

Hum measured across the voice coil of the speaker with the volume control set at minimum and band switch in the radio position should not exceed 12 millivolts.

PRODUCTION CHANGE

On early production R11 was a 1 meg 20% resistor and R12 was a 470,000 ohm 20% resistor. To improve phono sensitivity R11 was changed to 1.2 megohm 10% (URD-123) and R12 was changed from a 20% to a 10% tolerance resistor. The voltage on phono at the plate pin 5 of V3 should not drop below 13 volts as measured by a vacuum tube voltmeter.

TOUBLE SHOOTING NOTE

A gassy 12SA7 or 12SK7 may cause poor A.V.C. action thereby overloading the R.F. circuits and causing audio distortion at any setting of the volume control.

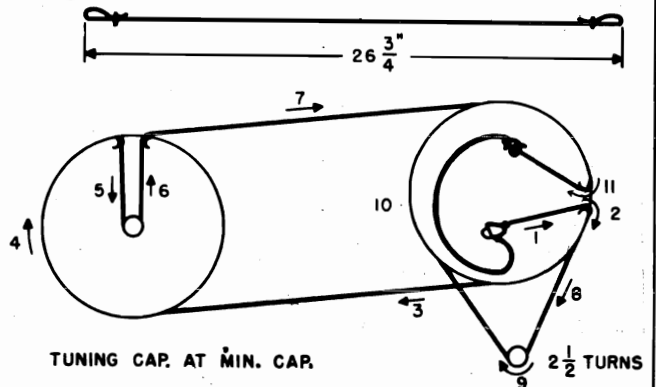


FIG. 1. STRINGING DIAGRAM

ALIGNMENT PROCEDURE

1. The chassis must be removed from the cabinet for I-F oscillator and r-f adjustments, steps 1 through 5. For alignment of the antenna trimmer on the loop, step 6, the chassis and loop should be mounted in position in the cabinet.

Connect an output meter across the speaker leads and make the necessary adjustments for maximum reading on the meter.

2. An isolation transformer should be used for the receiver power source when aligning or servicing these receivers to prevent short circuiting of equipment and shock hazard.

3. The output meter should be connected across the terminals of the loudspeaker voice coil.

4. The receiver volume control should be turned to maximum and test oscillator signal output attenuated during alignment to

develop not more than 1/2 watt output at the loudspeaker.

5. For i-f alignment, the high side of the signal generator output cable should be connected through a .05 mfd paper capacitor to the points indicated in the Alignment Chart. The low side of the output cable is connected to B minus.

6. To align the antenna trimmer, the signal generator output is inductively coupled to the radio loop, L1, by connecting a four-turn, six-inch diameter loop of bell wire across its output terminals and then locating the loop about one foot from the radio loop antenna. To prevent possible errors in comparative peak readings, the position of signal generator loop with respect to the radio loop antenna should not be changed during measurement.

7. Switch S2 should be in radio position during alignment.

ALIGNMENT CHART

| Step | Connect Test Oscillator Between | Test Osc. Setting | Radio Dial Setting | Adjust Trimmers for Maximum |
|----------------------|-----------------------------------------------------------|-------------------|--------------------|-----------------------------------------|
| I-F ALIGNMENT | | | | |
| 1 | V3, 6AU6 grid (Pin 1), in series with .05 mfd and B minus | 455 KC | | C7 and C8 of second i-f transformer, T3 |
| 2 | V2, 12SA7 grid (Pin 8) in series with .05 mfd and B minus | | | C5 and C6 of first i-f transformer, T2 |
| 3 | | | | Recheck C8, C7, C6, C5 for max. |
| R-F ALIGNMENT | | | | |
| 4 | V1, 12SK7 grid (Pin 4) in series with .05 mfd and B minus | 1620 KC | Minimum capacity | C2B, oscillator trimmer |
| 5 | V1, 12SK7 grid (Pin 4) in series with .05 mfd and B minus | 1500 KC | Tune for Maximum | C3B, r-f trimmer |
| 6 | Inductively coupled to the loop. See Note 6 | 1500 KC | Tune for Maximum | C1A antenna trimmer on loop |

MODEL 741

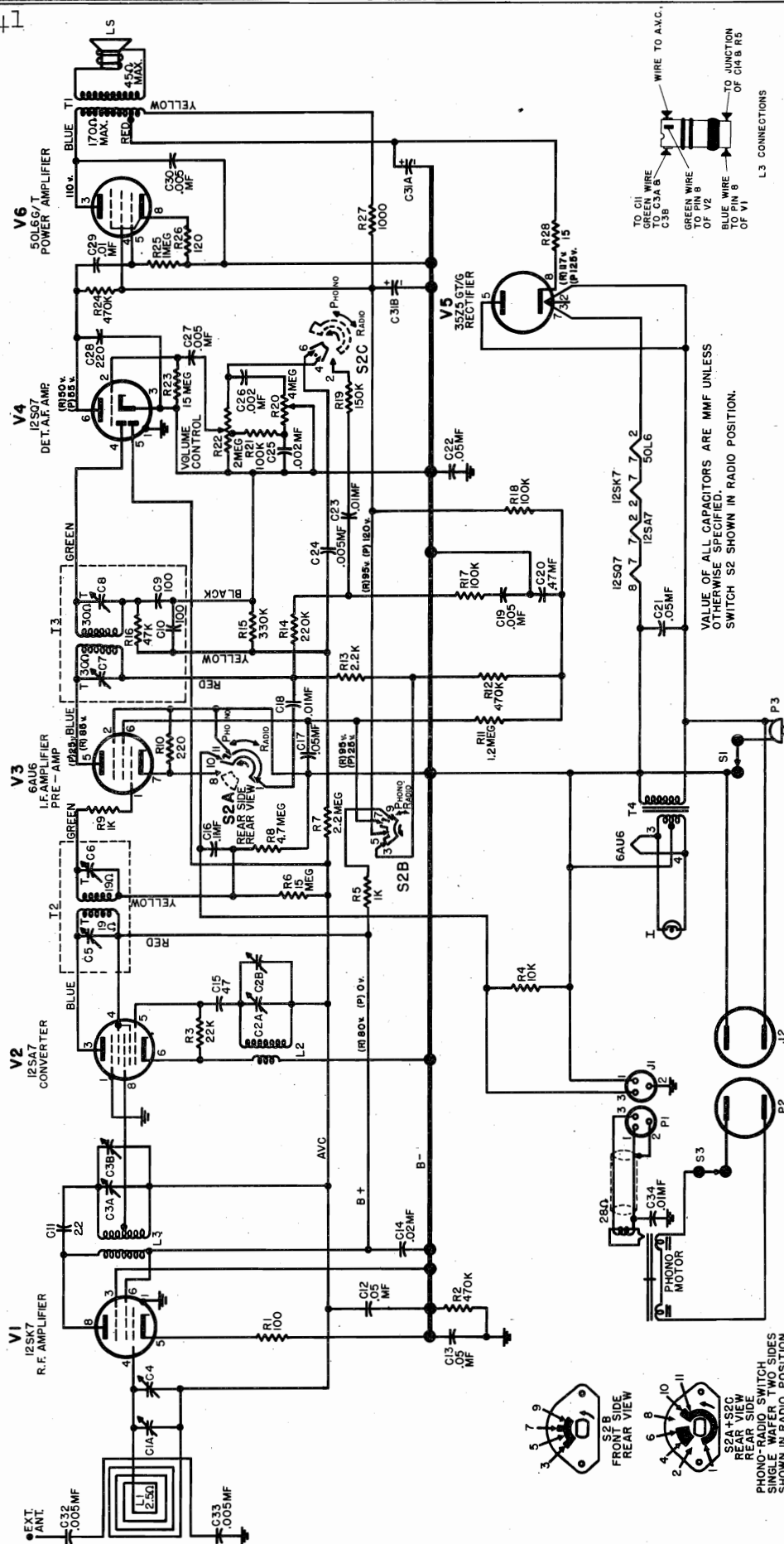


FIG. 2. SCHEMATIC DIAGRAM

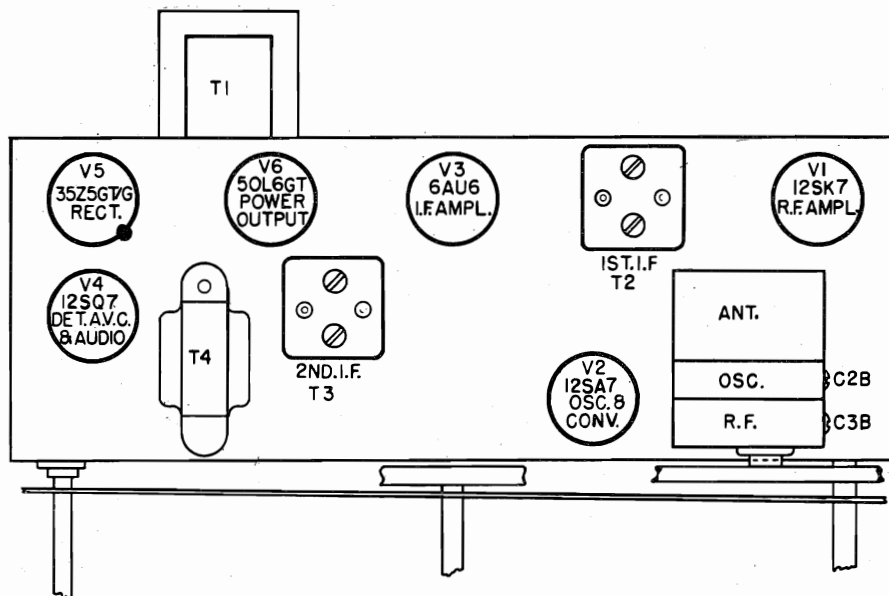
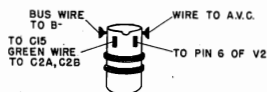


FIG. 3. TUBE AND TRIMMER LOCATION



L2 CONNECTIONS

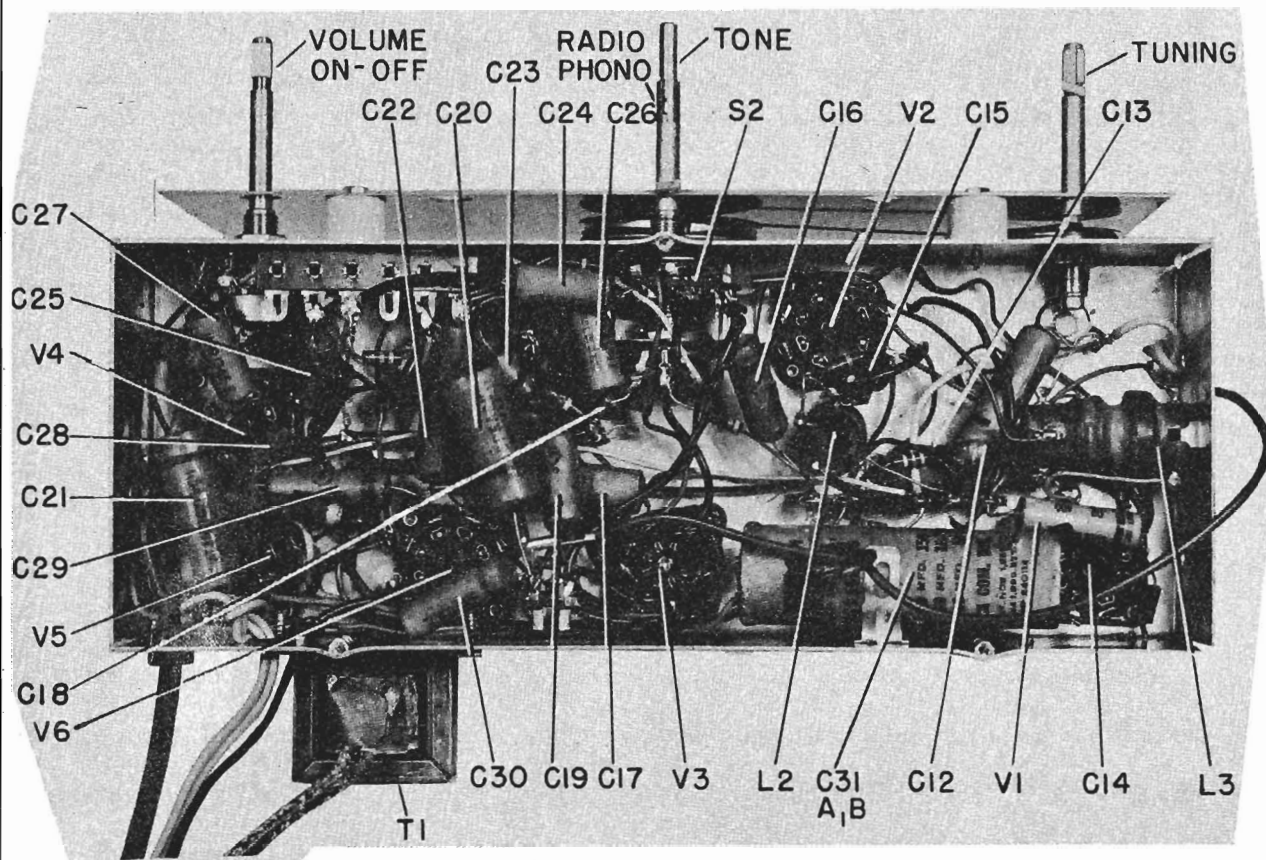


FIG. 4. BOTTOM VIEW

MODEL 741



MODEL 741 REPLACEMENT PARTS LIST

| Cat. No. | Symbol | Description | Cat. No. | Symbol | Description |
|-------------------------------|-------------------------|------------------------|-----------------------------------|--------|---------------------------------------|
| CAPACITORS | | | MISCELLANEOUS ELECTRICAL | | |
| RCC-110 | C16 | .1 mfd, 200 v | *RJC-019 | | PINS—Speaker lead |
| RCE-135 | C31A, B | Electrolytic | RJP-003 | P2 | PLUG—Phono power (male) |
| *RCN-039 | C11 | 2.2 mmf, silver mica | *RJS-003 | | SOCKET—Tube for V1, V2, V4, V5, V6 |
| *RCT-048 | C1A, 2A, 2B, 3A, 3B | Tuning gang | *RJS-049 | J2 | SOCKET—Phono power female |
| *RCY-016 | C4 | Trimmer | *RJS-097 | J1 | SOCKET—Phono on chassis |
| *UCG-020 | C15 | 47 mmf, silver mica | *RJS-141 | | SOCKET—Tube for V3 |
| *UCG-1036 | C28 | 220 mmf, silver mica | RJX-007 | P1 | PLUG—Phono (male) |
| *UCC-036 | C25, 26 | .002 mf., 600 v, paper | RJX-031 | | SOCKET—Pilot lamp |
| *UCC-039 | C19, 24, 27, 30, 32, 33 | .005 mf, 600 v, paper | RPJ-014 | | STYLUS—Dual stylus for pickup |
| *UCC-040 | C18, 23, 29 | .01 mf, 600 v, paper | RPX-048 | | RPX-048 |
| *UCC-041 | C14 | .02 mf, 600 v, paper | | | PICKUP—High output dual stylus pickup |
| *UCC-045 | C12, 13, 17, 21, 22 | .05 mf, 600 v, paper | *RWL-004 | | CORD—Power |
| *UCC-048 | C20 | .1 mf, 600 v, paper | MISCELLANEOUS MECHANICAL | | |
| RESISTORS | | | *RDC-032 | | DIAL CORD (25 y'ds) |
| *RRC-151 | R22, S1 | Volume and switch | RDP-062 | | POINTER |
| RRC-167 | R20, S2 | Tone and switch | RDS-108 | | BACK PLATE AND DIAL SCALE |
| *URD-005 | R28 | 15 ohms, 1/2 w | *RHC-017 | | CLIP—For oscillator coil L2 |
| *URD-025 | R1 | 100 ohms, 1/2 w | *RHC-038 | | CLIP—R.F. coil mtg. |
| *URD-027 | R26 | 120 ohms, 1/2 w | *RHC-024 | | CLIP—Capacitor |
| *URD-033 | R10 | 220 ohms, 1/2 w | *RHG-018 | | GROMMET—Gang mtg. |
| *URD-049 | R5, 9 | 1000 ohms, 1/2 w | *RHG-029 | | GROMMET—Phono power cord |
| *URD-057 | R13 | 2,200 ohms 1/2 w | *RHI-017 | | STRAIN RELIEF (Power cord) |
| *URD-073 | R4 | 10,000 ohms, 1/2 w | *RHJ-007 | | SPACER—Gang mtg. |
| *URD-081 | R3 | 22,000 ohms, 1/2 w | *RMC-002 | | CLIP—Osc. coil |
| *URD-097 | R17, 18, 21 | 100,000 ohms, 1/2 w | *RMS-130 | | SPRING—Dial cord |
| *URD-101 | R19 | 150,000 ohms, 1/2 w | RMX-174 | | DRIVE SHAFT AND BUSHING— |
| *URD-105 | R14 | 220,000 ohms, 1/2 w | | | For tuning control |
| *URD-109 | R15 | 330,000 ohms, 1/2 w | *ROP-018 | | SPEAKER—10 in. |
| *URD-113 | R2, 12, 24 | 470,000 ohms, 1/2 w | *ROB-001 | | BRUSH—Record changer |
| *URD-121 | R25 | 1 meg, 1/2 w | CABINETS AND CABINET PARTS | | |
| *URD-123 | R11 | 1.2 meg, 1/2 w | RAB-168 | L1 | LOOP AND BACK ASSEMBLY |
| *URD-129 | R7 | 2.2 meg, 1/2 w | RAV-171 | | CABINET—Model 741 |
| *URD-137 | R8 | 4.7 meg, 1/2 w | RDE-122 | | ESCUTCHEON & DIAL WINDOW |
| *URD-149 | R6, 23 | 15 meg, 1/2 w | RDK-257 | | KNOB—(Brown) Volume OFF-ON tuning |
| *URF-049 | R27 | 1000 ohms, 2 w | RDK-258 | | KNOB—(Brown) for switch |
| COILS AND TRANSFORMERS | | | RDK-259 | | KNOB—(Brown) (Tone) |
| *RLC-105 | L2 | OSCILLATOR COIL | | | |
| *RLI-125 | L3 | R.F. TRANSFORMER | | | |
| *RTF-001 | T4 | FILAMENT TRANSFORMER | | | |
| *RTL-115 | T2, C5, C6 | 1ST I.F. TRANSFORMER | | | |
| *RTL-116 | T3, C7, 8, 9, 10, R16 | 2ND I.F. TRANSFORMER | | | |
| RTO-111 | T1 | OUTPUT TRANSFORMER | | | |

*Parts used on previous models.

GENERAL

- Tubes Seven plus rectifier
- Speaker 5-inch PM
- Speaker V.C. Impedance . 3.2 ohms
- Headset Output Low Impedance
- Antenna Provision for external antenna
- Tuning Manual
- Tuning Range Band Selector Position Frequency Range

| Band Selector Position | Frequency Range |
|------------------------|------------------|
| 1. | 540 kc - 1680 kc |
| 2. | 1680 kc - 5.4 mc |
| 3. | 5.3 mc - 15.5 mc |
| 4. | 15.5 mc - 44 mc |

- Intermediate Frequency . 455 kc.
- Power Supply Standard Model 105-125 V. 60 cycles AC
Universal Model 105-250 V. 25/135 cycles AC
- Power Consumption 75 Watts

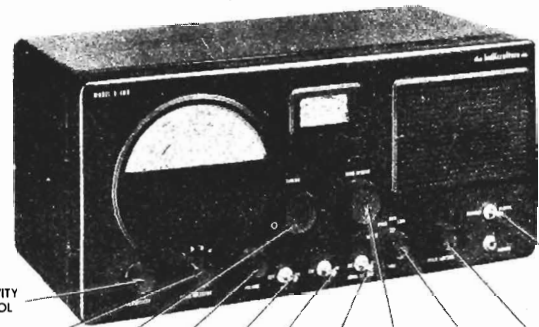
RESTRINGING DIAL CORD

To restring the general coverage tuning dial cord, cut an 18-inch length of 30 lb. test dial cord and tie one end to the tension spring of the main tuning capacitor drive pulley at position "1" on the diagram. Follow the numbers "1" through "4", and at position "4" stretch the tension spring and tie the cord securely.

To restring the band spread tuning dial cord cut a 36-inch length of dial cord and follow the procedure as above, starting at position "A" on the diagram. Note that the tuning drive shafts are wrapped with two and a fraction turns of dial cord for proper traction.

REPLACING LAMPS

Refer to Fig. 7 for the location of the two dial lamps used in the receiver. To gain access to defective lamps, reach in through cabinet cover and unclip the dial lamp sockets. The



92X1140

sockets may then be brought out into the open to change the defective lamp. Replace lamps with 6-8 V. Mazda #44 (Blue bead) lamps or equivalent.

ALIGNMENT PROCEDURE

For I-F amplifier alignment it will be necessary to remove the receiver chassis from the cabinet. The chassis is held in the cabinet by three screws along both the bottom edge of the front panel and the rear of the cabinet, and two screws on either side of the front panel.

NOTE - R-F alignment should be accomplished through the holes provided in the cabinet bottom as the oscillator calibration will be effected slightly by changes in the capacity between the cabinet bottom and the r-f coils and wiring.

Before starting the alignment procedure, check the position of the general coverage dial index marker on the low frequency end of the range and the bandspread dial on zero position. The general coverage condenser should index at max. capacity, and the bandspread condenser at min. capacity.

The standard RMA dummy antenna mentioned in the alignment chart consists of a 200 mmf. condenser in series with a 20 uh r-f choke which is shunted by a 400 mmf condenser in series with a 400 ohm carbon resistor.

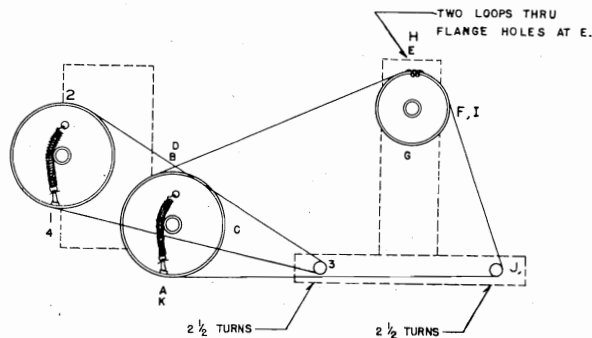


Fig 1. Dial cable stringing procedure

Set the following controls before alignment.

- SENSITIVITY Set at maximum
- VOLUME Set at maximum
- AVC switch Set at OFF
- BAND SPREAD Set at zero
- CW/AM Set at AM (See Step 2)
- NOISE LIMITER Set at OFF
- STANDBY RECEIVE Set at RECEIVE
- TONE SWITCH Set at HIGH

For the settings of the remaining controls, see alignment chart.

MODEL S-40B

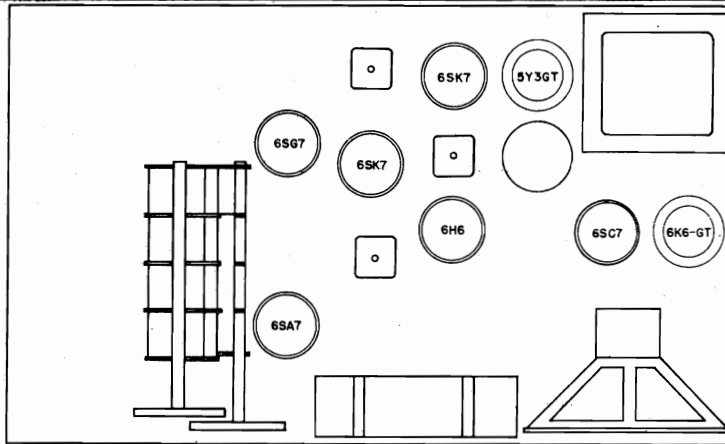


Fig. 7. Top view, location of tubes and dial lamps

92B881-A

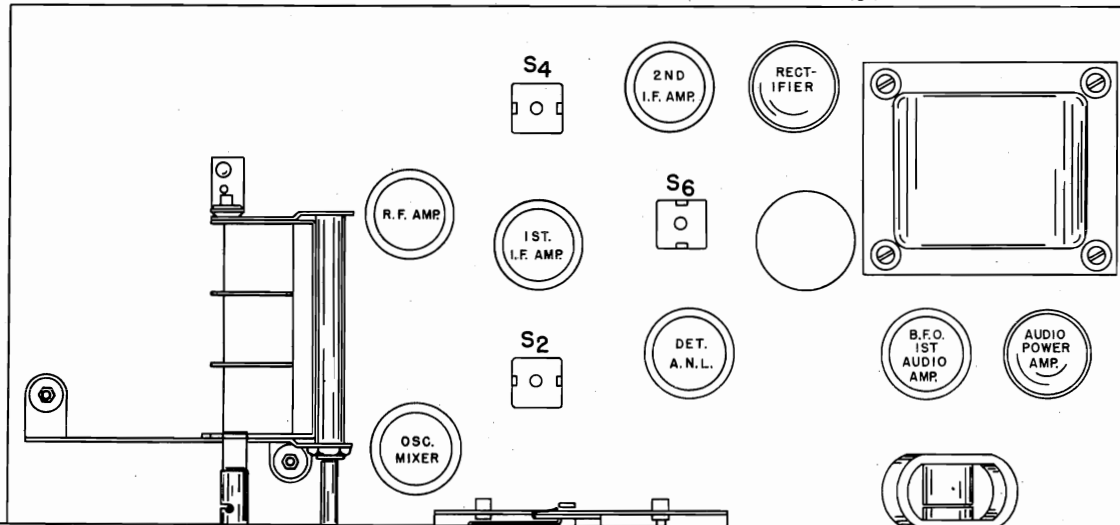


Fig. 2. Top view, alignment points

92D1132

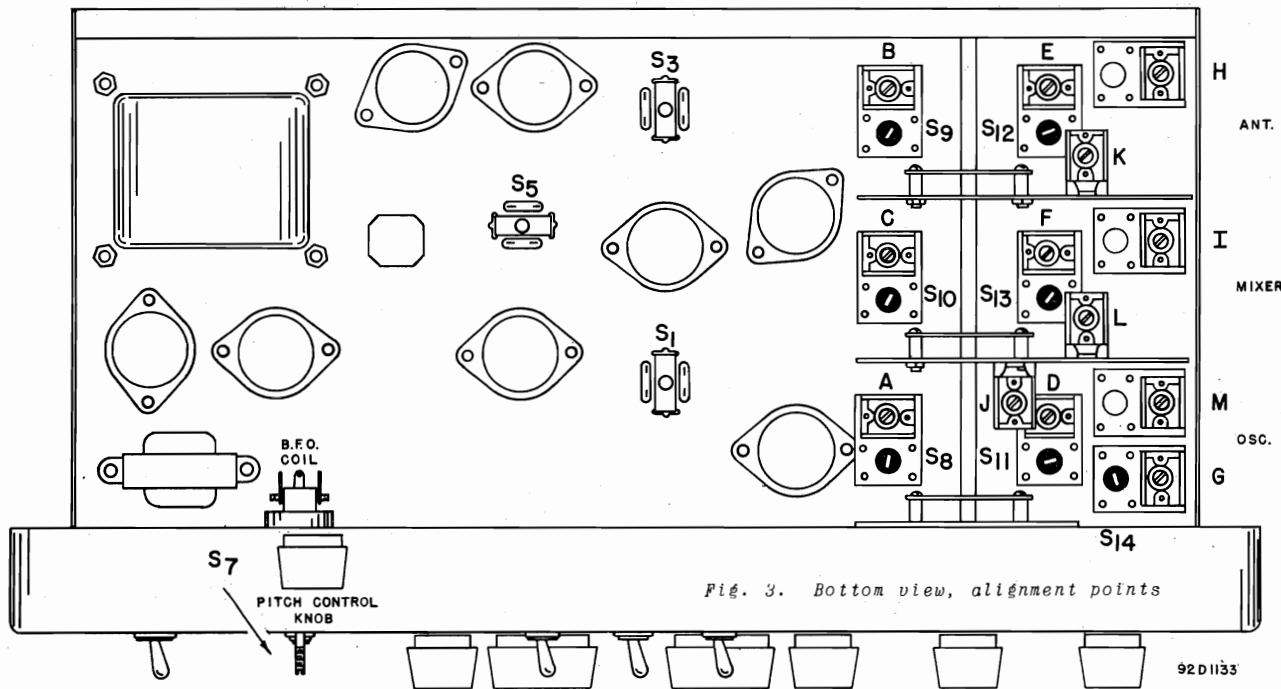


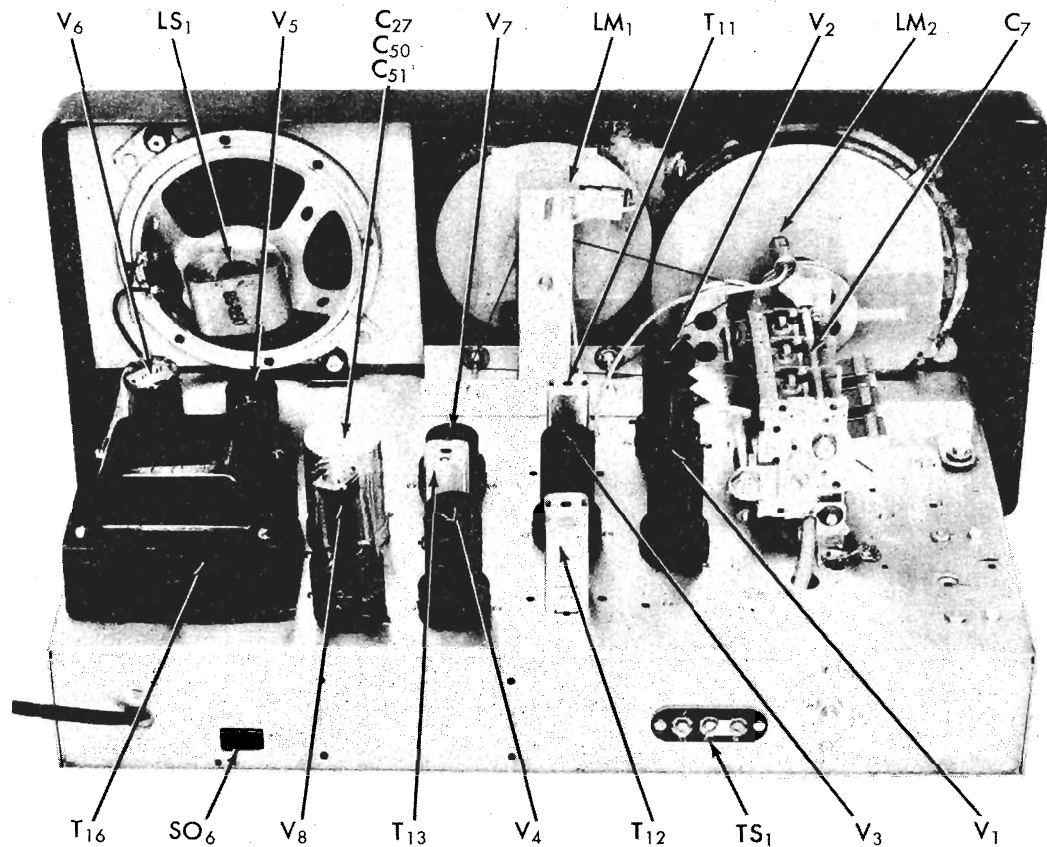
Fig. 3. Bottom view, alignment points

92D1133

ALIGNMENT CHART

| Step | Dummy Antenna | Signal Generator Coupling | Signal Generator Frequency | Band Switch Setting | Receiver Dial Setting | Adjust | Remarks |
|------|---------------|---------------------------------------------------------------|----------------------------|---------------------|-----------------------|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | None | Stator plates in center section of tuning gang. | 455 kc | "1" | 1000 kc | S1,S2,S3 S4,S5,S6 | Maximum audio output at speaker voice coil. Use just enough signal generator output to obtain a 50 MW signal level. |
| 2 | None | See step 1 | 455 kc (No modulation) | "1" | 1000 kc | S7 | With the CW/AM switch set at CW, remove the pitch control knob and adjust S1 for zero beat. Replace the knob with the dot in the center position. |
| 3 | Std RMA dummy | "A1" on antenna strip. Jumper connected between "A2" and "G". | 36 mc | "4" | 36 mc | *A, B, C | Maximum output as in step 1 |
| | | | 18 mc | | 18 mc | *S8,S9,S10 | |
| 4 | Std RMA dummy | See step 3 | 14 mc | "3" | 14 mc | *D, E, F | Maximum output as in step 1 |
| | | | 10 mc | | 10 mc | *S11,S12,S13 | |
| 5 | Std RMA dummy | See step 3 | 5 mc | "2" | 5 mc | *G, H, I | Maximum output as in step 1 |
| | | | 1.8 mc | | 1.8 mc | *S14 | |
| 6 | Std RMA dummy | See step 3 | 1500 kc | "1" | 1500 kc | *J, K, L | Maximum output as in step 1 |
| | | | 600 kc | | 600 kc | *M | |

*Note - Calibration adjustments.



92X1126

Fig. 4. Top view, component location

MODEL S-40B

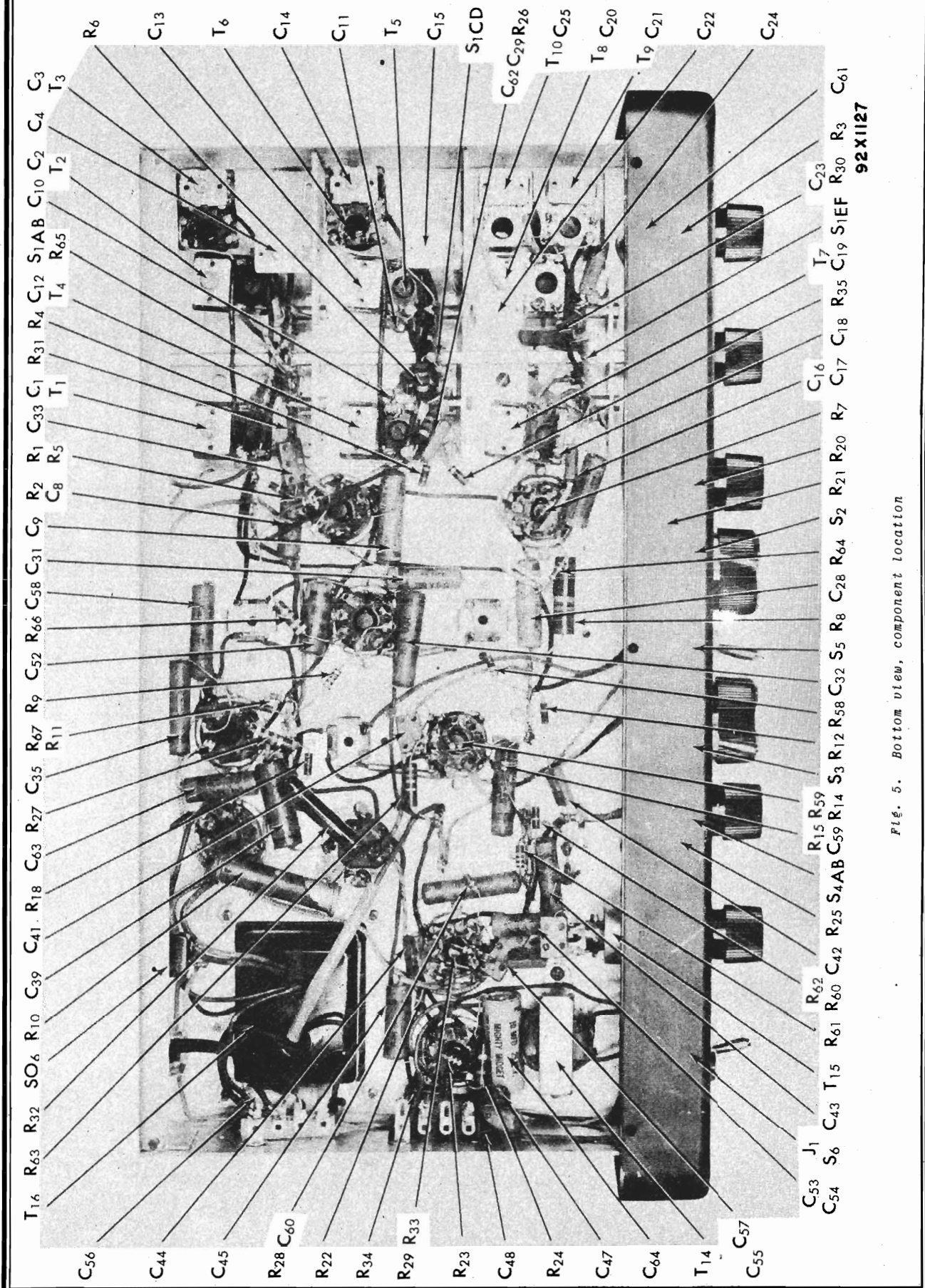
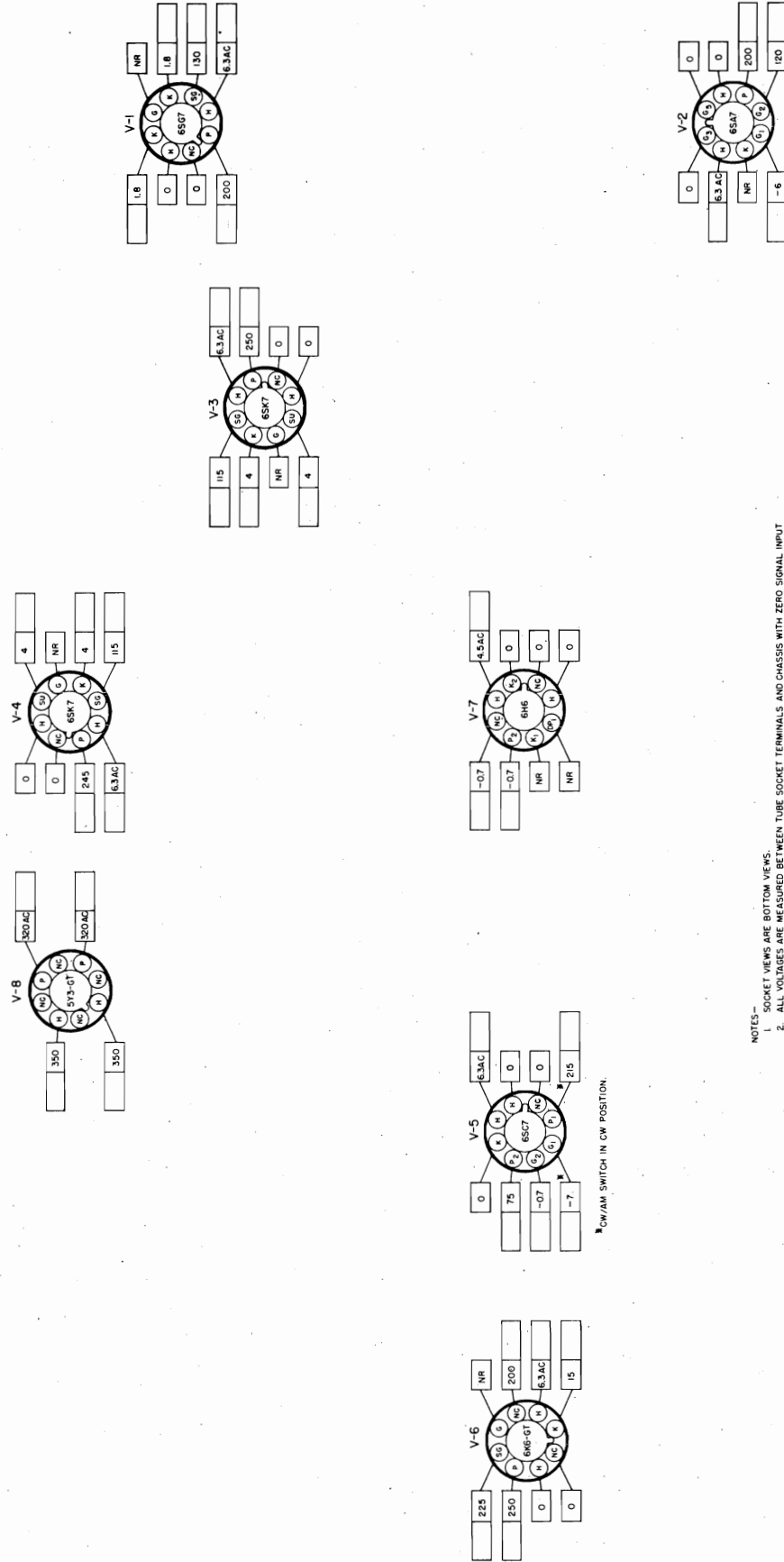


Fig. 5. Bottom view, component location

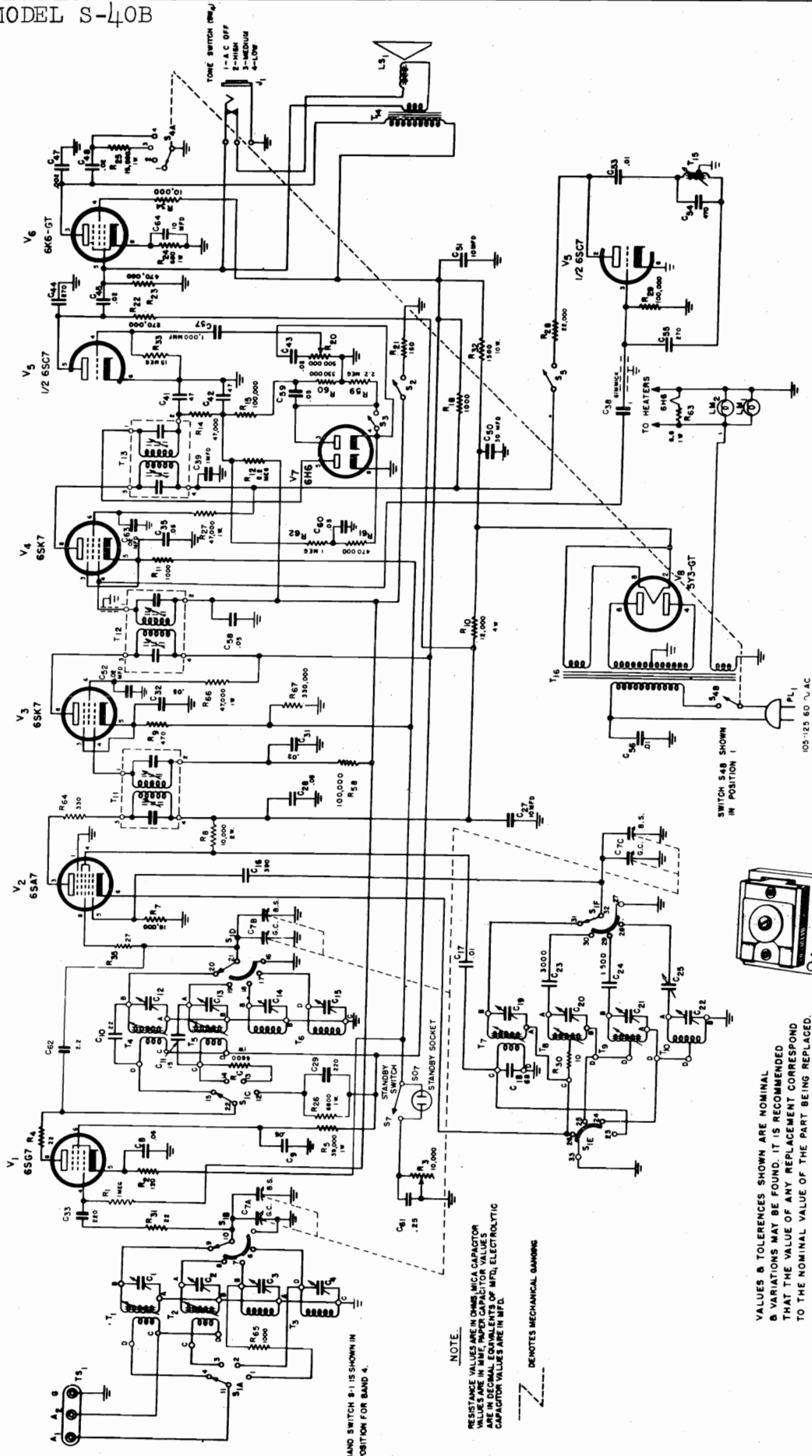


- NOTES-
1. SOCKET VIEWS ARE BOTTOM VIEWS.
 2. ALL VOLTAGES ARE MEASURED BETWEEN TUBE SOCKET TERMINALS AND CHASSIS WITH ZERO SIGNAL INPUT.
 3. LINE VOLTAGES ARE 117 V AC.
 4. ALL VOLTAGES ARE DC UNLESS OTHERWISE SPECIFIED.
 5. DC VOLTAGES SHOWN WERE MEASURED WITH AN ELECTRONIC VOLTMETER.
 6. "NC"=NO CONNECTION (VOLTAGE SHOWN FOR THIS TERMINAL ONLY WHEN TERMINAL IS USED AS A TIE LUG)
 7. "NR"=NOT READABLE (READING GENERALLY MEANINGLESS)
 8. SPACE PROVIDED FOR SERVICE METER READINGS.

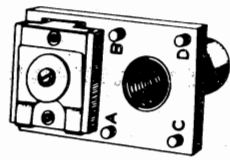
FRONT APRON
BOTTOM VIEW OF CHASSIS
SECURITY

Fig. 6. Tube socket voltage chart

MODEL S-40B



800349-A
LAST R SYMBOL R-67
LAST C SYMBOL C-64



REPRESENTS TRANSFORMERS T1 TO T10

VALUES & TOLERANCES SHOWN ARE NOMINAL & VARIATIONS MAY BE FOUND. IT IS RECOMMENDED THAT THE VALUE OF ANY REPLACEMENT CORRESPOND TO THE NOMINAL VALUE OF THE PART BEING REPLACED.

Fig. 8. Schematic diagram

RUN NO. 1

SERVICE PARTS LIST

| Ref. No. | Description | Hallicrafters Part Number | Ref. No. | Description | Hallicrafters Part Number |
|--------------------|-----------------------------------------------------------|---------------------------|------------------------------------|----------------------------------------------------------------------|---------------------------|
| CONDENSERS | | | TRANSFORMERS AND COILS | | |
| C-1,2,12,13,19 | Trimmer, adjustable, part of transformers T-1,2,4,5 and 7 | 44A149 | T-1 | Transformer, antenna stage, band 4 | 51B783 |
| C-3 | Trimmer, adjustable, part of transformer T-3 | 44A389 | T-2 | Transformer, antenna stage, band 3 | 51B782 |
| C-4,15,22 | Trimmer, adjustable | 44A191 | T-3 | Transformer, antenna stage, band 1 and 2 | 51B1241 |
| C-7 | Tuning capacitor, 3 sections ganged | 48C240-B | T-4 | Transformer, mixer stage, band 4 | 51B787 |
| C-8.32,35,58,59,60 | .05 mfd. 200 V., tubular | 46A U503J | T-5 | Transformer, mixer stage, band 3 | 51B786 |
| C-9,28 | .05 mfd. 600 V., tubular | 46A Y503J | T-6 | Transformer, mixer stage, band 1 and 2 | 51B1240 |
| C-10 | 22 mmf. 500 V., ceramic | 47X21UK220M | T-7 | Transformer, oscillator stage, band 4 | 51B791 |
| C-11 | 15 mmf. 500 V., ceramic | 47X21UK150M | T-8 | Transformer, oscillator stage, band 3 | 51B913 |
| C-14,21 | Trimmer, adjustable, part of transformers T-6 and 9 | 44A147 | T-9 | Transformer, oscillator stage, band 2 | 51B789 |
| C-16 | 390 mmf. 500 V., mica | 47X20B391K | T-10 | Transformer, oscillator stage, band 1 | 51B912 |
| C-17,53 | .01 mfd. 600 V., tubular | 46A Y103J | T-11,12 | Transformer, 1st and 2nd IF stages | 50C243 |
| C-18 | 68 mmf. 500 V., ceramic | 47X25UK680K | T-13 | Transformer, detector stage | 50C242 |
| C-20 | Trimmer, adjustable, part of transformer T-8 | 44A148 | T-14 | Transformer, audio output | 55B093 |
| C-25 | Padder, adjustable, part of transformer T-10 | 44A188 | T-15 | Transformer, BFO | 54B044 |
| C-23 | 3000 mmf. 500 V., mica | 47X30C302K | T-16 | Transformer, power | 52A209 |
| C-24 | 1500 mmf. 500 V., mica | 47X30C152J | *T-16 | Transformer, power (Universal) | 52C210 |
| C-27,50,51 | 30-10-10 mfd. 450 V., electrolytic | 45A062 | SWITCHES | | |
| C-29,33 | 220 mmf. 500 V., mica | 47X20B221K | S-1 | Bandswitch, wafer, antenna stage | 60B389 |
| C-31,43 | .02 mfd. 200 V., tubular | 46A U203J | | Bandswitch, wafer, mixer stage | 62B039 |
| C-38 | 2 mmf., twisted wire gimmick | | | Bandswitch, wafer, oscillator stage | 62B044 |
| C-39 | .1 mfd. 600 V., tubular | 46A Y104J | S-2,3,5,6 | Switch, toggle, S.P.S.T., A.V.C., A.N.L., CW-AM, and STANDBY-RECEIVE | 60A138 |
| C-41,42 | 47 mmf. 500 V., mica | 47X20B470M | S-4 | Switch, PWR-TONE control | 60A225 |
| C-44,55 | 270 mmf. 500 V., mica | 47X20B271K | PLUGS AND SOCKETS | | |
| C-45,48,52,63 | .02 mfd. 600 V., tubular | 46A Y203J | J-1 | Jack, headset | 36A002 |
| C-47 | .002 mfd. 1000 V., tubular | 46A104 | PL-1 | Line cord | 87B1573 |
| C-54 | 470 mmf. 500 V., mica | 47X20B471J | SO-6 | Socket, standby | 10A015 |
| C-56 | .01 mfd. 600 V., molded paper | 46AC103J | | Socket, octal (tube) | 6A035 |
| C-57 | 1000 mmf. 500 V., mica | 47X25B102M | | Socket, dial light, general coverage dial | 86A070 |
| C-61 | .25 mfd. 200 V., tubular | 46A T254J | | Socket, dial light, bandspread dial | 86B049 |
| C-62 | 2.2 mmf. 500 V., bakelite | 47A160-4 | TUBES, RECTIFIERS AND LAMPS | | |
| C-64 | 10 mfd. 25 V., electrolytic | 45A121 | V-1 | Type 6SG7, r-f amplifier | 90X6SG7 |
| RESISTORS | | | V-2 | Type 6SA7, mixer | 90X6SA7 |
| R-1,62 | 1 megohm 1/2 watt, carbon | 23X20X105M | V-3,4 | Type 6SK7, 1st and 2nd i-f amplifiers | 90X6SK7 |
| R-2 | 120 ohms 1/2 watt, carbon | 23X20X121K | V-5 | Type 6SC7, B.F.O. and audio amplifier | 90X6SC7 |
| R-3 | 10,000 ohms, SENSITIVITY control | 25B590 | V-6 | Type 6K6GT, audio power amplifier | 90X6K6GT |
| R-4,31 | 22 ohms 1/2 watt, carbon | 23X20X220M | V-7 | Type 6H6, A.N.L. and detector | 90X6H6 |
| R-5 | 39,000 ohms 1 watt, carbon | 23X30X393K | V-8 | Type 5Y3GT, rectifier | 90X5Y3GT |
| R-6,26 | 6800 ohms 1 watt, carbon | 23X30X682K | LM-1,2 | Lamp, dial light, Mazda #44 | 39A003 |
| R-7 | 18,000 ohms 1/2 watt, carbon | 23X20X183K | MISCELLANEOUS | | |
| R-8 | 10,000 ohms 2 watts, carbon | 23X40X103K | TS-1 | Terminal strip, antenna | 88A032 |
| R-9 | 470 ohms 1/2 watt, carbon | 23X20X471K | | Lock, line cord | 76A397 |
| R-10 | 12,000 ohms 4 watts, carbon | 23X65CE123K | | Spring, retainer (Bandspread, and main tuning drive shaft) | 75A062 |
| R-11,18,65 | 1000 ohms 1/2 watt, carbon | 23X20X102K | | Dial cord | 38A001 |
| R-12,59 | 2.2 megohms 1/2 watt, carbon | 23X20X225M | | Spring, dial cord | 75A012 |
| R-14 | 47,000 ohms 1/2 watt, carbon | 23X20X473M | | Dial, bandspread | 83B372 |
| R-15,29,58 | 100,000 ohms 1/2 watt, carbon | 23X20X104M | | Dial, general coverage | 83C240 |
| R-20 | 1/2 megohm, VOLUME control | 25A534 | | Glass, general coverage dial | 22B199 |
| R-21 | 150 ohms 1/2 watt, carbon | 23X20X151M | | Window, bandspread | 22A307 |
| R-22 | 270,000 ohms 1/2 watt, carbon | 23X20X274K | LS-1 | Speaker, P.M. (5-inch) | 85B050 |
| R-23,61 | 470,000 ohms 1/2 watt, carbon | 23X20X474M | | Knob, PITCH CONTROL | 12A058 |
| R-24 | 680 ohms 1 watt, carbon | 23X30X681K | | Knob, SENSITIVITY, VOLUME and TONE | 15A046 |
| R-25 | 15,000 ohms 1 watt, carbon | 23X30X153M | | Knob, TUNING and BANDSPREAD | 15A047 |
| R-27,66 | 47,000 ohms 1 watt, carbon | 23X30X473K | | Knob, BAND SELECTOR | 15A266 |
| R-28 | 22,000 ohms 1/2 watt, carbon | 23X20X223M | | Foot, rubber | 16A007 |
| R-30 | 10 ohms 1/4 watt, carbon | 23X10X100M | | | |
| R-32 | 1500 ohms 10 watts, WW | 24BG152E | | | |
| R-33 | 15 megohms 1/4 watt, carbon | 23X10X156M | | | |
| R-34 | 10,000 ohms 1/2 watt, carbon | 23X20X103M | | | |
| R-35 | 27 ohms 1/4 watt, carbon | 23X10X270K | | | |
| R-60,67 | 330,000 ohms 1/2 watt, carbon | 23X20X334K | | | |
| R-63 | 6.8 ohms 1 watt, carbon | 23X30X068K | | | |
| R-64 | 330 ohms 1/2 watt, carbon | 23X20X331K | | | |

* Used on Universal Model S-40BU only.



Radio Receiver Model S-77, front view.

- Tubes Seven plus rectifier
- Speaker 5-inch PM
- Speaker V.C. Impedance 3.2 ohms
- Headset Output Low Impedance
- Antenna Provision for external antenna
- Tuning Manual
- Intermediate Frequency 455 kc
- Power Supply 105-125 V. DC/60 cycles AC (using 117 V. ballast tube, R-38) or 210-250 V. DC/60 cycles AC (using 220 V. ballast tube, R-39)
- Power consumption 40 Watts

TUNING RANGE

| Band Selector Position | Frequency Range |
|------------------------|------------------|
| 1. | 540 kc - 1680 kc |
| 2. | 1680 kc - 5.4 mc |
| 3. | 5.3 mc - 15.5 mc |
| 4. | 15.5 mc - 44 mc |

SERVICE INSTRUCTIONS

RESTRINGING DIAL CORD

To restring the main tuning dial cord, cut a 15-inch length of 30 lb. test dial cord and tie one end to the tension spring of the main tuning capacitor drive pulley at position "1" on the diagram. Follow the numbers "1" through "4", and at position "4" stretch the tension spring and tie the cord securely.

To restring the band spread tuning dial cord cut a 22-inch length of dial cord and follow the procedure as above, starting at position "A" on the diagram. Note that the tuning drive shafts are wrapped with two and a fraction turns of dial cord for proper traction.

REPLACING LAMPS

Refer to Fig. 7 for the location of the two dial lamps used in the receiver. To gain access to defective lamps, reach in through cabinet cover and unclip the dial lamp sockets. The sockets may then be brought out into the open to change the defective lamp. Replace lamps with 6-8 V. G.E. #47 (brown bead) lamps or equivalent.

ALIGNMENT PROCEDURE

For I-F amplifier alignment it will be necessary to remove the receiver chassis from the cabinet. The chassis is held in the cabinet by three screws along both the bottom edge of the front panel and the rear of the cabinet, and two screws on either side of the front panel.

NOTE - R-F alignment should be accomplished through the holes provided in the cabinet bottom as the oscillator calibration will be effected slightly by changes in the capacity between the cabinet bottom and the r-f coils and wiring.

Before starting the alignment procedure, check the position of the main tuning index marker on the low frequency end of the range and set the bandspread dial on zero position. The main tuning condenser should index at max. capacity, and the bandspread condenser at min. capacity.

The standard RMA dummy antenna mentioned in the alignment chart consists of a 200 mmf. condenser in series with a 20 oh r-f choke which is shunted by a 400 mmf. condenser in series with a 400 ohm carbon resistor.

Set the following controls before alignment

- SENSITIVITY Set at maximum
- VOLUME Set at maximum
- AVC switch. Set at OFF
- BAND SPREAD Set at zero
- CW/AM Set at AM (See Step 2)
- NOISE LIMITER Set at OFF
- STANDBY/RECEIVE Set at RECEIVE
- TONE SWITCH Set at HIGH

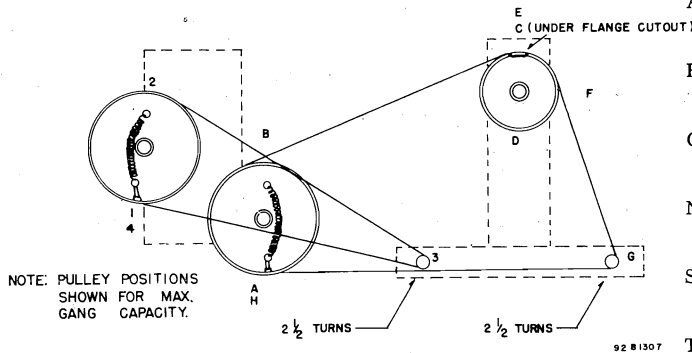


FIG. 1. DIAL CABLE STRINGING PROCEDURE

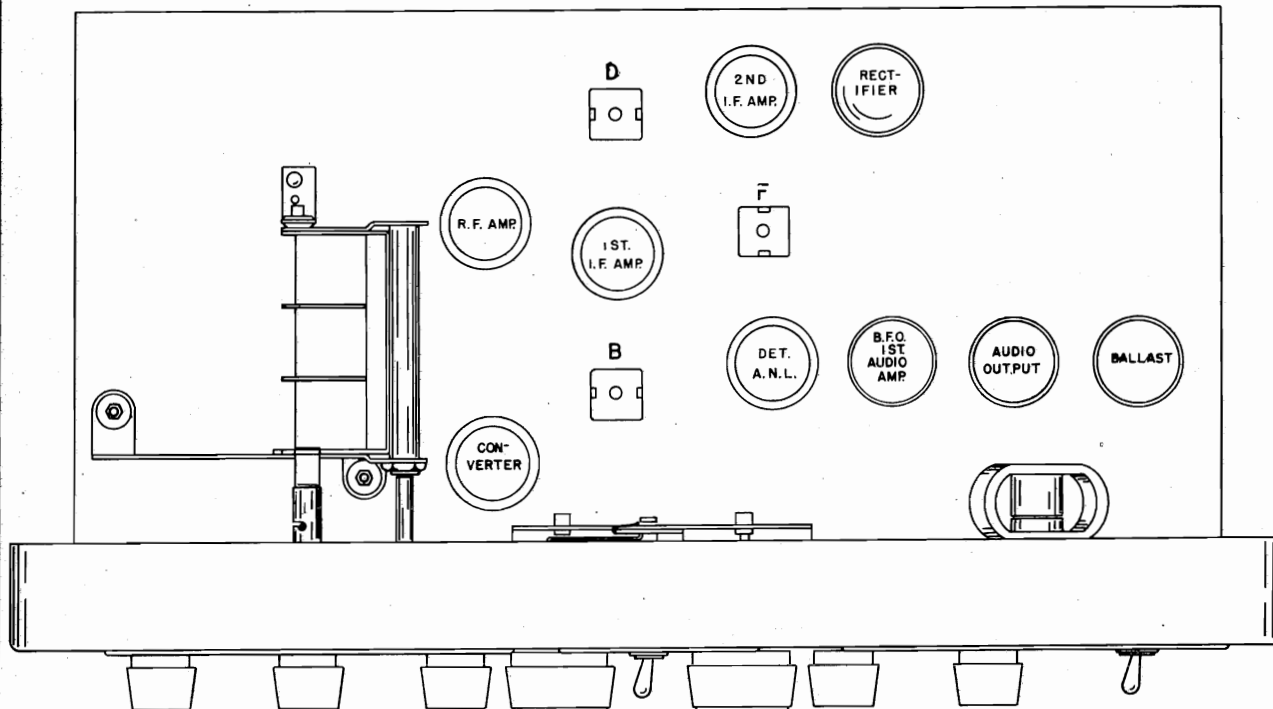
For the settings of the remaining controls, see alignment chart.

ALIGNMENT CHART

| Step | Dummy Antenna | Signal Generator Coupling | Signal Generator Frequency | Band Switch Setting | Receiver Dial Setting | Adjust | Remarks |
|------|---------------|---------------------------------------------------------------|----------------------------|---------------------|-----------------------|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | None | Stator plates in center section of tuning gang. | 455 kc | "1" | 1000 kc | A,B,C, D,E,F | Maximum audio output at speaker voice coil. Use just enough signal generator output to obtain a 50 MW signal level. |
| 2 | None | See step 1 | 455 kc (No modulation) | "1" | 1000 kc | G | With the CW/AM switch set at CW, remove the pitch control knob and adjust "G" for zero beat. Replace the knob with the dot on the center position. |
| 3 | Std RMA dummy | "A1" on antenna strip. Jumper connected between "A2" and "G". | 36 mc 18 mc | "4" | 36 mc 18 mc | *H,I,J *K,L,M | Maximum output as in step 1. |
| 4 | Std RMA dummy | See step 3 | 14 mc 10 mc | "3" | 14 mc 10 mc | *N,O,P *Q,R,S | Maximum output as in step 1. |
| 5 | Std RMA dummy | See step 3 | 5 mc 1.8 mc | "2" | 5 mc 1.8 mc | *T,U,V *W | Maximum output as in step 1. |
| 6 | Std RMA dummy | See step 3 | 1500 kc 600 kc | "1" | 1500 kc 600 kc | *X,Y,Z *Z' | Maximum output as in step 1. |

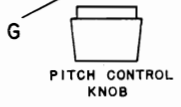
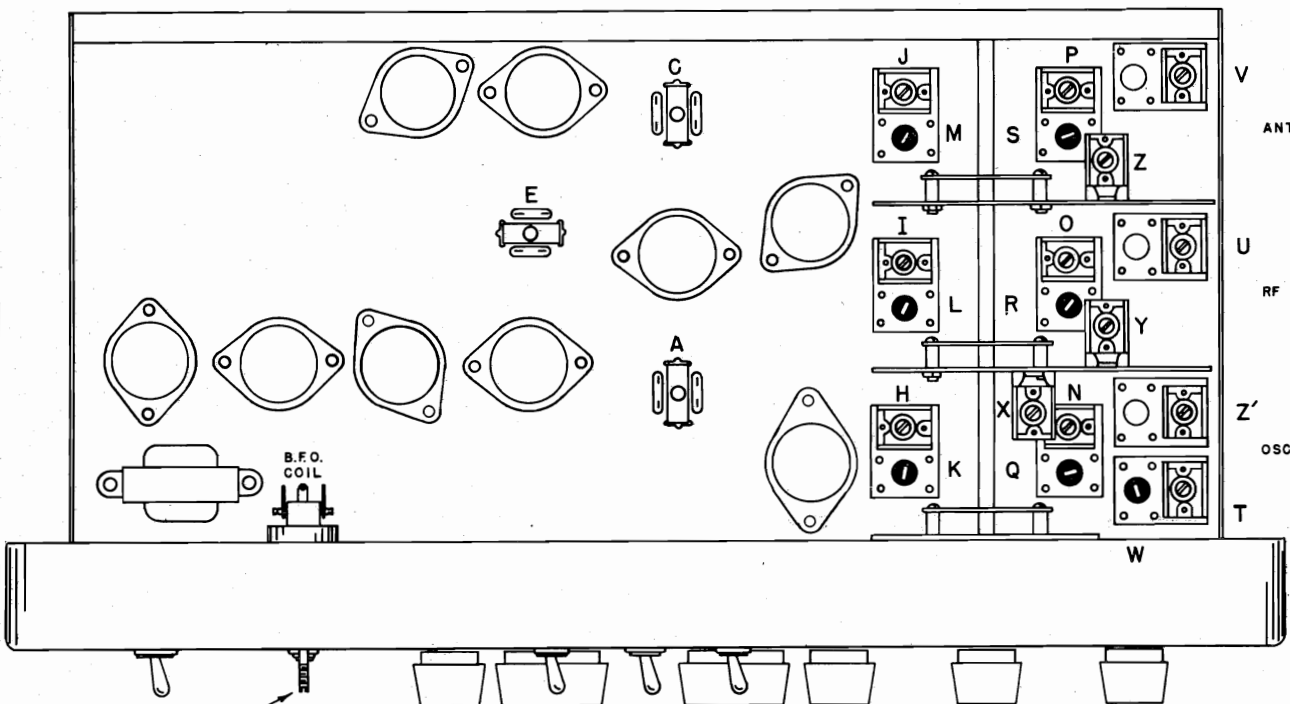
*Note - Calibration adjustments.

MODEL S-77



92D1310

FIG. 2. TOP VIEW, ALIGNMENT POINTS



92D1311

FIG. 3. BOTTOM VIEW, ALIGNMENT POINTS

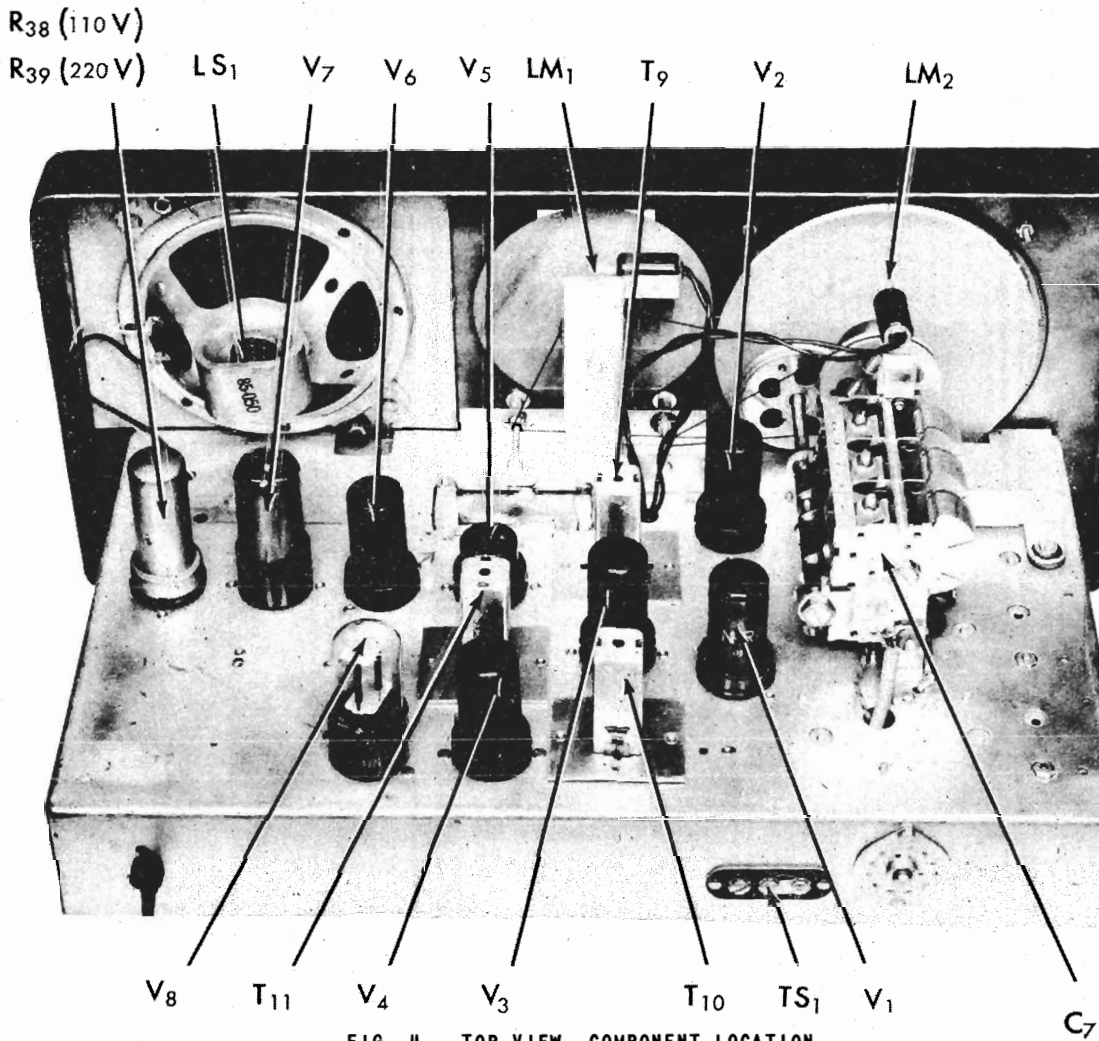
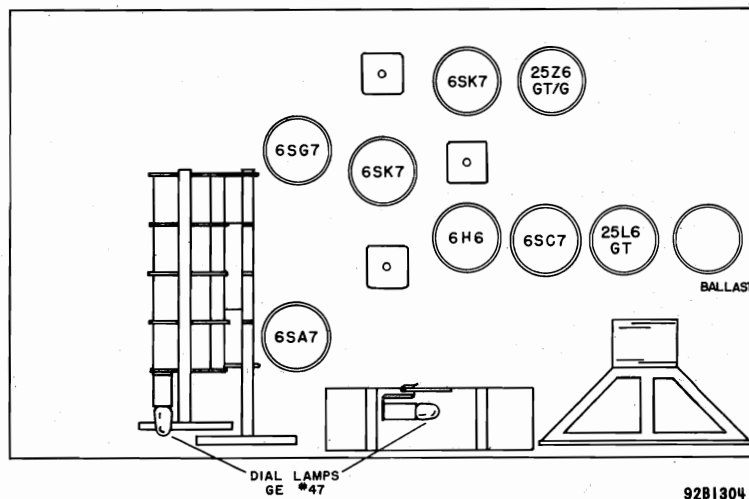


FIG. 4. TOP VIEW, COMPONENT LOCATION

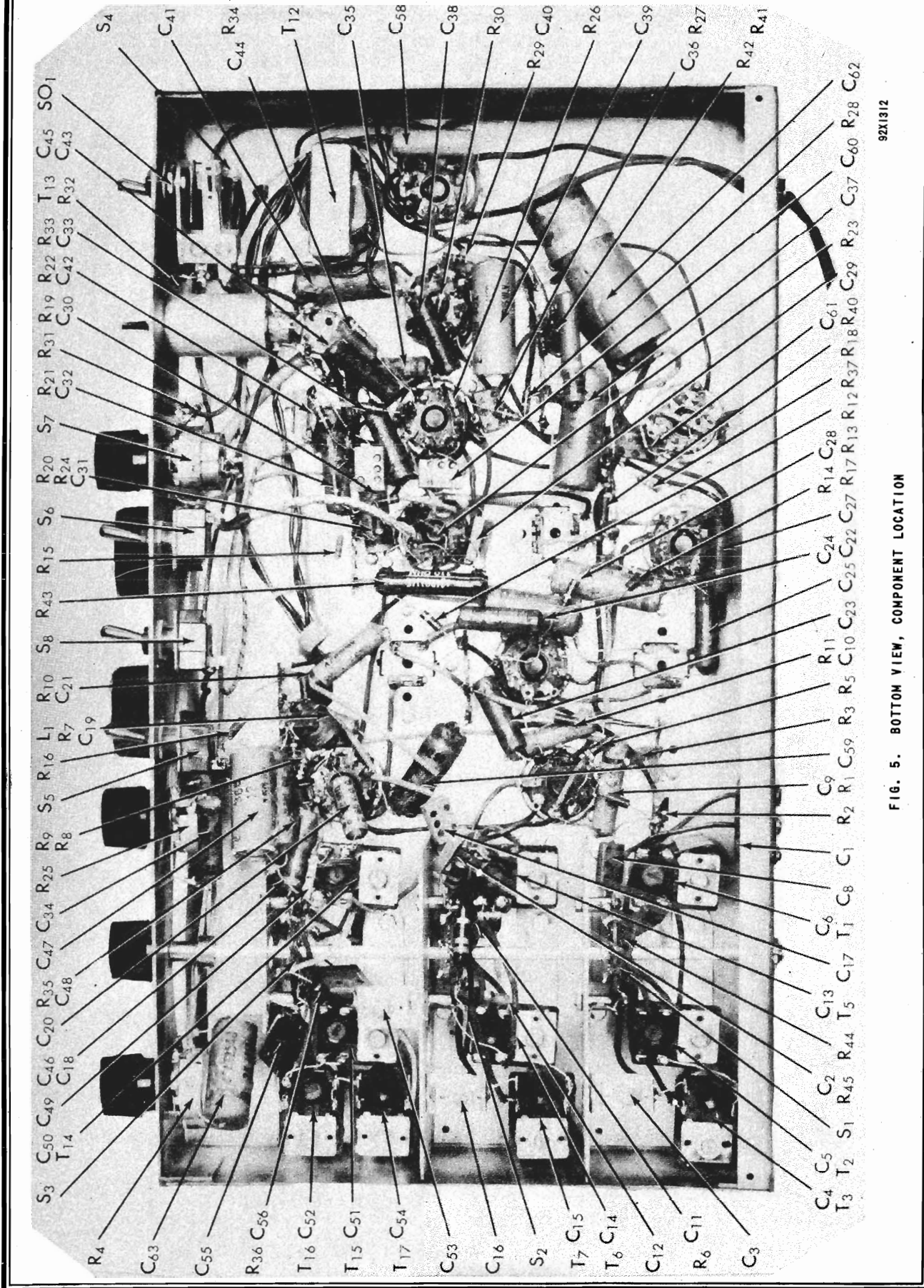
92X1313



92B1304

FIG. 7. TOP VIEW, LOCATION OF TUBES AND DIAL LAMPS

MODEL S-77



92X1312

FIG. 5. BOTTOM VIEW, COMPONENT LOCATION

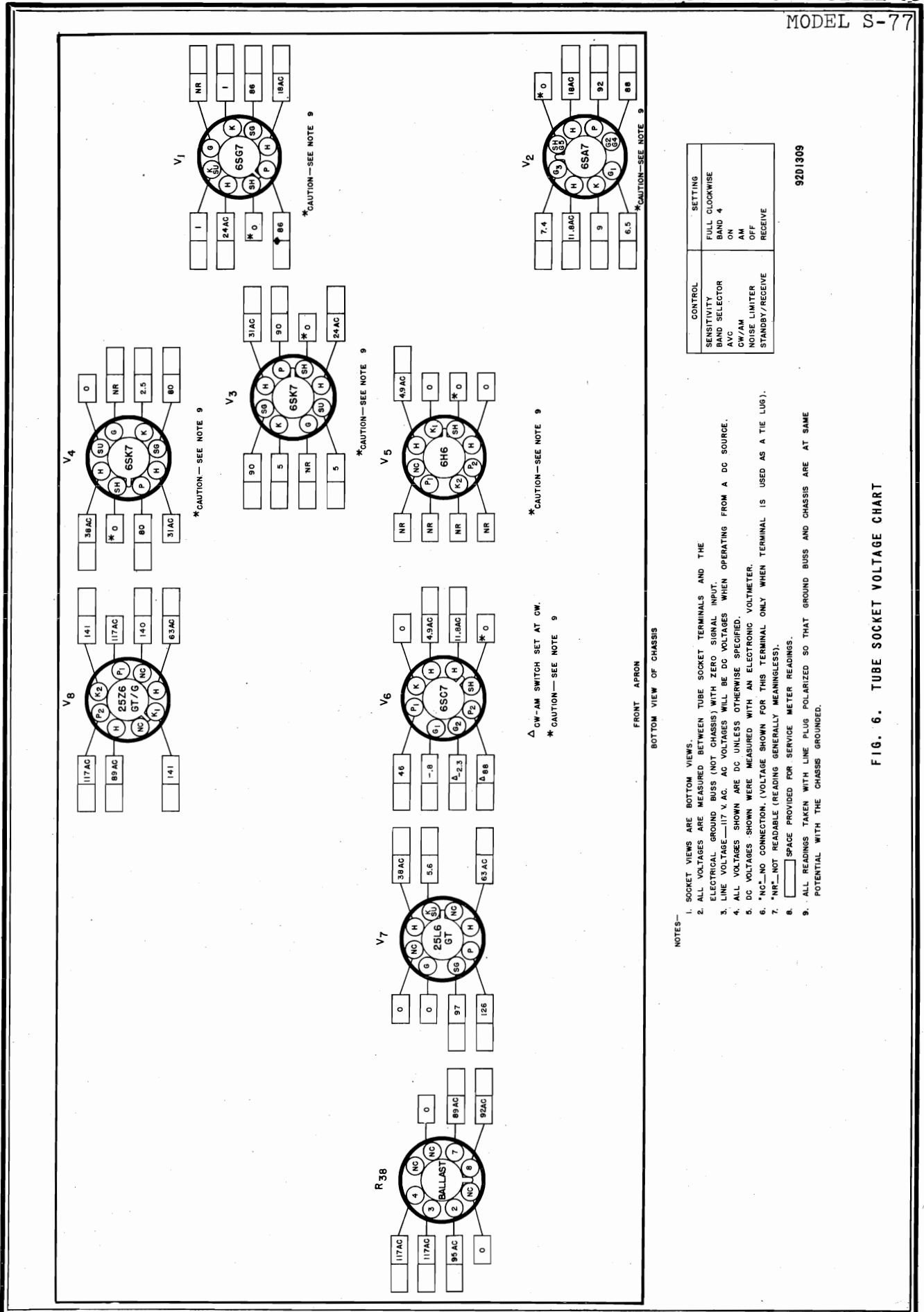


FIG. 6. TUBE SOCKET VOLTAGE CHART

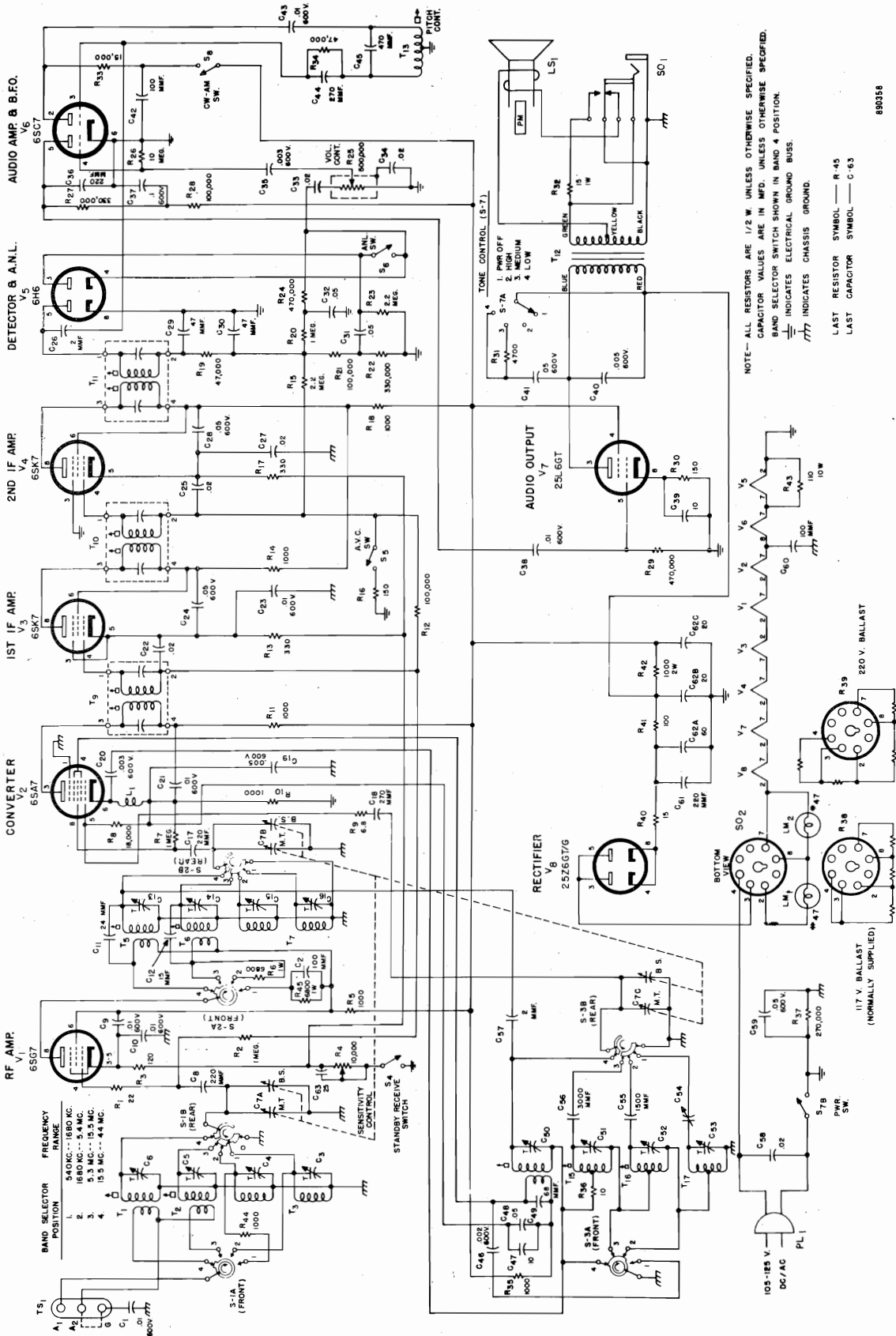


FIG. 8. SCHEMATIC DIAGRAM

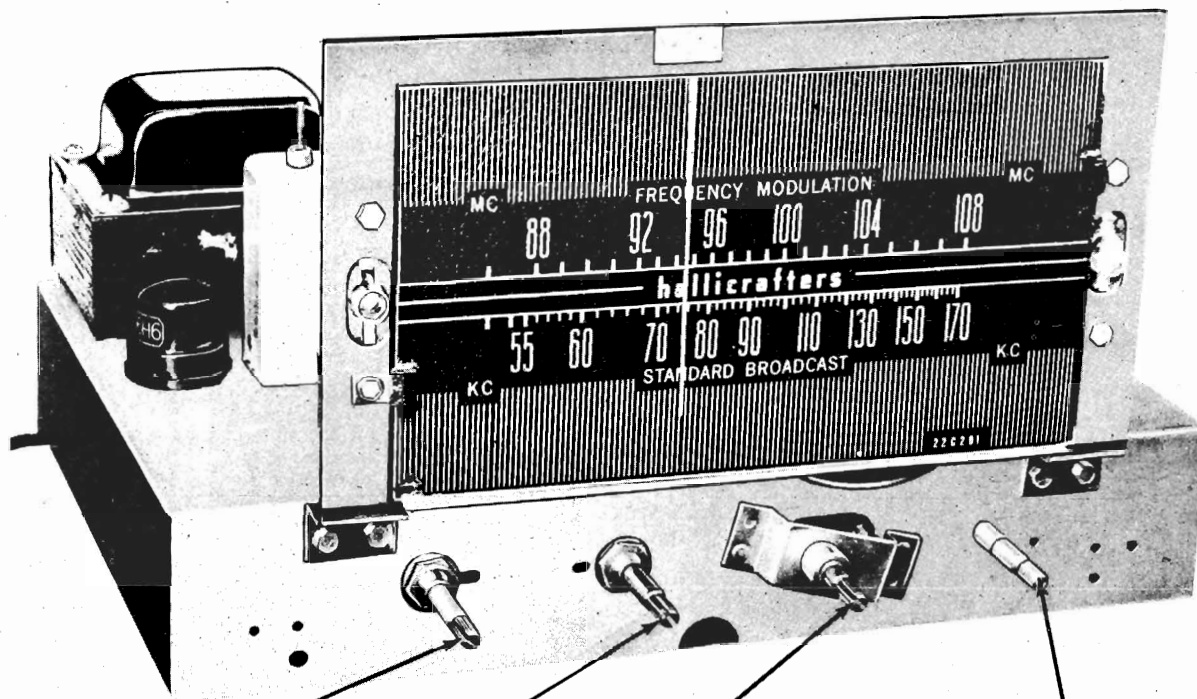
VALUES & TOLERANCES SHOWN ARE NOMINAL. VARIATIONS MAY BE FOUND... IT IS RECOMMENDED THAT THE VALUE OF ANY REPLACEMENT CORRESPOND TO THE NOMINAL VALUE OF THE PART BEING REPLACED.

SERVICE PARTS LIST

| Ref. No. | Description | Hallcrafters Part Number | Ref. No. | Description | Hallcrafters Part Number |
|-------------------------|--------------------------------------|--------------------------|-----------------------------------------|-------------------------------------------------------------------|--------------------------|
| CAPACITORS | | | TRANSFORMERS AND COILS | | |
| C-1,9,10,21, 23,38,43 | .01 mfd. 600V., tubular paper | 46AZ103J | L-1 | Choke, RF | 53A138 |
| C-2,42,60 | 100 mmf. 500V., mica | 47X20B101K | T-1 | Coil, antenna; band 4 | 51B783 |
| C-3,16,53 | Trimmer, 2-20 mmf. | 44A191 | T-2 | Coil, antenna; band 3 | 51B782 |
| C-4 | Trimmer (part of coil T-3) | | T-3 | Coil, antenna; bands 1 and 2 | 51B1241 |
| C-5 | Trimmer (part of coil T-2) | | T-5 | Coil, RF; band 4 | 51B787 |
| C-6 | Trimmer (part of coil T-1) | | T-6 | Coil, RF; band 3 | 51B786 |
| C-7 | Tuning capacitor, 3 section; ganged | 48C240-B | T-7 | Coil, RF; bands 1 and 2 | 51B1240 |
| C-8,17,36, 61 | 220 mmf. 500V., mica | 47X20B221K | T-9,10 | Transformer, 1st and 2nd IF | 50C243 |
| C-11 | 24 mmf., ceramic | 47X25UK240M | T-11 | Transformer, IF (detector stage) | 50C242 |
| C-12 | 15 mmf., ceramic | 47X21UK150M | T-12 | Transformer, audio output | 55B110 |
| C-13 | Trimmer (part of coil T-5) | | T-13 | Coil, PITCH CONTROL | 54B044 |
| C-14 | Trimmer (part of coil T-6) | | T-14 | Coil, oscillator; band 4 | 51B791 |
| C-15 | Trimmer (part of coil T-7) | | T-15 | Coil, oscillator; band 3 | 51B913 |
| C-18,44 | 270 mmf. 500V., mica | 47X20B271K | T-16 | Coil, oscillator; band 2 | 51B789 |
| C-19,40 | .005 mfd. 600V., tubular paper | 46AZ502J | T-17 | Coil, oscillator; band 1 | 51B912 |
| C-20,35 | .003 mfd. 600V., tubular paper | 46AY302J | SWITCHES | | |
| C-22,25,27, 33,34 | .02 mfd. 200V., tubular paper | 46AU203J | S-1 | Wafer, bandswitch; antenna stage | 60B389 |
| C-24,28,41 | .05 mfd. 600V., tubular paper | 46AY503J | S-2 | Wafer, bandswitch; RF stage | 62B039 |
| C-26,57 | 2 mmf., wire gimmick | | S-3 | Wafer, bandswitch; oscillator stage | 62B044 |
| C-29,30 | 47 mmf. 500V., mica | 47X20B470K | S-4,5,6,8, | Switch, toggle (SPST); STANDBY-RECEIVE, A.V.C., A.N.L., and CW-AM | 60A138 |
| C-31,32,48 | .05 mfd. 200V., tubular paper | 46AU503J | | | |
| C-37 | .1 mfd. 600V., tubular paper | 46AY104J | S-7 | Switch, PWR-TONE | 60A225 |
| C-39 | 10 mfd. 25V., electrolytic | 45A121 | PLUGS AND SOCKETS | | |
| C-45 | 470 mmf. 500V., mica | 47X20B471J | PL-1 | Line cord and plug | 87B1573 |
| C-46 | .002 mfd. 600V., tubular paper | 46AZ202J | SO-1 | Jack, PHONES | 36B004 |
| C-47 | 10 mfd. 150V., electrolytic | 45A097 | SO-2 | Socket, octal; ballast tube | 6A250 |
| C-49 | 68 mmf. ceramic | 47X25UK680K | | Socket, octal; tube | 6A250 |
| C-50 | Trimmer (part of coil T-14) | | | Socket, dial lamp (main tuning dial) | 86B101 |
| C-51 | Trimmer (part of coil T-15) | | | Socket, dial lamp (bandspread dial) | 68B068 |
| C-52 | Trimmer (part of coil T-16) | | | | |
| C-54 | Padder (part of coil T-17) | | | | |
| C-55 | 1500 mmf. 500V., mica | 47X35C152J | TUBES, RECTIFIERS AND DIAL LAMPS | | |
| C-56 | 3000 mmf. 500V., mica | 47X35B302K | V-1 | Type 6SG7, RF amplifier | 90X6SG7 |
| C-58 | .02 mfd. 600V., molded tubular paper | 46BR203L6 | V-2 | Type 6SA7, converter | 90X6SA7 |
| C-59 | Resonant capacitor (.05 mfd. 600V.) | 46A150 | V-3,4 | Type 6SK7, 1st and 2nd IF amplifiers | 90X6SK7 |
| C-62 | 60-20-20 mfd. 150V., electrolytic | 45B128-C | V-5 | Type 6H6, detector and A.N.L. | 90X6H6 |
| C-63 | .25 mfd. 200V., tubular paper | 46AT254J | V-6 | Type 6SC7, audio amp. and B.F.O. | 90X6SC7 |
| RESISTORS | | | V-7 | Type 25L6GT, audio output | 90X25L6GT |
| R-1 | 22 ohms 1/2 watt, carbon | 23X20X220K | V-8 | Type 25Z6GT/G, rectifier | 90X25Z6GT/G |
| R-2,7,20 | 1 megohm 1/2 watt, carbon | 23X20X105M | LM-1,2 | Lamp, dial; GE #47 | 39A004 |
| R-3 | 120 ohms 1/2 watt, carbon | 23X20X121K | MISCELLANEOUS | | |
| R-4 | 10,000 ohms; SENSITIVITY control | 25B590 | | Bandswitch and shaft | 60B392 |
| R-5,10,11, 14,18,35, 44 | 1000 ohms 1/2 watt, carbon | 23X20X102K | | Cabinet (lower section) | 66E359 |
| R-6,45 | 6800 ohms 1 watt, carbon | 23X30X682K | | Cabinet front panel | 68D160 |
| R-8 | 18,000 ohms 1/2 watt, carbon | 23X20X183K | | Cabinet top | 66D616 |
| R-9 | 6.8 ohms 1/2 watt, carbon | 23X20X068K | | Dial, bandspread | 83B372 |
| R-12,21,28 | 100,000 ohms 1/2 watt, carbon | 23X20X104M | | Dial, main tuning | 83C240 |
| R-13,17 | 330 ohms 1/2 watt, carbon | 23X20X331K | | Dial cord | 38A001 |
| R-15,23 | 2.2 megohms 1/2 watt, carbon | 23X20X225M | | Foot, rubber | 16A007 |
| R-16,30 | 150 ohms 1/2 watt, carbon | 23X20X151K | | Glass, bandspread tuning dial | 22A307 |
| R-19,34 | 47,000 ohms 1/2 watt, carbon | 23X20X473K | | Glass, main tuning dial | 22B199 |
| R-22,27 | 330,000 ohms 1/2 watt, carbon | 23X20X334M | | Knob, BAND SELECTOR | 15A266 |
| R-24,29 | 470,000 ohms 1/2 watt, carbon | 23X20X474M | | Knob, PITCH CONTROL | 15A058 |
| R-25 | 500,000 ohms; VOLUME control | 25B586 | | Knob, TUNING and BANDSPREAD | 15A047 |
| R-26 | 10 megohms 1/2 watt, carbon | 23X20X106M | | Knob, SENSITIVITY, VOLUME and TONE | 15A049 |
| R-31 | 4700 ohms 1/2 watt, carbon | 23X20X472K | | Lock, line cord | 76A397 |
| R-32 | 15 ohms 1 watt, carbon | 23X30X150M | | Screw, Allen head (6-32 x 3/16) | 3A1122 |
| R-33 | 15,000 ohms 1/2 watt, carbon | 23X20X153K | | Slug, adjustable tuning | 77A068 |
| R-36 | 10 ohms 1/2 watt, carbon | 23X20X100K | | Speaker, PM; 5 inch | 85B050 |
| R-37 | 270,000 ohms 1/2 watt, carbon | 23X20X274M | LS-1 | Spring, dial cord | 75A012 |
| R-38 | Ballast tube (117V.) | 24B875 | | Spring, retainer | 75A062 |
| R-39 | Ballast tube (220V.) | 24B874 | TS-1 | Terminal strip, antenna | 88A032 |
| R-40 | 15 ohms 1/2 watt, carbon | 23X20X150K | | | |
| R-41 | 100 ohms 1/2 watt, carbon | 23X20X101K | | | |
| R-42 | 1000 ohms 2 watts, carbon | 23X40X102K | | | |
| R-43 | 110 ohms 10 watts, WW | 24BG111E | | | |

MODEL S-78

USE OF OPERATING CONTROLS



OFF-VOICE-NORMAL-
BASS-HI-FI VOLUME FM-BROADCAST-PHONO TUNING 92X1252

This is a combination power switch and tone control. In position one the receiver is completely turned off. To turn the receiver on, set this control at any of the four remaining positions, depending upon the tone qualities desired. Illumination of the dial indicates that the receiver is obtaining power from the wall outlet and ready for use. The tone control settings generally used are VOICE and NORMAL for speech and BASS and HI FI for musical entertainment.

Turn this control clockwise to increase volume and counter clockwise to decrease volume.

This is the combination range and operation switch. In the FM (Frequency Modulation) position, the receiver tunes the 88 to 108 megacycle FM band; and in the BROADCAST position, the receiver operates as a standard broadcast receiver tuning the frequency range 540 to 1750 kilocycles. To use the receiver as a record player, set this switch at PHO and operate the volume and tone controls as for normal radio reception.

The tuning control "tunes in" either BC or FM stations depending upon the setting of the range switch. The standard broadcast band dial is calibrated so that a zero must be added to the number appearing on the dial to obtain the station frequency in kilocycles. The frequencies of the FM stations are shown directly in megacycles. The frequencies of local stations are generally listed in local newspapers, BC stations in kilocycles and FM stations in megacycles. When tuning for the station, tune carefully and obtain top performance from your receiver.

GENERAL SPECIFICATIONS

| | | | |
|-----------------------------|----------------------------------|-----------------------------|----------------------------------------------------------------------|
| Tubes | Ten plus rectifier | Tuning Range | Broadcast 540 kc - 1750 kc Frequency Modulation 88 mc - 108 mc |
| Speaker Output | 3.2 and 500 ohms. | Intermediate Frequency . . | 455 kc/10.7 mc. |
| Speaker Connection. | Std. 5 pin socket. | Power Supply. | 105-125 V. 50/60 cycles AC |
| Antenna | Provisions for external antennas | Power Consumption | 90 Watts |
| Tuning. | Manual | | |

INSTALLATION

When locating the receiver, avoid excessively warm locations such as are found near radiators or hot air registers. When placing the receiver with its back to the wall, leave about an inch or two of clearance between the back of the cabinet and the wall for proper ventilation.

There are three basic connections to be made, antenna, speaker, and power, to completely set up the receiver. All connections are located on the rear apron of the chassis.

ANTENNA - Terminals are provided for separate AM broadcast (BC) and FM broadcast (FM) antennas. The BC band antenna terminals are marked "A" and "G" and the FM band antenna terminals are identified by "D-D".

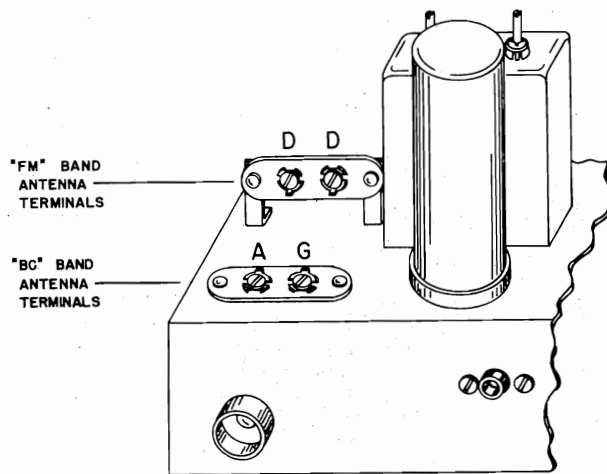


Fig. 2. Antenna terminal strip connections

92 B 391

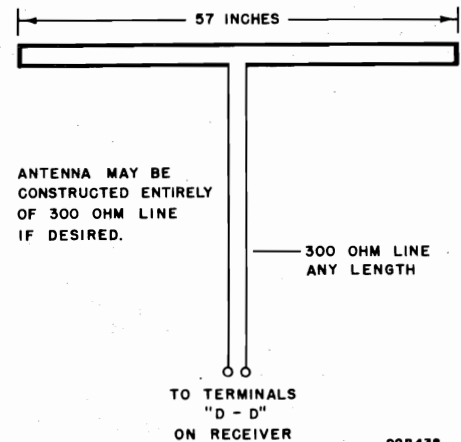


Fig. 3. Folded doublet antenna details.

BC Antenna - The standard broadcast band antenna may consist of any single length of wire from approximately ten feet to fifty feet depending upon the local receiving conditions. Attach the wire to the "A" terminal of the antenna terminal strip. Erect outdoor antenna installations as high and as free from surrounding objects as possible. Erecting this type of antenna at right angles to local "man made" sources of static, (street car lines, power lines, etc.) is recommended for best results. An excessively long antenna will not necessarily be the most desirable antenna. Use the length that will provide adequate signal pick up.

For some installations it will be found desirable to connect a ground wire to the "G" terminal of the terminal strip. A radiator or water pipe will generally serve as a good ground connection.

FM Antenna - The antenna for FM reception may consist of any type of antenna that operates with a 300-ohm transmission line. If a commercial antenna is installed, be sure it uses a 300-ohm transmission line. The transmission line from the antenna is connected to terminals "D-D" on the receiver.

The simplest antenna which will provide satisfactory results, mounted either on the back of a console cabinet or outside the building, is the folded doublet. This antenna may be constructed from 300-ohm transmission line as shown in Fig. 3. Keep in mind that the doublet antenna response favors signals broadside to its length and should be erected with its length at right angles to the direction of reception. This is especially important where receiving conditions are poor and maximum antenna pickup is required.

POWER SOURCE - The receiver operates from a 105-125 V. 60 cycle AC source only. The receiver will not operate from a 115 V. direct current source or 25 cycle AC source directly. If in doubt as to the voltage and frequency rating of your power source, contact the local power company representative and avoid costly repairs. The nominal power consumption for this receiver is 90 watts.

DIAL LAMP REPLACEMENT

Refer to Fig. 6 for the location of the two dial lamps used in the receiver. To gain access to defective lamps, unclip the dial lamp socket by compressing the side springs. The socket may then be brought out into the open to change the defective lamp.

SPEAKER CONNECTIONS

The speaker connector is located on the rear apron of the receiver. Connection is to be made through a standard 5 pin tube socket. The receiver is designed to operate into either a 3.2 ohm or a 500 ohm speaker load. For detailed information on making connections for either load refer to the schematic diagram. If a matching transformer is used in connection with the speaker load it should be capable of handling approximately 10 watts of audio power.

RECORD PLAYER CONNECTION

A shielded type receptacle is provided at the rear chassis apron to accommodate a record player pickup cable connector. Any record player employing a crystal cartridge or high level magnetic pickup in its tone arm may be used with the receiver. A utility receptacle is provided at the rear apron of the receiver to accommodate the power plug of the record player. The use of this receptacle will permit the record player to be turned off with the receiver.

TUBE REPLACEMENT

The types of tubes required and their relative position in the receiver are shown in the illustration, Fig. 6. When installing a replacement tube, insert the center guide pin into the center hole of the tube socket; rotate the tube until the key on the guide pin drops into the notch in the socket hole; and push down until the base of the tube rests firmly on the socket. A slightly different technique must be used on the miniature tubes. They have seven small pins which have to be lined up with the socket holes before pushing into place. Handle with care as all tubes are considered fragile and do not tolerate much mechanical abuse.

MODEL S-78

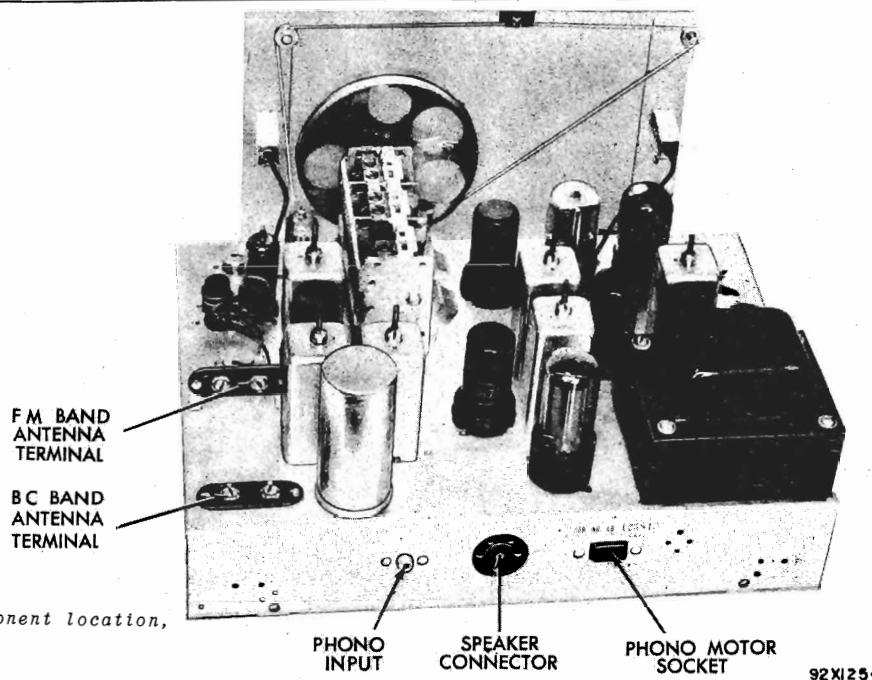


Fig. 4. Component location, rear view

ALIGNMENT PROCEDURE

The receiver is equipped with AUTOMATIC FREQUENCY CONTROL on the FM band to compensate for oscillator drift and improve the tuning function on the FM band. The correction factor is approximately 5 times: AFC takes hold 250 kc before the station frequency is reached and releases before tuning 500 kc beyond the station frequency when receiving a 1000 microvolt signal.

The standard RMA dummy specified in the alignment chart consists of a 200 mmf condenser in series with a 20 uh r-f choke which is shunted by a 400 mmf condenser in series with a 400 ohm carbon resistor.

When making the alignment adjustments set the tone control at NORMAL and the volume control at maximum volume. Use just enough signal generator output to obtain the results indicated on the chart.

ALIGNMENT CHART

| Step | Dummy Antenna | Signal Generator Coupling | Signal Generator Frequency | Band Switch Pos. | Radio Dial Setting | Adjust | Remarks |
|------|-----------------------------------------------------------|--------------------------------------------------|----------------------------|------------------|--------------------|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | 0.01 mfd. cap | To high cap. stator of center section. | 455 kc | "BC" | 1000 kc | A,B,C,D, E | Adjust for max. audio output. Keep audio output below 500 MW to avoid AVC action. |
| 2 | 0.01 mfd. cap. in series with a 4700 ohm carbon resistor. | To low cap. stator of center section. | 10.7 mc | "FM" | 90 mc | F,G,H,I, J,K | Adjust for max. voltage as measured between pin #3 of 6H6 and ground with an electronic volt meter. Adjust signal generator output for approx. 2 volts DC at this point. |
| 3 | 0.01 mfd cap. | See step 2. | 10.7 mc | "FM" | 90 mc | L | Adjust for zero voltage as measured between the junction of R27 and R28 and ground with an electronic volt meter. |
| 4. | Std RMA dummy | To terminals "A" and "G" on terminal strip TS-2. | 1500 kc | "BC" | 1500 kc | *M,N,O | Adjust for max. output as in step 1. |
| 5. | Two 150 ohm carbon resistors | To terminals "D-D" on terminal strip TS-1. | 105 mc | "FM" | 105 MC | *P,Q | Adjust for max. voltage as measured across R54 with an electronic volt meter. Adjust signal generator output for approx. 1 volt DC at this point. |

*NOTE - Calibration adjustments.

RESTRINGING DIAL CORD

Restring the dial drive with 30 lb. test dial cord. Tie one end to the tension spring and follow the sequence outlined in Fig. 5. Stretch the tension spring and tie the end of the cord securely to the spring as shown.

Set the tuning condenser at maximum capacity (closed), attach the pointer to the string and line it up with the left hand index mark on the dial scale.

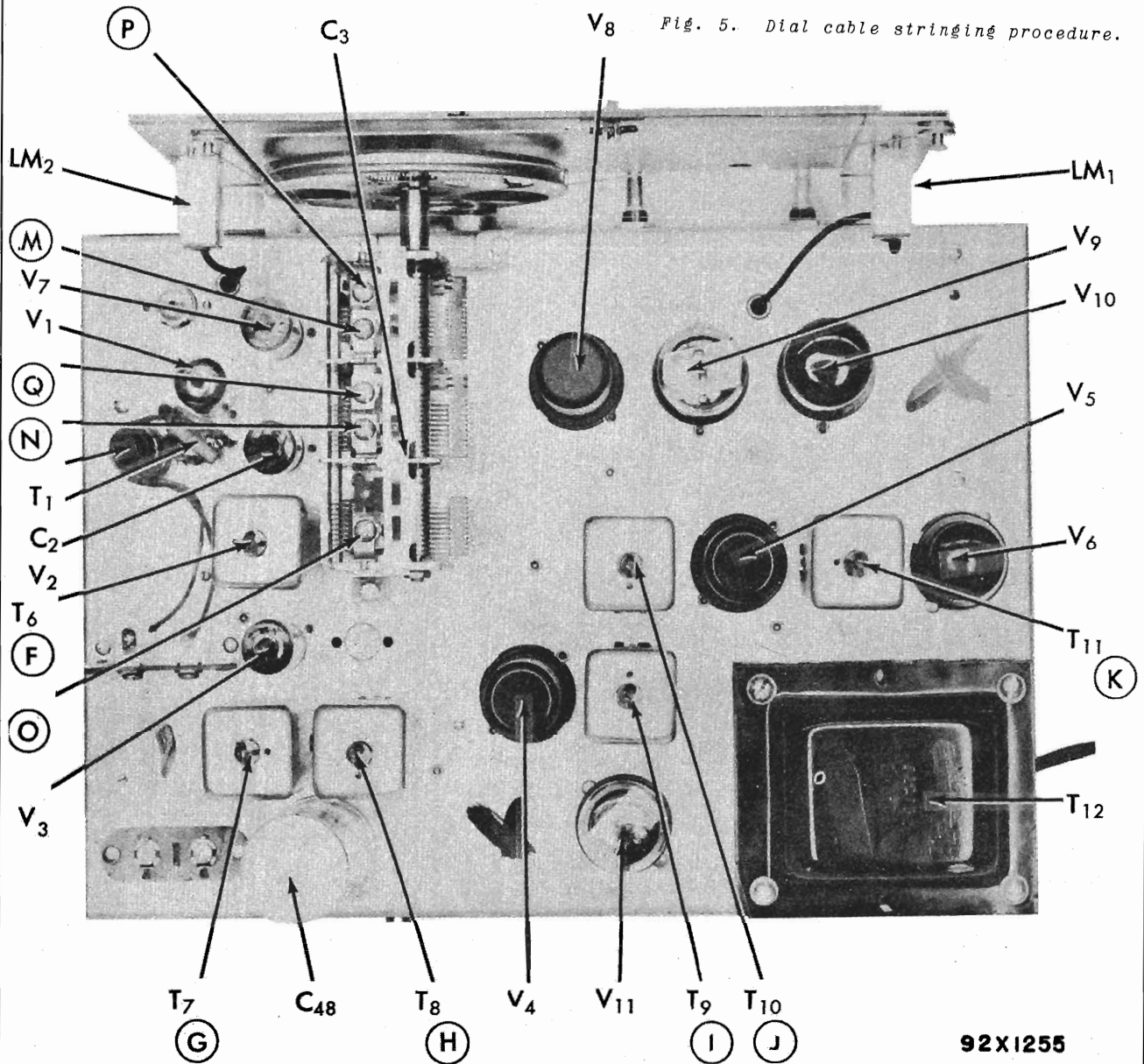
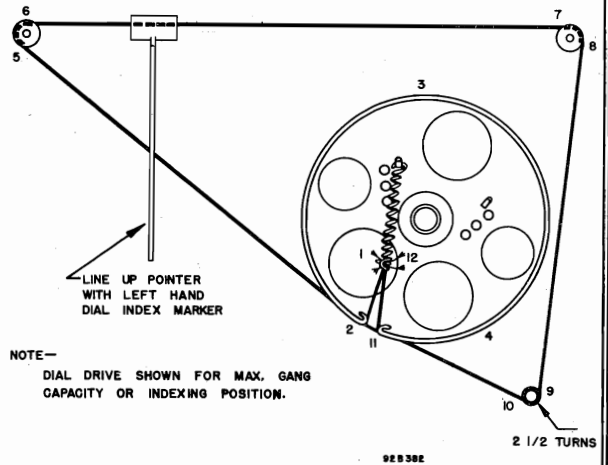


Fig. 6. Top view alignment points & component locations

92X1255

MODEL S-78

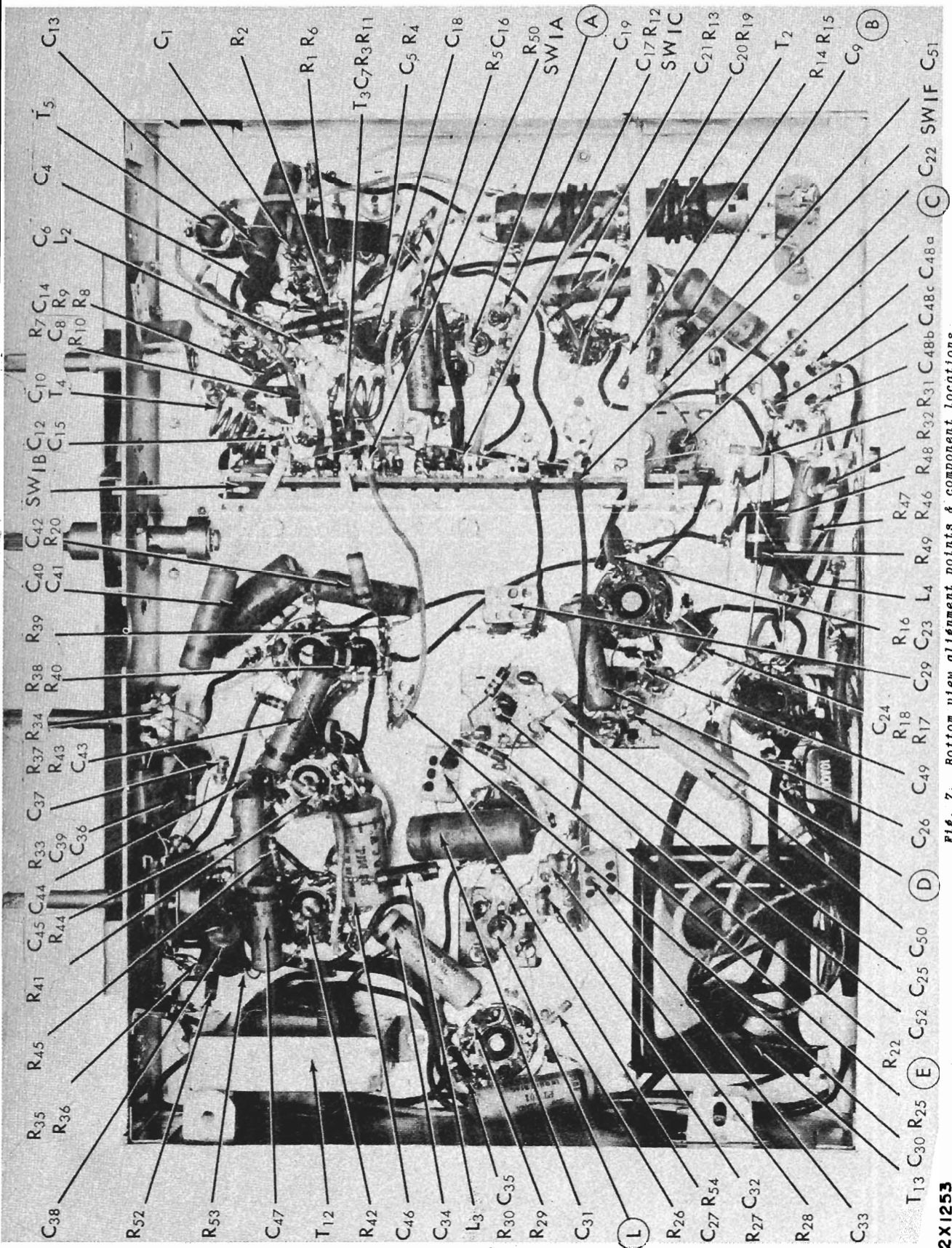
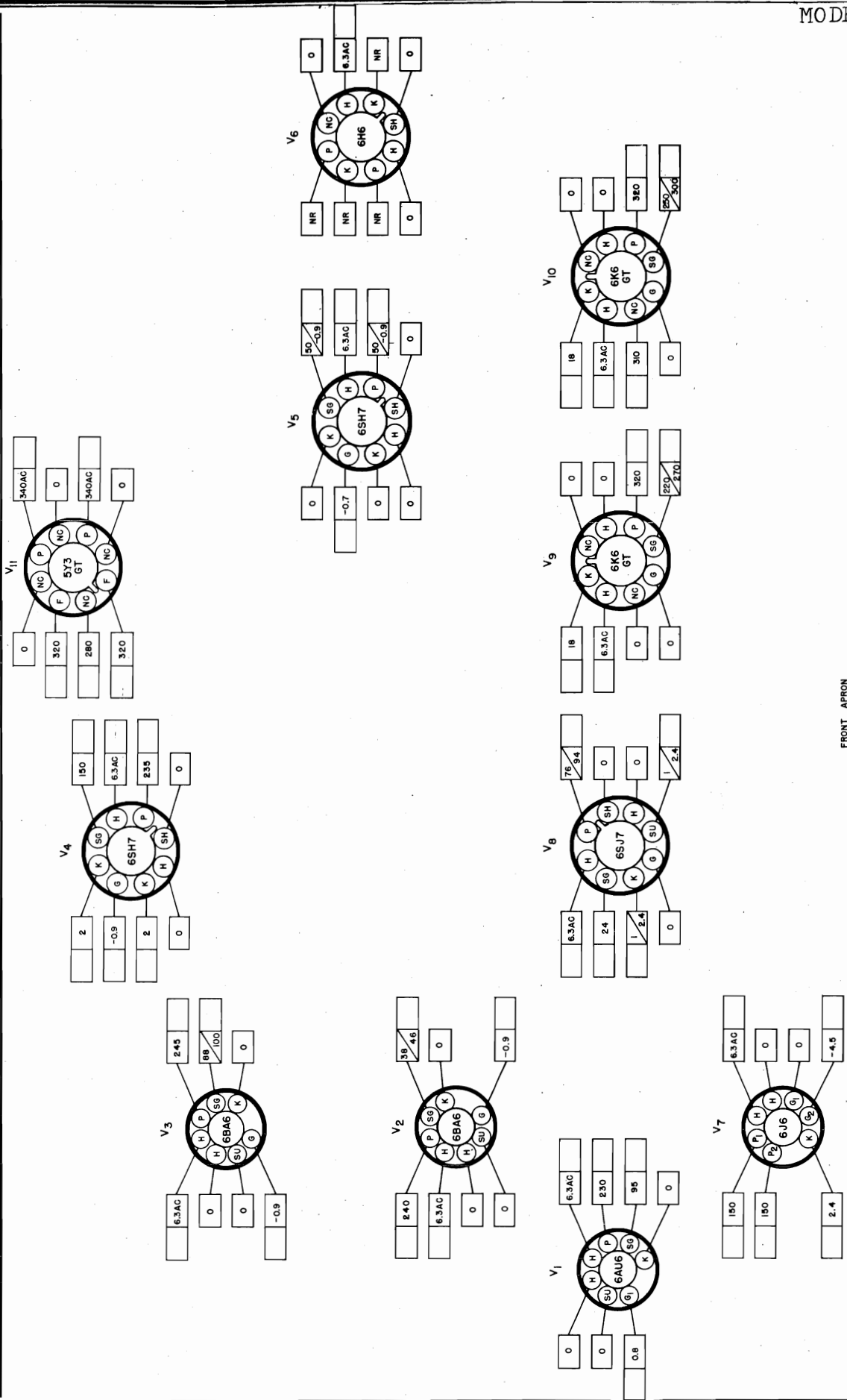


Fig. 7. Bottom view alignment points & component locations

92X1253

Fig. 8. Tube socket voltage chart



FRONT VIEW OF CHASSIS
BOTTOM VIEW OF CHASSIS

- NOTES—
1. SOCKET VIEWS ARE BOTTOM VIEWS.
 2. ALL VOLTAGES MEASURED BETWEEN TUBE SOCKET TERMINALS AND CHASSIS.
 3. LINE VOLTAGE 117 V. AC.
 4. VOLTAGES WERE MEASURED WITH A 20,000 OHM/VOLTMETER AND AT ZERO SIGNAL.
 5. ALL VOLTAGES ARE DC UNLESS OTHERWISE SPECIFIED.
 6. "FM" ARE SHOWN UPPER LEFT SHOWS FM READINGS—LOWER RIGHT SHOWS AM READINGS.
 7. THE BLANK SPACES ARE PROVIDED FOR THE SERVICEMAN. EQUIPMENT WITH FOUR TUBE SOCKETS SHOULD USE THESE MEASUREMENTS.
 8. "NR" ARE SHOWN UPPER LEFT SHOWS FM READINGS—LOWER RIGHT SHOWS AM READINGS.
 9. "NR"—NOT READABLE.

92D1257

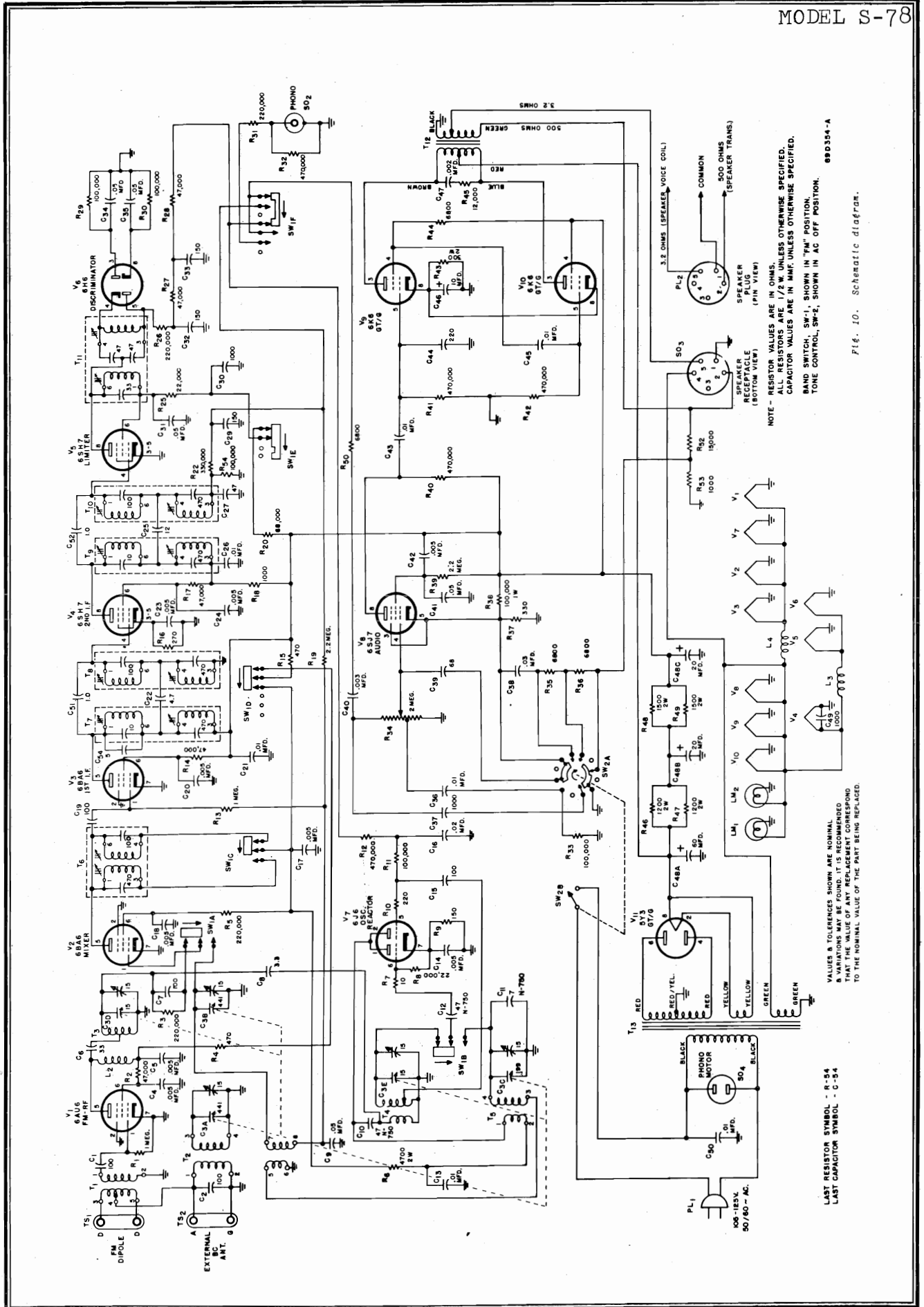


Fig. 10. Schematic diagram.

MODEL S-78

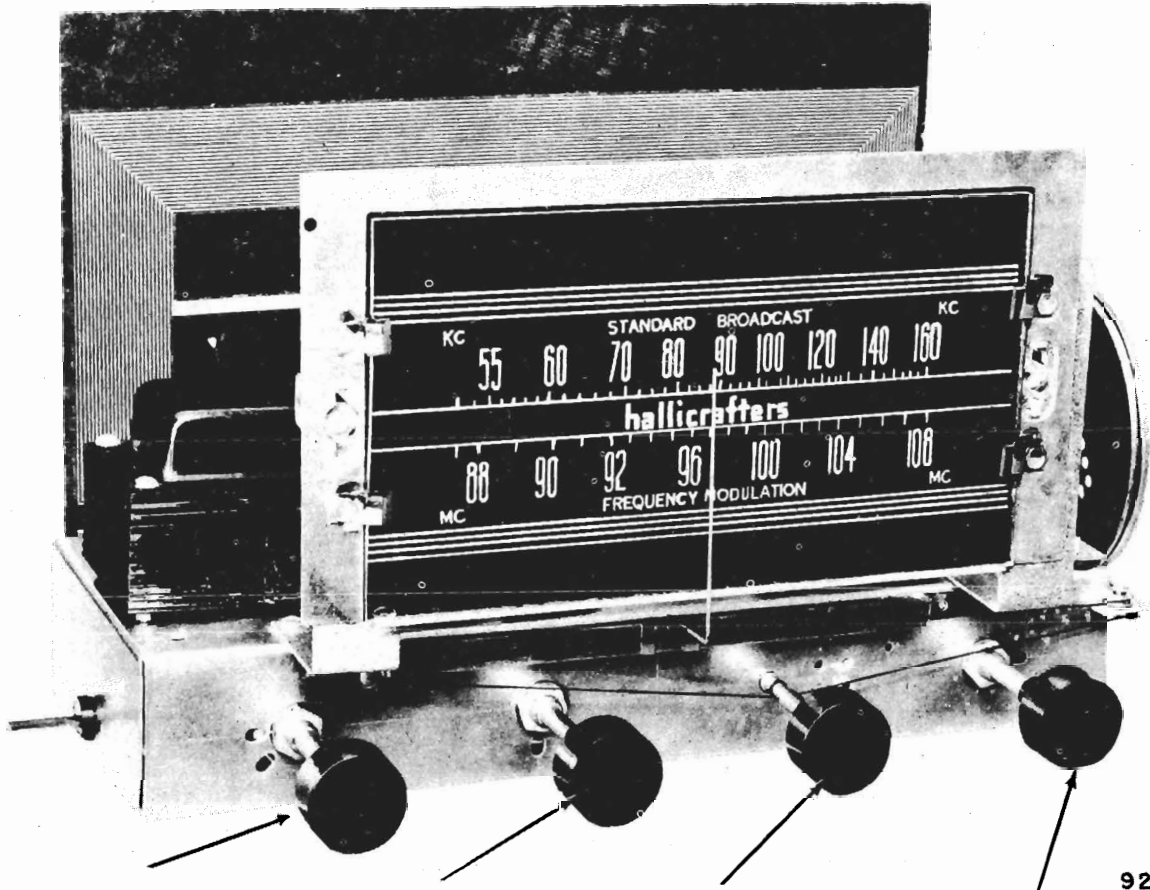
SERVICE PARTS LIST

| Ref. No. | Description | Hallcrafters Part Number |
|-------------------------------|----------------------------------------------------|--------------------------|
| CONDENSERS | | |
| C-1,7,15,19 | 100 mmf. 500 V., ceramic | 47B20101M5 |
| C-2 | 100 mmf. 500 V., mica | CM20A101M |
| C-3 | Tuning condenser, 5 sections | 48C196 |
| C-4,5,14,17,18,20,23,24 | .005 mfd. 450 V., ceramic | 47A168 |
| C-6 | 33 mmf. 500 V., ceramic | CC20UK330K |
| C-8 | 3.3 mmf. 500 V., bakelite | 47A160-5 |
| C-9,34,35 | .05 mfd. 200 V., tubular paper | 46AU503J |
| C-10,12 | 47 mmf. 500 V., ceramic | CC20UK470M |
| C-11 | 7 mmf. 500 V., ceramic | CC20UK070K |
| C-13,21,26,36,43,45 | .01 mfd. 600 V., tubular paper | 46AZ103F |
| C-16 | .02 mfd. 200 V., tubular paper | 46AU203J |
| C-22 | 4.7 mmf. 500 V., bakelite | 47A160-6 |
| C-25 | 12 mmf. 500 V., mica | CM20A120K |
| C-27 | 47mmf. 500 V., mica | CM20A470M |
| C-29,32,33 | 150 mmf. 500 V., mica | CM20A151M |
| C-30,37,49 | 1000 mmf. 500 V., ceramic | 47B20102M5 |
| C-31,41 | .05 mfd. 600 V., tubular paper | 46AY503J |
| C-38 | .03 mfd. 200 V., tubular paper | 46AU303J |
| C-39 | 68 mmf. 500 V., mica | CM20A680M |
| C-40 | .003 mfd. 600 V., tubular paper | 46AZ302J |
| C-42 | .005 mfd. 600 V., tubular paper | 46AZ502J |
| C-44 | 220 mmf. 500 V., mica | CM20A221M |
| C-46 | 10 mfd. 25 V., electrolytic | 45A121 |
| C-47 | .002 mfd. 600 V., tubular paper | 46AZ202J |
| C-48 | 60-20-20 mfd. 450 V., electrolytic | 45B113 |
| C-50 | .01 mfd. 600 V., molded paper | 46AG103J |
| C-51,52 | 1 mmf. 500 V., bakelite | 47A160-2 |
| RESISTORS | | |
| R-1,13 | 1 megohm $\frac{1}{2}$ watt, carbon | RC20AE105M |
| R-2,14,17,27,28 | 47,000 ohms $\frac{1}{2}$ watt, carbon | RC20AE473M |
| R-3,5,26,31 | 220,000 ohms $\frac{1}{2}$ watt, carbon | RC20AE224M |
| R-4,15 | 470 ohms $\frac{1}{2}$ watt, carbon | RC20AE471M |
| R-6 | 4700 ohms 2 watts, carbon | RC40AE472M |
| R-7 | 10 ohms $\frac{1}{2}$ watt, carbon | RC20AE100M |
| R-8,25 | 22,000 ohms $\frac{1}{2}$ watt, carbon | RC20AE223M |
| R-9 | 150 ohms $\frac{1}{2}$ watt, carbon | RC20AE151M |
| R-10 | 220 ohms $\frac{1}{2}$ watt, carbon | RC20AE221M |
| R-11,33,54 | 100,000 ohms $\frac{1}{2}$ watt, carbon | RC20AE104M |
| R-12,32,40,41,42 | 470,000 ohms $\frac{1}{2}$ watt, carbon | RC20AE474M |
| R-16 | 270 ohms $\frac{1}{2}$ watt, carbon | RC20AE271K |
| R-18,53 | 1000 ohms $\frac{1}{2}$ watt, carbon | RC20AE102M |
| R-19,39 | 2.2 megohms $\frac{1}{2}$ watt, carbon | RC20AE225M |
| R-20 | 68,000 ohms $\frac{1}{2}$ watt, carbon | RC20AE683M |
| R-22 | 330,000 ohms $\frac{1}{2}$ watt, carbon | RC20AE334M |
| R-29,30 | 100,000 ohms $\frac{1}{2}$ watt, carbon | RC20AE104K |
| R-34 | Volume control, 2 megohms (tapped) | 25B623 |
| R-35,36,44,50 | 6800 ohms $\frac{1}{2}$ watt, carbon | RC20AE682M |
| R-37 | 330 ohms $\frac{1}{2}$ watt, carbon | RC20AE331K |
| R-38 | 100,000 ohms 1 watt, carbon | RC30AE104K |
| R-43 | 300 ohms 2 watt, carbon | RC40AE301J |
| R-45 | 12,000 ohms $\frac{1}{2}$ watt, carbon | RC20AE123K |
| R-46,47 | 1200 ohms 2 watt, carbon | RC40AE122K |
| R-48,49 | 1500 ohms 2 watt, carbon | RC40AE152K |
| R-52 | 15,000 ohms 1/2 watt carbon | RC20AE153K |
| TRANSFORMERS AND COILS | | |
| T-1 | Transformer, FM, antenna stage | 51B1021 |
| T-2 | Transformer, BC, mixer stage | 51B1059 |
| T-3 | Transformer, FM, mixer stage | 51B1022 |
| T-4 | Transformer, FM, osc. stage | 51B1073 |
| T-5 | Transformer, BC, osc. stage | 51B1020 |
| T-6 | Transformer, 1st I.F. | 50B409 |
| T-7,9 | Transformer, 2nd I.F. and AM Detector & FM limiter | 50B407 |

SERVICE PARTS LIST (Cont.)

| Ref. No. | Description | Hallcrafters Part Number |
|---------------------------------------|----------------------------------------------------|--------------------------|
| TRANSFORMERS AND COILS (Cont.) | | |
| T-8,10 | Transformer, 2nd I.F. and AM Detector & FM limiter | 50B408 |
| T-11 | Transformer, FM, detector stage | 50B410 |
| T-12 | Transformer, audio output | 55B158 |
| T-13 | Transformer, power | 52C152 |
| L-2 | Plate choke for tube V1 | 53B124 |
| L-3 | Filament choke for tubes V5 & 6 | 53B123 |
| L-4 | Filament choke for tubes V1,2,3, & 7 | 53A136 |
| SWITCHES | | |
| SW-1 | Band switch assembly | 60B318 |
| SW-2 | Switch, tone control | 60B319 |
| PLUGS AND SOCKETS | | |
| PL-1 | Line cord and plug | 87A078 |
| SO-2 | Receptacle, television, phono | 36A029 |
| SO-3 | Receptacle, speaker | 6A277 |
| SO-4 | Receptacle, phono motor | 10A015 |
| | Socket, octal (tube) | 6A296 |
| | Socket, miniature (tube) | 6A297 |
| | Socket & bracket, dial light | 86A062 |
| TUBES, RECTIFIERS AND LAMPS | | |
| V-1 | 6AU6 antenna | 90X6AU6 |
| V-2,3 | 6BA6 mixer, 1st I.F. | 90X6BA6 |
| V-4,5 | 6SH7 2nd I.F., limiter | 90X6SH7 |
| V-6 | 6H6 discriminator | 90X6H6 |
| V-7 | 6J6 osc. & AFC | 90X6J6 |
| V-8 | 6SJ7 audio amp. | 90X6SJ7 |
| V-9,10 | 6K6GT power amp. | 90X6K6GT |
| V-11 | 5Y3GT rectifier | 90X5Y3GT |
| LM-1,2 | Lamp, 6-8 V., 250 Ma., Mazda #44 | 39A003 |
| MISCELLANEOUS | | |
| | Shaft, tuning | 74A247 |
| | Pulley, idler | 28A052-6 |
| | Switch, cam | 77A261 |
| | Drive pin | 74A246 |
| | Collar | 77A267 |
| | Bushing | 77A266 |
| | Bracket, dial plate mtg. | 67A793 |
| | Dial plate | 63B332 |
| | Dial background (paper) | 32A446 |
| | Dial glass (calibrated) | 22C201 |
| | Clip (for dial glass 22C201) | 76A390 |
| | Rubber spacer, for dial clip | 16A126 |
| | Pointer | 82A147 |
| | Dial cord | 38A019 |
| | Spring, dial cord | 75A012 |
| | Dial glass (clear) | 22B205 |
| | Clip (for dial glass 22B205) | 76A331 |
| | Escutcheon (Model S-55) | 7C067-1 |
| | Escutcheon (Model S-56) | 7C067 |
| | Knob, tone and range controls (Model S-55) | 15B077-4 |
| | Knob, tone and range controls (Model S-56) | 15B068-3 |
| | Knob, tuning and volume controls (Model S-55) | 15B068-4 |
| | Knob, tuning and volume controls (Model S-56) | 15B077-3 |
| TS-1 | Terminal strip, antenna (Marked D-D) | 87A379 |
| TS-2 | Terminal strip, antenna (Marked A-G) | 88A327 |
| | Line cord lock | 76A299 |
| | Mounting foot, rubber | 16A007 |

OPERATION



92X1269

This is a combination power switch and tone control. In the OFF position the receiver is completely turned off. To turn on the receiver, turn the control to the right. The power switch will click and the dial light will illuminate the dial face indicating that the receiver is receiving power from the wall outlet. After tuning in the station this control is again adjusted for the desired tonal response. Turning the control clockwise decreases the bass response.

VOLUME - Turn this control clockwise to increase volume and counter-clockwise to decrease volume.

TUNING - The tuning control "tunes in" either AM (Standard Broadcast) or FM (Frequency Modulation) stations depending upon the setting of the range switch. The standard broadcast band dial is calibrated so that a zero must be added to the number appearing on the dial to obtain the station frequency in kilocycles. The frequencies of the FM stations are shown directly in megacycles. The frequencies of local stations are generally listed in local newspapers, AM stations in kilocycles and FM stations in megacycles. Tune for the clearest reception to obtain top performance from your receiver.

This is the combination range and operation switch. In the FM (Frequency Modulation) position, the receiver tunes the 88 to 108 megacycle FM band; in the AM (Standard Broadcast) position, the receiver operates as a regular broadcast receiver tuning the frequency range 540 to 1600 kilocycles. To use the receiver as a record player, set this switch at PHONO and operate the volume and tone controls as for normal radio reception.

MODEL ST-74

DESCRIPTION

The model ST-74 receiver is a superheterodyne receiver covering the standard broadcast (540 kc - 1600 kc) and FM broadcast (88 mc-108 mc) services. The receiver is supplied in chassis form for custom installations.

A shielded connector and power receptacle located on the rear apron of the chassis permit the attachment of a record player for recorded entertainment.

To place the receiver in operation it is merely necessary to connect the antenna and speaker and plug the power plug into the wall outlet. Refer to the installation details that follow, especially to the paragraph on "Power Source", before connecting the receiver to the wall outlet to avoid unnecessary and perhaps costly repairs.

INSTALLATION

UNPACKING - Check all shipping instruction tags carefully before removing them.

LOCATING - When locating and mounting the receiver give careful consideration to ventilation. Avoid warm locations such as are found near radiators, or hot air registers. Carefully avoid dead air spaces in the installation.

ANTENNA - The receiver is equipped with a built in loop antenna for local reception on both the FM (frequency modulation) and AM (standard broadcast) bands. Due to the directional effect of a loop antenna, it may be necessary to rotate the receiver slightly to obtain optimum performance from all of the broadcasting stations. In general, however, the receiver may be placed in operation without further antenna considerations.

Where receiving conditions are poor and maximum antenna pickup is required, antenna terminals have been provided for an outdoor antenna system.

Standard Broadcast Antenna - When required, a single wire approximately 25 to 50 feet long may be connected to the terminal marked **EXTERNAL BROADCAST ANTENNA**, located at the rear of the receiver, to improve reception in the standard broadcast band (540-1600 kc). This wire may be concealed in the room or erected outside the building as desired.

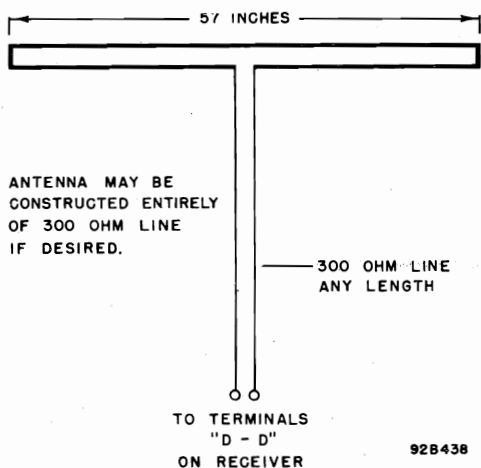


Fig. 2. Folded doublet antenna details.

FM Broadcast Antenna - Where receiving conditions demand more signal pickup on the FM band than provided by the built in loop, an FM band antenna may be erected and its transmission line connected to the two terminals marked "D-D" located on the rear apron of the receiver chassis. The receiver is designed to operate with any FM band antenna using a 300-ohm transmission line.

The simplest antenna which will provide satisfactory FM reception is the folded doublet. This antenna may be constructed of 300-ohm transmission line available at most radio supply houses. Cut and solder the transmission line conductors together as shown in Fig. 2.

Satisfactory reception may be obtained by concealing the antenna under the rug, along the molding, or along the back of a cabinet. If receiving conditions are poor in the particular location, it may be desirable to erect the antenna outdoors as high as practical. In either case the reception will be best when the antenna runs at right angles to the direction of reception.

POWER SOURCE - The receiver operates from a 105-125 V. 60 cycle AC (Alternating current) power source only. The receiver will not operate from a DC (Direct Current) or 25 cycle AC source directly. If in doubt as to the voltage and frequency rating of your power source, contact the local power company representative to avoid costly repairs. The normal power consumption for this receiver is 60 watts.

RECORD PLAYER CONNECTION - A shielded type receptacle, accessible at the rear chassis apron, is provided to accommodate a record player pickup cable connector. Any record player employing a crystal cartridge or high level magnetic pickup in its tone arm may be used with the receiver. An a-c receptacle is also provided to accommodate the power plug on the record player. The record player is automatically shut off with the receiver when using this power outlet.

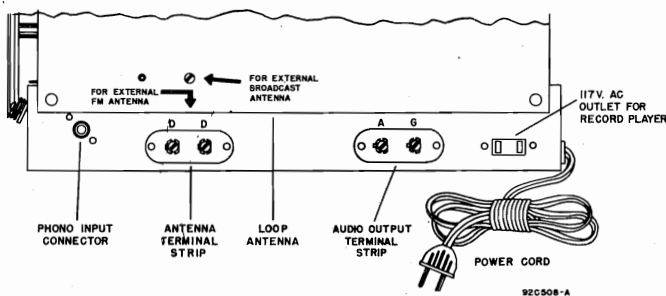


Fig. 3. Antenna & record player connections

SERVICE

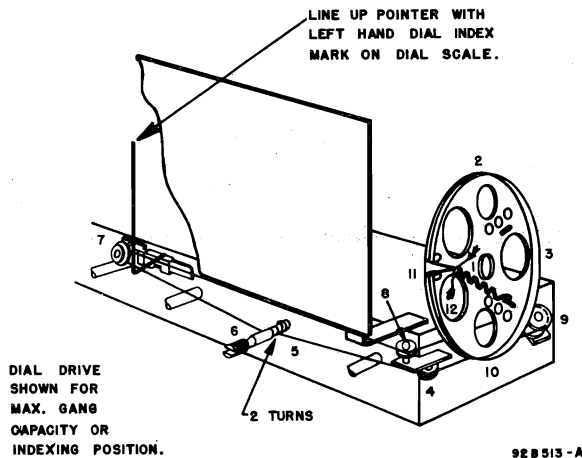
GENERAL SPECIFICATIONS

| | | | |
|-----------------------|--------------------------------------------------------------|-------------------------|-------------------------------------------------------------------|
| Tubes | Six plus rectifier | Tuning | Manual |
| High Impedance Output | | Frequency Range . . . | Broadcast 540 kc - 1600 kc Frequency Modulation 88 mc - 108 mc |
| Antenna | Built-in loop type Antenna. Provisions for external antenna. | Intermediate Frequency. | 455 kc/10.7 mc |
| Phono Input | High impedance | Power Supply | 105-125 V. 60 cycles AC |
| | | Power Consumption . . . | 60 watts |

TUBE REPLACEMENT - The tube types and their relative position in the receiver are shown in the illustration, Fig. 5. When installing a replacement tube, insert the center guide pin into the center hole of the tube socket; rotate the tube until the key on the guide pin drops into the notch in the socket hole; and push down until the base of the tube rests firmly on the socket. A slightly different technique must be used on the miniature tubes. They have seven small pins which have to be lined up with the socket holes before pushing the tube into the socket. Handle all tubes with care as they are considered fragile and do not tolerate much mechanical abuse.

DIAL LAMP REPLACEMENT - Refer to Fig. 5. for the location of the two dial lamps. To replace a defective dial lamp, unclip the dial lamp socket by compressing the side springs. The socket and defective lamp may then be brought out into the open for service. Replace defective lamps with 6-8 V. Mazda #44 (Blue bead) or equivalent.

RESTRINGING DIAL CORD



Restring the dial drive with a 48-inch length of 20 lb. test dial cord. Tie one end to the tension spring and follow the stringing sequence outlined in Fig. 1. Stretch the tension spring and tie the end of the cord securely to the spring as shown.

Set the tuning condenser at maximum capacity (closed), attach the dial pointer to the drive string and line it up with the left hand index mark on the dial scale.

Fig. 4. Dial cable stringing procedure

ALIGNMENT

| | | | |
|-----------------------------------|-------------------|-------------------------------------------|-----------|
| Generator connection | See chart | Electronic voltmeter connection | See chart |
| Generator ground | To chassis | Volume control position. | Maximum |
| Output meter connection | Across voice coil | Tone control position | Optional |

The standard RMA dummy specified in the alignment chart consists of a 200 mmf condenser in series with a 20 uh r-f choke which is shunted by a 400 mmf condenser in series with a 400 ohm carbon resistor.

MODEL ST-74

ALIGNMENT CHART

| Dummy Antenna Step | Signal Generator Coupling | Signal Generator Frequency | Radio Range Switch Position | Radio Dial Setting | Adjust | Remarks |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|----------------------------|-----------------------------|--------------------|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. .01 mfd. cap. | To stator plates of high cap. mixer section | 455 kc | 2 | 1000 kc | A,B,C,D | Adjust for max. audio output at voice coil. Keep audio output below 50 mw to avoid AVC action. |
| 2. .01 mfd. cap. | To stator plates of low cap. mixer section | 10.7 mc (No modulation) | 1 | 100 mc | E,F,G,H | Adjust for max. DC voltage between pin #7 of the 6AL5 and chassis. Connect a 500,000 ohm resistor in series with voltmeter probe. Use just enough signal generator output to obtain approx. 2 volts at the electronic voltmeter. |
| 3. After completing the adjustments required by step 2, detune the signal generator on each side of 10.7 mc and note the generator dial or frequency reading for one half of the DC voltage measured by the electronic voltmeter. Use just enough signal generator output to obtain a maximum of 2 volts at the center frequency of the IF channel. Set the signal generator frequency at the midpoint of the two readings obtained above and align the FM detector transformer as follows: | | | | | | |
| 4. Without changing the setup, adjust the primary of the FM detector transformer (I) for maximum DC voltage. Disconnect the electronic voltmeter probe and reconnect it to the junction of R24 and R25 using the 500,000-ohm resistor as before for isolation. Adjust the secondary of the FM detector (J) for the null or zero DC voltage. This completes the IF amplifier adjustment. | | | | | | |
| 5. Std. RMA dummy | To BC antenna terminal on back of loop. | 1500 kc | 2 | 1500 kc | *K,L | Adjust for max. audio output as in step 1. |
| | | 600 kc | 2 | 600 kc | *M | |
| 6. 300-ohm carbon resistor | To terminals "D-D" on rear chassis apron. Connect resistor to high side or ungrounded terminal | 108 mc | 1 | 108 mc | *N,O | Adjust for max. DC voltage as in step 2. |

*Calibration adjustment.

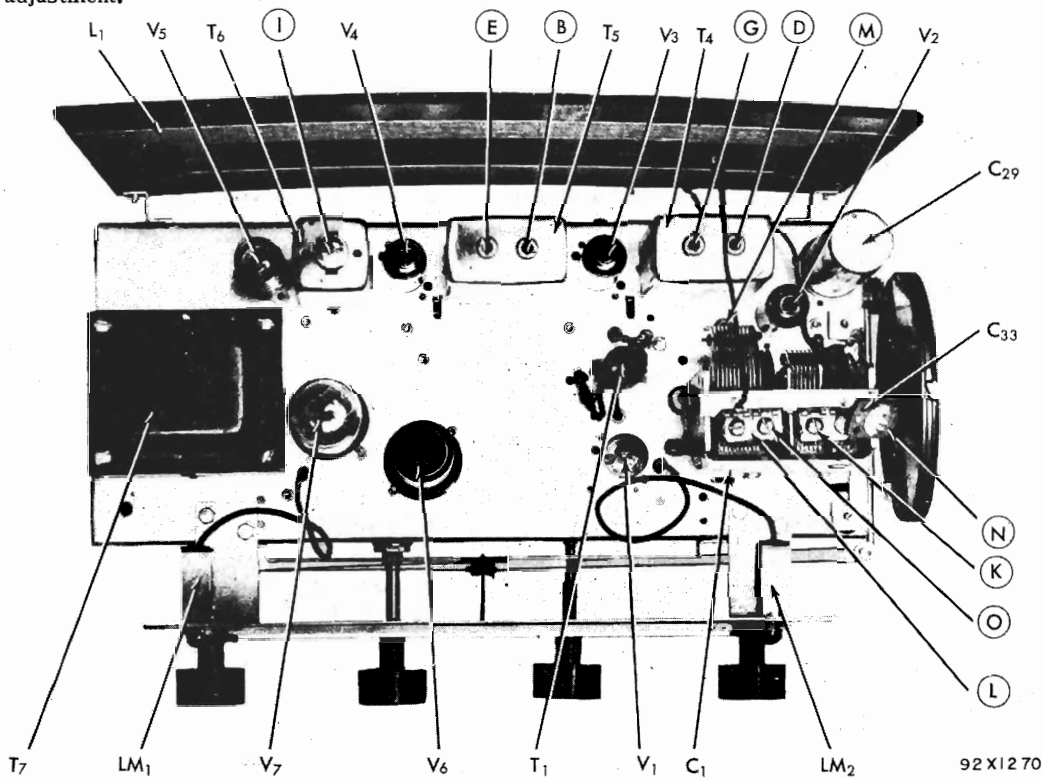
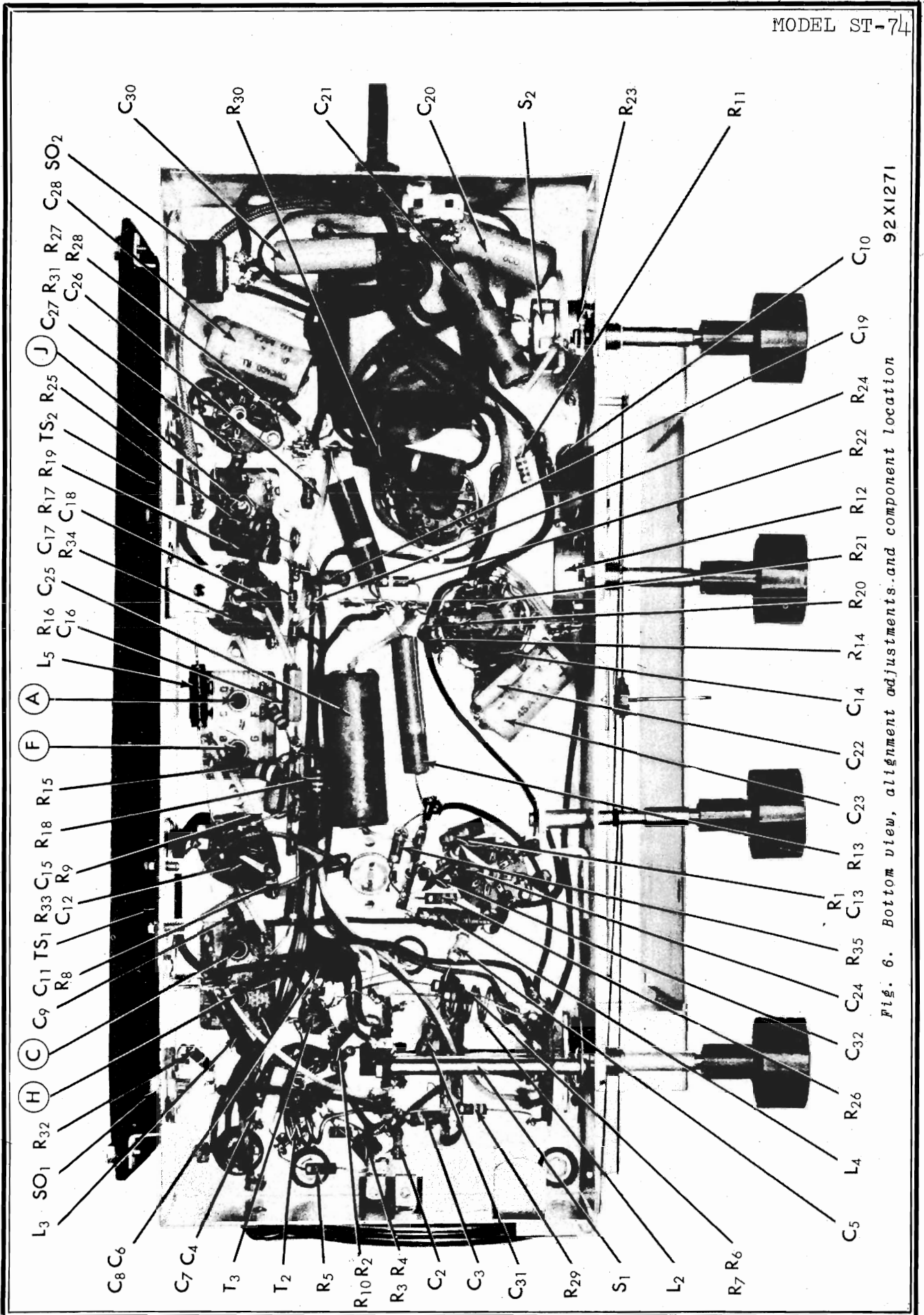


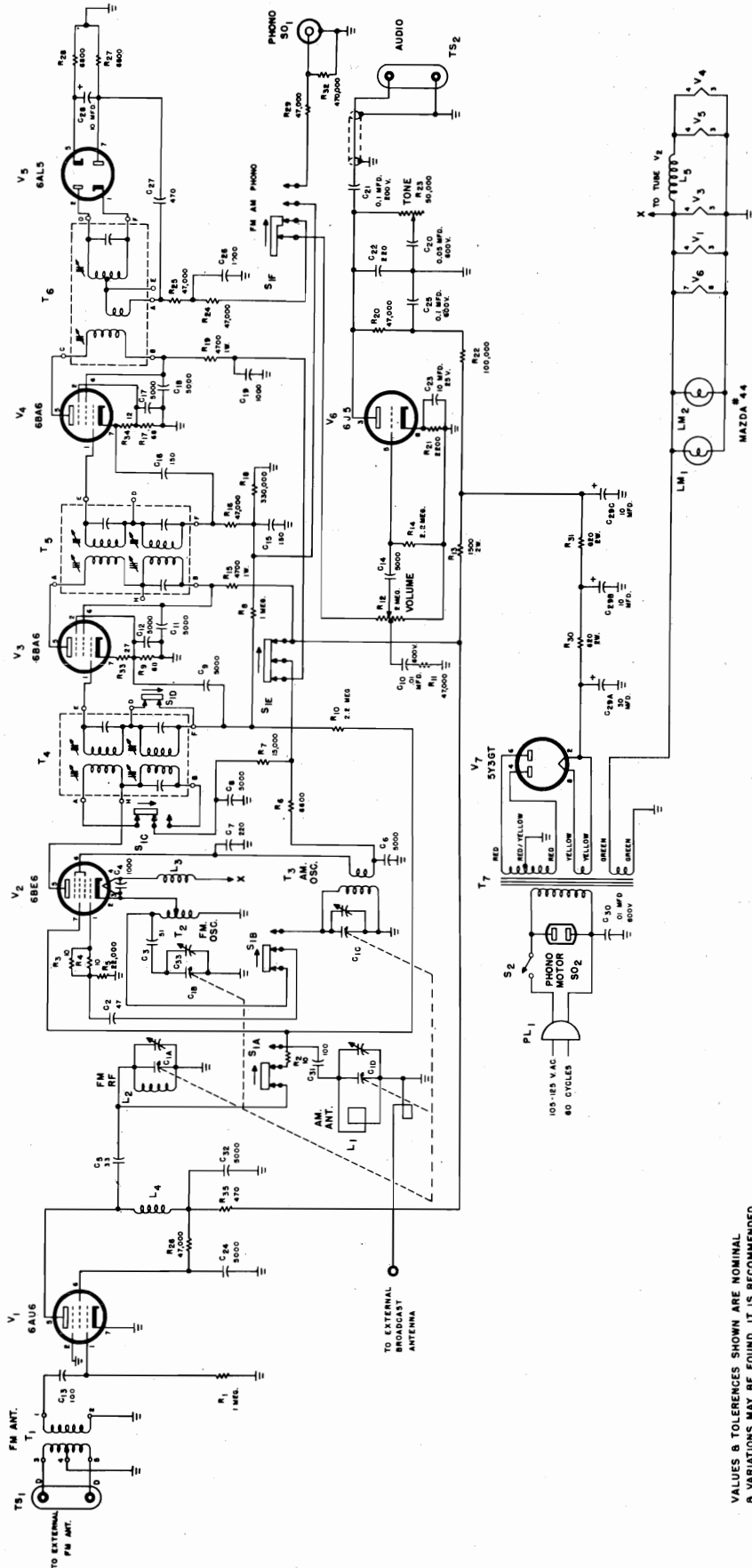
Fig. 5. Top view, alignment, adjustments and component location.



92X1271

Fig. 6. Bottom view, alignment adjustments and component location

MODEL ST-74



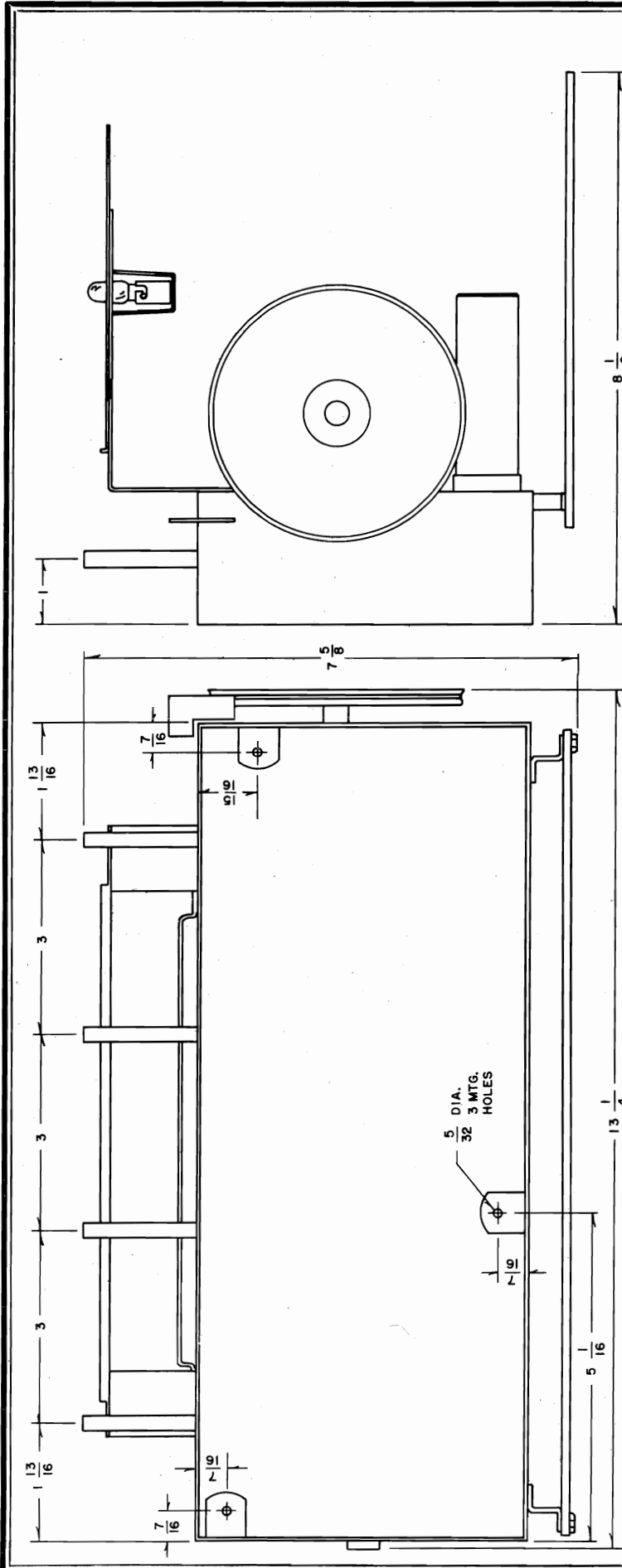
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VALUES & TOLERANCES SHOWN ARE NOMINAL & VARIATIONS MAY BE FOUND. IT IS RECOMMENDED THAT THE VALUE OF ANY REPLACEMENT CORRESPOND TO THE NOMINAL VALUE OF THE PART BEING REPLACED.

NOTES -
 RESISTOR VALUES ARE IN OHMS.
 RESISTORS ARE 1/2 WATT UNLESS OTHERWISE SPECIFIED.
 CAPACITOR VALUES ARE IN MMF. UNLESS OTHERWISE SPECIFIED.
 RANGE SWITCH S-1 SHOWN IN FM. POSITION.

LAST CAPACITOR SYMBOL — C-33
 LAST RESISTOR SYMBOL — R-35

Fig. 7. Schematic Diagram



SERVICE PARTS LIST

CONDENSERS

| Ref. No. | Description | Manufacturer's Part Number |
|---------------------------------------|------------------------------------|----------------------------|
| C-1 | Capacitor, main tuning | 48C203-1 |
| C-2 | 47 mmf. 500 V., ceramic | 47X21UK470K |
| C-3 | 51 mmf. 500 V., ceramic | 47X21UK510J |
| C-4, 19, 26 | 1000 mmf. 500 V., ceramic | 47B20A102N5 |
| C-5 | 33 mmf. 500 V., ceramic | 47X20UK330K |
| C-6, 8, 9, 11, 12, 14, 17, 18, 24, 32 | 5000 mmf. 500 V., Hi Kap | 47A168 |
| C-7, 22 | 220 mmf. 500 V., mica | 47X20B221M |
| C-10 | .01 mfd. 600 V., tubular paper | 46AY103J |
| C-13, 31 | 100 mmf. 500 V., Hi Kap | 47E20A101M5 |
| C-15, 16 | 150 mmf. 500 V., mica | 47X20B151M |
| C-20 | .05 mfd. 600 V., tubular paper | 46AY503J |
| C-21 | .1 mfd. 200 V., tubular paper | 46AU104J |
| C-23, 28 | .1 mfd. 25 V., electrolytic | 45A121 |
| C-25 | .1 mfd. 600 V., tubular paper | 46AY104J |
| C-27 | 470 mmf. 500 V., ceramic | 47E20A471M5 |
| C-29 | 30-10-10 mfd. 350 V., electrolytic | 45B131 |
| C-30 | .01 mfd. 600 V., molded paper | 46AG103J |
| C-33 | Trimmer | 44A115 |

Fig. 8. Chassis mounting dimensions

TRANSFORMERS AND COILS

| T-1 | Coil, FM antenna | 51B1021 |
|--------|-------------------------------------------|----------|
| T-2 | Coil, FM oscillator | 51A1062 |
| T-3 | Coil, AM oscillator | 51B1063 |
| T-4 | Transformer, 1st IF | 50B399 |
| T-5 | Transformer, 2nd IF | 50B400 |
| T-6 | Transformer, ratio detector | 50B401 |
| T-7 | Transformer, power | 52C200-B |
| L-1 | Loop Antenna | 57D123 |
| L-2 | Coil, FM-RF | 51A1061 |
| L-3, 4 | Choke, RF | 53A136 |
| L-5 | Choke, RF | 53B124 |
| S-1 | Switch, assembly band selector | 60B328 |
| S-2 | Switch, power (part of tone control R-23) | |

Fig. 8. Chassis mounting dimensions

RESISTORS

| R-1, 8 | 1 megohm 1/2 watt, carbon | 23X20X105M |
|------------------------------|---------------------------------------------------------|------------|
| R-2, 3, 4 | 10 ohms 1/2 watt, carbon <td>23X20X100M</td> | 23X20X100M |
| R-5 | 22,000 ohms 1/2 watt, carbon <td>23X20X223K</td> | 23X20X223K |
| R-6, 27, 28 | 6800 ohms 1/2 watt, carbon <td>23X20X682K</td> | 23X20X682K |
| R-7 | 15,000 ohms 1/2 watt, carbon <td>23X20X153M</td> | 23X20X153M |
| R-9, 17 | 68 ohms 1/2 watt, carbon <td>23X20X680K</td> | 23X20X680K |
| R-10, 14 | 2.2 megohms 1/2 watt, carbon <td>23X20X225M</td> | 23X20X225M |
| R-11, 16, 20, 24, 25, 26, 29 | 47,000 ohms 1/2 watt, carbon <td>23X20X473K</td> | 23X20X473K |
| R-12 | Volume control, 2 megohms <td>25B624</td> | 25B624 |
| R-13 | 1500 ohms 2 watt, carbon <td>23X40X152M</td> | 23X40X152M |
| R-15, 19 | 4700 ohms 1 watt, carbon <td>23X30X472M</td> | 23X30X472M |
| R-18 | 330,000 ohms 1/2 watt, carbon <td>23X20X334M</td> | 23X20X334M |
| R-21 | 2200 ohms 1/2 watt, carbon <td>23X20X222K</td> | 23X20X222K |
| R-22 | 100,000 ohms 1/2 watt, carbon <td>23X20X104M</td> | 23X20X104M |
| R-23 | Tone control and AC switch, 50,000 ohms <td>25B759</td> | 25B759 |
| R-30, 31 | 820 ohms 2 watt, carbon <td>23X40X821K</td> | 23X40X821K |
| R-32 | 470,000 ohms 1/2 watt, carbon <td>23X20X474M</td> | 23X20X474M |
| R-33 | 27 ohms 1/2 watt, carbon <td>23X20X270K</td> | 23X20X270K |
| R-34 | 12 ohms 1/2 watt, carbon <td>23X20X120K</td> | 23X20X120K |
| R-35 | 470 ohms 1/2 watt, carbon <td>23X20X471K</td> | 23X20X471K |

MODEL ST-74

PLUGS AND SOCKETS

- PL-1 Line cord and plug
- SO-1 Receptacle, phono
- SO-2 Socket, AC receptacle
- Socket, octal (tubes V-6, 7)
- Socket, miniature (tubes V-1, 2, 3, 4, 5)
- Socket, dial light

TUBES, RECTIFIERS AND LAMPS

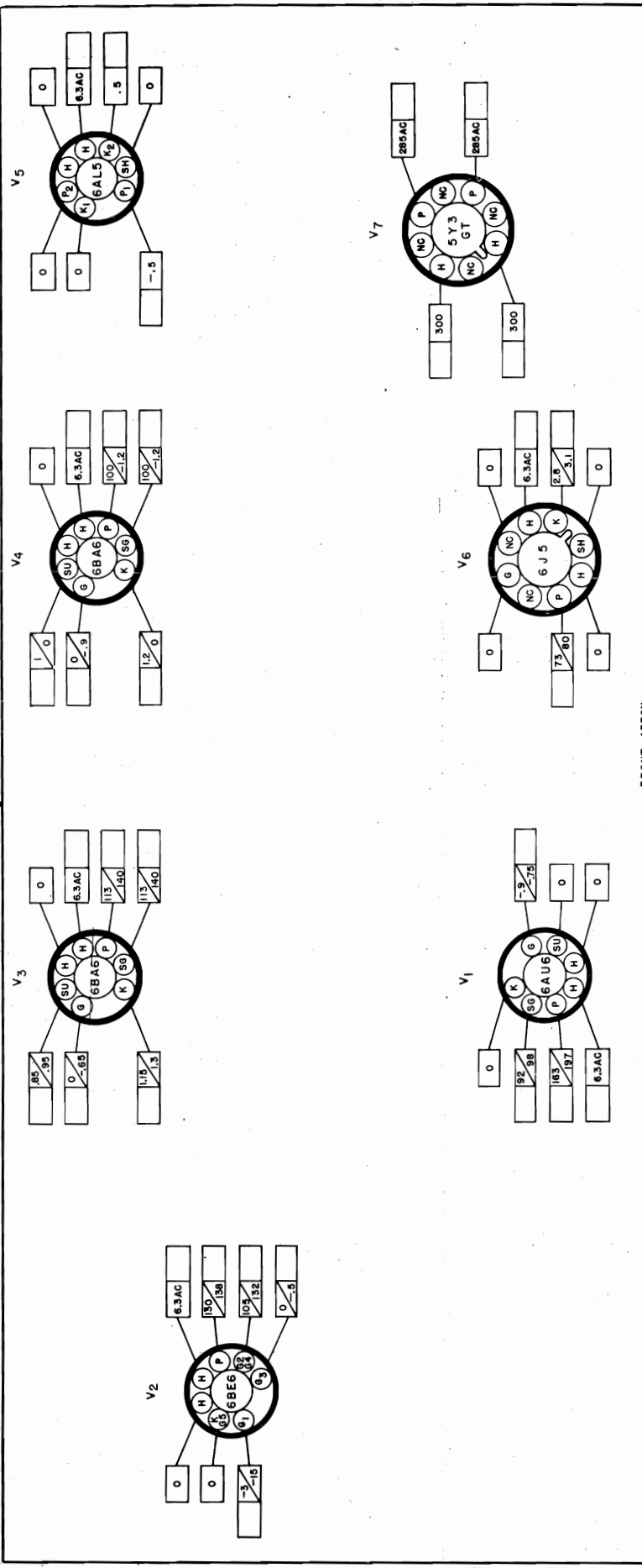
- V-1 Type 6AU6, RF amp.
- V-2 Type 6BE6, mixer/osc.
- V-3 Type 6BA6, 1st IF amp.
- V-4 Type 6BA6, 2nd IF amp. and detector (AM)

- V-5 Type 6AL5, detector (FM)
- V-6 Type 6J5, audio amp
- V-7 Type 5Y3GT, rectifier
- LM-1, 2 Lamp, 6-8 V., Mazda #44 (Blue bead)

MISCELLANEOUS

- TS-1 Terminal strip, antenna (FM)
- TS-2 Terminal strip, audio output
- Bracket, dial plate mtg.
- Bracket, gang mtg.
- Dial background (black)
- Dial cord
- Dial plate
- Dial scale (glass)

- Escutcheon 7D067
- Glass 22B205
- Knob, tuning and volume controls 15B067-2
- Knob, tone and range controls (1 dot) 15B142-6
- Line cord lock (male section) 76A397-1
- Line cord lock (female section) 76A397-2
- Pointer 82A152
- Shaft, tuning 74A251
- Shield, tube V-5 69A232
- Spring, dial cord 75B012
- Spring, retainer 75A062
- Template 95D177



FRONT AFRON
BOTTOM VIEW OF CHASSIS
Fig. 9 Tube socket voltage chart

- NOTES —
1. SOCKET VIEWS ARE BOTTOM VIEWS.
 2. ALL VOLTAGES MEASURED BETWEEN TUBE SOCKET TERMINALS AND CHASSIS.
 3. LINE VOLTAGE — 117V. AC.
 4. ALL VOLTAGES SHOWN WERE MEASURED WITH AN ELECTRONIC VOLTMEETER AND AT ZERO SIGNAL.
 5. ALL VOLTAGES ARE DC UNLESS OTHERWISE SPECIFIED.
6. WHERE TUBE SOCKET VOLTAGES CHANGE FROM FM TO AM RECEPTION TWO READINGS ARE SHOWN, UPPER LEFT SHOWS FM READINGS — LOWER RIGHT SHOWS AM READINGS.
7. "NC" — NO CONNECTION. READING SHOWN ONLY WHEN TERMINAL IS USED AS A TIE LUG.
8. "NR" — NOT READABLE OR READING GENERALLY MEANINGLESS.
9. THE BLANK SPACES ARE PROVIDED FOR THE SERVICE METER READING. FILL IN THE ACTUAL READING AS TAKEN WITH YOUR OWN TEST EQUIPMENT USING A NORMAL OPERATING RADIO FOR THESE MEASUREMENTS.

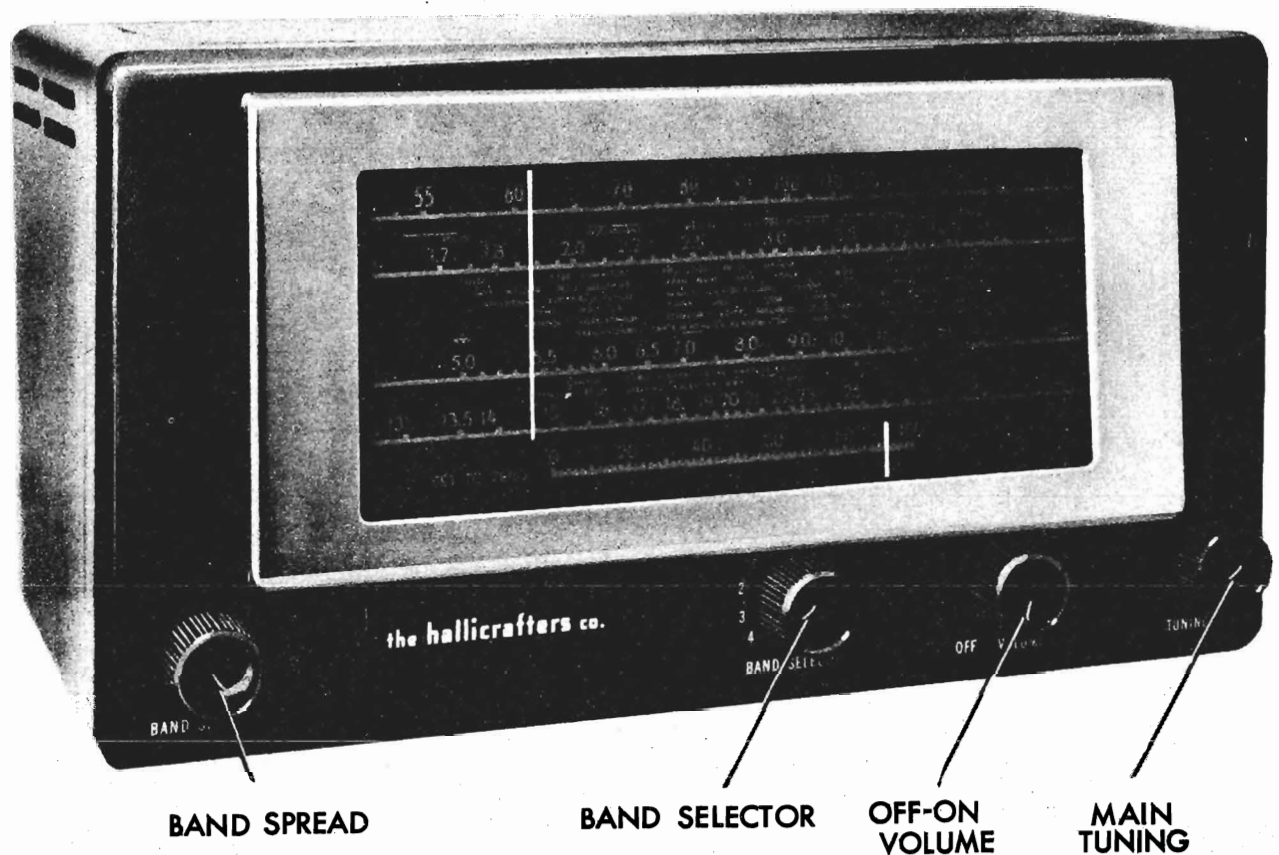


FIG. 1. RADIO RECEIVER MODEL 5R10

INSTALLATION

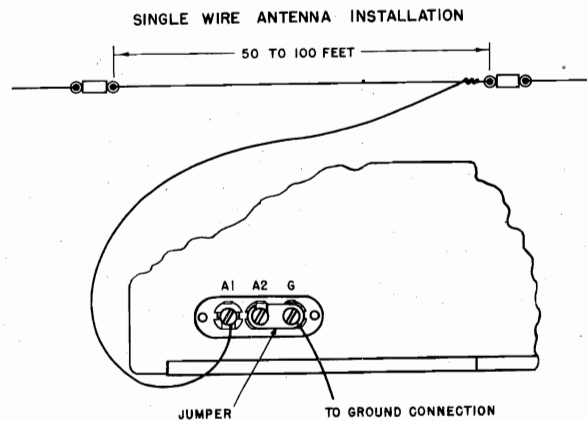
LOCATION - The receiver is equipped with rubber feet for table top or shelf mounting. When locating and mounting the receiver, avoid excessively warm locations such as those found near radiators and hot air registers or recessed installations which prevent proper circulation of air. If the receiver is placed with its back to the wall, leave about an inch or two of clearance between the back of the cabinet and the wall for proper ventilation.

POWER SOURCE - The receiver operates from a 105-125 volt DC (direct current) or 60 cycles AC (alternating current) source. The normal power consumption of the receiver is 30 watts. The receiver will not operate from a 25-cycle AC source directly. If in doubt as to the voltage and frequency rating of your power source, contact the local power company representative to avoid costly repairs. If the receiver does not respond after a minute warm-up period when operating on a DC source, it may be necessary to reverse the power plug at the wall outlet.

Operation from a 210-250 volt AC/DC source is possible by using a special line cord adapter available as an accessory. Consult your Hallicrafters dealer regarding this adapter unit (Hallicrafters part number 87D1566) if 210-250 volt operation is desired.

ANTENNA - A three terminal strip is provided on the rear chassis apron for antenna connections. The terminals are marked "A1", "A2" and "G". A jumper bar is normally connected between terminals "A2" and "G" for single wire antenna systems and unbalanced antenna transmission lines. For doublet antenna installations using a balanced transmission line, the jumper between "A2" and "G" is disconnected. A good ground connection, when used, is connected to terminal "G".

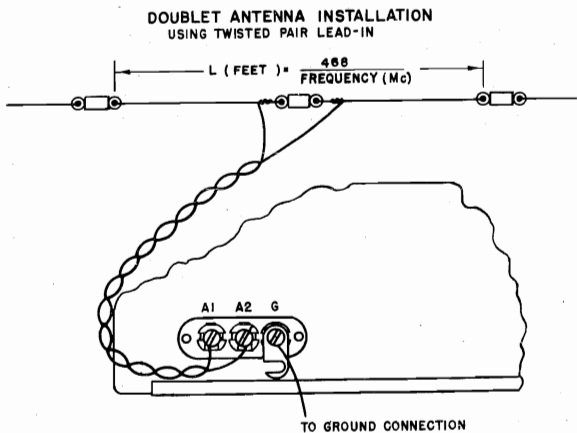
MODEL 5R10



92C1332-1

FIG. 2. SINGLE WIRE ANTENNA INSTALLATION

SINGLE WIRE ANTENNA - For a single wire antenna installation, connect a jumper between antenna terminals "A2" and "G". A single wire antenna of about 50 to 100 feet long (including lead-in) is then connected to terminal "A1". Erect the antenna as high and free of surrounding objects as possible. For improved reception, it may be desirable to connect a ground wire between terminal "G" and a suitable ground such as a water pipe or outside ground stake.



92C1332-2

FIG. 3. DOUBLET ANTENNA INSTALLATION

DOUBLET ANTENNA - The doublet antenna is recommended for the high frequency bands, especially where a maximum signal to noise ratio is required over a relatively narrow range of frequencies. The antenna transmission line is connected to terminals "A1" and "A2". If a concentric line with a grounded outer conductor is used, connect the inner conductor to terminal "A1", the outer conductor to terminal "A2", and connect a jumper between terminals "A2" and "G".

The overall length (feet) of a doublet antenna may be determined by dividing the constant 468 by the desired frequency in megacycles. Keep in mind that this type of antenna is directional broadside to its length and should be so oriented if maximum pickup from a given direction is desired.

OPERATION

STANDARD BROADCAST RECEPTION - For standard broadcast reception set the BAND SELECTOR switch to position "1", the SPEAKER/PHONES switch to "SPEAKER" and the BAND SPREAD dial pointer to "0". Note that the main tuning dial calibration will be true only when the bandspread dial pointer is set at zero. Turn on the receiver with the VOLUME control by turning it clockwise beyond the point of switch action. Adjust the TUNING and VOLUME controls in the usual manner, tuning carefully for the clearest reception. When operating the receiver from a DC source allow about a minute for warm-up. If the receiver doesn't respond after this warm-up period, reverse the power plug at the wall outlet to obtain proper polarity. In certain cases hum picked up from an AC outlet may be reduced by properly polarizing the power plug.

To turn off the receiver, turn the VOLUME control fully counter-clockwise beyond the point of switch action.

SHORT-WAVE RECEPTION - Reception in the short-wave bands is accomplished as described above for standard broadcast reception except that the BAND SELECTOR is set for bands 2, 3, or 4. The frequency of reception is read from the dial scale which corresponds to the setting of the BAND SELECTOR. Any narrow range of frequencies covered by the receiver may be spread out by tuning the stations with the BAND SPREAD control as explained below.

BAND SPREAD TUNING - To use the band spread dial, set the bandspread dial pointer to zero, set the main tuning dial pointer at the high frequency limit of the range of frequencies to be covered and then tune in the stations with the BAND SPREAD control. For example: Assume that the 40 meter amateur band is to be covered. Set the BAND SELECTOR to position "3", the main tuning dial pointer to 7.3 MC and tune in the stations with the BAND SPREAD control.

IMPORTANT - The calibrations on the main tuning dial scale are correct only when the BAND SPREAD dial pointer is set at "0".

SPEAKER PHONES - Normally this switch is set at "SPEAKER" for loud speaker operation. Setting the switch to the "PHONES" position switches the output circuit from the speaker to the headset output jacks located on the rear apron of the chassis.

SERVICE

GENERAL SPECIFICATION

Tubes Four plus rectifier
 Speaker 5-inch PM
 Voice coil impedance 3.2 ohms
 Headset output High impedance
 (1500 to 5000 ohms)
 Antenna Provisions for external antenna
 with transmission line or single
 wire feed.
 Intermediate frequency 455 KC
 Power Supply 105-125 volts DC or
 60 cycles AC
 Power Consumption 30 watts
 Tuning Manual

TUNING RANGE

| Band Selector Position | Frequency Range |
|------------------------|------------------|
| 1 | 540 KC - 1650 KC |
| 2 | 1.65 MC - 5.1 MC |
| 3 | 5 MC - 14.5 MC |
| 4 | 13 MC - 31 MC |

RESTRINGING DIAL CORD

MAIN TUNING DIAL POINTER DRIVE

Restring the main tuning dial pointer drive with a 39-inch length of 30 lb. test dial cord. Set the main tuning capacitor in a fully closed position. Tie one end of the cord to the tension spring at position "A" and follow the stringing procedure "A" through "I" as illustrated in Fig. 4. At position "I", stretch the tension spring and tie the cord securely. Note that three and a quarter turns of dial cord are wrapped around the main tuning drive shaft for proper traction.

Index the main tuning dial pointer by setting the main tuning gang at maximum capacity (fully closed) and aligning the dial pointer with the left hand dial index marker.

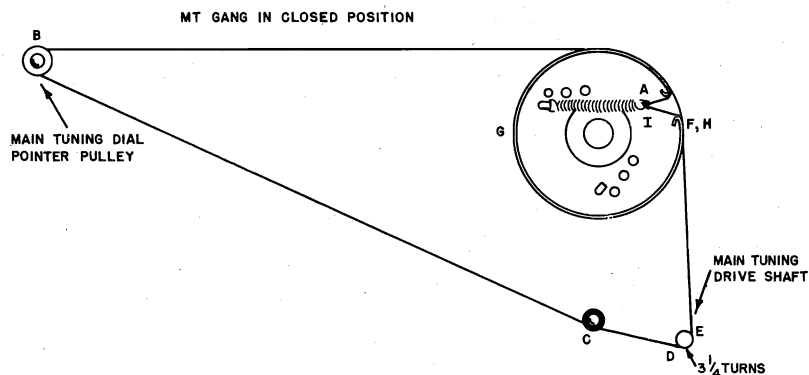


FIG. 4. MAIN TUNING DIAL POINTER DRIVE STRINGING PROCEDURE

92B1329

MODEL 5R10

MAIN TUNING GANG DRIVE

Restraining the main tuning capacitor drive with a 30-inch length of 30 lb. test dial cord. Set the main tuning capacitor in a fully open position. Tie one end of the cord to the tie point at position "1" and follow the stringing sequence "1" through "14" as shown in Fig. 5. At position "14", stretch the tension spring and tie the cord securely to the spring.

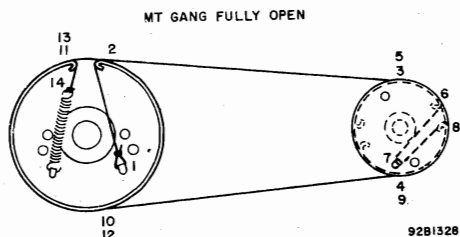


FIG. 5. MAIN TUNING GANG DRIVE STRINGING PROCEDURE

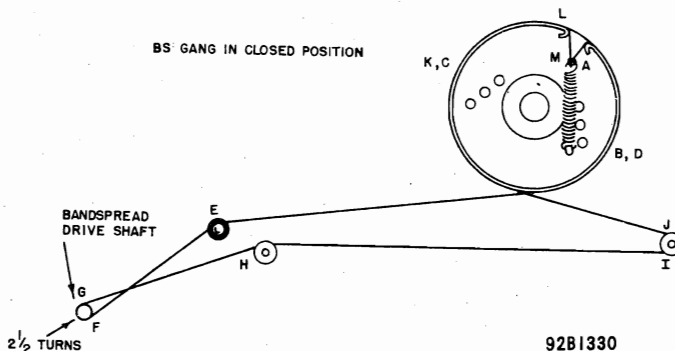


FIG. 6. BAND SPREAD GANG AND DIAL POINTER DRIVE STRINGING PROCEDURE

BAND SPREAD GANG AND POINTER DRIVE

Restraining the band spread gang and pointer drive with a 44-inch length of 30 lb. test dial cord. Set the band spread capacitor in a fully closed position. Tie one end of the cord to the tension spring at position "A" and follow the sequence outlined in Fig. 6. At position "M", stretch the tension spring and tie the cord securely.

Index the band spread dial pointer by setting the band spread gang at maximum capacity and aligning the pointer with the position marked "100" on the band spread dial.

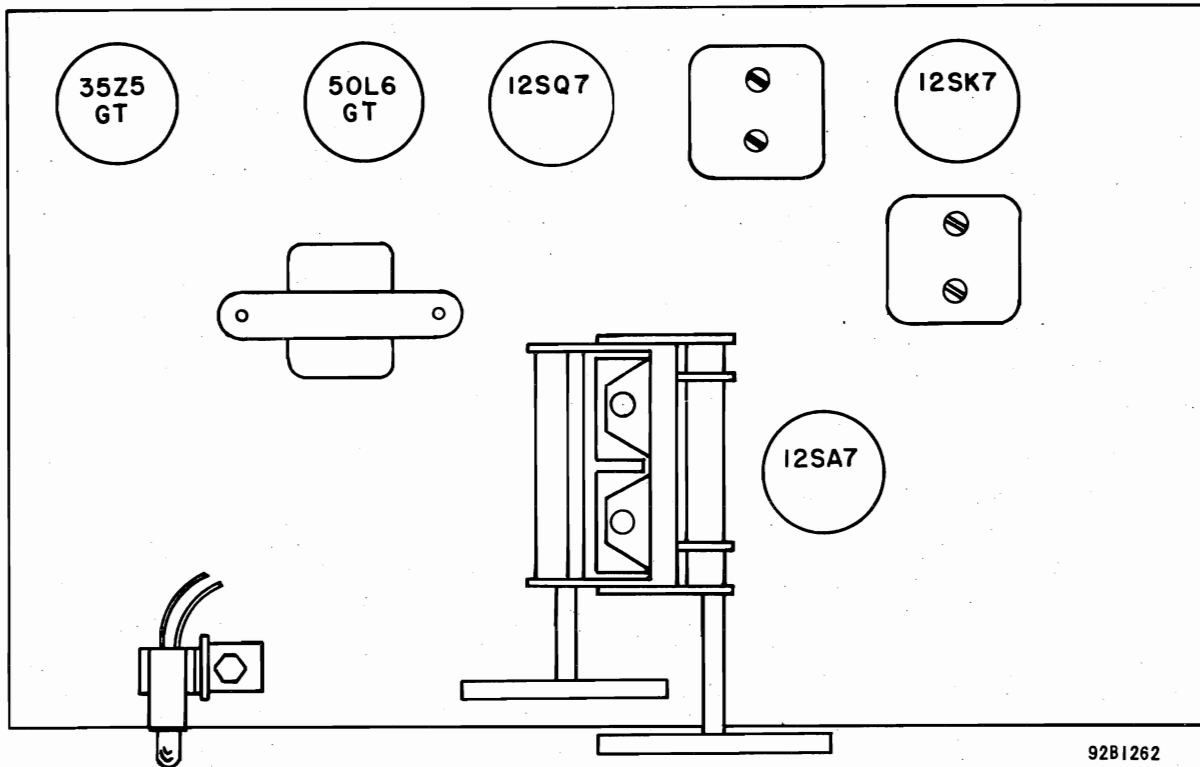


FIG. 7. TOP VIEW, LOCATION OF TUBES AND DIAL LAMPS

TUBE REPLACEMENT

The tube types and their relative position in the receiver are shown in the illustration, Fig. 7. When installing a replacement tube, insert the center guide pin into the center hole of the tube socket; rotate the tube until the key on the guide pin drops into the notch in the socket hole and then push down until the tube rests firmly on the socket.

Handle tubes with care as they are considered fragile and do not tolerate much mechanical abuse.

DIAL LAMP REPLACEMENT

Refer to Fig. 7. for the location of the dial lamp used in the receiver. To replace a defective lamp, remove the cabinet back, reach in through the rear of the cabinet and unclip the dial lamp socket from the mounting clip. The socket may then be brought out into the open for dial lamp replacement. Make replacement with 6-8 volt Mazda #47 (brown bead) lamps or equivalent.

ALIGNMENT PROCEDURE

Holes in the bottom cover permit minor adjustment of the oscillator and converter stage trimmers; however for complete alignment, the chassis will have to be removed from the cabinet. To separate the chassis from the cabinet, first remove the cabinet back, the bottom cover which is held in place by the four mounting feet, and the front control knobs. Next, remove the speaker from the cabinet. The chassis is fastened to the cabinet by four Phillips head screws located at the bottom of the cabinet.

CAUTION - The rubber grommets, fiber washers and nylon insulators are used to insulate the chassis from the cabinet. Check the condition of these insulators and replace them if necessary.

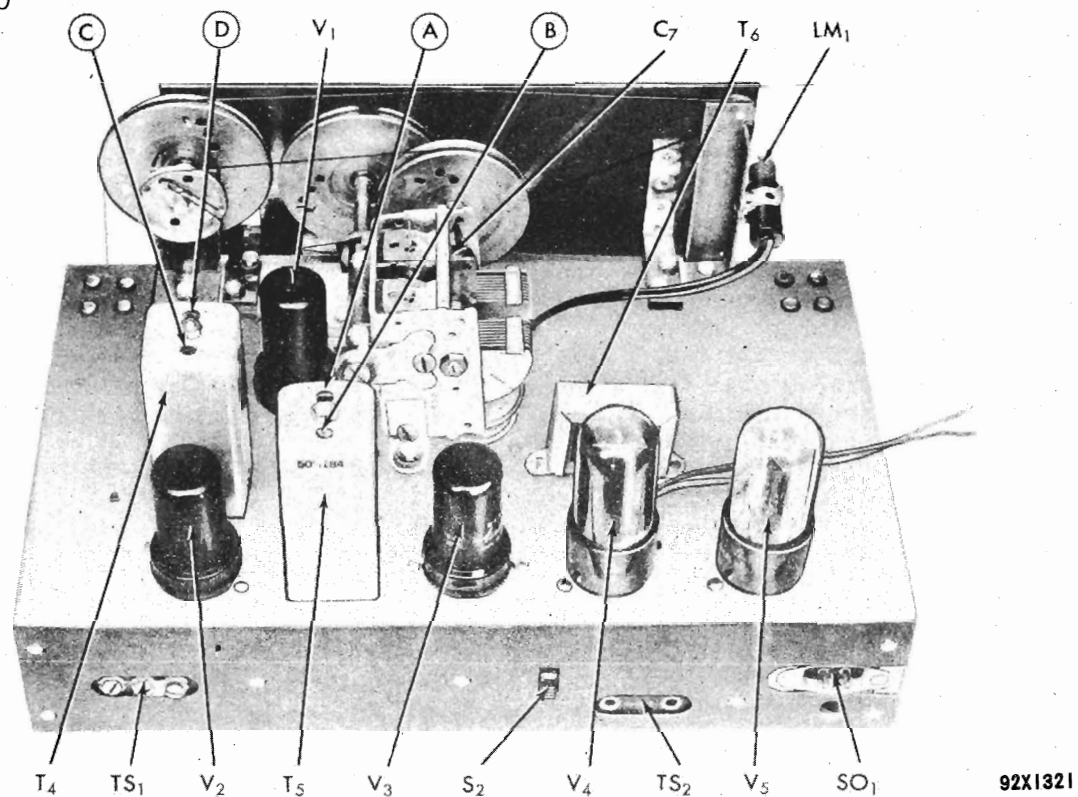
The standard RMA dummy antenna specified in the alignment chart consists of a 200 mmf. capacitor in series with a 20 micro-henry r-f choke which is shunted by a 400 mmf. capacitor in series with a 400 ohm carbon resistor.

Before starting alignment, set the SPEAKER/PHONES switch at SPEAKER, the VOLUME control fully clockwise and the BAND SPREAD control to zero. For the settings of the remaining controls, see the alignment chart.

ALIGNMENT CHART

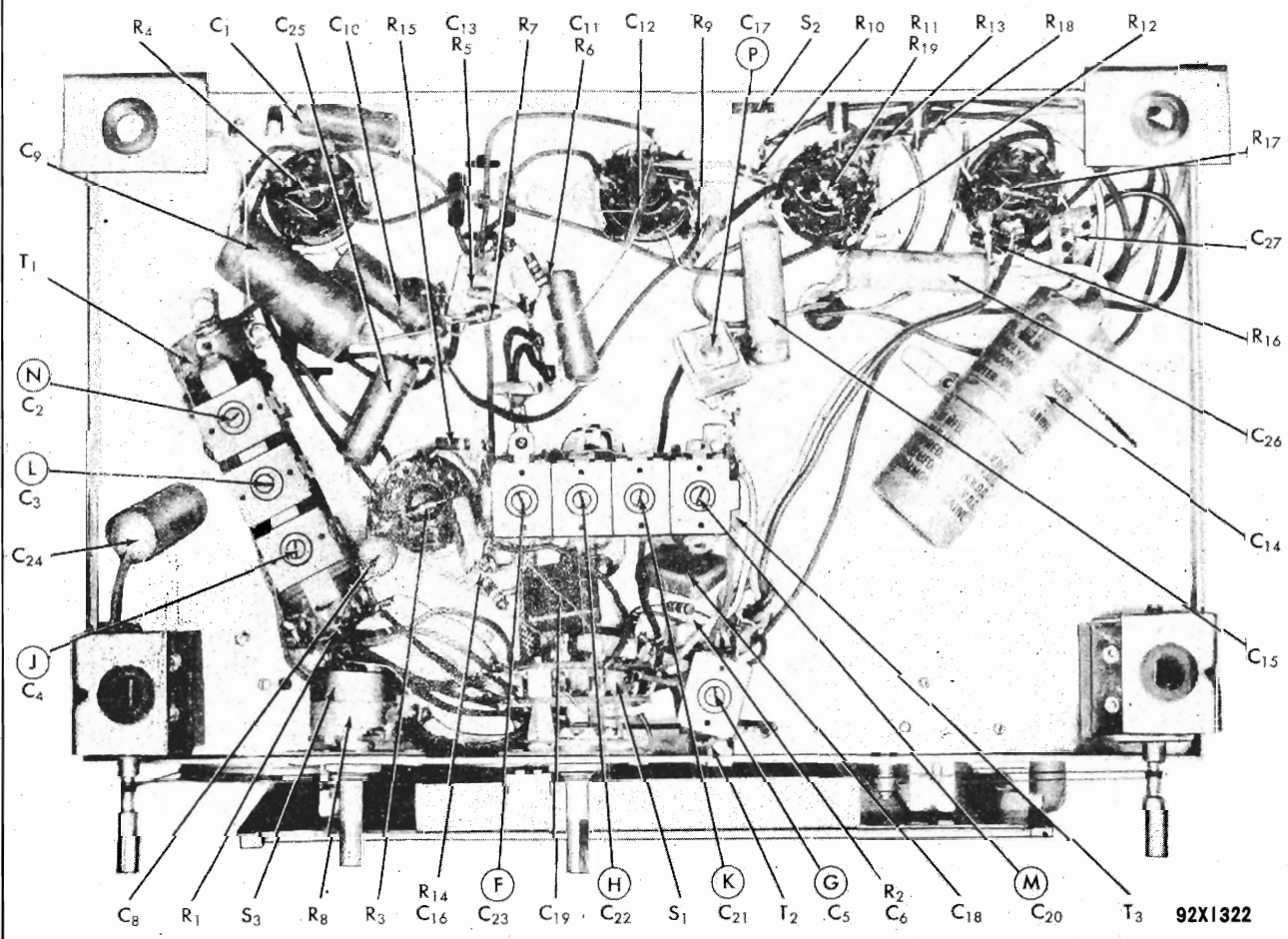
| Step | Dummy Antenna | Signal Generator Coupling | Signal Generator Frequency | Band Selector Setting | Receiver Dial Setting | Adjust | Remarks |
|------|----------------|-----------------------------------------------------------------------|----------------------------|-----------------------|-----------------------|----------|-------------------------------------------------------------------------------------------------------------------------------------|
| 1 | .01 mfd cap. | Stator plates, front section of tuning gang. | 455 kc | 1 | 1000 kc | A,B, C,D | Adjust for max. audio output at speaker voice coil. Use just enough signal generator output to obtain a suitable output indication. |
| 2 | Std. RMA dummy | High side to term. A1 on antenna strip. Jumper wire between A2 and G. | 30 mc | 4 | 30 mc | F,G | Max. output as in step 1. |
| 3 | Std. RMA dummy | See step 2. | 14 mc | 3 | 14 mc | H,J | Max. output as in step 1. |
| 4 | Std. RMA dummy | See step 2. | 5 mc | 2 | 5 mc | K,L | Max. output as in step 1. |
| 5 | Std. RMA dummy | See step 2. | 1500 kc 600 kc | 1 | 1500 kc 600 kc | M,N P | Max. output as in step 1. |

MODEL 5R10



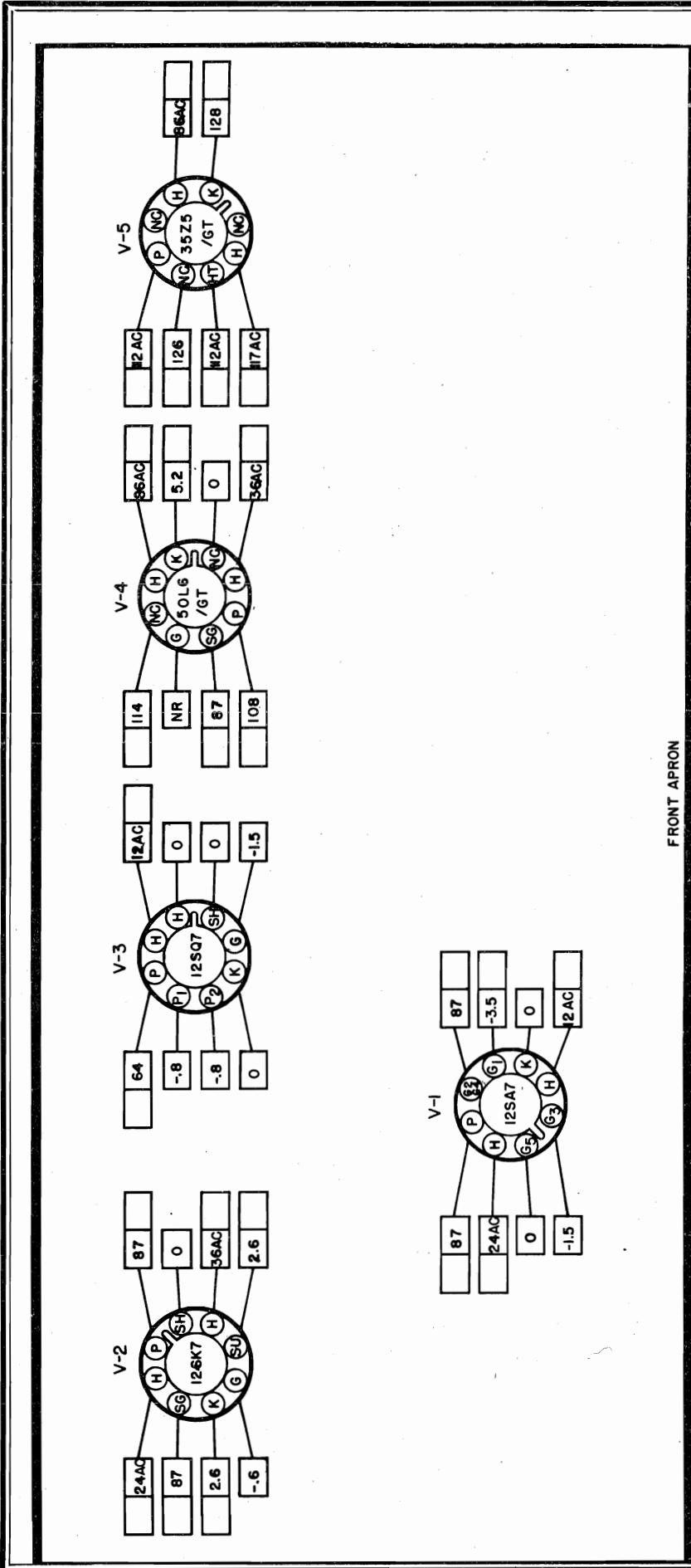
92X1321

FIG. 8. TOP VIEW, ALIGNMENT POINTS AND COMPONENT LOCATIONS



92X1322

FIG. 9. BOTTOM VIEW, ALIGNMENT POINTS AND COMPONENT LOCATIONS



FRONT APRON
BOTTOM VIEW OF CHASSIS

1. SOCKET VIEWS ARE BOTTOM VIEWS.
2. ALL VOLTAGES ARE MEASURED BETWEEN TUBE SOCKET TERMINALS & CHASSIS, WITH ZERO SIGNAL INPUT.
3. LINE VOLTAGE—117 V. AC. AC VOLTAGES WILL BE DC VOLTAGES WHEN OPERATING FROM A DC SOURCE.
4. ALL VOLTAGES SHOWN ARE DC UNLESS OTHERWISE SPECIFIED.
5. DC VOLTAGES SHOWN WERE MEASURED WITH A VACUUM TUBE VOLTMETER.
6. "NC" NO CONNECTION. (VOLTAGES SHOWN FOR THIS TERMINAL ONLY WHEN TERMINALS ARE USED AS A TIE LUG.)
7. "NR" NOT READABLE. (READING GENERALLY MEANINGLESS)
8. SPACE PROVIDED FOR SERVICE METER READINGS.
9. BAND SELECTOR SWITCH AT BAND "4" POSITION.

FIG. 10. TUBE SOCKET VOLTAGE CHART

92C1327

MODEL 5R10

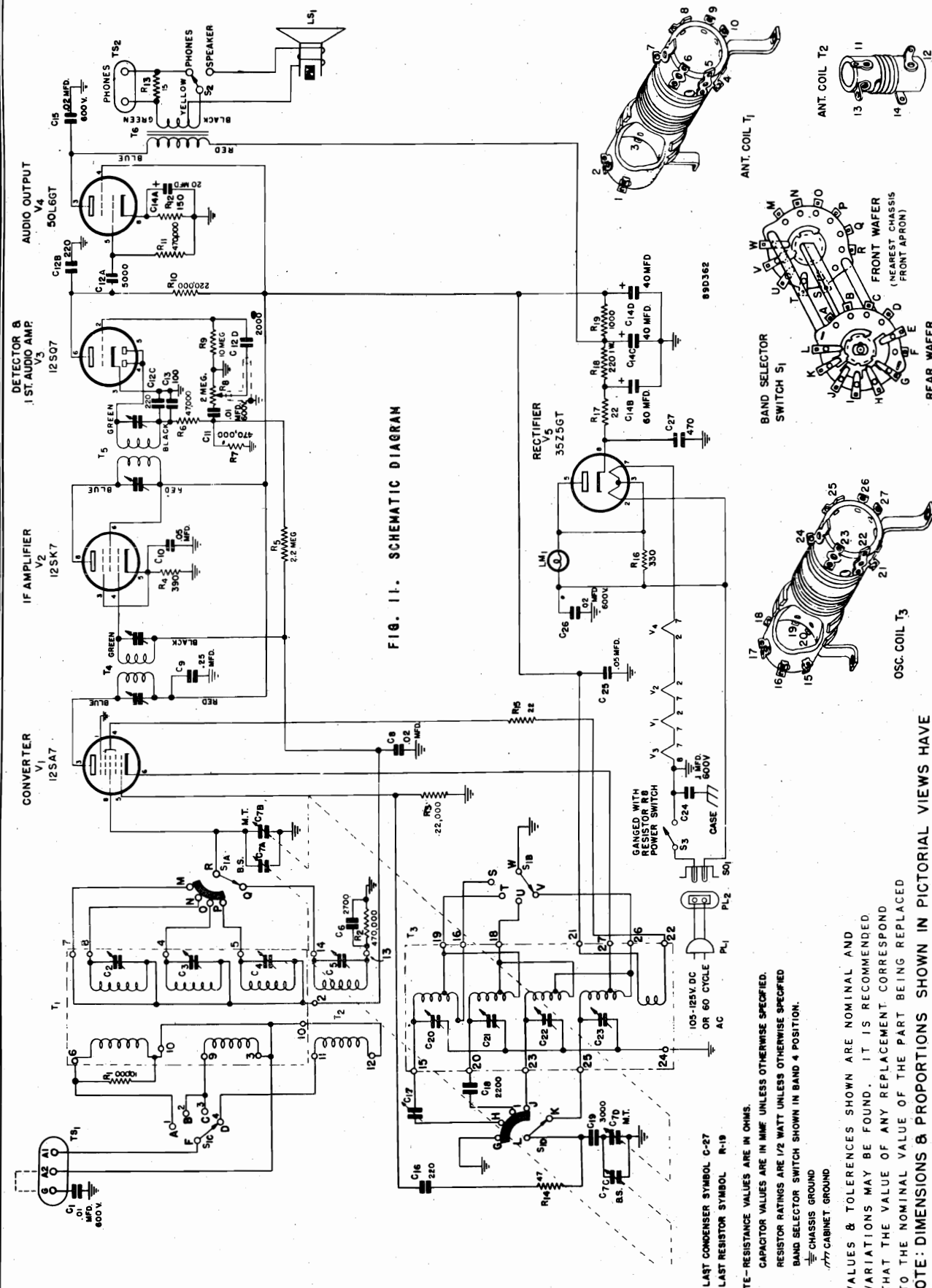


FIG. 11. SCHEMATIC DIAGRAM

LAST CONDENSER SYMBOL C-27
LAST RESISTOR SYMBOL R-19

NOTE-RESISTANCE VALUES ARE IN OHMS.
CAPACITOR VALUES ARE IN MME UNLESS OTHERWISE SPECIFIED.
RESISTOR RATINGS ARE 1/2 WATT UNLESS OTHERWISE SPECIFIED

⊥ CHASSIS GROUND
⊥ CABINET GROUND

VALUES & TOLERANCES SHOWN ARE NOMINAL AND VARIATIONS MAY BE FOUND. IT IS RECOMMENDED THAT THE VALUE OF ANY REPLACEMENT CORRESPOND TO THE NOMINAL VALUE OF THE PART BEING REPLACED

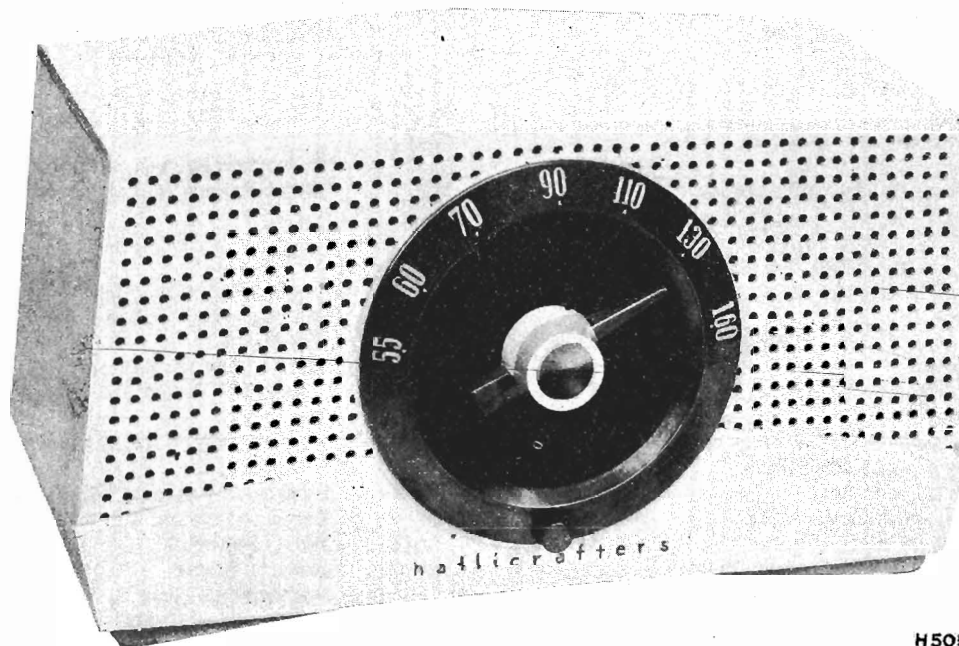
NOTE: DIMENSIONS & PROPORTIONS SHOWN IN PICTORIAL VIEWS HAVE BEEN EXAGGERATED FOR CLARITY OF TERMINAL LUG LOCATION.

SERVICE PARTS LIST

| Ref. No. | Description | Manufacturer's Part Number | Ref. No. | Description | Manufacturer's Part Number |
|-------------------------------|------------------------------------------------------------------|----------------------------|-----------------------------------------|---------------------------------------------------|----------------------------|
| CAPACITORS | | | TRANSFORMERS AND COILS (Cont.) | | |
| C-1,11 | .01 mfd. 600 V., tubular paper | 46AZ103J | T-2 | Coil, antenna (band 4) | 51B1015 |
| C-2,3,4 | Trimmer, adj. (part of antenna coil T-1) | | T-3 | Coil, oscillator (all bands) | 51C822 |
| C-5 | Trimmer, adj. (for antenna coil T-2) | 44A039 | T-4 | Transformer, 1st i-f | 50B183 |
| C-6 | 2700 mmf. 500 V., mica | 47X30B272J | T-5 | Transformer, i-f (detector) | 50B184 |
| C-7 | Tuning capacitor, 2 section | 48C246-B | T-6 | Transformer, audio output | 55A127 |
| C-8 | .02 mfd. 400 V., tubular paper | 46AW203J | SWITCHES | | |
| C-9 | .25 mfd. 200 V., tubular paper | 46AT254J | S-1 | Bandswitch assembly | 60C393 |
| C-10,25 | .05 mfd. 200 V., tubular paper | 46AU503J | S-2 | Switch, slide; SPEAKER- PHONES | 60A243 |
| C-12 | Capacitor, composite; 5000, 2X220, and 2000 mmf. 500 V.; ceramic | 46A151 | S-3 | Switch, power (part of VOLUME control R-8) | |
| C-13 | 100 mmf. 500 V., mica | 47X20B101K | CONNECTORS | | |
| C-14 | 60-40-40 mfd. 150 V., 20 mfd. 25 V., electrolytic | 45B091 | PL-1 | Line cord and plug PL-2 | 87A1668-1 |
| C-15,26 | .02 mfd. 600 V., tubular paper | 46AY203J | TS-1 | Terminal strip, antenna | 88A671 |
| C-16 | 220 mmf. 500 V., mica | 47X20B221K | TS-2 | Jack, PHONES | 88A071 |
| C-17 | Padder, adj. (for oscillator coil T-3, band 1) | 44A349 | SO-1 | Socket, power | 10A286 |
| C-18 | 2200 mmf. 500 V., mica | 47X30B222J | | Socket, dial lamp | 86B105 |
| C-19 | 3000 mmf. 500 V., mica | 47X30B302J | | Socket, octal; tube | 6A250 |
| C-20,21, 22,23 | Trimmer, adj. (part of oscillator coil T-3) | | TUBES, RECTIFIERS AND DIAL LAMPS | | |
| C-24 | .1 mfd. 600 V., tubular paper | 46AZ104J | V-1 | Type 12SA7, converter | 90X12SA7 |
| C-27 | 470 mmf. 500 V., mica | 47X20B471M | V-2 | Type 12SK7, i-f amplifier | 90X12SK7 |
| RESISTORS | | | V-3 | Type 12SQ7, detector and 1st audio amplifier | 90X12SQ7 |
| R-1 | 10,000 ohms 1/2 watt, carbon | 23X20X103M | V-4 | Type 50L6GT, audio output | 90X50L6GT |
| R-2,7,11 | 470,000 ohms 1/2 watt, carbon | 23X20X474M | V-5 | Type 35Z5GT, rectifier | 90X35Z5GT |
| R-3 | 22,000 ohms 1/2 watt, carbon | 23X20X223M | LM-1 | Lamp, dial; Mazda #47 | 39A004 |
| R-4 | 390 ohms 1/2 watt, carbon | 23X20X391K | CABINET PARTS | | |
| R-5 | 2.2 megohms 1/2 watt, carbon | 23X20X225M | | Baffle, speaker | 78B579-B |
| R-6 | 47,000 ohms 1/2 watt, carbon | 23X20X473M | | Cabinet | 66B634-B |
| R-8 | 2 megohms; VOLUME control | 25B896 | | Cabinet back | 8C1204-B |
| R-9 | 10 megohms 1/2 watt, carbon | 23X20X106M | | Channel, rubber; 4 inch (for escutcheon glass) | 16A211 |
| R-10 | 220,000 ohms 1/2 watt, carbon | 23X20X224M | | Channel, rubber, 3/8 inch (for escutcheon glass) | 16.1212 |
| R-12 | 150 ohms 1/2 watt, carbon | 23X20X151K | | Cover, cabinet bottom | 8C1212 |
| R-13 | 15 ohms 1/2 watt, carbon | 23X20X150M | | Clip, antenna coil T-2 mtg. | 76A326 |
| R-14 | 47 ohms 1/2 watt, carbon | 23X20X470M | | Dial background | 32B488 |
| R-15,17 | 22 ohms 1/2 watt, carbon | 23X20X220M | | Dial cord | 38A019 |
| R-16 | 330 ohms 1/2 watt, carbon | 23X20X331M | | Dial scale (glass) | 22B318-C |
| R-18 | 220 ohms 1 watt, carbon | 23X30X221M | | Escutcheon | 7C248 |
| R-19 | 1000 ohms 1/2 watt, carbon | 23X20X102M | | Foot, mounting; rubber | 16A007 |
| TRANSFORMERS AND COILS | | | | Glass, escutcheon | 22B319 |
| T-1 | Coil, antenna (bands 1, 2 and 3) | 51C821 | | Grommet, rubber; brown | 16A015 |
| | | | LS-1 | Grommet, rubber; red | 16A201 |
| | | | | Insulator, nylon (fits in red insulating grommet) | 4A647 |
| | | | | Knob, BAND SELECTOR | 15B322 |
| | | | | Knob, BANDSPREAD, OFF-VOLUME and TUNING | 15B323 |
| | | | | Pointer, bandspread tuning | 82A179 |
| | | | | Pointer, main tuning | 82A180 |
| | | | | Shield, dial lamp | 8A1249 |
| | | | | Speaker, PM; 5 inch | 85C030 |
| | | | | Spring, dial cord | 75A012 |
| | | | | Washer, insulating | 4A646 |

MODELS 5R11, 5R12,
5R13, 5R14

RADIO MODELS 5R11, 5R12, 5R13, 5R14



H505

SPECIFICATIONS

| | |
|------------------------|-----------------------------------------------|
| Power Supply | 117 volts 60 cycle AC, 117 volts DC, 29 watts |
| Frequency Range | 535 KC to 1630 KC |
| Intermediate Frequency | 455KC |
| Antenna | Built-in Loop |
| Tuning | Variable Capacity |
| Speaker | 4", P.M. voice coil impedance 3.2 ohms |
| Power Output | 0.8 watt undistorted, 1.8 watts maximum |
| Sensitivity | 400 uv/m average for 50 milliwatts output |
| Selectivity | 55 KC broad at 1000 times, signal at 1000KC |

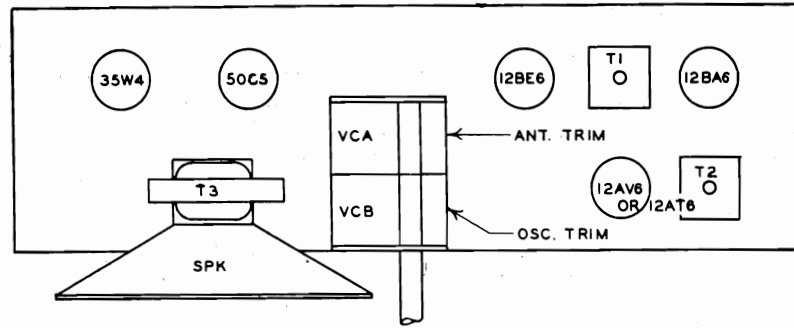
Tubes used are as follows:

| | |
|-----------------------------------------|----------------------|
| 12BE6 Oscillator-Converter | 50C5 Power Output |
| 12AV6 or 12AT6 AVC, Detector, and Audio | 35W4 Power Rectifier |
| 12BA6 I.F. Amplifier | |

MECHANICAL PARTS

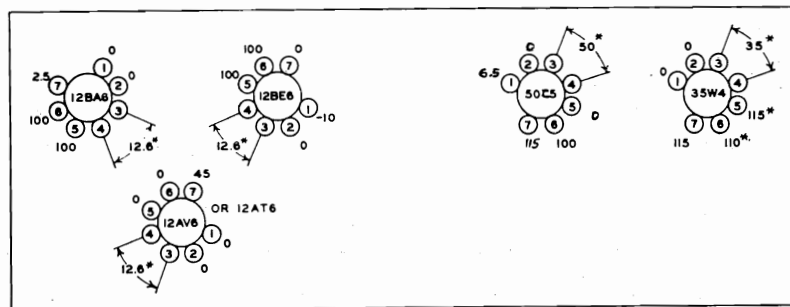
| PART NO. | DESCRIPTION | MODEL RADIO | | | |
|----------|-------------------------------|------------------|---------|-----------------------|------|
| 2A2047 | Nut, Push-on | Used On Radio | 15B318 | Knob, Pointer Ass'y | 5R14 |
| 3A189 | Screw, #6X3/8 Pan Hd. | Models 5R11, | 33A325 | Waxpaper | |
| 3A974 | Screw, Sems 6-32X1/4 Rd. Hd. | 5R12, 5R13, | 66C636 | Chassis Cover | |
| 3A1628 | Screw, Sems 8-32X3/16 Rd. Hd. | 5R14 Unless | 70D956 | Chassis | |
| 32VLXY | Screw, 6-32X3/8 H H S Tap | Otherwise | 73A591 | Spacer 1/8 | |
| 3ZVUKZ | Screw, 6-32X1/2 Pan Hd. | Indicated | 76A651 | I.F. Mounting Clip | |
| 4AXEV | Washer, Flat #6 | | 78F567 | Cabinet | 5R11 |
| 5AO58 | Rivet .088X.187 | | 78F568 | Cabinet | 5R12 |
| 6A340 | Socket, 7 Pin | | 78F569 | Cabinet | 5R13 |
| 7C237 | Dial Escutcheon | | 78F570 | Cabinet | 5R14 |
| 8A1211 | Strain Relief | | 87A716 | Wire, #22 Blue | |
| 11A110 | Ground Lug | | 87A717 | Wire, #22 Red | |
| 15A309 | Knob, Volume | 5R11, 5R12, 5R13 | 87A718 | Wire, #22 Green | |
| 15A310 | Knob, Volume | 5R14 | 87A721 | Wire, #22 Orange | |
| 15B313 | Knob, Tuning (Front) | 5R11, 5R12, 5R13 | 87A723 | Wire, #22 Tinned Buss | |
| 15B314 | Knob, Tuning (Front) | 5R14 | 87B1669 | Line Cord | |
| 15B317 | Knob, Pointer Ass'y | 5R11, 5R12, 5R13 | 94X655 | Instruction Book | |
| | | | 98C215 | Packaging Sequence | |

MODELS 5R11, 5R12,
5R13, 5R14



CHASSIS LAYOUT TOP VIEW

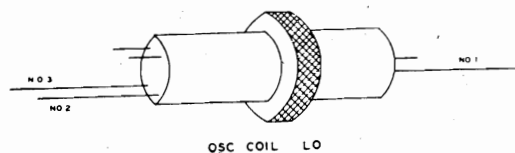
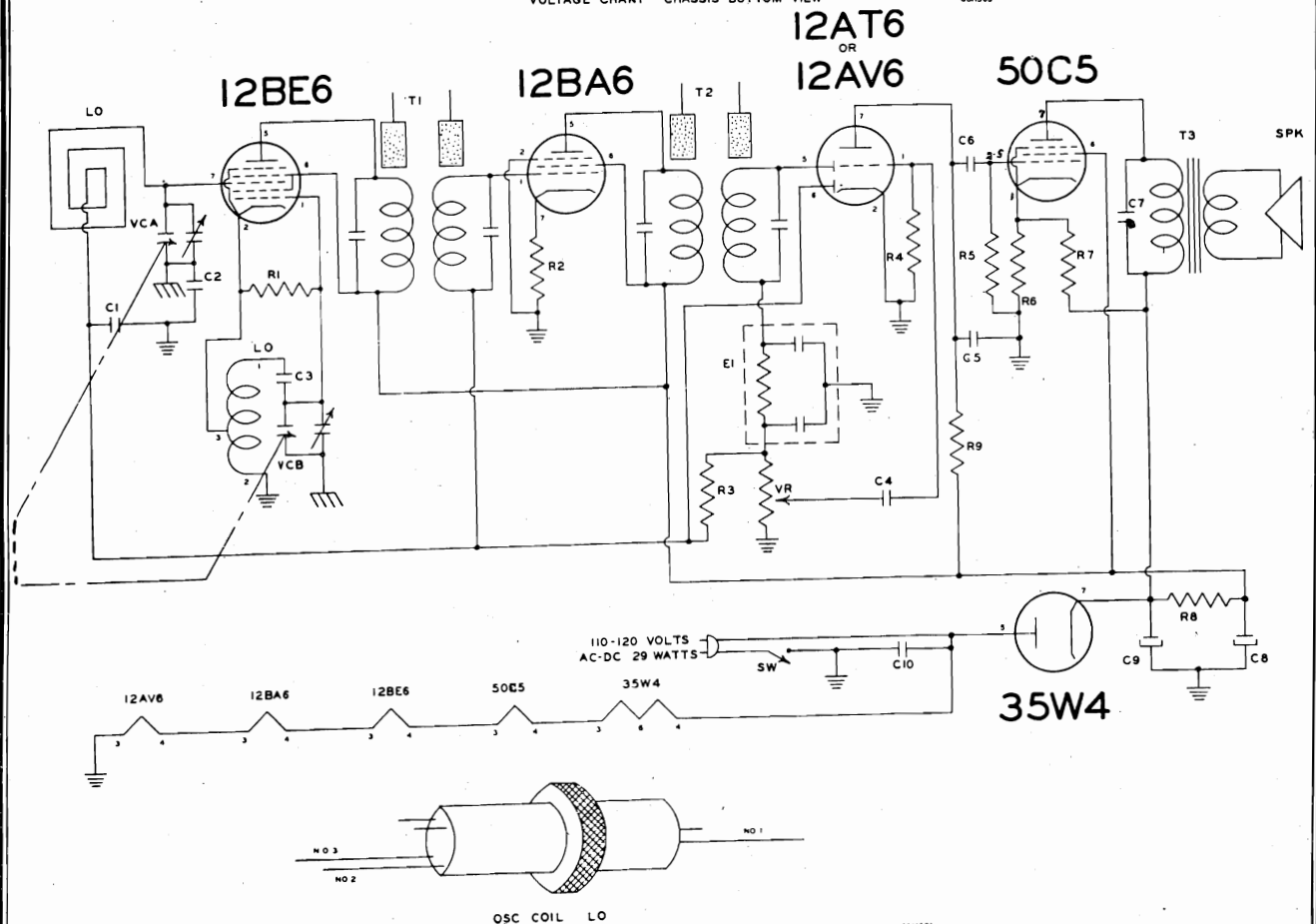
C5H502



ALL DC VOLTAGES IN REFERENCE TO COMMON GROUND
* AC EXCEPT WHEN USED ON DC

VOLTAGE CHART CHASSIS BOTTOM VIEW

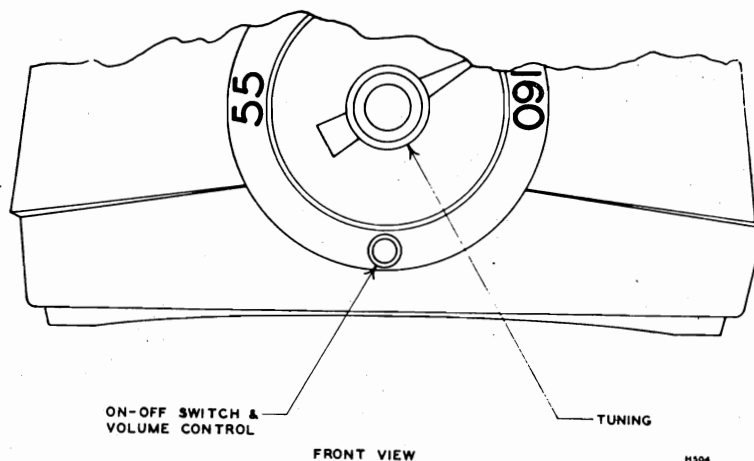
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OSC COIL LO

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MODELS 5R11, 5R12,
5R13, 5R14



ALIGNMENT PROCEDURE
(Refer to chassis view)

The following procedure is for use only by competent servicemen having the proper equipment.

The alignment should be made with volume control fully on, and the output from the signal generator as low as possible, to prevent AVC action from interfering with proper alignment.

With the output meter connected across the voice coil of the speaker, the output meter reading for 50 milliwatts is 0.4 volts, using a signal which is modulated 400 c.p.s.

Adjust all trimmers for maximum output. Repeat the alignment procedure given below as a final check.

CAUTION: This is an AC/DC receiver, and when aligning the set it is necessary to isolate the signal generator or the receiver from the line by use of a transformer, or to place a .2 MFD condenser in each test lead of the signal generator.

| Frequency | SIGNAL GENERATOR Dummy Antenna | Connection to Radio | POSITION OF VARIABLE | ADJUST FOR MAXIMUM OUTPUT |
|-----------|--------------------------------------|-------------------------|----------------------------|---------------------------------|
| 455 KC | .1 MFD | 12BE6 Grid Stator VCA | Fully Open | T1 & T2 |
| 1625 KC | | 12BE6 Grid Stator VCA | Fully Open | VCB Oscillator |
| 1400 KC | .1 MFD | Loosely Coupled to Loop | Tune in Signal Generator | VCA Antenna |

Connect low side of signal generator to common negative.

PARTS VALUES FOR HALLICRAFTER MODELS 5R11, 5R12, 5R13, 5R14

CIRCUIT COMPONENTS

| SYMBOL | PART NO. | DESCRIPTION | VALUE | RATING | TOL. |
|------------|------------|------------------------------|--------------------|-----------|------|
| VCA-VCB | 48-248 | Variable Capacitor | | | |
| C1 | 46AU503J | Capacitor, Tub. Paper | .05 MFD | 200 volts | |
| C2 | 46AU104J | Capacitor, Tub. Paper | .1 MFD | 400 volts | |
| C3 | 46AY203J | Capacitor, Tub. Paper | .02 MFD | 600 volts | |
| C4, C6, C7 | 46AY502J | Capacitor, Tub. Paper | .005 MFD | 600 volts | |
| C5 | 47X20B251K | Capacitor, Mica | 250 MMF | 500 volts | |
| C9, C8 | 45B183 | Capacitor, Elect. | 40-20 MFD | 150 volts | |
| C10 | 46AW503J | Capacitor, Tub. Paper | .05 MFD | 400 volts | |
| R1 | 23X20X223K | Resistor, Carbon | 22K Ohm | 1/2 watt | 20% |
| R2 | 23X20X391K | Resistor, Carbon | 390 Ohm | 1/2 watt | 10% |
| R3 | 23X20X105M | Resistor, Carbon | 1 Megohm | 1/2 watt | 20% |
| R4 | 23X20X106M | Resistor, Carbon | 10 Megohm | 1/2 watt | 20% |
| R5, R9 | 23X20X474M | Resistor, Carbon | 470K Ohm | 1/2 watt | 20% |
| R6 | 23X20X121K | Resistor, Carbon | 120 Ohm | 1/2 watt | 10% |
| R7 | 23X30X103K | Resistor, Carbon | 10K Ohm | 1 watt | 20% |
| R8 | 23X30X102K | Resistor, Carbon | 1000 Ohm | 1 watt | 20% |
| VR-SW | 25B918 | Volume Control & Switch | 1 Megohm | S.P.S.T. | |
| E1 | 49A016 | Diode Filter Unit | 2x100 MMFD-47K Ohm | | |
| LA | 57C149-B | Loop Antenna & Back | | | |
| LO | 51B1300 | Oscillator Coil | | | |
| T1, T2 | 50B487 | I. F. Coil | | | |
| SPK-T3 | 85C109 | Speaker & Output Transformer | | | |
| 12AV6 | 90X12AV6 | Tube, Type 12AV6 | | | |
| 12BA6 | 90X12BA6 | Tube, Type 12BA6 | | | |
| 12BE6 | 90X12BE6 | Tube, Type 12BE6 | | | |
| 35W4 | 90X35W4 | Tube, Type 35W4 | | | |
| 50C5 | 90X50C5 | Tube, Type 50C5 | | | |

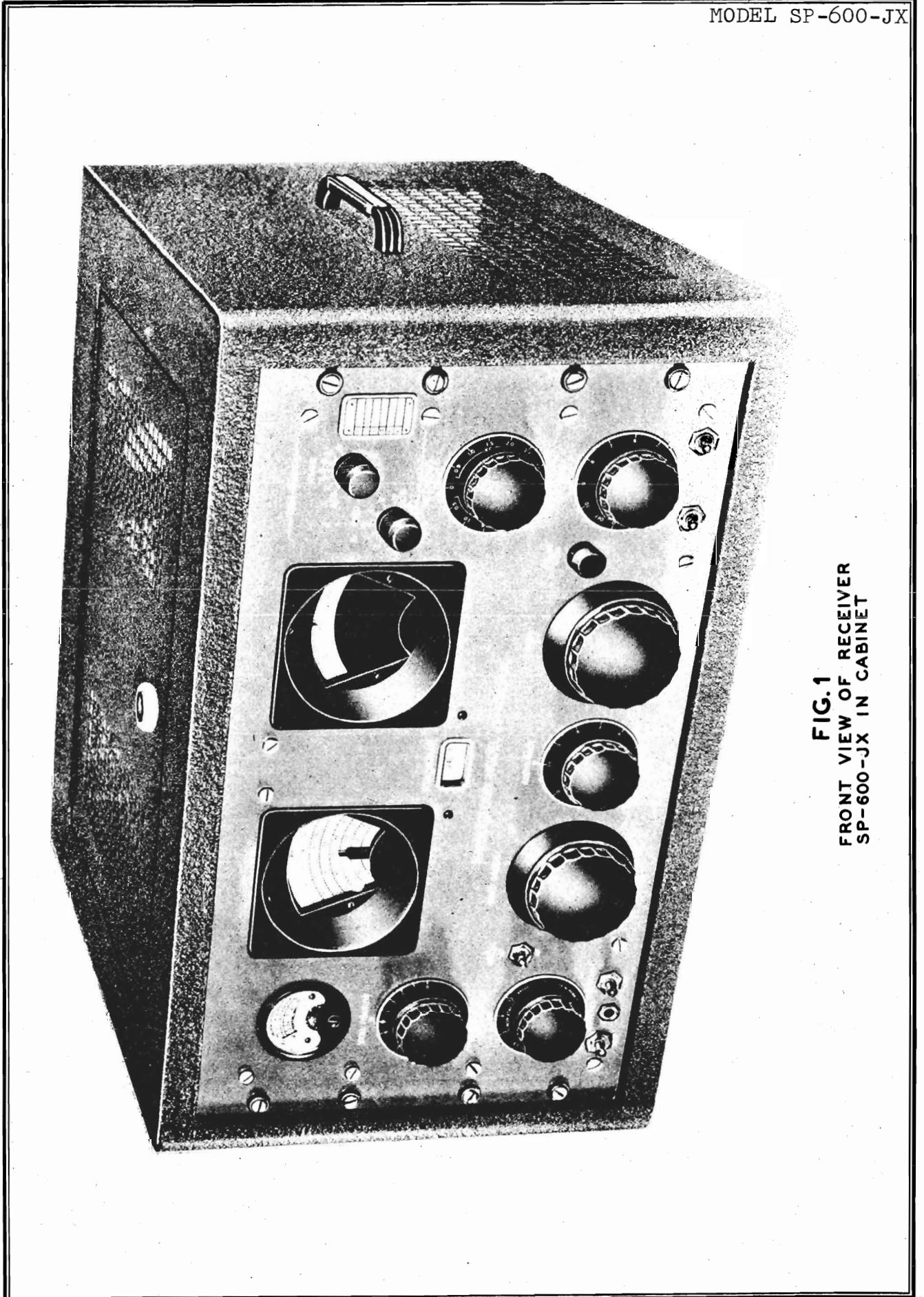


FIG.1
FRONT VIEW OF RECEIVER
SP-600-JX IN CABINET

MODEL SP-600-JX

TECHNICAL SUMMARY

Electrical Characteristics

| | |
|------------------------------------|------------------|
| Frequency Range—total 6 bands..... | .54 to 54.0 mc |
| Band 1..... | .54 to 1.35 mc |
| Band 2..... | 1.35 to 3.45 mc |
| Band 3..... | 3.45 to 7.40 mc |
| Band 4..... | 7.40 to 14.8 mc |
| Band 5..... | 14.80 to 29.7 mc |
| Band 6..... | 29.70 to 54.0 mc |

Maximum Undistorted Output—approximate—2.5 watts.

Output Impedance—600 ohms-balanced split windings.

Phone jack-winding; delivers 15 milliwatts to an 8000 ohm resistive load, when the audio output to the 600 ohm power load is adjusted to 500 milliwatts.

Power Supply Requirements

Line Rating..... 95, 105, 117, 130, 190, 210, 234 and 260 volt taps, 50-60 cycles.
 Power Consumption..... 130 watts, 1.25 amps. at 117 volts—maximum.

Tube Complement—total 20

| | |
|-----------------------------------------------------------------------|-----------|
| RF, IF and BFO Amplifiers..... | 7 — 6BA6 |
| HF, 2nd Conversion and BFO Oscillators..... | 3 — 6C4 |
| Crystal Controlled HF Oscillator..... | 1 — 6AC7 |
| Mixers..... | 2 — 6BE6 |
| Detector, "C" Bias Rectifier and Noise Limiter & Meter Rectifier..... | 3 — 6AL5 |
| AF Amplifier and IF Output..... | 1 — 12AU7 |
| Power Output..... | 1 — 6V6GT |
| Rectifier..... | 1 — 5R4GY |
| Voltage Regulator..... | 1 — 0A2 |

Mechanical Specifications

Rack Model—Dimensions; 19 inches wide, 10½ inches high and 16½ inches deep from rack mounting surface. Weight 66 lbs.

Table Model—Dimensions; 21¾ inches wide, 12¾ inches high and 17½ inches deep. Weight 87½ lbs.

Performance Data — (approximate values-taken on a sample receiver)

Sensitivity is 2.3 microvolts, or better, throughout the entire frequency range, for a signal to noise power ratio of 10 to 1.

Image rejection ratios are better than 80 db throughout the frequency range.

The IF rejection ratio at 600 kc is 2700 to 1

The AVC action will maintain the output constant within 12 db when the input is increased from 2 to 200,000 microvolts.

GENERAL DESCRIPTION

The SP-600-JX is a 20 tube Radio Communications Receiver with self contained power supply. The JX suffix in this model number denotes that this receiver is made in accordance with JAN specifications, with the exception of the use of a few capacitors and resistors where special design considerations require special values and tolerances not included in the JAN preferred value lists or where space limitations do not permit their use. The special components so used are equal or superior to the JAN components in quality.

The receiver is supplied in either a well ventilated steel, table model cabinet finished in dark grey to complement the lighter grey front panel or for mounting in a standard 19 inch relay rack.

The self contained power supply is designed for operation from a single phase, 50 to 60 cycle alternating current power source. The power transformer primary is provided with taps covering a line voltage range from 90 to 270 volts. The power consumption is 130 watts.

The receiver is suitable for either headphone or loud speaker reception of AM radio telephone, CW telegraph or AM MCW telegraph signals.

The standard model provides continuous coverage over a frequency range from 0.54 to 54.0 megacycles in six bands. The large easily operated band change control knob, on the front panel, selects the desired frequency band and a band indicator visible through a small front panel window indicates the frequency band in use. This control also aligns the dial frequency indicator with the proper dial scale.

In addition to the frequency scales, the main dial has an arbitrary scale which in conjunction with the band spread dial provides continuous band spread scales over each frequency band for extremely accurate logging and resetability.

The single tuning control is large and of special design to permit maximum traverse speed as well as exceptional operating ease. It controls both the main and band spread dials. An anti-backlash gear train provides extremely close calibration accuracy and completely accurate resetability. A tuning lock provides positive locking action without affecting the frequency setting.

The tuning ratio from the tuning control to the main dial is 50 to 1 and the ratio from the band spread dial to the main dial is 6 to 1.

An ingeniously designed rotary turret is employed to change bands and to place the coil assemblies of the RF amplifier, Mixer and First Heterodyne Oscil-

lator stages directly adjacent to their respective sections of the four gang tuning capacitor and their respective tubes. This assures maximum sensitivity at high signal to noise ratio.

Two stages of tuned radio frequency amplification are provided on all bands. The circuit for single conversion, used on frequencies up to 7.4 megacycles, includes a mixer, heterodyne oscillator, four stages of IF amplification, detector and AVC rectifier, noise limiter and meter rectifier, beat frequency oscillator, beat frequency buffer amplifier, IF output, AF amplifier and output power stage. The circuit for double conversion, employed for frequencies above 7.4 megacycles, includes a second mixer and a second heterodyne crystal controlled oscillator. The power supply system includes a B power rectifier, C bias rectifier and a voltage regulator.

The frequency control unit provides for fixed channel crystal controlled operation on any six frequencies chosen within the range of the receiver. Front panel controls permit the selection of the normal high stability continuously variable tuning or either of the six selected fixed frequency signals. For crystal controlled fixed channel operation it is only necessary to set the dial to the signal frequency, switch to the crystal frequency desired and tune with the delta frequency control. No retuning of the main tuning is necessary or desirable, when switching from VFO to crystal operation for the same signal frequency. These crystals are not supplied with the receiver, but should be purchased on special order from HAMMARLUND MFG. CO. specifying the signal frequency for which it is to function.

The two scale tuning meter normally indicates the relative strength of the received signal in db from 1 microvolt, when operated on AVC and with the RF gain control at maximum. A rear control is provided for adjustment at the plus 20 db scale reading with an RF signal input of 10 microvolts. On depression of the panel meter switch the lower scale of the meter indicates the audio output power level in db from 6 milliwatts. A rear control is provided for adjustment of the 0 db reading.

The AVC circuit is provided with separate time constants for CW and MCW operation. The beat frequency oscillator employs a high capacity Colpitts circuit which gives a high order of frequency stability and minimizes oscillator harmonics. The beat frequency oscillator voltage is introduced into the detector through a buffer amplifier which eliminates oscillator lock-in. This feature makes it possible to tune signals sharply to zero beat and permits the in-

MODEL SP-600-JX

clusion of the rear control for adjusting the beat oscillator injection to suit operating conditions. A front panel control varies the audio beat frequency from 0 to plus or minus 3 KC.

The noise limiter circuit effectively limits the interference from ignition systems or other sources of pulse type noise. The limiter switch permits optional use of the limiter.

The antenna input circuit is designed for use with a balanced line. The input impedance is nominally 100 ohms. The receiver may also be operated with a conventional single wire antenna.

The audio output circuit is designed for a 600 ohm load or line and is provided with a four terminal split winding for balanced load operation. Undistorted power output is approximately 2.5 watts. The head phone circuit when referred to an 8000 ohm load provides signals attenuated approximately 15 db below the 600 ohm power output.

An RF gain control is provided for the manual control of sensitivity in the presence of strong signals and

operates on either MANUAL or AVC.

The send receive switch desensitizes the receiver but leaves the power on to provide for instant reception between transmission periods. A rear receptacle provides for the connection of an external relay.

Radiation is negligible and complies with requirements for shipboard operation and for multi-receiver installations.

Frequency drift after a 15 minute warm up period, ranges between .001 percent and .01 percent of frequency depending on the frequency used. This is a very unusual degree of frequency stability for variable tuned HF oscillators and closely approaches crystal stability.

The selectivity control provides three degrees of crystal and three degrees of non-crystal selectivity ranging from sharp (.2kc) to broad (13.KC). The crystal filter embodies the same circuit features that have proved so effective and desirable in Hammarlund Super Pro Receivers, incorporated in an improved mechanical design.

II

CIRCUIT DESCRIPTION

General — The circuit is shown schematically in Figure 11. A block diagram, Figure 2, is provided to more clearly show the arrangement and functions of the various circuit sections. The location of the various tubes is shown in Figure 3. The circuit, for single conversion, used for signal frequencies up to 7.4 mc consists of two stages of RF amplification V-1 and V-2, First Mixer V-5, First Heterodyne Oscillator V-4, four stages of IF amplification V-7, V-9, V-10 and V-11, Detector and AVC rectifier V-14, Noise Limiter V-15, Beat Frequency Oscillator V-13, IF output and AF amplifier V-16-A and V-16-B, Output Power stage V-17 and the Power Supply system which includes B Power Rectifier V-19, C Bias Rectifier V-20 and Voltage Regulator V-18.

In the circuit for double conversion, used for signal frequencies above 7.4 mc, the Second Mixer V-6 and Second Heterodyne Oscillator V-8 are substituted for the Gate tube V-7.

Input Coupling — The antenna coupling is designed to provide optimum coupling from a 100 ohm transmission line. A balanced doublet or straight wire antenna may be used.

RF Amplifier — An ingeniously designed rotary turret is employed to change bands and to place the coil assemblies of the RF amplifier V-1 and V-2, Mixer V-5 and First Heterodyne Oscillator V-4 stages directly adjacent to their respective sections of the four gang tuning capacitor and their respective tubes. This assures maximum sensitivity at high signal to noise ratio.

First Heterodyne Oscillator — (Variable V-4) — The rotary turret band change switch, advanced de-

sign of the four gang, twin section, variable tuning capacitor and rugged construction throughout, provide frequency stability and dial calibration accuracy to a previously unattained degree.

First Heterodyne Oscillator — (Crystal Controlled V-3) — For services requiring extremely stable, fixed frequency operation, a crystal controlled high frequency oscillator is provided. Instant changeover from variable to crystal controlled oscillator, with a choice of six crystal positions, is effected by a front panel control. A second front panel control permits adjustment of the crystal oscillator frequency over a plus or minus .005 percent range.

Intermediate Frequency Amplifier — Single conversion to 455 kc is employed for signal frequencies below 7.4 mc. There are four stages of IF amplification incorporating the Hammarlund patented crystal filter circuit. Six positions of selectivity provide 6 db bandwidths of .2, .5, 1.3, 8 and 13 kc. On the three narrower bandwidth positions, the crystal filter is in operation. The crystal phasing control provides extreme selectivity for the high attenuation of closely adjacent interfering signals.

Double conversion is employed for signal frequencies above 7.4 mc. The signal is heterodyned to 3.955 mc by the First Mixer V-5 and Heterodyne Oscillator V-4 or V-3 for high image rejection. The 3.955 mc signal is then heterodyned to 455 kc by the Second Mixer V-6 and the 3.5 mc Fixed Crystal Controlled Oscillator V-8, for selectivity.

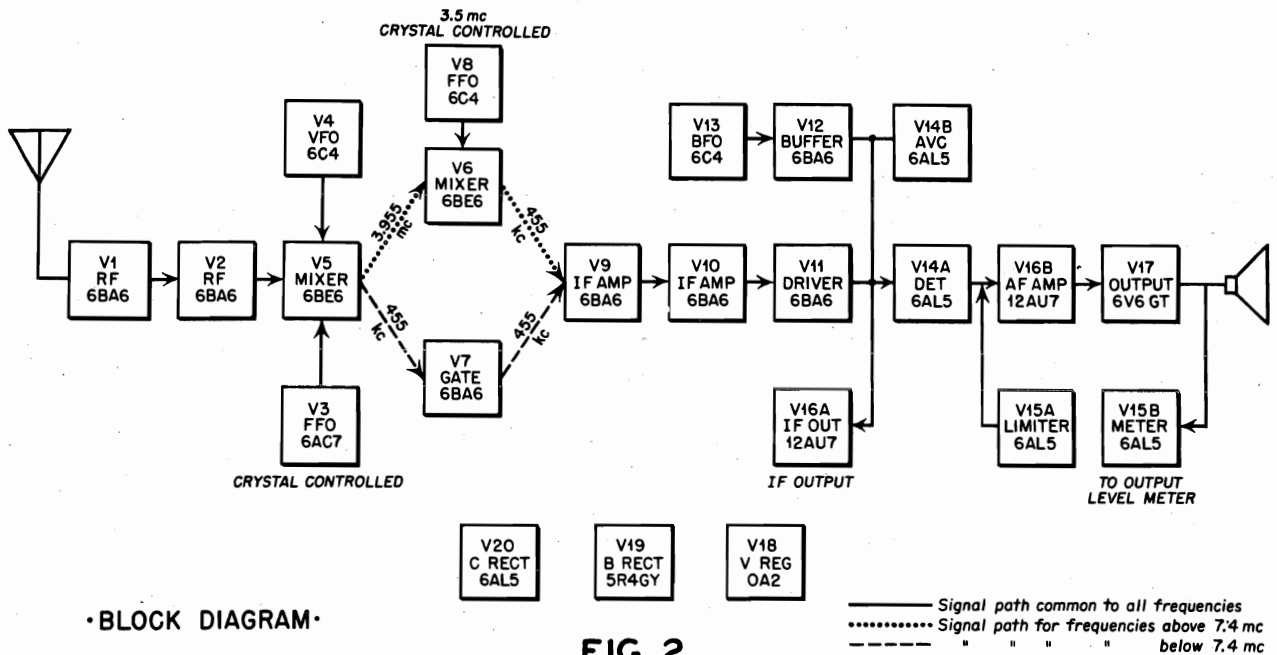
Detector and AVC — The V-14 tube is used as a high level Detector and AVC Rectifier. The AVC circuit is provided with separate time constants for CW and MCW operation.

Beat Frequency Oscillator—The beat frequency oscillator employs a high capacity Colpitts circuit which gives a high order of frequency stability and minimizes oscillator harmonics. The beat frequency Oscillator V-13, is coupled into the detector circuit through Buffer Amplifier V-12, which eliminates oscillator lock-in and permits variation of the beat oscillator injection by means of a control located on the rear of the chassis. A front Panel control varies the audio beat frequency, from zero beat to plus or minus 3 kc.

Noise Limiter—The noise limiter circuit V-15, limits the noise interference from ignition systems or other sources of pulse type noise. A separate control

Power Supply—The power supply is an integral part of the receiver. It includes the B rectifier V-19 and the C rectifier V-20, together with their respective low pass filters and the Voltage Regulator V-18. The power transformer is provided with screw terminal primary taps, covering a power line source range of 90 to 270 volts, 50 to 60 cycles. The power transformer is protected by a fuse in the primary circuit.

Tuning Meter—The tuning meter is used on AVC operation to indicate the accuracy of tuning and the relative strength of received signals. Depression of the Meter Switch converts the meter circuit for indication of output level in db from 6 milliwatts.



switch S-6, permits optional use of the limiter on any mode of operation when pulse type interference is present.

Audio Frequency Amplifier—A resistance coupled amplifier triode V-16-B, amplifies the audio frequency signal from the detector.

Audio Output—The audio output tube V-17, is transformer coupled through a split, balanced winding to deliver 2.5 watts undistorted output to a 600 ohm load. The split balanced winding permits balancing of the direct current in the output circuit, as used for teletype or similar service. A separate secondary winding provides attenuated audio signal output for headphone operation. This winding will deliver an output of 15 milliwatts into an 8000 ohm resistive load when the 600 ohm power secondary is delivering 500 milliwatts to a 600 ohm resistive load.

IF Output—A cathode follower V-16-A provides a low impedance source of intermediate frequency (455 Kc) signal to the connector on the rear skirt of the chassis.

RF Gain Control and Power Switch—The RF gain control is provided for manual control of sensitivity to prevent overloading on strong signals when operating with the AVC-MANUAL switch in the "MANUAL" position. This control also operates when the switch is in the "AVC" position. The Power "ON-OFF" switch is operated at the counter-clockwise extremity of the RF gain control.

Send-Receive Switch—The send-receive switch desensitizes the receiver but leaves the power "on" to provide for instant reception between transmission periods. A receptacle is provided on the rear of the receiver for the external connection of a relay.

Convenience Outlet—A convenience power outlet is provided on the rear of the chassis for the connection of an accessory such as a lamp or electric clock.

Radiation—Advanced design and shielding of the high frequency, second conversion, crystal and beat frequency oscillators has reduced radiation to a negligible point so that interference of this nature, common in multi-receiver installations, is reduced to a minimum.

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III

INSTALLATION

Tubes and Packing — Inspect the chassis to see that all tubes are firmly in their respective sockets and that any packing is removed from the receiver.

Power Supply — Make sure that the primary tap lead on the power transformer is connected to the transformer tap which most nearly agrees with the 50 to 60 cycle power source voltage.

Antenna — The input impedance at the antenna terminals is designed to match a 100 ohm transmission line. The angle plug adapter and connector, supplied with the receiver, is designed for use with a small diameter, "TWINAX" transmission line, which should be used with a balanced antenna installation. If it is desired to operate with a single wire antenna, the antenna lead-in wire should be connected to one terminal of the connector plug and a ground lead should be connected from the other terminal of the connector

plug to the ground terminal, which is adjacent to the antenna input receptacle at the rear of the tuning unit.

Speaker — The loud speaker should be of the permanent magnet dynamic type and should include a speaker voice coil to 600 ohm line matching transformer for connection to the 600 ohm audio output terminals of the receiver.

Headphones — Either low or high impedance headphones may be used in the phone jack. The high impedance type is recommended. The phone jack is located at the lower left side of the front panel.

Mounting — The receiver may be placed on a table or mounted in a standard 19 inch rack. If a table model is purchased, it is supplied with a steel cabinet. The cabinet should be placed in a position which permits the free access of air for the ventilation louvers.

IV

OPERATION

DESCRIPTION OF CONTROLS

The front panel dials and controls are shown in Figure 1 and the rear chassis skirt controls and terminals are shown in Figure 6.

Tuning Dials — The main dial is to the left and the band spread dial is to the right. The main dial has six frequency band scales, calibrated in megacycles and an arbitrary, outer scale. The band spread dial has an arbitrary, 0 to 100, scale. The numeral under the fixed pointer of the main dial indicates the number of revolutions that have been made by the band spread dial at any setting. Thus, if the pointer, for the outer scale, of the main dial indicates over the figure 4 and the band spread dial indicates 87.6, the reading to log for this setting is read, 487.6. This precise mechanical band spread system divides the rotation of the main dial over each frequency band into approximately 600 band spread divisions, with one half division calibration points. Since it is easy to estimate one tenth divisions, on the band spread scale, this divides each frequency band into approximately 6000 readable settings. This permits extreme accuracy in the logging of stations.

Crystal Controlled HF Oscillator — For operation on fixed frequency channels the "FREQUENCY CONTROL" is provided. The crystals are not supplied with the receiver, but will be supplied on special order. In order to insure correct crystal controlled frequency operation crystal units should be ordered from HAMMARLUND MFG. CO. INC. and the order should specify the **signal** frequency, for which each unit is to be used. The frequency control unit has provision for six crystals. Variable frequency op-

eration or crystal controlled frequency operation on any of the six crystal positions is selected by the "CRYSTAL SWITCH". The crystal oscillator is designed for use with suitable crystals at any frequency in the range of the receiver above one megacycle. The "DELTA FREQ" control is used to compensate for a very small plus or minus frequency tolerance of the crystals.

The procedure for crystal frequency control operation should be as follows: Loosen the knurled thumb screw on top of the crystal unit and push the retainer spring assembly to the rear. Insert the crystal or crystals in the crystal sockets, numbered 1 to 6. Bring the retainer spring assembly forward so that the springs press on top of the crystal holders and tighten the thumb screw. Mark the **signal** frequency for which each crystal was selected, in megacycles on the plastic chart provided for this purpose alongside the crystal switch. Pencil or ink may be used and can be erased if it is desired to change these figures at any time. The numerals on the chart should be used so that they agree with the numerals on the crystal socket positions, which are also indicated by the crystal switch. The main tuning dial should be set at the **signal** frequency for which operation is desired. The crystal switch should be set at the position corresponding to the number for that signal frequency on the chart. The Delta Frequency control should be adjusted for maximum signal or for zero beat as required. It should be noted that this tuning adjustment of the Delta Frequency control must be made each time that the signal frequency is changed and that the main tuning dial should be set to agree with the new signal frequency.

Tuning Lock—The tuning lock, located to the right of the tuning knob, provides a positive locking for the tuning mechanism without affecting the frequency setting, when it is desired to prevent accidental shifting of the tuning or when the receiver is operated under a severe condition of vibration.

Tuning Meter—The tuning meter at the upper left on the front panel is useful in accurately tuning a signal and provides an indication of the relative strength of the received signal in db from 1 microvolt. The "METER ADJ RF" control at the rear of the chassis provides adjustment of the plus 20 db reading on the RF scale, with a 10 microvolt input signal. Depression of the "METER SWITCH" converts the meter circuit for indication of the AF output power level in db from 6 milliwatts. This switch is spring returned to the RF scale circuit position when released and **should not be depressed for the AF scale unless the audio output has been adjusted for low power output, by means of headphones or speaker. Failure to observe this precaution may result in damage to the meter.** The "METER ADJ AF" control at the rear of the chassis provides adjustment of the 0 db reading on the AF scale, which should be made when the AF output power from the 600 ohm audio output terminals is 6 milliwatts or 1.9 volts across a 600 ohm load.

Band Change—The large knob, to the left, is the band change control. Each revolution of this control turns the turret, containing the RF and HF oscillator coil, trimmer and switch contact assemblies, from one frequency band to the next. The turret has no stops and may be turned in either direction desired. A positive detent mechanism assures correct location of the various bands. The band change control simultaneously operates the small frequency band dial, located at the center of the panel and aligns the dial frequency indicator with the proper scale.

Selectivity Switch—The selectivity switch provides three crystal and three non-crystal degrees of selectivity, ranging from extremely sharp, for CW reception, to broad for good fidelity MCW operation. The control knob dial indicates the 6 db band width at each setting.

Phasing Control—The phasing control permits high attenuation of closely adjacent channel interference on either side of the signal frequency, when the crystal selectivity positions are used.

Beat Frequency Oscillator—The beat frequency oscillator is turned "on" for CW signal operation by the "MOD-CW" switch. The beat frequency dial

should be set at zero for tuning to zero beat and then adjusted to give the desired audio pitch. The beat frequency oscillator injection voltage is adjustable by the "BFO INJ" control on the rear skirt of the chassis.

Noise Limiter—The noise limiter switch is independent of other controls and is useful in greatly attenuating noise interference from ignition or similar pulse type sources, regardless of the mode of operation.

Send-Receive—The send-receive switch permits desensitizing the receiver during transmission periods, to prevent damage to the receiver, when operated in proximity to the transmitter and provides instant return to reception between transmission periods.

Relay Receptacle—The relay receptacle, on the rear of the receiver, is connected in parallel with the send-receive switch and provides for the connection of an externally connected relay, to perform the send-receive operation. When the relay is used the send-receive switch is left in the "open" or "send" position.

AVC-Manual Switch—The AVC-Manual Switch permits the choice of either AVC or Manual sensitivity operation as desired. The AVC has a delay bias, which insures maximum sensitivity for weak signals.

RF Gain Control—The RF gain control provides adjustment of the sensitivity for signals of various strength, when under the "manual" operating condition, in order that the receiver sensitivity may be adjusted to suit the signal strength and prevent overloading. This control is also in the circuit when operating on AVC, in order that the sensitivity may be adjusted to reduce undesirable noise during "off" periods in the transmission of the received signal. When it is desired to use the tuning meter for indication of relative signal strength, the RF gain control should be at maximum.

Audio Gain Control—The audio gain control adjusts the audio input to the audio amplifier tube. It should be adjusted for the required audio output when operating on AVC and is best left at or near maximum when operating on MANUAL control.

Phono Input—Terminals are provided on the rear of the receiver for phonograph or other audio frequency source input to the audio frequency amplifier.

Convenience Outlet—A power outlet receptacle is provided on the rear of the receiver chassis for operating an accessory, such as an electric clock or lamp.

V

MAINTENANCE

This receiver is designed for continuous duty and should normally require little attention beyond the replacement of tubes. However, should trouble develop that cannot be eliminated with new tubes, the socket voltages and resistances should be measured to chassis. Any appreciable departure from the values shown in tables 1 and 2 will generally indicate the

component or circuit at fault.

Operating and maintenance of the receiver will be greatly facilitated if the contents of this instruction manual are thoroughly digested. Approximate input signal values for stage by stage gain checks are shown in table 4.

TUBE SOCKET VOLTAGES—TABLE 1

Voltage to chassis. Measurements made with Weston Model 663 Volt-Ohmmeter, except those indicated by asterisk were made with Measurements Corp. Model 62 VTVM. The 500 volt scale was used for all voltages above 10 volts and the 10 volt scale for voltages below 10 volts. Line voltage 117, no signal input. Audio Gain control at minimum and CW-MOD switch on "CW"

| TUBE | SOCKET PIN NUMBERS | | | | | | | | | MODE OF OPERATION |
|------|--------------------|--------|--------|-----|-----|-----|--------|-----|--------|-------------------------------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | |
| V-1 | *-1 | — | *6.3ac | — | 200 | 90 | — | — | — | RF Gain max. |
| V-1 | *-54 | — | *6.3ac | — | 260 | 235 | — | — | — | RF Gain min. |
| V-2 | *-1 | — | *6.3ac | — | 210 | 100 | — | — | — | RF Gain max. |
| V-2 | *-54 | — | *6.3ac | — | 260 | 240 | — | — | — | RF Gain min. |
| V-3 | — | *6.3ac | — | — | — | 0 | — | 265 | — | RF Gain max.—VFO operation |
| V-3 | — | *6.3ac | — | — | — | 150 | — | 265 | — | RF Gain max.—Crystal Freq. Control |
| V-3 | — | *6.3ac | — | — | — | 0 | 0 | 290 | — | RF Gain min.—VFO operation |
| V-3 | — | *6.3ac | — | — | — | 150 | 0 | 280 | — | RF Gain min.—Crystal Freq. Control |
| V-4 | 130 | — | *6.3ac | — | 130 | — | — | — | — | RF Gain max. or min. |
| V-5 | — | 1.2 | *6.3ac | — | 140 | 110 | — | — | — | RF Gain max. or min. |
| V-6 | — | — | *6.3ac | — | 225 | — | *-1 | — | — | RF Gain max.—Freqs. below 7.4mc |
| V-6 | — | — | *6.3ac | — | 260 | — | *-1 | — | — | RF Gain min.—Freqs. below 7.4mc |
| V-6 | — | — | *6.3ac | — | 225 | 90 | *-1 | — | — | RF Gain max.—Freqs. above 7.4mc |
| V-6 | — | — | *6.3ac | — | 260 | 105 | *-1 | — | — | RF Gain min.—Freqs. above 7.4mc |
| V-7 | *-11 | — | *6.3ac | — | 225 | 170 | — | — | — | RF Gain max.—Freqs. below 7.4mc |
| V-7 | *-11 | — | *6.3ac | — | 260 | 190 | — | — | — | RF Gain min.—Freqs. below 7.4mc |
| V-7 | *-11 | — | *6.3ac | — | 225 | 0 | — | — | — | RF Gain max.—Freqs. above 7.4mc |
| V-7 | *-11 | — | *6.3ac | — | 260 | 0 | — | — | — | RF Gain min.—Freqs. above 7.4mc |
| V-8 | 0 | — | *6.3ac | — | 0 | — | — | — | — | Frequencies below 7.4mc |
| V-8 | 30 | — | *6.3ac | — | 30 | — | — | — | — | Frequencies above 7.4mc |
| V-9 | *-1 | — | *6.3ac | — | 205 | 90 | — | — | — | RF Gain max. |
| V-9 | *-54 | — | *6.3ac | — | 260 | 235 | — | — | — | RF Gain min. |
| V-10 | *-1 | — | *6.3ac | — | 205 | 90 | — | — | — | RF Gain max. |
| V-10 | *-54 | — | *6.3ac | — | 260 | 235 | — | — | — | RF Gain min. |
| V-11 | *-11 | — | *6.3ac | — | 210 | 145 | — | — | — | RF Gain max. |
| V-11 | *-11 | — | *6.3ac | — | 240 | 145 | — | — | — | RF Gain min. |
| V-12 | — | — | *6.3ac | — | 210 | 40 | — | — | — | RF Gain max.—BFO Injection max. |
| V-12 | — | — | *6.3ac | — | 240 | 45 | — | — | — | RF Gain min.—BFO Injection max. |
| V-13 | 25 | — | *6.3ac | — | 25 | — | — | — | — | RF Gain max. or min. |
| V-14 | — | — | *6.3ac | — | *22 | — | — | — | — | RF Gain max. or min. |
| V-15 | — | — | *6.3ac | — | — | — | — | — | — | RF Gain max. or min. |
| V-16 | 50 | — | 1.5 | — | — | 210 | — | 6.4 | *6.3ac | RF Gain max. |
| V-16 | 52 | — | 1.6 | — | — | 240 | — | 7.4 | *6.3ac | RF Gain min. |
| V-17 | — | — | 260 | 228 | — | — | *6.3ac | 12 | — | RF Gain max. |
| V-17 | — | — | 280 | 265 | — | — | *6.3ac | 13 | — | RF Gain min. |
| V-18 | 150 | — | — | — | 150 | — | — | — | — | RF Gain max. or min. |
| V-19 | — | 300 | — | — | — | — | — | 300 | — | RF Gain max.—*5 V ac Pin 2 to Pin 8 |
| V-19 | — | 320 | — | — | — | — | — | 320 | — | RF Gain min.—*5 V ac Pin 2 to Pin 8 |
| V-20 | — | *-96 | *6.3ac | — | — | — | *-96 | — | — | RF Gain max. |
| V-20 | — | *-97 | *6.3ac | — | — | — | *-97 | — | — | RF Gain min. |

TUBE SOCKET TERMINAL RESISTANCE—TABLE 2

Resistance to chassis. Measurements made with Weston Model 663 Volt-Ohmmeter.

Tube removed from socket under measurement. Audio Gain Control at maximum, RF Gain Control at minimum. Limiter Switch "OFF". CW-MOD Switch on "CW". AVC-MAN Switch on "AVC".

| Socket Pin No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | MODE OF OPERATION |
|----------------|------|------|-----|-----|------|------|------|-----|---|----------------------------------|
| Tube Socket | | | | | | | | | | |
| V-1 | 1.8M | 0 | — | 0 | 48K | 80K | 0 | — | — | |
| V-2 | 1.8M | 0 | — | 0 | 48K | 80K | 0 | — | — | |
| V-3 | 0 | — | 0 | 47K | 0 | 46K | — | 46K | — | Crystal Freq. control pos. 1-6 |
| V-4 | Inf. | Inf. | — | 0 | Inf. | 47K | 0 | — | — | Crystal Freq. control pos. 1-6 |
| V-4 | 48K | Inf. | — | 0 | Inf. | 47K | 0 | — | — | VFO Operation |
| V-5 | 47K | 150 | — | 0 | 48K | 53K | 500K | — | — | |
| V-6 | 22K | 0 | — | 0 | 46K | Inf. | 100K | — | — | Freq. Bands below 7.4mc |
| V-6 | 22K | 0 | — | 0 | 46K | 70K | 100K | — | — | Freq. Bands above 7.4mc |
| V-7 | 115K | 0 | — | 0 | 46K | Inf. | 0 | — | — | Freq. Bands above 7.4mc |
| V-7 | 115K | 0 | — | 0 | 46K | 80K | 0 | — | — | Freq. Bands below 7.4mc |
| V-8 | — | — | — | 0 | Inf. | 22K | 0 | — | — | Freq. Bands below 7.4mc |
| V-8 | — | — | — | 0 | 150K | 22K | 0 | — | — | Freq. Bands above 7.4mc |
| V-9 | 1.3M | 0 | — | 0 | 52K | 80K | 0 | — | — | |
| V-10 | 1.3M | 0 | — | 0 | 52K | 80K | 0 | — | — | |
| V-11 | 125K | 0 | — | 0 | 48K | 50K | 0 | — | — | |
| V-12 | 0 | 0 | — | 0 | 48K | 145K | * | — | — | *0 to 1K (BFO Injection control) |
| V-13 | — | — | — | 0 | 195K | 100K | 0 | — | — | |
| V-14 | 0 | 770K | — | 0 | 16K | 0 | 220K | — | — | |
| V-15 | 94K | Inf. | — | 0 | Inf. | 0 | 220K | — | — | |
| V-16 | 150K | 500K | 1K | 0 | 0 | 46K | 470K | 680 | — | |
| V-17 | 0 | 0 | 46K | 46K | 470K | Inf. | — | 360 | — | |
| V-18 | 118K | — | — | — | 78K | — | 0 | — | — | |
| V-19 | — | 46K | 0 | 55 | — | 55 | — | 46K | — | |
| V-20 | 50K | 65K | — | 0 | 50K | 0 | 65K | — | — | |

VI ALIGNMENT

The alignment of a modern communications receiver requires precision instruments and a thorough knowledge of the circuits involved. This receiver, being a double super-heterodyne, the alignment procedure is even more involved than is usual.

Under normal service the receiver will stay in alignment for extremely long periods of time, consequently

realignment should not be attempted unless all other possible causes of a particular trouble have been eliminated. When it has been determined that any realignment should be attempted, a great deal of caution should be exercised in making the adjustments, as any required readjustment should not entail more than a slight angular motion of the adjusting screw.

ALIGNMENT OF THE IF STAGES

The low frequency IF should be aligned first. The recommended method for aligning the low frequency IF involves the use of a sweep frequency signal generator and an oscilloscope. Since these instruments are not available at the average service station the alternate method using an amplitude modulated signal generator and an output meter will be described first. The additional information required for the visual alignment method will be covered in a later paragraph.

The signal generator should be coupled to the grid of the mixer tube V5 through a capacitance of approximately .01 mfd. A miniature tube adapter will be required to make the mixer grid connection available. Such an adapter is manufactured by the Alden Manufacturing Co. An output meter should be connected across the output terminals of the receiver or the speaker voice coil. The receiver controls should now be set as follows:

| Control | Position |
|----------------|----------------------------|
| Selectivity | — See text |
| Send — Receive | — Receive |
| CW — Mod | — Mod |
| Phasing | — Arrow |
| AVC — Man | — Man |
| Audio Gain | — Set for approx. 20 volts |
| RF Gain | — See text |
| Band Switch | — 1.35 — 3.45 mc |
| Dial | — 2.5 mc |

The signal generator should be modulated 30 percent at 400 cycles. Turn the selectivity switch to the 3 kc position and advance the RF Gain control to maximum. Set the signal generator frequency to 455 kc and adjust its output until some deflection is noted on the output meter. Refer to figure 3 for the location of the various alignment adjustments. Adjust L42, L41, L39, L38, L36 and L32 for maximum output, reducing the signal generator output and the RF Gain control as required to prevent overload or excessive output. Now turn the selectivity switch to the narrowest position, .2 kc, and adjust the signal generator frequency for the maximum output. This establishes the correct signal frequency by the 455 kc crystal for the IF amplifier and the frequency of the signal generator should not be disturbed for the remainder of the low frequency IF alignment, unless it should be to recheck this establishment of crystal frequency to make sure that the signal generator frequency has not drifted during the alignment. The selectivity switch is now

turned to the 3 kc position and L42, L41, L39, L38, L36 and L32 are again adjusted for maximum output. Now turn the selectivity switch to the 1.3 kc position and adjust L37 for maximum output. Before changing this set-up the BFO should be turned on by throwing the CW-Mod switch to CW and checked for zero beat with the BFO knob dial at its zero reading. If necessary L44 should be adjusted for zero output. This check and adjustment of the BFO should be done with the signal generator carrier unmodulated.

The procedure for the visual method of aligning the low frequency IF should be the same as the above except that the adjustments are made for both maximum amplitude and coincidence of the oscilloscope images. The oscilloscope vertical input should be connected across the diode detector load resistance, from the junction of R64 and R65 to chassis.

The high frequency IF should be aligned next. Set the band switch to the 7.4 — 14.8 mc band. The selectivity switch should be in the 3 kc position. Adjust the signal generator frequency to 3.955 mc and adjust L31, L33 and L34 for maximum output.

The 3.5 mc crystal used in the second oscillator is held to a very close frequency tolerance. However, if it is desired that this oscillator frequency be exactly 3.5 mc to permit its use as a frequency standard, as hereinafter described, this may be accomplished by adjusting capacitor C101, underneath the chassis. The exact procedure is as follows; Set the receiver to 7.0 mc on the 3.45 — 7.4 mc band. Temporarily connect, by means of a jumper, the center and the open terminals on switch S4 at the rear of the tuning unit. Attach a two foot length of insulated wire to the antenna terminal and dress the free end around the tube shield on the 3.5 mc oscillator tube V8 with the CW-Mod switch on CW rock the tuning control slightly until a beat note is heard in the headphones or speaker. Now throw the CW — Mod switch to Mod and couple a 1.0 mc frequency standard to the antenna input terminal. Adjust capacitor C101 for zero beat. Remove the jumper from S4 and remove the two foot test lead. If appreciable adjustment of C101 was required it is advisable to repeat the high frequency IF alignment.

The 3.5 mc oscillator may now be used as a frequency standard at multiples of 3.5 mc from 10.5 mc upwards, by temporarily connecting the two foot length of wire as described above.

ALIGNMENT OF THE RF AMPLIFIER & HF OSCILLATOR

To adequately align the RF Amplifier and HF Oscillator an accurately calibrated signal generator and an output meter are required. The frequencies required are shown in table 3. The location of the adjustments is shown in Figure 3. The use of Table 3 and Figure 3 should be made in following this part of the alignment which will now be described for one frequency band. The same procedure should then be followed for the other frequency bands.

To align the .54-1.35 mc band the signal generator is coupled to the antenna input terminal through a 100 ohm carbon resistor. The generator should be modulated 30 percent at 400 cycles and the output meter connected across the receiver output terminals. The receiver controls should be set as follows:

| Control | Position |
|--------------|------------------------------|
| Selectivity | — 3kc |
| Send-Receive | — Receive |
| CW — Mod | — Mod |
| AVC — Man | — See Text |
| Audio Gain | — Set for approx. 20 volts |
| RF Gain | — See text |
| Band Switch | — set for band to be aligned |
| Limiters | — off |

Set the receiver and signal generator dials to .56 mc. The RF Gain control should be set at maximum and the AVC — Man switch set on AVC. The HF Osc. L adjustment shown in Figure 3, should now be set for maximum output. Then the Ant., 1st RF and 2nd RF L adjustments should be set for maximum output. The receiver and signal generator dials are now set to 1.3 mc and the C adjustments, shown in Figure 3, should be adjusted for maximum output in the same order, beginning with the Osc C adjustment and then making the C adjustments for the Ant, 1st RF and 2nd RF. This procedure should be carefully repeated until no increase in output can be realized. The AVC — Man switch should then be set to Man and the signal generator should be set for approximately 3 micro volts. The L and C adjustments should now be checked for maximum output, adjusting the RF Gain control as found necessary to maintain the output at approximately 20 volts.

Following the frequencies, shown in Table 3, align the remaining bands using the same procedure as above.

TABLE No. 3

RF AND HF OSCILLATOR ALIGNMENT FREQUENCIES AND ADJUSTMENT DESIGNATIONS

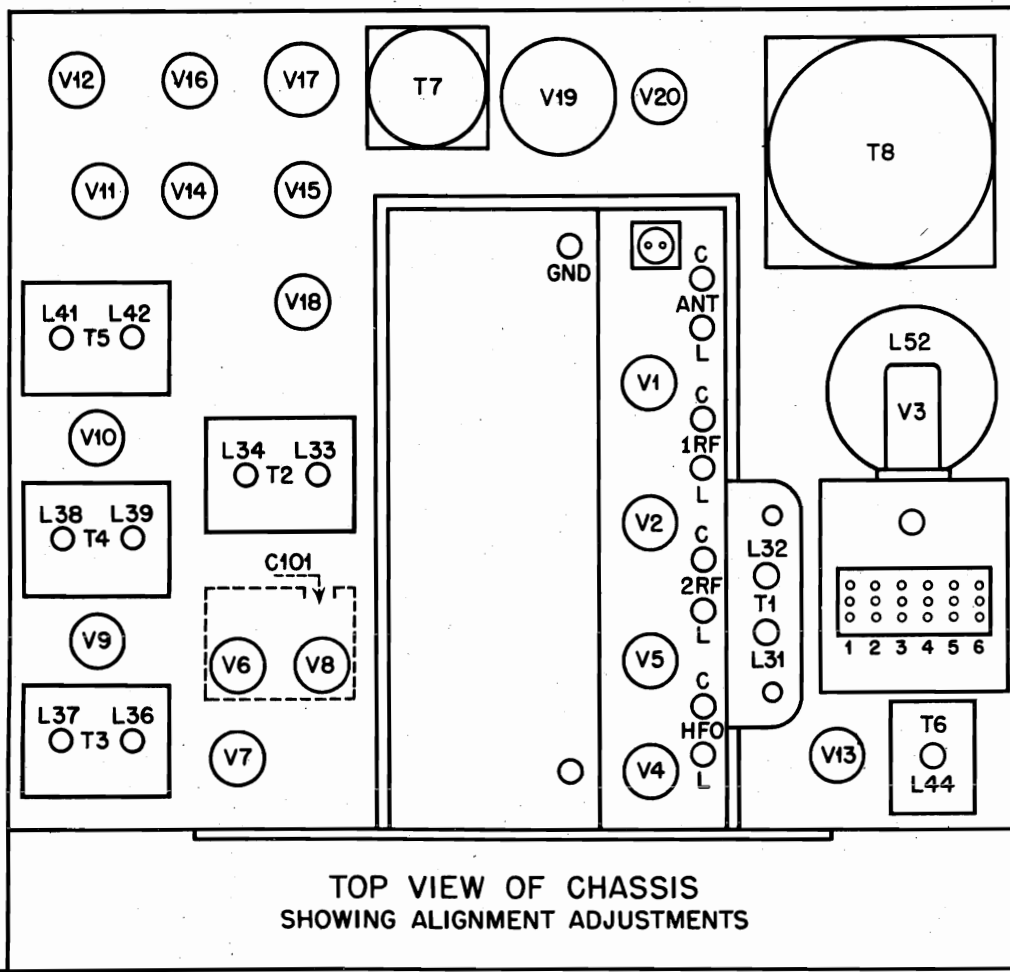
| FREQ. BAND IN MC | .54—1.35 | 1.35—3.45 | 3.45—7.4 | 7.4—14.8 | 14.8—29.7 | 29.7—54.0 |
|-----------------------------|----------|-----------|----------|----------|-----------|-----------|
| RF & HF OSC ADJUST L AT. | .56 | 1.4 | 3.75 | 7.5 | 15.0 | 30.0 |
| RF & HF OSC ADJUST C AT. | 1.3 | 3.4 | 7.15 | 14.5 | 29.0 | 52.0 |

TABLE No. 4

APPROXIMATE SIGNAL INPUT AT IF & AF STAGES FOR 20 VOLTS OUTPUT

Output measured across a 600 ohm resistive load at output terminals of receiver. RF signals modulated 30 percent at 400 cycles. Signals applied to tube grids through a .01 mfd capacitor. Selectivity switch at 3 kc AVC — MAN switch on MAN. CW — MOD switch on MOD, RF Gain and Audio Gain at maximum.

| BAND SWITCH | FREQUENCY | INPUT TO | APPROX. INPUT |
|--------------|------------------|-------------|-----------------|
| Any | Audio 400 cycles | Pin 5, V17 | 3.5 volts |
| Any | Audio 400 cycles | Pin 2, V16B | .3 volts |
| 1.35—3.45 mc | Mod RF 455 kc | Pin 1, V11 | .35 volts |
| 1.35—3.45 mc | Mod RF 455 kc | Pin 1, V10 | 6000 microvolts |
| 1.35—3.45 mc | Mod RF 455 kc | Pin 1, V9 | 110 microvolts |
| 1.35—3.45 mc | Mod RF 455 kc | Pin 1, V7 | 40 microvolts |
| 1.35—3.45 mc | Mod RF 455 kc | Pin 7, V5 | 65 microvolts |
| 7.40—14.8 mc | Mod RF 3.955 mc | Pin 7, V5 | 40 microvolts |
| 7.40—14.8 mc | Mod RF 3.955 mc | Pin 7, V6 | 250 microvolts |



TOP VIEW OF CHASSIS
SHOWING ALIGNMENT ADJUSTMENTS

FIG. 3

•AUDIO AND OVERALL FIDELITY CURVES•

- CURVE - Audio Frequency amplifier. Input to phono terminals.
- - - CURVE - Overall fidelity at 2.5 mc. Modulation 30 percent.
Selectivity switch in 13 kc position.
RF Gain set for 20 volts output at 400 cycles.
Output measured across a 600 ohm resistive load.
Audio gain control at maximum for both curves.

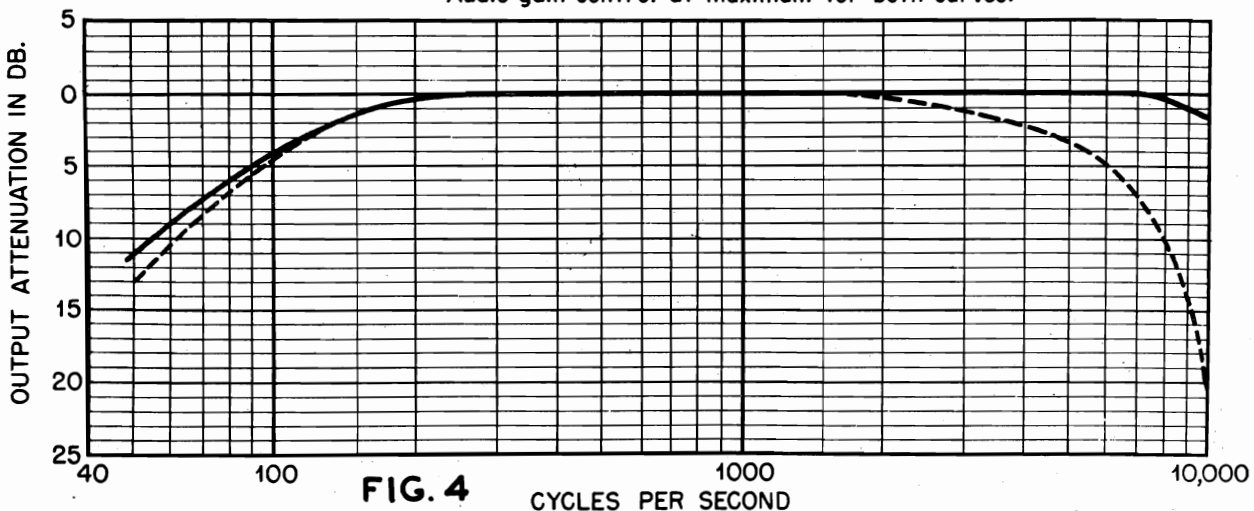


FIG. 4

• SELECTIVITY CURVES
Overall at 2 Megacycles •

NUMBERS DENOTE SELECTIVITY SWITCH POSITIONS
1,2 AND 3 NON CRYSTAL — 4,5 AND 6 CRYSTAL

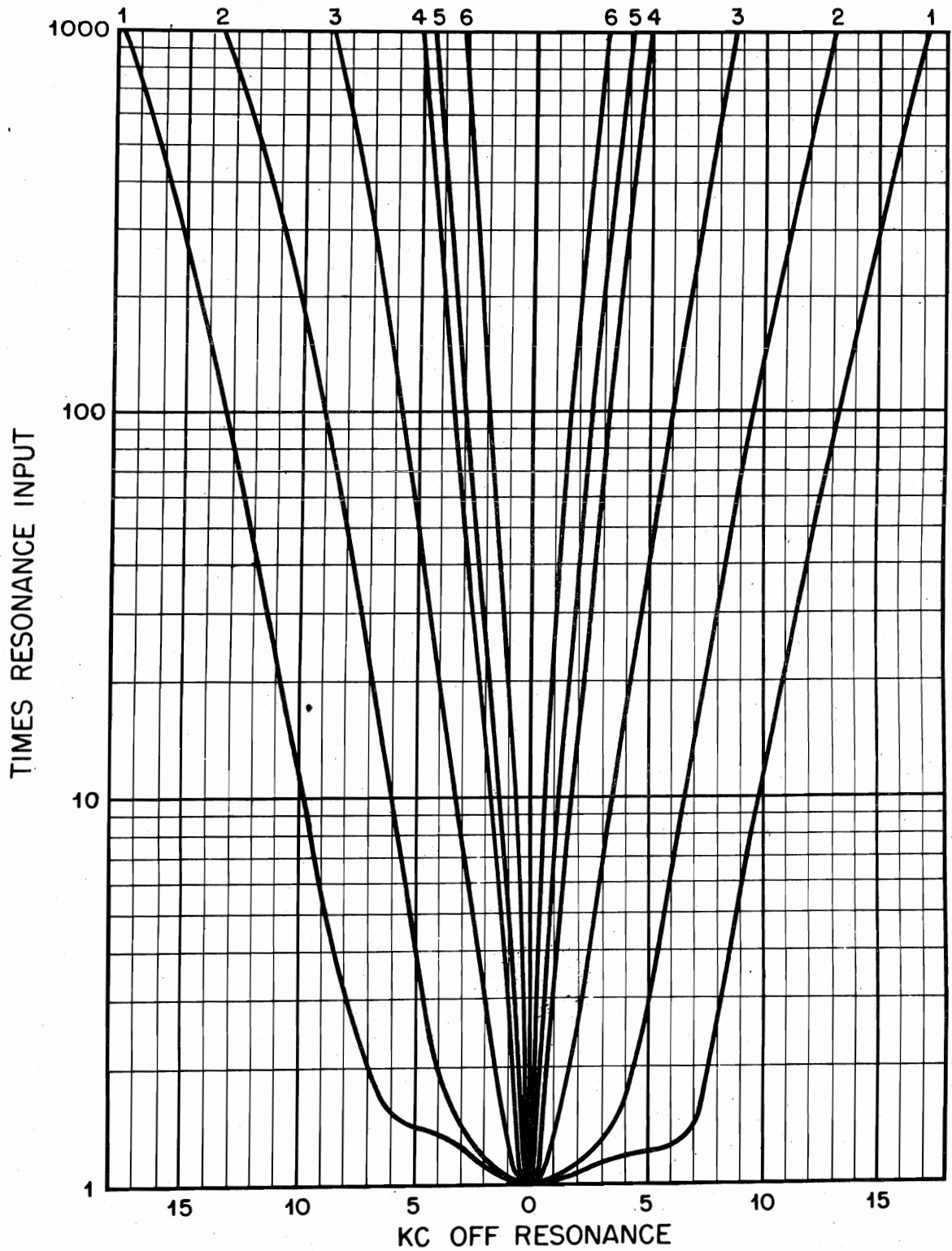


FIG. 5

MODEL SP-600-JX

TABLE No. 5 PARTS LIST

| Symbol Designations | DESCRIPTION | Hammarlund Part No. | Symbol Designations | DESCRIPTION | Hammarlund Part No. |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| C1A, B, C, D, E, F, G, H C3, 5, 19, 20, 21, 22, 23, 24, 27, 29, 40, 41, 42, 43, 44, 47, 49, 61, 64, 66, 68, 70, 71, 72, 73, 74, 100, 105, 115, 116, 121, 122, 127, 135, 153, 154, 155 C6, 30, 50 C8, 32, 52, 132 C9, 33, 53 C11, 17, 35, 55 C12, 138, 145 C14 C15, 139 C18, 25, 45, 75, 110, 112, 113 C37, 57, 67 C39, 59, 99, 134 C60, 88 C62 C63 C65 C69, 107, 117, 124 C77 C78 C79, 80 C82 C83 C85 C87 C89 C91 C92 C93 C95 C96 C97 C98, 102, 103, 104, 106, 108, 109, 118, 123, 136, 146, 147, 148, 156, 157 C101 C111 C114 C119, 125 C120, 126 C128, 151, 158, 159, 160 C129A, 129B, 152A, 152B C130 C131, 133 C137 C140 C141, 142 C143, 149 C144 C150 C161A, B, C E1 | Capacitor, variable, 8 sections Capacitor, .01 mfd..... Capacitor, 20 mmf..... Capacitor, 2400 mmf..... Capacitor, 33 mmf..... Capacitor, 1500 mmf..... Capacitor, 7 mmf..... Capacitor, 1000 mmf..... Capacitor, 15 mmf..... Capacitor, 100 mmf..... Capacitor, 85 mmf..... Capacitor, 51 mmf..... Capacitor, 12 mmf..... Capacitor, 2200 mmf..... Capacitor, 39 mmf..... Capacitor, variable..... Capacitor, 220 mmf..... Capacitor, 3300 mmf..... Capacitor, 404 mmf..... Capacitor, 5 mmf..... Capacitor, 810 mmf..... Capacitor, 10 mmf..... Capacitor, 1200 mmf..... Capacitor, 120 mmf..... Capacitor, 190 mmf..... Capacitor, 92 mmf..... Capacitor, 51 mmf..... Capacitor, 379 mmf..... Capacitor, 42 mmf..... Capacitor, 610 mmf..... Capacitor, 65 mmf..... Capacitor, .022 mfd..... Capacitor, variable..... Capacitor, variable..... Capacitor, 270 mmf..... Capacitor, 300 mmf..... Capacitor, 1300 mmf..... Capacitor, 10 mfd, 100V HS Can, Electrolytic. Capacitor, 2 x .05 mfd HS Can, Paper..... Capacitor, 27 mmf..... Capacitor, 430 mmf..... Capacitor, .25 mfd 200V. Capacitor, 1000 mmf..... Capacitor, 100 mmf..... Capacitor, 5100 mmf..... Capacitor, .05 mfd..... Capacitor, 2500 mmf 800V..... Capacitor, 3 x 20 mfd 450V. HS Can. Electrolytic..... 2 Screw Terminal, Phone Input..... | 34001-G1 23012-1 23003-41C 23011-40C 23003-45C 23011-62C 23061-168F 23011-58C 23061-155J 23003-94C 23071-59 23003-87C 23023-65UJ 23011-17C 23003-47C 11726-G109 23003-102C 23011-69C 23071-67 23023-8UJ 23072-53 23003-2B 23011-60C 23071-50 23071-64 23071-71 23023-45UJ 23071-63 23071-69 23072-52 23071-58 23013-1 11725-G151 11776-G1 23003-104C 23003-105C 23011-61C 15462-1 15461-1 23023-71UJ 23003-109C 23911-79E 23015-27A 23024-24SL 23015-16A 23911-77E 23070-40 15463-1 4904-5 | E2 E3, 4, 5, 6 E7 E8 E9, 10, 11, 12 E13, 14 E15, 16 E17 E18 F1 J1 J2 J3 J4, 5 L1 L2 L3 L4 L5 L6 L7, 14, 24, 35 L8 L9 L10 L11 L12 | 4 Screw Terminal, Audio Output Dial Lamp, No. 47 Mazda Dial Lamp Socket Assembly 2 Solder Term. strip..... 1 Solder term. strip (left) 1 Solder term. strip (right) 6 Solder term. strip..... 8 Solder term. strip..... 15 Solder term. strip..... 3 Solder term. strip (meter) Fuse, 3 Amp. Fuse Holder Fuse Holder, Spare..... Antenna Input Socket.. IF Output Socket..... Phone Jack Power or Relay receptacle RF Input assembly, includes C2, 3, L1 and Switch contacts for S1A RF Input assembly, includes C4, 5, L2 and Switch contacts for S1A RF Input assembly, includes C6, 7, 8, L3 and Switch contacts for S1A RF Input assembly, includes C9, 10, 11, L4 and Switch contacts for S1A RF Input assembly, includes C12, 13, 14, L5 and Switch contacts for S1A RF Input assembly, includes C15, 16, 17, L6 and Switch contacts for S1A RF Choke, 192 microhenries RF Transformer assembly, includes C26, 27, L8, R7 and Switch contacts for S1B..... RF Transformer assembly, includes C28, 29, L9, R8 and Switch contacts for S1B..... RF Transformer assembly, includes C30, 31, 32, L10 and Switch contacts for S1B..... RF Transformer assembly, includes C33, 34, 35, L11, R10 and Switch contacts for S1B RF Transformer assembly, includes C36, 37, L12 and Switch contacts for S1B..... | 31141-1 16004-1 31453-1 16650-12 16650-9 16650-11 16650-10 31163-G1 31162-G1 31454-G1 15928-8 15923-1 15923-4 15959-1 16111-1 5066-1 35013-1 31387-G1 31390-G1 31393-G1 31396-G1 31399-G1 31405-G1 15612-G1 31386-G1 31389-G1 31392-G1 31395-G1 31398-G1 |

PARTS LIST (Continued)

| Symbol Designations | DESCRIPTION | Hammarlund Part No. | Symbol Designations | DESCRIPTION | Hammarlund Part No. |
|---------------------|-----------------------------------------------------------------------------|---------------------|------------------------------------------------------------------------|------------------------------------------------|---------------------|
| L13 | RF Transformer assembly, includes C38, 39, L13 and Switch contacts for S1B | 31404-G1 | R1, 13, 26 | Resistor 510K ohms 1/3 watt | 19317-76BF |
| L15 | Same as L8, includes C46, 47, L15, R17 and Switch contacts for S1C | 31386-G1 | R2, 12, 44, 52, 57, 82, 90, 91, 92, 70 | Resistor 10K ohms 1/2 watt | 19309-278BF |
| L16 | Same as L9, includes C48, 49, L16, R18 and Switch contacts for S1C | 31389-G1 | R3, 14, 39, 48, 53 | Resistor 33K ohms 1/2 watt | 19309-282BF |
| L17 | Same as L10, includes C50, 51, 52, L17, R19 and Switch contacts for S1C | 31392-G1 | R4, 6, 16, 29, 30, 47, 83, 102, 103, 104, 105, 106, 107, 108, 109, 110 | Resistor 1000 ohms 1/2 watt | 19309-49BF |
| L18 | Same as L11, includes C53, 54, 55, L18, R20 and Switch contacts for S1C | 31395-G1 | R5, 15, 32 | Resistor 510 ohms 1/2 watt | 19309-170BF |
| L19 | Same as L12, includes C56, 57, L19 and Switch contacts for S1C | 31398-G1 | R7, 8, 17, 18 | Resistor 51 ohms 1/2 watt | 19309-193BF |
| L20 | Same as L13, includes C58, 59, L20 and Switch contacts for S1C | 31404-G1 | R9, 19 | Resistor 24 ohms 1/2 watt | 19309-189BF |
| L21 | RF Choke, 1 millihenry | 15617-G1 | R10, 11, 20, 21, 45 | Resistor 22 ohms 1/2 watt | 19309-9BF |
| L22 | RF Choke, 10 millihenries | 15618-1 | R22, 23, 64, 65, 77 | Resistor 47K ohms 1/2 watt | 19309-89BF |
| L23 | RF Choke, 25 millihenries | 15619-1 | R24, 25 | Resistor 180 ohms 1/2 watt | 19309-31BF |
| L25 | HF Osc. assembly, includes C76, 77, 78, L25 and Switch contacts for S1D | 31385-G1 | R27 | Resistor 150 ohms 1/2 watt | 19309-259BF |
| L26 | HF Osc. assembly, includes C81, 82, L26 and Switch contacts for S1D | 31388-G1 | R28 | Resistor 6800 ohms 1/2 watt | 19309-69BF |
| L27 | HF Osc. assembly, includes C83, 84, 85, L27 and Switch contacts for S1D | 31391-G1 | R31, 37, 41, 49, 54, 58, 80 | Resistor 2200 ohms 1/2 watt | 19309-57BF |
| L28 | HF Osc. assembly, includes C85, 87, 88, 89, L28 and Switch contacts for S1D | 31394-G1 | R33 | Resistor 1500 ohms 1/2 watt | 19309-53BF |
| L29 | HF Osc. assembly includes C90, 91, 92, 93, L29 and Switch contacts for S1D | 31397-G1 | R34, 35, 38, 43, 51, 56, 62, 67, 68, 75, 76, 81, 100 | Resistor 100K ohms 1/2 watt | 19309-97BF |
| L30 | HF Osc. assembly, includes C94, 95, 96, L30, and Switch contacts for S1D | 31403-G1 | R36, 96 | Resistor 22K ohms 1/2 watt | 19309-178BF |
| L47 | RF Choke, 3.8 millihenries | 15616-G1 | R40 | Resistor 20K ohms 1 watt | 19310-179BF |
| L48 | RF Choke, 2 ohms dc | 15611-1 | R42, 50, 55 | Resistor 10 ohms 1/2 watt | 19309-1BF |
| L49, 50 | RF Choke, 2.7 ohms dc | 15613-1 | R46 | Resistor 100 ohms 1/2 watt | 19309-25BF |
| L51 | 1st Filter Choke 8.5 Hy, 170 ohms dc | 31030-2 | R59 | Resistor 2200 ohms 1 watt | 19310-57BF |
| L52 | 2nd Filter Choke 20 Hy, 440 ohms dc | 31031-2 | R60, 61 | Resistor 1 megohm 1/2 watt | 19309-121BF |
| M1 | Tuning Meter | 4903-2 | R63 | Resistor 27K ohms 1/2 watt | 19309-83BF |
| P1 | Power plug and cord | 6143-1 | R66 | Resistor 18K ohms 1/2 watt | 19309-79BF |
| P2 | Antenna Input Plug | 16016-1 | R69, 74 | Resistor variable 1000 ohms | 15363-1 |
| P3 | Antenna Adapter Connector | 15987-1 | R72 | Resistor 20K ohms 1/2 watt | 19309-218BF |
| P4 | Cable Connector Plug (for J2) | 16071-1 | R73 | Resistor 56K ohms 1 watt | 19310-186BF |
| | | | R78, 98 | Resistor 470K ohms 1/2 watt | 19309-113BF |
| | | | R79 | Resistor 680 ohms 1/2 watt | 19309-45BF |
| | | | R84 | Resistor variable 500K ohms | 15342-11 |
| | | | R85 | Resistor 2500 ohm 10 watts | 19396-1 |
| | | | R86, 89, 95 | Resistor 82K ohms 1/2 watt | 19309-287BF |
| | | | R87, 88 | Resistor 120K ohms 1/2 watt | 19309-181BF |
| | | | R93 | Resistor variable 50K ohms includes switch S10 | 15342-21 |

MODEL SP-600-JX

PARTS LIST (Continued)

| Symbol Designations | DESCRIPTION | Hammarlund Part No. | Symbol Designations | DESCRIPTION | Hammarlund Part No. |
|---------------------------------------------------|------------------------------------------------------------------------------------|---------------------|---------------------|-----------------------------------------------------|---------------------|
| R94 | Resistor 1100 ohms 1/2 watt | 19309-208BF | X4 | Tube socket, miniature, ceramic, less center shield | 15989-5 |
| R97 | Resistor 3.3 megohms 1/2 watt | 19309-133BF | X5 | Tube socket, miniature, ceramic, with center shield | 15989-3 |
| R99 | Resistor 360 ohms 1 watt | 19310-211BF | X16 | Tube socket, "Noval" | 16100-1 |
| R101 | Resistor variable 25K ohms | 15342-4 | X21 | Crystal socket, ceramic, for crystals Y1 to Y6 | 16092-5 |
| S1A, B, C, D | Switch, base and spring assembly | 31234-G1 | Y1, 2, 3, 4, 5, 6 | Crystal, order special, specify signal frequency | 31473-spec. |
| S2 | Crystal selector switch | 15879-1 | Y7 | Crystal, 3.5mc | 31130-1 |
| S3 | Crystal switch | 31469-1 | Y8 | Crystal, 455kc | 31471-1 |
| S4 | Switch, conversion switching | 15862-1 | Miscellaneous | Wrench, set screw No. 6 | 11806-2 |
| S5A, B, C | Selectivity switch, 3 section | 15856-1 | | Wrench, set screw No. 8 | 11806-3 |
| S6, 9 | Toggle Switch SPST | 15864-1 | | Wrench, set screw No. 10 | 11806-4 |
| S7 | Toggle Switch DPST | 15866-1 | | Snap Button Plug | 29619-2 |
| S8 | Toggle Switch DPDT | 15867-1 | | Shaft Coupling, rigid | 31275-G1 |
| S10 | Switch "ON-OFF" part of R93 | — | | Shaft Coupling, flexible, soft | 415-G3 |
| S11 | Switch, DPDT, spring return | 15880-1 | | Shaft Coupling, flexible, stiff | 415-G2 |
| T1 | Mixer plate coil assembly, includes C67, 69, 70, L31, 32, R31 | 31183-G1 | | Spring, retainer for RF coil assemblies | 31003-1 |
| T2 | IF Transformer assembly, includes C97, 98, 99, L33, 34, R35 | 31116-G1 | | Spring, retainer for RF coil | 31004-1 |
| T3 | Crystal Filter assembly, includes C107, 110, 111, 112, 113, 114, L36, 37, R41, Y8 | 31114-G1 | | Spring, grounding for IF transformer shields | 31023-1 |
| T4 | IF Transformer, includes C117, 118, 119, 120, L38, 39, 40, R49 | 31102-G1 | | Spring, conversion switch | 31125-1 |
| T5 | Same as T4, includes C123, 124, 125, 126, L41, 42, 43, R54 | 31102-G1 | | Spring, indicator slide | 31126-1 |
| T6 | Beat Frequency Osc. assy., includes C130, 131, 132, 133, 134, L44, 45, 46, R76, 77 | 31106-G1 | | Spring, band change detent | 31205-1 |
| T7 | Transformer, Audio Output | 31029-2 | | Knob, frequency control | 31434-G1 |
| T8 | Transformer, Power | 31086-2 | | Knob, tuning lock | 31462-G1 |
| X1, 2, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 18, 20 | Tube socket, miniature | 15989-4 | | Knob & Skirt (large) | 31215-G1 |
| X3 17, 19 | Tube socket, octal | 16082-1 | | Knob & Dial (RF Gain) | 31227-G1 |

VII

CONVERSION OF TABLE

MODEL RECEIVER FOR RACK MOUNTING

The SP-600 Receiver is designed for either table cabinet or rack mounting. When table models are ordered, the receiver is not supplied with a bottom cover plate since the cabinet serves this purpose. When rack models are ordered the receiver is supplied with a bottom cover plate, but is not supplied with a top cover plate since in most cases the rack is of the cabinet type.

A cover plate kit is provided, on separate order, for conversion to rack mounting where table models have been ordered and where the covers are desired.

The following instructions should be followed when installing the cover kit; To install the bottom cover plate, remove the two rear corner nut plate brackets by removing the three screws at the lower rear ends of the large side mounting brackets and replace these two nut plate brackets with the two slightly shorter

ones from the kit, using the same screws. Remove the nut and lockwasher from the screw, nearest the bottom edge of the chassis, holding capacitor C151 (see bottom of chassis photograph). Install the short angle bracket, from the kit, using the same screw from which the nut and washer were removed, with the tapped (smaller end) of the bracket replacing the nut. The bottom cover plate is now installed using the five 10-32 screws from the kit and the two 10-32 screws that previously held the bottom of the receiver to the cabinet. To install the top cover plate assembly, place the cover with the angles facing downward toward the chassis and with pressure applied at the rear of the plate, to slightly compress the rubber channel against the rear of the front panel, secure the assembly in place with the four 6-32 screws from the kit, engaging them in the tapped holes in the brackets through the clearance holes in the side mounting brackets.

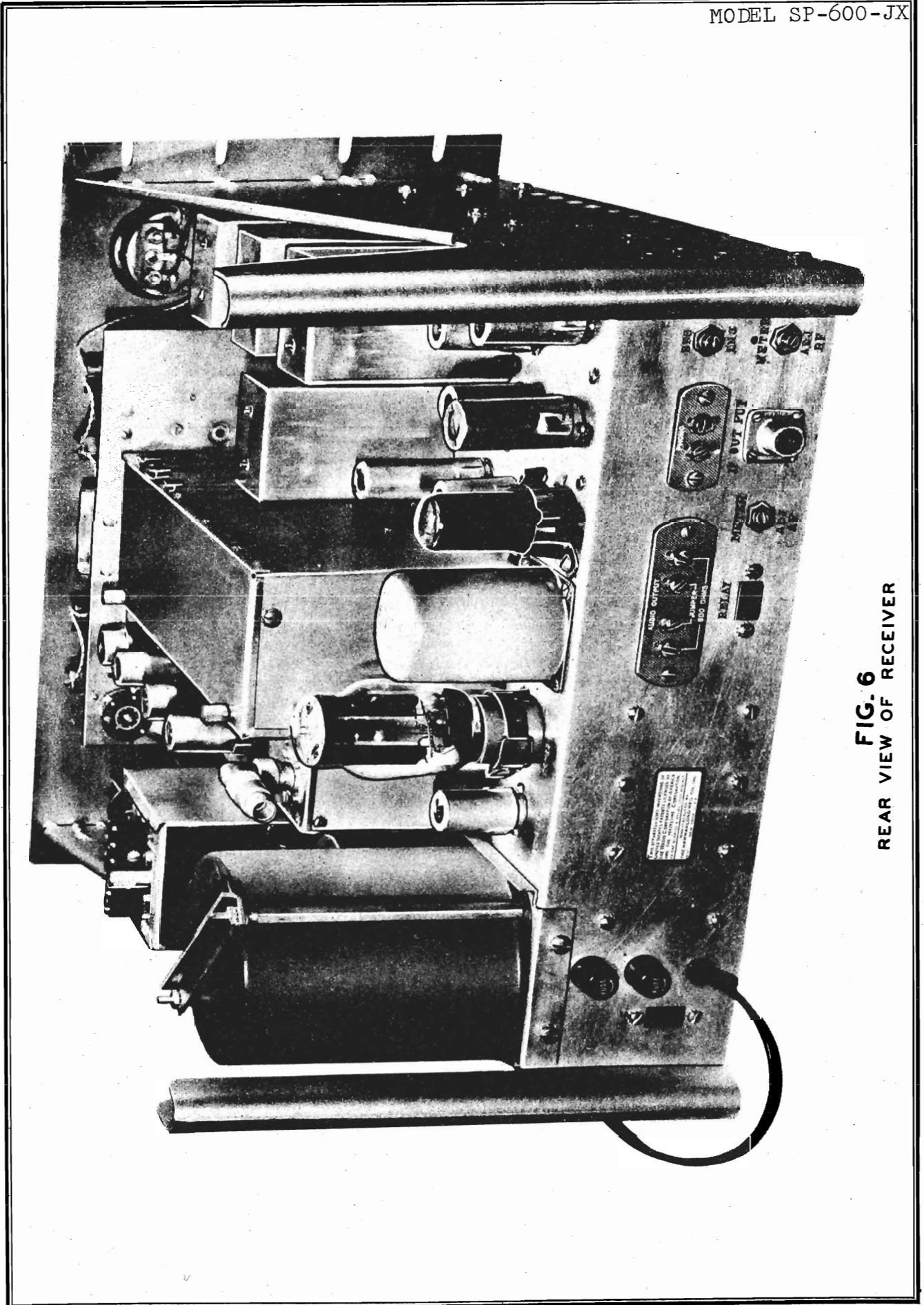
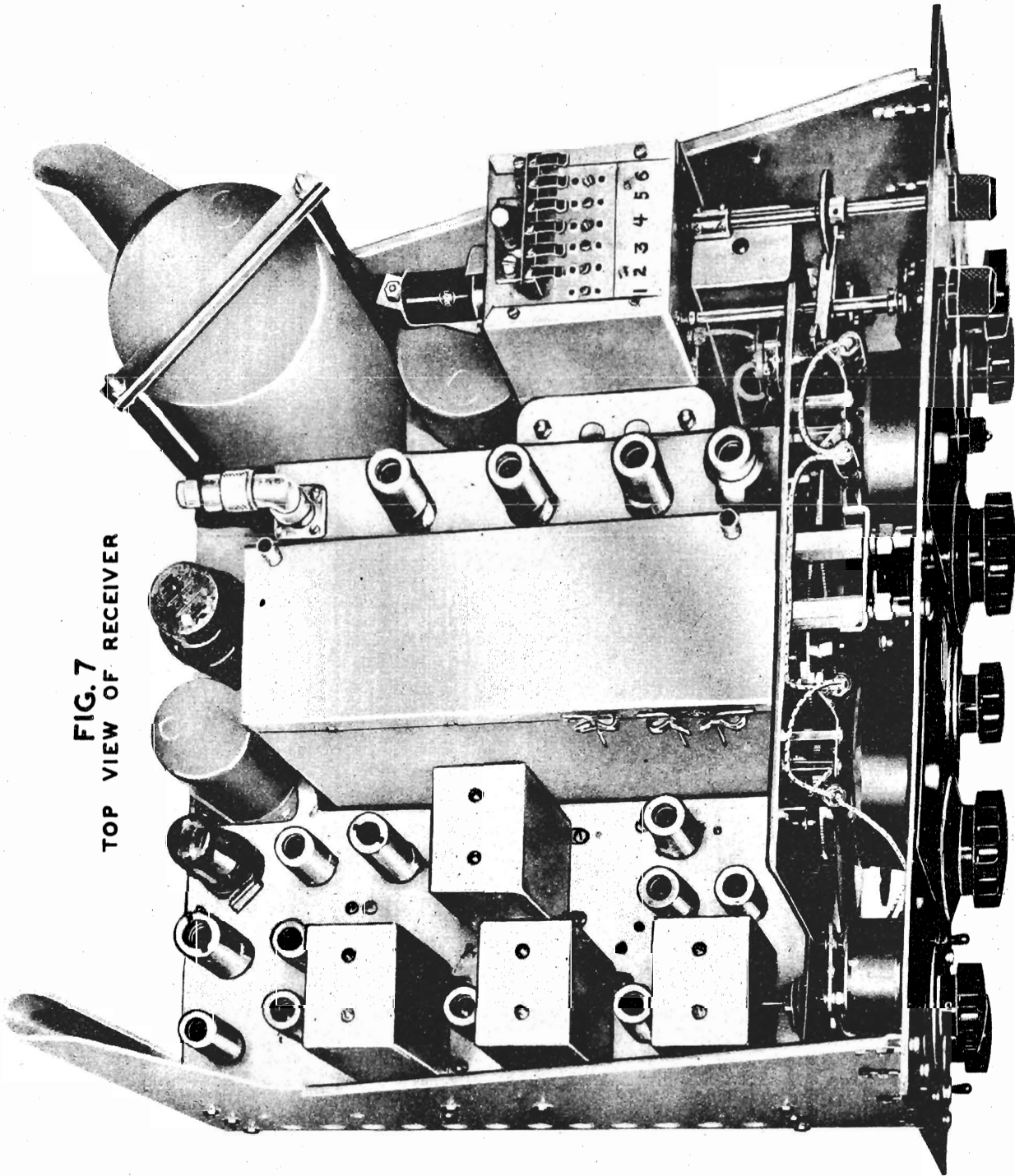


FIG. 6
REAR VIEW OF RECEIVER

FIG. 7
TOP VIEW OF RECEIVER



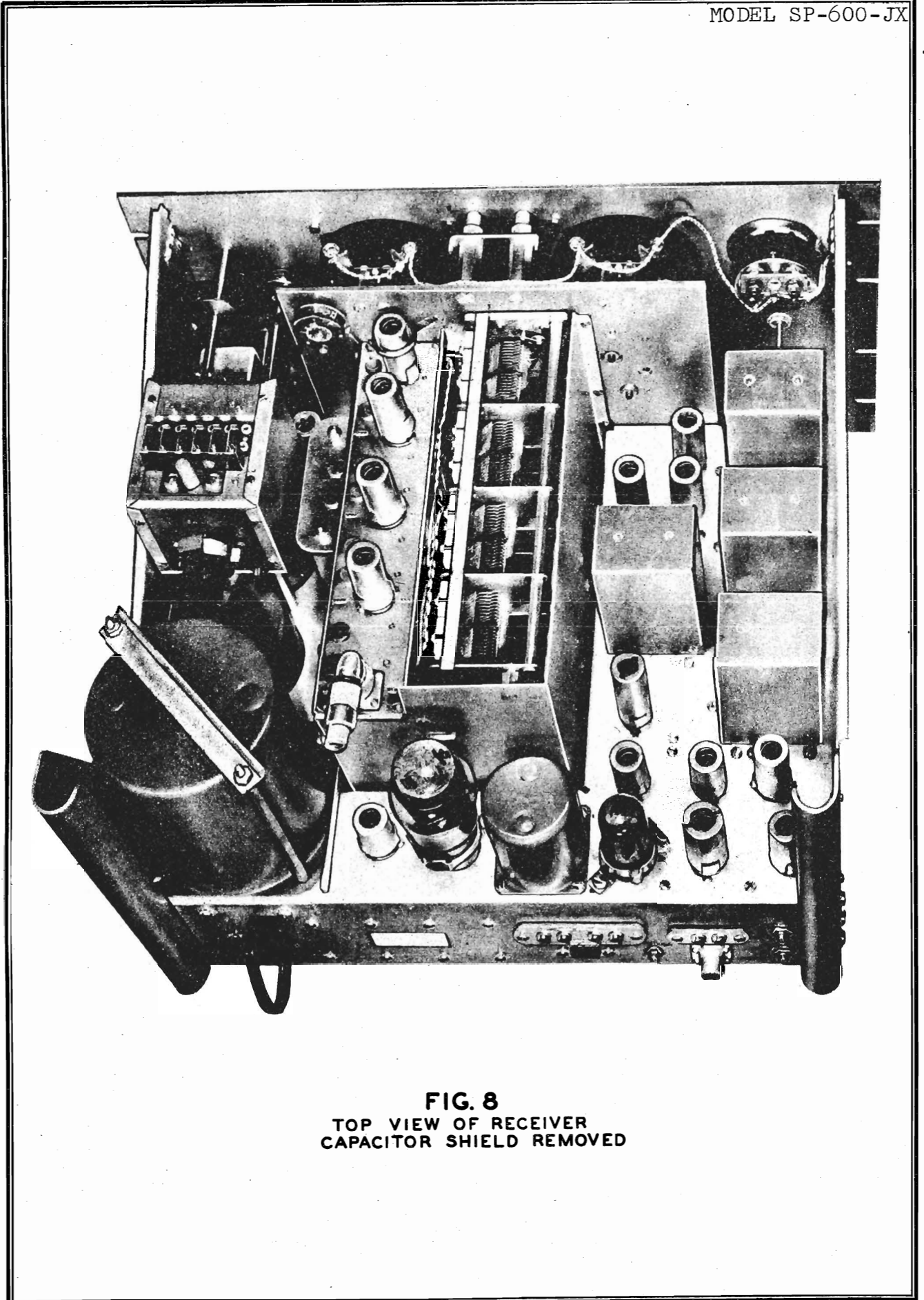


FIG. 8
TOP VIEW OF RECEIVER
CAPACITOR SHIELD REMOVED

MODEL SP-600-JX

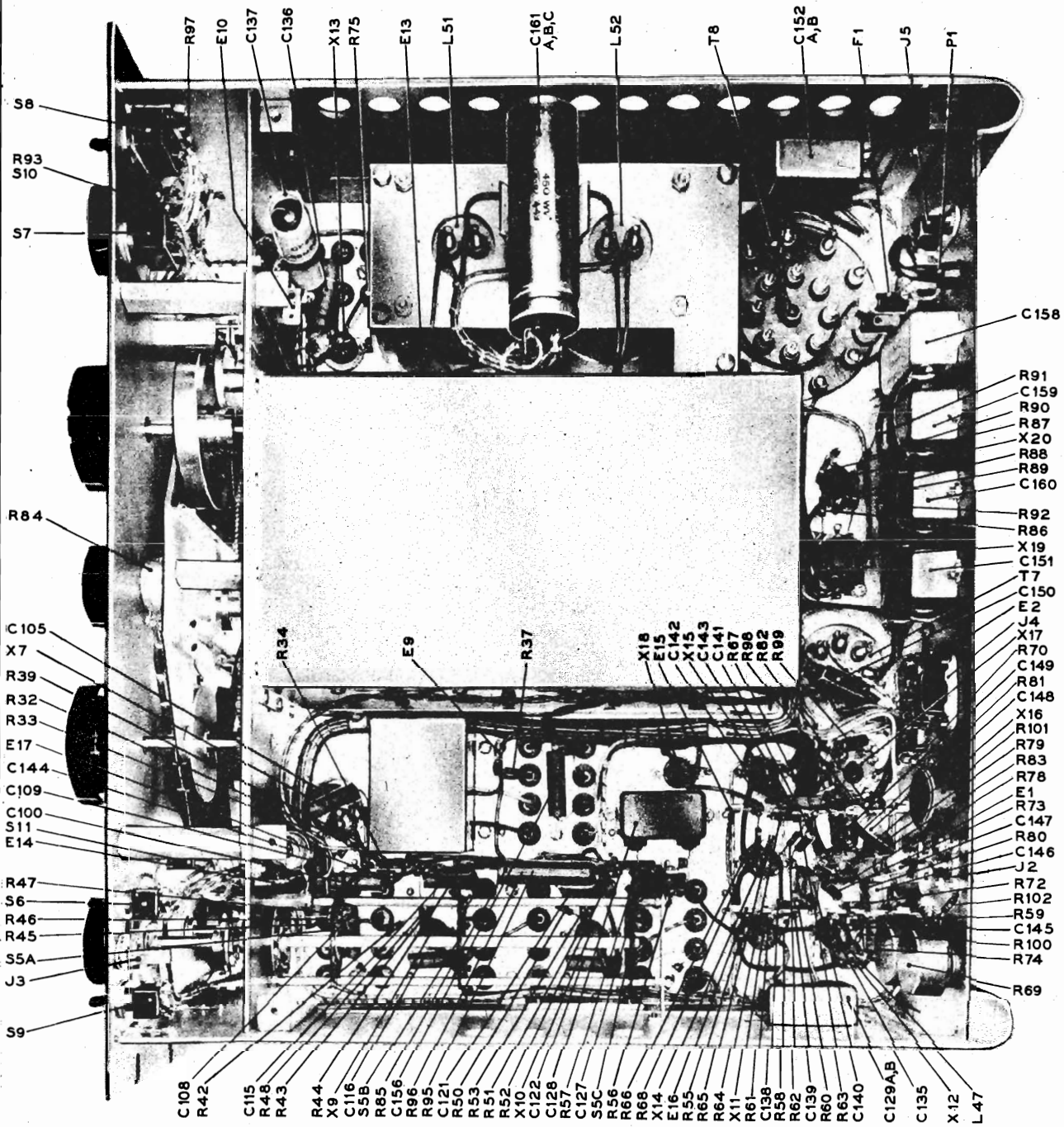


FIG. 9
BOTTOM VIEW OF RECEIVER SP-600-JX

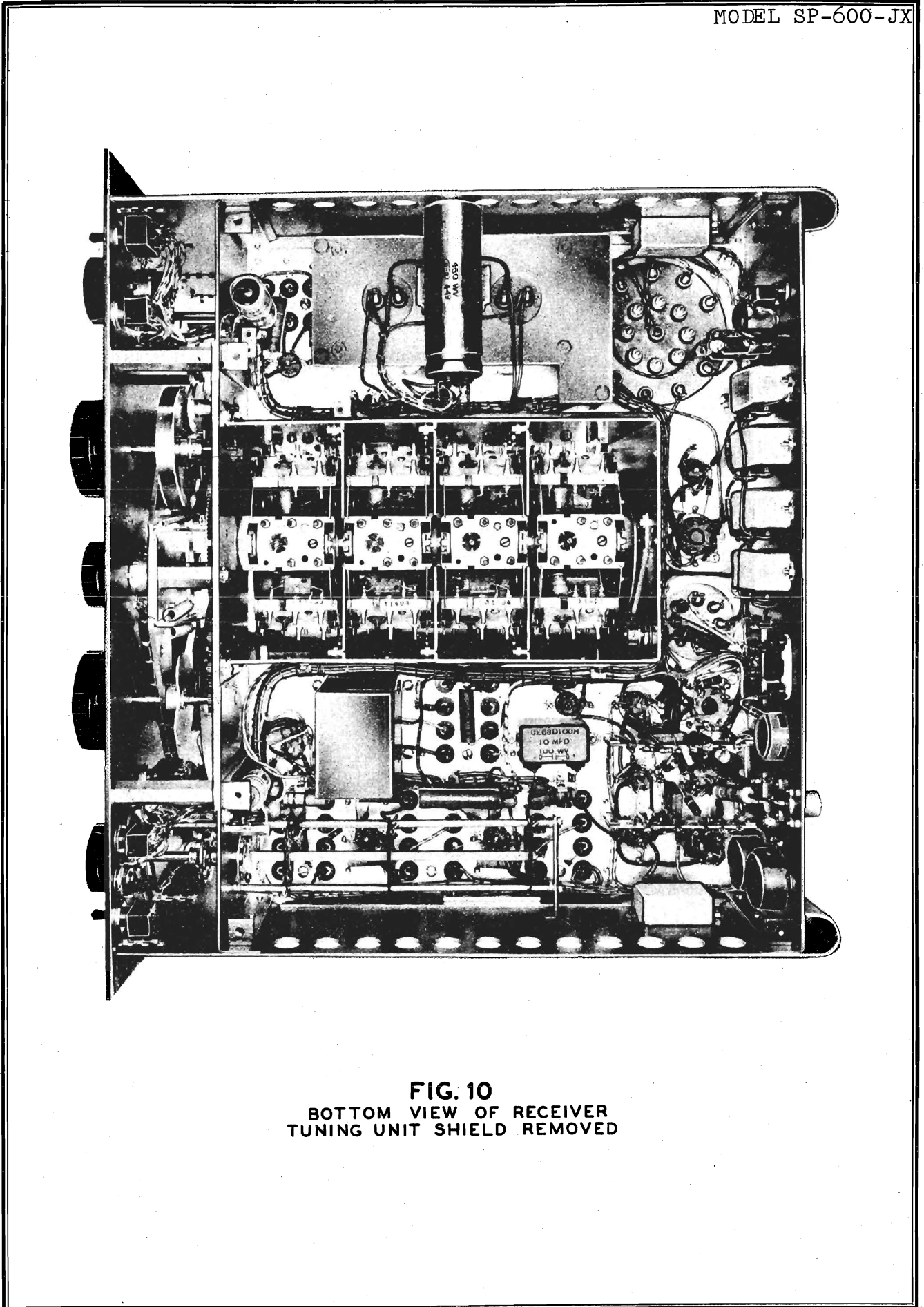


FIG. 10
BOTTOM VIEW OF RECEIVER
TUNING UNIT SHIELD REMOVED

NOTE: NUMBERS ON SWITCH-BASES ARE SAME AS THOSE ON SCHEMATIC DIAGRAM FOR SWITCH BASES AND COIL AND SWITCH ASSEMBLIES.

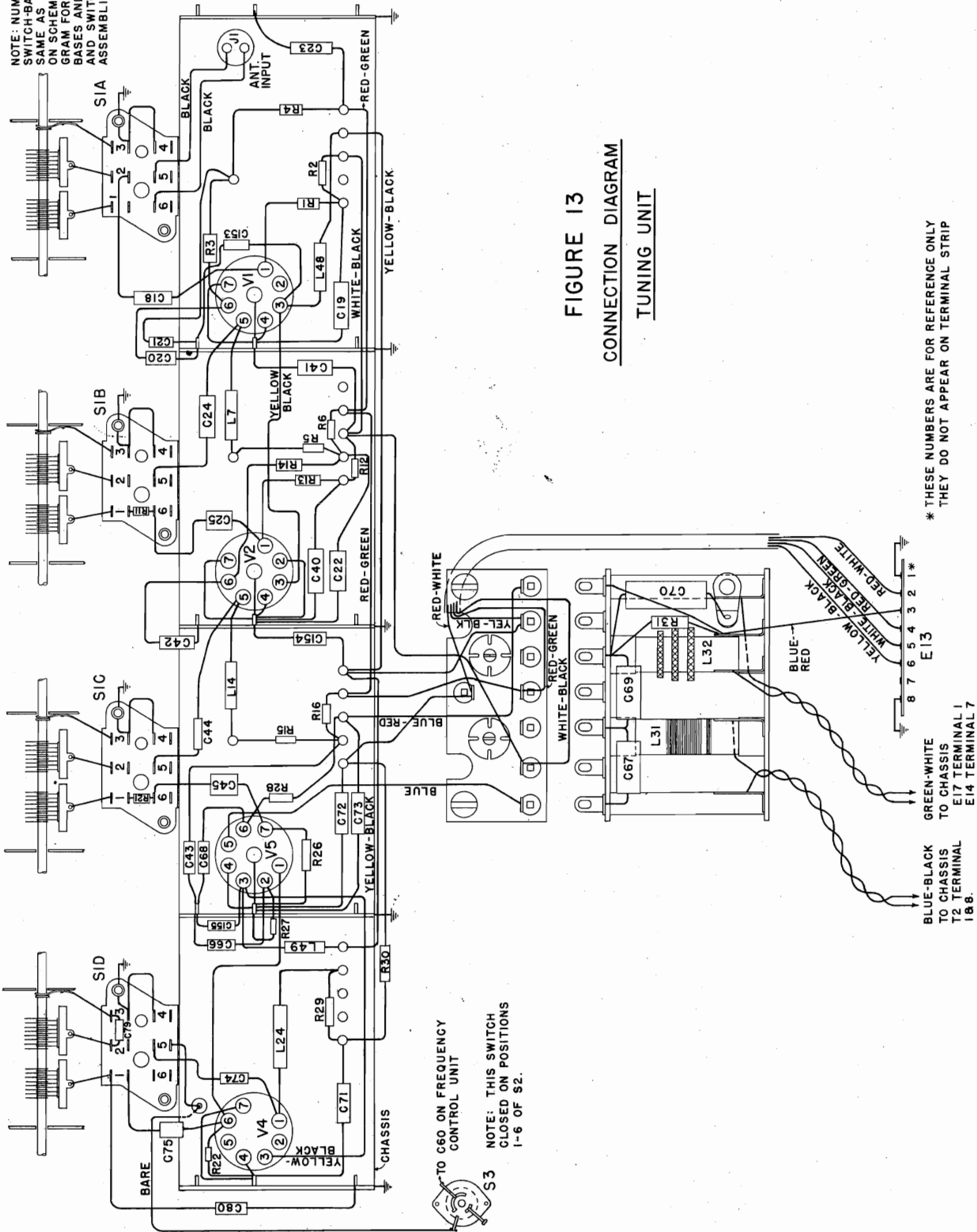


FIGURE 13
CONNECTION DIAGRAM
TUNING UNIT

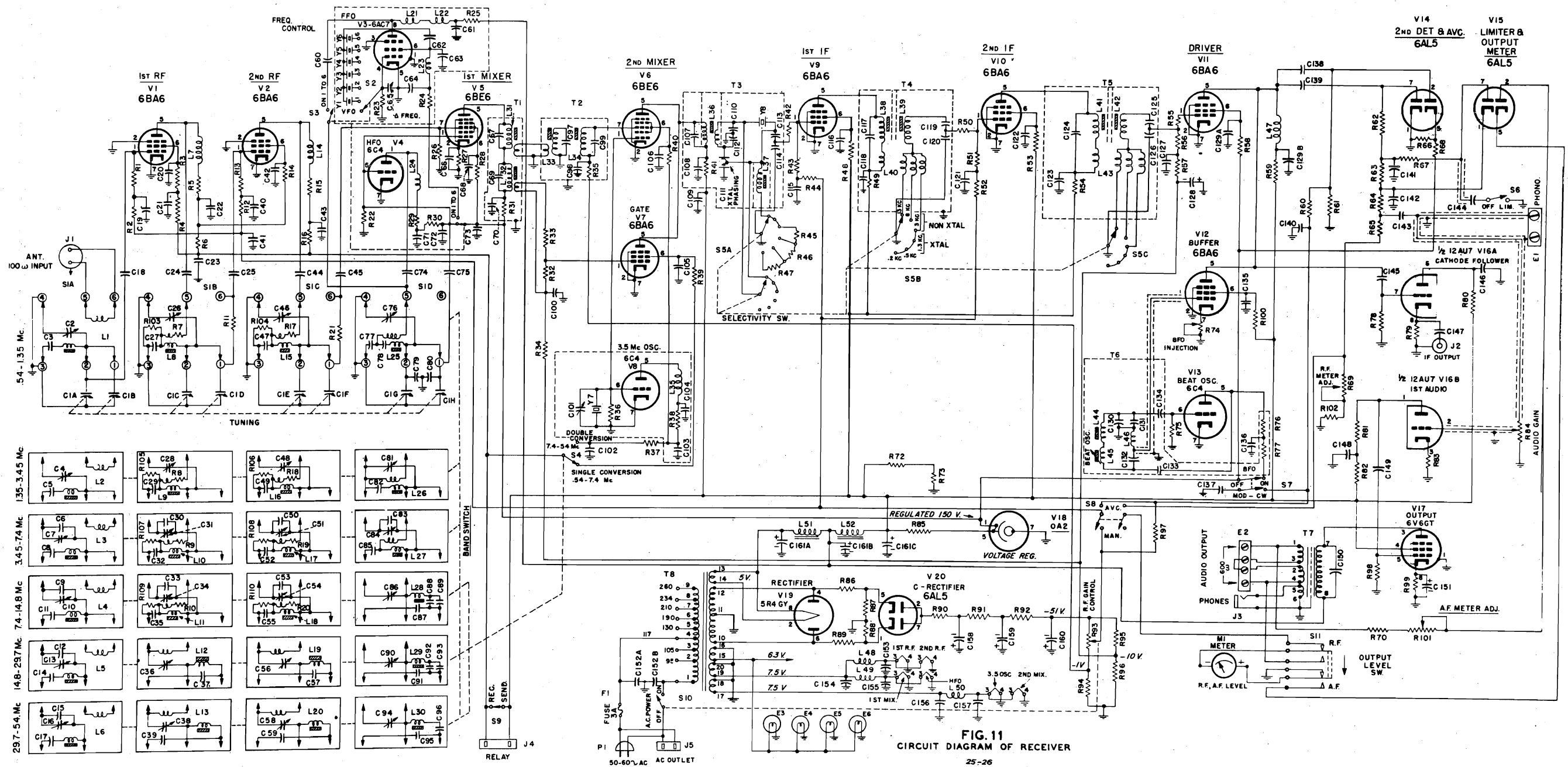
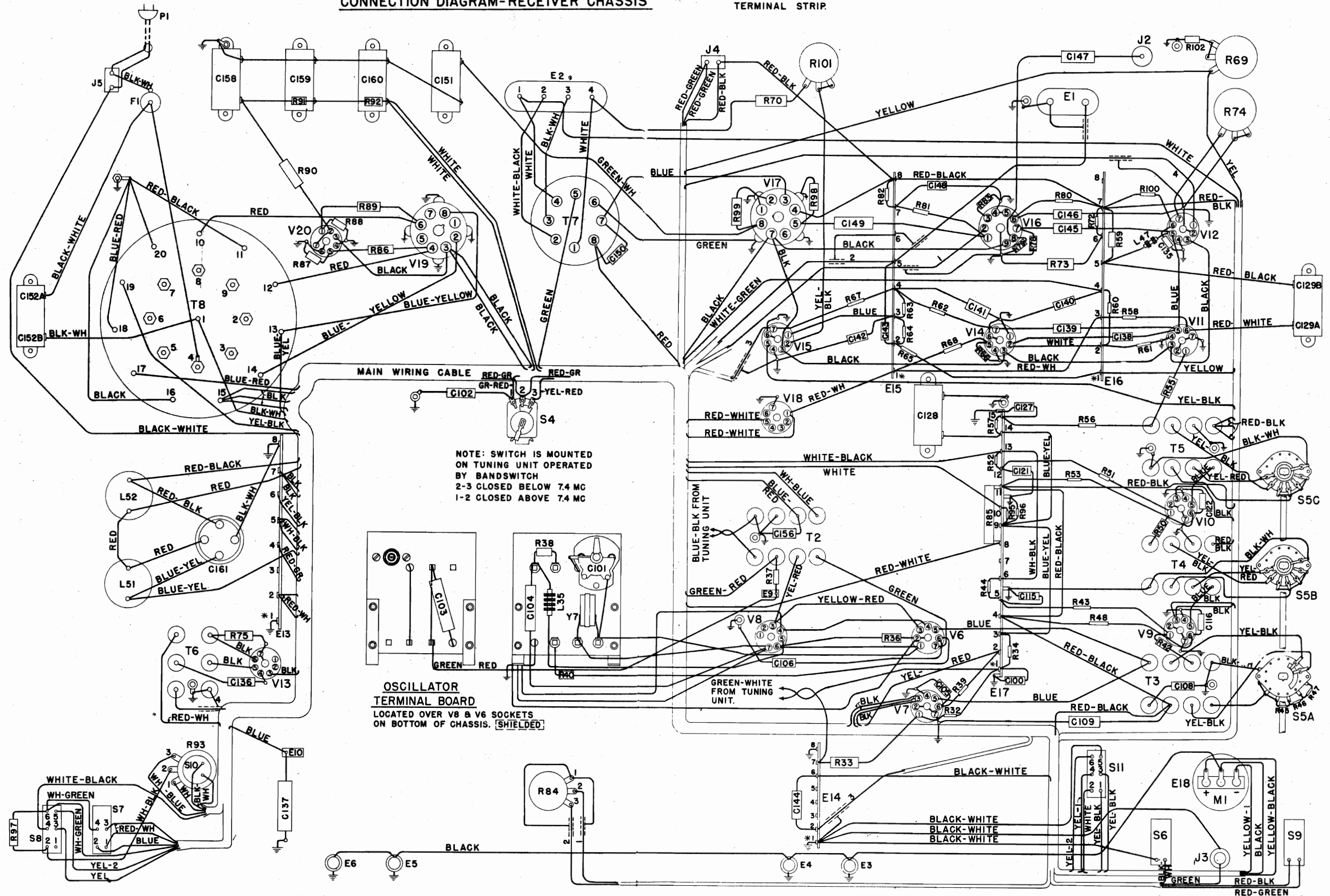
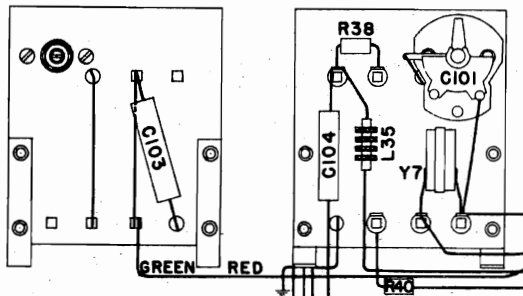


FIGURE NUMBER 12
CONNECTION DIAGRAM-RECEIVER CHASSIS

* THESE NUMBERS ARE FOR REFERENCE ONLY. THEY DO NOT APPEAR ON TERMINAL STRIP.



NOTE: SWITCH IS MOUNTED ON TUNING UNIT OPERATED BY BANDSWITCH
2-3 CLOSED BELOW 7.4 MC
1-2 CLOSED ABOVE 7.4 MC



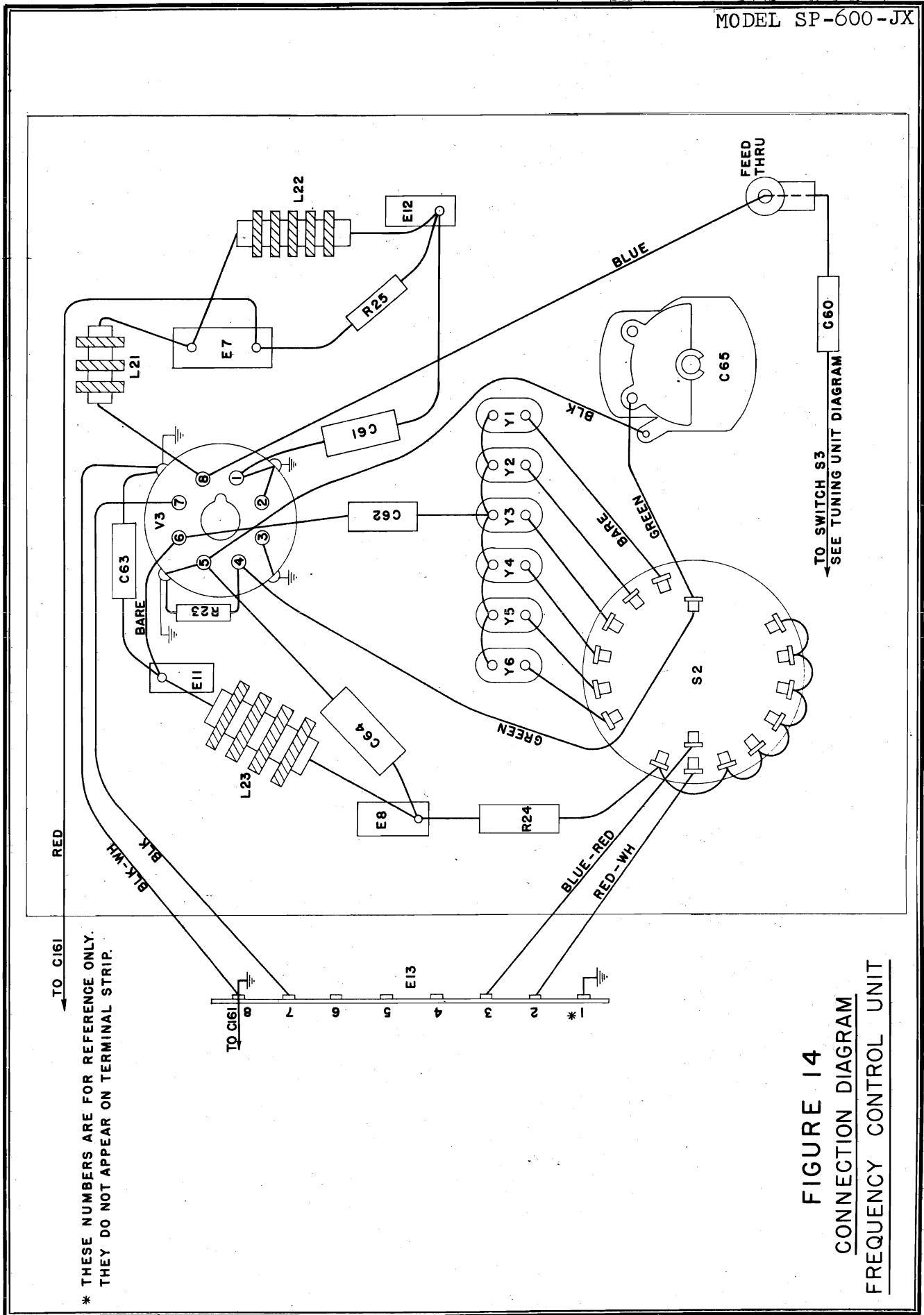
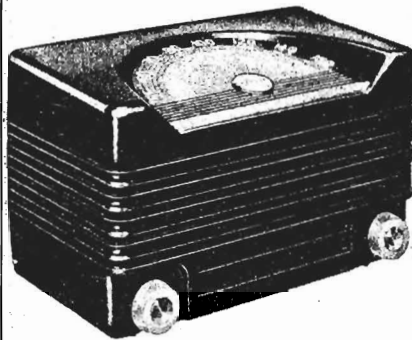


FIGURE 14
 CONNECTION DIAGRAM
 FREQUENCY CONTROL UNIT

* THESE NUMBERS ARE FOR REFERENCE ONLY.
 THEY DO NOT APPEAR ON TERMINAL STRIP.

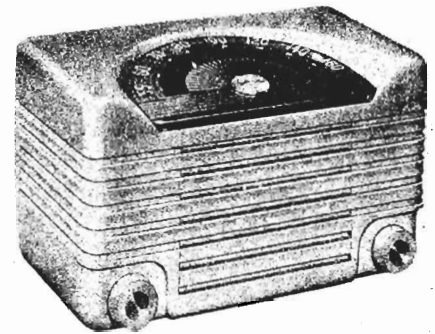
MODELS 204,
205, Ch. 165



Model 205
Brown

MAJOR COMPONENTS

| | | |
|-------------------------|--|------|
| Cabinet | | |
| Model 204 | | 7582 |
| Model 205 | | 7583 |
| Radio Chassis | | 165 |
| Loop Antenna | | 5238 |
| Dial, Calibrated | | 744A |
| Dial Insert | | 746A |
| Bracket, Dial Mechanism | | 2434 |
| Backboard | | 3710 |
| Knobs | | 3703 |



Model 204
Ivory

SPECIFICATIONS

| | |
|--------------------|---------------------------|
| Line Voltage | 115V DC or 115V AC 60 cps |
| Power Consumption | 26 Watts |
| Tuning Range | 540 KC to 1650 KC |
| Number of Tubes | 5 |
| Audio Power Output | 1.0 Watt |
| Speaker Type | 5" PM |
| Cabinet | |
| Height | 6-3/4" |
| Width | 11" |
| Depth | 6" |

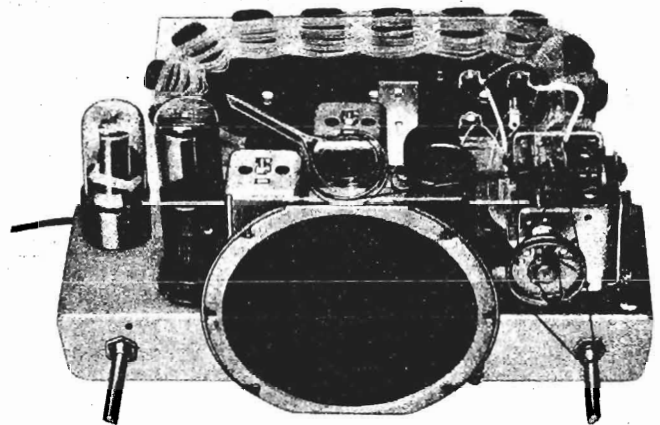


Figure 1. Chassis 165

ELECTRICAL AND MECHANICAL DATA

| | |
|------------------------|---------------------------------|
| Power Requirements: | |
| Operating Voltage | 115V DC or 115V AC 60 cps |
| Consumption | 26 watts |
| Tuning Range | 540 KC to 1650 KC |
| Audio Power Output | 1.0 watt |
| Output Impedance | 3.2 ohms |
| Intermediate Frequency | 455 KC |

TUBE COMPLEMENT

| | | | |
|---|--------|--------------------------|----|
| 1 | 12SA7 | Converter | V1 |
| 1 | 12SG7 | IF Amplifier | V2 |
| 1 | 12SQ7 | 2nd Det., AVC, 1st Audio | V3 |
| 1 | 50L6GT | Audio Output | V4 |
| 1 | 35Z5GT | Rectifier | V5 |

Chassis 165 is a 5-tube AM AC-DC superheterodyne incorporating a built-in loop antenna and a 5" PM speaker. A binding post is available on the loop antenna for connection to an external long wire antenna which will be required in very weak signal areas only. Dial stringing information is given in Figure 2.

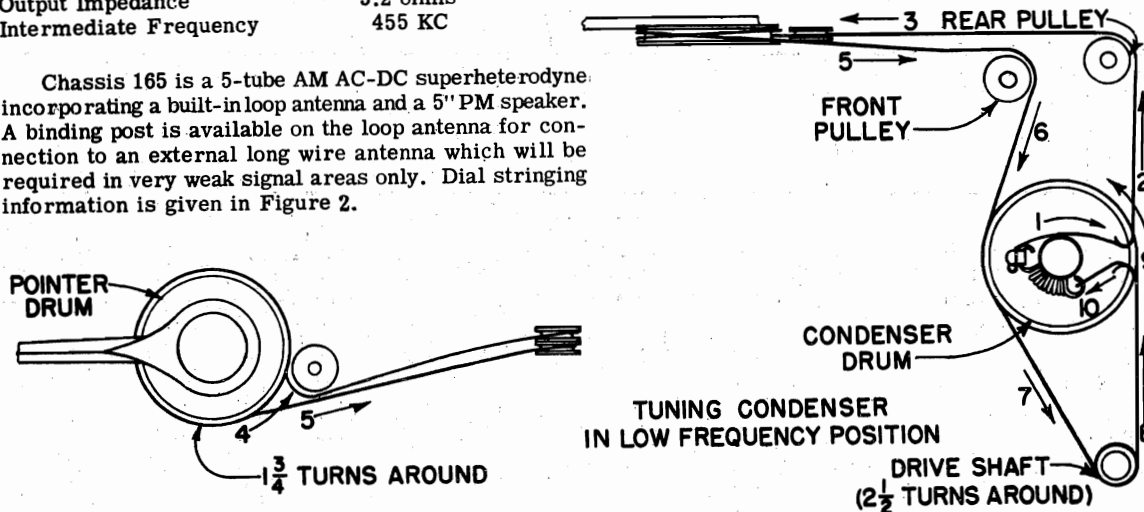


Figure 2. Dial Stringing

MODELS 204,
205, Ch. 165

ALIGNMENT

Equipment:

1. Signal generator capable of generating frequencies of 1650 KC, 1400 KC, and 455 KC.
2. AC meter with 2.5 V scale.
3. 0.1 mfd, 200 V blocking capacitor.

Procedure:

CAUTION: The chassis is the AC-DC type, and care should be exercised to avoid coming in contact with grounded objects when touching the chassis.

If the alignment is performed on a metal topped bench that is grounded, an isolation transformer must be used between the AC supply and the chassis. Allow the receiver to warm up for several minutes. Connect the AC voltmeter across the speaker voice coil. (An output meter may be used.) Set meter to 2.5 volt scale.

TABLE I - ALIGNMENT PROCEDURE

| Step No. | Signal Generator Frequency, KC | Adjust | Instructions |
|----------|--------------------------------|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IF | | | |
| 1 | 455 modulated | T4 Pri, Sec T3 Pri, Sec | Connect "hot" side of generator to antenna loop binding post, and connect ground side to receiver chassis through 0.1 condenser. Keep signal level low enough to keep maximum reading on lower half of meter scale. Set volume control at maximum and tuning condenser plates all the way unmeshed. |
| RF | | | |
| 2 | 1650 modulated | C4 | Tuning condenser plates unmeshed. Connect generator to wire loop about 6" in diameter. Place loop one foot from and parallel to antenna loop. Generator level should be adjusted to produce reading on lower half of meter scale. Adjust C4 for maximum output. |
| 3 | 1400 modulated | C3 | Generator input remains unchanged. Turn tuning condenser so that dial pointer is over extreme clockwise calibration mark. Adjust C3 for maximum output. |

NOTES:

The pin voltage readings are obtained with no signal input to receiver. D.C. voltages measured with 20,000 ohm/volt meter. A.C. voltages measured with 1,000 ohm/volt meter. All voltages measured with reference to B-.

Live voltage 115V A.C.

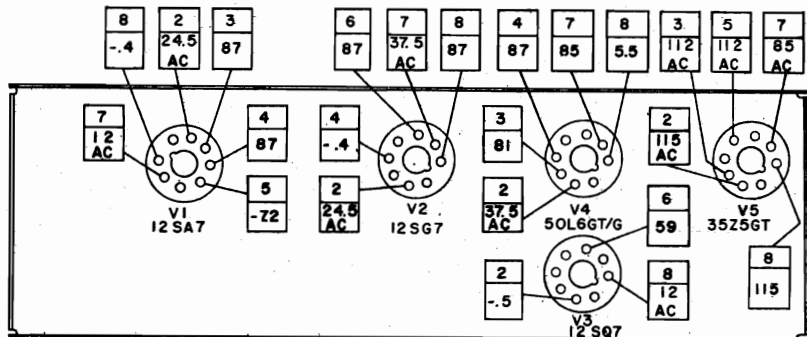


Figure 3. Pin Voltage Diagram

MODELS 204,
205, Ch. 165

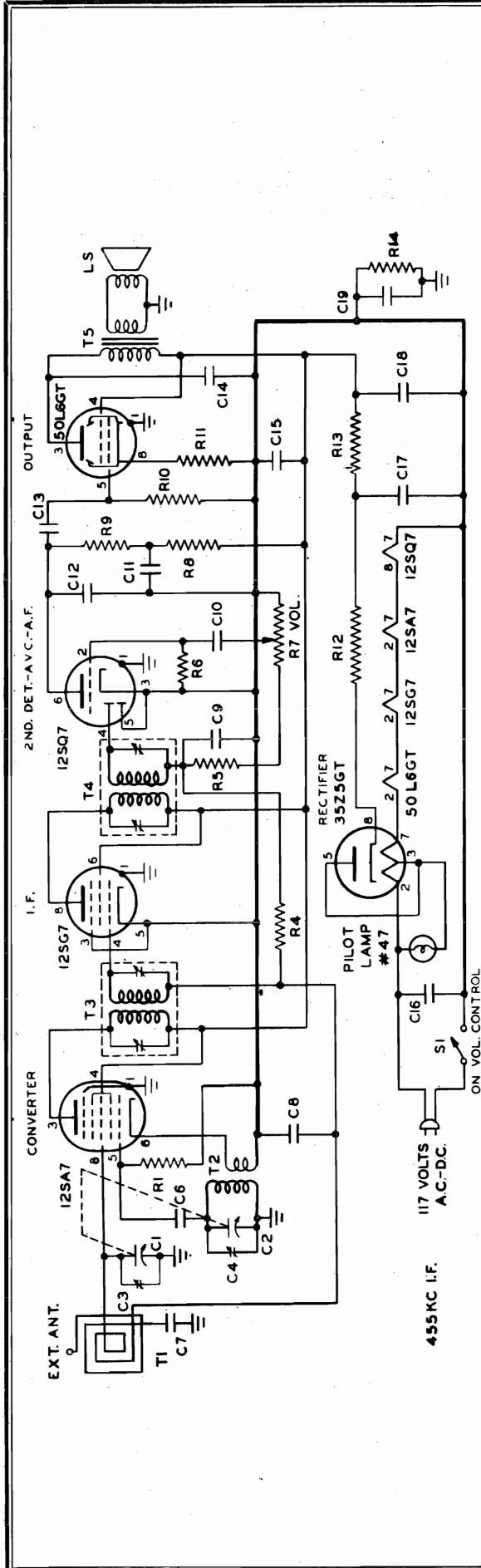
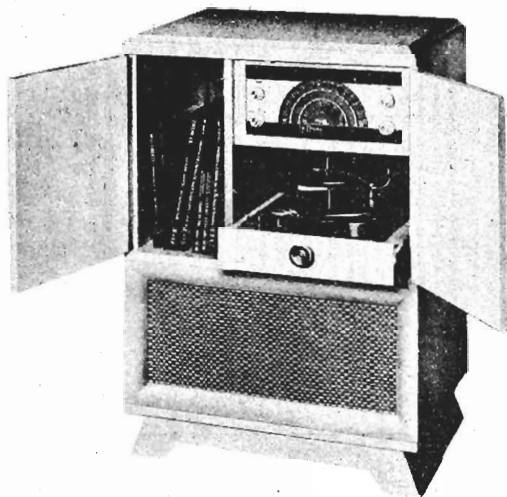


Figure 4 Receiver Schematic
PARTS LIST

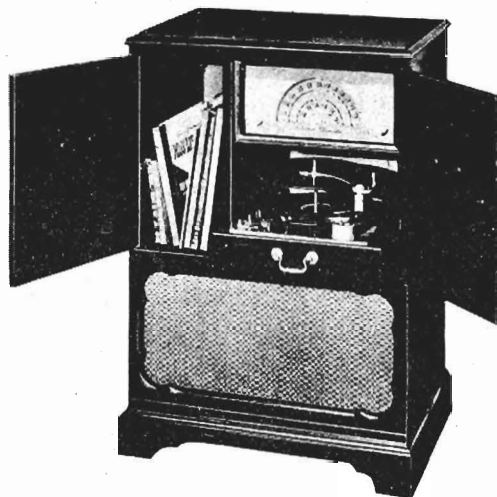
All values of capacity are microfarads unless otherwise noted.
All resistors are 1/2 watt composition type with values given in ohms unless otherwise specified.

| Symbol | Part No. | Value | Tolerance | Watts or Volts | Type | Symbol | Part No. | Description |
|--------|-------------------------|-------------|-----------|----------------|-----------------|--------|------------|---------------------------------|
| C1 | 4401 | 0 - 388 mmf | | | 2 Gang Variable | R2 | Not used | 2.2 meg |
| C2 | | 0 - 180 mmf | | | | R3 | Not used | 47K |
| C3 | Part of 2 Gang Variable | | | | | R4 | 4502 | 20% |
| C4 | | | | | | R5 | 4504 | 20% |
| C5 | Not used | | | | | R6 | 4505 | 20% |
| C6 | 4000 | 100 mmf | 20% | | Trimmers | R7 | 4836 | 500K |
| C7 | 4102 | .005 | | | | R8 | 4511 | 100K |
| C8 | 4100 | .05 | | 600 | Mica | R9 | 4500 | 20% |
| C9 | 4001 | 270 mmf | | 200 | Paper | R10 | 4506 | 20% |
| C10 | 4102 | .005 | | | | R11 | 4510 | 20% |
| C11 | 4100 | .05 | | 600 | Paper | R12 | 4508 | 20% |
| C12 | 4102 | .005 | 20% | 200 | Paper | R13 | 4700 | 10% |
| C13 | 4106 | .02 | | 600 | Mica | R14 | 4506 | 20% |
| C14 | 4100 | .05 | | 400 | Paper | S1 | Part of R7 | Loop, Antenna |
| C15 | 4100 | .05 | | 400 | Paper | T1 | 5238 | Coil, Oscillator |
| C16 | 4101 | .05 | | 400 | Paper | T2 | 5208 | Transformer, Input IF (455 KC) |
| C17 | 4201 | 50 | | 150 | Electrolytic | T3 | 5205 | Transformer, Output IF (455 KC) |
| C18 | 4121 | .1 | | 150 | Paper | T4 | 5206 | Transformer, Audio Output |
| C19 | 4501 | 22K | 20% | 400 | Paper | T5 | 5101 | Speaker, 5" PM |
| R1 | | | 20% | | | LS | 9003 | 5 W |

MODELS 533,
534, Ch. 167



MODEL 533
Modern Style
Oak Cabinet



MODEL 534
Traditional Style
Mahogany Cabinet

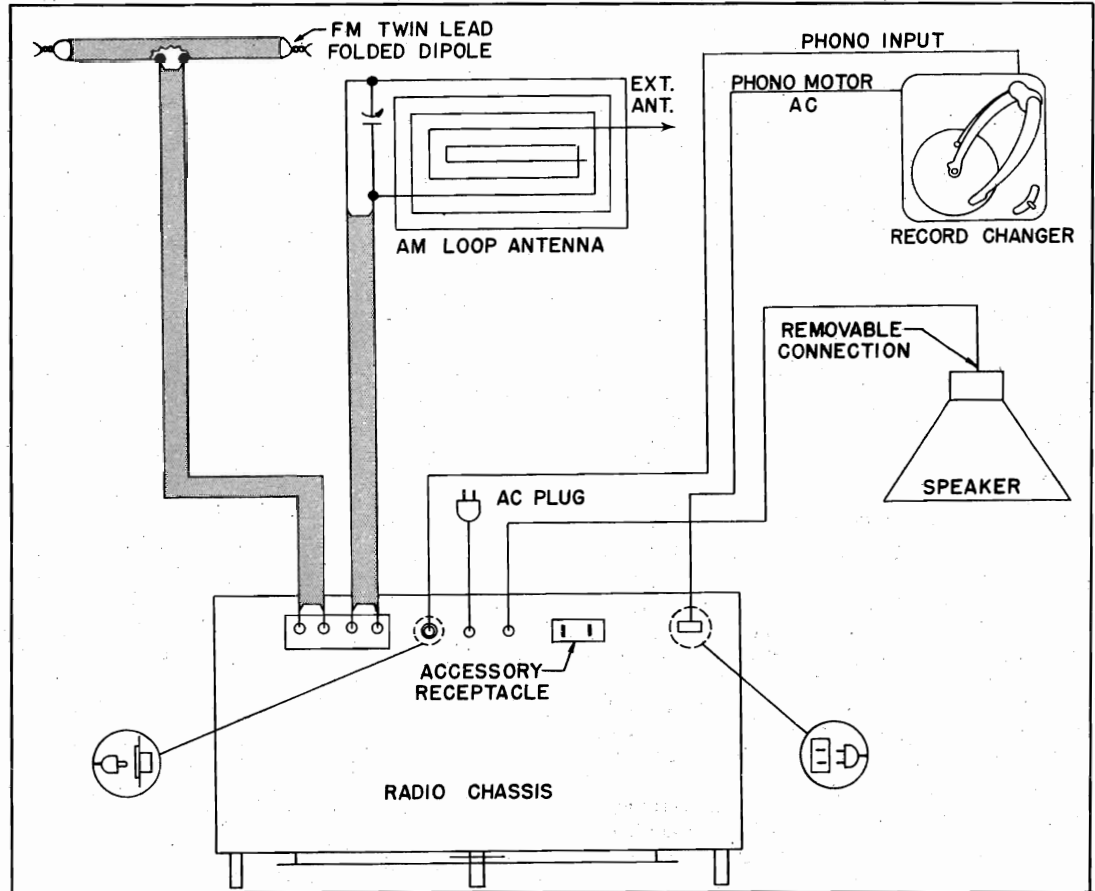
SPECIFICATIONS

| | | | |
|--------------------|-------------------|----------------|----------------------------------------------------------------------------------------------|
| Line Voltage | 115V AC 60 cps | Cabinet* | |
| Power Consumption | 95 Watts | Height | 36-1/2" |
| Tuning Ranges | | Width | 26-1/4" |
| AM | 535 KC to 1650 KC | Depth | 17-1/16" |
| FM | 88 MC to 108 MC | Record Changer | Automatically plays 1" stack of 7", 10", 12" records at 33-1/3 rpm, 45 rpm, or 78 rpm. |
| Number of Tubes | 8 | | |
| Audio Power Output | 3.5 Watts | | |
| Speaker Type | 12" PM | | |

* Where there are slight variations in certain of the dimensions for the two models, the largest value is listed.

MAJOR COMPONENTS

| | | | |
|----------------|-------|-----------------------|--------|
| Cabinet | | Dial Glass | 747 |
| Model 533 | 7591 | Backboard | 3714 |
| Model 534 | 7590 | Record Changer Drawer | 6656 |
| Radio Chassis | 167 | Knobs | |
| Speaker | 9070 | Tuning | 33517A |
| Antenna | | Off-On-Tone | 33517A |
| AM Assembly | 55214 | Volume | 33517A |
| FM Assembly | 55218 | Band Switch | 33517C |
| Record Changer | 9078 | | |



BLOCK DIAGRAM

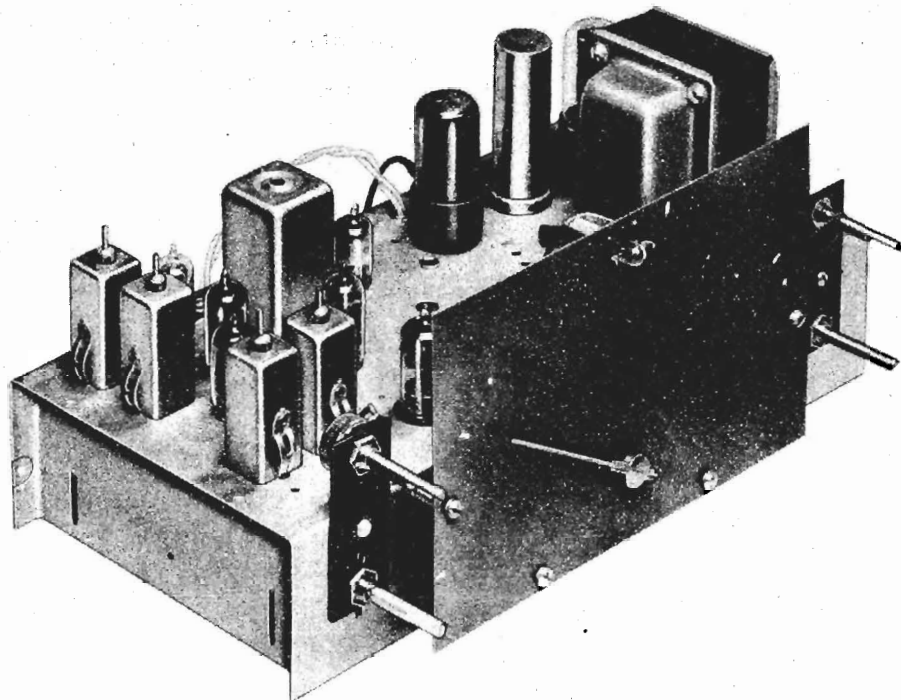


Figure 1. Chassis 167

MODELS 533,
534, Ch. 167

ELECTRICAL AND MECHANICAL DATA

Power Requirements:
Operating Voltage

115 V AC 60 cps

Watts:

95

Tuning Range:

AM

535 KC to 1650 KC

FM

88 MC to 108 MC

Audio Power Output

3.5 Watts

Output Impedance

3.2 ohms at 400 cps

Intermediate Frequencies:

AM

455 KC

FM

10.7 MC

FM Antenna Input Impedance 300 ohms, balanced

Chassis 167 is an 8 tube combination AM-FM radio receiver. It employs an indoor loop antenna for AM reception and is designed to be used with an indoor FM antenna in normal signal areas and an outside FM antenna in weak signal areas. The indoor antenna is located in the receiver cabinet, and it should be disconnected from the FM antenna terminal posts when an outside antenna is used. The chassis is mounted in place horizontally on rubber shock mounts which rest on wooden blocks that are bolted in the chassis from below. Dial stringing details are indicated in figure 2. Dial calibration appears on the dial glass mounted on the front of the cabinet.

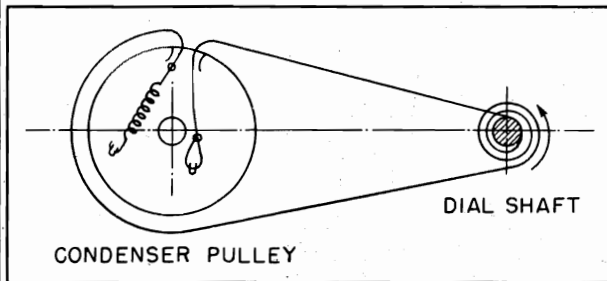


Figure 2. Dial Stringing

TUBE COMPLEMENT

| | | | |
|---|-------|-------------------------------------|----|
| 1 | 12AT7 | FM Oscillator-Converter | V1 |
| 1 | 6BE6 | AM Oscillator-Converter | V7 |
| 1 | 6BA6 | AM-FM 1st IF Amplifier | V2 |
| 1 | 6BA6 | FM 2nd IF Amplifier | V3 |
| 1 | 6AL5 | FM Detector | V4 |
| 1 | 6AT6 | AM Detector-AVC - 1st Audio (AM-FM) | V5 |
| 1 | 6V6GT | Power Output | V6 |
| 1 | 5Y3GT | Rectifier | V8 |

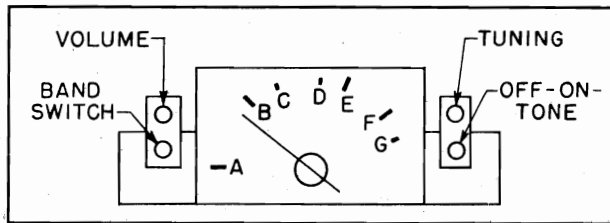


Figure 3. Location of Controls

Note: The alignment calibration marks which appear on the dial background plate are shown lettered for identification purposes. Pointer should be at "A" when condenser is in full mesh.

CONTROLS

Operation of the volume and tuning controls is straightforward. The BAND SWITCH has three positions for selecting one of the following: PHONO, AM radio, or FM radio. The PHONO position is obtained with the switch in the extreme counterclockwise position, and the other two positions are selected in the order listed by clockwise rotation of the band switch control shaft. The fourth control is the OFF-ON-TONE control. Extreme counterclockwise rotation of the control shaft turns the receiver off. Clockwise control turns the receiver on and continuously changes the tone from bass to treble.

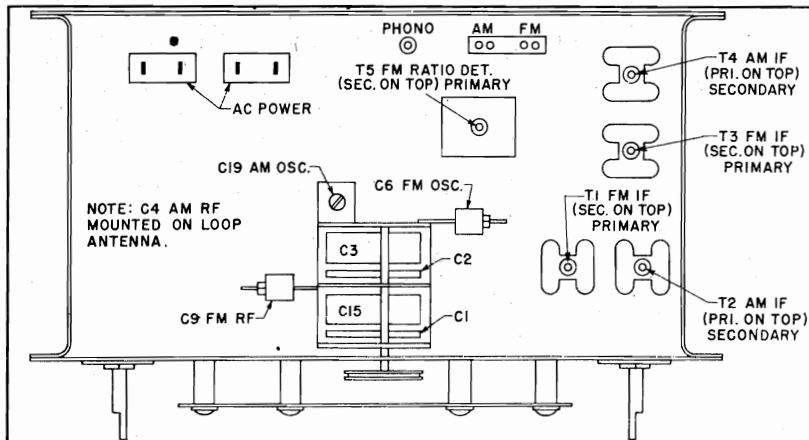


Figure 4. Trimmer Location- Bottom View

ALIGNMENT

This section describes the minimum equipment and procedure that is required to align the receiver satisfactorily. Before beginning alignment, the tuning condenser must be fully open, and the set should be allowed to warm up about 15 minutes. It is suggested that the alignment be performed on a metal-topped bench with generator, receiver, and voltmeter well bonded together. The bench area should be free of strong extraneous radiation.

Equipment:

CW Signal Generator capable of providing the frequencies listed in the table below. Must include audio modulating signal for AM alignment.

A voltmeter with at least a sensitivity of 20,000 ohms per volt (V.T.V.M. preferable). Should have AC scale.

Two 100K ohm composition resistors.

Two 150 ohm composition resistors.

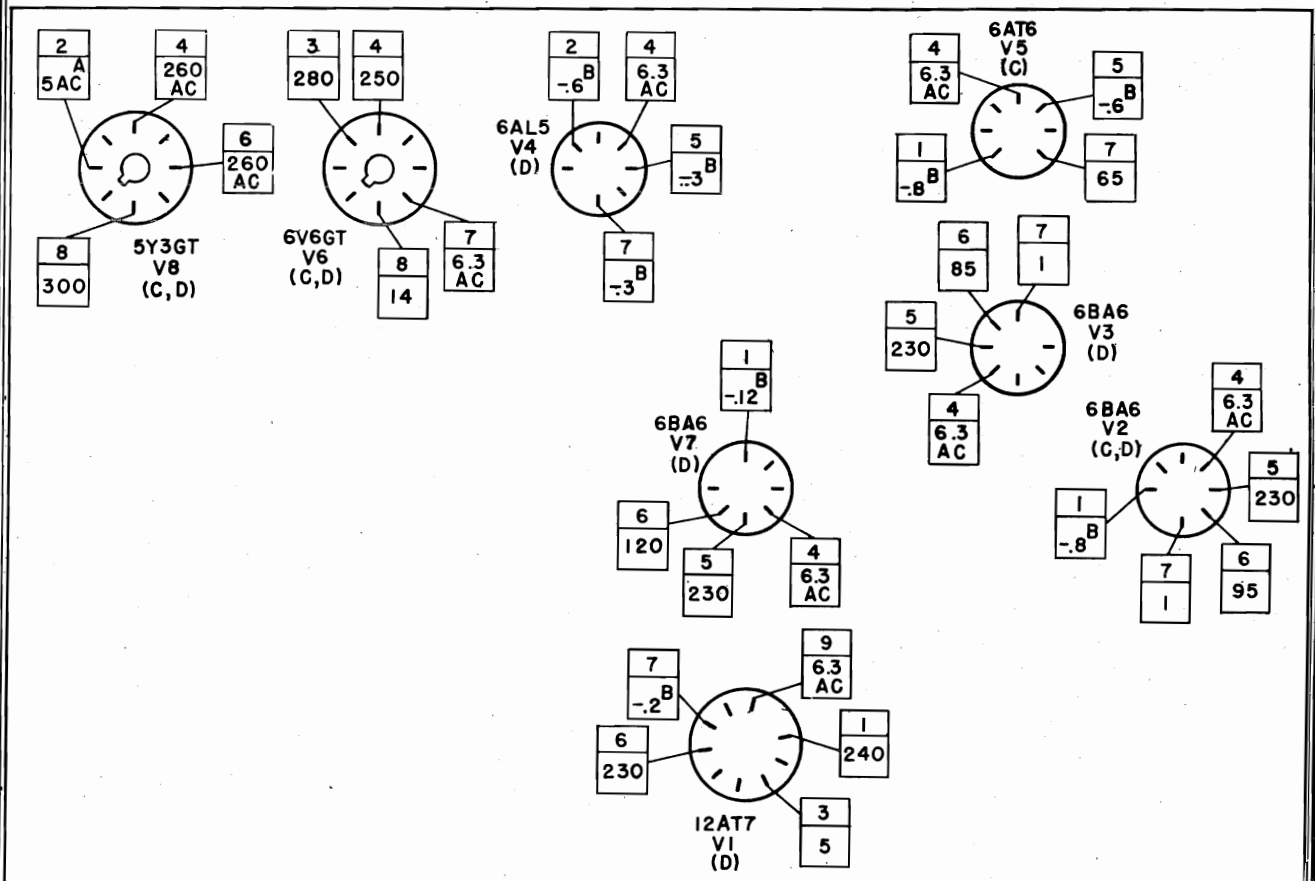


Figure 5. Bottom View, Tube Layout

All voltages measured to chassis unless otherwise noted.

DC voltages measured with 20,000 ohm/volt meter.

All voltages DC unless otherwise noted.

All measurements made with no signal input to receiver and receiver operated at rated line voltage.

A - Measured to pin 8

B - Measured with VTVM having insulating resistor in probe

C - Band switch in AM position

D - Band switch in FM position

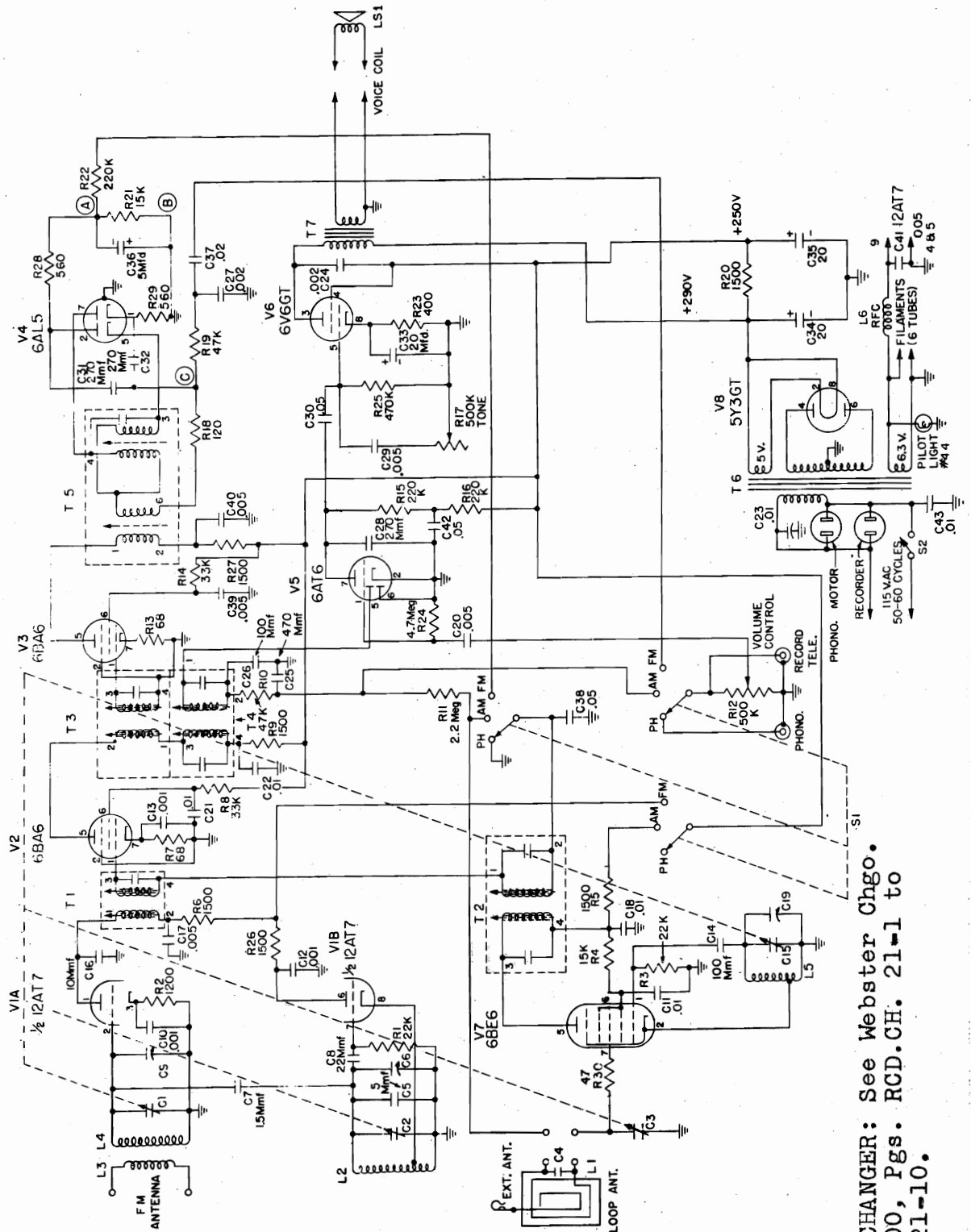
MODELS 533,
534, Ch. 167

Procedure:

The AM section should be completely aligned before beginning the FM alignment. For AM alignment the generator is coupled to the receiver by placing the "hot" lead next to the antenna loop so that lead and loop wire form a condenser. The voltmeter is connected across the voice coil and switched to a low AC scale. The coupling for FM alignment is two 150 ohm composition resistors, one in series with each generator lead. Before tuning the ratio detector transformer, solder two 100K ohm composition resistors in series from point "A", shown in figure 6, to ground. Remove them before aligning the FM RF section.

| Step No. | Band Switch Position | Signal Generator Frequency | Connect Signal To | Condenser Setting (See Fig. 3) | Voltmeter | Adjust | Instructions |
|----------|----------------------|----------------------------|----------------------------------|--------------------------------|-----------------------------------------------------------|------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| 1 | AM | 455 KC Mod. | 6BE6 V7 Pin 7 | Full Open | Across Voice Coil | T2 Pri., Sec. T4 Pri., Sec. | Adjust for max. output. Use as low a signal input as possible. |
| 2 | " | 1650 KC Mod. | Antenna Loop as described above. | " | " | C19 AM Osc. Trimmer | " |
| 3 | " | 1410 KC | " | F | " | C4 AM RF Trimmer | " |
| 4 | " | 600 KC | " | B | " | Plates of C3 | Bend plates as required. Adjust for max. reading. |
| 5 | FM | 10.7 MC CW | FM Ant. Terminals | Full Open | Between point A and ground. | T1 Pri., Sec. T3 Pri., Sec. T5 Pri. only | Adjust for max. voltmeter reading. |
| 6 | " | " | " | " | Between junction of two 100K resistors added and point C. | T5 Sec. | Adjust for zero reading, using a low signal input to avoid overloading. |
| 7 | " | 107 MC CW | " | G | Point A to ground. | C6 FM Osc. Trimmer | Remove the two 100K resistors. Adjust for max. reading. Make certain receiver oscillator freq. is 10.7 MC above incoming signal freq. |
| 8 | " | " | " | " | " | C9 FM RF Trimmer | " |
| 9 | " | 98 MC CW | " | D | " | Plates of C1 | Bend plates as required. Adjust for max. reading. |
| 10 | " | 90 MC CW | " | C | " | " | " |

**SCHEMATIC DIAGRAM
CHASSIS 167**



RECORD CHANGER: See Webster Chgo.
Model 100, Pgs. RCD.CH. 21-1 to
RCD.CH. 21-10.

MODELS 533, 534,
Ch. 167

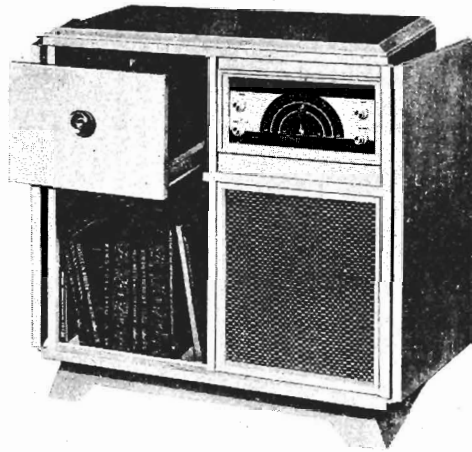
| Symbol | Part No. | Value | Tol. | Watts or Volts | Type |
|--------|----------|----------------------|------------------|----------------|------------|
| R5 | 4534 | 1.5K | 20% | | |
| R6 | 4534 | 1.5K | 20% | | |
| R7 | 4524 | 68 | 20% | | |
| R8 | 4556 | 33K | 20% | 1 W | |
| R9 | 4534 | 1.5K | 20% | | |
| R10 | 4504 | 47K | 20% | | |
| R11 | 4502 | 2.2 meg | 20% | | |
| R12 | 4842 | .5 meg Pot. | (Volume Control) | | |
| R13 | 4524 | 68 | 20% | | |
| R14 | 4556 | 33K | 20% | 1 W | |
| R15 | 4500 | 220K | 20% | | |
| R16 | 4500 | 220K | 20% | | |
| R17 | 4841 | .5 meg Pot. w/Switch | (Tone Control) | | |
| R18 | 4546 | 120 | 10% | | |
| R19 | 4504 | 47K | 20% | | |
| R20 | 4701 | 1.5K | 5% | 6-1/2 W | Wire Wound |
| R21 | 4521 | 15K | 20% | | |
| R22 | 4500 | 230K | 20% | | |
| R23 | 4587 | 400 | 10% | 1 W | |
| R24 | 4544 | 4.7 meg | 20% | | |
| R25 | 4506 | 470K | 20% | | |
| R26 | 4534 | 1.5K | 20% | | |
| R27 | 4534 | 1.5K | 20% | | |
| R28 | 4507 | 560 | 10% | | |
| R29 | 4507 | 560 | 10% | | |
| R30 | 4508 | 47 | 20% | | |

| Symbol | Description | Part No. |
|--------|--------------------------------------------------|---------------|
| L1 | Loop Antenna (AM) Assembly with mounting bracket | 55214 |
| L2 | Oscillator Coil (FM) | 5247 |
| L3 | Antenna Primary (FM) | 5258 |
| L4 | Antenna Secondary (FM) | 5248 |
| L5 | Oscillator Coil (AM) | 5282 |
| L6 | Filament Choke | 5266 |
| T1 | 1st FM IF Transformer | 5284 |
| T2 | 1st AM IF Transformer | 5286 |
| T3 | 2nd FM IF Transformer | 5285 |
| T4 | 2nd AM IF Transformer | 5287 |
| T5 | Ratio Detector Transformer | 5288 |
| T6 | Power Transformer | 5012 |
| T7 | Output Transformer | 5122 |
| S1 | Band Switch | 6024 |
| S2 | Off-On Switch | (Part of R17) |
| | Dial Glass | 747 |
| | Dial Background Plate | 2217C |
| | Knob, Indicator | 3654C |
| | Knob, Plain | 3654A |
| | Plug, Phone | 6203 |
| | Pointer, Dial | 518 |
| | Socket, 9 pin | 6134 |
| | Socket, Miniature | 6123 |
| | Socket, Octal | 6103 |
| | Socket, Phono | 6121 |
| | Socket, Pilot Lamp | 6110 |
| | Socket, AC Power | 6108 |
| | Strip, Antenna Terminal | 9507 |
| | | 424 |

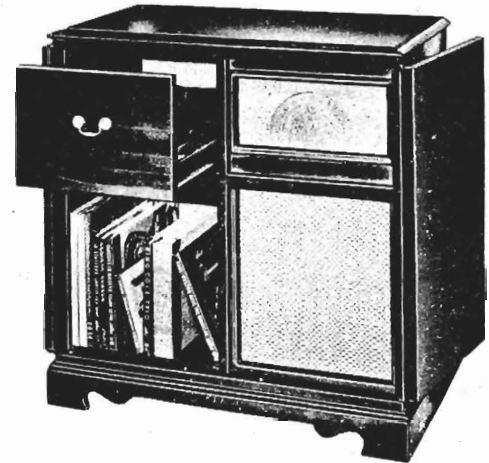
NOTES:
PARTS LIST
All values of capacity are microfarads unless otherwise noted.
All resistors are 1/2 watt composition type with values given in ohms unless otherwise specified.

| Symbol | Part No. | Value | Tol. | Watts or Volts | Type |
|--------|----------|----------------------------|------|----------------|-----------------|
| C1 | 4410 | | | | |
| C2 | 4313 | 4 Section Variable | | | |
| C3 | 4028 | 5 mmf | 10% | | Ceramic N750 |
| C4 | 4318 | Trimmer (AM Section) | | | |
| C5 | 4024 | 1.5 mmf | 10% | | Mica |
| C6 | 4021 | 22 mmf | 10% | | Ceramic N150 |
| C7 | 4318 | Trimmer (FM Section) | | | |
| C8 | 4025 | 1000 mmf | 20% | 400 V | Ceramic Hi-K |
| C9 | 4025 | 1000 mmf | 20% | | Paper |
| C10 | 4112 | 1000 mmf | 20% | | Ceramic Hi-K |
| C11 | 4025 | 1000 mmf | 20% | | Ceramic Hi-K |
| C12 | 4025 | 1000 mmf | 20% | | Ceramic Hi-K |
| C13 | 4025 | 1000 mmf | 20% | | Mica |
| C14 | 4000 | 100 mmf | 20% | | |
| C15 | 4410 | Part of 4 Section Variable | | | |
| C16 | 4027 | 10 mmf | 10% | | Ceramic |
| C17 | 4029 | 5000 mmf | | 400 V | Ceramic Hi-K |
| C18 | 4112 | .01 | 20% | | Paper |
| C19 | 4313 | Trimmer (AM Section) | | | |
| C20 | 4029 | 5000 mmf | | | Ceramic Hi-K |
| C21 | 4112 | .01 | 20% | 400 V | Paper |
| C22 | 4112 | .01 | 20% | 400 V | Paper |
| C23 | 4105 | .01 | 20% | 600 V | Molded Phenolic |
| C24 | 4118 | .002 | 20% | 600 V | Paper |
| C25 | 4003 | 470 mmf | 20% | | Mica |
| C26 | 4000 | 100 mmf | 20% | | Mica |
| C27 | 4118 | .002 | 20% | 600 V | Paper |
| C28 | 4001 | 270 mmf | 20% | | Mica |
| C29 | 4102 | .005 | 20% | 600 V | Paper |
| C30 | 4101 | .05 | 20% | 400 V | Paper |
| C31 | 4001 | 270 mmf | 20% | | Mica |
| C32 | 4001 | 270 mmf | 20% | | Mica |
| C33 | 4200 | 20 | | 25 V | Electrolytic |
| C34 | 4209 | 20 | | 450 V | Electrolytic |
| C35 | 4209 | 20 | | 450 V | Electrolytic |
| C36 | 4106 | 5 | 20% | 50 V | Electrolytic |
| C37 | 4100 | .02 | 20% | 400 V | Paper |
| C38 | 4100 | .05 | 20% | 200 V | Paper |
| C39 | 4029 | 5000 mmf | | | Ceramic Hi-K |
| C40 | 4029 | 5000 mmf | | | Ceramic Hi-K |
| C41 | 4029 | 5000 mmf | | | Ceramic Hi-K |
| C42 | 4101 | .05 | 20% | 400 V | Paper |
| C43 | 4105 | .01 | 20% | 400 V | Paper |
| R1 | 4501 | 22K | 20% | | Molded Phenolic |
| R2 | 4553 | 1.2K | 10% | | |
| R3 | 4501 | 22K | 20% | | |
| R4 | 4539 | 15K | 20% | 1 W | |

MODELS 537,
538, Ch. 168



MODEL 537
Modern Style
Oak Cabinet



MODEL 538
Traditional Style
Mahogany Cabinet

SPECIFICATIONS

| | | | | |
|--------------------|-------------------|--------|----------------|-------------------------------------------------------------------------------------------|
| Line Voltage | 115V AC | 60 cps | Record Changer | Automatically plays 1" stack of 7", 10", or 12" records at 33-1/3 rpm, 45 rpm, or 78 rpm. |
| Power Consumption | 150 Watts | | | |
| Tuning Ranges | | | | |
| AM | 535 KC to 1650 KC | | | |
| FM | 88 MC to 108 MC | | | |
| Number of Tubes | 14 | | Cabinet* | |
| Audio Power Output | 15 Watts | | Height | 35" |
| Speaker Type | 12" PM | | Width | 33-1/4" |
| | | | Depth | 17-1/2" |

* Where there are slight variations in certain of the dimensions for the two models, the largest value is listed.

MAJOR COMPONENTS

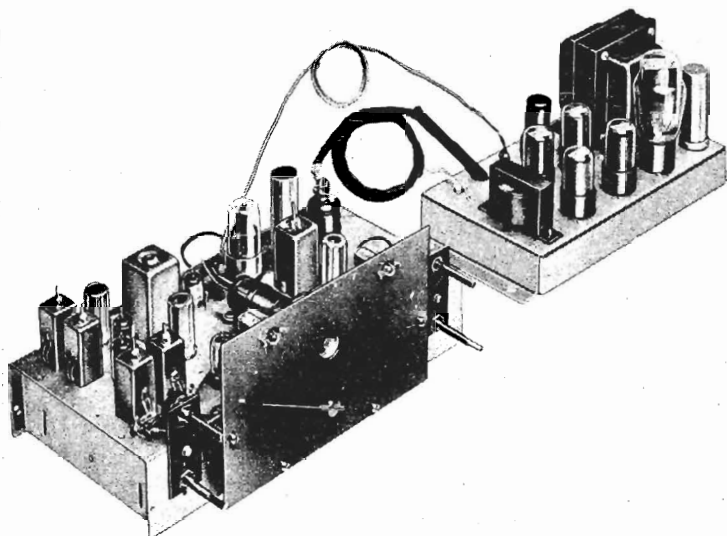


Figure 1. Chassis 168

| | |
|------------------------|--------|
| Cabinet | |
| Model 537 | 7593 |
| Model 538 | 7592 |
| Radio Chassis | 168 |
| Speaker | 9070 |
| Antenna | |
| AM | 55213 |
| FM Assembly | 55218 |
| Record Changer | 9078 |
| Dial Glass | 748 |
| Backboard | 3715 |
| Record Changer Drawer | 6659 |
| Knobs | |
| Tuning | 33517A |
| Off-On Treble Assembly | 33516A |
| Volume | 33517A |
| Band Switch | 33517C |
| Bass | 3656A |

MODELS 537,
538, Ch. 168

ELECTRICAL AND MECHANICAL DATA

Power Requirements:

Operating Voltage 115 V AC 60 cps
Watts 150

Tuning Range:

AM 535 KC to 1650 KC
FM 88 MC to 108 MC

Audio Power Output 15 Watts

Output Impedance 3.2 ohms at 400 cps

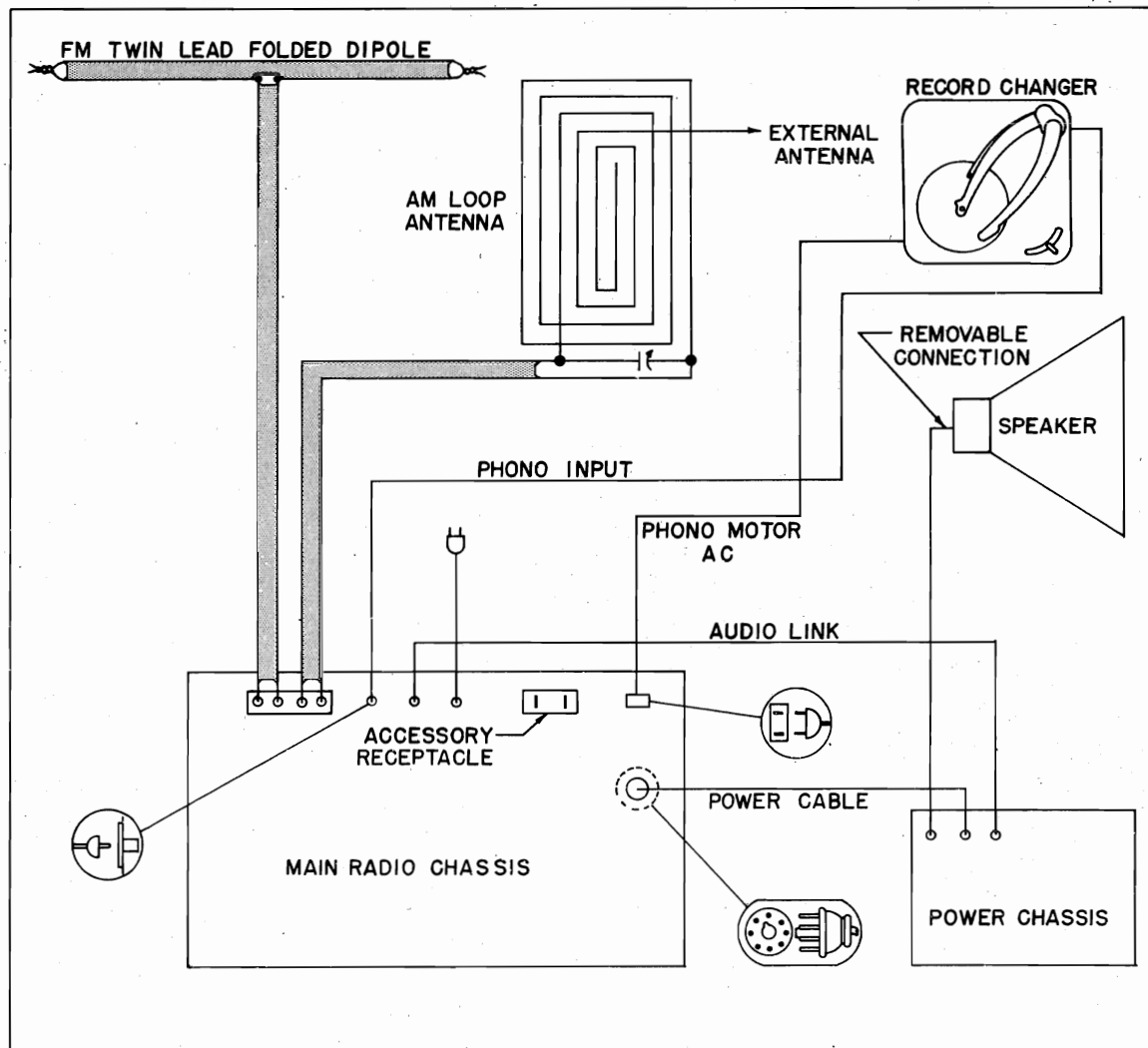
Intermediate Frequencies:

AM 455 KC
FM 10.7 MC

FM Antenna Input Impedance 300 ohms, balanced

TUBE COMPLEMENT

| | | | |
|---|-------|------------------------------------------------|-----------------------|
| 1 | 6BA6 | AM RF Amplifier | V1 |
| 1 | 6BE6 | AM Oscillator-Converter | V2 |
| 1 | 12AT7 | FM Oscillator-Converter | V3A, V3B |
| 1 | 6BA6 | AM-FM 1st IF Amplifier | V4 |
| 1 | 6BA6 | FM 2nd IF Amplifier | V5 |
| 1 | 6AL5 | FM Ratio Detector | V6 |
| 1 | 6AT6 | AM 2nd Detector, AVC, 1st Audio (AM and FM) | V7 |
| 1 | 6J5 | 2nd Audio Amplifier | V8 |
| 1 | 6J5 | Audio Phase Inverter | V9 |
| 4 | 6K6GT | Audio Power Amplifiers | V10, V11, V12, V13 |
| 1 | 5U4G | Rectifier | V14 |
| 1 | 6E5 | Tuning Indicator | V15 |



BLOCK DIAGRAM

Chassis 168 is a fifteen-tube combination AM-FM radio receiver, including tuning indicator and rectifier. The receiver uses an indoor loop antenna for normal AM reception; an external antenna may be used in very weak AM areas. It is designed to be used with an indoor FM antenna in normal signal areas and an outside FM antenna and a 300 ohm, balanced transmission line in weak signal areas. The indoor FM antenna is located in the receiver cabinet, and it should be disconnected from the FM antenna terminal posts when an outside antenna is used.

The physical make-up of chassis 168 consists of two units, as shown in figure 1. The unit on the right contains the power supply and power amplifier stages. The main unit, shown on the left side of the figure, contains the AM RF stage, AM and FM oscillator-converter stages, AM and FM IF stages, voltage amplifier stages, and tuning indicator. The main unit contains the dial mechanism. Dial stringing details are indicated in figure 3. Dial calibration appears on the dial glass mounted on the front of the cabinet. Calibration points needed during alignment are included on the dial background plate. These calibration points are indicated in figure 4.

The main unit is mounted in place horizontally on rubber shock mounts which rest on wooden blocks that are bolted in the cabinet from below the unit. The power unit is mounted horizontally below the main unit. It is shock mounted and held in place by a bolt at each corner.

CONTROLS

Operation of the VOLUME and TUNING controls is conventional. The BAND SWITCH has three positions for selecting one of the following: PHONO, AM radio, or FM radio. The PHONO position is selected with the switch in the extreme counterclockwise position, and the other two positions are selected in the order listed by clockwise rotation of the band switch control shaft.

The BASS and TREBLE controls are the dual type with the OFF-ON switch coupled to the TREBLE control. When the TREBLE control is in its extreme counterclockwise position, the receiver is turned off. Clockwise rotation of the TREBLE control shaft turns the receiver on and increases the treble tone. Extreme counterclockwise rotation of the BASS control shaft gives minimum bass, clockwise rotation giving increase in bass tone. Location of the controls is shown in figure 4.

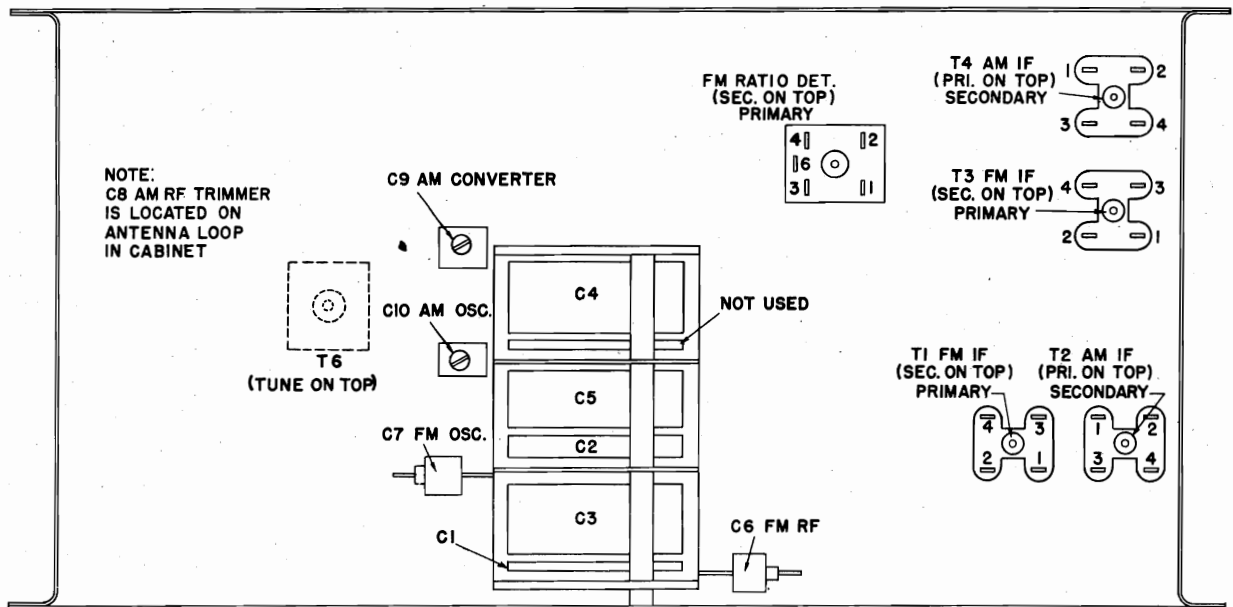


Figure 2. Trimmer Condenser Location - Bottom View

ALIGNMENT

This section describes the minimum equipment and procedure that is required to align the receiver satisfactorily. Before beginning alignment, the tuning condenser must be fully open, and the set should be allowed to warm up about 15 minutes. It is suggested that the alignment be performed on a metal-topped bench with generator, receiver, and voltmeter well bonded together. The bench area should be free of strong extraneous radiation.

Equipment:

CW Signal Generator capable of providing the frequencies listed in the table below. Must include audio modulating signal for AM alignment.

A voltmeter with at least a sensitivity of 20,000 ohms per volt (V.T.V.M. preferable). Should have AC scale.

MODELS 537,
538, Ch. 168

Two 100K ohm composition resistors.

Two 150 ohm composition resistors.

Procedure:

The AM section should be completely aligned before beginning the FM alignment. For AM alignment the generator is coupled to the receiver by placing the

"hot" lead next to the antenna loop so that lead and loop wire form a condenser. The voltmeter is connected across the voice coil and switched to a low AC scale. The coupling for FM alignment is two 150 ohm composition resistors, one in series with each generator lead. Before tuning the ratio detector transformer, solder two 100K ohm composition resistors in series from point "A", shown in figure 7, to ground. Remove them before aligning the FM RF section.

ALIGNMENT TABLE

| Step No. | Band Switch Position | Signal Generator Frequency | Connect Signal To | Condenser Setting (See Fig. 4) | Voltmeter | Adjust | Instructions |
|----------|----------------------|----------------------------|-------------------------------------------|--------------------------------|-------------------------------------------------------------------------------|------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| 1 | AM | 455 KC 400 cps Mod. | 6BE6 V2 Pin 7 | Full Open | Across Voice Coil | T2 Pri., Sec. T4 Pri., Sec. | Adjust for max. output. Use as low a signal input as possible. |
| 2 | " | 1650 KC 400 cps Mod. | Antenna Loop as described above. | " | " | C10 AM Osc. Trimmer | " |
| 3 | " | 1410 KC 400 cps Mod. | " | F | " | C8, C9 AM RF Trimmer | " |
| 4 | " | 600 KC 400 cps Mod. | " | B | " | T6 | Adjust for max. output. |
| 5 | " | " | " | " | " | Plates of C3 | Bend plates as required. Adjust for max. reading. |
| 6 | FM | 10.7 MC CW | FM Ant. Terminals | Full Open | Between point A and ground. | T1 Pri., Sec. T3 Pri., Sec. T5 Pri. only | Adjust for max. voltmeter reading. |
| 7 | " | " | " | " | Between junction of two 100K re- sistors added and point C. | T5 Sec. | Adjust for zero reading, using a low signal input to avoid overloading. |
| 8 | " | 107 MC CW | " | G | Point A to ground. | C7 FM Osc. Trimmer | Remove 100K resistors. Adjust for max. reading. Make certain receiver osc. freq. is 10.7 MC above incoming signal freq. |
| 9 | " | " | " | " | " | C6 FM RF Trimmer | " |
| 10 | " | 98 MC CW | " | D | " | Plates of C1 | Bend plates as required. Adjust for max. reading. |
| 11 | " | 90 MC CW | " | C | " | " | " |

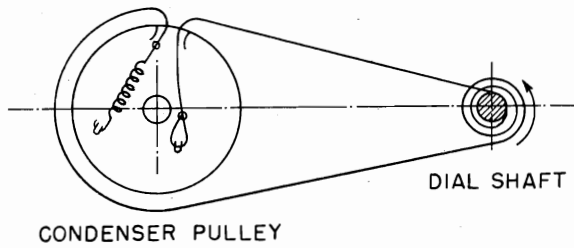


Figure 3. Dial Stringing

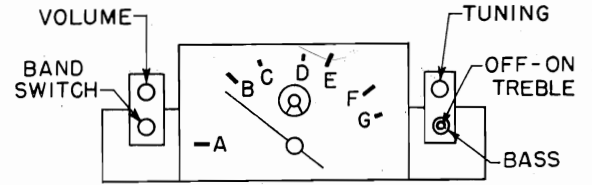


Figure 4. Location of Controls

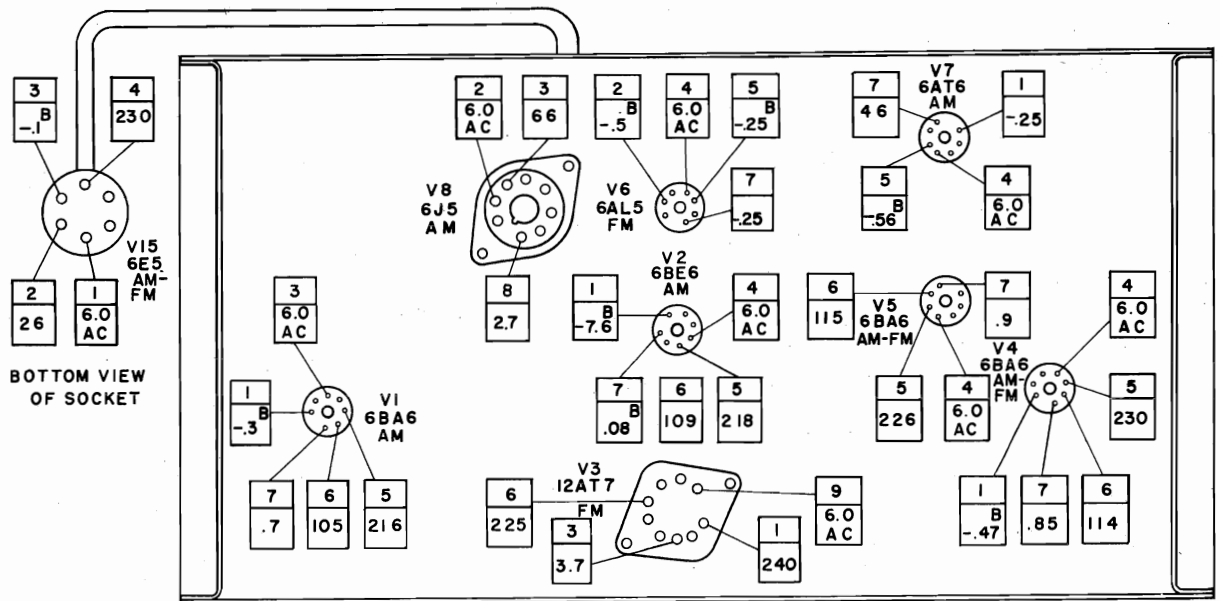


Figure 5. Pin Voltages of Main Unit

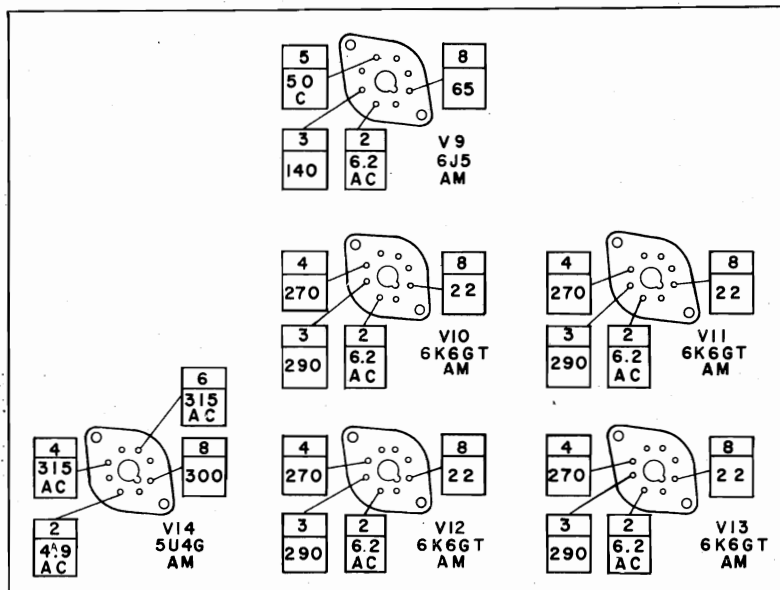


Figure 6. Pin Voltages of Power Unit

NOTES:

All voltages measured to chassis unless otherwise noted.

DC voltages measured with 20,000 ohm/volt meter.

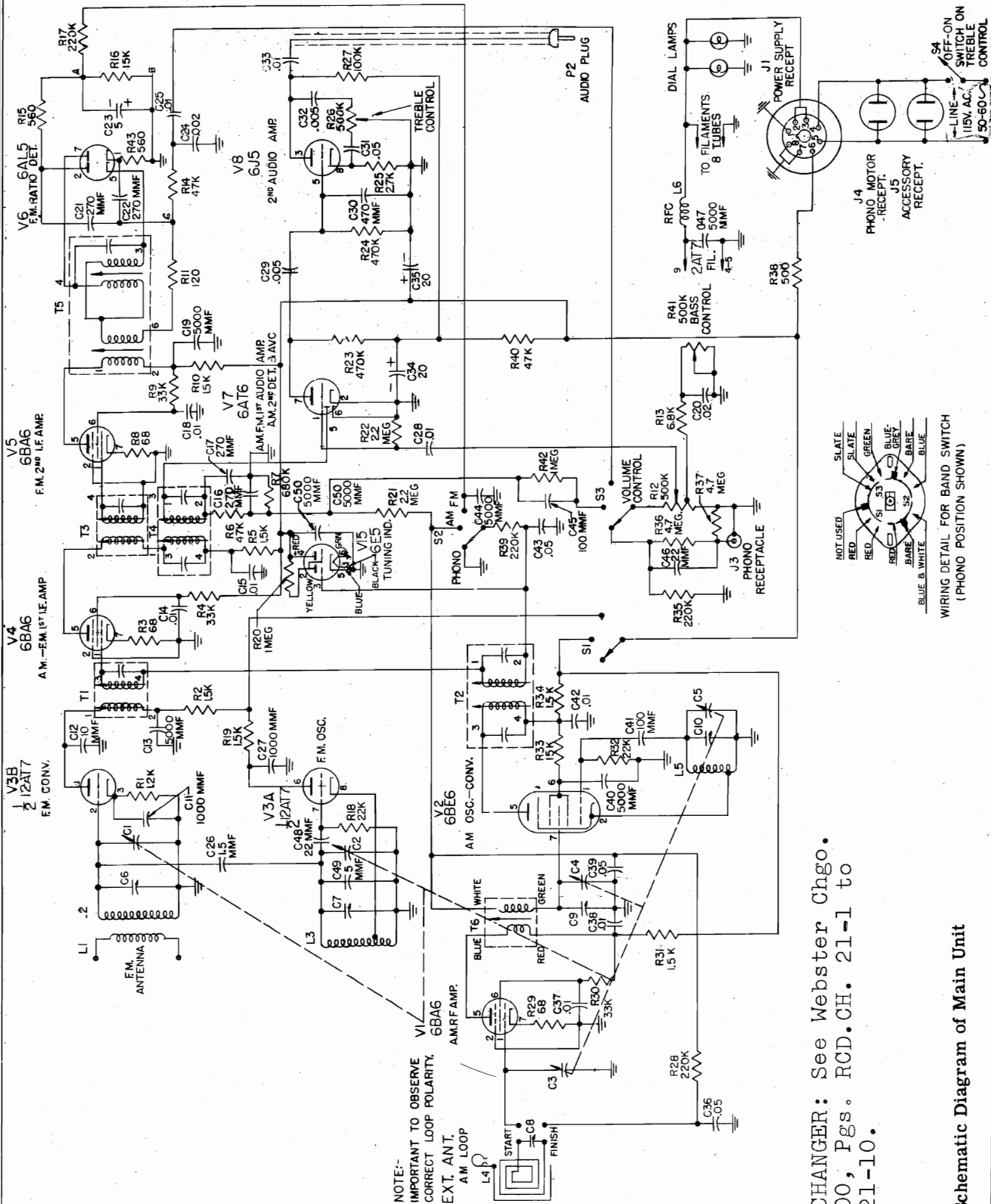
AC voltages measured with 1000 ohm/volt meter.

All measurements made with no signal input to receiver.

All pin voltages not indicated on diagram are at ground potential for all practical purposes.

A Measured from pin 2 to pin 8
B VTVM
C 250 V. scale

MODELS 537,
538, Ch. 168



RECORD CHANGER: See Webster Chgo. Model 100, Pgs. RCD.CH. 21-1 to RCD.CH.21-10.

Figure 7. Schematic Diagram of Main Unit

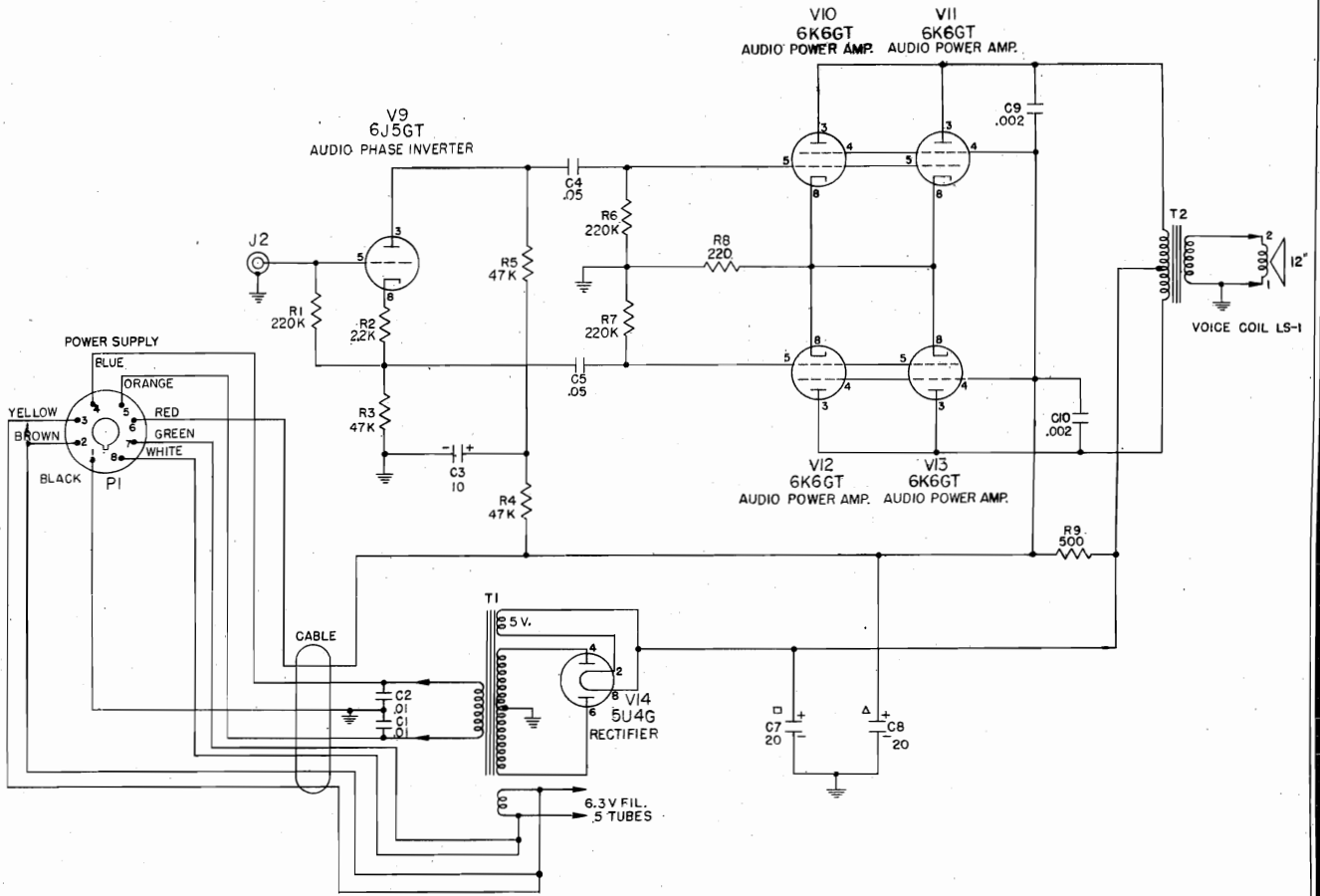


Figure 8. Schematic Diagram of Power Supply and Audio Section

PARTS LIST FOR POWER UNIT

| SYMBOL | PART NO. | VALUE | TOL. | WATTS OR VOLTS | TYPE |
|--------|------------|--------------------|------|----------------|----------------------|
| C1 | 4105 | .01 | | 600 V | Paper |
| C2 | 4103 | .01 | | 600 V | Paper |
| C3 | 4203 | 10 | | 450 V | Tubular Electrolytic |
| C4 | 4101 | .05 | | 400 V | Paper |
| C5 | 4101 | .05 | | 400 V | Paper |
| C6 | (Not Used) | | | | |
| C7 | 4231 | 20-20 | | 450 V | Electrolytic |
| C8 | | | | | |
| C9 | 4118 | .002 | | 600 V | Paper |
| C10 | 4118 | .002 | | 600 V | Paper |
| R1 | 4500 | 220K | 20% | | |
| R2 | 4512 | 2.2K | 20% | | |
| R3 | 4559 | 47K | 10% | | |
| R4 | 4504 | 47K | 20% | | |
| R5 | 4559 | 47K | 10% | | |
| R6 | 4500 | 220K | 20% | | |
| R7 | 4500 | 220K | 20% | | |
| R8 | 4706 | 220 | 20% | 3 W | |
| R9 | 4700 | 500 | 10% | 5 W | |
| T1 | 5001-4 | Power Transformer | | | |
| T2 | 5108 | Output Transformer | | | |
| P1 | 6212 | Plug, Power Supply | | | |

MODELS 537,
538, Ch. 168

PARTS LIST FOR MAIN UNIT

NOTES:

All values of capacity are microfarads unless otherwise noted.

All resistors are 1/2 watt composition type with values given in ohms unless otherwise specified.

| SYMBOL | PART NO. | VALUE | TOL. | WATTS OR VOLTS | TYPE |
|--------|----------|--------------------------------------|------|-------------------|------------------------|
| C1 | 4411 | 3 Gang AM, FM (1 Section unused) | | | |
| C2 | | | | | |
| C3 | | | | | |
| C4 | | | | | |
| C5 | | | | | |
| C6 | 4318 | Trimmer (FM Section) | | | |
| C7 | 4318 | Trimmer (FM Section) | | | |
| C8 | 4313 | Trimmer (Located on AM Antenna Loop) | | | |
| C9 | 4313 | Trimmer (AM Section) | | | |
| C10 | 4313 | Trimmer (AM Section) | | | |
| C11 | 4025 | 1000 mmf | | | Ceramic Hi-K |
| C12 | 4027 | 10 mmf | 10% | | Ceramic |
| C13 | 4029 | 5000 mmf | | | Ceramic Hi-K |
| C14 | 4112 | .01 | | 400 V | Paper |
| C15 | 4112 | .01 | | 400 V | Paper |
| C16 | 4001 | 270 mmf | 20% | | Mica |
| C17 | 4001 | 270 mmf | 20% | | Mica |
| C18 | 4112 | .01 | | 400 V | Paper |
| C19 | 4029 | 5000 mmf | | | Ceramic Hi-K |
| C20 | 4106 | .02 | | 400 V | Paper |
| C21 | 4001 | 270 mmf | 20% | | Mica |
| C22 | 4001 | 270 mmf | 20% | | Mica |
| C23 | 4209 | 5 | | 50 V | Electrolytic |
| C24 | 4118 | .002 | | 600 V | Paper |
| C25 | 4112 | .01 | | 400 V | Paper |
| C26 | 4024 | 1.5 mmf | 10% | | Mica |
| C27 | 4025 | 1000 mmf | | | Ceramic Hi-K |
| C28 | 4112 | .01 | | 400 V | Paper |
| C29 | 4102 | .005 | | 600 V | Paper |
| C30 | 4003 | 470 mmf | 20% | | Mica |
| C31 | 4100 | .05 | | 200 V | Paper |
| C32 | 4102 | .005 | | 600 V | Paper |
| C33 | 4112 | .01 | | 400 V | Paper |
| C34 | 4200 | 20-20 | | 450 V | Electrolytic |
| C35 | | | | | |
| C36 | | | | | |
| C37 | | | | | |
| C38 | | | | | |
| C39 | 4100 | .05 | | 200 V | Paper |
| C40 | 4029 | 5000 mmf | | | Ceramic Hi-K |
| C41 | 4000 | 100 mmf | 20% | | Mica |
| C42 | 4112 | .01 | | 400 V | Paper |
| C43 | 4100 | .05 | | 200 V | Paper |
| C44 | 4029 | 5000 mmf | | | Ceramic Hi-K |
| C45 | 4000 | 100 mmf | 20% | | Mica |
| C46 | 4021 | 22 mmf | 10% | | N150 Ceramic |
| C47 | 4029 | 5000 mmf | | | Ceramic Hi-K |
| C48 | 4021 | 22 mmf | 10% | | N150 Ceramic |
| C49 | 4028 | 5 mmf | 10% | | N750 Ceramic |
| C50 | 4029 | 5000 mmf | | | Ceramic Hi-K |
| R1 | 4553 | 1.2K | 20% | | |
| R2 | 4534 | 1.5K | 20% | | |
| R3 | 4524 | 68 | 20% | | |
| R4 | 4556 | 33K | 20% | 1 W | |
| R5 | 4534 | 1.5K | 20% | | |
| R6 | 4504 | 47K | 20% | | |
| R7 | 4555 | 680K | 20% | | |
| R8 | 4524 | 68 | 20% | | |
| R9 | 4556 | 33K | 20% | 1 W | |
| R10 | 4534 | 1.5K | 20% | | |
| R11 | 4546 | 120 | 10% | | |
| R12 | 4843 | .5 meg. | | | Volume Control, tapped |

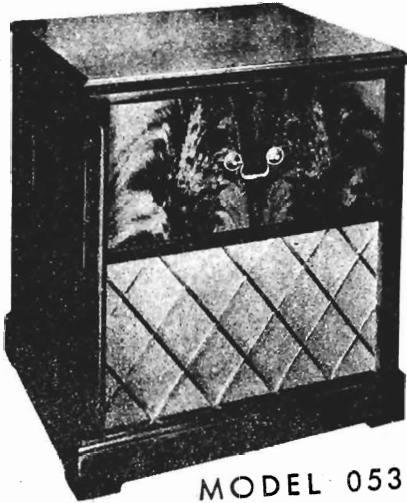
| SYMBOL | PART NO. | VALUE | TOL. | WATTS OR VOLTS | TYPE |
|--------|----------|----------|------|----------------|-------------------------------|
| R13 | 4557 | 6.8K | 10% | | |
| R14 | 4504 | 47K | 20% | | |
| R15 | 4507 | 560 | 10% | | |
| R16 | 4521 | 15K | 20% | 1 W | |
| R17 | 4500 | 220K | 20% | | |
| R18 | 4501 | 22K | 20% | | |
| R19 | 4534 | 1.5K | 20% | | |
| R20 | 4513 | 1 meg. | 20% | | |
| R21 | 4502 | 2.2 meg. | 20% | | |
| R22 | 4502 | 2.2 meg. | 20% | | |
| R23 | 4506 | 470K | 20% | | |
| R24 | 4506 | 470K | 20% | | |
| R25 | 4519 | 2.7K | 10% | | |
| R26 | 4840 | 500K | | | Dual Bass and Treble Controls |
| R27 | 4511 | 100K | 20% | | |
| R28 | 4500 | 220K | 20% | | |
| R29 | 4524 | 68 | 20% | | |
| R30 | 4556 | 33K | 20% | 1 W | |
| R31 | 4534 | 1.5K | 20% | | |
| R32 | 4501 | 22K | 20% | | |
| R33 | 4539 | 15K | 20% | 1 W | |
| R34 | 4534 | 1.5K | 20% | | |
| R35 | 4500 | 220K | 20% | | |
| R36 | 4544 | 4.7 meg. | 20% | | |
| R37 | 4544 | 4.7 meg. | 20% | | |
| R38 | 4700 | 500 | 10% | 5 W | |
| R39 | 4500 | 220K | 20% | | |
| R40 | 4504 | 47K | 20% | | |
| R41 | 4840 | 500K | | | Dual Bass and Treble Controls |
| R42 | 4513 | 1 meg. | 20% | | |
| R43 | 4507 | 560 | 10% | | |

| SYMBOL | PART NO. | DESCRIPTION |
|--------|----------|-------------------------------------------------|
| L1 | 5258 | FM Antenna Primary |
| L2 | 5248 | FM Antenna Secondary |
| L3 | 5247 | FM Oscillator Coil |
| L4 | 5279 | AM Loop Antenna |
| L5 | 5282 | AM Oscillator Coil |
| L6 | 5266 | RFC Filament Choke |
| T1 | 5284 | FM 1st IF Transformer |
| T2 | 5286 | AM 1st IF Transformer |
| T3 | 5285 | FM 2nd IF Transformer |
| T4 | 5287 | AM 2nd IF Transformer |
| T5 | 5288 | FM Ratio Detector Transformer |
| T6 | 5289 | AM RF Interstage Transformer |
| S1 | 6024 | Band Change Switch (3 Pole - 3 Position Rotary) |
| S2 | | |
| S3 | | |
| S4 | | |
| P2 | 6203 | Plug, Audio Output (Single Prong) |
| | 518 | Pointer, Dial |
| J3 | 6121 | Receptacle, Phono |
| J4 | 6108 | Receptacle, Phono Motor |
| J5 | 6108 | Receptacle, Accessory |
| | 6134 | Socket, 9 Pin Miniature |
| | 6123 | Socket, 7 Pin Miniature |
| | 6103 | Socket, Octal |
| | 6110 | Socket, Pilot Lamp |
| | 9507 | Spring, Dial |
| | 424 | Strip, Antenna Terminal |
| | 2224D | Plate, Dial Background |
| | 6112 | Socket, Tube with Cable (Eye Tube) |
| | 9505 | Pilot Lamp |

MODELS 053, JP50-3,
JP90-3, Ch.RP5L, RP5U

PARTS LIST

COILS AND TRANSFORMERS



MODEL 053

| REF. NO. | PART NO. | DESCRIPTION |
|----------------|-----------|-----------------------------------------------|
| L ₁ | A-1493-10 | Loop Antenna |
| L ₂ | A-1492-10 | Oscillator Coil |
| T ₁ | A-1490-10 | Input IF Transformer |
| T ₂ | A-1491-10 | Output IF Transformer |
| T ₃ | A-1656-13 | Audio Output Transformer 2500 ω to 3.2 |

MISCELLANEOUS

| | |
|-----------|--------------------------|
| C-2500-14 | Record changer - VM |
| A-1059-4 | Control knob |
| A-1060-4 | Pointer knob |
| 100-84 | Record Changer - Webster |

CAPACITORS

| REF. NO. | PART NO. | DESCRIPTION |
|----------------|--------------|---------------------------------------------|
| C ₁ | A-1200-6 | TUNING CAPACITOR |
| C ₂ | CWZ 04203 M | .02 Mfd 400 volts |
| C ₃ | CWZ 04503 M | .05 Mfd 400 volts |
| C ₄ | CWZ 06502 M | .005 Mfd 600 volts |
| C ₅ | CWZ 04203 M | .02 Mfd 400 volts |
| C ₆ | CED-4415 | DUAL 40 Mfd 150 volt electrolytic capacitor |
| C ₇ | CWR-04503 M | .05 Mfd resonant |
| C ₈ | CCC, 05050 M | 5 Mmf ceramic or mica |

RESISTORS

| REF. NO. | PART NO. | DESCRIPTION |
|-----------------|-----------|-----------------------------------------------------|
| R ₁ | RCC 224 M | 220,000 ohms \pm 20% 1/2 watt Resistor |
| R ₂ | RCC 105 M | 1.0 megohms \pm 20% 1/2 watt Resistor |
| R ₃ | RCC 223 M | 22,000 ohms \pm 20% 1/2 watt Resistor |
| R ₄ | RCC 106 M | 10 megohms \pm 20% 1/2 watt Resistor |
| R ₅ | RVC-301S | 500,000 ohms volume control audio taper with switch |
| R ₆ | RCC 151 M | 150 ohms \pm 20% 1/2 watt |
| R ₇ | RCC 154 M | 150,000 ohms \pm 20% 1/2 watt |
| R ₈ | RCC 154 M | 150,000 ohms \pm 20% 1/2 watt |
| R ₉ | RCF 222 M | 2,200 ohms \pm 20% 1 watt |
| R ₁₀ | RCC 150 M | 15 ohms \pm 20% 1/2 watt |

VOLTAGE CHART

| PIN | #1 | #2 | #3 | #4 | #5 | #6 | #7 |
|-------|------|----|------|-------|-------|------|-----|
| 12BE6 | -7.5 | 0 | 12AC | 23AC | 90 | 90 | 0 |
| 12BA6 | -0.8 | 0 | 23AC | 35AC | 90 | 90 | 0 |
| 12AT6 | -0.8 | 0 | 0 | 12AC | -0.8 | -0.5 | 45 |
| 50C5 | 6 | 0 | 35AC | 83AC | 0 | 90 | 120 |
| 35W4 | 0 | 0 | 83AC | 117AC | 115AC | 0 | 130 |

NOTES:

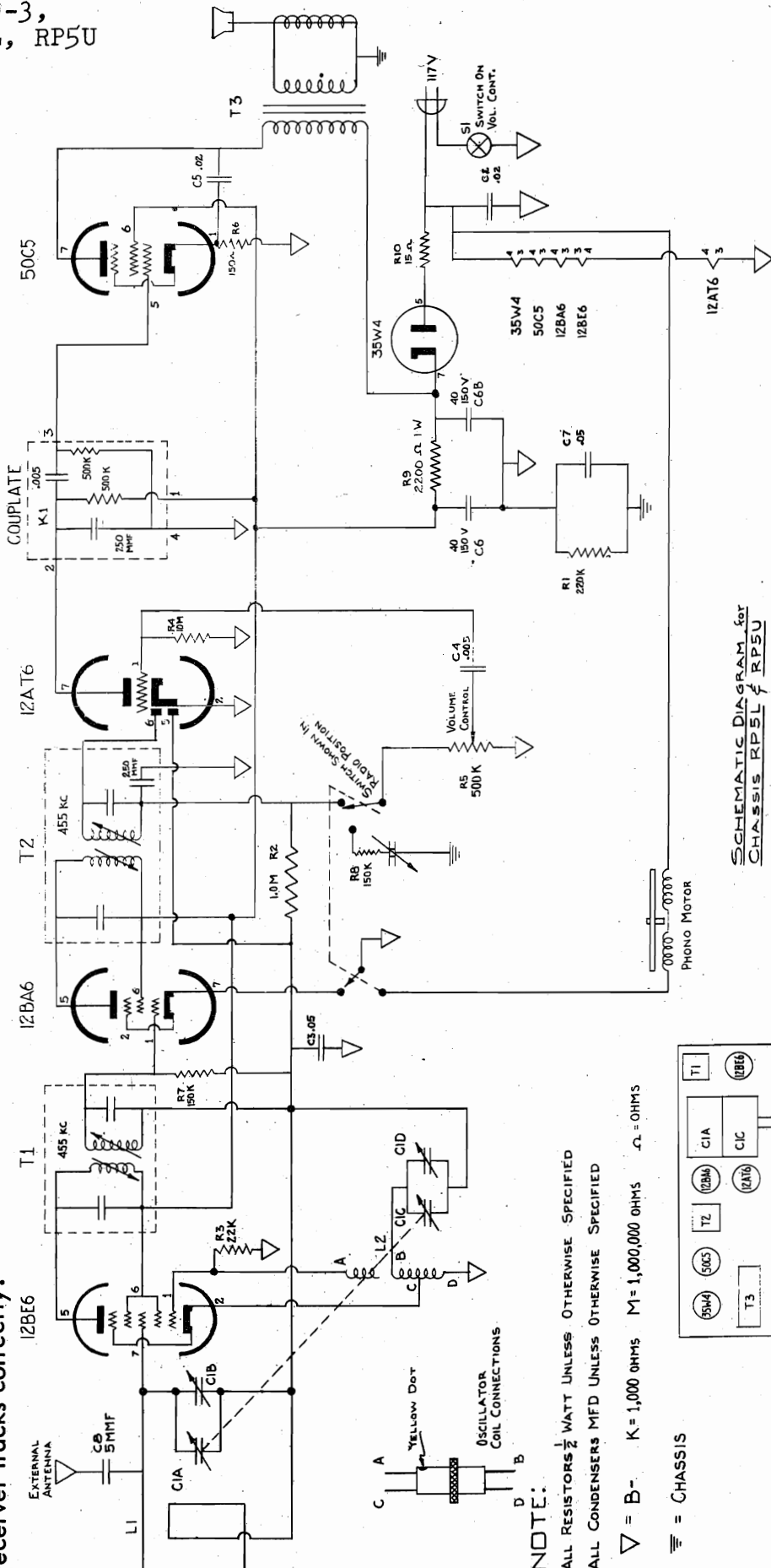
1. Measured with VTVM from indicated pin to B - line.
2. Phono-radio switch in radio position.
3. Line voltage set at 117V 60 ω AC.
4. Voltage s may vary considerably due to variations in line voltage and components.

MODELS 053, JP50-3,
JP90-3, Ch. RP5L, RP5U

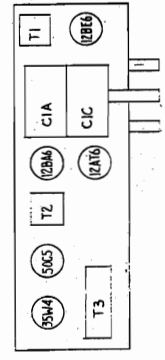
ALIGNMENT PROCEDURE

Feed a 455 K.C. modulated signal from grid (pin No. 7 12BE6 through a .01 M.F.D. condenser) and B-. Connect an output meter across the voice coil. Tune slugs on first and second I.F. transformers for maximum indication on meter. Set signal generator to 1600 KC modulated signal and couple loosely to loop antenna. Set dial to 1600 K.C. and tune oscillator trimmer for maximum indication on meter.

Set signal generator and dial to 1400 K.C. and tune R.F. trimmer, for maximum indication on meter. Check tracking at 600 K.C., knife gang if necessary. Repeat these adjustments until the receiver tracks correctly.



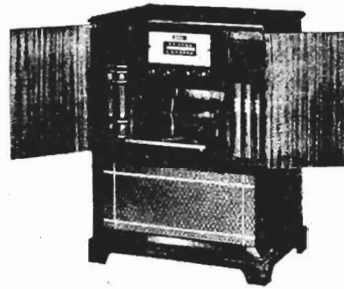
SCHEMATIC DIAGRAM FOR CHASSIS RP5L & RP5U



NOTE:
ALL RESISTORS 1/2 WATT UNLESS OTHERWISE SPECIFIED
ALL CONDENSERS MFD UNLESS OTHERWISE SPECIFIED

∇ = B- K = 1,000 OHMS M = 1,000,000 OHMS Ω = OHMS
≡ = CHASSIS

MODELS 153,
3170, Ch. AM7A



MODEL 153

HOW TO OPERATE THE RADIO:

This radio is equipped with four controls, the left hand control is the combined off-on switch and volume control. The second knob from the left is the phono-radio switch, the third knob is the tone control, the fourth control is used for tuning the desired station. To place the set in operation, rotate on-off volume control knob to right and allow 30 seconds for set to warm up. Rotate tuning control to desired station. Adjust volume control to desired volume, set tone control to treble or base response. To use phonograph follow above steps, except turn phono-radio switch, to phono position. Place records on changer in sequence desired, push reject button, and allow changer to cycle.

VOLTAGE CHART

| PIN | #1 | #2 | #3 | #4 | #5 | #6 | #7 |
|-------|------|----|-----|------|------|------|-----|
| 12BE6 | -7.3 | 0 | 24* | 24* | 78 | 78 | 0 |
| 12BA6 | -8. | 0 | 24* | 12* | 89 | 89 | 0 |
| 12AT6 | -1.8 | 0 | 0 | -8.* | -8. | -2.3 | 34 |
| 12AT6 | -.45 | 0 | 0 | 12* | 0 | 0 | 45 |
| 50C5 | -7.2 | 0 | 60* | 12* | 0 | 89 | 120 |
| 50C5 | -7.2 | 0 | 80* | 36* | 0 | 89 | 120 |
| 35W4 | -0 | 0 | 86* | 120* | 115* | 115* | 120 |

Measured with V.TVM from

Pin to B- line.

Set in radio position.

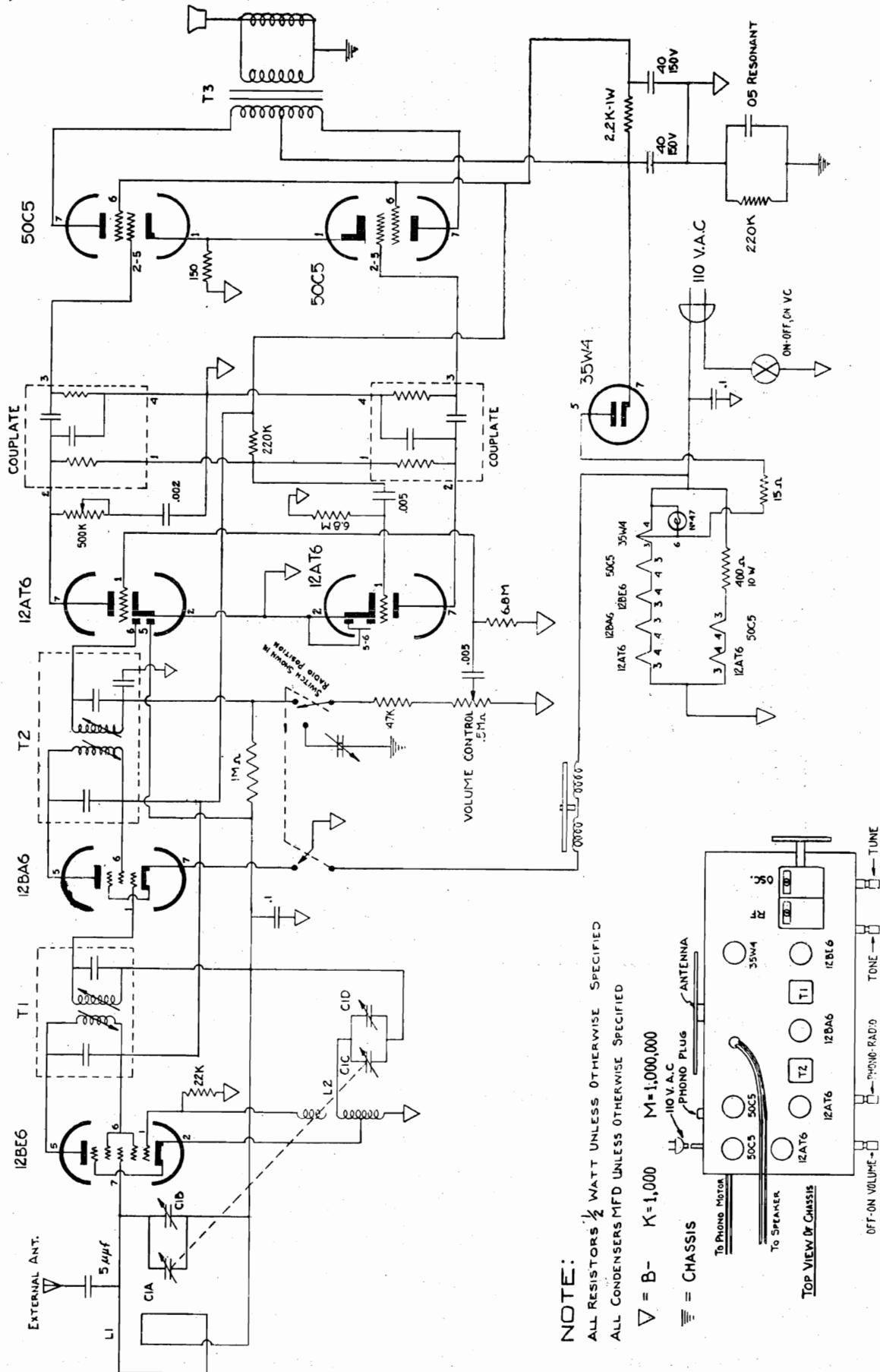
* A.C. Volts.

ALIGNMENT PROCEDURE

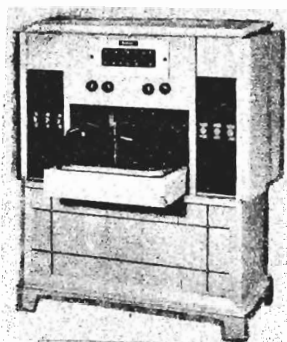
Feed a 455 K.C. modulated signal from grid to ground (pin No. 7 12BE6). Connect A output meter across the voice coil. Tune slugs on first and second I.F. transformers for maximum indication on meter. Set signal generator to 1600 K.C. Modulated signal and couple loosely to loop antenna. Set dial to 1600 K.C. and tune oscillator trimmer for maximum indication on meter.

Set signal generator and dial to 1400 K.C. and tune R.F. trimmer, for maximum indication on meter. Check tracking at 600 K.C., knife gang if necessary. Repeat these adjustments until the receiver tracks correctly.

MODELS 153,
3170, Ch. AM7A



MODELS 350,
5120, Ch. FA8A



MODEL 350
SPECIFICATIONS

- Power Supply.....105-125 volts 60 cycle AC only.
- Power Consumption.....65 Watts.
- Frequency Range FM.....88 to 108 MC.
- Frequency Range AM.....540 to 1600 KC.
- I.F. Frequency FM.....10.7 MC.
- I.F. Frequency AM.....455 KC.
- Band width, FM, Ratio Detector.....330 KC.
- Band width, FM, 1st I.F.....280 KC.
- Band width, FM, Converter.....220 KC.

All voltage readings are taken from tube pin to chassis. ALIGNMENT NOTES

All measurements are made with no signal, using a 20,000 ohm per volt meter.

AC input voltage must be maintained at 117 volts for accurate readings.

AC voltages shown are at 1000 ohms per volt.

All voltages shown are approximate.

VOLTAGE CHART

| | PIN 1 | PIN 2 | PIN 3 | PIN 4 | PIN 5 | PIN 6 | PIN 7 | PIN 8 | PIN 9 |
|------------------------------------|-----------|-------|---------|---------|-------|-------|-----------|-------|---------|
| 6BE6 FM & AM OSC AM CONV | 0 | 0 | 0 | 6 AC | 155 | 125 | 0 | | |
| 12AT7 FM RF AMP & CONV | 170 | 0 | 1.5 | 0 | 0 | 155 | 0 | 1 | 6 AC |
| 6BA6 1st IF AM & FM | 0 | 0 | 6 AC | 0 AC | 150 | 100 | 0 | | |
| 6BA6 2nd IF FM | 0 | 0 | 6 AC | 0 AC | 155 | 110 | 1 | | |
| 6AL5 FM DETECTOR | 0 | 0 | 6 AC | 0 AC | | 0 | 0 | | |
| 6AT6 AM DETECTOR, AVC, AUDIO | -.5 | 0 | 6 AC | 0 AC | 0 | 0 | 60 | | |
| 6AQ5 POWER OUTPUT | 0 | 7.5 | 6 AC | 0 AC | 215 | 170 | 0 | | |
| 6x4 POWER RECTIFIER | 230 AC | | 6 AC | 0 AC | 235 | 230 | 235 AC | | |

Band Switch on AM position. Dial 1600 KC. No Signal.

SERVICE NOTES

GENERAL

CAUTION: If realignment is necessary be sure the proper test equipment is available, as listed below, before proceeding with the alignment procedure as given on page 5.

Due to the high frequencies at which FM signals are received the service man must use great care when servicing these sets. Extreme caution must be used regarding the moving of component parts in the R.F. and oscillator circuits of the receiver as those circuits can be detuned in this manner.

If it becomes necessary to replace components such as resistors and condensers they must be replaced with parts of the same size, type, voltage rating and tolerance as called for in the parts list.

When installing new parts they should be placed in the same position as the original, and the leads should be cut to the same length.

This receiver has been thoroughly inspected and tested at the factory, using the most modern test equipment available, such as FM sweep generators and oscilloscopes. All R.F. and I.F. circuits have been accurately adjusted at the factory and no attempt should be made to realign these circuits unless it is absolutely necessary.

EQUIPMENT USED FOR ALIGNMENT

- Vacuum tube voltmeter.
- AM Signal generator
- FM Sweep generator.
- Oscilloscope.
- Insulated screw driver.
- Dummy antenna:
 - .1 MFD condenser
 - .00025 MED mica condenser
 - 150 ohm resistor (2)
- Output meter.

The tubes used are as follows:

- 12AT7 FM RF Amplifier, Converter
- 6BE6 FM Osc, Am Osc, Converter
- 6BA6 FM-AM, 1st I.F. Amplifier
- 6BA6 FM, 2nd I.F. Amplifier
- 6AL5 FM Detector
- 6AT6 AM Detector, AVC, Audio
- 6AQ5 Power Output
- 6X4 Power Rectifier
- No. 44 Pilot Lights (2)

MODELS 350,
5120, Ch. FA8A

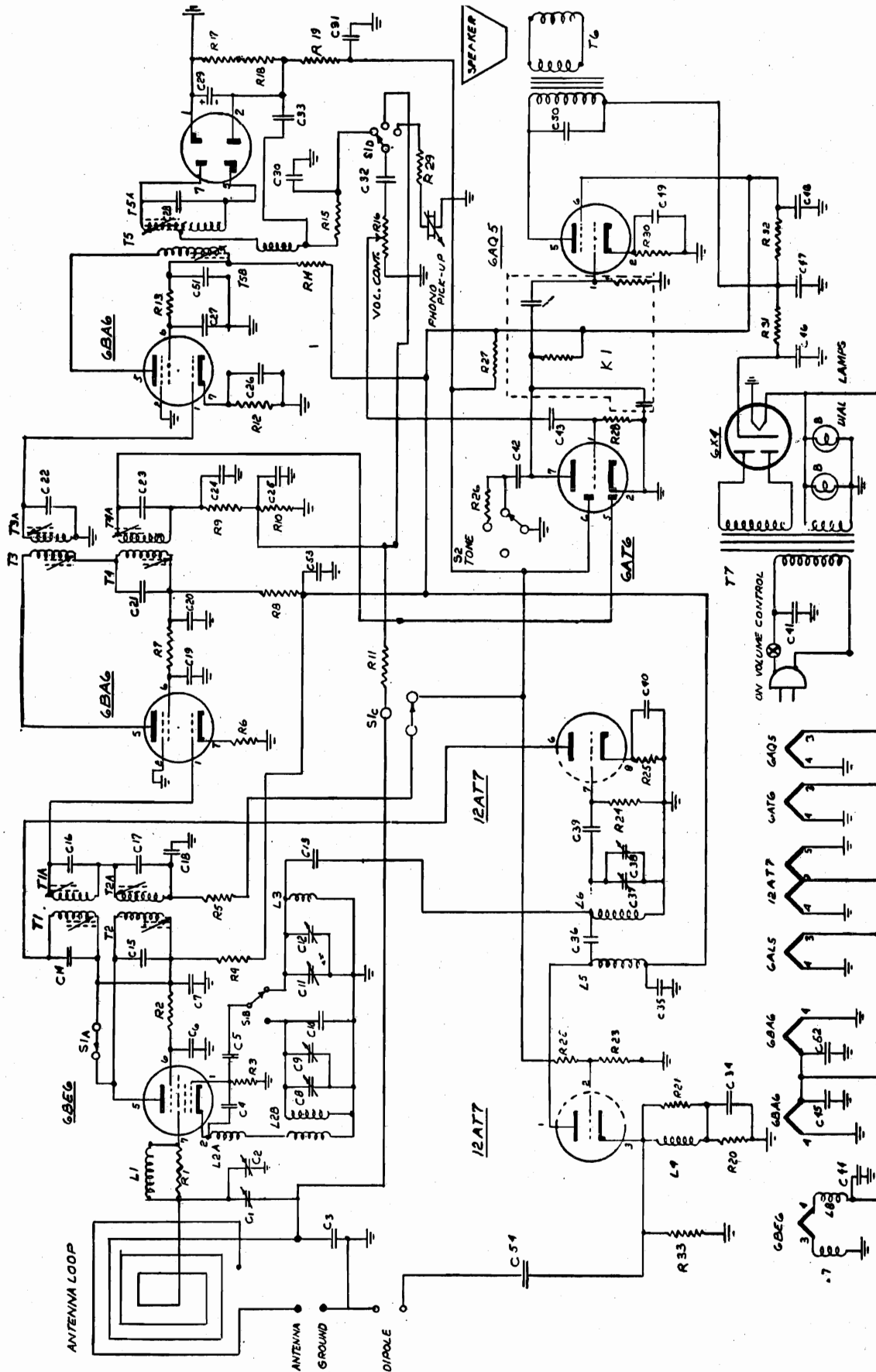


FIG. 1 SCHEMATIC DIAGRAM

ALIGNMENT PROCEDURE

| STEPS | RECEIVER DIAL SETTING | BAND SWITCH POSITION | SIGNAL GENERATOR FREQUENCY | DUMMY ANTENNA | SIGNAL GENERATOR CONNECTIONS | OUTPUT INDICATOR | TRIMMER ADJUSTMENT | TRIMMER FUNCTION | REMARKS |
|-------|-----------------------------------------------------------------|----------------------|-------------------------------------------------------------|-----------------------|-------------------------------------------------------------------------|----------------------------------------------------------------|--------------------|--------------------------|---------------------------------------------------------------|
| 1 | Minimum capacity | AM | 455 KC 400 cycle AM | .1 MFD | High side—grid of AM converter tube (6BE6) Low side—chassis | Output Meter across voice coil | T2 & T4 | AM I.F. | Adjust for maximum output |
| 2 | " | " | 1600 KC 400 cycle AM | " | " | " | AM OSC | AM Oscillator | " |
| 3 | 1400 KC Any position where there is no station interference. | " | 1400 KC 400 cycle AM | .00025 MFD | High side—One ant. terminal Low side—Other ant. terminal | " | Ant Loop | AM Antenna | " |
| 4 | " | FM | 10.7 MC unmodulated .1 volt output. | .1 MFD | High side—grid of 2nd I.F. amplifier tube (6BA6) Low side—chassis | Connect V.T.V.M. to plate of Ratio Detector tube, pin 2 (6AL5) | Top T5 | Ratio detector primary | Adjust for maximum negative voltage. |
| 5 | " | " | 10.7 MC 400 cycle 250 KC Deviation | " | " | Connect scope to audio take-off point (across vol. cont.) | Bottom T5 | Ratio detector secondary | Adjust for a balanced pattern on scope. See Fig. 2 |
| 6 | " | " | 10.7 MC 400 cycle 80 KC Deviation | " | High side—grid of 1st I.F. amplifier tube (6BA6) Low side—chassis | " | T3 | FM 2nd I.F. | Adjust for maximum gain and best pattern on scope. See Fig. 2 |
| 7 | " | " | " | " | High side—grid (pin 7) of FM converter tube (12AT7) Low side—chassis | " | T1 | FM 1st I.F. | " |
| 8 | 108.5 MC | " | 108.5 MC 400 cycle 30% modulation (22.5 KC deviation) | 300 ohms in high side | High side—ant. terminal Low side—chassis | Connect output meter across voice coil | FM OSC. | FM oscillator | Adjust for maximum output |
| 9 | 105 MC | " | 105 MC 400 cycle 30% modulation (22.5 KC deviation) | " | " | " | FM RF | FM R.F. | " |

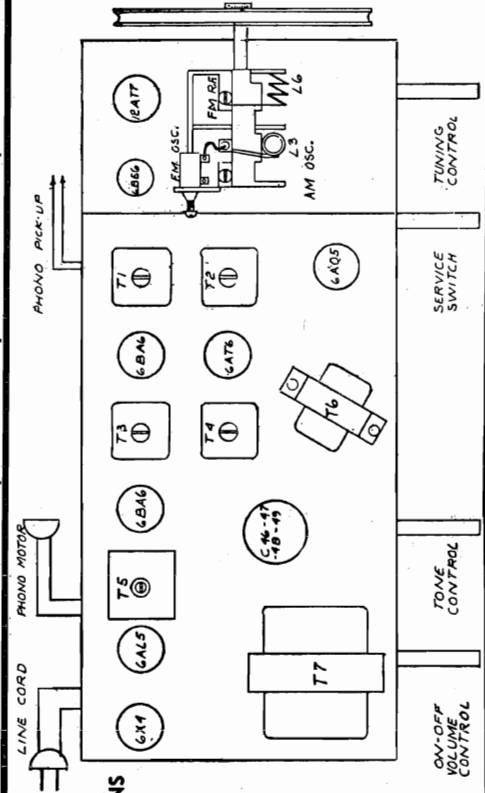


FIG. 3 TUBE AND TRIMMER LOCATIONS

NOTE A: When aligning the FM I.F. circuits, keep the output from the signal generator as low as possible.

FIGURE 2

MODELS 350,
5120, Ch. FA8A

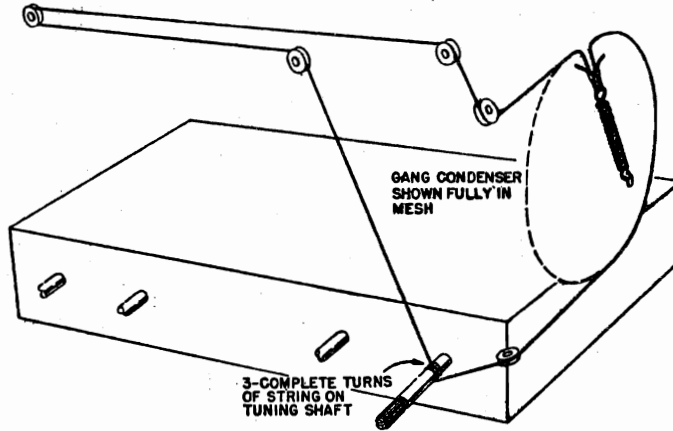
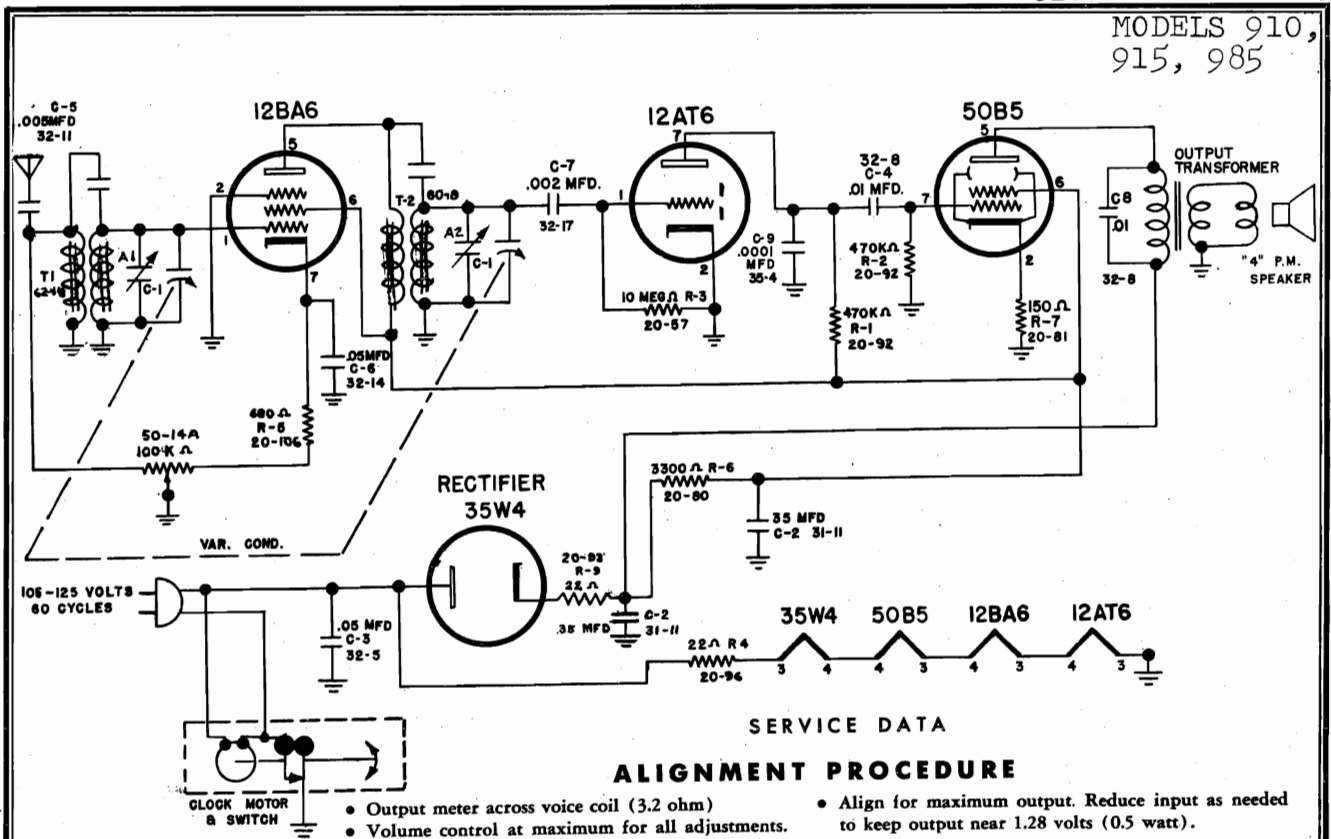


FIG. 4 DIAL CORD STRINGING

PARTS LIST

| Schematic Diagram Reference | Description | | |
|-----------------------------|----------------------------------------|-------------------------------------------------------|-------------------------------|
| C1 | Loop Trimmer..... | R10, R23, R24 | 470K ohm Resistor..... |
| C2 | Variable Cond..... | R11, R22 | 2.2M ohm Resistor..... |
| C8, C9 | | R16 | .5M Vol. Cont. — SPST..... |
| C11, C37 | | R17, R18 | 12K Resistor..... |
| C38 | .05-200V Condenser | R20 | 220 ohm Resistor..... |
| C3 | | R25 | 2.2K ohm..... |
| C4 | 2.2 MMF Gimmick Cond..... | R27 | 3.3M ohm |
| C5 | 33 MMF (Erie Style A N14004)..... | R28 | 6.8M ohm |
| C6, 18 | } 5000 MMFD GMV..... | R30 | 270 ohm — 1 Watt..... |
| C19, 27 | | R31 | 100 ohm — 1 Watt..... |
| C26 | | R32 | 1000 ohm — 5 Watt..... |
| C42, C45, 51 | | R33 | 560 ohm |
| C50, C52 | | K1 | CRL Triode couplate..... |
| C10 | 15 MMFD + or — 10% O° T.C. (Erie).... | L1 | AM Grid Choke on R1..... |
| C12 | FM Osc Trimmer..... | L2A, B | AM Osc. Coil..... |
| C13 | 1.5 MMFD (Erie Style "A")..... | L3 | FM Osc. Coil..... |
| C14, 15, 16, 17 | } Integral part of respective IF—XFMS | L4 | FM Cathode choke on R21 |
| 21, 22, 23, 24, 28 | | L5 | FM plate choke..... |
| | | L6 | FM RF Coil..... |
| C31, 32, 53, 7, 20 | 10,000 MMFD GMV..... | D-1 | Dial Scale |
| C25 | | L7, 8 | Filament choke |
| 36, 39, 54 | 100 MMF ceramic cond..... | T1 | 1st FM IF..... |
| C29 | 4 - 50V Lytic condenser..... | T2 | 1st AM IF..... |
| C30 | 2000 MMFD Condenser..... | T3 | 2nd FM IF..... |
| C33 | 470 MMFD Condenser..... | T4 | 2nd AM IF..... |
| C34, 35 | } 1000 MMFD GMV condenser..... | T5 | Ratio Detector |
| 40, 44, 53 | | T6 | Out Put XFMR..... |
| C41 | .1 - 400V condenser..... | T7 | Power XFMR |
| C43 | .01 - 200V condenser..... | B | Loop Ant. |
| C46, 47 | } 40-350V, 30-300V FP Lytic Condenser. | | No. 44 Pilot Light..... |
| 48, 49 | | 30-300V, 10-25V |  | Line cord ..... |
| R2 | 4.7K ohm Resistor..... | K=1000 | 300 ohm Line Di-Pole Ant..... |
| R3, R15 | 22K ohm Resistor..... | M=1,000,000 | |
| R4, R8, R14 | 1K ohm Resistor..... | All Resistors ½ Watt unless otherwise noted. | |
| R5, R19 | 100K ohm Resistor..... | Values of Capacitors in MFD. unless otherwise stated. | |
| R6, R12 | 68 ohm Resistor..... | Tolerance on Capacitors and Resistors + or — 20% | |
| R7, R13 | 10K ohm Resistor..... | unless otherwise stated. | |
| R9, R26 | 47K ohm Resistor..... | | |

MODELS 910,
915, 985



SERVICE DATA

ALIGNMENT PROCEDURE

- Output meter across voice coil (3.2 ohm)
- Volume control at maximum for all adjustments.
- Align for maximum output. Reduce input as needed to keep output near 1.28 volts (0.5 watt).

| SIGNAL GENERATOR | | | | Tuner Adjustment | ADJUST TRIMMERS TO MAXIMUM OUTPUT (in order shown) |
|------------------|--------------------|-------------------------|-------------------|--------------------------------------|----------------------------------------------------|
| Frequency | Coupling Capacitor | Connections to Receiver | Ground Connection | | |
| 1650 kc | 50 mmf | Antenna** | B- | Rotor full open (Plates out of mesh) | RF trimmer A2 Antenna trimmer A1 |
| 1500 Kc | 50 mmf | Antenna** | B- | 1500 Kc* | RF Trimmer A2 Antenna Trimmer A1 |

* Seven markings on the dial bracket represent respectively 550 kc, 600 kc, 700 kc, 900 kc, 1100 kc, 1400 kc, and 1600 kc reading from left to right. These points are to be used for the alignment of the receiver.

** Disconnect antenna hank by unsoldering

WAKE MASTER "JEWEL"
MODEL 910-915-985
105-125 VOLTS, 60 CYCLES
RANGE 540-1650 KC

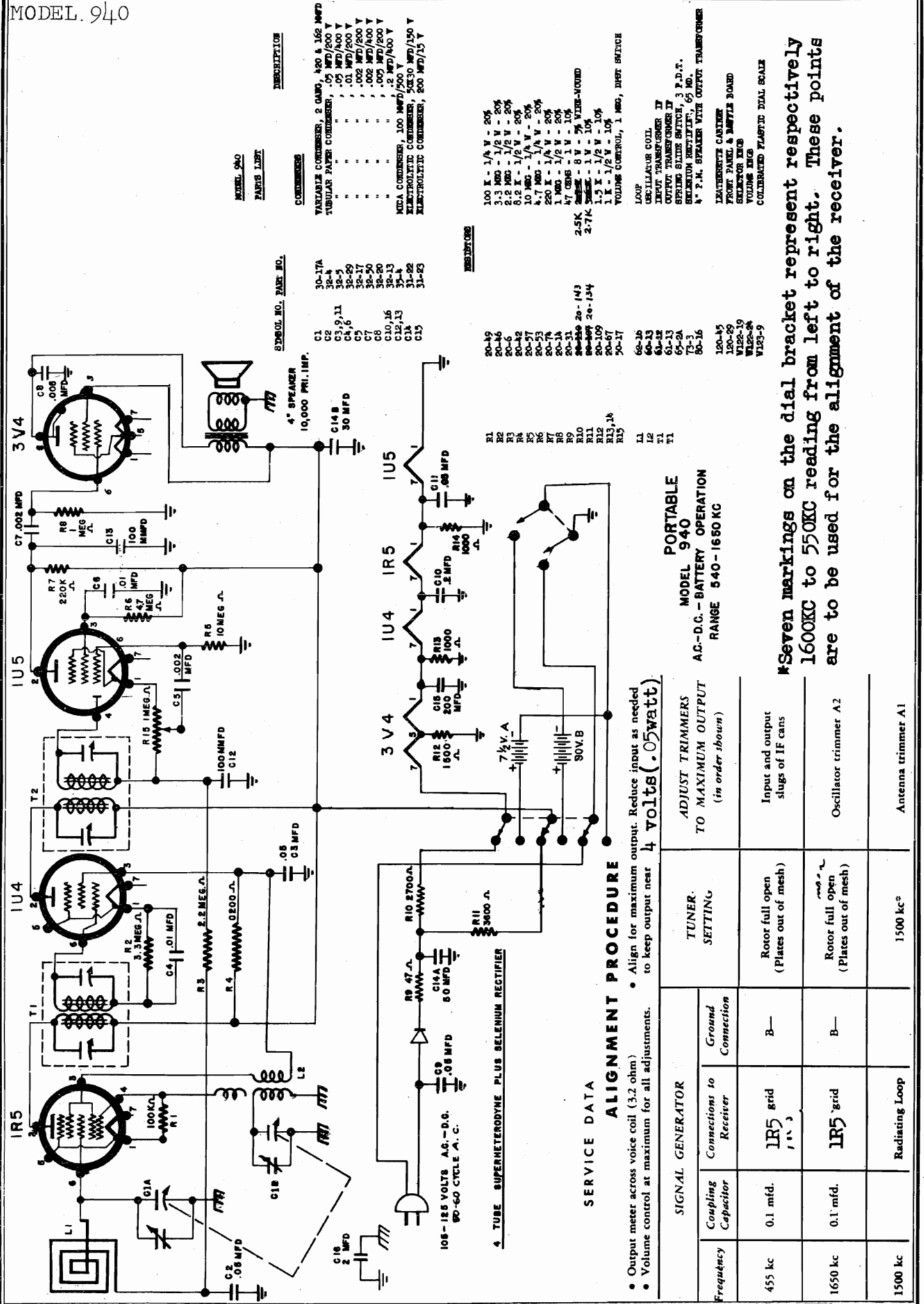
PARTS LIST

| SYMBOL NO. | PART NO. | DESCRIPTION |
|------------|----------|-------------------------------------------|
| C1 | 30-16 | VARIABLE CONDENSER, 2 GANG, 420 & 420 MMF |
| C2 | 31-11 | ELECTROLYTIC CONDENSER, 35 & 35 MFD/150 V |
| C3 | 32-5 | TUBULAR PAPER CONDENSER, .05 MFD/400 V |
| C4,8 | 32-8 | " " " " .01 MFD/150 V |
| C5 | 32-11 | " " " " .005 MFD/150 V |
| C6 | 32-14 | " " " " .05 MFD/200 V |
| C7 | 32-17 | " " " " .002 MFD/150 V |
| C9 | 35-4 | MICA CONDENSER, .0001 MFD |

RESISTORS

| | | |
|------|---------|-----------------------------------------|
| R1,2 | 20-92 | 470 K - 1/4 W - 20% |
| R3 | 20-57 | 10 MEGS 1/4 W - 20% |
| R4 | 20-96 | 22 OHMS 1 W - 20% |
| R5 | 20-106 | 680 OHMS - 1/4 W - 20% |
| R6 | 20-80 | 3300 OHMS - 1 W - 20% |
| R7 | 20-81 | 150 OHMS - 1/2 W - 20% |
| R8 | 50-14A | VOLUME CONTROL, 100 K, WITHOUT SWITCH |
| R9 | 20-93 | 22 OHMS - 1/2 W - 20% |
| T1 | 62-14 | ANTENNA COIL |
| T2 | 60-8 | R.F. COIL |
| | 80-12 | 4" P.M. SPEAKER WITH OUTPUT TRANSFORMER |
| | 140-4 | CLOCK |
| | 120-25E | CABINET |
| | 122-19 | SELECTOR KNOB (IVORY) |
| | 122-15 | VOLUME KNOB (IVORY) |

MODEL 940

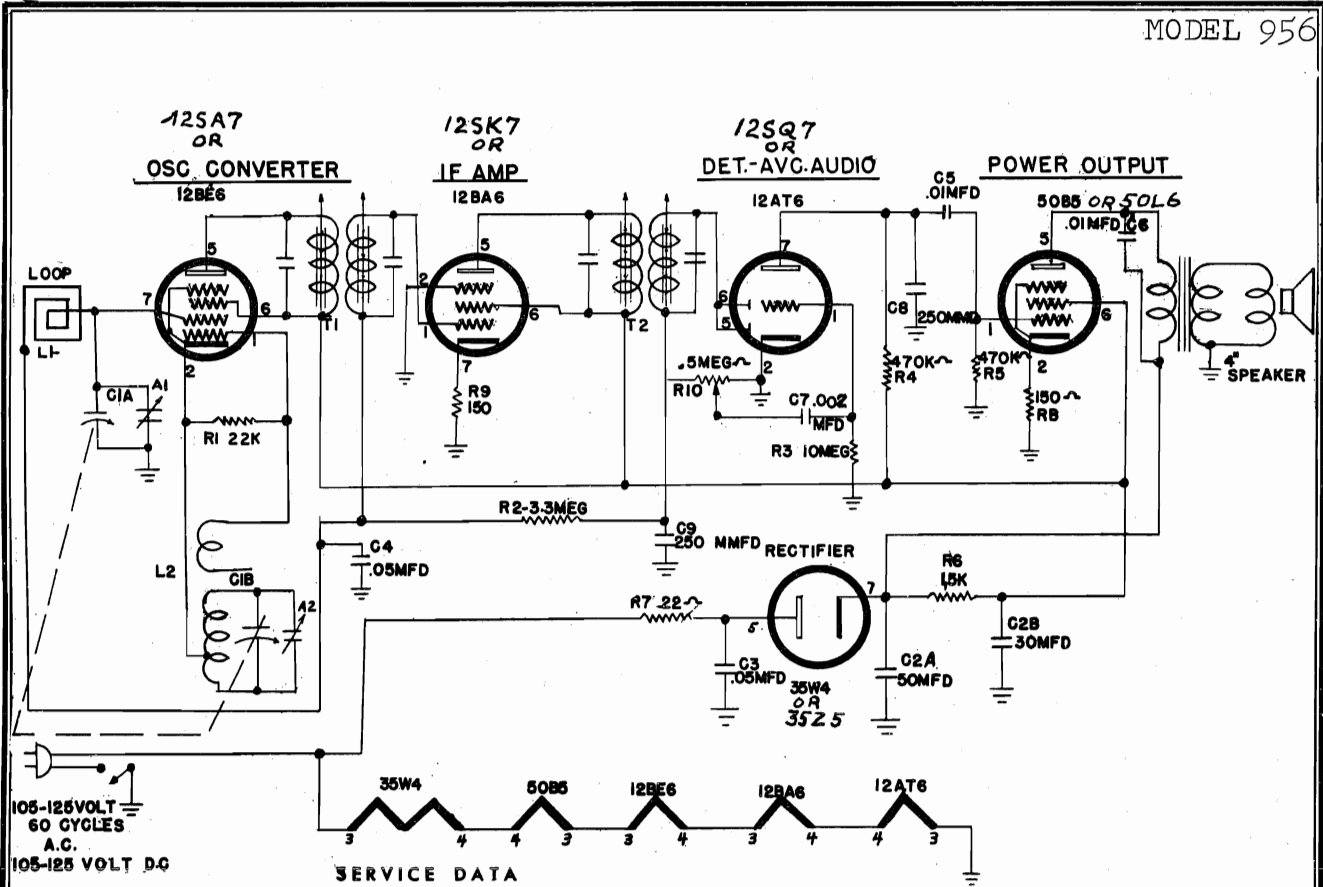


*Seven markings on the dial bracket represent respectively 1600KC to 550KC reading from left to right. These points are to be used for the alignment of the receiver.

ALIGNMENT PROCEDURE

- Output meter across voice coil (3.2 ohm)
- Volume control at maximum for all adjustments.
- Align for maximum output. Reduce input as needed to keep output near 4 Volts (.05 watt).

| SIGNAL GENERATOR | | TUNER SETTING | ADJUST TRIMMERS TO MAXIMUM OUTPUT (in order shown) |
|------------------|--------------------|-------------------------|----------------------------------------------------|
| Frequency | Coupling Capacitor | Connections to Receiver | Ground Connection |
| 455 kc | 0.1 mfd. | IR5 grid | B- |
| 1650 kc | 0.1 mfd. | IR5 grid | B- |
| 1500 kc | Radiating Loop | 1500 kc | Antenna trimmer A1 |



SERVICE DATA

ALIGNMENT PROCEDURE

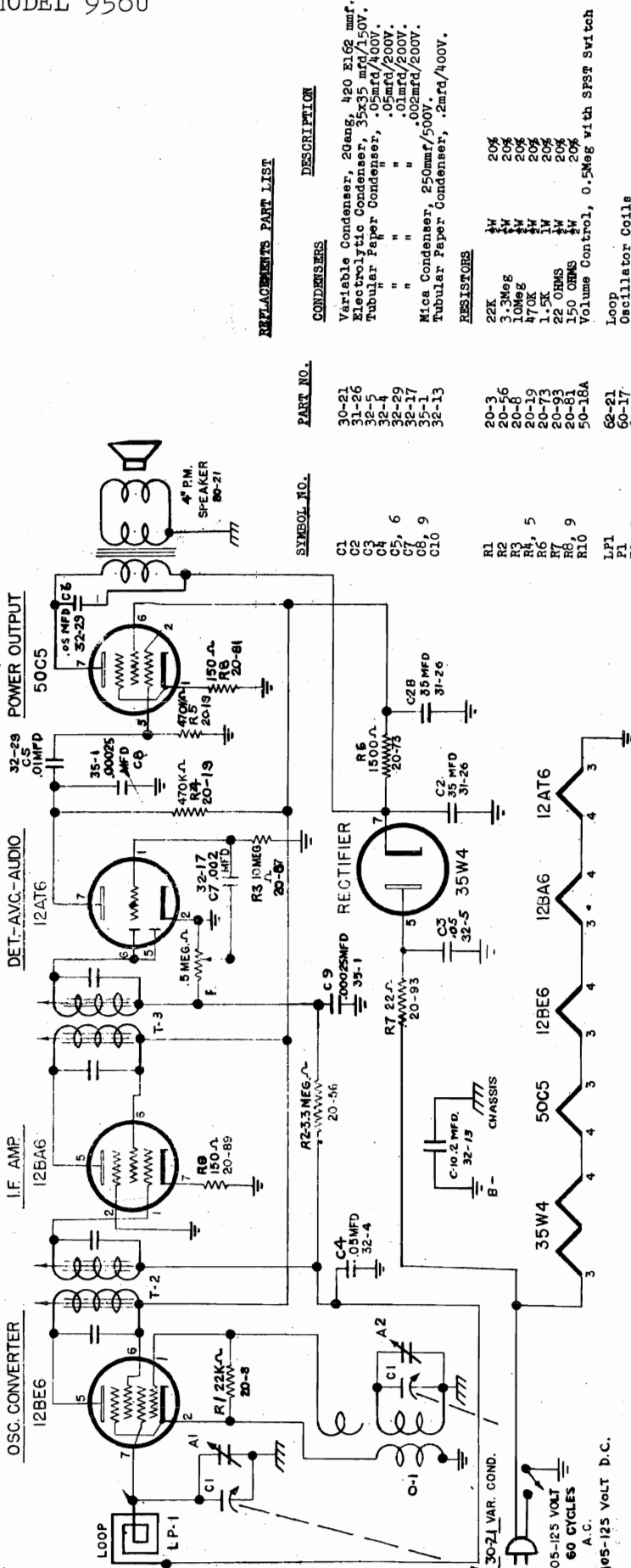
- Output meter across voice coil (3.2 ohm)
- Volume control at maximum for all adjustments.
- Align for maximum output. Reduce input as needed to keep output near 1.28 volts (0.5 watt).

| SIGNAL GENERATOR | | | | TUNER SETTING | ADJUST TRIMMERS TO MAXIMUM OUTPUT (in order shown) |
|------------------|--------------------|-------------------------|-------------------|--------------------------------------|----------------------------------------------------|
| Frequency | Coupling Capacitor | Connections to Receiver | Ground Connection | | |
| 455 kc | 0.1 mfd. | 12BE6 grid | B— | Rotor full open (Plates out of mesh) | Input and output slugs of IF cans |
| 1650 kc | 0.1 mfd. | 12BE6 grid | B— | Rotor full open (Plates out of mesh) | Oscillator trimmer A2 |
| 1500 kc | | Radiating Loop | | 1500 kc* | Antenna trimmer A1 |

* Ten markings on the dial represent respectively 550Kc, 650Kc, 750Kc, 850Kc, 950Kc, 1050Kc, 1200Kc, 1350Kc, 1500Kc, & 1600Kc, reading from top to bottom. These points are to be used for the alignment of the receiver

| SYMBOL NO. | PART NO. | DESCRIPTION | RESISTORS |
|------------|------------|-------------------------------------------|-----------------------------------------------|
| | MODEL 956 | | |
| | PARTS LIST | | |
| | CONDENSERS | | |
| C1 | 30-21 | VARIABLE CONDENSER, 2 GANG, 420 & 162 MFD | R1 20-3 |
| C2 | 31-20 | ELECTROLYTIC CONDENSER, 50X30 MFD/150 V | R2 20-56 |
| C3 | 32-5 | TUBULAR PAPER CONDENSER, .05 MFD/400 V | R3 20-8 |
| C4 | 32-4 | " " " " .05 MFD/200 V | R4,5 20-19 |
| C5 | 32-29 | " " " " .01 MFD/200 V | R6 20-73 |
| C7 | 32-17 | " " " " .002 MFD/200 V | R7 20-93 |
| C8,9 | 35-1 | MICA CONDENSER, 250 MFD/200 V | R8,9 20-81 |
| | | | R10 50-18 A |
| | | | L1 62-19 |
| | | | L2 60-12 |
| | | | T1,2 61-11 |
| | | | 80-17 |
| | | | 120-40B |
| | | | 1122-29 |
| | | | 1122-30 |
| | | | 142-9 |
| | | | 55-7 |
| | | | 22 K - 1/2 W - 20% |
| | | | 3.3 MEG/1/2 W - 20% |
| | | | 10 MEG 1/2 W - 20% |
| | | | 470K - 1/2 W - 20% |
| | | | 1500 OHMS - 1W - 20% |
| | | | 22 OHMS 1/2 W - 20% |
| | | | 150 OHMS - 1/2 W - 20% |
| | | | VOLUME CONTROL, 0.5 MEG, WITH S.P.S.T. SWITCH |
| | | | LOOP, BOX TYPE |
| | | | OSCILLATOR COIL |
| | | | I.F. TRANSFORMER |
| | | | 4" P.M. SPEAKER WITH OUTPUT TRANSFORMER |
| | | | CABINET (SPECIFY COLOR) |
| | | | SELECTOR KNOB |
| | | | VOLUME KNOB |
| | | | DIAL CRYSTAL WITH CALIBRATION POINTERS |

MODEL 956U



REPLACEMENTS PART LIST

| SYMBOL NO. | PART NO. | DESCRIPTION |
|------------|-----------|------------------------------------------|
| C1 | 30-21 | Variable Condenser, 20gms, 420 EI62 mmf. |
| C2 | 31-26 | Electrolytic Condenser, 35x35 mfd/150V. |
| C3 | 32-5 | Tubular Paper Condenser, .05mfd/400V. |
| C4 | 32-4 | " " " " .05mfd/200V. |
| C5 | 32-29 | " " " " .01mfd/200V. |
| C6 | 32-17 | " " " " .02mfd/200V. |
| C7 | 35-1 | Mica Condenser, .250mmf/500V. |
| C8 | 32-13 | Tubular Paper Condenser, .2mfd/400V. |
| C9 | 32-13 | " " " " .2mfd/400V. |
| C10 | 32-13 | " " " " .2mfd/400V. |
| R1 | 20-3 | 22K |
| R2 | 20-56 | 3.3Meg |
| R3 | 20-6 | 10Meg |
| R4 | 20-19 | 470K |
| R5 | 20-73 | 1.5K |
| R6 | 20-93 | 22 OHMS |
| R7 | 20-81 | 150 OHMS |
| R8 | 20-81 | 150 OHMS |
| R9 | 50-18A | Volume Control, 0.5Meg with SPST Switch |
| R10 | 50-18A | Volume Control, 0.5Meg with SPST Switch |
| LF1 | 62-21 | Loop |
| F1 | 60-17 | Oscillator Coils |
| T2, 3 | 61-11 | I.F. Transformers |
| | 80-21, 22 | 4" P.M. Speaker with Output Transformer |
| | 120-10B | Cabinet |
| | Y122-29 | Selector Knob |
| | Y122-30 | Volume Knob |
| | 142-9 | Dial Crystal |

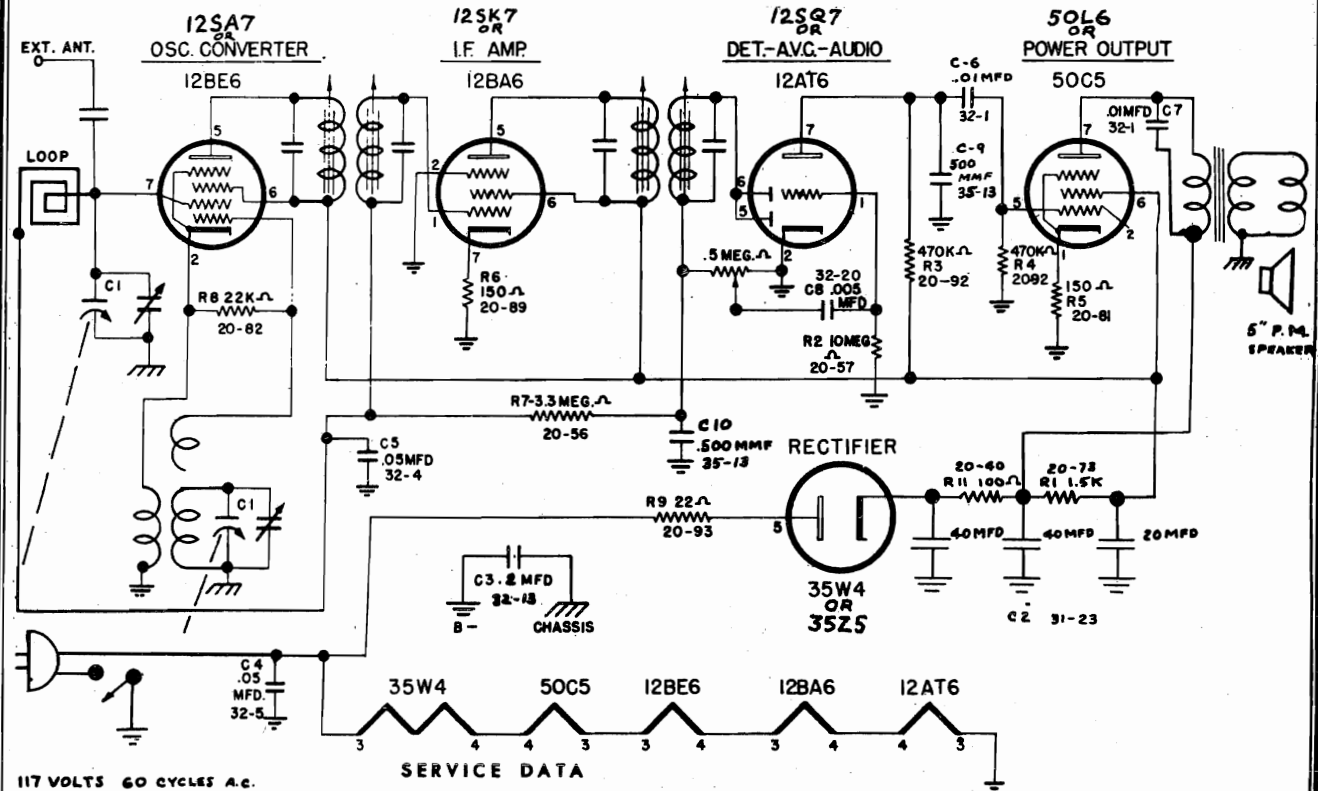
ALIGNMENT PROCEDURE

- Output meter across voice coil (3.2 ohm)
- Volume control at maximum for all adjustments.
- Align for maximum output. Reduce input as needed to keep output near 1.28 volts (0.5 watt).

| SIGNAL GENERATOR | | TUNER SETTING | ADJUST TRIMMERS * TO MAXIMUM OUTPUT (in order shown) |
|------------------|-------------------------|-------------------|------------------------------------------------------|
| Frequency | Connections to Receiver | Ground Connection | |
| 455 kc | 0.1 mfd. | 12BE6 grid | B— |
| 1650 kc | 0.1 mfd. | 12BE6 grid | B— |
| 1500 kc | | Radiating Loop | |
| | | | Input and output slugs of IF cans |
| | | | Oscillator trimmer A2 |
| | | | Antenna trimmer A1 |

* Ten markings on the dial represent respectively 550Kc, 650Kc, 750Kc, 850Kc, 950Kc, 1050Kc, 1200Kc, 1350Kc, 1500Kc, & 1600Kc, reading from top to bottom. These points are to be used for the alignment of the receiver

DATE 6-13-58
DRAWING NO. 130-77



117 VOLTS 60 CYCLES A.C.
117 VOLTS D.C.

SERVICE DATA

ALIGNMENT PROCEDURE

- Output meter across voice coil (3.2 ohm)
 - Volume control at maximum for all adjustments.
- Align for maximum output. Reduce input as needed to keep output near 1.28 volts (0.5 watt).

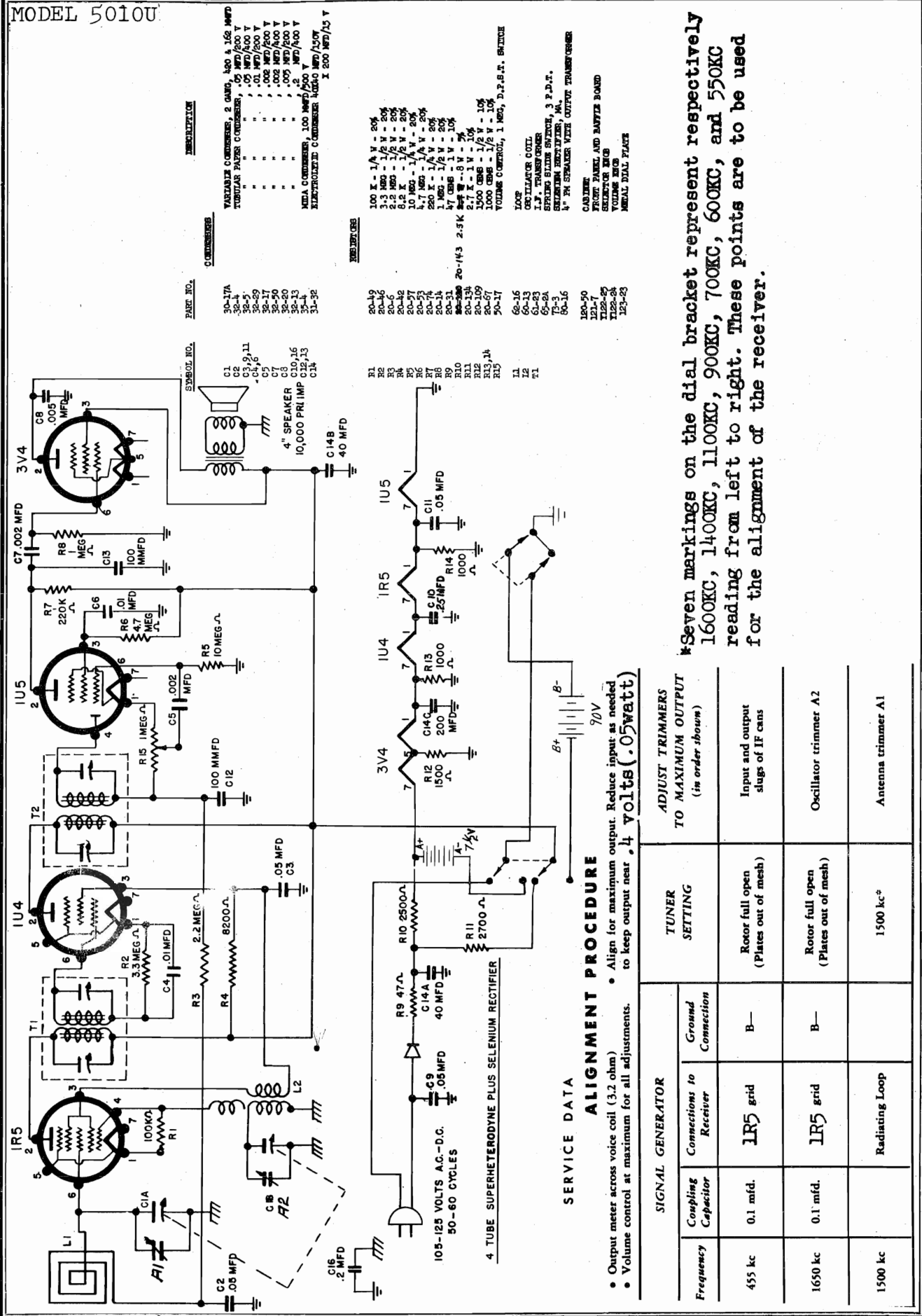
| SIGNAL GENERATOR | | | | TUNER SETTING | ADJUST TRIMMERS TO MAXIMUM OUTPUT (in order shown) |
|------------------|--------------------|-------------------------|-------------------|--------------------------------------|----------------------------------------------------|
| Frequency | Coupling Capacitor | Connections to Receiver | Ground Connection | | |
| 455 kc | 0.1 mfd. | 12BE6 grid | B— | Rotor full open (Plates out of mesh) | Input and output slugs of IF cans |
| 1650 kc | 0.1 mfd. | 12BE6 grid | B— | Rotor full open (Plates out of mesh) | Oscillator trimmer A2 |
| 1500 kc | | Radiating Loop | | 1500 kc* | Antenna trimmer A1 |

*Nine markings on the dial represent respectively 550KC, 600KC, 650KC, 750KC, 900KC, 1200KC, 1350KC, 1550KC, and 1650KC reading from left to right. These points are to be used for the alignment of the receiver.

REPLACEMENT PARTS LIST

| SYMBOL NO. | PART NO. | DESCRIPTION | U. L. | PART NO. | COILS |
|-------------------|------------------|---------------------------------------------|-------|----------|---------------------------------------------|
| CAPACITORS | | | | | |
| C1 | 30-20A | VARIABLE CONDENSER, 2 GANG, 420 MF - 162 MF | | | |
| C2 | 31-24 (UL 31-25) | 470,000 OHM 1/4 WATT - 20% | | | |
| C3 | 32-32 (UL 32-13) | 150 OHM - 1/2 WATT - 20% | | | |
| C4 | 32-5 (UL 32-55) | .05 MFD - 400 V. " | | | |
| C5 | 32-4 | .05 MFD - 200 V. " | | | |
| C6,7 | 32-1 | .01 MFD - 400 V. " | | | |
| C8 | 32-20 (UL 32-45) | .005 MFD - 200 V. " | 60-18 | 60-16 | OSCILLATOR COIL |
| C9 | 35-13 | 500 MF - 500 V. MICA | 61-11 | 61-17 | INPUT I.F. TRANSFORMER |
| C10 | 35-13 | 500 MF - 500 V. MICA | 61-11 | 61-17 | OUTPUT I.F. TRANSFORMER |
| RESISTORS | | | | | |
| R1 | 20-73 | 1.5 K, 1 WATT 20% | | | |
| R2 | 20-57 | 10 MEGOHM - 1/4 WATT - 20% | 80-23 | 80-20 | 5 INCH P.M. SPEAKER WITH OUTPUT TRANSFORMER |
| R3,4 | 20-92 | 470,000 OHM 1/4 WATT - 20% | | 120-41 | CABINET (SPECIFY COLOR) |
| R5 | 20-81 | 150 OHM - 1/2 WATT - 20% | | 122-26 | KNOB POINTER |
| R6 | 20-89 | 150 OHM - 1/4 WATT - 20% | | 122-31 | SELECTOR KNOB |
| R7 | 20-56 | 3.3 MEGOHM 1/4 WATT - 20% | | 122-31 | VOLUME KNOB |
| R8 | 20-82 | 22,000 OHM 1/4 WATT - 20% | | | |
| R9 | 20-93 | 22 OHM 1/2 WATT - 20% | | | |
| R10 | 50-19A | 1/2 MEG. VOLUME CONTROL WITH SWITCH | | | FREQ RANGE: ALIGN AT TRACK AT |
| R11 | 20-80 | 100 OHM - 1/2 WATT - 20% | | | |

MODEL 5010U



- | CONDENSERS | DESCRIPTION |
|------------|-------------------------------------------|
| 30-37A | VARIABLE CONDENSER, 2 GANG, 450 & 152 MFD |
| 32-4 | TUBULAR PAPER CONDENSER, .05 MFD/200 V |
| 32-5 | " " " " " " " " " " " " " " " " |
| 32-6 | " " " " " " " " " " " " " " " " |
| 32-7 | " " " " " " " " " " " " " " " " |
| 32-8 | " " " " " " " " " " " " " " " " |
| 32-9 | " " " " " " " " " " " " " " " " |
| 32-10 | " " " " " " " " " " " " " " " " |
| 32-11 | " " " " " " " " " " " " " " " " |
| 32-12 | " " " " " " " " " " " " " " " " |
| 32-13 | " " " " " " " " " " " " " " " " |
| 32-14 | " " " " " " " " " " " " " " " " |
| 32-15 | " " " " " " " " " " " " " " " " |
| 32-16 | " " " " " " " " " " " " " " " " |
| 32-17 | " " " " " " " " " " " " " " " " |
| 32-18 | " " " " " " " " " " " " " " " " |
| 32-19 | " " " " " " " " " " " " " " " " |
| 32-20 | " " " " " " " " " " " " " " " " |
| 32-21 | " " " " " " " " " " " " " " " " |
| 32-22 | " " " " " " " " " " " " " " " " |
| 32-23 | " " " " " " " " " " " " " " " " |
| 32-24 | " " " " " " " " " " " " " " " " |
| 32-25 | " " " " " " " " " " " " " " " " |
| 32-26 | " " " " " " " " " " " " " " " " |
| 32-27 | " " " " " " " " " " " " " " " " |
| 32-28 | " " " " " " " " " " " " " " " " |
| 32-29 | " " " " " " " " " " " " " " " " |
| 32-30 | " " " " " " " " " " " " " " " " |
| 32-31 | " " " " " " " " " " " " " " " " |
| 32-32 | " " " " " " " " " " " " " " " " |
| 32-33 | " " " " " " " " " " " " " " " " |
| 32-34 | " " " " " " " " " " " " " " " " |
| 32-35 | " " " " " " " " " " " " " " " " |
| 32-36 | " " " " " " " " " " " " " " " " |
| 32-37 | " " " " " " " " " " " " " " " " |
| 32-38 | " " " " " " " " " " " " " " " " |
| 32-39 | " " " " " " " " " " " " " " " " |
| 32-40 | " " " " " " " " " " " " " " " " |
| 32-41 | " " " " " " " " " " " " " " " " |
| 32-42 | " " " " " " " " " " " " " " " " |
| 32-43 | " " " " " " " " " " " " " " " " |
| 32-44 | " " " " " " " " " " " " " " " " |
| 32-45 | " " " " " " " " " " " " " " " " |
| 32-46 | " " " " " " " " " " " " " " " " |
| 32-47 | " " " " " " " " " " " " " " " " |
| 32-48 | " " " " " " " " " " " " " " " " |
| 32-49 | " " " " " " " " " " " " " " " " |
| 32-50 | " " " " " " " " " " " " " " " " |
| 32-51 | " " " " " " " " " " " " " " " " |
| 32-52 | " " " " " " " " " " " " " " " " |
| 32-53 | " " " " " " " " " " " " " " " " |
| 32-54 | " " " " " " " " " " " " " " " " |
| 32-55 | " " " " " " " " " " " " " " " " |
| 32-56 | " " " " " " " " " " " " " " " " |
| 32-57 | " " " " " " " " " " " " " " " " |
| 32-58 | " " " " " " " " " " " " " " " " |
| 32-59 | " " " " " " " " " " " " " " " " |
| 32-60 | " " " " " " " " " " " " " " " " |
| 32-61 | " " " " " " " " " " " " " " " " |
| 32-62 | " " " " " " " " " " " " " " " " |
| 32-63 | " " " " " " " " " " " " " " " " |
| 32-64 | " " " " " " " " " " " " " " " " |
| 32-65 | " " " " " " " " " " " " " " " " |
| 32-66 | " " " " " " " " " " " " " " " " |
| 32-67 | " " " " " " " " " " " " " " " " |
| 32-68 | " " " " " " " " " " " " " " " " |
| 32-69 | " " " " " " " " " " " " " " " " |
| 32-70 | " " " " " " " " " " " " " " " " |
| 32-71 | " " " " " " " " " " " " " " " " |
| 32-72 | " " " " " " " " " " " " " " " " |
| 32-73 | " " " " " " " " " " " " " " " " |
| 32-74 | " " " " " " " " " " " " " " " " |
| 32-75 | " " " " " " " " " " " " " " " " |
| 32-76 | " " " " " " " " " " " " " " " " |
| 32-77 | " " " " " " " " " " " " " " " " |
| 32-78 | " " " " " " " " " " " " " " " " |
| 32-79 | " " " " " " " " " " " " " " " " |
| 32-80 | " " " " " " " " " " " " " " " " |
| 32-81 | " " " " " " " " " " " " " " " " |
| 32-82 | " " " " " " " " " " " " " " " " |
| 32-83 | " " " " " " " " " " " " " " " " |
| 32-84 | " " " " " " " " " " " " " " " " |
| 32-85 | " " " " " " " " " " " " " " " " |
| 32-86 | " " " " " " " " " " " " " " " " |
| 32-87 | " " " " " " " " " " " " " " " " |
| 32-88 | " " " " " " " " " " " " " " " " |
| 32-89 | " " " " " " " " " " " " " " " " |
| 32-90 | " " " " " " " " " " " " " " " " |
| 32-91 | " " " " " " " " " " " " " " " " |
| 32-92 | " " " " " " " " " " " " " " " " |
| 32-93 | " " " " " " " " " " " " " " " " |
| 32-94 | " " " " " " " " " " " " " " " " |
| 32-95 | " " " " " " " " " " " " " " " " |
| 32-96 | " " " " " " " " " " " " " " " " |
| 32-97 | " " " " " " " " " " " " " " " " |
| 32-98 | " " " " " " " " " " " " " " " " |
| 32-99 | " " " " " " " " " " " " " " " " |
| 32-100 | " " " " " " " " " " " " " " " " |

ALIGNMENT PROCEDURE

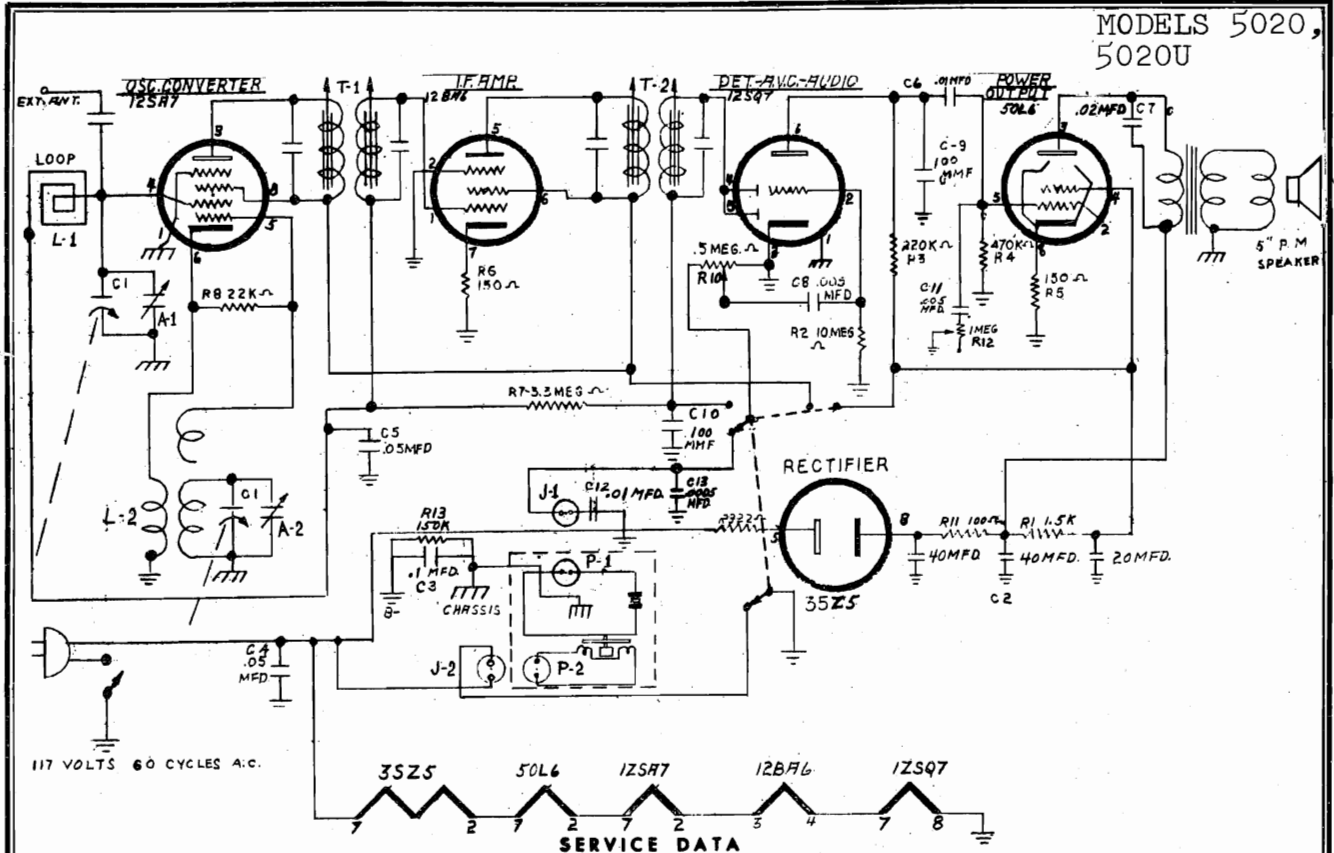
- Output meter across voice coil (3.2 ohm)
- Volume control at maximum for all adjustments.
- Align for maximum output. Reduce input as needed to keep output near .4 volts (.05 watt)

SERVICE DATA

| SIGNAL GENERATOR | | TUNER SETTING | ADJUST TRIMMERS TO MAXIMUM OUTPUT (in order shown) |
|------------------|--------------------|----------------------|----------------------------------------------------|
| Frequency | Coupling Capacitor | Ground Connection | Connections to Receiver |
| 455 kc | 0.1 mfd. | B- | 1R5 grid |
| 1650 kc | 0.1 mfd. | B- | 1R5 grid |
| 1500 kc | Radiating Loop | 1500 kc ^a | |
| | | | Input and output slugs of IF cans |
| | | | Oscillator trimmer A2 |
| | | | Antenna trimmer A1 |

*Seven markings on the dial bracket represent respectively 1600KC, 1400KC, 1100KC, 900KC, 700KC, 600KC, and 500KC reading from left to right. These points are to be used for the alignment of the receiver.

MODELS 5020,
5020U



ALIGNMENT PROCEDURE

- Output meter across voice coil (3.2 ohm)
- Volume control at maximum for all adjustments.
- Align for maximum output. Reduce input as needed to keep output near 1.28 volts (0.5 watt).

| SIGNAL GENERATOR | | | | TUNER SETTING | ADJUST TRIMMERS TO MAXIMUM OUTPUT (in order shown) |
|------------------|--------------------|-------------------------|-------------------|--------------------------------------|----------------------------------------------------|
| Frequency | Coupling Capacitor | Connections to Receiver | Ground Connection | | |
| 455 kc | 0.1 mfd. | GRID 12SA7 | B- | Rotor full open (Plates out of mesh) | Input and output trimmer of IF cans |
| 1650 kc | 0.1 mfd. | GRID 12SA7 | B- | Rotor full mesh (Plates out of mesh) | Oscillator trimmer A2 |
| 1500 kc | | Radiating Loop | B- | 1500 kc* | Antenna trimmer A1 |

MODEL 5020, 5020U

REPLACEMENT PARTS LIST

| SYMBOL NO. | PART NO. | DESCRIPTION |
|-------------------|----------|-------------------------------------------------|
| CAPACITORS | | |
| C1 | 30-20A | VARIABLE CONDENSER, 2 GANG, 420 MFD and 162 MFD |
| C2 | 31-30A | ELECTROLYTIC COND., 40x40x20 MFD, 150 V. |
| C3 | 32-57 | .1 MFD - 400 V TUBULAR PAPER |
| C4 | 32-55 | .05 MFD - 400 V MOULDED PHENOLIC |
| C5 | 32-4 | .05 MFD - 200 V TUBULAR PAPER |
| C6, 12 | 32-1 | .01 MFD - 400 V " " |
| C7 | 32-3 | .02 MFD - 400 V " " |
| C8 | 32-35 | .005 MFD - 600 V " " |
| C9, 10 | 35-4 | 100 MFD - 500 V MICA |
| C11 | 35-28 | .005 MFD DISC CERAMIC G. P. |
| C13 | 35-13 | .0005 MFD MICA |
| RESISTORS | | |
| R1 | 20-73 | 1.5 K - 1 WATT - 20% |
| R2 | 20-57 | 10 MEG - 1/4 WATT - 20% |
| R3 | 20-74 | 220 K - 1/4 WATT - 20% |
| R4 | 20-92 | 470 K - 1/4 WATT - 20% |
| R5 | 20-81 | 150 OHM - 1/2 WATT - 20% |
| R6 | 20-89 | 150 OHM - 1/4 WATT - 20% |
| R7 | 20-56 | 3.3 MEG. - 1/4 WATT - 20% |
| R8 | 20-82 | 22 K - 1/4 WATT - 20% |
| R9 | 20-93 | 22 OHM - 1/2 WATT - 20% |
| R10 | 50-19 | VOLUME CONTROL, 1/2 MEG., S.P.S.T. SWITCH |
| R11 | 20-10 | 100 OHM - 1/2 WATT - 20% |
| R12 | 50-31 | 100 OHM - 1/2 WATT - 20% |
| R13 | 20-144 | 150 K - 1/3 WATT - 20% |

* Nine markings on dial represent respectively 550 Kc, 600 Kc, 700 Kc, 800 Kc, 900 Kc, 1100 Kc, 1250 Kc, 1450 Kc, and 1600 Kc reading from left to right. These points are to be used for the alignment of the receiver.

COILS

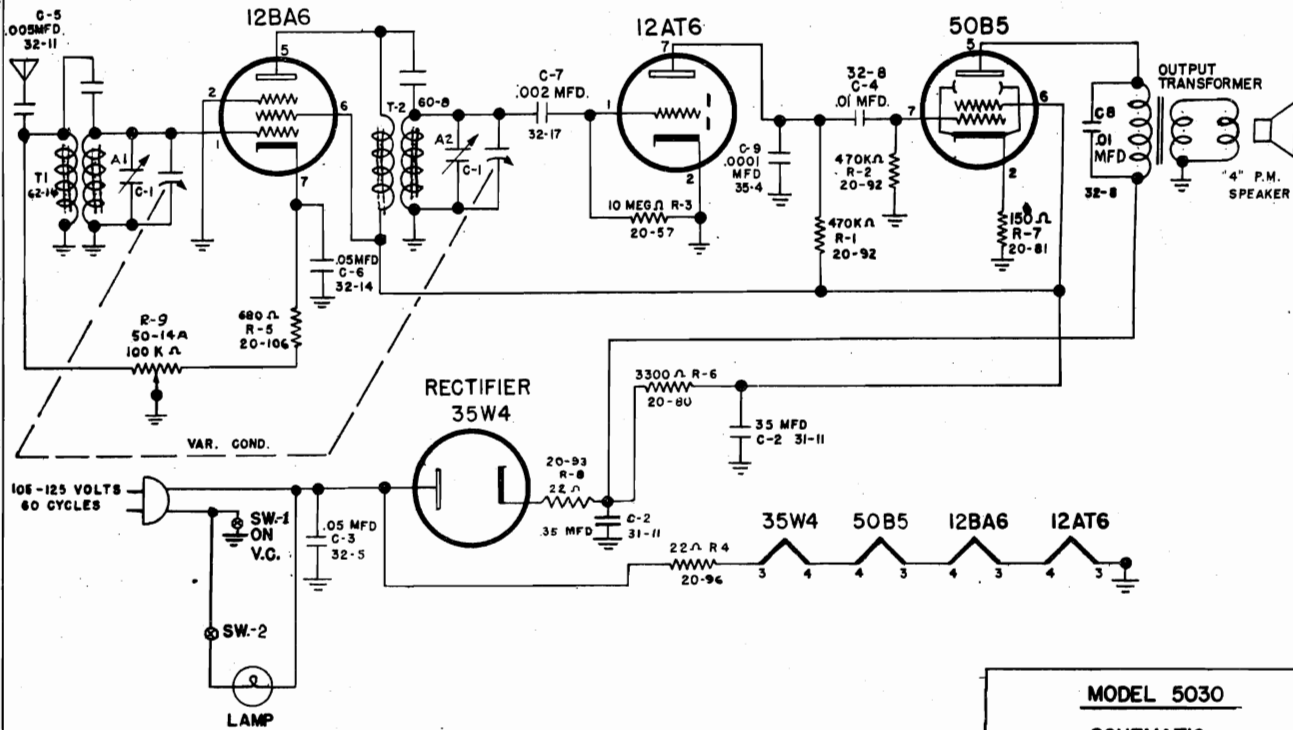
| | |
|-------|-------|
| L1 | 62-20 |
| L2 | 60-18 |
| T1, 2 | 61-11 |

MISC.

| | | |
|-----|--------|-----------------------------------------------|
| J-1 | 44-15A | 5 INCH. P. M. SPEAKER WITH OUTPUT TRANSFORMER |
| J-2 | 44-14 | |
| | 120-65 | PHONO PICKUP JACK WITH CABLE |
| | 122-26 | PHONO MOTOR JACK WITH LEADS |
| | 122-45 | CABINET (COMPLETE) |
| | 130-89 | KNOB POINTER |
| | 130-89 | KNOB (SELECTOR, VOLUME) |
| | 150-1 | PLASTIC DIAL |
| | | RECORD CHANGER |

7-12-66 130-96

MODEL 5030



SERVICE DATA

ALIGNMENT PROCEDURE

- Output meter across voice coil (3.2 ohm)
- Volume control at maximum for all adjustments.
- Align for maximum output. Reduce input as needed to keep output near 1.28 volts (0.5 watt).

MODEL 5030
SCHEMATIC
105-125 VOLTS, 60 CYCLES
RANGE 540-1650 K.C.

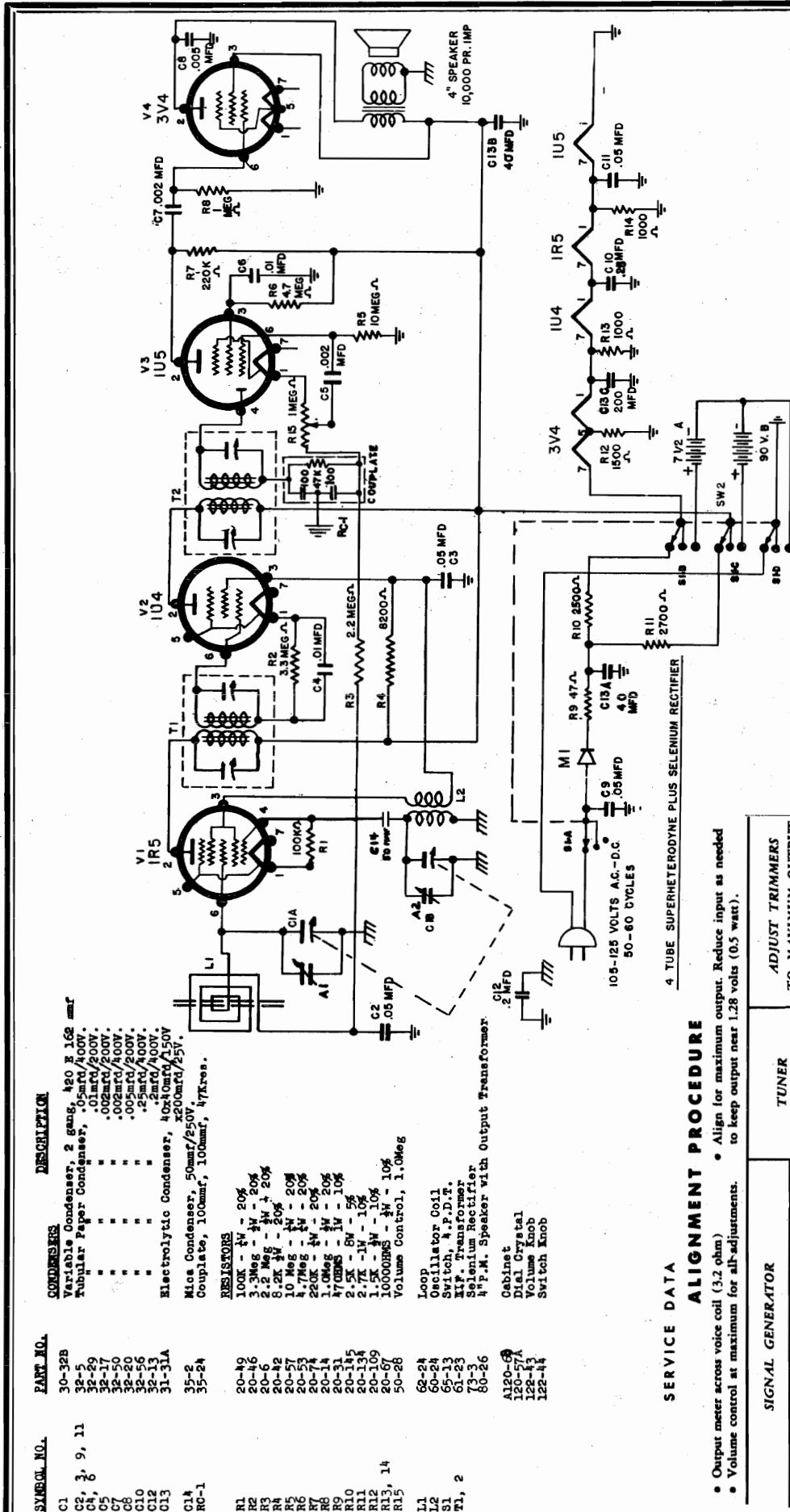
| SIGNAL GENERATOR | | | | Tuner Adjustment | ADJUST TRIMMERS TO MAXIMUM OUTPUT (in order shown) |
|------------------|--------------------|-------------------------|-------------------|--------------------------------------|----------------------------------------------------|
| Frequency | Coupling Capacitor | Connections to Receiver | Ground Connection | | |
| 1650 Kc | 50 μ F | Antenna** | Chassis | Rotor full open (Plates out of mesh) | RF trimmer A2 Antenna trimmer A1 |
| 1500 Kc | 50 μ F | Antenna** | Chassis | 1500 Kc* | RF Trimmer A2 Antenna Trimmer A1 |

* Seven markings on the tuning knob represent respectively 550 Kc, 600 Kc, 700 Kc, 900 Kc, 1100 Kc, 1400 Kc, and 1650 Kc. reading from right to left. These points are to be used for the alignment of the receiver.

** Disconnect antenna hank by unsoldering

PARTS LIST

| SYMBOL NO. | PART NO. | DESCRIPTION | | |
|------------|----------|--------------------------------------------|------------------|----------------------------------|
| CONDENSERS | | | | |
| C1 | 30-36A | Variable Condenser, 2 Gang, 420 & 420 Med. | | |
| C2 | 31-11 | Electrolytic Condenser, 35 35 MPD/150V | | Miscellaneous |
| C3 | 32-5 | Tubular Paper Condenser, .05MPD/400V | | |
| C4,8 | 32-8 | " " " " .01MPD/150V | T1 | 62-14 Antenna Coil |
| C5 | 32-11 | " " " " .005MPD/150V | T2 | 60-8B R.F. Coil |
| C6 | 32-4 | " " " " .05MPD/200V | | |
| C7 | 32-17 | " " " " .002MPD/150V | | |
| C9 | 35-4 | Mica Condenser, .0001MPD/500V | | |
| RESISTORS | | | | |
| R1,2 | 20-92 | 470 K - 1/2W - 20% | | |
| R3 | 20-57 | 10 Meg. - 1/2W - 20% | | |
| R4 | 20-96 | 22 Ohms - 1W - 20% | | |
| R5 | 20-106 | 680 Ohms - 1/2W - 20% | | |
| R6 | 20-80 | 3.3K - 1W - 20% | | |
| R7 | 20-81 | 150 Ohms - 1/2W - 20% | | |
| R8 | 20-93 | 22 Ohms - 1/2W - 20% | | |
| R9 | 50-33 | Volume Control, 100K, with Switch | | |
| | | | 80-17A or 80-18A | 4" P.M. Speaker |
| | | | SW2 | 65-14B Switch, A.C. Plunger Type |
| | | | | 11-70 Light Socket |
| | | | | 10-117A Window Retainers |
| | | | | 114-85 Felt Bumper Screws |
| | | | | 140-12 Frosted Window |
| | | | | 120-64D Cabinet |
| | | | | 122-51 Selector Knob |
| | | | | 122-52 Volume Knob |



- CONDENSERS**
 Variable Condenser, 2 gang, 420 p 162 mmf
 Tubular Paper Condenser, .05mfd/400V.
 .01mfd/200V.
 .002mfd/400V.
 .005mfd/200V.
 .005mfd/400V.
 .25mfd/400V.
 .2mfd/400V.
 Electrolytic Condenser, 4050mfd/150V.
 32-2
 31-31A
 35-2
 35-24
 Mica Condenser, 50mfd/250V.
 Complete, 10mm, 100mm, 47Kres.
- RESISTORS**
 100K - 1/4W - 20%
 3.2Meg - 1/4W - 20%
 20K - 1/4W - 20%
 5.2K - 1/4W - 20%
 20-42
 20-46
 20-6
 20-42
 20-57
 20-53
 20-54
 20-74
 20-14
 20-31
 20-145
 20-134
 20-134
 20-109
 20-67
 50-28
 100K
 1.0Meg - 1/4W - 10%
 1700Ω
 2.7K - 1W - 10%
 1000Ω
 1.5K - 1/4W - 10%
 1000Ω
 1.0Meg
 Loop
 Oscillator Coil
 120-57A
 120-57A
 122-43
 122-44

| SYMBOL NO. | PART NO. | DESCRIPTION |
|--------------|----------|-------------------------------------------|
| C1 | 30-32B | Variable Condenser, 2 gang, 420 p 162 mmf |
| C2, 3, 9, 11 | 32-5 | Tubular Paper Condenser, .05mfd/400V. |
| C4 | 32-29 | .01mfd/200V. |
| C5 | 32-17 | .002mfd/400V. |
| C7 | 32-50 | .005mfd/200V. |
| C8 | 32-20 | .005mfd/400V. |
| C10 | 32-20 | .25mfd/400V. |
| C12 | 32-56 | .2mfd/400V. |
| C13 | 31-31A | Electrolytic Condenser, 4050mfd/150V. |
| C14 | 35-2 | Mica Condenser, 50mfd/250V. |
| RC-1 | 35-24 | Complete, 10mm, 100mm, 47Kres. |
| R1 | 20-42 | 100K - 1/4W - 20% |
| R2 | 20-46 | 3.2Meg - 1/4W - 20% |
| R3 | 20-6 | 20K - 1/4W - 20% |
| R4 | 20-42 | 5.2K - 1/4W - 20% |
| R5 | 20-57 | 10 Meg - 1/4W - 20% |
| R6 | 20-53 | 4.7Meg - 1/4W - 20% |
| R7 | 20-74 | 220K - 1/4W - 20% |
| R8 | 20-14 | 1.0Meg - 1/4W - 10% |
| R9 | 20-31 | 1700Ω - 1/4W - 10% |
| R10 | 20-145 | 2.5K - 1W - 10% |
| R11 | 20-134 | 2.7K - 1W - 10% |
| R12 | 20-134 | 1.5K - 1/4W - 10% |
| R13 | 20-109 | 1000Ω - 1/4W - 10% |
| R15 | 20-67 | Volume Control, 1.0Meg |
| L1 | 62-24 | Loop |
| L2 | 62-24 | Oscillator Coil |
| S1 | 62-14 | 120-57A |
| S2 | 62-14 | 120-57A |
| T1, 2 | 63-23 | 122-43 |
| | 73-3 | 122-44 |
| | 80-26 | |

ALIGNMENT PROCEDURE

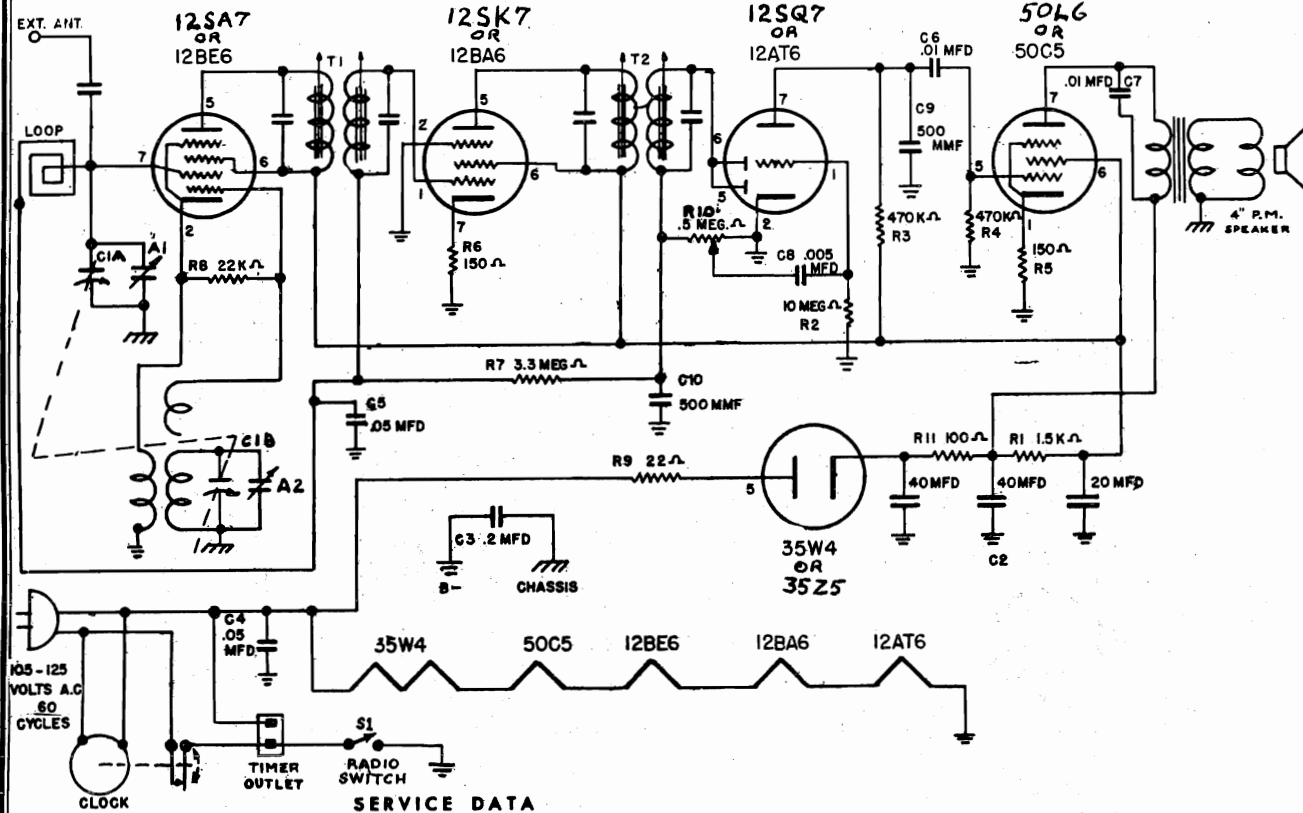
- Output meter across voice coil (3.2 ohm)
- Align for maximum output. Reduce input as needed to keep output near 1.28 volts (0.5 watt).
- Volume control at maximum for all adjustments.

| Frequency | SIGNAL GENERATOR | | TUNER SETTING | ADJUST TRIMMERS TO MAXIMUM OUTPUT (in order shown) |
|-----------|--------------------|-------------------------|--------------------------------------|----------------------------------------------------|
| | Coupling Capacitor | Connections to Receiver | | |
| 455 kc | 0.1 mfd. | 1R5 grid | Rotor full open (Plates out of mesh) | Input and output slugs of IF cans |
| 1650 kc | 0.1 mfd. | 1R5 grid | Rotor full open (Plates out of mesh) | Oscillator trimmer A2 |
| 1500 kc | | Radiating Loop | 1500 kc* | Antenna trimmer A1 |

*Eight markings on the dial bracket represent respectively 1600KC, and 1300KC, 1150KC, 1000KC, 850KC, 750KC, 650KC, and 500KC reading clockwise. These points are to be used for the alignment of the receiver.

SERVICE DATA

MODEL 5057U



SERVICE DATA

ALIGNMENT PROCEDURE

- Output meter across voice coil (3.2 ohm)
- Volume control at maximum for all adjustments.
- Align for maximum output. Reduce input as needed to keep output near 1.28 volts (0.5 watt).

| SIGNAL GENERATOR | | | | TUNER SETTING | ADJUST TRIMMERS TO MAXIMUM OUTPUT (in order shown) |
|------------------|--------------------|-------------------------|-------------------|--------------------------------------|----------------------------------------------------|
| Frequency | Coupling Capacitor | Connections to Receiver | Ground Connection | | |
| 455 kc | 0.1 mfd. | 12BE6 grid | B— | Rotor full open (Plates out of mesh) | Input and output slugs of IF cans |
| 1650 kc | 0.1 mfd. | 12BE6 grid | B— | Rotor full mesh (Plates out of mesh) | Oscillator trimmer A2 |
| 1500 kc | | Radiating Loop | | 1500 kc* | Antenna trimmer A1 |

*Nine markings on the dial represent respectively 540KC, 600KC, 700KC, 800KC, 900KC, 1100KC, 1300KC, 1500KC, and 1650KC reading from left to right. These points are to be used for the alignment of the receiver.

REPLACEMENT PARTS LIST

| SYMBOL NO. | PART NO. |
|------------|----------|
| C1 | 30-26 |
| C2 | 31-30A |
| C3 | 32-13 |
| C4 | 32-59 |
| C5 | 32-1 |
| C6,7 | 32-1 |
| C8 | 32-20 |
| C9,10 | 35-13 |

CONDENSERS

VARIABLE CONDENSER, 2 GANG, 420 & 162 MMF.
 ELECTROLYTIC CONDENSERS, 50/400V 500 MFD/150 V
 TUBULAR PAPER CONDENSERS, .2 MFD/400 V
 .05 MFD/200 V
 .01 MFD/400 V
 .005 MFD/600 V
 MICA CONDENSER, 500 MMFD/500 V

RESISTORS

| SYMBOL NO. | RESISTOR VALUE |
|------------|----------------------------------------------------------------------|
| R1 | 20-73 |
| R2 | 20-77 |
| R3,4 | 20-92 |
| R5 | 20-81 |
| R6 | 20-89 |
| R7 | 20-96 |
| R8 | 20-92 |
| R9 | 20-93 |
| R10 | 50-27 |
| R11 | 20-40 |
| T1,2 | 60-18 61-11 |
| S1 | A-125-34-B 65-11 80-25A 120-54 120-48 122-31 140-7 |

RESISTORS

| |
|--------------------------|
| 1500 OHMS - 1 V - 20% |
| 10 MEH. - 1/4 W - 20% |
| 470 K - 1/4 W - 20% |
| 150 OHMS - 1/2 W - 20% |
| 150 OHMS - 1/4 W - 20% |
| 3.3 MEH. - 1/4 W - 20% |
| 22 K - 1/4 W - 20% |
| 22 OHMS - 1/2 V - 20% |
| VOLUME CONTROL, 0.5 MEH. |
| 100 OHMS - 1/2 W - 20% |

OSCILLATOR COIL
 IF TRANSFORMER
 BACK ASSEMBLY, INCL. LOOP
 RADIO SWITCH
 4\"/>

DESCRIPTION

1. General

The new LEARAVIAN Model P-10B is a compact portable radio receiver employing six tubes in a highly sensitive superheterodyne circuit designed for reception in three bands - Marine Band - 2.0 to 5.5 MC - ship-to-shore communications, Coast Guard weather reports, universal radio service for aircraft, U.S. Standard Time Signals, 2.5 to 5.0 MC shortwave broadcasts; Standard Broadcast Band - 550 to 1600 KC - entertainment, newcasts and weather information; Airways Band - 200 to 400 KC - airport communications, weather reports via range stations and airways 4-course beacon signals (A/N).

A built-in loop antenna provides adequate reception on all bands. As an added feature a panel mounted jack offers a convenient connection for an external antenna which is useful under adverse receiving conditions or where the set is used as a direction finder.

The new LEARAVIAN is designed for operation on 105-125 volts, 50-60 cycles ac (alternating current) or 105-125 volts dc (direct current) or battery pack. Special "refresher battery charging" circuits are incorporated for appreciably extending the life of the battery pack.

A panel mounted jack is also provided for plugging in headphones. When the headphones are plugged in the loud speaker is automatically made inoperative.

2. Power Supplies (AC, DC and Battery Pack).

CAUTION

DO not plug in this radio receiver to any other power supply outlet than specified below or severe damage to the equipment may result. If you are in doubt as to the voltage rating of the power supply, consult the building electrician or your local power company before inserting plug of electric attachment cord.

Any of the following sources of electrical power are suitable for operation of the LEARAVIAN Model P-10B:

- a) Ac (alternating current) - 105 to 125 volts 50 to 60 cycle.
- b) Dc (direct current) - 105 to 125 volts.
- c) Battery packs (any one of the following types.)
 - General - No. 60A6F6.
 - Eveready - No. 753.
 - Burgess - No. F6A60.
 - Ray-O-Vac - No. 60A-6F.

3. Tube Complement

The LEARAVIAN Model P-10B is shipped from the factory with a complete set of fully tested tubes installed in their proper sockets. The tube complement is as follows:

- 1 Type 1U₄ Radio-frequency amplifier
- 1 Type 1R₅ Converter (r-f).
- 1 Type 1U₄ Intermediate-frequency amplifier.
- 1 Type 1U₅ Detector-AVC-1st Audio amplifier.
- 1 Type 3V₄ Power Amplifier.
- 1 Type 11723 Rectifier

4. Frequency Bands.

The frequency bands are as follows:

| <u>Dist</u> <u>Identification</u> | <u>Band</u> | <u>Frequency</u> |
|-----------------------------------|-------------|------------------|
| Marine (Blue) | Short-Wave | 1960 to 5750 KC |
| BC (Red) | Broadcast | 550 to 1650 KC |
| Range (Green) | Long-wave | 1.95 to 5.5 MC |

MODEL P-10B

The color of each dial scale corresponds with the color of one of the positions on the rim type band switch knob located at the right hand edge of the dial. Changing from one band to another is accomplished simply by rotating the knob up or down so that the desired band is in line with the indicating arrow. The proper dial scale for that band will then be in position also and in line with the indicating arrow. This is the scale that would be observed for tuning stations in the desired band.

INSTALLATION

NOTE

Since the LEARAVIAN Model P-10B is designed primarily as a portable radio receiver, very little consideration need be given the subject of "Installation." However, this set is also highly adaptable for marine and aviation use where a combination entertainment and utility portable receiver is desired. For these applications, an external antenna (to be used in conjunction with the built-in loop antenna) may be used to advantage as described in the following paragraphs.

1. Connecting to AC or DC (105 to 125 volts only).

The electric attachment cord for AC or DC operation is contained inside the cabinet and is arranged so it can be withdrawn after the back of the cabinet is opened. A notch for clearing the cord then permits the cabinet back to be closed. When the receiver is to be used on battery power, the cord can be replaced inside the cabinet.

2. Installing Battery Pack.

Ample space is provided in the bottom of the cabinet for any one of the correct types of battery packs listed. With the cabinet back opened, the battery holding bracket will be found held to the bottom of the cabinet with two screws. Remove the screws and bracket, then place battery pack in position as shown in Fig. 2. The battery socket should be on the right so that the battery connecting plug can be inserted. Replace battery bracket and fasten firmly with the two screws. Insert battery connecting plug and close cabinet back.

3. Installing External Antenna.

An external antenna may be used with the LEARAVIAN P-10B to improve reception under adverse conditions. The effectiveness of an outside (external) antenna depends largely on its location and length and no specific instructions can be given which will be found ideal under all circumstances.

In general the antenna should be about 20 to 40 ft. long. Small size insulated wire is usually most convenient. DO NOT USE SHIELDED WIRE. The insulation must be removed from the end of the lead-in to make connection to the INNER connector of a standard phone plug (PL-55) which is then plugged into the jack marked "ANT".

Marine or aircraft installations will be governed to a great extent by structural facilities. In all cases, however, the external antenna should be well constructed. Do not shield the lead-in. Be sure that neither the antenna proper nor the lead-in interferes with the existing controls or equipment of the boat or airplane. Secure lead-in at intervals throughout its length to prevent fouling.

In most cases, the LEARAVIAN performs well in a boat or airplane that does not have shielded ignition circuits. However, shielding of spark plugs, magnetos and generator, along with all ignition wires is very desirable. Complete shielding will remove all trace of background ignition noises which tend to reduce the effective receiving range of the radio.

OPERATION

MODEL P-10B

1. Warning on Power Source.

Do not connect this receiver to any power supply other than 105-125 volts 50-60 cycles ac (alternating current) or 105-125 volts dc (direct current) or battery packs as specified previously.

2. Selecting Power Source.

Move Power Selector Switch Knob (at left end of dial) so that marking on knob ("BATT" or "AC") is opposite the indicating arrow, depending on whether battery operation or AC-DC operation is desired. DO NOT MOVE KNOB TO "CHARGE" UNTIL DIRECTIONS IN PARAGRAPH 10 HAVE BEEN NOTED CAREFULLY.

3. Applying Power.

With the Power Selector Switch knob in the correct position, turn the ON-OFF switch and Volume Control knob (at left of handle) clockwise until a click is heard. Further rotation increases volume. Power is now being applied to the radio. On "BATT" (Battery) operation, stations can be tuned in immediately, but on "AC" (AC or DC) operation allow a few moments for the tubes to heat up. Where the set is plugged in to dc (direct current) and no response is obtained after one minute, reverse the electric attachment plug in the socket.

4. Selecting Frequency Band.

Move Band Selector switch knob (at right end of dial) up or down so that marking on knob ("RANGE", "BC", or "MARINE") is opposite the indicating arrow, depending on which band is desired. The dial scales are so arranged that as the knob is moved to any of the three positions, the corresponding scale will move simultaneously and be in line with the indicating arrow.

5. Tuning in a Desired Station.

Turn Station Selector knob (at right end of handle) to right or left until dial pointer is over the approximate frequency reading of the desired station (as read on the dial scale opposite the indicating arrow).

Then advance (turn clockwise) the volume control knob until reception is audible. Turn station selector knob right or left slowly until desired station is perfectly tuned in (on the "center" of the station) and adjust volume as required. Never reduce the volume by tuning "off" the station since this will cause distorted reception.

6. Loop Antenna Directional Effects.

The built-in loop antenna provides a directional receiving effect which is noticeable when the LEARAVIAN is lifted by the handle and turned slowly first in one direction and then the other. The station will come in strongest when either end of the set faces the direction of the station, and the station will be weakest or fade out (null) when either the front (speaker) or back faces that same station.

This directional effect serves a three-fold purpose:

- a) Weak or distant stations can be received better by rotating the set until they are best received.
- b) Local noise interference can be minimized on a particular station by rotating the set until the signal-to-noise ratio is best.
- c) Direction finding is possible since the fade out or null is comparatively "sharp" when the front or back of the set faces the station.

NOTE For direction finding applications of the LEARAVIAN, an external antenna plugged in and used as described in par. 7 is recommended.

MODEL P-10B

7. Direction Finding.

To determine the direction of a received station, slide the RECEIVING DIRECTION FINDING switch to the DIRECTION-FINDING positions and plug in the external antenna. Rotate set until station fades out, then unplug external antenna and slowly rotate set first in one direction and then the other so that the exact aural-null point is determined. At this point the speaker of the set is pointing to the station.

8. Headphone Reception.

To connect headphones to the LEARAVIAN, attach a Type PL-55 (or equivalent size) phone plug to the cord and plug in to the "PHONES" jack (to the left of the "RECEIVING-DIRECTION FINDING" switch).

When phones are plugged in, the loudspeaker is automatically cut out of the circuit and therefore silenced.

NOTE Headphones having 200 ohms resistance are recommended for use with the LEARAVIAN.

9. Shutting OFF Power.

Turn ON-OFF switch and Volume Control Knob counter-clockwise until a click is heard. This shuts off power, either from AC-DC or battery.

Be sure to shut off power when through using the set, especially, if the set is being operated on battery.

10. "Charging Battery"

The useful life of the battery pack may be extended appreciably by periodic "charging". This is conveniently done by plugging the attachment cord in to 105 to 125 volt, 50 to 60 cycle ac or 105 to 125 volt dc electric outlet and moving the Power Selector Switch Knob to "charge". Then apply power by turning ON-OFF switch to "ON" position.

For best results it is recommended that the battery be charged twice as long as it was discharged. For example, if the set has been battery operated for a period of four hours, the battery should be charged for approximately eight hours. It is desirable to charge the battery after each period of battery operation, rather than charging for a long time to cover several operative periods.

NOTE During the charge cycle, the radio is inoperative.

On completion of the charge cycle always return the Power Selector Switch to either "AC" or "BATT" positions, even if the ON-OFF switch is turned "OFF".

CARE AND MAINTENANCE

NOTE There are no adjustments of any kind to be made on the chassis or speaker.

1. Battery Replacement.

After extended use of the pattery pack its reserve power may be weakened sufficiently so that the "CHARGE" operation will no longer be effective and the performance of the set on "BATT" may not be satisfactory. The battery pack should then be replaced. Replacement battery packs may be obtained from your local Lear dealer or from radio supply houses. Be sure the number of the battery corresponds with one of the listed previously.

To replace battery, refer to par. "Installing Battery Pack". Carefully disconnect battery cable attachment plug from old battery and remove battery bracket permitting removal of battery,

2. Tube Replacement.

The Tubes in the set should be checked occasionally either by taking them out and having them tested or by obtaining a new set of tubes and inserting them in the sockets, one at a time, noting any difference in performance.

The type of tubes required and the position of these tubes are clearly shown in Fig. 2. The type number is etched or stamped on each tube. Should it be necessary to replace any tubes, gently rotate the tube until the pins drop into the socket. Then push down until tube is seated firmly in socket.

Alignment Chart
(See diagram Fig. 2)

| Step | Alignment of | Generator Connected | Dummy Antenna | Generator Frequency | Receiver Dial Setting | Adjustment *** |
|------|-----------------------------------------------------------------------------|--------------------------------|---------------|---------------------|-----------------------|--------------------|
| 1. | Set dial pointer to thin line at end of dial with tuning gang fully closed. | | | | | |
| 2. | I.F. | r-f section of gang and ground | .01 mf | 455 kc | 1000 kc | T5 Bottom and top |
| 3. | | | | | | T4 Bottom and top |
| 4. | | | | | | C22 (osc. trimmer) |
| 5. | Range | Ant. Jack and ground | | | | C16 (r-f trimmer) |
| 6. | Band | Ant. Jack and ground | 30 mmf | 400 kc | 400 kc | C7 (Ant. trimmer) |
| 7. | | | | 220 kc | 220 kc* | C20 (osc. padder) |
| 8. | Repeat steps 1,5,6 and 7 until no further improvement is obtained. | | | | | |
| 9. | | | | | | C21 (osc. trimmer) |
| 10. | Broadcast Band | Ant. jack and ground | 30 mmf | 1500 kc | 1500 kc | C15 (r-f trimmer) |
| 11. | | | | | | C6 (ant. trimmer) |
| 12. | | | | 600 kc | 600 kc* | C19 (osc. padder) |
| 13. | Marine Band | Ant. jack & ground | 30 mmf | 5 mc | 5 mc* | C13 (osc. trimmer) |
| 14. | | | | | | C12 (r-f trimmer) |
| 15. | | | | | | C4 (ant. trimmer) |
| 16. | | ** | 1 ft. lead | 5 mc | 5 mc | C4 (loop trimmer) |

*Rock tuning gang rotor while adjusting.
 ** Place 1 ft. antenna lead from generator near loop.
 The loop and antenna trimmer C4 is reached through hole in back cover of cabinet.
 *** All adjustment are for maximum output.

MODEL P-10B

| VOLTAGE MEASUREMENTS | | | | | | | | |
|----------------------|-----|-------|-------|-------|-------|-------|-------|-------|
| Tube | | Pin 1 | Pin 2 | Pin 3 | Pin 4 | Pin 5 | Pin 6 | Pin 7 |
| 1U4 | VT1 | 2.6 | 93 | 93 | .3 | - | - | 4 |
| 1R5 | VT2 | 0 | 93 | 55 | -8 | 0 | - | 1.3 |
| 1U4 | VT3 | 4 | 93 | 93 | - | 3.9 | -.4 | 5.4 |
| 1U5 | VT4 | 1.3 | 40 | 25 | - | - | - | 2.6 |
| 3V4 | VT5 | 5.4 | 90 | 93 | 93 | 6.5 | - | 7.8 |
| 11723 | VT6 | - | 117AC | 0 | 0 | 115AC | 120 | - |

| RESISTANCE MEASUREMENTS | | | | | | | | |
|-------------------------|-----|----|-------|------|------|-----|------|----|
| 1U4 | VT1 | 45 | *200 | *0 | 2M | 45 | 5M | 60 |
| 1R5 | VT2 | - | *16 | 15 K | 100K | .2 | 5M | 28 |
| 1U4 | VT3 | 60 | *24 | 0 | - | 60 | 1.6 | 70 |
| 1U5 | VT4 | 28 | 470 K | 5M | 1M | 1M | 10M | 45 |
| 3V4 | VT5 | 70 | 650 | 0 | 0 | 75 | 2.2 | 95 |
| 11723 | VT6 | - | - | 700 | 0 | 725 | 2400 | - |

NOTES:

All resistance measurements are to artificial ground (indicated by symbol \perp on schematic diagram); those marked * are from the 90 volt positive pin on the battery plug (see schematic diagram no. 64165).

All voltage measurements are to artificial ground (indicated by symbol \perp on schematic diagram). All are DC unless otherwise indicated.

Measurements made with 20,000 ohm per volt meter.

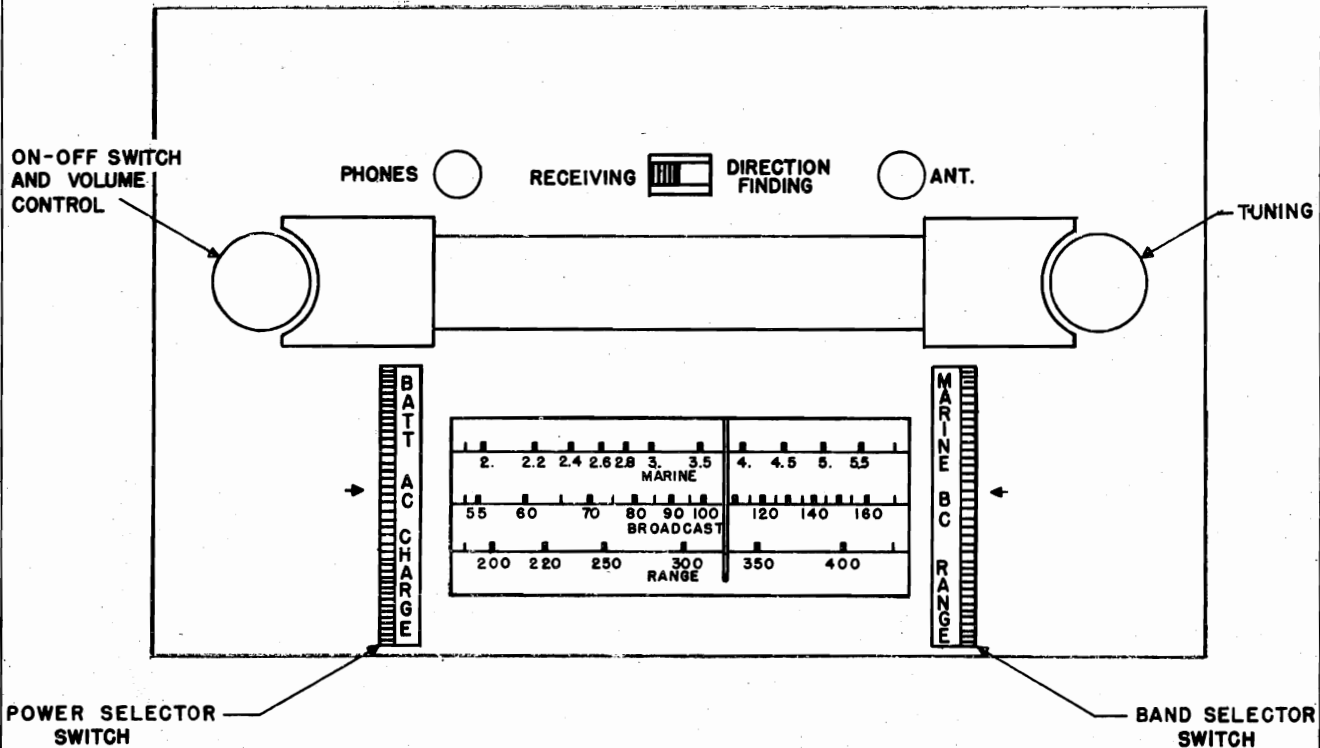


FIG. 1 OPERATING CONTROLS

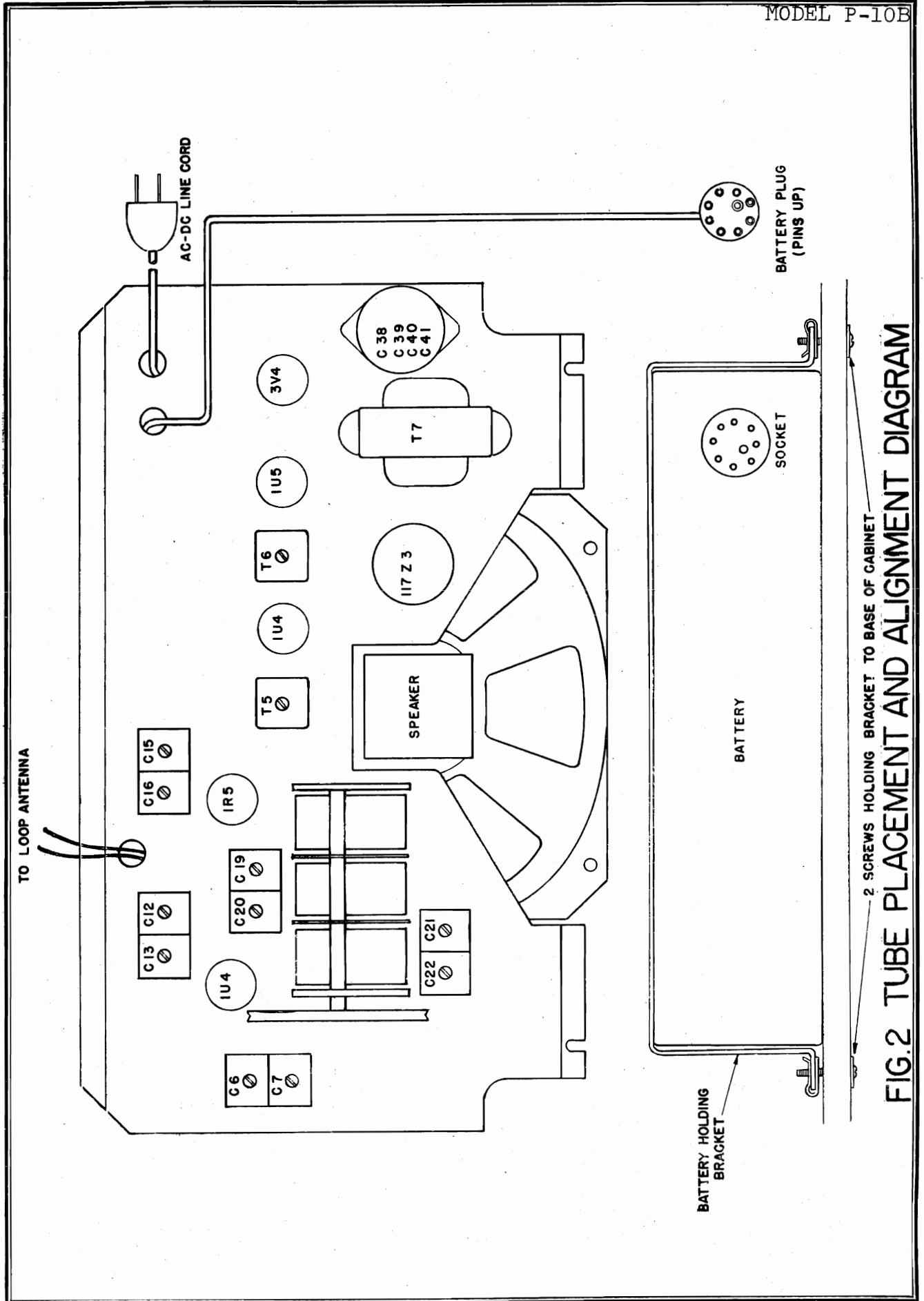
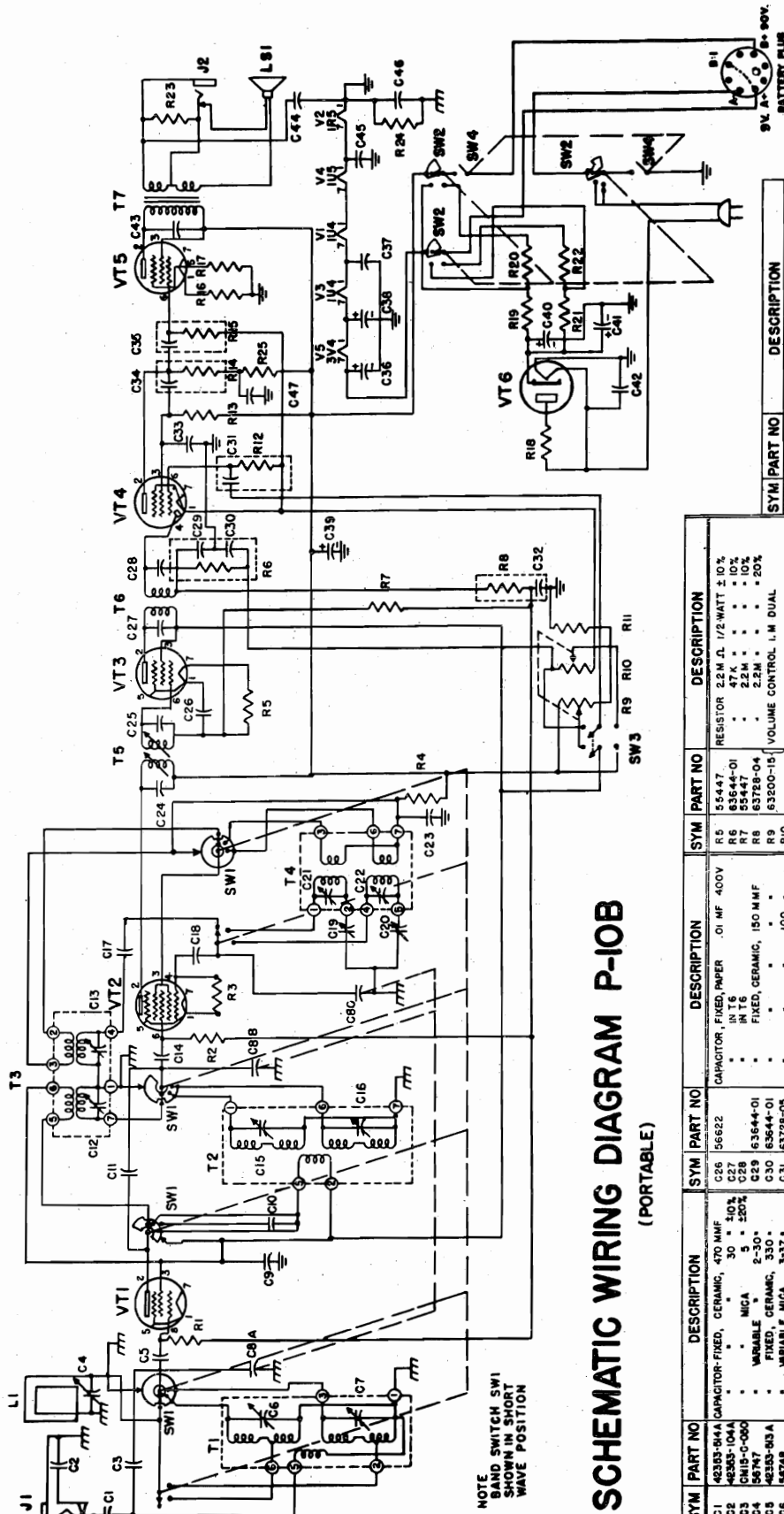


FIG.2 TUBE PLACEMENT AND ALIGNMENT DIAGRAM



NOTE
BAND SWITCH SW1
SHOWN IN SHORT
WAVE POSITION

SCHEMATIC WIRING DIAGRAM P-10B
(PORTABLE)

| SYM PART NO | DESCRIPTION | SYM PART NO | DESCRIPTION | SYM PART NO | DESCRIPTION | SYM PART NO | DESCRIPTION |
|-------------|---------------------------------------------------|-------------|-------------------------------------|-------------|---------------------------------------------|-------------|------------------------------------------------|
| C1 | 42355-941A CAPACITOR-FIXED, CERAMIC, 470 MMF | R5 | 55447 RESISTOR 2.2M Ω 1/2 WATT ±10% | VT6 | 54978 117 Z3 6T TRANS. ANT. BC & RANGE BAND | SW1 | 43300 SWITCH, BAND CHANGE |
| C2 | 42355-104A CAPACITOR-FIXED, CERAMIC, 30 ± 30% MMF | R6 | 63644-01 IN T6 47K ± 10% | VT7 | 43315 117 Z3 6T TRANS. ANT. BC & RANGE BAND | SW2 | 43301 SWITCH, BAND CHANGE |
| C3 | CH15-0-000 VARIABLE MICA 5 ± 20% MMF | R7 | 55447 2.2M ± 10% | T1 | 43315 117 Z3 6T TRANS. ANT. BC & RANGE BAND | SW3 | 50530 SLIDE DPDT FUNCTION |
| C4 | 56717 CH15-0-000 VARIABLE MICA 5 ± 20% MMF | R8 | 63728-04 2.2M ± 10% | T2 | 43315 117 Z3 6T TRANS. ANT. BC & RANGE BAND | SW4 | 50530 SLIDE DPDT SWITCH PART OF VOLUME CONTROL |
| C5 | 42355-93A CAPACITOR-FIXED, CERAMIC, 330 ± 30% MMF | R9 | 63500-15 VOLUME CONTROL, I.M DUAL | T3 | 43315 117 Z3 6T TRANS. ANT. BC & RANGE BAND | J1 | 2688 JACK ANT. |
| C6 | 56748 56748 VARIABLE, CERAMIC, 3-37 ± 30% MMF | R10 | 55431 RESISTOR 100K Ω 1/2 WATT ±10% | T4 | 43315 117 Z3 6T TRANS. ANT. BC & RANGE BAND | J2 | 2688 JACK ANT. PHONE |
| C7 | 56750 56750 VARIABLE, MICA, 10-170 ± 20% MMF | R11 | 52485-05 100 ± 20% Ω | T5 | 43315 117 Z3 6T TRANS. ANT. BC & RANGE BAND | L51 | 63751 SPEAKER |
| C8 A | 63785 AIR, 3 GAUG | R12 | 52485-05 100 ± 20% Ω | T6 | 43315 117 Z3 6T TRANS. ANT. BC & RANGE BAND | L1 | 63747 LOOP ANTENNA |
| C8 B | 63785 AIR, 3 GAUG | R13 | 52485-05 100 ± 20% Ω | T7 | 43315 117 Z3 6T TRANS. ANT. BC & RANGE BAND | | |
| C9 | 56803 FIXED, PAPER, 1M 200 V | R14 | 63728-07 470K ± 10% | | | | |
| C10 | 42355-100A CAPACITOR-FIXED, CERAMIC, 5 ± 20% MMF | R15 | 63728-06 2.2M ± 10% | | | | |
| C11 | CH15-0-000 VARIABLE, MICA 5 ± 20% MMF | R16 | 55409 1500 ± 10% Ω | | | | |
| C12 | 56748 56748 VARIABLE, MICA, 3-37 ± 30% MMF | R17 | 55409 1500 ± 10% Ω | | | | |
| C13 | 42355-93A CAPACITOR-FIXED, CERAMIC, 330 ± 30% MMF | R18 | 55388 27 ± 10% K Ω | | | | |
| C14 | 56750 56750 VARIABLE, MICA, 10-170 ± 20% MMF | R19 | 55739 2.2K ± 10% | | | | |
| C15 | CH15-0-000 VARIABLE, MICA 5 ± 20% MMF | R20 | 55739 2.2K ± 10% | | | | |
| C16 | 56750 56750 VARIABLE, MICA, 10-170 ± 20% MMF | R21 | 2310 2250 ± 10% Ω | | | | |
| C17 | 42355-93A CAPACITOR-FIXED, CERAMIC, 330 ± 30% MMF | R22 | 2310 2250 ± 10% Ω | | | | |
| C18 | 56750 56750 VARIABLE, MICA, 10-170 ± 20% MMF | R23 | 55473 2.2K ± 10% Ω | | | | |
| C19 | 42355-93A CAPACITOR-FIXED, CERAMIC, 330 ± 30% MMF | R24 | 56487 470K ± 20% Ω | | | | |
| C20 | 56750 56750 VARIABLE, MICA, 10-170 ± 20% MMF | R25 | 57104 220K ± 10% Ω | | | | |
| C21 | 56750 56750 VARIABLE, MICA, 10-170 ± 20% MMF | VT1 | 63760 TUBE 1U4 | | | | |
| C22 | 56750 56750 VARIABLE, MICA, 10-170 ± 20% MMF | VT2 | 64982 TUBE 6X4 | | | | |
| C23 | 56800 FIXED, PAPER, 205 MMF | VT3 | 64982 TUBE 6X4 | | | | |
| C24 | 56800 FIXED, PAPER, 205 MMF | VT4 | 63761 TUBE 6X4 | | | | |
| C25 | 56800 FIXED, PAPER, 205 MMF | VT5 | 63762 TUBE 6X4 | | | | |

HOW TO CONNECT BATTERIES-

BE SURE RADIO IS TURNED OFF-

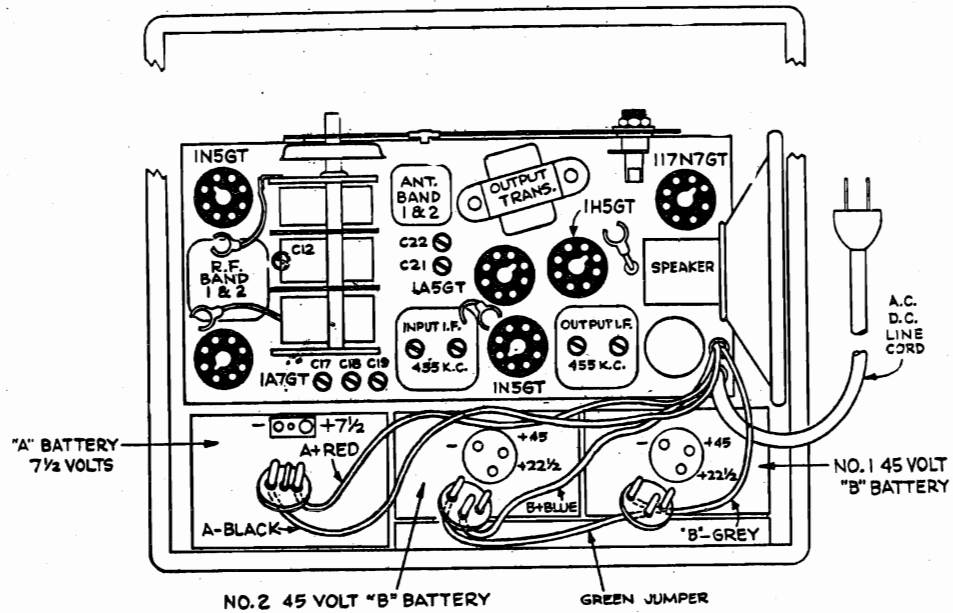


FIG. 1

INSTALLING AND CONNECTING THE BATTERIES— BE SURE THE RADIO IS TURNED OFF

1. Remove the back of the cabinet by removing the four screws which hold the back in place. Remove the cardboard spacer.
2. Place the three batteries in the cabinet exactly as shown in the above illustration (Fig. 1).
3. Insert the plug of the "A" battery cable from the radio into the socket on the "A" battery.
4. Next insert the two three-prong "B" battery plugs into the sockets on the "B" batteries, marked "Battery No. 1" and "Battery No. 2" in Fig. 1.
5. Replace the back of the cabinet and fasten it in place with the four screws.

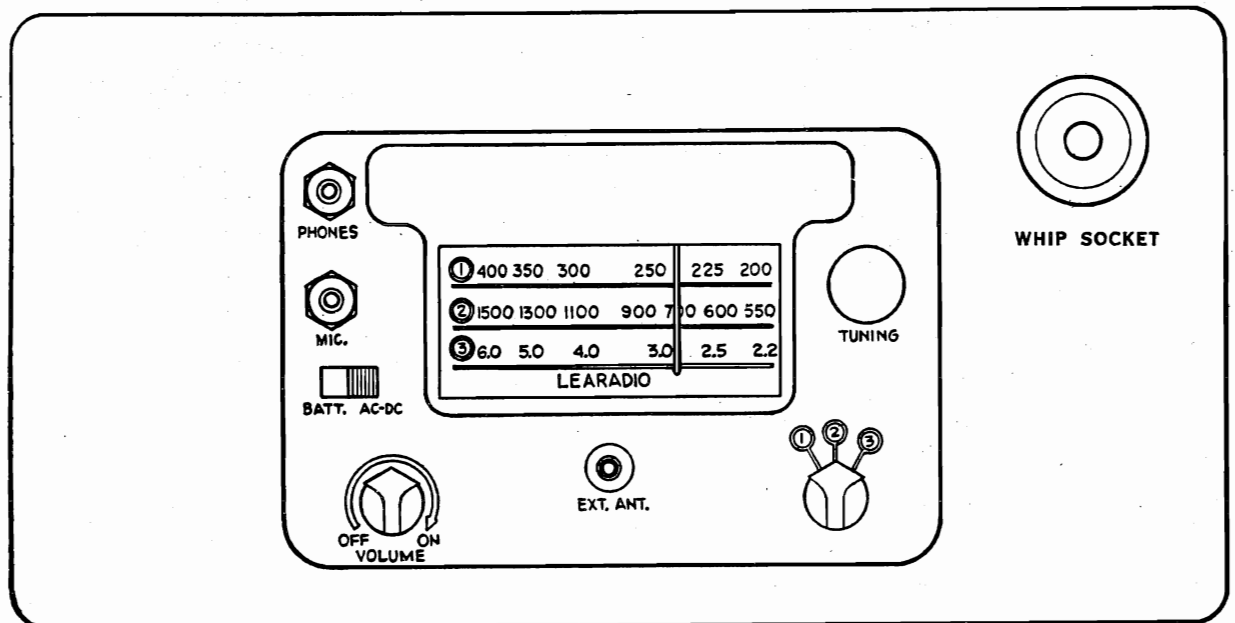


FIG. 2

MODEL RM-402B

HOW TO REMOVE RADIO CHASSIS FROM CABINET—

To remove chassis from the cabinet proceed as follows:

1. Remove back of cabinet (four screws).
2. Remove 2 chassis mounting screws from top of cabinet and 2 from front of cabinet, also 2 holding dial.

BATTERY REPLACEMENTS—

The batteries are designed especially for the Lear RM-402 B Portable and will give approximately 200 hours of service.

Use code word APRAB when ORDERING BATTERIES.

This type of radio set is designed to use less battery current when the set is operated at low volume and to use maximum battery cur-

rent only when large volume is desired. For this reason you will obtain longer life from your "B" batteries by not operating your set any louder than is necessary.

Be careful not to leave your radio turned on over night. The long drain uses a lot of current and gives the batteries no chance to recuperate. Remember also that the life of your batteries will depend upon the number of hours each day that you use your set. Turning the radio off when it is not needed saves the batteries accordingly.

The "A" and "B" batteries of the size used in this radio have an approximate life of 200 hours. This battery life may be expected with an average of several hours' daily use. Allowing the radio to run for long periods at a time reduces the life of the batteries. When reception becomes weak new batteries should be installed.

**Caution: When the receiver is operating on A.C. or D.C.—door in rear of cabinet should be left open in order to provide ventilation.*

MODEL RM-402 B

Series 1

When ordering parts always mention complete factory model number, and series

LIST OF REPAIR PARTS

RESISTORS

| Schematic No. | Part No. | Description |
|---------------|----------|-------------------------|
| R1 | R207 | 1 megohm—1/3 watt |
| R2 | R302 | 30 ohm—1/2 watt |
| R3 | R208 | 200,000 ohm—1/3 watt |
| R4 | R206 | 75,000 ohm—1/3 watt |
| R5 | R201 | 10,000 ohm—1/3 watt |
| R6 | R205 | 40,000 ohm—1/3 watt |
| R7 | R210 | 5 megohm—1/3 watt |
| R8 | R212 | 500,000 ohm—1/3 watt |
| R9 | R207 | 1 megohm—1/3 watt |
| R10 | R202 | 1,200 ohm—1/3 watt |
| R11 | R209 | 3 megohm—1/3 watt |
| R12 | R100 | 1 megohm—Vol. Control |
| R13 | R211 | 100,000 ohm—1/3 watt |
| R14 | R303 | 250,000 ohm—1/3 watt |
| R15 | R211 | 100,000 ohm—1/3 watt |
| R16 | R207 | 1 megohm—1/3 watt |
| R17 | R301 | 460 ohm wire—1 1/2 watt |
| R18 | R202 | 1,200 ohm—1/3 watt |
| R19 | R209 | 3 megohm—1/3 watt |

CONDENSERS

| | | |
|-----|--------|--------------------------|
| C | A102 | 3 gang Variable |
| C1 | A302 | .01 MFD.—400 V. |
| C2 | A2177 | .01 MFD.—Mica |
| C3 | 2186-C | 5 MMFD.—Mica |
| C4 | A502 | Broadcast Ant. Trimmer |
| C5 | A502 | Shortwave Ant. Trimmer |
| C6 | A502 | Longwave Ant. Trimmer |
| C7 | A206 | .00025 MFD.—Mica |
| C8 | | Broadcast Coupling Cond. |
| C9 | | Longwave Coupling Cond. |
| C10 | A205 | .0001 MF.—Mica |
| C11 | A304 | .05 MFD.—400 V. |
| C12 | A503 | Shortwave R.F. Trimmer |
| C13 | | Broadcast Trimmer |
| C14 | A210 | .000025 MFD.—Mica |
| C15 | | Longwave R.F. Trimmer |
| C16 | A200 | .0001 MFD.—Mica |
| C17 | A501 | Shortwave Osc. Trimmer |
| C18 | A501 | Broadcast Osc. Trimmer |

| | | |
|-----|--------|-----------------------|
| C19 | A501 | Longwave Osc. Trimmer |
| C20 | A50247 | 1600 MMFD.—Mica |
| C21 | A500 | Broadcast Padder |
| C22 | A500 | Longwave Padder |
| C23 | A306 | .1 MFD.—200 V. |
| C24 | A200 | .0001 MFD.—Mica |
| C25 | A202 | .00025 MFD.—Mica |
| C26 | A300 | .002 MFD.—400 V. |
| C27 | A304 | .05 MFD.—400 V. |
| C28 | A208 | .00044 MFD.—Mica |
| C29 | A302 | .01 MFD.—400 V. |
| C30 | A306 | .1 MFD.—200 V. |
| C31 | A300 | .002 MFD.—400 V. |
| C32 | A303 | .005 MFD.—400 V. |
| C33 | A304 | .05 MFD.—400 V. |
| C34 | A306 | .1 MFD.—200 V. |
| C35 | A400 | 20 MFD.—150 W.V. |
| C36 | A400 | 40 MFD.—150 W.V. |
| C37 | A400 | 200 MFD.—6 W.V. |
| C38 | A401 | 200 MFD.—10 W.V. |
| C39 | 2186-C | 5 MMFD.—Mica |
| C40 | 2187-C | 10 MMFD.—Mica |
| C41 | 2189-C | 20 MMFD.—Ceramicon |
| C42 | A50425 | 400 MFD.—10 W.V. |

In one can

COILS

| | | |
|-----|--------|--------------------------------|
| T1 | A50220 | Shortwave Ant. Coil |
| T2 | A50221 | L.W. & B.C. Ant. Coil |
| T5 | A50160 | Shortwave R. F. Coil |
| T6 | T302 | L.W. & B.C., R. F. Coil in Can |
| T7 | A50236 | Shortwave Osc. Coil |
| T8 | T404 | L.W. & B.C. Osc. Coil |
| T9 | T501 | 1st I.F. Coil |
| T10 | T601 | 2nd I.F. Coil |
| T11 | T600 | Output Trans. |
| T11 | T700 | Output Trans. |

PARTS

| | | |
|------|--------|--------------------------|
| S1 | | On-off Switch (on R12) |
| S2 | A50230 | Power change-over switch |
| S5 | A50228 | Band Switch |
| J2 | E400 | Phone Jack |
| J1 | E406 | Microphone Jack |
| H1 | | Sockets |
| E100 | | Tuning Knob |
| E101 | | Volume and Switch Knob |

SERVICE DATA FOR PROFESSIONAL SERVICE MEN

DESCRIPTION:

TUBES—
The tube complement of this chassis consists of the following tubes:

- 1—Type 1N5GT R.F. Amplifier.
- 1—Type 1A7GT Mixer, First Detector-Oscillator.
- 1—Type 1N5GT, First I.F. Amplifier (455 K.C.).
- 1—Type 1H5GT Second Detector, A.V.C. First Audio.
- 1—Type 1A5GT Output Amplifier. (Battery only.)
- 1—117N7GT-Rectifier and Output Tube. (A.D., D.C. only.)

SERVICE NOTES—

Voltagcs taken from different points of circuit to chassis are measured with volume control full on, all tubes in their sockets and speaker connected, with a volt meter having a resistance of 1,000 ohms per volt. All voltages are indicated on the voltage chart.
Resistances of coil windings are indicated in ohms on the schematic circuit diagram.
To check for open by-pass condensers, shunt each condenser with another condenser of the same capacity and voltage ratings, which is known to be good, until the defective unit is located.
Failure to operate, noisy or weak reception is usually due to defective tubes, the tubes making poor contact with

sockets, or grid clips making poor contact with the caps of the tubes. Tubes may be checked very easily by replacing with other tubes which are known to be good. Weak batteries are also a source of trouble.

ALIGNING INSTRUCTIONS—

CAUTION:—No aligning adjustments should be attempted without first thoroughly checking over all other possible causes of trouble, such as poor installations, open or grounded antenna systems, low battery voltage, defective tubes, condensers and resistors. In order to properly align this chassis an oscillator (generator) is absolutely necessary.

HEADPHONES—

Best results will be obtained with 200 ohm headphones.

ALIGNMENT PROCEDURE

• Volume control—Maximum all adjustments.

- Connect generator ground to shell of antenna socket.
- Connect dummy antenna value in series with generator output lead.
- Connect output meter into phone jack and set generator input at 200 ohms.
- Allow chassis and signal generator to "heat up" for several minutes.

The following equipment is required for alignment:

- An all wave signal generator which will provide an accurately calibrated signal at the test frequencies as listed.
- Output indicating meter.
- Non-metallic screwdriver.
- Dummy antennas—1 Mfd., 20 MMFD.

| Band | Switch Position | Signal Generator Frequency Setting | Dummy Antenna | Connection To Radio | Dial Setting | Trimmers Adjusted (in Order Shown) | Trimmer Function | Adjustment |
|---------------------------------------------------------------------------------|-----------------|------------------------------------|---------------|-----------------------------|---------------------------------------|------------------------------------|--------------------------------------------------------------|--------------------------------------------------|
| I F | 2 | 455 Kc. | .1 Mfd. | 1A7GT Grid | Rotor full closed | Four trimmers on top of I. F. cans | Output and input I. F. | Adjust to maximum output |
| Adjust dial pointer to read 2.2 mc. on band 3 with gang condenser fully closed. | | | | | | | | |
| 1 | 1 | 400 Kc. | 20 MMFD | Antenna and Ground Terminal | 400 Kc. | C 19 C 6, C 15 | Band 1 oscillator trimmer Band 1 antenna & R. F. trimmers | Adjust to max. output Adjust for max. output |
| 1 | 1 | 220 Kc. | 20 MMFD | Antenna and Ground Terminal | Rock rotor while adjusting | C 22 | Band 1 Oscillator padder | Adjust for max. output |
| 1 | 1 | 400 Kc. | 20 MMFD | Antenna and Ground Terminal | 400 Kc. | C 15 & C 6 | R. F. & Ant. trimmers | Adjust for max. output |
| 2 | 2 | 1400 Kc. | 20 MMFD | Antenna and Ground Terminal | 400 Kc. | C 18 C 4 & C 13 | Osc., Antenna & R. F. trimmers | Adjust for max. output Adjust for max. output |
| 2 | 2 | 600 Kc. | 20 MMFD | Antenna and Ground Terminal | 600 Kc. Rock rotor while adjusting | C 21 | Oscillator padder | Adjust for max. output |
| 3 | 3 | 6 Mc. | 20 MMFD | Antenna and Ground Terminal | 6 Mc. | C 17 | Osc. trimmer | Adjust for max. output |
| 3 | 3 | 6 Mc. | 20 MMFD | Antenna and Ground Terminal | Rock rotor while adjusting | C 5 & C 12 | Antenna & R. F. trimmers | Adjust for max. output |

NOTE—Trimmers C4, C5, and C6 can be reached by removing the Lear nameplate on the side of the cabinet. The above adjustments should be made several times to insure exact settings of trimmers and padders.

HOW TO CONNECT BATTERIES—Read Carefully
BE SURE RADIO IS TURNED OFF—

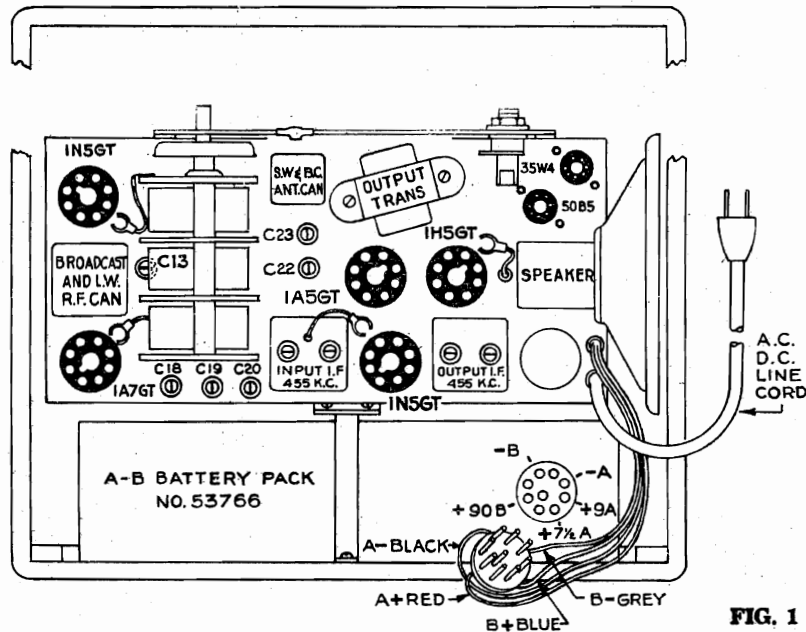


FIG. 1

INSTALLING AND CONNECTING THE BATTERIES —
BE SURE THE RADIO IS TURNED OFF

1. Remove the back and loop of the cabinet by removing the four screws which hold the back in place.
2. Place the battery in the cabinet exactly as shown in the above illustration (Fig. 1).
3. Insert the plug of the battery cable from the radio into the socket on the battery.
4. Replace battery clamp and holding screw.
5. Replace the back of the cabinet and fasten it in place with the four screws.

**Caution when the receiver is operating on A.C. or D.C.—door in rear of cabinet should be left open in order to provide for ventilation.*

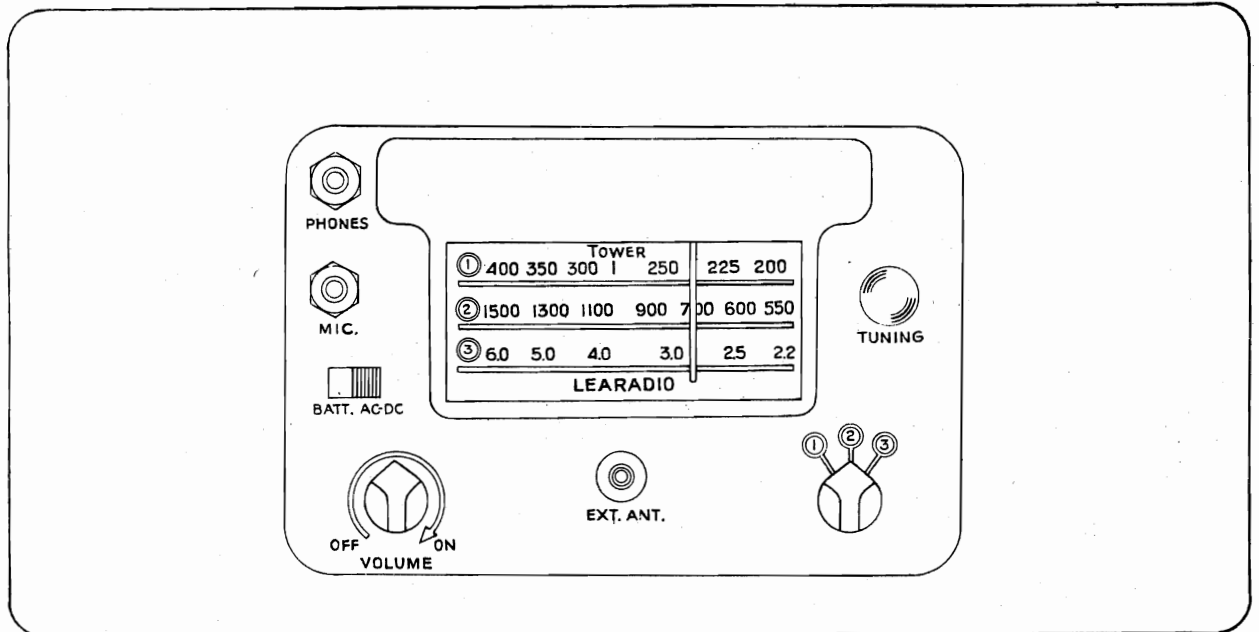


FIG. 2

MODEL RM-402C

CARE AND MAINTENANCE

BATTERY REPLACEMENTS—

The battery is designed especially for the Lear RM 402 C Portable and will give approximately 200 hours of service.

HOW TO REMOVE RADIO-CHASSIS FROM CABINET—

To remove chassis from the cabinet proceed as follows:

1. Remove back of cabinet, (four screws).
2. Disconnect the loop antenna.
3. Remove 2 chassis mounting screws from top of cabinet and 2 from front of cabinet, also 2 holding dial.

Specify No. 53766 when ORDERING BATTERIES.

Most of the newer types of radio sets are designed to use less battery current when the set is operated at low volume and to use maximum battery current only when large volume is desired. For this reason you will obtain longer life from your "B" batteries by not operating your set any louder than is necessary.

Be careful not to leave your radio turned on over night. The long drain uses a lot of current and gives the batteries no chance to recuperate. Remember also that the life of your batteries will depend upon the number of hours each day that you use your set. Turning the radio off when it is not needed saves the batteries accordingly.

The battery used in this radio has an approximate life of 200 hours. This battery life may be expected with an average of several hours daily use. Allowing the radio to run for long periods at a time reduces the life of the batteries. When reception becomes weak a new battery should be installed.

MODEL RM-402 C

Series I

When ordering parts always mention complete factory model number, and series.

LIST OF REPAIR PARTS

| Code No. | Part No. | Description | | | | |
|----------|----------|-------------------------|----------------|-----|-------|---------------------------|
| | | RESISTORS | | | | |
| R1 | 55480 | 1 Megohm | 1/2 W. | C18 | 53157 | Shortwave Osc. Trimmer |
| R2 | 55485 | 220K ohm | 1/2 W. | C19 | 53157 | Broadcast Osc. Trimmer |
| R3 | 55482 | 68K ohm | 1/2 W. | C20 | 53157 | Longwave Osc. Trimmer |
| R4 | 55477 | 10K ohm | 1/2 W. | C21 | 53844 | 1600 Mmfd Mica |
| R5 | 55492 | 3.3 Megohm | 1/2 W. | C22 | 53713 | Broadcast Padder |
| R6 | 55408 | 1200 ohm | 1/2 W. | C23 | 53713 | Longwave Padder |
| R7 | 55408 | 1200 ohm | 1/2 W. | C24 | 56603 | .1 Mfd 200 V. |
| R8 | 55489 | 1 Megohm | 1/2 W. | C25 | 56603 | .1 Mfd 200 V. |
| R9 | 55481 | 47K ohm | 1/2 W. | C26 | 56603 | .1 Mfd 200 V. |
| R10 | 55493 | 4.7 Megohm | 1/2 W. | C27 | 56600 | .05 Mfd 200 V. |
| R11 | 55492 | 3.3 Megohm | 1/2 W. | C28 | 56057 | 100 Mmfd Mica |
| R12 | 56344 | 1 Meg. vol. cont. | | C29 | 56614 | 002 Mfd 400 V. |
| R13 | 55483 | 100K ohm | 1/2 W. | C30 | 56057 | 100 Mmfd Mica |
| R14 | 55487 | 470K ohm | 1/2 W. | C31 | 56061 | 470 Mmfd Mica |
| R15 | 2312 | 1900 ohm | 10W. | C32 | 56622 | .01 Mfd 400 V. |
| R16 | 55485 | 220K ohm | 1/2 W. | C33 | 56603 | .1 Mfd 200 V. |
| R17 | 55483 | 100K ohm | 1/2 W. | C34 | 56622 | .01 Mfd 400 V. |
| R18 | 55935 | 470 ohm | 2W. | C35 | 56618 | .005 Mfd 400 V. |
| R19 | 55492 | 3.3 Megohm | 1/2 W. | C36 | 56614 | .002 Mfd 400 V. |
| R20 | 55489 | 1 Megohm | 1/2 W. | C37 | 60003 | 20 Mfd 25 V. |
| R21 | 55398 | 180 ohm | 1/2 W. | C38 | 56628 | .05 Mfd 400 V. |
| R22 | 55388 | 27 ohm | 1/2 W. | C39 | 53728 | 50 Mfd 150 WV |
| R23 | 55492 | 3.3 Megohm | 1/2 W. | C40 | 53728 | 30 Mfd 150 WV |
| | | CAPACITORS | | C41 | 53728 | 200 Mfd 6WV |
| C | 54070 | 3 Gang Variable | | C42 | 54057 | 200 Mfd 10 WV |
| C1 | 56622 | .01 Mfd 400 V. | | | | COILS |
| C2 | 56059 | 220 Mmfd Mica | | T1 | 53711 | Longwave Loop |
| C3 | 53734 | Longwave Ant. Trimmer | | T2 | 53771 | S.W.&B.C. Ant. Shunt Coil |
| C5 | 53734 | Shortwave Ant. Trimmer | On One Bracket | T3 | 50160 | S.W. R.F. Coil |
| C6 | (ON T2) | Shortwave Coup. Cap. | | T4 | 53740 | L.W.&B.C. R.F. Coil |
| C7 | 56059 | 220 Mmfd Mica | | T5 | 50236 | Shortwave Osc. Coil |
| C8 | (ON T3) | Shortwave Coup. Cap. | | T6 | 53739 | L.W.&B.C. Osc. Coil |
| C9 | (ON T4) | Broadcast Coup. Cap. | | T7 | 53730 | 1st. I.F. Coil |
| C10 | (ON T4) | Longwave Coup. Cap. | | T8 | 53729 | 2nd. I.F. Coil |
| C11 | 56057 | 100 Mmfd Mica | | T9 | 53733 | Output Trans. |
| C12 | 56600 | .05 Mfd 200 V. | | | | PARTS |
| C13 | 56748 | Shortwave R. F. Trimmer | | S1 | | On-Off Switch (on R 12) |
| C14 | (ON T4) | Broadcast R. F. Trimmer | | S2 | 50230 | Power Change-Over Switch |
| C15 | (ON T4) | Longwave Trimmer | | SS | 53764 | Band Switch |
| C16 | 56057 | 100 Mmfd Mica | | J2 | 2628 | Phone Jack |
| C17 | 2189 | 20 Mmfd Ceramic | | J1 | 2638 | Microphone Jack |
| | | | | | 53737 | Sockets |
| | | | | | 53742 | Tuning Knob |
| | | | | | 53741 | Volume & Switch Knob |
| | | | | PC1 | 54935 | Power Cord |

SERVICE DATA

SERVICE NOTES—

Volts taken from different points of circuit to chassis are measured with volume control full on, all tubes in their sockets and speaker connected, with a volt meter having a resistance of 1,000 ohms per volt. All voltages are indicated on the voltage chart.

Resistances of coil windings are indicated in ohms on the schematic circuit diagram.

To check for open by-pass condensers, shunt each condenser with another condenser of the same capacity and voltage rating, which is known to be good, until the defective unit is located.

Failure to operate, noisy or weak reception is usually due to defective tubes, the tubes making poor contact with

DESCRIPTION:

TUBES—
The tube complement of this chassis consists of the following tubes:

- 1—Type 1N5GT R.F. Amplifier.
- 1—Type 1A7GT Mixer, First Detector-Oscillator.
- 1—Type 1N5GT, First I.F. Amplifier (455 K.C.).
- 1—Type 1H5GT Second Detector, A.V.C. First Audio.
- 1—Type 1A5GT Output Amplifier. (Battery only.)
- 1—Type 50B5 Output Amplifier. (AC-DC only.)
- 1—Type 35W4 Rectifier. (AC-DC only.)

sockets, or grid clips making poor contact with the caps of the tubes. Tubes may be checked very easily by replacing with other tubes which are known to be good. Weak batteries are also a source of trouble.

ALIGNING INSTRUCTIONS—

CAUTION:—No aligning adjustments should be attempted without first thoroughly checking over all other possible causes of trouble, such as poor installations, open or grounded antenna systems, low battery voltage, defective tubes, condensers and resistors. In order to properly align this chassis an oscillator (generator) is absolutely necessary.

HEADPHONES—

Best results will be obtained with 200 ohm headphones.

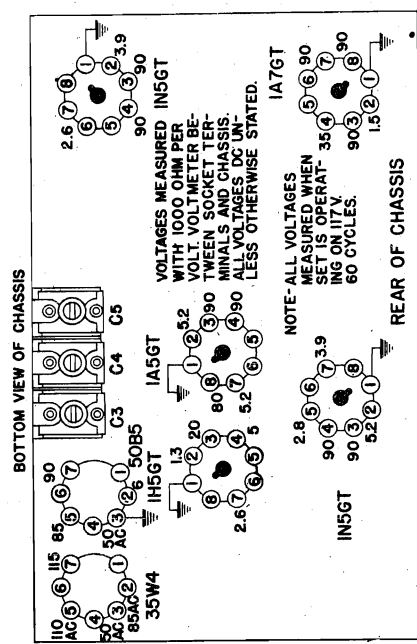
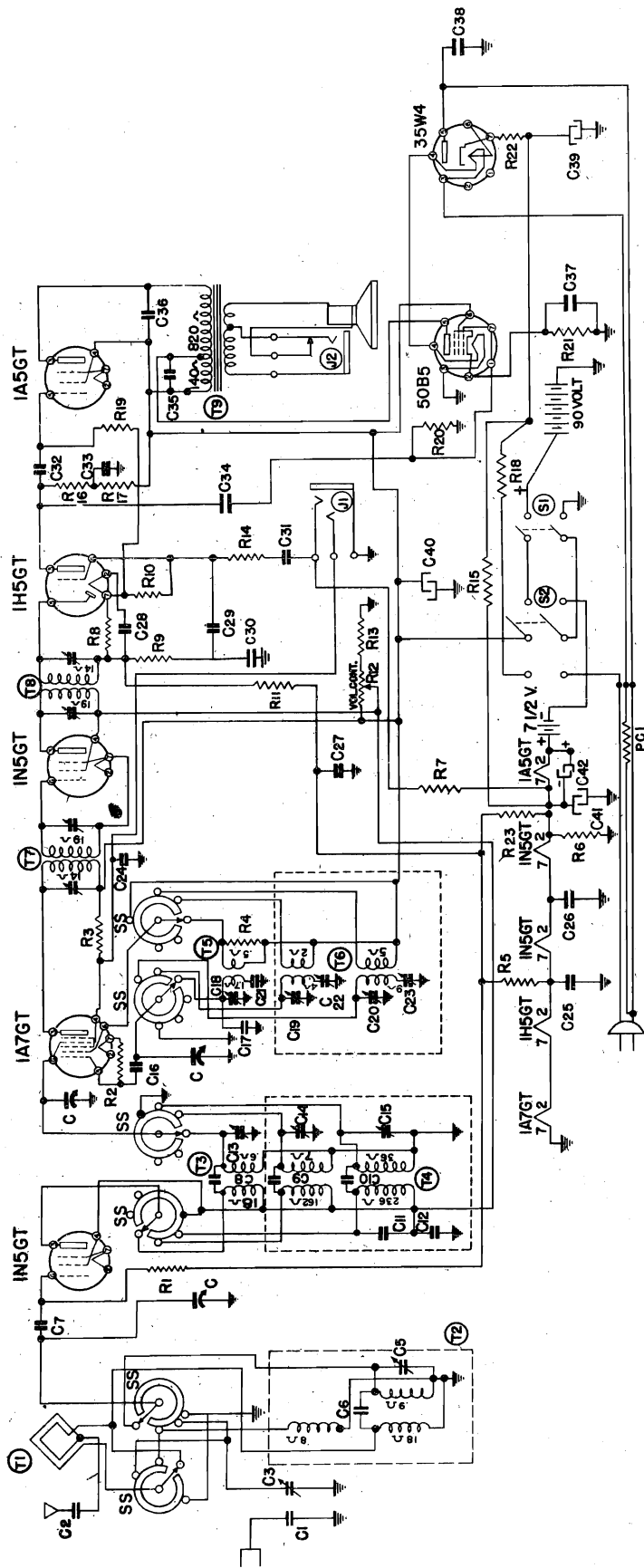
ALIGNMENT PROCEDURE

The following equipment is required for alignment:

- An all wave signal generator which will provide an accurately calibrated signal at the test frequencies as listed.
- Output indicating meter.
- Non-metallic screwdriver.
- Dummy antenna—1 Mfd., 20 MMFD.

| Band | Switch Position | Signal Generator Frequency Setting | Dummy Antenna | Connection To Radio | Dial Setting | Trimmers Adjusted (in Order Shown) | Trimmer Function | Adjustment |
|---------------------------------------------------------------------------------|-----------------|------------------------------------|---------------|-----------------------------|---------------------------------------|------------------------------------|--------------------------------------------------------------|--------------------------------------------------|
| I F | 2 | 455 Kc. | .1 Mfd. | 1A7GT Grid | Rotor full closed | Four trimmers on top of I. F. cans | Output and input I. F. | Adjust to maximum output |
| Adjust dial pointer to read 2.2 mc. on band 3 with gang condenser fully closed. | | | | | | | | |
| 1 | 1 | 400 Kc. | 20 MMFD | Antenna and Ground Terminal | 400 Kc. | C 20 C 6, C 15 | Band 1 oscillator trimmer Band 1 antenna & R. F. trimmers | Adjust to max. output Adjust for max. output |
| 1 | 1 | 220 Kc. | 20 MMFD | Antenna and Ground Terminal | Rock rotor while adjusting | C 23 | Band 1 Oscillator padder | Adjust for max. output |
| 1 | 1 | 400 Kc. | 20 MMFD | Antenna and Ground Terminal | 400 Kc. | C 15 & C 3 | R. F. & Ant. trimmers | Adjust for max. output |
| 2 | • 2 | 1400 Kc. | 20 MMFD | Antenna and Ground Terminal | 400 Kc. | C 19 C 4 & C 14 | Osc. Antenna & R. F. trimmers | Adjust for max. output Adjust for max. output |
| 2 | 2 | 600 Kc. | 20 MMFD | Antenna and Ground Terminal | 600 Kc. Rock rotor while adjusting | C 22 | Oscillator padder | Adjust for max. output |
| 3 | 3 | 6 Mc. | 20 MMFD | Antenna and Ground Terminal | 6 Mc. | C 18 | Osc. trimmer | Adjust for max. output |
| 3 | 3 | 6 Mc. | 20 MMFD | Antenna and Ground Terminal | Rock rotor while adjusting | C 5 & C 13 | Antenna & R. F. trimmers | Adjust for max. output |

NOTE— Trimmers C3, C4, and C5 can be reached by removing the Lear nameplate on the side of the cabinet. The above adjustments should be made several times to insure exact settings of trimmers and padders.



SPECIFICATIONS

| | |
|------------------------------------------|---------------------------|
| Power supply..... | 117 volts 50/60 cycles AC |
| Power consumption..... | 160 watts |
| Power output..... | 20 watts |
| Intermediate frequency..... | 455 kc./10.7 mc. |
| Tuning frequency range: | |
| Broadcast Band..... | 540-1620 kc. |
| FM Band..... | 88-108 mc. |
| Tubes: | |
| R-F Amplifier..... | 6BA6 |
| Converter..... | 6BE6 |
| 1st I-F Amplifier (AM-FM)..... | 6SG7 |
| 2nd I-F (FM), Detector and AVC (AM)..... | 6SG7 |
| Limiter..... | 6SH7 |
| Discriminator..... | 6H6 |
| First Audio..... | 6SR7 |
| Inverter..... | 6SN7GT |
| Power output (push-pull stage)..... | (2) 6L6 |
| Rectifier..... | 5U4G |
| Tuning Indicator..... | 6U5 |
| Dial Lamps..... | Mazda No. 44 |
| Speaker: coaxial..... | 12" Dynamic 5" PM |
| Field coil resistance..... | 165 ohms None |
| Voice coil impedance (400 cycles)..... | 6 ohms 3.8 ohms |
| Output transformer..... | 5000/6 |

METHOD FOR REMOVING CHASSIS FROM CABINET

Model CR-234 radio chassis is designed for easy removal from the cabinet in which it is installed. As the radio panel is permanently fastened to the chassis, the control knobs need not be removed when the chassis is taken out of the cabinet for service.

To remove the chassis, first remove the antenna leads from their terminals and all plugs from the receptacles on the rear of the chassis. Then remove the two Phillips-head screws from the angular slots in the flange at the rear of the chassis. Lift the rear of the chassis about one inch and pull it straight back. Never remove the chassis tray from the cabinet—it has been properly positioned to bring the

radio panel in place when the chassis is replaced. In replacing the chassis, slide it so that the small hooks near the front, ride inside the flanges on the sides of the chassis tray. Push the chassis forward as far as it will go and the hook should then engage the slots in the chassis tray. Replace the two Phillips-head screws and nuts and tighten securely. Replace all plugs in their receptacles and the antenna leads on their correct terminals. The antenna terminal board for the loop antenna connections is designated L-H. The two terminals on the loop are designated L and H; the leads connected to these terminals should be wired to the corresponding terminals (L and H) on the chassis.

ALIGNMENT PROCEDURE

Alignment of this receiver requires the use of an accurately calibrated r-f signal generator, range 455 kc. to 107 mc., an output meter, and a vacuum tube voltmeter of greater than 10 megohm input impedance. All trimmer condensers can be identified by stampings on the chassis and gang condenser cover and are shown on the chassis layout diagram.

The pointer on the radio dial should line up with the first vertical mark on the low frequency end of the dial glass. If the pointer does not line up, loosen the pointer on the dial string and move it to correct position. Re-tighten and re-cement the pointer to the string. Be sure the gang is fully meshed for this pointer alignment. Align AM first.

MODEL CR-234

AM ALIGNMENT**I-F ALIGNMENT**

1. Set volume, treble, and bass controls to maximum. Set Band Switch to Broadcast position, and dial pointer to 1000 kc.
2. Tune the signal generator to EXACTLY 455 kc.
3. Connect output of modulated signal generator to the signal grid of the 6BE6 (pin 7) through a .01 mfd. capacitor and signal generator ground to radio chassis.
4. AM and FM i-f transformers on this model are separate and can be identified on the chassis layout diagram Figure 3.
5. Connect output meter across voice coil of speaker and adjust the i-f transformers for peak output as indicated on the output meter.

ALTERNATE VISUAL ALIGNMENT OF I-F STAGES

1. Connect 455 kc. sweep generator having approximately 20 kc. sweep to signal grid of 6BE6 (pin 7) through a .01 mfd. capacitor. Connect an oscilloscope through a 1 megohm isolating resistor across the 150,000 ohm diode load resistor. Align for best possible peak and symmetry.

FM ALIGNMENT**DISCRIMINATOR ALIGNMENT**

1. Tune signal generator to EXACTLY 10.775 mc. and connect to pin 4 of the 6SH7 Limiter tube socket through a .01 mfd. capacitor.
2. Connect a DC vacuum tube voltmeter between point "B" on schematic diagram and ground (across .00047 mfd. capacitor—Pin 6 on 6H6 to ground).
3. Peak both discriminator slugs at 10.775 mc.
4. Retune signal generator to exactly 10.7 mc. and adjust bottom slug for zero volts.
5. The DC voltage at 10.625 mc. should be within 10% of the voltage at 10.775 mc. and of opposite polarity.

Note: If the signal generator is not capable of sufficient output to produce a readable DC voltage, the amplification of the last i-f stage can be used to increase the signal input to the limiter for discriminator alignment. To accomplish this, align the last i-f stage as indicated in "IF Alignment". Then align discriminator as above leaving the signal generator connected to the grid of the 6SG7 2nd i-f tube.

I-F ALIGNMENT

1. Connect high side of signal generator, through a .01 mfd. capacitor and a 1000 ohm resistor in series, to pin 4 of the 6SG7 2nd i-f tube. Connect low side of generator to chassis.

R-F ALIGNMENT

1. Remove the signal generator lead from the 6BE6 grid and connect it across H and L on terminal strip on the rear of the chassis. The high side of the signal generator should be connected to H and the signal generator ground to L.
2. Set the signal generator and the radio receiver to 1400 kc., adjust the 1400 kc. oscillator trimmer and the 1400 kc. r-f trimmer for maximum output.
3. Set the signal generator and radio receiver to 600 kc. Adjust the oscillator and r-f coil slugs for maximum output. If considerable adjustment was necessary re-check the 1400 kc. trimmer settings.
4. Replace chassis in cabinet and connect loop antenna leads to proper terminals on the rear of the chassis.
5. Form three turns of wire into a loop, connect this loop to the signal generator and loosely couple it to the receiver loop antenna.
6. With the signal generator and dial at 1400 kc., adjust the loop antenna trimmer for maximum output.

2. Close gang condenser and connect vacuum tube voltmeter across 220,000 ohm limiter grid resistor; (Point "A" on schematic to ground). Adjust signal generator output until a reading of at least 3 volts is obtained. In order to reduce regeneration caused by the vacuum tube voltmeter leads, a 1-megohm isolating resistor, connected with as short leads as possible to point "A" should be used in series with the vacuum tube voltmeter. Align the 3rd i-f transformer for best peak as indicated on voltmeter.

3. Repeat above for each succeeding transformer by connecting signal generator to signal grid of first i-f tube 6SG7 then to the signal grid of 6BE6 converter. The i-f stages should be aligned in this order.

WARNING—After each i-f stage has been aligned, do not repeak with the signal into the grid of the 6BE6.

ALTERNATE VISUAL ALIGNMENT OF I-F STAGES

1. Replace signal generator with sweep generator having approximately 300 kc. sweep and tune generator to 10.7 mc. Connect oscilloscope across 220,000 ohm limiter grid resistor through a 1-megohm isolating resistor. The order of alignment is the same as when using a vacuum tube voltmeter. Each i-f transformer should be individually aligned for best peak and symmetry.

R-F ALIGNMENT

1. Connect vacuum tube voltmeter across limiter grid resistor as in FM I-F alignment.
2. Ground one side of the FM Antenna by placing a wire jumper from one FM connection on the antenna terminal strip to the ground connection.
3. Connect unmodulated signal generator through a 300 ohm resistor to ungrounded antenna post and chassis, and tune signal generator to 107 mc.
4. Set radio dial to 107 mc. and tune oscillator trimmer to peak output on vacuum tube voltmeter. Adjust signal generator output until a reading of at least 3 volts is obtained.
5. Tune 107 mc. r-f and antenna trimmers for maximum indication on voltmeter—it may be necessary to rock the dial while adjusting the r-f trimmer.

| | |
|--------------------------------------------------|------|
| R-F on Converter Grid to 455 kc. on I-F Grid at: | |
| 600 kc. | 25.0 |
| 98 mc. | 3.2 |
| I-F on Converter Grid to 1st I-F Grid at: | |
| 455 kc. (gang closed)..... | 28.0 |
| 1st I-F Grid to 2nd I-F Grid** at: | |
| 455 kc. | 95 |
| 10.7 mc. | 33 |
| 2nd I-F Grid to Limiter Grid at: | |
| 10.7 mc. | 33.4 |

SPECIAL SERVICE INFORMATION

The following information is provided for the service man who has a vacuum tube voltmeter or a similar measuring instrument available.

STAGE GAINS*

| | |
|--------------------------------|------|
| Antenna Post to R-F Grid at: | |
| 600 kc. | 5.00 |
| 98 mc. | 1.15 |
| R-F Grid to Converter Grid at: | |
| 600 kc. | 14.5 |
| 98 mc. | 9.4 |

OSCILLATOR OUTPUT VOLTAGE

The DC voltage developed across the Oscillator Grid Resistor (105) at:

| | |
|--------------|-------|
| 600 kc. | 6.6V. |
| 98 mc. | 6.0V. |

or 0.3 ma. through 22,000 ohm Oscillator Grid Resistor at 600 kc. and 0.27 ma. at 98 mc.

AUDIO GAIN

Voltage required across the Volume Control to produce 0.1 watt speaker output*** at 400 cycles is .016 volt with Input Selector Switch in BDCST. setting.

*Variations of ±20% are permissible. All readings made with sufficient input signal to provide 0.5 watt speaker output. 0.5 watt speaker output at 400 cycles is equivalent to a reading of 2.74V. as measured by a high resistance AC voltmeter across the output transformer secondary.

**Detector Plate on AM.

***0.1 watt speaker output at 400 cycles is equivalent to a reading of 1.25 volts as measured by a high resistance AC voltmeter across the voice coil of speaker.

DIAL CORD REPLACEMENT

Two separate drive cables are used in the CR-234 dial assembly. One cable is used to transmit the motion from the tuning knob to the large pulley that is coupled to the condenser gang; the other cable actuates the dial pointer whenever the large pulley on the condenser gang is rotated. Separate instructions for replacing either of these cables is given in the following paragraphs.

CONDENSER DRIVE CABLE REPLACEMENT

Remove dial assembly after taking out four screws on each side of chassis. Slide a short length (approximately ½ inch) of sleeving over one end of a length of dial cable, form a small loop and tie a knot in the manner shown on Figure 1. Tie spring to opposite end of cable making length excluding spring 19½ inches. Hook loop over the metal hook in pulley "D" and lace the cable through the pulley slot and around the pulley in a counterclockwise direction when viewed from the rear of the dial assembly keeping the cable to the rear of the pulley groove. Lace the cable around the smaller diameter portion

of the tuning control shaft wrapping 2½ turns from front to back; then around the opposite side of pulley "D" into the pulley through the slot. Hook the end of tension spring "F" in the hole provided in pulley "D", completing this operation.

DIAL POINTER DRIVE CABLE REPLACEMENT

Remove dial assembly after taking out four screws on each side of chassis. Slip a one-half inch length of sleeving over a 42-inch length of dial cable. Tie the two ends to the loop end of the cable spring "E" securely so that the cable doubled measures 19½ inches end to end excluding spring.

Place spring hook in top hole and draw cable through slot of pulley "D". Loop one end of cable around pulley "D" in a clockwise direction in front of condenser drive cable (viewing dial assembly from front) then loop the remaining end around pulley in a counterclockwise direction. Secure both ends of cable to chassis at edge of pulley slot with scotch tape, keeping piece of sleeving on remaining loop of cable.

MODEL CR-234

Replace dial assembly and loop cable over pulley "A". While holding cable taut remove scotch tape and loop cable over pulleys "B" and "C" as shown in Figure 1.

Turn the tuning control shaft until the condenser gang is completely meshed and slide the dial pointer on its track until it is in line with the last calibration mark at the low frequency end of the dial. The short

piece of sleeving installed prior to the stringing operation should be slid to the rear of the dial pointer and the crimping lug on the pointer pressed over the sleeving. After checking to make certain that the condenser gang is completely meshed and the dial pointer is in the position specified previously, apply a few drops of cement to each end of the sleeving to which the dial pointer is fastened. This completes the operation.

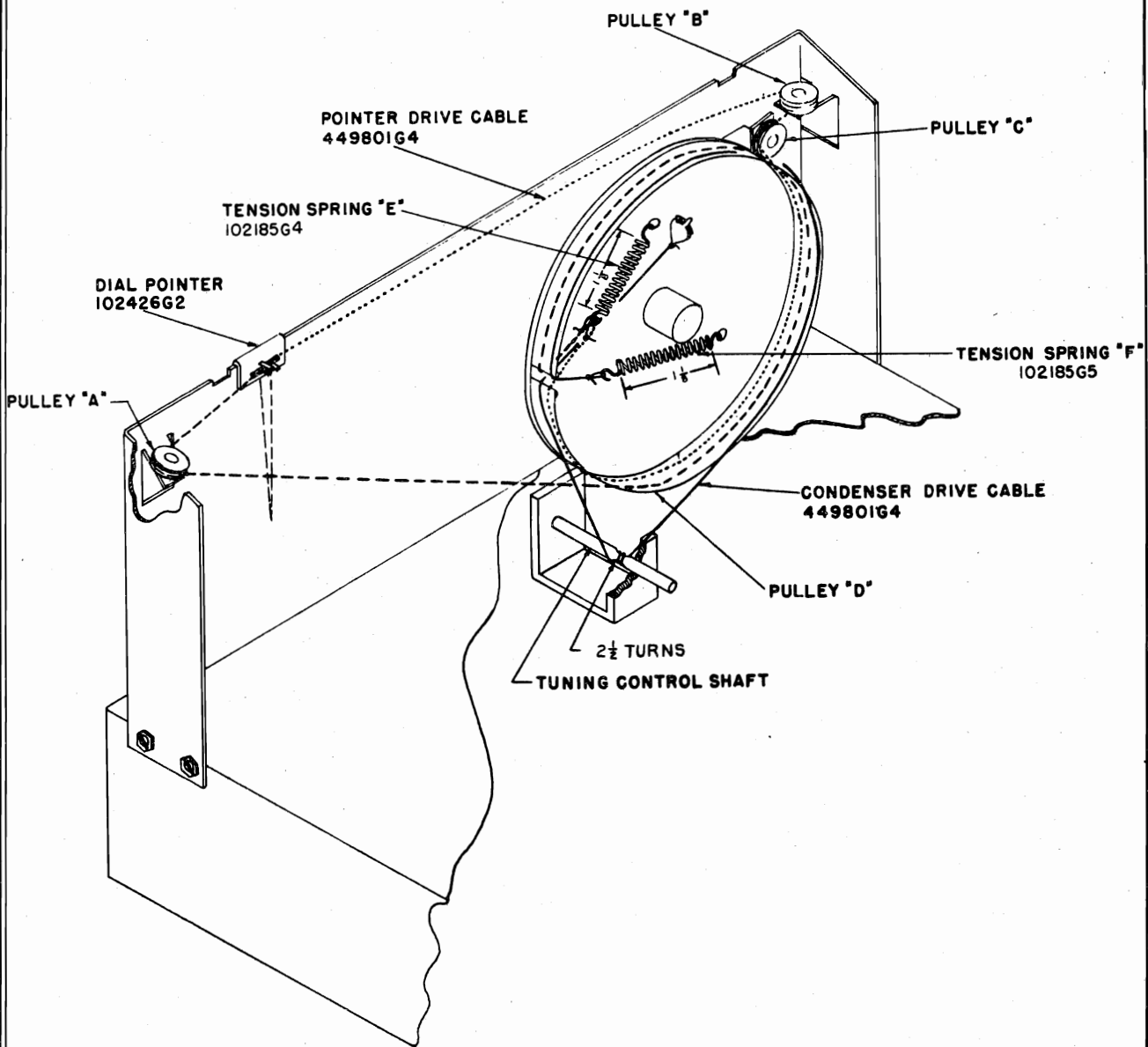


FIGURE 1

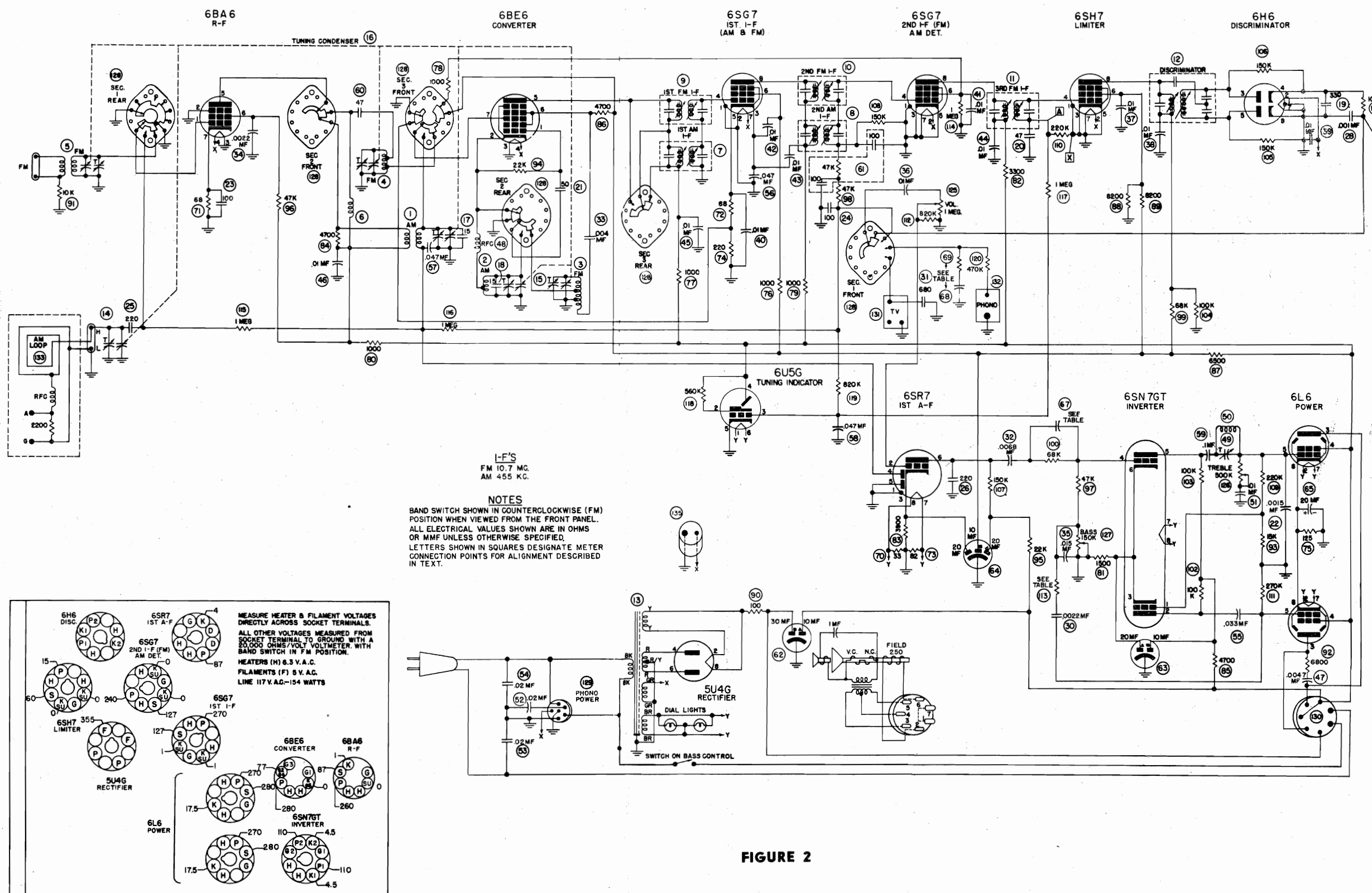


FIGURE 2

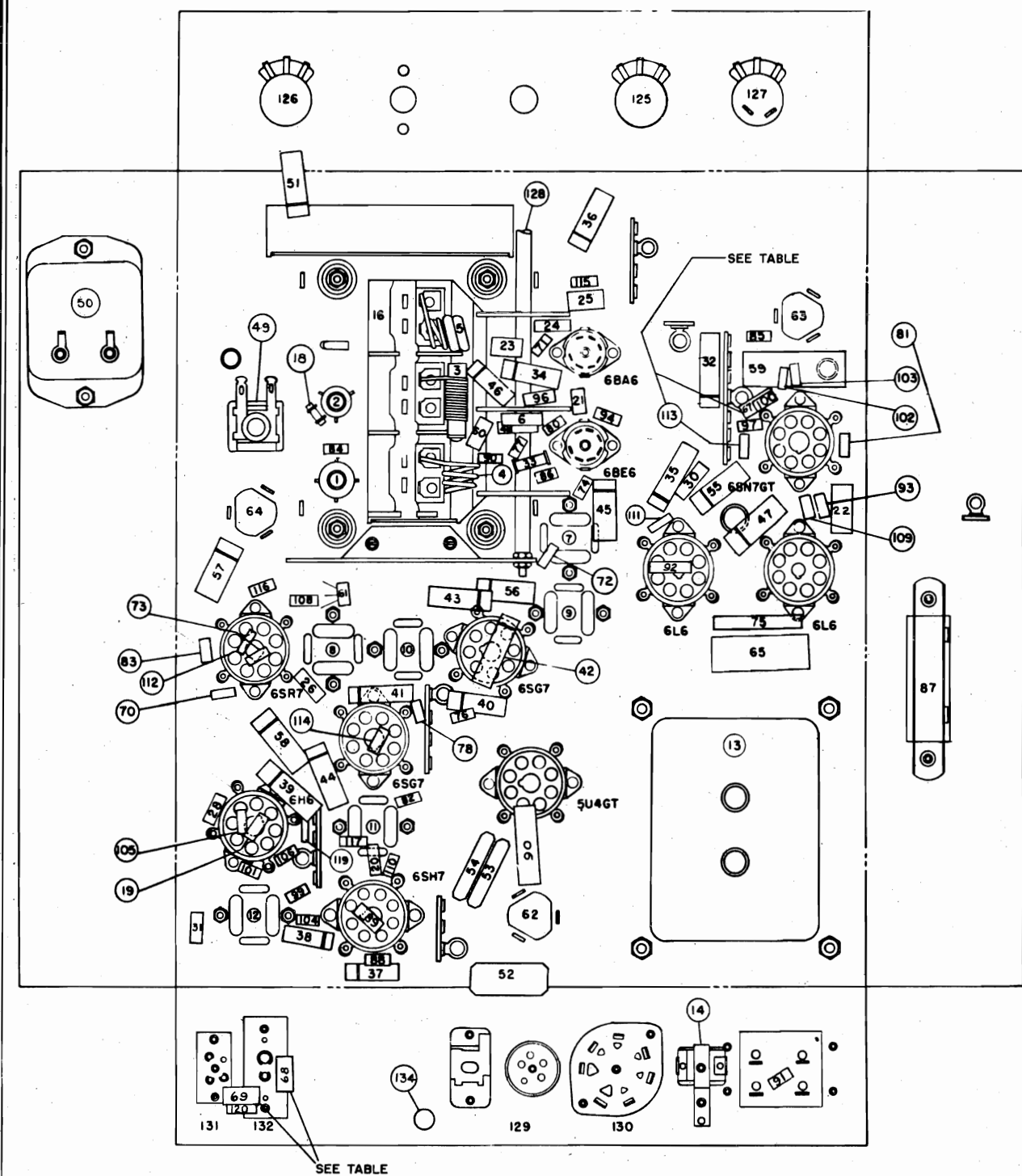
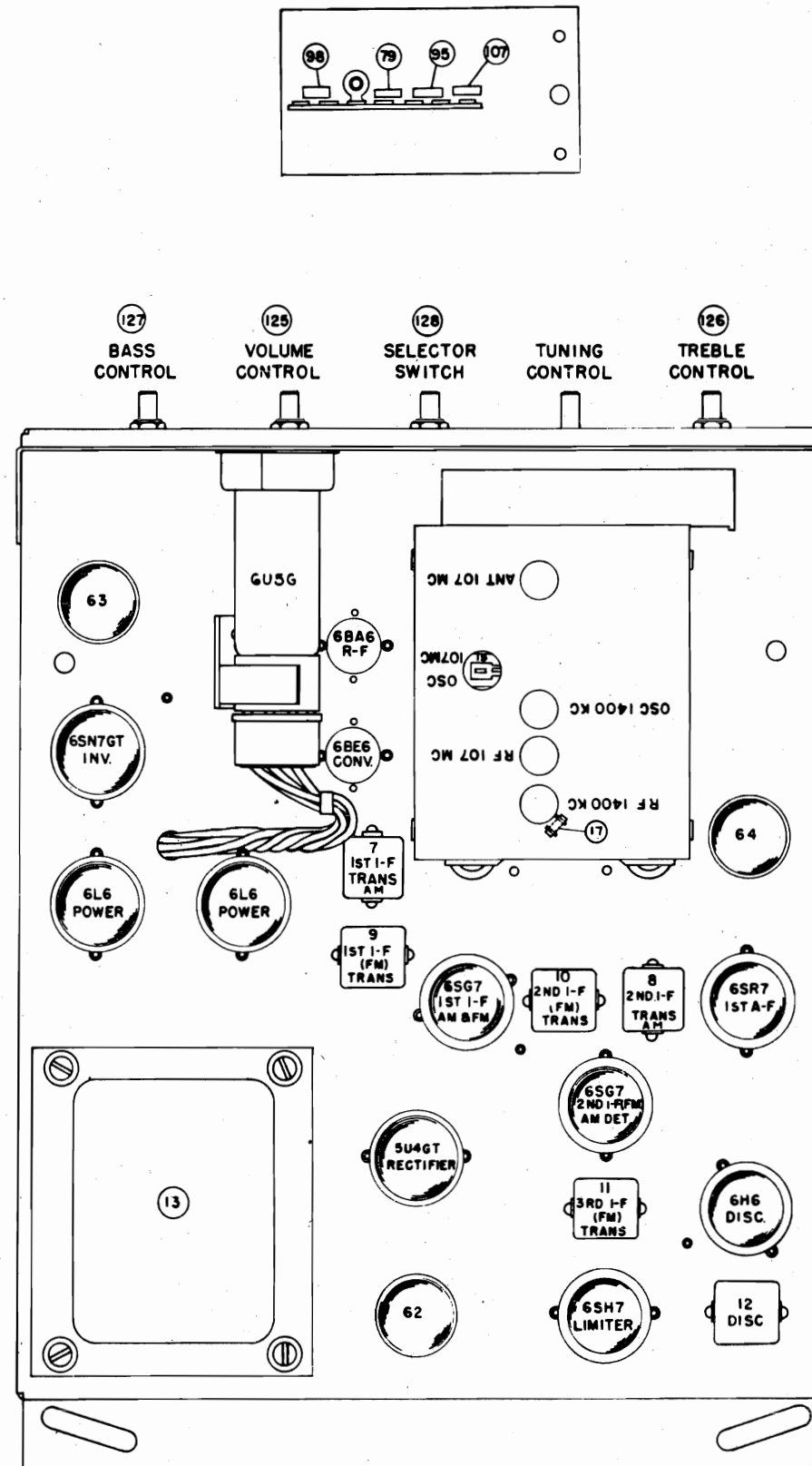


FIGURE 3



PARTS LIST

| REFERENCE NO. | DESCRIPTION | MAGNAVOX PART NO. |
|---------------|------------------------------------------------------|-------------------|
| 1 | Coil Assembly, R-F (AM) | 360348G1 |
| 2 | Coil Assembly, Oscillator (AM) | 360407G1 |
| 3 | Coil Assembly, Oscillator (FM) | 360323G1 |
| 4 | Coil Assembly, R-F (FM) | 360322G2 |
| 5 | Coil Assembly, Antenna (FM) | 360321G2 |
| 6 | Coil Choke | 360284G1 |
| 7 | Transformer, First I.F. (AM) | 360373G1 |
| 8 | Transformer, Second I.F. (AM) | 360373G2 |
| 9 | Transformer, First I.F. (FM) | 360374G1 |
| 10 | Transformer, Second I.F. (FM) | 360374G1 |
| 11 | Transformer, Third I.F. (FM) | 360374G1 |
| 12 | Transformer, Discriminator | 360375G1 |
| 13 | Transformer, Power | 300052G2 |
| 14 | Capacitor, Variable Trimmer | 250046G2 |
| 15 | Capacitor, Variable Trimmer | 260067G6 |
| 16 | Capacitor, Three Gang Tuning | 260103G1 |
| 17 | Capacitor, Ceramic, 15mmf, $\pm 10\%$, 500 V. | 250187G43 |
| 18 | Capacitor, Ceramic, 15mmf, $\pm 10\%$, 500 V. | 250187G43 |
| 19 | Capacitor, Mica, 330 mmf, 500 V. | 250159G101 |
| 20 | Capacitor, Mica, 47 mmf, 500 V. | 250159G96 |
| 21 | Capacitor, Ceramic, 50 mmf, $\pm 10\%$, 500 V. | 250088G39 |
| 22 | Capacitor, Molded Paper, .0015 mfd, 600 V. | 250201G2 |
| 23 | Capacitor, Mica, 100 mmf, 500 V. | 250159G98 |
| 24 | Capacitor, Mica, 100 mmf, 500 V. | 250159G98 |
| 25 | Capacitor, Mica, 220 mmf, 500 V. | 250159G100 |
| 26 | Capacitor, Mica, 220 mmf, 500 V. | 250159G100 |
| 28 | Capacitor, Molded Paper, .001 mfd, 600 V. | 250201G1 |
| 30 | Capacitor, Mica, .0022 mfd, $\pm 5\%$, 500 V. | 250160G46 |
| 31 | Capacitor, Mica, 680 mmf, 500 V. | 250159G136 |
| 32 | Capacitor, Molded Paper, .0068 mfd, 600 V. | 250201G6 |
| 33 | Capacitor, Ceramic, .004 mfd, 350 V. | 250088G34 |
| 34 | Capacitor, Molded Paper, .0022 mfd, 600 V. | 250201G3 |
| 35 | Capacitor, Paper, .015 mfd, $\pm 10\%$, 200 V. | 250185G1 |
| 36 | Capacitor, Molded Paper, .01 mfd, 600 V. | 250201G7 |
| 37 | Capacitor, Molded Paper, .01 mfd, 600 V. | 250201G7 |
| 38 | Capacitor, Molded Paper, .01 mfd, 600 V. | 250201G7 |
| 39 | Capacitor, Molded Paper, .01 mfd, 600 V. | 250201G7 |
| 40 | Capacitor, Molded Paper, .01 mfd, 600 V. | 250201G7 |
| 41 | Capacitor, Molded Paper, .01 mfd, 600 V. | 250201G7 |
| 42 | Capacitor, Molded Paper, .01 mfd, 600 V. | 250201G7 |
| 43 | Capacitor, Molded Paper, .01 mfd, 600 V. | 250201G7 |
| 44 | Capacitor, Molded Paper, .01 mfd, 600 V. | 250201G7 |
| 45 | Capacitor, Molded Paper, .01 mfd, 600 V. | 250201G7 |
| 46 | Capacitor, Molded Paper, .01 mfd, 600 V. | 250201G7 |
| 47 | Capacitor, Molded Paper, .01 mfd, 600 V. | 250201G7 |
| 48 | R. F. Choke | 360284G1 |
| 49 | Trimmer, 10 K.C. | 259610G2 |
| 50 | Coil, 10 K.C. | 360244G2 |
| 51 | Capacitor, Molded Paper, .01 mfd, 600 V. | 250201G7 |
| 52 | Capacitor, Molded Paper, .02 mfd, 600 V. | 250129G3 |

MODEL CR-234

| REFERENCE NO. | DESCRIPTION | MAGNAVOX PART NO. |
|---------------|-----------------------------------------------------------------|-------------------|
| 53 | Capacitor, Molded Paper, .02 mfd, 600 V. | 250129G3 |
| 54 | Capacitor, Molded Paper, .02 mfd, 600 V. | 250129G3 |
| 55 | Capacitor, Molded Paper, .033 mfd, 600 V. | 250201G10 |
| 56 | Capacitor, Molded Paper, .047 mfd, 600 V. | 250201G11 |
| 57 | Capacitor, Molded Paper, .047 mfd, 600 V. | 250201G11 |
| 58 | Capacitor, Molded Paper, .047 mfd, 600 V. | 250201G11 |
| 59 | Capacitor, Molded Paper, .1 mfd, 600 V. | 250201G13 |
| 60 | Capacitor, Mica, 47 mmf. | 250159G96 |
| 61 | Capacitor-Resistor Filter. | 250170G1 |
| 62 | Capacitor, Electrolytic, 30-10 mfd, 475 V. | 270023G2 |
| 63 | Capacitor, Electrolytic, 10 mfd, 475 V. — 20 mfd, 25 V. | 270023G13 |
| 64 | Capacitor, Electrolytic, 20-10 mfd, 475 V. — 20 mfd, 25 V. | 270023G12 |
| 65 | Capacitor, Electrolytic, 20 mfd, 25 V. | 270027G2 |
| 66 | Capacitor, Mica, 680 mmf, 300 V. \pm 10% | 250159G131 |
| 67 | Capacitor, Mica, 470 mmfd. | 250159G90 |
| 68 | Capacitor, Mica, 270 mmf. | 250159G87 |
| 69 | Resistor, Composition, 270 Ohms, \pm 10%, 1/2 W. | 230104G91 |
| 70 | Resistor, Composition, 33 Ohms, \pm 10%, 1/2 W. | 230104G44 |
| 71 | Resistor, Composition, 68 Ohms, \pm 10%, 1/2 W. | 230104G48 |
| 72 | Resistor, Composition, 68 Ohms, \pm 10%, 1/2 W. | 230104G48 |
| 73 | Resistor, Composition, 82 Ohms, \pm 10%, 1/2 W. | 230104G49 |
| 74 | Resistor, Composition, 220 Ohms, \pm 10%, 1/2 W. | 230104G54 |
| 75 | Resistor, Wire Wound, 125 Ohms, 5 W. | 240021G11 |
| 76 | Resistor, Composition, 1000 Ohms, \pm 10%, 1/2 W. | 230104G62 |
| 77 | Resistor, Composition, 1000 Ohms, \pm 10%, 1/2 W. | 230104G62 |
| 78 | Resistor, Composition, 1000 Ohms, \pm 10%, 1/2 W. | 230104G62 |
| 79 | Resistor, Composition, 1000 Ohms, \pm 10%, 1/2 W. | 230104G62 |
| 80 | Resistor, Composition, 1000 Ohms, \pm 10%, 1/2 W. | 230104G62 |
| 81 | Resistor, Composition, 1500 Ohms, \pm 10%, 1/2 W. | 230104G64 |
| 82 | Resistor, Composition, 3300 Ohms, \pm 10%, 1/2 W. | 230104G68 |
| 83 | Resistor, Composition, 3900 Ohms, \pm 10%, 1/2 W. | 230104G69 |
| 84 | Resistor, Composition, 4700 Ohms, \pm 10%, 1/2 W. | 230104G70 |
| 85 | Resistor, Composition, 4700 Ohms, \pm 10%, 1/2 W. | 230104G70 |
| 86 | Resistor, Composition, 4700 Ohms, \pm 10%, 1/2 W. | 230104G70 |
| 87 | Resistor, Wire Wound, 6500 Ohms, \pm 10%. | 240035G9 |
| 88 | Resistor, Composition, 8200 Ohms, \pm 10%, 1 W. | 230105G73 |
| 89 | Resistor, Composition, 8200 Ohms, \pm 10%, 1 W. | 230105G73 |
| 90 | Resistor, Wire Wound, 100 Ohms, 10 W. | 240021G17 |
| 91 | Resistor, Composition, 10K Ohms, \pm 10%, 1/2 W. | 230104G74 |
| 92 | Resistor, Composition, 6800 Ohms, 1W. | 230105G72 |
| 93 | Resistor, Composition, 15K Ohms, \pm 10%, 1/2 W. | 230104G76 |
| 94 | Resistor, Composition, 22K Ohms, \pm 10%, 1/2 W. | 230104G78 |
| 95 | Resistor, Composition, 22K Ohms, \pm 10%, 1/2 W. | 230104G78 |
| 96 | Resistor, Composition, 47K Ohms, \pm 10%, 1/2 W. | 230105G82 |
| 97 | Resistor, Composition, 47K Ohms, \pm 10%, 1/2 W. | 230104G82 |
| 98 | Resistor, Composition, 47K Ohms, \pm 10%, 1/2 W. | 230104G82 |
| 99 | Resistor, Composition, 68K Ohms, \pm 10%, 1/2 W. | 230104G84 |
| 100 | Resistor, Composition, 68K Ohms, \pm 10%, 1/2 W. | 230104G84 |
| 101 | Resistor, Composition, 100K Ohms, \pm 10%, 1/2 W. | 230104G86 |
| 102 | Resistor, Composition, 100K Ohms, \pm 10%, 1 W. | 230105G86 |
| 103 | Resistor, Composition, 100K Ohms, \pm 10%, 1 W. | 230105G86 |

| REFERENCE NO. | DESCRIPTION | MAGNAVOX PART NO. |
|---------------|-------------------------------------------------------------------------------------------|-------------------|
| 104 | Resistor, Composition, 100K Ohms, $\pm 10\%$, $\frac{1}{2}$ W. | 230104G86 |
| 105 | Resistor, Composition, 150K Ohms, $\pm 10\%$, $\frac{1}{2}$ W. | 230104G88 |
| 106 | Resistor, Composition, 150K Ohms, $\pm 10\%$, $\frac{1}{2}$ W. | 230104G88 |
| 107 | Resistor, Composition, 150K Ohms, $\pm 10\%$, $\frac{1}{2}$ W. | 230104G88 |
| 108 | Resistor, Composition, 150K Ohms, $\pm 10\%$, $\frac{1}{2}$ W. | 230104G88 |
| 109 | Resistor, Composition, 220K Ohms, $\pm 10\%$, $\frac{1}{2}$ W. | 230104G90 |
| 110 | Resistor, Composition, 220K Ohms, $\pm 10\%$, $\frac{1}{2}$ W. | 230104G90 |
| 111 | Resistor, Composition, 270K Ohms, $\pm 10\%$, $\frac{1}{2}$ W. | 230104G91 |
| 112 | Resistor, Composition, 820K Ohms, $\pm 10\%$, $\frac{1}{2}$ W. | 230104G97 |
| 113 | Resistor, Composition, 1.2 Megohm, $\pm 10\%$, $\frac{1}{2}$ W. ... 234AA Only | 230104G99 |
| | Resistor, Composition, 1 Megohm, $\pm 10\%$, $\frac{1}{2}$ W. ... 234BB Only | 230104G98 |
| 114 | Resistor, Composition, 1 Megohm, $\pm 10\%$, $\frac{1}{2}$ W. | 230104G98 |
| 115 | Resistor, Composition, 1 Megohm, $\pm 10\%$, $\frac{1}{2}$ W. | 230104G98 |
| 116 | Resistor, Composition, 1 Megohm, $\pm 10\%$, $\frac{1}{2}$ W. | 230104G98 |
| 117 | Resistor, Composition, 1 Megohm, $\pm 10\%$, $\frac{1}{2}$ W. | 230104G98 |
| 118 | Resistor, Composition, 560K Ohms, $\pm 10\%$, $\frac{1}{2}$ W. .. (In Tuning Eye Socket) | 230104G95 |
| 119 | Resistor, Composition, 820K Ohms, $\pm 10\%$, $\frac{1}{2}$ W. | 230104G97 |
| 120 | Resistor, Composition, 470K Ohms, $\pm 10\%$, $\frac{1}{2}$ W. | 230104G94 |
| 125 | Control Volume | 220072G18 |
| 126 | Control, Treble | 220072G8 |
| 127 | Control, Bass, With Switch | 220073G5 |
| 128 | Switch, Selector | 160194G1 |
| 129 | Socket, Motor | 180520G4 |
| | Plug, Motor (4 Prong) | 180502G5 |
| | Plug, Motor (6 Prong) | 180521G4 |
| 130 | Socket, Speaker | 180504G16 |
| | Plug, Speaker | 180503G4 |
| 131 | Socket, External | 180060G1 |
| | Plug, External | 180311G2 |
| 132 | Socket, Phono | 189741G1 |
| | Plug, Phono | 180311G1 |
| 133 | Loop Antenna | * * * * |
| 134 | Socket, A.C. Output | 180505G5 |
| 135 | Socket & Cable Assembly | 180458G2 |
| | Dial Glass | 150353G1 |
| | Panel Escutcheon | 633934G3 |
| | Knob, Tuning | |
| | Maroon | 140025G4 |
| | Beige | 140025G2 |
| | Knob, Selector | |
| | Maroon | 143727G3 |
| | Beige | 143727G2 |
| | Knob, Treble, Volume | |
| | Maroon | 140025G5 |
| | Beige | 140025G3 |
| | Output Transformer, Primary 5000 ohms, Secondary 6 ohms | 623504G1 |

* * * * The part number of the Loop Antenna Assembly changes with different Cabinets. It is therefore important that you specify the style number of the instrument when ordering a replacement Loop Antenna Assembly.

MODELS CR-242,
CR-243**SPECIFICATIONS**

JAN. 1951 1286

| | | | |
|------------------------------------------|---------------------------|----------------------------------------|-------------------|
| Power supply..... | 117 volts 50/60 cycles AC | First Audio..... | 6SR7 |
| Power consumption..... | 160 watts | Inverter..... | 6SN7GT |
| Power output..... | 20 watts | Power output (push-pull stage)..... | (2) 6L6 |
| Intermediate frequency..... | 455 kc./10.7 mc. | Rectifier..... | 5U4G |
| Tuning frequency range: | | Tuning Indicator..... | 6U5 |
| Broadcast Band..... | 540-1620 kc. | Dial Lamps..... | Mazda No. 44 |
| FM Band..... | 88-108 mc. | CT242 Speaker: coaxial..... | 15" Dynamic 5" PM |
| Tubes: | | Field coil resistance..... | 500 ohms None |
| R-F Amplifier..... | 6BA6 | Voice coil impedance (400 cycles)..... | 15 ohms 3.8 ohms |
| Converter..... | 6BE6 | Output transformer..... | 5000/15 |
| 1st I-F Amplifier (AM-FM)..... | 6SG7 | CT243 Speaker: coaxial..... | 12" Dynamic 5" PM |
| 2nd I-F (FM), Detector and AVC (AM)..... | 6SG7 | Field coil resistance..... | 165 ohms None |
| Limiter..... | 6SH7 | Voice coil impedance (400 cycles)..... | 6 ohms 3.8 ohms |
| Discriminator..... | 6H6 | Output transformer..... | 5000/6 |

GENERAL

CR-242 and CR-243 differ only in the speaker systems and audio response for different cabinets. It may become necessary to make minor changes in the electrical circuit of a chassis to provide the correct response for different cabinets.

If this becomes necessary such a variation from the original chassis is indicated by a suffix letter. Whenever necessary Service Bulletin Supplements will be issued with latest schematic drawings and parts lists indicating these changes.

METHOD FOR REMOVING CHASSIS FROM CABINET

Model CR-242 and CR-243 radio chassis are designed for easy removal from the cabinet in which it is installed. As the radio panel is permanently fastened to the chassis, the control knobs need not be removed when the chassis is taken out of the cabinet for service.

To remove the chassis, first remove the antenna leads from their terminals and all plugs from the receptacles on the rear of the chassis. Then remove the two Phillips-head screws from the angular slots in the flange at the rear of the chassis. Lift the rear of the chassis about one inch and pull it straight back. Never remove the chassis tray from the cabinet—it has been properly positioned to bring the

radio panel in place when the chassis is replaced. In replacing the chassis, slide it so that the small hooks near the front, ride inside the flanges on the sides of the chassis tray. Push the chassis forward as far as it will go and the hook should then engage the slots in the chassis tray. Replace the two Phillips-head screws and nuts and tighten securely. Replace all plugs in their receptacles and the antenna leads on their correct terminals. The antenna terminal board for the loop antenna connections is designated L-H. The two terminals on the loop are designated L and H; the leads connected to these terminals should be wired to the corresponding terminals (L and H) on the chassis.

ALIGNMENT PROCEDURE

Alignment of these receivers requires the use of an accurately calibrated r-f signal generator, range 455 kc. to 107 mc., an output meter, and a vacuum tube voltmeter of greater than 10 megohm input impedance. All trimmer condensers can be identified by stampings on the chassis and gang condenser cover and are shown on the chassis layout diagrams.

The pointer on the radio dial should line up with the first vertical mark on the low frequency end of the dial glass. If the pointer does not line up, loosen the pointer on the dial string and move it to correct position. Re-tighten and re-cement the pointer to the string. Be sure the gang is fully meshed for this pointer alignment. Align AM first.

AM ALIGNMENT**I-F ALIGNMENT**

1. Set volume, treble, and bass controls to maximum. Set Band Switch to Broadcast position, and dial pointer to 1000 kc.
2. Tune the signal generator to EXACTLY 455 kc.
3. Connect output of modulated signal generator to the signal grid of the 6BE6 (pin 7) through a .01 mfd.

capacitor and signal generator ground to radio chassis.

4. AM and FM i-f transformers on these models are separate and can be identified on the chassis layout diagram Figure 3.
5. Connect output meter across voice coil of speaker and adjust the i-f transformers for peak output as indicated on the output meter.

MODELS CR-242,
CR-243**ALTERNATE VISUAL ALIGNMENT OF I-F STAGES**

1. Connect 455 kc. sweep generator having approximately 20 kc. sweep to signal grid of 6BE6 (pin 7) through a .01 mfd. capacitor. Connect an oscilloscope through a 1 megohm isolating resistor across the 150,000 ohm diode load resistor. Align for best possible peak and symmetry.

R-F ALIGNMENT

1. Remove the signal generator lead from the 6BE6 grid and connect it across H and L on terminal strip on the rear of the chassis. The high side of the signal generator should be connected to H and the signal generator ground to L.

FM ALIGNMENT**DISCRIMINATOR ALIGNMENT**

1. Tune signal generator to EXACTLY 10.775 mc. and connect to pin 4 of the 6SH7 Limiter tube socket through a .01 mfd. capacitor.
2. Connect a DC vacuum tube voltmeter between point "B" on schematic diagram and ground (across .00047 mfd. capacitor—Pin 6 on 6H6 to ground).
3. Peak both discriminator slugs at 10.775 mc.
4. Retune signal generator to exactly 10.7 mc. and adjust bottom slug for zero volts.
5. The DC voltage at 10.625 mc. should be within 10% of the voltage at 10.775 mc. and of opposite polarity.

Note: If the signal generator is not capable of sufficient output to produce a readable DC voltage, the amplification of the last i-f stage can be used to increase the signal input to the limiter for discriminator alignment. To accomplish this, align the last i-f stage as indicated in "IF Alignment". Then align discriminator as above leaving the signal generator connected to the grid of the 6SG7 2nd i-f tube.

I-F ALIGNMENT

1. Connect high side of signal generator, through a .01 mfd. capacitor and a 1000 ohm resistor in series, to pin 4 of the 6SG7 2nd i-f tube. Connect low side of generator to chassis.
2. Close gang condenser and connect vacuum tube voltmeter across 220,000 ohm limiter grid resistor; (Point "A" on schematic to ground). Adjust signal generator output until a reading of at least 3 volts is obtained. In order to reduce regeneration caused by the vacuum tube voltmeter leads, a 1-megohm isolating resistor, connected with as short leads as possible to point "A" should be used in series with the

2. Set the signal generator and the radio receiver to 1400 kc., adjust the 1400 kc. oscillator trimmer and the 1400 kc. r-f trimmer for maximum output.

3. Set the signal generator and radio receiver to 600 kc. Adjust the oscillator and r-f coil slugs for maximum output. If considerable adjustment was necessary re-check the 1400 kc. trimmer settings.

4. Replace chassis in cabinet and connect loop antenna leads to proper terminals on the rear of the chassis.

5. Form three turns of wire into a loop, connect this loop to the signal generator and loosely couple it to the receiver loop antenna.

6. With the signal generator and dial at 1400 kc., adjust the loop antenna trimmer for maximum output.

vacuum tube voltmeter. Align the 3rd i-f transformer for best peak as indicated on voltmeter.

3. Repeat above for each succeeding transformer by connecting signal generator to signal grid of first i-f tube 6SG7 then to the signal grid of 6BE6 converter. The i-f stages should be aligned in this order.

WARNING—After each i-f stage has been aligned, do not repeak with the signal into the grid of the 6BE6.

ALTERNATE VISUAL ALIGNMENT OF I-F STAGES

1. Replace signal generator with sweep generator having approximately 300 kc. sweep and tune generator to 10.7 mc. Connect oscilloscope across 220,000 ohm limiter grid resistor through a 1-megohm isolating resistor. The order of alignment is the same as when using a vacuum tube voltmeter. Each i-f transformer should be individually aligned for best peak and symmetry.

R-F ALIGNMENT

1. Connect vacuum tube voltmeter across limiter grid resistor as in FM I-F alignment.

2. Ground one side of the FM Antenna by placing a wire jumper from one FM connection on the antenna terminal strip to the ground connection.

3. Connect unmodulated signal generator through a 300 ohm resistor to ungrounded antenna post and chassis, and tune signal generator to 107 mc.

4. Set radio dial to 107 mc. and tune oscillator trimmer to peak output on vacuum tube voltmeter. Adjust signal generator output until a reading of at least 3 volts is obtained.

5. Tune 107 mc. r-f and antenna trimmers for maximum indication on voltmeter—it may be necessary to rock the dial while adjusting the r-f trimmer.

MODELS CR-242,
CR-243

SPECIAL SERVICE INFORMATION

The following information is provided for the service man who has a vacuum tube voltmeter or a similar measuring instrument available.

STAGE GAINS*

| | |
|--------------------------------------------------|------|
| Antenna Post to R-F Grid at: | |
| 600 kc. | 5.00 |
| 98 mc. | 1.15 |
| R-F Grid to Converter Grid at: | |
| 600 kc. | 14.5 |
| 98 mc. | 9.4 |
| R-F on Converter Grid to 455 kc. on I-F Grid at: | |
| 600 kc. | 25.0 |
| 98 mc. | 3.2 |
| I-F on Converter Grid to 1st I-F Grid at: | |
| 455 kc. (gang closed)..... | 28.0 |
| 1st I-F Grid to 2nd I-F Grid** at: | |
| 455 kc. | 95 |
| 10.7 mc. | 33 |
| 2nd I-F Grid to Limiter Grid at: | |
| 10.7 mc. | 33.4 |

OSCILLATOR OUTPUT VOLTAGE

The DC voltage developed across the Oscillator Grid Resistor (105) at:

| | |
|--------------|-------|
| 600 kc. | 6.6V. |
| 98 mc. | 6.0V. |

or 0.3 ma. through 22,000 ohm Oscillator Grid Resistor at 600 kc. and 0.27 ma. at 98 mc.

AUDIO GAIN

Voltage required across the Volume Control to produce 0.1 watt speaker output*** at 400 cycles is .016 volt with Input Selector Switch in BDCST. setting.

CR-242—*Variations of ±20% are permissible. All readings made with sufficient input signal to provide 0.5 watt speaker output. 0.5 watt speaker output at 400 cycles is equivalent to a reading of 2.74V. as measured by a high resistance AC voltmeter across the output transformer secondary.

**Detector Plate on AM.

***0.1 watt speaker output at 400 cycles is equivalent to a reading of 1.25 volts as measured by a high resistance AC voltmeter across the voice coil of speaker.

CR-243—*Variations of ±20% are permissible. All readings made with sufficient input signal to provide 0.5 watt speaker output. 0.5 watt speaker output at 400 cycles is equivalent to a reading of 1.22V. as measured by a high resistance AC voltmeter across the output transformer secondary.

**Detector Plate on AM.

***0.1 watt speaker output at 400 cycles is equivalent to a reading of .57 volts as measured by a high resistance AC voltmeter across the voice coil of speaker.

DIAL CORD REPLACEMENT

Two separate drive cables are used in both the CR-242 and CR-243 dial assemblies. One cable is used to transmit the motion from the tuning knob to the large pulley that is coupled to the gang condenser; the other cable actuates the dial pointer whenever the large pulley on the gang condenser is rotated. Separate instructions for replacing either of these cables is given in the following paragraphs.

CONDENSER DRIVE CABLE REPLACEMENT

Remove dial assembly after taking out four screws on each side of chassis. Slide a short length (approximately 1/2 inch) of sleeving over one end of a length of dial cable, form a small loop and tie a knot in the manner shown on Figure 1. Tie spring to opposite end of cable making length excluding spring 19 1/2 inches. Hook loop over the metal hook in pulley "D" and lace the cable through the pulley slot and around the pulley in a counterclockwise direction when viewed from the rear of the dial assembly keeping the cable to the rear of the pulley groove. Lace the cable around the smaller diameter portion of the tuning control shaft wrapping 2 1/2 turns from front to back; then around the opposite side of pulley "D" into the pulley through the slot. Hook the end of tension spring "F" in the hole provided in pulley "D", completing this operation.

DIAL POINTER DRIVE CABLE REPLACEMENT

Remove dial assembly after taking out four screws on each side of chassis. Slip a one-half inch length

of sleeving over a 42-inch length of dial cable. Tie the two ends to the loop end of the cable spring "E" securely so that the cable doubled measures 19 5/8 inches end to end excluding spring.

Place spring hook in top hole and draw cable through slot of pulley "D". Loop one end of cable around pulley "D" in a clockwise direction in front of condenser drive cable (viewing dial assembly from front) then loop the remaining end around pulley in a counterclockwise direction. Secure both ends of cable to chassis at edge of pulley slot with scotch tape, keeping piece of sleeving on remaining loop of cable.

Replace dial assembly and loop cable over pulley "A". While holding cable taut remove scotch tape and loop cable over pulleys "B" and "C" as shown in Figure 1.

Turn the tuning control shaft until the gang condenser is completely meshed and slide the dial pointer on its track until it is in line with the last calibration mark at the low frequency end of the dial. The short piece of sleeving installed prior to the stringing operation should be slid to the rear of the dial pointer and the crimping lug on the pointer pressed over the sleeving. After checking to make certain that the gang condenser is completely meshed and the dial pointer is in the position specified previously, apply a few drops of cement to each end of the sleeving to which the dial pointer is fastened. This completes the operation.

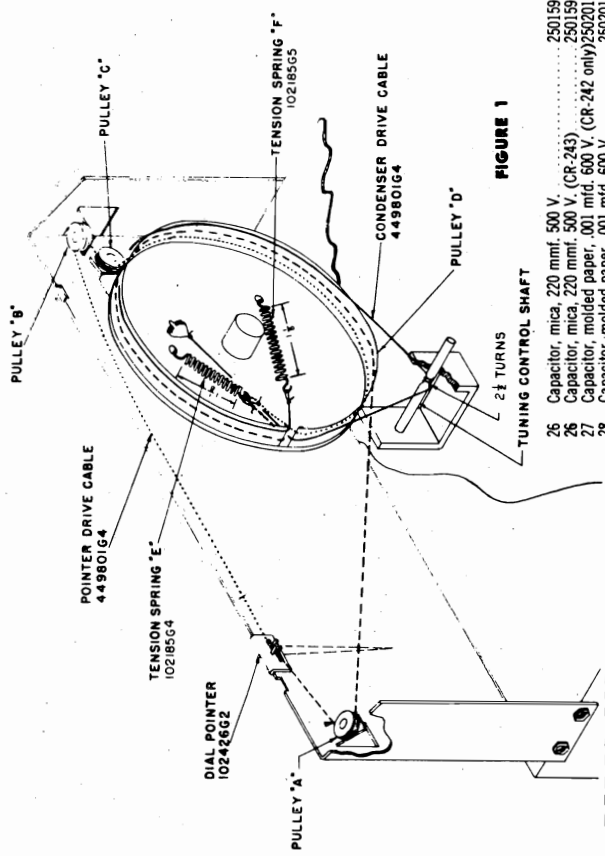


FIGURE 1

PARTS LIST

| REFERENCE NO. | DESCRIPTION | MAGNAVOX PART NO. |
|---------------|------------------------------------------|-------------------|
| 1 | Coil assembly, r-f (AM) | 360348-1 |
| 2 | Coil assembly, oscillator (AM) | 360407-1 |
| 3 | Coil assembly, r-f (FM) | 360323-1 |
| 4 | Coil assembly, r-f (FM) | 360322-2 |
| 5 | Coil assembly, antenna (FM) | 360321-2 |
| 6 | Coil, choke | 360284-1 |
| 7 | Transformer, first i-f | 360373-1 |
| 8 | Transformer, second i-f | 360373-2 |
| 9 | Transformer, first i-f (FM) | 360374-1 |
| 10 | Transformer, second i-f (FM) | 360374-1 |
| 11 | Transformer, third i-f (FM) | 360374-1 |
| 12 | Transformer, discriminator | 360375-1 |
| 13 | Transformer, power | 300052-2 |
| 14 | Capacitor, variable trimmer | 250046-2 |
| 15 | Capacitor, variable trimmer | 250067-6 |
| 16 | Capacitor, three gang tuning | 250103-1 |
| 17 | Capacitor, ceramic, 15 mmf. ±10% | 250187-43 |
| 18 | Capacitor, ceramic, 15 mmf. ±10% | 500 V, 250187-43 |
| 19 | Capacitor, mica, 330 mmf. 500 V (CR-243) | 250159-88 |
| 20 | Capacitor, mica, 47 mmf. 500 V (CR-243) | 250187-49 |
| 21 | Capacitor, mica, 100 mmf. 500 V (CR-243) | 250159-96 |
| 22 | Capacitor, ceramic, 50 mmf. ±10% | 500 V, 250088-39 |
| 23 | Capacitor, mica, 100 mmf. 500 V | 250187-53 |
| 24 | Capacitor, mica, 100 mmf. 500 V (CR-243) | 250187-53 |
| 25 | Capacitor, mica, 100 mmf. 500 V (CR-243) | 250159-98 |
| 26 | Capacitor, mica, 220 mmf. 500 V (CR-243) | 250159-96 |
| 27 | Capacitor, mica, 220 mmf. 500 V (CR-243) | 250170-1 |
| 28 | Capacitor, mica, 220 mmf. 500 V (CR-243) | 250159-96 |
| 29 | Capacitor, mica, 220 mmf. 500 V (CR-243) | 250159-100 |
| 30 | Capacitor, mica, 220 mmf. 500 V (CR-243) | 250201-1 |
| 31 | Capacitor, mica, 680 mmf. ±10% | 500 V, 250160-46 |
| 32 | Capacitor, mica, 680 mmf. ±10% | 500 V, 250160-136 |
| 33 | Capacitor, mica, 680 mmf. ±10% | 500 V, 250201-4 |
| 34 | Capacitor, mica, 680 mmf. ±10% | 500 V, 250201-6 |
| 35 | Capacitor, mica, 680 mmf. ±10% | 500 V, 250201-3 |
| 36 | Capacitor, mica, 680 mmf. ±10% | 500 V, 250185-1 |
| 37 | Capacitor, mica, 680 mmf. ±10% | 500 V, 250201-7 |
| 38 | Capacitor, mica, 680 mmf. ±10% | 500 V, 250201-7 |
| 39 | Capacitor, mica, 680 mmf. ±10% | 500 V, 250201-7 |
| 40 | Capacitor, mica, 680 mmf. ±10% | 500 V, 250201-7 |
| 41 | Capacitor, mica, 680 mmf. ±10% | 500 V, 250201-7 |
| 42 | Capacitor, mica, 680 mmf. ±10% | 500 V, 250201-7 |
| 43 | Capacitor, mica, 680 mmf. ±10% | 500 V, 250201-7 |
| 44 | Capacitor, mica, 680 mmf. ±10% | 500 V, 250201-7 |
| 45 | Capacitor, mica, 680 mmf. ±10% | 500 V, 250201-7 |
| 46 | Capacitor, mica, 680 mmf. ±10% | 500 V, 250201-7 |
| 47 | Capacitor, mica, 680 mmf. ±10% | 500 V, 250201-7 |
| 48 | Capacitor, mica, 680 mmf. ±10% | 500 V, 250201-7 |
| 49 | Capacitor, mica, 680 mmf. ±10% | 500 V, 250201-7 |
| 50 | Capacitor, mica, 680 mmf. ±10% | 500 V, 250201-7 |
| 51 | Capacitor, mica, 680 mmf. ±10% | 500 V, 250201-7 |
| 52 | Capacitor, mica, 680 mmf. ±10% | 500 V, 250201-7 |
| 53 | Capacitor, mica, 680 mmf. ±10% | 500 V, 250201-7 |
| 54 | Capacitor, mica, 680 mmf. ±10% | 500 V, 250201-7 |
| 55 | Capacitor, mica, 680 mmf. ±10% | 500 V, 250201-7 |
| 56 | Capacitor, mica, 680 mmf. ±10% | 500 V, 250201-7 |
| 57 | Capacitor, mica, 680 mmf. ±10% | 500 V, 250201-7 |
| 58 | Capacitor, mica, 680 mmf. ±10% | 500 V, 250201-7 |
| 59 | Capacitor, mica, 680 mmf. ±10% | 500 V, 250201-7 |
| 60 | Capacitor, mica, 680 mmf. ±10% | 500 V, 250201-7 |
| 61 | Capacitor, mica, 680 mmf. ±10% | 500 V, 250201-7 |

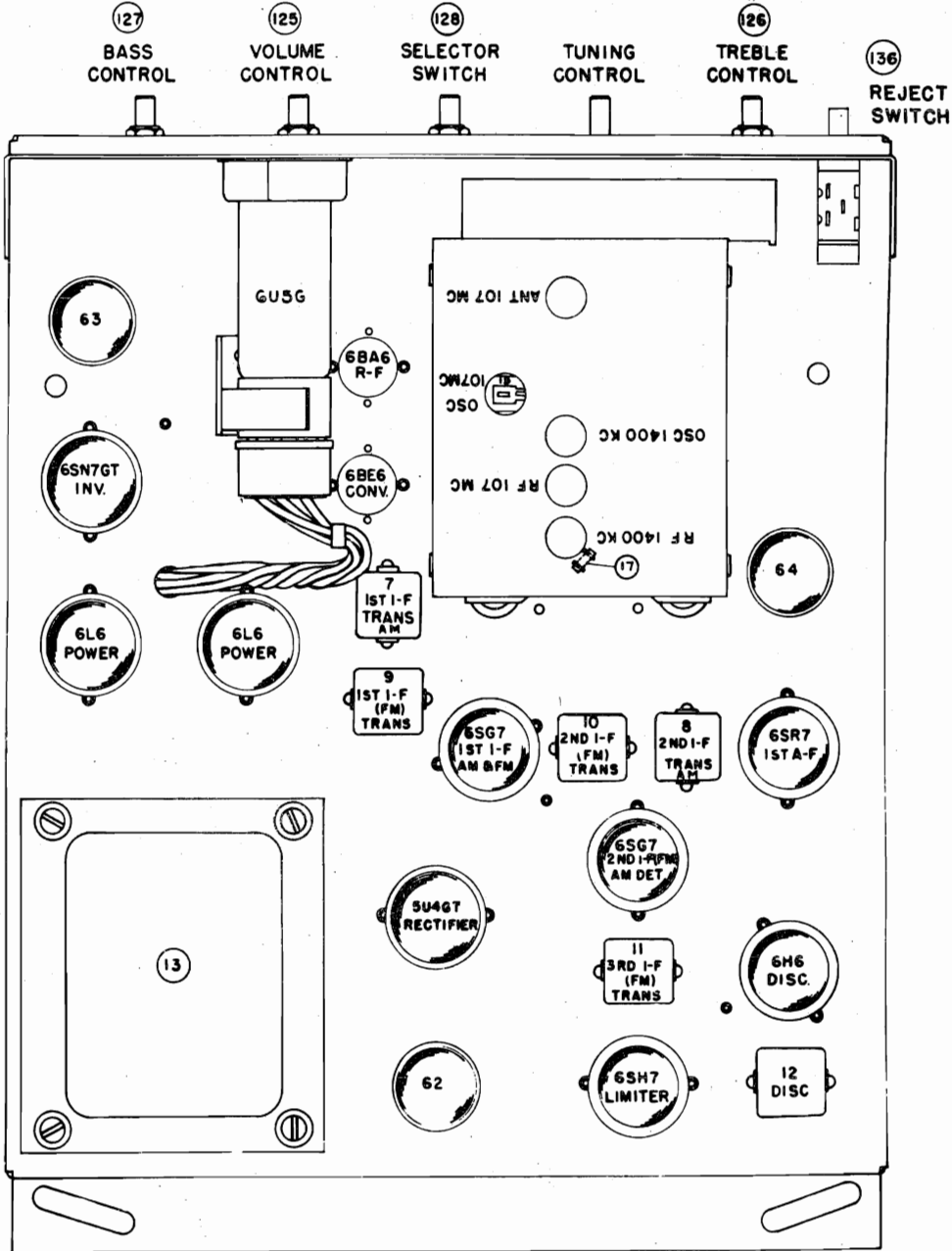
| | | |
|-----|----------------------------------------------------|------------|
| 62 | Capacitor, electrolytic, 30-10 mfd. 475 V. | 270023-2 |
| 63 | Capacitor, electrolytic, 10 mfd. 475 V. | 270023-13 |
| 64 | Capacitor, electrolytic, 20 mfd. 475 V. | 270023-12 |
| 65 | Capacitor, electrolytic, 20 mfd. 25 V. | 270023-7 |
| 66 | Capacitor, mica, 470 mmf. (CR-243) | 250201-7 |
| 67 | Capacitor, mica, 470 mmf. (CR-243) | 250201-7 |
| 68 | Capacitor, mica, 270 mmf. (CR-243) | 250159-87 |
| 69 | Resistor, composition, 270,000 ohms, ±10% | 230104-91 |
| 70 | Resistor, composition, 33 ohms, ±10% | 230104-44 |
| 71 | Resistor, composition, 68 ohms, ±10% | 230104-48 |
| 72 | Resistor, composition, 68 ohms, ±10% | 230104-48 |
| 73 | Resistor, composition, 82 ohms, ±10% | 230104-49 |
| 74 | Resistor, composition, 82 ohms, ±10% | 230104-54 |
| 75 | Resistor, composition, 125 ohms, 5 W. | 240021-11 |
| 76 | Resistor, composition, 1000 ohms, ±10% | 230104-62 |
| 77 | Resistor, composition, 1000 ohms, ±10% | 230104-62 |
| 78 | Resistor, composition, 1000 ohms, ±10% | 230104-62 |
| 79 | Resistor, composition, 1000 ohms, ±10% | 230104-62 |
| 80 | Resistor, composition, 1000 ohms, ±10% | 230104-62 |
| 81 | Resistor, composition, 1500 ohms, ±10% | 230104-64 |
| 82 | Resistor, composition, 3300 ohms, ±10% | 230104-68 |
| 83 | Resistor, composition, 3900 ohms, ±10% | 230104-60 |
| 84 | Resistor, composition, 4700 ohms, ±10% | 230104-69 |
| 85 | Resistor, composition, 4700 ohms, ±10% | 230104-70 |
| 86 | Resistor, composition, 4700 ohms, ±10% | 230104-70 |
| 87 | Resistor, wire wound, 6500 ohms, ±10% | 240035-9 |
| 88 | Resistor, composition, 8200 ohms, ±10% | 230105-73 |
| 89 | Resistor, composition, 8200 ohms, ±10% | 230105-73 |
| 90 | Resistor, wire wound, 100 ohms, 10 W (CR-243 only) | 240021-17 |
| 91 | Resistor, composition, 10,000 ohms, ±10% | 230104-74 |
| 92 | Resistor, composition, 33,000 ohms, ±10% | 230104-80 |
| 93 | Resistor, composition, 15,000 ohms, ±5% | 230104-187 |
| 94 | Resistor, composition, 22,000 ohms, ±10% | 230104-78 |
| 95 | Resistor, composition, 22,000 ohms, ±10% | 230105-82 |
| 96 | Resistor, composition, 47,000 ohms, ±10% | 230105-82 |
| 97 | Resistor, composition, 47,000 ohms, ±10% | 230104-82 |
| 98 | Resistor, composition, 68,000 ohms, ±10% | 230104-84 |
| 99 | Resistor, composition, 68,000 ohms, ±10% | 230104-84 |
| 100 | Resistor, composition, 100,000 ohms, ±10% | 230104-86 |
| 101 | Resistor, composition, 100,000 ohms, ±10% | 230105-86 |
| 102 | Resistor, composition, 100,000 ohms, ±10% | 230105-86 |
| 103 | Resistor, composition, 100,000 ohms, ±10% | 230104-86 |
| 104 | Resistor, composition, 150,000 ohms, ±10% | 230104-88 |
| 105 | Resistor, composition, 150,000 ohms, ±10% | 230104-88 |
| 106 | Resistor, composition, 150,000 ohms, ±10% | 230104-88 |
| 107 | Resistor, composition, 220,000 ohms, ±10% | 230104-88 |
| 108 | Resistor, composition, 220,000 ohms, ±10% | 230104-215 |
| 109 | Resistor, composition, 270,000 ohms, ±10% | 230104-91 |
| 110 | Resistor, composition, 270,000 ohms, ±10% | 230104-91 |
| 111 | Resistor, composition, 330,000 ohms, ±10% | 230104-92 |
| 112 | Resistor, composition, 330,000 ohms, ±10% | 230104-92 |
| 113 | Resistor, composition, 820,000 ohms, ±10% | 230104-99 |
| 114 | Resistor, composition, 1 megohm, ±10% | 230104-98 |
| 115 | Resistor, composition, 1 megohm, ±10% | 230104-98 |
| 116 | Resistor, composition, 1 megohm, ±10% | 230104-98 |
| 117 | Resistor, composition, 1 megohm, ±10% | 230104-98 |
| 118 | Resistor, composition, 1 megohm, ±10% | 230104-95 |
| 119 | Resistor, composition, 820,000 ohms, ±10% | 230104-97 |
| 120 | Resistor, composition, 470,000 ohms, ±10% | 230104-94 |
| 125 | Control, volume | 220072-18 |

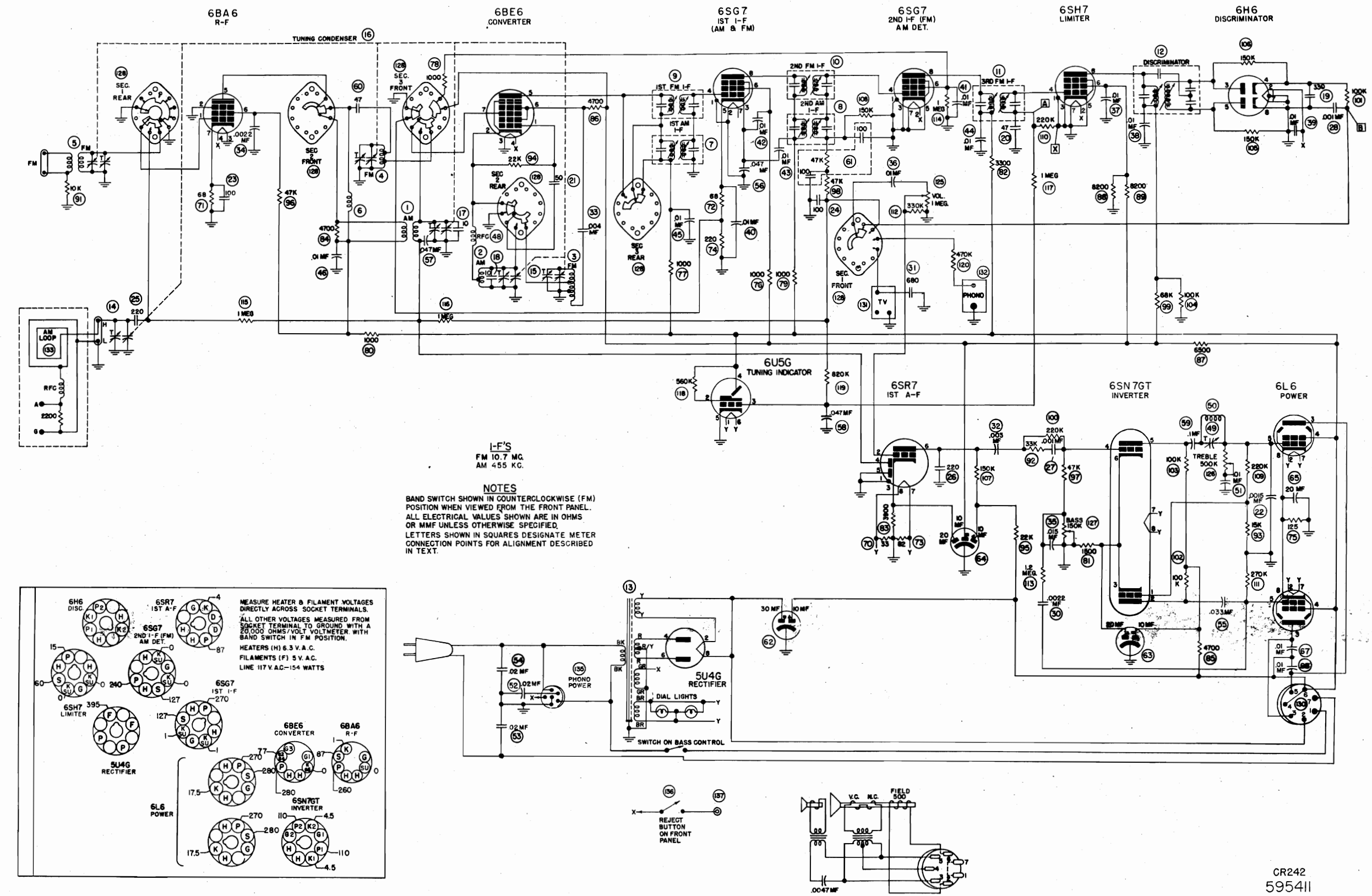
PAGE 22-16 MAGNAVOX

MODELS CR-
242, CR-243

| | | | | |
|-----|--------------------------------------------------------|-----------|---------------------------|----------|
| 126 | Control, treble..... | 220072-8 | Dial Glass..... | 150353-1 |
| 127 | Control, bass, with switch assembly (CR-243 only)..... | 220073-5 | Panel Escutcheon..... | 633934-3 |
| 128 | Switch, selector..... | 160194-1 | Knob, tuning | |
| 129 | Socket, motor..... | 180520-4 | Maroon..... | 140025-4 |
| | Plug, motor..... | 180521-4 | Beige..... | 140025-2 |
| 130 | Socket, speaker..... | 180504-16 | Knob, selector | |
| | Plug, speaker..... | 180503-4 | Maroon..... | 143727-3 |
| 131 | Socket, external..... | 180060-1 | Beige..... | 143727-2 |
| | Plug, external..... | 180311-2 | Knob, treble, volume | |
| 132 | Socket, phono..... | 189741-1 | Maroon..... | 140025-5 |
| | Plug, phono..... | 180311-1 | Beige..... | 140025-3 |
| 133 | Loop antenna..... | * | 136 Reject switch..... | 160224-1 |
| 135 | Socket and cable..... | 180458-2 | 137 Socket, solenoid..... | 182776-1 |

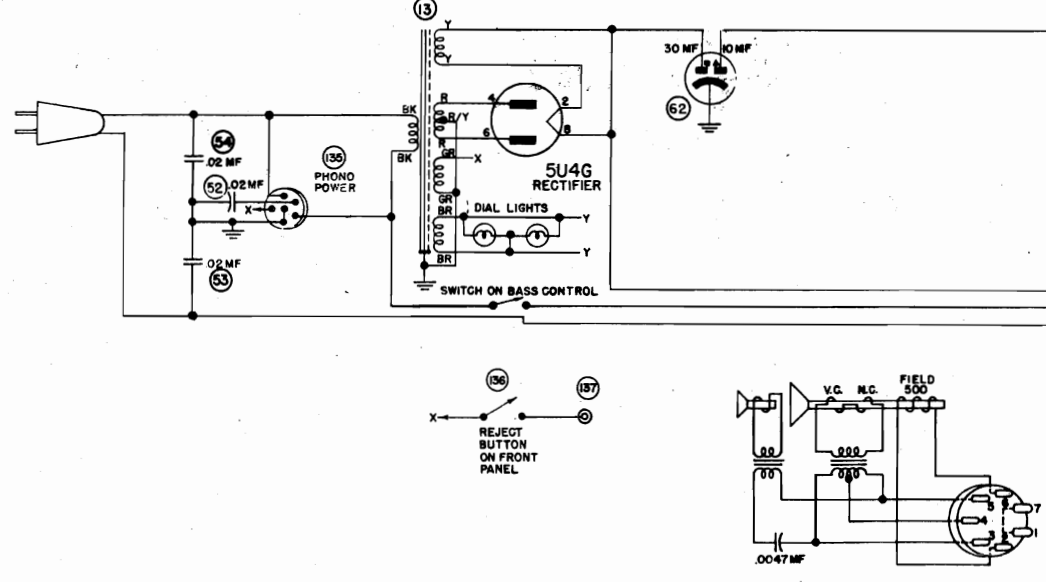
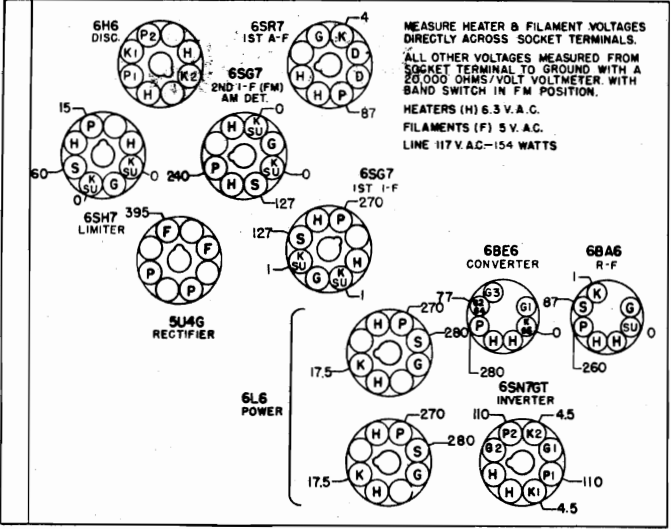
*The part number of the Loop Antenna Assembly changes with different Cabinets. It is therefore important that you specify the style number of the instrument when ordering a replacement Loop Antenna Assembly.





I-F'S
 FM 10.7 MC.
 AM 455 KC.

NOTES
 BAND SWITCH SHOWN IN COUNTERCLOCKWISE (FM)
 POSITION WHEN VIEWED FROM THE FRONT PANEL.
 ALL ELECTRICAL VALUES SHOWN ARE IN OHMS
 OR MMF UNLESS OTHERWISE SPECIFIED.
 LETTERS SHOWN IN SQUARES DESIGNATE METER
 CONNECTION POINTS FOR ALIGNMENT DESCRIBED
 IN TEXT.



CR242
 595411

FIG. 2a

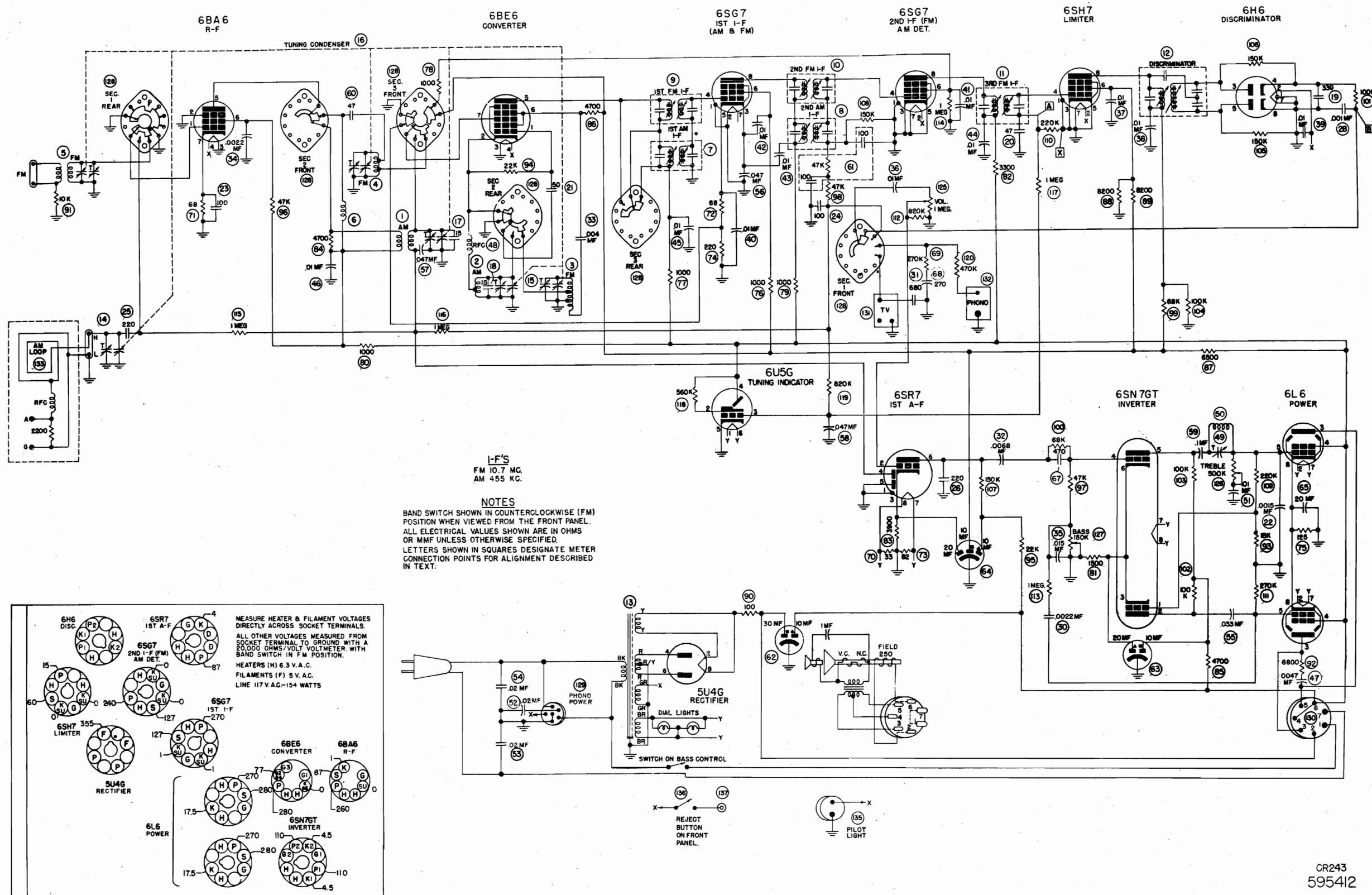
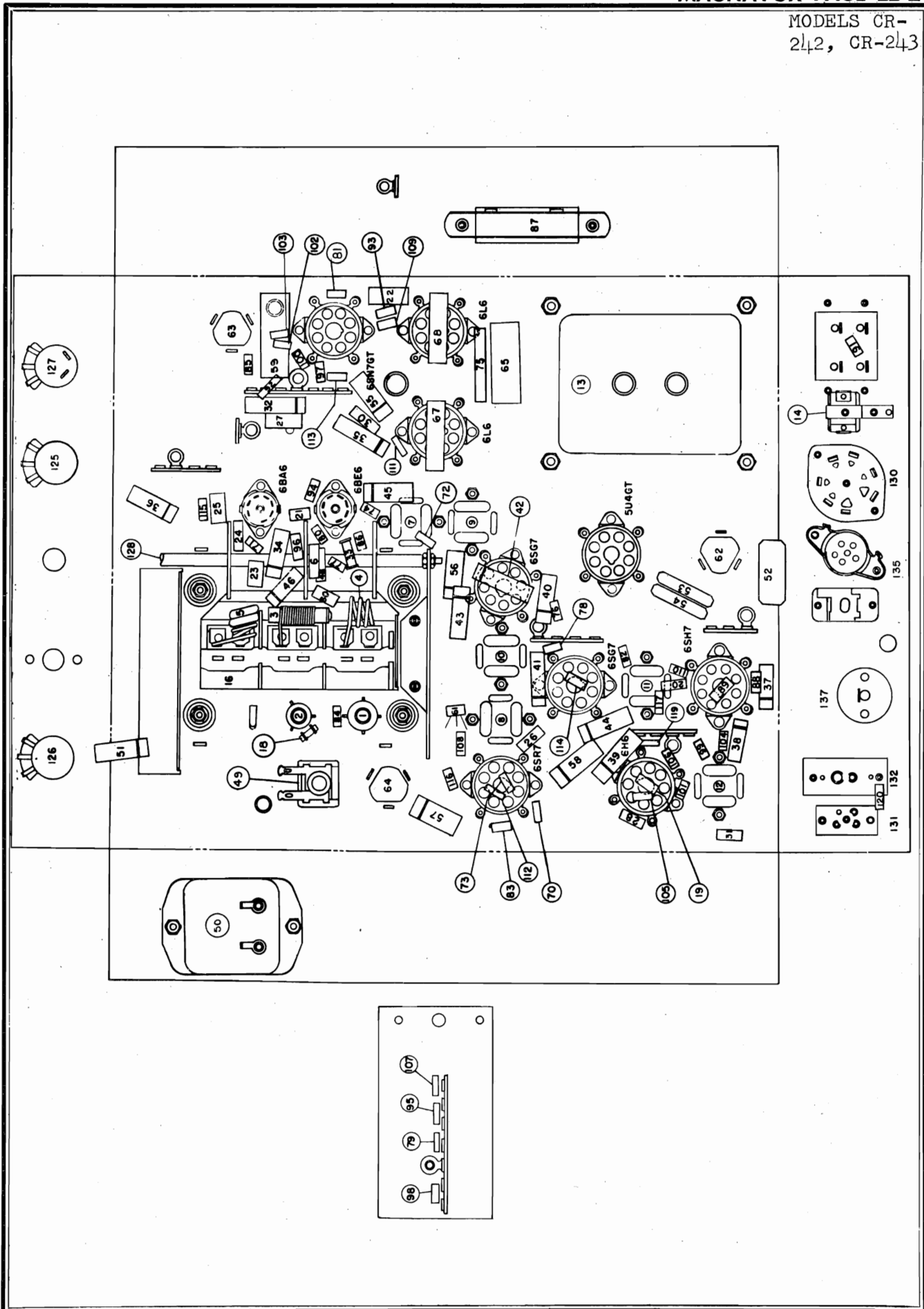


FIG. 2b

CR243
 595412

MODELS CR-242, CR-243



LINE VOLTAGE: This clock-radio receiver is designed for operation on 117 Volts, 60 Cycles, Alternating Current only.

POWER CONSUMPTION: Clock and Radio only — 35 watts
A.C. Receptacle — 700 watts max.

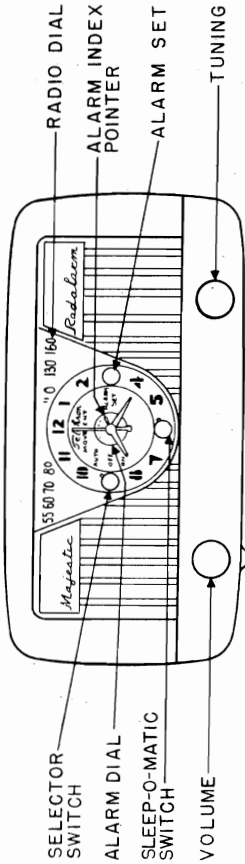
TUNING RANGE: Broadcast: 540 to 1650 Kilocycles (180 to 555 meters).
DIAL: The Dial Scale is calibrated in Kilocycles times 10 to correspond with newspaper or periodical listings.

TUBES: The tubes used, and their functions, are as follows:

- 12BE6 Converter
- 12AT6 or 12AV6 Detector, Avc and Audio Amp.
- 12BA6 I.F. Amplifier
- 50C5 Beam Power Amplifier
- 35W4 Rectifier

INSTALLATION: Models 5C-2 and 5C-3 are complete in every detail for efficient and immediate operation. A self-contained Loop Antenna is included which will give excellent results in most locations. Due to the directional properties of the Loop, it may be advantageous to turn the receiver to the left or right in noisy locations for maximum signal and minimum noise. A best position for reception can always be found.

CONTROLS: Refer to the diagram below for location of the clock and radio control knobs.



HOW TO OPERATE YOUR "RADALARM" RADIO: The electric clock starts as soon as you plug the radio power cord into the A-C power line which corresponds with the rating shown on the Model Label. To set the clock to the correct time, turn the Time Set knob, located at the rear of the receiver, in the clockwise direction.

TO OPERATE THE RADIO: Turn the Selector knob located at the left side of the clock face so that its index points to ON. This turns on the power to the radio. Next, turn the Volume control knob at the bottom left of the cabinet about half way in the clockwise direction, or to the right. After

the receiver has warmed up (allow about 30 seconds), set the Volume Control about half way and turn the Tuning Control knob so that the dial pointer indicates the frequency of the desired station. Then tune carefully for best reception. Adjust the volume by turning the Volume Control to the left or right to suit the listener. Never reduce the volume by detuning — always use the Volume Control knob.

To turn the radio off, turn the Selector knob so that the index points to the center or OFF position.

TO OPERATE YOUR "RADALARM" RADIO AS A MUSICAL ALARM: You may set your clock-radio to automatically turn on a program you wish to hear during the next eleven hours. Proceed by tuning in the station which will carry the program desired. Then set the Volume control knob at the level you want, as for regular radio operation. Pull alarm set knob, located at the right side of the clock face, and turn counterclockwise. This causes the alarm dial disc to rotate. Stop rotation when the time you desire the radio to go on, is indicated on the dial directly under the short index pointer, on the opposite end of the hour hand. Now turn Selector knob so that the index points to Auto position.

The "RADALARM" is now ready to turn on the radio automatically, at the time selected. As an added feature, an A.C. outlet is provided at the rear of the receiver. This enables the connection of any electrical appliance, of less than max. rated wattage, and its subsequent automatic simultaneous operation with that of the radio in the Auto position.

After setting the alarm, if you wish to return to normal radio operation, turn the Selector knob so that the index points to ON. Then operate the radio as described in preceding paragraphs. Be sure to turn the Selector knob back to the Auto position if you want a program to be turned on automatically, at the time previously set.

As with any alarm, when the radio goes on at the time selected, push alarm set knob in. To turn off radio, follow previous instructions.

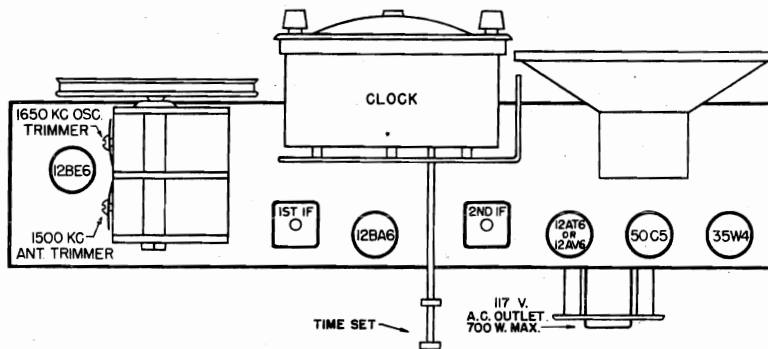
SLEEP-O-MATIC: Uninterrupted radio operation and automatic shut-off may be obtained by turning the "Sleep-o-matic" control, located at the bottom of the clock face, clockwise for up to 60 minutes of operation. No further controls are necessary, other than Tuning and Volume.

ALIGNMENT: Should it become necessary at any time to check the alignment of this receiver, proceed as follows:

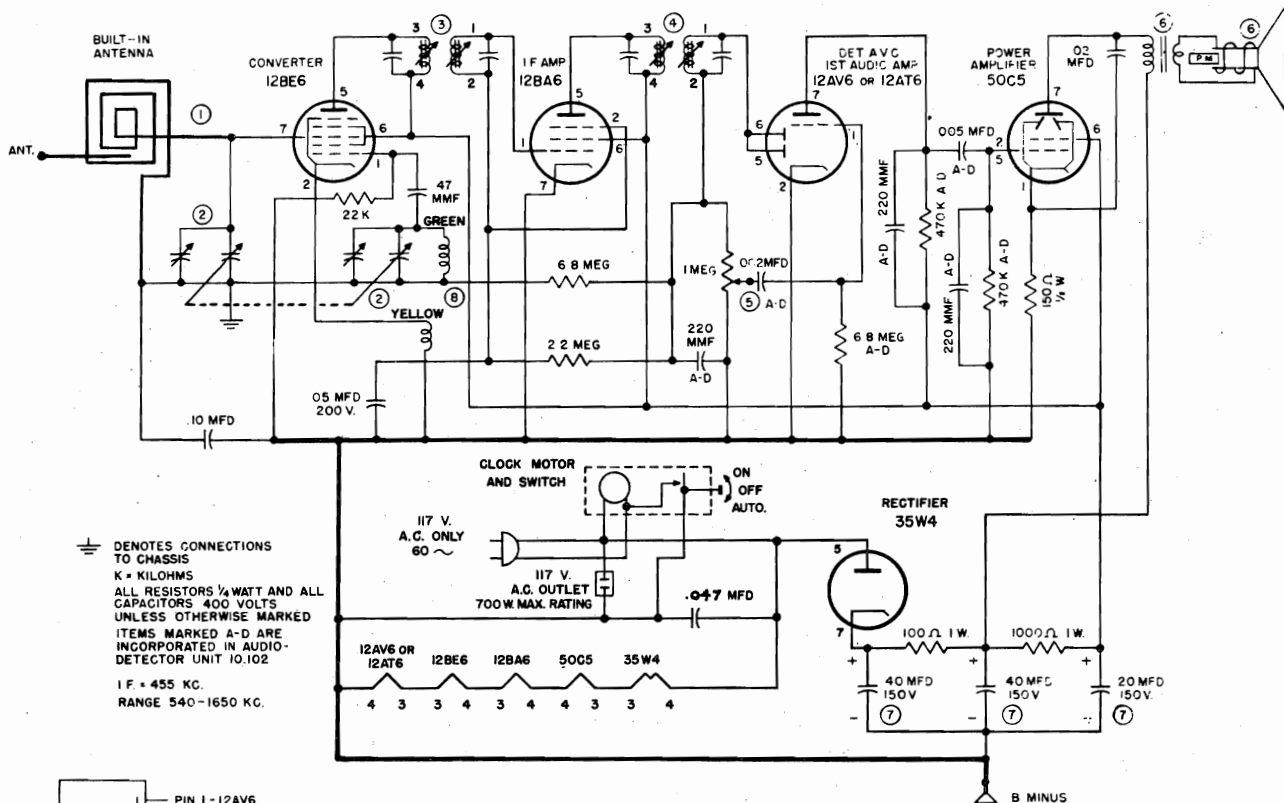
- (1) Set the Signal Generator to 455KC and connect to the stator lug on the rear section of the Variable Capacitor. Connect the Signal Generator Ground lead to the chassis. Connect a suitable output meter across the Speaker Voice Coil Connections. Turn the Volume Control to the maximum position. Turn the Variable Capacitor to the extreme clockwise position.
- (2) Adjust the trimmers located at the top of the first and second I. F. Transformers or the iron cores located at the top and bottom of each I. F. for maximum output as indicated on the Output Meter.

MODELS 50-2,
50-3

- (3) Loosely couple the Signal Generator lead to the Loop and set to 1650 KC.
- (4) With Variable Capacitor set at the extreme clockwise position, tune in the 1650 KC signal by means of the Oscillator Trimmer on the Variable Capacitor (front-section).
- (5) Set the Signal Generator to 1500 KC and turn the Tuning Control so that this frequency is indicated on the dial. Adjust the Antenna Trimmer on the Variable Capacitor (rear section) for maximum output. No other adjustments are necessary.



TRIMMER AND TUBE LOCATION DIAGRAM



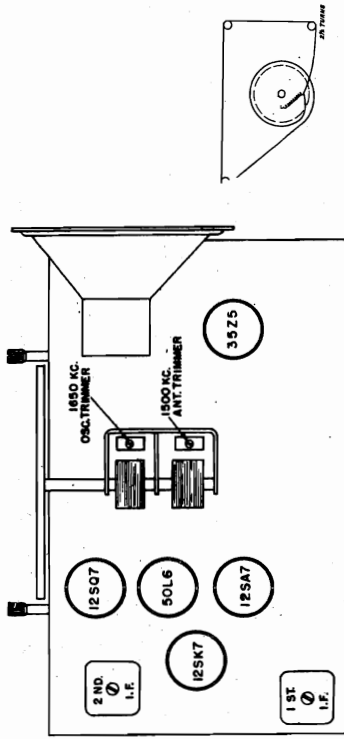
⊥ DENOTES CONNECTIONS TO CHASSIS
 K = KILOHMS
 ALL RESISTORS 1/4 WATT AND ALL CAPACITORS 400 VOLTS UNLESS OTHERWISE MARKED
 ITEMS MARKED A-D ARE INCORPORATED IN AUDIO-DETECTOR UNIT 10.102
 I.F. = 455 KC.
 RANGE 540-1650 KC.

| | | |
|---------------------|---|------------------|
| 10.102 | 1 | PIN 1-12AV6 |
| | 2 | ARM OF VOL. CON. |
| AUDIO DETECTOR UNIT | 3 | TOP OF VOL. CON. |
| | 4 | PIN 2-12AV6 |
| | 5 | PIN 5-50C5 |
| ITEMS MARKED A-D | 6 | PIN 7-12AV6 |
| | 7 | B + |

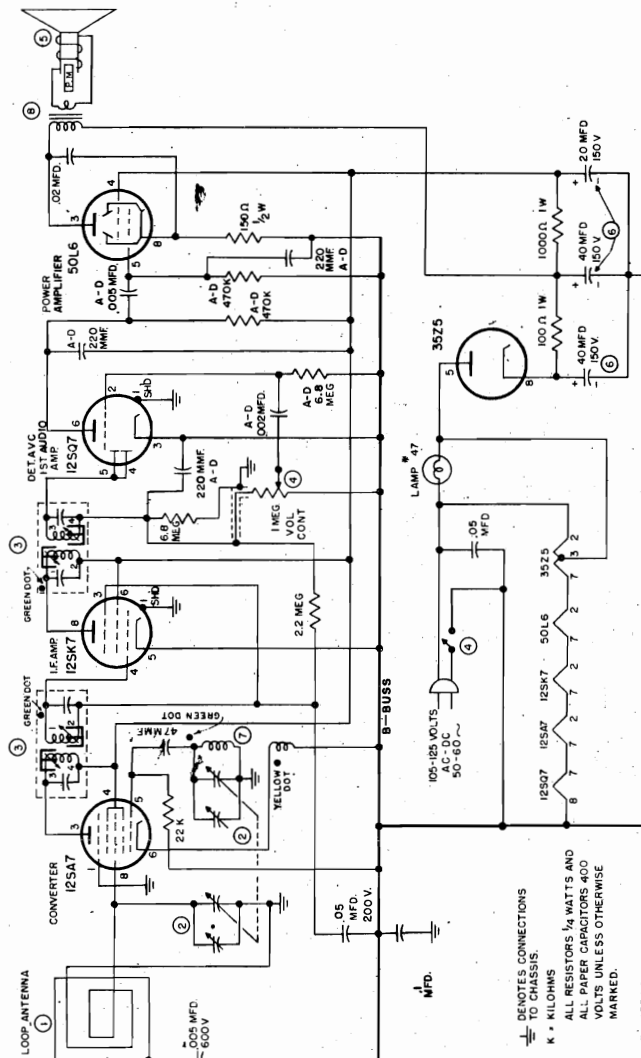
| PART NO. | DESCRIPTION |
|----------|---------------------------------|
| ① | 1.550 LOOP ASSEMBLY |
| ② | 2.163 2 GANG VARIABLE CONDENSER |
| ③ | 1.445-2 1st I.F. TRANSFORMER |
| ④ | 1.445-6 2nd I.F. TRANSFORMER |

| PART NO. | DESCRIPTION |
|----------|----------------------------------------------|
| ⑤ | 8.200-11 VOLUME CONTROL AND SWITCH |
| ⑥ | 30.332-3 PM 4" SPEAKER & OUTPUT TRANS. |
| ⑦ | 5.415-5 ELECTROLYTIC CAP. 40-40-20 MFD 150V. |
| ⑧ | 1.526 OSCILLATOR COIL |

MODELS 5LA50,
5LA60



TRIMMER AND TUBE LOCATION DIAGRAM



| PART NO. | DESCRIPTION | PART NO. | DESCRIPTION |
|----------|---------------------------|----------|---------------------------------------|
| 1 | 12SA7 CONVERTER | 4 | 30.325 LAMP |
| 2 | 12SK7 I.F. AMPLIFIER | 5 | 5-415-4 ELECTROLYTIC CAP. 40-40-20MFD |
| 3 | 50L6 BEAM POWER AMPLIFIER | 6 | 1.526 OSCILLATOR COIL |
| 4 | 35Z5 RECTIFIER | 7 | 9.249-1 OUTPUT TRANSFORMER |
| 5 | 105-125 VOLTS, 50-60~ | 8 | 10.102 AUDIO DETECTOR UNIT |

MODEL 5LA50 OR 5LA60 SCHEMATIC DIAGRAM

LINE VOLTAGE: This receiver is designed for operation on 105-125 Volts, 50-60 Cycles, either Alternating or Direct Current (AC-DC).

POWER CONSUMPTION: 30 Watts.

TUNING RANGE: Broadcast: 540 to 1650 Kilocycles (180 to 555 meters).

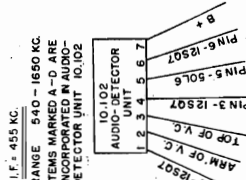
TUBES: The tubes used, and their functions, are as follows:

- 12SA7 Converter
- 12SK7 I.F. Amplifier
- 50L6 Beam Power Amplifier
- 35Z5 Rectifier

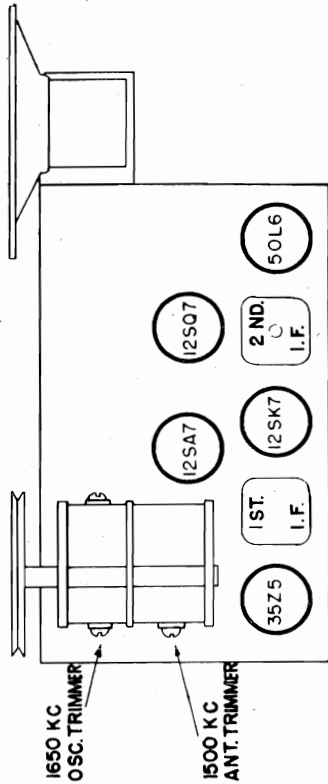
ALIGNMENT: Should it become necessary at any time to check the alignment of this receiver, proceed as follows:

- (1) Set the Signal Generator to 455 KC and connect to the stator lug on the rear section of the Variable Capacitor. Connect the Signal Generator Ground lead to the chassis. Connect a suitable output meter across the Speaker Voice Coil Connections. Turn the Volume Control to the maximum position. Turn the Variable Capacitor to the extreme clockwise position.
- (2) Adjust the trimmers located at the top of the first and second I. F. Transformers or the iron cores located at the top and bottom of each I. F. for maximum output as indicated on the Output Meter.
- (3) Loosely couple the Signal Generator lead to the Loop and set to 1650 KC.
- (4) With Variable Capacitor set at the extreme clockwise position, tune in the 1650 KC signal by means of the Oscillator Trimmer on the Variable Capacitor (front section).
- (5) Set the Signal Generator to 1500 KC and turn the Tuning Control so that this frequency is indicated on the dial. Adjust the Antenna Trimmer on the Variable Capacitor (rear section) for maximum output. No other adjustments are necessary.

⊖ DENOTES CONNECTIONS TO CHASSIS.
K = KILOHMS
ALL RESISTORS 1/4 WATTS AND ALL PAPER CAPACITORS 400 VOLTS UNLESS OTHERWISE MARKED.



MODELS 5LA70,
5LA80



TRIMMER AND TUBE LOCATION DIAGRAM

LINE VOLTAGE: This receiver is designed for operation on 105-125 Volts 50-60 Cycles, either Alternating or Direct Current (AC-DC).

POWER CONSUMPTION: 30 Watts.

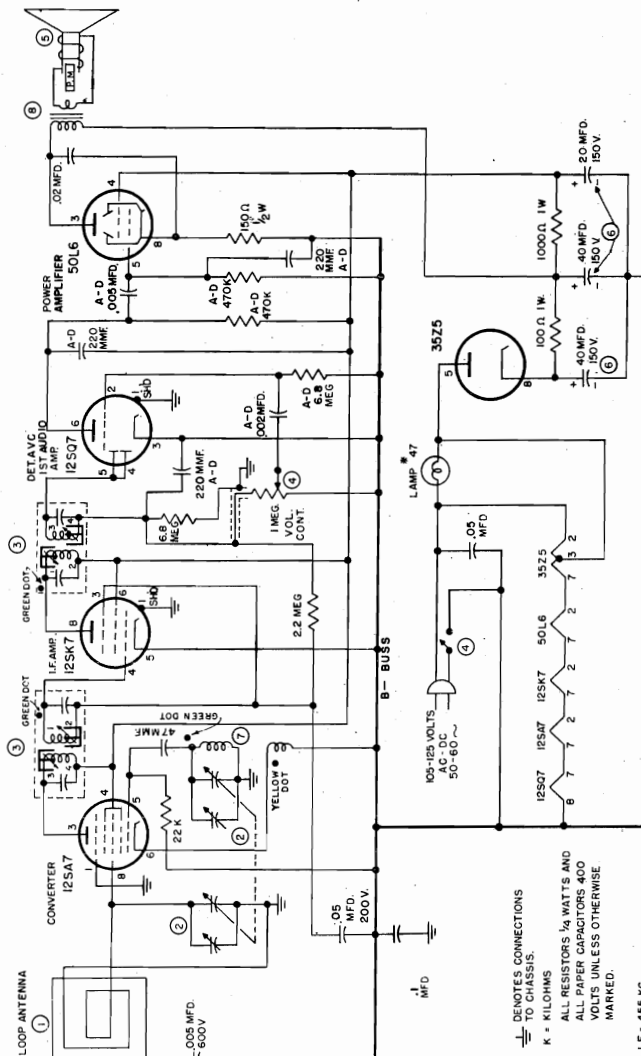
TUNING RANGE: Broadcast: 540 to 1650 Kilocycles (180 to 555 meters)

TUBES: The tubes used, and their functions, are as follows:

- 12SA7 Converter
- 12SQ7 Detector, AVC and Audio Amp
- 12SK7 I.F. Amplifier
- 50L6 Beam Power Amplifier
- 35Z5 Rectifier

ALIGNMENT: Should it become necessary at any time to check the alignment of this receiver, proceed as follows:

- (1) Set the Signal Generator to 455 KC and connect to the stator lug on the rear section of the Variable Capacitor. Connect the Signal Generator Ground lead to the chassis. Connect a suitable output meter across the Speaker Voice Coil Connections. Turn the Volume Control to the maximum position. Turn the Variable Capacitor to the extreme clockwise position.
- (2) Adjust the trimmers located at the top of the first and second I. F. Transformers or the iron cores located at the top and bottom of each I. F. for maximum output as indicated on the Output Meter.
- (3) Loosely couple the Signal Generator lead to the Loop and set to 1650 KC.
- (4) With Variable Capacitor set at the extreme clockwise position, tune in the 1650 KC signal by means of the Oscillator Trimmer on the Variable Capacitor (front section).
- (5) Set the Signal Generator to 1500 KC and turn the Tuning Control so that this frequency is indicated on the dial. Adjust the Antenna Trimmer on the Variable Capacitor (rear section) for maximum output. No other adjustments are necessary.



| PART NO. | DESCRIPTION |
|----------|-----------------------------------|
| 1 | 12SA7 CONVERTER |
| 2 | 12SQ7 DETECTOR, AVC AND AUDIO AMP |
| 3 | 12SK7 I.F. AMPLIFIER |
| 4 | 50L6 BEAM POWER AMPLIFIER |
| 5 | 35Z5 RECTIFIER |
| 6 | 10-102 DETECTOR UNIT |
| 7 | ARM OF V.C. |
| 8 | TOP OF V.C. |
| 9 | PIN 6 - 12SQ7 |
| 10 | PIN 5 - 50L6 |
| 11 | PIN 6 - 12SA7 |

MODEL 5LA70 OR 5LA80 SCHEMATIC DIAGRAM

LINE VOLTAGE: This receiver is designed for operation on 105-125 Volts, 50-60 Cycles, either Alternating or Direct Current (AC-DC).

POWER CONSUMPTION: 30 Watts.

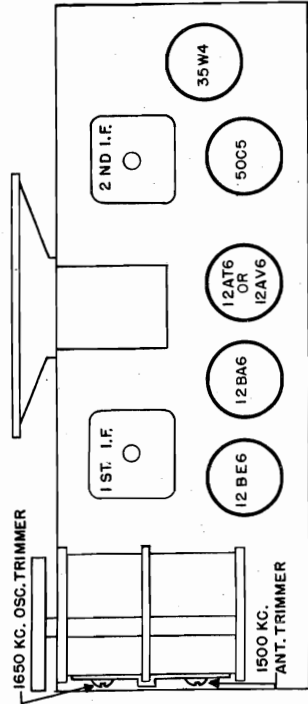
TUNING RANGE: Broadcast: 540 to 1650 Kilocycles (180 to 555 meters).

TUBES: The tubes used, and their functions, are as follows:

- 12BE6 Converter
- 12BA6 I.F. Amplifier
- 50C5 Beam Power Amplifier
- 35W4 Rectifier

ALIGNMENT: Should it become necessary at any time to check the alignment of this receiver, proceed as follows:

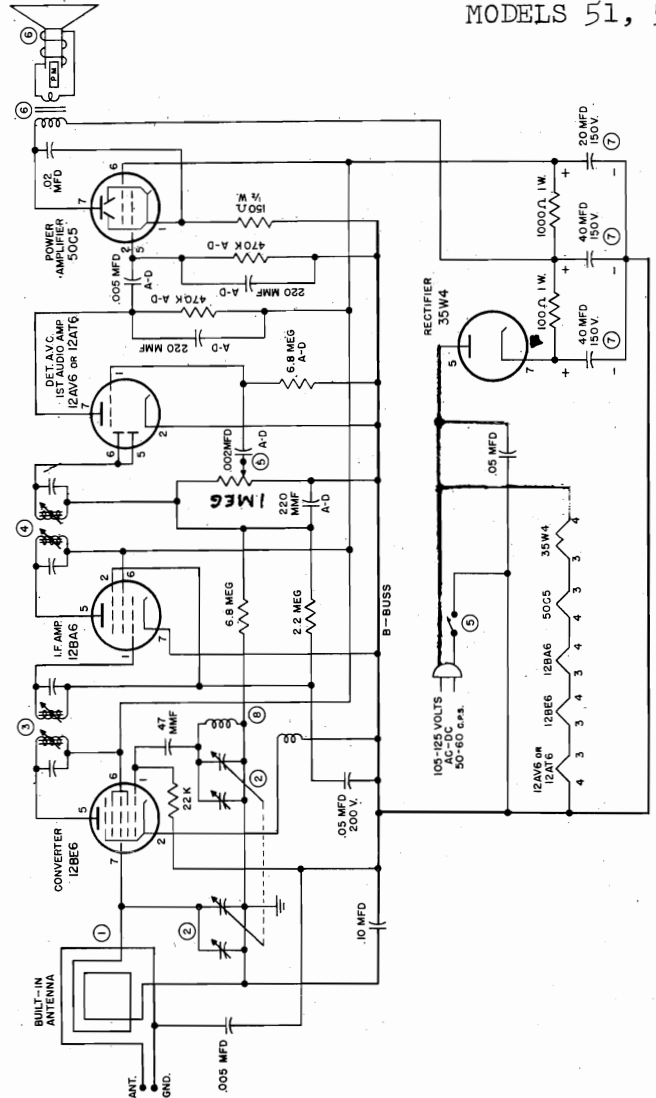
- (1) Set the Signal Generator to 455 KC and connect to the stator lug on the rear section of the Variable Capacitor. Connect the Signal Generator Ground lead to the chassis. Connect a suitable output meter across the Speaker Voice Coil Connections. Turn the Volume Control to the maximum position. Turn the Variable Capacitor to the extreme clockwise position.
- (2) Adjust the trimmers located at the top of the first and second I. F. Transformers or the iron cores located at the top and bottom of each I. F. for maximum output as indicated on the Output Meter.
- (3) Loosely couple the Signal Generator lead to the Loop and set to 1650 KC.
- (4) With Variable Capacitor set at the extreme clockwise position, tune in the 1650 KC signal by means of the Oscillator Trimmer on the Variable Capacitor (front section).
- (5) Set the Signal Generator to 1500 KC and turn the Tuning Control so that this frequency is indicated on the dial. Adjust the Antenna Trimmer on the Variable Capacitor (rear section) for maximum output. No other adjustments are necessary.



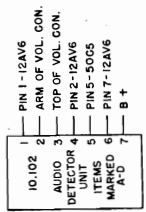
TRIMMER AND TUBE LOCATION DIAGRAM

| PART NO. | DESCRIPTION |
|------------|--------------------------------------|
| ① 1.546 | LOOP ASSEMBLY |
| ② 2.200 | 2 GANG VARIABLE CONDENSER |
| ③ 1.445-2 | 1st I.F. TRANSFORMER |
| ④ 1.445-6 | 2nd I.F. TRANSFORMER |
| ⑤ 9.200-9 | OR 9.201-4 VOLUME CONTROL & SWITCH |
| ⑥ 30.332-2 | PM 4" SPEAKER & OUTPUT TRANS. |
| ⑦ 5.415-5 | ELECTROLYTIC CAP. 40-40-20 MFD 150V. |
| ⑧ 1.445-2 | OSCILLATOR COIL |
| ⑨ 10.102 | AUDIO-DETECTOR UNIT |

MODEL 51, 52 SCHEMATIC DIAGRAM



⊥ DENOTES CONNECTIONS TO CHASSIS
 K = KILOHMS
 M = MEGOHMS
 CAPACITORS *400 VOLTS AND ALL UNLESS OTHERWISE MARKED
 ITEMS MARKED A-D ARE DETECTOR UNIT 10.102
 I.F. - 455 KC.
 RANGE 540-1650 KC.



MODEL 80FMP2

TUBES: The Tubes used, and their functions, are as follows:

- 12AT7 R-F Amplifier and Mixer (F-M)
- 6BE6 A-M Converter and F-M Oscillator
- 6BA6 1st I-F Amplifier (A-M & F-M)
- 6BA6 2nd I-F Amplifier (F-M)
- 6AL5 F-M Detector
- 6AV6 A-M Detector, A.V.C. and Audio Amp.
- 6V6GT Beam Power Amplifier
- 5Y3GT Rectifier

LINE VOLTAGE: This receiver is designed for operation on 105-125 Volts; 60 Cycles, Alternating Current (AC) only.

POWER CONSUMPTION INCLUDING RECORD CHANGER: 115 Watts.

TUNING RANGE:

- Broadcast Band: 540 to 1650 Kilocycles (182 to 555 Meters)
- F-M Band: 87.5 to 108.5 Megacycles (2.7 to 3.4 Meters)

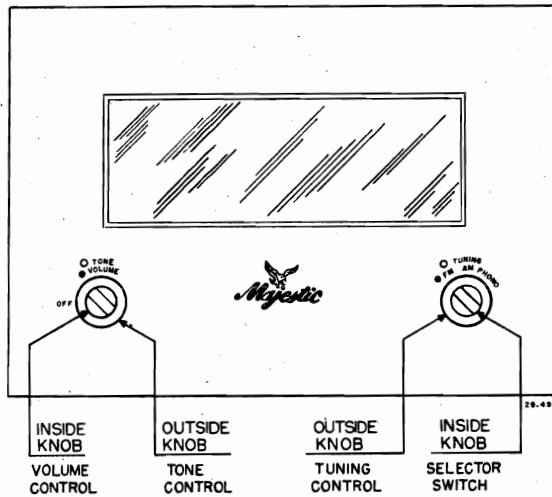


FIG. 1—FRONT PANEL CONTROLS

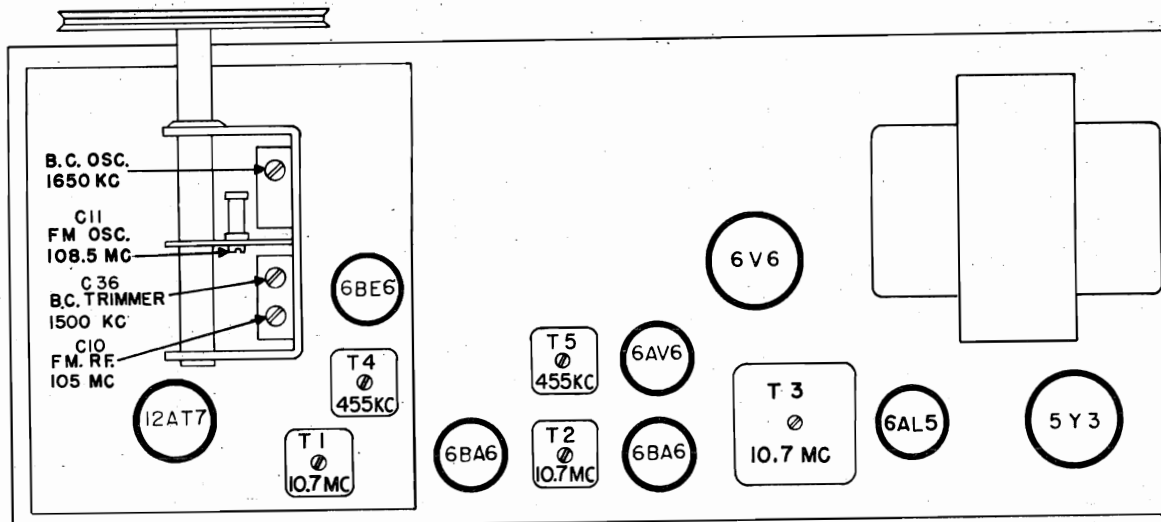
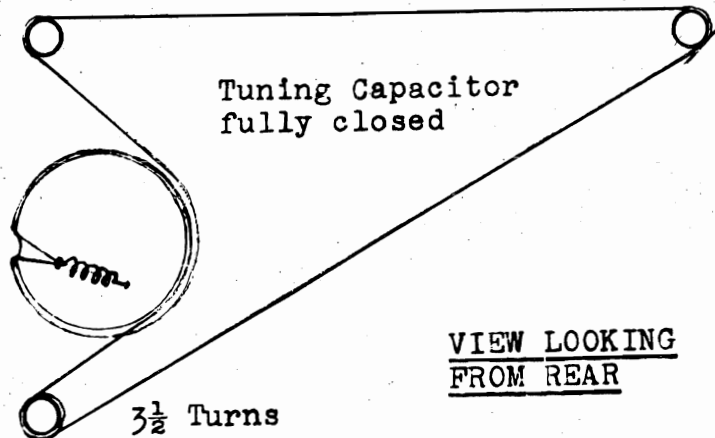


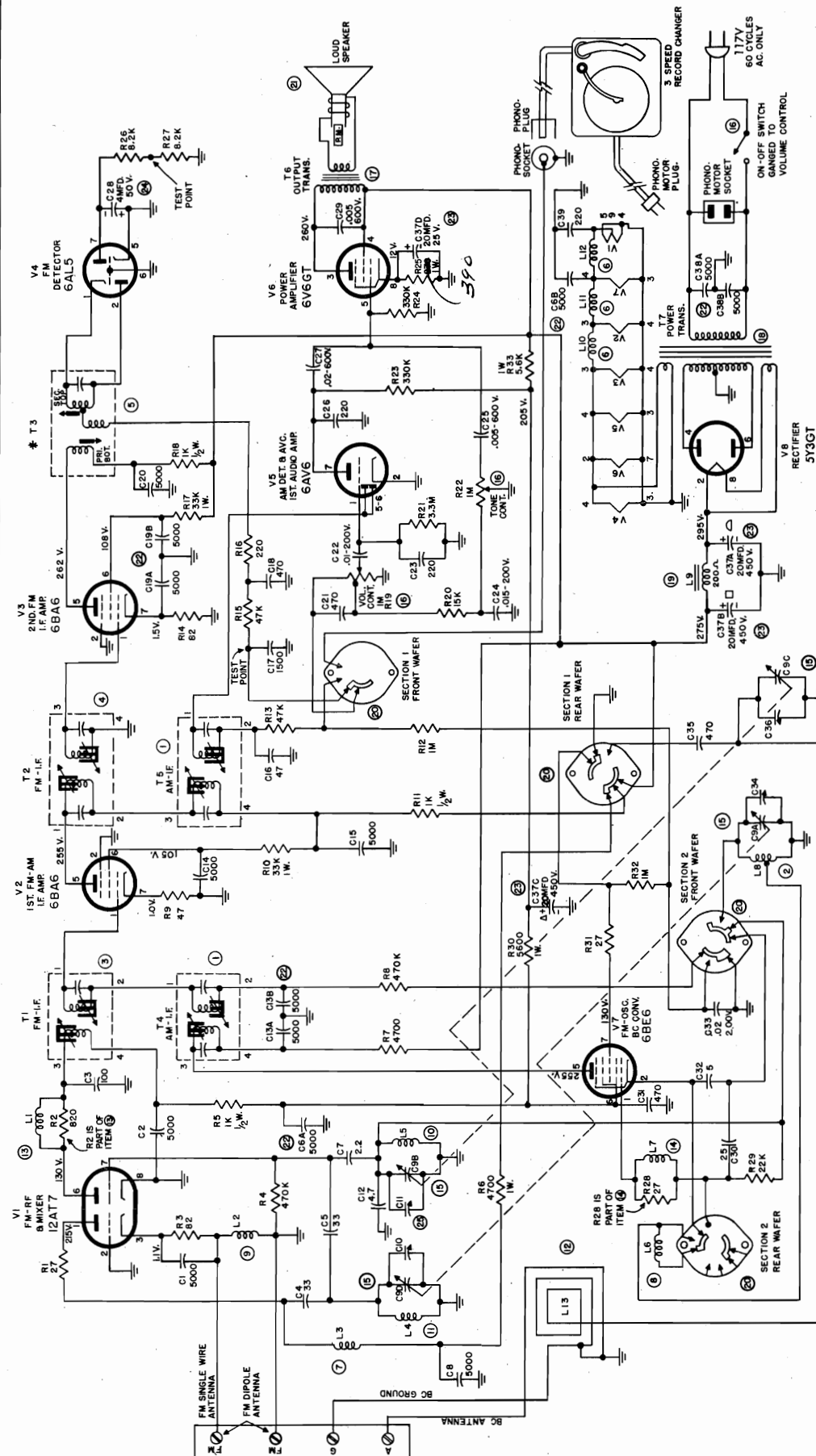
FIG. 2—TUBE AND ADJUSTMENT LOCATION DIAGRAM

ALIGNMENT CHART

| STEP | CIRCUIT ALIGNED | RECEIVER DIAL AT | SIGNAL GENERATOR | | METER CONNECTIONS | | METER INDICATION |
|--------------------|-----------------|----------------------|------------------|--------------------|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------|------------------------------------------|
| | | | TYPE | FREQ. | TYPE | CONNECTIONS | |
| 1 | B.C. I.F. | B.C. BAND MAX. FREQ. | A.M. | 455 KC 30% MOD. | REAR B.C. SECTION OF VARIABLE CONDENSER | ACROSS VOICE COIL | MAX. OUTPUT |
| PREFERRED METHOD 2 | F.M. | F.M. BAND MAX. FREQ. | F.M. | 10.7 MC. 30% MOD. | HIGH SIDE THROUGH .005 MF. (APPROX.) CAP TO PIN 7 OF 12AT7 | ACROSS VOICE COIL | MAX. OUTPUT |
| ALTERNATE METHOD 2 | I.F. | | R.F. OR A.M. | 10.7 MC. UNMOD. | | D.C. V.T.V.M. NEGATIVE TO PIN 7 OF 6AL5; POSITIVE TO GROUND | MAX. DEFLECTION |
| PREFERRED METHOD 3 | F.M. | F.M. BAND MAX. FREQ. | F.M. | 10.7 MC. 30% MOD. | EACH SIDE OF GEN. OUTPUT THROUGH 150 OHM RESISTOR TO F.M. ANT. TERMINALS | ACROSS VOICE COIL | MAX. OUTPUT |
| ALTERNATE METHOD 3 | DET. | | R.F. OR A.M. | 10.7 MC. UNMOD. | | D.C. V.T.V.M. NEG. TO JUNCTION OF 82K5 AT 6AL5; POS. TO JUNCTION OF R15 B C17. | ZERO BETWEEN TWO OPPOSITE POLARITY PEAKS |
| PREFERRED METHOD 4 | F.M. | F.M. BAND MAX. FREQ. | F.M. | 109.5 MC. 30% MOD. | EACH SIDE OF GEN. OUTPUT THROUGH 150 OHM RESISTOR TO F.M. ANT. TERMINALS | ACROSS VOICE COIL | MAX. OUTPUT |
| ALTERNATE METHOD 4 | OSC. | | R.F. OR A.M. | 109.5 MC. UNMOD. | | D.C. V.T.V.M. NEGATIVE TO PIN 7 OF 6AL5; POSITIVE TO GROUND | MAX. DEFLECTION |
| PREFERRED METHOD 5 | F.M. | F.M. BAND 105 MC | F.M. | 105 MC. 30% MOD. | REAR B.C. SECTION OF VARIABLE CONDENSER | ACROSS VOICE COIL | MAX. OUTPUT |
| ALTERNATE METHOD 5 | R.F. | | R.F. OR A.M. | 105 MC. UNMOD. | | D.C. V.T.V.M. NEGATIVE TO PIN 7 OF 6AL5; POSITIVE TO GROUND | MAX. DEFLECTION |
| 6 | B.C. OSC. | B.C. BAND MAX. FREQ. | A.M. | 1650 KC 30% MOD. | EACH SIDE OF GEN. OUTPUT TO 2 OR 3-TURN LOOP (1 FOOT DIA.) SEVERAL FEET FROM ANT. | ACROSS VOICE COIL | MAX. OUTPUT |
| 7 | B.C. R.F. | B.C. BAND 1500 KC | A.M. | 1500 KC 30% MOD. | | ACROSS VOICE COIL | MAX. OUTPUT |

29,498

- NOTES:
- 1-TURN VOLUME CONTROL FULLY CLOCKWISE.
 - 2-MAINTAIN SIGNAL INPUT LOW ENOUGH TO HAVE LESS THAN 2 VOLTS ACROSS METERS.
 - 3-UNLESS OTHERWISE NOTED, CONNECT LOW SIDE OF SIGNAL GENERATOR TO CHASSIS.
 - 4-UNLESS OTHERWISE NOTED, SET VARIABLE CONDENSER TO MINIMUM CAPACITY (MAX. FREQ.)
 - 5-USE PROPER TOOL FOR SMALL I.F. TRANS. ADJUSTMENTS— I.E., .150 DIA. BAKELITE WITH BLADE .075 THICK.
 - 6-MAINTAIN 60 CYCLE LINE VOLTAGE AT APPROX. 117 VOLTS.



- K = KILOHMS
 - M = MEGOHMS
 - ALL CONDENSERS SHOWN IN MMF.
 - ALL CONDENSERS 500V. EXCEPT AS SHOWN.
 - ALL RESISTORS 1/4 WATT EXCEPT AS SHOWN.
- BAND-SWITCH POSITIONS
- COUNTER CLOCKWISE — FM (87.5 - 108.5 MC)
 - CLOCKWISE — AM (540 - 1650 KC)
 - CLOCKWISE — PHONO.
 - BAND-SWITCH IN FM POSITION.
- * ITEM 5
- T3 RATIO DETECTOR TRANSFORMERS
- TWO TYPES OF TRANSFORMERS ARE USED. IDENTIFICATION AS FOLLOWS:
- 1 - CAN HEIGHT OF PART NO. C-1524 IS 2 1/2"
 - 2 - CAN HEIGHT OF PART NO. C-1542-1 IS 1 15/16"
- 1 C-1-445-3 AM-IF TRANSFORMER
 - 2 C-1-436-2 BC-OSCILLATOR COIL
 - 3 C-1-446-2 FM-IF TRANSFORMER
 - 4 C-1-446-3 FM-IF TRANSFORMER
 - 5 SEE NOTE
 - 6 B-1-501 FILAMENT CHOKE
 - 7 B-1-512 RF CHOKE - RF PLATE
 - 8 B-1-535-1 RF CHOKE - OSC. CATHODE
- 9 B-1-535-2 AM-IF TRANSFORMER
 - 10 B-1-538 BC-OSCILLATOR COIL
 - 11 B-1-539 FM-IF TRANSFORMER
 - 12 D-1-540 BC LOOP ANTENNA
 - 13 B-1-536-1 MODULATOR PLATE CHOKE
 - 14 B-1-536-2 PARASITIC SUPPRESSOR
 - 15 C-2-222 VARIABLE CONDENSER
 - 16 C-8-218-2 DUAL CONCENTRIC VOLTAGE SWITCH
- 17 C-9-241-3 OUTPUT TRANSFORMER
 - 18 D-9-246 POWER TRANSFORMER
 - 19 C-9-255 FILTER CHOKE
 - 20 C-11-227-1 BAND-SWITCH
 - 21 C-30-328 10" SPEAKER
 - 22 B-4-125-1 DUAL SHIELDED CERAMIC CAPACITOR
 - 23 C-5-421-7 DRY ELECTROLYTIC CAPACITOR UNIT
 - 24 C-5-430 ELECTROLYTIC CAPACITOR
 - 25 B-4-118 CERAMIC TRIMMER 7.7 TO 3.5 MMF.

80F-82

MODEL 104, Lone Ranger, Rudolph

LINE VOLTAGE: This receiver is designed for operation on 105-125 Volts, 50-60 Cycles, either Alternating or Direct Current (AC-DC).

POWER CONSUMPTION: 30 Watts.

TUNING RANGE: Broadcast: 540 to 1650 Kilocycles (180 to 555 meters).

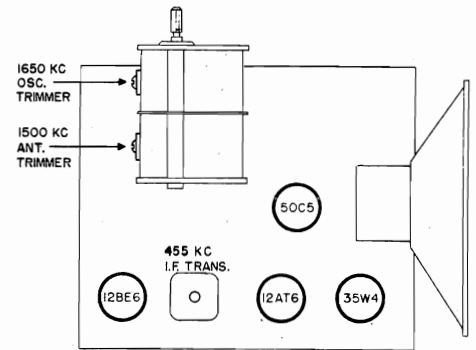
TUBES: The tubes used, and their functions, are as follows:

12BE6 Converter 12AT6 Detector, Avc and Audio Amp.
 35W4 Rectifier 50C5 Power Amplifier

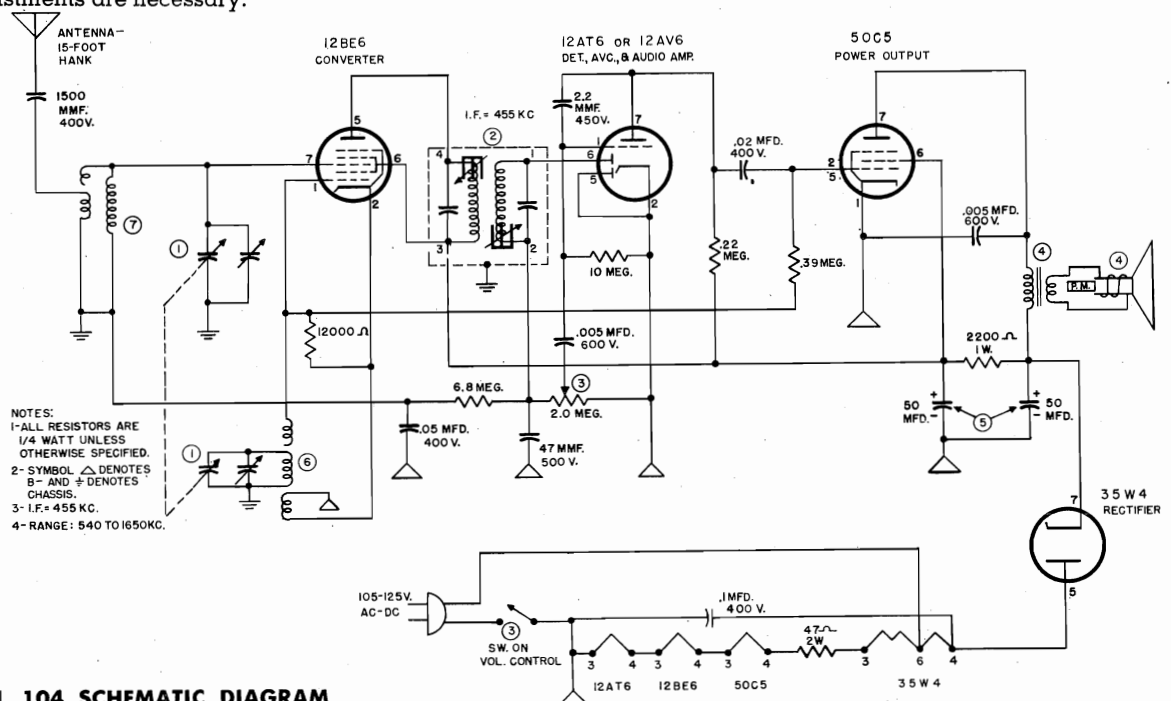
ALIGNMENT: Should it become necessary at any time to check the alignment of this receiver, proceed as follows:

- (1) Connect the high side of a 455 KC Signal Generator through a .1 mf capacitor to the stator lug on the rear section of the variable capacitor; the ground lead to one of the lugs on the line on-off switch. Connect a suitable output meter across the speaker voice coil. Turn the Volume and Tuning controls to their extreme clockwise positions.
- (2) Adjust the trimmers located at the top and bottom of the I-F transformer for maximum indication on the output meter.
- (3) Connect the Signal Generator high side to the antenna lug through a 47 mmfd capacitor; the low side remains as in step (1). Set the Signal Generator to 1650 KC.
- (4) With Variable Capacitor set at the extreme clockwise position, tune in the 1650 KC signal by means of the Oscillator Trimmer on the Variable Capacitor (front section).
- (5) Set the Signal Generator to 1500 KC and turn the Tuning Control so that this frequency is received. Adjust the Antenna Trimmer on the Variable Capacitor (rear section) for maximum output. No other adjustments are necessary.

| ITEM | PART NO. | DESCRIPTION |
|------|----------|-----------------------------------------|
| ① | 2.225 | 2-GANG VAR. CONDENSER |
| ② | L445-2 | I.F. TRANSFORMER |
| ③ | 8.201-9 | VOLUME CONTROL W/SWITCH |
| ④ | 30.332-1 | 4" P.M. SPEAKER WITH OUTPUT TRANSFORMER |
| ⑤ | 5.436-1 | 50-50 MFD. ELECT. 150V. D.C. |
| ⑥ | 1.402-4 | OSCILLATOR COIL |
| ⑦ | 1.534 | ANTENNA COIL |



TRIMMER AND TUBE LOCATION DIAGRAM



MODEL 104 SCHEMATIC DIAGRAM

MEISSNER T.R.F. BANDPASS TUNER
MODEL 4E

The Meissner Model 4E T.R.F. Bandpass Tuner is designed for superior high fidelity broadcast reception. It is specifically designed for custom installation and may be used in connection with a power amplifier and speaker system to fit a wide variety of installations ranging from the simplest home installation consisting of a low power amplifier and a speaker, to the largest high power installations designed to serve large auditoriums and consisting of one or more high power amplifiers and multiple speakers. Although the designer of such an installation must be guided to a large extent by the requirements of the installation, the following general hints may prove helpful.

The Power Amplifier

The output impedance of the 4E Tuner is 100,000 ohms and should be worked into an amplifier having high impedance input. High impedance amplifiers usually have an input impedance of 500,000 ohms, but some have a lower impedance than this and the 4E may be worked into an impedance as low as 100,000 ohms with no appreciable loss of low frequencies or increase in distortion. An amplifier having provision for phonograph input from a crystal pickup is satisfactory for use with the 4E, but under no conditions should the 4E be worked into a microphone input channel. The relatively high output of the 4E would cause overloading and severe distortion in the microphone input stage and the hum level would be too high to be a considered acceptable.

The Cabinet

No special precautions are necessary in the installation of the 4E Tuner, although it should be borne in mind that sufficient ventilation is required to prevent the unit from overheating. The heat generated by the 4E is low so that only a small amount of ventilation is required and usually the ordinary open back type of cabinet is satisfactory.

One more thing which should be observed in planning an installation is to use the normal precautions against microphonics. Since the 4E is a T.R.F. circuit and has no local oscillator, its tendency toward microphonism will be much less than in a similar superhet unit; but the 6AT6 audio amplifier tube may produce microphonics if subjected to severe vibration. This vibration may be transmitted through the cabinet or through the air from the speaker and the installation layout should be planned to avoid it.

The Record Player (or Changer)

The phonograph system of the 4E chassis is designed for use with crystal type pickups, and any record player or changer having this type pickup may be used. The following notes should be observed:

1. The record player frame must be connected to the tuner chassis in order to prevent hum pickup. In some record players the connecting lead from the phonograph pickup cartridge to the tuner chassis is a shielded lead with the shield connected to the pickup cartridge and to the record player frame. In this case the record player frame is automatically connected to the tuner chassis; but in record players which do not have this connection, a separate connecting lead between the record player frame and tuner may be used.

MODEL TLEK

2. The record player motor may be plugged into the convenience outlet on the rear of the tuner chassis. A power switch must be provided on the record player to turn the motor on and off.
3. The connecting lead from the pickup cartridge must be provided with a miniature phonograph plug. The 4E chassis is shipped with a proper plug in the input jack for use on phono units not so equipped. The outer band or shield is connected to the shell of the plug, and the center wire is soldered in the pin of the plug.

Antenna and Ground

For the best results it is strongly recommended that a good outdoor antenna be used with the 4E. Although this practice has been virtually abandoned with present day receivers having built-in antennas, it is still good practice when the best reception is desired.

Equally important in insuring the best possible reception is the use of a good ground system. Cold water pipes or a rod driven several feet into the earth may be used for external ground, but hot water or steam pipes or electrical conduit should not be used. A good ground connection will do much to minimize electrical interference, and is well worth the effort required for its installation.

Service Data - General

Power Supply 110-120 V 50-60 cycles.

Power Consumption 25 watts

Undistorted Output 2 to 15 volts.

Replacement Part Numbers - as shown on circuit diagram.

Circuit T.R.F. Bandpass.

Audio Frequency Response - flat ± 2 db. 40 to 15,000 cycles.

Hum Output .002 volts.

| | | |
|--------|---------------------|---------------------------------|
| Tubes: | 6BA6 R.F. Amplifier | 6AT6 Detector - Audio Amplifier |
| | 6BA6 R.F. Amplifier | 6X4 Rectifier |

Alignment Procedure (use 200 uuf. dummy)

1. Using an F.M. Signal Generator and Oscilloscope:

Connect the vertical plates of the oscilloscope to the chassis and top of volume control. Connect the horizontal plates to the sync terminals of the F.M. signal generator.

Set the dial of the tuner to 1,400 kc and the generator to 1,400 kc, using a sweep frequency of 400 cycles and deviation of about ± 50 kc. Set the output of the generator to the least that will give a useful picture, connecting generator to antenna terminal.

Adjust the 4 trimmers at the top of the gang condenser to obtain a pattern of the greatest amplitude, reducing generator input as alignment proceeds, and at the same time adjusting the trimmers to give a double-humped pattern with humps of equal magnitude and with the center of the pattern centered on the scope.

2. Using an A.M. Signal Generator:

Connect the signal generator as usual, with an output meter as indicator connected to top of volume control or audio cable.

Set generator at 1,385 kc and tuner to 1,400 kc. Loosen the 4 trimmers on top of the gang and slowly tighten one at a time to obtain a maximum output reading. Keep each trimmer on the loose side of resonance until all trimmers are nearly peaked; then carefully peak each trimmer. Check

alignment by slowly tuning generator to about 1,415 kc, during which the output meter should show a slight drop and then a rise again. This alignment centers the response at 1,400 kc so that the dial calibration will be accurate. If the generator had been set at 1,400 kc initially, the center of the tuner's response would be below 1,400 kc on the tuner dial.

Resistance and Voltage Chart

Resistance between pin and chassis

| Tube | Pin Number | | | | | | |
|---------------|------------|-----------|----------|----------|-----------|----------|----------|
| | <u>1</u> | <u>2</u> | <u>3</u> | <u>4</u> | <u>5</u> | <u>6</u> | <u>7</u> |
| 6BA6 1st RF | 2.1 meg. | 0 | *0-25 | *0-25 | **5 meg. | **5 meg. | 470 |
| 6BA6 2nd RF | 470K | 0 | *0-25 | *0-25 | **5 meg. | **5 meg. | 470 |
| 6AT6 Detector | 10 meg. | 0 | *0-25 | *0-25 | 940K | 147K | **5 meg. |
| 6X4 Rectifier | 240 | Tie Point | *0-25 | *0-25 | Tie Point | 240 | **5 meg. |

* Reading subject to position of hum balance control.

** Reading subject to variation depending upon the filter condensers.
CAUTION: Discharge filter condensers before making measurements.

Voltage between pin and chassis

No signal condition.

Measurements to ground with 20,000 ohm/volt meter, 1,000 ohm/volt on AC

| Tube | Pin Number | | | | | | |
|---------------|------------|-----------|----------|----------|-----------|----------|----------|
| | <u>1</u> | <u>2</u> | <u>3</u> | <u>4</u> | <u>5</u> | <u>6</u> | <u>7</u> |
| 6BA6 1st RF | Sl.Neg. | 0 | * | * | 200 | 132 | 3.5 |
| 6BA6 2nd RF | Sl.Neg. | 0 | * | * | 200 | 132 | 3.9 |
| 6AT6 Detector | Sl.Neg. | 0 | * | * | Sl.Neg. | Sl.Neg. | 85 |
| 6X4 Rectifier | 185 VAC | Tie Point | * | * | Tie Point | 185 VAC | 237 |

* Reading will range from 0 to 6.3 volts AC depending on setting of hum control.

Parts List for T4EK

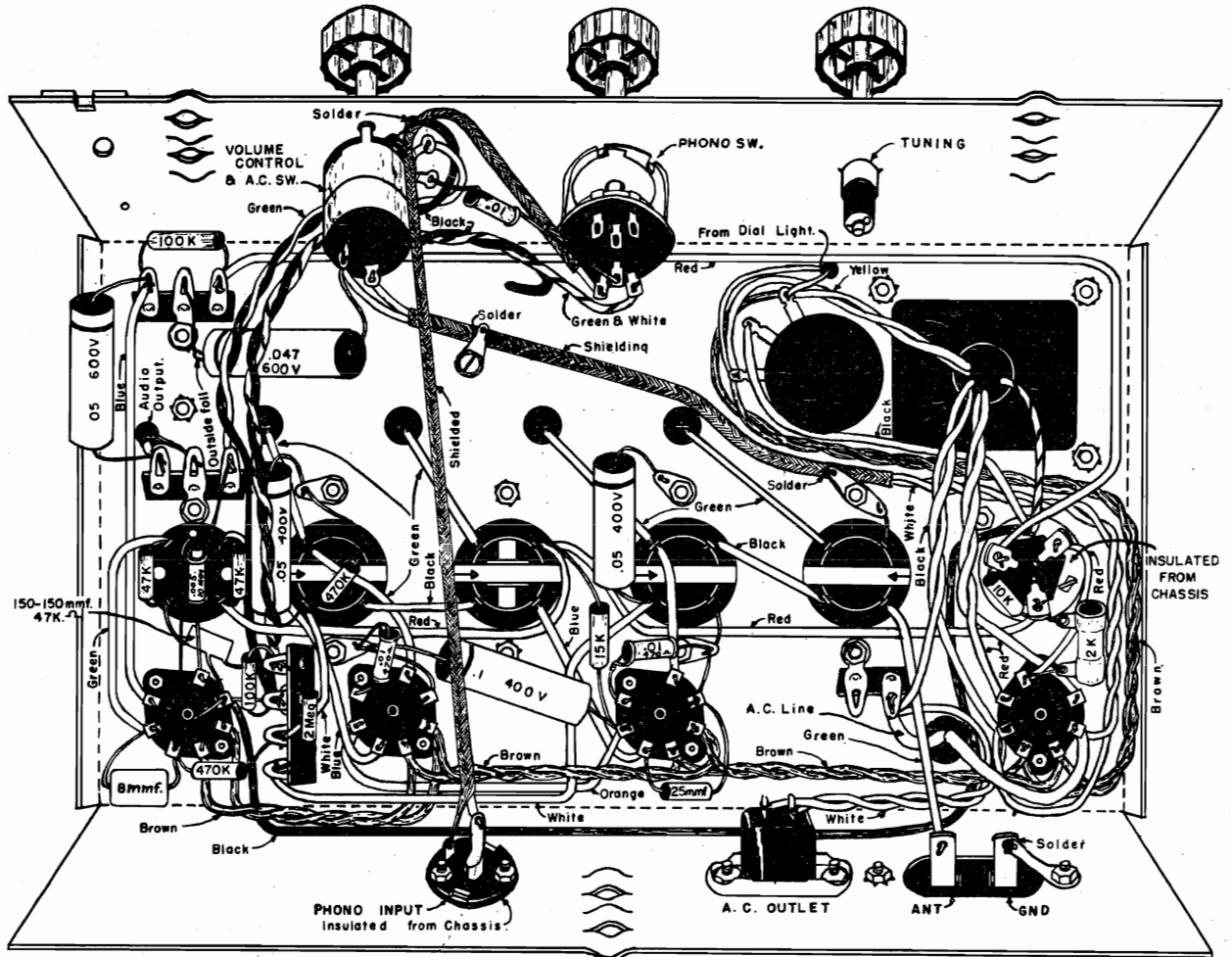
1. One chassis with bearing, #06279.
2. One bracket and pulley assembly #06282.
3. One 4 gang variable condenser #21-5223.
4. One gang condenser shield assembly #25-8208.
5. One dial plate assembly #05939.
6. One input ant. coil #9820.
7. One output ant. coil #9822.
8. One input R.F. coil #9824.
9. One output R.F. coil #9826.
10. One untuned R.F. coil #9828.
11. One 500K volume control with switch #29424.
12. One two-position switch #29582.
13. One 100 ohm jum balance control #29260.
14. One power transformer #29501.
15. One output cable assembly #05554.

MODEL T4EK

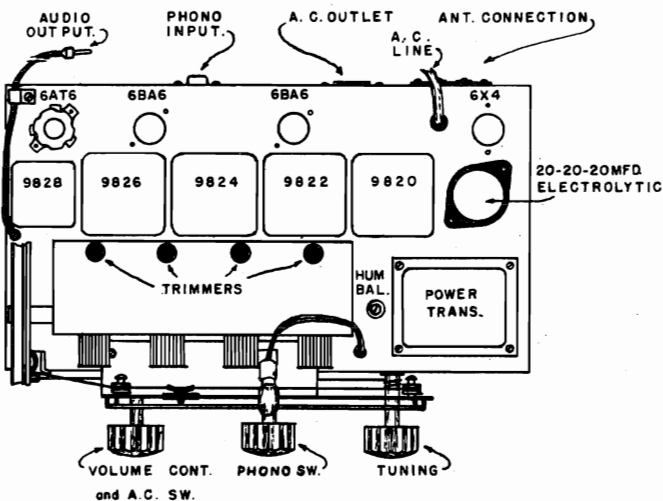
16. One length of shielded wire.
17. One length of braided shielding.
18. One line cord #12434.
19. One 20-20-20 mfd. 250 V. electrolytic condenser #34102.
20. One .1 mfd. 400 V. paper condenser #28113GT.
21. One .05 mfd. 600 V. paper condenser #28115GT.
22. Two .05 mfd. 400 V. paper condensers #28103GT.
23. One .047 mfd. 600 V. molded condenser #34160.
24. One 8 mmf. molded mica condenser #15149.
25. One 25 mmf. ceramic condenser #27165.
26. One .01 mfd. ceramic condenser #34111.
27. Two .01 mfd. -470 ohm type JCR-P capristors #34150-5.
28. One .005 mfd. -10 megohm type JCR-C capristor #34151-7.
29. One 150 mmf. -150 mmf. -47,000 ohm filpec #34171-1.
30. One 2,000 ohm 5 watt wire wound resistor #34149.
31. Two 47,000 ohm 1/2 watt carbon resistors.
32. One 100,000 ohm 1/2 watt carbon resistor.
33. One 100,000 ohm 1 watt carbon resistor.
34. Two 470,000 ohm 1/2 watt carbon resistors.
35. One 2 megohm 1/2 watt carbon resistor.
36. One 10,000 ohm 1/2 watt carbon resistor.
37. One 15,000 ohm 1 watt carbon resistor.
38. One tuning shaft #06285.
39. One AC receptacle #19794.
40. Four miniature tube sockets #29477.
41. One tube shield clip #29530.
42. One tube shield #29531.
43. One phono jack #29253.
44. One insulating washer for phono jack #26624.
45. One 2 lug terminal strip #16731.
46. One bakelite mounting plate for electrolytic condenser #19450.
47. One 1-insulated tie lug #25-5732.
48. One 3-insulated tie lug #25-6715.
49. Two 2-insulated tie lugs #25-5731.
50. Six single ended lugs.
51. One double ended lug #16480.
52. One cable clamp #16491.
53. One line cord strain relief (2 pieces) #29414.
54. One dial pointer #29425.
55. Two dial scale retaining springs #05938.
56. One dial drum assembly #05817.
57. One dial cord assembly #06286.
58. One dial scale #23-8238.
59. Three felt washers #19595.
60. Two knobs (plain) #29270.
61. One knob with dot #05878.
62. One dial light socket #29583.
63. One dial lamp #29262.
64. One 6X4 tube.
65. One 6AT6 tube.
66. Two 6BA6 tubes.
67. One hairpin cotter #29493.
68. One piece of plastic tubing #23440.
69. Supply of screws, nuts, lockwashers, and washers for assembly.
70. Instructions, including circuit and pictorial diagrams.
71. One mounting dimensions sheet printed full scale.

4 TUBE T.R.F. TUNER KIT.

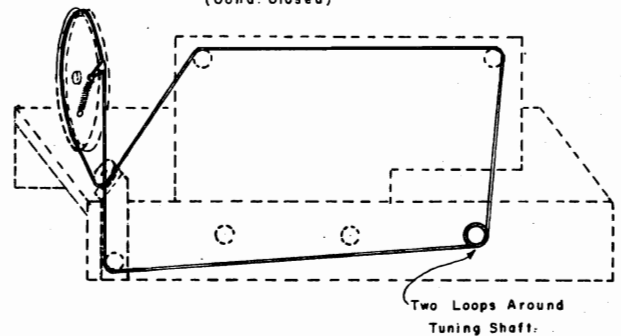
MODEL 4EK.



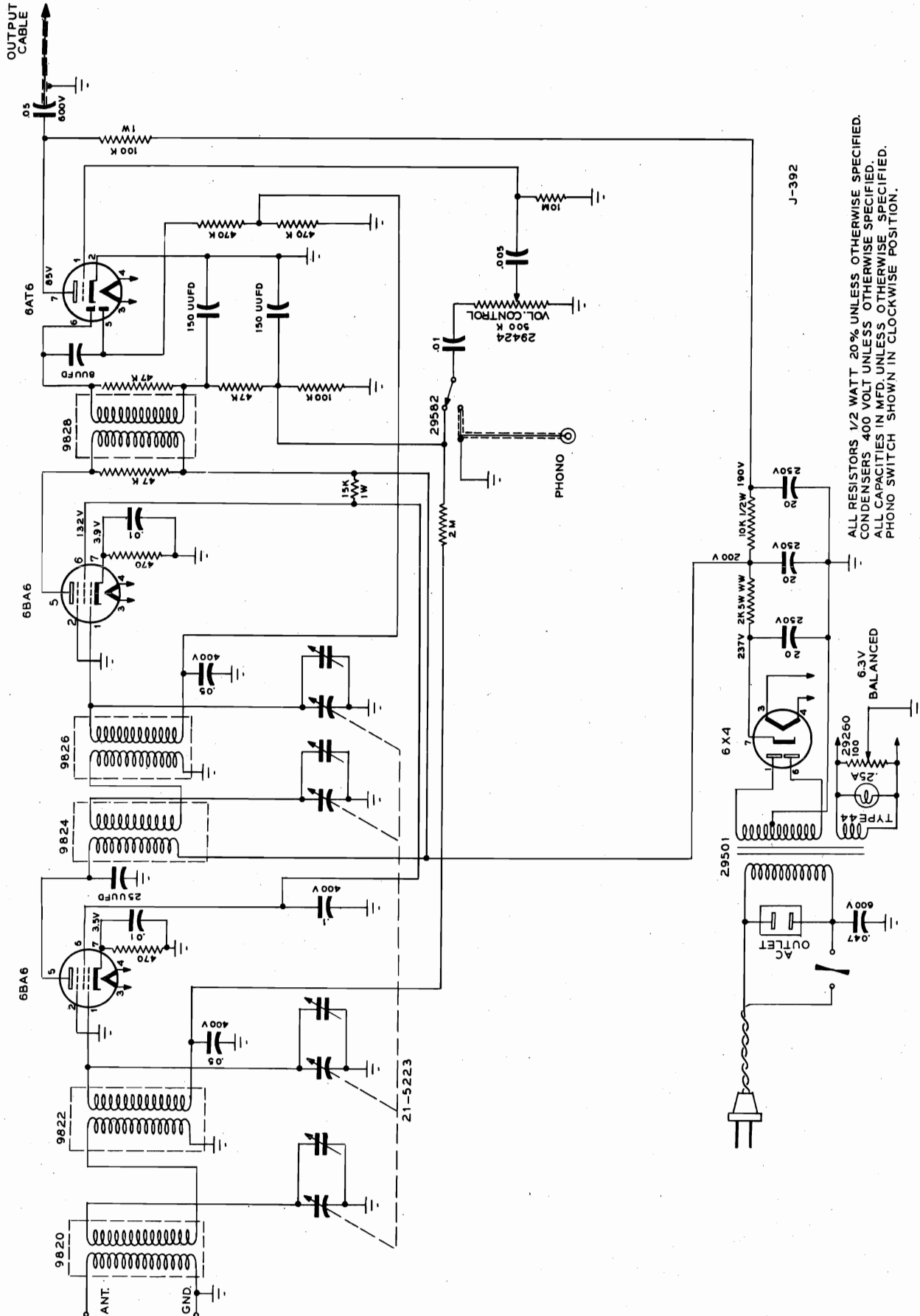
J-393



DIAL STRING DETAIL. (Cond. Closed)



MODEL T4EK



ALL RESISTORS 1/2 WATT, 20% UNLESS OTHERWISE SPECIFIED.
 CONDENSERS 400 VOLT UNLESS OTHERWISE SPECIFIED.
 ALL CAPACITIES IN MFD. UNLESS OTHERWISE SPECIFIED.
 PHONO SWITCH SHOWN IN CLOCKWISE POSITION.

SPECIFICATIONS

Power Requirement: 120 volts, 50 to 60 cycles, 110 watts.
Frequency Coverage:

Band A-540 to 1600 KC, AM
Band B-1.6 to 4.7 MC Band D-11 to 22 MC
Band C-4.7 to 10 MC Band E-88 to 108 MC, FM

Audio Sensitivity: .05 volts for 1/2 watt output.

Maximum Undistorted Audio: 7 watts.

AM Sensitivity: 2 to 4 microvolts.

FM Sensitivity: 20 microvolts, quieting signal.
5 microvolts, minimum signal.

Tube Complement:

| | | | |
|-------------------|-------|-----------------------|-------|
| RF | 6BA6 | FM Detector | 6AL5 |
| Mixer | 12AT7 | 1st AF | 6C4 |
| Oscillator | 12AT7 | 2nd AF | 6C4 |
| 1st IF | 6BA6 | Phase Inv. | 6C4 |
| 2nd IF | 6BA6 | AF output, two | 6V6GT |
| AM Detector | 6AL5 | Rectifiers, two | 5Y3GT |
| 3rd IF, FM | 6BA6 | Tuning Ind. | 6U5 |

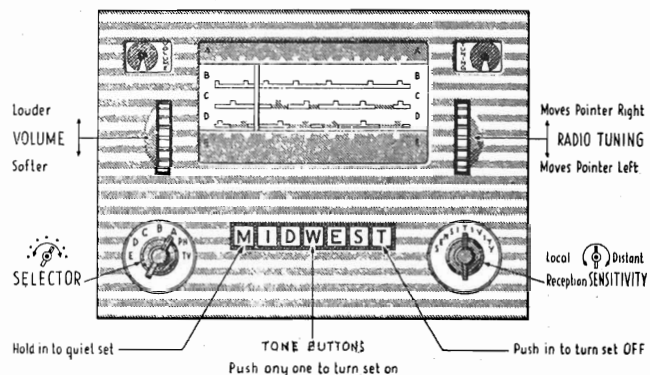
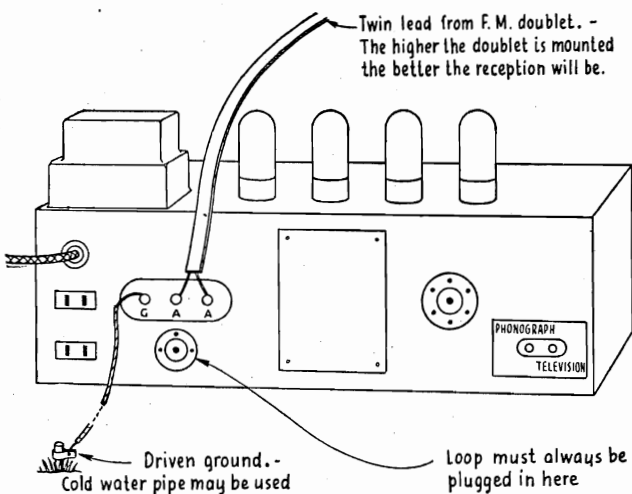
oriented only with respect to the FM transmitter location. The Midwest Model DP di-pole is a special design which is not directional and we recommend it for use with Midwest receivers for FM, broadcast and short wave reception.

PRECAUTIONS. Be sure that the speaker and Magna Tenna Loop are plugged in, also the flexible dipole leads must be connected to screw strip at "A-A". A ground wire may be connected to "G" but it is usually not needed. See that all tubes are seated and light up. Remove the packing inside the phonograph compartment and observe other warnings and cautions as advised by the tags attached to the receiver.

Plug the receiver into a 120 volt 60 cycle outlet. If you are not certain that your supply is 120 volts, 60 cycles alternating current (ac) call the local Electric Company.

INSTALLATION

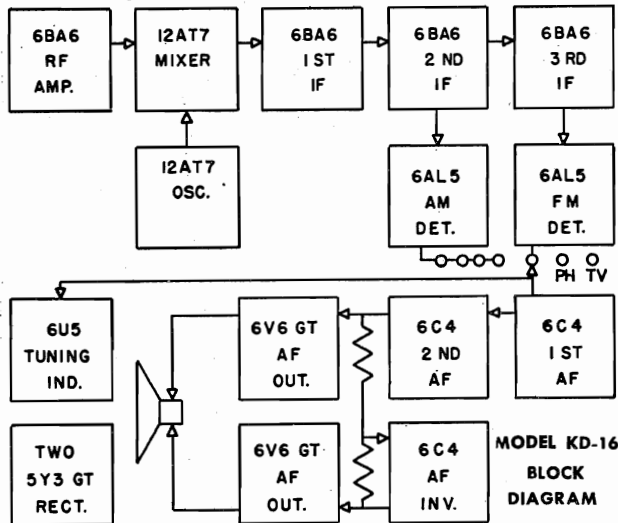
The Midwest Radio & Television receivers have built-in antennae for satisfactory reception of signals on the broadcast band, short wave and FM bands where the location is not unfavorable. In homes or apartments where steel is used extensively, such as for beams and concrete reinforcements or lath, or in rural areas distant from the broadcasting stations an FM doublet must be installed. The straight doublet antenna is directional only on the FM broadcast band so that it need be



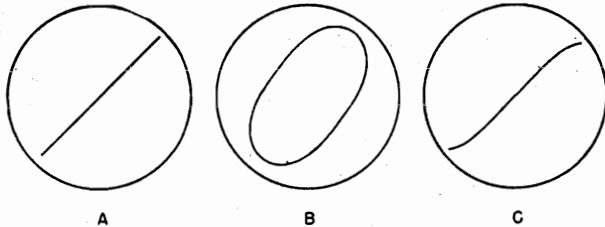
ALIGNMENT

AM IF should be aligned at 456 KC. There are three transformers and six adjustments, the transformers are coupled with less than critical coupling and there is only one peak. Couple the generator into the mixer grid and use either AVC or audio for the output meter.
FM IF should be aligned at 10.7 MC. There are four transformers and eight adjustments, the transformers are over-coupled and must be aligned with a scope and sweep generator.

MODEL TK-16,
Ch. KD-16



1. Connect generator to 3rd IF grid and vertical input of scope to the audio of the receiver at any point where sufficient signal is available and phasing can be properly adjusted.
2. Adjust the top screw for greatest length of straight line. This is the secondary winding; the bottom screw should give improvement in signal level.



A does not have the hook indicating that the sweep generator has a greater deviation than the detector capability.

B shows improper phasing of the horizontal sweep with the audio output of the receiver.

C is preferred because it shows the limits of deviation and you obtain it simply by adjusting the deviation (sweep width) control on the signal generator. Approximately 150 KC is normal.

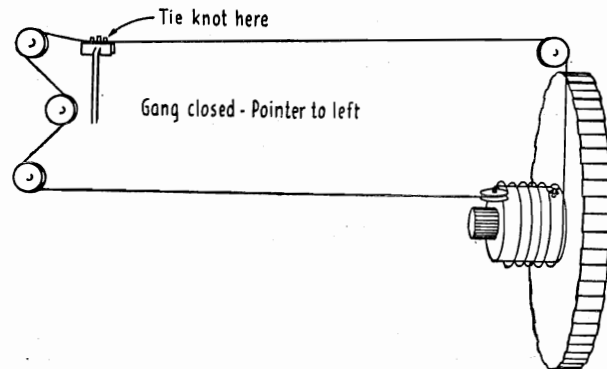
3. Connect generator to 2nd IF grid and adjust the 2nd IF slugs for maximum signal and band width. This you can be sure of by the amount of hook at the ends of the line on the scope. Repeat this procedure for 1st IF grid and mixer grid. Adjust for greatest signal without appreciable loss of band width.
Alternate Method: The IF response of the 1st, 2nd and 3rd transformer may be observed more directly if

you use a crystal detector at the plate of the tube following the transformer and feed the vertical plates of the scope from that point. Feed signal into grid of tube preceding transformer. Use a CW marker at 10.7 to be sure the double peaked response curve straddles the ratio detector response. Observe each stage separately. Discount the transformer in the plate of the tube following the transformer to be aligned and use 470 ohm resistor as plate load.
Notice: Do not use AM or CW signal to peak the FM transformers. Regeneration may result and bandwidth and noise rejection will be poor, although signal strength will increase.

FM RF should be trimmed at 105 MC. There should not be any reason to adjust the low end but if this is necessary it can be done by distorting the FM coils on the tuning gang.

AM RF should be peaked at the high end with the trimmer and at the low end by core adjustment.

Notice: Use as low signal input as possible for readable output indication. Feed signal in from FM RF generator through 150 ohms in each lead to "A-A." Use 400 ohms in lead from AM RF generator and connect to either "A" terminal.

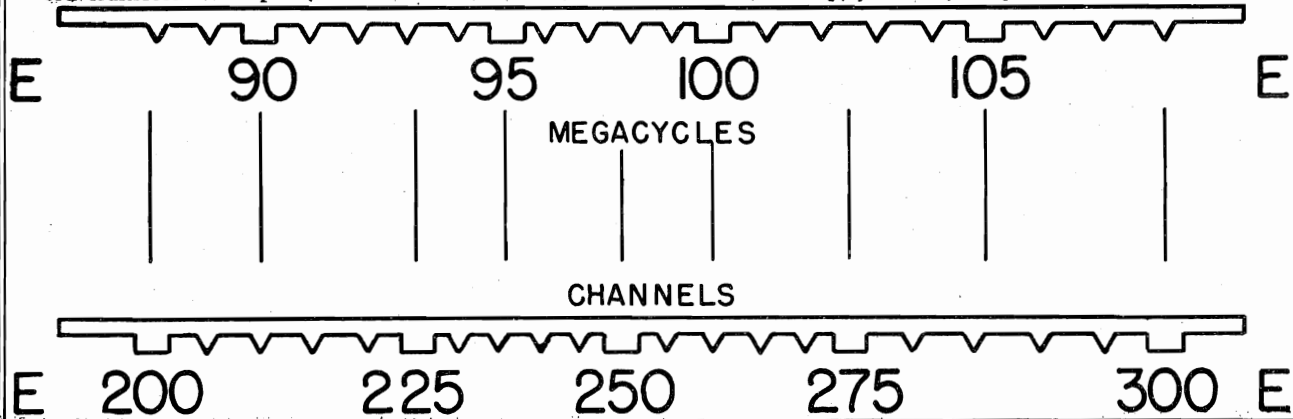


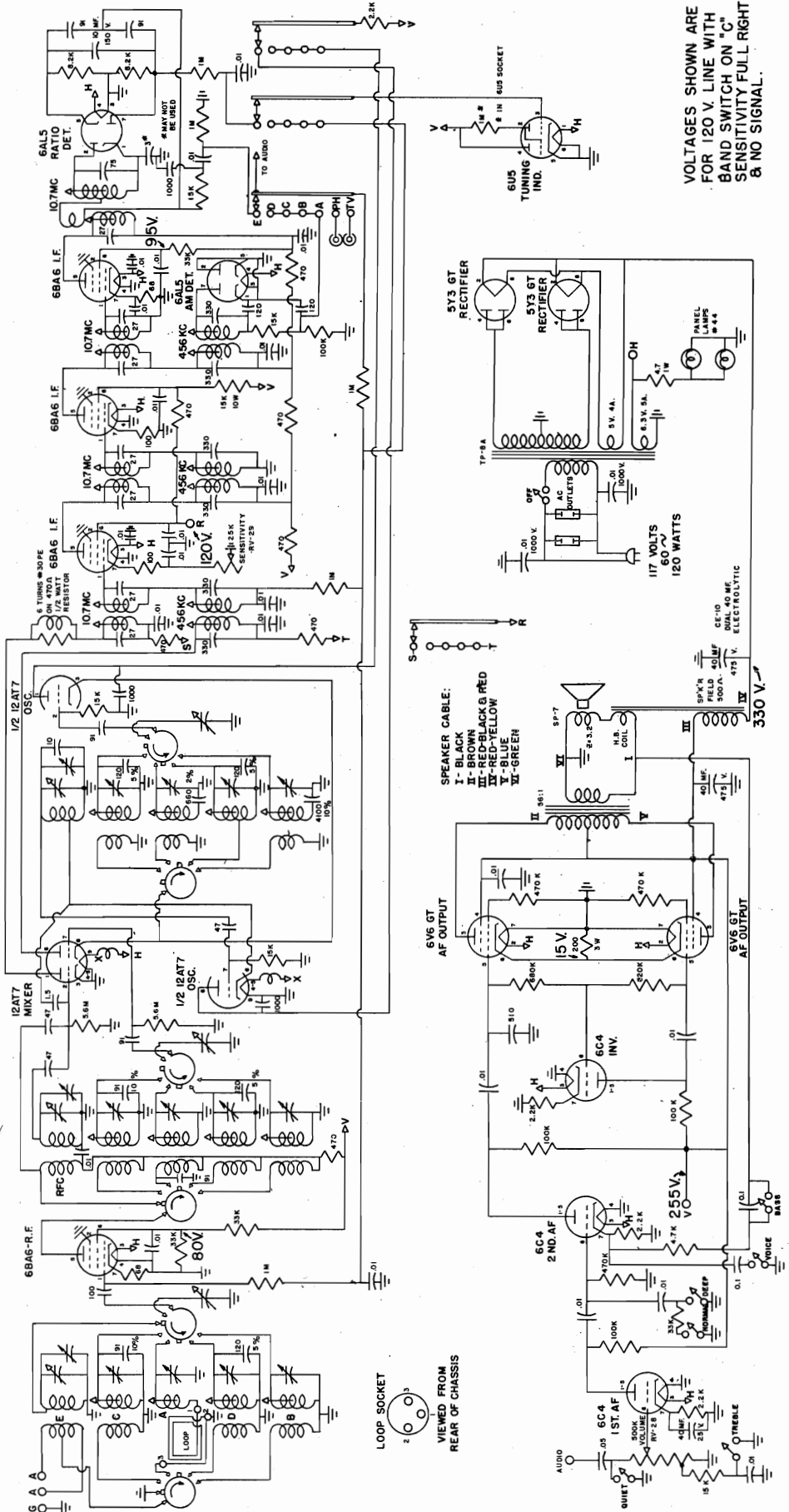
For dial stringing use a light weight dial cord such as Bevin-Wilcox 6-18 Imperial silk cord.

| Radio Band | Coil Adj. | Trimmer Adj. |
|------------|-----------|--------------|
| A | 560 KC | 1500 KC |
| B | 1.6 MC | 4.7 MC |
| C | 5 MC | 10 MC |
| D | 11.5 MC | 22 MC |
| E | ..... | 105 MC |

If replacement parts of identical manufacture and rating are not available for service repairs these should be ordered from Midwest Radio & Television Corporation, giving model number and serial number of the chassis and name of the part.

Repair data for the record changer mechanism is available separately, please specify Model.





VOLTAGES SHOWN ARE
FOR 120 V. LINE WITH
BAND SWITCH ON "C"
SENSITIVITY FULL RIGHT
& NO SIGNAL.

SPEAKER CABLE:
I- BLACK
II- BROWN BLACK & RED
III- RED-YELLOW
IV- BLUE
V- GREEN

CODE 216

MODEL KD-16

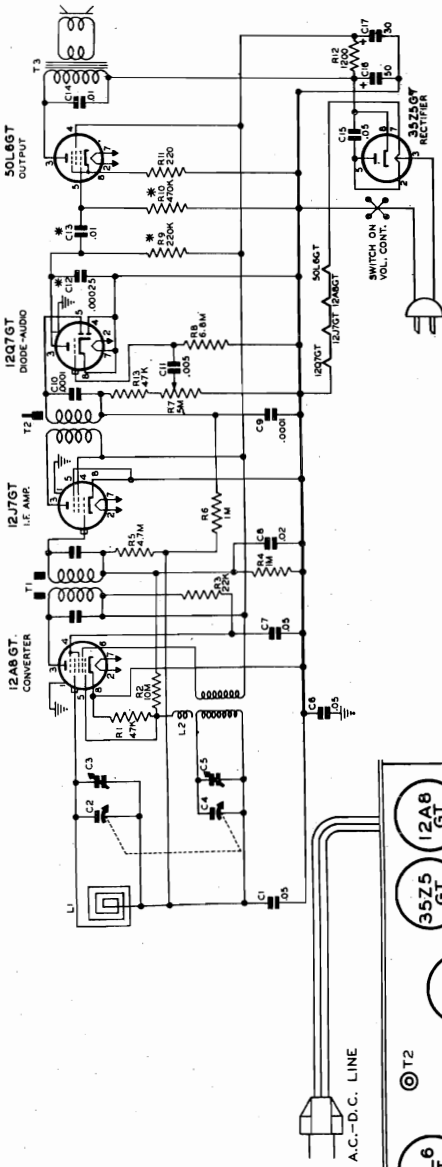
TOLERANCE IS
±.20% UNLESS
INDICATED.

WATTAGE IS 1/2
EXCEPT WHERE
INDICATED.

RESISTANCE IS GIVEN
IN OHMS UNLESS
INDICATED.
K = 1000 OHMS

CAPACITY IS GIVEN
IN MMFD. EXCEPT
WHERE INDICATED.
.01, .05 & 0.1 ARE MFD.

MODELS 1252, 1253,
The Nocturne



SERVICE DATA

Lack of sensitivity and poor tone quality may be due to any one or a combination of causes such as weak or defective tubes or speaker open or grounded bias resistor, bypass condenser, etc. Never attempt to realign set until all other possible sources of trouble have been first thoroughly investigated and definitely proved not to be the cause.

NOTE: IT IS ABSOLUTELY NECESSARY THAT AN ACCURATELY CALIBRATED TEST OSCILLATOR WITH SOME TYPE OF OUTPUT MEASURING DEVICE BE USED WHEN ALIGNING THE RECEIVER AND THAT THE PROCEDURE BE CAREFULLY FOLLOWED, OTHERWISE THE RECEIVER WILL BE INSENSITIVE AND THE DIAL CALIBRATION WILL BE INCORRECT. THE TRIMMERS WILL BE REFERRED TO BY THEIR FUNCTION AS INDICATED ON THE PARTS DIAGRAM.

ALIGNMENT PROCEDURE

| STEP NO. | POSITION OF GANG | SIGNAL GENERAL FREQUENCY | GENERATOR CONNECTION | DUMMY ANTENNA | ADJUSTMENT | TYPE OF ADJUSTMENT |
|----------|------------------|--------------------------|----------------------|-----------------------------------------------------------------------------------|---------------------------|---------------------------|
| 1. | Open | 455 KC. | Rear Gang Terminal | .1 Mfd. | I.F. Slugs | Adjust for Maximum Output |
| 2. | Open | 1620 KC. | Dummy Antenna | 2 Turns of Hookup Wire 6" in Dia. (Place Approx. a Foot from & parallel to loop.) | Front Gang Trimmer | Adjust for Maximum Output |
| 3. | 1400 KC. | Rear Gang Trimmer | | | Adjust for Maximum Output | |
| 4. | 600 KC. | | | | Check Gang Alignment | |

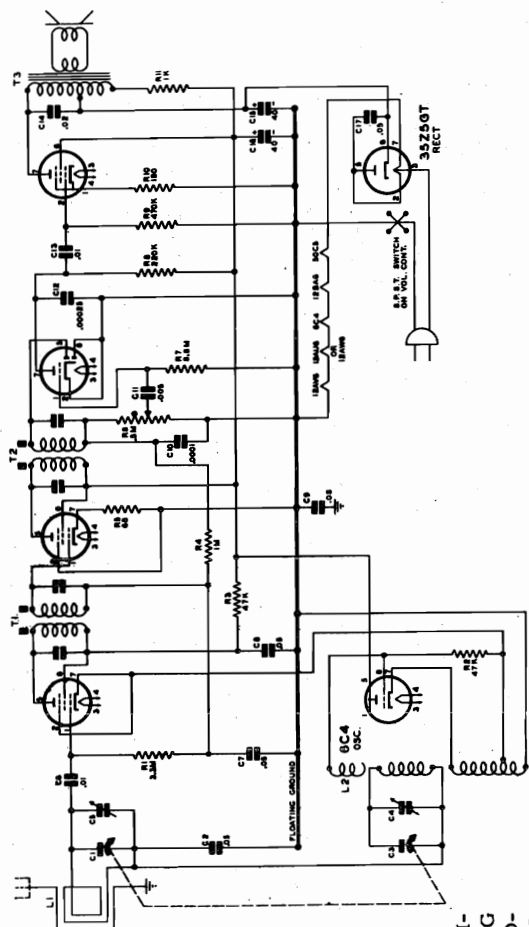
| PART NUMBER | DESCRIPTION |
|-------------|-----------------------------------------------|
| C1, C9, C7 | Capacitor, Paper .05 MFD. 250 V. |
| C8 | Capacitor, Paper .02 MFD. 200 V. |
| C9 | Capacitor, Ceramic .0001 MFD. 500 V. 20% |
| C10 | Capacitor, Ceramic .0001 MFD. 500 V. 10% |
| C11 | Capacitor, Paper .005 MFD. 600 V. |
| *C12 | Capacitor, Ceramic .00025 MFD. 500 V. 20% |
| *C13, C14 | Capacitor, Paper .01 MFD. 400 V. |
| C15 | Capacitor, Paper .05 MFD. 400 V. |
| C16 | Capacitor, Electro- (50 MFD. 150 V. |
| C17 | Capacitor, Electro- (30 MFD. 150 V. |
| R1, R13 | Resistor 47,000 Ohm - 1/2 W. - 20% |
| R2 | Resistor 10 Megohm - 1/2 W. - 20% |
| R3 | Resistor 22,000 Ohm - 1/2 W. - 20% |
| R4, R6 | Resistor 1.0 Megohm - 1/2 W. - 20% |
| R5 | Resistor 4.7 Megohm - 1/2 W. - 20% |
| R7 | Volume Control with On-Off Switch |
| R8 | Resistor 6.8 Megohm - 1/2 W. - 20% |
| *R9 | Resistor 220,000 Ohm - 1/2 W. - 20% |
| *R10 | Resistor 470,000 Ohm - 1/2 W. - 20% |
| R11 | Resistor 220 Ohm - 1/2 W. - 10% |
| R12 | Resistor 1.200 Ohm - 1.0 W. - 10% |
| N-7624 | Speaker, 4" P.M with Output Transformer |
| N-8138 | Coil, Loop Antenna |
| N-7981 | Coil, 1st. I.F. |
| N-8150 | Coil, 2nd. I.F. (Includes C10) or |
| N-7542 | Coil, 2nd I.F. (C10 must be added externally) |
| N-8263 | Coil, Oscillator |

* In some receivers parts indicated with asterisk are replaced by an N-8215 Couplate.

MODELS 1254, 1255,
the Madrigal



NOTE: IT IS ABSOLUTELY NECESSARY THAT AN ACCURATELY CALIBRATED TEST OSCILLATOR WITH SOME TYPE OF OUTPUT MEASURING DEVICE BE USED WHEN ALIGNING THE RECEIVER AND THAT THE PROCEDURE BE CAREFULLY FOLLOWED, OTHERWISE THE RECEIVER WILL BE INSENSITIVE AND THE DIAL CALIBRATION WILL BE INCORRECT. THE TRIMMERS WILL BE REFERRED TO BY THEIR FUNCTION AS INDICATED ON THE PARTS DIAGRAM.

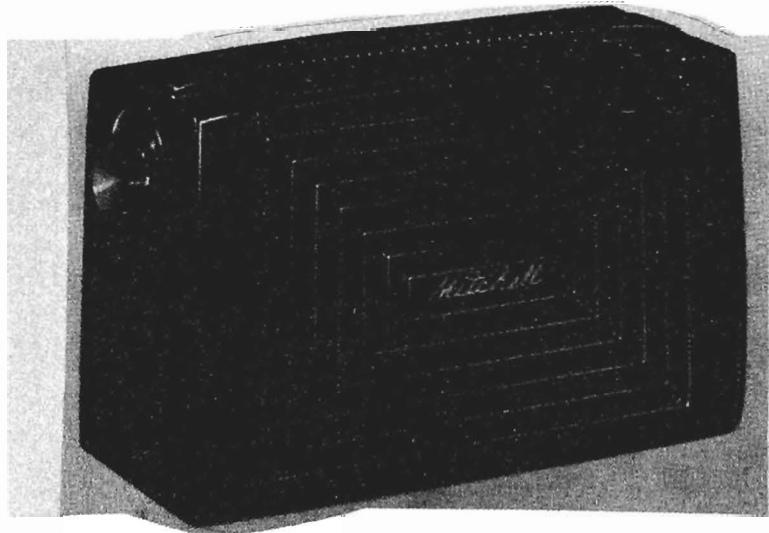


PARTS LIST

| ILLUS. NO. | PART NUMBER | DESCRIPTION |
|------------|-------------|------------------------------------------------|
| C2, C7, C8 | M-1395 | Condenser, Paper .05 MFD. 200 V. |
| C5, C13 | M-1394 | Condenser, Paper .01 MFD. 400 V. |
| C9 | M-8092 | Condenser, Paper .08 MFD. 200 V. |
| C10 | M-6015 | Condenser, Ceramic 100 MMFD. 500 V. 20% |
| C11 | M-4894 | Condenser, Paper .005 MFD. 600 V. |
| C12 | M-6888 | Condenser, Ceramic 250 MMFD. 500 V. 20% |
| C14 | M-1376 | Condenser, Paper .02 MFD. 400 V. |
| C15) | M-5051 | Condenser, Electrolytic (40 MFD. 150 V. |
| C16) | M-1346 | Condenser, Paper .05 MFD. 400 V. |
| R1 | M-4062 | Resistor, Carbon 3.3 Megohm 1/2 W. 20% |
| R2, R8 | M-4068 | Resistor, Carbon 47,000 Ohm 1/2W. 20% |
| R4 | M-1262 | Resistor, Carbon 1.0 Megohm 1/2 W. 20% |
| R5 | M-6485 | Resistor, Carbon 68 Ohm 1/2 W. 10% |
| R6 | M-7984 | Volume Control-500,000 Ohm with Switch |
| R7 | M-4028 | Resistor, Carbon 6.8 Megohm 1/2 W. 20% |
| R8 | M-4026 | Resistor, Carbon 220,000 Ohm 1/2W. 20% |
| R9 | M-4027 | Resistor, Carbon 470,000 Ohm 1/2W. 20% |
| R10 | M-4067 | Resistor, Carbon 180 Ohm 1/2W. 10% |
| R11 | M-3341 | Resistor, Carbon 1,000 Ohm 1/2W. 10% |
| L1 | M-8002 | Coil, Loop Antenna and Cabinet Back Oscillator |
| L2 | M-7982 | Coil, |
| T1, T2 | M-7981 | Coil, 1st. and 2nd. I.F. Transformer |
| T3 | M-8001 | Transformer, Output |
| | M-7980 | Speaker, 5 Inch P.M. |
| | M-6045 | Assembly, Gang Condenser & Pulley |
| | M-8386 | Screen, Flocked - Front Panel |
| | M-8387 | Escutcheon, Dial |
| | M-8392 | Pointer, Dial Indicator |
| | M-1080 | Cord, Line - 6 Ft. Rubber |
| | #314 | Cabinet, Ivory Plastic } Model 1255 |
| | M-8008 | Knob, Ivory Plastic } Only |
| | #315 | Cabinet, Walnut Plastic } Model 1254 |
| | M-8004 | Knob, Walnut Plastic } Only |

ALIGNMENT PROCEDURE

| STEP | TEST RECEIVER DIAL TO | TEST OSCILLATOR FREQUENCY TO | ADJUST TEST OSCILLATOR TO | DUMMY ANTENNA | ADJUSTMENTS |
|------|---------------------------------------------------|------------------------------|-------------------------------------------------------------------|---------------------|-----------------------------------------------------------------------------------------------------------------|
| 1 | Any point where no interfering signal is received | EXACTLY 455 KC | High side to grid of Converter Tube, Low side to common negative. | .05 MMFD CONDENSER | Adjust slugs at top and bottom of 2nd I.F. (T2) and then each of the slugs of the 1st. I.F. for maximum output. |
| 2 | Exactly 1620 KC | Exactly 1620 KC | External Antenna blue lead on loop. | 100 MMFD Condenser. | Adjust 1620 KC cillator trimmer (C4) for maximum output. |
| 3 | Approx. 1400 KC | Approx. 1400 KC | External Antenna blue lead on loop. | 100 MMFD Condenser. | Adjust 1400 KC antenna trimmer for maximum output. |



BATTERY INSTALLATION

BATTERY INSTALLATION: Before installing new batteries or replacing old ones, turn the volume control to the extreme left or "OFF" position.

Attach the connector with the snap-on fasteners to the "B" battery (90 Volt) and insert battery into the left hand side of the battery retaining area of the cabinet back so that the connector faces in the direction of the top of the receiver. Insert the prongs of the other battery connector into the socket of the "A" battery (4-1/2 Volt) and place battery in cabinet back so that the connector faces the outside wall of cabinet.

This receiver will accommodate any of the batteries listed below: (No preference is intended by the order of listing.)

| <u>MANUFACTURER</u> | <u>MANUFACTURER'S TYPE NUMBER</u> | |
|--------------------------------------|-----------------------------------|--------------------|
| | <u>"A" Battery</u> | <u>"B" Battery</u> |
| National Carbon (Eveready) | 746 | 490 |
| General Dry Battery | 3H3 | 132 |
| Ray-O-Vac | P83A | 4390 |
| Burgess Battery | G3 | N-60 |

BATTERY OPERATION

BATTERY OPERATION: To operate this receiver on battery, insert the power cord prongs into the power switch through the two slots provided in the bottom of chassis. These slots are at the right hand edge of chassis as viewed from rear.

TUBE REPLACEMENT

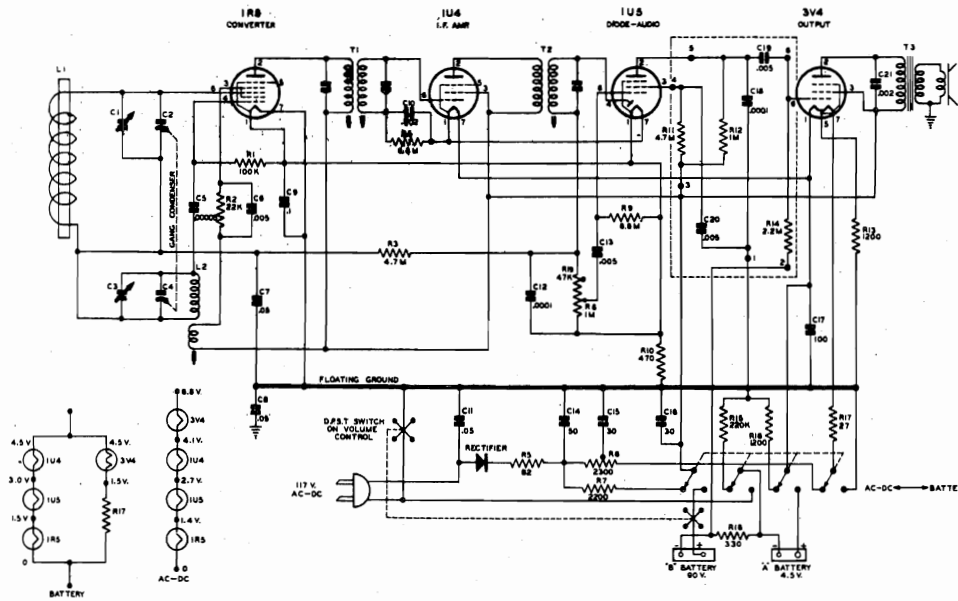
Do not replace tubes or batteries unless switch on the volume control is turned completely off. In case of tube failure be sure to turn the receiver off immediately.

Four tubes (Plus selenium rectifier) are used. Type numbers and locations are shown in the tube diagram label located inside the cabinet. If tubes are removed from their sockets for test or replacement purposes, make certain that the receiver is turned off when replacing the tubes in their proper sockets. Failure to replace tubes in their proper sockets may result in damage to the tube, or to the receiver, or both.

SERVICE DATA

Lack of sensitivity and poor tone quality may be due to any one or a combination of causes such as weak or defective tubes or speaker, open or grounded bias resistor, bypass condenser, etc. Never attempt to realign set until all other possible sources of trouble have been first thoroughly investigated and definitely proved not to be the cause.

NOTE: IT IS ABSOLUTELY NECESSARY THAT AN ACCURATELY CALIBRATED TEST OSCILLATOR WITH SOME TYPE OF OUTPUT MEASURING DEVICE BE USED WHEN ALIGNING THE RECEIVER AND THAT THE PROCEDURE BE CAREFULLY FOLLOWED, OTHERWISE THE RECEIVER WILL BE INSENSITIVE AND THE DIAL CALIBRATION WILL BE INCORRECT. THE TRIMMERS WILL BE REFERRED TO BY THEIR FUNCTION AS INDICATED ON THE PARTS DIAGRAM.



ALIGNMENT PROCEDURE

GENERAL DATA. The alignment of this receiver requires the use of a test oscillator that will cover the frequencies of 455,600,1400 and 1620 KC and an output meter to be connected across the primary or secondary of the output transformer. If possible, all alignments should be made with the volume control on maximum and the test oscillator output as low as possible to prevent the AVC from operating and giving false readings.

ALIGNMENT PROCEDURE CHART

| STEP NO. | POSITION OF GANG | SIGNAL GENERATOR FREQUENCY | GENERATOR CONNECTION | DUMMY ANTENNA | ADJUST* MENT | TYPE OF ADJUSTMENT |
|----------|---------------------------------------------------|----------------------------|------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|-------------------------------|
| 1 | Any point where no interfering signal is received | Exactly 455 KC | High side to grid of 1R5 tube. Low side to common negative | .05 MFD Condenser | Slug at top of 2nd. I.F. (T2) and then each of the slugs of the 1st. I.F. | For Maximum Output. |
| 2 | Exactly 1620 KC | Exactly 1620 KC. | DUMMY | 2 Turns of hookup wire 6" in Diameter. (Place approximately a foot from end of, and in same axis as loop.) | Front Gang Trimmer | For Maximum Output. |
| 3 | Approx. 1400 KC. | Approx. 1400 KC | | | Rear Gang Trimmer | For Maximum Output. |
| 4 | Exactly 600 KC | Exactly 600 KC | | | ANTENNA | Slug in Oscillator Coil. (L2) | For Maximum Output. |
| 5 | | | | | Repeat Steps 2 and 3. | |

PARTS LIST

| SCHEMATIC LOCATION | PART NUMBER | DESCRIPTION |
|--------------------|-------------|------------------------------------------|
| C18 | | (.0001 MFD.) |
| C19, C20 | | (.005 MFD.) |
| R11 | N-8330 | Couplate (4.7 Megohm) |
| R12 | | (1.0 Megohm) |
| R14 | | (2.2 Megohm) |
| C5 | N-6375 | Condenser, Ceramic 50 MMFS. 500 V. |
| C6, C13 | N-4894 | Condenser, Paper .005 MFD. 600 V. |
| C7, C8 | N-1345 | Condenser, Paper .05 MFD. 200 V. |
| C9 | N-1351 | Condenser, Paper .1 MFD. 200 V. |
| C10, C21 | N-6377 | Condenser, Paper .002 MFD. 600 V. |
| C11 | N-1346 | Condenser, Paper .05 MFD. 400 V. |
| C12 | N-6015 | Condenser, Paper 100 MMFD. 500 V. |
| C14 | | (50 MFD. 150 V.) |
| C15 | N-6841 | Condenser, Electrolytic (30 MFD. 150 V.) |
| C16 | | (30 MFD. 150 V.) |
| C17 | | (100 MFD. 25 V.) |
| | N-6681 | Speaker, 4" P.M. |
| L1 | N-8328 | Coil, Loop - Iron Rod Type |
| T1 | N-7981 | Coil, 1st. I.F. |
| T2 | N-8326 | Coil, 2nd. I.F. |
| L2 | N-8327 | Coil, Oscillator |
| T3 | N-8329 | Transformer, Output |
| | N-8331 | Rectifier, Selenium |
| | N-5951 | Switch, Power Changeover |

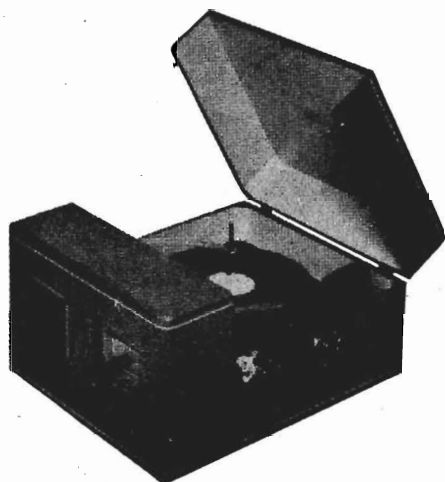
PARTS LIST

| SCHEMATIC LOCATION | PART NUMBER | DESCRIPTION |
|--------------------|-------------|---------------------------------------------|
| R1 | N-1973 | Resistor 100,000 Ohm 1/2W. 10% |
| R2 | N-6012 | Resistor 22,000 Ohm 1/2W. 10% |
| R3 | N-4061 | Resistor 4.7 Megohm 1/2W. 20% |
| R4, R9 | N-4028 | Resistor 6.8 Megohm 1/2W. 20% |
| R5 | N-4023 | Resistor 82 Ohm 2.0W. 10% |
| R6 | N-8333 | Resistor 2,300 Ohm 5.6W. 5% (Center Tapped) |

PARTS LIST

| SCHEMATIC LOCATION | PART NUMBER | DESCRIPTION |
|--------------------|-------------|---------------------------------------|
| R7 | N-4896 | Resistor 2,200 Ohm 1/2W. 10% |
| R8 | N-8332 | Volume Control with Switch 1.0 Megohm |
| R10 | N-1066 | Resistor 470 Ohm 1/2W. 10% |
| R13, R16 | N-6793 | Resistor 1,200 Ohm 1/2W. 10% |
| R15 | N-4026 | Resistor 220,000 Ohm 1/2W. 20% |
| R17 | N-6792 | Resistor 27 Ohm 1/2W. 10% |
| R18 | N-4420 | Resistor 330 Ohm 1/2W. 10% |

N-8381



Sensitivity (.05 watt output with Hazeltine test loop)
 350 Microvolt per meter average.

Power Output 1.1 watts max. .7 watts 10% distortion.

Loud Speaker 5" PM dynamic 1.47 oz. Alnico 5 magnet, voice coil impedance 3.2 ohms at 400 cycles

Tube Complement 1 - 12SA7 Mixer
 1 - 12SK7 I.F. Amplifier
 1 - 12SQ7 Det. & A.F.
 1 - 50L6 Power Amp.
 1 - 35Z5 Rectifier
 1 - No. 47 Dial Lamp

Record Changer Three speed intermix. (10" and 12")

ELECTRICAL SPECIFICATIONS

Power Supply 105 to 125 volts A.C. 60 cycle. 50 watts with record player operating.

Frequency Range 535 to 1620 KC

Intermediate Frequency 455 KC

Selectivity 40 KC broad at 1000 times signal, 1000 KC

SPECIAL INSTRUCTIONS

REMOVAL OF RADIO CHASSIS

Remove two screws holding record changer. Lift record changer and move back, tilting at the same time. Remove changer power cord and pick up lead.

Remove two wood screws holding back board. This will expose the antenna. Remove antenna plug.
 Remove two wood screws holding back of chassis.
 Remove two nuts holding front panel. Chassis may now be removed.

ALIGNMENT PROCEDURE

The following equipment is required for aligning: A signal generator which will provide an accurately calibrated signal at the indicated test frequencies; an output indicating meter; a non-metallic screwdriver.

Radiation Loop: 2-turn loop, 6 inches in diameter.

Conditions for Alignment:

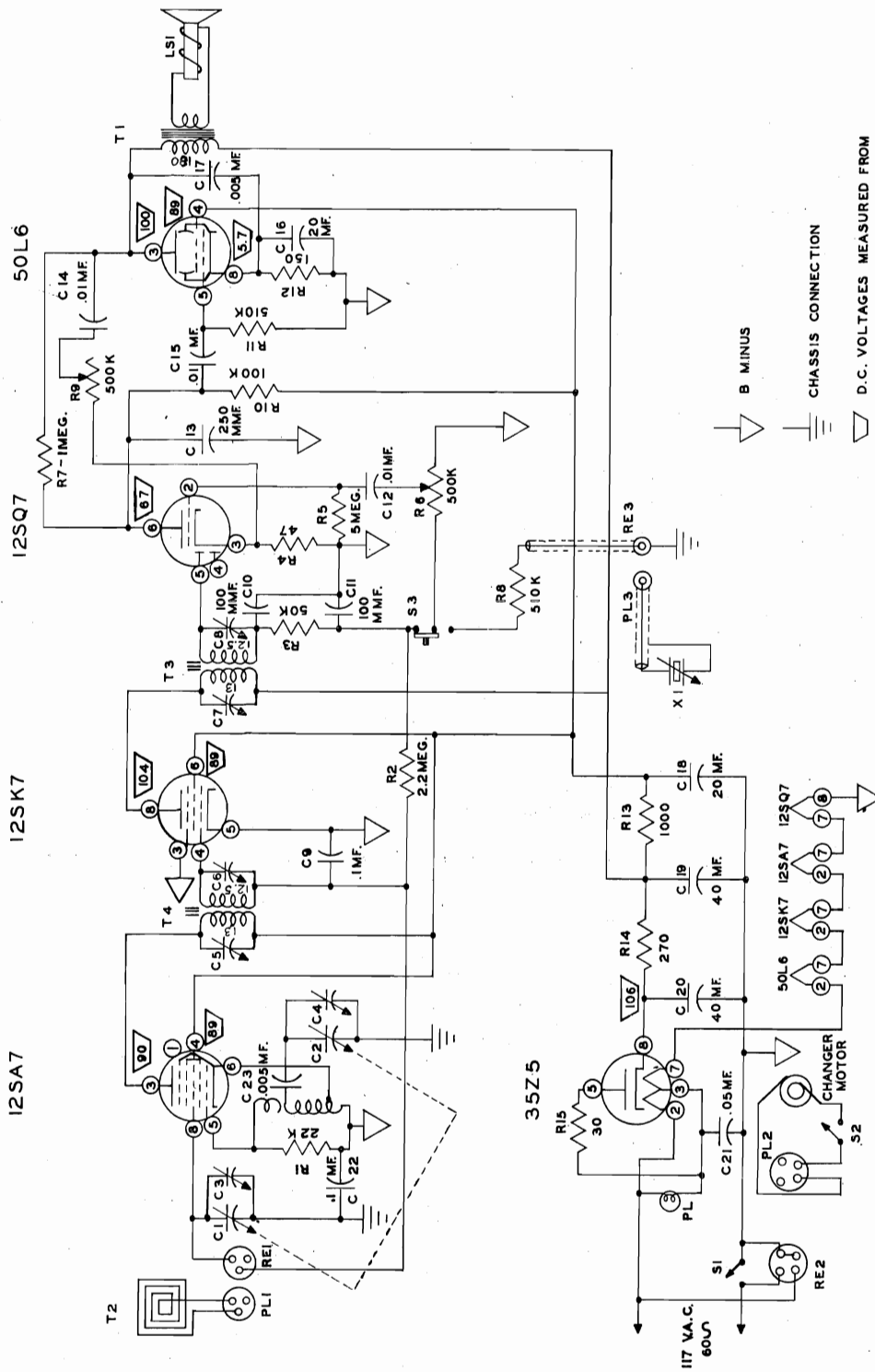
Tone - Treble

Volume - Maximum

Selector Switch - "Radio" position

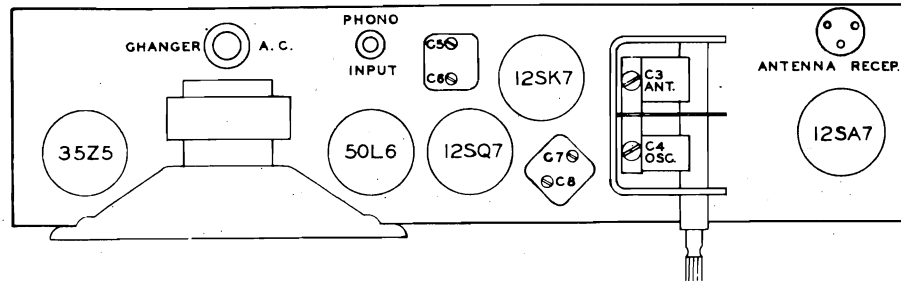
Test loop coupled loosely to receiver by spacing - receiver loop in same position as it will be with chassis in cabinet.

| <u>SIGNAL GENERATOR COUPLING</u> | <u>SIGNAL GENERATOR FREQUENCY</u> | <u>RADIO DIAL SETTING</u> | <u>OUTPUT METER</u> | <u>REMARKS</u> | <u>ADJUST FOR MAXIMUM OUTPUT</u> |
|----------------------------------|-----------------------------------|---------------------------|---------------------|------------------------------------------------------|----------------------------------|
| LOOP | 455 KC | Low End of Band | Across Voice Coil | Short out osc. tuning gang section C-2; compress C-3 | C-8, C-7, C-6, C-5 |
| LOOP | 1620 KC | High End of Band | " | Remove short across C-2 | C-4 |
| LOOP | 1400 KC | Point of Maximum Output | " | Set pointer to 140 on dial | C-3 |
| LOOP | 600 KC | Point of Maximum Output | " | Knife C-1 plates for maximum output | |
| LOOP | 1400 KC | 1400 | " | Recheck Alignment | C-3 if necessary |



B MINUS
 CHASSIS CONNECTION
 D.C. VOLTAGES MEASURED FROM INDICATED POINTS TO B MINUS WITH V.T.V.M.
 NUMBERS NEXT TO COIL WINDINGS INDICATE D.C. RESISTANCES OF WINDINGS.

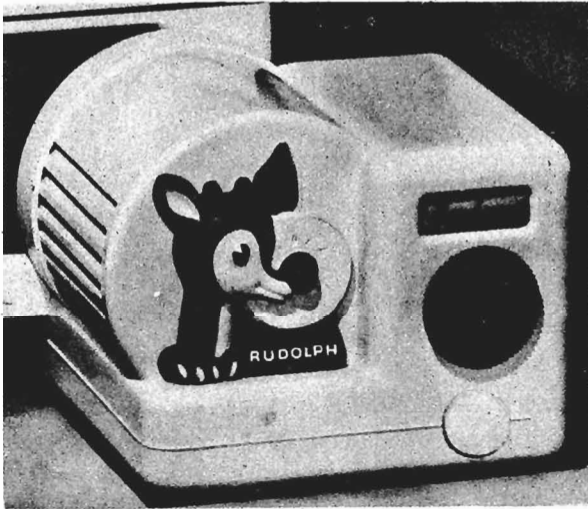
LOCATION OF TUBES



REPLACEMENT PARTS LIST

| SCHEMATIC LOCATION | PART NO. | DESCRIPTION | SCHEMATIC LOCATION | PART NO. | DESCRIPTION |
|--------------------|----------|------------------------------------------------------|----------------------|----------|--------------------------------------------------|
| RESISTORS | | | | | |
| R1 | 517 | 22,000 OHM ½ Watt | R5, C12 | 813 | .01 MF 5 Meg OHM Common Terminal Connection |
| R2 | 615 | 2.2 Meg OHM ½ Watt | R10, C15 | 814 | .01 MF 100,000 OHM Common Terminal Connection |
| R3 | | See Capristors | | | |
| R4 | 520 | 47 OHM ½ Watt | TRANSFORMERS | | |
| R5 | | See Capristors | T1 | 1201 | Output Transformer |
| R6 | 401 | 500,000 OHM Vol. Control with Switch | T3, T4 | 1402 | I.F. Transformers |
| R7 | 516 | 1 Meg OHM ½ Watt | MISCELLANEOUS | | |
| R8, R11 | 502 | 510,000 OHM ½ Watt | S1 | 401 | On-Off Switch on Volume Control |
| R9 | 408 | 500,000 OHM Tone Control | S2 | 407 | Motor Switch on Changer Assembly |
| R10 | | See Capristors | S3 | 1892 | Radio-Phono Slide Switch |
| R12 | 505 | 150 OHM ½ Watt | PL1 | 307A | Loop Antenna Plug |
| R13 | 607 | 1000 OHM 1 Watt | PL2 | 307 | Changer A.C. Plug |
| R14 | 602 | 270 OHM 1 Watt | PL3 | 305 | Pickup Plug |
| R15 | 534 | 30 Ohm 1/2 W. | RE1 | 106A | Loop Antenna Receptacle |
| CAPACITORS | | | | | |
| C1, C2 | | Tuning Gang and Trimmer | RE2 | 106 | Changer A.C. Receptacle |
| C3, C4 | 1004A | Assembly | RE3 | 104 | Pickup Receptacle |
| C5, C6 | | Trimmer Condensors in | X1 | 2534 | Pickup Cartridge EV-334 |
| C7, C8 | | I.F. Cans. | | 62-349 | .0023 Needle |
| C9, C22 | 804 | .1 MFD. 200 V. | LS1 - T1 | 2607 | 5" Speaker and Output Transformer |
| C10, C11 | | See Capristors | | 2108 | Portable Carrying Case |
| C12 | | See Capristors | | 2411 | Knob |
| C13 | 817 | 250 MMF. Ceramic | T2 | 1512 | Loop Antenna |
| C14 | 825 | .01 MF. Ceramic | | 1736A | Dial Pointer |
| C15 | | See Capristors | | 2307 | Dial Bezel |
| C17 | 824 | .005 MF. Ceramic | | 2127C | Front Panel |
| C18, C19 | 1003 | 40-40-20 MFD/150 Volts | | 1722B | Dial |
| C20, C16 | | 20 MFD/25 Volts | | | |
| C21 | 803A | .05 400 V. Tubular | | | |
| CAPRISTORS | | | | | |
| R3, C10 | 811 | 100 MMF. 50,000 OHM 100 MMF Dual Shunt Connection | | | |

MODELS 05GCB-1540A, Rudolph;
05GCB-1541A, Lone Ranger



MODEL 05GCB-1540A "RUDOLPH"



MODEL 05GCB-1541A "LONE RANGER"

ALIGNMENT PROCEDURE AND RECEIVER STAGE SENSITIVITIES

ALIGNMENT: Should it become necessary at any time to check the alignment of this receiver, proceed as follows:
(1) Connect the high side of 455 KC Signal Generator through a .1 mf capacitor to the stator lug on the rear section of the variable capacitor; the ground lead to one of the lugs on the line on-off switch. Use Isolation Transformer if available. If not, connect a capacitor in series with low side of signal generator and power lug on switch. Connect a suitable output meter across the speaker voice coil. Turn the Volume and Tuning controls to their extreme clockwise positions.

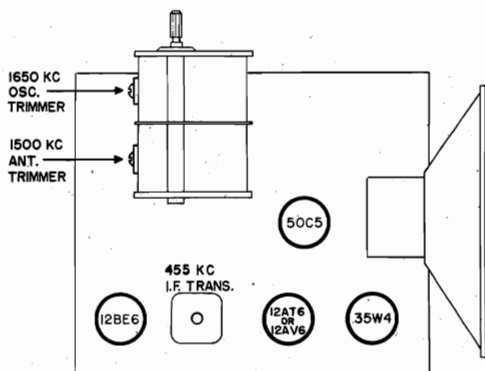
(2) Adjust the trimmers located at the top and bottom of the

I-F transformer for maximum indication on the output meter.

(3) Connect the Signal Generator high side to the antenna lug through a 47 mmfd capacitor; the low side remains as in step (1). Set the Signal Generator to 1650 KC.

(4) With Variable Capacitor set at the minimum capacity position, tune in the 1650 KC signal by means of the Oscillator Trimmer on the Variable Capacitor (front section).

(5) Set the Signal Generator to 1500 KC and turn the Tuning Control so that this frequency is received. Adjust the Antenna Trimmer on the Variable Capacitor (rear section) for maximum output. No other adjustments are necessary.



TRIMMER AND TUBE LOCATION DIAGRAM

ELECTRICAL SPECIFICATIONS

- Frequency Range 540 to 1650 KC
- Intermediate Freq. 455 KC
- Selectivity At 1000 Kilocycles, 22 KC at 10 X signal
- Sensitivity 400 Microvolts per meter average for .05 watt output.
- Power Output 620 Milliwatts undistorted
- Loud Speaker 4" P.M., V.C. impedance 3.2 ohms
- Tube Complement 12BE6 Converter
12AT6 or 12AV6 Detector, AVC, audio amplifier
50C5 Power Amplifier
35W4 Rectifier
#47 Pilot Light

MODELS 05GCB-1540A,
Rudolph; 05GCB-1541A,
Lone Ranger

The signal source must be an accurately calibrated signal generator capable of supplying R.F. signals modulated 30% with a 400-cycle audio signal. A 400-cycle source is necessary for the audio measurements.

The table below lists the sensitivity at various points. All measurements are based on an output of 50 milliwatts. This

may be measured by disconnecting the speaker voice coil and substituting a 3.2 ohm, 5 watt resistor across the secondary winding of the output transformer. A reading of .4 volts AC across this resistor will be equivalent to a 50-milliwatt output with the speaker connected. Variations of plus or minus 25% are usually permissible. Volume control at maximum for all adjustments.

| SIGNAL GENERATOR | | | | DIAL SETTING | ADJUST FOR MAXIMUM OUTPUT | INPUT FOR 50-MILLIWATT OUTPUT |
|------------------|------------------|------------------------------------------------|------------------------|-------------------------------------|---------------------------------------|-------------------------------|
| Frequency | Coupling | Connection to Radio | Ground Connection | | | |
| 455 KC | .1 mfd condenser | Stator lug Var. Capacitor (rear section) | Lug on Power Switch | Variable Condenser fully open | Trimmers on I.F. transformer | 3000 microvolts |
| 1650 KC | 47 mmf condenser | To lug of Ant. Hank | Lug on Power Switch | Variable Condenser fully open | Oscillator Trimmer (front section) | ----- |
| 1500 KC | 47 mmf condenser | To lug of Ant. Hank | Lug on Power Switch | 1500 KC | Ant. trimmer (front section) | ----- |
| 400 cycles | .1 mfd condenser | High side of volume control | Lug on Power Switch | ----- | ----- | .03 volts |

REPLACEMENT PARTS LIST

| Ref. No. | Part No. | Description |
|----------|----------|-------------|
|----------|----------|-------------|

CAPACITORS

| | | |
|------------------|------------|--------------------------------------|
| C1 | D-4.108-12 | 1500 mmf ±20% Ceramic |
| C2A, C2B, C3, C4 | 2.225 | Variable Condenser |
| C5, C9 | D-3.103-11 | .05 × 400 volts, Paper |
| C6 | C-4.109-12 | 47 mmf ±20% Ceramic |
| C7 | D-3.103-4 | .005 × 600 volts, Paper Tubular |
| C8 | D-3.103-23 | .1 × 400 volts, Paper Tubular |
| C10 | 5.425 | Electrolytic, 25 mfd, 25 volts |
| C11 | D-3.103-7 | .01 × 400 volts, Paper Tubular |
| C12A, C12B | C-5.436-1 | Electrolytic, 50-50 mfd., 150 V.D.C. |

RESISTORS

| | | |
|-----|-------------|----------------------------------|
| R4 | C-8.201-10 | 2 Meg. Volume Control and Switch |
| R10 | D-7.103-31 | 47 ohm, 2 watt, 20% |
| R1 | D-7.100-62 | 12 K ohms, ¼ watt, 10% |
| R2 | D-7.100-178 | 6.8 meg ohm, ¼ watt, 20% |
| R3 | D-7.100-185 | 10 meg ohm, ½ watt, 20% |
| R5 | D-7.100-115 | 220 K ohms, ¼ watt, 20% |
| R6 | D-7.100-125 | 390 K ohms, ¼ watt, 20% |
| R7 | D-7.101-204 | 150 ohms, ½ watt, 20% |
| R8 | D-7.102-27 | 1200 ohms, 1 watt, 10% |
| R9 | D-7.102-215 | 22 ohms, 1 watt, 20% |

SPEAKER

| | | |
|----|------------|------------------------------------|
| T4 | B-30.332-1 | Speaker, 4" P.M., with Transformer |
|----|------------|------------------------------------|

COILS

| | | |
|----|-----------|----------------------------|
| T1 | B-1.534 | Antenna Coil |
| T2 | C-1.402-4 | Oscillator Coil |
| T3 | C-1.445-2 | I.F. Transformer, 455 K.C. |

MODELS 05GCB-1540A,
Rudolph; 05GCB-1541A,
Lone Ranger

DIAL PARTS

Tuning Knob
Volume Knob

C-13.133
B-13.102

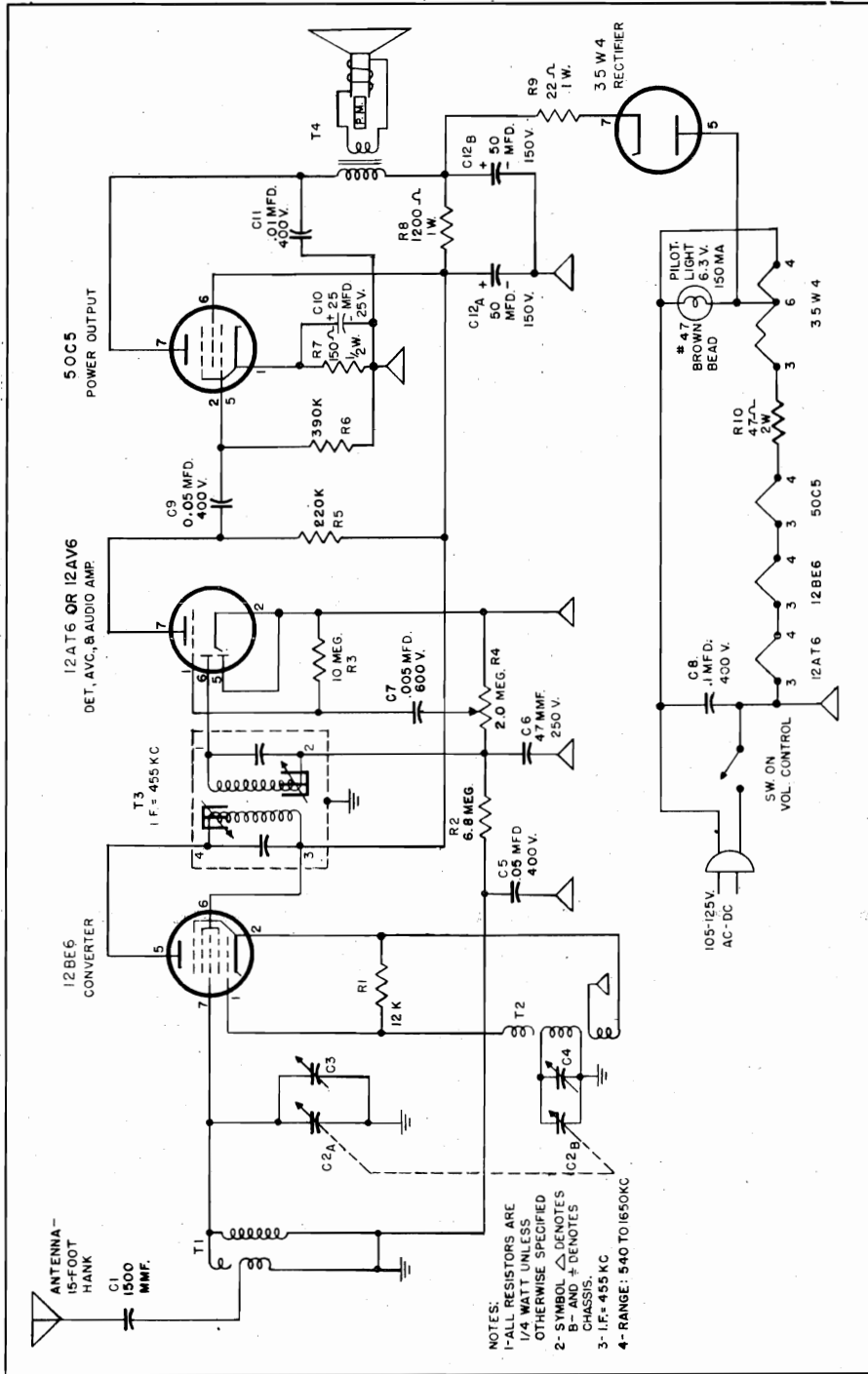
MISCELLANEOUS

Cabinet
Back Cover
Antenna Hank, 15 Ft.
Socket, Min. 7 Pin
Line Cord, 6 Ft., U.L.

D-12.418
C-29.442
B-24.235
C-20.206

#47 Pilot Light Bulb, 6.3 volts
Front Plaque, Rudolph
Front Plaque, Lone Ranger

C-13.214
C-13.215





NEVER LEAVE A DISCHARGED BATTERY IN THE SET. After a dry cell is completely exhausted the zinc outer case may be eaten through and the electrolyte inside may leak out. This fluid is very corrosive and can ruin the metal parts of the set if neglected.

BATTERY REQUIREMENTS. The Model 1061A operates from a battery pack which delivers 7½ volts and 90 volts. Wards #33 pack should be used. This battery can be obtained from any Wards Retail Store or Mail Order House. Other batteries which can be used are: RCA VS019, General 60A6F6/5, Sears 6404, Burgess F6A60, Philco P841A, Ray-o-vac B6460 and Western AB994. To install the battery in the set merely place it in position in the bottom of the cabinet and plug the battery cable into the socket in the top of the battery.

ELECTRICAL SPECIFICATIONS

POWER SUPPLY: 105-125 Volts AC or DC and #33 Battery

FREQUENCY RANGE: 540 to 1640 KC

INTERMEDIATE FREQUENCY: 455 KC

SENSITIVITY (For .05 Watt Output)
150 Microvolts per Meter

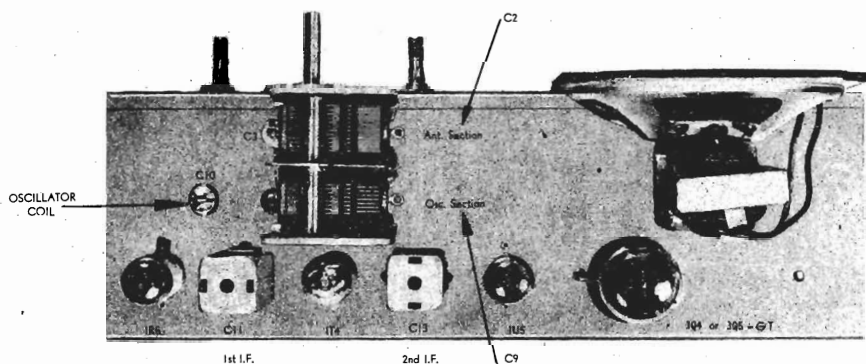
POWER OUTPUT: .190 Watt 10% Distortion

TUBE COMPLEMENT:

- 1—IR5 Converter
- 1—IT4 I.F. Amplifier
- 1—IU5 Det. Avc. 1st AF.
- 1—3Q5 or 3Q4 Power Amplifier

LOUD SPEAKER: 4" PM Dynamic 3.2 Voice Coil Impedance

TUBE AND TRIMMER CONDENSER LAYOUT



NOTE:

- C12 is located on bottom of 1st I.F. Transformer.
- C14 is located on bottom of 2nd I.F. Transformer.

ALIGNMENT PROCEDURE

Volume Control—Maximum All Adjustments.

Allow Chassis and Signal Generator to "Heat Up" for several Minutes.

The equipment in column at right is required for aligning:

Signal Generator which will provide an accurately calibrated signal at the test frequencies as listed.

Output Indicating Meter; Non-Metallic Screwdriver.

Dummy Antennas—.1 mf.

MODEL 05GHM-1061A

| SIGNAL GENERATOR | | Variable Condenser Setting | ADJUST TRIMMERS TO MAXIMUM See Trimmer Illustration | RESISTORS | | | | |
|----------------------|-----------------------|----------------------------------|-----------------------------------------------------------|----------------------|---------------------|----------|-------|----------|
| Frequency Setting | Coupling Capacitor | | | Ground Connection | Connection to Radio | Part No. | Value | |
| 455 KC | . | CONTROL GRID OF IR5 | TO B-BUS BAR | CLOSED | R8-9 | 5.6 " | PR7 | 1/2 Watt |
| 540 KC | . | CONTROL GRID OF IR5 | TO B-BUS BAR | CLOSED | R10 | 2.2 " | PR8 | 1/2 " |
| 1640 KC | . | CONTROL GRID OF IR5 | TO B-BUS BAR | WIDE OPEN | R11 | 15 K | PR9 | 1/2 " |
| 1400 KC | . | CONTROL GRID OF IR5 | TO B-BUS BAR | TO 1400 KC SIGNAL | R12-R13* | 1 K | PR10 | 1/2 " |
| | | | | | R14 | 2.5 Meg. | PR11 | 1/2 " |
| | | | | | R16 | 1 Meg. | PR12 | 1/2 " |
| | | | | | R17 | 25 OHM | PR13 | 1 " |
| | | | | | R18 | 3000 " | PR14 | 1 " |
| | | | | | R19 | 470 " | PR15 | 1/2 " |
| | | | | | R20 | 2500 " | PR16 | 10 " |
| | | | | | R21-R23 | 360 " | PR17 | 1/2 " |
| | | | | | R22 | 510 " | PR18 | 1/2 " |

NOTE: Resistors Marked By * Are Used in Earlier Production Only

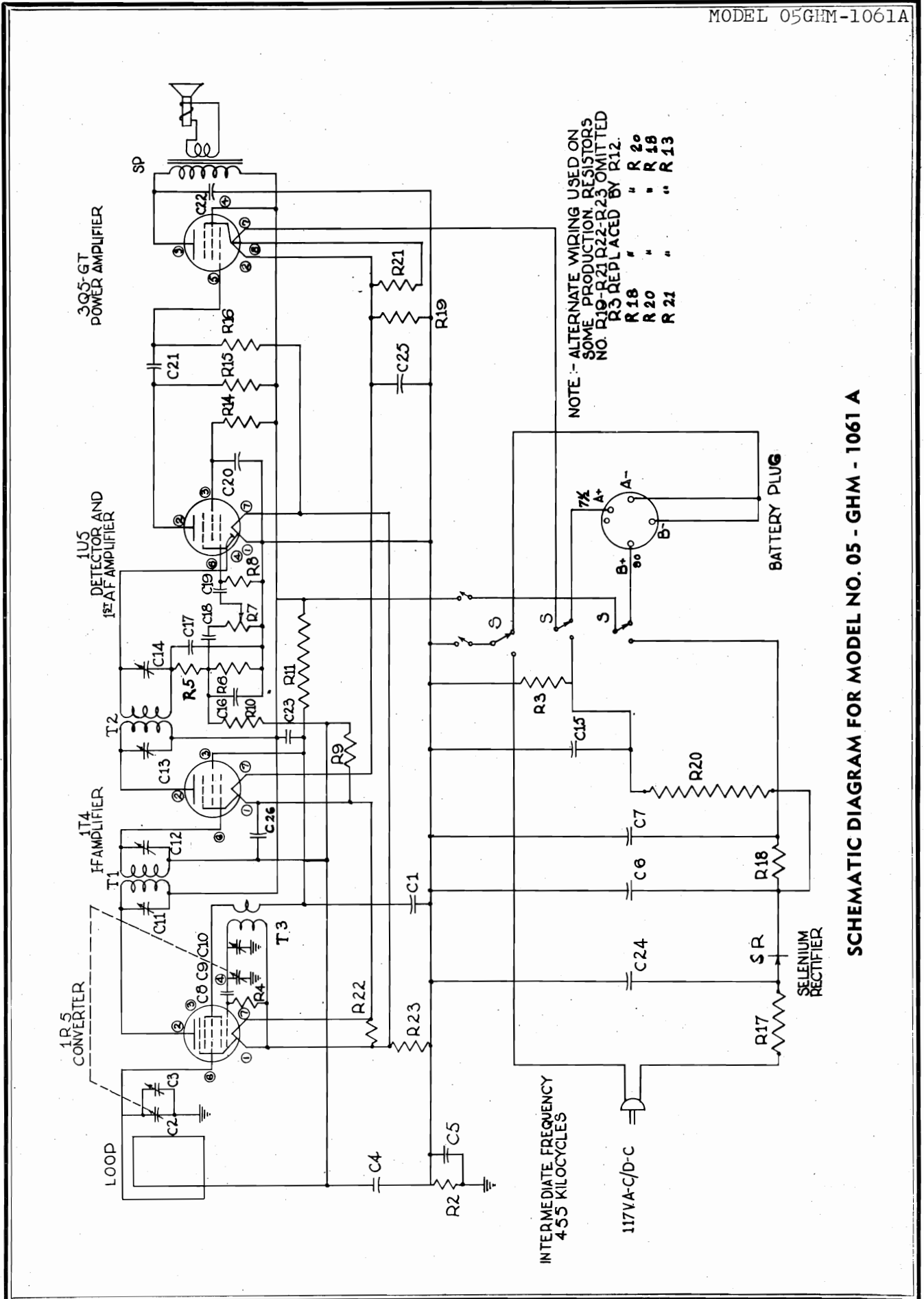
| SIGNAL GENERATOR | | Variable Condenser Setting | ADJUST TRIMMERS TO MAXIMUM See Trimmer Illustration | RESISTORS | | | | |
|----------------------|-----------------------|----------------------------------|-----------------------------------------------------------|----------------------|---------------------|----------|-------|----------|
| Frequency Setting | Coupling Capacitor | | | Ground Connection | Connection to Radio | Part No. | Value | |
| | | | | | R8-9 | 5.6 " | PR7 | 1/2 Watt |
| | | | | | R10 | 2.2 " | PR8 | 1/2 " |
| | | | | | R11 | 15 K | PR9 | 1/2 " |
| | | | | | R12-R13* | 1 K | PR10 | 1/2 " |
| | | | | | R14 | 2.5 Meg. | PR11 | 1/2 " |
| | | | | | R16 | 1 Meg. | PR12 | 1/2 " |
| | | | | | R17 | 25 OHM | PR13 | 1 " |
| | | | | | R18 | 3000 " | PR14 | 1 " |
| | | | | | R19 | 470 " | PR15 | 1/2 " |
| | | | | | R20 | 2500 " | PR16 | 10 " |
| | | | | | R21-R23 | 360 " | PR17 | 1/2 " |
| | | | | | R22 | 510 " | PR18 | 1/2 " |

MISCELLANEOUS
 4" Speaker with Output Trans.
 Selenium Rectifier, 100 Mil.
 I.F. Transformer
 I.F. Trans. Mounting Clip
 Oscillator Coil
 Switch, "Electric-Battery"
 Socket, Tube, Miniature
 Socket, Tube, Octal
 Dial, Tuning
 Knob, "AC-DC-Battery" or "Volume"
 Specify Push on Knob or Set Screw Knob
 Loop Antenna
 Grill Cloth, Plastic
 Cabinet-Leatherette Covered
 Line Cord with Plug
 Battery Plug with Leads

**REPEAT PROCEDURE
PARTS LIST**

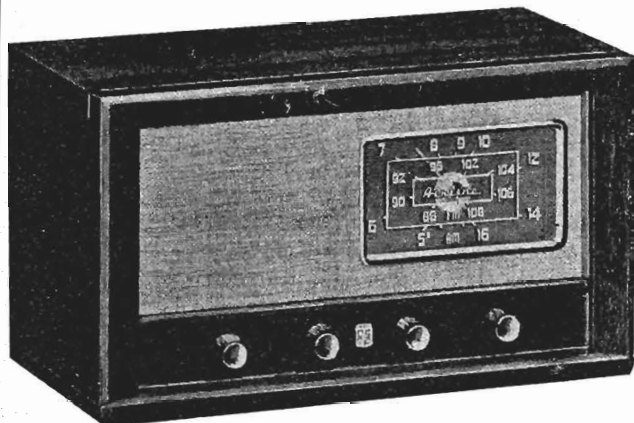
WHEN ORDERING PART, STATE MODEL NO. OF RADIO AND PART NO.

| Ref. No. | Part No. | Description | Ref. No. | Part No. | Description |
|-----------------|----------|-------------------------------------------------------------------------------|----------|----------|--------------------------------------|
| C1-20-23 26 | PC1 | CONDENSER .05-150 V. | C16-C17 | PC6 | 100 MMF-150 V. |
| C2-C3 C9-C10 | PM1 | 2 Gang Var. Condenser | C18-C19 | PC7 | .005-150 V. |
| C4 | PC2 | .1-150 V. | C21 | PC8 | .01-150 V. |
| C5 | PC3 | .2-200 V. | C22 | PC9 | .006-150 V. |
| C6-C7 C15 | PC4 | 50 MFD-150 V. (C6-C7) 200 MFD-25 V. (C15) 3 Section Filter Condenser | C24 | PC10 | .05-400 V. |
| C8 | PC5 | 50 MMF-150 V. | C25 | PC11 | 100 MFD-25 V. |
| C11-C12 | ..... | 1st I.F. Trimmers Part of T-1 | R2-R15 | PR1 | RESISTORS 470 K — 1/2 Watt |
| C13-C14 | ..... | 2nd I.F. Trimmers Part of T-2 | R3 | PR2 | 1800 OHM — 1/2 " |
| | | | R4 | PR3 | 100 K — 1/2 " |
| | | | R5 | PR4 | 47 K — 1/2 " |
| | | | R6 | PR5 | 560 K — 1/2 " |
| | | | R7 | PR6 | 2 Meg. Vol. Control With Switch |



SCHEMATIC DIAGRAM FOR MODEL NO. 05 - GHM - 1061 A

MODEL 05WG-1813A

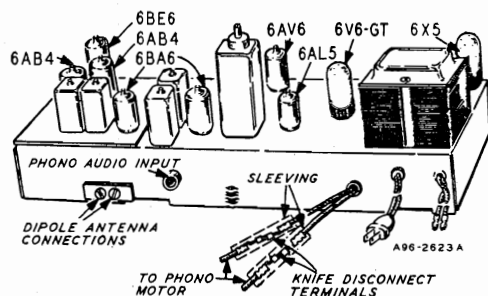


GENERAL DESCRIPTION

This is a two band, eight tube (plus rectifier tube) AM and FM receiver. Controls are provided at the front of the cabinet for tuning, volume, tone and band or phono selection. A phono input socket is provided at the rear of the receiver to which a record player may be connected. The I-F stages use high gain miniature type tubes. Air Wave Aerials are provided for the FM and Broadcast bands. Features include, a grounded grid R-F amplifier stage on the FM band, compensator circuits to prevent oscillator drift, automatic volume control, beam power output stage, PM dynamic loud speaker and an electrostatic shield in the power transformer to reduce power line noise.

ELECTRICAL SPECIFICATIONS

- Power Supply.....105-125 volts AC 50-60 cycles, 40 watts.
- Frequency Ranges.....Broadcast 540-1600 KC
Frequency Modulation 88-108 MC
- Intermediate Frequency...AM—455 KC
FM—10.7 MC
- Selectivity.....AM—45 KC broad at 1000 times signal, measured at 1000 KC
I.F. FM—200 KC broad at 2 times down
I.F. FM—950 KC broad at 200 times down
- AM Sensitivity.....(For .5 watt output with external antenna) 25 microvolts average
- FM Sensitivity.....(For .5 watt output) 25 microvolts average
- Power Output.....1.9 watts maximum
0.8 watts 10% distortion
- Loud Speaker.....6" PM Dynamic
- Voice Coil Impedance.....3.2 ohms 400 cycles



- Tube and Dial Lamp Complement**
- 1 6BE6 AM Converter & FM Osc.
 - 1 6BA6 1st I-F Amplifier
 - 1 6BA6 2nd I-F Amplifier
 - 1 6AL5 FM Discriminator
 - 1 6AV6 Audio Amplifier, AM 2nd Detector and AVC
 - 1 6V6GT Audio Output
 - 1 6X5GT Rectifier
 - 1 6AB4 R-F Amplifier
 - 1 6AB4 Mixer
 - 1 No. 47 Dial Lamp

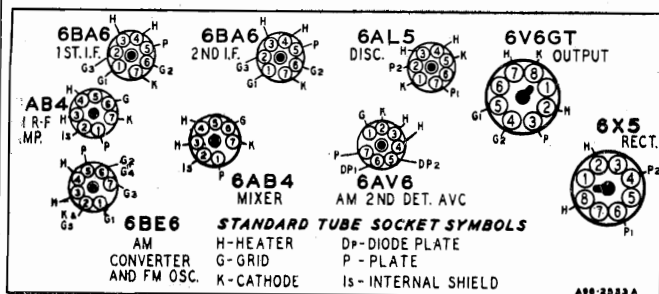
TUBE SOCKET VOLTAGES

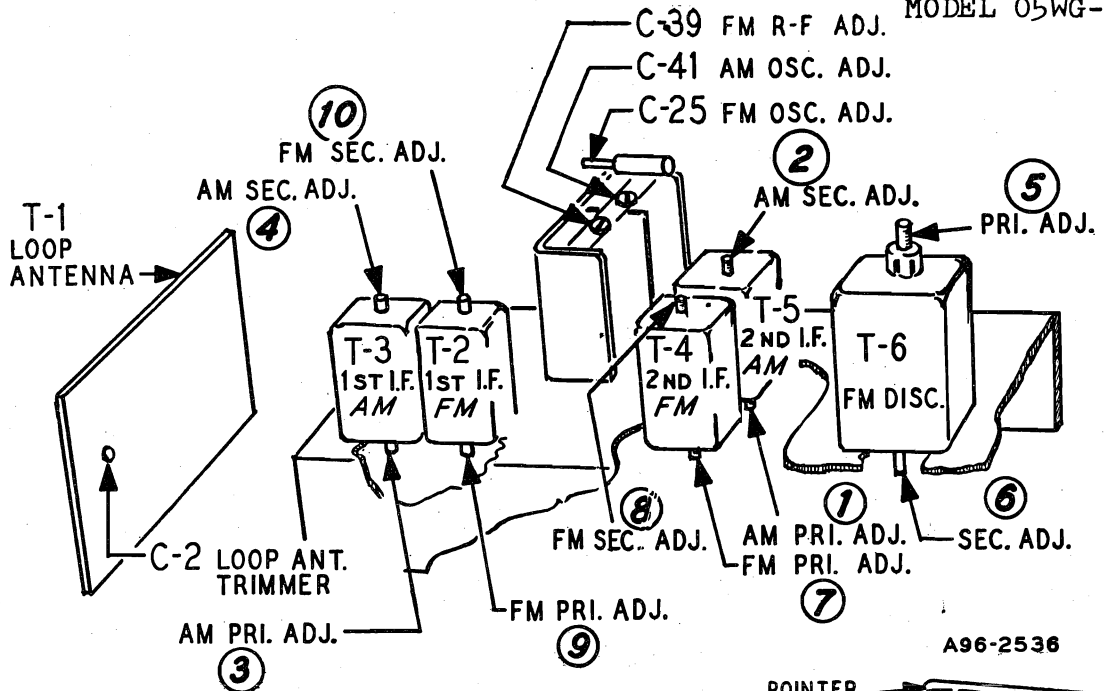
Socket voltages are shown on the schematic diagram at the tube socket terminals. All voltages are between the socket terminal and chassis ground. Plate, screen and cathode voltages were taken with a 1000 ohm-per-volt meter with a 300 volt scale used for plate and screen voltages. Audio grid voltages were read with a vacuum tube volt-meter.

Conditions of measurement are:

- Line voltage117 Volts AC
- Signal InputNone

A variation of $\pm 10\%$ is usually permissible.

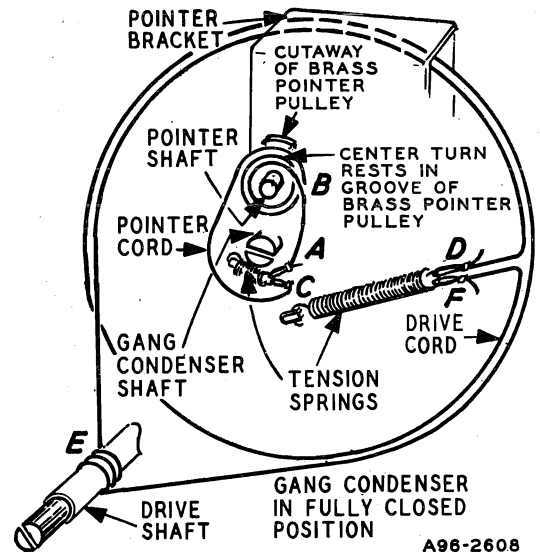




DRIVE CORD REPLACEMENTS

POINTER CORD

Install the cord as shown in the illustration making sure that the center turn of the three turns rests in the groove of the brass pointer pulley.



DIAL CORD

Install the cord as shown in the illustration, winding three turns counterclockwise around the drive shaft with the turns progressing away from the chassis. After completing the installation rotate the drive shaft a few turns to take up the slack in the cord.

ALIGNMENT PROCEDURES

AM STAGES

The following is required for aligning:
 An All Wave Signal Generator Which Will Provide an Accurately Calibrated Signal at the Test Frequencies as Listed.
 Output Indicating Meter, Non-Metallic Screwdriver, Dummy Antennas — .1 mf, and 50mmf.

Volume Control Maximum all Adjustments.
 Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.
 Allow Chassis and Signal Generator to "Heat Up" for Several Minutes.

| SIGNAL GENERATOR | | | | GANG CONDENSER SETTING | ADJUST | ADJUST FOR |
|-------------------|--------------------------------------------|-----------------------|-------------------|--------------------------------------------------------------------|--------------------------------|----------------|
| FREQUENCY SETTING | CONNECT GENERATOR OUTPUT TO | THROUGH DUMMY ANTENNA | CONNECT GROUND TO | | | |
| 455 KC | Control Grid 1st 6BA6 Pin No. 1 | .1 mf | Chassis Base | Rotor Fully Open | 2nd I.F. Pri. (1) and Sec. (2) | Maximum Output |
| 455 KC | Control Grid 6BE6 Pin No. 7 1st Det. | .1 mf | Chassis Base | Rotor Fully Open | 1st I.F. Pri. (3) and Sec. (4) | Maximum Output |
| 455 KC | Control Grid 6BE6 Pin No. 7 | .1 mf | Chassis Base | Rotor Fully Open | 2nd I-F Pri. (1) and Sec. (2) | Maximum Output |
| 1620 KC | Control Grid 6BE6 Pin No. 7 | .1 mf | Chassis Base | Rotor Fully Open | Oscillator C-41 | Maximum Output |
| 1400 KC | External Antenna Terminal | 50 mmf | Chassis Base | Turn Rotor to Max. Output. Set Pointer to 1400 KC See Note A | Antenna C-2 | Maximum Output |

NOTE A—If the pointer is not at 1400 KC on the dial, reset pointer to the 1400 KC mark on the dial scale.

MODEL 05WG-1813A

FM STAGES

The following is required for aligning:

An accurately calibrated signal generator providing unmodulated signals at the test frequencies listed below.

Non-metallic screwdriver.

Dummy Antennas and I-F Loading Resistor—2500 mmf, 300 ohms

Zero center scale DC vacuum tube voltmeter having a range of approximately 3 volts.

(If a zero center scale meter is not available, a standard scale vacuum tube voltmeter may be used by reversing the meter connections for negative readings).

Allow chassis and signal generator to "Heat Up" for several minutes.

| SIGNAL GENERATOR | | | THROUGH DUMMY ANTENNA | BAND SWITCH SETTING | GANG CONDENSER SETTING | ADJUST | ADJUST FOR |
|------------------|-------------------|-----------------------------------------------------------|-----------------------|---------------------|------------------------|-----------------------------------------------------------------------------------------------------------------|--------------------|
| | FREQUENCY SETTING | CONNECT GENERATOR OUTPUT TO | | | | | |
| Discriminator | 10.7 MC | 6BA6 2nd I-F Pin 1 and Chassis | 2500 mmf | FM | Rotor Fully Open | Disc. Pri. (5) Note A | Maximum Deflection |
| | 10.7 MC | 6BA6 2nd I-F Pin 1 and Chassis | 2500 mmf | FM | Rotor Fully Open | Disc. Sec. (6) Note B | |
| I-F | 10.7 MC Note C | 6BA6 1st I-F Pin 1 and Chassis | 2500 mmf | FM | Rotor Fully Open | 2nd I-F Pri. (7) Sec. (8) Note D | Maximum Deflection |
| Discriminator | 10.7 MC | 6BA6 1st I-F Pin 1 and Chassis | 2500 mmf | FM | Rotor Fully Open | Disc. Pri. (5) Note D | Maximum Deflection |
| I-F | 10.7 MC | Junction C-32A & B (Dual 100 mmf cond.) And chassis | 2500 mmf | FM | Rotor Fully Open | 1st I-F Pri. (9) & Sec. (10) 2nd I-F Pri. (7) & Sec. (8) Disc. Pri. (5) In Order Shown Note D | Maximum Deflection |
| | 10.7 MC | Same as above | 2500 mmf | FM | Rotor Fully Open | Disc. Sec. (6) Note B | |

RECHECK I-F ADJUSTMENTS IN ORDER GIVEN

| | | | | | | | |
|------------|-------|--------------------------------------------------------------------------------------------|----------|----|---------------------------------|-----------|--------------------|
| Oscillator | 108.5 | Disconnect hank antenna and connect generator to dipole terminals with resistor in series. | 300 ohms | FM | Rotor Fully Open | Osc. C-25 | Maximum Deflection |
| Antenna | 104.5 | Same as above | 300 ohms | FM | Tune rotor for max. AVC voltage | Ant. C-39 | Maximum Deflection |

RECHECK ANTENNA & OSC. ADJUSTMENTS IN ORDER GIVEN

FM ALIGNMENT NOTES

NOTE A—The zero center scale DC vacuum tube voltmeter is to be connected between chassis ground and the AVC line. A signal of .1 volt must be fed into the receiver for this adjustment.
Note output voltage on the zero center DC vacuum tube voltmeter.

NOTE B—Disconnect zero center DC vacuum tube voltmeter from AVC and connect it at the audio takeoff point at the

27 K ohm resistor (R-10) and its junction with the terminal strip. Adjust for zero voltage indication.

NOTE C—AM I-F coils must be aligned before attempting to align the FM I-F coils.

NOTE D—Connect zero center DC vacuum tube voltmeter as in Note A. Adjust input to give same output on the zero center DC vacuum tube voltmeter as in Note A.

REPLACEMENT PARTS LIST

| Ref. No. | Part No. | Description | Qty. Used In Set |
|------------------|----------|-----------------------------|------------------|
| RESISTORS | | | |
| | | Ohms Watts | |
| R-1 | B85470 | 47 0.5 Carbon..... | 1 |
| R-2 | B85102 | 1000 0.5 Carbon..... | 4 |
| R-3 | | | |
| R-6 | | | |
| R-9 | | | |
| R-4 | B84680 | 68 0.5 Carbon..... | 2 |
| R-8 | | | |
| R-5 | B84682 | 6800 0.5 Carbon..... | 3 |
| R-12 | | | |
| R-13 | | | |
| R-7 | B85473 | 47 K 0.5 Carbon..... | 2 |
| R-25 | | | |
| R-10 | B85273 | 27 K 0.5 Carbon..... | 1 |
| R-11 | 43X233 | 3.6 0.5 Wirewound | 1 |
| R-14 | B85104 | 100 K 0.5 Carbon..... | 2 |
| R-16 | | | |
| R-15 | B85223 | 22 K 0.5 Carbon..... | 1 |
| R-17 | B84221 | 220 0.5 Carbon..... | 1 |

| | | | | | |
|------|--------|---------|-------------------------|-------------|---|
| R-18 | B85474 | 470 K | 0.5 | Carbon..... | 4 |
| R-19 | | | | | |
| R-24 | | | | | |
| R-26 | | | | | |
| R-20 | B85153 | 15 K | 0.5 | Carbon..... | 1 |
| R-21 | 36X385 | .5 meg. | Volume Control & Switch | | 1 |
| R-23 | 40X312 | .5 meg. | Tone Control | | 1 |
| R-27 | B85106 | 10 meg. | .05 | Carbon..... | 1 |
| R-28 | D84821 | 820 | 2.0 | Carbon..... | 1 |
| R-29 | B85105 | 1 meg. | 0.5 | Carbon..... | 1 |
| R-30 | B84271 | 270 | 0.5 | Carbon..... | 1 |
| R-31 | B84274 | 270 K | 0.5 | Carbon..... | 1 |

TRANSFORMERS AND COILS

| | | | |
|-----|--------|--------------------------------|---|
| L-1 | 35A5 | Insulated Choke | 1 |
| L-2 | 9A2103 | Parasitic Choke Assembly | 1 |
| L-3 | 35A9 | Insulated Choke | 1 |
| L-4 | 35A8 | Insulated Choke | 1 |
| T-1 | 9A2182 | "B" Range Loop Antenna | 1 |
| T-2 | 9A2060 | 1st I-F Trans. (FM) | 1 |

| Ref. No. | Part No. | Description | Qty. Used in Set |
|----------|----------|---------------------------|------------------|
| T-3 | 9A2062 | 1st I-F Trans. (AM) | 1 |
| T-4 | 9A2061 | 2nd I-F Trans. (FM) | 1 |
| T-5 | 9A2063 | 2nd I-F Trans. (AM) | 1 |
| T-6 | 9A2161 | Discriminator Transformer | 1 |
| T-7 | 9A2065 | Oscillator Coil (AM) | 1 |
| T-8 | 9A2067 | Oscillator Coil (FM) | 1 |
| T-9 | 51X152 | Output Transformer | 1 |
| T-11 | 53X291 | Power Transformer | 1 |
| T-12 | 9A2066 | Antenna Coil (FM) | 1 |

CAPACITORS

| | | | | | | |
|---------------------------------------------------------------------------|--------|------------------------------|---|------------------------------------|----------------------|---|
| C-1 | 14A214 | Gang Condenser Assembly | 1 | | | |
| C-2 | 17A256 | 2-24 mmf Trimmer | 1 | | | |
| C-3 | 47X559 | 130 mmf Ceramic | 1 | | | |
| C-4 } C-5 } C-9 } C-10 } C-11 } C-17 } C-27 } C-43 } | 47X507 | 5000 mmf Ceramic | 8 | | | |
| C-6 } C-7 } | | | | Part of T-2 (1st I-F Trans. FM) | | |
| C-8 | | | | Part of T-3 (1st I-F Trans. AM) | | |
| C-12 } C-13 } | | | | Part of T-5 (2nd I-F Trans. AM) | | |
| C-14 } C-15 } | | | | Part of T-4 (2nd I-F Trans. FM) | | |
| C-16A } C-16B } | | | | 47X112 | 50-50 mmf Dual Mica | 1 |
| C-18 | | | | Part of T-6 (Discriminator Trans.) | | |
| C-19 | | | | 47X492 | 2700 mmf Molded Mica | 1 |
| C-20 } C-35 } | 47X468 | 220 mmf Ceramic | 2 | | | |
| C-21 | 45X361 | 5 mf 100 V Dry Electrolytic | 1 | | | |
| C-22 } C-42 } | 47X557 | 2.2 mmf Ceramic | 2 | | | |
| C-23 | 47X558 | 30 mmf Ceramic | 1 | | | |
| C-24 | 47X516 | 20 mmf Ceramic | 1 | | | |
| C-25 | 17A255 | 1-8 mmf Trimmer | 1 | | | |
| C-26 } C-44 } | B66503 | .05 mf 200 V Tubular | 2 | | | |
| C-28A } C-28B } C-28C } | 45X360 | 20 mf 20 V | 1 | | | |
| | | 40 mf 150 V Dry Electrolytic | | | | |
| | | 40 mf 200 V | | | | |
| C-29 | H66102 | .001 mf 800 V Tubular | 1 | | | |
| C-30 | 47X470 | 330 mmf Molded Mica | 1 | | | |
| C-31 | 47X508 | 500 mmf Ceramic | 1 | | | |
| C-32A } C-32B } | 76X4 | 100 mmf Dual Ceramic | 1 | | | |

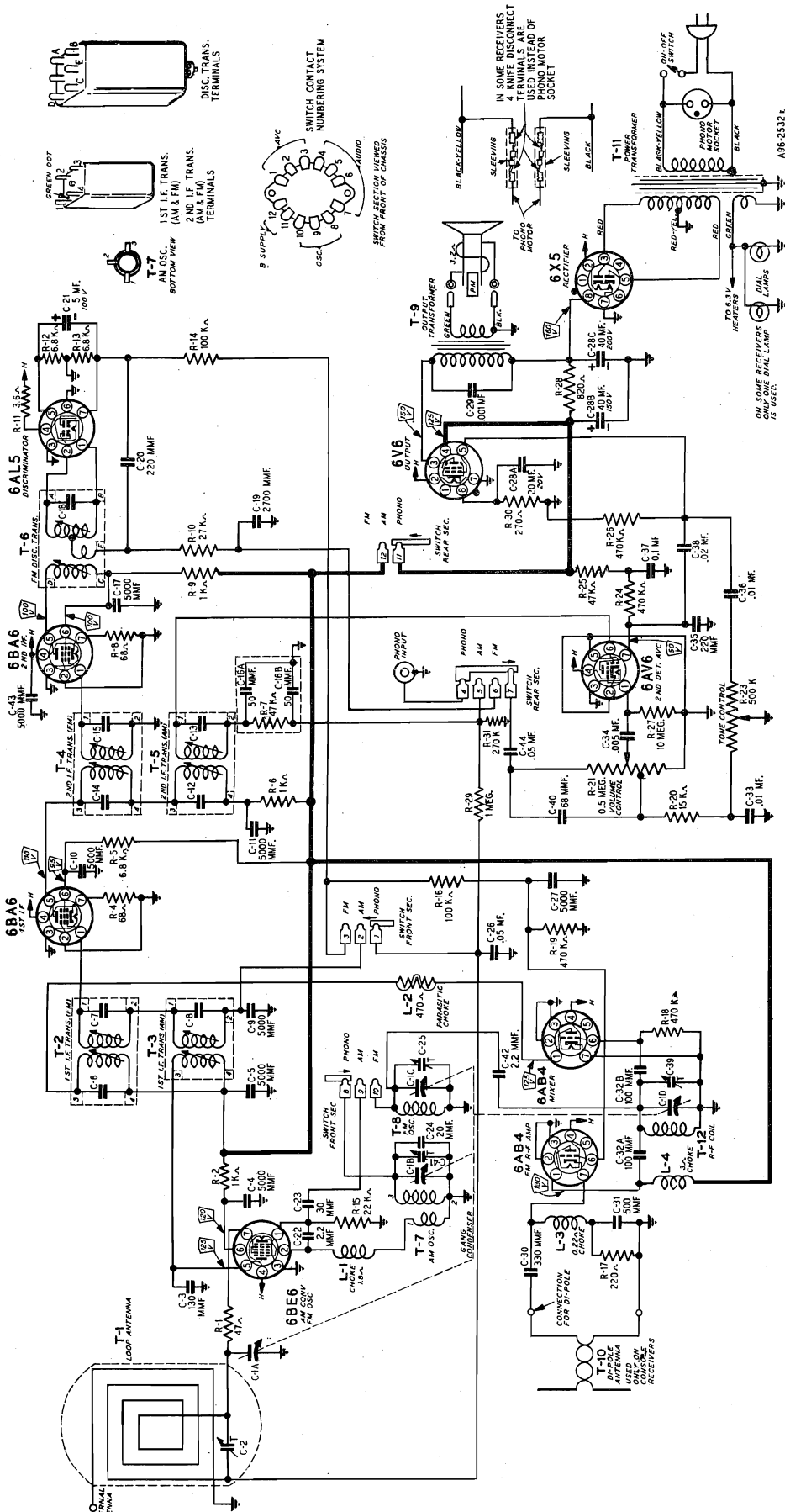
| Ref. No. | Part No. | Description | Qty. Used in Set |
|------------------|------------------------------|-----------------------|------------------|
| C-33 | B66203 | .02 mf 200 V Tubular | 1 |
| C-34 | D66502 | .005 mf 400 V Tubular | 1 |
| C-36 | B66103 | .01 mf 200 V Tubular | 1 |
| C-37 | D66104 | .1 mf 400 V Tubular | 1 |
| C-38 | D66203 | .02 mf 400 V Tubular | 1 |
| C-39 } C-41 } | Part of C-1 (Gang Condenser) | | |
| C-40 | 47X471 | 68 mmf Ceramic | 1 |

DIAL AND DRIVE ASSEMBLY

| | | |
|---------|--------------------------------------|---|
| 58X745 | Dial Glass | 1 |
| 15X253 | Pointer | 1 |
| 7A103 | No. 47 Pilot Light Bulb | 1 |
| 7A226 | Pilot Light Socket Assembly | 1 |
| 26X514 | Drive Shaft | 1 |
| 28X113 | Drive Cord Tension Spring | 1 |
| 10X74 | Drive Cord Assembly | 1 |
| 19X192 | "C" Washer (Mtg. Drive Shaft) | 2 |
| 28X292 | Snap Button | 4 |
| 6X66 | Rubber Grommet (Mtg. Gang Condenser) | 3 |
| 25A1079 | Pointer Shaft & Pulley Assembly | 1 |
| 28X524 | Pointer Cord Tension Spring | 1 |
| 25X1672 | Pointer Bracket | 1 |
| 10X76 | Pointer Cord Assembly | 1 |

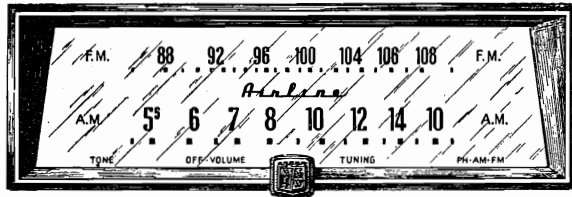
MISCELLANEOUS

| | | |
|--------|------------------------------------|---|
| 12A498 | 6" P.M. Speaker | 1 |
| 3A435 | Tube Socket—Octal (8 prong) Molded | 2 |
| 3A426 | Tube Socket (1st 6BA6) | 1 |
| 3A427 | Tube Socket | 3 |
| 3A439 | Tube Socket (Miniature) | 3 |
| 3A305 | Phono Socket—Single Pin Tip | 1 |
| 2A394 | Band Change Switch | 1 |
| 13X546 | Line Cord and Plug Assembly | 1 |
| 4X1120 | Escutcheon | 1 |
| 10A757 | Knob | 4 |



Phono Motor Sockets Not Used In Mantel Receivers.

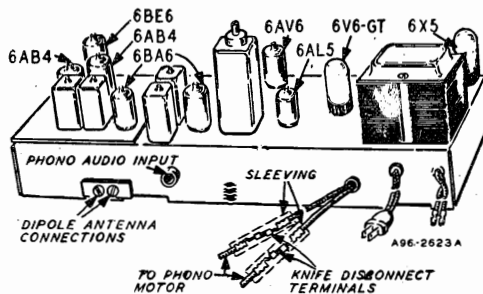
NOTE—In later production C-33 is .02 mf



GENERAL DESCRIPTION

This is a two band, eight tube (plus rectifier tube) AM and FM receiver with automatic record changer. The I-F stages use high gain miniature type tubes. Built-in Air Wave Aerials are provided for the FM and Broadcast bands. Features include, a grounded grid R-F amplifier stage on the FM band, compensator circuits to prevent oscillator drift, automatic volume control, beam power output stage, PM dynamic loud speaker and an electrostatic shield in the power transformer to reduce power line noise.

The receiver and record changer are housed in a console combination cabinet with controls provided for tuning, volume, tone and band or phono selection.



DRIVE CORD REPLACEMENT

DIAL POINTER CORD

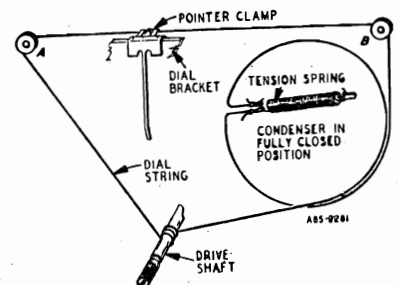
Use a new 10X72 drive cord assembly or a new length of cord 44 inches long for the installation. Install the cord as shown in the illustration, winding three turns clockwise around the drive shaft with the turns progressing away from the chassis. After completing the installation rotate the drive shaft a few turns to take up the slack in the cord.

ELECTRICAL SPECIFICATIONS

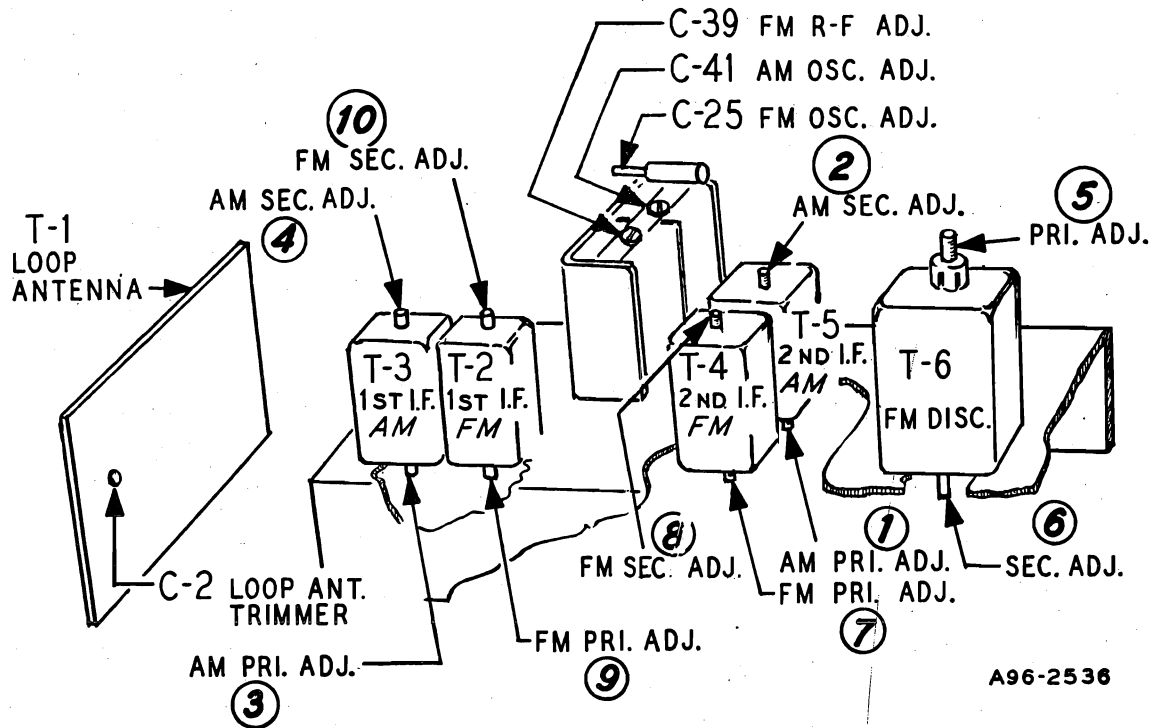
- Power Supply..... 105-125 volts AC 60 cycles, 40 watts. 60 watts with record changer.
- Frequency Ranges..... Broadcast 540-1600 KC
Frequency Modulation 88-108 MC
- Intermediate Frequency... AM-455 KC
FM-10.7 MC
- Selectivity..... AM-45 KC broad at 1000 times signal, measured at 1000 KC
I.F. FM-200 KC broad at 2 times down
I.F. FM-950 KC broad at 200 times down
- AM Sensitivity..... (For .5 watt output with external antenna) 25 microvolts average
- FM Sensitivity..... (For .5 watt output) 25 microvolts average
- Power Output 1.9 watts maximum
0.8 watts 10% distortion
- Loud Speaker 10" PM Dynamic
- Voice Coil Impedance..... 3.2 ohms 400 cycles

Tube and Dial Lamp Complement

- 1 6BE6 AM Converter & FM Osc.
- 1 6BA6 1st I-F Amplifier
- 1 6BA6 2nd I-F Amplifier
- 1 6AL5 FM Discriminator
- 1 6AV6 Audio Amplifier, AM 2nd Detector and AVC
- 1 6V6GT Audio Output
- 1 6X5GT Rectifier
- 1 6AB4 R-F Amplifier
- 1 6AB4 Mixer
- 2 No. 47 Dial Lamps

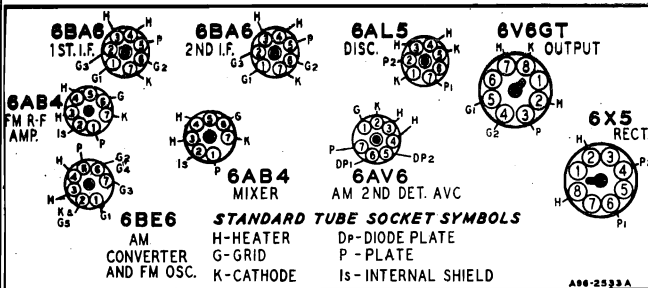


MODEL 05WG-2748F



A96-2536

TUBE SOCKET VOLTAGES



Socket voltages are shown on the schematic diagram at the tube socket terminals. All voltages are between the socket terminal and chassis ground. Plate, screen and cathode voltages were taken with a 1000 ohm-per-volt meter with a 300 volt scale used for plate and screen voltages. Audio grid voltages were read with a vacuum tube volt-meter. Conditions of measurement are:

Line voltage 117 Volts AC
 Signal Input None

A variation of $\pm 10\%$ is usually permissible.

ALIGNMENT PROCEDURES
AM STAGES

The following is required for aligning:
 An All Wave Signal Generator Which Will Provide an Accurately Calibrated Signal at the Test Frequencies as Listed.
 Output Indicating Meter, Non-Metallic Screwdriver, Dummy Antennas - .1 mf, and 50 mmf.

Volume Control Maximum all Adjustments.
 Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.
 Allow Chassis and Signal Generator to "Heat Up" for Several Minutes.

| SIGNAL GENERATOR | | | | GANG CONDENSER SETTING | ADJUST | ADJUST FOR |
|-------------------|--------------------------------------------|-----------------------|-------------------|--------------------------------------------------------------------|--------------------------------|-----------------|
| FREQUENCY SETTING | CONNECT GENERATOR OUTPUT TO | THROUGH DUMMY ANTENNA | CONNECT GROUND TO | | | |
| 455 KC | Control Grid 1st 6BA6 Pin No. 1 | .1 mf | Chassis Base | Rotor Fully Open | 2nd I.F. Pri. (1) and Sec. (2) | Maximum Output |
| 455 KC | Control Grid 6BE6 Pin No. 7 1st Det. | .1 mf | Chassis Base | Rotor Fully Open | 1st I.F. Pri. (3) and Sec. (4) | Maximum Output |
| 455 KC | Control Grid 6BE6 Pin No. 7 | .1 mf | Chassis Base | Rotor Fully Open | 2nd I-F Pri. (1) and Sec. (2) | Maximum Output |
| 1620 KC | Control Grid 6BE6 Pin No. 7 | .1 mf | Chassis Base | Rotor Fully Open | Oscillator C-41 | Maximum Output |
| 1400 KC* | External Antenna Terminal | 50 mmf | Chassis Base | Turn Rotor to Max. Output. Set Pointer to 1400 KC See Note A | Antenna C-2 | *Maximum Output |

NOTE A-If the pointer is not at 1400 KC on the dial, reset pointer to the 1400 KC mark on the dial scale.

FM STAGES

The following is required for aligning:

An accurately calibrated signal generator providing unmodulated signals at the test frequencies listed below.

Non-metallic screwdriver.

Dummy Antennas and I-F Loading Resistor—2500 mmf, 300 ohms

Zero center scale DC vacuum tube voltmeter having a range of approximately 3 volts.

(If a zero center scale meter is not available, a standard scale vacuum tube voltmeter may be used by reversing the meter connections for negative readings).

Allow chassis and signal generator to "Heat Up" for several minutes.

| SIGNAL GENERATOR | | | THROUGH DUMMY ANTENNA | BAND SWITCH SETTING | GANG CONDENSER SETTING | ADJUST | ADJUST FOR |
|------------------|-------------------|------------------------------------------------------|-----------------------|---------------------|------------------------|-----------------------------------------------------------------------------------------------|--------------------|
| Discriminator | FREQUENCY SETTING | CONNECT GENERATOR OUTPUT TO | 2500 mmf | FM | Rotor Fully Open | Disc. Pri. (5) Note A | Maximum Deflection |
| | 10.7 MC | 6BA6 2nd I-F Pin 1 and Chassis | 2500 mmf | FM | Rotor Fully Open | Disc. Sec. (6) Note B | |
| I-F | 10.7 MC | 6BA6 1st I-F Pin 1 and Chassis | 2500 mmf | FM | Rotor Fully Open | 2nd I-F Pri. (7) Sec. (8) Note D | Maximum Deflection |
| | Note C | | | | | | |
| Discriminator | 10.7 MC | 6BA6 1st I-F Pin 1 and Chassis | 2500 mmf | FM | Rotor Fully Open | Disc. Pri. (5) Note D | Maximum Deflection |
| I-F | 10.7 MC | Junction C-32A & B. (Dual 100 mmf cond.) And chassis | 2500 mmf | FM | Rotor Fully Open | 1st I-F Pri. (9) & Sec. (10) 2nd I-F Pri. (7) & Sec. (8) Disc. Pri. (5) In Order Shown Note D | Maximum Deflection |
| | 10.7 MC | Same as above | 2500 mmf | FM | Rotor Fully Open | Disc. Sec. (6) Note B | |

RECHECK I-F ADJUSTMENTS IN ORDER GIVEN

| | | | | | | | |
|------------|-------|-------------------------------------------------------------------------------------------------------|----------|----|---------------------------------|-----------|--------------------|
| Oscillator | 108.5 | Disconnect built-in dipole antenna and connect generator to dipole terminals with resistor in series. | 300 ohms | FM | Rotor Fully Open | Osc. C-25 | Deflection Maximum |
| Antenna | 104.5 | Same as above | 300 ohms | FM | Tune rotor for max. AVC voltage | Ant. C-39 | Maximum Deflection |

RECHECK ANTENNA & OSC. ADJUSTMENTS IN ORDER GIVEN

FM ALIGNMENT NOTES

NOTE A—The zero center scale DC vacuum tube voltmeter is to be connected between chassis ground and the AVC line. A signal of .1 volt must be fed into the receiver for this adjustment. Note output voltage on the zero center DC vacuum tube voltmeter.

NOTE B—Disconnect zero center DC vacuum tube voltmeter from AVC and connect it at the audio takeoff point at the

27 K ohm resistor (R-10) and its junction with the terminal strip. Adjust for zero voltage indication.

NOTE C—AM I-F coils must be aligned before attempting to align the FM I-F coils.

NOTE D—Connect zero center DC vacuum tube voltmeter as in Note A. Adjust input to give same output on the zero center DC vacuum tube voltmeter as in Note A.

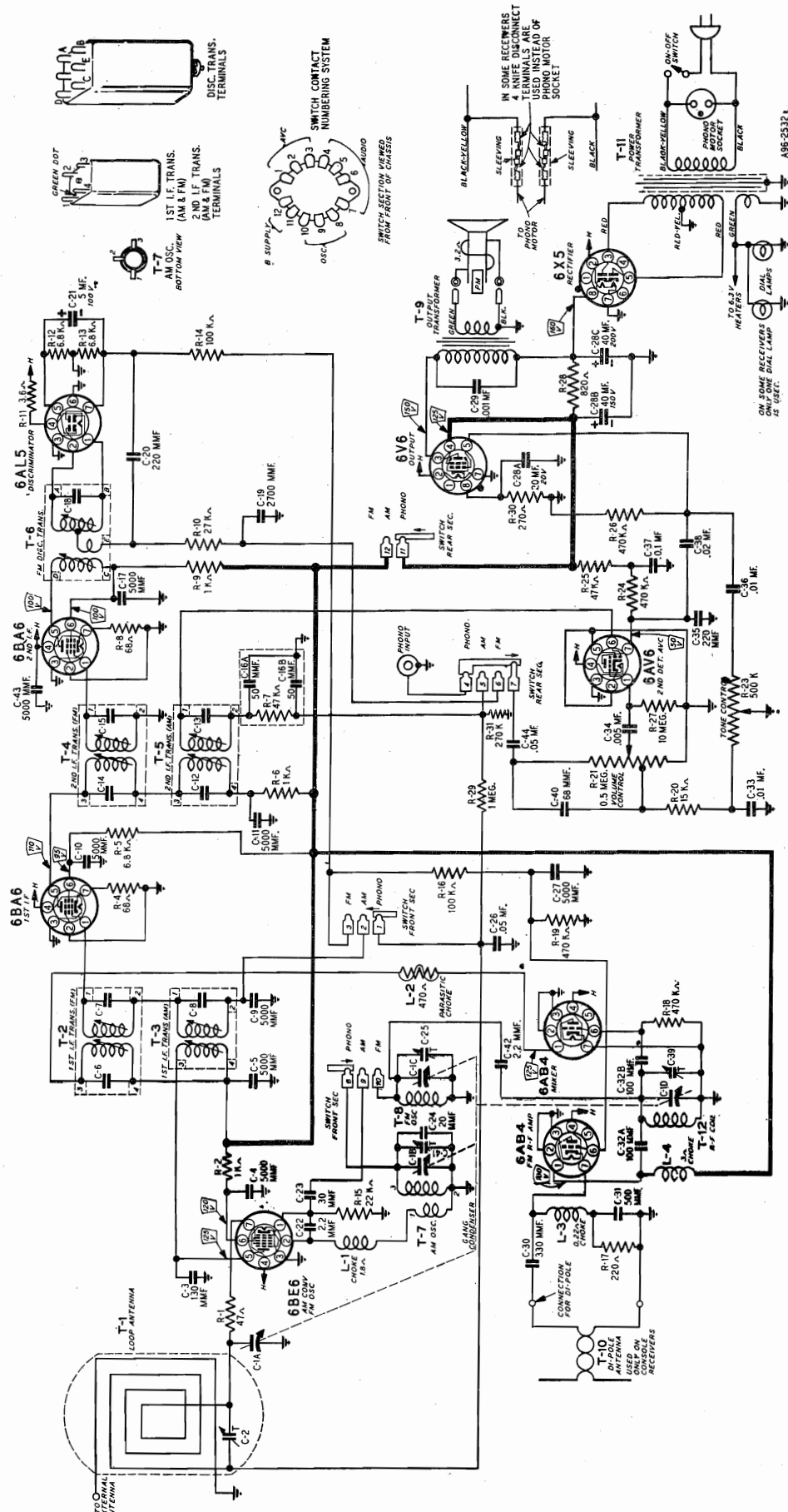
REPLACEMENT PARTS LIST

| Ref. No. | Part No. | Description | Qty. Used in Set |
|-------------------|------------------------------------|-------------------------|------------------|
| CAPACITORS | | | |
| C-1 | 14A209 | Gang Condenser Assembly | 1 |
| C-2 | 17A235 | 2-24 mmf Trimmer | 1 |
| C-3 | 47X559 | 130 mmf Ceramic | 1 |
| C-4 | 47X507 | 5000 mmf Ceramic | 8 |
| C-5 | | | |
| C-9 | | | |
| C-10 | | | |
| C-11 | | | |
| C-17 | | | |
| C-27 | | | |
| C-43 | | | |
| C-6 | Part of T-2 (1st I-F Trans. FM) | | |
| C-7 | | | |
| C-8 | Part of T-3 (1st I-F Trans. AM) | | |
| C-12 | Part of T-5 (2nd I-F Trans. AM) | | |
| C-13 | | | |
| C-14 | Part of T-4 (2nd I-F Trans. FM) | | |
| C-15 | | | |
| C-15A | 47X112 | 50-50 mmf | Dual Mica |
| C-16B | | | |
| C-18 | Part of T-6 (Discriminator Trans.) | | |
| C-19 | 47X492 | 2700 mmf | Molded Mica |
| C-20 | 47X468 | 220 mmf | Ceramic |
| C-35 | | | |
| C-21 | 45X361 | 5 mf 100 V | Dry Electrolytic |
| C-22 | 47X557 | 2.2 mmf | Ceramic |
| C-42 | | | |
| C-23 | 47X558 | 30 mmf | Ceramic |
| C-24 | 47X523 | 10 mmf | Ceramic |
| C-25 | 17A255 | 1-8 mmf | Trimmer |
| C-26 | B66503 | .05 mf 200 V | Tubular |
| C-44 | | | |
| C-28A | 45X360 | 20 mf 20 V | Dry Electrolytic |
| C-28B | | 40 mf 150 V | |
| C-28C | | 40 mf 200 V | |
| C-29 | H66102 | .001 mf 800 V | Tubular |
| C-30 | 47X470 | 330 mmf | Molded Mica |
| C-31 | 47X508 | 500 mmf | Ceramic |

MODEL 05WG-2748F

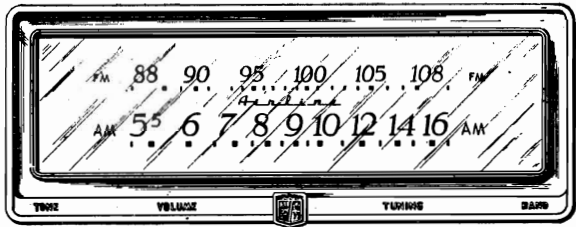
| Ref. No. | Part No. | Description | Qty. Used in Set |
|-------------------------------|----------|---------------------------------|------------------|
| C-32A } C-32B } | 76X4 | 100 mmf Dual Ceramic | 1 |
| C-33 | B66203 | .02 mf 200 V Tubular | 1 |
| C-34 | D66502 | .005 mf 400 V Tubular | 1 |
| C-36 | B66103 | .01 mf 200 V Tubular | 1 |
| C-37 | D66104 | .1 mf 400 V Tubular | 1 |
| C-38 | D66203 | .02 mf 400 V Tubular | 1 |
| C-39 } C-41 } | | Part of C-1 (Gang Condenser) | |
| C-40 | 47X471 | *68 mmf Ceramic | 1 |
| RESISTORS | | | |
| | | Ohms Watts | |
| R-1 | B85470 | 47 0.5 Carbon | 1 |
| R-2 } R-6 } R-9 } | B85102 | 1000 0.5 Carbon | 3 |
| R-4 } R-8 } | B84680 | 68 0.5 Carbon | 2 |
| R-5 } R-12 } R-13 } | B84682 | 6800 0.5 Carbon | 3 |
| R-7 } R-25 } | B85473 | 47 K 0.5 Carbon | 2 |
| R-10 | B85273 | 27 K 0.5 Carbon | 1 |
| R-11 | 43X233 | 3.6 0.5 Wirewound | 1 |
| R-14 } R-16 } | B85104 | 100 K 0.5 Carbon | 2 |
| R-15 | B85223 | 22 K 0.5 Carbon | 1 |
| R-17 | B84221 | 220 0.5 Carbon | 1 |
| R-18 } R-24 } R-26 } | B85474 | 470 K 0.5 Carbon | 3 |
| R-20 | B85153 | 15 K 0.5 Carbon | 1 |
| R-21 | 36X372 | .5 meg. Volume Control & Switch | 1 |
| R-23 | 40X310 | .5 meg. Tone Control | 1 |
| R-27 | B85106 | 10 meg. 0.5 Carbon | 1 |
| R-28 | D84821 | 820 2.0 Carbon | 1 |
| R-29 | B85105 | 1 meg. 0.5 Carbon | 1 |
| R-30 | B84271 | 270 0.5 Carbon | 1 |
| R-31 | B84274 | 270 K 0.5 Carbon | 1 |
| TRANSFORMERS AND COILS | | | |
| L-1 | 35A5 | Insulated Choke | 1 |
| L-2 | 9A2103 | Parasitic Choke Assembly | 1 |
| L-3 | 35A9 | Insulated Choke | 1 |
| L-4 | 35A8 | Insulated Choke | 1 |
| T-1 | 9A2146 | "B" Range Loop Antenna | 1 |
| T-2 | 9A2060 | 1st I-F Trans. (FM) | 1 |
| T-3 | 9A2062 | 1st I-F Trans. (AM) | 1 |
| T-4 | 9A2061 | 2nd I-F Trans. (FM) | 1 |
| T-5 | 9A2063 | 2nd I-F Trans. (AM) | 1 |
| T-6 | 9A2161 | Discriminator Transformer | 1 |
| T-7 | 9A2065 | Oscillator Coil (AM) | 1 |

| | | | |
|------------------------------------------------|--------|--------------------------------------------|---|
| T-8 | 9A2067 | Oscillator Coil (FM) | 1 |
| T-9 | 51X134 | Output Transformer | 1 |
| T-10 | 9A2004 | Dipole Antenna | 1 |
| T-11 | 53X291 | Power Transformer | 1 |
| T-12 | 9A2066 | Antenna Coil (FM) | 1 |
| MISCELLANEOUS | | | |
| 12A480 | | 10" P.M. Speaker | 1 |
| 3A435 | | Tube Socket—Octal (8 prong) Molded | 2 |
| 3A426 | | Tube Socket (1st 6BA6) | 1 |
| 3A427 | | Tube Socket | 3 |
| 3A439 | | Tube Socket (Miniature) | 3 |
| 3A308 | | Phono Socket—Single Pin Tip | 1 |
| 2A393 | | Band Change Switch | 1 |
| 13X546 | | Line Cord and Plug Assembly | 1 |
| 4X1114 | | Escutcheon | 1 |
| 10A759 | | Knob | 4 |
| DIAL AND DRIVE ASSEMBLY | | | |
| 58X741 | | Dial Glass | 1 |
| 24X446 | | Idler Pulley | 2 |
| 15X251 | | Pointer | 1 |
| 25X1650 | | Dial Bracket | 1 |
| 7A103 | | No. 47 Pilot Light Bulb | 2 |
| 7A199 | | Pilot Light Socket Assembly | 1 |
| 26X486 | | Drive Shaft | 1 |
| 41X88 | | Reflector, Dial Light | 2 |
| 28X113 | | Drive Cord Tension Spring | 1 |
| 10X72 | | Drive Cord Assembly | 1 |
| 19X192 | | "C" Washer (Mtg. drive shaft) | 2 |
| 6X66 | | Rubber Grommet (Mtg. gang cond.) | 3 |
| TYPE G.I. — 28A169 RECORD CHANGER PARTS | | | |
| G.I.-56-76507 | | Motor Assembly, 60 cycles 105-125 Volts AC | |
| G.I.-69-73657 | | Tone Arm | |
| S-P81 | | Crystal Cartridge & Needle (Shure) | |
| S-85-35 | | Needle | |



NOTE—C-24 is 10 mmf, C-33 is .02 mf and R-19 is not used.

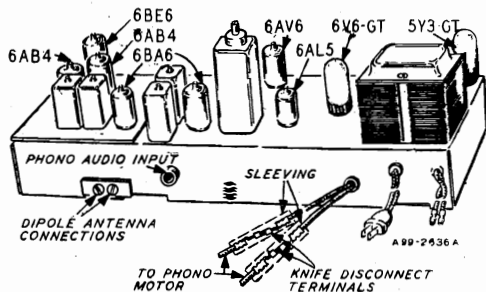
MODEL 05WG-2749D



GENERAL DESCRIPTION

This is a two band, eight tube (plus rectifier tube) AM and FM receiver with automatic record changer. The I-F stages use high gain miniature type tubes. Built-in Air Wave Aerials are provided for the FM and Broadcast bands. Features include, a grounded grid R-F amplifier stage on the FM band, compensator circuits to prevent oscillator drift, automatic volume control, beam power output stage, PM dynamic loud speaker and an electrostatic shield in the power transformer to reduce power line noise.

The receiver and record changer are housed in a console combination cabinet with controls provided for tuning, volume, tone and band or phono selection.



DRIVE CORD REPLACEMENT

DIAL POINTER CORD

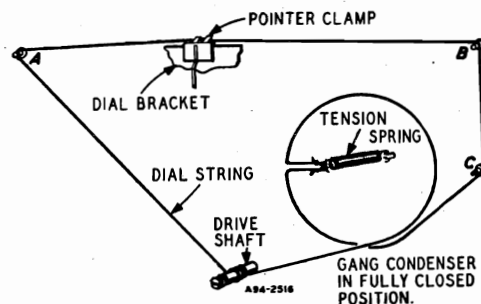
Use a new 10X38 drive cord assembly or a new length of cord 48 inches long for the installation. Install the cord as shown in the illustration, winding three turns clockwise around the drive shaft with the turns progressing away from the chassis. After completing the installation rotate the drive shaft a few turns to take up the slack in the cord.

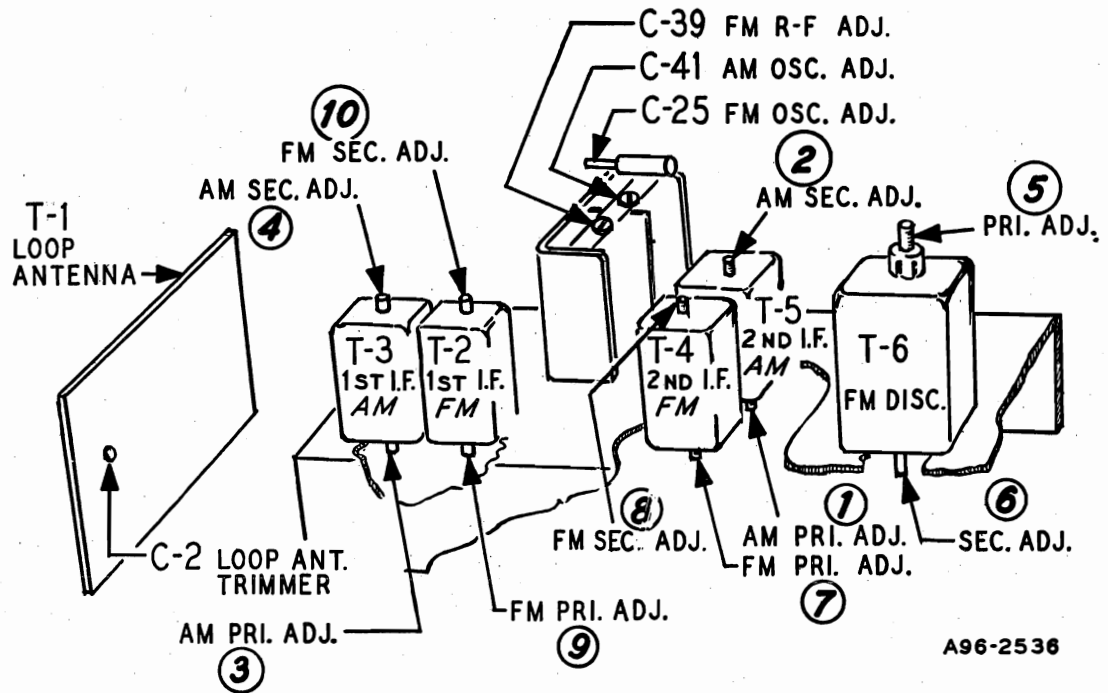
ELECTRICAL SPECIFICATIONS

- Power Supply..... 105-125 volts AC 60 cycles, 60 watts. 80 watts with record changer.
- Frequency Ranges..... Broadcast 540-1600 KC
Frequency Modulation 88-108 MC
- Intermediate Frequency AM-455 KC
FM-10.7 MC
- Selectivity..... AM-45 KC broad at 1000 times signal, measured at 1000 KC
I.F. FM-200 KC broad at 2 times down
I.F. FM-950 KC broad at 200 times down
- AM Sensitivity..... (For .5 watt output with external antenna) 25 microvolts average
- FM Sensitivity..... (For .5 watt output) 25 microvolts average
- Power Output..... 4.5 watts maximum
2.5 watts 10% distortion
- Loud Speaker..... 12" PM Dynamic
- Voice Coil Impedance..... 3.2 ohms 400 cycles

Tube and Dial Lamp Complement

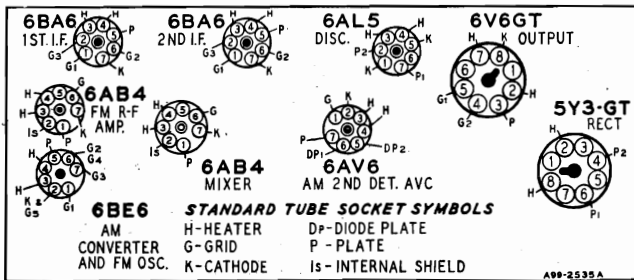
- 1 6BE6 AM Converter & FM Osc.
- 1 6BA6 1st I-F Amplifier
- 1 6BA6 2nd I-F Amplifier
- 1 6AL5 FM Discriminator
- 1 6AV6 Audio Amplifier, AM 2nd Detector and AVC
- 1 6V6GT Audio Output
- 1 5Y3GT Rectifier
- 1 6AB4 R-F Amplifier
- 1 6AB4 Mixer
- 2 No. 47 Dial Lamps





A96-2536

TUBE SOCKET VOLTAGES



Socket voltages are shown on the schematic diagram at the tube socket terminals. All voltages are between the socket terminal and chassis ground. Plate, screen and cathode voltages were taken with a 1000 ohm-per-volt meter with a 300 volt scale used for plate and screen voltages. Audio grid voltages were read with a vacuum tube volt-meter.

Conditions of measurement are:

- Line voltage 117 Volts AC
- Signal Input None

A variation of $\pm 10\%$ is usually permissible.

ALIGNMENT PROCEDURES

AM STAGES

The following is required for aligning:
 An All Wave Signal Generator Which Will Provide an Accurately Calibrated Signal at the Test Frequencies as Listed.
 Output Indicating Meter, Non-Metallic Screwdriver, Dummy Antennas - .1 mf, and 50mmf.

Volume Control Maximum all Adjustments.
 Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.
 Allow Chassis and Signal Generator to "Heat Up" for Several Minutes.

| SIGNAL GENERATOR | | | | GANG CONDENSER SETTING | ADJUST | ADJUST FOR |
|-------------------|--------------------------------------------|-----------------------|-------------------|--------------------------------------------------------------------|--------------------------------|----------------|
| FREQUENCY SETTING | CONNECT GENERATOR OUTPUT TO | THROUGH DUMMY ANTENNA | CONNECT GROUND TO | | | |
| 455 KC | Control Grid 1st 6BA6 Pin No. 1 | .1 mf | Chassis Base | Rotor Fully Open | 2nd I.F. Pri. (1) and Sec. (2) | Maximum Output |
| 455 KC | Control Grid 6BE6 Pin No. 7 1st Det. | .1 mf | Chassis Base | Rotor Fully Open | 1st I.F. Pri. (3) and Sec. (4) | Maximum Output |
| 455 KC | Control Grid 6BE6 Pin No. 7 | .1 mf | Chassis Base | Rotor Fully Open | 2nd I-F Pri. (1) and Sec. (2) | Maximum Output |
| 1620 KC | Control Grid 6BE6 Pin No. 7 | .1 mf | Chassis Base | Rotor Fully Open | Oscillator C-41 | Maximum Output |
| 1400 KC | External Antenna Terminal | 50 mmf | Chassis Base | Turn Rotor to Max. Output. Set Pointer to 1400 KC See Note A | Antenna C-2 | Maximum Output |

NOTE A - If the pointer is not at 1400 KC on the dial, reset pointer to the 1400 KC mark on the dial scale.

MODEL 05WG-2749D

FM STAGES

The following is required for aligning:

An accurately calibrated signal generator providing unmodulated signals at the test frequencies listed below.

Non-metallic screwdriver.

Dummy Antennas and I-F Loading Resistor—2500 mmf, 300 ohms

Zero center scale DC vacuum tube voltmeter having a range of approximately 3 volts.

(If a zero center scale meter is not available, a standard scale vacuum tube voltmeter may be used by reversing the meter connections for negative readings).

Allow chassis and signal generator to "Heat Up" for several minutes.

| SIGNAL GENERATOR | | | THROUGH DUMMY ANTENNA | BAND SWITCH SETTING | GANG CONDENSER SETTING | ADJUST | ADJUST FOR |
|------------------|-------------------|-----------------------------------------------------|-----------------------|---------------------|------------------------|-----------------------------------------------------------------------------------------------|--------------------|
| | FREQUENCY SETTING | CONNECT GENERATOR OUTPUT TO | | | | | |
| Discriminator | 10.7 MC | 6BA6 2nd I-F Pin 1 and Chassis | 2500 mmf | FM | Rotor Fully Open | Disc. Pri. (5) Note A | Maximum Deflection |
| | 10.7 MC | 6BA6 2nd I-F Pin 1 and Chassis | 2500 mmf | FM | Rotor Fully Open | Disc. Sec. (6) Note B | |
| I-F | 10.7 MC Note C | 6BA6 1st I-F Pin 1 and Chassis | 2500 mmf | FM | Rotor Fully Open | 2nd I-F Pri. (7) Sec. (8) Note D | Maximum Deflection |
| Discriminator | 10.7 MC | 6BA6 1st I-F Pin 1 and Chassis | 2500 mmf | FM | Rotor Fully Open | Disc. Pri. (5) Note D | Maximum Deflection |
| I-F | 10.7 MC | Junction C-32A & B (Dual 100 mmf cond.) And chassis | 2500 mmf | FM | Rotor Fully Open | 1st I-F Pri. (9) & Sec. (10) 2nd I-F Pri. (7) & Sec. (8) Disc. Pri. (5) In Order Shown Note D | Maximum Deflection |
| | 10.7 MC | Same as above | 2500 mmf | FM | Rotor Fully Open | Disc. Sec. (6) Note B | |

RECHECK I-F ADJUSTMENTS IN ORDER GIVEN

| | | | | | | | |
|------------|-------|-------------------------------------------------------------------------------------------------------|----------|----|---------------------------------|-----------|--------------------|
| Oscillator | 108.5 | Disconnect built-in dipole antenna and connect generator to dipole terminals with resistor in series. | 300 ohms | FM | Rotor Fully Open | Osc. C-25 | Deflection Maximum |
| Antenna | 104.5 | Same as above | 300 ohms | FM | Tune rotor for max. AVC voltage | Ant. C-39 | Maximum Deflection |

RECHECK ANTENNA & OSC. ADJUSTMENTS IN ORDER GIVEN

FM ALIGNMENT NOTES

NOTE A—The zero center scale DC vacuum tube voltmeter is to be connected between chassis ground and the AVC line. A signal of .1 volt must be fed into the receiver for this adjustment.

Note output voltage on the zero center DC vacuum tube voltmeter

NOTE B—Disconnect zero center DC vacuum tube voltmeter from AVC and connect it at the audio takeoff point at the

27 K ohm resistor (R-10) and its junction with the terminal strip. Adjust for zero voltage indication.

NOTE C—AM I-F coils must be aligned before attempting to align the FM I-F coils.

NOTE D—Connect zero center DC vacuum tube voltmeter as in Note A. Adjust input to give same output on the zero center DC vacuum tube voltmeter as in Note A.

REPLACEMENT PARTS LIST

| Ref. No. | Part No. | Description | Qty. Used in Set |
|-------------------|---------------------------------|-------------------------|------------------|
| CAPACITORS | | | |
| C-1 | 14A209 | Gang Condenser Assembly | 1 |
| C-2 | 17A235 | 2-24 mmf Trimmer | 1 |
| C-3 | 47X559 | 130 mmf Ceramic | 1 |
| C-4 | 47X507 | 5000 mmf Ceramic | 8 |
| C-5 | | | |
| C-9 | | | |
| C-10 | | | |
| C-11 | | | |
| C-17 | | | |
| C-27 | | | |
| C-43 | | | |
| C-6 | Part of T-2 (1st I-F Trans. FM) | | |
| C-7 | | | |
| C-8 | Part of T-3 (1st I-F Trans. AM) | | |
| C-12 | Part of T-5 (2nd I-F Trans. AM) | | |
| C-13 | | | |

| | | | |
|------------------------------------------|------------------------------------|--------------|--------------------|
| C-14 } C-15 } | Part of T-4 (2nd I-F Trans. FM) | | |
| C-16A } C-16B } | 47X112 | 50-50 mmf | Dual Mica.... 1 |
| C-18 | Part of T-6 (Discriminator Trans.) | | |
| C-19 | 47X492 | 2700 mmf | Molded Mica 1 |
| C-20 } C-35 } | 47X468 | 220 mmf | Ceramic..... 2 |
| C-21 | 45X361 | 5 mf 100 V | Dry Electrolytic 1 |
| C-22 } C-42 } | 47X557 | 2.2 mmf | Ceramic..... 2 |
| C-23 | 47X558 | 30 mmf | Ceramic..... 1 |
| C-24 | 47X523 | 10 mmf | Ceramic..... 1 |
| C-25 | 17A255 | 1-8 mmf | Trimmer..... 1 |
| C-26 } C-44 } | B66503 | .05 mf 200 V | Tubular..... 2 |
| C-28A } C-28B } C-28C } C-28D } | 45X359 | 20 mf 25 V | Dry Electrolytic 1 |
| | | 20 mf 350 V | |
| | | 40 mf 350 V | |
| | | 40 mf 350 V | |

| Ref. No. | Part No. | Description | Qty. Used in Set |
|--------------------------------------|----------|---------------------------------|------------------|
| C-29 | H66102 | .001 mf 800 V Tubular..... | 1 |
| C-30 | 47X470 | 330 mmf Molded Mica.... | 1 |
| C-31 | 47X508 | 500 mmf Ceramic..... | 1 |
| C-32A } C-32B } | 76X4 | 100 mmf Dual Ceramic.... | 1 |
| C-33 } C-36 } | B66103 | .01 mf 200 V Tubular..... | 2 |
| C-34 | D66502 | .005 mf 400 V Tubular..... | 1 |
| C-37 | D66104 | .1 mf 400 V Tubular..... | 1 |
| C-38 | D66203 | .02 mf 400 V Tubular..... | 1 |
| C-39 } C-41 } | | Part of C-1 (Gang Condenser) | |
| C-40 | 47X471 | 68 mmf Ceramic..... | 1 |
| RESISTORS | | | |
| | | Ohms Watts | |
| R-1 | B85470 | 47 0.5 Carbon..... | 1 |
| R-2 } R-6 } | B85102 | 1000 0.5 Carbon..... | 2 |
| R-4 } R-8 } | B84680 | 68 0.5 Carbon..... | 2 |
| R-5 } R-12 } R-13 } | B84682 | 6800 0.5 Carbon..... | 3 |
| R-7 } R-25 } | B85473 | 47 K 0.5 Carbon..... | 2 |
| R-9 | B85222 | 2200 0.5 Carbon..... | 1 |
| R-10 | B85273 | 27 K 0.5 Carbon..... | 1 |
| R-11 | 43X233 | 3.6 0.5 Wirewound | 1 |
| R-14 } R-16 } | B85104 | 100 K 0.5 Carbon..... | 2 |
| R-15 | B85223 | 22 K 0.5 Carbon..... | 1 |
| R-17 | B84221 | 220 0.5 Carbon..... | 1 |
| R-18 } R-19 } R-24 } R-26 } | B85474 | 470 K 0.5 Carbon..... | 4 |
| R-20 | B85153 | 15 K 0.5 Carbon..... | 1 |
| R-21 | 36X372 | .5 meg. Volume Control & Switch | 1 |
| R-23 | 40X310 | .5 meg. Tone Control | 1 |
| R-27 | B85106 | 10 meg. 0.5 Carbon..... | 1 |
| R-28A } R-28B } | 43X224 | 1000 4.0 Wirewound | 1 |
| | | 1400 6.0 | |
| R-29 | B85105 | 1 meg. 0.5 Carbon..... | 1 |
| R-30 | B84271 | 270 0.5 Carbon..... | 1 |
| R-31 | B84274 | 270 K 0.5 Carbon..... | 1 |
| TRANSFORMERS AND COILS | | | |
| L-1 | 35A5 | Insulated Choke | 1 |
| L-2 | 9A2103 | Parasitic Choke Assembly | 1 |
| L-3 | 35A9 | Insulated Choke | 1 |
| L-4 | 35A8 | Insulated Choke | 1 |
| T-1 | 9A1972 | "B" Range Loop Antenna | 1 |
| T-2 | 9A2060 | 1st I-F Trans. (FM) | 1 |
| T-3 | 9A2062 | 1st I-F Trans. (AM) | 1 |
| T-4 | 9A2061 | 2nd I-F Trans. (FM) | 1 |
| T-5 | 9A2063 | 2nd I-F Trans. (AM) | 1 |
| T-6 | 9A2161 | Discriminator Transformer | 1 |
| T-7 | 9A2065 | Oscillator Coil (AM) | 1 |

| | | | |
|------|--------|----------------------------|---|
| T-8 | 9A2067 | Oscillator Coil (FM) | 1 |
| T-9 | 51X134 | Output Transformer | 1 |
| T-10 | 9A2004 | Dipole Antenna | 1 |
| T-11 | 53X290 | Power Transformer | 1 |
| T-12 | 9A2066 | Antenna Coil (FM) | 1 |

MISCELLANEOUS

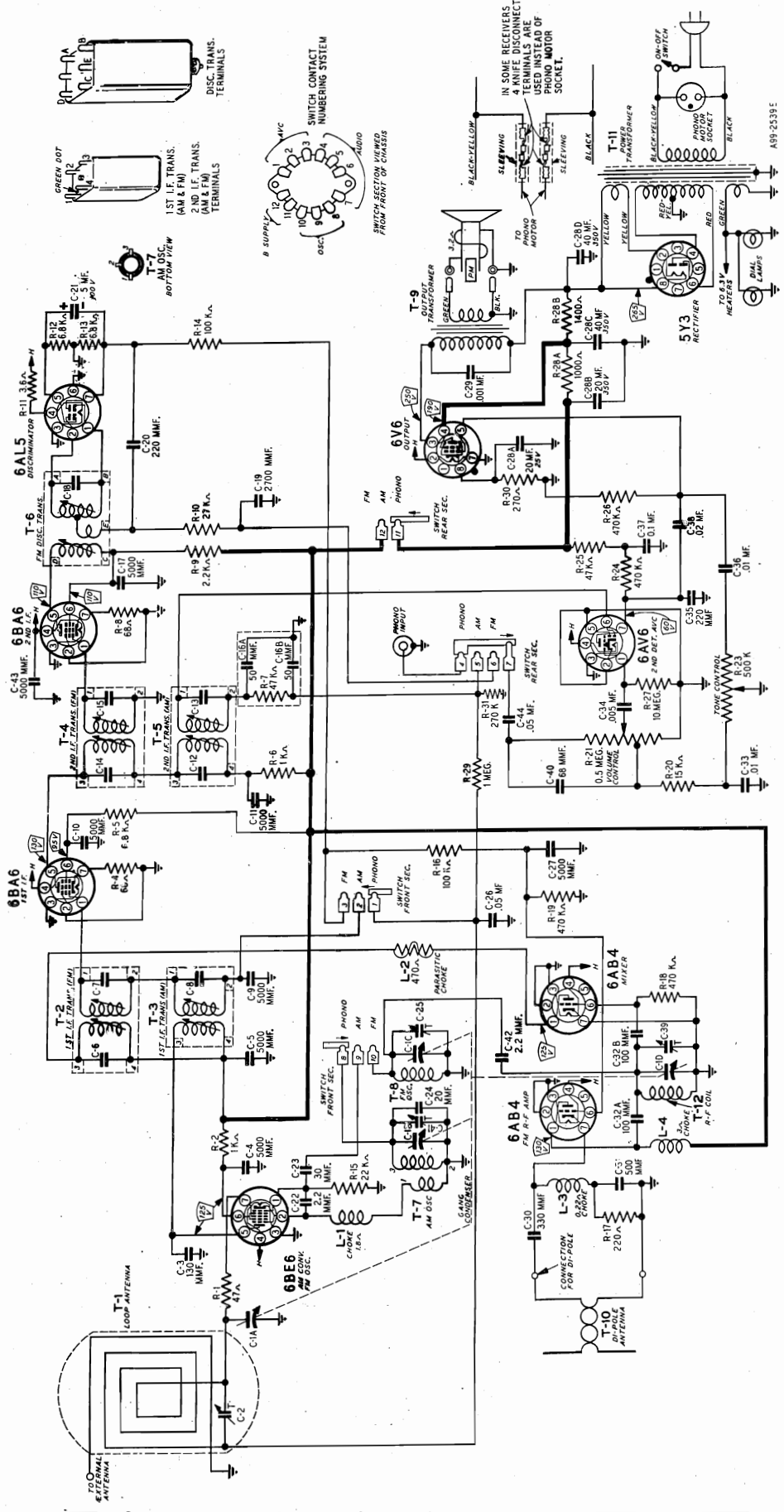
| | | |
|--------|------------------------------------------|---|
| 12A502 | 12" P.M. Speaker | 1 |
| 3A435 | Tube Socket—Octal (8 prong) Molded | 2 |
| 3A426 | Tube Socket (1st 6BA6)..... | 1 |
| 3A427 | Tube Socket | 3 |
| 3A439 | Tube Socket (Miniature) | 3 |
| 3A305 | Phono Socket—Single Pin Tip..... | 1 |
| 2A393 | Band Change Switch | 1 |
| 13X546 | Line Cord and Plug Assembly..... | 1 |
| 4X1049 | Escutcheon | 1 |
| 10A735 | Knob | 4 |

DIAL AND DRIVE ASSEMBLY

| | | |
|---------|----------------------------------------|---|
| 58X729 | Dial Glass | 1 |
| 24X446 | Idler Pulley | 2 |
| 15X251 | Pointer | 1 |
| 25X1616 | Dial Bracket | 1 |
| 7A103 | No. 47 Pilot Light Bulb | 2 |
| 7A199 | Pilot Light Socket Assembly | 1 |
| 26X486 | Drive Shaft | 1 |
| 41X88 | Reflector, Dial Light | 2 |
| 28X113 | Drive Cord Tension Spring | 1 |
| 10X38 | Drive Cord Assembly | 1 |
| 19X192 | "C" Washer (Mtg. drive Shaft) | 2 |
| 6X66 | Rubber Grommet (Mtg. gang cond.) | 3 |

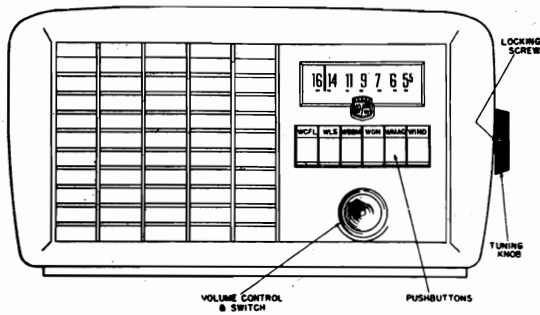
TYPE W-28A176 RECORD CHANGER PARTS

| | | |
|-------------|--------------------------------------------------|---|
| W-15X106-26 | Motor Assembly, 60 cycles 105-125 Volts AC | 1 |
| W-49X123-5C | Pickup Arm | 1 |
| W-R A7M-1 | Crystal Cartridge & Needles | 1 |
| W-R-13017 | Needle, Microgroove (Red) | 1 |
| W-R-13016 | Needle, Regular | 1 |

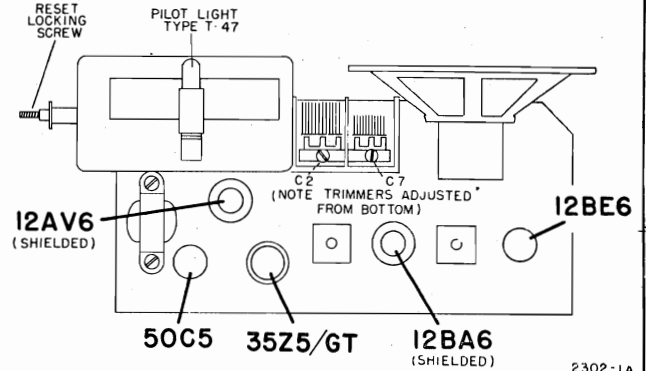


NOTE-In later production C-24 is 10 mmf.

MODELS 15BR-1536B,
15BR-1537B



DWG NO 2242-1



CHASSIS VIEW, SHOWING TUBE LOCATIONS

SERVICE DATA

GENERAL DESCRIPTION

This receiver is a single-band, AC-DC set which uses 4 tubes plus a rectifier. The antenna input and oscillator circuits are tuned by a two-gang capacitor. A loop antenna is built into the cabinet; provision is made also for the connection of an external antenna. AVC voltage is applied to the grid of the IF-amplifier and converter tubes.

ELECTRICAL SPECIFICATIONS

Power Supply..... 115 volts, DC or 50-60 cycles AC,
35 watts.

Frequency Range 540 to 1600 kc.
Intermediate Freq. 455 kc.
Selectivity At 1000 kc, 55 kc at 1000 x signal.
Sensitivity 140 microvolts average for .05 watt output (By radiation.)
Power Output..... .08 watts undistorted, 1 watt maximum.
Loud Speaker..... 5" P.M., v.c. impedance 3.2 ohms.
Tube Complement.. 12BE6, converter,
12BA6, I.F. amplifier.
12AV6, detector, AVC, audio amplifier.
50C5, output amplifier.
35Z5, rectifier.

ALIGNMENT PROCEDURE AND RECEIVER STAGE SENSITIVITIES

The signal source must be an accurately calibrated signal generator capable of supplying R. F. signals modulated 30% with a 400-cycle audio signal. A 400-cycle source is necessary for the audio measurement.

The table below lists the sensitivity at various points. All measurements are based on an output of 50-milliwatts. This may be measured by disconnecting the

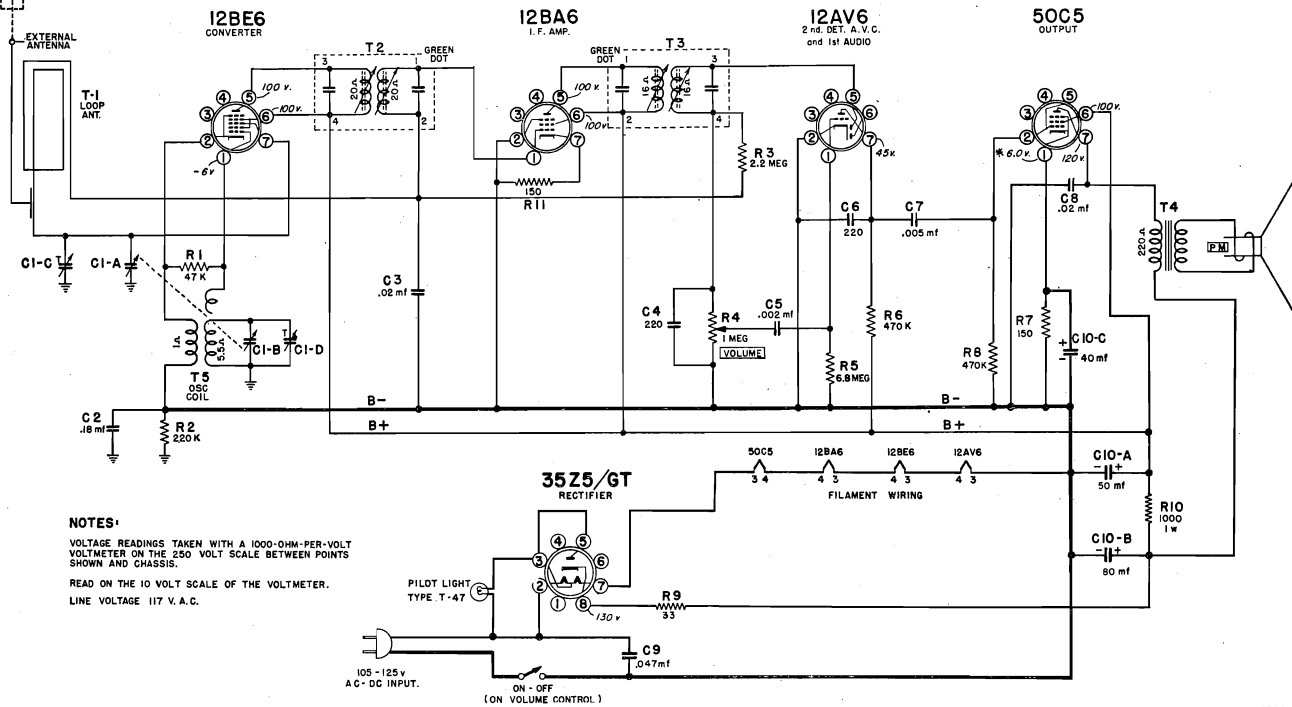
speaker voice coil and substituting a 3.2-ohm, 5-watt resistor across the secondary winding of the output transformer. A reading of .4 volts AC across this resistor will be equivalent to a 50-milliwatt output with the speaker connected. Variations of plus or minus 25% are usually permissible. Volume control at maximum for all adjustments.

| SIGNAL GENERATOR | | | | TUNER SETTING | ADJUST FOR MAXIMUM OUTPUT | INPUT FOR 50-MILLIWATT OUTPUT |
|------------------|--------------------|-----------------------|-------------------|------------------|----------------------------------------|-------------------------------|
| Frequency | Coupling Capacitor | Connection to Radio | Ground Connection | | | |
| 455 kc. | .1 mf. | Pin No. 7 of 12BE6 | Buss wire | Rotor full open | Trimmers on output and input I.F. cans | 50 microvolts |
| 1700 kc. | .1 mf. | Pin No. 7 of 12BE6 | Buss wire | Rotor full open | Oscillator trimmer C7 (on top) | _____ |
| 1400 kc. | none | See note A | none | Set dial at 1400 | Antenna trimmer C2 (on top) | _____ |
| 1400 kc. | .1 mf. | External antenna clip | Buss wire | 1400 kc. | _____ | 50 microvolts |
| 400 cycles | .1 mf. | 12AV6, Pin 1 | Buss wire | _____ | _____ | .03 volts |

Note A: Lay output lead of generator in back of loop antenna.

Turn up generator output. Loop antenna will pick up energy.

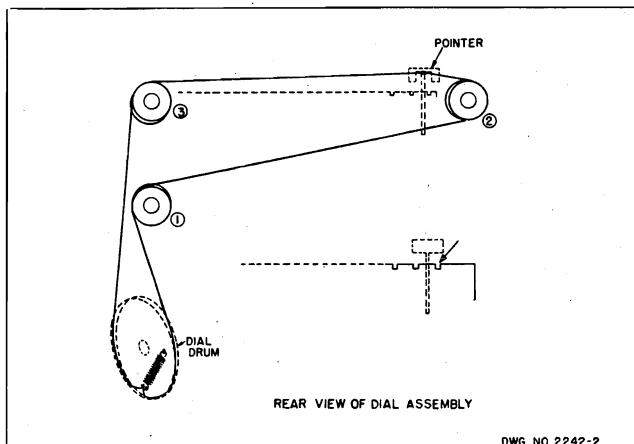
MODELS 15BR-1536B,
15BR-1537B



NOTES:
VOLTAGE READINGS TAKEN WITH A 1000-OHM-PER-VOLT
VOLTMETER ON THE 250 VOLT SCALE BETWEEN POINTS
SHOWN AND CHASSIS.
READ ON THE 10 VOLT SCALE OF THE VOLTMETER.
LINE VOLTAGE 117 V. A.C.

REPLACING DIAL POINTER DRIVE CORD—

1. Rotate tuning knob to extreme clockwise position. This closes the tuning condenser. Knob should remain in this position until installation of cord is completed.
2. Tie cord to loop in spring in drum. Pass around drum in direction shown.
3. Pass over idler pulley number 1, then around idler pulley number 2 as shown.
4. Pass cord over idler pulley number 3, then down around drum as shown. Tie to loop in spring in such a manner that the spring is partly stretched.
5. Place pointer on top edge of dial plate. Guide cord through the three fingers on the back of the pointer.
6. Make sure the tuning knob is in the extreme clockwise position. Slide the dial pointer along the edge of the dial plate until the left edge of the pointer coincides with the right hand notch on the gold background plate, when viewed from the front.
7. Push the cord firmly into the three fingers and clamp them tightly together.



DWG. NO 2242-2

MODELS 15BR-1536B,
15BR-1537B

SETTING THE PUSHBUTTONS—The pushbuttons may be used, after proper adjustment, for the automatic tuning of any six stations which you select. They can be set up in any order.

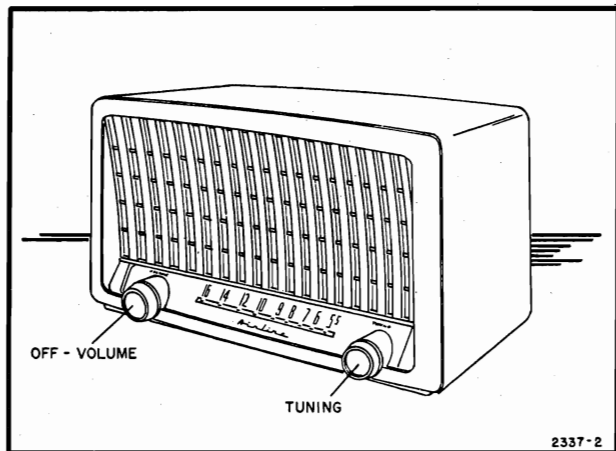
1. Turn on the radio. Allow it to warm up for at least one minute.
2. Push out the call letters of the six stations from the call-letter sheets supplied with this manual.
3. Insert one call-letter tab in the rectangular opening in each of the pushbuttons, in any sequence. Press an acetate tab (supplied in small envelope) into each of the pushbuttons.
4. With the screwdriver supplied, check to see that the locking screw in the center of the tuning knob (see illustration) is loose. If it is not, turn it several turns to the left (counterclockwise).

5. Press the first pushbutton down *all the way*. With one hand hold the button down *firmly* and with the other carefully tune in the desired station. Release the pushbutton.
6. Follow this procedure for each of the five other buttons, adjusting each one for a different station.
7. Rotate the tuning knob on the side of the cabinet as far to the right as it will go. Tighten the locking screw in the center of the knob. **IT IS IMPORTANT THAT THIS SCREW BE TIGHTENED VERY FIRMLY.**
8. The pushbuttons are now properly set for automatic tuning. Any of the six stations may now be tuned in simply by pressing the proper button down as far as it will go. If it is desired to reset any of the buttons for a new station, loosen the locking screw in the center of the tuning knob, set the pushbutton as described above, and re-tighten the locking screw.

REPLACEMENT PARTS LIST

| Ref. No. | Part No. | Description | Ref. No. | Part No. | Description |
|-------------------------|-------------|---------------------------------------|----------------------|-------------------------------------------------|------------------------|
| TUNER ASSEMBLY | | | | | |
| | 115448 | End plate (right hand bracket) | R9 | C-9B1-44 | 33 ohms, 1/2 watt, 10% |
| | 115448C | End plate (left hand bracket) | R10 | C-9B2-62 | 1K ohm, 1 watt, 10% |
| | 115146 | Cams | TRANSFORMERS | | |
| | 115143 | Key washers (12 used on cam-shaft) | T1 | C-13E-18714 | Loop antenna assembly |
| | 115143C | Key washer (one used) | T2 | B-13B-17731 | Input IF transformer |
| | 117528 | Brass spacer (one used on cam-shaft) | T3 | B-13B-17731 | Output IF transformer |
| | 117602 | Brass spacer (four used on cam-shaft) | T4 | B-12C-18723 | Output transformer |
| | 131181 | Spring washer for locking collar | T5 | B-12D-18741 | Oscillator coil |
| | 117604 | Locking collar | MISCELLANEOUS | | |
| | 117600 | Lever shaft | A-18A-18712 | 5" PM speaker | |
| | 115361 | Lever with roller | A-46A-10793 | Pilot light, T-47 | |
| | 120283 | Return spring for levers | A-47A-15451 | Pilot light assembly | |
| | A-2G-15449 | Pointer | A-15C-16007 | 7-prong, miniature tube socket | |
| | A-55A-10989 | Dial cord (24") | A-2M-17589 | Tube shield base | |
| | C-2C-15428 | Dial plate assembly | A-2H-17588 | Tube shield | |
| | A-200-15463 | Drum pulley | A-2D-15279 | Loop mounting bracket | |
| | A-3H-10299 | Idler pulley | A-2M-17580 | Coil locking clip | |
| | 120285 | Drum spring | B-14M-10088-5 | AC line cord and plugs | |
| | B-2M-10383 | Cinch button | A-23A-10344 | Line cord lock | |
| | A-2C-15450 | Background plate | A-15B-10440 | Octal tube socket | |
| CHASSIS ASSEMBLY | | | | | |
| CAPACITORS | | | | | |
| C-1A,B,C,D | B-8A-18708 | 2-gang, variable condenser | 5C-14286-36 | Cabinet (62-1536) | |
| C2 | C-8D-11111 | .18 mmf x 400 volts | 5C-14286-82 | Cabinet (62-1537) | |
| C3, 8 | C-8D-10774 | .02 mmf x 400 volts | C-6D-15422 | Dial Scale | |
| C4, 5, 6, 7 | A-201-14397 | Audio coupling plate | 134123 | Rubber bumper (bottom of cabinet) | |
| C9 | C-8J-16081 | .047 mfd x 400 volts | B-2M-15200 | Cinch button (for dial scale) | |
| C10, A, B, C | A-8C-18713 | Electrolytic condenser | B-5B-18717-78 | Volume knob (62-1537) | |
| | | | B-5B-18717-74 | Volume knob (62-1536) | |
| | | | A-5B-10994-77 | Tuning knob (62-1537) | |
| | | | B-5B-10994-36 | Tuning knob (62-1536) | |
| | | | B-5B-14298-78 | Pushbutton | |
| | | | 120388 | Locking spring (for tuning knob) | |
| R1 | C-9B1-82 | 47K ohms, 1/2 watt, 10% | A-3F-10995 | Locking screw (for tuning knob) | |
| R2 | C-9B1-27 | 220K ohms, 1/2 watt, 20% | A-23L-11900 | Call letters, set | |
| R3 | C-9B1-33 | 2.2 megohms, 1/2 watt, 20% | A-6C-14299 | Acetate tabs (call letters set) | |
| R4 | A-10A-10626 | Volume control and switch | A-2H-10996 | Reset key | |
| R5 | C-9B1-36 | 6.8 megohms, 1/2 watt, 20% | 13141 | Cinch buttons to cover trimmer holes in cabinet | |
| R6, 8 | C-9B1-29 | 470K ohms, 1/2 watt, 20% | | | |
| R7, 11 | C-9B1-52 | 150 ohms, 1/2 watt, 10% | | | |

MODELS 15BR-1543A,
15BR-1544A



Front Cabinet View

SERVICE DATA

Power Supply 115 volts, DC or 50-60 cycle AC,
24 watts.

Frequency Range 540 to 1600 Kc.

Intermediate Freq. 455 Kc.

Selectivity At 1000 Kc., 60 Kc. at 1000 x
signal

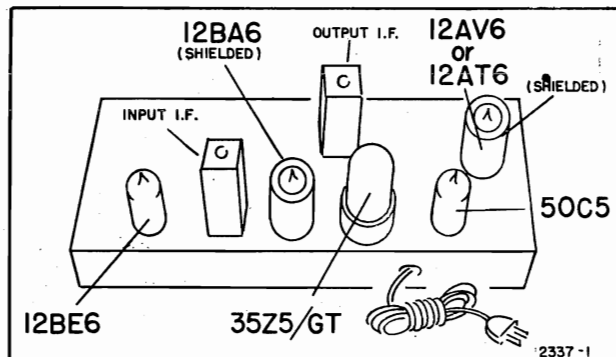
Sensitivity 150 u. v. per meter.

Power Output 0.8 watts undistorted, 1.0 watt
max.

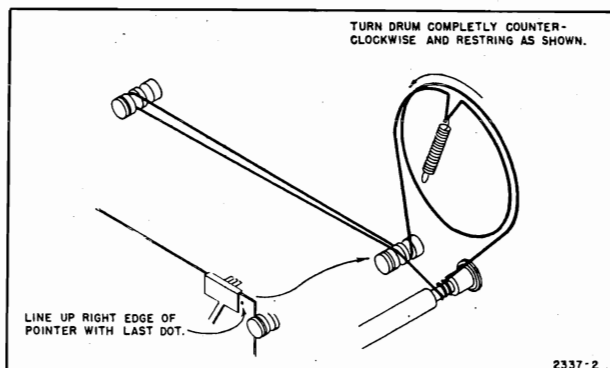
Loud Speaker 4" PM., v.c. impedance, 3.2 ohms.

Tube Complement

| | |
|-----------------------------------------|--------------------|
| 12BE6, Converter | 50C5, Audio output |
| 12BA6, IF Amplifier | 35Z5, Rectifier |
| 12AV6 or 12AT6, Detector, AVC, Audio | |



Top Chassis View

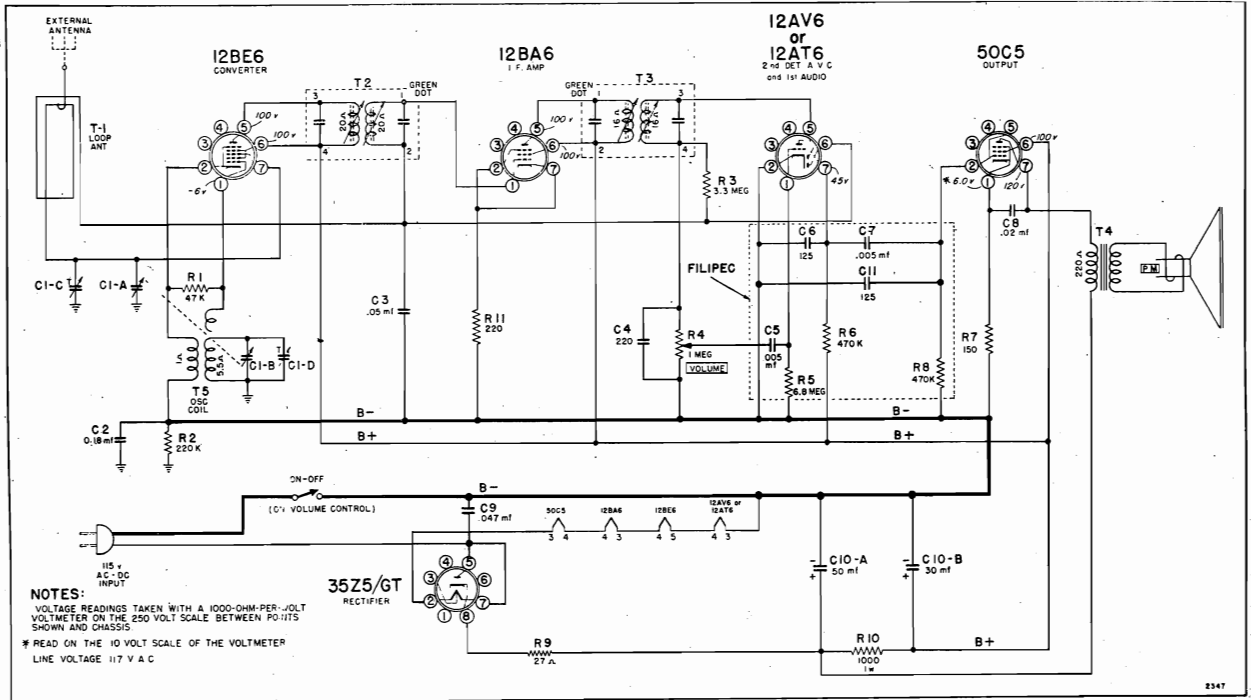


Dial Stringing Diagram

ALIGNMENT PROCEDURE

● Loop must be connected and set volume to maximum.

| SIGNAL GENERATOR | | | | TUNER SETTING | ADJUST FOR MAXIMUM OUTPUT | INPUT FOR 50-MILLIWATT OUTPUT |
|------------------|--------------------|-----------------------------------------|------------------------------------------|-------------------------------------------|----------------------------------------------------|-------------------------------|
| Frequency | Coupling Capacitor | Connection to Radio | Ground Connection | | | |
| 455 kc. | .1 mf | 12BE6, Pin 7 | HEAVY BUSS LEAD ACROSS CENTER OF CHASSIS | Capacitor fully open (plates out of mesh) | Top and bottom Cores in output and input I.F. cans | 65 microvolts |
| 1620 kc. | .1 mf | 12BE6, Pin 7 | | Capacitor fully open (plates out of mesh) | Oscillator trimmer C1-D on gang | 70 microvolts |
| 535 kc. | .1 mf. | 12BE6, Pin 7 | | Capacitor fully closed | Check for adequate range | 70 microvolts |
| 1400 kc. | — | Lay generator lead near back of cabinet | | Tune in 1400 kc. signal | Antenna trimmer C-1C on gang | 200 to 400 microvolts |
| 400 cycles | .1 mf | 12AT6, Pin 1 | | — | — | .06 volts |



NOTE: Capacitor C4 is included in filpec.

SCHEMATIC DIAGRAM

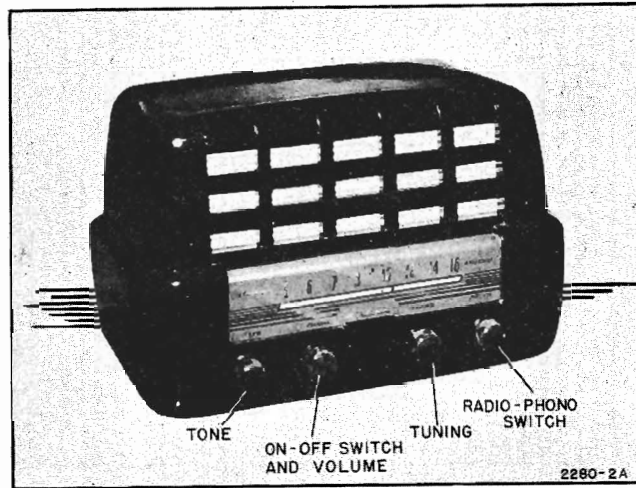
REPLACEMENT PARTS LIST

Please specify part number and chassis model number when ordering replacements.

Use only Genuine Factory Replacement Parts

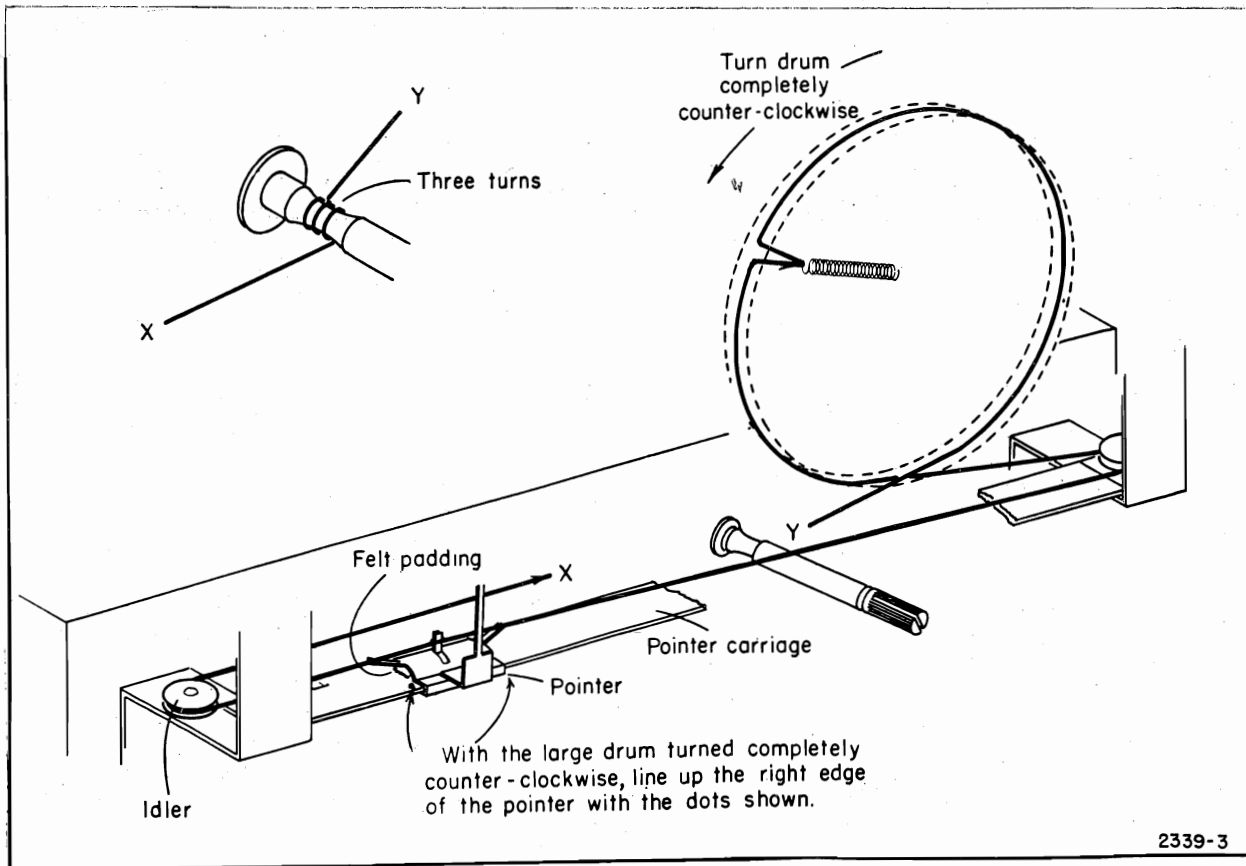
| Ref. No. | Part No. | Description | Ref. No. | Part No. | Description |
|-------------------------------|--------------|----------------------------|----------------------|----------|------------------------------|
| CAPACITORS | | | | | |
| C1A, B | 8A-17377 | 2-gang condenser | 29E-17592 | | Spring washer |
| C1C, D | | Trimmers on gang | 43D-17609 | | Tinnerman clip |
| C2 | 8D-11111 | .18 mfd x 400 volts | 29C-10630 | | "C" washer |
| C3 | 8D-10770 | .05 mfd x 200 volts | 53A-18547 | | Dial string (approx 20") |
| C4 | | Included in filpec | 49A-10078 | | Take up spring |
| C5-6-7-11- and R5-6-8 | 201-19303 | Filpec | 2C-19619 | | Pointer plate |
| C8 | 8D-10774 | .02 mfd x 400 volts | 2G-19620 | | Pointer |
| C9 | 8J-16081 | .047 mfd x 400 volts | 3M-19623 | | String guide |
| C10A, B | 8C-17391 | Electrolytic condenser | 37A-19626 | | Dial background |
| RESISTORS | | | | | |
| R1 | 9B1-82 | 47K ohms, 1/2 watt, 10% | 6D-19625 | | Dial scale |
| R2 | 9B1-27 | 220K ohms, 1/2 watt, 20% | 2M-19624 | | Dial mounting strip |
| R3 | 9B1-34 | 3.3 megohms, 1/2 watt, 20% | MISCELLANEOUS | | |
| R4 | 10A-19616 | Volume control and switch | 5C-19532-9 | | Cabinet (Ivory) |
| R5-6-8 | | See Filipecc | 5C-19532-36 | | Cabinet (Walnut) |
| R7 | 9B1-52 | 150 ohms, 1/2 watt, 10% | 5B-19790-8 | | Knob (Ivory) |
| R9 | 9B1-43 | 27 ohms, 1/2 watt, 10% | 5B-19790-74 | | Knob (Walnut) |
| R10 | 9B2-62 | 1000 ohms, 1 watt, 10% | 23J-19627 | | Grill cloth and baffle board |
| R11 | 9B1-54 | 220 ohms, 1/2 watt, 10% | 18A-19618 | | Speaker, 4" PM |
| TRANSFORMERS AND COILS | | | | | |
| T1 | 13E-19621 | Loop antenna assembly | 43D-12779 | | Tinnerman clip |
| T2-3 | 13B-17731 | IF transformer | 2H-17588 or | | Tube shield |
| T4 | 12C-19302 or | Output transformer | 2H-19188 | | Tube shield |
| | 12C-17595 | Output transformer | 2M-17589 or | | Tube shield base |
| T5 | 13D-17583 | Oscillator coil | 2M-19187 | | Tube shield base |
| DIAL PARTS | | | | | |
| | 3A-19617 | Tuning shaft | 2M-17580 | | IF locking clip |
| | 40A-17591 | Bushing | 15C-16007 | | 7-prong, socket |
| | | | 15B-10440 | | Octal socket |
| | | | 14M-10088-4 | | AC line cord and plug |
| | | | 2D-15432-1 | | Loop mounting bracket |
| | | | 23A-10344 | | Line cord lock |
| | | | 42A10-19851 | | Chassis mounting bolt |
| | | | 29A-3528 | | Steel washer |
| | | | 29J-16690 | | Rubber washer |

MODEL 15BR-1547A



SERVICE DATA
ELECTRICAL SPECIFICATIONS

| | | | |
|------------------------|-------------------------------------|-------------------|---------------------------------------------|
| Power Supply..... | 115 volts; 60-cycle AC, 60 watts. | Sensitivity..... | 20 microvolts average for .05 watts output. |
| Frequency Range..... | 540 to 1600 kc. | Power Output..... | 1.0 watts undistorted, 2.0 watts maximum. |
| Intermediate Freq..... | 455 kc. | Loud Speaker..... | 5 x 7 P. M., v.c. impedance 3.2 ohms. |
| Selectivity..... | At 1000 kc. 50 kc. at 1000 x signal | | |



Dial Cord Stringing

2339-3

ALIGNMENT PROCEDURE AND RECEIVER STAGE SENSITIVITIES

Alignment must be done in the cabinet.

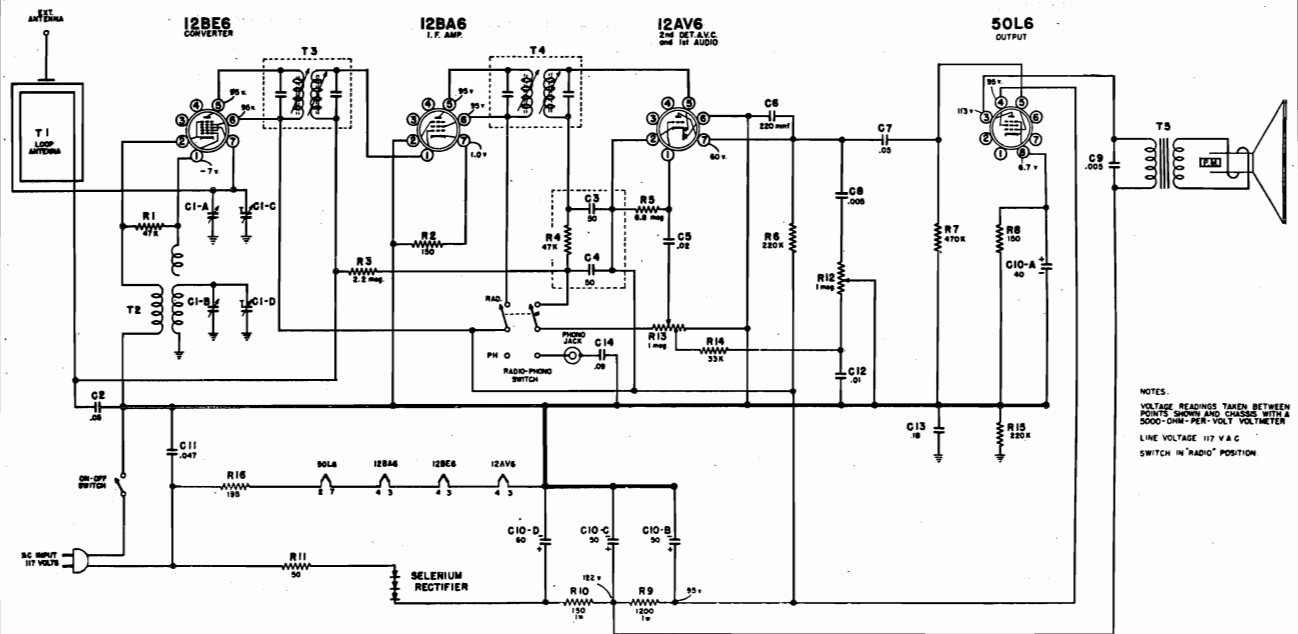
The signal source must be an accurately calibrated signal generator capable of supplying 455 Kc and up to 1620 Kc signals modulated 30% with a 400-cycle audio signal.

To connect the output meter, disconnect the speaker and substitute a 3.2 ohm, 5 watt resistor across the secondary winding of the output transformer. Connect output meter across 3.2 ohm resistor.

- Volume control at maximum for all adjustments.
- Align for maximum output. Reduce input as needed to keep output near 0.4 volts.
- Loop antenna should be connected to receiver and in its proper position when making adjustments.

| SIGNAL GENERATOR | | | | TUNER SETTING | ADJUST FOR MAXIMUM OUTPUT |
|------------------|--------------------|------------------------------------------|----------------------------|-------------------------------------------|----------------------------------------------------|
| Frequency | Coupling Capacitor | Connection to Radio | Ground Connection | | |
| 455 kc. | .1 mf. | 12BE6, Pin 7 | B MINUS POINT BUSS LEAD | Capacitor fully open (plates out of mesh) | Top and bottom Cores in output and input I.F. cans |
| 1620 kc. | .1 mf. | 12BE6, Pin 7 | | Capacitor fully open (plates out of mesh) | Oscillator trimmer C1-D on gang |
| 535 kc. | .1 mf. | 12BE6, Pin 7 | | Capacitor fully closed | Check for adequate range |
| 1400 kc. | — | Lay Generator lead near back of cabinet. | | Set dial pointer at 1400 kc. | Antenna trimmer C1-C on gang |

SCHEMATIC DIAGRAM WITH VOLTAGES



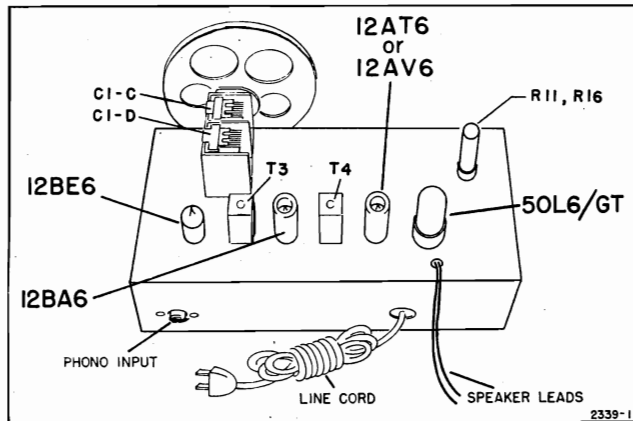
NOTES:
VOLTAGE READINGS TAKEN BETWEEN POINTS SHOWN AND CHANGED WITH A 5000-OHM PER-VOLT VOLTMETER
LINE VOLTAGE 117 V A.C.
SWITCH IN "RADIO" POSITION

NOTE: Either a 12AT6 or a 12AV6 tube may be used.

MODEL 15BR-1547A

TUBE COMPLEMENT

- 12BE6, Converter.
- 12BA6, I.F. Amplifier.
- 12AT6 or 12AV6, Detector, AVC, audio amplifier.
- 50L6, Output amplifier.
- Selenium rectifier.



Top Chassis View

REPLACEMENT PARTS LIST

Please specify PART number and chassis Model Number when ordering replacements.

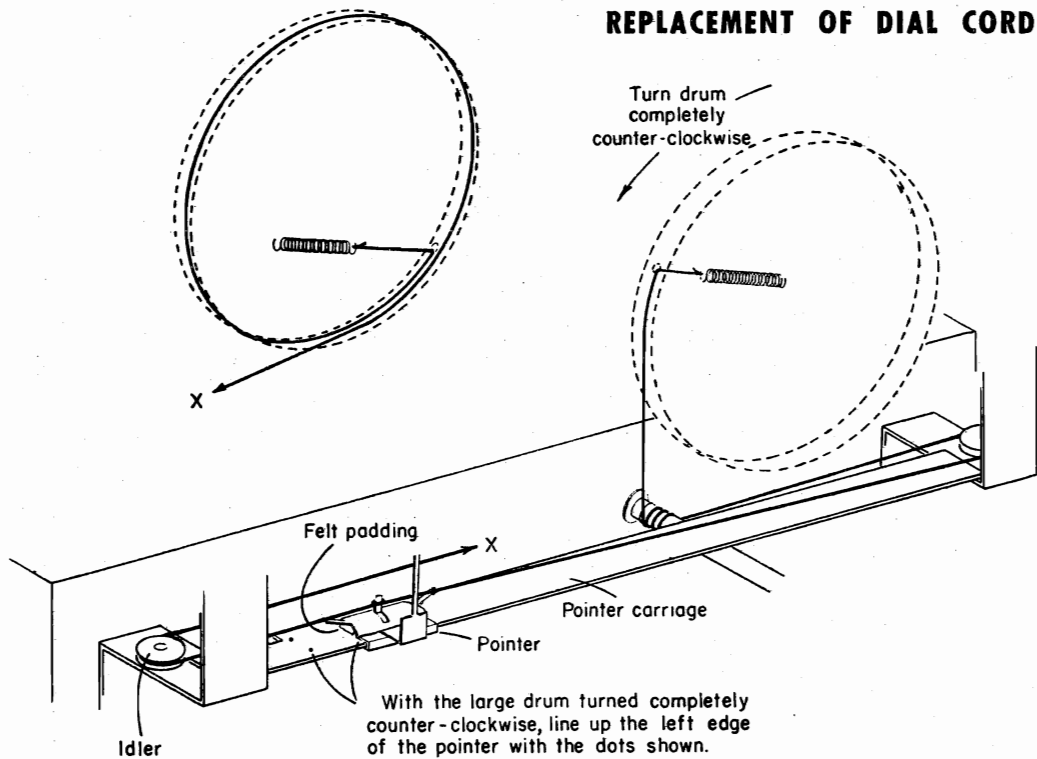
| Ref. No. | Part No. | Description | Ref. No. | Part No. | Description |
|-------------------------------|------------------------|----------------------------------|----------|----------|-------------|
| CAPACITORS | | | | | |
| C1A,B | 8A-18997 | 2 gang condenser | | | |
| C1C,D | | Trimmer on gang | | | |
| C2-7 | 8D-10770 | .05 mfd x 200 volts, paper | | | |
| C3-4 and R4 | 201-15005 | Filpec | | | |
| C5 | 8D-11304 | .02 mfd x 200 volts, paper | | | |
| C6 | 8G-14459 | 220 mmf, ceramic | | | |
| C8-9 | 8D-10935 | .005 mfd x 600 volt, paper | | | |
| C10A,B,C,D | 8C-19829 | Electrolytic condenser | | | |
| C11 | 8J-16081 | .047 mfd x 400 volt, molded case | | | |
| C12 | 8D-17258 | .01 mfd x 200 volt, paper | | | |
| C13 | 8D-11111 | .18 mfd x 400 volt, paper | | | |
| C14 | 8D-11251 | .09 mfd x 400 volts, paper | | | |
| RESISTORS | | | | | |
| R1 | 9B1-82 | 47K ohms, 1/2 watt, 10% | | | |
| R2-8 | 9B1-52 | 150 ohms, 1/2 watt, 10% | | | |
| R3 | 9B1-33 | 2.2 megohms, 1/2 watt, 20% | | | |
| R4 | | See Filipec | | | |
| R5 | 9B1-36 | 6.8 megohms, 1/2 watt, 20% | | | |
| R6-15 | 9B1-90 | 220K ohms, 1/2 watt, 10% | | | |
| R7 | 9B1-29 | 470K ohms, 1/2 watt, 10% | | | |
| R9 | 9B2-63 | 1200 ohms, 1 watt, 10% | | | |
| R10 | 9B2-52 | 150 ohms, 1 watt, 10% | | | |
| R11-16 | 9M-19778 | Claroostat resistor | | | |
| | | 50 ohms, 4 watts, 10% | | | |
| | | 195 ohms, 4 1/2 watts, 10% | | | |
| R12 | 11B-15852 | Tone control (1 meg.) | | | |
| R13 | 10A-19606 | Volume control & switch (1 meg.) | | | |
| R14 | 9B1-80 | 33K ohms, 1/2 watt, 10% | | | |
| TRANSFORMERS AND COILS | | | | | |
| T1 | 13E-19830 | Loop antenna | | | |
| T2 | 13D-19064 | Oscillator coil | | | |
| T3-4 | 13B-17731 | IF transformer | | | |
| T5 | 12C-19009-1 | Output transformer | | | |
| DIAL PARTS | | | | | |
| | 3A-18116 | Tuning shaft | | | |
| | 2D-10033 | Tuning shaft bracket | | | |
| | 29E-466 | Spring washer | | | |
| | 29C-10393 | "C" washer | | | |
| | 29J-18188 | Rubber washer | | | |
| | 2D-17627 | Pointer bar bracket | | | |
| | 2M-19825 | Pointer bar | | | |
| | 3M-10299* | Pulley | | | |
| | 27A-10102 | Shoulder rivet | | | |
| | 2G-18119 | Dial pointer | | | |
| | 53A-18547 | Dial string (approx. 60") | | | |
| | 49A-11324 | Tension spring | | | |
| | 50A-16434 | Felt strip for pointer | | | |
| | 2M-18440 | Dial mounting bracket | | | |
| | 2M-19777 | Dial scale | | | |
| MISCELLANEOUS | | | | | |
| | 2M-17580 | IF clip | | | |
| | 20A-19660 | Radio Phono switch | | | |
| | 43F-15390 | Pal nut | | | |
| | 23J-19826 | Background plate | | | |
| | 21J-19594 | Selenium rectifier | | | |
| | 2H-10974 | Tube shield | | | |
| | 15C-16007 | 7-pin, tube socket | | | |
| | 2H-17008 | Tube shield base | | | |
| | 15B-10440 | 8-pin, tube socket | | | |
| | 23A-10344 | Line cord lock | | | |
| | 14M-11479-5 | Line cord and plug | | | |
| | 19B-12170 | Pickup socket | | | |
| | 39A-14155 | Insulator | | | |
| | 2D-15432-1 | Loop mounting bracket | | | |
| | 5C-18396-36 | Bakelite cabinet | | | |
| | 23K-19822 | Grille cloth | | | |
| | 24M-18433-1 | Baffle board | | | |
| | 18A-19896 or 18A-17637 | Speaker, 7" PM | | | |
| | 5B-11131-74 | Knob | | | |
| | 5B-16057-74 | Knob (with dot) | | | |

MODELS 15BR-2756B,
15BR-2757A



2330

REPLACEMENT OF DIAL CORDS



With the large drum turned completely counter-clockwise, line up the left edge of the pointer with the dots shown.

Pointer Stringing and Alignment

2268-2

ELECTRICAL SPECIFICATIONS

| | | | | |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|-------------------|
| Power Supply..... | 115 volts, AC, 60-cycles; radio only 75 watts, with phono operation 100 watts. | FM Sensitivity..... | (For .5 watt output)—12 microvolts average. | |
| Frequency Ranges..... | Broadcast Band—540 to 1600 kc. FM Band—88 to 108 mc. | Power Output..... | 2.0 watts. 10% distortion. 4.5 watts maximum. | |
| Intermediate Freq..... | AM-455 kc.; FM-10.7 mc. | Loud Speaker..... | 8" PM. Voice coil impedance 3.2 ohms, 400 cycles. | |
| Selectivity..... | AM-47 kc. broad at 1000 times signal, measured at 1000 kc. I.F. FM-230 kc. broad at 2 times down. I.F. FM-470 kc. broad at 10 times down. | Tube Complement..... | T-44, Pilot light; 12AT7, FM-RF amp. mixer; 6BA7, AM converter, FM oscillator; 6BA6, IF amplifier; 6AU6, FM driver; | |
| AM Sensitivity..... | (For .5 watt output)—200 microvolts per meter average. | 6AL5, FM detector; 6AV6, AM detector and 1st audio; 6V6 output; 5Y3, rectifier. | Automatic Changer..... | See Manual 5089A. |

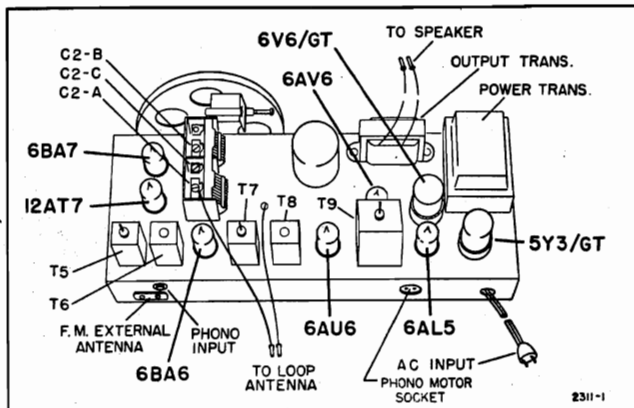
MODELS 15BR-2756B,
15BR-2757A

ALIGNMENT PROCEDURE

Broadcast Band Section I. F. and R. F.

The alignment procedure below includes the sensitivities at the inputs of various stages. All signal input values are based on an output of 500 milliwatts. This may be measured by disconnecting the speaker voice coil and substituting a 3.2-ohm resistor across the secondary winding of the output transformer. A reading of 1.27 volts AC across this resistor will be approximately equivalent to 500 milliwatt output with the speaker connected. The volume control must be set at maximum. The tone control must be set for maximum treble.

The signal source must be an accurately calibrated signal generator capable of supplying the frequencies designated, modulated 30% with a 400-cycle audio signal. A 400 cycle audio signal is required for the audio measurement. Variations in sensitivities of plus or minus 25% are usually permissible.



Chassis View

AM—I. F. ALIGNMENT

Band Switch in AM Position, Gang Open, Dummy Antenna .1 Mfd.

| SIGNAL GENERATOR FREQUENCY | CONNECTION TO RADIO | ADJUSTMENTS TO BE MADE | ADJUST FOR |
|-------------------------------|-----------------------------------------|------------------------------------------------|-----------------------------------------|
| 400 cycles. Use 65 millivolts | High Side of Volume Control and chassis | None | Maximum output Should be 500 Milliwatts |
| 455 Kc. Use 3300 microvolts | Pin 1 of 6BA6 I.F. Amp. and chassis | Primary and Secondary of T8. See chassis view. | Maximum output Should be 500 Milliwatts |
| 455 Kc. Use 55 microvolts | Pin 7 of 6BA7 Converter and chassis | Primary and Secondary of T6. See chassis view. | Maximum output Should be 500 Milliwatts |

BROADCAST BAND—R. F. ALIGNMENT

Check pointer so that the right hand edge of the pointer skirt coincides with the left hand edge of dial marker at the extreme left when gang is closed.

For adjustment, see dial mechanism illustration.

| SIGNAL GENERATOR FREQUENCY | SET POINTER AT | CONNECT TO RADIO | ADJUST |
|----------------------------|----------------------------------|--------------------------------------------------------------------------------------------------|-------------------------------------|
| 1600 Kc. | Extreme Right Calibration Marker | RADIATION COUPLING Use six turn loop across generator output. Place close to cabinet back. | Oscillator trimmer C2-B for maximum |
| 1400 Kc. | Third Calibration from Right | | Antenna Trimmer C2-A for maximum |

Check tracking at 1000 Kc, 600 Kc, and 535 Kc to be sure oscillator is set correctly.

MODELS 15BR-2756B,
15BR-2757A

ALIGNMENT PROCEDURE

FM Band Section I. F. and R. F.

A non-metallic alignment tool must be used.

IMPORTANT

No alignment of the FM section of this radio should be attempted unless you are positive that the circuits are in need of adjustment and you have the necessary equipment.

All components used in this radio are extremely stable and the tuned circuits should require no adjustment over a long period of time.

NOTE

The following alignment is based on the use of the vacuum tube voltmeter which has a "floating ground". In other words, the meter, when used as a vacuum tube voltmeter, can have both the positive and negative sides connected to points above ground and still give true readings. (See note "C" below).

A standard AM signal generator is required.

FM — I. F. ALIGNMENT

Band Switch in FM Position. Dummy Antenna .1 Mfd

| SIGNAL GENERATOR FREQUENCY | CONNECTION TO RADIO | VACUUM TUBE VOLT METER CONNECTION TO RADIO | ADJUSTMENTS TO BE MADE | ADJUST FOR |
|---------------------------------------|---------------------|--------------------------------------------|------------------------------------------------------------|------------------------------------------|
| 10.7 Mc. Use about .05 volt | Pin No. 1 of 6AU6 | Pin No. 7 of 6AL5 and chassis | Bottom Core Primary of T9 Ratio Detector | Resonance should be about 3 volts |
| 10.7 Mc. Use about .05 volt | Pin No. 1 of 6AU6 | See note "A" | Top Core Secondary of T9 Ratio Detector | Zero. Use zero center scale See note "B" |
| 10.7 Mc. Use about 1800 microvolts | Pin No. 1 of 6BA6 | Pin No. 7 of 6AL5 and chassis | Primary and Secondary of T7. FM Driver IF See chassis view | Resonance should be about 3 volts |
| 10.7 Mc. Use about 400 microvolts | Top end of C2-C | Pin No. 7 of 6AL5 and chassis | Primary and Secondary of T5. FM Input IF See chassis view | Resonance should be about 3 volts |

NOTES ON FM — I. F. ALIGNMENT

NOTE "A"—Connect two resistors in series, 100K OHMS each, from Pin No. 7 of 6AL5 to chassis (Pin No. 5). These resistors must be matched within 5%. Connect vacuum tube voltmeter between the midpoint of the resistors and point zz.

NOTE "B"—If T9 has been tampered with, it is possible that no crossover point will be found at first. Careful adjustment of both primary and secondary is necessary.

NOTE "C"—To use a VTVM which does not have the "floating ground" feature, in step 2 above, connect "ground" side of VTVM to midpoint of resistors (Note "A") and "high" side to point zz.

GENERAL—Input signals should be adjusted to give approximately 3 volts. The ratio detector is operating at a reasonable level at this point and will give the truest indication of correct alignment with the procedure specified.

FM—R. F. ALIGNMENT

Check pointer so that the right hand edge of the pointer skirt coincides with the left hand edge of dial marker at the extreme left when gang is closed.

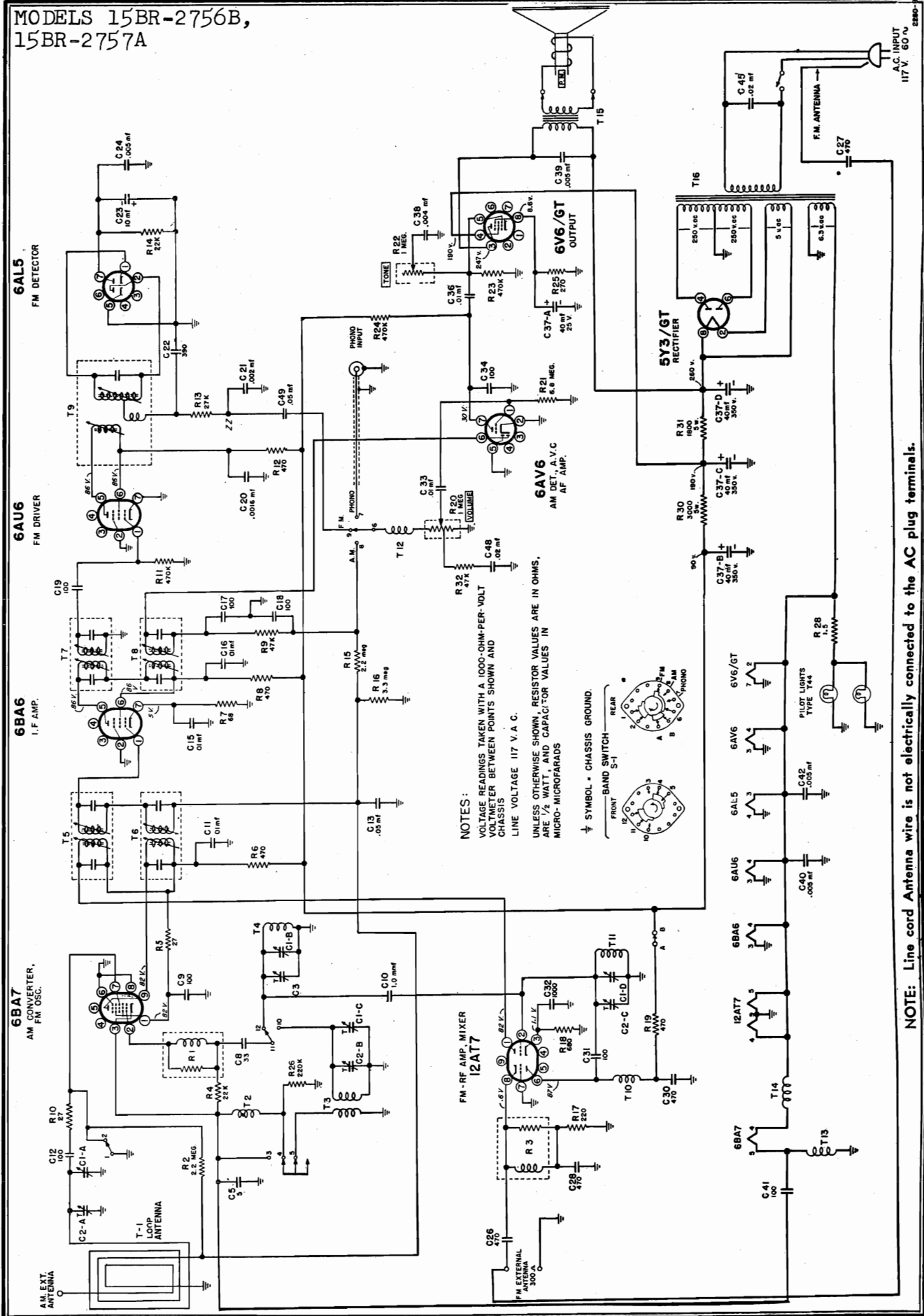
For adjustment, see dial mechanism illustration.

| SIGNAL GENERATOR FREQUENCY | POINTER | CONNECTION TO RADIO | ADJUST | VTVM CONNECTIONS |
|----------------------------|---------------------|----------------------|---------------------------|-------------------------------|
| 108 mc. | 108 mc. Marker | FM antenna terminals | FM Osc. C3 for maximum | Pin No. 7 of 6AL5 to chassis. |
| 98 mc. | Tune in Gen. Signal | See Note "B" below | FM Mixer C2-C for maximum | |

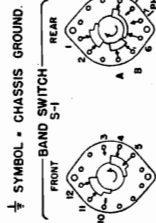
NOTE "A"—If a signal generator with the above fundamental frequency is not available, it is sometimes possible to use harmonics. An alternate procedure is to use a local station carrier of known frequency to align the FM Band and to use the vacuum tube voltmeter as above for resonance indication. A weak carrier, however, will not produce 3 volts.

NOTE "B"—Connect 300 ohms in series with "hot" side of generator and connect to left hand screw of external FM Antenna Terminals. Connect cold side of generator to right hand screw.

MODELS 15BR-2756B,
15BR-2757A



NOTES:
VOLTAGE READINGS TAKEN WITH A 1000-OHM-PER-VOLT
VOLTMETER BETWEEN POINTS SHOWN AND
CHASSIS
LINE VOLTAGE 117 V. A. C.
UNLESS OTHERWISE SHOWN, RESISTOR VALUES ARE IN OHMS,
ARE 1/2 WATT, AND CAPACITOR VALUES IN
MICRO-MICROFARADS



NOTE: Line cord Antenna wire is not electrically connected to the AC plug terminals.

MODELS 15BR-2756B,
15BR-2757A

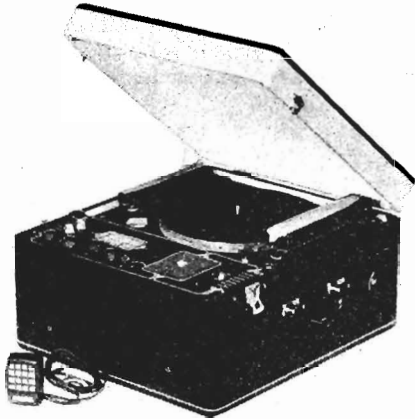
REPLACEMENT PARTS INFORMATION

Please specify PART number and chassis model number when ordering replacements.

REPLACEMENT PARTS LIST

| Ref. No. | Part No. | Description | Ref. No. | Part No. | Description |
|-------------------|--------------|------------------------------------------------|------------------------------------|---------------------------------------------|----------------------------|
| CAPACITORS | | | COILS, TRANSFORMERS, CHOKES | | |
| C1A,B,C,D | B-8A-17673 | Gang tuning condenser | T1 | C-13E-18924-1 | Loop antenna assembly |
| C2A,B,C, | | Trimmmers on gang | T2-T13-T14 | A-16B-16023 | RF choke coil assembly |
| C3 | A-201-15142 | Trimmer condenser | T3 | B-13D-18996 | Oscillator coil (AM) |
| C5 | C-8G-12166 | 5 mmf, ceramic, 10 % | T4 | A-13D-16617 | Oscillator coil (FM) |
| C8 | C-8G-14172 | 33 mmf, ceramic, 10 % | T5 | B-13A-18567 | Input IF transformer (FM) |
| C9-31-41 | C-8G-12759 | 100 mmf, ceramic, 10 % | T6 | B-13A-16662 | Input IF transformer (AM) |
| C10 | A-8G-12495-1 | 1.0 mmf, ceramic, 20 % | T7 | B-13B-18568 | Output IF transformer (FM) |
| C11-16-36 | C-8D-17270 | .01 mfd, 400 volts, 20 % | T8 | B-13A-16662 | Output IF transformer (AM) |
| C12 | C-8G-13131 | 100 mmf, ceramic, 10 % | T9 | B-13M-19356 | Ratio detector transformer |
| C13-49 | C-8D-10770 | .05 mfd, 200 volts, 20 % | T10 | A-16B-16613 | RF choke coil |
| C15-33 | C-8D-11738 | .01 mfd, 200 volts, 20 % | T11 | A-13E-16618 | RF coil (FM) |
| C17-18 | A-8F-13127 | 100 mmf, dual mica +30 % -20 % | T12 | A-16A-18676 | RF choke coil |
| C19-34 | C-8G-11734 | 100 mmf, ceramic, 10 % | T15 | B-12C-18143-1 | Output transformer |
| C20 | C-8D-19565 | .0016 mfd, 600 volts, 10 % | T16 | B-12A-18137 | Power transformer |
| C21 | C-8G-16049 | .002 mfd, ceramic, 10 % | MISCELLANEOUS | | |
| C22 | C-8F3-120 | 390 mmf, mica, 10 % | A-15B-13430 | 9-prong, miniature tube socket | |
| C23 | A-8C-18128 | 10 mfd, 50 volts | A-15B-10440 | 8-prong, octal socket | |
| C24-40-42 | A-8G-13962 | .005 mfd, ceramic | A-15C-16007 | 7-prong, miniature tube socket | |
| C26-27-28-30 | C-8G-11732 | 470 mmf, ceramic, 20 % | B-20A-19475 | Band change switch | |
| C32 | C-8G-13201 | 1000 mmf, ceramic | B-14M-11479-3 | AC line cord and plug | |
| C37-A-B-C-D | A-8C-18125 | 40 mfd x 25 volts, 40-40-40 mfd x 350 volts | A-23A-10344 | Line cord lock | |
| C38 | C-8D-10788 | .004 mfd, 600 volts, 20 % | A-19B-12170 | Phono pick-up socket | |
| C39 | C-8D-10935 | .005 mfd, 600 volts, +40 % -15 % | A-7B-13050 | Dipole socket | |
| C45 | C-8J-11321 | .02 mfd, 600 volts, 20 % | B-47A-18870 | Pilot light assembly | |
| C48 | C-8D-11304 | .02 mfd, 200 volts, 20 % | A-46A-11971 | Pilot light bulb, T-44 | |
| RESISTORS | | | A-19B-12468 | Phono motor socket | |
| R1 | A-16B-16615 | Suppressor | B-18A-18872 | Speaker, 8" PM | |
| R2-15 | C-9B1-33 | 2.2 megohms, 1/2 watt, 20 % | B-2G-18868 | Escutcheon | |
| R3 | A-16B-16616 | Suppressor | B-30A-18869 | Dial scale | |
| R4-14 | C-9B1-78 | 22K ohms, 1/2 watt, 10 % | B-5B-18876-74 | Knob | |
| R5-10 | C-9B1-43 | 27 ohms, 1/2 watt, 10 % | B-5B-18877-74 | Knob (with indicator) | |
| R6-8-12-19 | C-9B1-58 | 470 ohms, 1/2 watt, 10 % | DIAL PARTS | | |
| R7 | C-9B1-48 | 68 ohms, 1/2 watt, 10 % | A-3A-18548 | Tuning shaft | |
| R9-32 | C-9B1-82 | 47K ohms, 1/2 watt, 10 % | A-2D-10033 | Tuning shaft bracket | |
| R11-23-24 | C-9B1-94 | 470K ohms, 1/2 watt, 10 % | A-2M-16034 | Dial mounting bracket | |
| R13 | C-9B1-79 | 27K ohms, 1/2 watt, 10 % | B-6M-17622 | Background diffuser | |
| R16 | C-9B1-34 | 3.3 megohms, 1/2 watt, 20 % | B-2M-16656 | Pointer bar | |
| R17 | C-9B1-54 | 220 ohms, 1/2 watt, 10 % | A-2D-17627 | Pointer bar bracket | |
| R18 | C-9B1-60 | 680 ohms, 1/2 watt, 10 % | A-3M-10299 | Pulley | |
| R20 | A-10A-17971 | 1 megohm, (volume control and switch) | B-27A-10102 | Shoulder rivet | |
| R21 | C-9B1-36 | 6.8 megohms, 1/2 watt, 20 % | B-2G-18119 | Dial pointer | |
| R22 | A-11B-16502 | 1 megohm, (tone control) | A-50A-16434 | Felt Strip for Pointer | |
| R25 | C-9B1-55 | 270 ohms, 1/2 watt, 10 % | A-49A-11324 | Tension spring | |
| R26 | C-9B1-27 | 220K ohms, 1/2 watt, 20 % | PHONO PARTS | | |
| R28 | C-9C2-1065 | 1.5 ohms, 1 watt, 10 % | C-21H-19575 | Record Changer assembly, (GI model 700F) | |
| R30 | C-9C12-2059 | 3000 ohms, 5 watts, 5 % | | Shure P-81 cartridge | |
| R31 | C-9C12-1102 | 1800 ohms, 5 watts, 10 % | | Needle | |
| | | | A-39A-17837 | 45 RPM fiber inserts | |

MODEL 15GAA-3967C



- Power Output . . . 8.9 watts maximum; 2.4 watts, 10% distortion
- Loud Speaker . . . 5" permanent magnet dynamic - 1.47 oz. Alnico 5 magnet - voice coil impedance 3.2 ohms at 400 cycles.
- Tubes and Dial
- Light Complement . . . 1 6SA7 GT Mixer
1 6SK7 GT IF Amplifier
1 6SQ7 GT 2nd. Det. 1st AF
1 6V6 GT Power Amp.
1 6X5 GT Rectifier
1 6SQ7 GT Mike Amp.
2 NE-51 Neon Lamps
1 No. 47 Dial Lamp
- Recorder Unit . . . General Industries - Model GI-R90L - 115 volts 60 cycle AC - Part No. 2305
- Microphone Crystal - Electro Voice Model 915, Part No. 2510

SPECIAL INSTRUCTIONS

REMOVAL OF RADIO CHASSIS

Remove the four sheet metal screws at the edge of the metal panel. Remove the two machine screws from the front of the cabinet. Lift chassis enough to remove the small three-prong (antenna) plug from the top of the chassis. Then disconnect the three plugs from the rear of the chassis, and lift the chassis out of the cabinet.

NOTE: In cabinets that have a panel in bottom, remove this panel and disconnect the four plugs through this opening; then proceed as above.

ELECTRICAL SPECIFICATIONS

- Power Supply 105-125 volts AC, 60 cycles, 45 watts normal, 75 watts recorder operating.
- Frequency Range. . . 535-1620 KC
- Intermediate Frequency 455 KC
- Selectivity 36 KC broad at 1000 times signal, 1000 KC
- Sensitivity (for 0.5 watt output - with loop antenna) 200 microvolts per meter average.

REMOVAL OF RECORDER UNIT

After the radio chassis has been removed, unscrew the four machine screws at the corners of the unit. Lift "Recorder" arm three inches, swing it halfway towards the turntable center and then lower it. Grasp the unit at the edges and lift it out.

When testing the radio, the loop antenna should be removed from the cabinet and reconnected to the chassis.

OPERATING INSTRUCTIONS

Operating the AIRLINE Radio Recorder is not complicated or difficult. However, the better you understand it the better your results will

be. Read these instructions carefully so that you may derive the greatest pleasure and satisfaction from your Radio-Recorder.

INSTALLATION

IMPORTANT During shipment the base plate, on which are mounted the motor and the recording and play-back arms, is secured firmly to case by four bolts located at each corner of the base plate. These bolts must be loosened about 2 complete turns to allow the recording assembly to float freely on the rubber shock absorbers under the plate.

Before connecting your Radio-Recorder, make certain that the line voltage is 105-125 volts AC, 60 Cycles.

For best results the unit must be operated on a firm and level support. This is important to insure proper "tracking" of the arms when making or playing recordings.

OPERATION

TO OPERATE RADIO

Turn "Function Selector" switch knob to Radio position. Turn OFF-ON switch to the right and allow time for tubes to warm up, then tune in desired station. Adjust the Tone and Volume controls to the most pleasing tonal balance.

TO RECORD FROM RADIO

1. Raise the Recording Arm and insert the cutting needle in the cutting head, making sure that the point of the retaining screw bears against the flattened shank of the needle. Tighten the screw firmly with your fingers - DC NOT USE PLIERS. RE-TIGHTEN the screw after each recording.

2. Turn "Function Selector" switch to Radio position and tune in station desired.

3. Turn "Function Selector" switch knob to Record Radio position. Turn Tone Control all the way to the right-Treble position. THIS IS IMPORTANT. Recordings made with the Tone Control in any other position will have a tendency to sound muffled. Adjust Volume Control to a point where the lower neon indicator lamp will glow continuously while the upper one will light up only during loud passages of music or speech. The correct setting of the Volume Control is very **IMPORTANT**. Either excessive or insufficient volume will result in poor recording. Too much volume will produce distorted recordings while insufficient volume will cause excessive groove and surface noise. WARNING - Excessive volume can permanently damage the crystal recording head. NEVER ADVANCE the VOLUME CONTROL any farther than is required to light up the upper neon indicator lamp on loud passages of music or speech.

4. Place a blank recording disc on the turntable so that the Retractable Pin protrudes through the small hole near the center hole of the recording disc.

5. The AIRLINE Radio-Recorder is equipped with a two-speed recording unit. Recordings can be made either at the standard speed (78 RPM) or the professional slow speed (33-1/3 RPM). At

33-1/3 RPM the recording time is almost doubled. For example: at 78 RPM on a 10 inch record the recording time is approximately 4½ minutes, while at 33-1/3 RPM on a 10 inch record the time is approximately 9½ minutes. Select the recording speed desired and start the turntable. Raise the Recording Arm about three inches, move horizontally and place on the recording disc. The record is now being cut and a fine thread or shaving cut from the record will be directed toward the center post. Allow this shaving to collect around the center post until the recording is finished. When the recording is finished, raise the Recording Arm about 3 inches and return it to the arm rest. Turn motor off and remove the shavings that have collected around the center post.

TO RECORD FROM MICROPHONE

Turn "Function Selector" knob to Record Microphone position and follow the same procedure as outlined in To Record From Radio. The microphone should be used as far away from the recorder as possible to reduce possible acoustic feedback, a howl that results from excessive sound from the loud speaker re-entering the microphone. For best results the microphone should be used from 6 to 8 inches from the source of the sound to be recorded.

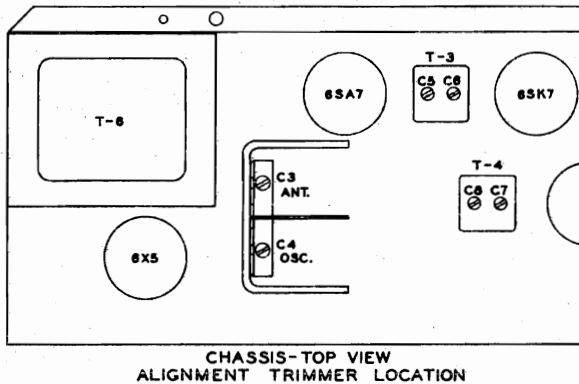
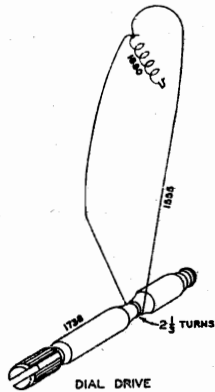
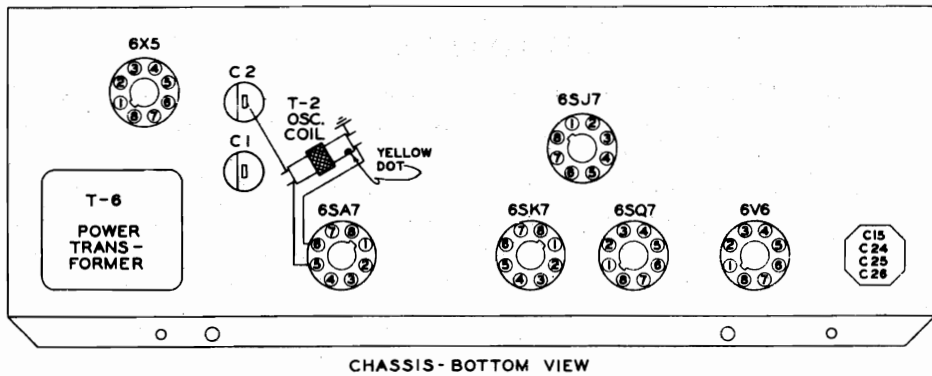
TO PLAY RECORDS

Turn "Function Selector" knob to "Phonograph" position. Select the proper speed 33 or 78 RPM, start the turntable and place the "Play-back arm" on the record. Adjust tone and Volume to pleasing setting. LP microgroove records are played with speed selector in "33" position.

TO USE AS PUBLIC ADDRESS SYSTEM

Turn "Function Selector" knob to Public Address position. As in Recording From Microphone, the microphone should be used as far away from the recorder as possible to reduce possible acoustic feedback. The setting of the volume control will depend on the position and the distance of the microphone in relation to the loud speaker.

MODEL 15GAA-3967C



ALIGNMENT PROCEDURE

The following equipment is required for aligning:

A signal generator which will provide an accurately calibrated signal at the indicated test frequencies; an output indicating meter; a non-metallic screwdriver.

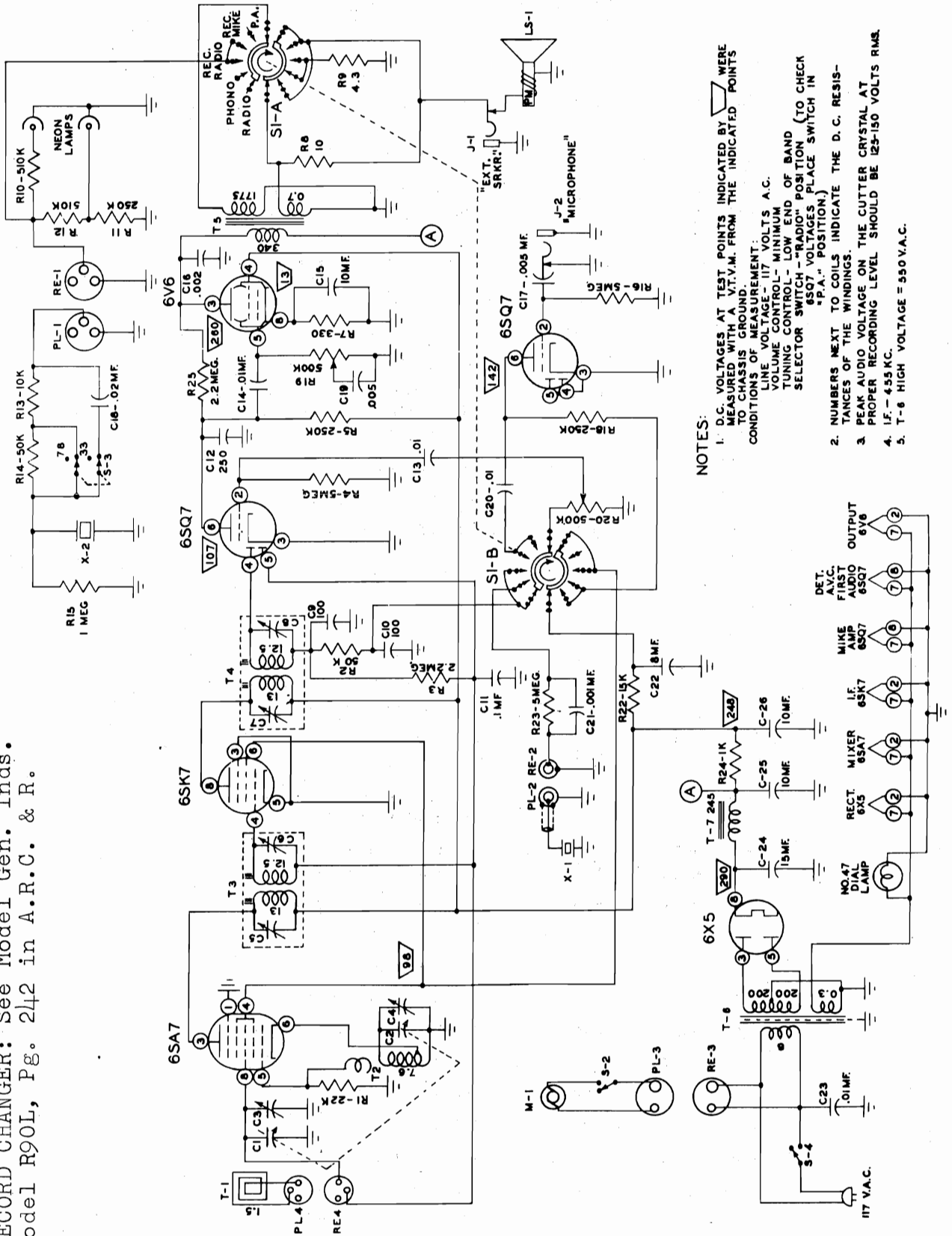
Radiation Loop: 2-turn loop, 6 inches in diameter.


Conditions for Alignment:

- Tone - Treble
- Volume - Maximum
- Selector Switch - "Radio" position
- Test loop coupled loosely to receiver by spacing - receiver loop in same position as it will be with chassis in cabinet.

| SIGNAL GENERATOR COUPLING | SIGNAL GENERATOR FREQUENCY | RADIO DIAL SETTING | OUTPUT METER | REMARKS | ADJUST FOR MAXIMUM OUTPUT |
|---------------------------|----------------------------|-------------------------|-------------------|------------------------------------------------------|---------------------------|
| LOOP | 455 KC | Low End of Band | Across Voice Coil | Short out osc. tuning gang section C-2; compress C-3 | C-8, C-7, C-6, C-5 |
| LOOP | 1620 KC | High End of Band | " | Remove short across C-2 | C-4 |
| LOOP | 1400 KC | Point of Maximum Output | " | Set pointer to 140 on dial | C-3 |
| LOOP | 600 KC | Point of Maximum Output | " | Knife C-1 plates for maximum output | |
| LOOP | 1400 KC | 1400 | " | Recheck alignment. | C-3 if necessary |

RECORD CHANGER: See Model Gen. Inds.
Model R90L, Pg. 242 in A.R.C. & R.



- NOTES:
1. D.C. VOLTAGES AT TEST POINTS INDICATED BY  WERE MEASURED WITH A V.T.V.M. FROM THE INDICATED POINTS TO CHASSIS GROUND. CONDITIONS OF MEASUREMENT: LINE VOLTAGE - 117 VOLTS A.C. VOLUME CONTROL - MINIMUM TUNING CONTROL - LOW END OF BAND SELECTOR SWITCH - "RADIO" POSITION (TO CHECK "P.A." POSITION)
 2. NUMBERS NEXT TO COILS INDICATE THE D.C. RESISTANCES OF THE WINDINGS.
 3. PEAK AUDIO VOLTAGE ON THE CUTTER CRYSTAL AT PROPER RECORDING LEVEL SHOULD BE 125-150 VOLTS RMS.
 4. IF - 455 KC.
 5. T-6 HIGH VOLTAGE = 550 V.A.C.

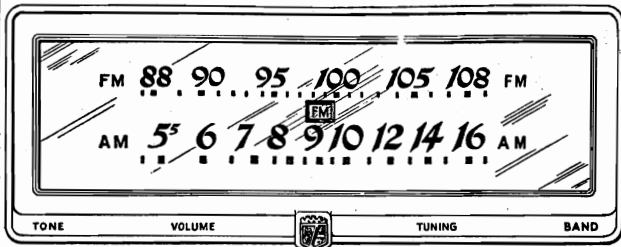
RADIO REPLACEMENT PARTS LIST

| Ref. No. | Part No. | Description | Qty. Used |
|--------------------------------------------------------------|----------|-------------------------------------------------------|-----------|
| CAPACITORS | | | |
| C-1, C-2 C-3, C-4 | 1004 | Tuning Gang and Trimmer Assembly | 1 |
| C-5, C-6 C-7, C-8 | | Part of I. F. Assemblies | |
| C-11 | 807 | .1 uf 400 V Tubular | 1 |
| C-12 | 809 | 250 uuf Ceramic | 1 |
| C-15 | | 10 uf 25 V | |
| C-24 | 1005 | 14 uf 450 V Dry | 1 |
| C-25 | | 8 uf 450 V Electrolytic | |
| C-26 | | 8 uf 450 V | |
| C-16 | 810 | .002 uf 600 V Tubular | 1 |
| C-18 | 808 | .02 uf 400 V Tubular | 1 |
| C-23 | 802-A | .01 uf 600 V Tubular | 1 |
| C-17 | | 5000 MMF. Ceramic Cond. | |
| C-19 | | | |
| C-22 | | 8 MF - 350 V Cond. | |
| CAPRISTORS (Combination Capacitors and Resistors) | | | |
| C-9, C-10 R-2 | 811 | 100 uuf - 50 K OHM - 100 uuf Dual Shunt Connection | 1 |
| C-13, R-4 | 813 | .01 uf - 5 Meg Ohm, Common Terminal Connection | 1 |
| C-14, R-5 C-20, R-18 | 814 | .01 uf - 250 K Ohm, Common Terminal Connection | 2 |
| C-21, R-23 | 812 | .001 uf - 5 Meg Ohm, Parallel Connection | 1 |
| RESISTORS | | | |
| R-1 | 517 | 22,000 Ohm 0.5 Watt Carbon | 1 |
| R-3, R-25 | 615 | 2.2 Meg. 0.5 Watt Carbon | 2 |
| R-10, R-12 | 501 | 510,000 Ohm 0.5 Watt Carbon | 2 |
| R-7 | 602 | 330 Ohm 1.0 Watt Carbon | 1 |
| R-8 | 527 | 10 Ohm 0.5 Watt Carbon | 1 |
| R-9 | 526 | 4.3 Ohm 1.0 Watt Wire | 1 |
| R-11 | 529 | 250,000 Ohm 0.5 Watt Carbon | 1 |
| R-13 | 522 | 10,000 Ohm 0.5 Watt Carbon | 1 |

RADIO REPLACEMENT PARTS LIST (Cont.)

| Ref. No. | Part No. | Description | Qty. Used |
|-------------------------------|----------|----------------------------------------------------|-----------|
| R-14 | 523 | 50,000 Ohm 0.5 Watt Carbon | 1 |
| R-15 | 516 | 1.0 Meg. Ohm 0.5 Watt Carbon | 1 |
| R-16 | 525 | 5.0 Meg. Ohm 0.5 Watt Carbon | 1 |
| R-19 | 408 | 500,000 Ohm Tone Control | 1 |
| R-20, S-4 | 401 | 500,000 Ohm Volume Control, Off-On Switch | 1 |
| R-22 | 606 | 15,000 Ohm 2.0 Watt Carbon | 1 |
| R-24 | 607 | 1,000 Ohm 1.0 Watt Carbon | 1 |
| TRANSFORMERS AND COILS | | | |
| T-1 | 1512 | Loop Antenna | 1 |
| T-2 | 1403 | Oscillator Coil | 1 |
| T-3 } T-4 } | 1402 | I.F. Transformer and Can Assembly | 2 |
| T-5 | 1202 | Output Transformer | 1 |
| T-6 | 1101 | 117 Volt, 60 Cycle Standard Power Transformer | 1 |
| T-7 | 1301 | Filter Choke | 1 |
| DIAL DRIVE AND PANEL ASSEMBLY | | | |
| | 1722 | Dial Scale | 1 |
| | 1736 | Dial Pointer | 1 |
| | 2307 | Dial Bezel | 1 |
| | 1738 | Tuning Shaft | 1 |
| | 1879 | Fiber Washer for Tuning Shaft | 1 |
| | 1878 | Hairpin Cotter | 1 |
| | 1555 | Dial Cable | 1 |
| | 1880 | Dial Cable Spring | 1 |
| | 1513 | Pilot Lamp Assembly | 1 |
| | 2202-A | NE-51 Neon Lamp | 2 |
| | 2306 | Neon Protector - plastic | 2 |
| J-1, J-2 | 1875 | Shorting Type Jack | 2 |
| | 2406 | Knob, Walnut Plastic | 1 |
| | 2407 | Knob, Walnut Plastic with White dot. | 2 |
| | 2409 | Knob, Walnut Plastic - white dot - Steel insert | 1 |
| | 2127-A | Front Panel, Metal | 1 |
| | 2131 | Speaker Grille with emblem | 1 |
| | 2103-A | Case, Plywood, leatherette covered. | 1 |

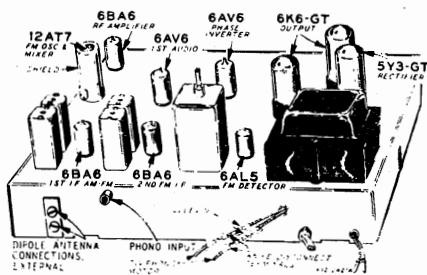
MODEL 15WG-2745C



GENERAL DESCRIPTION

This is a two band, nine tube (plus rectifier tube) AM and FM receiver with an automatic record changer. The I-F stages use high gain miniature type tubes. Built-in Air Wave Aerials are provided for the FM and Broadcast bands. Features include, compensator circuits to prevent oscillator drift, automatic volume control, push-pull pentode power output stage, PM dynamic loud speaker and an electrostatic shield in the power transformer to reduce power line noise.

The receiver and record changer are housed in a console combination cabinet with controls provided for tuning, volume, tone and band or phono selection.



DRIVE CORD REPLACEMENT

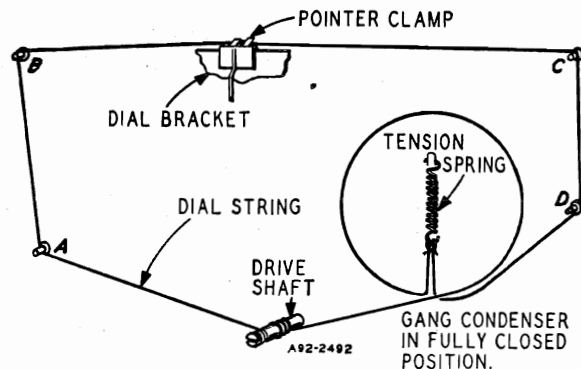
Use a new 10X54 drive cord assembly or a new length of cord 48 inches long for the installation, winding three turns clockwise around the drive shaft with the turns progressing away from the chassis. After completing the installation, rotate the drive shaft a few turns to take up the slack in the cord.

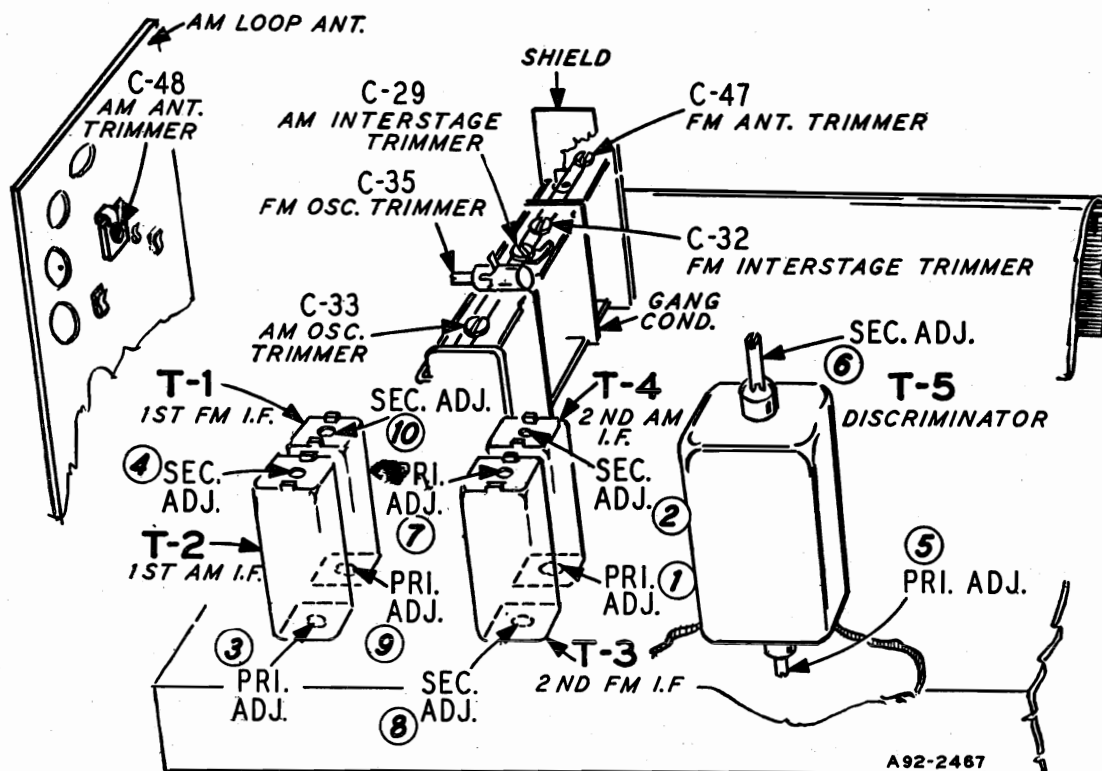
ELECTRICAL SPECIFICATIONS

- Power Supply 105-125 volts AC 60 cycles, 80 watts, 100 watts with record changer
- Frequency Ranges..... Broadcast 540-1600 KC
Frequency Modulation 88-108 MC
- Intermediate Frequency.. AM—455 KC
FM—10.7 MC
- Selectivity AM—43 KC broad at 1000 times signal, measured at 1000 KC
I.F. FM—200 KC broad at 2 times down
I.F. FM—760 KC broad at 200 times down
- AM Sensitivity (For .5 watt output with external antenna)
10 microvolts average
- FM Sensitivity (For .5 watt output)
30 microvolts average
- Power Output 8.5 watts maximum
6.0 watts 10% distortion
- Loud Speaker 12" PM Dynamic
- Voice Coil Impedance.. 3.2 ohms 400 cycles

Tube and Dial Lamp Complement

- 1 6BA6 AM-FM R-F Amplifier
- 1 12AT7 FM & AM Osc. & Mixer
- 1 6BA6 FM-AM 1st I-F Amplifier
- 1 6BA6 FM 2nd I-F Amplifier
- 1 6AL5 FM Detector
- 1 6AV6 Audio Amplifier, AM 2nd Detector and AVC
- 2 6K6-GT Audio Output
- 1 5Y3-GT Rectifier
- 1 6AV6 Phase Inverter
- 2 No. 47 Dial Lamps





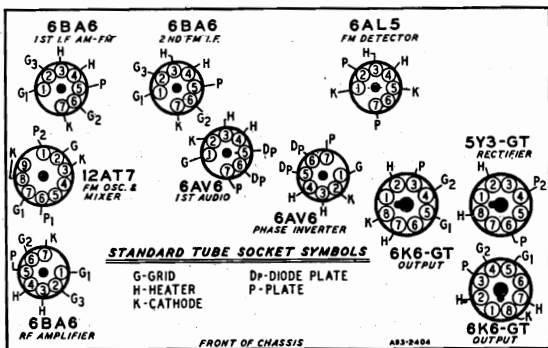
NOTE—T-5 discriminator transformers with Part No. 9A1970 stamped on the can must be aligned as outlined in this service manual.

Discriminator transformers with Part No. 9A2064 stamped on the can have the primary adjustment at the top and the secondary adjustment at the bottom.

TUBE SOCKET VOLTAGES

Socket voltages are shown on the Schematic diagram at the tube socket terminals. All voltages are between the socket terminal and chassis ground. Plate, screen and cathode voltages were taken with a 1000 ohm-per-volt meter with a 300 volt scale used for plate and screen voltages. Audio grid voltages were read with a vacuum tube volt-meter. Conditions of measurement are:

- Line voltage 117 Volts AC
- Signal Input None
- A variation of $\pm 10\%$ is usually permissible.



ALIGNMENT PROCEDURE
AM STAGES

The following is required for aligning:
An All Wave Signal Generator. Which Will Provide an Accurately Calibrated Signal at the Test Frequencies as Listed.
Output Indicating Meter, Non-Metallic Screwdriver, Dummy Antennas
—.1 mf, 200 mmf.

Volume Control—Maximum all Adjustments
Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.
Allow Chassis and Signal Generator to "Heat Up" for Several Minutes.

| SIGNAL GENERATOR | | CONNECT GENERATOR OUTPUT TO | THROUGH DUMMY ANTENNA | BAND SWITCH SETTING | GANG CONDENSER SETTING | ADJUST | ADJUST FOR |
|------------------|-------------------|-----------------------------|-----------------------|---------------------|-------------------------------------------------------------------|--------------------------------------------------------|----------------|
| | FREQUENCY SETTING | | | | | | |
| I-F | 455 kc | 12AT7 Pin 7 and Chassis | .1 mf | Broadcast | Rotor Fully Open | 2nd I-F Pri. & Sec. ① & ② 1st I-F Pri. & Sec. ③ & ④ | Maximum Output |
| Broadcast | 1620 kc | External ant. term. | 200 mmf | Broadcast | Rotor Fully Open | Broadcast Oscillator C-33 | |
| | 1400 kc | External ant. term. | 200 mmf | Broadcast | Turn Rotor to Max. Output Set pointer to 1400 kc See Note A | Broadcast Interstage C-29 | |
| | 1400 kc | External ant. term. | 200 mmf | Broadcast | | Loop Antenna C-48 | |

Note A—If the pointer is not at 1400 KC on dial, reset pointer at the 1400 KC mark on the dial scale.

MODEL 15WG-27450

FM STAGES

The following equipment is required for aligning:
 An accurately calibrated signal generator providing unmodulated signals at the test frequencies listed below.
 Non-metallic screwdriver.
 Dummy Antennas and I-F Loading Resistor—.01 mf, 300 ohms and 1000 ohms.

Zero center scale DC vacuum tube voltmeter having a range of approximately 3 volts.
 (If a zero center scale meter is not available, a standard scale vacuum tube voltmeter may be used by reversing the meter connections for negative readings.)
 Allow chassis and signal generator to warm up for several minutes.

| | SIGNAL GENERATOR | | THROUGH DUMMY ANTENNA | BAND SWITCH SETTING | GANG CONDENSER SETTING | ADJUST | ADJUST FOR |
|---------------|-------------------|--------------------------------|-----------------------|---------------------|------------------------|----------------------------------------------------------------|--------------------|
| | FREQUENCY SETTING | CONNECT GENERATOR OUTPUT TO | | | | | |
| Discriminator | 10.7 MC Note B | 6BA6 2nd I-F Pin 1 and Chassis | .01 mf | FM | Rotor Fully Open | Disc. Pri. (5) Note A | Maximum Deflection |
| | 10.7 MC Note B | 6BA6 2nd I-F Pin 1 and Chassis | .01 mf | FM | Rotor Fully Open | Disc. Sec. (6) Note C | Zero Center |
| I-F | 10.7 MC Note F | 6BA6 1st I-F Pin 1 and Chassis | .01 mf | FM | Rotor Fully Open | 2nd I-F Pri. Note A and D (7) 2nd I-F Sec. Note A and E (8) | Maximum Deflection |
| Discriminator | 10.7 MC Note F | 6BA6 1st I-F Pin 1 and Chassis | .01 mf | FM | Rotor Fully Open | Disc. Pri. (5) Note A | Maximum Deflection |
| | 10.7 MC Note F | 6BA6 1st I-F Pin 1 and Chassis | .01 mf | FM | Rotor Fully Open | Disc. Sec. (6) Note C | Zero Center |
| | 10.7 MC Note F | FM-RF Gang Condenser terminal | .01 mf | FM | Rotor Fully Open | 1st I-F Pri. (9) 1st I-F Sec. (10) Notes A, D & E | Maximum Deflection |

Recheck I-F Adjustments in order given

| | | | | | | | |
|------------|-----------------|-------------------------------------------------------------------------------------|----------|----|---------------------------------|---------------------------|--------------------|
| R-F & Osc. | 108.4 Note H | Disconnect dipole and connect generator to dipole terminals with resistor in series | 300 ohms | FM | Rotor Fully Open | Oscillator C-35 Note G | Maximum Deflection |
| | 104.5 | Disconnect dipole and connect generator to dipole terminals with resistor in series | 300 ohms | FM | Tune Rotor for Max. AVC voltage | FM Interstage C-32 | Maximum Deflection |
| | 104.5 | Disconnect dipole and connect generator to dipole terminals with resistor in series | 300 ohms | FM | Tune Rotor for Max. AVC voltage | Ant. C-47 | Maximum Deflection |

Recheck R-F and Osc. Adjustments in order given

NOTE A—Test Equipment connections are as given in the table. The zero center scale DC vacuum tube voltmeter is to be connected between chassis ground and the AVC line at the junction of resistor R-22 and condenser C-18 for all adjustments except the discriminator secondary adjustment, for which See Note C.

NOTE B—A signal of .1 volt must be fed into the receiver for this adjustment.

NOTE C—Disconnect zero center DC vacuum tube voltmeter from AVC and connect to junction of R-18 and C-62. Adjust for zero voltage indication.

NOTE D—Before adjusting Pri. core connect 1000 ohm load resistor across the 2nd I.F. secondary terminals. Input may have to be increased to .1 volt if receiver is badly mis-aligned.

NOTE E—Disconnect 1000 ohm load resistor from secondary terminals and connect across the 2nd I.F. primary terminals. Input may have to be increased to .1 volt if receiver is badly mis-aligned.

NOTE F—Input can be reduced to 10,000 microvolts.

NOTE G—Oscillator frequency above signal frequency.

NOTE H—Remove the 1000 ohm load resistor before attempting to check the R-F and oscillator adjustments.

REPLACEMENT PARTS LIST

| Ref. No. | Part No. | Description | Qty. Used in Set |
|-------------------|----------|------------------|------------------|
| CAPACITORS | | | |
| C-1 | 14A207 | Gang Condenser | 1 |
| C-2 | 47X507 | 5000 mmf Ceramic | 11 |
| C-3 | | | |
| C-7 | | | |
| C-9 | | | |
| C-13 | | | |
| C-16 | | | |
| C-17 | | | |
| C-18 | | | |
| C-19 | | | |
| C-27 | | | |
| C-42 | | | |

| | | | | |
|------------------|---------------------------|------------|------------------|---|
| C-4 | 47X497 | 100 mmf | Ceramic | 1 |
| C-5 | 47X499 | 47 mmf | Ceramic | 1 |
| C-8 | 47X498 | 47 mmf | Ceramic | 1 |
| C-10 } C-65 } | Part of T-1 1st I-F (FM) | | | |
| C-11 } C-28 } | 47X550 | 100 mmf | Ceramic | 2 |
| C-15 | Part of T-3 2nd I-F (FM) | | | |
| C-21 | Part of T-5 Discriminator | | | |
| C-22 } C-24 } | 47X501 | 68 mmf | Ceramic | 4 |
| C-31 | | | | |
| C-51 | | | | |
| C-23 | | | | |
| C-23 | 45X361 | 5 mf 100 V | Dry Electrolytic | 1 |

| Ref. No. | Part No. | Description | Qty. Used in Set |
|--------------------------------------|----------------------------|------------------------------------------|--------------------|
| C-25 } C-26 } C-45 } | 47X496 | 500 mmf Ceramic..... | 3 |
| C-29 } C-32 } C-33 } C-47 } | Part of Gang Condenser | | |
| C-30 | 47X552 | 15 mmf Ceramic..... | 1 |
| C-34 } C-46 } | 47X516 | 20 mmf Ceramic..... | 2 |
| C-35 | 26A489 | 1-8 mmf Trimmer..... | 1 |
| C-36 } C-64 } | 47X549 | 5 mmf Ceramic..... | 2 |
| C-37 } C-65 } | F66403 | .04 mf 600 V Tubular..... | 2 |
| C-38 } C-39 } | Part of T-2 1st I-F (AM) | | |
| C-40 | B66503 | .05 mf 200 V Tubular..... | 1 |
| C-41 } C-43 } | Part of T-4 2nd I-F (AM) | | |
| C-44A } C-44B } | 47X112 | 50-50 mmf Dual Mica.... | 1 |
| C-48 | Part of T-7 (Loop Antenna) | | |
| C-50A } C-50B } C-50C } | 45X374 | 40 mf 450 V 40 mf 450 V 40 mf 25 V | Dry Electrolytic 1 |
| C-52 | F66103 | .01 mf 600 V Tubular..... | 1 |
| C-53 | 47X468 | 220 mmf Ceramic..... | 1 |
| C-54 } C-59 } | F66203 | .02 mf 600 V Tubular..... | 2 |
| C-55 } C-60 } | F66102 | .001 mf 600 V Tubular..... | 2 |
| C-56 | B66203 | .02 mf 200 V Tubular..... | 1 |
| C-57 | F66602 | .006 mf 600 V Tubular..... | 1 |
| C-58 | B66502 | .005 mf 200 V Tubular..... | 1 |
| C-61 | 47X471 | 68 mmf Ceramic..... | 1 |
| C-62 | 47X492 | 2700 mmf Molded Mica.. | 1 |
| C-63 | 46X328 | .01 mf 120 V Tubular..... | 1 |

RESISTORS

| | | Ohms | Watts | | |
|-----------------------------------|--------|--------|-------|-------------|---|
| R-1 } R-10 } R-22 } | B85105 | 1 meg. | 0.5 | Carbon..... | 3 |
| R-2 } R-12 } R-15 } | B83680 | 68 | 0.5 | Carbon..... | 3 |
| R-3 } R-11 } | B84563 | 56K | 0.5 | Carbon..... | 2 |
| R-4 } R-6 } R-8 } R-13 } | B84102 | 1000 | 0.5 | Carbon..... | 4 |
| R-5 | B85104 | 100K | 0.5 | Carbon..... | 1 |
| R-7 | B84103 | 10K | 0.5 | Carbon..... | 1 |

| | | | | | |
|----------------------------|--------|----------|-----|----------------|---|
| R-9 | B85225 | 2.2 meg. | 0.5 | Carbon..... | 1 |
| R-14 | B85473 | 47K | 0.5 | Carbon..... | 1 |
| R-16 | C84393 | 39K | 1.0 | Carbon..... | 1 |
| R-17 | B85222 | 2200 | 0.5 | Carbon..... | 1 |
| R-18 | B84273 | 27K | 0.5 | Carbon..... | 1 |
| R-19 | 43X233 | 3.6 | 0.5 | Wire wound.. | 1 |
| R-20 } R-21 } | B83682 | 6800 | 0.5 | Carbon..... | 2 |
| R-23 | 43X242 | 1400 | 5.0 | Wirewound... | 1 |
| R-25 | 36X383 | 0.5 meg. | | Volume Control | 1 |
| R-26 | B85153 | 15K | 0.5 | Carbon..... | 1 |
| R-27 | 40X285 | 3 meg. | | Tone Control.. | 1 |
| R-28 } R-33 } | B85106 | 10 meg. | 0.5 | Carbon..... | 2 |
| R-29 } R-34 } | B85274 | 270K | 0.5 | Carbon..... | 2 |
| R-30 | D83561 | 560 | 2.0 | Carbon..... | 1 |
| R-31 } R-35 } R-38 } | B85474 | 470K | 0.5 | Carbon..... | 3 |
| R-32 | B84822 | 8200 | 0.5 | Carbon..... | 1 |
| R-36 | B84682 | 6800 | 0.5 | Carbon..... | 1 |
| R-37 | B84562 | 5600 | 0.5 | Carbon..... | 1 |

TRANSFORMERS AND COILS

| | | | |
|-----|--------|------------------------------|---|
| L-2 | 9A2025 | Interstage Coil (AM) | 1 |
| L-3 | 9A2024 | Interstage Coil (FM) | 1 |
| L-4 | 9A2022 | Oscillator Coil (AM) | 1 |
| L-5 | 35A5 | Insulated Choke | 1 |
| L-6 | 9A1881 | Filament Choke | 1 |
| L-7 | 9A2023 | Oscillator Coil (FM) | 1 |
| L-8 | 35A7 | Mixer Choke (FM) | 1 |
| L-9 | 9A2027 | Antenna Coil (FM) | 1 |
| T-1 | 9A2043 | 1st I-F Trans. (FM) | 1 |
| T-2 | 9A2029 | 1st I-F Trans. (AM) | 1 |
| T-3 | 9A2030 | 2nd I-F Trans. (FM) | 1 |
| T-4 | 9A2042 | 2nd I-F Trans. (AM) | 1 |
| T-5 | 9A1970 | Discriminator Coil | 1 |
| OR | | | |
| T-5 | 9A2064 | Discriminator Coil | 1 |
| T-6 | 9A2004 | Dipole Antenna | 1 |
| T-7 | 9A2041 | "B" Range Loop Antenna | 1 |
| T-8 | 53X286 | Power Transformer | 1 |
| T-9 | 51X142 | Output Transformer | 1 |

DIAL AND DRIVE ASSEMBLY

| | | |
|---------|-------------------------------------|---|
| 58X723 | Dial Glass | 1 |
| 25X1634 | Dial Bracket | 1 |
| 41X88 | Dial Light Ref ecto | 2 |
| 15X251 | Pointer | 1 |
| 10X54 | Drive Cord Assembly | 1 |
| 28X113 | Drive Cord Spring | 1 |
| 7A103 | No. 47 Pilot Light | 2 |
| 7A199 | Pilot Light Socket Assembly | 1 |
| 19X192 | "C" Washer (mtg. Drive Shaft) | 2 |
| 26X512 | Drive Shaft | 1 |
| 6X67 | Rubber Grommet | 4 |

MODEL 15WG-27450

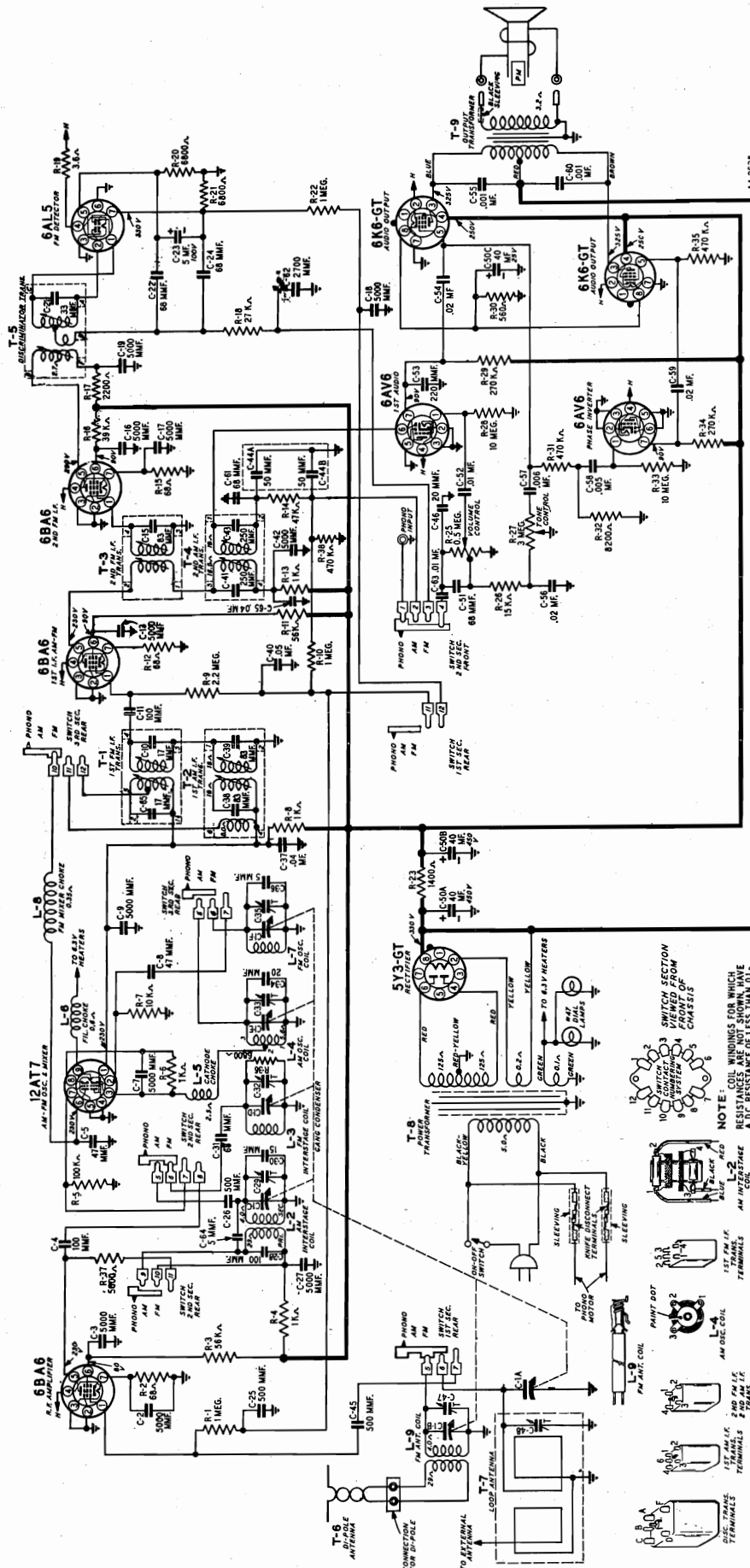
TYPE W-28A175 RECORD CHANGER PARTS

- W-15X106-26 Motor Assembly, 60 cycles
- 105-125 Volts AC
- W-49X123-5C Pickup Arm
- S-P77V Crystal Cartridge & Needle
- (Shure Bros.)
- S-85-18 Needle, Microgroove (Red)
- S-85-16 Needle, Regular

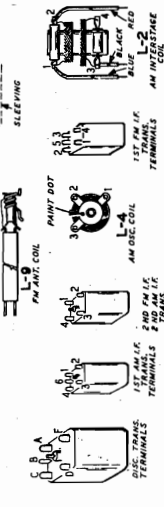
RECORD CHANGER: See Webster Chgo. Model 100, Pgs. RCD.CH.21-1 to RCD.CH.21-10.

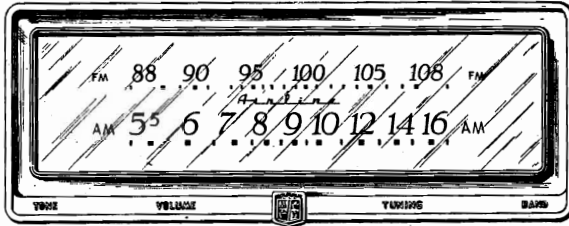
MISCELLANEOUS

- 12A502 Speaker 12" P.M.
- 3A305 Phono Socket—Single Pin Tip
- 3A435 Tube Socket—Octal (8 prong)
- 3A436 Tube Socket—Noval (miniature)
- 32X388 Tube Shield—Noval
- 32X390 Tube Shield (miniature)
- 3A439 Tube Socket (miniature)
- 2A391 Band Change Switch
- 13X546 Line Cord & Plug Assembly
- 10A713 Knobs
- 4X1049 Escutcheon



NOTE: COIL WINDINGS FOR WHICH RESISTANCE IS GIVEN ARE FOR A D.C. RESISTANCE OF LESS THAN 0.1 A.

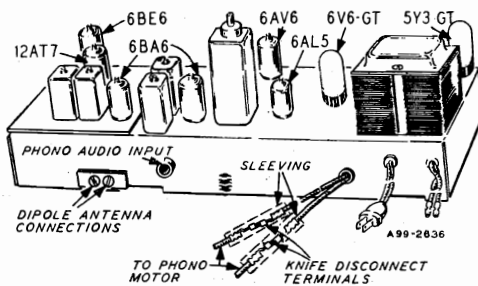




GENERAL DESCRIPTION

This is a two band, seven tube (plus rectifier tube) AM and FM receiver with automatic record changer. The I-F stages use high gain miniature type tubes. Built-in Air Wave Aerials are provided for the FM and Broadcast bands. Features include, a grounded grid R-F amplifier stage on the FM band, compensator circuits to prevent oscillator drift, automatic volume control, beam power output stage, PM dynamic loud speaker and an electrostatic shield in the power transformer to reduce power line noise.

The receiver and record changer are housed in a console combination cabinet with controls provided for tuning, volume, tone and band or phono selection.



DRIVE CORD REPLACEMENT

DIAL POINTER CORD

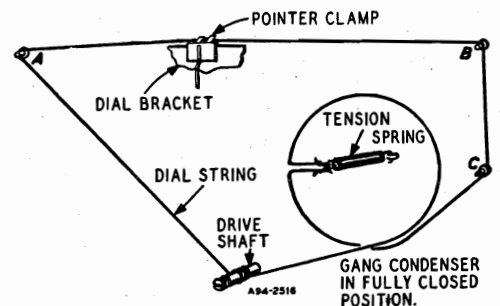
Use a new 10X38 drive cord assembly or a new length of cord 48 inches long for the installation. Install the cord as shown in the illustration, winding three turns clockwise around the drive shaft with the turns progressing away from the chassis. After completing the installation rotate the drive shaft a few turns to take up the slack in the cord.

ELECTRICAL SPECIFICATIONS

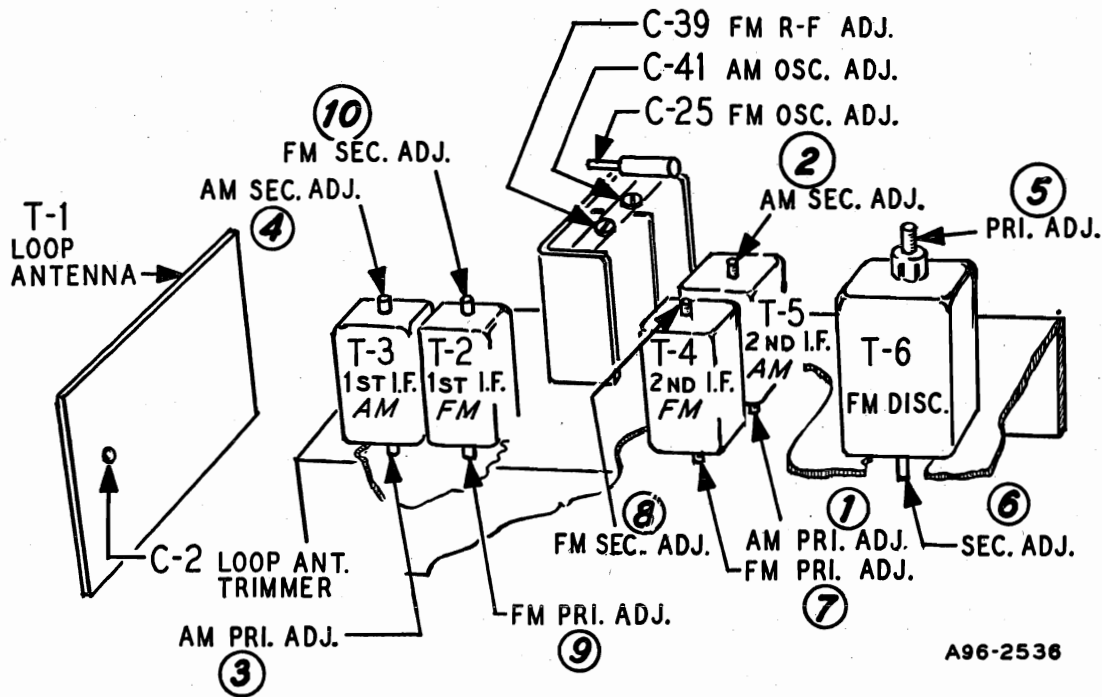
- Power Supply..... 105-125 volts AC 60 cycles, 60 watts. 80 watts with record changer.
- Frequency Ranges..... Broadcast 540-1600 KC
Frequency Modulation 88-108 MC
- Intermediate Frequency... AM—455 KC
FM—10.7 MC
- Selectivity..... AM—45 KC broad at 1000 times signal, measured at 1000 KC
I.F. FM—200 KC broad at 2 times down
I.F. FM—950 KC broad at 200 times down
- AM Sensitivity.....(For .5 watt output with external antenna) 25 microvolts average
- FM Sensitivity.....(For .5 watt output) 25 microvolts average
- Power Output..... 4.5 watts maximum
2.5 watts 10% distortion
- Loud Speaker.....12" PM Dynamic
- Voice Coil Impedance.....3.2 ohms 400 cycles

Tube and Dial Lamp Complement

- 1 6BE6 AM Converter & FM Osc.
- 1 6BA6 1st I-F Amplifier
- 1 6BA6 2nd I-F Amplifier
- 1 6AL5 FM Discriminator
- 1 6AV6 Audio Amplifier, AM 2nd Detector and AVC
- 1 6V6GT Audio Output
- 1 5Y3GT Rectifier
- 1 12AT7 R-F Amplifier & Mixer
- 2 No. 47 Dial Lamps



MODEL 15WG-2749E

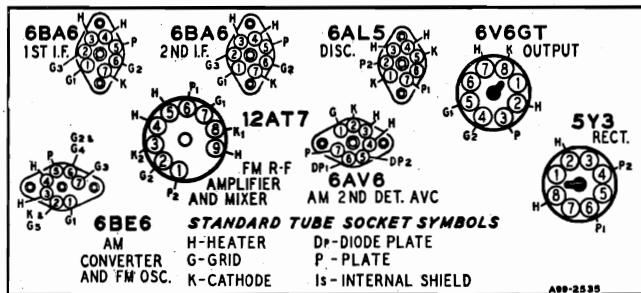


TUBE SOCKET VOLTAGES

Socket voltages are shown on the schematic diagram at the tube socket terminals. All voltages are between the socket terminal and chassis ground. Plate, screen and cathode voltages were taken with a 1000 ohm-per-volt meter with a 300 volt scale used for plate and screen voltages. Audio grid voltages were read with a vacuum tube volt-meter. Conditions of measurement are:

- Line voltage 117 Volts AC
- Signal Input None

A variation of $\pm 10\%$ is usually permissible.



ALIGNMENT PROCEDURES
AM STAGES

The following is required for aligning:
An All Wave Signal Generator Which Will Provide an Accurately Calibrated Signal at the Test Frequencies as Listed.
Output Indicating Meter, Non-Metallic Screwdriver, Dummy Antennas - .1 mf, and 50 mmf.

Volume Control Maximum all Adjustments.
Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.
Allow Chassis and Signal Generator to "Heat Up" for Several Minutes.

| FREQUENCY SETTING | SIGNAL GENERATOR CONNECT GENERATOR OUTPUT TO | THROUGH DUMMY ANTENNA | CONNECT GROUND TO | GANG CONDENSER SETTING | ADJUST | ADJUST FOR |
|-------------------|----------------------------------------------|-----------------------|-------------------|-------------------------------------------------------------|--------------------------------|----------------|
| 455 KC | Control Grid 1st 6BA6 Pin No. 1 | .1 mf | Chassis Base | Rotor Fully Open | 2nd I.F. Pri. (1) and Sec. (2) | Maximum Output |
| 455 KC | Control Grid 6BE6 Pin No. 7 1st Det. | .1 mf | Chassis Base | Rotor Fully Open | 1st I.F. Pri. (3) and Sec. (4) | Maximum Output |
| 455 KC | Control Grid 6BE6 Pin No. 7 | .1 mf | Chassis Base | Rotor Fully Open | 2nd I-F Pri. (1) and Sec. (2) | Maximum Output |
| 1620 KC | Control Grid 6BE6 Pin No. 7 | .1 mf | Chassis Base | Rotor Fully Open | Oscillator C-41 | Maximum Output |
| 1400 KC | External Antenna Terminal | 50 mmf | Chassis Base | Turn Rotor to Max. Output Set Pointer to 1400 KC See Note A | Antenna C-2 | Maximum Output |

NOTE A—If the pointer is not at 1400 KC on the dial, reset pointer to the 1400 KC mark on the dial scale.

FM STAGES

The following is required for aligning:

An accurately calibrated signal generator providing unmodulated signals at the test frequencies listed below.

Non-metallic screwdriver.

Dummy Antennas and I-F Loading Resistor—2500 mmf, 300 ohms

Zero center scale DC vacuum tube voltmeter having a range of approximately 3 volts.

(If a zero center scale meter is not available, a standard scale vacuum tube voltmeter may be used by reversing the meter connections for negative readings).

Allow chassis and signal generator to "Heat Up" for several minutes.

| SIGNAL GENERATOR | | | THROUGH DUMMY ANTENNA | BAND SWITCH SETTING | GANG CONDENSER SETTING | ADJUST ^a | ADJUST FOR |
|------------------|-------------------|-----------------------------------------------------------|-----------------------|---------------------|------------------------|-----------------------------------------------------------------------------------------------------------------|--------------------|
| Discriminator | 10.7 MC | 6BA6 2nd I-F Pin 1 and Chassis | 2500 mmf | FM | Rotor Fully Open | Disc. Pri. (5) Note A | Maximum Deflection |
| | 10.7 MC | 6BA6 2nd I-F Pin 1 and Chassis | 2500 mmf | FM | Rotor Fully Open | Disc. Sec. (6) Note B | |
| I-F | 10.7 MC Note C | 6BA6 1st I-F Pin 1 and Chassis | 2500 mmf | FM | Rotor Fully Open | 2nd I-F Pri. (7) Sec. (8) Note D | Maximum Deflection |
| Discriminator | 10.7 MC | 6BA6 1st I-F Pin 1 and Chassis | 2500 mmf | FM | Rotor Fully Open | Disc. Pri. (5) Note D | Maximum Deflection |
| I-F | 10.7 MC | Junction C-32A & B (Dual 100 mmf cond.) And chassis | 2500 mmf | FM | Rotor Fully Open | 1st I-F Pri. (9) & Sec. (10) 2nd I-F Pri. (7) & Sec. (8) Disc. Pri. (5) In Order Shown Note D | Maximum Deflection |
| | 10.7 MC | Same as above | 2500 mmf | FM | Rotor Fully Open | Disc. Sec. (6) Note B | |

RECHECK I-F ADJUSTMENTS IN ORDER GIVEN

| | | | | | | | |
|------------|-------|-------------------------------------------------------------------------------------------------------|----------|----|---------------------------------|-----------|--------------------|
| Oscillator | 108.5 | Disconnect built-in dipole antenna and connect generator to dipole terminals with resistor in series. | 300 ohms | FM | Rotor Fully Open | Osc. C-25 | Deflection Maximum |
| Antenna | 104.5 | Same as above | 300 ohms | FM | Tune rotor for max. AVC voltage | Ant. C-39 | Maximum Deflection |

RECHECK ANTENNA & OSC. ADJUSTMENTS IN ORDER GIVEN

FM ALIGNMENT NOTES

NOTE A—The zero center scale DC vacuum tube voltmeter is to be connected between chassis ground and the AVC line. A signal of .1 volt must be fed into the receiver for this adjustment.

Note output voltage on the zero center DC vacuum tube voltmeter.

NOTE B—Disconnect zero center DC vacuum tube voltmeter from AVC and connect it at the audio takeoff point at the

27 K ohm resistor (R-10) and its junction with the terminal strip. Adjust for zero voltage indication.

NOTE C—AM I-F coils must be aligned before attempting to align the FM I-F coils.

NOTE D—Connect zero center DC vacuum tube voltmeter as in Note A. Adjust input to give same output on the zero center DC vacuum tube voltmeter as in Note A.

REPLACEMENT PARTS LIST

| Ref. No. | Part No. | Description | Qty. Used in Set |
|-------------------|----------|---------------------------------|------------------|
| CAPACITORS | | | |
| C-1 | 14A209 | Gang Condenser Assembly | 1 |
| C-2 | 17A235 | 2-24 mmf Trimmer | 1 |
| C-3 | 47X559 | 130 mmf Ceramic | 1 |
| C-4 | 47X507 | 5000 mmf Ceramic | 8 |
| C-5 | | | |
| C-9 | | | |
| C-10 | | | |
| C-11 | | | |
| C-17 | | | |
| C-27 | | | |
| C-43 | | | |
| C-6 | | Part of T-2 (1st I-F Trans. FM) | |
| C-7 | | | |
| C-8 | | Part of T-3 (1st I-F Trans. AM) | |
| C-12 | | Part of T-5 (2nd I-F Trans. AM) | |
| C-13 | | | |
| C-14 | | Part of T-4 (2nd I-F Trans. FM) | |
| C-15 | | | |

| | | | | |
|-------|------------------------------------|-----------|------------------------|------------------|
| C-16A | 47X112 | 50-50 mmf | Dual Mica | 1 |
| C-16B | | | | |
| C-18 | Part of T-6 (Discriminator Trans.) | | | |
| C-19 | 47X492 | 2700 mmf | Molded Mica | 1 |
| C-20 | 47X468 | 220 mmf | Ceramic | 2 |
| C-35 | | | | |
| C-21 | 45X361 | 5 mf | 100 V Dry Electrolytic | 1 |
| C-22 | 47X557 | 2.2 mmf | Ceramic | 2 |
| C-42 | | | | |
| C-23 | 47X558 | 30 mmf | Ceramic | 1 |
| C-24 | 47X523 | 10 mmf | Ceramic | 1 |
| C-25 | 17A255 | 1-8 mmf | Trimmer | 1 |
| C-26 | 866503 | .05 mf | 200 V Tubular | 2 |
| C-44 | | | | |
| C-28A | 45X359 | 20 mf | 25 V | Dry Electrolytic |
| C-28B | | 20 mf | 350 V | |
| C-28C | | 40 mf | 350 V | |
| C-28D | | 40 mf | 350 V | |
| C-29 | H66102 | .001 mf | 800 V Tubular | 1 |
| C-30 | 47X470 | 330 mmf | Molded Mica | 1 |
| C-31 | 47X508 | 500 mmf | Ceramic | 1 |

| Ref. No. | Part No. | Description | Qty. Used in Set |
|--------------------|----------|------------------------------|------------------|
| C-32A } C-32B } | 76X4 | 100 mmf Dual Ceramic | 1 |
| C-33 | B66203 | .02 mf 200 V Tubular | 1 |
| C-34 | D66502 | .005 mf 400 V Tubular | 1 |
| C-36 | B66103 | .01 mf 200 V Tubular | 1 |
| C-37 | D66104 | .1 mf 400 V Tubular | 1 |
| C-38 | D66203 | .02 mf 400 V Tubular | 1 |
| C-39 } C-41 } | | Part of C-1 (Gang Condenser) | |
| C-40 | 47X471 | 68 mmf Ceramic | 1 |

RESISTORS

| | | Ohms | Watts | | |
|----------------------------|--------|--------------|------------|-------------------------|---|
| R-1 | B85470 | 47 | 0.5 | Carbon | 1 |
| R-2 } R-6 } R-9 } | B85102 | 1000 | 0.5 | Carbon | 3 |
| R-4 } R-8 } | B84680 | 68 | 0.5 | Carbon | 2 |
| R-5 } R-12 } R-13 } | B84682 | 6800 | 0.5 | Carbon | 3 |
| R-7 } R-25 } | B85473 | 47 K | 0.5 | Carbon | 2 |
| R-10 | B85273 | 27 K | 0.5 | Carbon | 1 |
| R-11 | 43X233 | 3.6 | 0.5 | Wirewound | 1 |
| R-14 } R-16 } | B85104 | 100 K | 0.5 | Carbon | 2 |
| R-15 | B85223 | 22 K | 0.5 | Carbon | 1 |
| R-17 | B84221 | 220 | 0.5 | Carbon | 1 |
| R-18 } R-24 } R-26 } | B85474 | 470 K | 0.5 | Carbon | 3 |
| R-20 | B85153 | 15 K | 0.5 | Carbon | 1 |
| R-21 | 36X372 | .5 meg. | | Volume Control & Switch | 1 |
| R-23 | 40X310 | .5 meg. | | Tone Control | 1 |
| R-27 | B85106 | 10 meg. | 0.5 | Carbon | 1 |
| R-28A } R-28B } | 43X224 | 1000 1400 | 4.0 6.0 | Wirewound | 1 |
| R-29 | B85105 | 1 meg. | 0.5 | Carbon | 1 |
| R-30 | B84271 | 270 | 0.5 | Carbon | 1 |
| R-31 | B84274 | 270 K | 0.5 | Carbon | 1 |

TRANSFORMERS AND COILS

| | | | |
|-----|--------|---------------------------|---|
| L-1 | 35A5 | Insulated Choke | 1 |
| L-2 | 9A2103 | Parasitic Choke Assembly | 1 |
| L-3 | 35A9 | Insulated Choke | 1 |
| L-4 | 35A8 | Insulated Choke | 1 |
| T-1 | 9A1972 | "B" Range Loop Antenna | 1 |
| T-2 | 9A2060 | 1st I-F Trans. (FM) | 1 |
| T-3 | 9A2062 | 1st I-F Trans. (AM) | 1 |
| T-4 | 9A2061 | 2nd I-F Trans. (FM) | 1 |
| T-5 | 9A2063 | 2nd I-F Trans. (AM) | 1 |
| T-6 | 9A2161 | Discriminator Transformer | 1 |
| T-7 | 9A2065 | Oscillator Coil (AM) | 1 |

| | | | |
|------|--------|----------------------|---|
| T-8 | 9A2067 | Oscillator Coil (FM) | 1 |
| T-9 | 51X134 | Output Transformer | 1 |
| T-10 | 9A2004 | Dipole Antenna | 1 |
| T-11 | 53X290 | Power Transformer | 1 |
| T-12 | 9A2066 | Antenna Coil (FM) | 1 |

MISCELLANEOUS

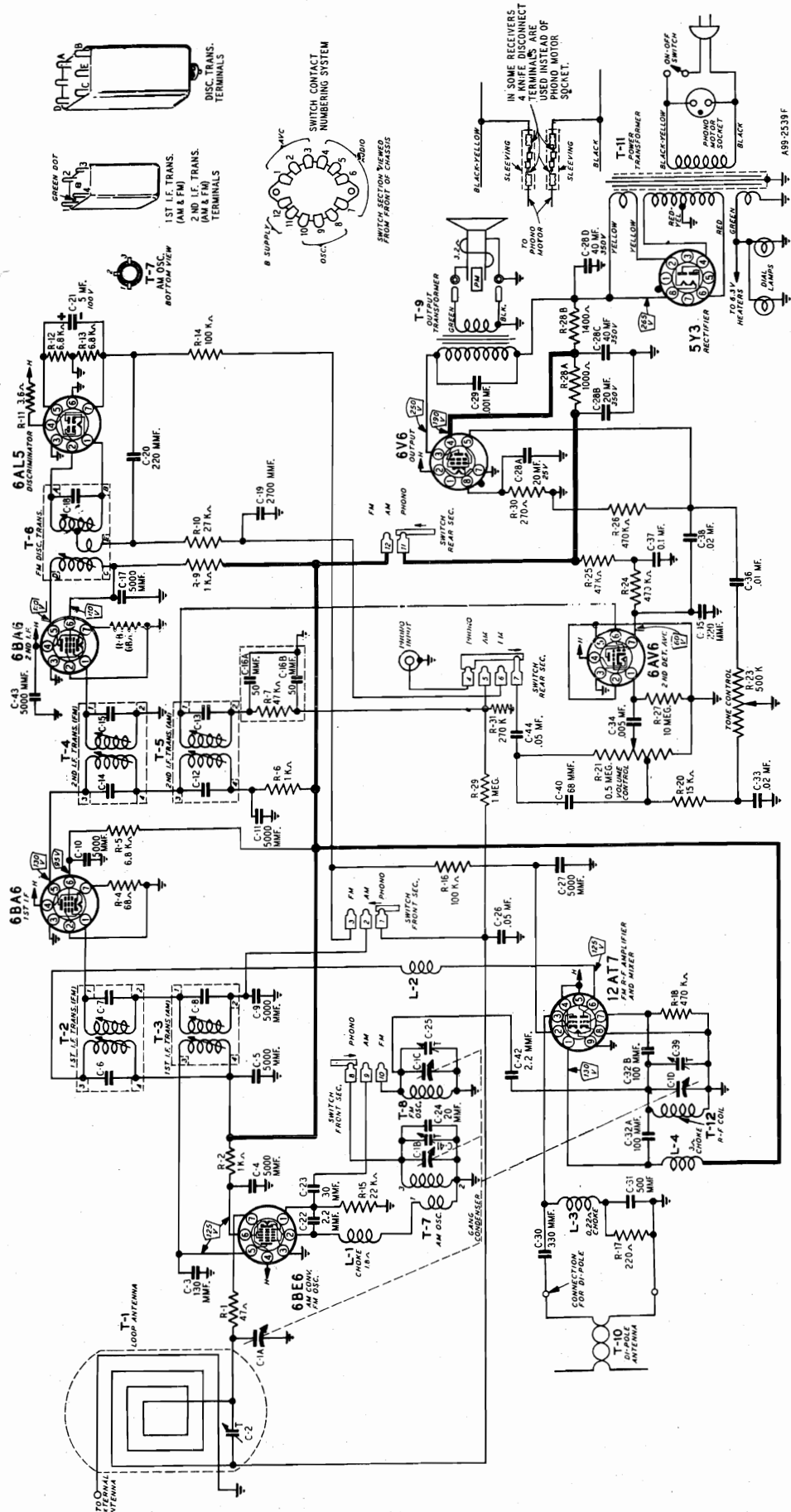
| | | |
|--------|------------------------------------|---|
| 12A502 | 12" P.M. Speaker | 1 |
| 3A435 | Tube Socket—Octal (8 prong) Molded | 2 |
| 3A426 | Tube Socket (1st 6BA6) | 1 |
| 3A427 | Tube Socket | 1 |
| 3A443 | Tube Socket (12AT7) | 1 |
| 3A439 | Tube Socket (Miniature) | 3 |
| 3A305 | Phono Socket—Single Pin Tip | 1 |
| 2A393 | Band Change Switch | 1 |
| 13X546 | Line Cord and Plug Assembly | 1 |
| 4X1049 | Escutcheon | 1 |
| 10A735 | Knob | 4 |

DIAL AND DRIVE ASSEMBLY

| | | |
|---------|----------------------------------|---|
| 58X729 | Dial Glass | 1 |
| 24X446 | Idler Pulley | 2 |
| 15X251 | Pointer | 1 |
| 25X1616 | Dial Bracket | 1 |
| 7A103 | No. 47 Pilot Light Bulb | 2 |
| 7A199 | Pilot Light Socket Assembly | 1 |
| 26X486 | Drive Shaft | 1 |
| 41X88 | Reflector, Dial Light | 2 |
| 28X113 | Drive Cord Tension Spring | 1 |
| 10X38 | Drive Cord Assembly | 1 |
| 19X192 | "C" Washer (Mtg. drive Shaft) | 2 |
| 6X66 | Rubber Grommet (Mtg. gang cond.) | 3 |

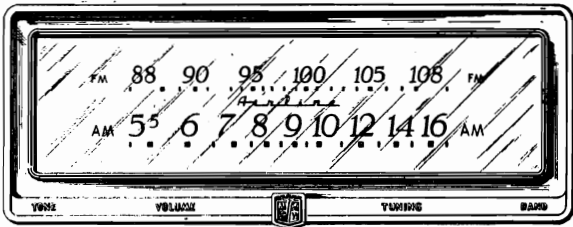
TYPE W-28A176 RECORD CHANGER PARTS

| | | |
|-------------|--------------------------------------------|---|
| W-15X106-26 | Motor Assembly, 60 cycles 105-125 Volts AC | 1 |
| W-49X123-5C | Pickup Arm | 1 |
| W-R A7M-1 | Crystal Cartridge & Needles | 1 |
| W-R-13017 | Needle, Microgroove (Red) | 1 |
| W-R-13016 | Needle, Regular | 1 |



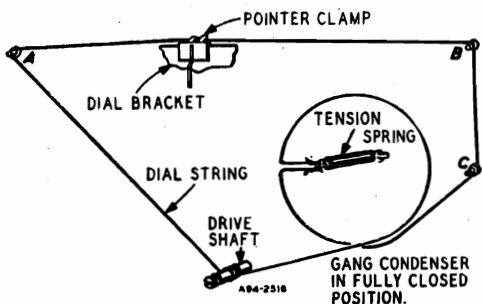
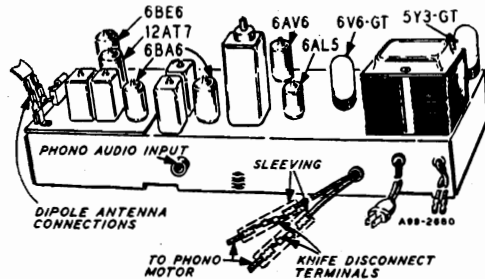
RECORD CHANGER: See Webster Chgo.
 Model 100, Pgs. RCD.CH.21-1 to
 RCD.CH.21-10.

MODEL 15WG-2749F



GENERAL DESCRIPTION

This is a two band, seven tube (plus rectifier tube) AM and FM receiver. Controls are provided at the front of the cabinet for tuning, volume, tone and band or phono selection. A phono input socket is provided at the rear of the receiver to which a record player may be connected. The I-F stages use high gain miniature type tubes. Air Wave Aerials are provided for the FM and Broadcast bands. Features include, a grounded grid R-F amplifier stage on the FM band, compensator circuits to prevent oscillator drift, automatic volume control, beam power output stage, PM dynamic loud speaker and an electrostatic shield in the power transformer to reduce power line noise.



62Z-470-4 451

DRIVE CORD REPLACEMENT

DIAL POINTER CORD

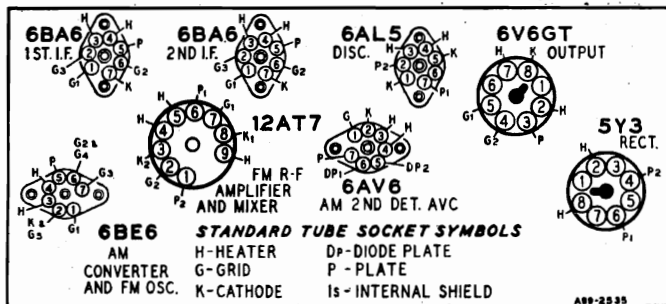
Use a new 10X38 drive cord assembly or a new length of cord 48 inches long for the installation. Install the cord as shown in the illustration, winding three turns clockwise around the drive shaft with the turns progressing away from the chassis. After completing the installation rotate the drive shaft a few turns to take up the slack in the cord.

ELECTRICAL SPECIFICATIONS

- Power Supply..... 105-125 volts AC 60 cycles, 60 watts. 80 watts with record changer.
- Selectivity..... AM—45 KC broad at 1000 times signal, measured at 1000 KC I.F. FM—200 KC broad at 2 times down I.F. FM—950 KC broad at 200 times down
- Intermediate Frequency... AM—455 KC FM—10.7 MC
- Frequency Ranges..... Broadcast 540-1600 KC Frequency Modulation 88-108 MC
- FM Sensitivity..... (For .5 watt output) 25 microvolts average
- AM Sensitivity..... (For .5 watt output with external antenna) 25 microvolts average
- Loud Speaker..... 8" PM Dynamic
- Power Output..... 4.5 watts maximum 2.5 watts 10% distortion
- Voice Coil Impedance..... 3.2 ohms 400 cycles
- Record Changer See Manual 5096A

Tube and Dial Lamp Complement

- 1 6BE6 AM Converter & FM Osc.
- 1 6BA6 1st I-F Amplifier
- 1 6BA6 2nd I-F Amplifier
- 1 6AL5 FM Discriminator
- 1 6AV6 Audio Amplifier, AM 2nd Detector and AVC
- 1 6V6GT Audio Output
- 1 5Y3GT Rectifier
- 1 12AT7 R-F Amplifier & Mixer
- 2 No. 47 Dial Lamps



TUBE SOCKET VOLTAGES

Socket voltages are shown on the schematic diagram at the tube socket terminals. All voltages are between the socket terminal and chassis ground. Plate, screen and cathode voltages were taken with a 1000 ohm-per-volt meter with a 300 volt scale used for plate and screen voltages. Audio grid voltages were read with a vacuum tube volt-meter.

Conditions of measurement are:

- Line voltage117 Volts AC
- Signal InputNone

A variation of $\pm 10\%$ is usually permissible.

ALIGNMENT PROCEDURES

MODEL 15WG-2749F

AM STAGES

The following is required for aligning:
 An All Wave Signal Generator Which Will Provide an Accurately Calibrated Signal at the Test Frequencies as Listed.
 Output Indicating Meter, Non-Metallic Screwdriver, Dummy Antennas
 — .1 mf, and 50 mmf.

Volume Control Maximum all Adjustments.
 Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.
 Allow Chassis and Signal Generator to "Heat Up" for Several Minutes.

| SIGNAL GENERATOR | | | | GANG CONDENSER SETTING | ADJUST | ADJUST FOR |
|-------------------|--------------------------------------------|-----------------------|-------------------|--------------------------------------------------------------------|--------------------------------|----------------|
| FREQUENCY SETTING | CONNECT GENERATOR OUTPUT TO | THROUGH DUMMY ANTENNA | CONNECT GROUND TO | | | |
| 455 KC | Control Grid 1st 6BA6 Pin No. 1 | .1 mf | Chassis Base | Rotor Fully Open | 2nd I.F. Pri. (1) and Sec. (2) | Maximum Output |
| 455 KC | Control Grid 6BE6 Pin No. 7 1st Det. | .1 mf | Chassis Base | Rotor Fully Open | 1st I.F. Pri. (3) and Sec. (4) | Maximum Output |
| 455 KC | Control Grid 6BE6 Pin No. 7 | .1 mf | Chassis Base | Rotor Fully Open | 2nd I-F Pri. (1) and Sec. (2) | Maximum Output |
| 1620 KC | Control Grid 6BE6 Pin No. 7 | .1 mf | Chassis Base | Rotor Fully Open | Oscillator C-41 | Maximum Output |
| 1400 KC | External Antenna Terminal | 50 mmf | Chassis Base | Turn Rotor to Max. Output. Set Pointer to 1400 KC See Note A | Antenna C-2 | Maximum Output |

NOTE A—If the pointer is not at 1400 KC on the dial, reset pointer to the 1400 KC mark on the dial scale.

FM STAGES

The following is required for aligning:
 An accurately calibrated signal generator providing unmodulated signals at the test frequencies listed below.
 Non-metallic screwdriver.
 Dummy Antennas and I-F Loading Resistor—2500 mmf, 300 ohms

Zero center scale DC vacuum tube voltmeter having a range of approximately 3 volts.
 (If a zero center scale meter is not available, a standard scale vacuum tube voltmeter may be used by reversing the meter connections for negative readings).
 Allow chassis and signal generator to "Heat Up" for several minutes.

| SIGNAL GENERATOR | | | THROUGH DUMMY ANTENNA | BAND SWITCH SETTING | GANG CONDENSER SETTING | ADJUST | ADJUST FOR |
|------------------|-------------------|-----------------------------------------------------------|-----------------------|---------------------|------------------------|-----------------------------------------------------------------------------------------------------------------|--------------------|
| | FREQUENCY SETTING | CONNECT GENERATOR OUTPUT TO | | | | | |
| Discriminator | 10.7 MC | 6BA6 2nd I-F Pin 1 and Chassis | 2500 mmf | FM | Rotor Fully Open | Disc. Pri. (5) Note A | Maximum Deflection |
| | 10.7 MC | 6BA6 2nd I-F Pin 1 and Chassis | 2500 mmf | FM | Rotor Fully Open | Disc. Sec. (6) Note B | |
| I-F | 10.7 MC Note C | 6BA6 1st I-F Pin 1 and Chassis | 2500 mmf | FM | Rotor Fully Open | 2nd I-F Pri. (7) Sec. (8) Note D | Maximum Deflection |
| Discriminator | 10.7 MC | 6BA6 1st I-F Pin 1 and Chassis | 2500 mmf | FM | Rotor Fully Open | Disc. Pri. (5) Note D | Maximum Deflection |
| I-F | 10.7 MC | Junction C-32A & B (Dual 100 mmf cond.) And chassis | 2500 mmf | FM | Rotor Fully Open | 1st I-F Pri. (9) & Sec. (10) 2nd I-F Pri. (7) & Sec. (8) Disc. Pri. (5) In Order Shown Note D | Maximum Deflection |
| | 10.7 MC | Same as above | 2500 mmf | FM | Rotor Fully Open | Disc. Sec. (6) Note B | |

RECHECK I-F ADJUSTMENTS IN ORDER GIVEN

| | | | | | | | |
|------------|-------|-------------------------------------------------------------------------------------------------------|----------|----|----------------------------------|-----------|--------------------|
| Oscillator | 108.5 | Disconnect built-in dipole antenna and connect generator to dipole terminals with resistor in series. | 300 ohms | FM | Rotor Fully Open | Osc. C-25 | Deflection Maximum |
| Antenna | 104.5 | Same as above | 300 ohms | FM | *Tune rotor for max. AVC voltage | Ant. C-39 | Maximum Deflection |

RECHECK ANTENNA & OSC. ADJUSTMENTS IN ORDER GIVEN

FM ALIGNMENT NOTES

NOTE A—The zero center scale DC vacuum tube voltmeter is to be connected between chassis ground and the AVC line. A signal of .1 volt must be fed into the receiver for this adjustment.
 Note output voltage on the zero center DC vacuum tube voltmeter.
 NOTE B—Disconnect zero center DC vacuum tube voltmeter from AVC and connect it at the audio takeoff point at the

27 K ohm resistor (R-10) and its junction with the terminal strip. Adjust for zero voltage indication.

NOTE C—AM I-F coils must be aligned before attempting to align the FM I-F coils.

NOTE D—Connect zero center DC vacuum tube voltmeter as in Note A. Adjust input to give same output on the zero center DC vacuum tube voltmeter as in Note A.

MODEL 15WG-2749F

| Ref. No. | Part No. | Description | Qty. Used in Set |
|-------------------|------------------------------------|-------------------------|------------------------|
| CAPACITORS | | | |
| C-1 | 14A209 | Gang Condenser Assembly | 1 |
| C-2 | 17A235 | 2-24 mmf Trimmer | 1 |
| C-3 | 47X559 | 130 mmf Ceramic | 1 |
| C-4 | 47X507 | 5000 mmf Ceramic | 8 |
| C-5 | | | |
| C-9 | | | |
| C-10 | | | |
| C-11 | | | |
| C-17 | | | |
| C-27 | | | |
| C-43 | | | |
| C-6 | Part of T-2 (1st I-F Trans. FM) | | |
| C-7 | Part of T-2 (1st I-F Trans. FM) | | |
| C-8 | Part of T-3 (1st I-F Trans. AM) | | |
| C-12 | Part of T-5 (2nd I-F Trans. AM) | | |
| C-13 | Part of T-5 (2nd I-F Trans. AM) | | |
| C-14 | Part of T-4 (2nd I-F Trans. FM) | | |
| C-15 | Part of T-4 (2nd I-F Trans. FM) | | |
| C-16A | 47X112 | 50-50 mmf | Dual Mica |
| C-16B | | | |
| C-18 | Part of T-6 (Discriminator Trans.) | | |
| C-19 | 47X492 | 2700 mmf | Molded Mica |
| C-20 | 47X468 | 220 mmf | Ceramic |
| C-35 | | | |
| C-21 | 45X361 | 5 mf | 100 V Dry Electrolytic |
| C-22 | 47X557 | 2.2 mmf | Ceramic |
| C-42 | | | |
| C-23 | 47X558 | 30 mmf | Ceramic |
| C-24 | 47X523 | 10 mmf | Ceramic |
| C-25 | 17A255 | 1-8 mmf | Trimmer |
| C-26 | B66503 | .05 mf | 200 V Tubular |
| C-44 | | | |
| C-28A | 20 mf | 25 V | Dry Electrolytic |
| C-28B | 20 mf | 350 V | |
| C-28C | 40 mf | 350 V | |
| C-28D | 40 mf | 350 V | |
| C-29 | H66102 | .001 mf | 800 V Tubular |
| C-30 | 47X470 | 330 mmf | Molded Mica |
| C-31 | 47X508 | 500 mmf | Ceramic |
| C-32A | 76X4 | 100 mmf | Dual Ceramic |
| C-32B | | | |
| C-33 | B66203 | .02 mf | 200 V Tubular |
| C-34 | D66502 | .005 mf | 400 V Tubular |

REPLACEMENT PARTS LIST

| Ref. No. | Part No. | Value | Power | Material | Qty. |
|------------------|------------------------------|----------|-------------------------|-----------|------|
| C-36 | B66103 | .01 mf | 200 V | Tubular | 1 |
| C-37 | D66104 | .1 mf | 400 V | Tubular | 1 |
| C-38 | D66203 | .02 mf | 400 V | Tubular | 1 |
| C-39 | Part of C-1 (Gang Condenser) | | | | 1 |
| C-41 | Part of C-1 (Gang Condenser) | | | | 1 |
| C-40 | 47X471 | 68 mmf | | Ceramic | 1 |
| RESISTORS | | | | | |
| | | Ohms | Watts | | |
| R-1 | B85470 | 47 | 0.5 | Carbon | 1 |
| R-2 | B85102 | 1000 | 0.5 | Carbon | 3 |
| R-6 | | | | | |
| R-9 | | | | | |
| R-4 | B84680 | 68 | 0.5 | Carbon | 2 |
| R-8 | | | | | |
| R-5 | B84682 | 6800 | 0.5 | Carbon | 3 |
| R-12 | | | | | |
| R-13 | | | | | |
| R-7 | B85473 | 47 K | 0.5 | Carbon | 2 |
| R-25 | | | | | |
| R-10 | B85273 | 27 K | 0.5 | Carbon | 1 |
| R-11 | 43X233 | 3.6 | 0.5 | Wirewound | 1 |
| R-14 | B85104 | 100 K | 0.5 | Carbon | 2 |
| R-16 | | | | | |
| R-15 | B85223 | 22 K | 0.5 | Carbon | 1 |
| R-17 | B84221 | 220 | 0.5 | Carbon | 1 |
| R-18 | B85474 | 470 K | 0.5 | Carbon | 3 |
| R-24 | | | | | |
| R-26 | | | | | |
| R-20 | B85153 | 15 K | 0.5 | Carbon | 1 |
| R-21 | 36X372 | .5 meg. | Volume Control & Switch | | |
| R-23 | 40X341 | 1.0 meg. | Tone Control | | |
| R-27 | B85106 | 10 meg. | 0.5 | Carbon | 1 |
| R-28A | 43X224 | 1000 | 4.0 | Wirewound | 1 |
| R-28B | | | | | |
| R-29 | B85105 | 1 meg. | 0.5 | Carbon | 1 |
| R-30 | B84271 | 270 | 0.5 | Carbon | 1 |
| R-31 | B84274 | 270 K | 0.5 | Carbon | 1 |

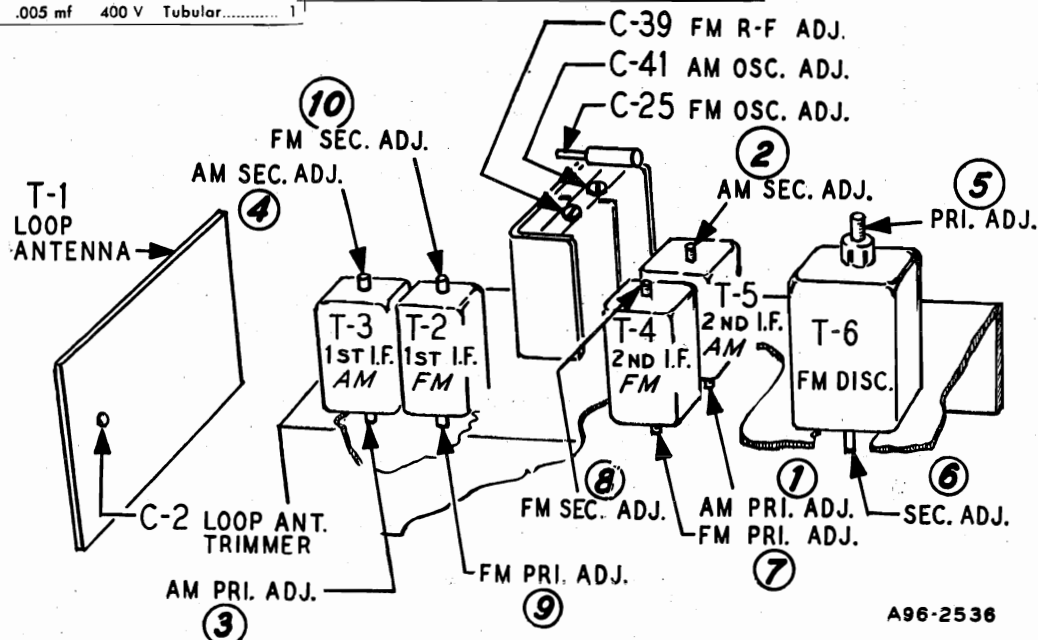
| | | | |
|------|--------|---------------------------|---|
| T-2 | 9A2060 | 1st I-F Trans. (FM) | 1 |
| T-3 | 9A2062 | 1st I-F Trans. (AM) | 1 |
| T-4 | 9A2061 | 2nd I-F Trans. (FM) | 1 |
| T-5 | 9A2063 | 2nd I-F Trans. (AM) | 1 |
| T-6 | 9A2161 | Discriminator Transformer | 1 |
| T-7 | 9A2065 | Oscillator Coil (AM) | 1 |
| T-8 | 9A2067 | Oscillator Coil (FM) | 1 |
| T-9 | 51X134 | Output Transformer | 1 |
| T-10 | 9A2209 | Dipole Antenna | 1 |
| T-11 | 53X290 | Power Transformer | 1 |
| T-12 | 9A2066 | Antenna Coil (FM) | 1 |

MISCELLANEOUS

| | | |
|--------|------------------------------------|---|
| 12A505 | 8" P.M. Speaker | 1 |
| 3A435 | Tube Socket—Octal (8 prong) Molded | 2 |
| 3A426 | Tube Socket (1st 6BA6) | 1 |
| 3A427 | Tube Socket | 1 |
| 3A439 | Tube Socket (Miniature) | 3 |
| 3A443 | Tube Socket (12AT7) | 1 |
| 3A305 | Phono Socket—Single Pin Tip | 1 |
| 2A393 | Band Change Switch | 1 |
| 13X546 | Line Cord and Plug Assembly | 1 |
| 4X1049 | Escutcheon | 1 |
| 10A735 | Knob | 4 |

DIAL AND DRIVE ASSEMBLY

| | | |
|---------|-----------------------------|---|
| 58X729 | Dial Glass | 1 |
| 24X446 | Idler Pulley | 2 |
| 15X251 | Pointer | 1 |
| 25X1616 | Dial Bracket | 1 |
| 7A103 | No. 47 Pilot Light Bulb | 2 |
| 7A199 | Pilot Light Socket Assembly | 1 |
| 26X486 | Drive Shaft | 1 |
| 41X88 | Reflector, Dial Light | 2 |
| 28X113 | Drive Cord Tension Spring | 1 |

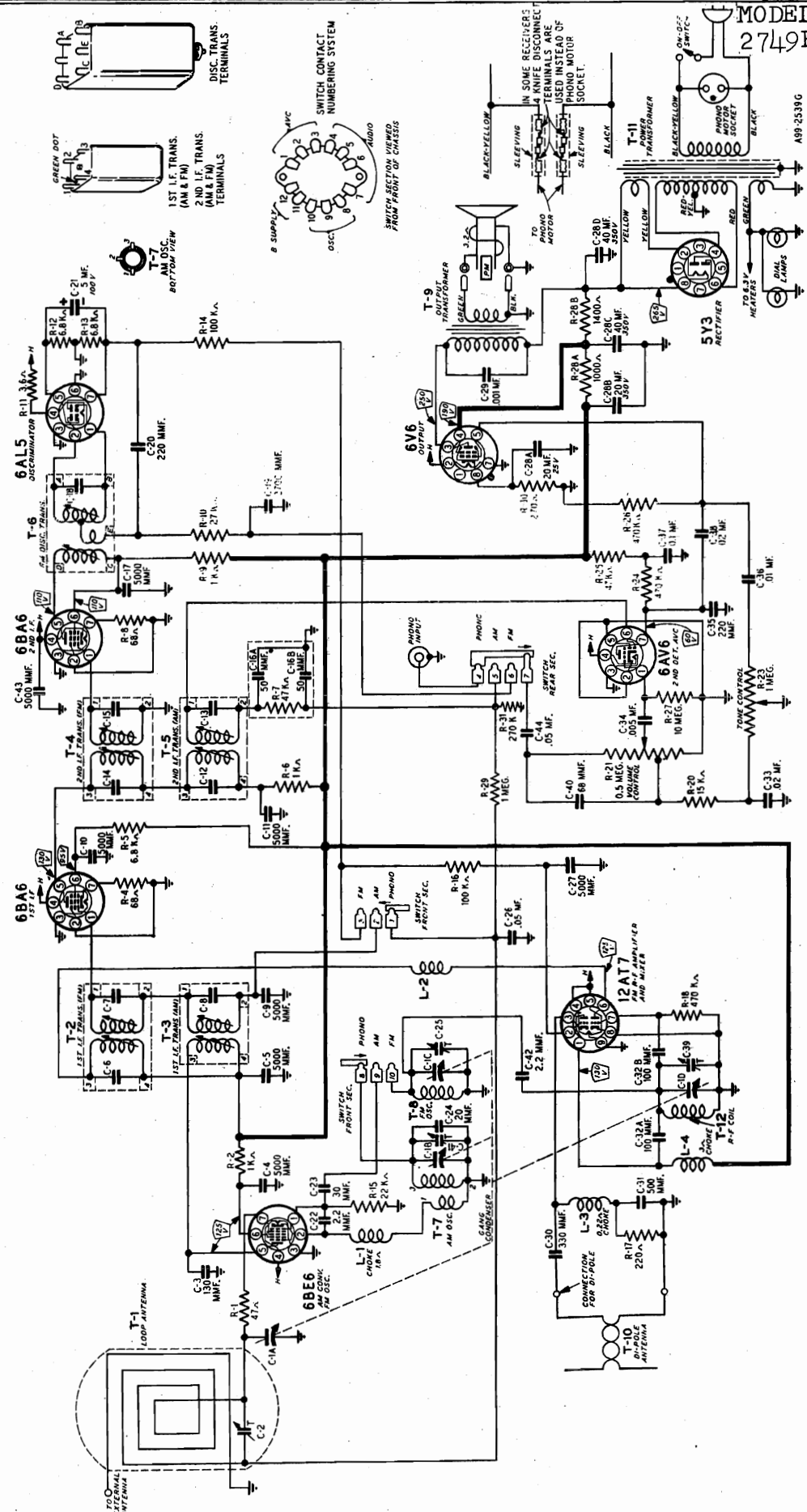


A96-2536

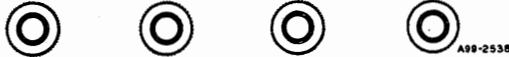
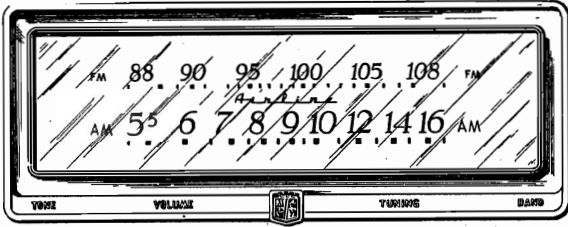
MODEL 15WG-2749F

TYPE V-28A172 RECORD CHANGER PARTS

- | | |
|-----------------------------------------------|------------------------------------------------------------|
| 10X38 Drive Cord Assembly 1 | W-R-13017 Needle, Microgroove (Red) 1 |
| 19X192 "C" Washer (Mtg. drive Shaft) 2 | W-R-13016 Needle, Regular 1 |
| 6X66 Rubber Grommet (Mtg. gang cond.) 3 | |
| | NOTE—Specify part number stamped on motor assembly. |
| | See Note |
| | Motor Assembly, 60 cycles |
| | 105-125 Volts AC |
| | Pickup Arm |
| | V-3429B |
| | Crystal Cartridge & Needles |
| | W-R-A1M |



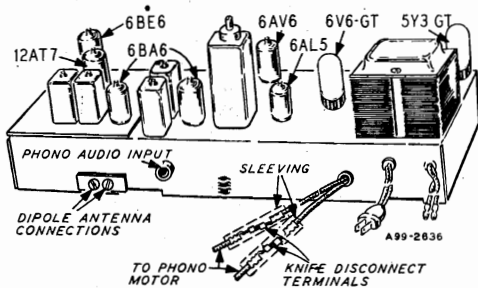
MODEL 15WG-2752D



GENERAL DESCRIPTION

This is a two band, seven tube (plus rectifier tube) AM and FM receiver with automatic record changer. The I-F stages use high gain miniature type tubes. Built-in Air Wave Aerials are provided for the FM and Broadcast bands. Features include, a grounded grid R-F amplifier stage on the FM band, compensator circuits to prevent oscillator drift, automatic volume control, beam power output stage, PM dynamic loud speaker and an electrostatic shield in the power transformer to reduce power line noise.

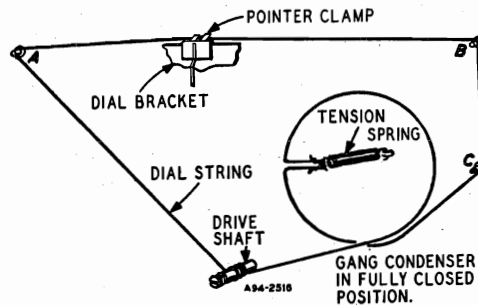
The receiver and record changer are housed in a console combination cabinet with controls provided for tuning, volume, tone and band or phono selection.



DRIVE CORD REPLACEMENT

DIAL POINTER CORD

Use a new 10X38 drive cord assembly or a new length of cord 48 inches long for the installation. Install the cord as shown in the illustration, winding three turns clockwise around the drive shaft with the turns progressing away from the chassis. After completing the installation rotate the drive shaft a few turns to take up the slack in the cord.

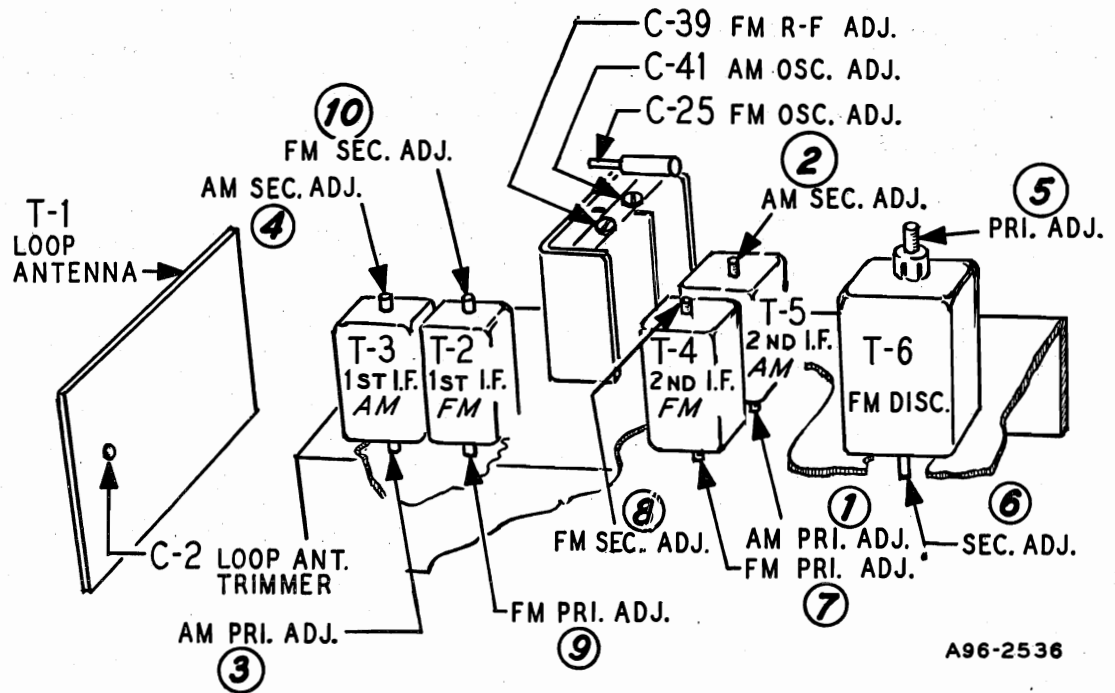


ELECTRICAL SPECIFICATIONS

- Power Supply..... 105-125 volts AC 60 cycles, 60 watts. 80 watts with record changer.
- Frequency Ranges..... Broadcast .540-1600 KC
Frequency Modulation 88-108 MC
- Intermediate Frequency... AM—455 KC
FM—10.7 MC
- Selectivity..... AM—45 KC broad at 1000 times signal, measured at 1000 KC
I.F. FM—200 KC broad at 2 times down
I.F. FM—950 KC broad at 200 times down
- AM Sensitivity.....(For .5 watt output with external antenna) 25 microvolts average
- FM Sensitivity.....(For .5 watt output) 25 microvolts average
- Power Output..... 4.5 watts maximum
2.5 watts 10% distortion
- Loud Speaker..... 12" PM Dynamic
- Voice Coil Impedance..... 3.2 ohms 400 cycles

Tube and Dial Lamp Complement

- 1 6BE6 AM Converter & FM Osc.
- 1 6BA6 1st I-F Amplifier
- 1 6BA6 2nd I-F Amplifier
- 1 6AL5 FM Discriminator
- 1 6AV6 Audio Amplifier, AM 2nd Detector and AVC
- 1 6V6GT Audio Output
- 1 5Y3GT Rectifier
- 1 12AT7 R-F Amplifier & Mixer
- 2 No. 47 Dial Lamps



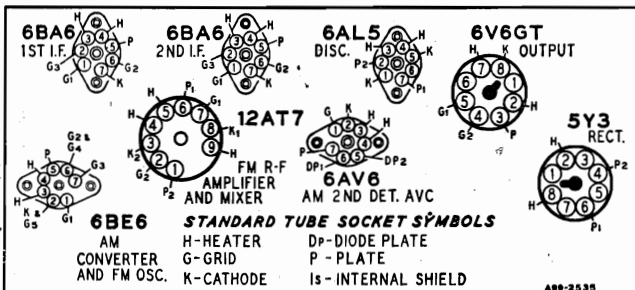
A96-2536

TUBE SOCKET VOLTAGES

Socket voltages are shown on the schematic diagram at the tube socket terminals. All voltages are between the socket terminal and chassis ground. Plate, screen and cathode voltages were taken with a 1000 ohm-per-volt meter with a 300 volt scale used for plate and screen voltages. Audio grid voltages were read with a vacuum tube volt-meter. Conditions of measurement are:

- Line voltage 117 Volts AC
- Signal Input None

A variation of $\pm 10\%$ is usually permissible.



ALIGNMENT PROCEDURES

AM STAGES

The following is required for aligning:
 An All Wave Signal Generator Which Will Provide an Accurately Calibrated Signal at the Test Frequencies as Listed.
 Output Indicating Meter, Non-Metallic Screwdriver, Dummy Antennas - .1 mf, and 50 mmf.

Volume Control Maximum all Adjustments.
 Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.
 Allow Chassis and Signal Generator to "Heat Up" for Several Minutes.

| SIGNAL GENERATOR | | | | GANG CONDENSER SETTING | ADJUST | ADJUST FOR |
|-------------------|--------------------------------------------|-----------------------|-------------------|--------------------------------------------------------------------|--------------------------------|----------------|
| FREQUENCY SETTING | CONNECT GENERATOR OUTPUT TO | THROUGH DUMMY ANTENNA | CONNECT GROUND TO | | | |
| 455 KC | Control Grid 1st 6BA6 Pin No. 1 | .1 mf | Chassis Base | Rotor Fully Open | 2nd I.F. Pri. (1) and Sec. (2) | Maximum Output |
| 455 KC | Control Grid 6BE6 Pin No. 7 1st Det. | .1 mf | Chassis Base | Rotor Fully Open | 1st I.F. Pri. (3) and Sec. (4) | Maximum Output |
| 455 KC | Control Grid 6BE6 Pin No. 7 | .1 mf | Chassis Base | Rotor Fully Open | 2nd I-F Pri. (1) and Sec. (2) | Maximum Output |
| 1620 KC | Control Grid 6BE6 Pin No. 7 | .1 mf | Chassis Base | Rotor Fully Open | Oscillator C-41 | Maximum Output |
| 1400 KC | External Antenna Terminal | 50 mmf | Chassis Base | Turn Rotor to Max. Output Set Pointer to 1400 KC. See Note A | Antenna C-2 | Maximum Output |

NOTE A—If the pointer is not at 1400 KC on the dial, reset pointer to the 1400 KC mark on the dial scale.

MODEL 15WG-2752D

FM STAGES

The following is required for aligning:

An accurately calibrated signal generator providing unmodulated signals at the test frequencies listed below.

Non-metallic screwdriver.

Dummy Antennas and I-F Loading Resistor—2500 mmf, 300 ohms

Zero center scale DC vacuum tube voltmeter having a range of approximately 3 volts.

(If a zero center scale meter is not available, a standard scale vacuum tube voltmeter may be used by reversing the meter connections for negative readings).

Allow chassis and signal generator to "Heat Up" for several minutes.

| SIGNAL GENERATOR | | | | | | | |
|------------------|-------------------|-----------------------------------------------------------|-----------------------|---------------------|------------------------|-----------------------------------------------------------------------------------------------------------------|-----------------------|
| | FREQUENCY SETTING | CONNECT GENERATOR OUTPUT TO | THROUGH DUMMY ANTENNA | BAND SWITCH SETTING | GANG CONDENSER SETTING | ADJUST | ADJUST FOR |
| Discriminator | 10.7 MC | 6BA6 2nd I-F Pin 1 and Chassis | 2500 mmf | FM | Rotor Fully Open | Disc. Pri. (5) Note A | Maximum Deflection |
| | 10.7 MC | 6BA6 2nd I-F Pin 1 and Chassis | 2500 mmf | FM | Rotor Fully Open | Disc. Sec. (6) Note B | |
| I-F | 10.7 MC Note C | 6BA6 1st I-F Pin 1 and Chassis | 2500 mmf | FM | Rotor Fully Open | 2nd I-F Pri. (7) Sec. (8) Note D | Maximum Deflection |
| Discriminator | 10.7 MC | 6BA6 1st I-F Pin 1 and Chassis | 2500 mmf | FM | Rotor Fully Open | Disc. Pri. (5) Note D | Maximum Deflection |
| I-F | 10.7 MC | Junction C-32A & B (Dual 100 mmf cond.) And chassis | 2500 mmf | FM | Rotor Fully Open | 1st I-F Pri. (9) & Sec. (10) 2nd I-F Pri. (7) & Sec. (8) Disc. Pri. (5) In Order Shown Note D | Maximum Deflection |
| | 10.7 MC | Same as above | 2500 mmf | FM | Rotor Fully Open | Disc. Sec. (6) Note B | |

RECHECK I-F ADJUSTMENTS IN ORDER GIVEN

| | | | | | | | |
|------------|-------|-------------------------------------------------------------------------------------------------------|----------|----|------------------------------------|-----------|-----------------------|
| Oscillator | 108.5 | Disconnect built-in dipole antenna and connect generator to dipole terminals with resistor in series. | 300 ohms | FM | Rotor Fully Open | Osc. C-25 | Deflection Maximum |
| Antenna | 104.5 | Same as above | 300 ohms | FM | Tune rotor for max. AVC voltage | Ant. C-39 | Maximum Deflection |

RECHECK ANTENNA & OSC. ADJUSTMENTS IN ORDER GIVEN

FM ALIGNMENT NOTES

NOTE A—The zero center scale DC vacuum tube voltmeter is to be connected between chassis ground and the AVC line. A signal of .1 volt must be fed into the receiver for this adjustment.
Note output voltage on the zero center DC vacuum tube voltmeter.

NOTE B—Disconnect zero center DC vacuum tube voltmeter from AVC and connect it at the audio takeoff point at the

27 K ohm resistor (R-10) and its junction with the terminal strip. Adjust for zero voltage indication.

NOTE C—AM I-F coils must be aligned before attempting to align the FM I-F coils.

NOTE D—Connect zero center DC vacuum tube voltmeter as in Note A. Adjust input to give same output on the zero center DC vacuum tube voltmeter as in Note A.

REPLACEMENT PARTS LIST

| Ref. No. | Part No. | Description | Qty. Used in Set |
|---------------------------------------------------------------------------|----------|---------------------------------|------------------|
| CAPACITORS | | | |
| C-1 | 14A209 | Gang Condenser Assembly | 1 |
| C-2 | 17A235 | 2-24 mmf Trimmer | 1 |
| C-3 | 47X559 | 130 mmf Ceramic | 1 |
| C-4 } C-5 } C-9 } C-10 } C-11 } C-17 } C-27 } C-43 } | 47X507 | 5000 mmf Ceramic | 8 |
| C-6 } C-7 } | | Part of T-2 (1st I-F Trans. FM) | |
| C-8 | | Part of T-3 (1st I-F Trans. AM) | |
| C-12 } C-13 } | | Part of T-5 (2nd I-F Trans. AM) | |

| | | | |
|------------------------------------------|--------|------------------------------------|-------------------------------------------------------|
| C-14 } C-15 } | | Part of T-4 (2nd I-F Trans. FM) | |
| C-16A } C-16B } | 47X112 | 50-50 mmf | Dual Mica... 1 |
| C-18 | | Part of T-6 (Discriminator Trans.) | |
| C-19 | 47X492 | 2700 mmf | Molded Mica 1 |
| C-20 } C-35 } | 47X468 | 220 mmf | Ceramic..... 2 |
| C-21 | 45X361 | 5 mf | 100 V Dry Electrolytic 1 |
| C-22 } C-42 } | 47X557 | 2.2 mmf | Ceramic..... 2 |
| C-23 | 47X558 | 30 mmf | Ceramic..... 1 |
| C-24 | 47X523 | 10 mmf | Ceramic..... 1 |
| C-25 | 17A255 | 1-8 mmf | Trimmer..... 1 |
| C-26 } C-44 } | B66503 | .05 mf | 200 V Tubular..... 2 |
| C-28A } C-28B } C-28C } C-28D } | 45X359 | 20 mf 20 mf 40 mf 40 mf | 25 V 350 V 350 V 350 V Dry Electrolytic 1 |
| C-29 | H66102 | .001 mf | 800 V Tubular..... 1 |

| Ref. No. | Part No. | Description | Qty. Used in Set |
|--------------------|----------|------------------------------|------------------|
| C-30 | 47X470 | 330 mmf Molded Mica | 1 |
| C-31 | 47X508 | 500 mmf Ceramic | 1 |
| C-32A } C-32B } | 76X4 | 100 mmf Dual Ceramic | 1 |
| C-33 | B66203 | .02 mf 200 V Tubular | 1 |
| C-34 | D66502 | .005 mf 400 V Tubular | 1 |
| C-36 | B66103 | .01 mf 200 V Tubular | 1 |
| C-37 | D66104 | .1 mf 400 V Tubular | 1 |
| C-38 | D66203 | .02 mf 400 V Tubular | 1 |
| C-39 } C-41 } | | Part of C-1 (Gang Condenser) | |
| C-40 | 47X471 | 68 mmf Ceramic | 1 |

RESISTORS

| | | Ohms | Watts | | |
|----------------------------|--------|--------------|------------|-------------------------|---|
| R-1 | B85470 | 47 | 0.5 | Carbon | 1 |
| R-2 } R-6 } R-9 } | B85102 | 1000 | 0.5 | Carbon | 3 |
| R-4 } R-8 } | B84680 | 68 | 0.5 | Carbon | 2 |
| R-5 } R-12 } R-13 } | B84682 | 6800 | 0.5 | Carbon | 3 |
| R-7 } R-25 } | B85473 | 47 K | 0.5 | Carbon | 2 |
| R-10 | B85273 | 27 K | 0.5 | Carbon | 1 |
| R-11 | 43X233 | 3.6 | 0.5 | Wirewound | 1 |
| R-14 } R-16 } | B85104 | 100 K | 0.5 | Carbon | 2 |
| R-15 | B85223 | 22 K | 0.5 | Carbon | 1 |
| R-17 | B84221 | 220 | 0.5 | Carbon | 1 |
| R-18 } R-24 } R-26 } | B85474 | 470 K | 0.5 | Carbon | 3 |
| R-20 | B85153 | 15 K | 0.5 | Carbon | 1 |
| R-21 | 36X372 | .5 meg. | | Volume Control & Switch | 1 |
| R-23 | 40X310 | .5 meg. | | Tone Control | 1 |
| R-27 | B85106 | 10 meg. | 0.5 | Carbon | 1 |
| R-28A } R-28B } | 43X224 | 1000 1400 | 4.0 6.0 | Wirewound | 1 |
| R-29 | B85105 | 1 meg. | 0.5 | Carbon | 1 |
| R-30 | B84271 | 270 | 0.5 | Carbon | 1 |
| R-31 | B84274 | 270 K | 0.5 | Carbon | 1 |

TRANSFORMERS AND COILS

| | | | |
|-----|--------|---------------------------|---|
| L-1 | 35A5 | Insulated Choke | 1 |
| L-2 | 9A2103 | Parasitic Choke Assembly | 1 |
| L-3 | 35A9 | Insulated Choke | 1 |
| L-4 | 35A8 | Insulated Choke | 1 |
| T-1 | 9A1972 | "B" Range Loop Antenna | 1 |
| T-2 | 9A2060 | 1st I-F Trans. (FM) | 1 |
| T-3 | 9A2062 | 1st I-F Trans. (AM) | 1 |
| T-4 | 9A2061 | 2nd I-F Trans. (FM) | 1 |
| T-5 | 9A2063 | 2nd I-F Trans. (AM) | 1 |
| T-6 | 9A2161 | Discriminator Transformer | 1 |
| T-7 | 9A2065 | Oscillator Coil (AM) | 1 |
| T-8 | 9A2067 | Oscillator Coil (FM) | 1 |

| | | | |
|------|--------|--------------------|---|
| T-9 | 51X134 | Output Transformer | 1 |
| T-10 | 9A2004 | Dipole Antenna | 1 |
| T-11 | 53X290 | Power Transformer | 1 |
| T-12 | 9A2066 | Antenna Coil (FM) | 1 |

MISCELLANEOUS

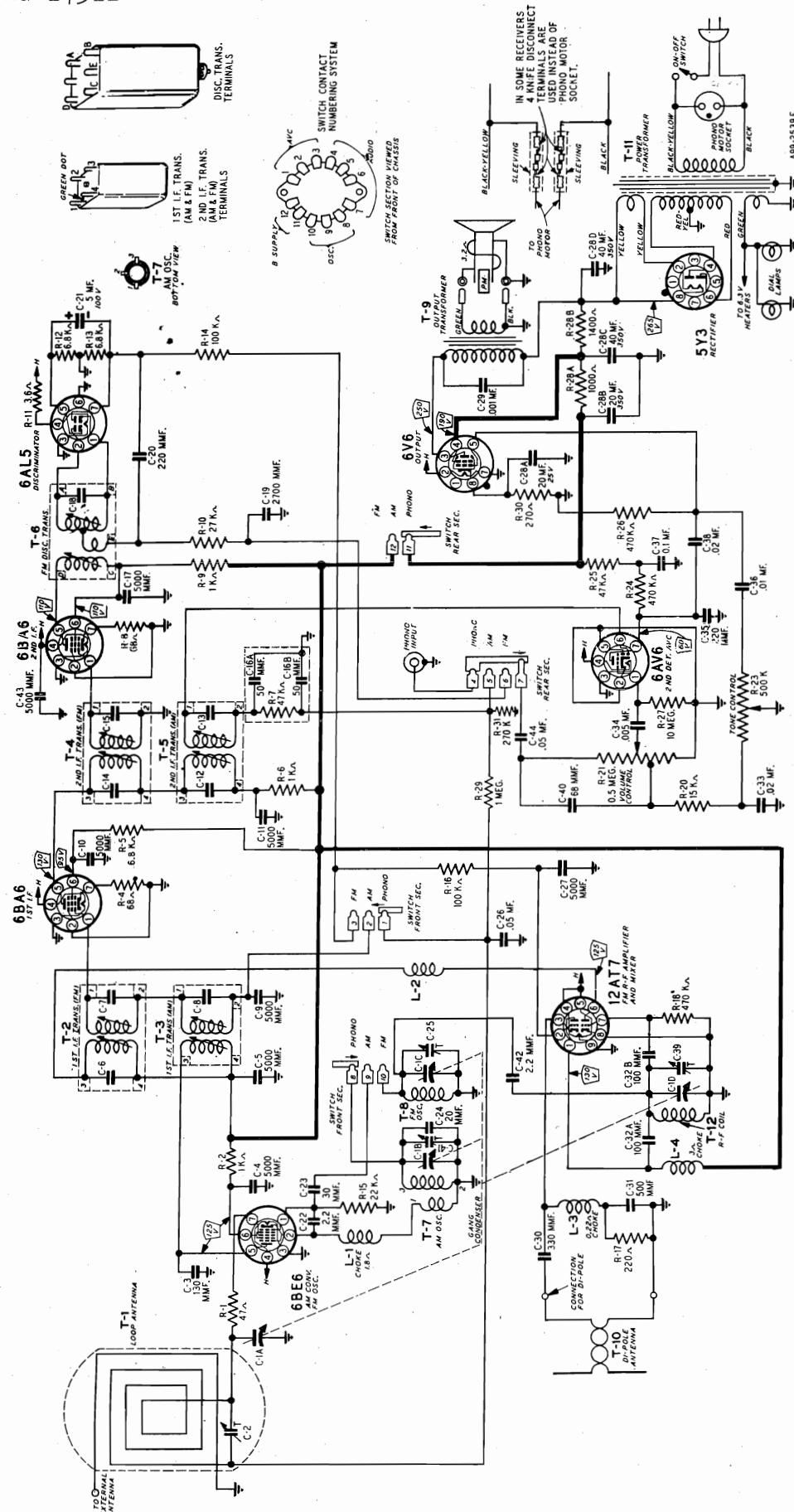
| | | |
|--------|------------------------------------|---|
| 12A502 | 12" P.M. Speaker | 1 |
| 3A435 | Tube Socket—Octal (8 prong) Molded | 2 |
| 3A426 | Tube Socket (1st 6BA6) | 1 |
| 3A427 | Tube Socket | 1 |
| 3A443 | Tube Socket (12AT7) | 1 |
| 3A439 | Tube Socket (Miniature) | 3 |
| 3A305 | Phono Socket—Single Pin Tip | 1 |
| 2A393 | Band Change Switch | 1 |
| 13X546 | Line Cord and Plug Assembly | 1 |
| 4X1049 | Escutcheon | 1 |
| 10A754 | Knob | 4 |

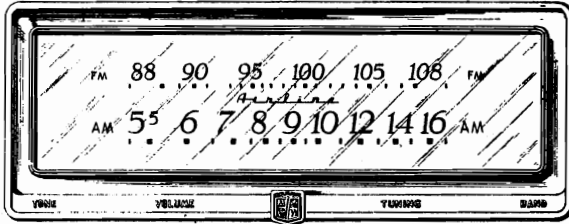
DIAL AND DRIVE ASSEMBLY

| | | |
|---------|----------------------------------|---|
| 58X729 | Dial Glass | 1 |
| 24X446 | Idler Pulley | 2 |
| 15X251 | Pointer | 1 |
| 25X1616 | Dial Bracket | 1 |
| 7A103 | No. 47 Pilot Light Bulb | 2 |
| 7A199 | *Pilot Light Socket Assembly | 1 |
| 26X486 | Drive Shaft | 1 |
| 41X88 | Reflector, Dial Light | 2 |
| 28X113 | Drive Cord Tension Spring | 1 |
| 10X38 | Drive Cord Assembly | 1 |
| 19X192 | "C" Washer (Mtg. drive Shaft) | 2 |
| 6X66 | Rubber Grommet (Mtg. gang cond.) | 3 |

TYPE W-28A176 RECORD CHANGER PARTS

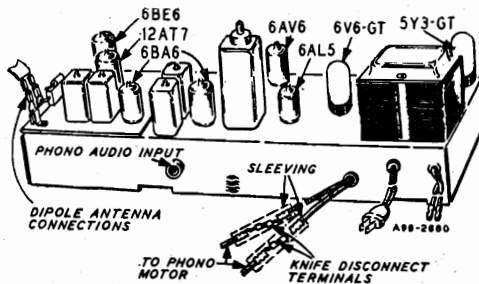
| | | |
|-------------|--------------------------------------------|---|
| W-15X106-26 | Motor Assembly, 60 cycles 105-125 Volts AC | 1 |
| W-49X123-5C | Pickup Arm | 1 |
| W-R A7M-1 | Crystal Cartridge & Needles | 1 |
| W-R-13017 | Needle, Microgroove (Red) | 1 |
| W-R-13016 | Needle, Regular | 1 |





GENERAL DESCRIPTION

This is a two band, seven tube (plus rectifier tube) AM and FM receiver. Controls are provided at the front of the cabinet for tuning, volume, tone and band or phono selection. A phono input socket is provided at the rear of the receiver to which a record player may be connected. The I-F stages use high gain miniature type tubes. Air-Wave Aerials are provided for the FM and Broadcast bands. Features include, a grounded grid R-F amplifier stage on the FM band, compensator circuits to prevent oscillator drift, automatic volume control, beam power output stage, PM dynamic loud speaker and an electrostatic shield in the power transformer to reduce power line noise.



DRIVE CORD REPLACEMENT

DIAL POINTER CORD

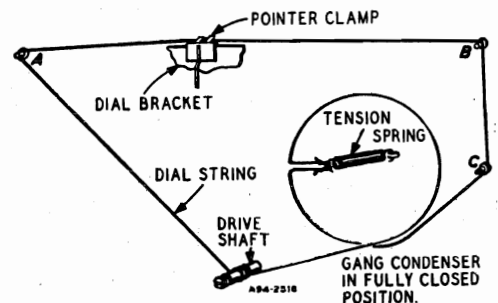
Use a new 10X38 drive cord assembly or a new length of cord 48 inches long for the installation. Install the cord as shown in the illustration, winding three turns clockwise around the drive shaft with the turns progressing away from the chassis. After completing the installation rotate the drive shaft a few turns to take up the slack in the cord.

ELECTRICAL SPECIFICATIONS

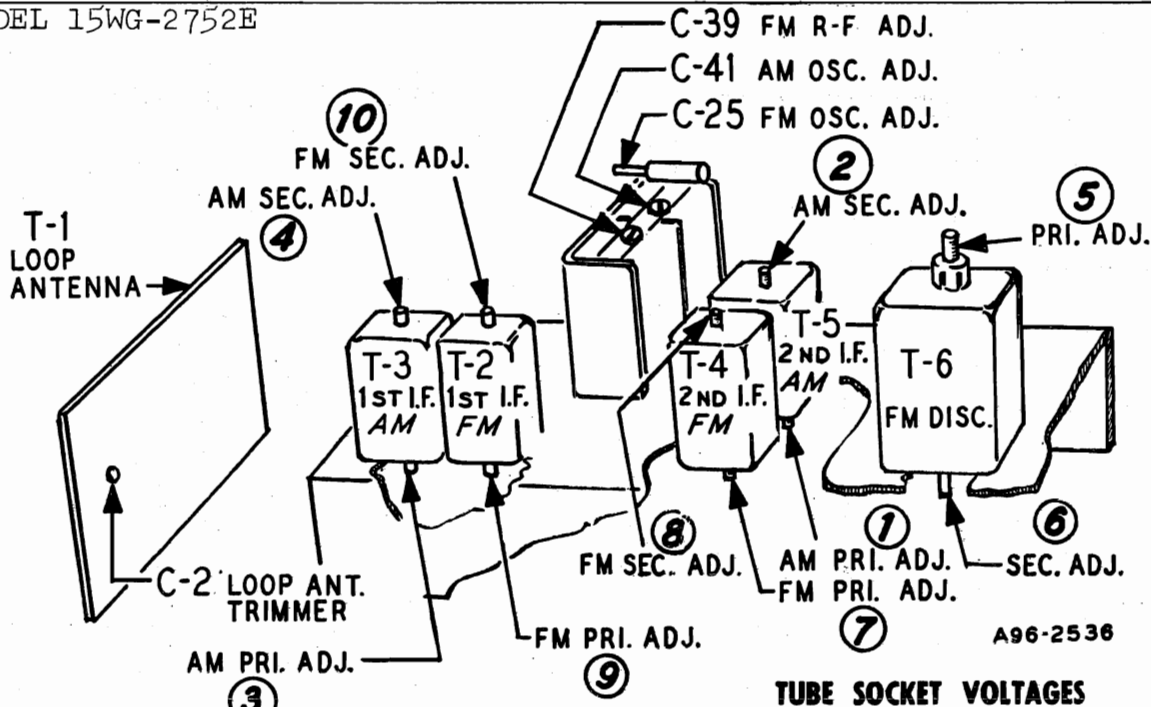
- Power Supply..... 105-125 volts AC 60 cycles, 60 watts. 80 watts with record changer.
- Frequency Ranges..... Broadcast 540-1600 KC
Frequency Modulation 88-108 MC
- Intermediate Frequency... AM—455 KC
FM—10.7 MC
- Selectivity..... AM—45 KC broad at 1000 times signal, measured at 1000 KC
I.F. FM—200 KC broad at 2 times down
I.F. FM—950 KC broad at 200 times down
- AM Sensitivity..... (For .5 watt output with external antenna) 25 microvolts average
- FM Sensitivity..... (For .5 watt output) 25 microvolts average
- Power Output..... 4.5 watts maximum
2.5 watts 10% distortion
- Loud Speaker..... 8" PM Dynamic
- Voice Coil Impedance..... 3.2 ohms 400 cycles
- Record Changer See Manual 5096A

Tube and Dial Lamp Complement

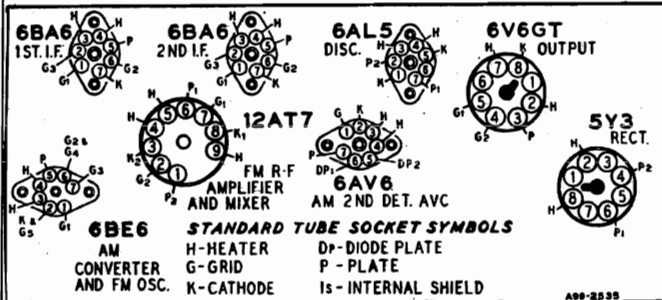
- 1 6BE6 AM Converter & FM Osc.
- 1 6BA6 1st I-F Amplifier
- 1 6BA6 2nd I-F Amplifier
- 1 6AL5 FM Discriminator
- 1 6AV6 Audio Amplifier, AM 2nd Detector and AVC
- 1 6V6GT Audio Output
- 1 5Y3GT Rectifier
- 1 12AT7 R-F Amplifier & Mixer
- 2 No. 47 Dial Lamps



MODEL 15WG-2752E



TUBE SOCKET VOLTAGES



Socket voltages are shown on the schematic diagram at the tube socket terminals. All voltages are between the socket terminal and chassis ground. Plate, screen and cathode voltages were taken with a 1000 ohm-per-volt meter with a 300 volt scale used for plate and screen voltages. Audio grid voltages were read with a vacuum tube volt-meter.

Conditions of measurement are:

- Line voltage 117 Volts AC
- Signal Input None

A variation of $\pm 10\%$ is usually permissible.

REPLACEMENT PARTS LIST

| Ref. No. | Part No. | Description | Qty. Used in Set |
|-------------------|------------------------------------|-------------------------|------------------|
| CAPACITORS | | | |
| C-1 | 14A209 | Gang Condenser Assembly | 1 |
| C-2 | 17A235 | 2-24 mmf Trimmer | 1 |
| C-3 | 47X559 | 130 mmf Ceramic | 1 |
| C-4 | 47X507 | 5000 mmf Ceramic | 8 |
| C-5 | | | |
| C-9 | | | |
| C-10 | | | |
| C-11 | | | |
| C-17 | 47X112 | 50-50 mmf Dual Mica | 1 |
| C-27 | | | |
| C-43 | | | |
| C-6 | Part of T-2 (1st I-F Trans. FM) | | |
| C-7 | | | |
| C-8 | Part of T-3 (1st I-F Trans. AM) | | |
| C-12 | Part of T-5 (2nd I-F Trans. AM) | | |
| C-13 | | | |
| C-14 | Part of T-4 (2nd I-F Trans. FM) | | |
| C-15 | | | |
| C-18 | Part of T-6 (Discriminator Trans.) | | |
| C-19 | 47X492 | 2700 mmf Molded Mica | 1 |

| | | | | | |
|-------|------------------------------|---------|-------------|------------------|---|
| C-20 | 47X468 | 220 mmf | Ceramic | 2 | |
| C-35 | 45X361 | 5 mf | 100 V | Dry Electrolytic | |
| C-21 | | | | | |
| C-22 | 47X557 | 2.2 mmf | Ceramic | 2 | |
| C-42 | | | | | |
| C-23 | 47X558 | 30 mmf | Ceramic | 1 | |
| C-24 | 47X523 | 10 mmf | Ceramic | 1 | |
| C-25 | 17A255 | 1-8 mmf | Trimmer | 1 | |
| C-26 | B66503 | .05 mf | 200 V | Tubular | |
| C-44 | | | | | |
| C-28A | 45X359 | 40 mf | 350 V | Dry Electrolytic | |
| C-28B | | | | | |
| C-28C | | | | | |
| C-28D | | | | | |
| C-29 | H66102 | .001 mf | 800 V | Tubular | 1 |
| C-30 | 47X470 | 330 mmf | Molded Mica | 1 | |
| C-31 | 47X508 | 500 mmf | Ceramic | 1 | |
| C-32A | 76X4 | 100 mmf | | Dual Ceramic | |
| C-32B | | | | | |
| C-33 | B66203 | .02 mf | 200 V | Tubular | 1 |
| C-34 | D66502 | .005 mf | 400 V | Tubular | 1 |
| C-36 | B66103 | .01 mf | 200 V | Tubular | 1 |
| C-37 | D66104 | .1 mf | 400 V | Tubular | 1 |
| C-38 | D66203 | .02 mf | 400 V | Tubular | 1 |
| C-39 | Part of C-1 (Gang Condenser) | | | | |
| C-41 | | | | | |
| C-40 | 47X471 | 68 mmf | Ceramic | 1 | |

REPLACEMENT PARTS LIST (continued)

| Ref. No. | Part No. | Description | Qty. Used in Set |
|-------------------------------|----------|--------------------------------------|---------------------|
| RESISTORS | | | |
| | | Ohms Watts | |
| R-1 | B85470 | 47 0.5 Carbon..... | 1 |
| R-2 | B85102 | 1000 0.5 Carbon..... | 3 |
| R-6 | | | |
| R-9 | | | |
| R-4 | B84680 | 68 0.5 Carbon..... | 2 |
| R-8 | | | |
| R-5 | B84682 | 6800 0.5 Carbon..... | 3 |
| R-12 | | | |
| R-13 | | | |
| R-7 | B85473 | 47 K 0.5 Carbon..... | 2 |
| R-25 | | | |
| R-10 | B85273 | 27 K 0.5 Carbon..... | 1 |
| R-11 | 43X233 | 3.6 0.5 Wirewound.... | 1 |
| R-14 | B85104 | 100 K 0.5 Carbon..... | 2 |
| R-16 | | | |
| R-15 | B85223 | 22 K 0.5 Carbon..... | 1 |
| R-17 | B84221 | 220 0.5 Carbon..... | 1 |
| R-18 | B85474 | 470 K 0.5 Carbon..... | 3 |
| R-24 | | | |
| R-26 | | | |
| R-20 | B85153 | 15 K 0.5 Carbon..... | 1 |
| R-21 | 36X372 | .5 meg. Volume Control & Switch | 1 |
| R-23 | 40X341 | 1.0 meg. Tone Control | 1 |
| R-27 | B85106 | 10 meg. 0.5 Carbon..... | 1 |
| R-28A | 43X224 | 1000 4.0 Wirewound.... | 1 |
| R-28B | | 1400 6.0 | |
| R-29 | B85105 | 1 meg 0.5 Carbon..... | 1 |
| R-30 | B84271 | 270 0.5 Carbon..... | 1 |
| R-31 | B84274 | 270 K 0.5 Carbon..... | 1 |
| TRANSFORMERS AND COILS | | | |
| L-1 | 35A5 | Insulated Choke | 1 |
| L-2 | 9A2103 | Parasitic Choke Assembly | 1 |
| L-3 | 35A9 | Insulated Choke | 1 |
| L-4 | 35A8 | Insulated Choke | 1 |
| T-1 | 9A1972 | "B" Range Loop Antenna | 1 |
| T-2 | 9A2060 | 1st I-F Trans. (FM) | 1 |
| T-3 | 9A2062 | 1st I-F Trans. (AM) | 1 |
| T-4 | 9A2061 | 2nd I-F Trans. (FM) | 1 |
| T-5 | 9A2063 | 2nd I-F Trans. (AM) | 1 |
| T-6 | 9A2161 | Discriminator Transformer | 1 |
| T-7 | 9A2065 | Oscillator Coil (AM) | 1 |
| T-8 | 9A2067 | Oscillator Coil (FM) | 1 |
| T-9 | 51X134 | Output Transformer | 1 |
| T-10 | 9A2209 | Dipole Antenna | 1 |
| T-11 | 53X290 | Power Transformer | 1 |
| T-12 | 9A2066 | Antenna Coil (FM) | 1 |

| Ref. No. | Part No. | Description | Qty. Used in Set |
|-----------------------------------------------------|-----------------------------------------------------|---------------------------------------------|---------------------|
| MISCELLANEOUS | | | |
| | 12A505 | 8" P.M. Speaker | 1 |
| | 3A435 | Tube Socket—Octal (8 prong) Molded | 2 |
| | 3A426 | Tube Socket (1st 6BA6)..... | 1 |
| | 3A427 | Tube Socket | 1 |
| | 3A439 | Tube Socket (Miniature) | 3 |
| | 3A443 | Tube Socket (12AT7) | 1 |
| | 3A305 | Phono Socket—Single Pin Tip..... | 1 |
| | 2A393 | Band Change Switch | 1 |
| | 13X546 | Line Cord and Plug Assembly..... | 1 |
| | 4X1049 | Escutcheon | 1 |
| | 10A754 | Knob | 4 |
| DIAL AND DRIVE ASSEMBLY | | | |
| | 58X729 | Dial Glass | 1 |
| | 24X446 | Idler Pulley | 2 |
| | 15X251 | Pointer | 1 |
| | 25X1616 | Dial Bracket | 1 |
| | 7A103 | No. 47 Pilot Light Bulb | 2 |
| | 7A199 | Pilot Light Socket Assembly | 1 |
| | 26X486 | Drive Shaft | 1 |
| | 41X88 | Reflector, Dial Light | 2 |
| | 28X113 | Drive Cord Tension Spring | 1 |
| | 10X38 | Drive Cord Assembly | 1 |
| | 19X192 | "C" Washer (Mtg. drive Shaft) | 2 |
| | 6X66 | Rubber Grommet (Mtg. gang cond.) | 3 |
| TYPE V-28A172 RECORD CHANGER PARTS | | | |
| See Note | Motor Assembly, 60 cycles 105-125 Volts AC | | 1 |
| V-3429B | Pickup Arm | | 1 |
| W-R-A1M | Crystal Cartridge & Needles | | 1 |
| W-R-13017 | Needle, Microgroove (Red) | | 1 |
| W-R-13016 | Needle, Regular | | 1 |
| NOTE—Specify part number stamped on motor assembly. | | | |

MODEL 15WG-2752E

**ALIGNMENT PROCEDURES
AM STAGES**

The following is required for aligning:
An All Wave Signal Generator Which Will Provide an Accurately Calibrated Signal at the Test Frequencies as Listed.
Output Indicating Meter, Non-Metallic Screwdriver, Dummy Antennas — .1 mf, and 50 mmf.

Volume Control Maximum all Adjustments.
Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.
Allow Chassis and Signal Generator to "Heat Up" for Several Minutes.

| SIGNAL GENERATOR | | | | GANG CONDENSER SETTING | ADJUST | ADJUST FOR |
|-------------------|--------------------------------------------|-----------------------|-------------------|--------------------------------------------------------------------|--------------------------------|----------------|
| FREQUENCY SETTING | CONNECT GENERATOR OUTPUT TO | THROUGH DUMMY ANTENNA | CONNECT GROUND TO | | | |
| 455 KC | Control Grid 1st 6BA6 Pin No. 1 | .1 mf | Chassis Base | Rotor Fully Open | 2nd I.F. Pri. (1) and Sec. (2) | Maximum Output |
| 455 KC | Control Grid 6BE6 Pin No. 7 1st Det. | .1 mf | Chassis Base | Rotor Fully Open | 1st I.F. Pri. (3) and Sec. (4) | Maximum Output |
| 455 KC | Control Grid 6BE6 Pin No. 7 | .1 mf | Chassis Base | Rotor Fully Open | 2nd I-F Pri. (1) and Sec. (2) | Maximum Output |
| 1620 KC | Control Grid 6BE6 Pin No. 7 | .1 mf | Chassis Base | Rotor Fully Open | Oscillator C-41 | Maximum Output |
| 1400 KC | External Antenna Terminal | 50 mmf | Chassis Base | Turn Rotor to Max. Output. Set Pointer to 1400 KC See Note A | Antenna C-2 | Maximum Output |

NOTE A—If the pointer is not at 1400 KC on the dial, reset pointer to the 1400 KC mark on the dial scale.

FM STAGES

The following is required for aligning:
An accurately calibrated signal generator providing unmodulated signals at the test frequencies listed below.
Non-metallic screwdriver.
Dummy Antennas and I-F Loading Resistor—2500 mmf, 300 ohms

Zero center scale DC vacuum tube voltmeter having a range of approximately 3 volts.
(If a zero center scale meter is not available, a standard scale vacuum tube voltmeter may be used by reversing the meter connections for negative readings).
Allow chassis and signal generator to "Heat Up" for several minutes.

| SIGNAL GENERATOR | | | THROUGH DUMMY ANTENNA | BAND SWITCH SETTING | GANG CONDENSER SETTING | ADJUST | ADJUST FOR |
|------------------|-------------------|-----------------------------------|-----------------------------------------------------------|---------------------|------------------------|-------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| | FREQUENCY SETTING | CONNECT GENERATOR OUTPUT TO | | | | | |
| Discriminator | 10.7 MC | 6BA6 2nd I-F Pin 1 and Chassis | 2500 mmf | FM | Rotor Fully Open | Disc. Pri. (5) Note A | Maximum Deflection |
| | 10.7 MC | 6BA6 2nd I-F Pin 1 and Chassis | 2500 mmf | FM | Rotor Fully Open | Disc. Sec. (6) Note B | |
| I-F | 10.7 MC Note C | 6BA6 1st I-F Pin 1 and Chassis | 2500 mmf | FM | Rotor Fully Open | 2nd I-F Pri. (7) Sec. (8) Note D | Maximum Deflection |
| Discriminator | 10.7 MC | 6BA6 1st I-F Pin 1 and Chassis | 2500 mmf | FM | Rotor Fully Open | Disc. Pri. (5) Note D | Maximum Deflection |
| | I-F | 10.7 MC | Junction C-32A & B (Dual 100 mmf cond.) And chassis | 2500 mmf | FM | Rotor Fully Open | 1st I-F Pri. (9) & Sec. (10) 2nd I-F Pri. (7) & Sec. (8) Disc. Pri. (5) In Order Shown Note D | Maximum Deflection |
| | 10.7 MC | Same as above | 2500 mmf | FM | Rotor Fully Open | Disc. Sec. (6) Note B | |

RECHECK I-F ADJUSTMENTS IN ORDER GIVEN

| | | | | | | | |
|------------|-------|-------------------------------------------------------------------------------------------------------|----------|----|---------------------------------|-----------|--------------------|
| Oscillator | 108.5 | Disconnect built-in dipole antenna and connect generator to dipole terminals with resistor in series. | 300 ohms | FM | Rotor Fully Open | Osc. C-25 | Deflection Maximum |
| Antenna | 104.5 | Same as above | 300 ohms | FM | Tune rotor for max. AVC voltage | Ant. C-39 | Maximum Deflection |

RECHECK ANTENNA & OSC. ADJUSTMENTS IN ORDER GIVEN

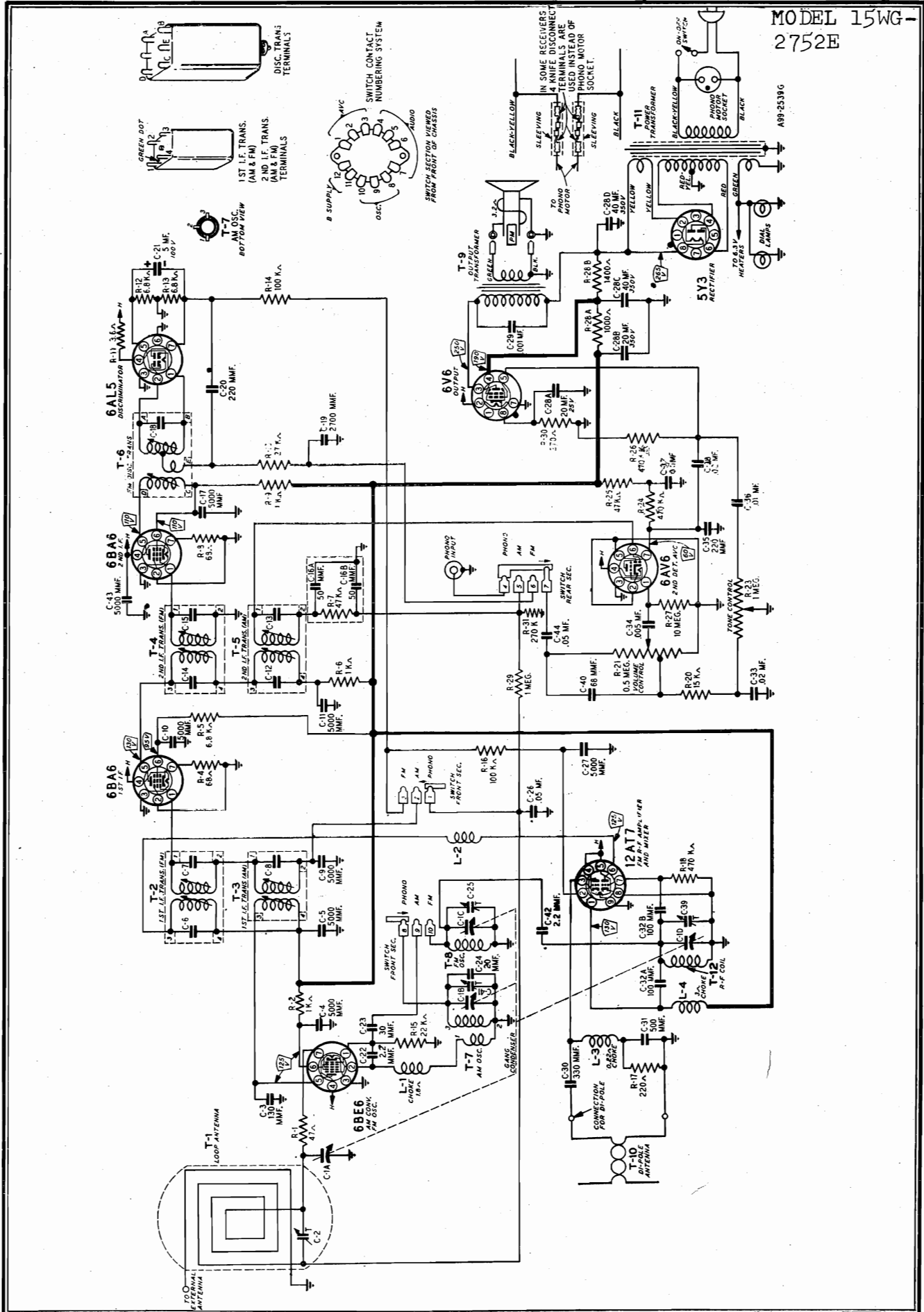
FM ALIGNMENT NOTES

NOTE A—The zero center scale DC vacuum tube voltmeter is to be connected between chassis ground and the AVC line. A signal of .1 volt must be fed into the receiver for this adjustment.
Note output voltage on the zero center DC vacuum tube voltmeter.
NOTE B—Disconnect zero center DC vacuum tube voltmeter from AVC and connect it at the audio takeoff point at the

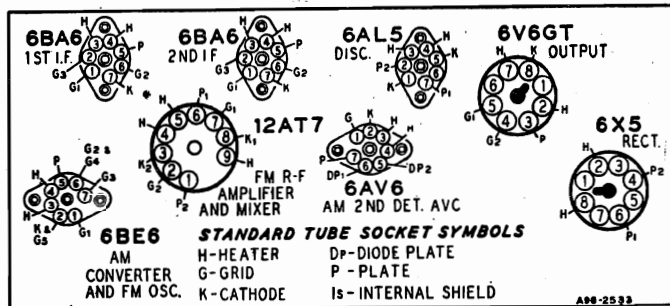
27 K ohm resistor (R-10) and its junction with the terminal strip. Adjust for zero voltage indication.

NOTE C—AM I-F coils must be aligned before attempting to align the FM I-F coils.

NOTE D—Connect zero center DC vacuum tube voltmeter as in Note A. Adjust input to give same output on the zero center DC vacuum tube voltmeter as in Note A.



MODEL 15WG-2758A



ELECTRICAL SPECIFICATIONS

- Power Supply..... 105-125 volts AC 60 cycles, 40 watts. 60 watts with record changer.
- Frequency Ranges..... Broadcast 540-1600 KC
Frequency Modulation 88-108 MC
- Intermediate Frequency... AM—455 KC
FM—10.7 MC
- Selectivity..... AM—45 KC broad at 1000 times signal, measured at 1000 KC
I.F. FM—200 KC broad at 2 times down
I.F. FM—950 KC broad at 200 times down
- AM Sensitivity..... (For .5 watt output with external antenna) 25 microvolts average
- FM Sensitivity..... (For .5 watt output) 25 microvolts average
- Power Output..... 1.9 watts maximum
0.8 watts 10% distortion
- Loud Speaker..... 10" PM Dynamic
- Voice Coil Impedance..... 3.2 ohms 400 cycles
- Record Changer See Manual 5089A

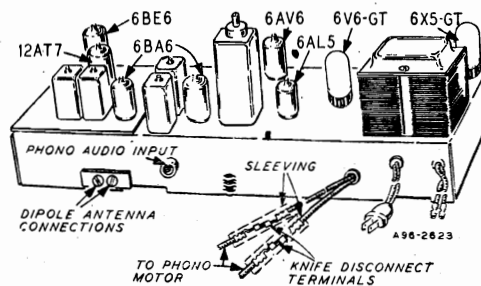
- Tube and Dial Lamp Complement**
- 1 6BE6 AM Converter & FM Osc.
 - 1 6BA6 1st I-F Amplifier
 - 1 6BA6 2nd I-F Amplifier
 - 1 6AL5 FM Discriminator
 - 1 6AV6 Audio Amplifier, AM 2nd Detector and AVC
 - 1 6V6GT Audio Output
 - 1 6X5GT Rectifier
 - 1 12AT7 R-F Amplifier & Mixer
 - 2 No. 47 Dial Lamps

TUBE SOCKET VOLTAGES

Socket voltages are shown on the schematic diagram at the tube socket terminals. All voltages are between the socket terminal and chassis ground. Plate, screen and cathode voltages were taken with a 1000 ohm-per-volt meter with a 300 volt scale used for plate and screen voltages. Audio grid voltages were read with a vacuum tube volt-meter. Conditions of measurement are:

- Line voltage 117 Volts AC
- Signal Input None

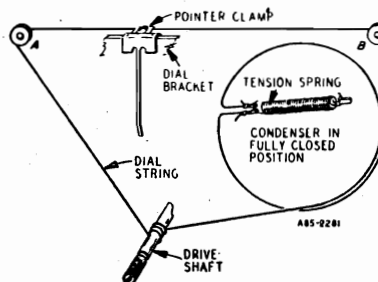
A variation of $\pm 10\%$ is usually permissible.



DRIVE CORD REPLACEMENT

DIAL POINTER CORD

Use a new 10X72 drive cord assembly or a new length of cord 44 inches long for the installation. Install the cord as shown in the illustration, winding three turns clockwise around the drive shaft with the turns progressing away from the chassis. After completing the installation rotate the drive shaft a few turns to take up the slack in the cord.



ALIGNMENT PROCEDURES

AM STAGES

The following is required for aligning:
 An All Wave Signal Generator Which Will Provide an Accurately Calibrated Signal at the Test Frequencies as Listed.
 Output Indicating Meter, Non-Metallic Screwdriver, Dummy Antennas .1 mf, and 50 mmf.

Volume Control Maximum all Adjustments.
 Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.
 Allow Chassis and Signal Generator to "Heat Up" for Several Minutes.

| SIGNAL GENERATOR | | | | GANG CONDENSER SETTING | ADJUST | ADJUST FOR |
|-------------------|--------------------------------------------|-----------------------|-------------------|--------------------------------------------------------------|--------------------------------|----------------|
| FREQUENCY SETTING | CONNECT GENERATOR OUTPUT TO | THROUGH DUMMY ANTENNA | CONNECT GROUND TO | | | |
| 455 KC | Control Grid 1st 6BA6 Pin No. 1 | .1 mf | Chassis Base | Rotor Fully Open | 2nd I.F. Pri. (1) and Sec. (2) | Maximum Output |
| 455 KC | Control Grid 6BE6 Pin No. 7 1st Det. | .1 mf | Chassis Base | Rotor Fully Open | 1st I.F. Pri. (3) and Sec. (4) | Maximum Output |
| 455 KC | Control Grid 6BE6 Pin No. 7 | .1 mf | Chassis Base | Rotor Fully Open | 2nd I-F Pri. (1) and Sec. (2) | Maximum Output |
| 1620 KC | Control Grid 6BE6 Pin No. 7 | .1 mf | Chassis Base | Rotor Fully Open | Oscillator C-41 | Maximum Output |
| 1400 KC | External Antenna Terminal | 50 mmf | Chassis Base | Turn Rotor to Max. Output. Set Pointer to 1400 KC See Note A | Antenna C-2 | Maximum Output |

NOTE A—If the pointer is not at 1400 KC on the dial, reset pointer to the 1400 KC mark on the dial scale.

FM STAGES

The following is required for aligning:
 An accurately calibrated signal generator providing unmodulated signals at the test frequencies listed below.
 Non-metallic screwdriver.
 Dummy Antennas and I-F Loading Resistor—2500 mmf, 300 ohms

Zero center scale DC vacuum tube voltmeter having a range of approximately 3 volts.
 (If a zero center scale meter is not available, a standard scale vacuum tube voltmeter may be used by reversing the meter connections for negative readings).
 Allow chassis and signal generator to "Heat Up" for several minutes.

| SIGNAL GENERATOR | | | THROUGH DUMMY ANTENNA | BAND SWITCH SETTING | GANG CONDENSER SETTING | ADJUST | ADJUST FOR |
|------------------|-------------------|-----------------------------------------------------------|-----------------------|---------------------|------------------------|-----------------------------------------------------------------------------------------------------------------|--------------------|
| | FREQUENCY SETTING | CONNECT GENERATOR OUTPUT TO | | | | | |
| Discriminator | 10.7 MC | 6BA6 2nd I-F Pin 1 and Chassis | 2500 mmf | FM | Rotor Fully Open | Disc. Pri. (5) Note A | Maximum Deflection |
| | 10.7 MC | 6BA6 2nd I-F Pin 1 and Chassis | 2500 mmf | FM | Rotor Fully Open | Disc. Sec. (6) Note B | |
| I-F | 10.7 MC Note C | 6BA6 1st I-F Pin 1 and Chassis | 2500 mmf | FM | Rotor Fully Open | 2nd I-F Pri. (7) Sec. (8) Note D | Maximum Deflection |
| Discriminator | 10.7 MC | 6BA6 1st I-F Pin 1 and Chassis | 2500 mmf | FM | Rotor Fully Open | Disc. Pri. (5) Note D | Maximum Deflection |
| I-F | 10.7 MC | Junction C-32A & B (Dual 100 mmf cond.) And chassis | 2500 mmf | FM | Rotor Fully Open | 1st I-F Pri. (9) & Sec. (10) 2nd I-F Pri. (7) & Sec. (8) Disc. Pri. (5) In Order Shown Note D | Maximum Deflection |
| | 10.7 MC | Same as above | 2500 mmf | FM | Rotor Fully Open | Disc. Sec. (6) Note B | |

RECHECK I-F ADJUSTMENTS IN ORDER GIVEN

| | | | | | | | |
|------------|-------|-------------------------------------------------------------------------------------------------------|----------|----|---------------------------------|-----------|--------------------|
| Oscillator | 108.5 | Disconnect built-in dipole antenna and connect generator to dipole terminals with resistor in series. | 300 ohms | FM | Rotor Fully Open | Osc. C-25 | Deflection Maximum |
| Antenna | 104.5 | Same as above | 300 ohms | FM | Tune rotor for max. AVC voltage | Ant. C-39 | Maximum Deflection |

RECHECK ANTENNA & OSC. ADJUSTMENTS IN ORDER GIVEN

FM ALIGNMENT NOTES

NOTE A—The zero center scale DC vacuum tube voltmeter is to be connected between chassis ground and the AVC line. A signal of .1 volt must be fed into the receiver for this adjustment.
 Note output voltage on the zero center DC vacuum tube voltmeter.

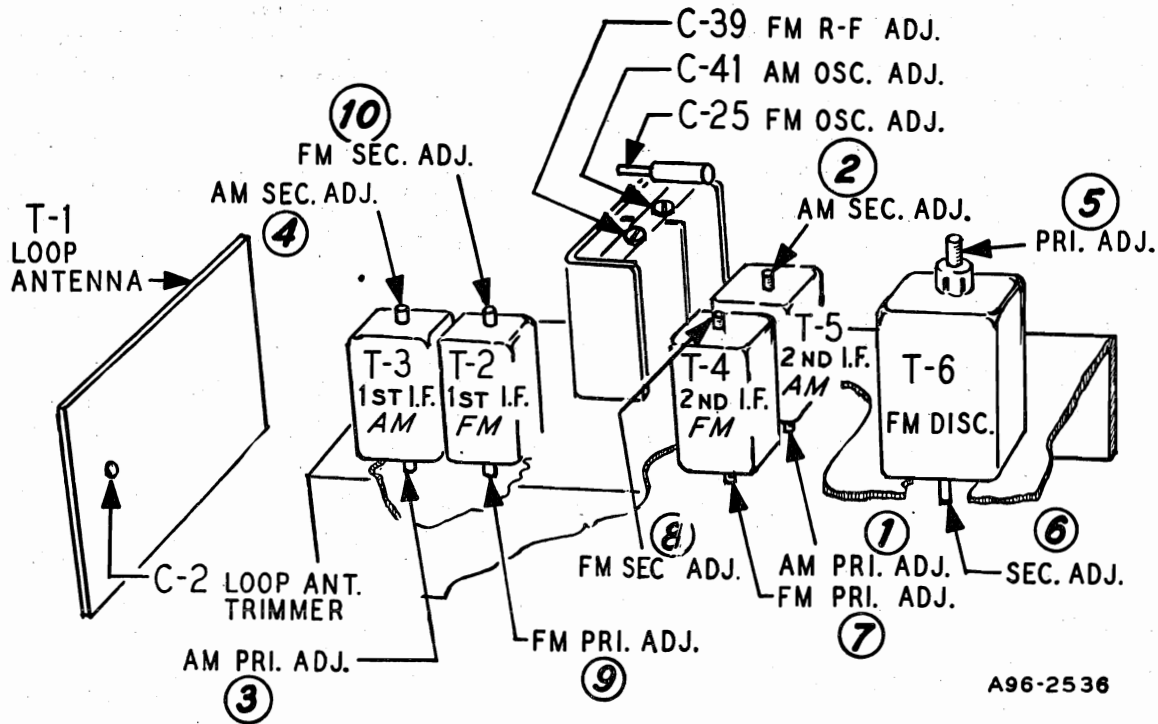
NOTE B—Disconnect zero center DC vacuum tube voltmeter from AVC and connect it at the audio takeoff point at the

27 K ohm resistor (R-10) and its junction with the terminal strip. Adjust for zero voltage indication.

NOTE C—AM I-F coils must be aligned before attempting to align the FM I-F coils.

NOTE D—Connect zero center DC vacuum tube voltmeter as in Note A. Adjust input to give same output on the zero center DC vacuum tube voltmeter as in Note A.

MODEL 15WG-2758A



A96-2536

REPLACEMENT PARTS LIST

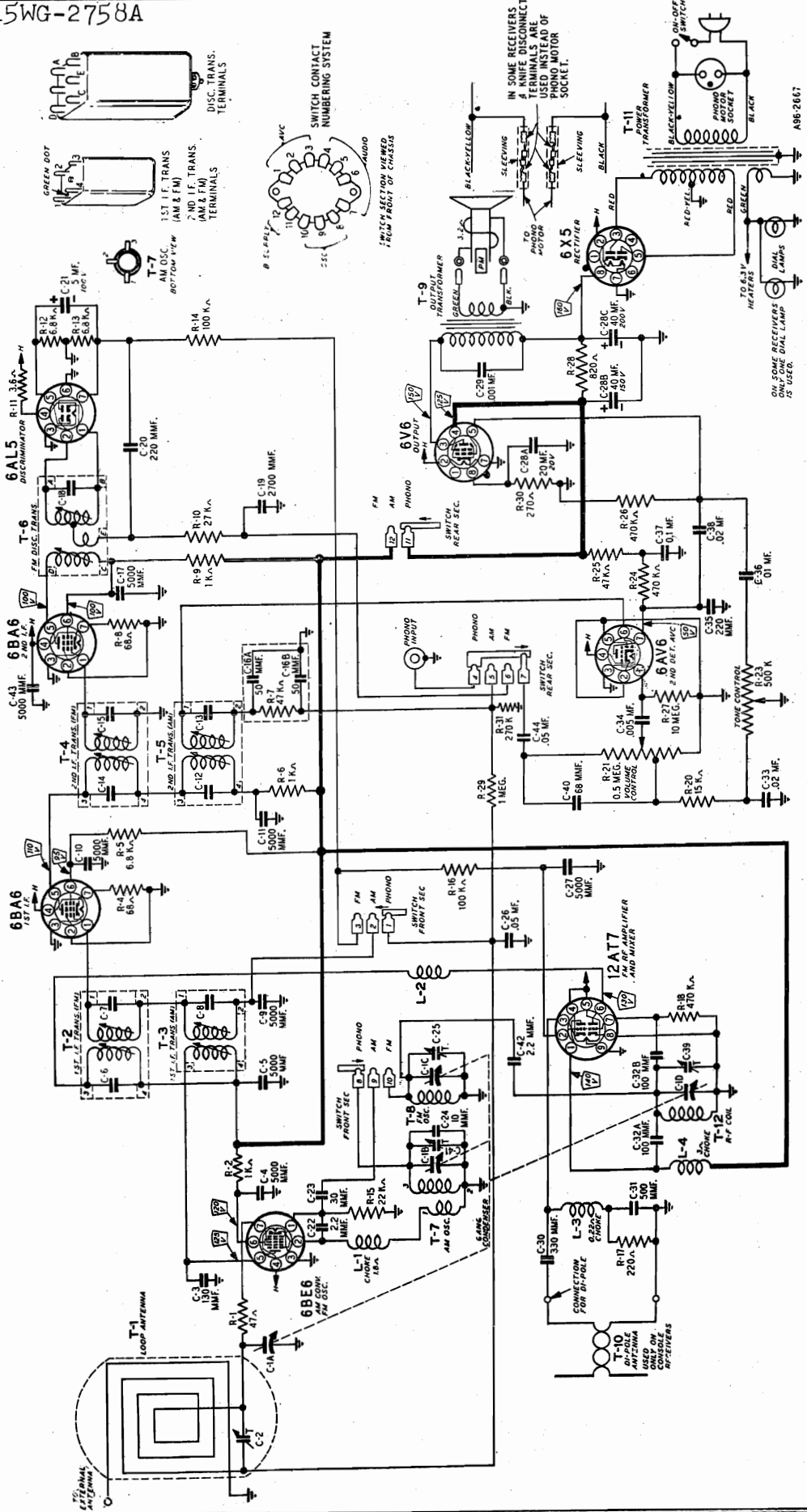
| Ref. No. | Part No. | Description | Qty. Used in Set |
|----------------------|----------|------------------------------------------|------------------|
| MISCELLANEOUS | | | |
| | 12A480 | 10" P.M. Speaker | 1 |
| | 3A435 | Tube Socket—Octal (8 prong) Molded | 2 |
| | 3A426 | Tube Socket (1st 6BA6)..... | 1 |
| | 3A427 | Tube Socket | 1 |
| | 3A443 | Tube Socket (12AT7) | 1 |
| | 3A439 | Tube Socket (Miniature) | 3 |
| | 3A305 | Phono Socket—Single Pin Tip..... | 1 |
| | 2A393 | Band Change Switch | 1 |
| | 13X546 | Line Cord and Plug Assembly..... | 1 |
| | 4X1114 | Escutcheon | 1 |
| | 10A759 | Knob | 4 |

| Ref. No. | Part No. | Description | Qty. Used in Set |
|------------------------------------------------|---------------|--------------------------------------------------|------------------|
| DIAL AND DRIVE ASSEMBLY | | | |
| | 58X741 | Dial Glass | 1 |
| | 15X251 | Pointer | 1 |
| | 25X1650 | Dial Bracket | 1 |
| | 7A103 | No. 47 Pilot Light Bulb | 2 |
| | 7A199 | Pilot Light Socket Assembly | 1 |
| | 26X486 | Drive Shaft | 1 |
| | 41X88 | Reflector, Dial Light | 2 |
| | 28X113 | Drive Cord Tension Spring | 1 |
| | 10X72 | Drive Cord Assembly | 1 |
| | 19X192 | "C" Washer (Mtg. drive Shaft) | 2 |
| | 6X66 | Rubber Grommet (Mtg. gang cond.) | 3 |
| TYPE G.I. — 28A169 RECORD CHANGER PARTS | | | |
| | G.I.-56-76507 | Motor Assembly, 60 cycles 105-125 Volts AC | |
| | G.I.-69-73657 | Tone Arm | |
| | S-P81 | Crystal Cartridge & Needle (Shure) | |
| | S-85-35 | Needle | |

REPLACEMENT PARTS LIST

| Ref. No. | Part No. | Description | Qty. Used in Set | |
|------------------------------------------------|------------------------------------|------------------------------|------------------|---------------------------------|
| CAPACITORS | | | | |
| C-1 | 14A209 | Gang Condenser Assembly | 1 | |
| C-2 | 17A235 | 2-24 mmf Trimmer | 1 | |
| C-3 | 47X559 | 130 mmf Ceramic | 1 | |
| C-4 } C-5 } C-9 } | 47X507 | 5000 mmf Ceramic | 8 | |
| C-10 } C-11 } C-17 } C-27 } C-43 } | | | | |
| C-6 } C-7 } | | | | Part of T-2 (1st I-F Trans. FM) |
| C-8 | | | | Part of T-3 (1st I-F Trans. AM) |
| C-12 } C-13 } | Part of T-5 (2nd I-F Trans. AM) | | | |
| C-14 } C-15 } | Part of T-4 (2nd I-F Trans. FM) | | | |
| C-16A } C-16B } | 47X112 | 50-50 mmf Dual Mica | 1 | |
| C-18 | Part of T-6 (Discriminator Trans.) | | | |
| C-19 | 47X492 | 2700 mmf Molded Mica | 1 | |
| C-20 } C-35 } | 47X468 | 220 mmf Ceramic | 2 | |
| C-21 | 45X361 | 5 mf 100 V Dry Electrolytic | 1 | |
| C-22 } C-42 } | 47X557 | 2.2 mmf Ceramic | 2 | |
| C-23 | 47X558 | 30 mmf Ceramic | 1 | |
| C-24 | 47X523 | 10 mmf Ceramic | 1 | |
| C-25 | 17A255 | 1-8 mmf Trimmer | 1 | |
| C-26 } C-44 } | B66503 | .05 mf 200 V Tubular | 2 | |
| C-28A } C-28B } C-28C } | 45X360 | 20 mf 20 V | | |
| | | 40 mf 150 V Dry Electrolytic | 1 | |
| | | 40 mf 200 V | | |
| C-29 | H66102 | .001 mf 800 V Tubular | 1 | |
| C-30 | 47X470 | 330 mmf Molded Mica | 1 | |
| C-31 | 47X508 | 500 mmf Ceramic | 1 | |
| C-32A } C-32B } | 76X4 | 100 mmf Dual Ceramic | 1 | |
| C-33 | B66203 | .02 mf 200 V Tubular | 1 | |
| C-34 | D66502 | .005 mf 400 V Tubular | 1 | |
| C-36 | B66103 | .01 mf 200 V Tubular | 1 | |
| C-37 | D66104 | .1 mf 400 V Tubular | 1 | |
| C-38 | D66203 | .02 mf 400 V Tubular | 1 | |
| C-39 } C-41 } | Part of C-1 (Gang Condenser) | | | |
| C-40 | 47X471 | 68 mmf Ceramic | 1 | |

| Ref. No. | Part No. | Description | Qty. Used in Set | | | | | |
|-------------------------------|----------|---------------------------|------------------|---|--------|---------|-------------------------|---|
| RESISTORS | | | | | | | | |
| | | Ohms | Watts | | | | | |
| R-1 | B85470 | 47 | 0.5 Carbon | 1 | | | | |
| R-2 } R-6 } R-9 } | B85102 | 1000 | 0.5 Carbon | 3 | | | | |
| R-4 } R-8 } | | | | | B84680 | 68 | 0.5 Carbon | 2 |
| R-5 } R-12 } R-13 } |  |  |  |  |  |  |  |  | B84682 | 6800 | 0.5 Carbon | 3 |
| R-7 } R-25 } | B85473 | 47 K | 0.5 Carbon | 2 | | | | |
| R-10 | | | | | B85273 | 27 K | 0.5 Carbon | 1 |
| R-11 | 43X233 | 3.6 | 0.5 Wirewound | 1 | | | | |
| R-14 } R-16 } | B85104 | 100 K | 0.5 Carbon | 2 | | | | |
| R-15 | | | | | B85223 | 22 K | 0.5 Carbon | 1 |
| R-17 | B84221 | 220 | 0.5 Carbon | 1 | | | | |
| R-18 } R-24 } R-26 } | B85474 | 470 K | 0.5 Carbon | 3 | | | | |
| R-20 | | | | | B85153 | 15 K | 0.5 Carbon | 1 |
| R-21 | | | | | 36X372 | .5 meg. | Volume Control & Switch | 1 |
| R-23 | 40X310 | .5 meg. | Tone Control | 1 | | | | |
| R-27 | B85106 | 10 meg. | 0.5 Carbon | 1 | | | | |
| R-28 | D84821 | 820 | 2.0 Carbon | 1 | | | | |
| R-29 | B85105 | 1 meg. | 0.5 Carbon | 1 | | | | |
| R-30 | B84271 | 270 | 0.5 Carbon | 1 | | | | |
| R-31 | B84274 | 270 K | 0.5 Carbon | 1 | | | | |
| TRANSFORMERS AND COILS | | | | | | | | |
| L-1 | 35A5 | Insulated Choke | 1 | | | | | |
| L-2 | 9A2103 | Parasitic Choke Assembly | 1 | | | | | |
| L-3 | 35A9 | Insulated Choke | 1 | | | | | |
| L-4 | 35A8 | Insulated Choke | 1 | | | | | |
| T-1 | 9A2146 | "B" Range Loop Antenna | 1 | | | | | |
| T-2 | 9A2060 | 1st I-F Trans. (FM) | 1 | | | | | |
| T-3 | 9A2062 | 1st I-F Trans. (AM) | 1 | | | | | |
| T-4 | 9A2061 | 2nd I-F Trans. (FM) | 1 | | | | | |
| T-5 | 9A2063 | 2nd I-F Trans. (AM) | 1 | | | | | |
| T-6 | 9A2161 | Discriminator Transformer | 1 | | | | | |
| T-7 | 9A2065 | Oscillator Coil (AM) | 1 | | | | | |
| T-8 | 9A2067 | Oscillator Coil (FM) | 1 | | | | | |
| T-9 | 51X134 | Output Transformer | 1 | | | | | |
| T-10 | 9A2004 | Dipole Antenna | 1 | | | | | |
| T-11 | 53X291 | Power Transformer | 1 | | | | | |
| T-12 | 9A2066 | Antenna Coil (FM) | 1 | | | | | |

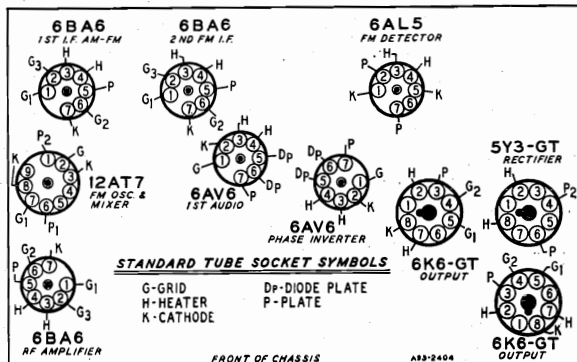
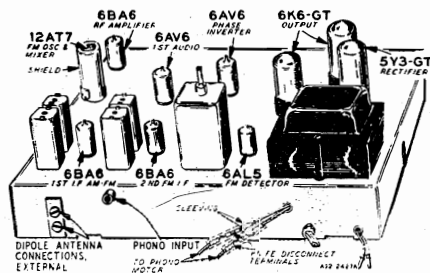




GENERAL DESCRIPTION

This is a two band, nine tube (plus rectifier tube) AM and FM receiver with an automatic record changer. The I-F stages use high gain miniature type tubes. Built-in Air Wave Aerials are provided for the FM and Broadcast bands. Features include, compensator circuits to prevent oscillator drift, automatic volume control, push-pull pentode power output stage, PM dynamic loud speaker and an electrostatic shield in the power transformer to reduce power line noise.

The receiver and record changer are housed in a console combination cabinet with controls provided for tuning, volume, tone and band or phono selection.



ELECTRICAL SPECIFICATIONS

- Power Supply 105-125 volts AC 60 cycles, 80 watts, 100 watts with record changer
- Frequency Ranges.....Broadcast 540-1600 KC
Frequency Modulation 88-108 MC
- Intermediate Frequency ..AM—455 KC
FM—10.7 MC
- SelectivityAM—43 KC broad at 1000 times signal, measured at 1000 KC
I.F. FM—200 KC broad at 2 times down
I.F. FM—760 KC broad at 200 times down
- AM Sensitivity(For .5 watt output with external antenna)
10 microvolts average
- FM Sensitivity(For .5 watt output)
30 microvolts average
- Power Output8.5 watts maximum
6.0 watts 10% distortion
- Loud Speaker12" PM Dynamic
- Voice Coil Impedance..3.2 ohms 400 cycles
- Record ChangerSee Manual No. 5098A

Tube and Dial Lamp Complement

- 1 6BA6 AM-FM R-F Amplifier
- 1 12AT7 FM & AM Osc. & Mixer
- 1 6BA6 FM-AM 1st I-F Amplifier
- 1 6BA6 FM 2nd I-F Amplifier
- 1 6AL5 FM Detector
- 1 6AV6 Audio Amplifier, AM 2nd Detector and AVC
- 2 6K6-GT Audio Output
- 1 5Y3-GT Rectifier
- 1 6AV6 Phase Inverter
- 2 No. 47 Dial Lamps

TUBE SOCKET VOLTAGES

Socket voltages are shown on the Schematic diagram at the tube socket terminals. All voltages are between the socket terminal and chassis ground. Plate, screen and cathode voltages were taken with a 1000 ohm-per-volt meter with a 300 volt scale used for plate and screen voltages. Audio grid voltages were read with a vacuum tube volt-meter. Conditions of measurement are:

- Line voltage 117 Volts AC
- Signal Input None
- A variation of $\pm 10\%$ is usually permissible.

MODEL 15WG-2765A

ALIGNMENT PROCEDURE AM STAGES

The following is required for aligning:
An All Wave Signal Generator Which Will Provide an Accurately Calibrated Signal at the Test Frequencies as Listed.
Output Indicating Meter, Non-Metallic Screwdriver, Dummy Antennas
—.1 mf, 200 mmf.

Volume Control—Maximum all Adjustments
Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.
Allow Chassis and Signal Generator to "Heat Up" for Several Minutes.

| SIGNAL GENERATOR | | CONNECT GENERATOR OUTPUT TO | THROUGH DUMMY ANTENNA | BAND SWITCH SETTING | GANG CONDENSER SETTING | ADJUST | ADJUST FOR |
|------------------|-------------------|-----------------------------|-----------------------|---------------------|-------------------------------------------------------------------|--------------------------------------------------------|----------------|
| | FREQUENCY SETTING | | | | | | |
| I-F | 455 kc | 12AT7 Pin 7 and Chassis | .1 mf | Broadcast | Rotor Fully Open | 2nd I-F Pri. & Sec. ① & ② 1st I-F Pri. & Sec. ③ & ④ | Maximum Output |
| Broadcast | 1620 kc | External ant. term. | 200 mmf | Broadcast | Rotor Fully Open | Broadcast Oscillator C-33 | |
| | 1400 kc | External ant. term. | 200 mmf | Broadcast | Turn Rotor to Max. Output Set pointer to 1400 kc See Note A | Broadcast Interstage C-29 | |
| | 1400 kc | External ant. term. | 200 mmf | Broadcast | | Loop Antenna C-48 | |

Note A—If the pointer is not at 1400 KC on dial, reset pointer at the 1400 KC mark on the dial scale.

FM STAGES

The following equipment is required for aligning:
An accurately calibrated signal generator providing unmodulated signals at the test frequencies listed below.
Non-metallic screwdriver.
Dummy Antennas and I-F Loading Resistor—.01 mf, 300 ohms and 1000 ohms.

Zero center scale DC vacuum tube voltmeter having a range of approximately 3 volts.
(If a zero center scale meter is not available, a standard scale vacuum tube voltmeter may be used by reversing the meter connections for negative readings.)
Allow chassis and signal generator to warm up for several minutes.

| SIGNAL GENERATOR | | CONNECT GENERATOR OUTPUT TO | THROUGH DUMMY ANTENNA | BAND SWITCH SETTING | GANG CONDENSER SETTING | ADJUST | ADJUST FOR |
|------------------|-------------------|--------------------------------|-----------------------|---------------------|------------------------|------------------------------------------------------------|--------------------|
| | FREQUENCY SETTING | | | | | | |
| Discriminator | 10.7 MC Note B | 6BA6 2nd I-F Pin 1 and Chassis | .01 mf | FM | Rotor Fully Open | Disc. Pri. ⑤ Note A | Maximum Deflection |
| | 10.7 MC Note B | 6BA6 2nd I-F Pin 1 and Chassis | .01 mf | FM | Rotor Fully Open | Disc. Sec. ⑥ Note C | Zero Center |
| I-F | 10.7 MC Note F | 6BA6 1st I-F Pin 1 and Chassis | .01 mf | FM | Rotor Fully Open | 2nd I-F Pri. Note A and D ⑦ 2nd I-F Sec. Note A and E ⑧ | Maximum Deflection |
| Discriminator | 10.7 MC Note F | 6BA6 1st I-F Pin 1 and Chassis | .01 mf | FM | Rotor Fully Open | Disc. Pri. ⑤ Note A | Maximum Deflection |
| | 10.7 MC Note F | 6BA6 1st I-F Pin 1 and Chassis | .01 mf | FM | Rotor Fully Open | Disc. Sec. ⑥ Note C | Zero Center |
| | 10.7 MC Note F | FM-RF Gang Condenser terminal | .01 mf | FM | Rotor Fully Open | 1st I-F Pri. ⑨ 1st I-F Sec. ⑩ Notes A, D & E | Maximum Deflection |

Recheck I-F Adjustments in order given

| | FREQUENCY SETTING | CONNECT GENERATOR OUTPUT TO | THROUGH DUMMY ANTENNA | BAND SWITCH SETTING | GANG CONDENSER SETTING | ADJUST | ADJUST FOR |
|------------|-------------------|-------------------------------------------------------------------------------------|-----------------------|---------------------|---------------------------------|---------------------------|--------------------|
| R-F & Osc. | 108.4 Note H | Disconnect dipole and connect generator to dipole terminals with resistor in series | 300 ohms | FM | Rotor Fully Open | Oscillator C-35 Note G | Maximum Deflection |
| | 104.5 | Disconnect dipole and connect generator to dipole terminals with resistor in series | 300 ohms | FM | Tune Rotor for Max. AVC voltage | FM Interstage C-32 | Maximum Deflection |
| | 104.5 | Disconnect dipole and connect generator to dipole terminals with resistor in series | 300 ohms | FM | Tune Rotor for Max. AVC voltage | Ant. C-47 | Maximum Deflection |

Recheck R-F and Osc. Adjustments in order given

NOTE A—Test Equipment connections are as given in the table. The zero center scale DC vacuum tube voltmeter is to be connected between chassis ground and the AVC line at the junction of resistor R-22 and condenser C-18 for all adjustments except the discriminator secondary adjustment, for which See Note C.

NOTE B—A signal of .1 volt must be fed into the receiver for this adjustment.

NOTE C—Disconnect zero center DC vacuum tube voltmeter from AVC and connect to junction of R-18 and C-62. Adjust for zero voltage indication.

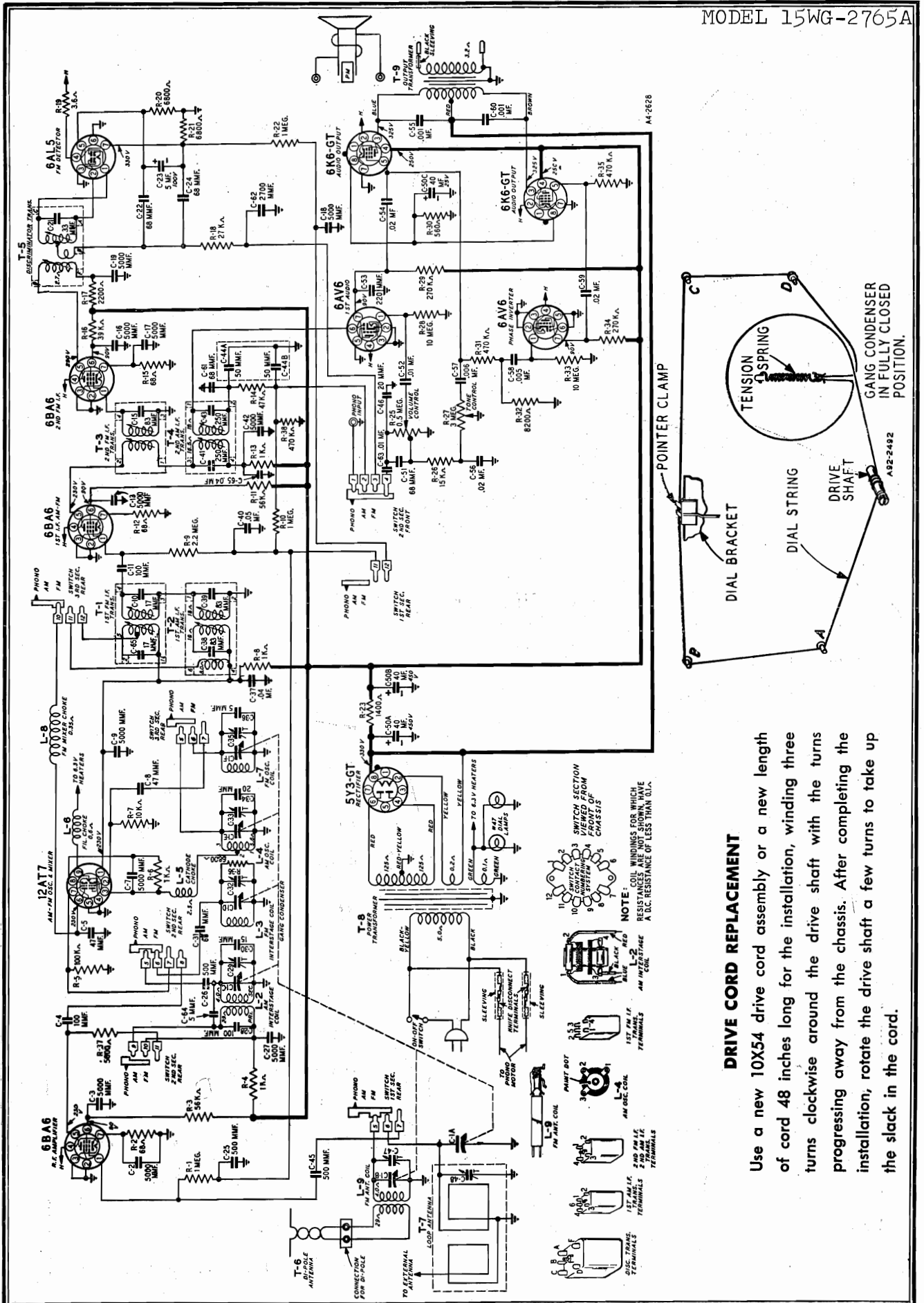
NOTE D—Before adjusting Pri. core connect 1000 ohm load resistor across the 2nd I.F. secondary terminals. Input may have to be increased to .1 volt if receiver is badly mis-aligned.

NOTE E—Disconnect 1000 ohm load resistor from secondary terminals and connect across the 2nd I.F. primary terminals. Input may have to be increased to .1 volt if receiver is badly mis-aligned.

NOTE F—Input can be reduced to 10,000 microvolts.

NOTE G—Oscillator frequency above signal frequency.

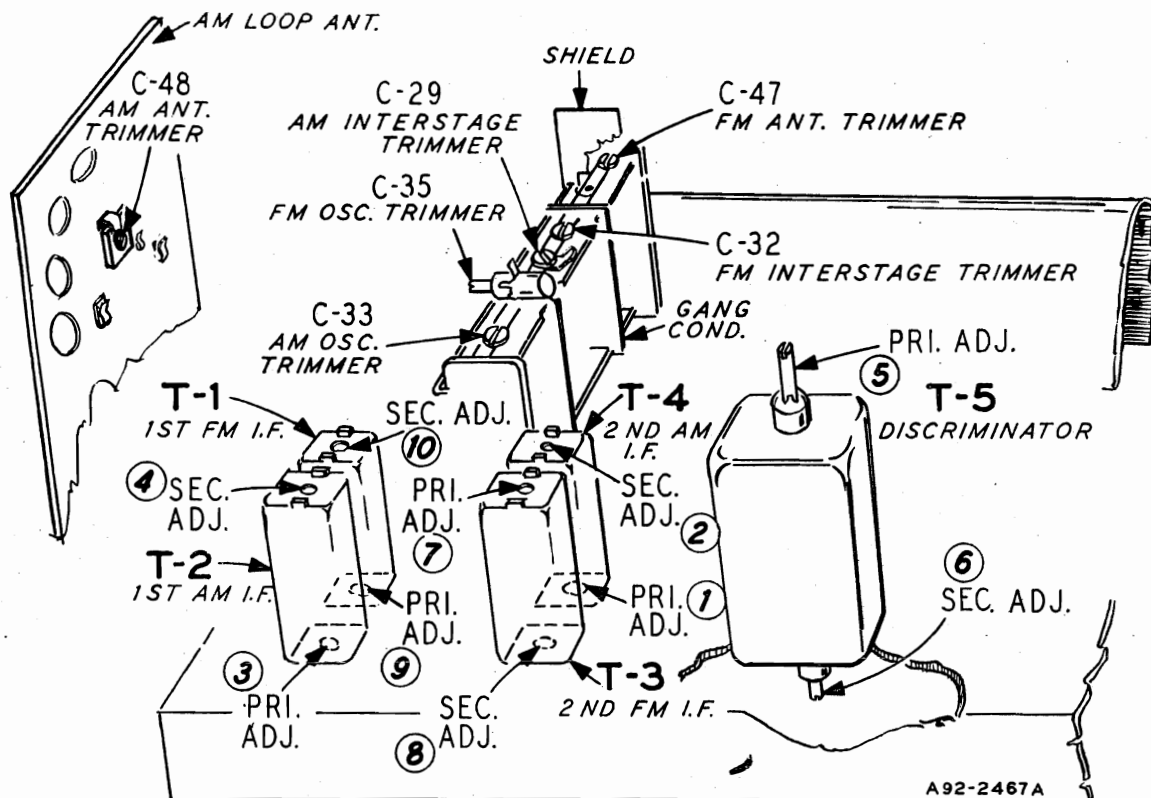
NOTE H—Remove the 1000 ohm load resistor before attempting to check the R-F and oscillator adjustments.



DRIVE CORD REPLACEMENT

Use a new 10X54 drive cord assembly or a new length of cord 48 inches long for the installation, winding three turns clockwise around the drive shaft with the turns progressing away from the chassis. After completing the installation, rotate the drive shaft a few turns to take up the slack in the cord.

MODEL 15WG-2765A



REPLACEMENT PARTS LIST

| Ref. No. | Part No. | Description | Qty. Used in Set |
|--------------------------------------|---------------------------|-----------------------------|------------------|
| CAPACITORS | | | |
| C-1 | 14A207 | Gang Condenser | 1 |
| C-2 | 47X507 | 5000 mmf Ceramic | 11 |
| C-3 | | | |
| C-7 | | | |
| C-9 | | | |
| C-13 | | | |
| C-16 | | | |
| C-17 | | | |
| C-18 | | | |
| C-19 | | | |
| C-27 | | | |
| C-42 | | | |
| C-4 | 47X497 | 100 mmf Ceramic | 1 |
| C-5 | 47X499 | 47 mmf Ceramic | 1 |
| C-8 | 47X498 | 47 mmf Ceramic | 1 |
| C-10 } C-65 } | Part of T-1 1st I-F (FM) | | |
| C-11 } C-28 } | 47X550 | 100 mmf Ceramic | 2 |
| C-15 | Part of T-3 2nd I-F (FM) | | |
| C-21 | Part of T-5 Discriminator | | |
| C-22 } C-24 } C-31 } C-51 } | 47X501 | 68 mmf Ceramic | 4 |
| C-23 | 45X361 | 5 mf 100 V Dry Electrolytic | 1 |
| C-25 } C-26 } C-45 } | 47X496 | 500 mmf Ceramic | 3 |

| Ref. No. | Part No. | Description | Qty. Used in Set |
|--------------------------------------|----------------------------|------------------------------|------------------|
| C-29 } C-32 } C-33 } C-47 } | Part of Gang Condenser | | |
| C-30 | 47X552 | 15 mmf Ceramic | 1 |
| C-34 } C-46 } | 47X516 | 20 mmf Ceramic | 2 |
| C-35 | 26A489 | 1-8 mmf Trimmer | 1 |
| C-36 } C-64 } | 47X549 | 5 mmf Ceramic | 2 |
| C-37 } C-65 } | F66403 | .04 mf 600 V Tubular | 2 |
| C-38 } C-39 } | Part of T-2 1st I-F (AM) | | |
| C-40 | B66503 | .05 mf 200 V Tubular | 1 |
| C-41 } C-43 } | Part of T-4 2nd I-F (AM) | | |
| C-44A } C-44B } | 47X112 | 50-50 mmf Dual Mica | 1 |
| C-48 | Part of T-7 (Loop Antenna) | | |
| C-50A } C-50B } C-50C } | 45X374 | 40 mf 450 V Dry Electrolytic | 1 |
| C-52 | F66103 | .01 mf 600 V Tubular | 1 |
| C-53 | 47X468 | 220 mmf Ceramic | 1 |
| C-54 } C-59 } | F66203 | .02 mf 600 V Tubular | 2 |
| C-55 } C-60 } | F66102 | .001 mf 600 V Tubular | 2 |

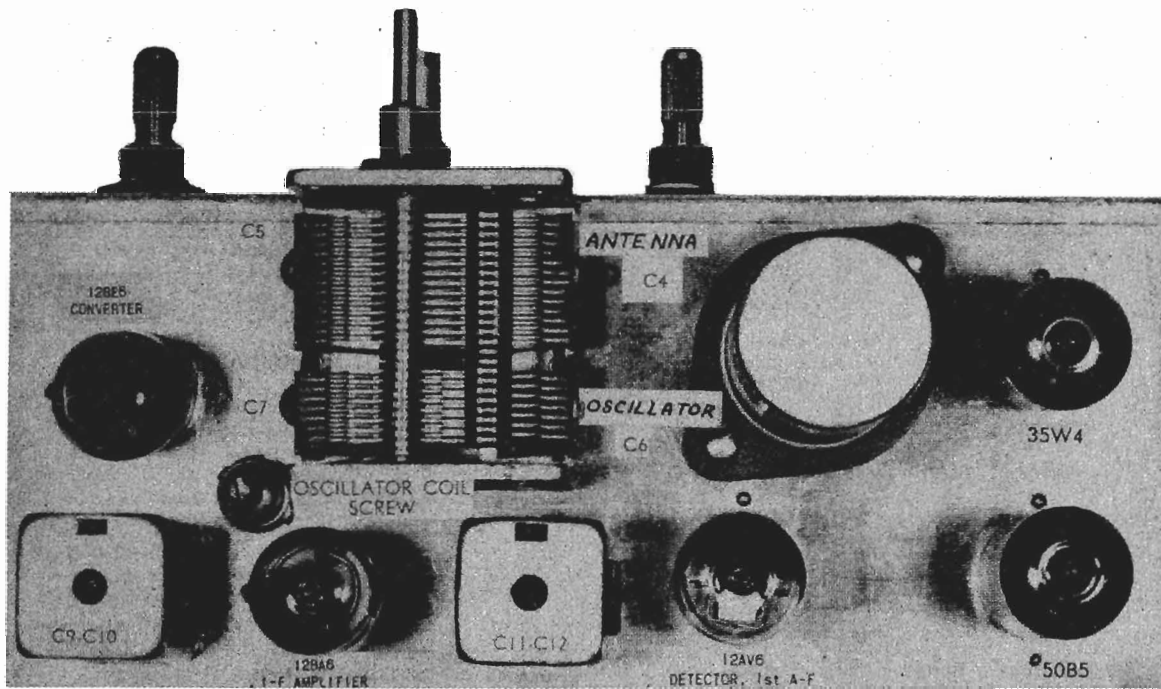
| Ref. No. | Part No. | Description | Qty. Used in Set |
|-----------------------------------|----------|-------------------------------|------------------|
| CAPACITORS—Cont. | | | |
| C-56 | B66203 | .02 mf 200 V Tubular..... | 1 |
| C-57 | F66602 | .006 mf 600 V Tubular..... | 1 |
| C-58 | B66502 | .005 mf 200 V Tubular..... | 1 |
| C-61 | 47X471 | 68 mmf Ceramic..... | 1 |
| C-62 | 47X492 | 2700 mmf Molded Mica.. | 1 |
| C-63 | 46X328 | .01 mf 120 V Tubular..... | 1 |
| RESISTORS | | | |
| | | Ohms Watts | |
| R-1 } R-10 } R-22 } | B85105 | 1 meg. 0.5 Carbon..... | 3 |
| R-2 } R-12 } R-15 } | B83680 | 68 0.5 Carbon..... | 3 |
| R-3 } R-11 } | B84563 | 56K 0.5 Carbon..... | 2 |
| R-4 } R-6 } R-8 } R-13 } | B84102 | 1000 0.5 Carbon..... | 4 |
| R-5 | B85104 | 100K 0.5 Carbon..... | 1 |
| R-7 | B84103 | 10K 0.5 Carbon..... | 1 |
| R-9 | B85225 | 2.2 meg. 0.5 Carbon..... | 1 |
| R-14 | B85473 | 47K 0.5 Carbon..... | 1 |
| R-16 | C84393 | 39K 1.0 Carbon..... | 1 |
| R-17 | B85222 | 2200 0.5 Carbon..... | 1 |
| R-18 | B84273 | 27K 0.5 Carbon..... | 1 |
| R-19 | 43X233 | 3.6 0.5 Wirewound.. | 1 |
| R-20 } R-21 } | B83682 | 6800 0.5 Carbon..... | 2 |
| R-23 | 43X242 | 1400 5.0 Wirewound... | 1 |
| R-25 | 36X372 | 0.5 meg. Volume Control | 1 |
| R-26 | B85153 | 15K 0.5 Carbon..... | 1 |
| R-27 | 40X285 | 3 meg. Tone Control.. | 1 |
| R-28 } R-33 } | B85106 | 10 meg. 0.5 Carbon..... | 2 |
| R-29 } R-34 } | B85274 | 270K 0.5 Carbon..... | 2 |
| R-30 | D83561 | 560 2.0 Carbon..... | 1 |
| R-31 } R-35 } R-38 } | B85474 | 470K 0.5 Carbon..... | 3 |
| R-32 | B84822 | 8200 0.5 Carbon..... | 1 |
| R-36 | B84682 | 6800 0.5 Carbon..... | 1 |
| R-37 | B84562 | 5600 0.5 Carbon..... | 1 |

| Ref. No. | Part No. | Description | Qty. Used in Set |
|-------------------------------------------|-------------|-----------------------------------------------------|------------------|
| TRANSFORMERS AND COILS | | | |
| L-2 | 9A2025 | Interstage Coil (AM) | 1 |
| L-3 | 9A2024 | Interstage Coil (FM) | 1 |
| L-4 | 9A2022 | Oscillator Coil (AM) | 1 |
| L-5 | 35A5 | Insulated Choke | 1 |
| L-6 | 9A1881 | Filament Choke | 1 |
| L-7 | 9A2023 | Oscillator Coil (FM) | 1 |
| L-8 | 35A7 | Mixer Choke (FM) | 1 |
| L-9 | 9A2027 | Antenna Coil (FM) | 1 |
| T-1 | 9A2043 | 1st I-F Trans. (FM) | 1 |
| T-2 | 9A2029 | 1st I-F Trans. (AM) | 1 |
| T-3 | 9A2030 | 2nd I-F Trans. (FM) | 1 |
| T-4 | 9A2042 | 2nd I-F Trans. (AM) | 1 |
| T-5 | 9A2064 | Discriminator Coil | 1 |
| T-6 | 9A2004 | Dipole Antenna | 1 |
| T-7 | 9A2041 | "B" Range Loop Antenna | 1 |
| T-8 | 53X286 | Power Transformer | 1 |
| T-9 | 51X142 | Output Transformer | 1 |
| DIAL AND DRIVE ASSEMBLY | | | |
| | 58X723 | Dial Glass | 1 |
| | 25X1634 | Dial Bracket | 1 |
| | 41X88 | Dial Light Reflector | 2 |
| | 15X251 | Pointer | 1 |
| | 10X54 | Drive Cord Assembly | 1 |
| | 28X113 | Drive Cord Spring | 1 |
| | 7A103 | No. 47 Pilot Light | 2 |
| | 7A199 | Pilot Light Socket Assembly ... | 1 |
| | 19X192 | "C" Washer (mtg. Drive Shaft) 2 | |
| | 26X512 | Drive Shaft | 1 |
| | 6X67 | Rubber Grommet | 4 |
| MISCELLANEOUS | | | |
| | 12A502 | Speaker 12" P.M. | 1 |
| | 3A305 | Phono Socket—Single Pin Tip .. | 1 |
| | 3A435 | Tube Socket—Octal (8 prong) Molded | 3 |
| | 3A436 | Tube Socket—Noval (miniature) .. | 1 |
| | 32X388 | Tube Shield—Noval | 1 |
| | 32X390 | Tube Shield (miniature) | 1 |
| | 3A439 | Tube Socket (miniature) | 6 |
| | 2A391 | Band Change Switch | 1 |
| | 13X546 | Line Cord & Plug Assembly | 1 |
| | 10A713 | Knobs | 4 |
| | 4X1049 | Escutcheon | 1 |
| TYPE W-28A176 RECORD CHANGER PARTS | | | |
| | W-17X467 | Motor Assembly, 60 cycles 105-125 Volts AC | 1 |
| | W-49X123-5C | Pickup Arm | 1 |
| | W-R A7M-1 | Crystal Cartridge & Needles | 1 |
| | W-R-13017 | Needle, Microgroove (Red) | 1 |
| | W-R-13016 | Needle, Regular | 1 |

MODELS 05GHM-934A,
15GHM-934A, 94GHM-
934A



TUBE AND TRIMMER CONDENSER LAYOUT

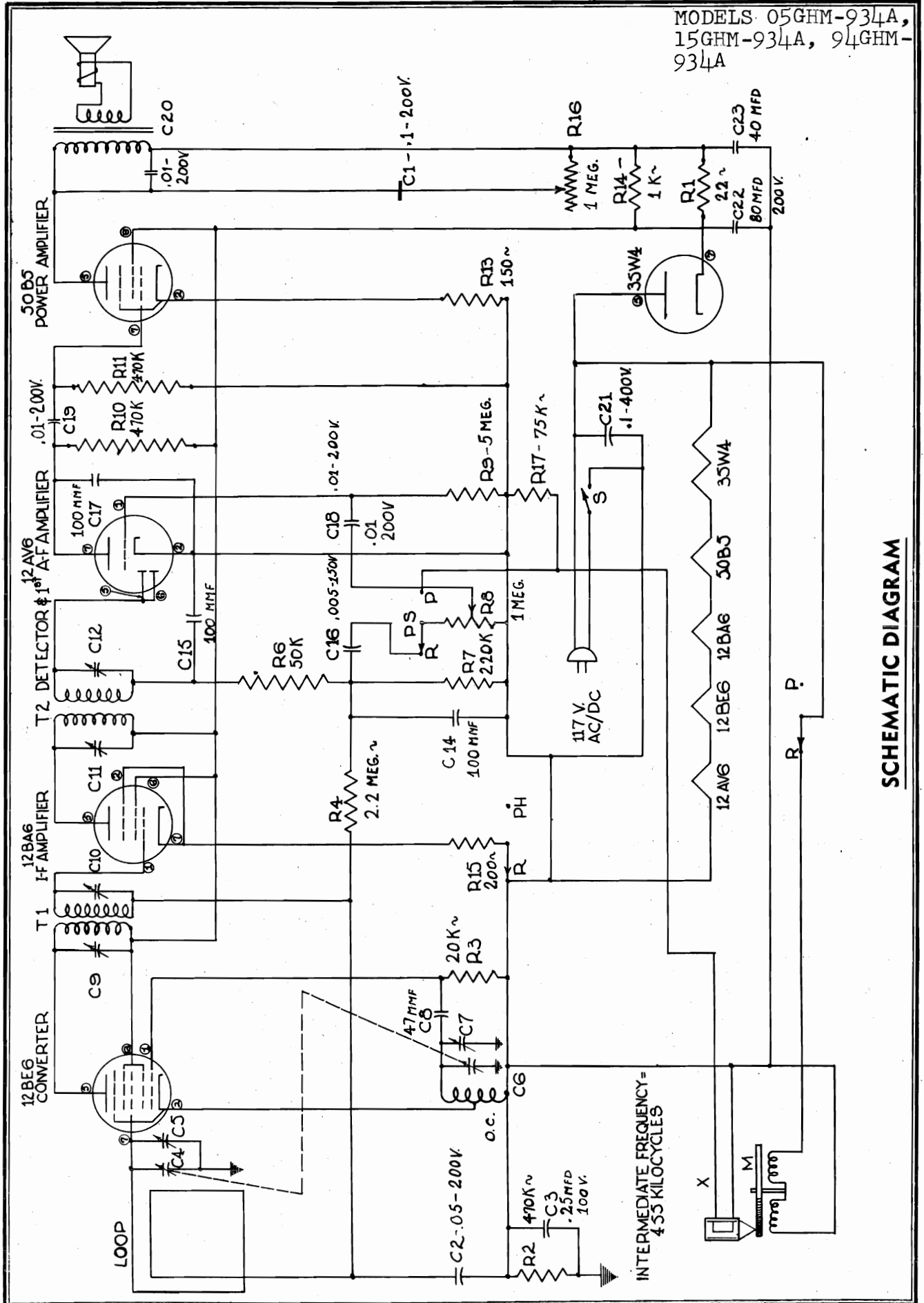


ELECTRICAL SPECIFICATIONS:

POWER SUPPLY: 105-125 volts A. C. 60 cycle
POWER OUTPUT: 1.8 watts
LOUD SPEAKER: 5" P.M. with transformer
TUBE COMPLEMENT: 1—12BE6 1—50B5
 1—12BA6 1—35W4
 1—12AV6

NOTE: C10 is located on bottom of 1st I.F. Transformer.
 C12 is located on bottom of 2nd I.F. Transformer.

MODELS: 05GHM-934A,
15GHM-934A, 94GHM-
934A



SCHEMATIC DIAGRAM

MODELS 05GHM-934A,
15GHM-934A, 94GHM-
934A

ALIGNMENT PROCEDURE

Volume Control—Maximum All Adjustments. Signal Generator which will provide an accurately cali-
Allow Chassis and Signal Generator to "Heat Up" for brated signal at the test frequencies as listed.
several Minutes. Output Indicating Meter; Non-Metallic Screwdriver.
The equipment in column at right is required for aligning: Dummy Antennas—.1 mf.

| Frequency Setting | SIGNAL GENERATOR | | Ground Connection | Variable Condenser Setting | ADJUST TRIMMERS TO MAXIMUM See Trimmer Illustration |
|-------------------|--------------------|------------------------|-------------------|----------------------------|--------------------------------------------------------|
| | Coupling Capacitor | Connection to Radio | | | |
| 455 KC | .1 | CONTROL GRID OF 12 BE6 | TO B-BUS BAR | CLOSED | 1st AND 2nd I.F. C9-C10-C11-C12 |
| 540 KC | .1 | CONTROL GRID OF 12 BE6 | TO B-BUS BAR | CLOSED | OSCILLATOR COIL SCREW |
| 1640 KC | .1 | CONTROL GRID OF 12 BE6 | BAR TO B-BUS | WIDE OPEN | OSCILLATOR TRIMMER C7 |
| 1400 KC | .1 | CONTROL GRID OF 12 BE6 | TO B-BUS BAR | TO 1400 KC SIGNAL | ANTENNA TRIMMER C5 |

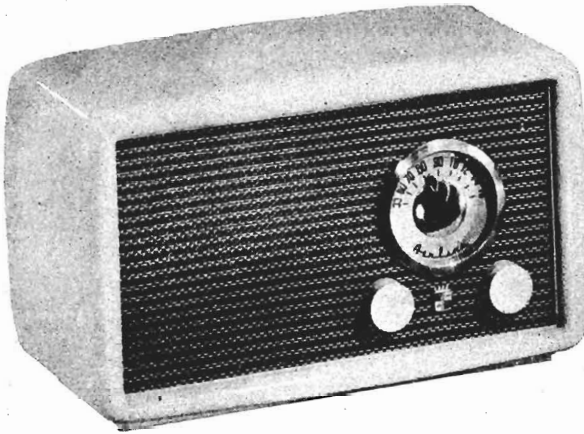
REPEAT PROCEDURE

PARTS LIST

| REF. NO. | PART NO. | DESCRIPTION | REF. NO. | PART NO. | DESCRIPTION |
|--------------|----------|--------------------------------|----------|----------|----------------------------------------------------------|
| | | RESISTORS | | | MISCELLANEOUS |
| R 1 | RA10 | 22 ohm 1 watt | X | RA33 | Pickup cartridge, Electro-Voice #167T (Use 60H19) |
| R 2-10-11 | RA11 | 470K ohm 1/2 watt | | RA33A | Needle for #16 cartridge (Use 61H10) |
| R 3 | RA12 | 20K " 1/2 watt | X | RA34 | Pickup cartridge, Electro-Voice #33-4 (Use 60H21) |
| R 4 | RA13 | 2.2 meg. ohm 1/2 watt | | RA34A | Needle for #33-4 cartridge (Use 61H12) |
| R 6 | RA15 | 50K ohm 1/2 watt | X | RA35 | Pickup cartridge, Electro-Voice #13 (Use 60H21) |
| R 7 | RA16 | 220K " 1/2 watt | | RA35A | Needle for #13 cartridge (Use 61H12) |
| R 8 | RA17 | 1 meg. volume control | | RA36 | Pickup arm complete (with Electro-Voice #167T cartridge) |
| R 9 | RA18 | 5 meg. ohm 1/2 watt | PS | RA37 | Phono-radio switch, 3 pole D.T. |
| R 13 | RA19 | 150 ohm 1/2 watt | S | — | Line switch (on tone control) |
| R 14 | RA20 | 1K " 1/2 watt | | RA38T | Knob, Tone |
| R 15 | RA21 | 200 " 1/2 watt | | RA38V | Knob, Volume |
| R 16 | RA22 | 25K " tone control with switch | | RA38PR | Knob, Phono-Radio |
| R 17 | RA9 | 75K " 1/2 watt | | RA38P | Knob, Plain |
| | | CONDENSERS | | RA39 | Speaker with output transformer |
| C 1 | RA23 | .1MFD-200 volts | M | RA40 | Three speed motor (Alliance) |
| C 2 | RA24 | .05-200v. | OC | RA41 | Oscillator coil |
| C 3 | RA25 | .25-100v. | T1 | RA42 | I.F. Transformer, input (450KC-4 lugs) |
| C 4-5-6-7 | RA26 | Variable tuning cond. 2 gang | T2 | RA43 | I.F. Transformer, output (450KC-6 lugs) |
| C 8 | | 47MMF-200v. | | RA44 | Dial pointer |
| C 9-10-11-12 | | I.F. trimmers | | | Dial face |
| C 14-15-17 | RA28 | 100MMF-200v. | | RA45 | Motor speed indicator plate |
| C 16 | RA29 | .005-150v. | | RA46 | Loop antenna |
| C 18-20 | RA30 | .01-200v. | | RA47 | Cabinet |
| C 21 | RA31 | .1-400v. | | RA48 | Line cord, with plug |
| C 22-23 | RA32 | 80/40MFD-200v. filter block | | RA49 | Tube socket, 7 prong - miniature |
| | | | | RA50 | 45 RPM record disc adapter |

MODELS 94HA-1527C,
94HA-1528C

INSTALLATION



UNPACKING - Check all shipping instruction tags carefully before removing them.

POWER SUPPLY - This radio must be operated from a 105 to 125 volt DC or 105-125 volt-60 cycle AC outlet. If you are in doubt or unfamiliar with the voltage and frequency rating of your utility service, consult your local power company. Attempting to operate from other sources of power than specified above may involve costly repairs to the receiver. If the receiver does not respond after a one minute warm up period when operated from a 105-125 volt DC (Direct-Current) source, the power plug may have to be reversed at the wall outlet to obtain proper polarization.

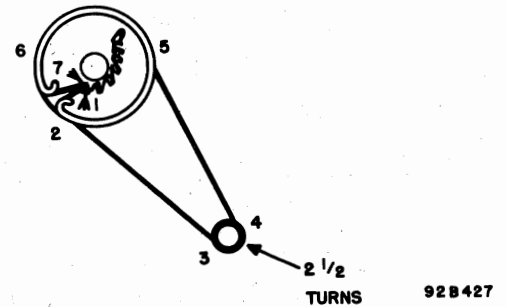
ANTENNA - The receiver is equipped with a loop type antenna eliminating the use of an external antenna. Due to the directional effect of a loop antenna, it may be necessary to rotate the receiver to obtain maximum performance from some particular station. To place the receiver in operation, simply connect the power plug to the wall receptacle and operate.

VOLUME control - This is the left hand control. It serves the function of power switch as well as volume control. To turn on the receiver, turn this control to the right past the point at which it clicks and similarly when turning off the set turn it to the left until the tell-tale click is heard and the dial light is extinguished. Turn the control clockwise to increase volume and counter-clockwise to decrease volume.

TUNING control - This is the control knob on the right. To tune in a station, turn the volume control to the right until the background noise is audible, then turn the tuning knob back and forth across the station frequency until the station is heard the clearest. Reset the volume control for the desired volume level. Never set the volume by detuning the receiver from the station. Undesired distortion results from this practice.

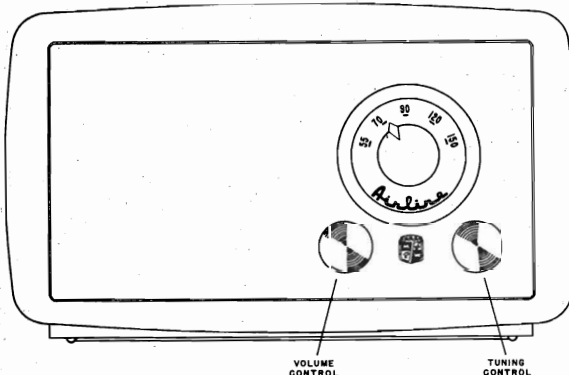
The dial is calibrated so that a zero must be added to the number appearing on the dial to obtain the station frequency in kilocycles. This will be helpful when setting the receiver dial to the station frequency listed in the radio logs of most newspapers.

DIAL CORD STRINGING INSTRUCTIONS



To restring the dial cable, pull the two control knobs and dial pointer from their shafts remove the chassis bolts and pull the chassis from the cabinet. Restring the dial drive with a 12-inch length of 30 lb. test dial cord following the stringing sequence shown in the accompanying illustration. Reinstall the receiver chassis and replace the knobs. Set the tuning condenser at maximum capacity and clip on the dial pointer so that its pointer falls on the left hand limit of the dial scale.

OPERATION



SERVICE DATA

This radio is a condenser tuned receiver using a cut plate tracking mixer section and employs four tubes in a conventional superheterodyne circuit. The loop provides for signal pickup as well as the inductive component in the tuned circuit of the mixer stage. No provision is made for the use of an external antenna.

The receiver is encased in a plastic cabinet which is supplied in two colors, Brown (62-1527) or Ivory (62-1528).

MODELS 94HA-1527C,
94HA-1528C

ELECTRICAL SPECIFICATIONS

- Power Supply 105-125 volts DC or 60 cycle AC, 25 watts
- Frequency Range Broadcast 540-1620 KC
- Intermediate Frequency 455 KC
- Antenna Built in loop
- Power Output 0.6 watt
- Speaker 5 inch P.M.
- Voice Coil Impedance 3 ohms
- Tube and Dial Lamp Complement. 12SA7 Mixer
12SK7 I.F. Amplifier
12SQ7 Detector & Audio
50L6GT Power Amplifier
35Z5GT Rectifier
Mazda No. 47 Dial Lamp

For placement of these tubes, see the diagram showing tube layout.

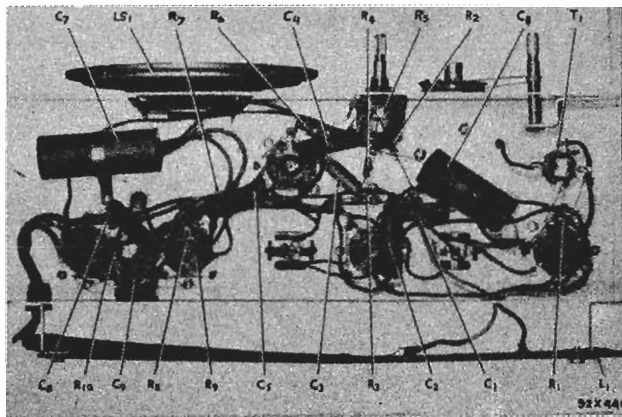
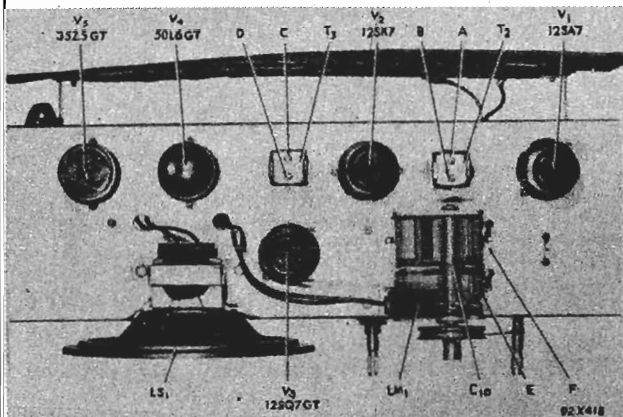
ALIGNMENT PROCEDURE

- Output meter connection. Across voice coil
- Generator ground To chassis
- Volume control position Maximum

ALIGNMENT CHART

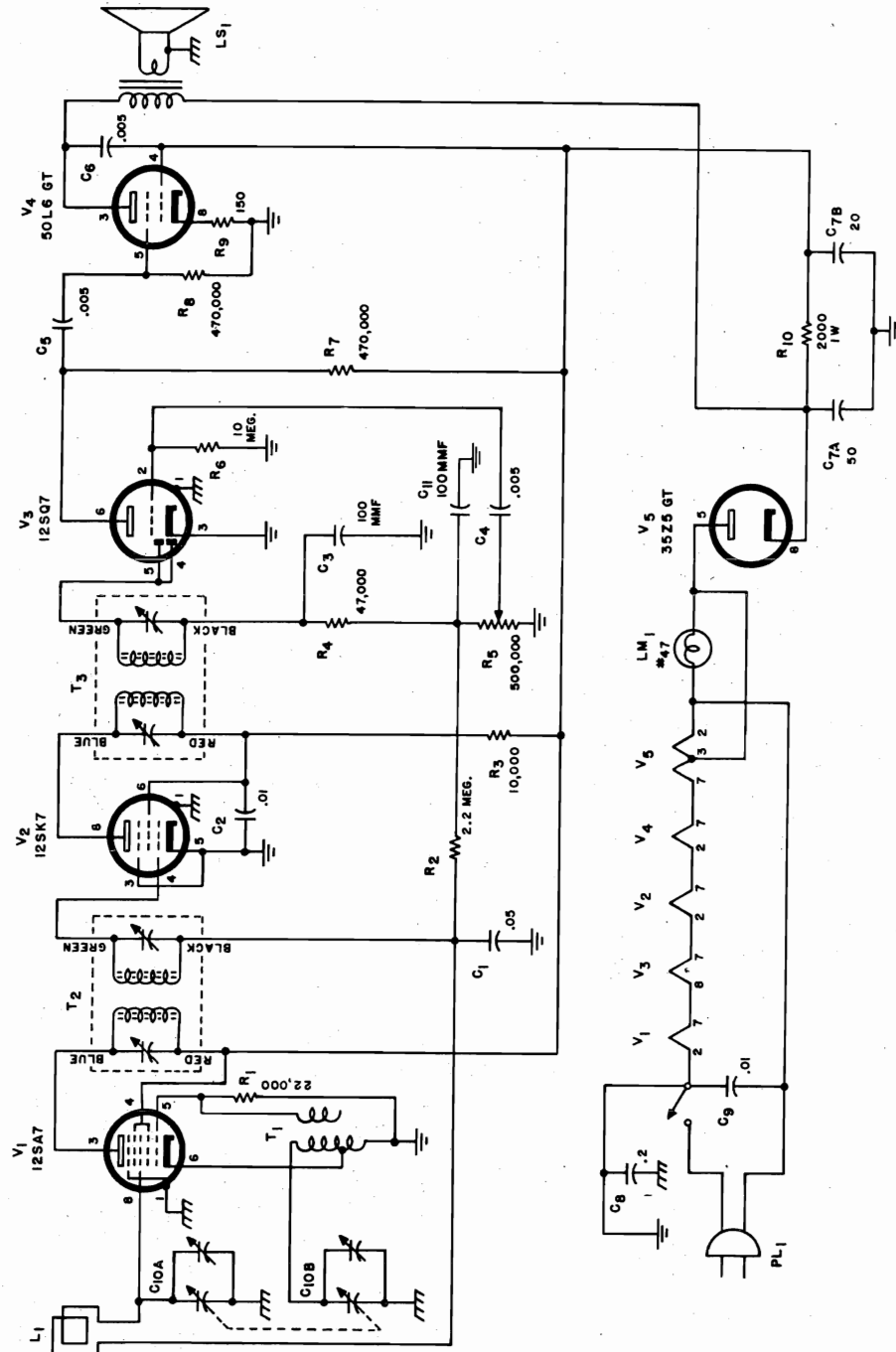
| Dummy Antenna | Signal Generator Coupling | Signal Generator Frequency | Radio Tuned To | Adjust | Remarks |
|----------------|---------------------------------------------------------------------------|----------------------------|----------------|---------|-------------------------------------------------------------------------------------------|
| 0.01 mfd. cap. | Connect to pin #5 of 12SA7 through dummy ant. | 455 kc | 1000 kc | A,B,C,D | Adjust for max. output. IF sensitivity for 50 milliwatt output is approx. 150 microvolts. |
| None | Do not couple directly to loop, pickup generator signal by radiation only | 1500 kc | 1500 kc | E*F | Adjust for max. output. |

*Note - Calibration adjustment.



MODELS 94HA-1527C,
94HA-1528C

SCHEMATIC DIAGRAM



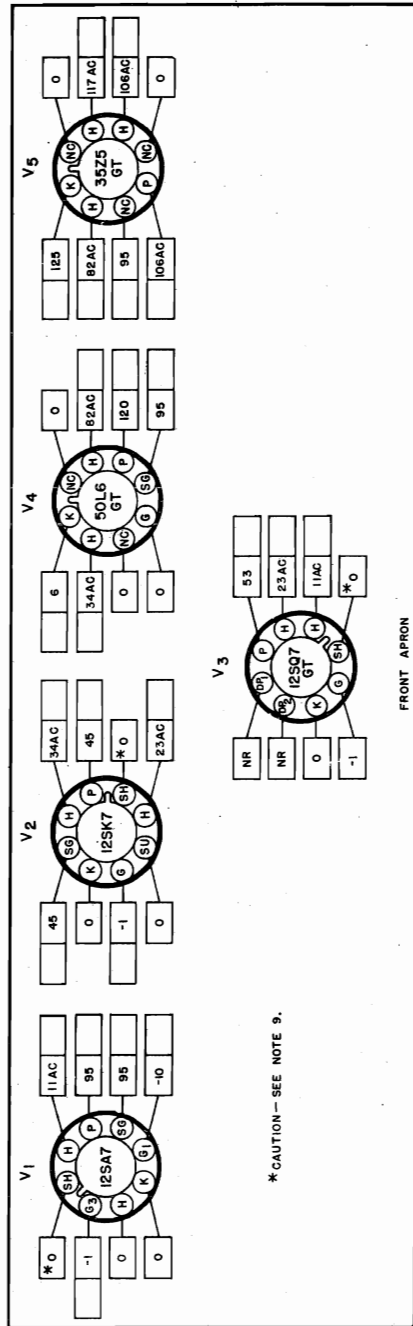
890277-C

NOTE- RESISTOR VALUES ARE IN OHMS.
ALL RESISTORS ARE 1/2W. UNLESS OTHERWISE SPECIFIED.
CAPACITOR VALUES ARE IN MFD. UNLESS OTHERWISE SPECIFIED.
⊥ INDICATES ELECTRICAL GROUND
⏏ INDICATES CHASSIS GROUND

LAST RESISTOR SYMBOL — R-10
LAST CAPACITOR SYMBOL — C-11

MODELS 94HA-1527C,
94HA-1528C

TUBE SOCKET VOLTAGE CHART



FRONT APRON
BOTTOM VIEW OF CHASSIS

REPLACEMENT PARTS LIST

- NOTES-
1. SOCKET VIEWS ARE BOTTOM VIEWS.
 2. ALL VOLTAGES ARE MEASURED BETWEEN TUBE SOCKET TERMINALS AND ELECTRICAL GROUND (NOT CHASSIS) WITH ZERO SIGNAL INPUT.
 3. LINE VOLTAGE—117 V. AC.
 4. ALL VOLTAGES SHOWN ARE DC UNLESS OTHERWISE SPECIFIED.
 5. DC VOLTAGES SHOWN BECOME DC WHEN OPERATING FROM A DC LINE.
 6. "NO"—NO CONNECTION. (VOLTAGE SHOWN FOR THIS TERMINAL ONLY WHEN TERMINAL IS USED AS A TIE LUG).
 7. "NR"—NOT READABLE. (READING GENERALLY MEANINGLESS).
 8. " " SPACE PROVIDED FOR SERVICE METER READINGS.
 9. ALL READINGS TAKEN WITH LINE PLUG POLARIZED SO THAT GROUND BUSS AND CHASSIS ARE AT THE SAME POTENTIAL WITH THE CHASSIS GROUNDED.

MISCELLANEOUS

- Speaker 85C073
- Pilot light socket & bracket 86B066
- Socket, octal 6A296
- Line cord 87B1669
- Line cord lock 76A397
- Escutcheon 7C073
- Pointer 82B150
- Dial scale 22C218
- Knob, ivory 15B068-5
- Knob, brown 15B068-6
- Cabinet, ivory finish 66E450
- Cabinet, brown finish 66E450-1

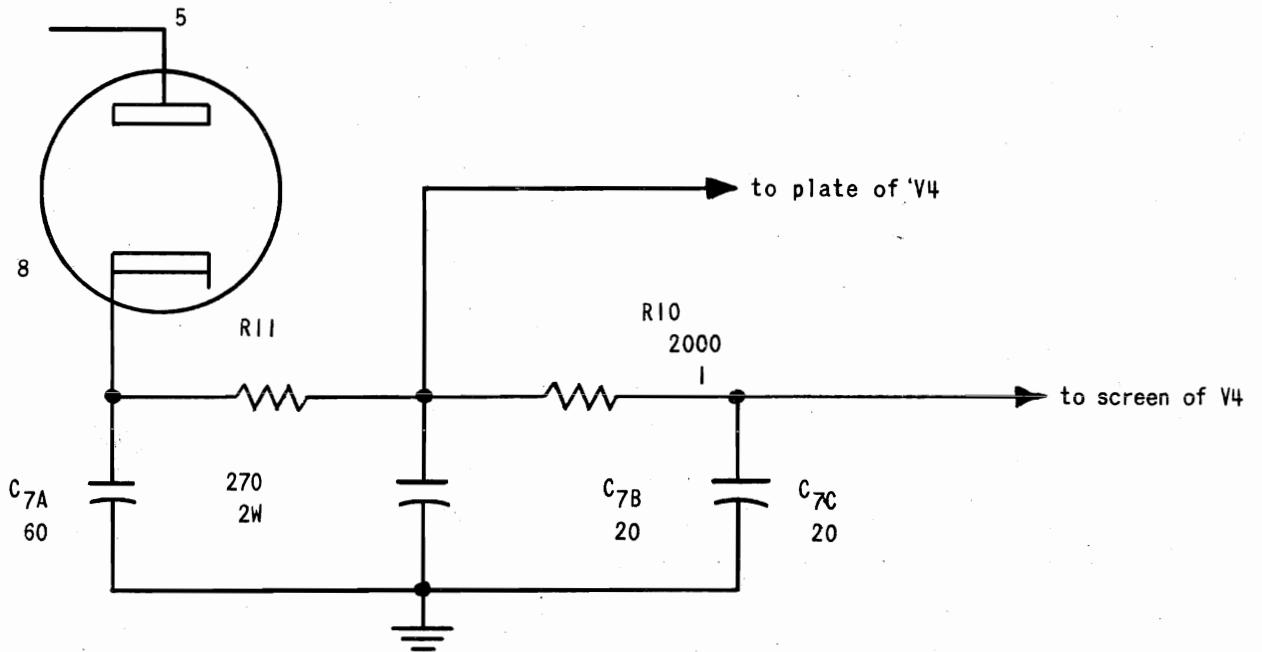
REPLACEMENT PARTS

HOW TO ORDER PARTS - Should it be necessary to write us or to order any repair parts, it is important that the complete model number which appears on the label attached to the rear of the chassis be specified. Repair parts should be ordered from your nearest Wards Retail Store, Catalog Order Office or Mail Order House.

| Ref. No. | Part No. | Description |
|----------|------------|---------------------------------|
| C-1 | 46AY503J | .05 mfd. 600 V., tubular |
| C-2 | 46AZ103J | .01 mfd. 600 V., tubular |
| C-3,11 | CM20A101M | 100 mmf. 500 V., mica |
| C-4,5,6 | 46AZ502J | .005 mfd. 600 V., tubular |
| C-7 | 45B151 | 50-20 mfd. 150 V., electrolytic |
| C-8 | 46AX204H | .2 mfd. 600 V., tubular |
| C-9 | 46BR103J6 | .01 mfd. 600 V., molded paper |
| C-10 | 48B201 | Tuning condenser |
| R-1 | RC20AE223M | 22,000 ohms 1/2 watt, carbon |
| R-2 | RC20AE225M | 2.2 megohms 1/2 watt, carbon |
| R-3 | RC20AE103M | 10,000 ohms 1/2 watt, carbon |
| R-4 | RC20AE473M | 47,000 ohms 1/2 watt, carbon |
| R-5 | 25B641 | Volume control |
| R-6 | RC20AE106M | 10 megohms 1/2 watt, carbon |
| R-7,8 | RC20AE474M | 470,000 ohms 1/2 watt, carbon |
| R-9 | RC20AE151M | 150 ohms 1/2 watt, carbon |
| R-10 | RC30AE202M | 2000 ohms 1 watt, carbon |
| L-1 | 57C119 | Loop antenna |
| T-1 | 51B1058 | Oscillator coil |
| T-2,3 | 50B374 | Transformer IF & Det. |

COILS AND TRANSFORMERS

SCHEMATIC



REPLACEMENT PARTS

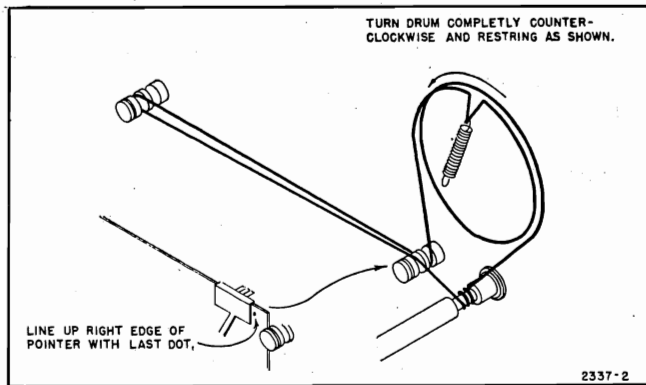
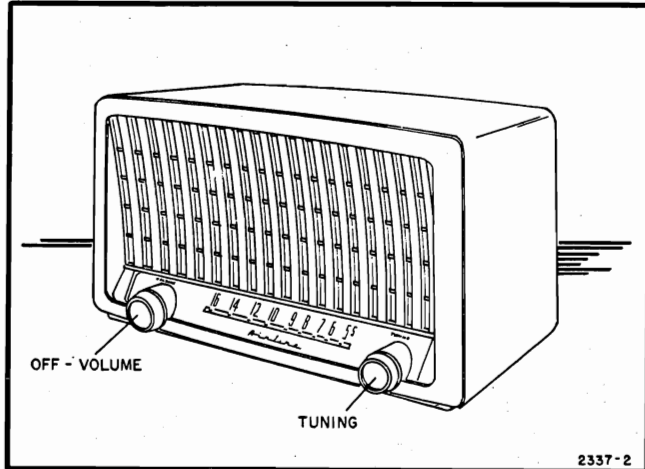
| Ref. No. | Part No. | Description |
|----------|------------|-----------------------------------|
| C-7 | 45B128 | 60-20-20 mfd 175 V., electrolytic |
| R-11 | RC40AF271K | 276 ohms 2 watts, carbon |

NOTE - Some sets will use condenser 45B151 with an additional single 10 mfd. condenser unit.
For service replacement use condenser 45A128 wired as shown.

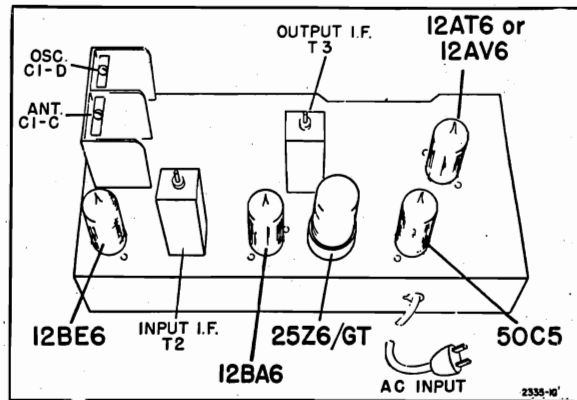
MODELS 15BR-1543B,
15BR-1544B

SERVICE DATA

Power Supply..... 115 volts, DC or 50-60 cycle AC,
24 watts.
Frequency Range..... 540 to 1600 Kc.
Intermediate Freq..... 455 Kc.
Selectivity..... At 1000 Kc., 60 Kc. at 1000 x
signal
Sensitivity..... 150 u. v. per meter.
Power Output..... 0.8 watts undistorted, 1.0 watt
max.
Loud Speaker..... 4" PM., v.c. impedance, 3.2 ohms.
Tube Complement.....
12BE6, Converter 50C5, Audio output
12BA6, IF Amplifier 25Z6, Rectifier
12AV6 or 12AT6,
Detector, AVC, Audio



Dial Stringing Diagram

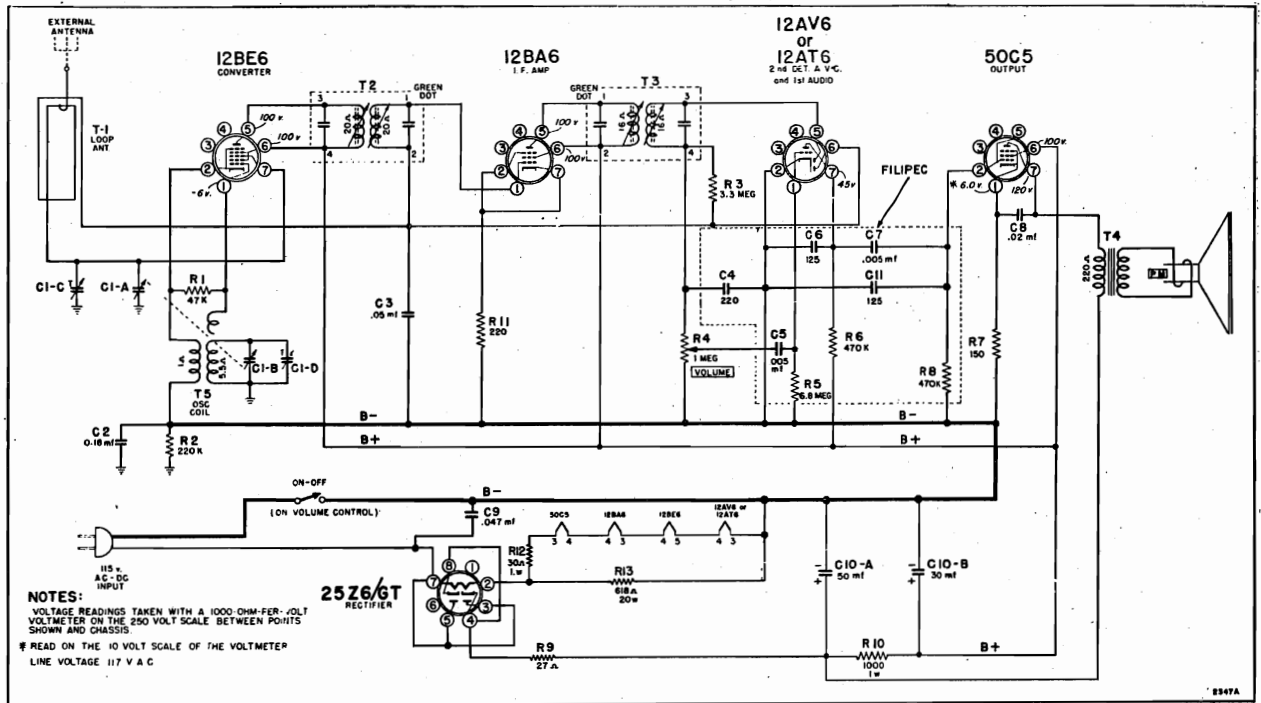


Top Chassis View

ALIGNMENT PROCEDURE

Loop must be connected and set volume to maximum.

| SIGNAL GENERATOR | | | | TUNER SETTING | ADJUST FOR MAXIMUM OUTPUT | INPUT FOR 50-MILLIWATT OUTPUT |
|------------------|--------------------|-----------------------------------------|------------------------------------------|-------------------------------------------|----------------------------------------------------|-------------------------------|
| Frequency | Coupling Capacitor | Connection to Radio | Ground Connection | | | |
| 455 kc. | .1 mf | 12BE6, Pin 7 | HEAVY BUSS LEAD ACROSS CENTER OF CHASSIS | Capacitor fully open (plates out of mesh) | Top and bottom Cores in output and input I.F. cans | 65 microvolts |
| 1620 kc. | .1 mf | 12BE6, Pin 7 | | Capacitor fully open (plates out of mesh) | Oscillator trimmer C1-D on gang | 70 microvolts |
| 535 kc. | .1 mf. | 12BE6, Pin 7 | | Capacitor fully closed | Check for adequate range | 70 microvolts |
| 1400 kc. | _____ | Lay generator lead near back of cabinet | | Tune in 1400 kc. signal | Antenna trimmer C-1C on gang | 200 to 400 microvolts |
| 400 cycles | .1 mf | 12AT6, Pin 1 | | _____ | _____ | .06 volts |

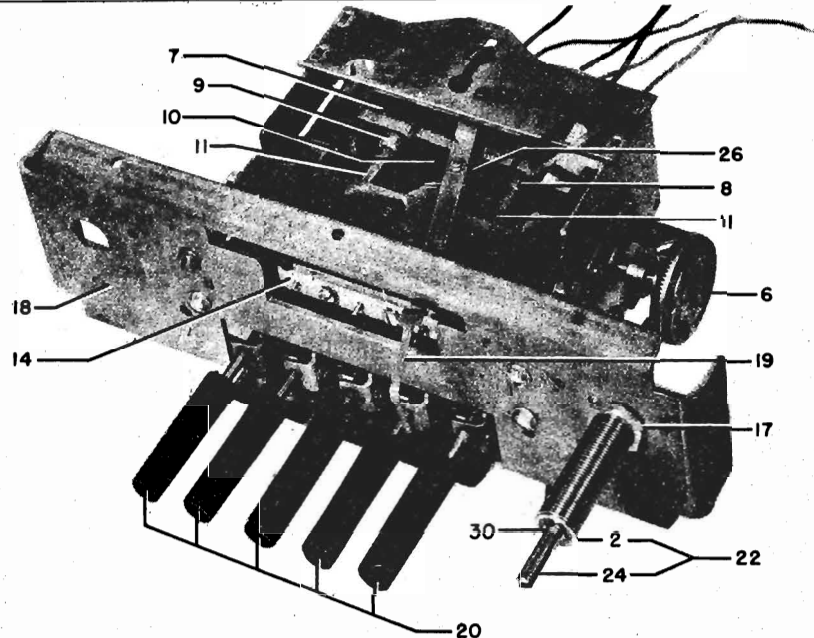


SCHEMATIC DIAGRAM

REPLACEMENT PARTS LIST

Please specify part number and chassis model number when ordering replacements.

| Ref. No. | Part No. | Description | Ref. No. | Part No. | Description |
|-------------------------------|--------------|----------------------------|----------------------|----------|------------------------------|
| CAPACITORS | | | | | |
| C1A, B | 8A-17377 | 2-gang condenser | 29E-17592 | | Spring washer |
| C1C, D | | Trimmers on gang | 43D-17609 | | Tinnerman clip |
| C2 | 8D-11111 | .18 mfd x 400 volts | 29C-10630 | | "C" washer |
| C3 | 8D-10770 | .05 mfd x 200 volts | 53A-18547 | | Dial string (approx. 20") |
| C4-5-6-7-11- and R5-6-8 | 201-19303 | Filipec | 49A-10078 | | Take up spring |
| C8 | 8D-10774 | .02 mfd x 400 volts | 2C-19619 | | Pointer plate |
| C9 | 8J-16081 | .047 mfd x 400 volts | 2G-19620 | | Pointer |
| C10A, B | 8C-17391 | Electrolytic condenser | 3M-19623 | | String guide |
| RESISTORS | | | | | |
| R1 | 9B1-82 | 47K ohms, 1/2 watt, 10% | 37A-19626 | | Dial background |
| R2 | 9B1-27 | 220K ohms, 1/2 watt, 20% | 6D-19625 | | Dial scale |
| R3 | 9B1-34 | 3.3 megohms, 1/2 watt, 20% | 2M-19624 | | Dial mounting strip |
| R4 | 10A-19616 | Volume control and switch | MISCELLANEOUS | | |
| R5-6-8 | | See Filipec | 5C-19532-9 | | Cabinet (Ivory) |
| R7 | 9B1-52 | 150 ohms, 1/2 watt, 10% | 5C-19532-36 | | Cabinet (Walnut) |
| R9 | 9B1-43 | 27 ohms, 1/2 watt, 10% | 5B-19790-8 | | Knob (Ivory) |
| R10 | 9B2-62 | 1000 ohms, 1 watt, 10% | 5B-19790-74 | | Knob (Walnut) |
| R11 | 9B1-54 | 220 ohms, 1/2 watt, 10% | 23J-19627 | | Grill cloth and baffle board |
| R12 | 9C-19769 | 30 ohms, 1 watt, 10% | 18A-19618 | | Speaker, 4" PM |
| R13 | 9M-19602 | 618 ohms, 20 watts, 10% | 43D-12779 | | Tinnerman clip |
| TRANSFORMERS AND COILS | | | | | |
| T1 | 13E-19621 | Loop antenna assembly | 2H-17588 or | | Tube shield |
| T2-3 | 13B-17731 | IF transformer | 2H-19188 | | Tube shield |
| T4 | 12C-19302 or | Output transformer | 2M-17589 or | | Tube shield base |
| | 12C-17595 | Output transformer | 2M-19187 | | Tube shield base |
| T5 | 13D-17583 | Oscillator coil | 2M-17580 | | IF locking clip |
| DIAL PARTS | | | | | |
| | 3A-19617 | Tuning shaft | 15C-16007 | | 7-prong, socket |
| | 40A-17591 | Bushing | 15B-10440 | | Octal socket |
| | | | 14M-10088-4 | | AC line cord and plug |
| | | | 2D-15432-1 | | Loop mounting bracket |
| | | | 23A-10344 | | Line cord lock |
| | | | 42A10-19851 | | Chassis mounting bolt |
| | | | 29A-3528 | | Steel washer |
| | | | 29J-16690 | | Rubber washer |



GENERAL INFORMATION

Automatic Tuner AT-81 is used in Motorola auto receiver, Model IMF.

This is a 3-gang permeability type tuner, mechanically

operated by movement of its push buttons or manual tuning control. Five pre-set tuning positions are provided. Stations can also be selected simply by turning manual control until desired station is tuned in.

TO SET THE PUSH BUTTONS

1. Turn receiver "on" and allow it to warm up for a few minutes.
2. With the tuning knob, tune in the station you desire to set up. Tune carefully until you are exactly on the station; tuning to either side of it will result in poor tone quality. The pointer will indicate the station being set up.
3. Loosen by turning counterclockwise the automatic tun-

- ing push button you wish to use.
4. Push the automatic push button in as far as it will go and tighten by turning clockwise until moderately tight.
5. Push button now will automatically bring station selected simply by pushing button all the way in.
6. Remaining push buttons can be set up in the same manner.

SERVICE INFORMATION

CORE REPLACEMENT

When tuner is in the set, the following method of removing cores is recommended:

1. Remove knobs, dial escutcheon and background.
2. Mark core insulator and core bracket to re-mount core assembly the same as before removal.
3. Remove the two #4-40 x 3/16" core assembly mounting screws.
4. Gently pull out core and insulator assembly through holes of core mounting bracket.
5. Soften cement holding core screw to insulator and unscrew from insulator.
6. Replace core and insulator assembly into same position as before removal.
7. Realign tuner.
8. Cement core screws to insulator.

TUNER ALIGNMENT

The tuner cores have been correctly aligned at the factory. Field alignment is not recommended unless components have been replaced or tampered with. If found necessary to realign, construct two core alignment tools. These are made by gluing strips of rubber to two wood sticks, as shown in Figure 1. Refer to Figure 1 for proper use of tools. Alignment instructions are given in Model IMF service manual.

COIL REPLACEMENT

First remove tuning cores by following steps 1 through 4 of CORE REPLACEMENT. With cores out of the way, push coil out of rubber grommet and gently ease out of tuner. CAUTION: In replacing coils, be careful not to nick or damage coil by hitting sides of shields, etc. Cement coil to rubber grommet with any household rubber cement, replace cores, and realign tuner.

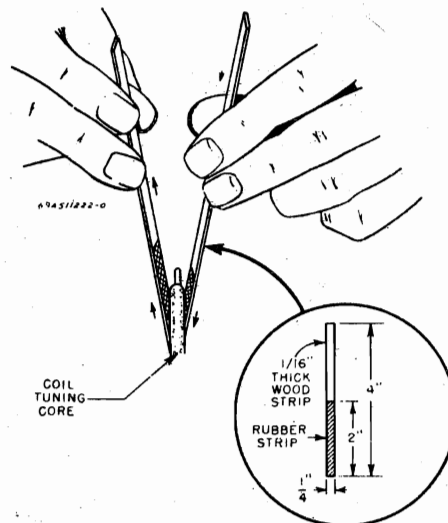


FIGURE 1. CORE ALIGNMENT DETAIL

MODEL AT-81,
Tuner

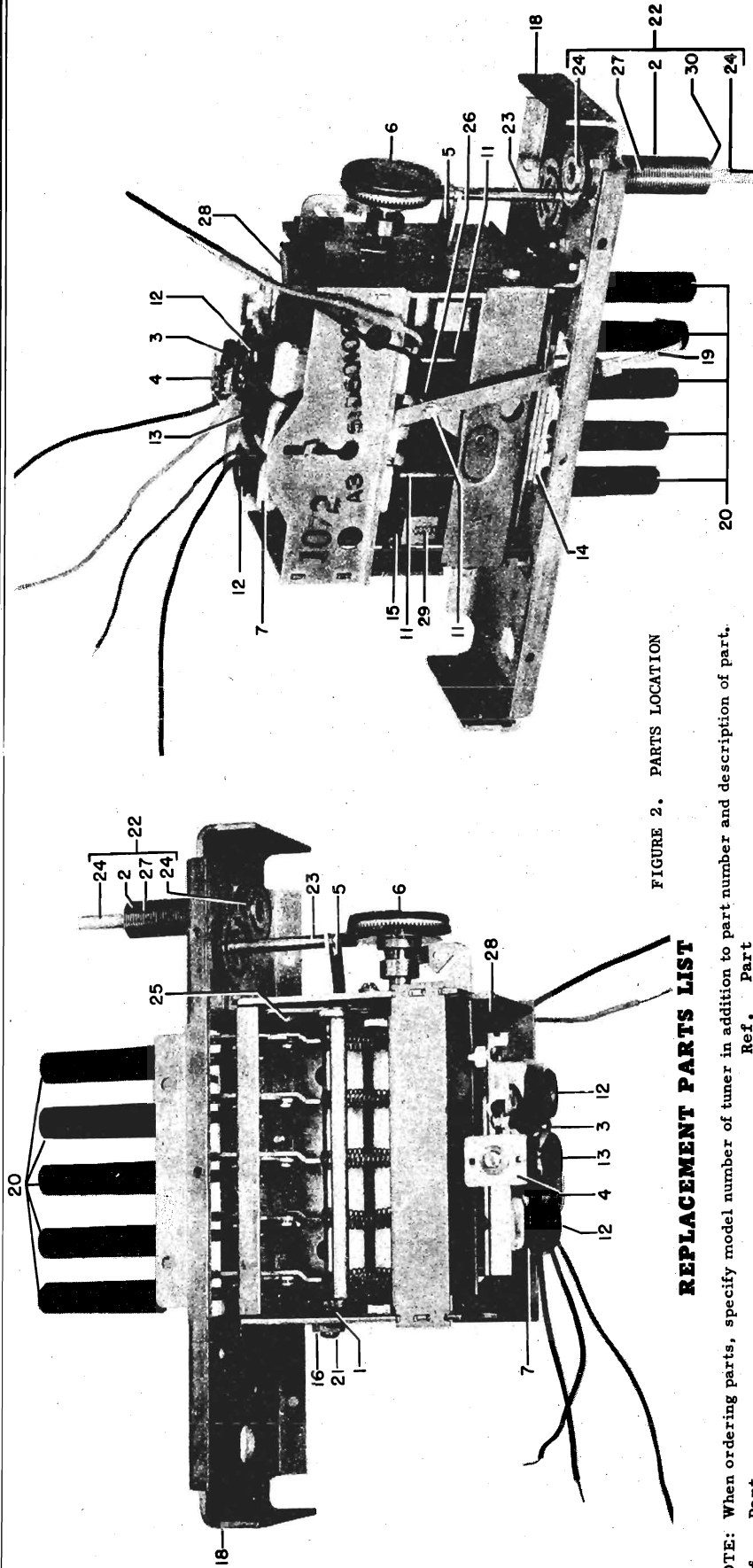


FIGURE 2. PARTS LOCATION

REPLACEMENT PARTS LIST

NOTE: When ordering parts, specify model number of tuner in addition to part number and description of part.

| Ref. No. | Part Number | Description | Ref. No. | Part Number | Description |
|----------|-------------|-------------------------------------------------------------------------------------------|----------|-------------|---------------------------------------------------------------------------------------------------|
| 1 | 51D501008 | Tuner, Model AT-81: | 21 | 3S3859 | Setscrew, 10-32 x 1/4"; slotted headless; cup point machine screw (tuner drive carriage mtg)..... |
| 2 | 43A4326 | Ball, steel: .125" diameter (tuner drive carriage bearings)..... | 22 | 51B502838 | Shaft and Bushing Assembly, manual tuning: complete.... |
| 3 | 43A501147 | Bushing, manual shaft..... | 23 | 51A501042 | Shaft, Drive Disc and Pinion Assembly..... |
| 4 | 21K114068 | Capacitor, compensating: 43 mmf..... | 24 | 51K502839 | Shaft Assembly, manual drive: includes 2 pinch washers.... |
| 5 | 20A510111 | Capacitor, variable: mica; 470 mmf (osc trim)..... | 25 | 41B501025 | Spring, compression (on split gear)..... |
| 6 | 43A500920 | Clamp, clutch support..... | 26 | 41K501096 | Spring, pointer anti-backlash |
| 7 | 51A500995 | Clutch Drive Assembly: consists of friction washers, hub crown gear, pinion gear etc..... | 27 | 41A501027 | Spring, compression (part of shaft and bushing assem).... |
| | | | 28 | 41A501047 | Spring, tension (on clutch gate release)..... |
| | | | 29 | 41A501037 | Spring, tension (link retaining)..... |
| | | | 30 | 4A501015 | Washer, "C" (manual shaft retaining)..... |
| 8 | 24B510175 | Coil antenna..... | | | |
| 9 | 24K510176 | Coil, RF..... | | | |
| 10 | 24B510112 | Coil, oscillator..... | | | |
| 11 | 46A510788 | Core, iron (tuning cores).... | | | |
| 12 | 5A501016 | Grommet, rubber (ant and RF coil mtg)..... | | | |
| 13 | 5A501017 | Grommet, rubber (osc coil mtg)..... | | | |
| 14 | 14A510154 | Insulator, core, (tuning core mtg)..... | | | |
| 15 | 45A501035 | Link, connecting (core brkt) steel; hex: 10-32 x 5/16"; screw lock)..... | | | |
| 16 | 2S7048 | Nut, hex: 1/2-28 x 5/8"; steel | | | |
| 17 | 2S8397 | Nut, hex: 1/2-28 x 5/8"; steel cad pl (manual shaft bushing assem mtg)..... | | | |
| 18 | 64C501141 | Plate, front mtg..... | | | |
| 19 | 52A510159 | Pointer, dial: with adj cam. | | | |
| 20 | 51B500602 | Pushbutton and Screw Assembly | | | |

MODEL CT1M,
Chevrolet

GENERAL INFORMATION

TYPE - An automotive superheterodyne receiver, designed for 1951 Chevrolet. An external speaker is used.

TUNING RANGE - 540 to 1600 Kc IF - 455 Kc

TUBE COMPLEMENT - 6BA6 - RF Amplifier
6BE6 - Converter
6BA6 - IF Amplifier
6AT6 - Detector-AVC-AF Amp
6AQ5 - Power Amplifier
6X4 - Rectifier

POWER INPUT - 6.3 volts DC, 5 amperes

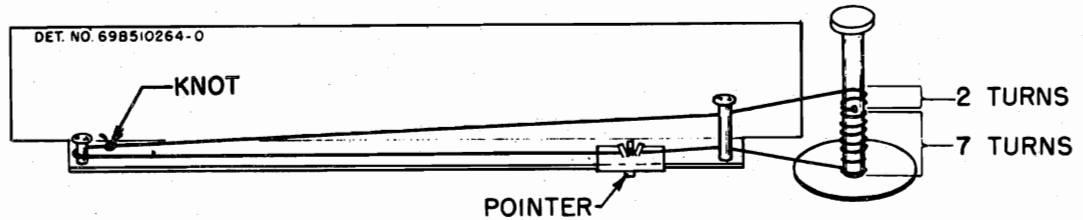
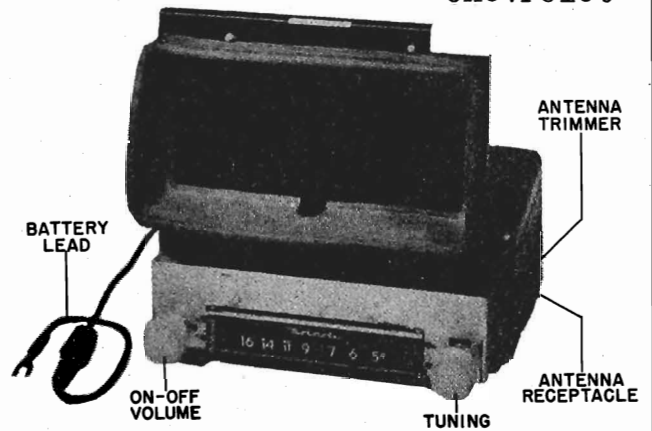


FIGURE 1. DIAL CORD RESTRINGING DETAIL

ALIGNMENT

Equipment Required:

1. A small fibre screwdriver for IF and RF adjustments.
2. An accurately calibrated AM signal generator.
3. A low range output meter.
4. A dummy antenna for RF and tuner alignment. (Construct dummy antenna as shown in Figure 3.)

justments.

2. Connect output meter across voice coil of the speaker.
3. Connect a 6 volt DC source of power between "A" lead and receiver ground. Turn receiver on and permit it to warm up for a few minutes. Then proceed as per instructions in the alignment chart.

Procedure:

1. Remove top and bottom covers to expose alignment ad-

NOTE: Keep output of receiver at approximately 1 watt (1 watt = 1.79 volts on output meter) throughout alignment by reducing signal generator output as stages are brought into alignment.

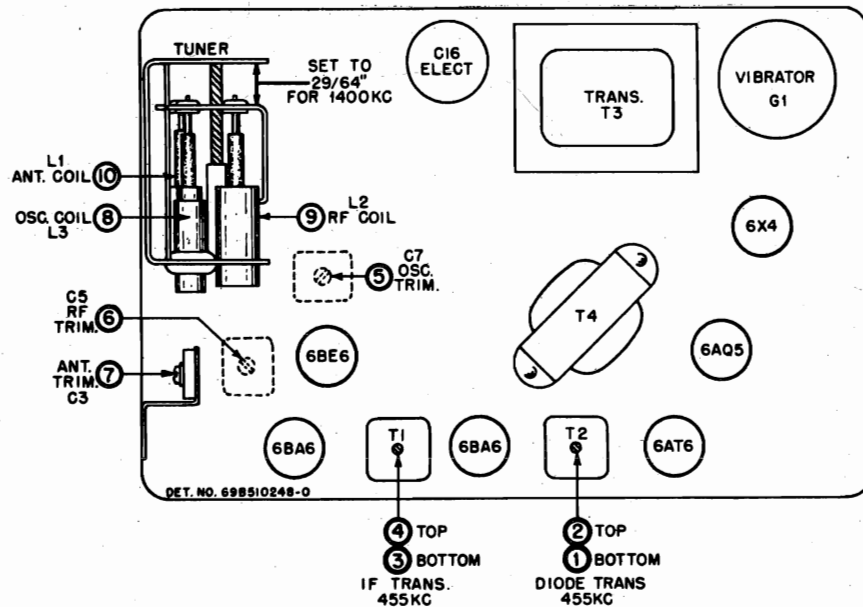


FIGURE 2. TUBE & TRIMMER LOCATIONS.

MODEL CT1M,
Chevrolet

ALIGNMENT CHART

| STEP | DUMMY ANTENNA | GENERATOR CONNECTION | GENERATOR FREQUENCY | TUNER SET TO | ADJUST | REMARKS |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|----------------------------------|---------------------|---------------------------------------------------------------------------------------------------------|-------------|--------------------------------------|
| IF ALIGNMENT | | | | | | |
| 1. | .1 mf | 6BE6 grid (pin #7) | 455 Kc | High frequency end of dial (cores out) | 1, 2, 3 & 4 | Peak for maximum in order indicated. |
| RF ALIGNMENT | | | | | | |
| 2. | See Fig. 3 | Antenna receptacle through dummy | 1605 Kc | " | 5 | Peak for maximum. |
| 3. | " | " | 1400 Kc | Tune for max. | 6 & 7 | " |
| TUNER ALIGNMENT | | | | | | |
| NOTE: The tuner cores have been correctly aligned at the factory. Field alignment of the tuner is not recommended unless components have been replaced or tampered with. Construct two core alignment tools as shown in Figure 4. Refer to Figure 4 for proper use of tools, and proceed to align as follows: | | | | | | |
| 4. | See Fig. 3 | Antenna receptacle through dummy | 1610 Kc | High frequency end of dial; cores should project 1-1/32" from end of coil form - screw out if necessary | 5, 6 & 7 | Peak for maximum in order indicated. |
| 5. | " | " | 1400 Kc | 1400 Kc -per Figure 2 | 8, 9 & 10 | " |

6. With receiver installed in car, the antenna fully extended and dial set to approximately 1400 Kc, adjust the antenna trimmer (7) for maximum signal of a weak station or noise between stations.

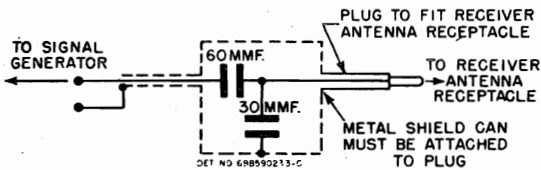


FIGURE 3. DUMMY ANTENNA DETAIL.

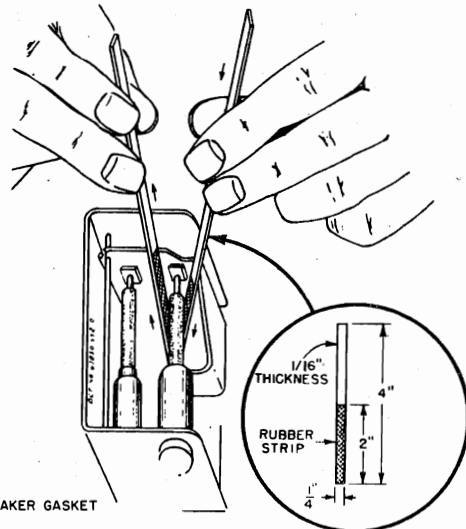


FIGURE 4. CORE ALIGNMENT DETAIL.

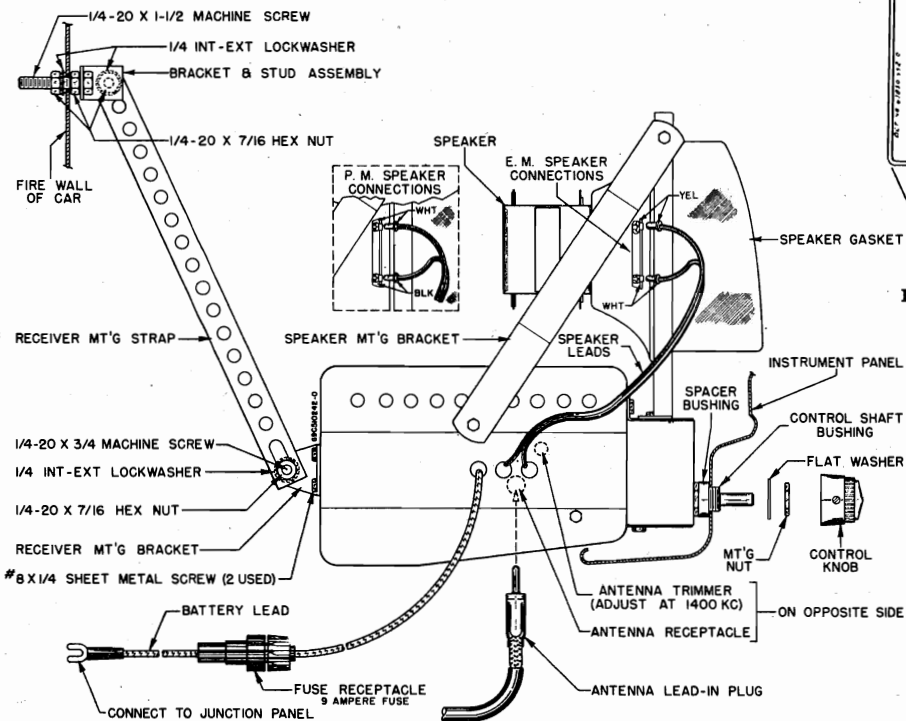


FIGURE 5. RECEIVER INSTALLATION DETAIL.

INSTALLATION INFORMATION

INSTALL DISTRIBUTOR SUPPRESSOR

Cut the high tension lead, which runs from the center terminal of the car distributor to the ignition coil, approximately 1-1/2 inches from the distributor. See Figure 6. Screw the distributor suppressor in series with the two pieces of high tension wire, and plug the end terminal of the lead into the center receptacle of the distributor.

hood down tight.

2. Hood Bonds (Motorola Part Number 39A4205) may be installed at the shoulders so that the hood makes a good ground to the cowl of the car.

TIRE STATIC

After completion of radio installation, road test car for tire static on dry concrete and blacktop pavements, under the following conditions:

1. At both low and high car speeds.
2. With antenna extended to operating position.
3. With radio at full volume and tuned off station.

If tire static noise is encountered, inject Tire Static Elimination Powder (available in kit form - Motorola Part No. 51B591494) into tires, following instructions given on the package.

INSTALL CAPACITOR ON GENERATOR

Mount the noise suppression capacitor (Motorola Part Number 8A4491) on the generator frame, under the ground lead screw. See Figure 7. Connect the capacitor lead to the armature terminal of the generator. **WARNING: DO NOT CONNECT THE CAPACITOR LEAD TO THE FIELD TERMINAL.**

ADDITIONAL MOTOR NOISE HINTS

1. When checking the car for motor noise, clamp the

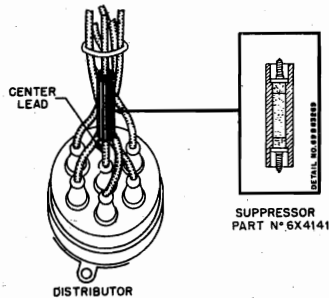


FIGURE 6. DISTRIBUTOR SUPPRESSOR INSTALLATION.

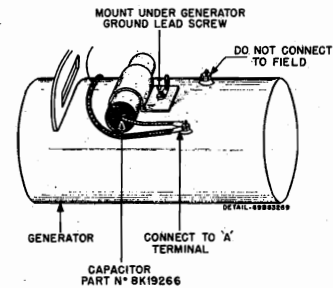


FIGURE 7. GENERATOR CAPACITOR INSTALLATION.

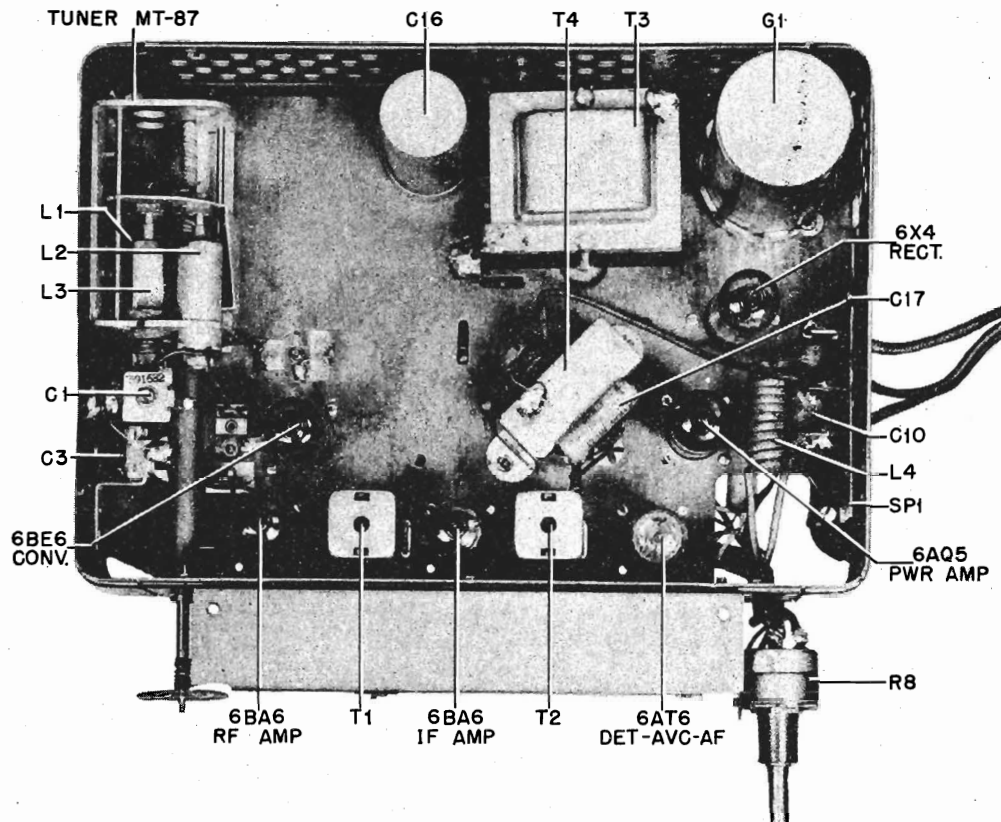


FIGURE 8. TOP VIEW OF CHASSIS.

MODEL CT1M,
Chevrolet

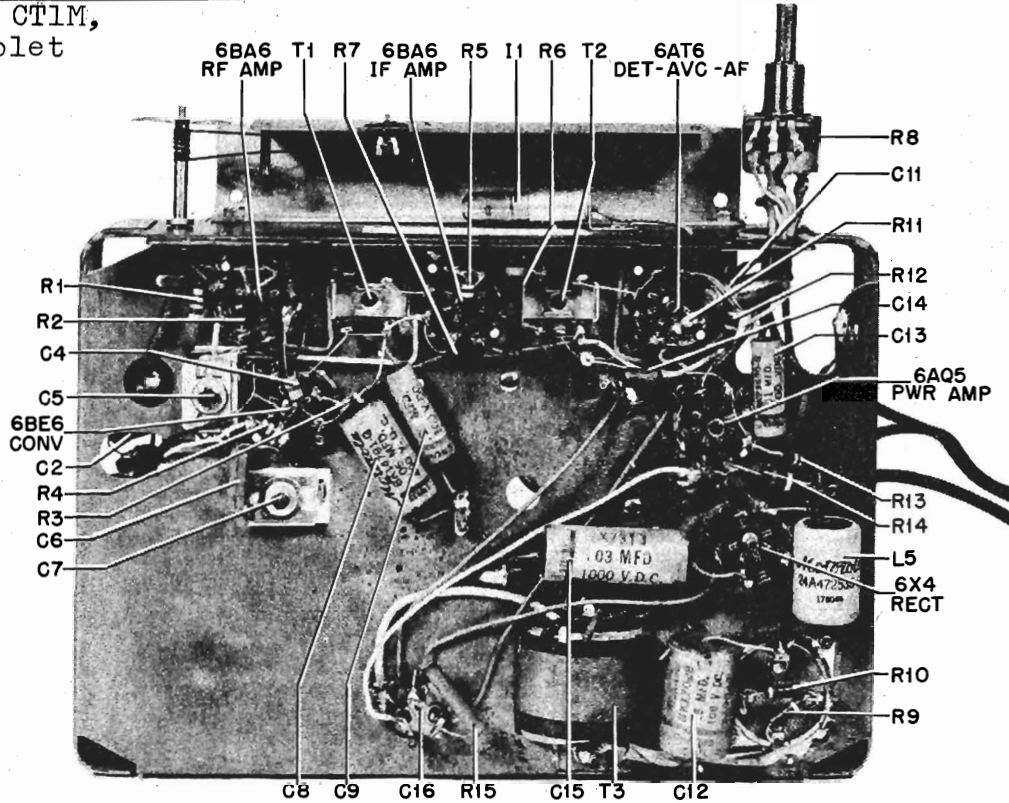


FIGURE 9. BOTTOM VIEW OF CHASSIS.

REPLACEMENT PARTS LIST

NOTE: When ordering parts, specify model number of set in addition to part number and description of part.

| Ref. No. | Part Number | Description | | |
|-----------------------------------|-------------|---------------------------------------------------|---------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| CHASSIS PARTS - ELECTRICAL | | | | |
| Capacitors | | | | |
| C-1 | 21A591682 | Ceramic: 90 mmf 500V..... | L-1 | 24B502472 Antenna Coil Assembly (specify color coding on old coil when ordering)..... |
| C-2 | 8A4529 | Paper: .006 mf 100V..... | L-2 | 24B502473 RF Coil Assembly (specify color coding on old coil when ordering)..... |
| C-3 | 20A502338 | Trimmer, mica: 50 to 280 mmf..... | L-3 | 24B502474 Oscillator Coil Assembly (specify color coding on old coil when ordering).. |
| C-4 | 21K70720 | Molded: 5 mmf 500V..... | L-4 | 24K580706 Choke, RF..... |
| C-5 | 20A481526 | Trimmer, mica: 20 to 80 mmf | L-5 | 24A472535 Choke, hash..... |
| C-6 | 21K77373 | Ceramic: 47 mmf..... | Speaker | |
| C-7 | 20A485708 | Trimmer, mica: 395 to 470 mmf..... | LS-1 | 50B510532 Speaker, EM: 5" x 7"... |
| C-8 | 8K14791 | Paper: .05 mf 400V..... | or | |
| C-9 | 8R13514 | Paper: .05 mf 100V..... | LS-2 | 50K510064 Speaker, PM: 5" x 7"; 3.2 ohm VC..... |
| C-10 | 8K17028 | Paper: .5 mf 100V..... | Resistors | |
| C-11 | 8R472754 | Paper: .01 mf 100V..... | Note: All resistors are insulated carbon type unless otherwise specified. | |
| C-12 | 8K17028 | Paper: .5 mf 100V..... | R-1 | 6R6032 470,000 20% 1/2W..... |
| C-13 | 8R23690 | Paper: .01 mf 400V..... | R-2 | 6R3933 220 20% 1/2W..... |
| C-14 | 21K481377 | Ceramic: 500 mmf..... | R-3 | 6R6075 100,000 20% 1/2W..... |
| C-15 | 8K400883 | Paper: .03 mf 1000V..... | R-4 | 6R6056 47,000 20% 1/2W..... |
| C-16 | 23A485677 | Electrolytic: 15-10-20 mf/350-350-25V..... | R-5 | 6R6010 330 20% 1/2W..... |
| C-17 | 8K71909 | Paper: .004 mf 400V..... | R-6 | 6R490001 6800 10% 1W N.I..... |
| Fuse | | | | |
| F-1 | 65K16248 | Fuse: 9 amp..... | R-7 | 6R6004 1 meg 20% 1/2W..... |
| Vibrator | | | | |
| G-1 | 48B3333 | Vibrator: 4-pin; non-sync. | | |
| Dial Light | | | | |
| I-1 | 65X10867 | Bulb: 6.3V; .25A; tubular; bayonet base; #44..... | | |

| | | |
|------|-----------|----------------------------------------------------|
| R-8 | 18K510011 | Volume control: .5 meg; includes on-off switch.... |
| R-9 | 6R5614 | 56 10% 1/2W..... |
| R-10 | 6R5614 | 56 10% 1/2W..... |
| R-11 | 6R2122 | 4.7 meg 20% 1/2W..... |
| R-12 | 6R6032 | 470,000 20% 1/2W..... |
| R-13 | 6R6414 | 270,000 10% 1/2W..... |
| R-14 | 6R6336 | 270 10% 1W..... |
| R-15 | 6R488312 | 2200 10% 1W N.I..... |

Spark Plate

| | | |
|------|----------|---------------------------|
| SP-1 | 1B501290 | Spark Plate Assembly..... |
|------|----------|---------------------------|

Transformers

| | | |
|-----|--------------|----------------------------|
| T-1 | 24B485553 | IF, 455 Kc: complete..... |
| | or 24K502819 | |
| T-2 | 24K485554 | Diode, 455 Kc: complete... |
| T-3 | 25C501303 | Power Transformer..... |
| T-4 | 25B70171 | Output Transformer..... |

CHASSIS PARTS - MECHANICAL

| | |
|-----------|-----------------------------------------------------------------------------------|
| 1X510137 | Bracket, dial background: includes shoulder rivets..... |
| 7C510065 | Bracket, dial mtg..... |
| 43K510014 | Bushing, manual shaft..... |
| 1X510135 | Cable Assembly, speaker (for PM spkr)..... |
| 1X510195 | Cable, Assembly, speaker (for EM spkr)..... |
| 42A510012 | Clip, dial scale retainer..... |
| 42A485548 | Clip, coil can mtg (T-1 & T-2).. |
| 42A4215 | Clip, vibrator grounding..... |
| 11M8877 | Cord, dial: 20 lb; black..... |
| 58A501296 | Coupling, tuning shaft: less insert springs..... |
| 9K510086 | Lead Assembly, fuse: complete with fuse..... |
| 2S8397 | Nut, hex: 1/2-28 x 5/8; cad pl (tuning shaft bushing and volume control mtg)..... |
| 1A510007 | Pointer and Slider Assembly..... |
| 9A472148 | Receptacle, antenna..... |
| 5K71246 | Rivet, shoulder: .187 lg (dial cord guide)..... |
| 5A71735 | Rivet, shoulder: 1/2" long (dial cord guide)..... |
| 34B510062 | Scale, dial..... |
| 3S7247 | Screw, machine: 6-32 x 3/16; slotted locking type; stl; cad pl (tuner mtg)..... |
| 1X510142 | Shaft Assembly, manual drive: includes 2 pinch-type drive washers. |
| 1X510138 | Shaft, Drive Disc, & Dial Cord Assembly..... |
| 9K592354 | Socket, dial light: includes mtg bracket..... |
| 9A70208 | Socket, tube: 4-prong (for vibrator)..... |
| 9A472534 | Socket, tube: miniature; 7-prong.. |
| 9K580218 | Socket, tube: miniature; 7-prong; with dummy lug..... |
| 41A485380 | Spring, insert (inside tuning shaft coupling)..... |
| 29A76280 | Terminal, pin and washer: black (for PM speaker)..... |
| 29K76282 | Terminal, pin and washer: white |
| 29K502828 | Terminal, pin and washer: yellow (for EM Speaker)..... |
| 4K501364 | Washer, "C" (tuning shaft retainer) |

| | |
|---------------|--------------------|
| <u>Part</u> | <u>Description</u> |
| <u>Number</u> | |

HOUSING PARTS

| | |
|-----------|--------------------|
| 15K501283 | Cover, bottom..... |
| 15K501306 | Cover, top..... |

MOUNTING PARTS & ACCESSORIES

| | |
|-----------|----------------------------------------------------------------------------------------------|
| 7A72256 | Bracket, receiver mtg (on hsgng).... |
| 7B510058 | Bracket, speaker plate mtg..... |
| 7A484424 | Bracket and Stud Assembly (receiver mtg)..... |
| 43A502927 | Bushing, spacer (receiver mtg to instrument panel)..... |
| 8A4491 | Capacitor, noise suppression (generator)..... |
| 32C510039 | Gasket, speaker..... |
| 36K510180 | Knob, control..... |
| 4S7688 | Lockwasher, int-ext: 1/4; stl; cad pl (receiver mtg)..... |
| 2S7022 | Nut, hex: 1/2-20 x 7/16; stl; cad pl (receiver mtg)..... |
| 2S8397 | Nut, hex: 1/2-28 x 5/8; stl; cad pl (receiver mtg to instrument panel) |
| 1X510130 | Plate and Gasket Assembly, speaker. |
| 3S488298 | Screw, sheet metal: #8 x 1/4 slotted hex head; stl; cad pl (mtg brkt mtg-rear)..... |
| 3S7295 | Screw, machine: 1/4-20 x 3/4; plain hex head; stl; cad pl (receiver mtg strap)..... |
| 3S9694 | Screw, machine: 1/4-20 x 1 1/2; plain hex head; stl; cad pl (receiver mtg to firewall)..... |
| 3S7118 | Set screw (control knob)..... |
| 42A485718 | Strap, receiver mtg..... |
| 6A4141 | Suppressor, noise (distributor).... |
| 4S1758 | Washer, flat: 13/16 x .515 x .040 thick; stl; nkl pl (receiver mtg to instrument panel)..... |

TUNER - MODEL MT-87

Note: Electrical parts of the tuner are included in the Electrical Chassis Parts List.

| | |
|-----------|---------------------------------------------------------------------------------------|
| 51D502490 | Tuner, Model MT-87: complete..... |
| 43A502513 | Bushing, stop (stop on manual drive shaft)..... |
| 42A502507 | Clip, spring (manual drive shaft retainer)..... |
| 46A502505 | Core, iron (L-1, 2, & 3 tuning - specify color coding on old core when ordering)..... |
| 5A502510 | Grommet (L-1 & 2 mtg)..... |
| 5K502516 | Grommet (L-3 mtg)..... |
| 5A501503 | Grommet (L-1, 2, & 3 core mtg).. |
| 2A502508 | Nut, tension drive (on tuner carriage)..... |
| 47A502509 | Shaft, manual drive..... |
| 46A502506 | Sleeve, iron (inside L-1 & 2, shields)..... |
| 4K502518 | Washer, fibre (on manual drive shaft)..... |
| 4A502517 | Washer, paper (inside L-1 & 2, shields)..... |

MODEL CT1M,
Chevrolet

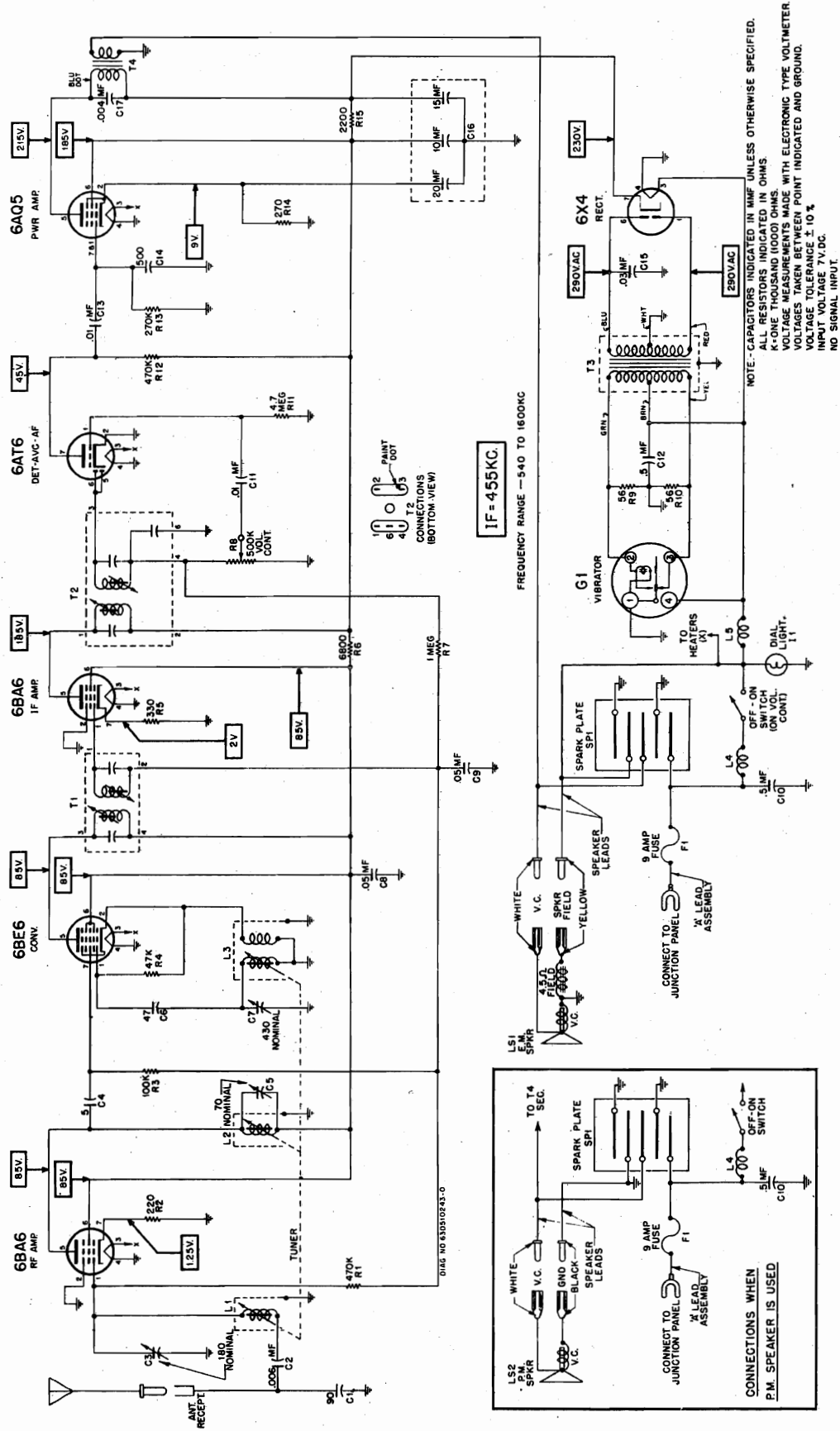


FIGURE 10. SCHEMATIC DIAGRAM.

MODELS 16VF8B, 16VF8R,
Ch. HS-211; 19F1, 19F1B,
Ch. HS-230

GENERAL INFORMATION

NOTE: This manual contains complete service information and replacement parts list for AM-FM radio chassis HS-211 and HS-230. Service data for the television chassis and the record changers will be found in their respective service manuals.

RECEIVER MODELS

| Model | Radio Chassis Used | Record Changer Used | TV Chassis Used |
|--------|--------------------|---------------------|-----------------|
| 16VF8R | HS-211 | M3RC | TS-16 series |
| 16VF8B | HS-211 | M3RC | TS-16 series |
| 19F1 | HS-230 | RC-36 | TS-67 series |
| 19F1B | HS-230 | RC-36 | TS-67 series |

RADIO CHASSIS - HS-211: Radio chassis HS-211 contains 9 tubes and receives both AM and FM broadcast programs. Except for common speakers, it operates entirely independently of the television receiver.

HS-230: Similar to chassis HS-211 except for the addition of a separate phono motor power switch, connected to the AM-FM-PHONO switch control shaft.

RADIO TUNING RANGE - AM - 535 to 1620 Kc
FM - 88 to 108 Mc

RADIO IF FREQUENCIES - AM IF - 455 Kc
FM IF - 10.7 Mc

RADIO ANTENNAS - Separate AM and FM loop antennas, mounted in cabinet

SPEAKERS - Dual 12" PM and 5" FM, common to both radio and television chassis.

POWER SUPPLY - 117 volts, 60 cycle alternating current only

RADIO POWER CONSUMPTION - 100 watts, including phono motor

RADIO AUDIO OUTPUT - 8 watts

RADIO CHASSIS TUBE COMPLEMENT -

| | |
|-------|-------------------------------|
| 6AU6 | - FM-AM RF Amplifier |
| 6BA7 | - FM-AM Converter |
| 6BA6 | - FM-AM IF Amplifier |
| 6AU6 | - FM IF Amplifier |
| 6AL5 | - FM Ratio Detector |
| 6AV6 | - AM Detector & 1st Audio Amp |
| 6V6GT | - Power Amplifier |
| 6V6GT | - Power Amplifier |
| 7Z4 | - Rectifier |

INSTALLATION & OPERATING INSTRUCTIONS

ANTENNAS

No outside antenna or ground is normally required for standard broadcast (AM) reception, as a loop antenna is located inside the cabinet. Antenna connections are shown in Figure 1. In locations where additional pick-up is desired, an external antenna may be connected to the clip marked "EXT BC ANT" on the loop antenna.

An FM loop antenna, mounted inside the cabinet, eliminates the need for an external FM antenna when the receiver is used in normal FM service areas such as are found in and for a few miles around metropolitan areas.

In "fringe" or weak signal areas, improved FM reception can be obtained by using an outside FM antenna. The loop connections should be removed from the terminal strip on the rear of the chassis and the outside antenna should be connected, through a 300 ohm twin transmission line, to the terminal strip, as shown in Figure 1. Orient the antenna to obtain maximum volume of the FM stations.

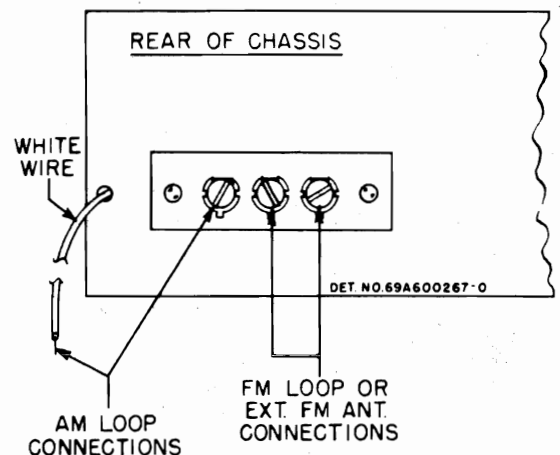


FIGURE 1. EXTERNAL ANTENNA CONNECTIONS

MODELS 16VF8B, 16VF8R,
Ch. HS-211; 19F1, 19F1B,
Ch. HS-230

SERVICE NOTE

TO REMOVE RADIO CHASSIS FROM CABINET

1. Pull off the four radio knobs on the front of the cabinet.
2. Remove the AC power plug from the receptacle attached to the cabinet.
3. Remove the large panel covering the rear of the cabinet.
4. Disconnect the AM and FM loop leads from the receiver.
5. Disconnect the phono power plug from the chassis.
6. Disconnect the speaker leads.
7. Remove the three chassis mounting screws.
8. Slide the chassis from the cabinet.

CONTROLS

Refer to Figure 2 for the location of the radio controls.

POWER SWITCH AND VOLUME CONTROL. The volume control and power switch for both radio and phonograph operation are combined and are operated with the extreme left-hand knob. **CAUTION:** The power switches on the AM-FM radio and on the television receiver are independent. Make sure both are turned off when the set is not in use.

TONE CONTROL. Tone is varied by adjusting the second knob from the left.

AM-FM-PHONO SWITCH. The third control from the left operates a three-position switch. The extreme counterclockwise position selects the AM (Standard

Broadcast) band, the center position selects the FM (Frequency Modulation) band, and the extreme clockwise position is used for phonograph operation. **NOTE:** On the 19F1 model, rotating the control to the "PHONO" position also starts the phono motor, whereas model 16VF8 has a separate power switch on the record changer itself.

TUNING CONTROL. The extreme right-hand control selects the desired FM or AM station. The standard broadcast scale (AM) is read in kilocycles by adding one '0' to the figures. The frequency modulation scale (FM) is read in megacycles (88 to 108).

Tuning of FM stations should be done very carefully, for best sound reproduction, not necessarily for strongest volume received.

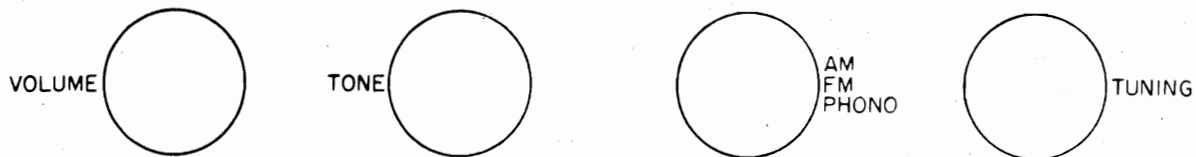


FIGURE 2. RADIO CONTROLS

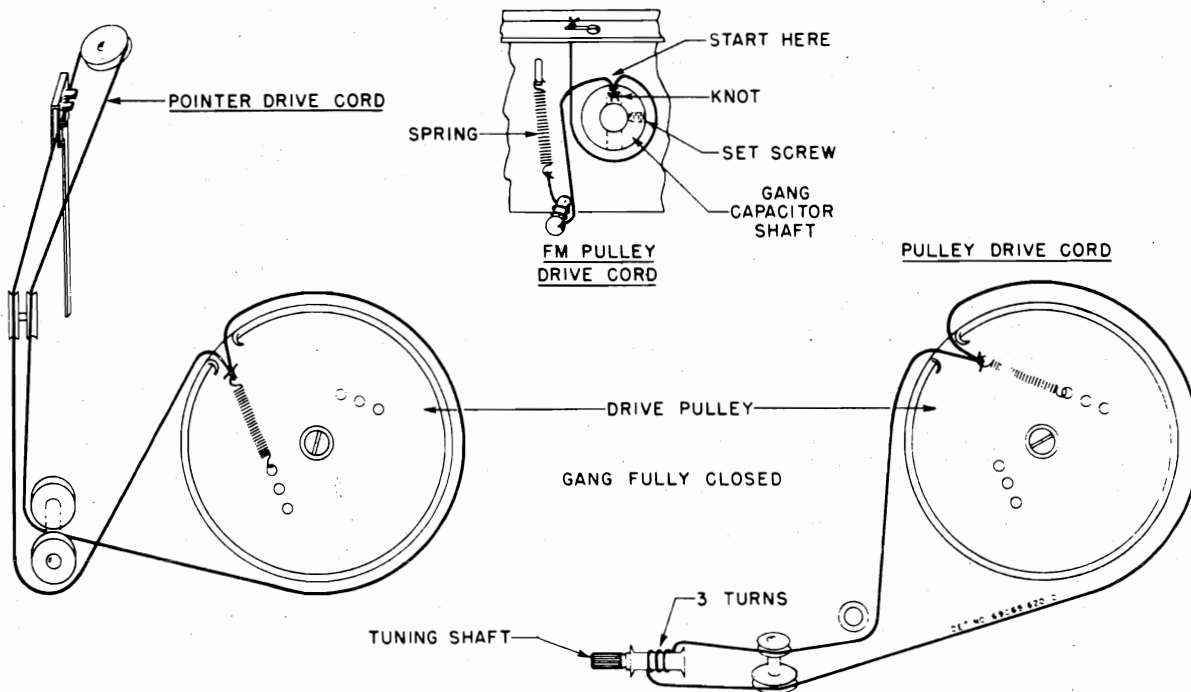


FIGURE 3. STRING DRIVE DETAIL

MODELS 16VF8B, 16VF8R,
Ch. HS-211; 19F1,
19F1B, Ch. HS-230

ALIGNMENT

GENERAL INFORMATION

1. Maximum performance can be obtained only if extreme care is exercised during alignment.
2. Use a small fibre screwdriver for aligning the IF transformers.
3. Refer to Figure 4 for the location of all alignment trimmers and cores.
4. As the stages are brought into alignment, reduce the signal generator output to a low value to avoid overloading the receiver.

ORDER OF ALIGNMENT AND EQUIPMENT REQUIRED

1. Broadcast Band IF & RF Alignment
 - a. 455 to 1620 Kc AM Signal Generator
 - b. Low range output meter
 - a. 10.7 to 108 Mc FM signal generator
 - b. Oscilloscope
- 2 (A) FM Band IF & RF Alignment (Preferred Method)
 - a. 10.7 to 108 Mc signal generator (unmod.)
 - b. Low range DC electronic voltmeter.

BROADCAST BAND - IF & RF ALIGNMENT

1. With the gang fully closed, adjust the pointer to coincide with the calibration marks at the left of the "55" on the dial scale.
2. Connect the AM signal generator as in chart below, with 400 cycle, 30% modulation.
3. Connect the output meter across the speaker voice coil. Throughout alignment reduce the generator output to a level which produces less than 1.27 volts (.5 watt) across the voice coil, to avoid overloading the receiver.
4. Set the bandswitch to the AM position.
5. Turn the receiver volume control to maximum.
6. Proceed as shown in the following chart.

| STEP | DUMMY ANTENNA | GENERATOR CONNECTION | GENERATOR FREQUENCY | GANG SETTING | ADJUST | REMARKS |
|---------------------|---------------|---------------------------------|---------------------|----------------|-------------------------|-----------------------------|
| IF ALIGNMENT | | | | | | |
| 1. | .1 mf | Grid of conv. V-2 (pin 7, 6BA7) | 455 Kc | Fully opened | 1, 2, 3, & 4 (IF cores) | Adjust for maximum. |
| RF ALIGNMENT | | | | | | |
| 2. | .1 mf | Grid of conv. V-2 (pin 7, 6BA7) | 1620 Kc | Fully opened | 5 (AM osc) | Adjust for maximum. |
| 3. | .1 mf | Grid of conv. V-2 (pin 7, 6BA7) | 1400 Kc | Tune in signal | 6 (AM RF) | Adjust for maximum. |
| 4. | - | - | - | - | - | Connect AM loop to chassis. |
| 5. | - | Across radiation loop* | 1400 Kc | Tune in signal | 7 (AM ant) | Adjust for maximum. |

*Connect generator output across 5" diameter, 5 turn loop and couple inductively to receiver loop. Keep loops at least 12" apart.

MODELS 16VF8B, 16VF8R,
Ch. HS-211; 19F1,
19F1B, Ch. HS-230

FM BAND - IF & RF ALIGNMENT (PREFERRED METHOD)

1. The following FM alignment procedure, using an FM signal generator and an oscilloscope, is to be preferred because the actual response pattern may be observed on the scope and adjusted for best symmetry and maximum amplitude.
2. Connect the vertical input terminals of the oscilloscope between the chassis and the junction of resistor R-17 (47K) and capacitor C-21 (1000 mmf).
3. Connect the FM signal generator sync voltage output terminals, through a phase shifting network, to the horizontal input terminals of the scope, as in Figure 5. (Other values of resistance and capa-

citance may be required, depending upon the scope). The phasing control should be adjusted to give only one trace on the scope. NOTE: If the FM generator has a built-in phase control, the phase shifting network is not necessary.

4. Set the bandswitch to the FM position.
5. Throughout alignment, reduce the generator output to keep the signal just above the noise level, to avoid overloading the receiver.
6. Proceed as shown in the following chart.

| GENERATOR CONNECTION | STEP | DUMMY ANTENNA | GENERATOR FREQUENCY | TUNER SETTING | ADJUST | REMARKS |
|--------------------------------------|------|---------------|-------------------------|----------------|------------------------------------|-----------------------------------------------------------------------------------------|
| IF ALIGNMENT | | | | | | |
| Grid of 2nd IF Amp V-4 (pin 1, 6AU6) | 1. | 1000 mmf | 10.7 mc ±100 Kc dev. | Fully opened | 8 (ratio det pri) | Adjust for maximum amplitude of pattern.* |
| Grid of 2nd IF Amp V-4 (pin 1, 6AU6) | 2. | 1000 mmf | 10.7 mc ±100 Kc dev. | Fully opened | 9 (ratio det sec) | Adjust for symmetrical curve, as shown in Figure 6. |
| - | 3. | - | - | - | - | Repeat steps 1 & 2 for maximum amplitude and best symmetry. |
| Grid of 1st IF Amp V-3 (pin 1, 6BA6) | 4. | 1000 mmf | 10.7 mc ±100 Kc dev. | Fully opened | 10 & 11 (2nd IF sec & pri) | Adjust for maximum amplitude of pattern.* |
| Grid of conv. V-2 (pin 7, 6BA7) | 5. | 1000 mmf | 10.7 mc ±100 Kc dev. | Fully opened | 12 & 13 (1st IF sec & pri) | Adjust for maximum amplitude of pattern.* |
| Grid of conv. V-2 (pin 7, 6BA7) | 6. | 1000 mmf | 10.7 mc ±100 Kc dev. | Fully opened | 10, 11 12 & 13 | Readjust for maximum amplitude and best symmetry. |
| RF ALIGNMENT | | | | | | |
| FM terminal 19 on rear of chassis | 7. | 270 ohms | 105 mc ±22½ Kc dev. | 105 mc on dial | 14 (osc core) | Adjust for maximum amplitude of pattern.* |
| - | 8. | - | - | Fully closed | 15 & 16 (RF & ant cores) | Turn counterclockwise until cores are at bottom of pipe, then turn two turns clockwise. |
| FM terminal 19 on rear of chassis | 9. | 270 ohms | 90 mc ±22½ kc dev. | Tune in signal | 17 & 18 (RF & ant tuning plugs) | Adjust for maximum amplitude of pattern.* |
| FM terminal 19 on rear of | 10. | 270 ohms | 105 mc ±22½ kc dev. | Tune in signal | 15 & 16 (RF & ant cores) | Adjust for maximum amplitude of pattern.* |
| - | 11. | - | - | - | - | Repeat steps 9 & 10 until no further adjustment is necessary. |

An output meter across the speaker voice coil will also indicate maximum amplitude. It should not be used in place of the scope, however, since it will not show symmetry of the curve.

MODELS 16VF8B, 16VF8R,
Ch. HS-211; 19F1,
19F1B, Ch. HS-230

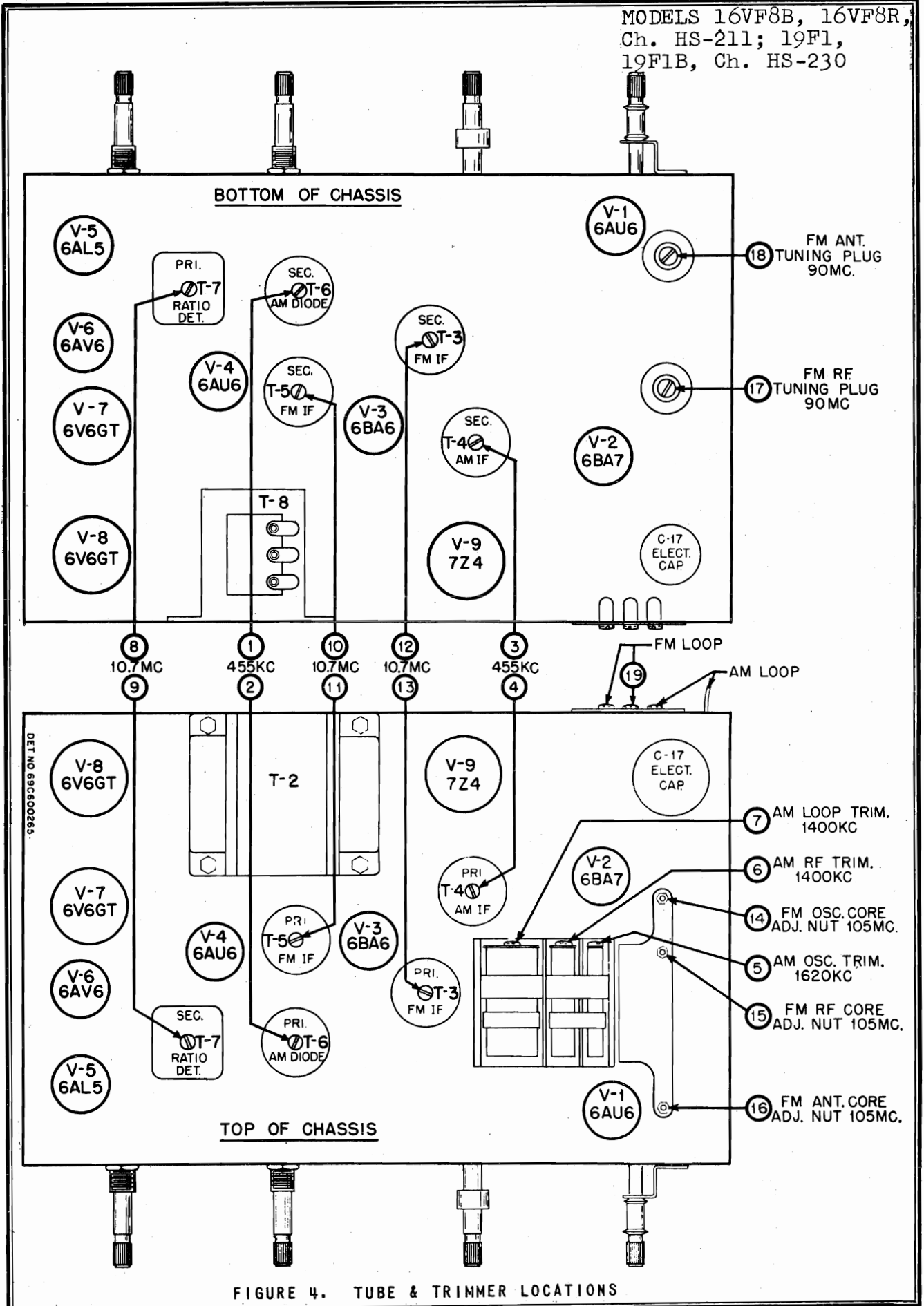


FIGURE 4. TUBE & TRIMMER LOCATIONS

MODELS 16VF8B, 16VF8R,
Ch. HS-211; 19F1,
19F1B, Ch. HS-230

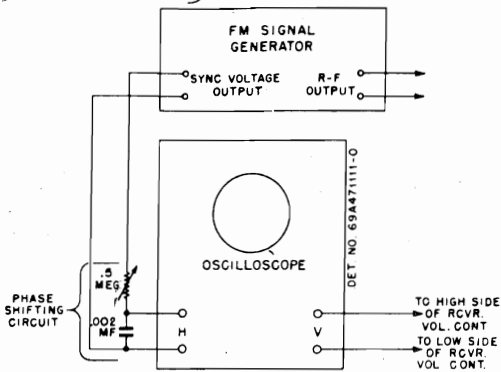


FIGURE 5.

FM SIGNAL GENERATOR & OSCILLOSCOPE HOOK-UP

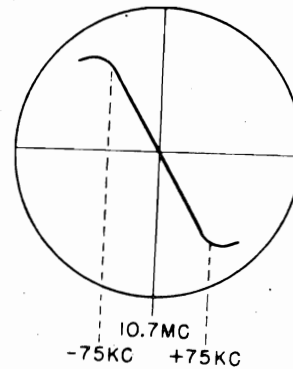


FIGURE 6.

RATIO DETECTOR WAVEFORM

FM BAND - IF & RF ALIGNMENT (ALTERNATE METHOD)

1. The following procedure for FM alignment, with an unmodulated carrier generator and a DC electronic voltmeter, is not as desirable as the preceding method; but it may be used if no FM generator is available.
2. Connect the signal generator as in chart below, with no modulation.
3. Set the bandswitch to the FM position.
4. Except in step 2 below, connect the electronic voltmeter across resistor R-21 (33K) in the ratio detector stage.
5. Throughout alignment reduce the signal generator output to a value which produces no more than a 5 volt rise above no signal voltage, to avoid overloading the receiver.
6. In step 2 below, connect two 100K ohm resistors in series across R-21. Connect the electronic voltmeter between the volume control side of resistor R-17 (47K) and the junction of the two 100K resistors, with the low side of the meter at the 100K resistors.
7. Proceed as shown in the following chart.

| STEP | DUMMY ANTENNA | GENERATOR CONNECTION | GENERATOR FREQUENCY | TUNER SETTING | ADJUST | REMARKS |
|---------------------|---------------|-----------------------------------|---------------------|----------------|---------------------------------|-----------------------------------------------------------------------------------------|
| IF ALIGNMENT | | | | | | |
| 1. | 1000 mmf | Grid of conv. V-2 (pin 7, 6BA7) | 10.7 mc | Fully opened | 8, 10, 11, 12 & 13 (IF cores) | Adjust for maximum. |
| 2. | 1000 mmf | Grid of conv. V-2 (pin 7, 6BA7) | 10.7 mc | Fully opened | 9 (ratio det sec) | Adjust for zero. (Connect meter as in step 6 above) |
| RF ALIGNMENT | | | | | | |
| 3. | 270 ohms | FM terminal 19 on rear of chassis | 105 mc | 105 mc on dial | 14 (osc core) | Adjust for maximum. |
| 4. | - | - | - | Fully closed | 15 & 16 (RF & ant cores) | Turn counterclockwise until cores are at bottom of pipe, then turn two turns clockwise. |
| 5. | 270 ohms | FM terminal 19 on rear of chassis | 90 mc | Tune in signal | 17 & 18 (RF & ant tuning plugs) | Adjust for maximum. |
| 6. | 270 ohms | FM terminal 19 on rear of chassis | 105 mc | Tune in signal | 15 & 16 (RF & ant cores) | Adjust for maximum. |
| 7. | - | - | - | - | - | Repeat steps 5 & 6 until no further adjustment is necessary. |

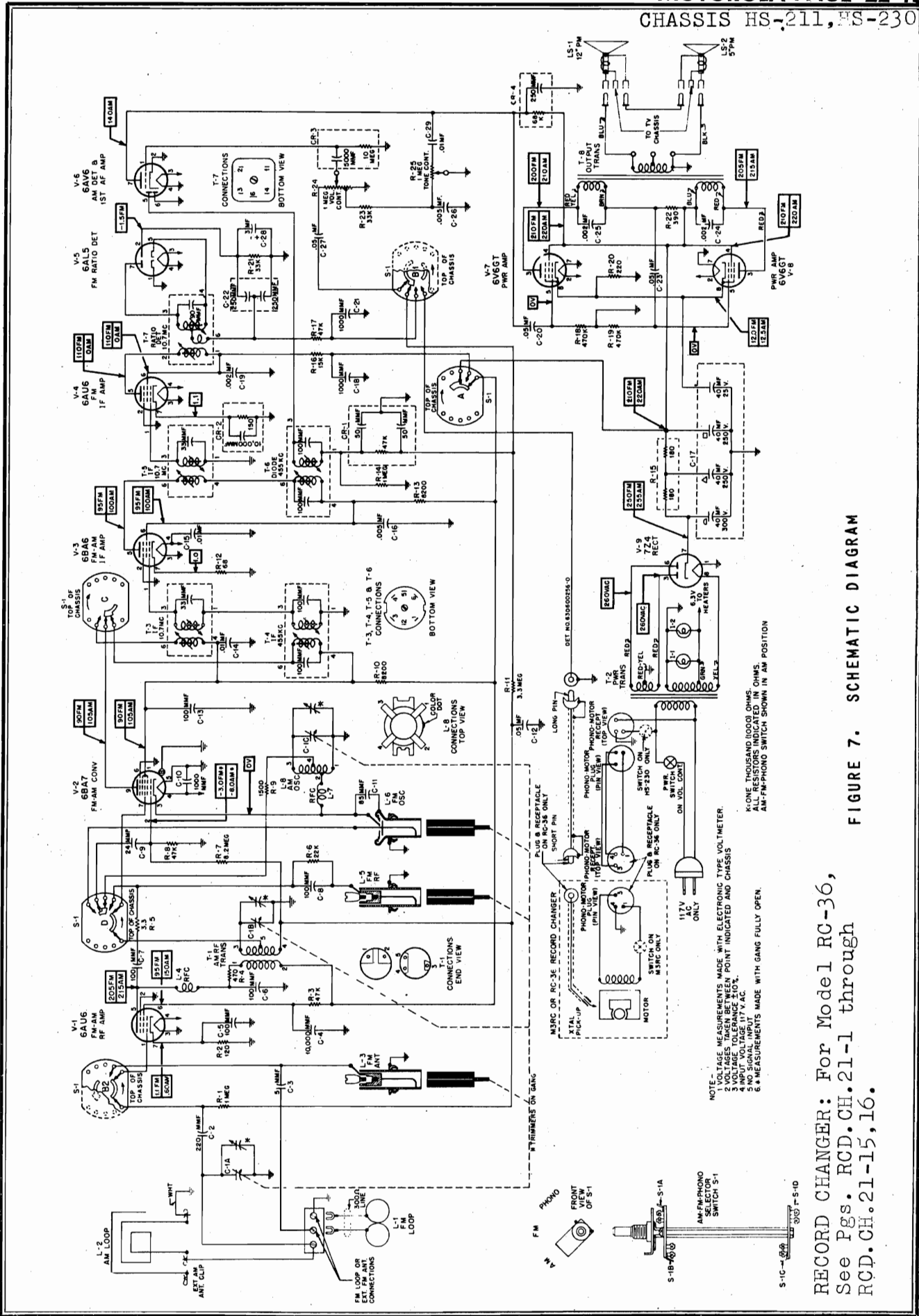


FIGURE 7. SCHEMATIC DIAGRAM

RECORD CHANGER: For Model RC-36,
See Pgs. RCD.CH.21-1 through
RCD.CH.21-15, 16.

PAGE 22-16 MOTOROLA

MODELS 16VF8B, 16VF8R,
Ch. HS-211; 19F1,
19F1B, Ch. HS-230

REPLACEMENT PARTS LIST

REF. NO. PART NO. DESCRIPTION

SPEAKERS

LS-1 50C791631 Speaker: 12" PM; 3.2 ohm VC
LS-2 50C790701 Speaker: 5" PM; 3.2 ohm VC..
or 50C791430

RESISTORS

Note: All resistors are carbon insulated type unless otherwise specified.

R-1 6R6004 1 meg 20% 1/2W
R-2 6R5551 120 10% 1/2W
R-3 6R6048 47,000 10% 1/2W
R-4 6R3949 470 20% 1/2W
R-5 6R490131 3.3 10% 1/2W
R-6 6R6028 22,000 20% 1/2W
R-7 6R5585 8.2 meg 10% 1/2W
R-8 6R6048 47,000 10% 1/2W
R-9 6R6038 1500 10% 1/2W
R-10 6R5725 8200 10% 2W
R-11 6R6497 3.3 meg 10% 1/2W
R-12 6R2039 68 10% 1/2W
R-13 6R5725 8200 10% 2W
R-14 6R6046 1 meg 10% 1/2W
R-15 17A690973 Wirewound: 360 10% 3W; cen-
ter tapped
R-16 6R6431 15,000 10% 1W
R-17 6R6056 47,000 20% 1/2W
R-18 6R6032 470,000 20% 1/2W
R-19 6R6032 470,000 20% 1/2W
R-20 6R6389 220 10% 1W.....
R-21 6R6410 33,000 10% 1/2W
R-22 6R5598 390 10% 1W
R-23 6R6012 33,000 20% 1/2W
R-24 18K691192 Volume Control: 1 meg; tapped
at 300,000 ohms; includes
on-off switch
R-25 18K77399 Tone Control: 1 meg

SWITCHES

S-1 40B690977 Band Switch: AM-FM-PHONO.....
S-2 On-off Switch (on volume control)
S-3 40A691922 Phono-Radio-Switch; SPST (HS-234)

TRANSFORMERS

T-1 24B690899 AM RF Transformer
T-2 25B691035 Power Transformer
T-3 24B690540 1st FM IF Transformer (orange
dot): 10.7 mc; complete with
capacitor and cores; less shield
T-4 24B482863 AM IF Transformer (brown dot):
455 Kc: complete with capaci-
tors and cores; less shield....
T-5 24B690541 2nd FM IF Transformer (yellow
dot): 10.7 mc; complete with
capacitor and cores; less shield
T-6 24B482865 AM Diode Transformer (red dot):
455 Kc: complete with capaci-
tors and cores; less shield....
T-7 24B690542 Ratio Detector Transformer:
10.7 mc: complete with capa-
citors, cores and shield.....
T-8 25B690898 Audio Output Transformer.....

REF. NO. PART NO. DESCRIPTION

CHASSIS PARTS - ELECTRICAL

CAPACITORS

C-1 19B690978 Variable, 3 gang
C-2 21K77375 Ceramic: 220 mmf 500V
C-3 21K70720 Ceramic: 5 mmf 500V
C-4 21K482726 Ceramic, disc type: 10,000 mmf
450V
C-5 21B77286 Ceramic: 100 mmf 500V
C-6 21B77286 Ceramic: 100 mmf 500V
C-7 21B77286 Ceramic: 100 mmf 500V
C-8 21R6554 Mica: 100 mmf 10% 500V
C-9 21K28816 Ceramic: 24 mmf 500V
C-10 21K478410 Ceramic: 1000 mmf 500V
C-11 21K691203 Ceramic: 85 mmf 500V
C-12 8R9821 Paper: .05 mf 200V
C-13 21B77286 Ceramic: 100 mmf 500V
C-14 8R9809 Paper: .01 mf 400V
C-15 8R9809 Paper: .01 mf 400V
C-16 8R9813 Paper: .005 mf 600V
C-17 23B690975 Electrolytic: 40 mf/300V, 40-40
mf/250V, 40 mf/25V.....
C-18 21K478410 Ceramic: 1000 mmf 500V
C-19 8R9824 Paper: .002 mf 400V
C-20 8K470606 Paper: .05 mf 400V
C-21 21K478410 Ceramic: 1000 mmf 500V
C-22 21B484337 Ceramic: dual; 250-250 mmf/450V.
C-23 8K470606 Paper: .05 mf 400V
C-24 8R9824 Paper: .002 mf 400V
C-25 8R9824 Paper: .002 mf 400V
C-26 8R9813 Paper: .005 mf 600V
C-27 8R9821 Paper: .05 mf 200V
C-28 23K690543 Electrolytic: 3 mf 50V
C-29 8R9809 Paper: .01 mf 400V

CAPACITOR-RESISTOR

CR-1 21K690980 Capacitor-Resistor: 50 mmf-50 mmf
47,000 ohms
CR-2 21K680007 Capacitor-Resistor: 10,000 mmf
150 ohms
CR-3 21K691125 Capacitor-Resistor: 5000 mmf
10 meg
CR-4 21K690979 Capacitor-Resistor: 250 mmf
68,000 ohms

DIAL LIGHT

I-1,
I-2 65X11854 Bulb, dial light: #47; 6-8V;
.15 amp; clear; bayonet
base

COILS

L-1 24K690985 FM Loop antenna: with lead.....
L-2 24C690896 AM Loop antenna
L-3 24C690584 Inductor and Capacitor Assembly:
FM antenna: less tuning core...
L-4 24A484025 RF choke
L-5 24C690584 Inductor and Capacitor Assembly:
FM RF; less tuning core
L-6 24K690996 Inductor and Capacitor Assembly:
FM oscillator; less tuning core
L-7 24K780128 RF choke: insulated
L-8 24B690976 AM oscillator coil

MODELS 16VF8B, 16VF8R,
Ch. HS-211; 19F1,
19F1B, Ch. HS-230

| PART NUMBER | DESCRIPTION | PART NUMBER | DESCRIPTION |
|-----------------------------------|----------------------------------------------------------------------------------------------------------|----------------------|-----------------------------------------------------------------------------------------|
| CHASSIS PARTS - MECHANICAL | | 5K481770 | Rivet, shoulder (for double pulleys on dial plate) |
| 1X690717 | Bracket Assembly, tuning core mtg; includes shoulder rivet and single anti-backlash clip | 3S7462 | Screw, machine: 6-32 x 3/16 plain hex head; cad pl (electrostatic shield mtg) |
| 1X691127 | Bracket & Pulleys Assembly: includes two pulleys and shoulder rivet (cord guides on chassis front) | 3S7326 | Screw, machine: 8-32 x 3/16 plain locking hex head; cad pl (gang mtg) |
| 7C690567 | Bracket, tuner mtg (gang mtg)..... | 3S7163 | Screw, machine: 8-32 x 1/4 plain hex head; cad pl (pointer drive pulley mtg) |
| 7A77337 | Bracket, tuning shaft | 3S2695 | Screw, sheet metal: #6 x 3/16 PKZ plain hex head; cad pl (tuner brkt mtg) |
| 43K890398 | Bushing, line cord retainer (use with 43A890397) | 3S7454 | Screw, sheet metal: #8 x 1/4 PKZ plain hex head; cad pl (dial plate assembly mtg) |
| 43A890397 | Bushing, line cord strain relief (use with 43K890398) | 3S7475 | Screw, sheet metal: #8 x 1/4 PKZ slotted acorn head; cad pl (power trans mtg) |
| 42A690560 | Clip, anti-backlash: double (on tuner mounting brkt) | 3S7103 | Setscrew: 8-32 x 1/8 Allen head; cad pl (core drive pulley mtg)..... |
| 42K690561 | Clip, anti-backlash: single (on core mtg brkt) | 3S7113 | Setscrew: 8-32 x 1/4 slab head; cad pl (bandswitch link assembly mtg). |
| 42B482867 | Clip, spring: blued finish (holds IF transformer) | 47A690893 | Shaft, bandswitch actuating (HS-211).. |
| 11M488137 | Cord, dial (core drive) | 1X691134 | Shaft, tuning: complete with pulley... |
| 11M8944 | Cord, dial (pointer drive)..... | 26K485936 | Shield, coil: for IF transformers.... |
| 30K21859 | Cord, line: with plug: 9 ft long | 26A470013 | Shield, dial light |
| 46B692164 | Core, iron and screw: green dot (FM osc tuning core) | 26K690984 | Shield, electrostatic (gang shield)... |
| 46K692165 | Core, iron and screw (FM RF and ant tuning core) | 26K690981 | Shield, tube: spring type |
| 34C690897 | Dial scale: glass | 26A692080 | Shield, tube (for V-9) |
| 1X691136 | Dial Scale and Plate Assembly: complete with cord pulleys | 9K471935 | Socket, dial light: includes brkt..... |
| 5S7866 | Eyelet: .125 x .091; brass; nkl pl (core drive cord retainer)..... | 9A72519 | Socket, tube: loctal |
| 1X600081 | Link Assembly, bandswitch actuating: complete with bushings; less setscrews | 9A690129 | Socket, tube: midget; 7 prong (for V-1) |
| 4S9751 | Lockwasher, int-ext: #8; cad pl (pointer drive pulley mtg)..... | 9K484167 | Socket, tube: miniature; 7 prong |
| 2S7019 | Nut, hex: 4-40 x 1/4; cad pl (FM tuning core mtg) | 9A485495 | Socket, tube: noval; 9-prong |
| 2S7051 | Nut, hex palnut: 3/8-32 x 9/16; cad pl (bandswitch, tone and volume control mtg) | 9A76209 | Socket, tube: octal |
| 52B481704 | Pointer, dial | 41A690598 | Spring, coil: 7 turns; cosmoline dipped (FM RF & ant core mtg) |
| 49A21741 | Pulley, cord: 3/8" groove (on chassis front) | 41K691840 | Spring, coil: 8 turns; copper plated (FM osc core mtg) |
| 49A73807 | Pulley, cord: 1/2" groove (on chassis side and on dial plate) | 41A14244 | Spring, tension (core & pointer drive cord) |
| 49A26433 | Pulley, cord: 21/32" groove (on chassis front) | 41K692081 | Spring, tube shield retaining (for V-9 shield) |
| 49A690562 | Pulley, core drive: brass | 37K21114 | Strip, channel: rubber; 1" long (dial scale mtg) |
| 1K691145 | Pulley, pointer drive: 3-1/2" diameter | 31K37504 | Strip, terminal: 1 insulated lug; #1 mtg; 3/8" spacing |
| 9K592170 | Receptacle, phono pick-up: 1 prong.... | 31K51251 | Strip, terminal: 1 insulated lug, #1 gnd; 3/8" spacing |
| 9A27674 | Receptacle, phono power: 3-prong.... | 31K471565 | Strip, terminal: 3 insulated lugs, #4 gnd; 3/8" spacing |
| 5S8497 | Rivet: .088 x 1/8 stl; nkl pl (single anti-backlash clip mtg) | 31A690974 | Strip, terminal: 7 insulated lugs, #4 & 9 gnd; 3/8" spacing |
| 5S7771 | Rivet: .088 x 3/16; stl; nkl pl (min and midget tube socket mtg).... | 31K471498 | Strip, terminal: 3-screw (antenna input) |
| 5S7707 | Rivet: .122 x 5/32; stl; nkl pl (loctal tube socket, terminal strip, output transformer mtg)..... | 29K5412 | Terminal, plain pin (on speaker leads) |
| 5S7701 | Rivet: .122 x 3/16 stl; nkl pl (power receptacle, ant term strip, and tuning shaft bracket mtg)..... | 4A70015 | Washer, 'C' (tuning shaft retainer) |
| 5S7700 | Rivet: .122 x 1/4; stl; nkl pl (octal tube socket mtg)..... | CABINET PARTS | |
| 5K13896 | Rivet, shoulder (tuning core cord guide and pulley mtg on front of chassis) | 39K17396 | Contact, pin terminal (in molded phono motor receptacle)(19F1).. |
| 5K71246 | Rivet, shoulder (pulley mtg on side of chassis and on left side of dial plate) | 13C791478 | Escutcheon, radio dial: brass... |
| | | 5A71081 | Eyelet (radio chassis mtg)..... |

CHASSIS HS-211,
HS-230, HS-230A

| PART NUMBER | DESCRIPTION | PART NUMBER | DESCRIPTION |
|-------------|-------------------------------------------------------------------------------------------------|-------------|------------------------------------------------------------------------------------------------------|
| 5A71092 | Grommet, rubber (radio chassis mtg) | 28K30736 | Plug, phono motor: 3-pin; includes shell (on phono motor lead)..... |
| 14K791482 | Insulator, fibre (clamps phono and antenna leads) | 9K470402 | Receptacle, phono motor: 5-prong; molded; includes contacts (19F1) |
| 36B790569 | Knob, control: no dot; beige plastic (radio controls) | 9A600040 | Receptacle, phono motor: 3-prong; includes shell (19F1) |
| 36K791630 | Knob, control: with dot; beige plastic (radio controls) | 3S7536 | Screw, sheet metal: #6 x 3/8 PKA slotted acorn head; antique copper finish (cabinet back panel mtg). |
| 1X792530 | Lead and Plugs Assembly, phono pick-up (shielded lead with two phono pick-up plugs)(19F1) | 3S7534 | Screw, sheet metal: #8 x 1-3/8 PKA plain hex head; cad pl (radio chassis mtg) |
| 64D791510 | Panel, cabinet back: fibre (covers radio and phono compartments)(16VF8) | 15K74443 | Shell, plug (on 28K30736 phono motor plug) |
| 64K792522 | Panel, cabinet back: fibre (covers radio and phono compartments)(19F1).. | 15A690616 | Shell, receptacle (on 9A600040 phono motor receptacle)(19F1) |
| 28K71775 | Plug, phono pick-up (short plug on phono lead)(19F1) | 4S490513 | Washer, flat: 3/4 x 7/32 x .042 stl; cad pl (radio chassis mtg)... |
| 28K22183 | Plug, phono pick-up (long plug on phono lead)(19F1) | | |

GENERAL INFORMATION

AM-FM radio chassis HS-230A is the same as chassis HS-230 except that the output transformer secondary winding is connected for use with one speaker instead of dual speakers.

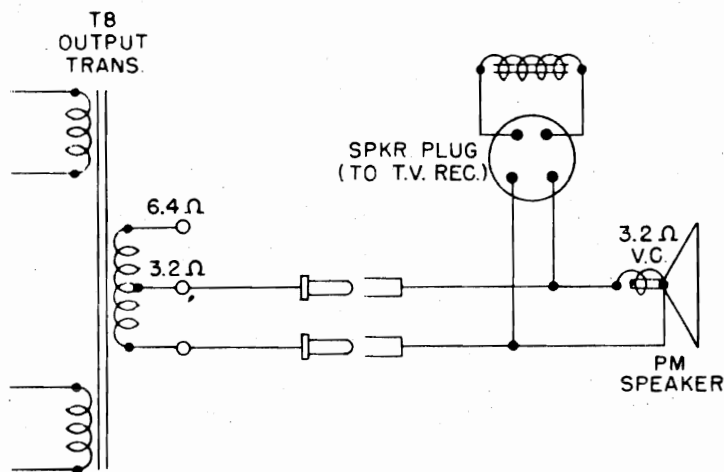
SERVICE NOTE

The following service note applies only to television-radio combinations, where both chassis use the same speaker:

be induced into the speaker from the power line because of coupling between the radio and TV chassis. This AC hum will be noticed even with both the radio and the TV power switches turned off.

One side of the output transformer secondary winding is grounded in some HS-230A chassis. If the leads to the speaker are not correctly polarized, a 60 cycle hum may

be induced into the speaker from the power line because of coupling between the radio and TV chassis. This AC hum will be noticed even with both the radio and the TV power switches turned off.



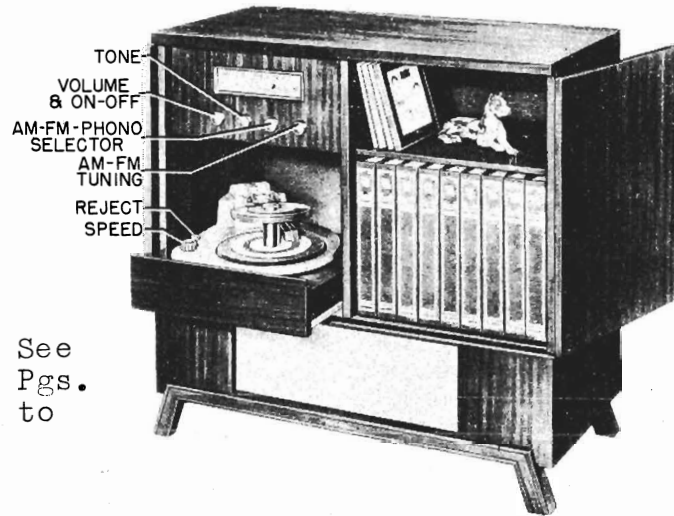
REVISED SPEAKER CIRCUIT IN CHASSIS HS-230A

GENERAL INFORMATION

TYPE - AM-FM Radio-Phonograph Combination

CHASSIS - HS-230A. Refer to HS-230 & HS-230A Service Manual for service information.

PHONOGRAPH - Model RC-37, three-speed; 33, 45 & 78 RPM. Refer to RC-37 Service Manual for record changer service information.



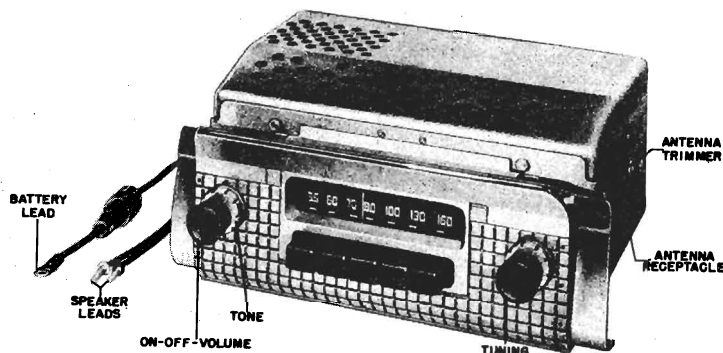
RECORD CHANGER: See Model RC-37, on Pgs. RCD.CH.21-17,18 to RCD.CH.21-29.

REPLACEMENT PARTS LIST

NOTE: When ordering parts, specify model number of set in addition to part number and description of part. For chassis & record changer replacement parts, refer to their respective service manuals.

| <u>Part Number</u> | <u>Description</u> | <u>Part Number</u> | <u>Description</u> |
|----------------------|------------------------------------------------------------------------------------------------|--------------------|----------------------------------------------------------------------------------|
| CABINET PARTS | | | |
| 16F610008 | Cabinet, console: red-brn mahogany; complete, less escutcheon, loop antennas, and speaker..... | 62K70581 | Logotype: "Motorola"; gold finish. |
| 55B72307 | Catch, bullet: statuary bronze finish (door latch on cabinet)... | 24C690896 | Loop Antenna, AM..... |
| 13K700763 | Cloth, grille: 22-5/8 x 7-5/8; mahogany & gold..... | 24C482890 | Loop Antenna, FM; with lead..... |
| 15D610006 | Cover, cabinet back..... | 55C790564 | Plate, door: brass plated..... |
| 13B72750 | Escutcheon, dial..... | 28K22183 | Plug, phono pick-up..... |
| 5A71081 | Eyelet, chassis mtg: plain; 9/32" long..... | 28A27573 | Plug, phono motor: 3-pin..... |
| 5A600963 | Eyelet, chassis mtg: pierced; 1/8" long..... | 9A600040 | Receptacle, phono motor: 3-prong.. |
| 5A71092 | Grommet, chassis mtg..... | 3K791011 | Screw, machine: 8-32 x 1-1/4; oven head cross slot (door pull mtg) |
| 55K790566 | Handle, door: brass plated..... | 3S7526 | Screw, sheet metal: #8 x 1-1/8; plain hex head (chassis mtg).. |
| 55K791499RH | Hinge, stop: statuary bronze finish (upper right & lower left)..... | 15A690616 | Shell, receptacle: with insulator (phono motor receptacle)..... |
| 55K791499LH | Hinge, stop: statuary bronze finish (upper left & lower right)..... | 15K74442 | Shell, receptacle: with insulator (phono motor plug)..... |
| 36C701150 | Knob, control..... | 50C610000 | Speaker, PM: 6" x 9" oval..... |
| 1X601844 | Lead Assembly, phono motor: complete | 55K72308 | Strike, bullet: statuary bronze finish; with 1/2" nail (door latch on door)..... |
| 1X601843 | Lead & Plug Assembly: phono pick-up (includes shielded lead and plugs) | 55K601672 | Track & Channel, record changer drawer..... |
| | | 4S490513 | Washer, flat: 3/4 x 7/32 x .042 cad pl (chassis mtg)..... |

MODEL KR1,
Ch. 1A



TYPICAL RECEIVER USING CHASSIS 1A.
MODEL KR1 ILLUSTRATED

GENERAL INFORMATION

TYPE - Automotive type universal radio chassis. In addition to Model KR1, this chassis will be used on subsequent models. Separate service manuals covering these models will be issued as required.

TUNING RANGE - 540 to 1600 Kc

IF - 455 Kc

TUBE COMPLEMENT -

- 6BA6 - RF Amplifier
- 6BE6 - Converter
- 6BA6 - IF Amplifier

- 6AT6 - Diode, detector, AVC & 1st AF Amp
- 6AQ5 - Power Amplifier
- 6X4 - Rectifier

POWER INPUT - 6.8 amps at 6.3V DC

POWER OUTPUT - 3.5 watts (max)

TUNER - Model AT-86 or AT-90. See AT-86 or AT-90 Service Manual for Replacement Parts.

OPERATING INSTRUCTIONS

TO TURN RADIO "ON"

The On-Off switch is combined with the volume control. Turn the knob clockwise until a "click" indicates the receiver is "on". Wait a few seconds for the tubes to heat up, before tuning-in a station.

STATION SELECTOR

Turn the volume "up" until stations can be heard; then turn the station selector knob until the desired station is received. After station is tuned in properly, adjust the volume control to the desired level.

SET AUTOMATIC TUNING

The receiver has 5 buttons for automatic station selection. To set the push buttons on automatic tuning, proceed as follows:

1. Turn volume up until stations can be heard.

2. Pull out button to unlock tuner and with the station selector, tune to the station desired.

3. Push button in to lock tuner. This station is now set for automatic tuning.

4. Follow the same procedure for the remaining four buttons.

NOTE: The numbers on the dial scale indicate the frequency range of the receiver. Tune carefully until you are exactly on the station; tuning to either side of it will result in poor tone quality and excessive noise. When setting automatic tuning, it is preferred that the left-hand buttons tune in the lower KC stations and the right-hand buttons tune in the higher KC stations.

TO TURN THE RADIO "OFF"

Turn the volume knob counterclockwise until a "click" indicates that the receiver is "off".

ALIGNMENT

EQUIPMENT REQUIRED:

1. A special tool for adjusting the tuner cores. Use alignment tool, Motorola Part No. 66A76278.
2. A small screwdriver for IF & RF alignment.
3. An accurately calibrated AM modulated signal generator.
4. A low range output meter.
5. A special dummy antenna for RF alignment. Construct dummy antenna as shown in Figure 2.

4. Connect 6.3 volts to the receiver "A" lead terminal and chassis.
5. Turn the receiver "on" and allow it to warm up for a few minutes. Set receiver volume control at maximum and tone control to "high" position.
6. For greatest accuracy, keep the output of the receiver at 1 watt (1 watt = 1.79 volts on output meter) by reducing signal generator output (not receiver volume control) as stages are brought into alignment.

IMPORTANT: Do not push in on the alignment tool when adjusting the tuner cores. The slightest inward pressure on the alignment tool may move the tuner carriage and result in inaccurate alignment.

PROCEDURE:

1. To expose the alignment adjustments, remove the top and bottom covers. If the tuner cores require adjustment, remove the escutcheon and dial scale bracket assembly.
2. Connect a PM speaker (3.2 ohm VC) to "VC" and "GND" terminals of the receiver.
3. Connect an output meter across the speaker voice coil.
7. **Antenna Trimmer Adjustment.** Once alignment has been satisfactorily performed, no further adjustment of any alignment trimmer (7) to car antenna after receiver is installed in car. This adjustment should be made with antenna fully extended and receiver set to approximately 1400 Kc. Peak the trimmer for maximum volume of a weak station or background noise between stations.

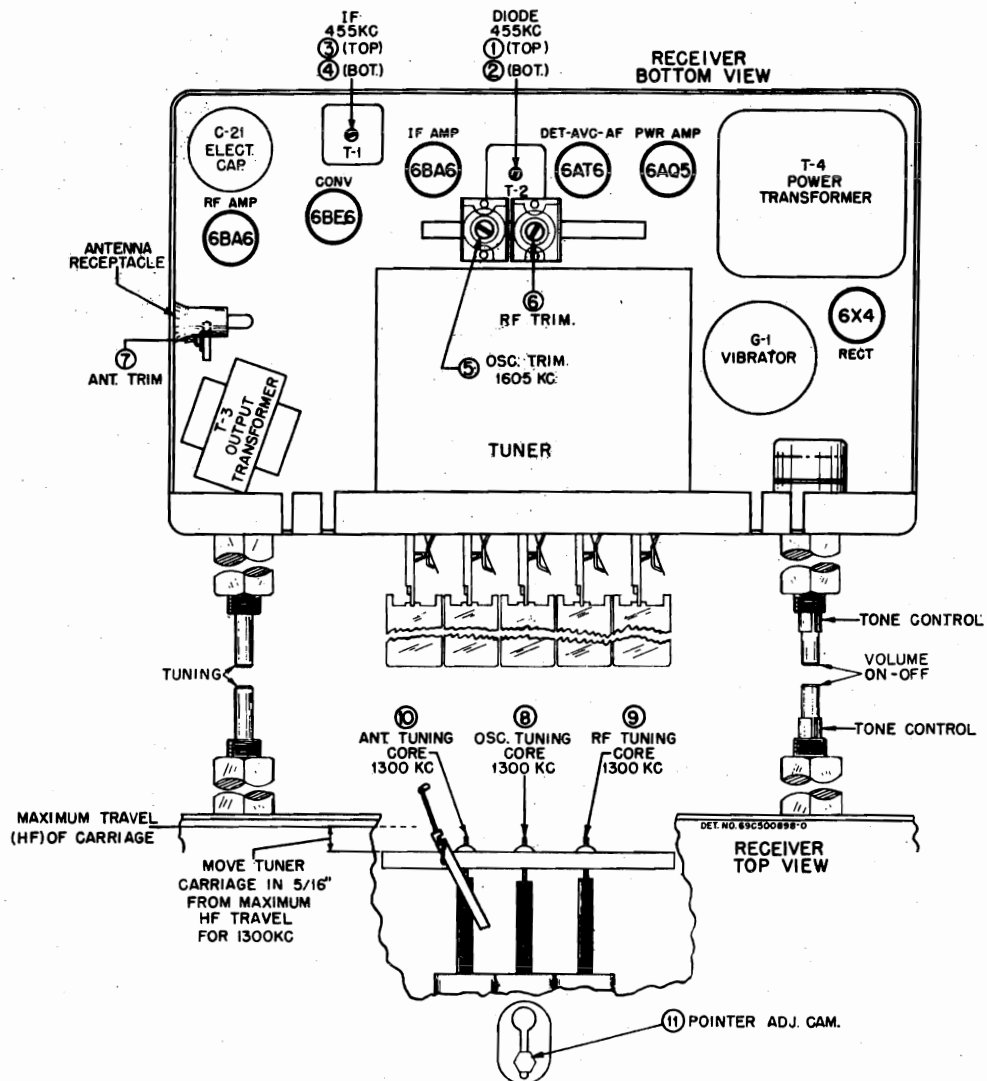


FIGURE 1. TUBE AND TRIMMER LOCATIONS

MODEL KR1,
Ch. 1A

ALIGNMENT CHART

| STEP | DUMMY ANTENNA | GENERATOR CONNECTION | GENERATOR FREQUENCY | TUNER SET TO | ADJUST | REMARKS |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-------------------------------------------------|---------------------|---------------------------------------------------------------------|-------------|--------------------------------------------------------------------------------|
| IF ALIGNMENT | | | | | | |
| 1. | .1 mf | Hi side -6BE6 grid (pin #7) Low side-chassis | 455 kc | Extreme high frequency end of travel | 1, 2, 3 & 4 | Peak for maximum in order indicated. Check by repeating procedure. |
| RF ALIGNMENT | | | | | | |
| NOTE: If the tuner is tracking properly over its entire range, the tuner cores 8, 9, & 10 will not require adjustment - proceed as follows: | | | | | | |
| 2. | Dummy-see Fig. 1 | Ant. receptacle thru dummy antenna | 1605 kc | Extreme high frequency end of travel | 5 | Peak for maximum. |
| 3. | " | " | 1300 kc | With tuning knob, tune to maximum signal | 6 & 7 | Peak for maximum in order indicated. |
| 4. | - | - | - | - | - | Repeat steps 2 & 3. |
| NOTE: If the tuner coils or cores have been replaced or tampered with, or the tuner does not cover the required range, the tuner cores 8, 9, & 10 require adjustment - proceed as follows: | | | | | | |
| 5. | Dummy-see Fig. 1 | Ant receptacle thru dummy antenna | 1605 kc | Extreme high frequency end of travel | 5, 6, & 7 | Remove escutcheon and dial scale bracket. Peak for maximum in order indicated. |
| 6. | " | " | 1300 kc | With tuning knob, move carriage "in" 5/16" from position in step 5. | 8, 9, & 10 | Peak for maximum in order indicated. |
| 7. | " | " | 1605 kc | With tuning knob, tune for maximum signal at high frequency end. | 5, 6, & 7 | Peak for maximum in order indicated. |
| 8. | " | " | 1300 kc | With tuning knob, tune to maximum signal | 8, 9, & 10 | Peak for maximum in order indicated. |
| 9. | - | - | - | - | - | Repeat step 7. |

POINTER ADJUSTMENT

- Tune receiver to 1300 kc and adjust pointer by means of eccentric cam (11) on the tie plate to the 1300 kc calibration mark on dial scale.
- With set installed in car, peak ant trim (7) for maximum signal at approximately 1400 kc. Car antenna should be fully extended.

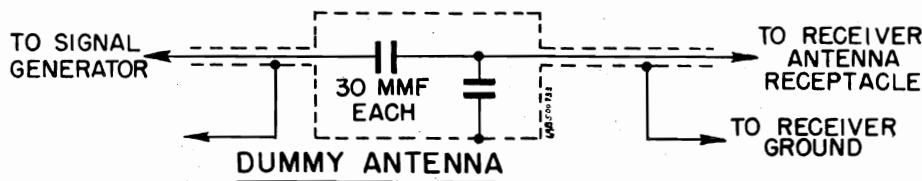


FIGURE 2. DUMMY ANTENNA DETAIL

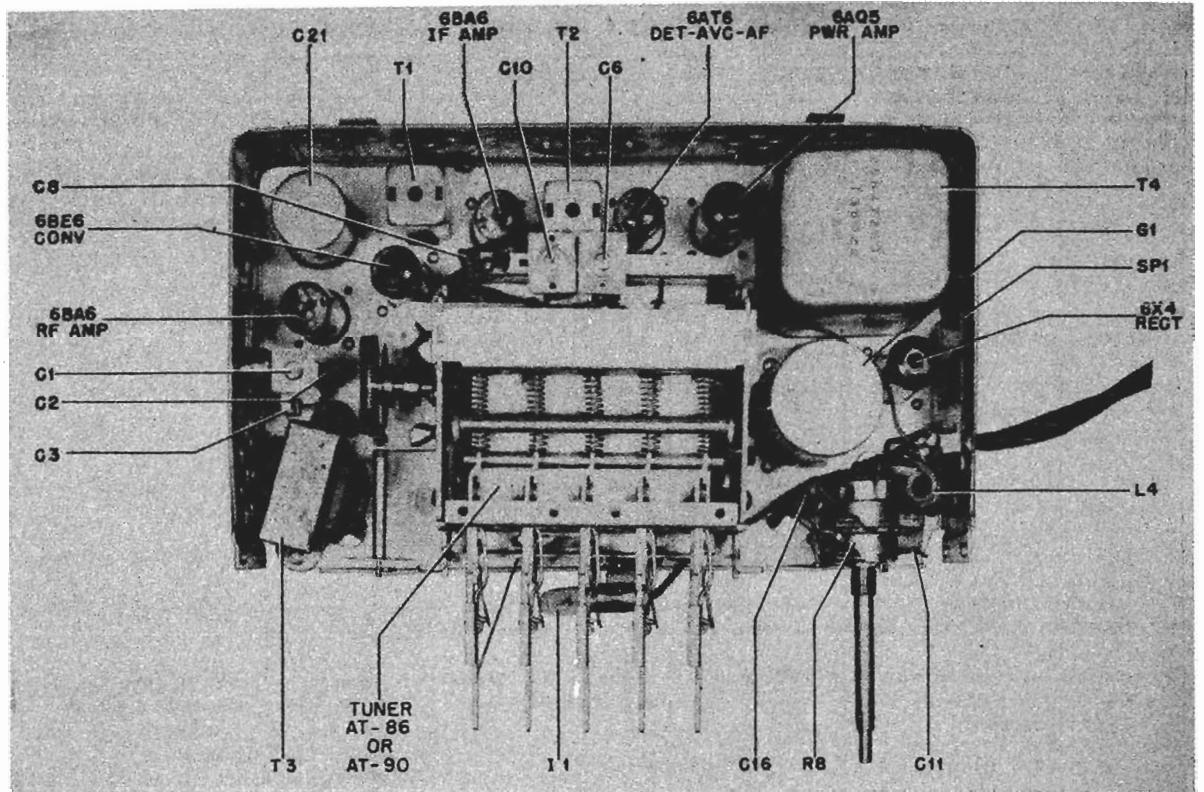


FIGURE 3. TOP VIEW OF CHASSIS

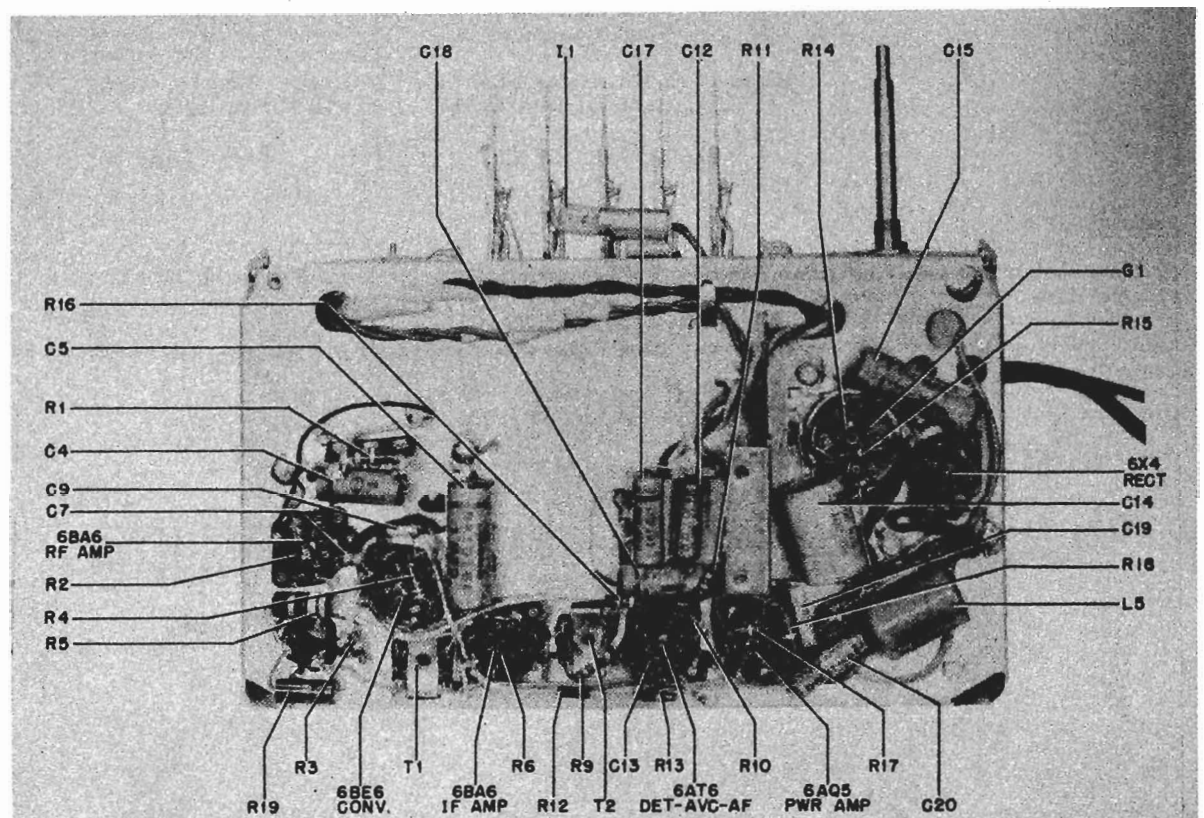


FIGURE 4. BOTTOM VIEW OF CHASSIS

MODEL KR1,
Ch. 1A

REPLACEMENT PARTS LIST

NOTE: When ordering parts, specify model number of set in addition to part number and description of part.

| Ref No. | Part Number | Description | Part No. | Description |
|-----------------------------------------------------------------------------------|-------------|-----------------------------------------------------------------------------------|---------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| CHASSIS 1A ELECTRICAL PARTS | | | T-2 | 24B485555 Diode Transformer, 455 kc: complete with padding capacitor and tuning cores |
| Capacitors | | | T-3 | 24B500727 Output Transformer |
| C-1 | 21A591682 | Mica, metal: 90 mmf 500V... | T-4 | 25B472533 Power Transformer |
| C-2 | 8A4529 | Paper: .006 mf 100V | Tuner - Model AT-86 | |
| C-3 | 20A501419 | Mica, variable: 50 to 280 mmf; includes bracket | 51D501442 | Tuner, Model AT-86: complete with pinion shaft (See AT-86 Tuner Service Manual for breakdown) |
| C-4 | 8R13514 | Paper: .05 mf 100V | OR | |
| C-5 | 8R13166 | Paper: .1 mf 400V | Tuner - Model AT-90 | |
| C-6 | - | Variable, mica: RF trimmer (See AT-86 or AT-90 Service Manuals) | 51D502000 | Tuner, Model AT-90: complete with pinion shaft (See AT-90 Tuner Service Manual for breakdown) |
| C-7 | 21K70720 | Molded, miniature: 5 mmf 500V | CHASSIS 1A MECHANICAL PARTS | |
| C-8 | - | Ceramic: temperature compensating (See AT-86 or AT-90 Tuner Service Manuals)..... | 7B501472 | Bracket, shield (near vib socket) |
| C-9 | 21R6513 | Mica: 50 mmf 500V | 42A485548 | Clip, coil can mtg |
| C-10 | - | Variable, mica: osc trimmer (See AT-86 or AT-90 Tuner Service Manuals) | 42B500725 | Clip, bottom cover retainer ... |
| C-11 | 8K17028 | Paper: .5 mf 100V | 42A4215 | Clip, vibrator grounding |
| C-12 | 8R472754 | Paper: .01 mf 100V | 1X500714 | Cover Assembly, bottom: includes clips and grounding wiper |
| C-13 | 21K70720 | Molded; miniature: 5 mmf 500V | 5C500663 | Cover, top |
| C-14 | 8K17028 | Paper: .5 mf 100V | 1X501612 | Lead Assembly, speaker cable ... |
| C-15 | 8R490449 | Paper: .02 mf 1000V | 9A472148 | Receptacle, antenna |
| C-16 | 8R51209 | Paper: .02 mf 100V | 5S7771 | Rivet: .088 x 3/16; stl; nkl pl (tube socket mtg)..... |
| C-17 | 8K71910 | Paper: .006 mf 400V | 5S7706 | Rivet: .122 x 1/8; stl; nkl pl (cover retainer clip and terminal strip mtg) |
| C-18 | 8R23690 | Paper: .01 mf 400V | 5S7701 | Rivet: .122 x 3/16 stl; nkl pl (vibrator clip & spark plate mtg) |
| C-19 | 21R6590 | Mica: 500 mmf 500V | 5S7707 | Rivet: .122 x 5/32; stl; nkl pl (output transformer & capacitor mtg) |
| C-20 | 8K71909 | Paper: .004 mf 400V | 3S7454 | Screw, sheet metal: #8 x 1/4 PKZ plain hex head; stl; cad pl (pwr trans, housing, & shield bracket mtg) |
| C-21 | 23A485677 | Electrolytic: 15-10 mf/350V; 20 mf/25V | 9A500709 | Socket, pilot light: includes brkt. |
| Fuse | | | 9A70208 | Socket, tube: 4-prong (for vibrator) |
| F-1 | 65K16248 | 9 amp | 9A472534 | Socket, tube: 7-prong |
| Vibrator | | | 9K580218 | Socket, tube: 7-prong; with one dummy lug |
| G-1 | 48B3333 | Vibrator, non-sync? 4-pin .. | 31K490142 | Strip, terminal: 2 insulated lugs, #1 mtg |
| Pilot Light | | | 31K490143 | Strip, terminal: 2 insulated lugs, #2 mtg |
| I-1 | 65X10867 | Bulb: 6.3V .25A | 31A500705 | Strip, terminal: 3 insulated lugs, #2 mtg |
| Coils | | | 29A76280 | Terminal, speaker cable: black. |
| L-1 | - | Antenna coil (See AT-86 or AT-90 Tuner Service Manuals) | 29K76282 | Terminal, speaker cable: white.. |
| L-2 | - | RF coil (See Tuner AT-86 or AT-90 Tuner Service Manuals) | 39K470032 | Wiper, grounding (bottom cover). |
| L-3 | - | Oscillator coil (See AT-86 or AT-90 Tuner Service Manuals) | RECEIVER KR1 - MOUNTING PARTS, ACCESSORIES | |
| L-4 | 24K592269 | Choke, hash | 7B501170 | Bracket, dial background |
| L-5 | 24A472535 | Choke, hash | 7C501187 | Bracket, dial mtg |
| Resistors | | | 7D501138 | Bracket, radio mtg |
| Note: All resistors are carbon insulated type, unless otherwise specified. | | | 43A501167 | Bushing, tuning and volume control mtg |
| R-1 | 6R6032 | 470,000 20% 1/2W | 1X501247 | Button, push |
| R-2 | 6R3992 | 150 20% 1/2W | 8A4491 | Capacitor, noise suppression |
| R-3 | 6R6075 | 100,000 20% 1/2W | 42A591931 | Clip, dial glass retaining |
| R-4 | 6R6012 | 33,000 20% 1/2W | 32B501170 | Gasket, speaker |
| R-5 | 6R476012 | 3900 10% 2W | 36K592304 | Knob, dummy: notched disc; chrome pl |
| R-6 | 6R6010 | 330 20% 1/2W | 36B473538 | Knob, tone control: notched disc; chrome pl |
| R-7 | 6R6394 | 12,000 10% 1/2W | 36K501199 | Knob, tuning and volume control: includes setscrew |
| R-8A,B | 18B501206 | Volume-On-Off-Tone Control (R-8A 250,000 ohms; R-8B 1 meg) | 4S7658 | Lockwasher: #10 int; stl; cad pl (speaker mtg) |
| R-9 | 6R6056 | 47,000 20% 1/2W | 4S7668 | Lockwasher: 3/8 ext; stl; cad pl (tuning and volume control mtg) |
| R-10 | 6R2122 | 4.7 meg 20% 1/2W | 4S7653 | Lockwasher: 5/16 int-ext; stl; cad pl (receiver mtg) |
| R-11 | 6R5577 | 2700 10% 1/2W | | |
| R-12 | 6R6004 | 1 meg 20% 1/2W | | |
| R-13 | 6R6004 | 1 meg 20% 1/2W | | |
| R-14 | 6R5614 | 56 10% 1/2W | | |
| R-15 | 6R5614 | 56 10% 1/2W | | |
| R-16 | 6R6032 | 470,000 20% 1/2W | | |
| R-17 | 6R6015 | 220,000 20% 1/2W | | |
| R-18 | 6R6336 | 270 10% 1W | | |
| R-19 | 6R476130 | 2200 20% 2W | | |
| Spark Plate | | | | |
| SP-1 | 1A501207 | Spark Plate Assembly | | |
| Transformers | | | | |
| T-1 | 24B485553 | IF Transformer, 455 kc: complete with padding capacitor and tuning cores | | |

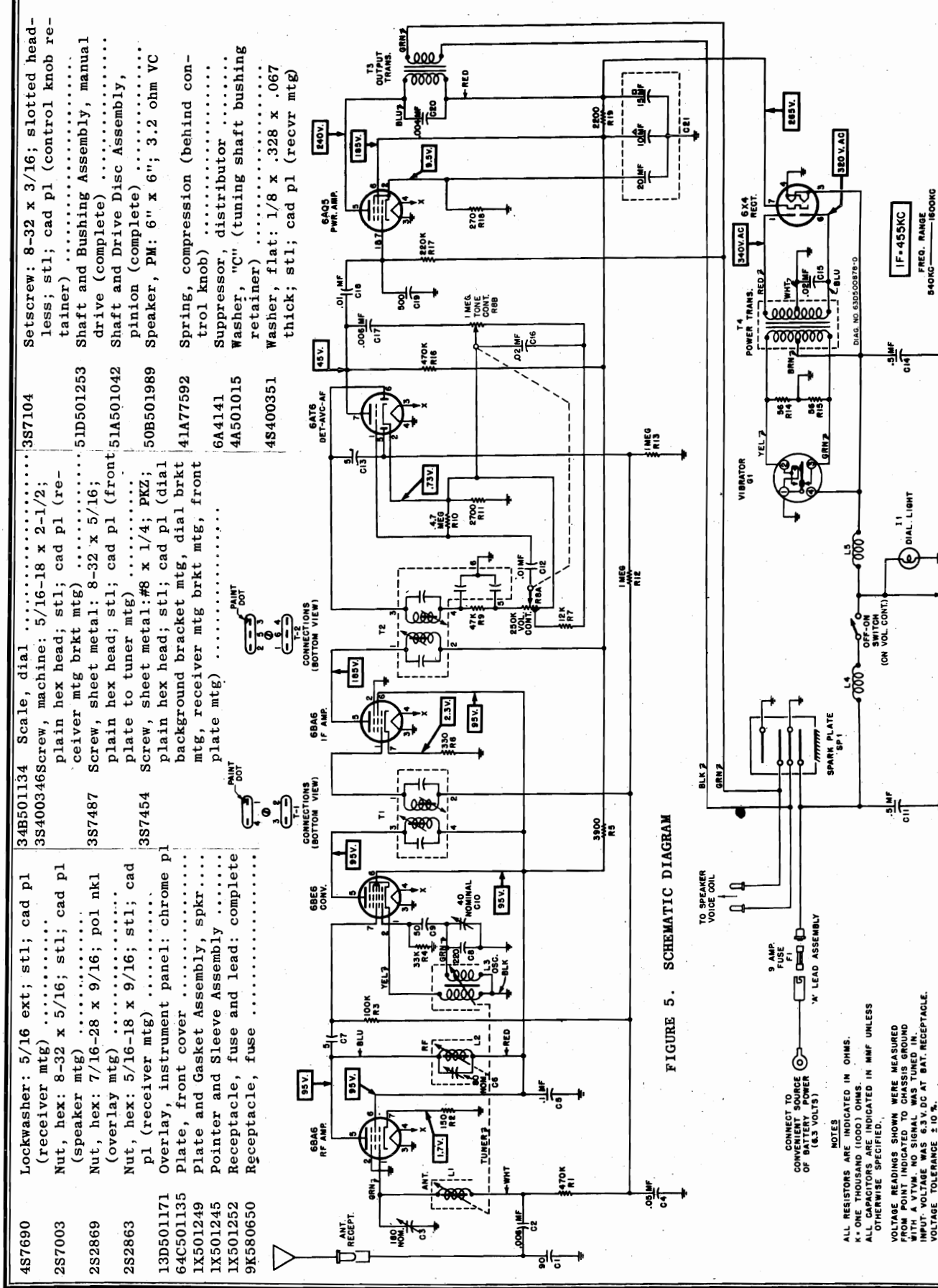


FIGURE 5. SCHEMATIC DIAGRAM

- 4S7690 Lockwasher: 5/16 ext; stl; cad pl (receiver mtg)
- 2S7003 Nut, hex: 8-32 x 5/16; stl; cad pl (speaker mtg)
- 2S2869 Nut, hex: 7/16-28 x 9/16; pol nk1 (overlay mtg)
- 2S2863 Nut, hex: 5/16-18 x 9/16; stl; cad pl (receiver mtg)
- 13D501171 Overlay, instrument panel: chrome pl
- 6A4501135 Plate, front cover
- 1X501249 Plate and Gasket Assembly, spkr
- 1X501245 Pointer and Sleeve Assembly
- 1X501252 Receptacle, fuse and lead: complete
- 9K580650 Receptacle, fuse
- 34B501134 Scale, dial
- 3S400346Screw, machine: 5/16-18 x 2-1/2; plain hex head; stl; cad pl (receiver mtg brkt mtg)
- 3S7487 Screw, sheet metal: 8-32 x 5/16; plain hex head; stl; cad pl (front plate to tuner mtg)
- 3S7454 Screw, sheet metal: #8 x 1/4; PKZ; plain hex head; stl; cad pl (dial background bracket mtg, dial brkt mtg, receiver mtg brkt mtg, front plate mtg)
- 3S7104 Setscrew: 8-32 x 3/16; slotted headless; stl; cad pl (control knob retainer)
- 51D501253 Shaft and Bushing Assembly, manual shaft (complete)
- 51A501042 Shaft and Drive Disc Assembly, pinion (complete)
- 50B501989 Speaker, PM: 6" x 6"; 3.2 ohm VC
- 41A77592 Spring, compression (behind control knob)
- 6A4141 Suppressor, distributor
- 4A501015 Washer, "C" (tuning shaft bushing retainer)
- 4S400351 Washer, flat: 1/8 x .328 x .067 thick; stl; cad pl (recvr mtg)

CONNECT TO SPEAKER VOICE COIL

9 AMP FUSE

CONVENIENT SOURCE OF BATTERY POWER (8.5 VOLTS)

* LEAD ASSEMBLY

NOTES

ALL RESISTORS ARE INDICATED IN OHMS.

K = ONE THOUSAND (1000) OHMS.

ALL CAPACITORS ARE INDICATED IN MMF UNLESS OTHERWISE SPECIFIED.

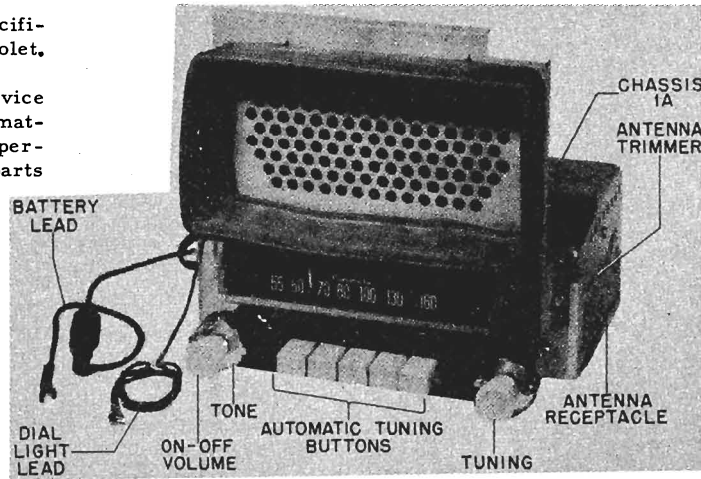
VOLTAGE READINGS SHOWN WERE MEASURED FROM POINT INDICATED TO CHASSIS GROUND WITH A VTVM. NO SIGNAL WAS TUNED IN. INPUT VOLTAGE WAS 6.3V DC AT BAT. RECEPTACLE. VOLTAGE TOLERANCE ± 10 %.

MODEL GTL, Ch. 1A,
Chevrolet

GENERAL INFORMATION

TYPE - Automotive type superheterodyne receiver specifically designed for installation in the 1951 Chevrolet.

CHASSIS USED - Chassis 1A. Refer to Chassis 1A Service Manual, Part No. 54P501584 for schematic, alignment, push button set-up, operating instructions, and replacement parts list.



INSTALLATION INFORMATION

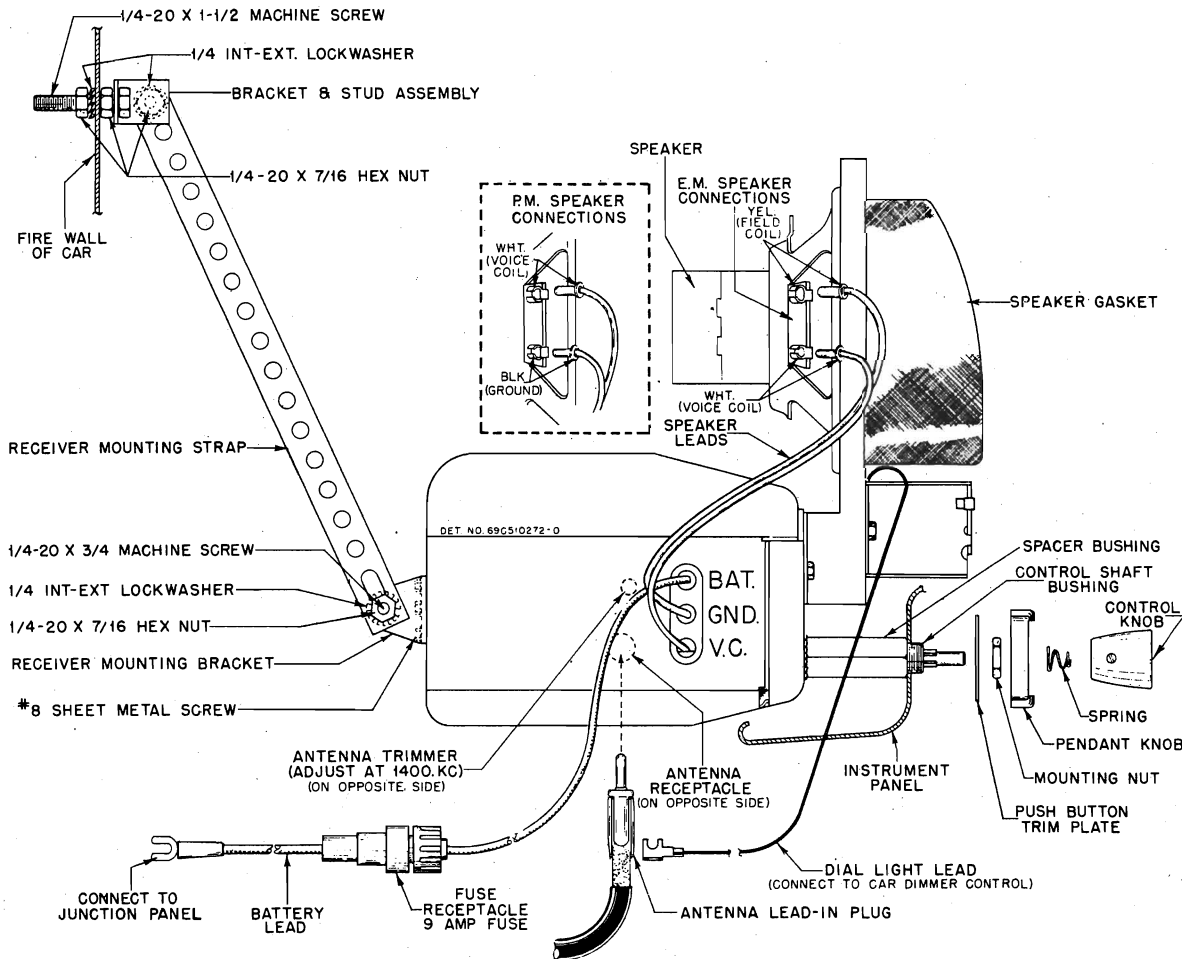


FIGURE 1. RECEIVER INSTALLATION DETAIL

INSTALLATION INFORMATION CONTD.-INTERFERENCE ELIMINATION

INSTALL DISTRIBUTOR SUPPRESSOR

Cut the high tension lead, which runs from the center terminal of the car distributor to the ignition coil, approximately 1-1/2 inches from the distributor. See Figure 2. Screw the distributor suppressor in series with the two pieces of high tension wire, and plug the end terminal of the lead into the center receptacle of the distributor.

INSTALL CAPACITOR ON GENERATOR

Mount the noise suppression capacitor (Motorola Part Number 8A4491) on the generator frame, under the ground lead screw. See Figure 3. Connect the capacitor lead to the armature terminal of the generator. **WARNING: DO NOT CONNECT THE CAPACITOR LEAD TO THE FIELD TERMINAL.**

ADDITIONAL MOTOR NOISE HINTS

1. When checking the car for motor noise, clamp the

hood down tight.

2. Hood Bonds (Motorola Part Number 39A4205) may be installed at the shoulders so that the hood makes a good ground to the cowl of the car.

TIRE STATIC

After completion of radio installation, road test car for tire static on dry concrete and blacktop pavements, under the following conditions:

1. At both low and high car speeds.
2. With antenna extended to operating position.
3. With radio at full volume and tuned off station.

If tire static noise is encountered, inject Tire Static Elimination Powder (available in kit form -Motorola Part No. 51B591494) into tires, following instructions given on the package.

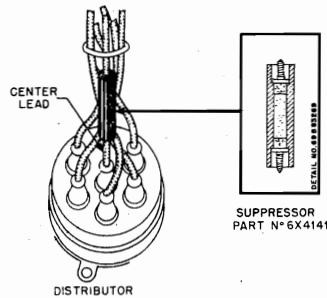


FIGURE 2. DISTRIBUTOR SUPPRESSOR INSTALLATION

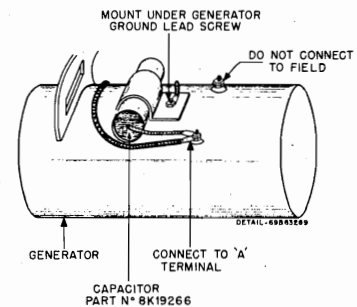


FIGURE 3. GENERATOR CAPACITOR INSTALLATION

REPLACEMENT PARTS LIST

For Chassis replacement parts, refer to Chassis 1A Service Manual.

NOTE: When ordering parts, specify model number of set in addition to part number and description of part.

| Part Number | Description | Part Number | Description |
|-------------|-------------------------------------------------------------------|-------------|-----------------------------------------------------------------------------------|
| 7B510025 | Bracket, dial background..... | 3S2956 | Screw, machine: 1/4-20 x 3/4 plain hex head; stl; cad pl (receiver mtg)..... |
| 7C510040 | Bracket, dial scale mtg..... | 3S9694 | Screw, machine: 1/4-20 x 1 1/2 plain hex head; stl; cad pl (receiver mtg)..... |
| 7A472857 | Bracket, receiver-mtg (on rear of set)..... | 3S488298 | Screw, sheet metal: #8 x 1/4 slotted hex head; stl; cad pl (mtg brkt - rear)..... |
| 7A484424 | Bracket and Stud Assembly, receiver mtg..... | 3S8176 | Screw, sheetmetal: #10 x 3/8; cad pl (speaker mtg)..... |
| 43K510047 | Bushing, tuning shaft and volume control mtg..... | 3S7104 | Setscrew: 8-32 x 3/16; headless: stl; cad pl (knobs)..... |
| 1X510098 | Button, push: complete..... | 51B502001 | Shaft Assembly, manual drive: complete..... |
| 8A4491 | Capacitor, noise suppression..... | 51A502012 | Shaft and Drive Disc Assembly: with pinion on one end (for AT-90)..... |
| 42A500196 | Clip, dial scale mtg..... | 1X510096 | Shield and Crystal Assembly, light. |
| 32C510039 | Gasket, speaker..... | 9A510075 | Socket, pilot light: with bracket. |
| 36K592302 | Knob, dummy: chrome pl (behind tuning knob)..... | 41A77592 | Spring, compression (behind control knobs)..... |
| 36K473550 | Knob, tone: chrome pl..... | 50B510063 | Speaker, PM: 5 x 7; 3.2 ohm VC or |
| 36K510051 | Knob, tuning and volume: includes setscrew..... | 50B510577 | Speaker, EM: 5 x 7; 3.2 ohm VC |
| 9K510086 | Lead Assembly fuse: complete with fuse..... | 1X511064 | Speaker Plate & Gasket Assembly: less speaker..... |
| 4S7668 | Lockwasher, ext: 3/8; stl; cad pl (tuning and volume control mtg) | 42A485718 | Strap, receiver mtg..... |
| 4S7688 | Lockwasher, int-ext: 1/4; stl; cad pl (receiver mtg)..... | 6A4141 | Suppressor, distributor..... |
| 2S2878 | Nut, hex: 1/4-20 x 7/16; stl; cad pl (receiver mtg)..... | 42A510531 | Wiper, spring (on front plate).. |
| 1X510555 | Plate, front: includes wiper (tuner mtg - for AT-90)..... | | |
| 64B510022 | Plate, push button trim..... | | |
| 1X510092 | Pointer..... | | |
| 34B510021 | Scale, dial..... | | |

MODEL NH1C, 1951
Nash Rambler

GENERAL INFORMATION

TYPE - Specifically designed for installation in the 1951 Nash (Rambler Series cars only).

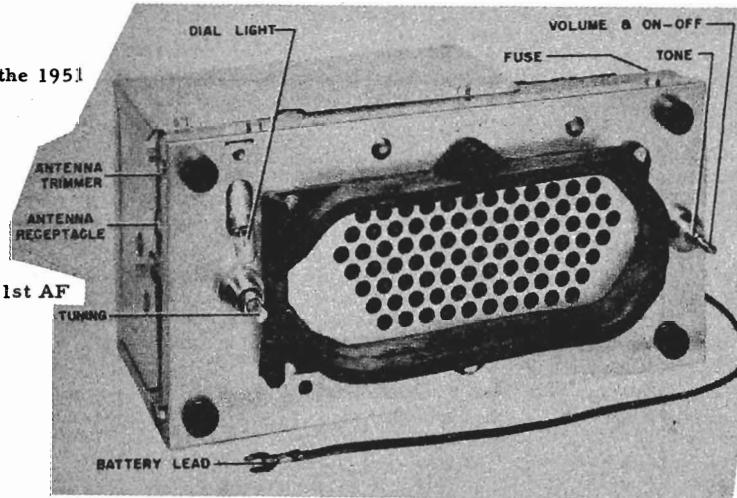
TUNING RANGE - 540 to 1600 Kc

IF FREQUENCY - 455 Kc

TUBE COMPLEMENT - 6BE6 - Converter
6BA6 - IF Amplifier
6AV6 - Detector, AVC & 1st AF Amplifier
6AS5 - Power Amplifier
6X4 - Rectifier

POWER INPUT - 5.0 amps at 6.3V DC

POWER OUTPUT-2 watts (maximum)



OPERATING INSTRUCTION

VOLUME CONTROL & ON-OFF SWITCH. The volume control and on-off switch are combined and are operated with the inner right-hand knob. Turn radio on by turning knob to the right until a "click" is heard. Continued rotation to the right will increase volume. To turn radio off, turn knob fully to left until "click" is heard.

TONE CONTROL. The outer right-hand knob operates the tone control.

TUNING. Tune stations with the left-hand knob. Always tune carefully until you are exactly on the station; tuning to either side of it will result in poor tone quality.

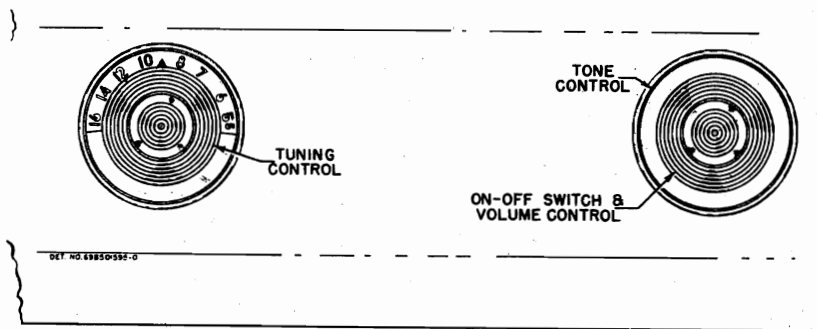


FIGURE 1. OPERATING CONTROLS

SERVICE NOTES

TO REPLACE TUBES. To replace tubes, it will be necessary to remove radio from car. Proceed as follows:

1. Disconnect "A" lead from car terminal located behind instrument panel.
2. Remove antenna plug from antenna receptacle located on left side of radio.
3. Pull off control knobs and pointer.
4. Remove two nuts, two washers and dial scale assembly.
5. Remove radio from behind instrument panel.
6. Remove large cover from radio to expose tubes.

RADIO NOISE SUPPRESSION. A capacitor installed on the car generator, a capacitor on the ignition coil, and a suppressor in the car's ignition system distributor circuit, eliminate motor noise from these sources.

TO REPLACE VIBRATOR OR FUSE. The plug-in type vibrator and radio fuse are accessible from the rear of the instrument panel. Should those require replacement, it is only necessary to pull out old vibrator or fuse and plug in a new one.

MODEL NH1C, 1951
Nash Rambler

ALIGNMENT

EQUIPMENT REQUIRED

1. A small screwdriver for IF and RF alignment.
2. An accurately calibrated 400 cycle, AM modulated signal generator.
3. A low range output meter.
4. A special dummy antenna for RF alignment. Construct dummy antenna as shown in Figure 2.

covers, through holes provided.

2. Connect an output meter across the voice coil.
3. Connect a 6 volt storage battery to chassis and BATT terminal of receiver; turn receiver on and allow it to warm up for a few minutes.

4. For greatest accuracy, keep output of receiver at approximately 1/2 watt (1/2 watt = 1.25 volts on output meter) throughout alignment by reducing generator output (not receiver volume control) as stages are brought into alignment.

PROCEDURE

1. All adjustments are accessible without removing the

ALIGNMENT CHART

| STEP | DUMMY ANTENNA | GENERATOR CONNECTION | GENERATOR FREQUENCY | GANG SET TO | ADJUST | REMARKS |
|--------------------|----------------------|------------------------------------------------|---------------------|----------------|---------------|--------------------------------------------------------------------|
| IF ALIGNMENT 1. | .1 mf | Hi side -6BE6 grid (pin #7) Lo side-chassis | 455 Kc | High freq. end | 1, 2 3 & 4 | Peak for maximum in order indicated. Check by repeating procedure. |
| RF ALIGNMENT 2. | Special-see Figure 2 | Ant receptacle through special dummy | 1605 Kc | Gang open | 5 | Peak for maximum. |
| 3. | " | " | 1400 Kc | Tune in signal | 6 | Peak for maximum. |
| 4. | " | " | 600 Kc | " | 7 | Peak antenna padder for maximum while rocking gang. |

5. Repeat steps 3 & 4 until maximum output is obtained. The last adjustment should be trimmer (6).
6. With set installed in car, peak antenna trimmer (6) for maximum noise or volume of a weak station. Car antenna should be fully extended.

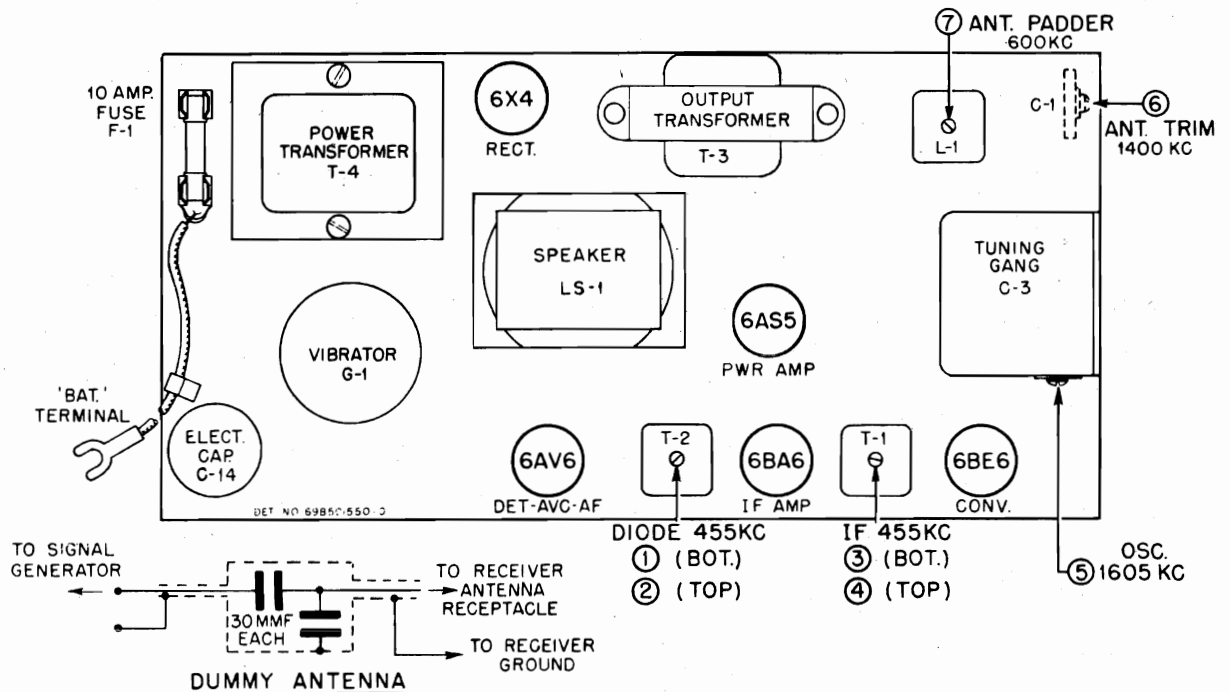


FIGURE 2. TUBE & TRIMMER LOCATION AND DUMMY

MODEL NH1C, 1951
Nash Rambler

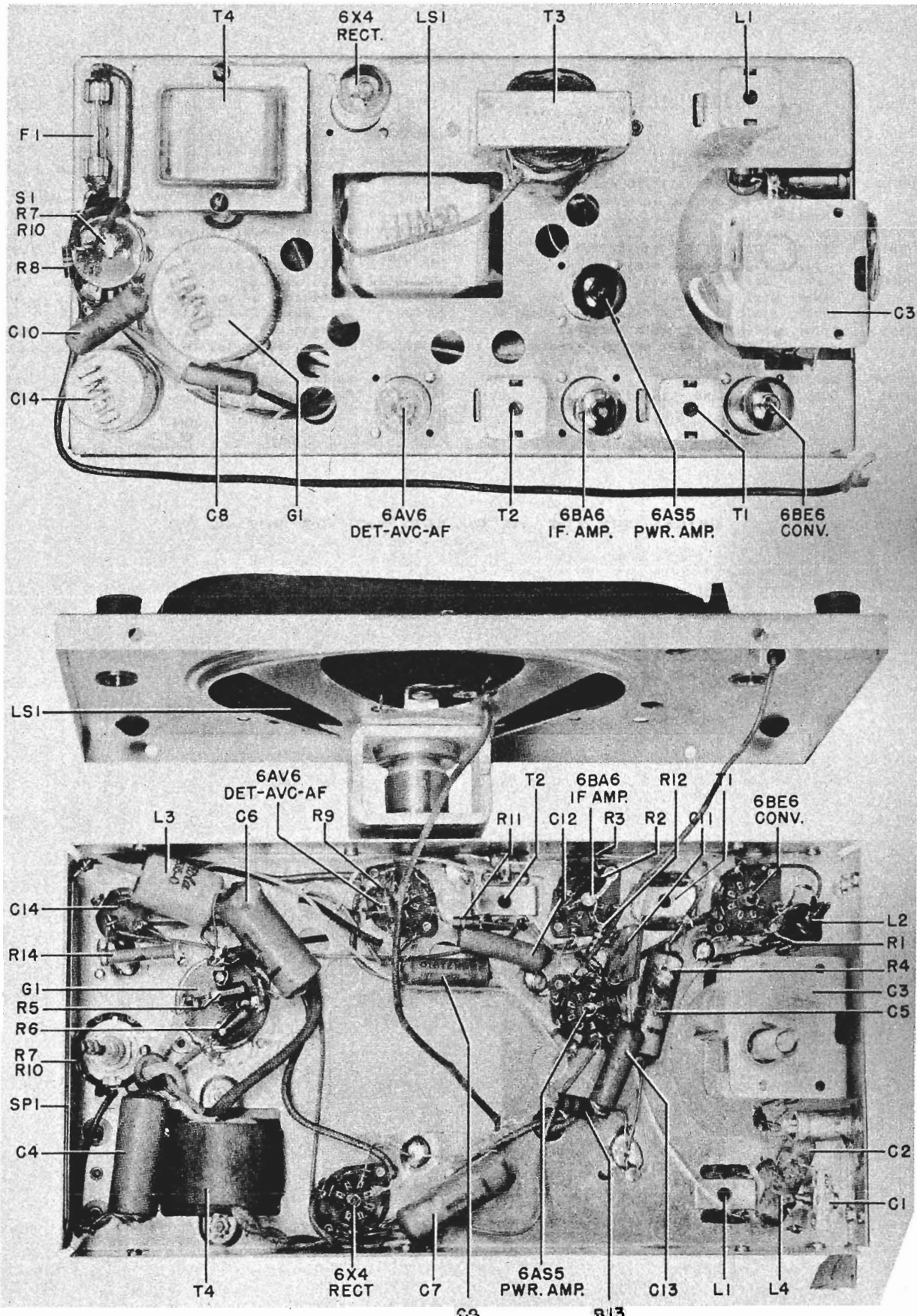


FIGURE 3. PARTS LOCATION

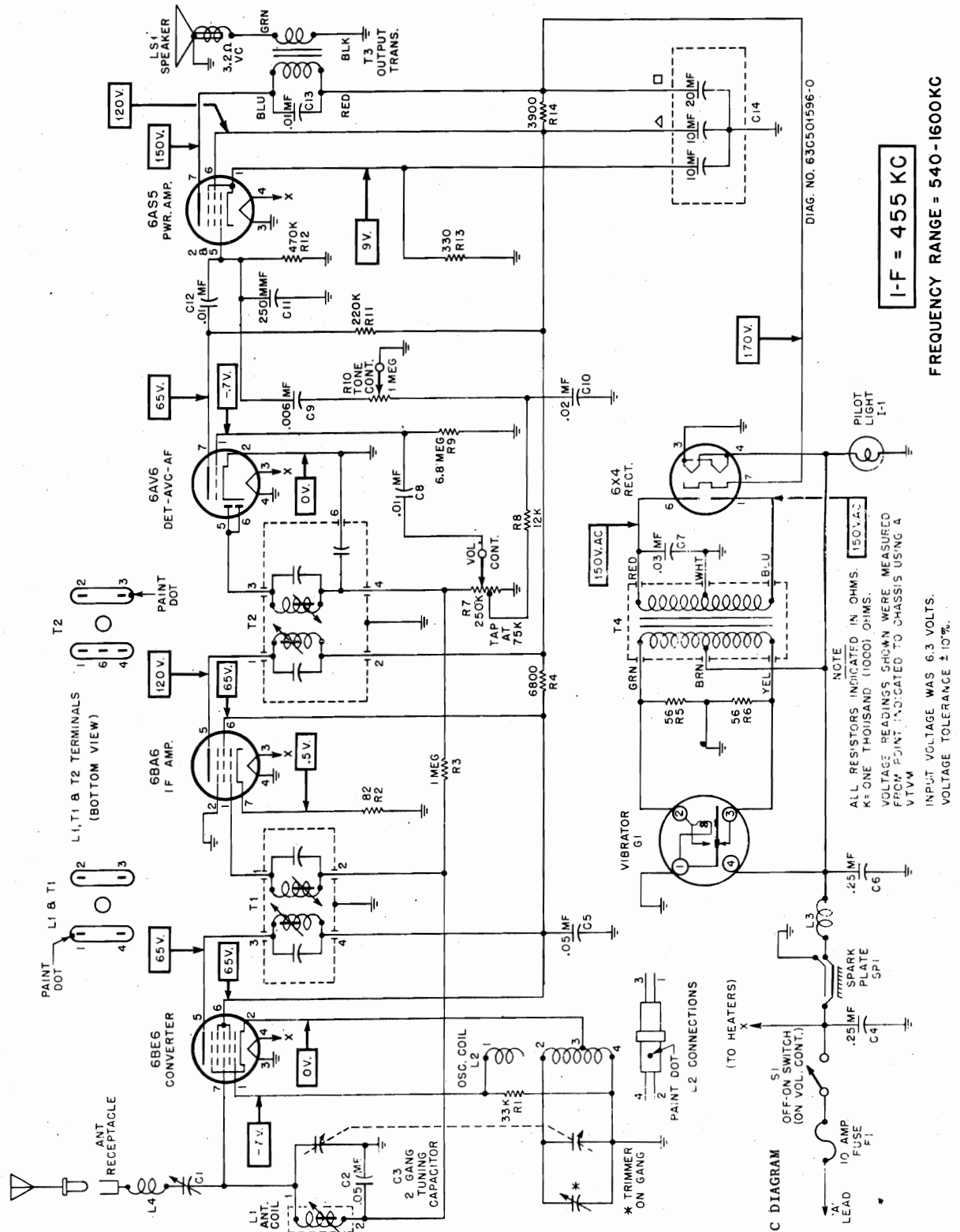


FIGURE 4. SCHEMATIC DIAGRAM

I-F = 455 KC

FREQUENCY RANGE = 540-1600KC

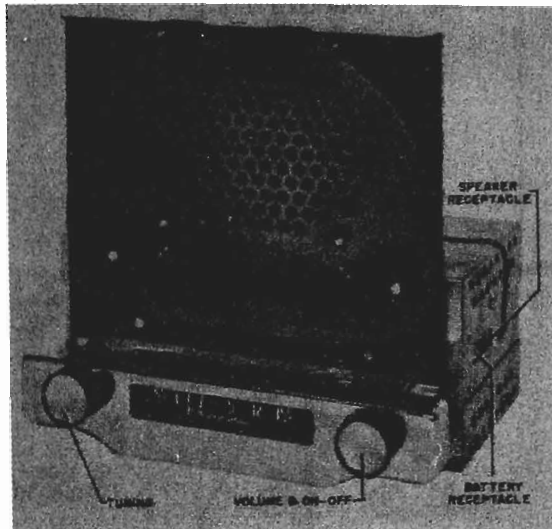
DIAG. NO. 63C501596-0

MODEL NH1C, 1951
Nash Rambler

REPLACEMENT PARTS LIST

| Ref. No. | Part Number | Description | Ref. No. | Part Number | Description |
|----------------------------------------|----------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|-----------------------------------|----------------------------------------------------------------------------------------|--------------------------------------------------|
| CHASSIS PARTS - ELECTRICAL | | | | | |
| Capacitors | | | | | |
| C-1 | 20K481527 | Trimmer, variable mica: 70 mmf; includes mounting brkt | R-10 | | Tone Control: 1 meg (part of volume control R-7) |
| C-2 | 8R13514 | Paper: .05 mf 100V | R-11 | 6R6015 | 220,000 20% 1/2W |
| C-3 | 19B501790 | Variab. 2-gang | R-12 | 6R6032 | 470,000 20% 1/2W |
| C-4 | 8R4283 | Paper: .25 mf 100V | R-13 | 6R6254 | 330 10% 1W |
| C-5 | 8R23146 | Paper: .05 mf 200V | R-14 | 6R488313 | 3900 10% 1W N.I. |
| C-6 | 8R4283 | Paper: .25 mf 100V | Switch | | Switch: part of volume control R-7 |
| C-7 | 8R592154 | Paper: .03 mf 600V | S-1 | | Spark Plate Assembly |
| C-8 | 8R472754 | Paper: .01 mf 100V | SP-1 | 1A591512 | Spark Plate Assembly |
| C-9 | 8K71910 | Paper: .006 mf 400V | Transformers | | |
| C-10 | 8R51209 | Paper: .02 mf 100V | T-1 | 24K591556 | IF, 455 Kc: complete |
| C-11 | 21R6543 | Mica: 250 mmf 500V | T-2 | 24K591555 | Diode, 455 Kc: complete |
| C-12 | 8R23053 | Paper: .01 mf 200V | T-3 | 25B502142 | Output Transformer |
| C-13 | 8R23690 | Paper: .01 mf 400V | T-4 | 25C591533 | Power Transformer |
| C-14 | 23A500059 | Electrolytic: 10 mf-10 mf 250V; 10 mf 25V | CHASSIS PARTS - MECHANICAL | | |
| Fuse | | | 1X591534 | "A" Lead Assembly | |
| F-1 | 65A10266 | Fuse: 10 amp | 42A591508 | Clamp, cable: cad pl (for "A" lead) | |
| Vibrator | | | 42A485548 | Clip, coil can mtg (for T-1, T-2, & antenna coil) | |
| G-1 | 49B3333 | Vibrator: non-sync; 4-pin full wave | 42A4215 | Clip, vibrator grounding | |
| Bulb | | | 48T666 | Lockwasher, ext: #6; cad pl (power transformer mtg) | |
| I-1 | 65X10867 | Bulb: 6-8V; .25 amp; round; bayonet base; clear | 48T655 | Lockwasher, int: 3/8; cad pl (volume control mtg) | |
| Coils | | | 2S1376 | Nut, hex: 3/8-32 x 1/2; stl; cad pl (volume control mtg) | |
| L-1 | 24B591628 | Antenna coil | 2S7005 | Nut, hex: 6-32 x 1/4; cad pl (power transformer mtg) | |
| L-2 | 24A591629 | Oscillator coil | 9A472148 | Receptacle, antenna contact | |
| L-3 | 24A472535 | Choke, hash | 5S7771 | Rivet: .088 x 3/16 stl; pol nkl (tube socket mtg) | |
| L-4 | 24K592197 | Choke, antenna spark | 5S7707 | Rivet: .122 x 5/32; stl; pol nkl (capacitor brkt mtg and spark plate mtg) | |
| Speaker | | | 5S7701 | Rivet: .122 x 3/16; stl; pol nkl (vibrator and output trans mtg) | |
| LS-1 | 50C501823 | Speaker, PM: 4" x 6"; 3.2 ohm VC | 5S7703 | Rivet: .122 x 7/32; stl; pol nkl (fuse strip mtg) | |
| Resistors | | | 3S7350 | Screw, machine: 6-32 x 1/4; slotted hex head; locking type; cad pl (gang mtg) | |
| R-1 | 6R6012 | 33,000 20% 1/2W | 3S7506 | Screw, sheet metal: #6 x 1/4; PKZ; plain hex head; cad pl ("A" lead cable clamp mtg) | |
| R-2 | 6R2035 | 82 10% 1/2W | 9A70208 | Socket, tube: 4-prong (for vibrator) | |
| R-3 | 6R6004 | 1 meg 20% 1/2W | 9A472534 | Socket, tube: miniature; 7-prong | |
| R-4 | 6R6428 | 6800 10% 1/2W | 9K580218 | Socket, tube: miniature; 8-prong (for power amplifier tube 6AS5) | |
| R-5 | 6R5614 | 56 10% 1/2W | 31A591516 | Strip, fuse mtg | |
| R-6 | 6R5614 | 56 10% 1/2W | | | |
| R-7 | 19B501837 | Volume Control: 250,000 ohms tapped at 25,000 ohms; includes on-off and tone control | | | |
| R-8 | 6R6394 | 12,000 10% 1/2W | | | |
| R-9 | 6R3987 | 6.8 meg 20% 1/2W | | | |
| HOUSING PARTS & ACCESSORIES | | | | | |
| 35K591519 | Bumper, grommet type: rubber; large (on front cover) | | 36B502200 | Knob, tuning control | |
| 35K591518 | Bumper, grommet type: rubber; small (on front cover) | | 36K502201 | Knob, volume control | |
| 8A500108 | Capacitor, noise suppression (ignition coil) | | 2A502084 | Nut, hex: 9/16-24 x 11/16 stl; cad pl (receiver mtg to instrument panel) | |
| 8A500109 | Capacitor, noise suppression (generator) | | 52A502203 | Pointer, dial | |
| 15D501838 | Cover, rear | | 5S7701 | Rivet: .122 x 3/16; stl; nkl pl (pilot light socket mtg) | |
| 1X502097 | Cover Assembly, front: includes speaker, bushings and pilot light socket | | 5S490641 | Rivet: .187 x 3/16; stl; nkl pl (sprk mtg) | |
| 32B501848 | Gasket, speaker: rubber | | 34C502204 | Scale, dial: includes frame | |
| 36B502202 | Knob, tone control | | 3S7454 | Screw, sheet metal: #8 x 1/4; PKZ plain hex head; stl; cad pl (front & back cover mtg) | |
| 36B502200 | Knob, tuning control | | 9A502284 | Socket, pilot light | |
| 36K502201 | Knob, volume control | | 6A4141 | Suppressor, noise | |
| 4S400868 | Washer, flat: 3/4 x 19/32 x .042 thick; stl; cad pl (receiver mtg to instrument panel) | | 1B592409 | Antenna Lead-In Assembly | |
| | | | 1B592622 | Antenna Tube Assembly | |
| | | | 15A592617 | Cap, antenna trim | |
| | | | 42K500171 | Clip, speed | |
| | | | 14B592618 | Insulator, antenna mtg tube | |
| | | | 2S2884 | Nut, hex: 5/16-32 x 1/2 x 3/16; brass; cad pl | |
| | | | 4S490837 | Washer, flat: 1-1/16 O.D. x .317 I.D. x .032 thick; stl; cad pl | |
| | | | 4A592619 | Washer, gasket | |
| | | | 4K592453 | Washer, rubber | |

MODEL SR1B,
Ch. 1B



TYPICAL RECEIVER USING CHASSIS 1B.
MODEL SR1B ILLUSTRATED

GENERAL INFORMATION

TYPE - Automotive type universal, manually tuned, radio chassis. In addition to Model SR1B, this chassis will be used on subsequent models. Supplements covering these models will be issued as required. An external speaker is used.

TUNING RANGE - 540 to 1600 Kc **IF** - 455 Kc

TUBE COMPLEMENT - 6BA6 - RF Amplifier
6BE6 - Converter
6BA6 - IF Amplifier
6AV6 - Det-AVC & AF Amp
6AS5 - Power Amplifier
6X4 - Rectifier

POWER INPUT - 5 amps at 6.3V DC

POWER OUTPUT - 2 watts

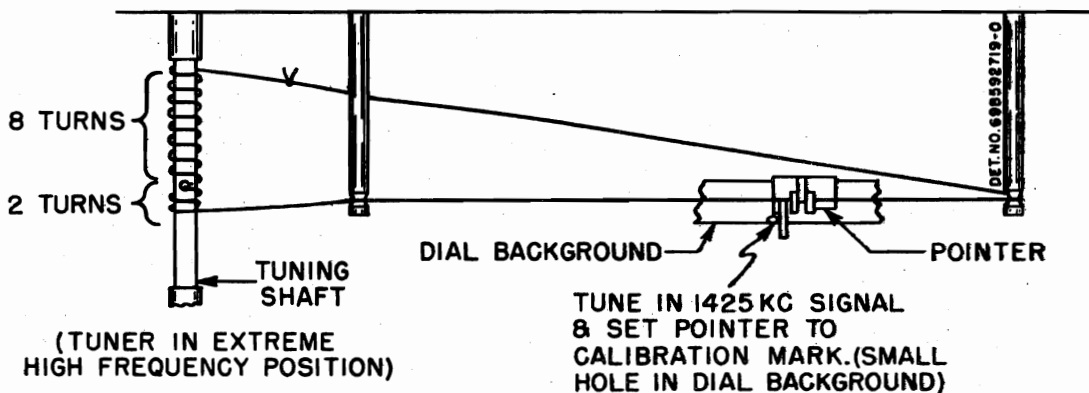


FIGURE 1. STRING DRIVE DETAIL FOR MODEL SR1B

ALIGNMENT

Remove receiver top and bottom housing covers, es-cutcheon and speaker plate to expose all alignment adjustments.

Connect a 6 volt storage battery to BAT terminal and chassis of receiver.

Connect a 3.2 ohm PM speaker to VC terminal and chassis of receiver.

Connect a low range output meter across speaker voice coil and set volume control at maximum. For greatest ac-

curacy, keep output of receiver at approximately 1 watt (1 watt = 1.79 volts on output meter) throughout alignment by reducing signal generator output as stages are brought into alignment. Use a small fibre screwdriver when aligning IF and diode transformers. A special tool, Motorola Part No. 66A76278, is required for adjusting the tuner cores. **IMPORTANT:** Do not push in on the alignment tool when adjusting the tuner cores; the slightest inward pressure may move the tuner carriage and result in inaccurate alignment.

MODEL SR1B,
Ch. 1B

ALIGNMENT CHART

| STEP | DUMMY ANTENNA | GENERATOR CONNECTION | GENERATOR FREQUENCY | TUNER SET TO | ADJUST | REMARKS |
|--------------------|---------------|----------------------------------|---------------------|-------------------------------------------------------------------------------|-------------|---------------------------------------------------------------|
| IF ALIGNMENT 1. | .1 mf | 6BE6 grid (pin #7) & chassis | 455 Kc | High freq end (cores out) | 1, 2, 3 & 4 | Peak for maximum in order indicated. Check by repeating step. |
| RF ALIGNMENT 2. | See Fig. 2 | Antenna receptacle through dummy | 1610 Kc | High freq end; cores should project 1-1/8" from cans (Screw out if necessary) | 5, 6 & 7 | Peak for maximum in order indicated. |
| 3. | " | " | 1425 Kc | 1425 Kc-per Figure 2 | 8, 9, & 10 | Peak for maximum in order indicated. |

4. When receiver is installed in car, extend antenna fully, set dial to approximately 1400 Kc and repeak antenna trimmer (7) for maximum volume of a weak station or noise between stations.

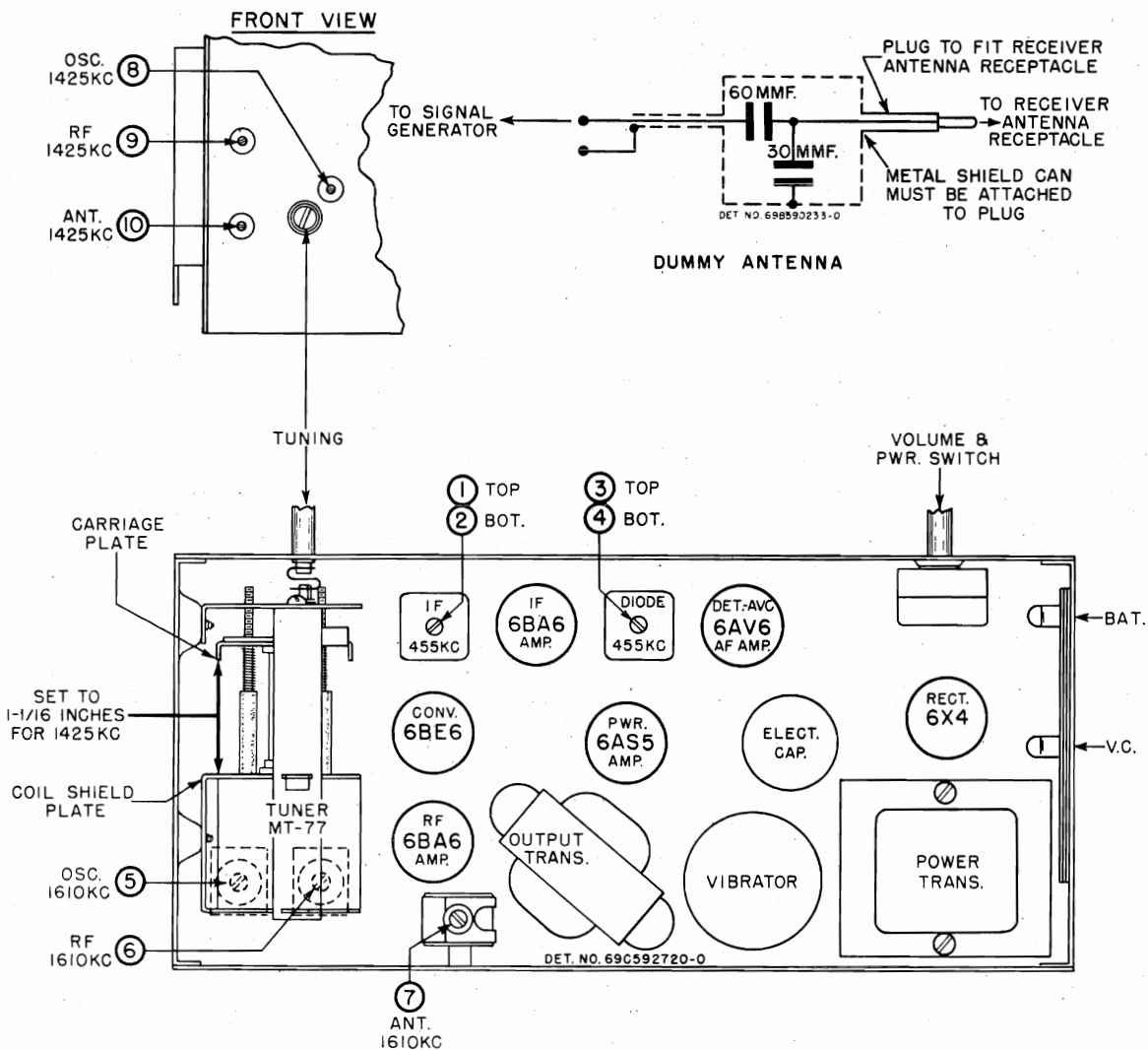


FIGURE 2. TUBE & TRIMMER LOCATIONS AND DUMMY ANTENNA DETAIL

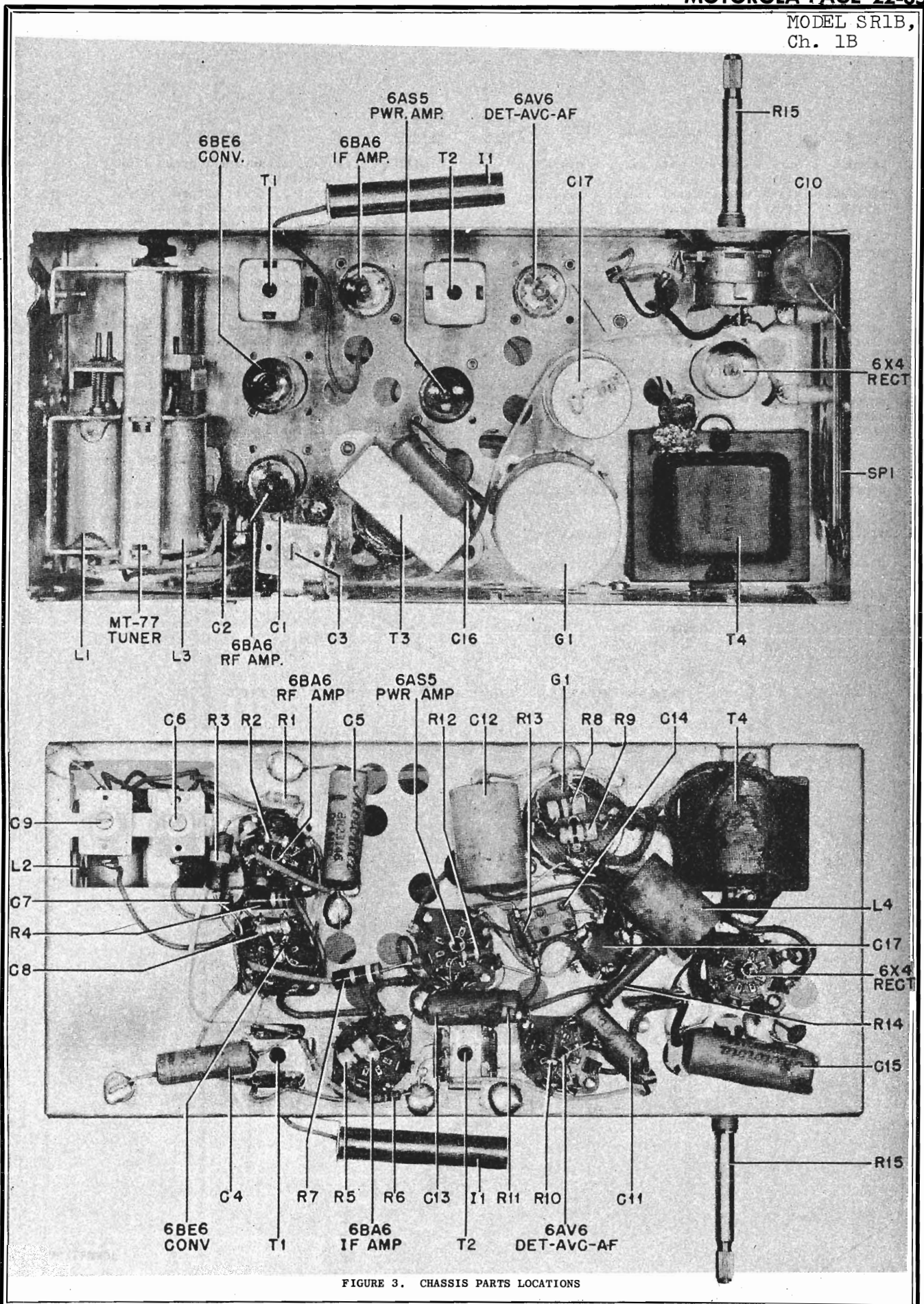


FIGURE 3. CHASSIS PARTS LOCATIONS

MODEL SR1B,
Ch. 1B

REPLACEMENT PARTS LIST

| Ref. No. | Part Number | Description |
|---------------------------------------------------------------------------|-------------|---------------------------------------------------------------------------|
| CHASSIS 1B ELECTRICAL PARTS | | |
| Capacitors | | |
| C-1 | 21B77562 | Ceramic: 100 mfmf 500V |
| C-2 | 8A4529 | Paper: .006 mf 100V |
| C-3 | 20K591969 | Trimmer, variable: 180 mfmf nominal |
| C-4 | 8K13514 | Paper: .05 mf 100V |
| C-5 | 8R23146 | Paper: .05 mf 200V |
| C-6 | 20A481526 | Trimmer, variable: 70 mfmf nominal |
| C-7 | 21K70720 | Molded: 5 mfmf 500V |
| C-8 | 21K592375 | Molded: 47 mfmf 500V |
| C-9 | 20A591977 | Trimmer, variable: 540 mfmf nominal |
| C-10 | 8K17028 | Paper: .5 mf 100V |
| C-11 | 8K472754 | Paper: .01 mf 100V |
| C-12 | 8K17028 | Paper: .5 mf 100V |
| C-13 | 8R23690 | Paper: .01 mf 400V |
| C-14 | 21R6543 | Mica: 250 mfmf 20% 500V |
| C-15 | 8K592154 | Paper: .03 mf 600V |
| C-16 | 8R23690 | Paper: .01 mf 400V |
| C-17 | 23A500059 | Electrolytic: 10-20/250V; 10/25V |
| Fuse | F-1 | 65K16248. Fuse: 9 amp |
| Pilot Light | | |
| L-1 | 65X10867 | Bulb: 6.3V; .25 amp; tubular bayonet base; clear; #44... |
| Vibrator | | |
| G-1 | 48B3333 | Vibrator: non-sync; 4-pin |
| Coils | | |
| L-1,2 | 24B71881 | RF & Antenna Coil (specify color of paint dots on old coil when ordering) |
| L-3 | 24B592153 | Oscillator Coil (specify color of paint dots on old coil when ordering) |
| L-4 | 24A472535 | Choke, hash |
| Resistors | | |
| Note: All resistors are insulated carbon type unless otherwise specified. | | |
| R-1 | 6R6032 | 470,000 20% 1/2W |
| R-2 | 6R6090 | 470 10% 1/2W |
| R-3 | 6R6075 | 100,000 20% 1/2W |
| R-4 | 6R6056 | 47,000 20% 1/2W |
| R-5 | 6R5554 | 390 10% 1/2W |
| R-6 | 6R6004 | 1 meg 20% 1/2W |
| R-7 | 6R5618 | 3900 10% 1W |

TUNER PARTS - MECHANICAL

Note: Electrical parts of the tuner are included in the Electrical Chassis Parts List.

| | |
|-----------------------------------------------------|------------------------------------------------------------------------------|
| LX592120 | Model WT-77 Manual Tuner: complete. |
| LX592099 | Base, Sleeve, Shields & Channels Assembly |
| LX78034 | Center Guide Rod Assembly |
| 42A70184 | Clip, core adjustment |
| 46R591654 | Core, iron & screw |
| 14A70876 | Insulator, coil sleeve |
| 14B78007 | Insulator, slug: bakelite |
| 2A77596 | Nut, floating: without ear (on manual lead screw) |
| 2A78005 | Nut, floating: with ear (on manual lead screw) |
| 64K592064 | Plate, tuner front |
| 5S7770 | Rivet: .088 x 5/32; stl; pol nkl (slug insulator mtg) |
| 47A78002 | Rod, carriage guide |
| 3S7352 | Screw, machine: 8-32 x 2"; slotted round head; stl; cad pl (front plate mtg) |
| 3A591998 | Screw, manual lead (tuning shaft) |
| 43A70881 | Sleeve, coil: iron |
| 41A77595 | Spring, coil slug |
| 41A77592 | Spring, compression (on manual lead screw) |
| 4A21577 | Washer, "C" spring (manual lead screw mtg) |
| 4A70873 | Washer, coil spacer |
| 4A74571 | Washer, fishpaper |
| 4A70956 | Washer, slug insulator |
| MODEL SR1A MOUNTING PARTS, ACCESSORIES, ETC. | |
| 3A592058 | Bolt, radio mounting |
| 7C592046 | Bracket, escutcheon mtg (mounts escutcheon to speaker plate) |
| 8A4491 | Capacitor, noise suppression (generator capacitor) |
| 42A591931 | Clip, dial scale retaining |
| 11M8877 | Cord, dial: 20 lb; nylon; black. |
| 61A473514 | Crystal, transparent green (for dial light) |
| 13C592066 | Escutcheon, dial: chrome plated. |
| 32C591967 | Gasket, speaker: rubber |
| 36K591949 | Knob, control: tuning & volume |
| 9B473111 | Lead Assembly, fuse |
| 1K592062 | Pointer & Slider Assembly |
| 34B592149 | Scale, dial: glass |
| 3S7462 | Screw, machine: 6-32 x 3/16 slotted hex head; cad pl (escutcheon mtg) |

| | | |
|---------------------------------------|-----------|-------------------------------------------------------------------------------------------|
| R-8 | 6R5614 | 56 10% 1/2W |
| R-9 | 6R5614 | 56 10% 1/2W |
| R-10 | 6R2122 | 4.7 meg 20% 1/2W |
| R-11 | 6R6015 | 220,000 20% 1/2W |
| R-12 | 6R6032 | 470,000 20% 1/2W |
| R-13 | 6R6336 | 270 10% 1W |
| R-14 | 6R6006 | 2200 20% 1W |
| R-15 | 18A591978 | Volume Control: 500,000 ohms; includes SPST switch |
| Spark Plate Assembly: complete | | |
| SP-1 | 1B592173 | Spark Plate Assembly: complete |
| Transformers | | |
| T-1 | 24B485553 | IF, 455 Kc: complete. |
| T-2 | 24B485554 | Diode, 455 Kc: complete |
| T-3 | 25B70171 | Output Transformer |
| T-4 | 25C591533 | Power Transformer |
| CHASSIS 1B MECHANICAL PARTS | | |
| | 42A485548 | Clip, coil can mtg |
| | 42A591959 | Clip, spring (tuner drive) |
| | 42A4215 | Clip, vibrator grounding |
| | 15K592073 | Cover, housing (top & bottom) |
| | 1X473150 | Light Shield & Plug Assembly |
| | 4S7666 | Lockwasher, ext: #6; cad pl (power transformer mtg) |
| | 4S7691 | Lockwasher, int: 3/8"; cad pl (vol control mtg) |
| | 2S7005 | Nut, hex: 6-32 x 1/4; cad pl (pwr trans mtg) |
| | 2S1376 | Nut, hex: 3/8-32 x 1/2; cad pl (vol control mtg) |
| | 64A591992 | Plate, rear cover |
| | 9A472148 | Receptacle, antenna contact |
| | 5S7706 | Rivet: .122 x 1/8; stl; nkl pl (dial light brkt mtg) |
| | 5S7707 | Rivet: .122 x 5/32; stl; nkl pl (terminal strip, output trans, and capacitor bracket mtg) |
| | 5S7771 | Rivet: .088 x 3/16; stl; nkl pl (tube socket mtg) |
| | 5S7701 | Rivet: .122 x 3/16; stl; nkl pl (vibrator socket mtg) |
| | 5S7700 | Rivet: .122 x 1/4; stl; nkl pl (spark plate mtg) |
| | 3S7454 | Screw, sheet metal: #8 x 1/4; PKZ; plain hex head; (tuner mtg, rear cover mtg) |
| | 3S8140 | Screw, sheet metal: #8 x 3/16; PKZ; plain hex head (tuner mtg) |
| | 9A591971 | Socket, pilot light & brkt |
| | 9A70208 | Socket, tube: 4-pin; with grounding lug (vibrator socket) |
| | 9A472534 | Socket, tube: miniature; 7-prong |
| | 9K580218 | Socket, tube: miniature; 8-prong |
| | 31C490140 | Strip, terminal: 1 insulated lug, #1 mtg |

- 3S7454 Screw, sheet metal: #8 x 1/4; PKZ; plain hex head; cad pl (cover, escutcheon bracket & spkr brkt to chassis mtg)
- 3S7468 Screw, sheet metal: #10 x 3/8 PKZ; plain hex head; cad pl (speaker mtg)
- 1X500090 Speaker Plate & Gasket Assembly: less spkr, pointer, tuning shaft & escutcheon mtg brkt
- 6A4141 Suppressor, distributor
- 29K5407 Terminal, insulated pin: white (spkr lead)
- 4B592098 Washer, "C" (tuning shaft retainer)

- 47A592070 Shaft, tuning
- 50B592106 or 50B592479 Speaker, PM: 5 x 7"; 3.2 ohm voice coil

- 6BE6 CONVERTER
- 6BA6 I-F AMP
- 6BA6 I-F AMP
- 6AS5 PWR. AMP
- 6AV6 DET.-A.V.C.-A.F.

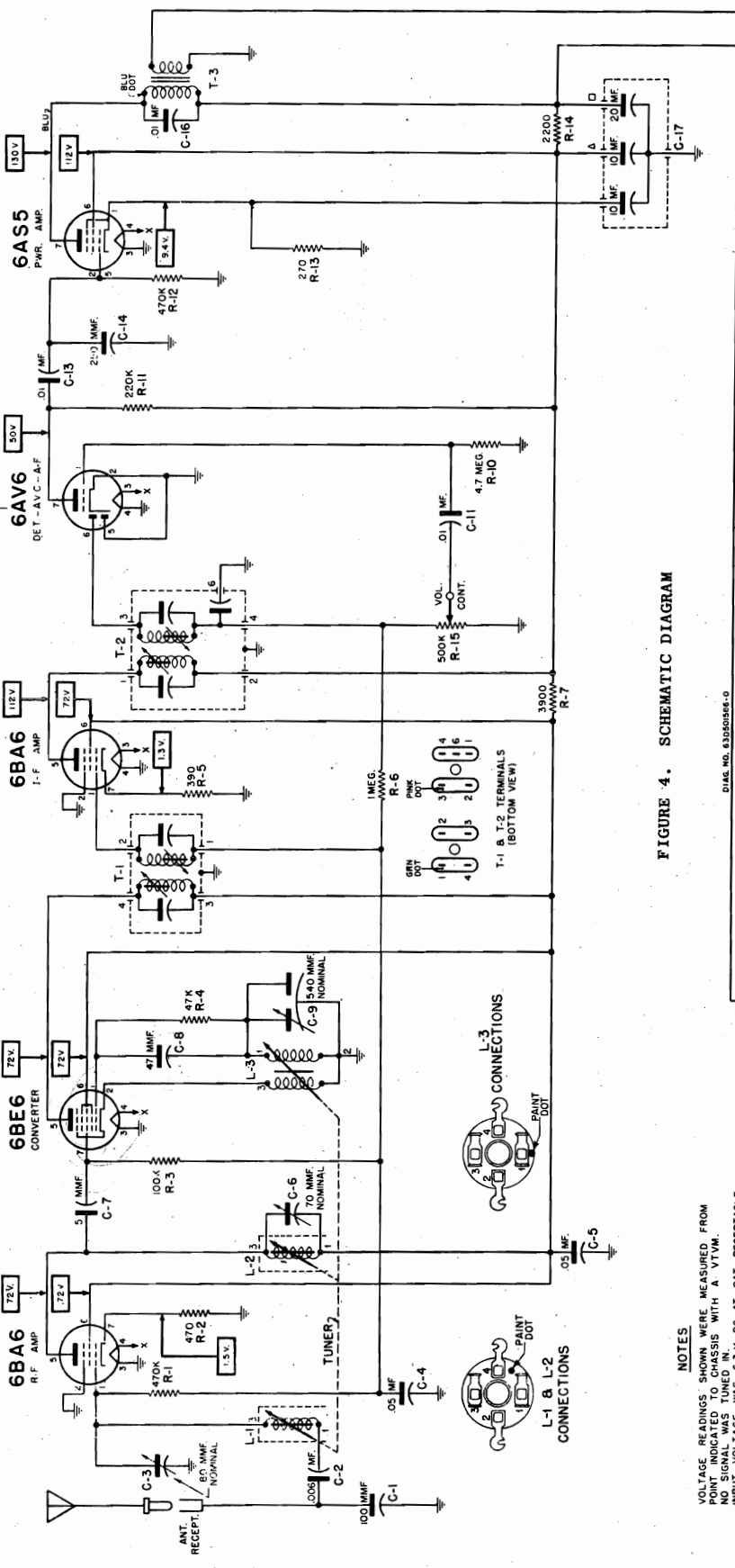
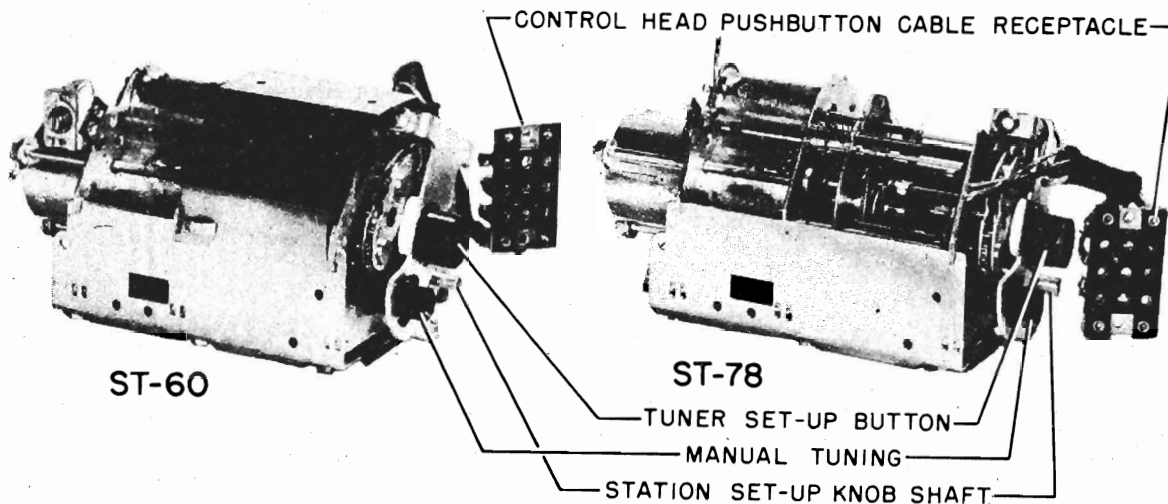


FIGURE 4. SCHEMATIC DIAGRAM

NOTES
 VOLTAGE READINGS SHOWN WERE MEASURED FROM POINT INDICATED TO CHASSIS WITH A VTVM. NO SIGNAL WAS TUNED IN.
 * LEAD ASSEMBLY
 L-F = 455 KC
 FREQUENCY RANGE - 540 TO 1600 KC

CONNECT TO COMMON SOURCE OF BATTERY POWER (6 VOLTS)
 FUSE F-1
 V.C.
 BAT.
 6.3V DC
 OFF ON SWITCH (ON VOL. CONT.)
 DIAL LIGHT 1-1
 TO HEATERS X
 VIBRATOR G-1
 SPARK PLATE SP-1
 5 MF
 C-10 (ON VOL. CONT.)
 L-4
 0000

MODELS ST-60,
ST-78, Tuners



GENERAL

Solenoid Tuners ST-60 and ST-78 are used in Motorola electric push-button standard auto receivers.

Fundamentally ST-60 and ST-78 tuners are the same. The two tuners differ in push-button switch lead lengths, oscillator coil, sleeve and shield, tuning cores, antenna trimmer and cover over ST-60 carriage. These tuners are similar to the original Motorola ST-54 solenoid tuner.

This is a 3 gang permeability type tuner operated by a solenoid. Five pre-set and one manual tuning positions are provided. The frequency range is 535 to 1600 kc. The pre-set positions can be set to any frequency within this range.

The tuner is designed to operate satisfactorily with 4.5 to 7.3 volts input. Before attempting any service work on a tuner that operates too slowly or one that doesn't operate at all, check the battery voltage directly at the receiver

spark plate. Normally, this voltage is 6.3 volts. At the moment any push-button is pressed, the voltage at the spark plate should not drop to less than 4.5 volts. If the voltage is less than 4.5, it is an indication of poor wiring between the car battery and receiver or a defective car battery.

This tuner depends on "dash-pot" action between the plunger and the solenoid for proper operation. When the fit between the plunger and solenoid is too tight, the air can't get out fast enough. The result is a slow or sluggish operating tuner. All ST-60 and ST-78 tuners have an adjustable air release in the solenoid end plate. See Figures 1 & 3.

The tuner solenoid coil must be in a horizontal or near horizontal position or the tuner will not operate properly. If it is operated with the coil in a vertical position, the solenoid and carriage return spring may not be strong enough to operate the tuner.

TO SET UP AUTOMATIC TUNER

- a. Turn receiver on and allow it to warm up for a few minutes.
- b. Collapse antenna until signal is weak.
- c. Press Manual "M" button on control head.
- d. Turn tuning knob until desired station is tuned in. (Make a mental note of the program). For best results choose only local stations.
- e. Press desired button and wait until tuning mechanism completes its operation.
- f. Press automatic tuner set-up button until "click" is heard. (See detail above.)
- g. Turn automatic tuner set-up knob until previously noted program is heard. NOTE: Check the setting of the automatic button just set up by pressing the "M" button and manually tune in the station. There should be no difference in volume or clarity when the station is tuned in either manually or automatically. If a difference is noted, reset the automatic tuner push button more accurately by repeating above procedure. Also make sure the push button is set to same station that was selected manually and not to a weak distant station carrying the same network program.
- h. Repeat steps c, d, e, f and g for balance of buttons.

THEORY OF OPERATION

NOTE: Throughout these paragraphs, it is suggested that constant reference be made to Figure 1.

When any push-button is pressed, current flows through the solenoid coil, causing the plunger to pull into the coil. Near the end of the plunger travel, through a ratchet mechanism inside the plunger, the selector switch shaft is rotated 60°, moving the selector switch and stop plate to their new position.

An instant later, the solenoid switch is opened breaking solenoid current and the carriage return spring then pulls

the plunger out, closing the solenoid switch again. If the selector switch is now resting at the position selected by the push-button (cut away section of selector switch resting in front of contact selected by push-button), the solenoid plunger will continue to be pulled out until the stop plate is resting on the selected lead screw stop. In the event the selector switch is not resting in the position selected by the push-button when the solenoid plunger is on its return trip, the moment the plunger moves out far enough to actuate the solenoid switch, current will again flow through solenoid causing the plunger to be pulled in again. The plunger's inward motion again rotates the stopplate and selector switch

through another 60°. This last operation is repeated automatically until the selector switch comes to rest at the position selected by the push-button, at which time the solenoid circuit is opened and the plunger moves out until the stop plate is resting on the selected lead screw stop. The stops are adjusted to the desired positions during the station setting up procedure, through the set-up gear train assembly.

Refer to Figure 2 for mechanics behind station setting-up mechanism detail.

When the button on which a station is to be set up is first pressed, the tuner operates and the stop plate comes to rest against the selected lead screw stop. The pressure of the stop plate against the lead screw stop moves the lead screw forward until its shoulder rests against the tuner end

plate. The square end of the lead screw does not engage in the square hole of the set-up gear until the set-up button is pushed in and the station set-up knob is turned. A latch on one end of the detent lever engages the gear lever, holding the set-up gear train in contact with the selected lead screw. Now the selected lead screw stop can be moved on its lead screw by turning the station set-up knob. None of the other lead screws turn because the stop plate is not resting against them. After the button is set up, pressing any other button will unlatch the gear lever and disengage the lead screw from the set-up gear. See Figure 2.

Since the coil tuning iron cores are attached to the carriage plate and move in unison with the plunger, the point at which they are brought to a stop (by means of the lead screw stop) determines the frequency to which the coils are tuned.

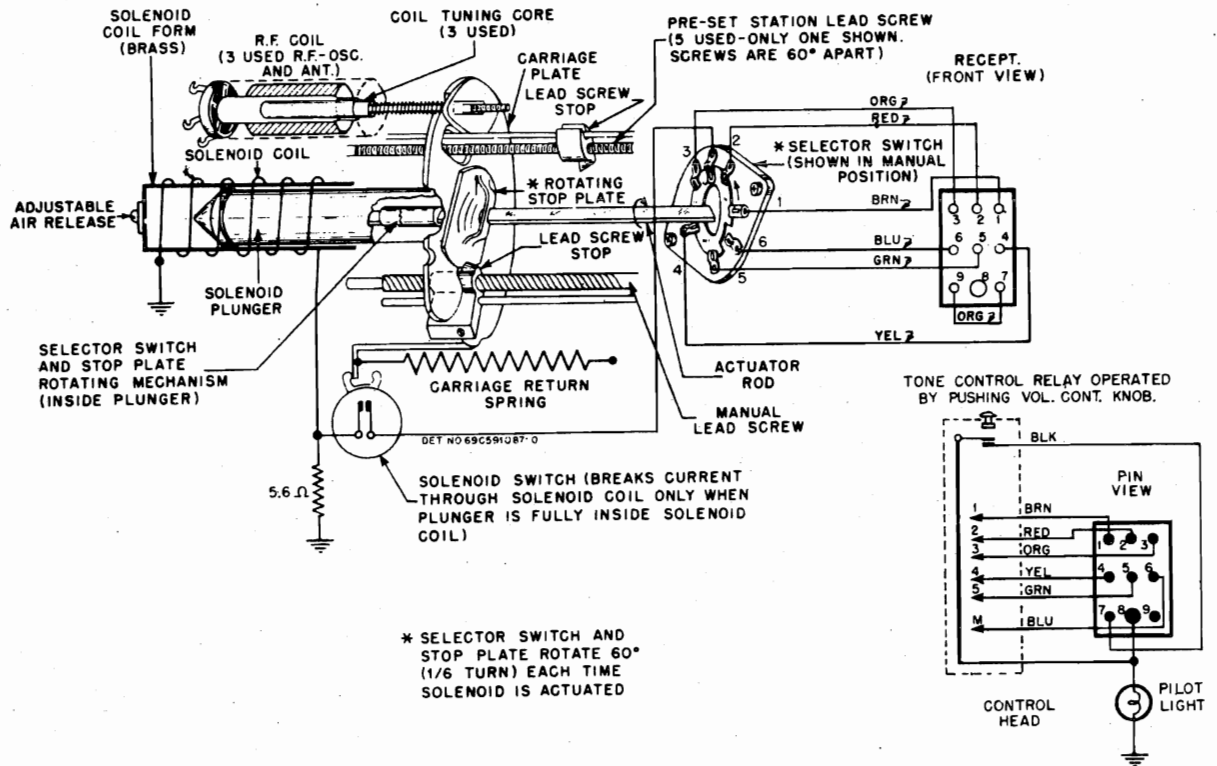
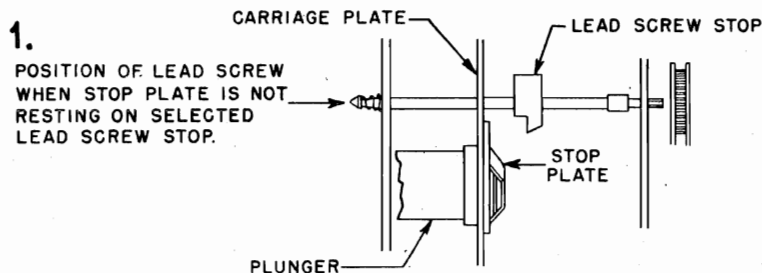


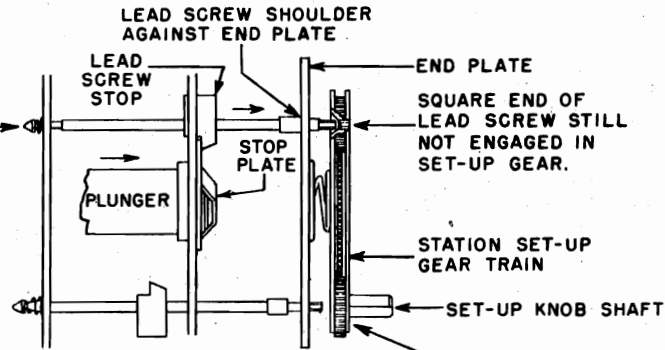
FIGURE 1. TUNER FUNCTIONAL DETAIL



MODELS ST-60,
ST-78, Tuners

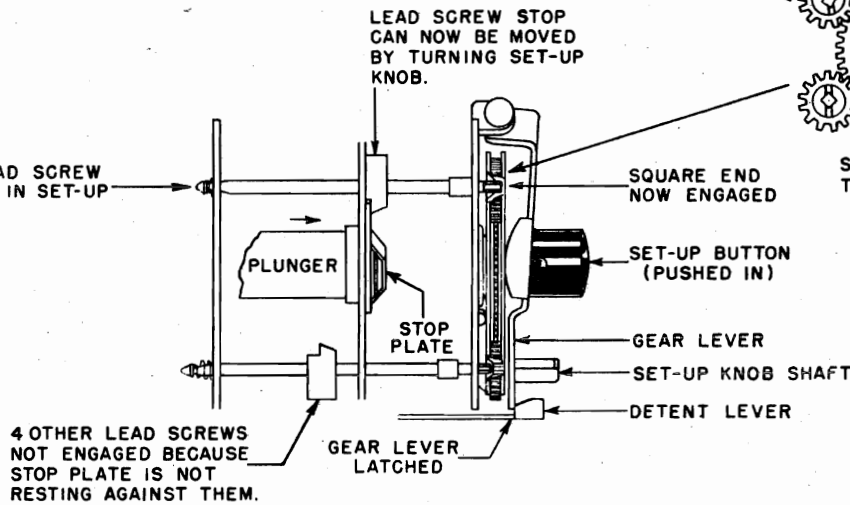
2.

POSITION WHEN STOP PLATE IS RESTING AGAINST LEAD SCREW STOP.



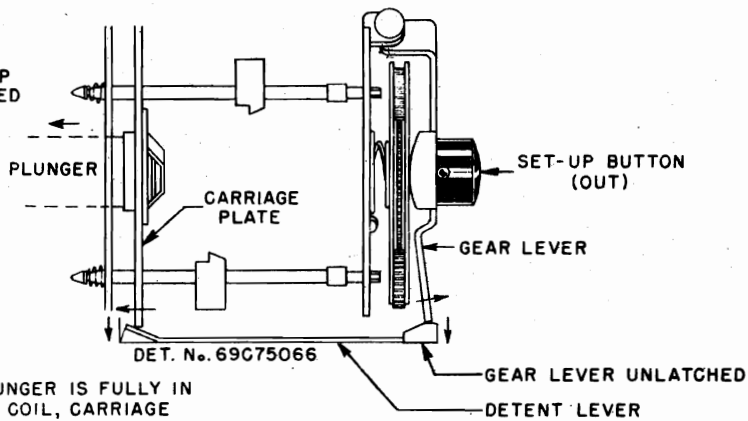
3.

SELECTED LEAD SCREW NOW ENGAGED IN SET-UP GEAR.



4.

AFTER STATION IS SET UP GEAR LEVER IS UNLATCHED BY PRESSING A BUTTON



WHEN PLUNGER IS FULLY IN SOLENOID COIL, CARRIAGE PLATE RELEASES GEAR LEVER AS SHOWN, DISENGAGING LEAD SCREW FROM SET-UP GEAR.

**FIGURE 2. STATION SET-UP MECHANISM
TO REMOVE TUNER FROM CHASSIS**

Should it become necessary to remove the solenoid tuner from the receiver chassis, proceed as follows:

1. Remove the covers from the set, completely exposing the chassis.
2. Mark all leads connecting tuner to receiver.

3. Disconnect all leads connecting tuner to receiver. The control head connecting receptacle is to be removed by unscrewing the two self-tapping screws. Do not unsolder leads from the tuner selector switch.

4. The tuner is held to the chassis by self-tapping screws driven into the sides of the tuner. Do not remove any other screws.

ADJUSTMENTS

AIR RELEASE ADJUSTMENT

The speed at which the tuner operates is governed by dash-pot action of the solenoid plunger within the closed solenoid coil form. The rate at which air is allowed to enter or escape determines the speed of the plunger.

An adjustable air release is provided on all ST-60 and ST-78 tuners. See Fig. 3. To adjust, loosen the screw and move the eccentric washer which covers the air release hole to expose or cover more of the air release hole as required.

1. If tuner operates too slowly, open the air release hole. Open it only far enough to secure reliable operation. Too little "dash-pot" action (air release open too much) may cause the plunger to hammer and sometimes even to make the tuner operate continuously due to the selector switch rotor being turned so rapidly as to overshoot its contacts.
2. If the tuner operates too rapidly increase dash-pot action by closing the air release hole slightly. Close it only enough to eliminate hammering.

END VIEW OF TUNER

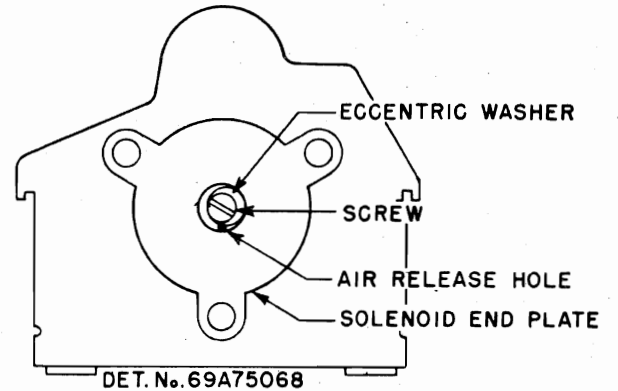


FIGURE 3. AIR RELEASE ADJUSTMENT

PLUNGER RATCHET ADJUSTMENT

The plunger ratchet mechanism is shown in Figure 4. This mechanism rotates the actuator rod which, in turn, rotates the carriage stop plate and the selector switch 60° for each inward motion of the plunger.

If this adjustment is incorrect, tuner may operate continuously once current is applied.

Correct ratchet adjustment is indicated when 1/64" to 1/32" clearance is observed between selector switch contacts and the selector switch rotor as shown in Figure 5. Slowly work the plunger by hand and observe clearance at each contact position. If the average clearance is not 1/64" to 1/32", correction can be made by loosening ratchet adjustment setscrew and turning actuator rod by hand until correct clearance is observed.

Before ratchet adjustment setscrew is finally tightened, push fixed ratchet 1/32" back into plunger. This increases spring tension against rotating ratchet, thus insuring more positive operation.

SOLENOID SWITCH TRIP ADJUSTMENT

The solenoid switch tripping mechanism should be adjusted as shown in Figure 6.

If the solenoid switch is tripped too early, the ratchet mechanism may fail to operate; if it trips too late, the plunger may hammer violently or should the solenoid switch fail to trip, the plunger would be held within the solenoid.

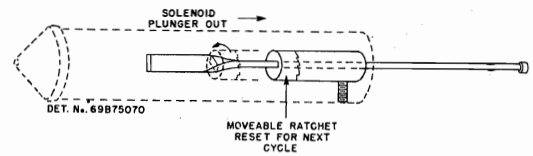
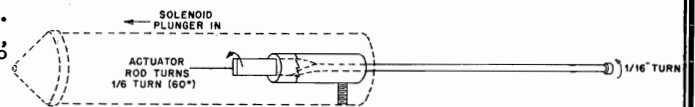
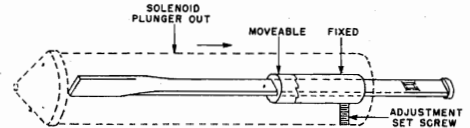


FIGURE 4. PLUNGER RATCHET MECHANISM

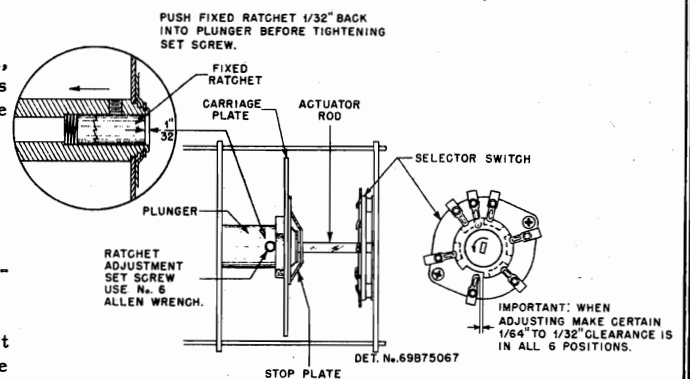


FIGURE 5. PLUNGER RATCHET ADJUSTMENT

ADJUSTMENT OF GEAR LEVER LATCH

The gear lever latch holds the station set-up gear train in position while setting up stations. Failure of the latch to engage properly when the set-up button is pushed in will result in the inability to set up pre-set stations. Failure of

the latch to disengage after station is set-up will result in faulty automatic tuning because the lead screws might not seat themselves properly against the tuner end plate. Figure 7 shows the latch detail and adjustment.

MODELS ST-60,
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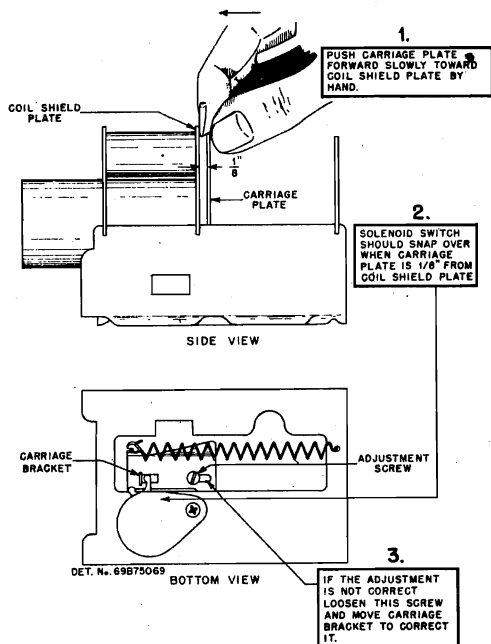


FIGURE 6. SOLENOID SWITCH ADJUSTMENT

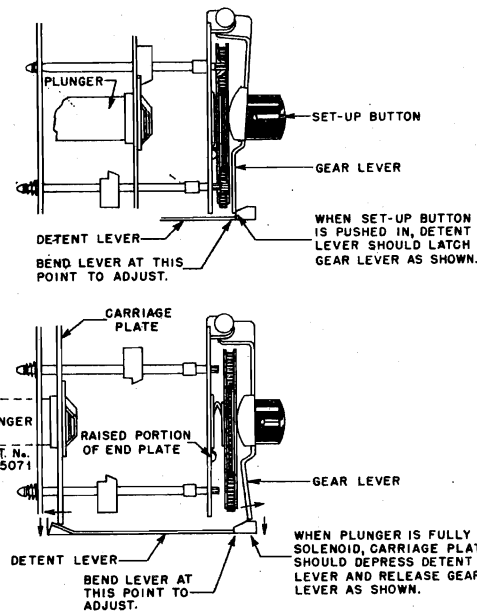


FIGURE 7. GEAR LEVER LATCH ADJUSTMENT

SERVICE NOTES

FAILURE OF SOME LEAD SCREW TO ENGAGE IN SET-UP GEARS

If some of the lead screws fail to engage in the set-up gears during station setting up procedure, check the gear lever to see if it is bent. When the set-up button is pushed in and the gear lever latches on the detent lever, the set-up gear train should be parallel with the tuner end plate and the bottom of the gear train should be resting on the raised portions of the tuner end plate.

LUBRICATION

Should lubrication ever be required, it is recommended that a very fine grease, commercially called DOW-CORNING Silicone (DC 44 Medium Grade), or its equivalent be used.

Remove all old and sticky lubricant with a solvent such as carbon tetrachloride and then, very sparingly, lubricate only the following points:

1. Carriage guide rods.
2. Actuator rod.
3. Manual lead screw.

IMPORTANT

Do not lubricate or permit lubricant to get on Selector Switch contacts. The friction drag is required for proper operation of tuner.

LEAD DRESSING

Make sure that the selector switch and solenoid coil leads are dressed so that carriage plate does not rub against them. Leads rubbing against the carriage plate may cause the tuner to stick, especially at the high frequency end.

REPLACEMENT OF SOLENOID COIL OR SOLENOID PLUNGER

Should replacement of the solenoid coil or solenoid plunger be required, it will be necessary to replace the entire tuner. A close fit between solenoid plunger and solenoid coil form is required; a proper match can only be secured at the factory. When service of this kind is required, return the tuner to the factory for exchange.

ALIGNMENT

In the event that some part of the R.F. circuit has been changed or the adjustments shifted by mishandling, it is suggested that the receiver be realigned. Follow the alignment instructions found in the receiver service manual.

The tuner must be in good working order and assembled onto the chassis before attempting alignment of its tuned circuits.

TO REPLACE ANT. R.F., OR OSC. COILS

IMPORTANT: When ordering replacement coils, order by part number and also specify the color coding (paint dots) on old coil. THE REPLACEMENT COIL SHOULD CARRY THE SAME COLOR CODING AS THE ORIGINAL OR THE TUNER WILL NOT TRACK PROPERLY.

1. Unsolder the two lugs holding the coil to the tuner plate.
2. Carefully remove the old coil. Save the thin paper washer that is found at the base of the coil.
3. Slip the paper washer over the replacement coil and slip coil into shield can.
4. Orient coil so its lugs are in same position as before and resolder to tuner plate.
5. Reassemble tuner and install in receiver.
6. Realign ANT., R.F. and OSC. stages per instructions found in the receiver service manual.

TO REPLACE ANT. R.F. OR OSC. COIL TUNING CORES

IMPORTANT: When ordering coil tuning cores, order by part number and also specify the color coding (paint spot) on the old core. ALL 3 TUNING CORES MUST CARRY THE SAME COLOR CODING OR THE TUNER WILL NOT TRACK PROPERLY.

1. Remove the carriage return spring.
2. Move the carriage plate back as far as it can go. The tuning cores can now be screwed "out" or "in" by grasping the portion that sticks out the back of the coil. When installing a new core, make sure that the insulating washer and adjustment clip are replaced properly. The insulating washer goes on the core side; the core adjustment clip has an ear on it and this ear must fit into a hole in the bakelite insulator on the carriage plate. Refer to Figure 8.
3. Replace the carriage return spring.
4. Install tuner in receiver.
5. Realign ANT., R.F. and OSC. stages following the instructions found in the receiver service manual.

PLUNGER RATCHET REMOVAL

To remove ratchets, proceed as follows:
(Refer to Figure 8 for parts identification).

1. Remove gear plate mounting screw (55).
2. Pull out actuator rod (46). Don't lose washers (83), (88) and (89).
3. Remove stop plate bracket (4) by sliding it out of the retaining slots.
4. Loosen setscrew (50).
5. The large fixed ratchet (34), small floating ratchet (35) and ratchet spring (70) can now be removed.
6. Reassemble in reverse order.

TUNER HANGS UP

The beginning of this trouble is usually a condition where the tuner "runs wild" (fails to stop at a station). Eventually, the stop plate gets "hung up" by getting on the wrong side of the station stops (56). The cause of the trouble is that the selector switch (74) does not turn the correct amount with each dash of the plunger.

Since the actuator rod (46) determines the rotation of the selector switch, it is usually at fault. Check the twist in the actuator rod. It should be 82 degrees. Also check the fit between the "head" end of the actuator rod (46) and the rotary section of the selector switch (77). We have found that some sloppiness sometimes occurs at this point. If the fit is loose, replace the actuator rod (46). This can be easily done by removing gear plate mounting screw (55).

REPLACEMENT PARTS LIST

NOTE: When ordering parts, specify model number of tuner in addition to part number and description of part.

| Ref. No. | Part Number | Description | Ref. No. | Part Number | Description |
|----------|-------------|-------------------------------------------------------------------------------------------------------|----------|-------------|------------------------------------------------------------------------------------------------------------------------------------|
| | 1X472634 | Model ST-60 Solenoid Tuner (complete)..... | 15 | 46K592080 | Core, powdered iron: with molded-in adj screw (ST-78) (specify color of paint dot on old core when ordering).... |
| | 1X592280 | Model ST-78 Solenoid Tuner (complete)..... | 15 | 46A70880 | Core, powdered iron: with molded-in adj screw (ST-60) (specify color of paint dot on old core when ordering).. |
| 1 | 1X71358 | Base & Spring Assembly..... | 16 | 32A70972 | Gasket, solenoid.....doz |
| 2 | 7A70928 | Bracket, carriage..... | 17 | 14A70876 | Insulator, coil sleeve: armite.....doz |
| 3 | 7A70986 | Bracket, lead screw stop.... | 18 | 14A74198 | Insulator, magnet winding: armite.....doz |
| 4 | 7A500429 | Bracket, stop plate (stainless steel)..... | 19 | 14A70979 | Insulator, slug: bakelite.....doz |
| 5 | 38A70945 | Button, lever and gear (set-up button) | 20 | 14A70973 | Insulator, switch: armite.....doz |
| 6 | 38A70954 | Button, mute switch; fibre.. | 21 | 45B70926 | Lever, detent..... |
| 7 | 20K472612 | Capacitor, variable: mica; 30-60 mmf; with mounting bracket..... | 22 | 45B70930 | Lever, gear..... |
| 8 | 20K472613 | Capacitor, variable: mica; 50-280 mmf; with mounting bracket (ST-60 only)..... | 23 | 29R3014 | Lug, solder (ST-78 only).doz |
| 9 | 20K481527 | Capacitor, variable: mica; 20-180 mmf; with mounting bracket..... | 24 | 29R5331 | Lug, solder (ST-60 only).doz |
| 10 | 42A70980 | Clip, lead screw..... | 25 | 4S7651 | Lockwasher, steel: #8 internal; cad pl.....per/c |
| 11 | 42A70184 | Clip, core adjustment.... | 26 | 2S7003 | Nut, steel: 8-32 x 5/16 hex; cad pl.....per/c |
| 12 | 1A71881 | Coil, antenna or RF (specify color of paint dot on old coil when ordering)..... | 27 | 1X73012 | Plate, Bushing and Stud Assembly: stop end plate with actuator rod bushing and gear locating stud..... |
| 13 | 24B592153 | Coil, oscillator; (ST-78) (specify color of paint dot on old coil when ordering).. | 28 | 1X73007 | Plate & Coil Shields Assembly: consists of tuner plate solenoid shield, 3 coil shields and 3 solenoid mtg bolts (ST-60 only)..... |
| 13 | 24B71879 | Coil, oscillator; (ST-60) (specify color of paint dot on old coil when ordering).. | 28 | 1X592275 | Plate & Coil Shields Assembly: consists of tuner plate, solenoid shield, 3 coil shields and 3 solenoid mtg bolts (ST-78 only)..... |
| 14 | 59B70889 | Coil, solenoid (RETURN entire tuner to factory for exchange when this part requires replacement)..... | | | |

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MODELS ST-60,
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| Ref. No. | Part Number | Description | Ref. No. | Part Number | Description |
|----------|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-------------|-------------------------------------------------------------------------------------------------------------------------|
| 29 | 1X76556 | Plate, end: solenoid end plate assembly; with gasket and adjustable air release. | 53 | 3S2684 | Screw, sheet metal: #6 x 1/4 Phillips filister head; stl; cad pl (solenoid switch mtg)..... |
| 30 | 1X71359 | Plate & Gears Assembly (station set-up gear train) | 54 | 3S7205 | Screw (lockscrew): 8-32 x 1/4; slotted hex head; cad pl (base mtg)..... |
| 31 | 1X73008 | Plate & Plunger Assembly: consists of carriage plate with 3 bakelite core screw insulators and solenoid plunger rod with ratchets and stop plate (RETURN entire tuner to factory for exchange when this part requires replacement)..... | 55 | 3A74390 | Screw, special (gear plate mtg)..... |
| 32 | 1X592268 | Plate & Trimmers Assembly: consists of coil end plate, 2 trimmers and terminal strip (ST-78)..... | 56 | 3S8175 | Screw, sheet metal: #4 x 3/16; PKZ; slotted hex head; stl; cad pl (holds lead screw stop brkt to manual lead stop)..... |
| 32 | 1X472639 | Plate & Trimmers Assembly: consists of coil end plate, 3 trimmers and terminal strip (ST-60)..... | 57 | 58A70902 | Screw & Coupling Assembly: manual lead screw with bakelite coupling..... |
| 33 | 64K472055 | Plate, switch mounting... | 58 | 1A73015 | Screw & Stop Assembly: lead screw with carriage stop... |
| 34 | 43A70905 | Ratchet, fixed (large)... | 59 | 47A70934 | Shaft, lever..... |
| 35 | 43A70904 | Ratchet, floating (small) | 60 | 26K592104 | Shield, coil (Osc ST-78)... |
| 36 | 9K500055 | Receptacle, plug: 9-pin..... | 61 | 26A70878 | Shield, coil (ST-60 Ant, RF & Osc) (ST-78 Ant & RF).... |
| 37 | 17K484497 | Resistor, wire-wound: 5.6 ohms 10% 1W (in parallel with solenoid coil)..... | 62 | 26B472568 | Shield, tuner (ST-60 carriage cover)..... |
| 38 | 5S2833 | Rivet, brass: .064 x 1/8 (part of actuator rod adj)..... | 63 | 43A70881 | Sleeve, coil: powdered iron (not in Osc ST-78)..... |
| 39 | 5S7770 | Rivet, steel: .088 x 5/32; nkl pl (slug insulator mtg)..... | 64 | 43A70953 | Spacer, selector switch: fibre..... |
| 40 | 5S7706 | Rivet, steel: .122 x 1/8; nkl pl (lock-up spring mtg)..... | 65 | 2S7988 | Speednut, steel: for .093 diameter rod..... |
| 41 | 5S7707 | Rivet, steel: .122 x 5/32; nkl pl (trimmer mtg)... | 66 | 41A70958 | Spring, coil: iron core..... |
| 42 | 5S8497 | Rivet, steel: .088 x 1/8; nkl pl (terminal strip mtg)..... | 67 | 41A70968 | Spring, gear plate..... |
| 43 | 47A472003 | Rod, carriage guide..... | 68 | 41A70949 | Spring, lead screw..... |
| 44 | 47A73787 | Rod, manual stop guide... | 69 | 41A70971 | Spring, lock-up..... |
| 45 | 47A70921 | Rod, stop guide..... | 70 | 41A70955 | Spring, ratchet..... |
| 46 | 47A480767 | Rod, actuator..... | 71 | 41A70941 | Spring, carriage..... |
| 47 | 3S2950 | Screw, machine: 4-40 x 1/4; slotted locking, stl; 3 index head cad pl (carriage brkt mtg)..... | 72 | 41A472134 | Spring, carriage balance..... |
| 48 | 3S2681 | Screw, steel: #4 x 3/8 Phillips filister head; cad pl (selector switch mtg)... | 73 | 41A472480 | Spring, actuator rod adjustment..... |
| 49 | 3S7327 | Screw, machine: 5-40 x 3/8; slotted hex head; stl; cad pl (mute switch mtg)... | 74 | 46A70983 | Stop, manual lead..... |
| 50 | 3S7104 | Setscrew, steel: 8-32 x 3/16 slotted headless; cad pl (part of actuator rod adj)..... | 75 | 31A70948 | Strip, terminal lug..... |
| 51 | 3S7148 | Setscrew, steel: 6-32 x 1/8; Allen head; nkl pl (ratchet setscrew in plunger)..... | 76 | 40A472644 | Switch, mute..... |
| 52 | 3S7200 | Screw, machine: 6-32 x 3/16; slotted filister head; stl; cad pl (air release adj screw)..... | 77 | 40B70952 | Switch, selector..... |
| | | | 78 | 1B70944 | Switch, solenoid: with mtg plate..... |
| | | | 79 | 4A73378 | Washer, bumper..... |
| | | | 80 | 4A70015 | Washer, "C" (lever shaft retainer)..... |
| | | | 81 | 47A70873 | Washer, coil spacer: fibre..... |
| | | | 82 | 4A76542 | Washer, eccentric (air release hole adjustable cover)..... |
| | | | 83 | 4A70974 | Washer, insulator (actuator rod)..... |
| | | | 84 | 4A70956 | Washer, iron core insulator; bakelite..... |
| | | | 85 | 4A74571 | Washer, paper..... |
| | | | 86 | 4A73621 | Washer, spring (manual lead screw)..... |
| | | | 87 | 4A70932 | Washer, "C" spring (manual lead screw retainer).... |
| | | | 88 | 4A70961 | Washer, actuator rod: rectangular hole..... |
| | | | 89 | 4A70962 | Washer, bearing (actuator rod)..... |
| | | | 90 | 4A75683 | Washer, brass: special. |

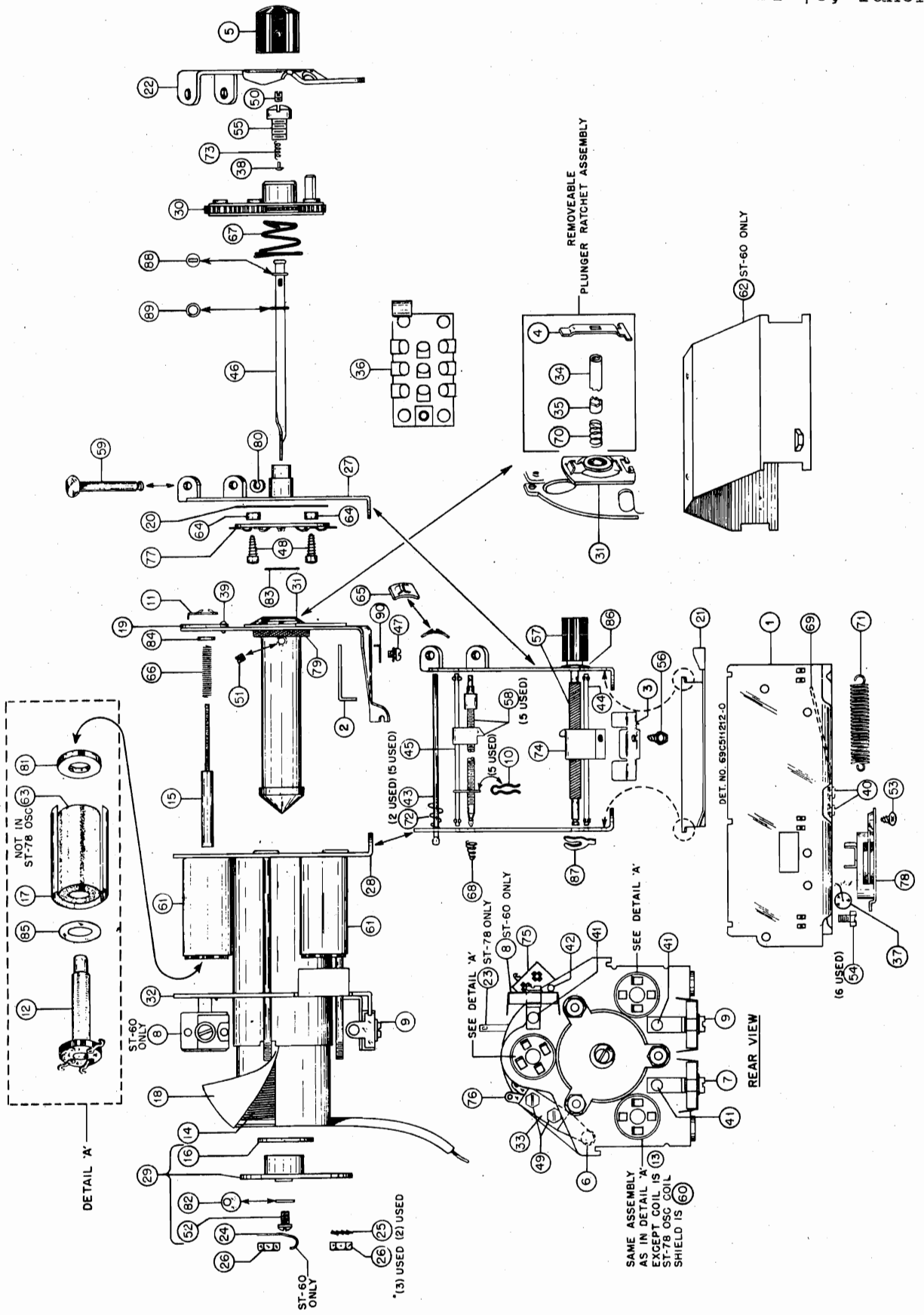


FIGURE 8. PARTS LOCATION

MODEL WS1C, 1951
 Willys-Overland

GENERAL INFORMATION

TYPE - Automotive type radio receiver designed for installation in 1951 Willys-Overland cars. An external speaker is used.

TUNING RANGE - 540 to 1600 Kc **IF** - 455 Kc

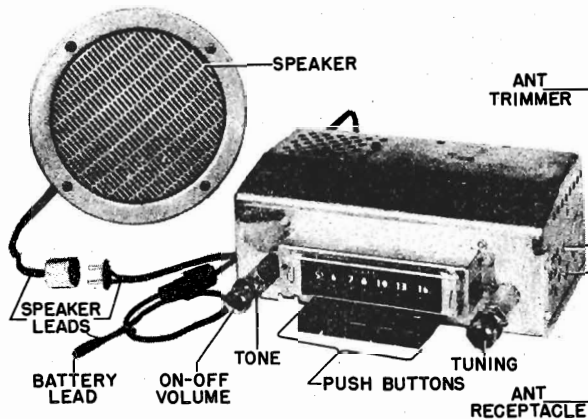
TUBE COMPLEMENT -

- 6BA6 - RF Amplifier
- 6BE6 - Converter
- 6BA6 - IF Amplifier
- 6AT6 - Diode detector, AVC & 1st AF Amp
- 6AQ5 - Power Amplifier
- 6X4 - Rectifier

POWER INPUT - 6.8 amps at 6.3V DC

POWER OUTPUT - 3.5 watts (max)

TUNER - Model AT-90. See AT-90 Service Manual for Replacement Parts.



TO SET THE PUSHBUTTONS

Receiver has 5 buttons for automatic station selection. To set the push buttons, proceed as follows:

1. Turn volume up until stations can be heard.
2. Pull button out and with the station selector, tune to the station desired.
3. Push button in. This station is now set for automatic tuning.

4. Follow the same procedure for the remaining four buttons.

NOTE: The numbers on the dial scale indicate the frequency range of the receiver. Before setting the pushbutton, tune carefully until you are exactly on the station; tuning to either side of it will result in poor tone quality and excessive noise. When setting automatic tuning, it is preferred that the left-hand buttons tune in the lower KC stations and the right-hand buttons tune in the higher KC stations.

ALIGNMENT

EQUIPMENT REQUIRED

1. A special tool for adjusting the tuner cores. Use alignment tool, Motorola Part No. 66A76278.
2. A small screwdriver for IF and RF alignment.
3. An accurately calibrated AM modulated signal generator.
4. A low range output meter.
5. A special dummy antenna for RF alignment. Construct dummy antenna as shown in Figure 1.

PROCEDURE

1. To expose the alignment adjustments, remove the top and bottom covers. If the tuner cores require adjustment, remove the dial scale bracket assembly and dial background.
2. Connect a PM speaker (3.2 ohm VC) to speaker cable terminals of the receiver.
3. Connect an output meter across the speaker voice coils.

4. Connect 6.3 volts to the receiver "A" lead terminal and chassis.
5. Turn the receiver "on" and allow it to warm up for a few minutes. Set receiver volume control at maximum and tone control to "high" position.
6. For greatest accuracy, keep the output of the receiver at 1 watt (1 watt = 1.79 volts on output meter) by reducing signal generator output (not receiver volume control) as stages are brought into alignment.

IMPORTANT: Do not push in on the alignment tool when adjusting the tuner cores. The slightest inward pressure on the alignment tool may move the tuner carriage and result in inaccurate alignment.

7. Antenna Trimmer Adjustment. Once alignment has been satisfactorily performed, no further adjustment of any alignment screws should be made except to align the antenna trimmer (7) to car antenna after receiver is installed in car. This adjustment should be made with antenna fully extended and receiver set to approximately 1400 Kc. Peak the trimmer for maximum volume of a weak station or background noise between stations.

ALIGNMENT CHART

| STEP | DUMMY ANTENNA | GENERATOR CONNECTION | GENERATOR FREQUENCY | TUNER SET TO | ADJUST | REMARKS |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------------------------------------|---------------------|---------------------------------------------------------------------|-------------|-------------------------------------------------------------------------------------|
| IF ALIGNMENT | | | | | | |
| 1. | .1 mf | Hi side - 6BE6 grid (pin #7) Low side-chassis | 455 Kc | Extreme high frequency end of travel | 1, 2, 3 & 4 | Peak for maximum in order indicated. Check by repeating procedure. |
| RF ALIGNMENT | | | | | | |
| NOTE: If the tuner is tracking properly over its entire range, the tuner cores 8, 9, & 10 will not require adjustment - proceed as follows: | | | | | | |
| 2. | Dummy -see Figure 1 | Ant receptacle thru dummy antenna | 1605 Kc | Extreme high frequency end of travel | 5 | Peak for maximum. |
| 3. | " | " | 1300 Kc | With tuning knob, tune to maximum signal | 6 & 7 | Peak for maximum in order indicated. |
| 4. | - | - | - | - | - | Repeat steps 2 & 3. |
| NOTE: If the tuner coils or cores have been replaced or tampered with, or the tuner does not cover the required range, the tuner cores 8, 9, & 10 require adjustment - proceed as follows: | | | | | | |
| 5. | Dummy -see Figure 1 | Ant receptacle thru dummy antenna | 1605 Kc | Extreme high frequency end of travel | 5, 6 & 7 | Remove dial scale bracket and dial background. Peak for maximum in order indicated. |
| 6. | " | " | 1300 Kc | With tuning knob, move carriage "in" 5/16" from position in step 5. | 8, 9 & 10 | Peak for maximum in order indicated. |
| 7. | " | " | 1605 Kc | With tuning knob, tune for maximum signal at high frequency end. | 5, 6 & 7 | Peak for maximum in order indicated. |
| 8. | " | " | 1300 Kc | With tuning knob, tune to maximum signal | 8, 9 & 10 | Peak for maximum in order indicated. |
| 9. | - | - | - | - | - | Repeat step 7. |

POINTER ADJUSTMENT

10. Tune receiver to 1300 Kc and adjust pointer by means of eccentric cam (11) on the tie plate to the 1300 Kc calibration mark on dial scale.
11. With set installed in car, peak ant trim (7) for maximum signal at approximately 1400 Kc. Car antenna should be fully extended.

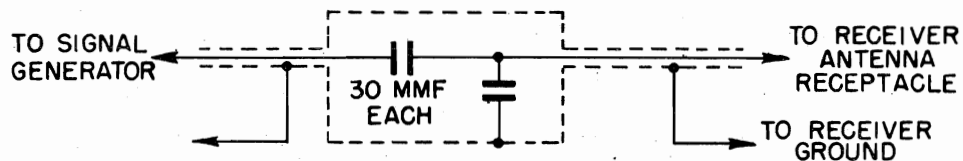


FIGURE 1. DUMMY ANTENNA

MODEL WS1C, 1951
Willlys-Overland

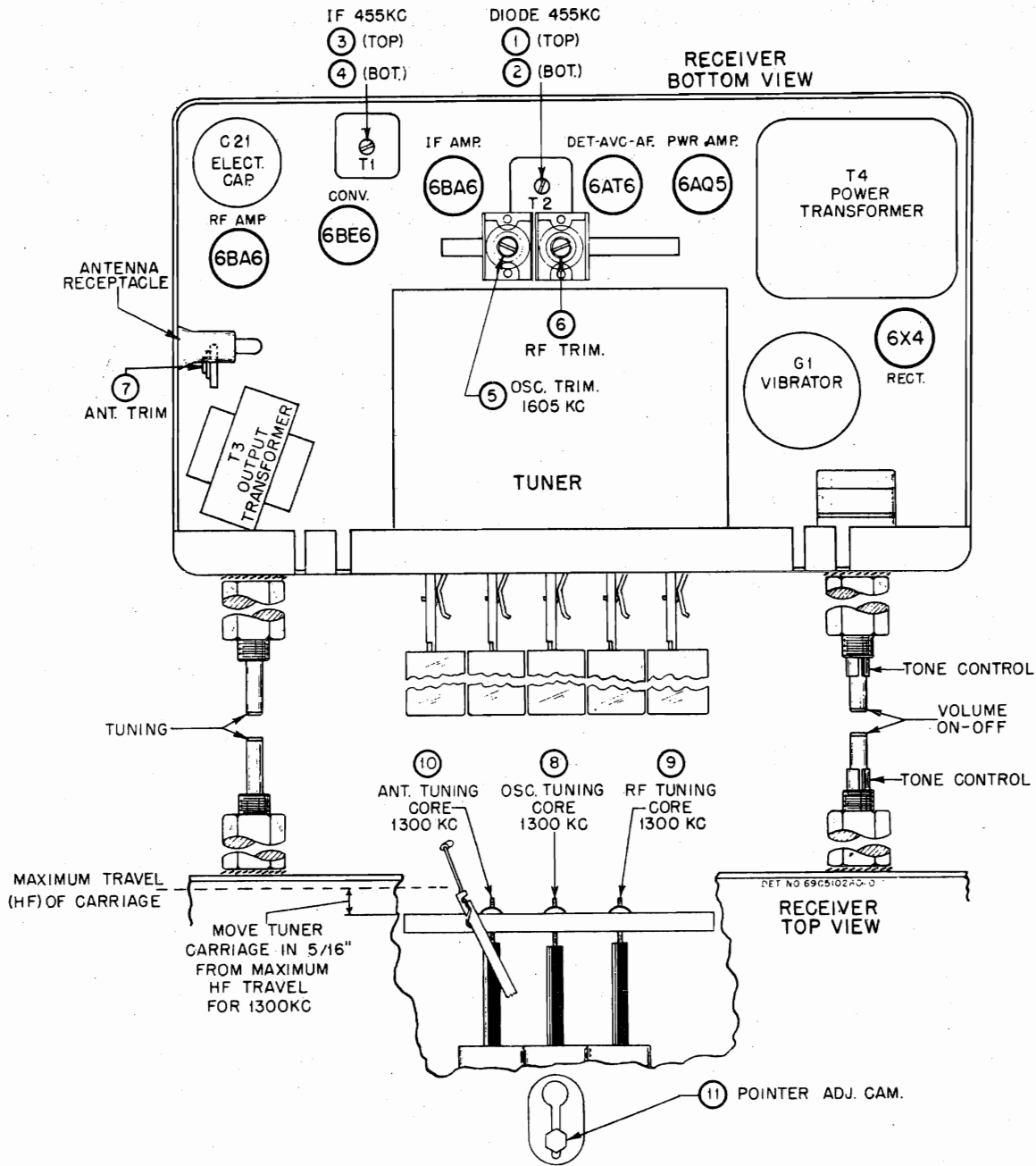


FIGURE 2. TUBE AND TRIMMER LOCATIONS

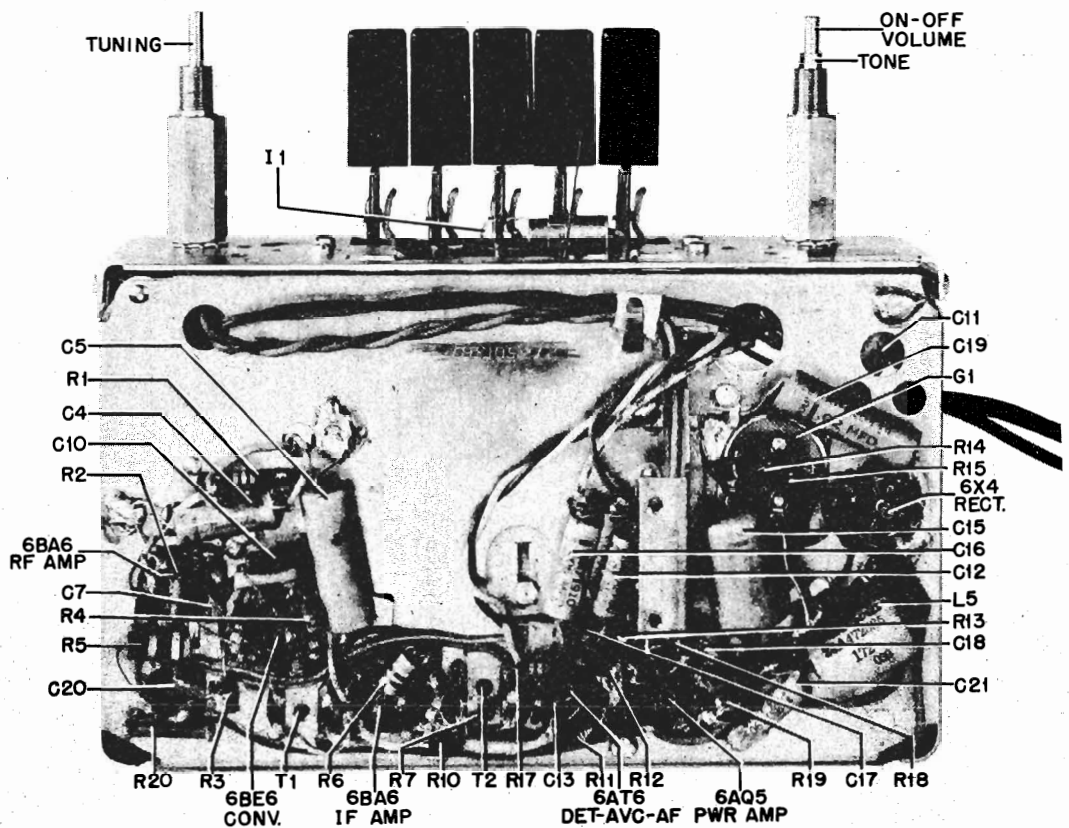
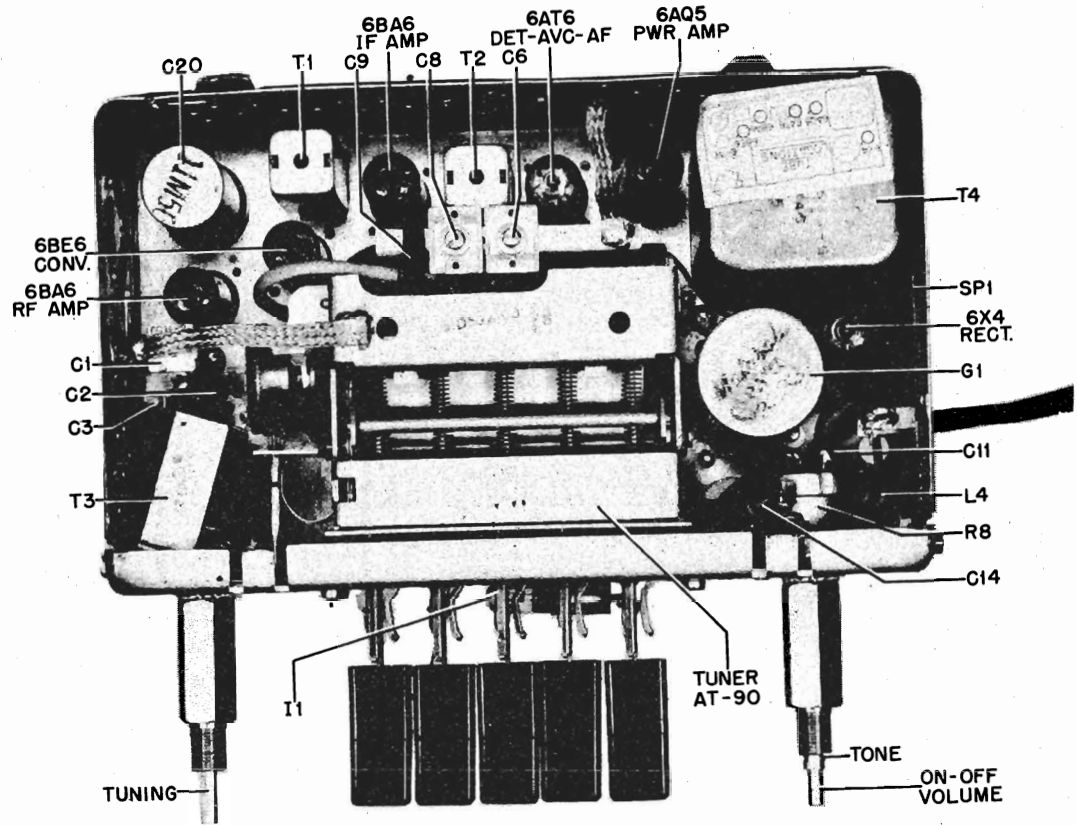


FIGURE 3. CHASSIS PARTS LOCATIONS

MODEL WSIC, 1951
Willys-Overland

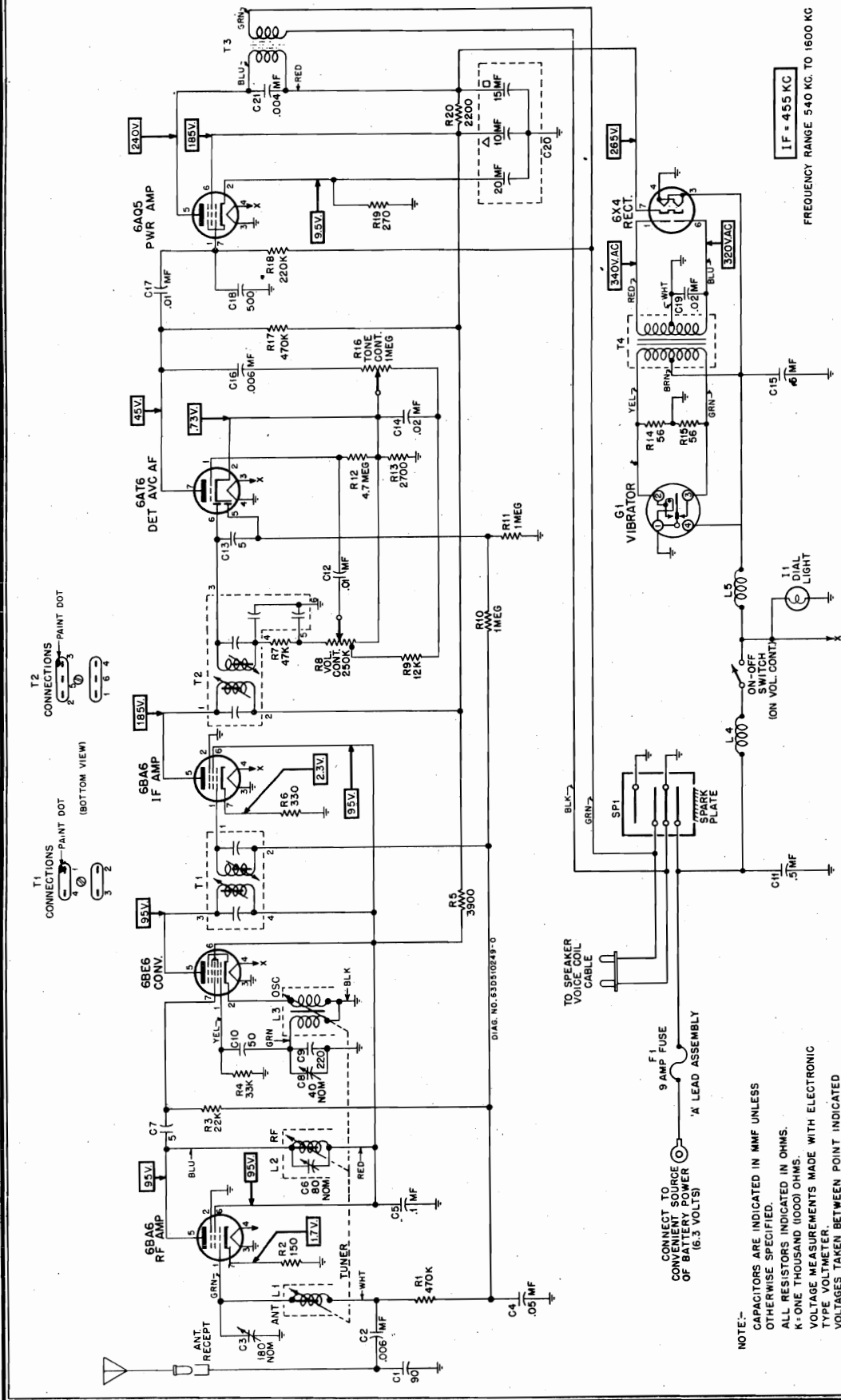


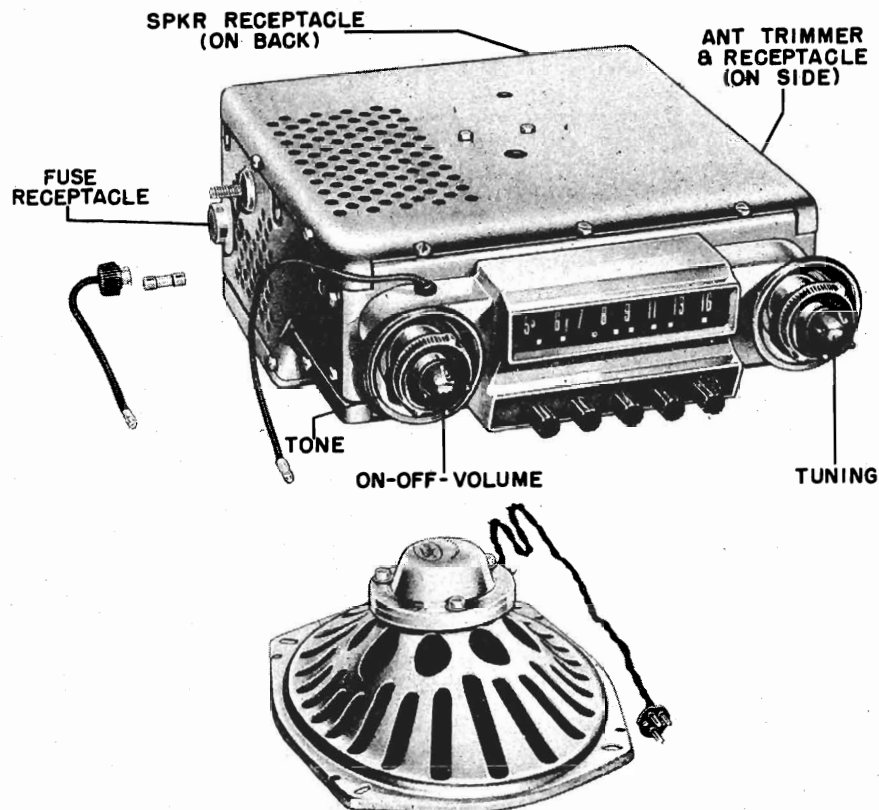
FIGURE 4. SCHEMATIC DIAGRAM

NOTE:-
CAPACITORS ARE INDICATED IN MMF UNLESS OTHERWISE SPECIFIED.
ALL RESISTORS INDICATED IN OHMS.
K-ONE THOUSAND (1000) OHMS.
VOLTAGE MEASUREMENTS MADE WITH ELECTRONIC TYPE VOLTMETER.
VOLTAGES TAKEN BETWEEN POINT INDICATED AND CHASSIS.
VOLTAGE TOLERANCE ± 10 %
NO SIGNAL INPUT.

| Ref. No. | Part Number | Description | Ref. No. | Part Number | Description |
|------------------------|-------------|--------------------------------------------------------------------------------------|----------------------------|---------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| C-1 | 21A591682 | Mica, metal: 90 mmf 500V | R-12 | 6R2122 | 4.7 meg 20% 1/4W |
| C-2 | 8A4529 | Paper: .006 mf 100V | R-13 | 6R5577 | 2700 10% 1/4W |
| C-3 | 20A501419 | Mica, variable: 50 to 280 mmf; includes bracket | R-14 | 6R5614 | 56 10% 1/4W |
| C-4 | 8R13514 | Paper: .05 mf 100V | R-15 | 6R5614 | 56 10% 1/4W |
| C-5 | 8R13166 | Paper: .1 mf 400V | R-16 | 18K502898 | Tone control: 1 meg; includes volume control R-8 |
| C-6 | - | Variable, mica: RF trimmer (see AT-90 Service Manual) | R-17 | 6R6032 | 470,000 20% 1/4W |
| C-7 | 21K70720 | Molded, miniature: 5 mmf 500V | R-18 | 6R6014 | 220,000 20% 1/4W |
| C-8 | - | Variable, mica: osc trimmer (see AT-90 Tuner Service Manual) | R-19 | 6R6336 | 270 10% 1W |
| C-9 | - | Ceramic: temperature compensating (see AT-90 Tuner Service Manual) | R-20 | 6R476130 | 2200 20% 2W |
| C-10 | 21R6513 | Mica: 50 mmf 500V | SP-1 | 1A501207 | Spark Plate Assembly |
| C-11 | 8K17028 | Paper: .5 mf 100V | Transformers | - | - |
| C-12 | 8R472754 | Paper: .01 mf 100V | T-1 | 24C485553 | IF Transformer, 455 Kc: complete with padding capacitors and tuning cores |
| C-13 | 21K70720 | Molded, miniature: 5 mmf 500V | T-2 | 24K485555 | Diode transformer, 455 Kc: complete with padding capacitors and tuning cores |
| C-14 | 8R51209 | Paper: .02 mf 100V | T-3 | 25B500727 | Output Transformer |
| C-15 | 8K17028 | Paper: .5 mf 100V | T-4 | 25B472533 | Power Transformer |
| C-16 | 8K17910 | Paper: .006 mf 400V | Tuner - Model AT-90 | - | - |
| C-17 | 8R23690 | Paper: .01 mf 400V | 51D502000 | Tuner, Model AT-90 (see AT-90 Tuner Service Manual for breakdown) | |
| C-18 | 21R6580 | Mica: 500 mmf 500V | CHASSIS PARTS - MECHANICAL | - | - |
| C-19 | 8K11437 | Paper: .02 mf 1000V | 7B501177 | Bracket, dial background | |
| C-20 | 23A485677 | Electrolytic: 15-10 mf/350V, 20 mf/25V | 7C501187 | Bracket, dial scale mounting | |
| C-21 | 8K71909 | Paper: .004 mf 400V | 7B501472 | Bracket, shield | |
| F-1 | 65K16248 | Fuse: 9 amp | 43K502884 | Bushing, control shaft (volume and tuning shaft mtg) | |
| F-1 | 48B3333 | Vibrator, non-sync: 4-pin | 42B500725 | Clip, bottom cover retainer | |
| Pilot Light | - | - | 42B485548 | Clip, coil can mounting | |
| I-1 | 65K10867 | Bulb: 6.3V; .25A; #44 bayonet base | 42K510959 | Clip, dial retaining | |
| Coils | - | - | 42A4215 | Clip, vibrator grounding | |
| L-1 | - | Antenna coil (see AT-90 Tuner Service Manual) | 1X500714 | Cover Assembly, bottom: includes clips and grounding wiper | |
| L-2 | - | RF coil (see AT-90 Tuner Service Manual) | 15C500663 | Cover, top | |
| L-3 | - | Oscillator coil (see AT-90 Tuner Service Manual) | 9K510182 | Lead Assembly, fuse: complete; with fuse | |
| L-4 | 24K592269 | Choke, hash | 4S7668 | Lockwasher, ext: 3/8; stl; cad pl (volume and tuning shaft mtg) | |
| L-5 | 24A472535 | Choke, hash | 4S7686 | Lockwasher, ext: #5; spring stl; cad pl (dial light socket mtg) | |
| Resistors | - | - | 51A502012 | Pinion Shaft and Drive Disc Assembly | |
| R-1 | 6R6032 | 470,000 20% 1/4W | 64K510429 | Plate, chassis front | |
| R-2 | 6R3992 | 150 20% 1/4W | 28A791030 | Plug, 2-pin (on sprk cable) | |
| R-3 | 6R6028 | 22,000 20% 1/4W | 1X510728 | Pointer, dial | |
| R-4 | 6R6012 | 33,000 20% 1/4W | 9A472148 | Receptacle, antenna | |
| R-5 | 6R476012 | 3900 10% 2W | 34B502890 | Scale, dial | |
| R-6 | 6R6010 | 330 20% 1/4W | 2S2878 | Nut, hex: 1/4-20 x 7/16; stl; cad pl (receiver mtg) | |
| R-7 | 6R6056 | 47,000 20% 1/4W | 2S2869 | Nut, hex: 5/16-18 x 9/16; pol nkl (receiver and bezel mtg) | |
| R-8 | 18K502898 | Volume-On-Off: 250,000 ohms; includes tone control R-16 | 9A791031 | Receptacle, two-prong: less shell & insulator (used on sprk cable) | |
| R-9 | 6R6394 | 12,000 10% 1/4W | 64K510084 | Screen, speaker | |
| R-10 | 6R6004 | 1 meg 20% 1/4W | - | - | |
| R-11 | 6R6004 | 1 meg 20% 1/4W | - | - | |
| 3S10073 | - | Screw, machine: 8-32 x 3/4; Phillips oval head; chrome pl (sprk mtg) | 3S1849 | - | |
| 3S7454 | - | Screw, sheet metal: #8 x 1/4; plain hex head; stl; cad pl (mtg plate mtg) | 3S410095 | - | |
| 3S1849 | - | Screw, machine: 1/4-20 x 1/2; slotted round head; stl; cad pl (support bracket mtg) | 3S7104 | - | |
| 3S410095 | - | Screw, machine: 1/4-20 x 5/8; plain hex head; stl; cad pl (support brkt mtg to dash) | 15K74442 | - | |
| 3S7104 | - | Setscrew: 8-32 x 3/16; slotted headless; stl; cad pl (control knob) | 50B500707 or 50B592352 | Speaker, PM; 6"; 3.2 ohm VC | |
| 15K74442 | - | Shell and insulator (for sprk receptacle) | 41A77592 | Spring, compression (behind volume control knob) | |
| 50B500707 or 50B592352 | - | Speaker, PM; 6"; 3.2 ohm VC | 6A4141 | Suppressor, distributor | |
| 41A77592 | - | Spring, compression (behind volume control knob) | 4S7562 | Washer, flat: 7/16 x .187 x .033; stl; cad pl (sprk mtg) | |
| 6A4141 | - | Suppressor, distributor | 4S1792 | Washer, flat: 5/8 x 9/32 x .090; stl; cad pl (support bracket mtg to mtg plate) | |
| 4S7562 | - | Washer, flat: 7/16 x .187 x .033; stl; cad pl (sprk mtg) | 4S1730 | Washer, flat: 3/4 x .453 x .040; stl; cad pl (bezel mtg) | |
| 4S1792 | - | Washer, flat: 5/8 x 9/32 x .090; stl; cad pl (support bracket mtg to mtg plate) | 4A580282 | Washer, spring (behind dummy knob) | |
| 4S1730 | - | Washer, flat: 3/4 x .453 x .040; stl; cad pl (bezel mtg) | 51K502894 | Shaft Assembly, manual drive: complete | |
| 4A580282 | - | Washer, spring (behind dummy knob) | 9K580218 | Socket, tube: 7-prong; with one dummy lug | |
| 51K502894 | - | Shaft Assembly, manual drive: complete | 9A70208 | Socket, 4-prong (vibrator) | |
| 9K580218 | - | Socket, tube: 7-prong; with one dummy lug | 9K510960 | Socket, dial light: includes brkt. | |
| 9A70208 | - | Socket, 4-prong (vibrator) | 31K490142 | Strip, terminal: 2 insulated lugs, #1 mtg | |
| 9K510960 | - | Socket, dial light: includes brkt. | 31K490143 | Strip, terminal: 2 insulated lugs, #2 mtg | |
| 31K490142 | - | Strip, terminal: 2 insulated lugs, #1 mtg | 31A500705 | Strip, terminal: 3 insulated lugs, #2 mtg | |
| 31K490143 | - | Strip, terminal: 2 insulated lugs, #2 mtg | 39K502418 | Wiper, ground (used on vibrator socket) | |
| 31A500705 | - | Strip, terminal: 3 insulated lugs, #2 mtg | 39K470032 | Wiper, grounding (bottom cover) | |
| 39K502418 | - | Wiper, ground (used on vibrator socket) | 13K510082 | Bezel, speaker | |
| 39K470032 | - | Wiper, grounding (bottom cover) | 1X510730 | Button, push | |
| 13K510082 | - | Bezel, speaker | 7B502885 | Bracket, receiver mtg | |
| 1X510730 | - | Button, push | 8A4491 | Capacitor, noise suppression | |
| 7B502885 | - | Bracket, receiver mtg | 32B502889 | Gasket, speaker | |
| 8A4491 | - | Capacitor, noise suppression | 1X473155 | Knob, tuning and volume: chrome pl | |
| 32B502889 | - | Gasket, speaker | 37K472939 | Knob, tone control: chrome pl | |
| 1X473155 | - | Knob, tuning and volume: chrome pl | 36K502896 | Knob, dummy: chrome pl (behind tuning knob) | |
| 37K472939 | - | Knob, tone control: chrome pl | 4S7688 | Lockwasher, int-ext: 1/4; stl; cad pl (receiver mtg) | |
| 36K502896 | - | Knob, dummy: chrome pl (behind tuning knob) | 4S7657 | Lockwasher, ext: #8; cad pl (sprk mtg) | |
| 4S7688 | - | Lockwasher, int-ext: 1/4; stl; cad pl (receiver mtg) | 1A472928 | Mounting Plate & Stud Assembly (receiver rear mtg) | |
| 4S7657 | - | Lockwasher, ext: #8; cad pl (sprk mtg) | - | - | |
| 1A472928 | - | Mounting Plate & Stud Assembly (receiver rear mtg) | - | - | |

PAGE 22-52 MOTOROLA

MODEL 1MF, Ford
Part No. 1A-18805-A2



GENERAL INFORMATION

TYPE - Automotive superheterodyne receiver with external speaker.

TUNING RANGE - 540 to 1610 Kc IF - 265 Kc

TUBE COMPLEMENT - 6SK7GT - RF Amplifier 6SQ7GT - Det, AVC & AF Amp
6SA7GT - Converter 6V6GT - AF Output Amplifier
6SK7GT - IF Amplifier 6X5GT - Rectifier

OPERATES FROM - 6 volt storage battery

TUNER - Model AT-81 Service Manual for Replacement Parts.

TO SET THE PUSH BUTTONS

Automatic push button tuning is provided for selection of five favorite local stations. The five push buttons may be adjusted to any of the desired stations. In order to simplify the identification of these stations, it is advisable to set the push buttons in sequence according to their frequencies, beginning with the station broadcasting on the lowest frequency and progressing to the station broadcasting on the highest frequency. The push buttons should be set up during the daytime because at night, distant stations will be heard with the same intensity as local stations, making it difficult to select local stations. To set the push buttons proceed as follows:

1. Collapse the antenna.
2. Turn the receiver on and allow it to operate for at least fifteen minutes in order for each part to reach normal operating temperature.
3. Loosen the first push button on the left by turning it

(with your fingers) counterclockwise one turn.

4. Select the station desired and with low volume tune it in by turning the manual tuning knob. Tune very carefully for clearest reception.
5. Press the first push button in firmly, then release and tighten (with your fingers) by turning clockwise.

The first push button is now set for this station selection. Follow the above procedure for setting each of the other four buttons.

When the five push buttons have been set to the desired stations, return the antenna to the lowest position necessary for good reception. It is only necessary to press a push button to receive the station for which the adjustment was made. The dial pointer will automatically indicate the frequency of the selected station.

54P501535 1050

ALIGNMENT

Connect the receiver "A" lead and receiver chassis to a 6 volt storage battery. Rotate volume and tone controls to maximum clockwise position. Connect an output meter across the speaker voice coil. Use an insulated screwdriver for making all adjustments. For greatest accuracy, keep output of receiver at approximately 1 watt (1 watt = 1.79 volts on output meter) throughout alignment by reducing generator output (not receiver volume control) as stages are brought into alignment. Remove receiver es-

cuteon, dial scale, and top & bottom covers to expose all alignment adjustments. See Figure 1.

To adjust the pointer, tune the receiver to a 1300 Kc signal, and rotate the adjusting cam (see Figure 1) until the pointer coincides with the 1300 Kc marker on the dial scale. This cam may be adjusted thru a hole provided in the top cover.

ALIGNMENT CHART

| STEP | DUMMY ANTENNA | GENERATOR CONNECTION | GENERATOR FREQUENCY | TUNER SET TO | ADJUST | REMARKS |
|------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-------------------------------|-------------------------------------|------------------------------------------------------------------|---------------------|---------------------------------------------------------------------------------------------------------|
| IF ALIGNMENT | | | | | | |
| 1. | .1 mf | Converter grid (6SA7GT pin 8) | 265 Kc | HF end stop | 1, 2, 3 & 4 | Adjust for maximum. Repeat for greater accuracy. |
| RF ALIGNMENT | | | | | | |
| 2. | See Fig. 1 | Ant. receptacle | 1608 Kc | HF end stop* | C-12, C-8 C-1 | Adjust for maximum. |
| 3. | See Fig. 1 | Ant. receptacle | 1300 Kc | Move carriage "in" 21/64" from HF end stop position. See Fig. 1. | L-4, L-3 L-1 | Adjust for maximum. |
| 4. | See Fig. 1 | Ant. receptacle | 1608 Kc | HF end stop | C-12, C-8 C-1 | Adjust for maximum. |
| 5. Repeat steps 3 & 4 until no further increase is obtainable. After final adjustment is made, cement core adjustments in place with speaker cement. | | | | | | |
| SENSITIVITY CONTROL | | | | | | |
| 6. | See Fig. 1 | Ant. receptacle | Set to 600 kc & 4 microvolts output | Tune for max | Sensitivity control | Set sensitivity control for 1 watt output (1.79 volts on output meter). |
| ANTENNA TRIMMER ADJUSTMENT | | | | | | |
| 7. | - | - | - | Weak station at approx. 1400 Kc | C-1 | With receiver installed in car, peak antenna trimmer for maximum volume. Ant. should be fully extended. |

*Tuner cores should be backed out to project 1-3/8" from end of coil forms so they will have no effect on trimmer adj.

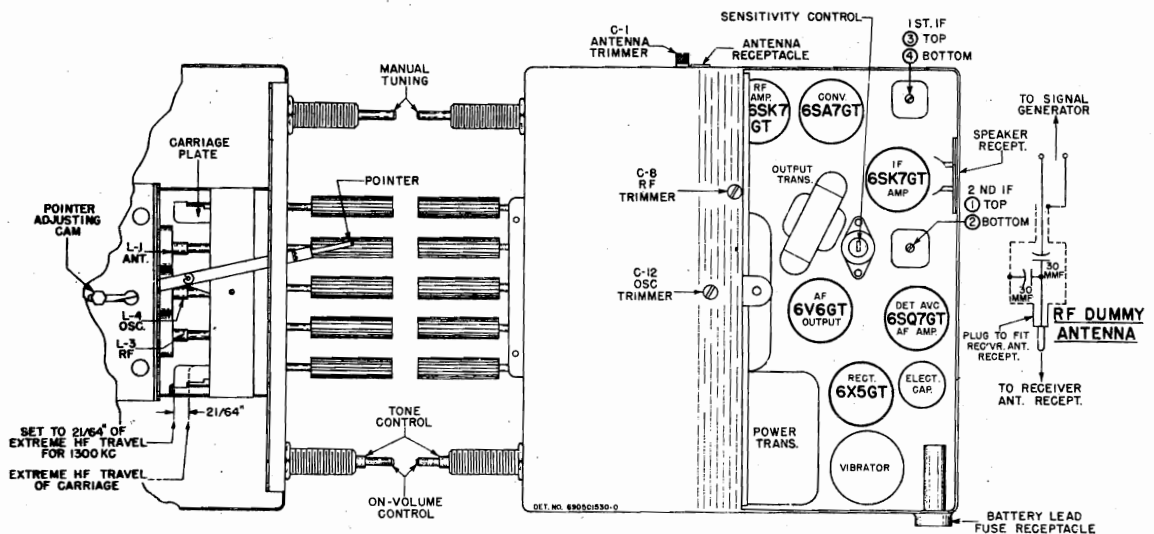


FIGURE 1. TUBE AND TRIMMER LOCATIONS

MODEL 1MF, Ford
 Part No. 1A-18805-A2

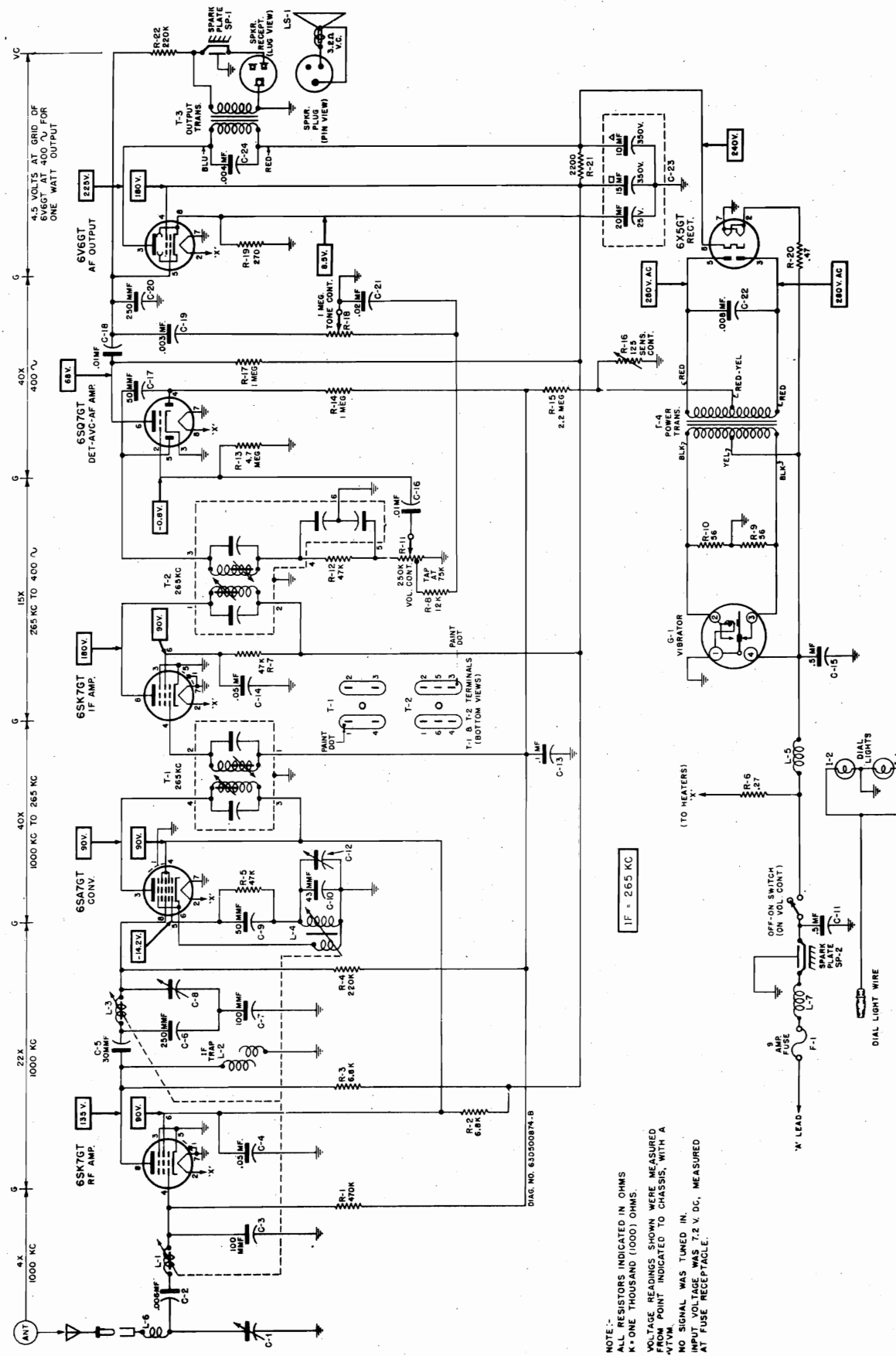


FIGURE 2. SCHEMATIC DIAGRAM

NOTE:-
 ALL RESISTORS INDICATED IN OHMS
 K - ONE THOUSAND (1000) OHMS.
 VOLTA GE READINGS SHOWN WERE MEASURED
 FROM POINT INDICATED TO CHASSIS, WITH A
 -47VM.
 NO SIGNAL WAS TUNED IN.
 INPUT VOLTAGE WAS 7.2 V. DC, MEASURED
 AT FUSE RECEPTACLE.

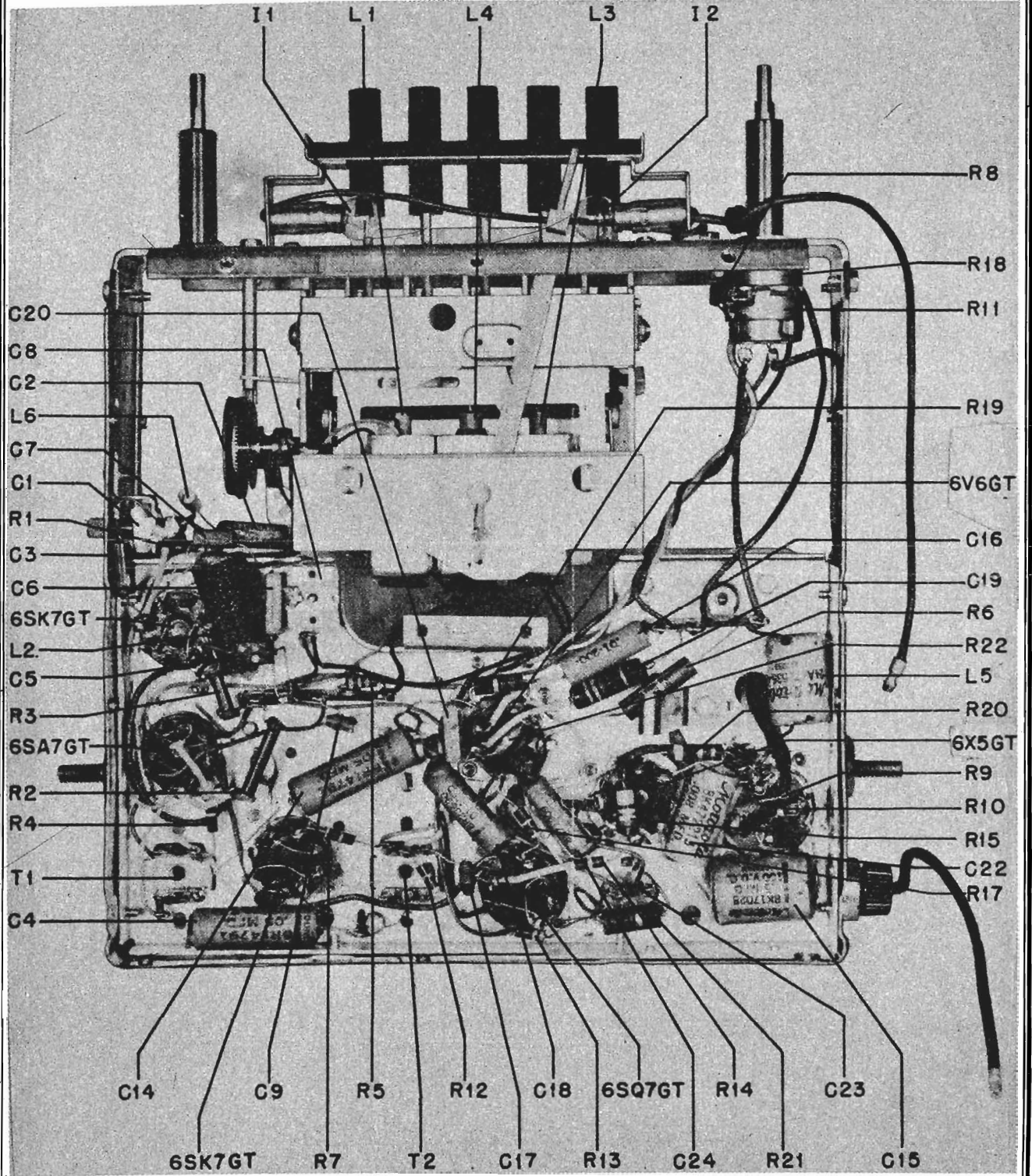


FIGURE 3. PARTS LOCATION

MODEL 1MF, Ford
Part No. 1A-18805-A2

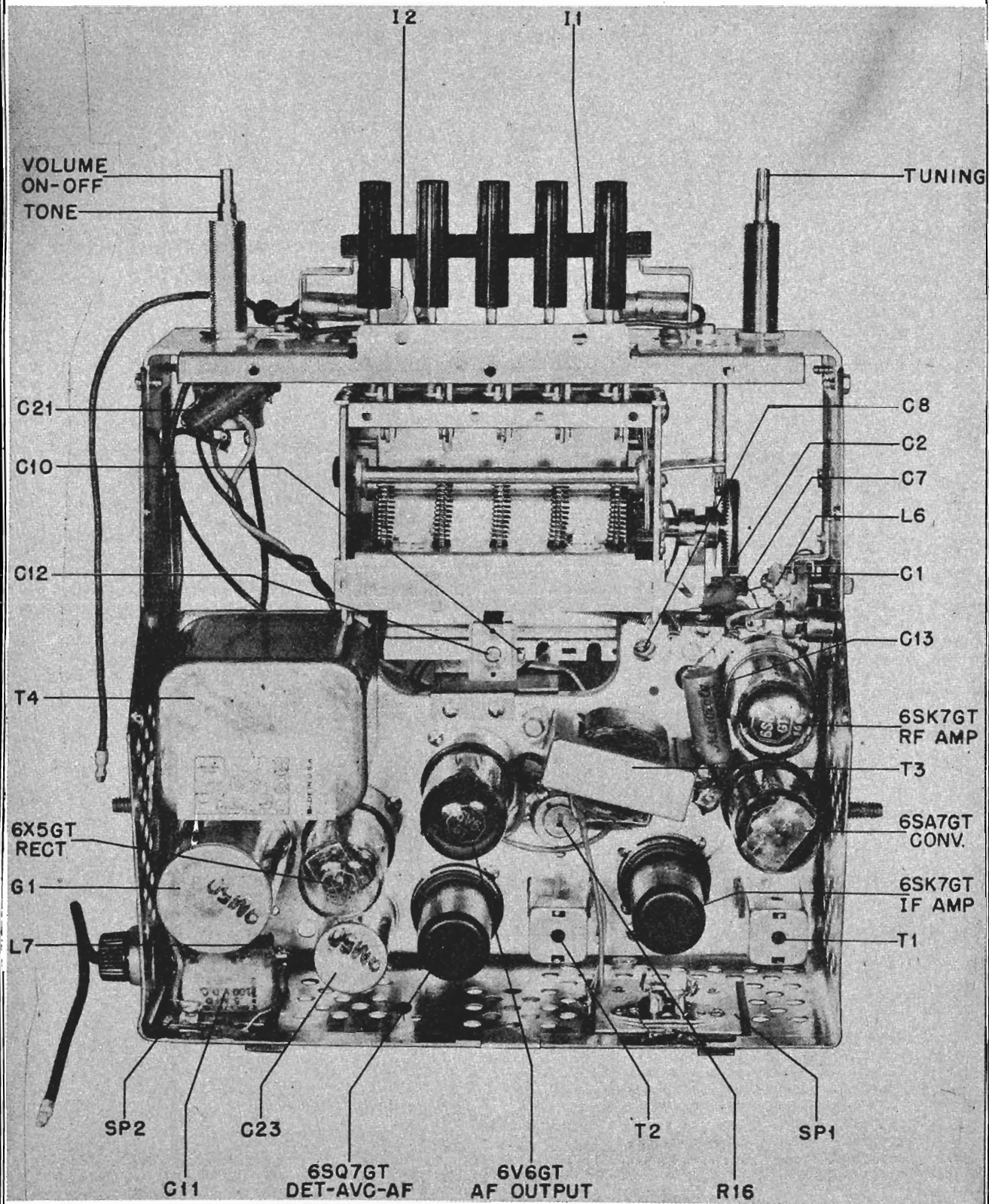


FIGURE 4. PARTS LOCATION

REPLACEMENT PARTS LIST

NOTE: When ordering parts, specify model number of set in addition to part number and description of part.

| Motorola Part Number | Description | Motorola Part Number | Description | Motorola Part Number | Description |
|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-------------|----------------------|-------------|
| CHASSIS PARTS - ELECTRICAL | | | | | |
| C-1 | 20B591269 Capacitors | | | | |
| C-2 | 84A529 Mica, variable: 5 to 80 mf; includes bracket & thumbscrew | | | | |
| C-3 | 21R6619 Paper: .006 mf 100V | | | | |
| C-4 | 81K1791 Paper: .05 mf 400V | | | | |
| C-5 | 21R6665 Mica: 250 mf 10K 500V | | | | |
| C-6 | 21R6662 Mica: 100 mf 10K 300V | | | | |
| C-7 | 21R6631 Mica, variable: 5 to 80 mf; includes bracket | | | | |
| C-8 | 20A591272 Mica, variable: 5 to 80 mf; includes bracket | | | | |
| C-9 | 21R6513 Mica: 50 mf 10K 300V | | | | |
| C-10 | Compensating - See AT-81 Tuner Service Manual | | | | |
| C-11 | 8K17028 Paper: .5 mf 100V | | | | |
| C-12 | Mica, variable - See AT-81 Tuner Service Manual | | | | |
| C-13 | 8R472035 Paper: .1 mf 100V | | | | |
| C-14 | 8R14791 Paper: .05 mf 400V | | | | |
| C-15 | 8K17028 Paper: .5 mf 100V | | | | |
| C-16 | 8K472754 Paper: .01 mf 100V | | | | |
| C-17 | 21R6513 Mica: 50 mf 10K 300V | | | | |
| C-18 | 8R23690 Paper: .003 mf 400V | | | | |
| C-19 | 21R6648 Mica: 250 mf 20K 500V | | | | |
| C-20 | 8R51209 Paper: .02 mf 100V | | | | |
| C-21 | 8R51209 Paper: .02 mf 100V | | | | |
| C-22 | 8R472215 Paper: .008 mf 1600V | | | | |
| C-23A, B & C | 23A485677 Electrolytic: 10-15-20 mf/350-350-25V | | | | |
| C-24 | 8K71909 Paper: .004 mf 400V | | | | |
| Fuse | | | | | |
| F-1 | 65K16248 Fuse, 9 amp | | | | |
| Vibrator | | | | | |
| G-1 | 48B3333 Vibrator, 4-prong; full wave; non sync | | | | |
| Dial Light | | | | | |
| I-1,2 | 65K4151 Bulb, pilot: 6-8V; .2A, round bayonet base; #55 | | | | |
| Coils | | | | | |
| L-1 | Antenna Coil Assembly - See AT-81 Tuner Service Manual | | | | |
| L-2 | 24A591317 Coil, IF trap: 265 kc | | | | |
| L-3 | RF Coil Assembly - See AT-81 Tuner Service Manual | | | | |
| L-4 | Oscillator Coil Assembly - See AT-81 Tuner Service Manual | | | | |
| L-5 | 24A472535 Choke, hash | | | | |
| L-6 | 44K592197 Choke, antenna spark | | | | |
| L-7 | 24A501320 Choke, "A" spark | | | | |
| Resistors | | | | | |
| R-1 | 6R6032 470,000 20% 1/2W | | | | |
| R-2 | 6R6287 6800 20% 1W N.I. | | | | |
| R-3 | 6R490492 6800 20% 1W | | | | |
| R-4 | 6R6015 220,000 20% 1/2W | | | | |
| R-5 | 6R6056 47,000 20% 1/2W | | | | |
| R-6 | 17K488267 Wirewound: .27 10% 1W | | | | |
| R-7 | 6R6056 47,000 20% 1/2W | | | | |
| R-8 | 6R6394 12,000 10% 1/2W | | | | |
| R-9 | 6R6394 12,000 10% 1/2W | | | | |
| R-10 | 6R6394 12,000 10% 1/2W | | | | |
| R-11 | 18B501153 Volume & tone control: dual; 250,000 ohms each section; rear section tapped at 75,000 ohms; with switch | | | | |
| R-12 | 6R6056 47,000 20% 1/2W | | | | |
| R-13 | 6R2122 4.7 meg 20% 1/2W | | | | |
| R-14 | 6R6046 1 meg 20% 1/2W | | | | |
| R-15 | 6R3927 2.2 meg 20% 1/2W | | | | |
| R-16 | 18K591265 Control, sensitivity: 125 | | | | |
| R-17 | 6R6046 1 meg 20% 1/2W | | | | |
| R-18 | Tone control (part of R-11) | | | | |
| R-19 | 6R6336 270 10% 1W | | | | |
| R-20 | 17K488266 Wirewound: 47 10% 1/2W | | | | |
| R-21 | 6R6006 2200 20% 1W N.I. | | | | |
| R-22 | 6R6015 220,000 20% 1/2W | | | | |
| Spark Plate | | | | | |
| SP-1 | 1A591220 Spark Plate Assembly: spkr | | | | |
| SP-2 | 1A591221 Spark Plate Assembly: "A" | | | | |
| Transformers | | | | | |
| T-1 | 24B580183 1st IF transformer: 265 Kc; iron core tuning | | | | |
| T-2 | 24K591267 2nd IF transformer: 265 Kc; iron core tuning | | | | |
| T-3 | 25B501909 Transformer, output | | | | |
| T-4 | 25C591264 Transformer, power | | | | |
| Tuner | | | | | |
| 51D501008 | Permeability tuner: Model AT-81 (See AT-81 Service Manual) | | | | |
| CHASSIS PARTS - MECHANICAL | | | | | |
| 7A912109 | Bracket, front cover mounting | | | | |
| 51B501304 | Bracket and Socket Assembly, dial; complete with leads & bullet terminal; less bulbs | | | | |
| 42A485548 | Clip, coil can | | | | |
| 42A4215 | Clip, vibrator ground | | | | |
| 1X501260 | Escutcheon and Dial Scale Assembly | | | | |
| 9A501325 | Fusebody Retainer: includes body, spring and contact assembly | | | | |
| 37K85556 | Grommet, rubber (dial light lead insulator) | | | | |
| 2S2882 | Nut, hex: 1/2-28 x 11/16; stl; cad pl (volume control and escutcheon mtg) | | | | |
| 2S488296 | Nut, speed (fuse retainer mtg) | | | | |
| 5S7706 | Rivet: .122 x 1/8; stl; nkl pl (grounding wiper mtg) | | | | |
| 5S7707 | Rivet: .122 x 5/32; stl; nkl pl (tub socket, spark plate, shield, front cover bracket, sensitivity control terminal strip and antenna socket mtg) | | | | |
| 5S7703 | Rivet: .122 x 7/32; stl; nkl pl (vibrator clip mtg) | | | | |
| 5S7708 | Rivet: .122 x 9/32; stl; nkl pl (speaker socket mtg) | | | | |
| 34B500603 | Scale, dial | | | | |
| 3S7350 | Screw, machine: 6-32 x 1/4; slotted hex head; locking type; stl; cad pl (ant & RF trim mtg) | | | | |
| 3S3397 | Screw, sheet metal: #8 x 5/16 PKZ; plain hex head; stl; cad pl (pwr transformer mtg) | | | | |
| 3S488298 | Screw, sheet metal: #8 x 1/4 PKZ; slotted hex head; stl; cad pl (out put trans, tuner mtg and housing screws) | | | | |
| 3S7454 | Screw, sheet metal: #8 x 1/4 PKZ; plain hex head; stl; cad pl (dial brkt assom mtg) | | | | |
| 26A591208 | Shield, hash | | | | |
| 9A912113 | Socket, antenna connector | | | | |
| 9A912114 | Socket, speaker: 3-prong | | | | |
| 9A590099 | Socket, tube: octal; molded | | | | |
| 9A70208 | Socket, tube: 4-prong, wafer | | | | |
| 31K490143 | Strip, terminal: 2 insulated lugs; #2 mtg; 3/8" spacing | | | | |
| HOUSING PARTS & ACCESSORIES | | | | | |
| 30K501326 | Cable, fuse: includes knob & insert | | | | |
| 8A590751 | Capacitor, fuel gauge (Ford 51AF-18871) | | | | |
| 8B591375 | Capacitor, generator (Ford 51AF-18827) | | | | |
| 8B500736 | Capacitor, oil gauge (Ford 8M18826) | | | | |
| 8A500737 | Capacitor, voltage regulator (Ford 8M18832) | | | | |
| 42A591234 | Clip, cover tension & grounding wiper | | | | |
| 15C591222 | Cover, bottom front: includes brkt & grounding wiper | | | | |
| 15D500675 | Cover, bottom rear | | | | |
| 1C501211 | Baffle and Gasket Assembly, speaker (Ford 1A-18836) | | | | |
| 13B500596 | Bezel, cup: chrome pl (Ford 1A-18835) | | | | |
| 7C500695 | Bracket, receiver mtg: RH (Ford 1A-18888) | | | | |
| 7K500697 | Bracket, receiver mtg: LH (Ford 1A-18889) | | | | |
| 1X501261 | Knob, manual tuning: chrome pl (Ford 1A-18824) | | | | |
| 36B500598 | Knob, tone control: chrome pl (Ford 1A-18830) | | | | |
| 1X501262 | Knob, volume control and on-off (Ford 1A-18820) | | | | |
| 4S7693 | Lockwasher, split: 1/4; stl; cad pl (receiver mtg) (Ford 34805-S8) | | | | |
| 2S2878 | Nut, hex: 1/4-20 x 7/16; stl; cad pl (receiver mtg) (Ford 33795-S8) | | | | |
| 2S2882 | Nut, hex: 1/2-28 x 11/16; stl; cad pl (receiver mtg to instrument panel and bezel cup mtg) (Ford 356098-S8) | | | | |
| 2A912119 | Nut, wing: 8-32; stl; cad pl (spkr mtg) (Ford 33900-S8) | | | | |
| 3A580587 | Screw, cap: cad pl (bottom cover mtg) | | | | |
| 3S488298 | Screw, sheet metal: #8 x 1/4 PKZ; slotted hex head; stl; cad pl (housing screws) | | | | |
| 6A912121 | Suppressor, distributor (Ford 1GA-18811-A) | | | | |
| 4A500702 | Washer, serrated (receiver mtg) (Ford 0L-18869) | | | | |
| 1X591404 | Wheel Static Collector Assembly | | | | |
| 39A51490 | Wiper ground (on bottom front cover) | | | | |

MODELS 5C4, Ch. HS-270;
 5C5, Ch. HS-271;
 5C6, Ch. HS-272

GENERAL INFORMATION

TYPE - AC table model superheterodyne with appliance outlet and self-contained electric clock for controlling automatically the operation of the radio and the outlet.

APPLIANCE OUTLET - For use with 117 volt AC appliances only, rated at 1100 watts or less.

RECEIVER MODELS -

| Model | Color | Chassis |
|-------|--------|---------|
| 5C4 | Green | HS-270 |
| 5C5 | Ivory | HS-271 |
| 5C6 | Walnut | HS-272 |

TUNING RANGE - 535 to 1620 Kc **IF** - 455 Kc

TUBE COMPLEMENT -

| | |
|-------|-------------------|
| 12BE6 | Converter |
| 12BA6 | IF Amplifier |
| 12AT6 | Det, AVC & AF Amp |
| 50C5 | Power Amplifier |
| 35W4 | Rectifier |

POWER SUPPLY - Operates from 117 volts, 60 cycle, alternating current only. Power consumption 37 watts.

CLOCK - Telechron self-starting electric clock (Telechron basic movement No. C-57, with Motorola face, hands, and escutcheon).



INSTALLATION & OPERATING INSTRUCTIONS

The locations and functions of the clock and radio controls are shown in Figure 1.

NORMAL RADIO OPERATION

Knob "A" on the clock turns the radio on or off. Select stations with the TUNING knob, and adjust volume with the VOLUME control.

A built-in loop antenna eliminates the need for an outside antenna in most locations. When receiving a weak station, rotate the receiver slightly for best signal strength. If additional pick-up is necessary, connect an external antenna to the radio by following the instructions printed on the rear panel. **CAUTION:** Never connect the radio chassis to a water pipe, radiator, or other ground.

CLOCK OPERATION

The clock will start as soon as the receiver is plugged into an electrical outlet. To set the hands to the correct time, rotate the TIME SET knob (on the rear of the radio) in a clockwise direction only.

ALARM OPERATION

To set the alarm, pull out knob "C" and rotate it in a counterclockwise direction to the desired time on the alarm dial scale. The alarm will ring for one hour, or until knob "C" is pushed in. The alarm function is completely independent of the other controls on the clock.

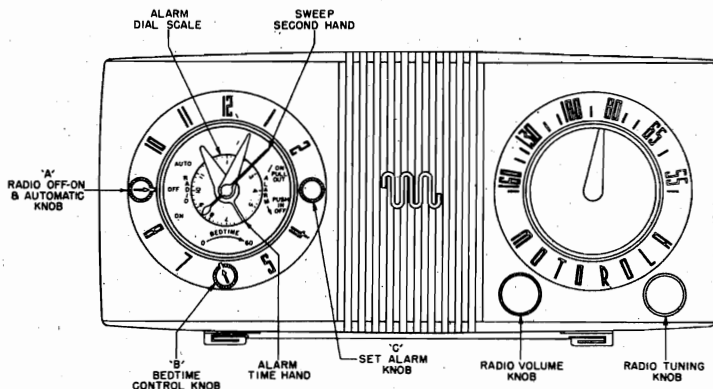


FIGURE 1. OPERATING CONTROLS

MODELS 504, Ch. HS-270;
505, Ch. HS-271;
506, Ch. HS-272

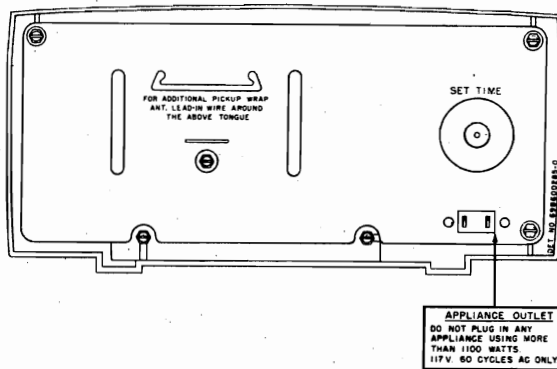


FIGURE 2. REAR VIEW

APPLIANCE OUTLET

To control an electrical appliance automatically, plug it into the receptacle on the back of the radio. See Figure 2. It will then be turned on or off simultaneously with the radio. CAUTION: Note that the rating of the outlet is 1100 watts or less.

If radio reception is not desired when operating the appliance, rotate the radio volume control to the minimum volume position.

BEDTIME CONTROL

The BEDTIME control will turn the radio and appliance off after any pre-set interval of time up to one hour.

Turn knob "A" to the "OFF" position and rotate knob "B" to any period of time between 0 and 60 minutes. The radio and appliance will be turned off automatically after the proper time has elapsed, and they will remain off until turned on again manually.

AUTOMATIC RADIO OPERATION

The clock controls may be pre-set to turn the radio on automatically at any time up to twelve hours in advance.

If an appliance is plugged into the receptacle on the back of the receiver, it will be turned on automatically, along with the radio.

Pull out knob "C", rotate it counterclockwise to the desired time on the alarm dial scale, and push the knob back in. Rotate knob "A" first to the "OFF" and then to the "AUTO" position. At the pre-set time, the radio will come on and will continue to play until turned off manually. The alarm will ring also if the knob "C" is left pulled out. The radio will come on first and, after an interval of about ten minutes, the alarm will ring.

BEDTIME AND AUTOMATIC OPERATIONS COMBINED

By combining the operations in the two sections above, the radio may be turned off automatically and on again automatically.

When setting the BEDTIME control, rotate knob "A" to the "AUTO" position instead of "OFF". IMPORTANT: It is necessary to turn knob "A" first to the "OFF" position before proceeding to "AUTO", otherwise the radio may not shut off.

ALIGNMENT

NOTE: It is recommended that an isolation transformer be placed between the power line and the receiver to avoid hum and electrical shocks. If an isolation transformer is not available, connect the low side of the signal generator to B through a .1 mf capacitor.

1. Connect a low range output meter across the speaker voice coil.
2. Connect the low side of the signal generator to B-.
3. Set the signal generator for 400 cycle, 30% modulation.

4. Turn the receiver volume control to maximum.
5. Use a small fibre screwdriver for aligning the IF and diode transformers.
6. As stages are brought into alignment, reduce the signal generator output to a level which produces less than .40 volts (.05 watt) across the voice coil to avoid overloading the receiver.
7. See Figure 3 for adjustment locations and the following chart for procedure.

ALIGNMENT CHART

| STEP | DUMMY ANTENNA | GENERATOR CONNECTION | GENERATOR FREQUENCY | GANG SETTING | ADJUST | REMARKS |
|--------------|---------------|------------------------------|---------------------|--------------|------------------------|-------------------------------------|
| IF ALIGNMENT | | | | | | |
| 1. | 1 mf | Grid of conv. (pin 7, 12BE6) | 455 Kc | Fully open | 1, 2, 3 & 4 (IF cores) | Adjust for maximum. |
| RF ALIGNMENT | | | | | | |
| 2. | - | - | - | Fully closed | - | Set pointer to horizontal position. |
| 3. | - | Grid of conv. (pin 7, 12BE6) | 1620 Kc | Fully open | 5 (Osc) | Adjust for maximum. |
| 4. | - | Radiation loop* | 1400 Kc | Tune for max | 6 (Ant) | Adjust for maximum. |

*Connect generator output across 5" diameter, 5 turn loop and couple inductively to receiver loop. Keep loops at least 12" apart.

MODELS 504, Ch. HS-270;
 505, Ch. HS-271;
 506, Ch. HS-272

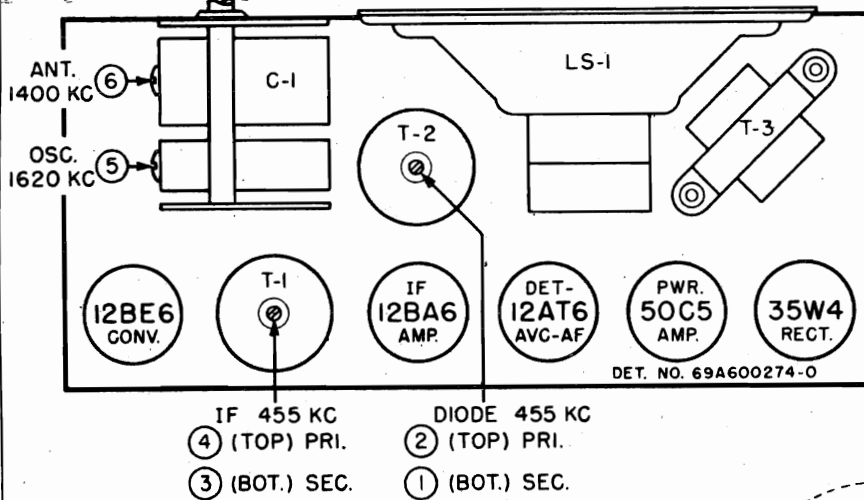
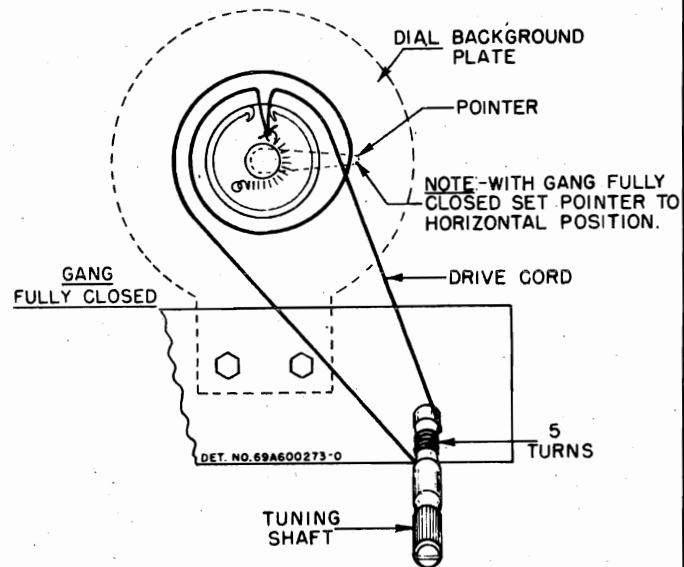


FIGURE 3. TUBE & TRIMMER LOCATIONS

FIGURE 4. STRING DRIVE DETAIL



SERVICE NOTES

TO REMOVE RADIO CHASSIS FROM CABINET

1. Pull off the two radio control knobs.
2. Remove the three hex head screws which hold the loop to the cabinet.
3. From the back of the cabinet, remove the two hex head screws at the rear edge of the radio chassis.
4. Slide the radio chassis and loop from the cabinet.
5. Disconnect the power leads to the radio chassis and to the appliance receptacle.

TO REMOVE CLOCK FROM CABINET

1. Remove radio chassis as above.
2. Remove the three nuts and lockwashers holding the shield behind the clock.
3. Slide the shield from the cabinet.
4. Turn the BEDTIME control knob to "60".
5. Pull out the ALARM set knob.
6. Turn the RADIO control knob to "AUTO".
7. While observing the clock from the back to avoid bending or breaking any parts, gently push the clock forward, at the same time twisting it slightly to eliminate binding.

TO REPLACE CLOCK DIAL FACE

1. Remove the clock from the cabinet as above.
2. Pull off the RADIO control and BEDTIME knobs.
3. Turn the ALARM set knob clockwise to remove.
4. Remove the escutcheon and crystal.
5. Carefully pull off the three hands.
6. Remove the alarm dial and the clock face.
7. Turn the radio control shaft to "AUTO" position.
8. Slowly rotate the time set shaft clockwise until the switch contacts behind the radio control shaft close.
9. Reassemble the clock face, alarm dial and three hands. Set all the hands to indicate 12 o'clock. Set the figure "12" on the alarm dial to index with the small pointer on the hour hand.
10. Replace the crystal, the escutcheon, and the knobs.
11. Check the automatic operation to be sure the switch contacts close at the time indicated on the alarm dial.

MODELS 5C4, Ch. HS-270;
 5C5, Ch. HS-271;
 5C6, Ch. HS-272

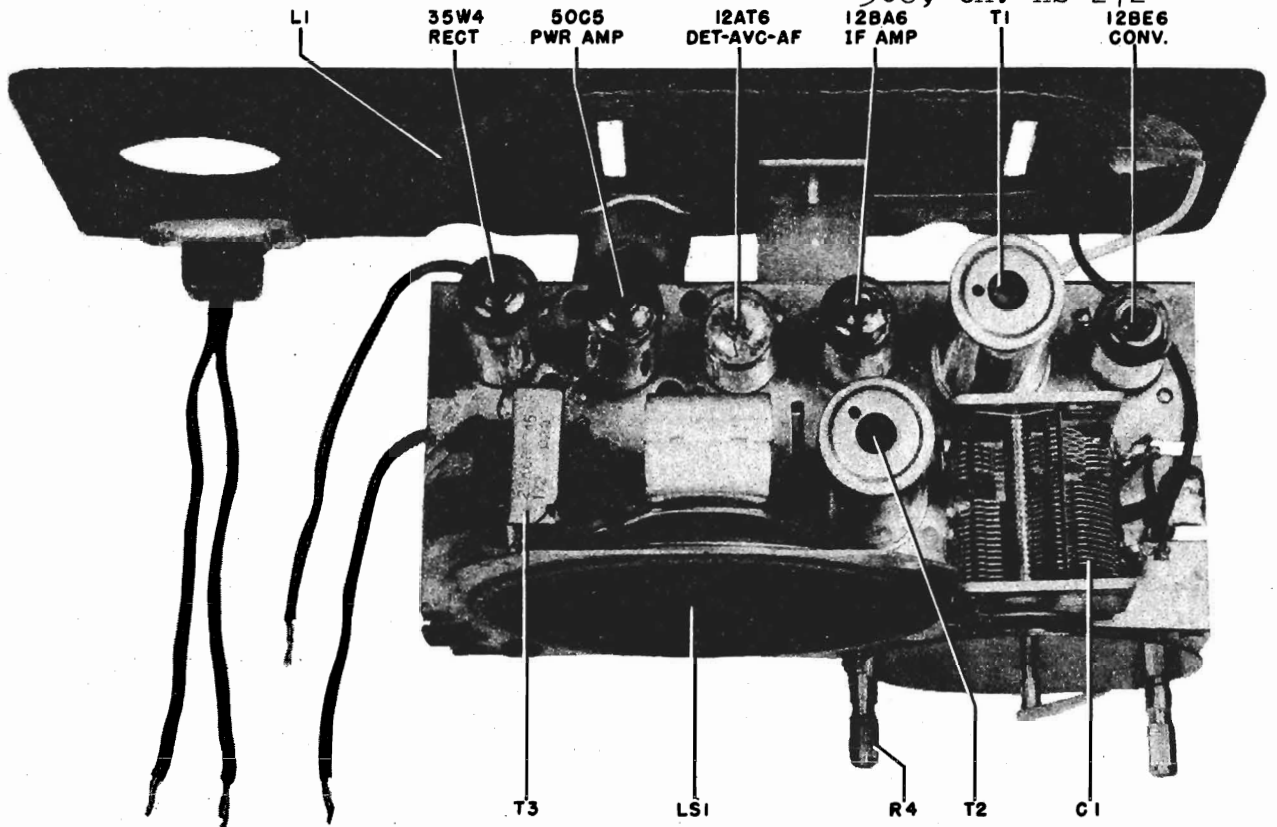


FIGURE 5. TOP VIEW OF CHASSIS

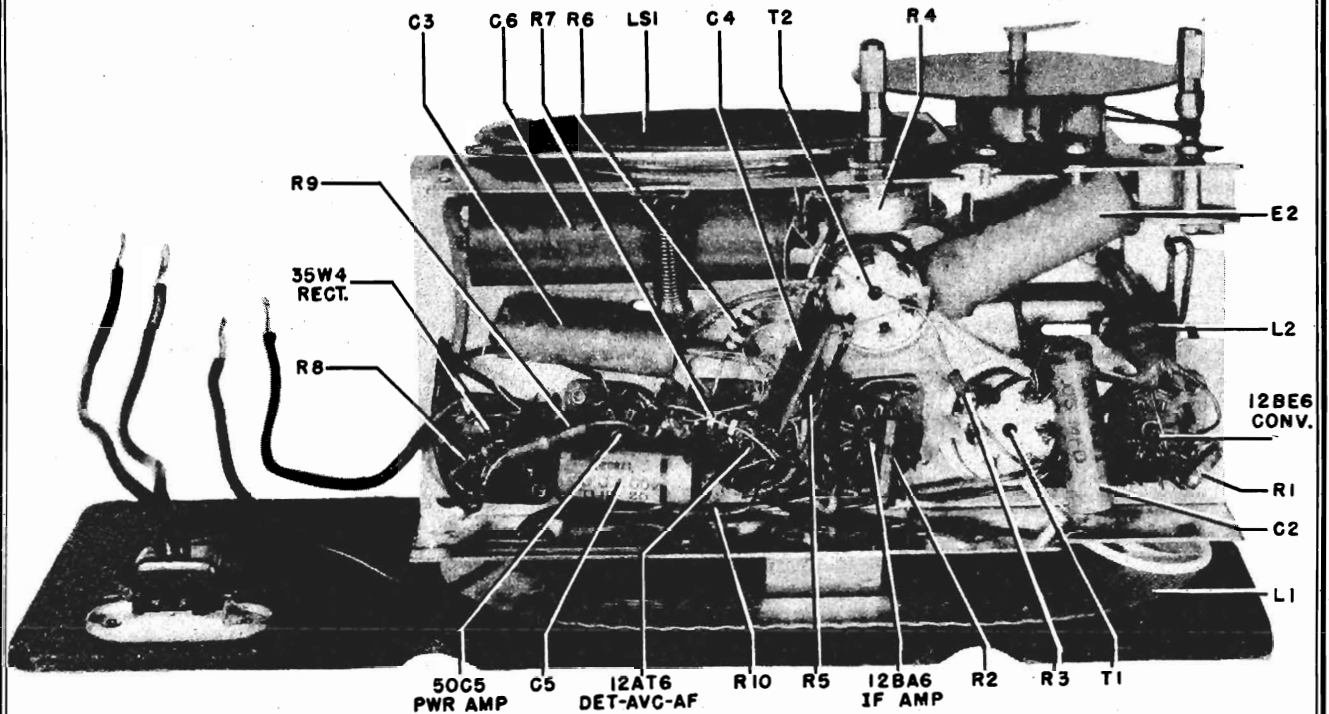


FIGURE 6. BOTTOM VIEW OF CHASSIS USING MULTIPLE CERAMIC CAPACITOR PLATE

MODELS 504, Ch. HS-270;
 505, Ch. HS-271;
 506, Ch. HS-272

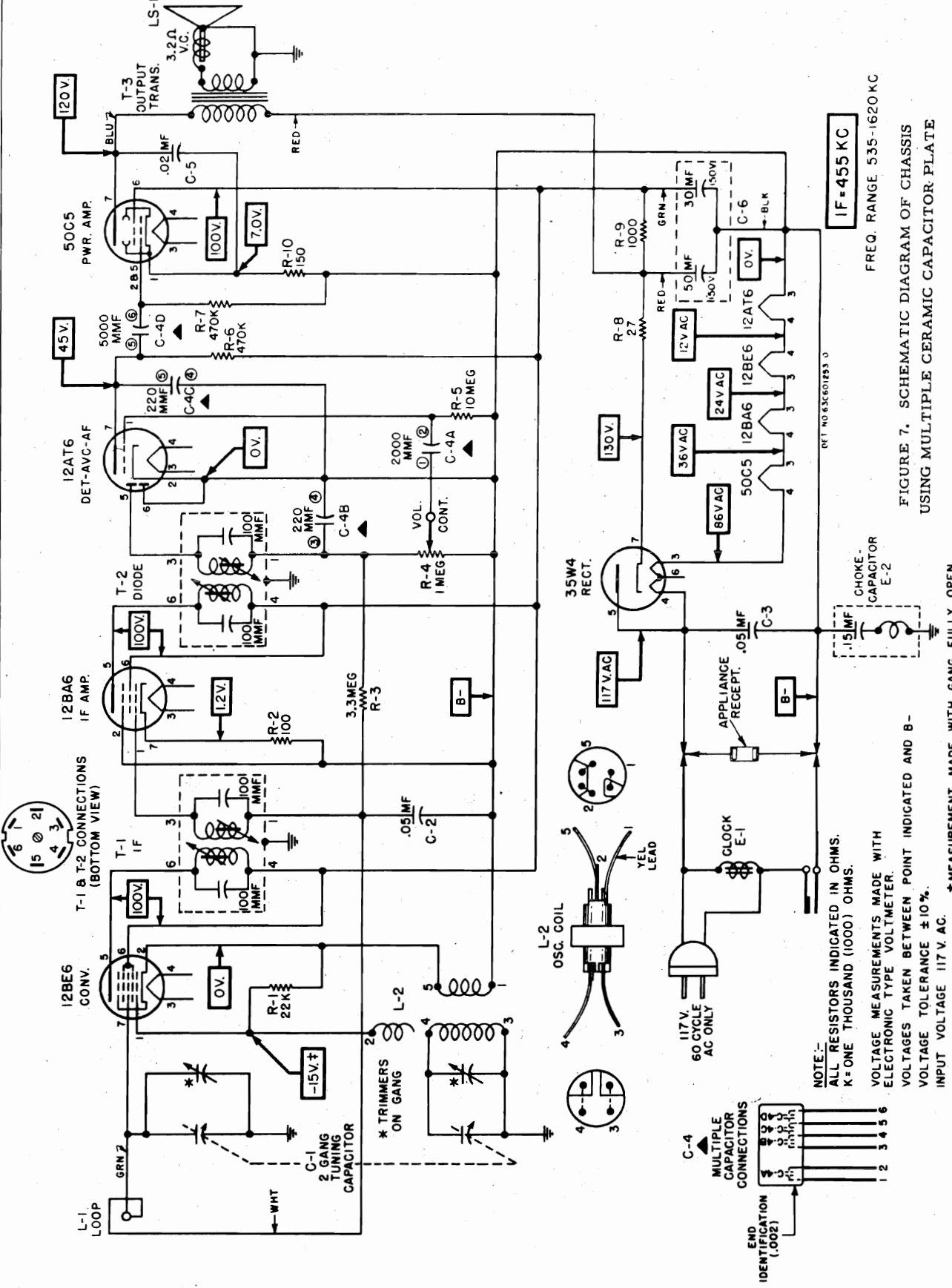


FIGURE 7. SCHEMATIC DIAGRAM OF CHASSIS USING MULTIPLE CERAMIC CAPACITOR PLATE

IF = 455 KC
 FREQ. RANGE 535-1620 KC
 CHOKER CAPACITOR E-2
 NOTE: ALL RESISTORS INDICATED IN OHMS. K=ONE THOUSAND (1000) OHMS. VOLTAGE MEASUREMENTS MADE WITH ELECTRONIC TYPE VOLTMETER. VOLTAGES TAKEN BETWEEN POINT INDICATED AND B- VOLTAGE TOLERANCE ± 10%. INPUT VOLTAGE 117 V. AC. NO SIGNAL INPUT.

MODELS 504, Ch. HS-270;
 505, Ch. HS-271;
 506, Ch. HS-272

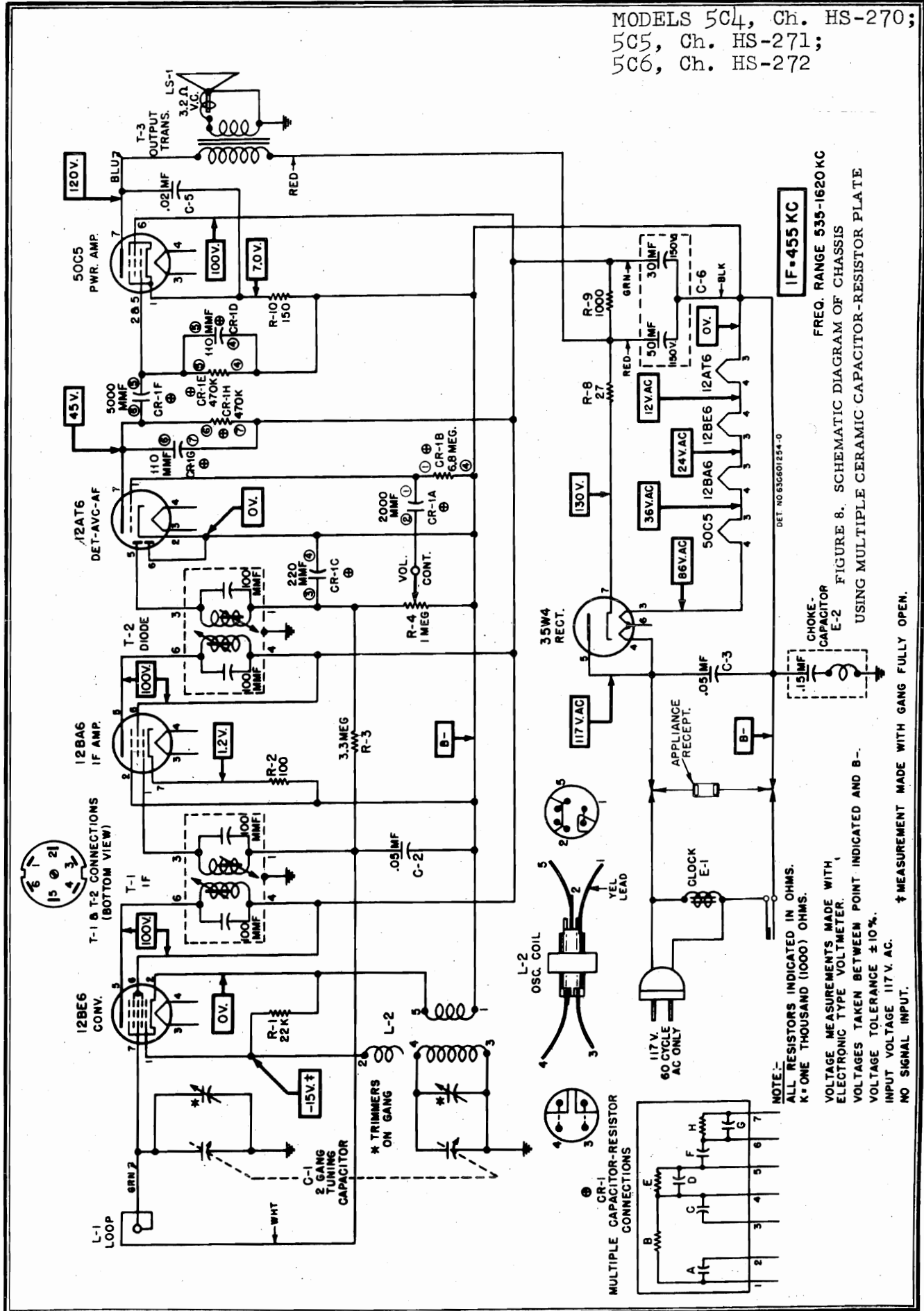


FIGURE 8. SCHEMATIC DIAGRAM OF CHASSIS
 USING MULTIPLE CERAMIC CAPACITOR-RESISTOR PLATE
 IF=455 KC
 FREQ. RANGE 535-1620 KC

MODELS 504, Ch. HS-270;
505, Ch. HS-271;
506, Ch. HS-272

REPLACEMENT PARTS LIST

NOTE: When ordering parts, specify model number of set in addition to part number and description of part.

| Ref. No. | Part Number | Description |
|---------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| CHASSIS PARTS - ELECTRICAL | | |
| Capacitors | | |
| C-1 | 15R600021 | Variable: 2 gang; with pulley |
| C-2 | 8R9821 | Paper: .05 mf 200V |
| C-3 | 8R9816 | Paper: .05 mf 400V |
| C-4 | 21B482847 | Ceramic, multiple: 2000 muf, 220 muf, 220 muf, 5000 muf |
| C-5 | 8R9802 | Paper: .02 mf 400V |
| C-6 | 23R600855 | Electrolytic: 50-30 mf/150V |
| Capacitor-Resistor | | |
| CR-1 | 21B601007 | Capacitor-Resistor: 2000, 220, 110, 5000, 110 muf; 6.8 meg; 470,000, 470,000 ohms |
| Coil | | |
| E-1 | 59G600007 | Electric Clock Assembly: Telechron movement No. C-57, with Motorola face, hands, crystal, escutcheon and knobs (for Green cabinet)(504) |
| 59K600198 Same as above except color (for ivory cabinet)(505) | | |
| 59K600788 Same as above except color (for walnut cabinet)(506) | | |
| Choke & Capacitor | | |
| E-2 | 8A590487 | Choke & .15 mf paper capacitor |
| Coils | | |
| L-1 | 1X601033 | Antenna Loop, Panel, and Receptacle Assembly: complete |
| | 24K601023 | Antenna Loop and Panel Assembly: less receptacle |
| L-2 | 24B680364 | Oscillator coil |
| Speaker | | |
| LS-1 | 50G600017 | Speaker: 4" PW; 3.2 ohm VC |
| or 50G600857 | | |
| Resistors | | |
| R-1 | 6R6028 | 22,000 20% 1/2W |
| R-2 | 6R6018 | 100 20% 1/2W |
| R-3 | 6R2118 | 3.3 meg 20% 1/2W |
| R-4 | 18A600018 | Volume control: 1 meg |
| R-5 | 6R2109 | 10 meg 20% 1/2W |
| R-6 | 6R6032 | 470,000 20% 1/2W |
| R-7 | 6R6032 | 470,000 20% 1/2W |
| R-8 | 6R5683 | 27 10% 1/2W |
| R-9 | 6R3953 | 1000 20% 1W |
| R-10 | 6R3992 | 150 20% 1/2W |
| Note: All resistors are insulated carbon type unless otherwise specified. | | |
| CABINET PARTS | | |
| 16E600005 | Cabinet, table model: plastic; green (504) | |
| 16K600199 | Cabinet, table model: plastic; ivory (505) | |
| 16K600791 | Cabinet, table model: plastic; walnut(506) | |
| 28A600064 | Connector, wire (connects clock & radio power leads) | |
| 61A600001 | Crystal: plastic (cover over radio dial) | |
| 13K600003 | Escutcheon, radio dial: green (504) | |
| 13K600197 | Escutcheon, radio dial: ivory (505) | |
| 13K600790 | Escutcheon, radio dial: walnut (506) | |
| 14A16304 | Grommet, fibre (on clock shield) | |
| 36A600065 | Knob, radio control: green plastic (504) | |
| 36K600192 | Knob, radio control: ivory plastic (505) | |
| 36K600787 | Knob, radio control: walnut plastic (506) | |
| 4S7667 | Lockwasher: #4 ext: cad pl (clock shield mtg) | |
| 13A792195 | Medallion: brass (on front of speaker grille) | |
| 2S7019 | Nut, hex: 4-40 x 1/4 stl; cad pl (clock shield mtg) | |
| 3S476083 | Screw, machine: 6-32 x 5/16 slotted locking hex head; cad pl (radio chassis mtg) | |
| 3S2991 | Screw, machine: 6-32 x 1/2 plain hex head; cad pl (mounts loop to cabinet) | |
| 1X600799 | Shield, clock: with grommet (covers rear of clock) | |
| 2S490840 | Speednut: for 1/16" stud (medallion mtg) | |
| 11M488253 | Tape, aluminum foil (inside top of cabinet) | |
| 4S7633 | Washer, flat: 9/16 x 11/64 x .033 stl; cad pl (mounts loop to cabinet) | |
| CLOCK PARTS | | |
| 34K600993 | Alarm dial: green color (504) | |
| 34K600994 | Alarm dial: ivory color (505) | |
| 34K600995 | Alarm dial: walnut color (506) | |
| 30K600980 | Cord, line: with plug; 6 ft long | |
| 61A600001 | Crystal: plastic (cover over face of clock) | |
| 34K600990 | Dial face: green color (504) | |
| 34K600991 | Dial face: ivory color (505) | |
| 34K600992 | Dial face: walnut color (506) | |
| 13K600002 | Escutcheon, clock: green color (504) | |
| 13K600196 | Escutcheon, clock: ivory color (505) | |
| 13K600789 | Escutcheon, clock: walnut color (506) | |
| 52K600996 | Hand, hour: light green color (504 & 506) | |
| 52K600997 | Hand, hour: dark green color (505) | |
| 52K600998 | Hand, minute: light green color (504 & 506) | |
| 52K600999 | Hand, minute: dark green color (505) | |
| 52K601001 | Hand, second: brass | |
| 36K600987 | Knob, clock control: plain; green (504) | |
| 36K600988 | Knob, clock control: plain; ivory (505) | |
| 36K600989 | Knob, clock control: plain; walnut (506) | |
| 36K600984 | Knob, clock control: with arrow; green (504) | |
| 36K600985 | Knob, clock control: with arrow; ivory (505) | |
| 36K600986 | Knob, clock control: with arrow; walnut (506) | |
| 36K601002 | Knob, time set | |
| Note: The following Motorola parts are for use with the basic Telechron clock movement No. C-57. | | |
| 47A600022 | Shaft, tuning | |
| 26K485936 | Shield, coil (for IF transformers) | |
| 26A478117 | Shield, electrostatic (on rear of chassis) | |
| 43A600095 | Sleeve, paper: black (on pointer shaft) (HS-270 & HS-272) | |
| 43K600195 | Sleeve, paper: ivory (on pointer shaft) (HS-271) | |
| 9A472534 | Socket, tube: miniature; 7-prong | |
| 41A73996 | Spring, tension (electrolytic mtg) | |
| 41A73619 | Spring, tension (gang drive cord) | |
| 4A70015 | Washer, "C" (tuning shaft mtg) | |
| 4S7633 | Washer, flat: 9/16 x 11/64 x .033 stl; cad pl (loop mtg) | |
| 14A11493 | Washer, shoulder: fibre (loop bracket mtg) | |
| Transformers | | |
| T-1 | 24B482863 | IF Transformer (brown dot): 455 kc; complete with capacitor and cores; less shield |
| T-2 | 24B482865 | Diode Transformer (red dot): 455 Kc; complete with capacitors and cores; less shield |
| T-3 | 25K680345 | Output Transformer |
| CHASSIS PARTS - MECHANICAL | | |
| 7A478118 | Bracket, loop mtg | |
| 7A77337 | Bracket, tuning shaft | |
| 42B482867 | Clip, spring: blued finish (holds IF transformers) | |
| 11M8944 | Cord, dial: 18 lb; black | |
| 5A484268 | Grommet, speaker mtg: rubber | |
| 14A478119 | Insulator, loop brkt mtg: fibre | |
| 4S7691 | Lockwasher, internal: 3/8; cad pl (vol control mtg) | |
| 2A780465 | Nut, knurled (vol control mtg) | |
| 6A4600025 | Plate, dial background: green (HS-270) | |
| 6A4600193 | Plate, dial background: ivory (HS-271) | |
| 6A4600779 | Plate, dial background: walnut (HS-272) | |
| 52A600027 | Pointer, dial: light green color (HS-270 & HS-272) | |
| 52K600194 | Pointer, dial: dark green color (HS-271) | |
| 9A601018 | Receptacle, appliance (on loop panel) | |
| 5S7771 | Rivet: .088 x 3/16 stl; nkl pl (tube socket mtg) | |
| 5S7707 | Rivet: .122 x 5/32 stl; nkl pl (output trans mtg) | |
| 5S7701 | Rivet: .122 x 3/16 stl; nkl pl (tuning shaft brkt mtg) | |
| 5S7703 | Rivet: .122 x 7/32 stl; nkl pl (loop bracket & speaker mtg) | |
| 5S7700 | Rivet: .122 x 1/4 stl; nkl pl (appliance receptacle mtg) | |
| 3S7247 | Screw, machine: 6-32 x 3/16 slotted locking hex head; cad pl (gang mtg) | |
| 3S7506 | Screw, sheet metal: #6 x 1/4 PKZ plain hex head; cad pl (dial background plate mtg) | |
| 3S7467 | Screw, sheet metal: #8 x 3/8 PKZ plain hex head; cad pl (loop mtg) | |
| 47A600022 | Shaft, tuning | |
| 26K485936 | Shield, coil (for IF transformers) | |
| 26A478117 | Shield, electrostatic (on rear of chassis) | |

MODELS 5H11, 5H12,
5H13, Ch. HS-256

GENERAL INFORMATION

TYPE - AC-DC table model superheterodyne receiver with loop antenna.

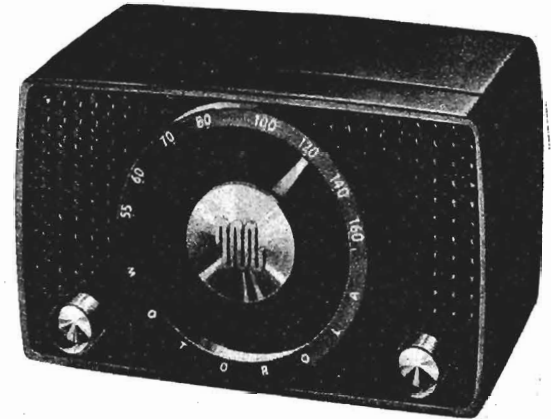
RECEIVER MODELS

| Model | Color |
|-------|--------|
| 5H11 | Walnut |
| 5H12 | Ivory |
| 5H13 | Green |

TUNING RANGE - 535 to 1620 Kc IF - 455 Kc

TUBE COMPLEMENT - 12BE6 - Converter
12BA6 - IF Amplifier
12AT6 - Det, AVC & 1st AF Amp
50C5 - Power Amplifier
35W4 - Rectifier

POWER SUPPLY - 117 volts AC or DC, 35 watts



INSTALLATION & OPERATING INSTRUCTIONS

VOLUME CONTROL & OFF-ON SWITCH. The "off-on" hand knob, switch and volume control are combined and are operated with the left-hand knob. **NOTE:** If the receiver does not operate from DC power, reverse the plug in the power outlet. When operating from AC power, reception may sometimes be improved by reversing the power plug in the outlet.

ANTENNA. A built-in loop antenna eliminates the need for an outside antenna in most locations. When receiving a weak station, rotate the receiver slightly for best signal strength. If additional pick-up is necessary, connect an external antenna to the radio by following the instructions printed on the rear panel. **CAUTION:** Never connect the radio chassis to a water pipe, radiator, or other ground.

TUNING CONTROL. Stations are tuned in with the right-

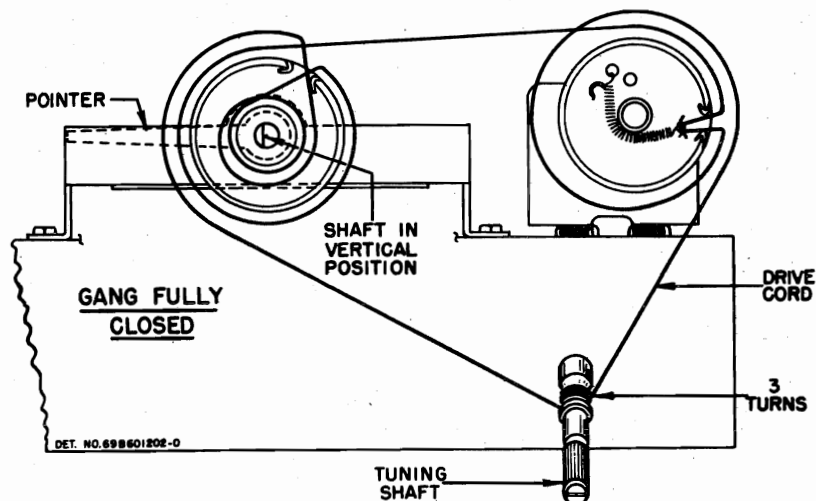


FIGURE 1. STRING DRIVE DETAIL

MODELS 5H11, 5H12,
5H13, Ch. HS-256

SERVICE NOTES

The chassis of this receiver is connected directly to the power line. When operating the chassis (from an AC line) outside of its cabinet, use an isolation transformer between the power line and the receiver to reduce the possibility of an electrical shock.

TO REMOVE THE CHASSIS FROM THE CABINET:

1. Pull off the two radio control knobs.
2. Pull off the brass cover over the pointer.

3. Pull off the pointer.
4. Remove the split plugs which hold the loop to the cabinet.
5. From the back of the cabinet, remove the two hex head screws at the rear edge of the radio chassis.
6. Slide the radio chassis and loop from the cabinet.

ALIGNMENT

NOTE: If AC power is used, it is recommended that an isolation transformer be placed between the power line and the receiver to avoid hum and electrical shocks. If an isolation transformer is not available, connect the low side of the signal generator to chassis through a .1 mf capacitor.

1. Connect a low range output meter across the speaker voice coil.
2. Connect the low side of the signal generator to chassis.
3. Set the signal generator for 400 cycle, 30% modulation.
4. Turn the receiver volume control to maximum.
5. Use a small fibre screwdriver for aligning the IF and diode transformers.
6. As stages are brought into alignment, reduce the signal generator output to a level which produces less than .40 volts (.05 watt) across the voice coil to avoid overloading the receiver.
7. See Figure 2 for adjustment locations and the following chart for procedure.

ALIGNMENT CHART

| STEP | DUMMY ANTENNA | GENERATOR CONNECTION | GENERATOR FREQUENCY | GANG SETTING | ADJUST | REMARKS |
|---------------------|---------------|------------------------------|---------------------|--------------|-------------------------|---------------------|
| IF ALIGNMENT | | | | | | |
| 1. | .1 mf | Grid of conv. (pin 7, 12BE6) | 455 Kc | Fully open | 1, 2, 3, & 4 (IF cores) | Adjust for maximum. |
| RF ALIGNMENT | | | | | | |
| 2. | - | Grid of conv. (pin 7, 12BE6) | 1620 Kc | Fully open | 5 (Osc) | Adjust for maximum. |
| 3. | - | Radiation loop* | 1400 Kc | Tune for max | 6 (Ant) | Adjust for maximum. |

*Connect generator output across 5" diameter, 5 turn loop and couple inductively to receiver loop. Keep loops at least 12" apart.

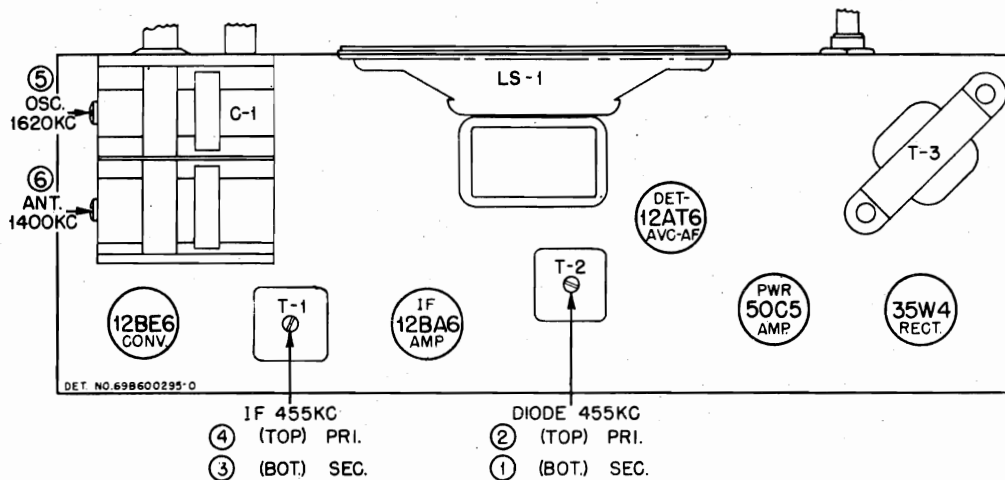


FIGURE 2. TUBE & TRIMMER LOCATIONS

MODELS 5H11, 5H12,
5H13, Ch. HS-256

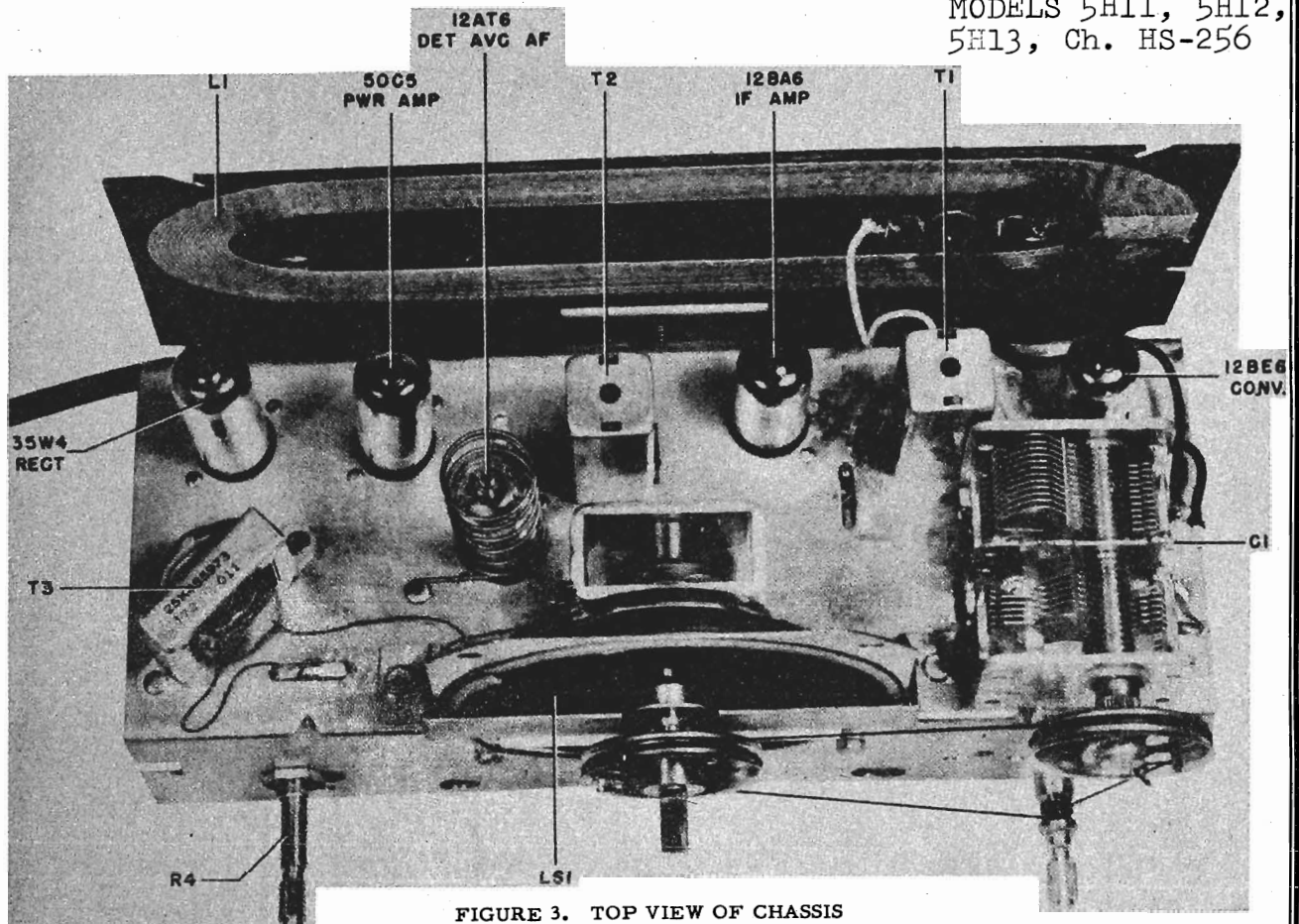


FIGURE 3. TOP VIEW OF CHASSIS

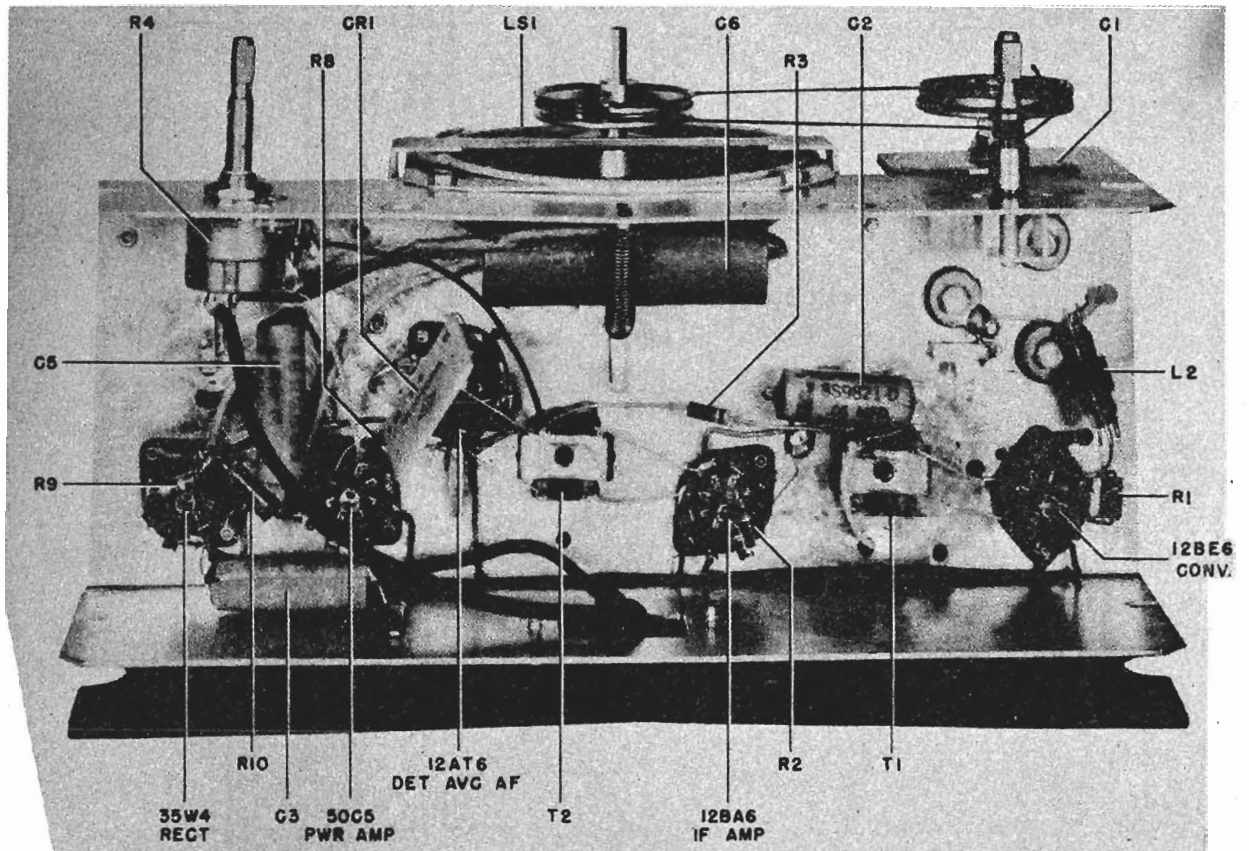
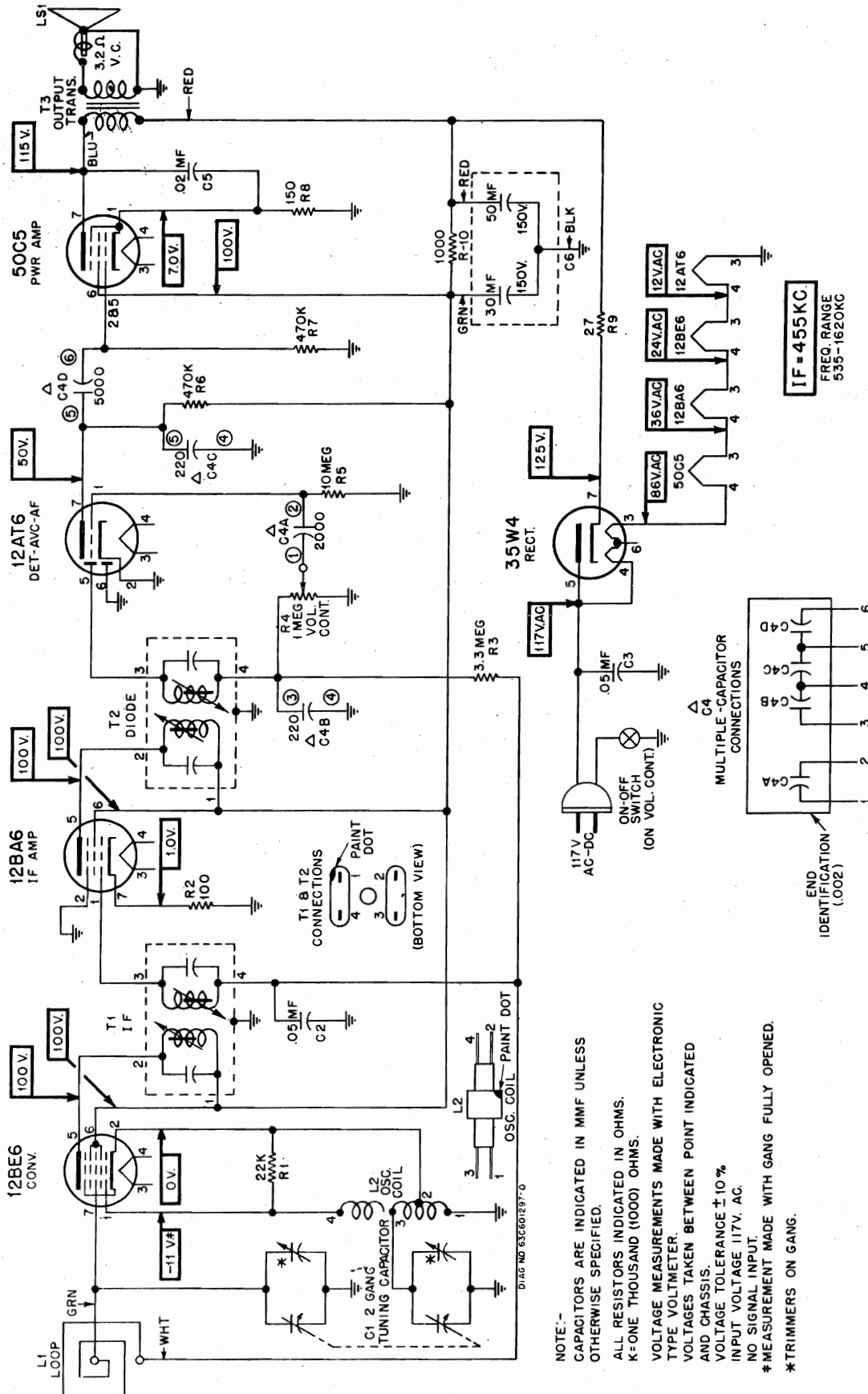


FIGURE 4. BOTTOM VIEW OF CHASSIS USING MULTIPLE CERAMIC CAPACITOR-RESISTOR PLATE

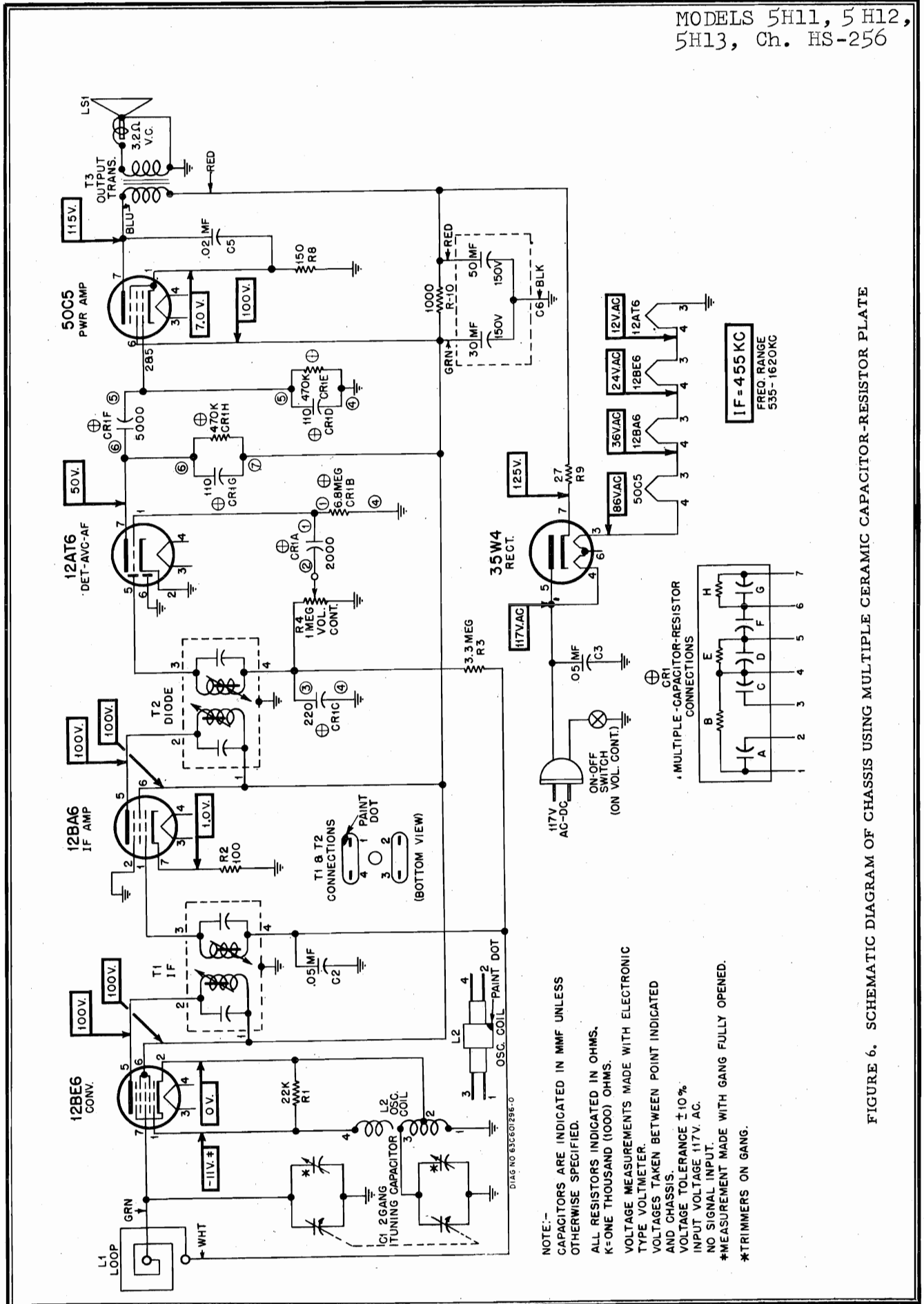
MODELS 5H11, 5H12,
5H13, Ch. HS-256



NOTE:-
CAPACITORS ARE INDICATED IN MMF UNLESS OTHERWISE SPECIFIED.
ALL RESISTORS INDICATED IN OHMS.
K=ONE THOUSAND (1000) OHMS.
VOLTAGE MEASUREMENTS MADE WITH ELECTRONIC TYPE VOLTMETER
VOLTAGES TAKEN BETWEEN POINT INDICATED AND CHASSIS.
VOLTAGE TOLERANCE ±10 %
INPUT VOLTAGE 117V. AC.
NO SIGNAL INPUT.
* MEASUREMENT MADE WITH GANG FULLY OPENED.
* TRIMMERS ON GANG.

FIGURE 5. SCHEMATIC DIAGRAM OF CHASSIS USING MULTIPLE CERAMIC CAPACITOR PLATE

MODELS 5H11, 5H12,
5H13, Ch. HS-256



NOTE:-
CAPACITORS ARE INDICATED IN MMF UNLESS OTHERWISE SPECIFIED.
ALL RESISTORS INDICATED IN OHMS.
K=ONE THOUSAND (1000) OHMS.
VOLTAGE MEASUREMENTS MADE WITH ELECTRONIC TYPE VOLTMETER.
VOLTAGES TAKEN BETWEEN POINT INDICATED AND CHASSIS.
VOLTAGE TOLERANCE $\pm 10\%$.
INPUT VOLTAGE 117V. AC.
NO SIGNAL INPUT.
*MEASUREMENT MADE WITH GANG FULLY OPENED.
*TRIMMERS ON GANG.

FIGURE 6. SCHEMATIC DIAGRAM OF CHASSIS USING MULTIPLE CERAMIC CAPACITOR-RESISTOR PLATE

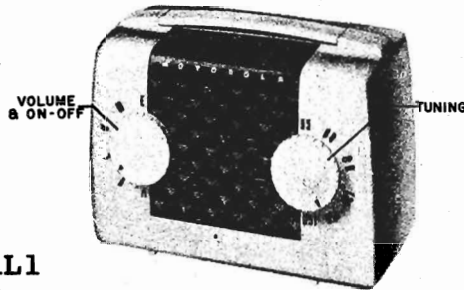
MODELS 5H11, 5H12,
5H13, Ch. HS-256

REPLACEMENT PARTS LIST

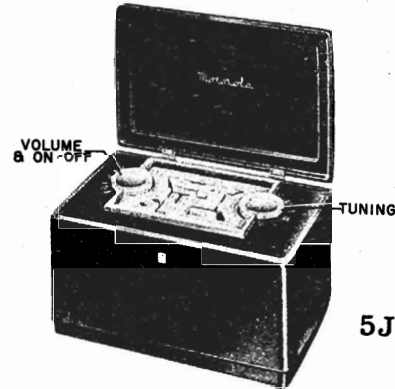
NOTE: When ordering parts specify model number of set in addition to part number and description of part.

| Ref. No. | Part Number | Description | Ref. No. | Description |
|-----------------------------------------------------------------------|----------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|-----------|----------------------------------------------------------------------------------------------------|
| CHASSIS PARTS - ELECTRICAL | | | | |
| <u>Capacitors</u> | | | | |
| C-1 | 19B600483 | Variable: 2 gang; with pulley..... | 42A485548 | Clip, IF coil mtg..... |
| C-2 | 8R9821 | Paper: .05 mf 200V..... | 11M8944 | Cord, dial: 18 lb; black..... |
| C-3 | 8R9816 | Paper: .05 mf 400V..... | 30A470651 | Cord, line: with plug; 6 ft long |
| C-4 | 21B482847 | Ceramic, multiple: 2000,220 220, 5000 mmf..... | 5A19658 | Eyelet, spacer (gang mtg)..... |
| C-5 | 8R9802 | Paper: .02 mf 400V.... | 5A70404 | Grommet, rubber (gang mtg)..... |
| C-6 | 23B600855 | Electrolytic: 50-30 mf/150V | 14A482844 | Insulator, line cord: fibre..... |
| <u>Capacitor-Resistor</u> | | | | |
| CR-1 | 21B601007 | Capacitor-resistor: 2000, 220,110,110,5000 mmf; 6.8 meg; 470,000, 470,000 ohms | 29R3010 | Lug, soldering (under gang mtg screw)..... |
| <u>Coils</u> | | | | |
| L-1 | 24C600518 | Loop Antenna Assembly: includes back panel..... | 2S7051 | Nut, hex palnut: 3/8-32 x 9/16 (volume control mtg)..... |
| L-2 | 24K600896 | Oscillator coil(green dot). | 1X600590 | Pulley and Bushing Assembly, pointer drive..... |
| <u>Speaker</u> | | | | |
| LS-1 | 50C691401 | Speaker: 4" PM; 3.2 ohm VC. | 5S7771 | Rivet: .088 x 3/16 stl; nkl pl (tube socket mtg)..... |
| <u>Resistors</u> | | | | |
| Note: All resistors are insulated carbon type unless other specified. | | | | |
| R-1 | 6R6028 | 22,000 20% 1/2W..... | 5S7707 | Rivet: .122 x 5/32 stl; nkl pl (tube shield, output transformer, and tuning shaft bracket mtg).... |
| R-2 | 6R6018 | 100 20% 1/2W..... | 3S2294 | Screw, machine: 6-32 x 1/2 plain hex head lock screw; cad pl (gang mtg)..... |
| R-3 | 6R2118 | 3.3 meg 20% 1/2W..... | 3S7477 | Screw, machine: 3-32 x 1/4; type #1; plain hex head; cad pl (back panel mtg)..... |
| R-4 | 18K600473 | Volume control: 1 meg; in cludes on-off switch... | 3S2695 | Screw, sheet metal: #6 x 3/16 PKZ plain hex head; cad pl (pointer bracket mtg)..... |
| R-5 | 6R2109 | 10 meg 20% 1/2W..... | 3S3398 | Screw, sheet metal: #6 x 3/8 PKZ plain hex head; cad pl (loop bracket mtg)..... |
| R-6 | 6R6032 | 470,000 20% 1/2W..... | 3S7454 | Screw, sheet metal: #8 x 1/4 PKZ plain hex head; cad pl (speaker mtg)..... |
| R-7 | 6R6032 | 470,000 20% 1/2W..... | 3S7148 | Setscrew: 6-32 x 1/8; Allen head; cad pl (pointer drive pulley mtg) |
| R-8 | 6R3992 | 150 20% 1/2W..... | 47K600598 | Shaft, pointer..... |
| R-9 | 6R5683 | 27 10% 1/2W..... | 1K600594 | Shaft, tuning..... |
| R-10 | 6R3953 | 1000 20% 1W..... | 26A481521 | Shield, spring (for 12BA6 tube) |
| <u>Transformers</u> | | | | |
| T-1,2 | 24B485553 | IF and Diode transformer (green dot): 455 Kc; complete with capacitors, cores, and shield..... | 9A472534 | Socket, tube: miniature; 7-prong. |
| T-3 | 25K485973 | Output transformer..... | 41A73996 | Spring, tension(electrolytic mtg) |
| <u>CABINET PARTS</u> | | | | |
| Ref. No. | Description | | 41A14244 | Spring, tension (pointer drive cord)..... |
| CHASSIS PARTS - MECHANICAL | | | | |
| 7K485971 | Bracket, loop mtg..... | | 4K692188 | Washer, "C" (tuning shaft and pointer shaft mtg)..... |
| 7A600476 | Bracket, tuning shaft mtg..... | | 4S7633 | Washer, flat: 9/16 x 11/64 x .033 stl; cad pl (back panel mtg)... |
| 1X600606 | Bracket, pointer shaft mtg: with bushing..... | | 4K482859 | Washer, shoulder: fibre (loop bracket mtg)..... |
| 16E600461 | Cabinet, table model: walnut(5H11) | | | |
| 16K600463 | Cabinet, table model: ivory (5H12) | | | |
| 16K600465 | Cabinet, table model: green (5H13) | | | |
| 15B600569 | Cover, pointer..... | | | |
| 36B600566 | Knob, control: walnut (5H11)..... | | | |
| 36K600567 | Knob, control: ivory (5H12)..... | | | |
| 36K600568 | Knob, control: green (5H13)..... | | | |
| 38A25507 | Plug, split (back panel mtg)... | | | |
| 52B600537 | Pointer, dial..... | | | |
| 3S3371 | Screw, sheet metal: #8 x 3/8 PKF plain hex head; cad pl (chassis mtg)..... | | | |

MODELS 5L1, 5L1U, Rev.;
5L2, 5L2U, 51L1U, 51L2U;
5J1, 5J1U, Rev.; 5J2,
5J2U; Ch. HS-224, HS-250



**5L1 & 51L1
SERIES**



5J1 SERIES

GENERAL INFORMATION

TYPE - Three-power (AC/DC, Battery) portable receiver. Four miniature type tubes and a selenium rectifier are used in a superheterodyne circuit.

| MODEL | COLOR | CHASSIS |
|-------|--------|---------|
| 5L1 | Tan | HS-250 |
| 5L1U | Tan | HS-224 |
| 5L2 | Maroon | HS-250 |
| 5L2U | Maroon | HS-224 |
| 51L1U | Green | HS-224 |
| 51L2U | Maroon | HS-224 |
| 5J1 | Black | HS-250 |
| 5J1U | Black | HS-224 |
| 5J2 | Green | HS-250 |
| 5J2U | Green | HS-224 |

TUBE COMPLEMENT -

| Type | Function |
|------|----------------------------------------|
| 1R5 | Converter |
| 1U4 | IF Amplifier |
| 1U5 | Det. AVC & 1st AF Amp |
| 3S4 | Power Amplifier |
| Rect | Selenium type (for AC/DC Operation) |

POWER SUPPLY - Operates from 117V AC/DC (15 watts) or from the following batteries:

- 2 - 1-1/2V flashlight cells (Eveready #950 or equivalent)
- 1 - 67-1/2V "B" battery (Eveready #467 or equivalent)

TUNING RANGE - 535 to 1620 Kc **IF** - 455 Kc

OPERATING INSTRUCTIONS

TO OPEN FRONT COVER (5J1 & 5J2 Series). The front covers of the models 5J1 and 5J2 Series contain the loop antenna. They may be opened simply by lifting them upward with the fingers. A special hinge holds the covers in either the closed, half-opened, or fully open position.

VOLUME CONTROL & OFF-ON SWITCH. The "off-on" switch and volume control are operated with the left-hand knob.

TO TURN OFF. Turn the receiver "off" by rotating the volume knob to the left until a click is heard.

TUNING CONTROL. Stations are tuned in with the right-hand knob.

TO OPEN BACK COVER. The back cover may be opened by inserting the fingertips into the slots in the cover and pulling it open. When closing the cover be careful not to pinch the power line cord or other leads between the cover and the cabinet.

117 VOLT AC OR DC OPERATION. The power cord is located inside the cabinet and may be reached by opening the

back cover. Pass the line cord through the slot on the side of the receiver, and plug it into any 117 volt AC or DC power outlet. If the receiver does not operate from DC power, reverse the plug in the power outlet. When operating from AC power, reception may sometimes be improved by reversing the power plug in the outlet. It is not necessary that batteries be installed if the receiver is to be operated only from house power lines.

BATTERY OPERATION. Open the back cover and install the batteries, following the instructions on the label inside the back cover (or see Figure 1). Insert the line cord plug into the receptacle on the chassis, or the receiver will not play from batteries. If the receiver is to be operated for a long period of time from 117 volts AC or DC, or is to be placed in storage, remove the batteries and store in a cool place. **IMPORTANT:** Never leave low or run-down batteries in the receiver, as they will leak or swell and damage it.

ANTENNA. A loop antenna is built into the front cover of models 5J1 and 5J2 series and into the rear cover of models 5L1, 5L2 and 51L1U and 51L2U Series. Because of the slightly directional characteristics of the loop antenna, re-

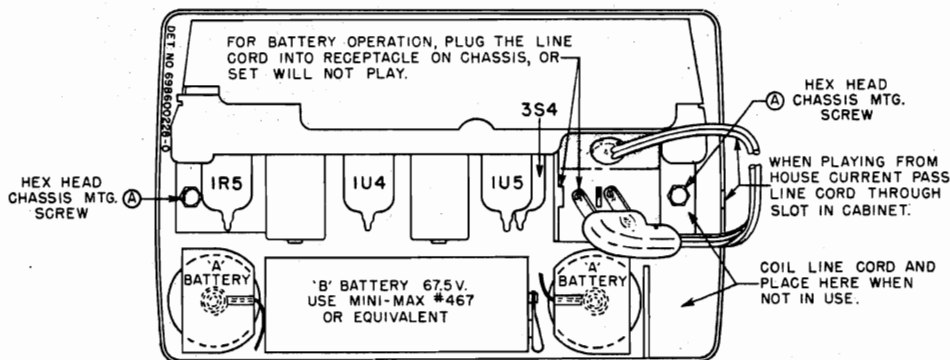
PART NO. 54P610221

MODELS 5L1, 5L1U, Rev.;
5L2, 5L2U, 5L1U, 5L2U;
5J1, 5J1U, Rev.; 5J2,
5J2U; Ch. HS-224, HS-250

ception from some stations may be improved by rotating the entire receiver. In extremely noisy locations, rotate the receiver until minimum noise and maximum signal pickup are obtained.

is noticed when operating from batteries, replace the flashlight cells. Normally, the 67-1/2V "B" battery will last for 3 or 4 changes of the flashlight cells. The condition of the batteries will not affect the operation of the receiver from 117 volts AC or DC. Complete battery replacement instructions will be found inside the cabinet back cover (or see Figure 1).

BATTERY REPLACEMENT. If low volume or fuzzy tone



NOTE: 'A' BATTERIES: USE TWO 1-1/2V. FLASHLIGHT CELLS- EVEREADY #950 OR EQUIVALENT. INSTALL 'A' BATTERIES SO SPRING CONTACTS BOTTOM OF BATTERIES.

FIGURE 1. BATTERY INSTALLATION AND CHASSIS REMOVAL INSTRUCTIONS

ALIGNMENT

NOTE: The receiver may be operated either from a battery or from the commercial power lines during alignment. If AC power is used, it is recommended that an isolation transformer be placed between the power line and the receiver. If an isolation transformer is not available, connect the low side of the signal generator to B- through a .1 mf capacitor.

2. Connect the low side of the signal generator to B-.
3. Set the signal generator for 400 cycle, 30% modulation.
4. Turn the receiver volume control to maximum.
5. Use a small fibre screwdriver for aligning the IF and diode transformers.
6. As stages are brought into alignment, reduce the signal generator output to keep the output of the receiver at approximately .05 watt (.05 watt = .40 volts on the output meter) to avoid overloading the receiver.
7. See Figure 2 for adjustment locations and the following chart for procedure.

1. Connect a low range output meter across the speaker voice coil.

ALIGNMENT CHART

| STEP | DUMMY ANTENNA | GENERATOR CONNECTION | GENERATOR FREQUENCY | GANG SETTING | ADJUST | REMARKS |
|---------------------|---------------|-----------------------------|---------------------|------------------|---------------------|--------------------------------------------------------------------------------------------------------------|
| IF ALIGNMENT | | | | | | |
| 1. | .1 mf | Grid of conv. (pin 6, 1R5)* | 455 Kc | Fully open | 1, 2 & 3 (IF Cores) | Adjust for maximum. |
| RF ALIGNMENT | | | | | | |
| 2. | .1 mf | Grid of conv. (pin 6, 1R5)* | 1620 Kc | Fully open | 4 (osc.) | Adjust for maximum. |
| 3. | - | - | - | - | - | Install chassis in cabinet, leaving output meter connected to speaker. NOTE: Batteries should be in cabinet. |
| 4. | - | Radiation loop** | 1400 Kc | Tune for maximum | 5 (Ant.) | Adjust for maximum. Trimmer is reached through hole under plug button on side of cabinet. |

*On chassis HS-250 return the grid of the converter tube to AVC either through the loop or through a 4.7 meg resistor (as in chassis HS-224).

**Connect generator output across 5" diameter, 5 turn loop and couple inductively to receiver loop. Keep loops at least 12" apart.

MODELS 5L1, 5L1U, Rev.;
5L2, 5L2U, 51L1U, 51L2U;
5J1, 5J1U, Rev.; 5J2,
5J2U; Ch. HS-224, HS-250

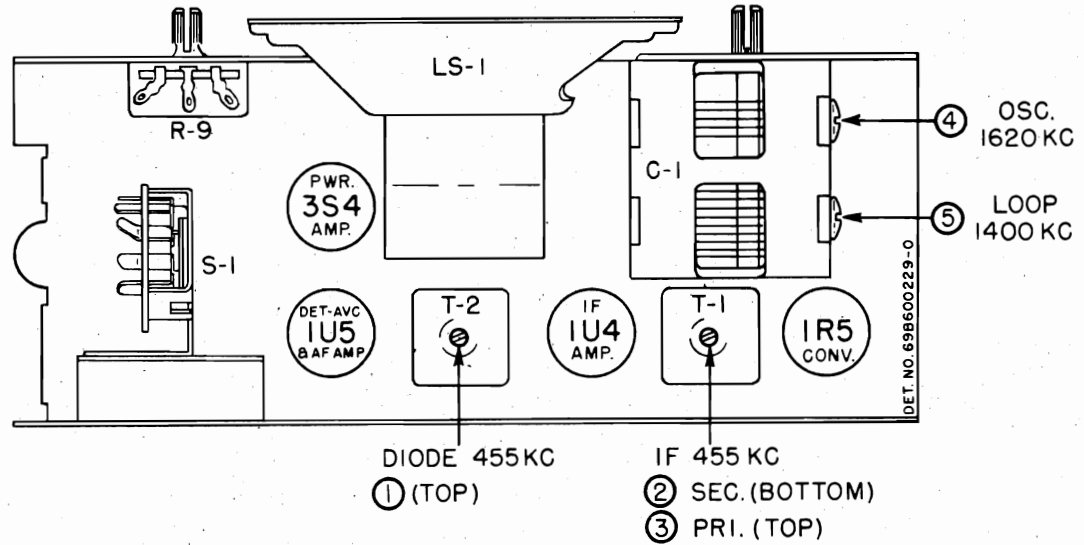


FIGURE 2. TUBE AND TRIMMER LOCATIONS

SERVICE NOTES

GENERAL

The chassis of this receiver is isolated from the AC power line circuit by a capacitor-choke assembly to eliminate the shock hazard when handling the receiver. However, as an additional precaution when aligning or servicing the receiver from AC, an isolation transformer should be inserted between the power line and the chassis.

The tubes are exposed when the rear cover is opened. It is not necessary to remove the chassis to replace tubes.

TO REMOVE THE CHASSIS FROM THE CABINET:

1. Pull off the two control knobs on the front of the cabinet.
2. Open the rear cover and remove the batteries.
3. Disconnect the two loop antenna leads from the chassis.
4. Remove the two hex head screws holding the chassis to the cabinet ("A" - "A" in Figure 1).
5. Slide the chassis from the cabinet.

PRODUCTION REVISIONS

The following revisions in the chassis and cabinets have been made from early production receivers:

1. Alternate IF and diode transformers have been added, with connections as shown on the circuit diagrams. Electrically, the original and the alternate transformers are interchangeable.
2. A multiple capacitor-resistor plate is used in some chassis to replace several resistors and capacitors in the audio circuit. Refer to the appropriate circuit diagram when servicing a chassis.
3. A battery retainer spring, which clips to the rear edge of the chassis, has been provided for the 5J1 and 5J2 series models to prevent the "B" battery from forcing off the rear cover.
4. The rear cover locking clips on the early 5J1 and 5J2 series models were replaced with a different type to provide better locking. The new type clips are interchangeable with the old clips.

REAR COVER HINGE INSTALLATION

The proper method for installing a new hinge in the 5L1, 5L2 and 51L1U, 51L2U series is shown in Figure 3. Note that the under side of the cabinet should rest on an iron block during the heating process to prevent the formation of a heat bubble on the bottom of the cabinet.

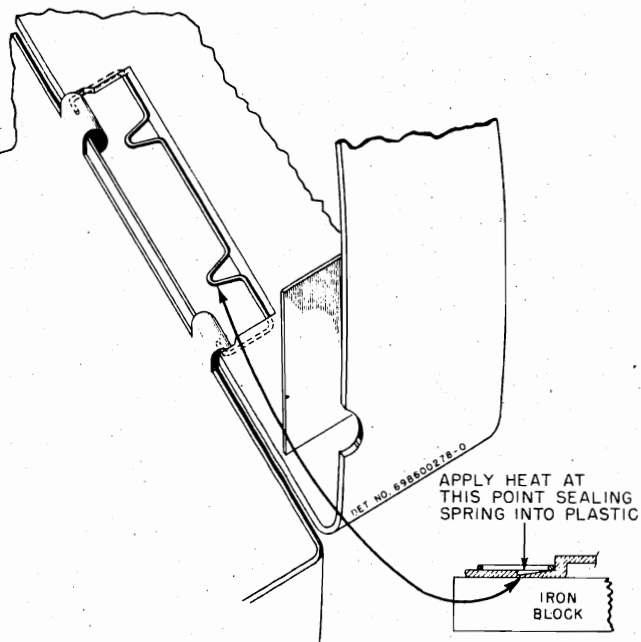


FIGURE 3.

HINGE INSTALLATION FOR 5L1 AND 51L1U SERIES

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MODELS 5L1, 5L1U, Rev.;
 5L2, 5L2U, 5L1U, 5L2U;
 5J1, 5J1U, Rev; 5J2, 5J2U;
 Ch. HS-224, HS-250

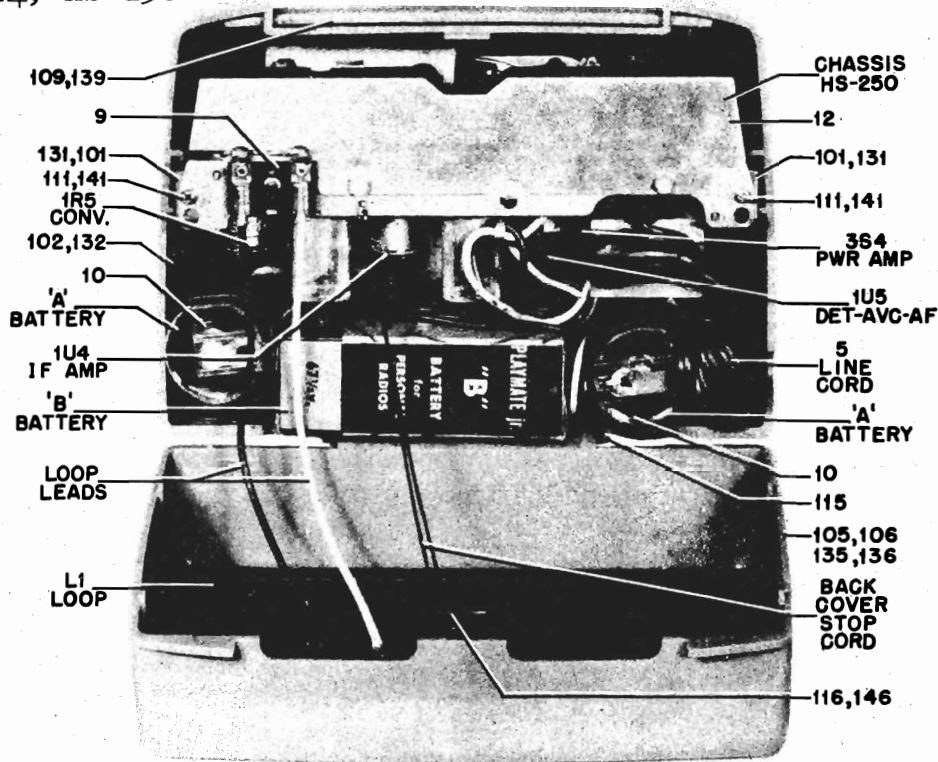


FIGURE 4. 5L1 AND 5L2 REAR VIEW

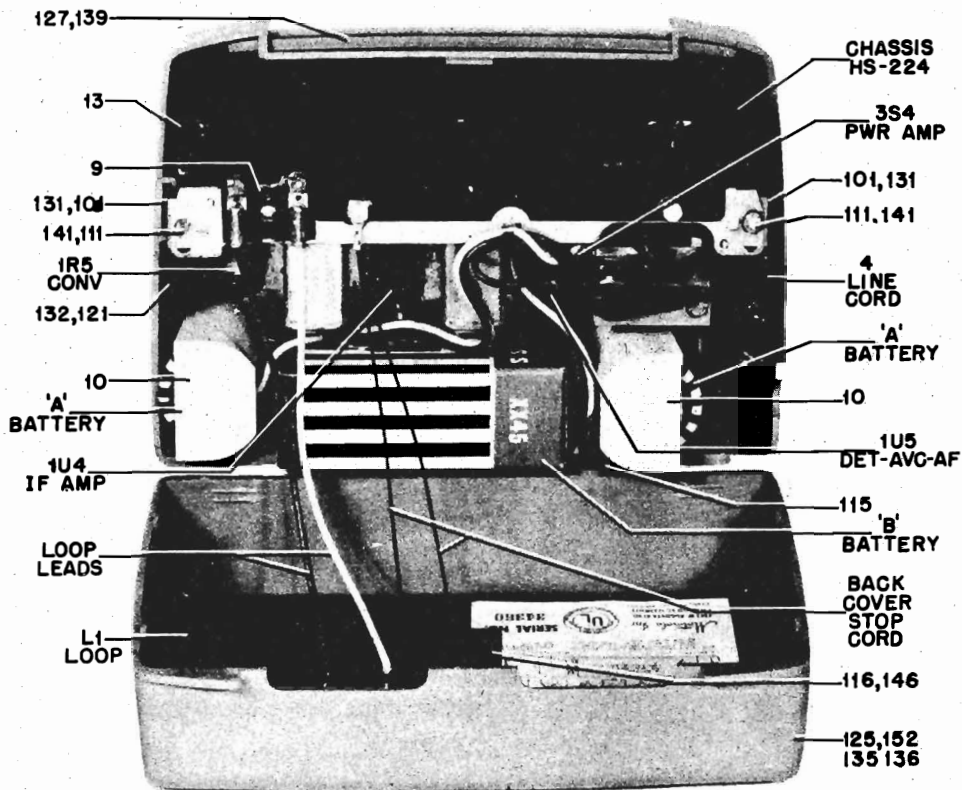


FIGURE 5. 5L1U AND 5L2U REAR VIEW

MODELS 5L1, 5L1U, Rev.;
 5L2, 5L2U, 5L1U, 5L2U;
 5J1, 5J1U, Rev.; 5J2,
 5J2U; Ch. HS-224, HS-250

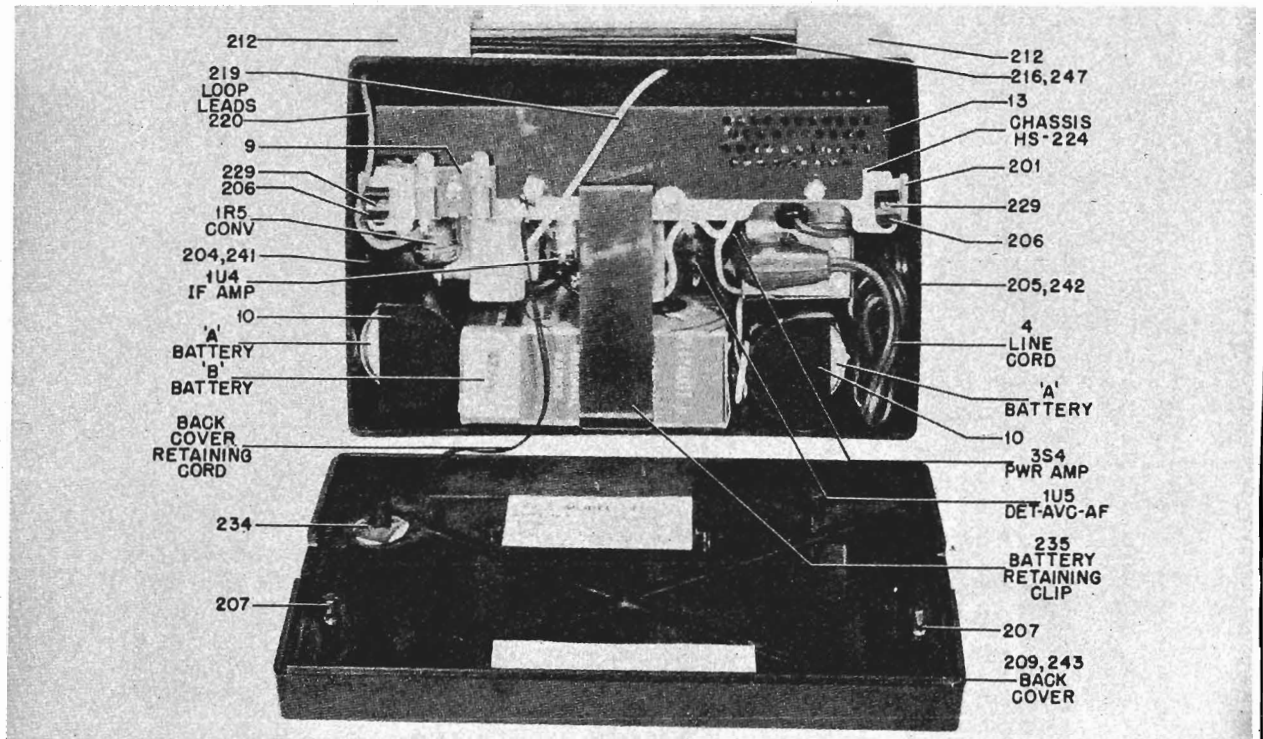


FIGURE 6. 5J1U AND 5J2U REAR VIEW

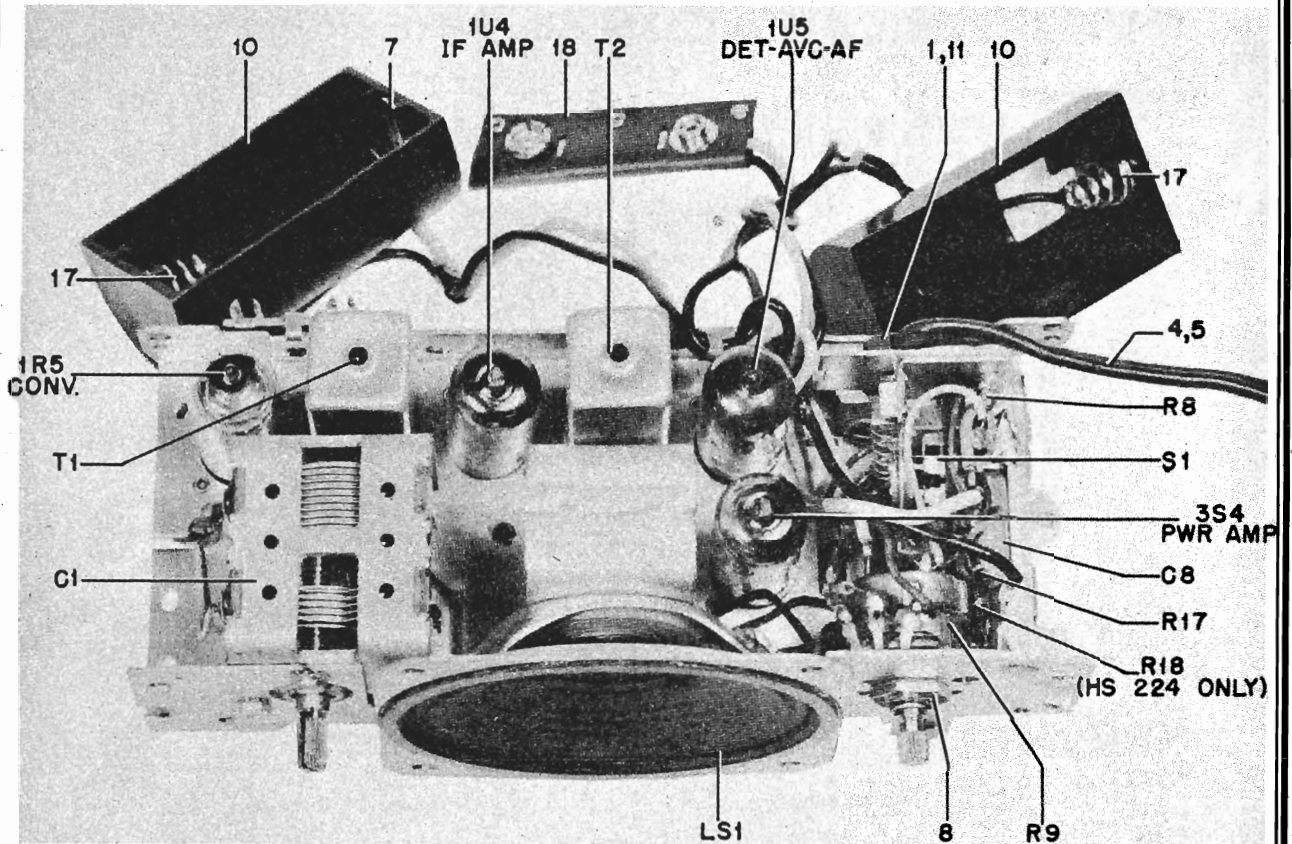


FIGURE 7. HS-224 AND HS-250 TOP VIEW OF CHASSIS

MODELS 5L1, 5L1U, Rev.;
 5L2, 5L2U, 5L1U, 5L2U;
 5J1, 5J1U, Rev.; 5J2,
 5J2U; Ch. HS-224, HS-250

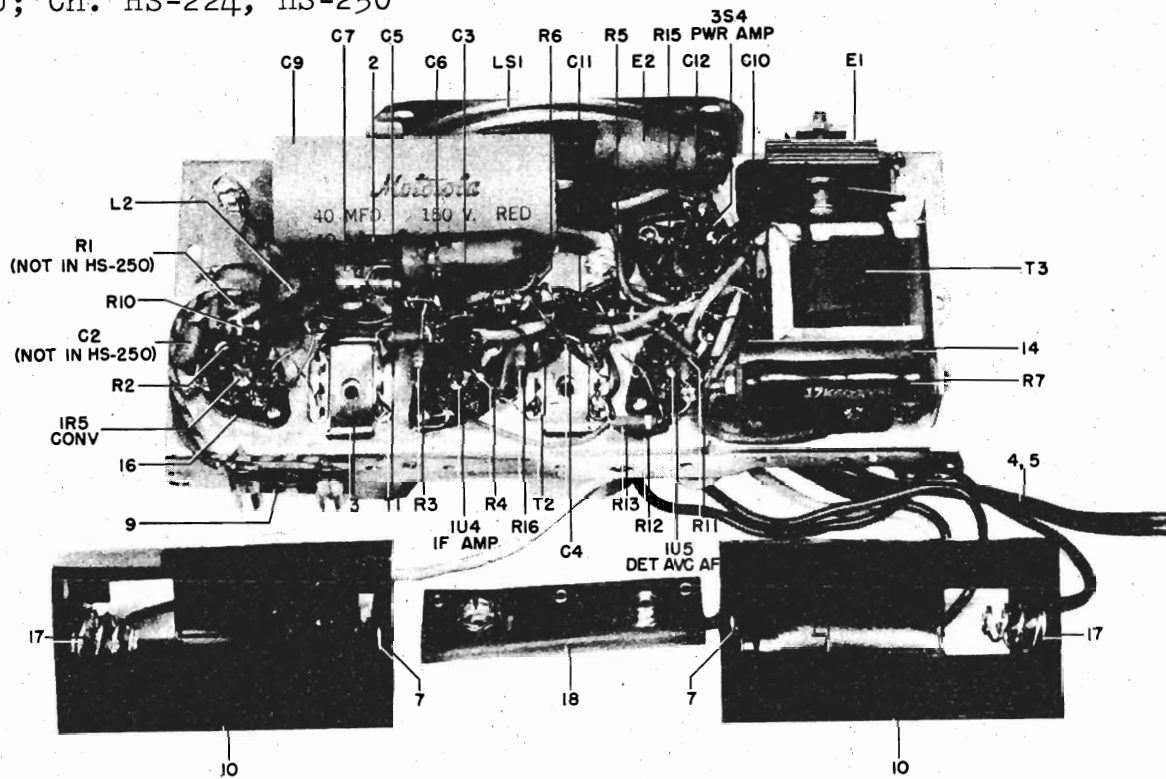


FIGURE 8. BOTTOM VIEW OF CHASSIS HS-224 AND HS-250 SHOWING MULTIPLE CAPACITOR PLATE

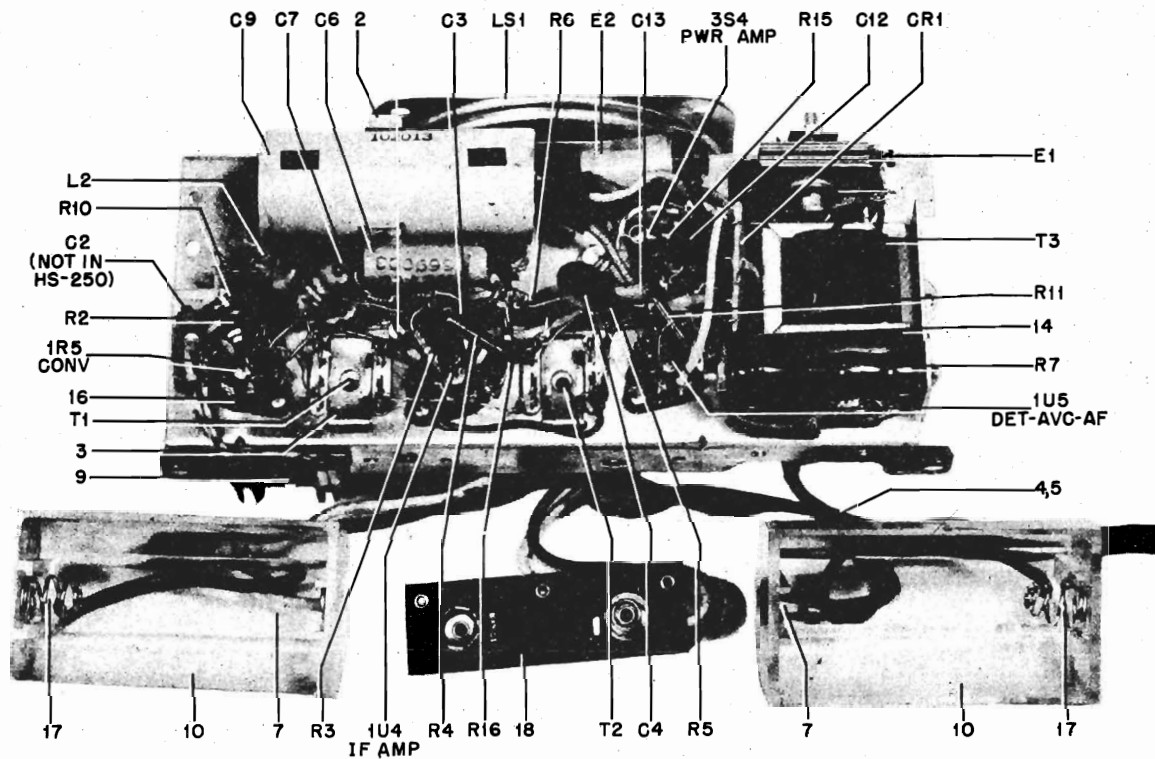
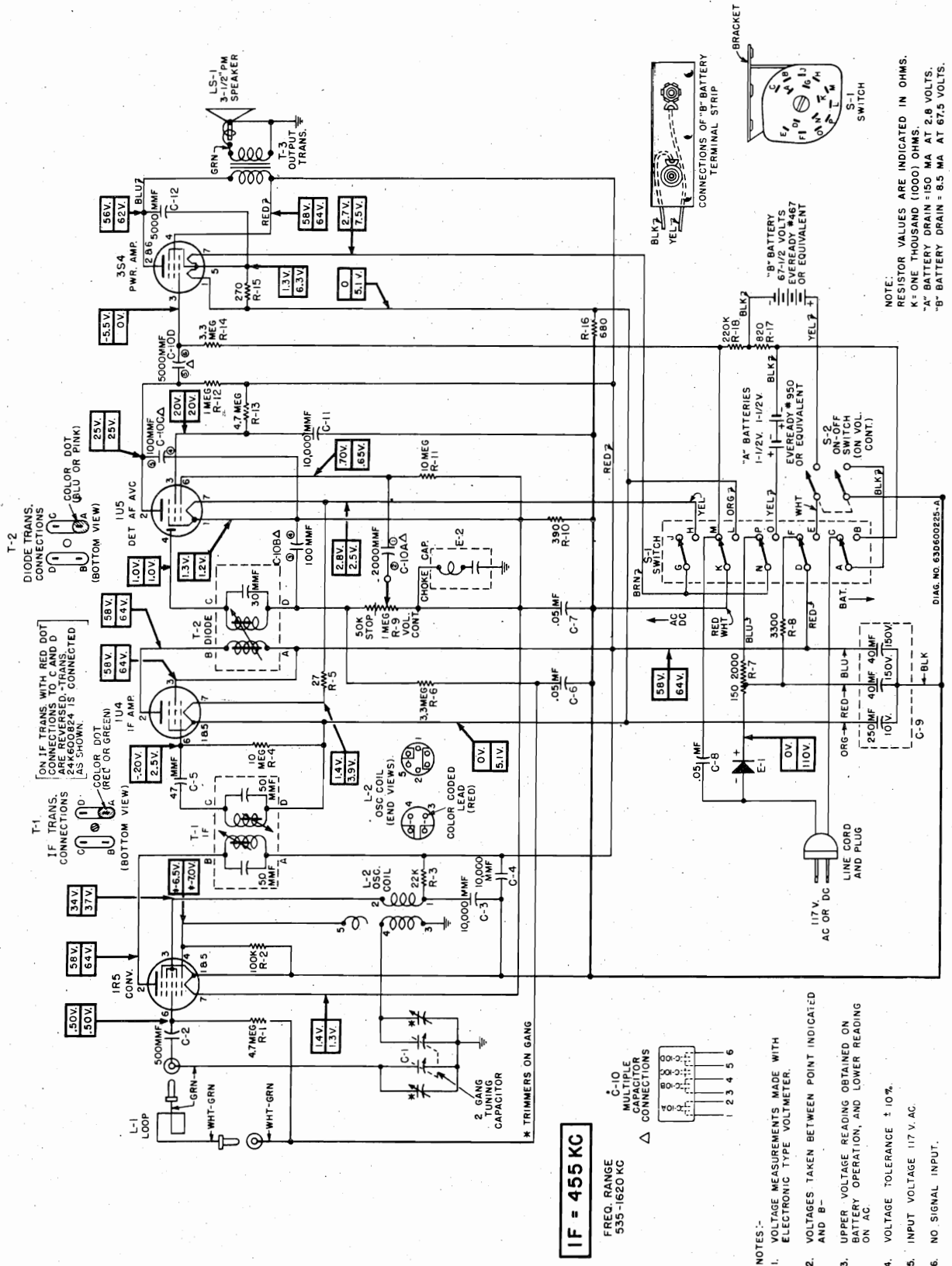


FIGURE 9. BOTTOM VIEW OF CHASSIS HS-224 AND HS-250 SHOWING MULTIPLE CAPACITOR-RESISTOR PLATE

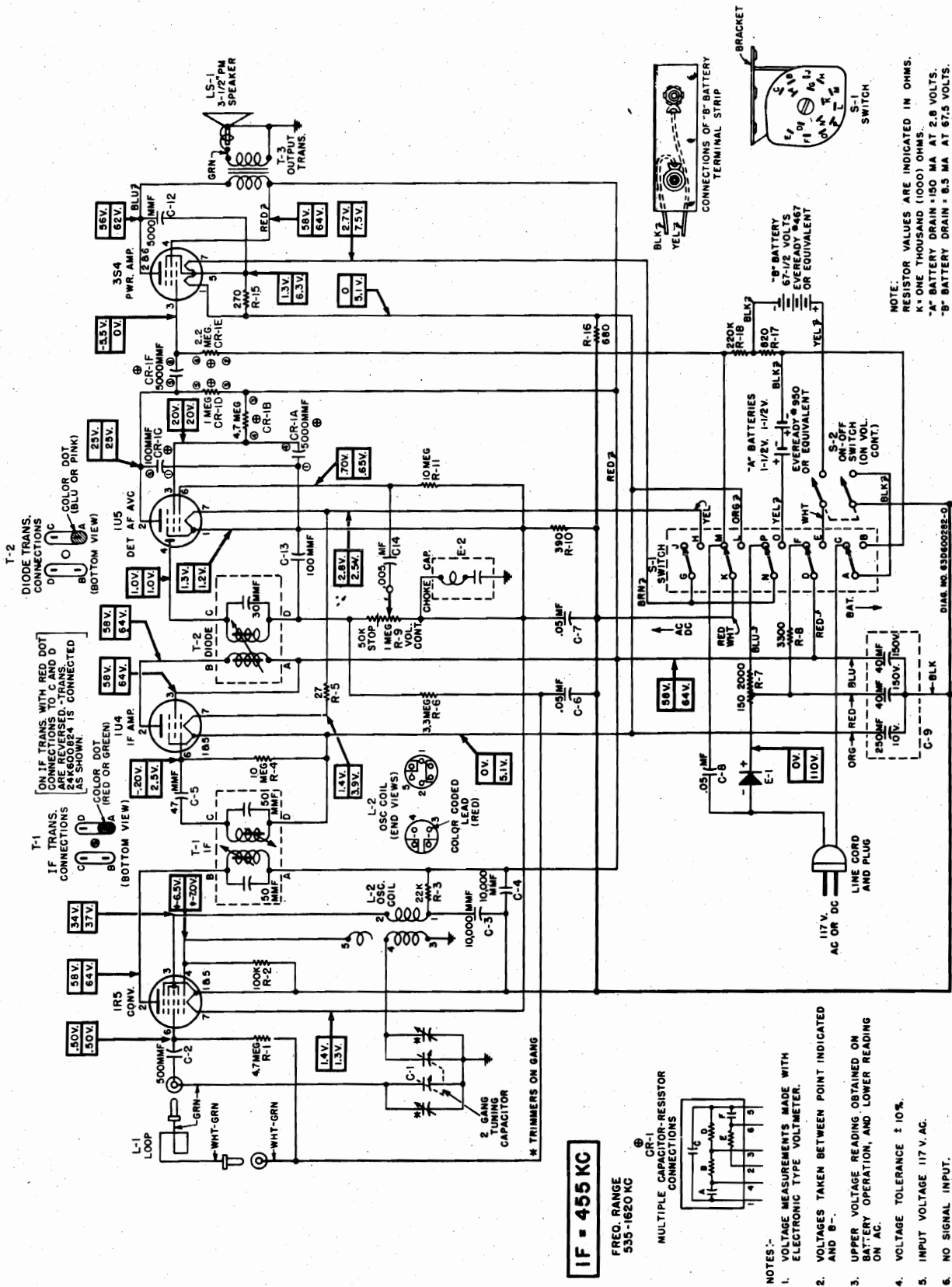
MODELS 5L1U, 5L2U,
51L1U, 51L2U, 5J1U,
5J2U, Ch. HS-224

FIGURE 10. SCHEMATIC DIAGRAM OF HS-224 USING MULTIPLE CAPACITOR PLATE.



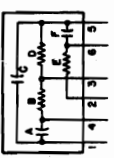
MODELS 5L1U, 5L2U,
51L1U, 51L2U, 5J1U,
5J2U, Ch. HS-224

FIGURE 11. SCHEMATIC DIAGRAM OF CHASSIS HS-224 USING MULTIPLE CAPACITOR-RESISTOR PLATE



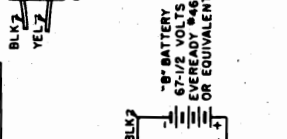
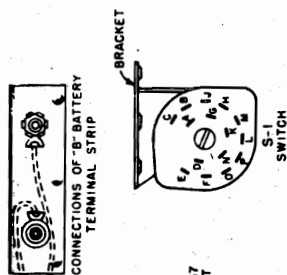
IF = 455 KC
FREQ. RANGE
535-1620 KC

CR-1
MULTIPLE CAPACITOR-RESISTOR
CONNECTIONS



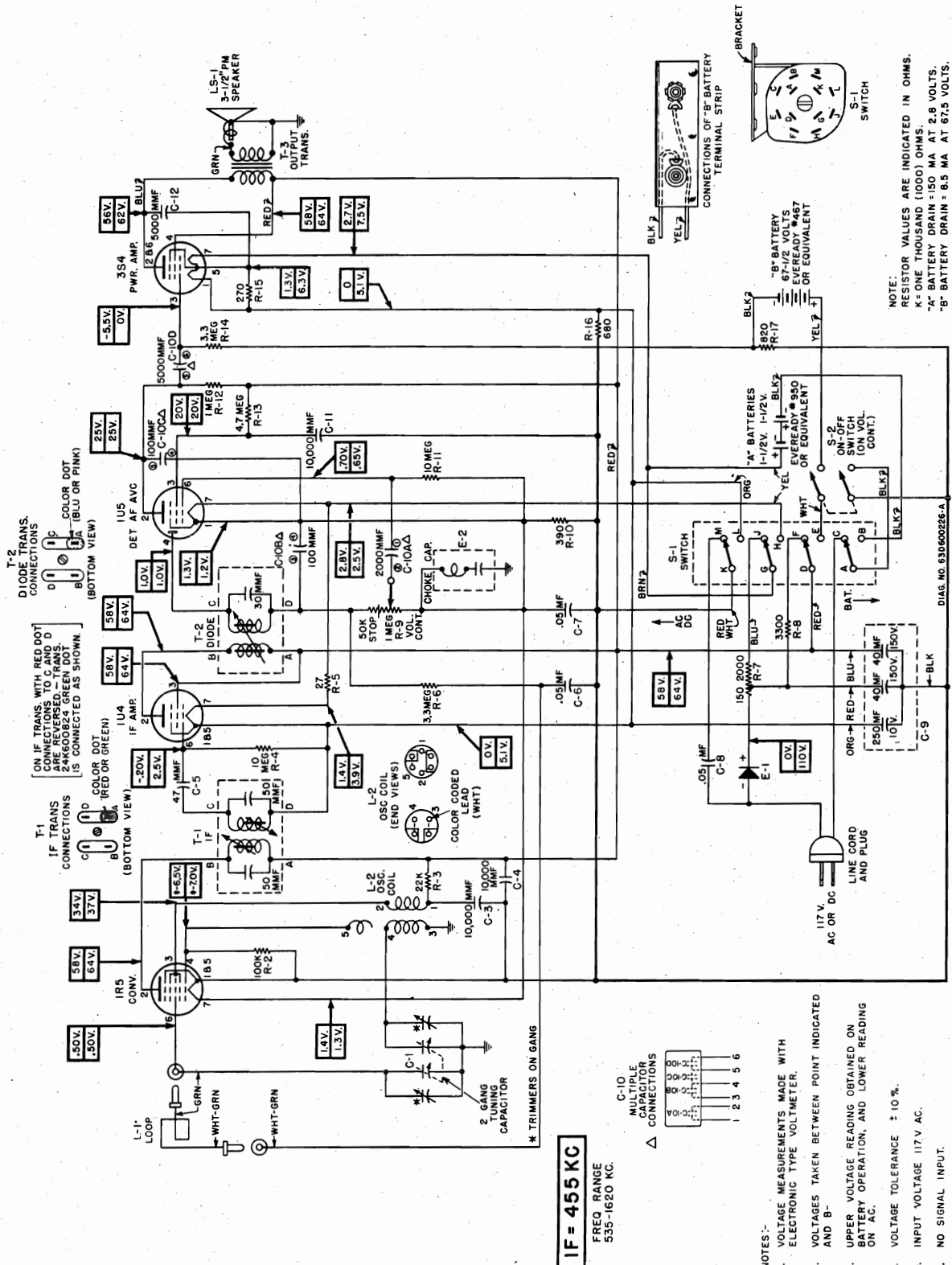
- NOTES:-
1. VOLTAGE MEASUREMENTS MADE WITH ELECTRONIC TYPE VOLTMETER.
 2. VOLTAGES TAKEN BETWEEN POINT INDICATED AND B-.
 3. UPPER VOLTAGE READING OBTAINED ON BATTERY OPERATION, AND LOWER READING ON AC.
 4. VOLTAGE TOLERANCE ± 10%.
 5. INPUT VOLTAGE 117 V.AC.
 6. NO SIGNAL INPUT.
 7. † MEASUREMENT MADE WITH GANG FULLY OPEN.

NOTE:
RESISTOR VALUES ARE INDICATED IN OHMS.
K = ONE THOUSAND (1000) OHMS.
* -A BATTERY DRAIN = 150 MA AT 2.8 VOLTS.
* -B BATTERY DRAIN = 8.5 MA AT 67.5 VOLTS.



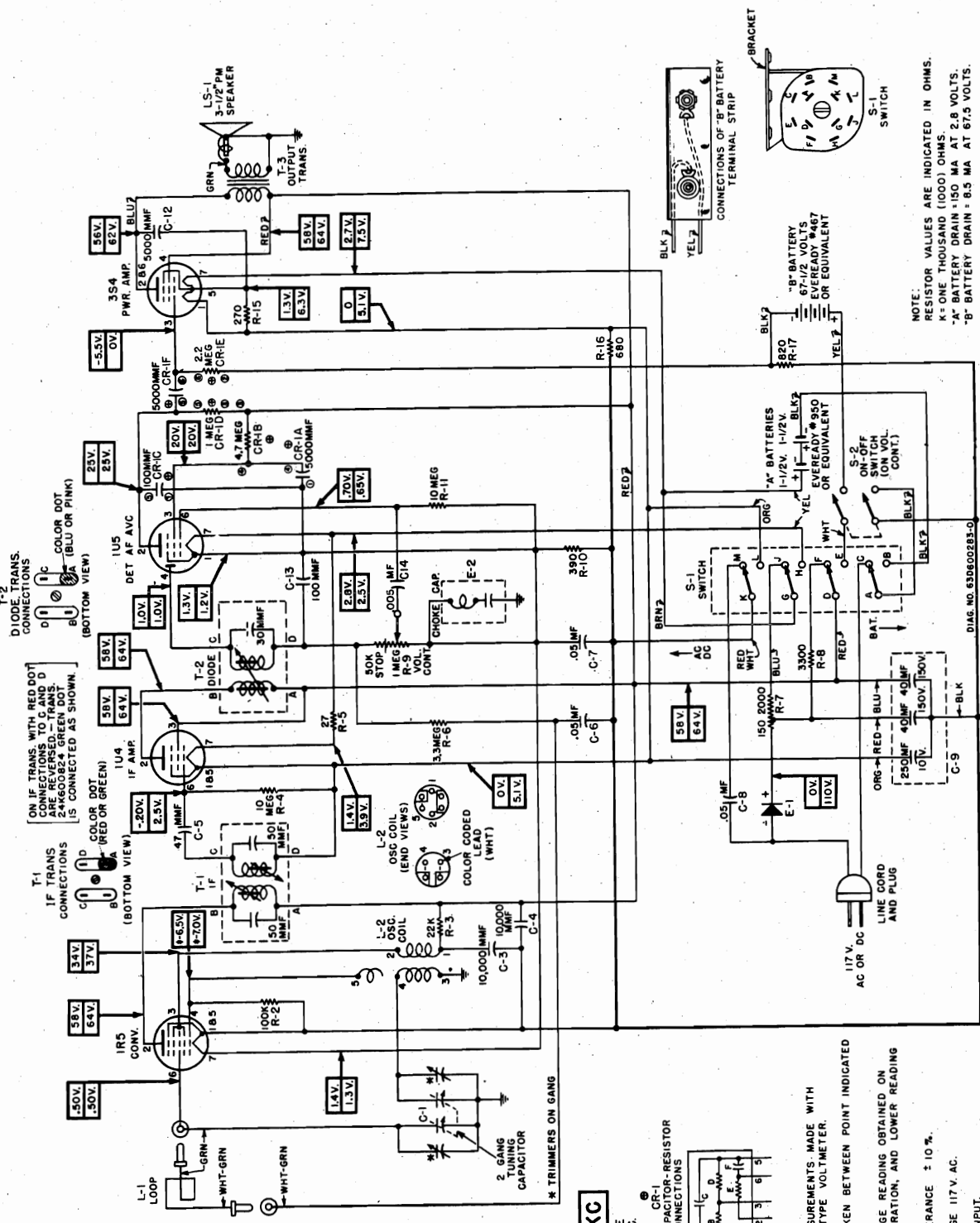
MODELS 5L1, 5L2,
5J1, 5J2, Ch.
HS-250

FIGURE 12. SCHEMATIC DIAGRAM OF CHASSIS HS-250 USING MULTIPLE CAPACITOR PLATE



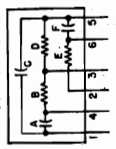
MODELS 5L1, 5L2, 5J1,
5J2, Ch. HS-250

FIGURE 13. SCHEMATIC DIAGRAM OF CHASSIS HS-250 USING MULTIPLE CAPACITOR-RESISTOR PLATE



IF = 455 KC
FREQ. RANGE
535-1620 KC.

CR-1
MULTIPLE CAPACITOR-RESISTOR
CONNECTIONS



- NOTES:-
- VOLTAGE MEASUREMENTS MADE WITH ELECTRONIC TYPE VOLTMETER.
 - VOLTAGES TAKEN BETWEEN POINT INDICATED AND B-
 - UPPER VOLTAGE READING OBTAINED ON BATTERY OPERATION, AND LOWER READING ON AC.
 - VOLTAGE TOLERANCE ± 10%.
 - INPUT VOLTAGE 117 V. AC.
 - NO SIGNAL INPUT.
 - MEASUREMENT MADE WITH GANG FULLY OPEN.

NOTE:
RESISTOR VALUES ARE INDICATED IN OHMS.
K = ONE THOUSAND (1000) OHMS.
M = ONE MILLION (1,000,000) OHMS.
-A- BATTERY DRAIN 150 MA. AT 2.8 VOLTS.
-B- BATTERY DRAIN 8.5 MA. AT 67.5 VOLTS.

MODELS 5L1, 5L1U, Rev.;
5L2, 5L2U, 5L1L1U, 5L1L2U;
5J1, 5J1U, Rev.; 5J2,
5J2U; Ch. HS-224, HS-250

REPLACEMENT PARTS LIST

NOTE: When ordering parts, specify model number of set in addition to part number and description of part.

| Ref. No. | Part Number | Description |
|-----------------------------------|--------------|------------------------------------------------------------------------------------|
| CHASSIS PARTS - ELECTRICAL | | |
| <u>Capacitors</u> | | |
| C-1 | 19K692008 | Variable, 2 gang..... |
| C-2 | 21K481377 | Ceramic: 500 mmf 500V..... |
| C-3 | 21K482726 | Ceramic, disc type: 10,000 mmf 450V..... |
| C-4 | 21K482726 | Ceramic, disc type: 10,000 mmf 450V..... |
| C-5 | 21K77373 | Ceramic, 47 mmf 500V..... |
| C-6 | 8K71213 | Paper: .05 mf 100V..... |
| C-7 | 8K71213 | Paper: .05 mf 100V..... |
| C-8 | 8K471635 | Paper: .05 mf 400V..... |
| C-9 | 23B691995 | Electrolytic: 40-40 mf 150V/250 mf 10V..... |
| C-10 | 21K691992 | Ceramic, multiple: 2000 mmf, 100 mmf, 100 mmf 5000 mmf..... |
| C-11 | 21K482726 | Ceramic, disc type: 10,000 mmf 450V..... |
| C-12 | 21A470789 | Ceramic, disc type: 5000 mmf 450V..... |
| C-13 | 21B772286 | Ceramic: 100 mmf 500V..... |
| C-14 | 8A24966 | Paper: .005 mf 100V..... |
| <u>Capacitor-Resistor</u> | | |
| CR-1 | 21B601036 | Capacitor-Resistor: 5000 mmf, 100 mmf, 5000 mmf; 4.7 meg, 1 meg, 2.2 meg... |
| <u>Rectifier</u> | | |
| E-1 | 48B791092 | Selenium Rectifier: half wave..... |
| <u>Choke & Capacitor</u> | | |
| E-2 | 24K691986 | Choke & .05 mf 200V Paper Capacitor..... |
| <u>Coils</u> | | |
| L-1 | 1X692056 | Antenna Loop & Lead Assembly (5L1 & 5L1 series)... |
| | 1X692141 | Antenna Loop, Panel & Hinge Assembly: less front cover; black plastic (5J1 series) |
| | 1X600437 | Antenna Loop, Panel & Hinge Assembly: less front cover; green plastic (5J2 series) |
| | 24B691936 | Antenna Loop & Panel Assembly: less hinges; black plastic (5J1 series)..... |
| | 24K600403 | Antenna Loop & Panel Assembly: less hinges; green plastic (5J2 series)..... |
| L-2 | 24B691987 | Oscillator Coil (red code) (HS-224 only)..... |
| | 24K600154 | Oscillator Coil (white code) (HS-250 only)..... |
| <u>Speaker</u> | | |
| LS-1 | 50B692037 | Speaker: 3½" PM; 3.2 ohm VC |
| | or 50B692038 | Speaker: 3½" PM; 3.2 ohm VC |

| Ref. No. | Part Number | Description |
|---------------------------------------------------------------------------|--------------|--------------------------------------------------------------------------------|
| <u>Resistors</u> | | |
| Note: All resistors are insulated carbon type unless otherwise specified. | | |
| R-1 | 6R2122 | 4.7 meg 20% ½W |
| R-2 | 6R6031 | 100,000 10% ½W |
| R-3 | 6R6397 | 22,000 10% ½W |
| R-4 | 6R2109 | 10 meg 20% ½W |
| R-5 | 6R5683 | 27 10% ½W |
| R-6 | 6R2118 | 3.3 meg 20% ½W |
| R-7 | 17K692009 | Wire Wound: 2150 5% 10W; tapped..... |
| R-8 | 6R5581 | 3300 10% ½W |
| R-9 | 18A692018 | Volume Control: 1 meg; with on-off switch..... |
| R-10 | 6R5554 | 390 10% ½W |
| R-11 | 6R2109 | 10 meg 20% ½W |
| R-12 | 6R6004 | 1 meg 20% ½W |
| R-13 | 6R2122 | 4.7 meg 20% ½W |
| R-14 | 6R2118 | 3.3 meg 20% ½W |
| R-15 | 6R6432 | 270 10% ½W |
| R-16 | 6R6040 | 680 10% ½W |
| R-17 | 6R6269 | 820 10% ½W |
| R-18 | 6R6015 | 220,000 20% ½W |
| <u>Switches</u> | | |
| S-1 | 40B471927 | Rotary Switch, 5PDT (AC/DC, battery selector) (HS-224 only)..... |
| | 40K600156 | Rotary Switch, 4PDT (AC/DC, battery selector) (HS-250 only)..... |
| <u>Transformers</u> | | |
| T-1 | 24K600824 | IF Transformer, 455 Kc: complete with capacitors and shield (green dot).... |
| | or 24B692014 | IF Transformer, 455 Kc: complete with capacitors and shield (red dot)..... |
| T-2 | 24K600825 | Diode Transformer 455 Kc: complete with capacitors and shield (pink dot)..... |
| | or 24B692015 | Diode Transformer, 455 Kc: complete with capacitors and shield (blue dot)..... |
| T-3 | 25K692006 | Output Transformer..... |
| CHASSIS PARTS - MECHANICAL | | |
| 1 | 43A692012 | Bushing, strain relief: line cord (use with 43K692013)..... |
| 2 | 42K75826 | Clip, electrolytic mtg.. |
| 3 | 42A485548 | Clip, IF Coil mtg..... |
| 4 | 30B691994 | Cord, line: with plug; 6 ft long (HS-224 only)..... |
| 5 | 30K600125 | Cord, line: with plug; 6 ft long (HS-250 only)..... |
| | 29R5294 | Lug, soldering (holds battery leads)..... |
| 7 | 29R3020 | Lug, soldering: battery contact (in "A" battery retainer)..... |

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CHASSIS HS-
224, HS-250

| Ref. No. | Part Number | Description | Ref. No. | Part Number | Description |
|---------------------------------|-------------|--------------------------------------------------------------------------------------------------|----------|-------------|--------------------------------------------------------------------------------------------------|
| 8 | 2S7051 | Nut, hex: Palnut; 3/8-32 x 9/16; volume control mtg) | | 2S7089 | Speednut: for .187 stud; black (loop mtg)..... |
| 9 | 9A691988 | Receptacle, 2 pin (antenna lead receptacle)..... | 115 | 41A480094 | Spring, hinge (rear cover) |
| 10 | 15B481896 | Retainer, "A" battery..... | 116 | 55B692068 | Spring, rear cover latch.. |
| 11 | 43K692013 | Retainer, strain relief (on line cord bushing)..... | | | |
| 12 | 26K600155 | Shield, back (on rear of chassis)(HS-250 only)..... | | | MODEL 51L1U CABINET PARTS - Same as 5L1 & 5L1U except |
| 13 | 26C691983 | Shield, bottom: black (over chassis bottom) (HS-224 only)..... | 121 | 38K692050 | Button, plug: green..... |
| 14 | 26A692005 | Shield, heat (around R-7) | | 16K610023 | Cabinet & Grille Assembly, front section: complete, less carrying handle; green plastic..... |
| | 26K691997 | Shield, switch: (over AC/DC Battery switch)..... | | 16K610024 | Cabinet, front section: less grille & carrying handle; green plastic..... |
| 16 | 9A690129 | Socket, tube: miniature; 7 prong..... | 125 | 16K601704 | Cover, cabinet back: less latch spring and loop antenna; green plastic..... |
| 17 | 41K680029 | Spring, battery contact (in "A" battery retainer)..... | | 16K610025 | Grille, speaker: green plastic..... |
| 18 | 31K691985 | Strip, "B" battery terminal with leads..... | 127 | 1X610018 | Handle Assembly, complete: green..... |
| | 31K37504 | Strip, terminal: 1 insulated lug; #1 mtg..... | | 36K610022 | Knob, tuning: green..... |
| | 31K470746 | Strip, terminal: 3 insulated lugs #2 mtg..... | | | |
| | 4K470939 | Washer, fibre (antenna receptacle mtg & R-7 mtg) | | | MODEL 5L2 & 5L2U CABINET PARTS |
| | | | 131 | 7B600059 | Bracket, chassis support (on sides of chassis).... |
| | | | 132 | 38K600106 | Button, plug: maroon..... |
| | | | | 16K600410 | Cabinet & Grille Assembly, front section: complete, less carrying handle; maroon plastic..... |
| | | | | 16K600411 | Cabinet, front section: less grille and carrying handle; maroon plastic ... |
| | | | 135 | 1X600431 | Cover and Loop Assembly, cabinet back: complete with latch spring, and stop cord; maroon plastic |
| | | | 136 | 16K600413 | Cover, cabinet back: less latch spring and antenna loop; maroon plastic..... |
| | | | | 5S7855 | Eyelet: .156 x .484 (on loop leads)..... |
| | | | | 16K600412 | Grille, speaker: maroon plastic..... |
| | | | 139 | 1X600429 | Handle Assembly, complete: maroon..... |
| | | | | 36K600406 | Knob, tuning: maroon plastic |
| | | | 141 | 3S8175 | Screw, sheet metal: #4 x 3/16 PKZ; plain hex head (chassis support bracket mtg)..... |
| | | | | 3S490390 | Screw, thread-cutting: #4 x 3/8; type 25 phillips round head;(speaker grille mtg)..... |
| | | | | 3S488009 | Screw, thread-cutting: #6 x 3/8; type 25 plain hex head (mts chassis to cabinet). |
| | | | | 2S7089 | Speednut: for .187 stud: black (loop mtg)..... |
| | | | 145 | 41A480094 | Spring, hinge (rear cover) |
| | | | 146 | 55B692068 | Spring, rear cover latch. |
| MODELS 5L1 & 5L1U CABINET PARTS | | | | | |
| 101 | 7B600059 | Bracket, chassis support (on sides of chassis)..... | | | |
| 102 | 38K692051 | Button, plug: tan..... | | | |
| | 16E691902 | Cabinet & Grille Assembly, front section; complete, less carrying handle; tan plastic..... | | | |
| | 16K691903 | Cabinet, front section: less grille & carrying handle; tan plastic..... | | | |
| 105 | 1X600168 | Cover and Loop Assembly cabinet back: complete with latch spring and stop cord; tan plastic..... | | | |
| 106 | 16D691905 | Cover, cabinet back: tan plastic; less latch spring and loop antenna..... | | | |
| | 5S7855 | Eyelet: .156 x .484 (on loop leads)..... | | | |
| | 16K691904 | Grille, speaker: brown plastic..... | | | |
| 109 | 1X600082 | Handle Assembly, complete: tan..... | | | |
| | 36B691906 | Knob, tuning: tan plastic.. | | | |
| 111 | 3S8175 | Screw, sheet metal: #4 x 3/16 PKZ; plain hex head (chassis support bracket mtg)..... | | | |
| | 3S490390 | Screw, thread-cutting: #4 x 3/8; type 25 phillips round head(speaker grille mtg)..... | | | |
| | 3S488009 | Screw, thread-cutting: #6 x 3/8; type 25 plain hex head (mounts chassis to cabinet) | | | |

MODELS 5L1, 5L1U, Rev.;
5L2, 5L2U, 5L1U, 5L2U;
5J1, 5J1U, Rev.; 5J2,
5J2U; Ch. HS-224, HS-250

| Ref. No. | Part Number | Description | Ref. No. | Part Number | Description |
|-------------------------------------------------------|-------------|------------------------------------------------------------------------------------------------|-----------------------------------------------------|-------------|----------------------------------------------------------------------------------------------------------------|
| MODEL 5L2U CABINET PARTS - Same as 5L2 & 5L2U except: | | | 3S7327 | | Screw, machine: 5-40 x 3/8 plain hex head (handle mtg)..... |
| 152 | 16K601703 | Cover, cabinet back: less latch spring and loop antenna..... | 3S7155 | | Screw, machine: 6-32 x 3/16; plain hex head (holds hinge to hinge mtg bracket)..... |
| | 36K610034 | Knob, tuning: maroon plastic | | | |
| MODEL 5J1 & 5J1U CABINET PARTS | | | 3S490018 | | Screw, sheet metal: #2 x 1/4; PKZ; phillips flat head; blk nkl (mounts loop to front cover)..... |
| 201 | 7A600078 | Bracket, chassis support (on sides of chassis)..... | | | |
| | 7A692061 | Bracket, hinge mtg: black nickel finish (inside cabinet front)..... | 229 | 3S8136 | Screw, sheet metal: #4 x 1/4; PKZ; phillips round head; blk nkl (chassis support bracket mtg)..... |
| | 14K600713 | Bushing, insulating: bakelite (on handle mtg cover)..... | 3S400036 | | Screw, thread cutting: #6 x 1/4; PKF; slotted binder head (holds hinge mtg brkt)..... |
| 204 | 38K692052 | Button, plug: black..... | 3S488009 | | Screw, thread cutting: #6 x 3/8; type 25 plain hex head (mounts chassis to cabinet)..... |
| 205 | 16E691798 | Cabinet, front section: less grille, loop and front cover; black plastic | 2S490840 | | Speednut: for 1/16 stud; black parkerized finish (medallion mtg)..... |
| 206 | 42A600664 | Clip, cabinet locking (on front section of cabinet) (replaces 42K692143).. | 2S7092 | | Speednut: for .125 stud; black parkerized finish (spkr grille mtg)..... |
| 207 | 42A600665 | Clip, cabinet locking (on rear cover) (replaces 42A480078)..... | 234 | 2S490842 | Speednut: for .271 stud; black parkerized finish (holds cover stop cord)..... |
| | 13A691938 | Cloth, grille..... | 235 | 42A600663 | Spring, battery retainer.. |
| 209 | 1X600173 | Cover Assembly, cabinet back: complete with locking clip and stop cord; black plastic..... | | 41A692060 | Spring, handle (inside plastic handle)..... |
| | 1X692139 | Cover and Loop Assembly, cabinet front: complete with hinges and medallion; black plastic..... | 4S1719 | | Washer, flat; 3/8 x .140 x .030 stl; (handle mtg) |
| 212 | 55A692058 | Cover, handle mtg: brass plated (over ends of handle)..... | MODEL 5J2 & 5J2U CABINET PARTS - Same as 5J1 except | | |
| | 7A691932 | Frame, grille: satin brass finish (around top of speaker grille)..... | 241 | 38K600402 | Button, plug: green..... |
| | 7K691934 | Frame, grille: satin brass finish (around bottom of speaker grille)..... | 242 | 16K600409 | Cabinet, front section: less grille, loop and front cover; green plastic |
| | 13C691896 | Grille, speaker: green plastic..... | 243 | 1X600438 | Cover Assembly, cabinet back: complete with locking clip and stop cord; green plastic..... |
| 216 | 55A691944 | Handle, carrying: black plastic; less spring..... | | 1X600435 | Cover and Loop Assembly, cabinet front: complete with hinges and medallion; green plastic..... |
| | 1X692142 | Hinge Assembly, front cover: complete..... | 15K600414 | | Cover, cabinet front: less medallion and loop; green plastic..... |
| | 36B691923 | Knob, control: green plastic | 13K600408 | | Grille, speaker: black plastic..... |
| 219 | 1X692137 | Lead and Eyelet Assembly: white (loop lead)..... | 247 | 55K600401 | Handle, carrying: less spring; green plastic..... |
| 220 | 1X692138 | Lead and Eyelet Assembly: green (loop lead)..... | 36K600859 | | Knob, control black plastic |
| | 29R3037 | Lug, soldering: #6 hole (loop lead connector-on loop panel)..... | 5S7773 | | Rivet: .122 x 7/32 stl; ant copper (mounts hinge to loop panel)..... |
| | 13A691927 | Medallion: brass plated (on front cover)..... | 3S3389 | | Screw, sheet metal: #2 x 1/4 PKZ; phillips flat head; statuary bronze finish (mounts loop to front cover)..... |
| | 64A692191 | Plate, handle mtg (under ends of handle)..... | | | |
| | 64A600044 | Plate, loop panel support (under loop hinges on loop panel)..... | | | |
| | 5S490843 | Rivet: .122 x 7/32 stl; black nkl (mounts hinge to loop panel)..... | | | |

MODELS 5R11, 5R12,
5R13, 5R14, 5R15,
5R16, Ch. HS-254

GENERAL INFORMATION

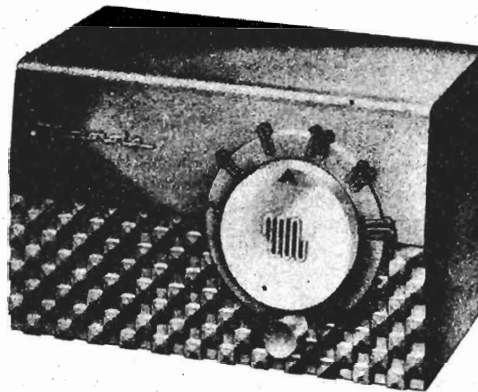
TYPE - AC-DC table model superheterodyne receiver with loop antenna.

| RECEIVER MODELS - Model | Color |
|-------------------------|-----------------|
| 5R11 | Walnut-Mahogany |
| 5R12 | Ivory |
| 5R13 | Maroon |
| 5R14 | Gray |
| 5R15 | Green |
| 5R16 | Yellow |

| TUBE COMPLEMENT - | | |
|-------------------|-------------------|--|
| 12BE6 | Converter | |
| 12BA6 | IF Amplifier | |
| 12AT6 | Det, AVC & AF Amp | |
| 50C5 | Power Amplifier | |
| 35W4 | Rectifier | |

TUNING RANGE - 535 to 1620 Kc IF - 455 Kc

POWER SUPPLY - 117 volts, AC or DC; 35 watts



INSTALLATION & OPERATING INSTRUCTIONS

POWER SWITCH & VOLUME CONTROL. The 'off-on' switch and the volume control are combined and are operated with the small lower knob. NOTE: If the receiver does not operate from DC power, reverse the plug in the power outlet. When operating from AC power, reception may sometimes be improved by reversing the power plug in the outlet.

TUNING CONTROL. Stations are tuned in with the large

upper knob.

ANTENNA. A built-in loop antenna eliminates the need for an outside antenna in most locations. When receiving a weak station, rotate the receiver slightly for best signal strength. If additional pick-up is necessary, connect an external antenna to the radio by following the instructions printed on the rear panel. CAUTION: Never connect the radio chassis to a water pipe, radiator, or other ground.

SERVICE NOTES

The chassis of this receiver is connected directly to the power line. When operating the chassis (from an AC line) outside of its cabinet, use an isolation transformer between the power line and the receiver to reduce the possibility of an electrical shock.

TO REMOVE CHASSIS FROM CABINET:

1. Pull off the two control knobs from the front of the re-

ceiver.

2. Remove the two split plugs which hold the loop to the cabinet.

3. Remove the two hex head screws at the rear edge of the chassis.

4. Slide the chassis from the cabinet.

MODELS 5R11, 5R12,
5R13, 5R14, 5R15,
5R16, Ch. HS-254

ALIGNMENT

NOTE: If AC power is used, it is recommended that an isolation transformer be placed between the power line and the receiver to avoid hum and electrical shocks. If an isolation transformer is not available, connect the low side of the signal generator to chassis through a .1 mf capacitor.

1. Connect a low range output meter across the speaker voice coil.
2. Connect the low side of the signal generator to chassis.
3. Set the signal generator for 400 cycle, 30% modulation.
4. Turn the receiver volume control to maximum.
5. Use a small fibre screwdriver for aligning the IF and diode transformers.
6. As stages are brought into alignment, reduce the signal generator output to a level which produces less than .40 volts (.05 watt) across the voice coil to avoid overloading the receiver.
7. See Figure 1 for adjustment locations and the following chart for procedure.

ALIGNMENT CHART

| STEP | DUMMY ANTENNA | GENERATOR CONNECTION | GENERATOR FREQUENCY | GANG SETTING | ADJUST | REMARKS |
|--------------------|---------------|------------------------------|---------------------|--------------|-------------------------|---------------------|
| IF ALIGNMENT 1. | .1 mf | Grid of conv. (pin 7, 12BE6) | 455 Kc | Fully open | 1, 2, 3, & 4 (IF cores) | Adjust for maximum. |
| RF ALIGNMENT 2. | - | Grid of conv. (pin 7, 12BE6) | 1620 Kc | Fully Open | 5 (Osc) | Adjust for maximum. |
| 3. | - | Radiation loop* | 1400 Kc | Tune for max | 6 (Ant) | Adjust for maximum. |

*Connect generator output across 5" diameter, 5 turn loop and couple inductively to receiver loop. Keep loops at least 12" apart.

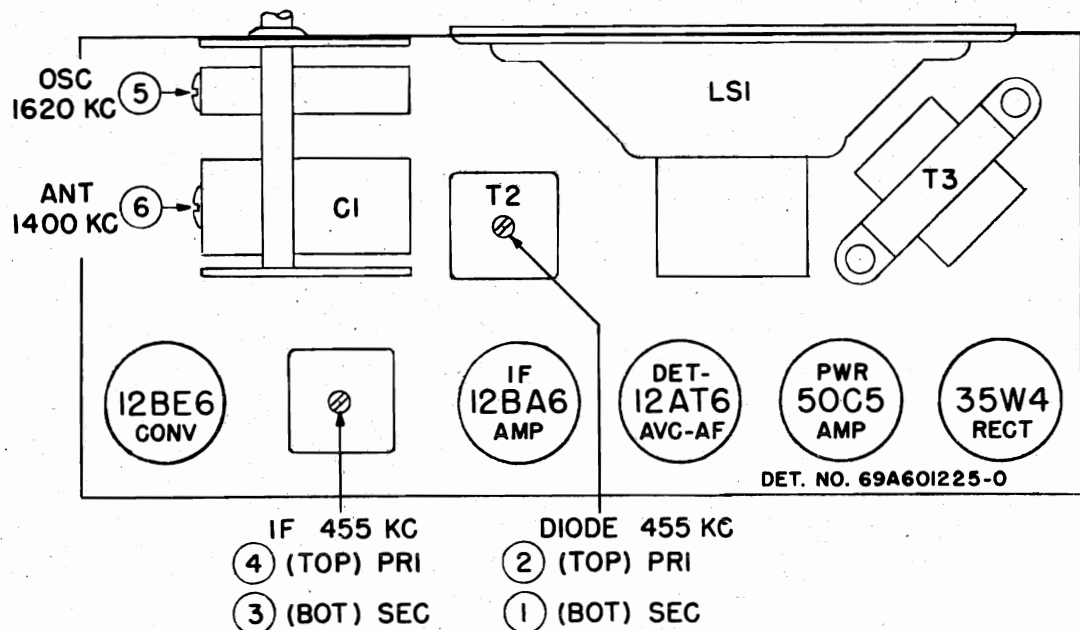


FIGURE 1. TUBE AND TRIMMER LOCATIONS

MODELS 5R11, 5R12,
5R13, 5R14, 5R15,
5R16, Ch. HS-254

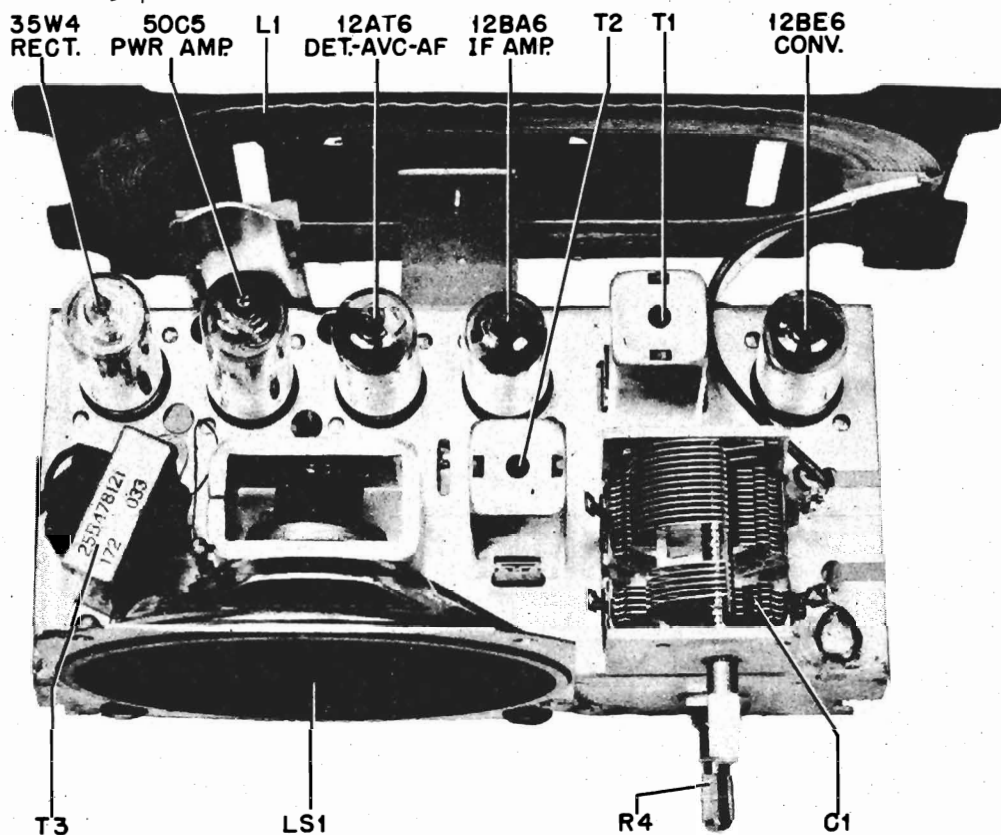


FIGURE 2. TOP VIEW OF CHASSIS

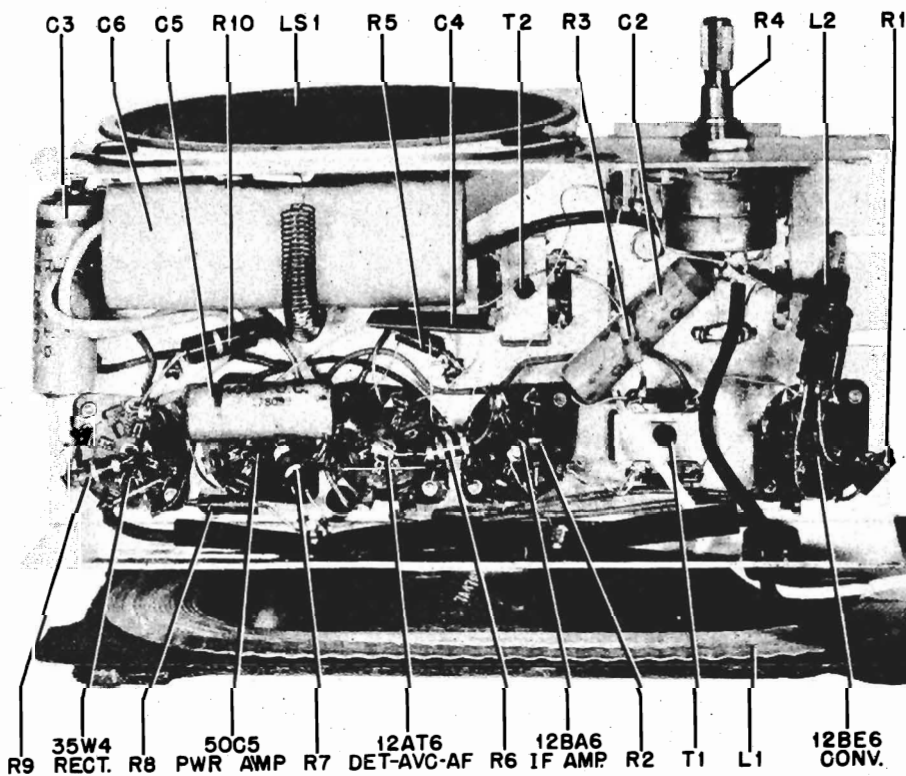
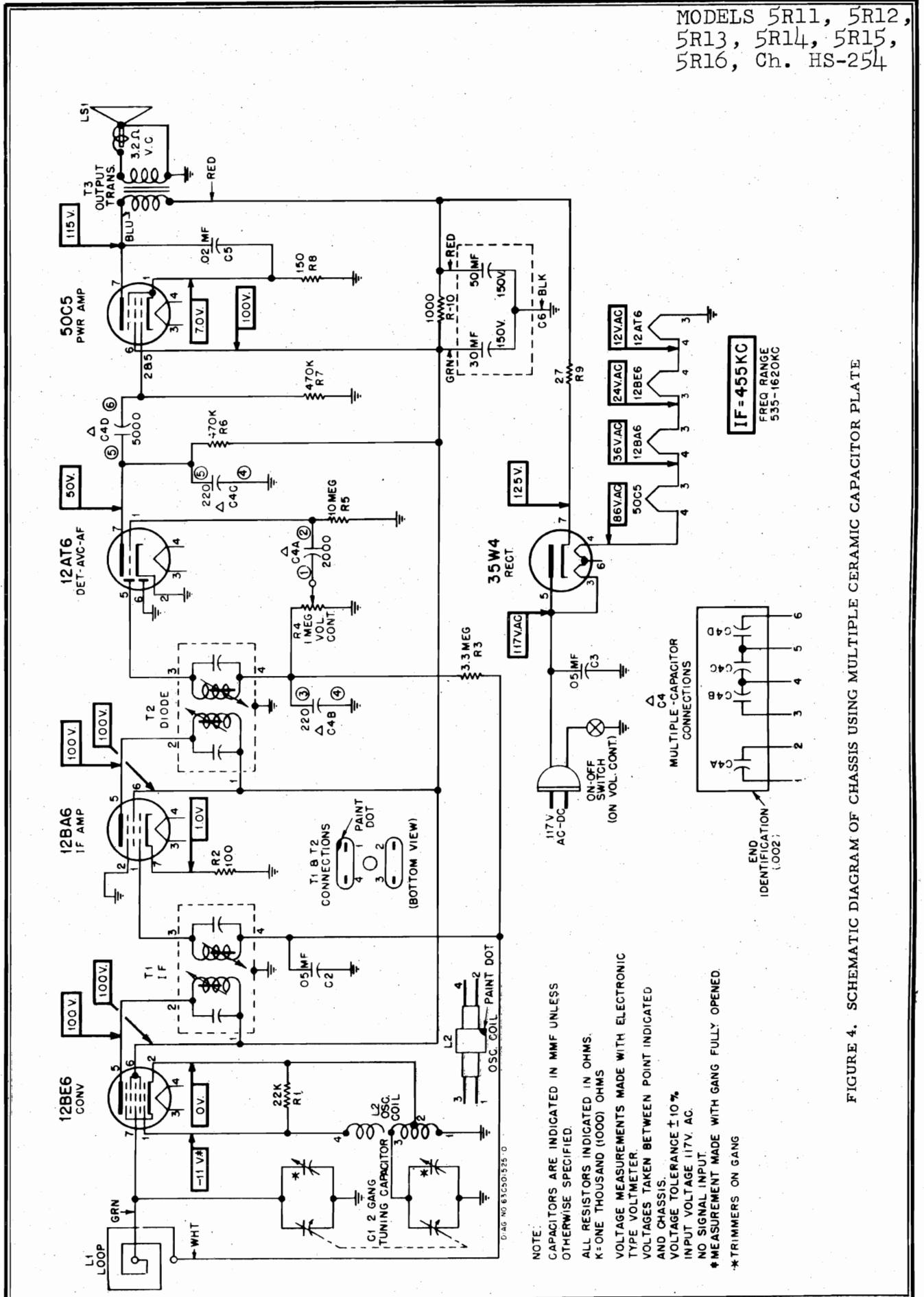


FIGURE 3. BOTTOM VIEW OF CHASSIS USING MULTIPLE CERAMIC CAPACITOR PLATE

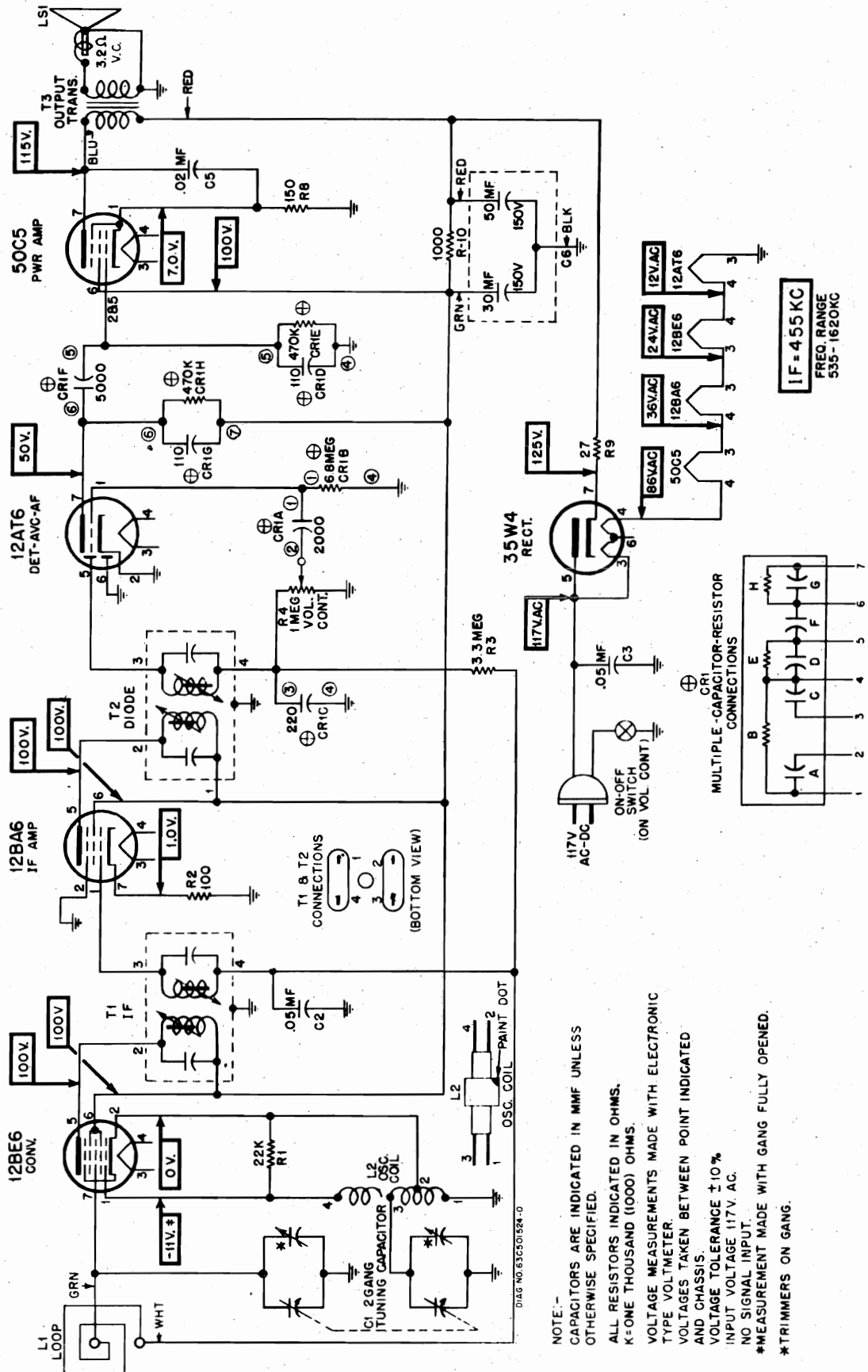
MODELS 5R11, 5R12,
5R13, 5R14, 5R15,
5R16, Ch. HS-254



NOTE:
CAPACITORS ARE INDICATED IN MMF UNLESS OTHERWISE SPECIFIED.
ALL RESISTORS INDICATED IN OHMS.
K=ONE THOUSAND (1000) OHMS
VOLTAGE MEASUREMENTS MADE WITH ELECTRONIC TYPE VOLTMETER.
VOLTAGES TAKEN BETWEEN POINT INDICATED AND CHASSIS.
VOLTAGE TOLERANCE $\pm 10\%$
INPUT VOLTAGE 117V. AC.
NO SIGNAL INPUT
* MEASUREMENT MADE WITH GANG FULLY OPENED.
*-TRIMMERS ON GANG

FIGURE 4. SCHEMATIC DIAGRAM OF CHASSIS USING MULTIPLE CERAMIC CAPACITOR PLATE

MODELS 5R11, 5R12,
5R13, 5R14, 5R15,
5R16, Ch. HS-254



NOTE:-
CAPACITORS ARE INDICATED IN MMF UNLESS OTHERWISE SPECIFIED.
ALL RESISTORS INDICATED IN OHMS.
K= ONE THOUSAND (1000) OHMS.
VOLTAGE MEASUREMENTS MADE WITH ELECTRONIC TYPE VOLTMETER.
VOLTAGES TAKEN BETWEEN POINT INDICATED AND CHASSIS.
VOLTAGE TOLERANCE ±10%
INPUT VOLTAGE 117V. AC.
NO SIGNAL INPUT.
*MEASUREMENT MADE WITH GANG FULLY OPENED.
*TRIMMERS ON GANG.

FIGURE 6. SCHEMATIC DIAGRAM OF CHASSIS USING MULTIPLE CERAMIC CAPACITOR-RESISTOR PLATE

MODELS 5R11, 5R12,
5R13, 5R14, 5R15,
5R16, Ch. HS-254

REPLACEMENT PARTS LIST

NOTE: When ordering parts, specify model number of set in addition to part number and description of part.

| Ref. No. | Part Number | Description | Part No. | Description |
|--------------------------------------------------------------------------|-------------|------------------------------------------------------------------------------------------------|-----------------------------------|-----------------------------------------------------------------------------------|
| CHASSIS PARTS - ELECTRICAL | | | CHASSIS PARTS - MECHANICAL | |
| <u>Capacitors</u> | | | 7A478118 | Bracket, loop mtg..... |
| C-1 | 19B600458 | Variable: 2 gang; with pulley..... | 43A692012 | Bushing, strain relief: line cord (use with 43K692013)..... |
| C-2 | 8R9821 | Paper: .05 mf 200V..... | 42A485548 | Clip, IF coil mtg..... |
| C-3 | 8R9816 | Paper: .05 mf 400V..... | 30K478137 | Cord, line: with plug; 6 feet long |
| C-4 | 21B482847 | Ceramic, multiple: 2000, 220,220, 5000 mmf..... | 5A484268 | Grommet, rubber (speaker mtg). |
| C-5 | 8R9802 | Paper: .02 mf 400V..... | 14A478119 | Insulator, loop bracket mtg: fibre |
| C-6 | 23B600855 | Electrolytic: 50-30 mf/150V | 2S7051 | Nut, hex palnut: 3/8-32 x 9/16 (volume control mtg)..... |
| <u>Capacitor-Resistor</u> | | | 43K692013 | Retainer, strain relief: line cord (use with 43A692012)..... |
| CR-1 | 21B601007 | Capacitor-Resistor: 2000, 220, 5000, 110, 110 mmf, 6.8 meg, 470,000, 470,000 ohms..... | 5S7771 | Rivet: .088 x 3/16; stl; nkl pl (tube socket mtg)..... |
| <u>Coils</u> | | | 5S7707 | Rivet: .122 x 5/32; stl; nkl pl (output trans mtg)..... |
| L-1 | 24C600543 | Antenna Loop and Panel Assembly..... | 5S7703 | Rivet: .122 x 7/32; stl; nkl pl (loop bracket and speaker mtg)..... |
| L-2 | 24A478129 | Oscillator coil (red dot).. | 3S7247 | Screw, machine: 6-32 x 3/16 slotted locking hex head; cad pl (gang mtg)..... |
| <u>Speaker</u> | | | 26A478117 | Shield, electrostatic (on rear of chassis)..... |
| LS-1 | 50B690661 | Speaker: 4" PM; 3.2 ohm VC. | 9A472534 | Socket, tube: miniature; 7 prong.. |
| <u>Resistors</u> | | | 41A73996 | Spring, tension (electrolytic mtg) |
| Note: All resistors are insulated carbon type unless otherwise specified | | | 46A478145 | Stud, tri-mount (mounts loop to bracket)..... |
| R-1 | 6R6028 | 22,000 20% 1/2W..... | 14A11493 | Washer, shoulder: fibre (loop bracket mtg)..... |
| R-2 | 6R6018 | 110 20% 1/2W..... | CABINET PARTS | |
| R-3 | 6R2118 | 3.3 meg 20% 1/2W..... | 16K600181 | Cabinet, table model: walnut-mahogany (5R11)..... |
| R-4 | 18K600449 | Volume control: 1 meg; with switch..... | 16E600157 | Cabinet, table model: ivory(5R12).. |
| R-5 | 6R2109 | 10 meg 20% 1/2W..... | 16K600183 | Cabinet, table model: maroon(5R13) |
| R-6 | 6R6032 | 470,000 20% 1/2W..... | 16K600184 | Cabinet, table model: gray (5R14). |
| R-7 | 6R6032 | 470,000 20% 1/2W..... | 16K600185 | Cabinet, table model: green(5R15). |
| R-8 | 6R3992 | 150 20% 1/2W..... | 16K600186 | Cabinet, table model: yellow(5R16) |
| R-9 | 6R5683 | 27 10% 1/2W..... | 36B600485 | Knob, tuning: ivory (5R11,5R13, 5R14, and 5R15)..... |
| R-10 | 6R3953 | 1000 20% 1W..... | 36K600486 | Knob, tuning: red (5R12)..... |
| <u>Transformers</u> | | | 36K600487 | Knob, tuning: blue(5R16)..... |
| T-1,2 | 24B485553 | IF and Diode Transformer (green dot): 455 KC; complete with capacitors, cores, and shield..... | 36B600544 | Knob, volume control: walnut(5R11) |
| T-3 | 25B478121 | Output Transformer..... | 36K600545 | Knob, volume control: ivory (5R12) |
| | | | 36K600546 | Knob, volume control: maroon(5R13) |
| | | | 36K600547 | Knob, volume control: gray(5R14).. |
| | | | 36K600548 | Knob, volume control: green (5R15) |
| | | | 36K600549 | Knob, volume control: yellow(5R16) |
| | | | 3S476083 | Screw, machine: 6-32 x 5/16; slotted locking hex head; cad pl; (chassis mtg)..... |
| | | | 38A25507 | Plug, split (mounts back panel to cabinet)..... |
| | | | 11M488253 | Tape, aluminum foil: 2 1/2" wide..... |

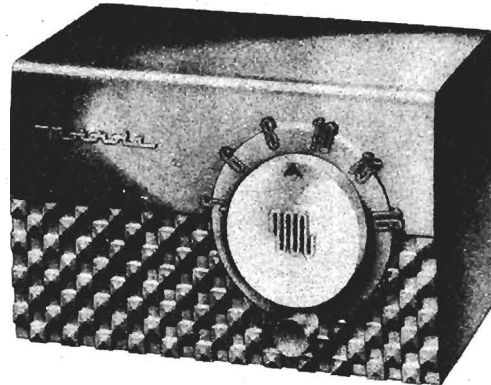
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MODELS 5R11A, 5R12A,
5R13A, 5R14A, 5R15A,
5R16A, Ch. HS-280

GENERAL INFORMATION

TYPE - AC-DC table model superheterodyne receiver with loop antenna.

| RECEIVER MODELS - | Model | Color |
|-------------------|-------|-----------------|
| | 5R11A | Walnut-Mahogany |
| | 5R12A | Ivory |
| | 5R13A | Maroon |
| | 5R14A | Gray |
| | 5R15A | Green |
| | 5R16A | Yellow |



| TUBE COMPLEMENT - | Type | Function |
|-------------------|-------|-------------------|
| | 12BE6 | Converter |
| | 12BA6 | IF Amplifier |
| | 12AT6 | Det, AVC & AF Amp |
| | 50C5 | Power Amplifier |

RECTIFIER - Selenium type

TUNING RANGE - 535 to 1620 Kc IF - 455 Kc

POWER SUPPLY - 117 volts AC or DC; 35 watts

INSTALLATION & OPERATING INSTRUCTIONS

ON-OFF SWITCH & VOLUME CONTROL. Operated with the small lower knob. NOTE: To operate on DC, the line plug must be inserted in the electrical outlet for correct polarity. If the set does not function, reverse the plug. When operating from AC, reversal of the line plug may improve reception.

TUNING CONTROL. Stations are tuned in with the large upper knob.

ANTENNA. The built-in loop antenna provides satisfactory reception in most locations. When receiving a distant or weak station, rotate the receiver slightly to get maximum signal pick-up. If additional pick-up is necessary, connect an external antenna by following the instructions printed on the rear panel. CAUTION: Never connect the chassis to a water pipe, radiator or other ground.

SERVICE NOTES

This receiver has one lead of the power line connected directly to the chassis. If AC power is used, it is recommended, when operating the chassis outside of its cabinet, that an isolation transformer be placed between the power line and the receiver to reduce the possibility of an electrical shock.

TO REMOVE CHASSIS FROM CABINET:

1. Pull off the two control knobs from the front of the receiver.

ceiver.

2. Remove the two split plugs which hold the loop to the cabinet.

3. Remove the two hex head screws at the rear edge of the chassis.

4. Slide the chassis from the cabinet.

MODELS 5R11A, 5R12A,
5R13A, 5R14A, 5R15A,
5R16A, Ch. HS-280

ALIGNMENT

NOTE: If AC power is used, it is recommended that an isolation transformer be placed between the power line and the receiver to avoid hum and electrical shocks. If an isolation transformer is not available, connect the low side of the signal generator to chassis through a .1 mf capacitor.

1. Connect a low range output meter across the speaker voice coil.
2. Connect the low side of the signal generator to chassis.
3. Set the signal generator for 400 cycle, 30% modulation.
4. Turn the receiver volume control to maximum.
5. Use a small fibre screwdriver for aligning the IF and diode transformers.
6. As stages are brought into alignment, reduce the signal generator output to a level which produces less than .40 volts (.05 watt) across the voice coil to avoid overloading the receiver.
7. See Figure 1 for adjustment locations and the following chart for procedure.

ALIGNMENT CHART

| STEP | DUMMY ANTENNA | GENERATOR CONNECTION | GENERATOR FREQUENCY | GANG SETTING | ADJUST | REMARKS |
|---------------------|---------------|------------------------------|---------------------|--------------|-------------------------|---------------------|
| IF ALIGNMENT | | | | | | |
| 1. | .1 mf | Grid of conv. (pin 7, 12BE6) | 455 Kc | Fully open | 1, 2, 3, & 4 (IF cores) | Adjust for maximum. |
| RF ALIGNMENT | | | | | | |
| 2. | .1 mf | Grid of conv. (pin 7, 12BE6) | 1620 Kc | Fully open | 5 (Osc) | Adjust for maximum. |
| 3. | - | Radiation loop* | 1400 Kc | Tune for max | 6 (Ant) | Adjust for maximum. |

*Connect generator output across 5" diameter, 5 turn loop and couple inductively to receiver loop. Keep loops at least 12" apart.

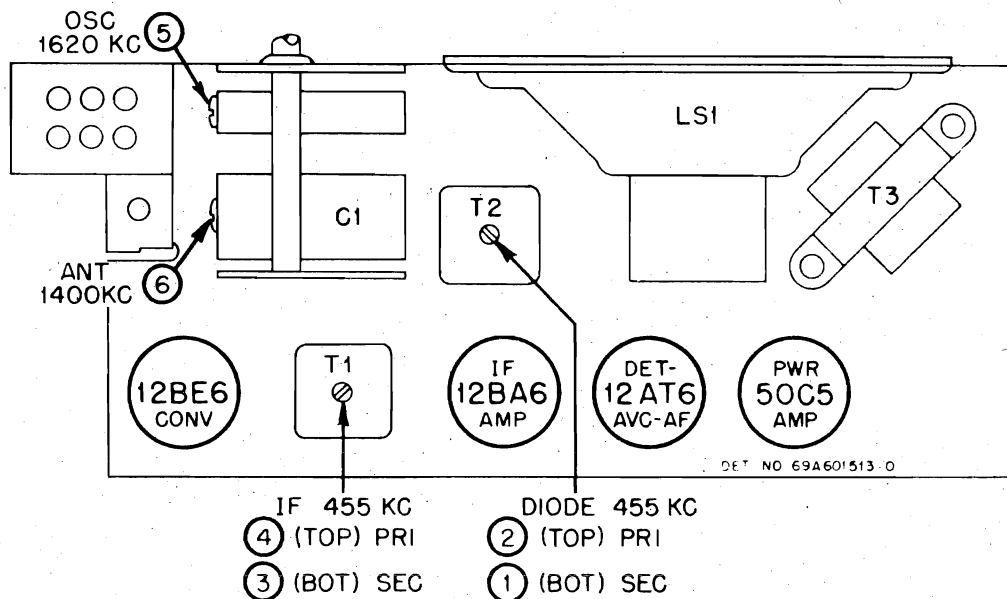


FIGURE 1. TUBE AND TRIMMER LOCATIONS

MODELS 5R11A, 5R12A,
5R13A, 5R14A, 5R15A,
5R16A, Ch. HS-280

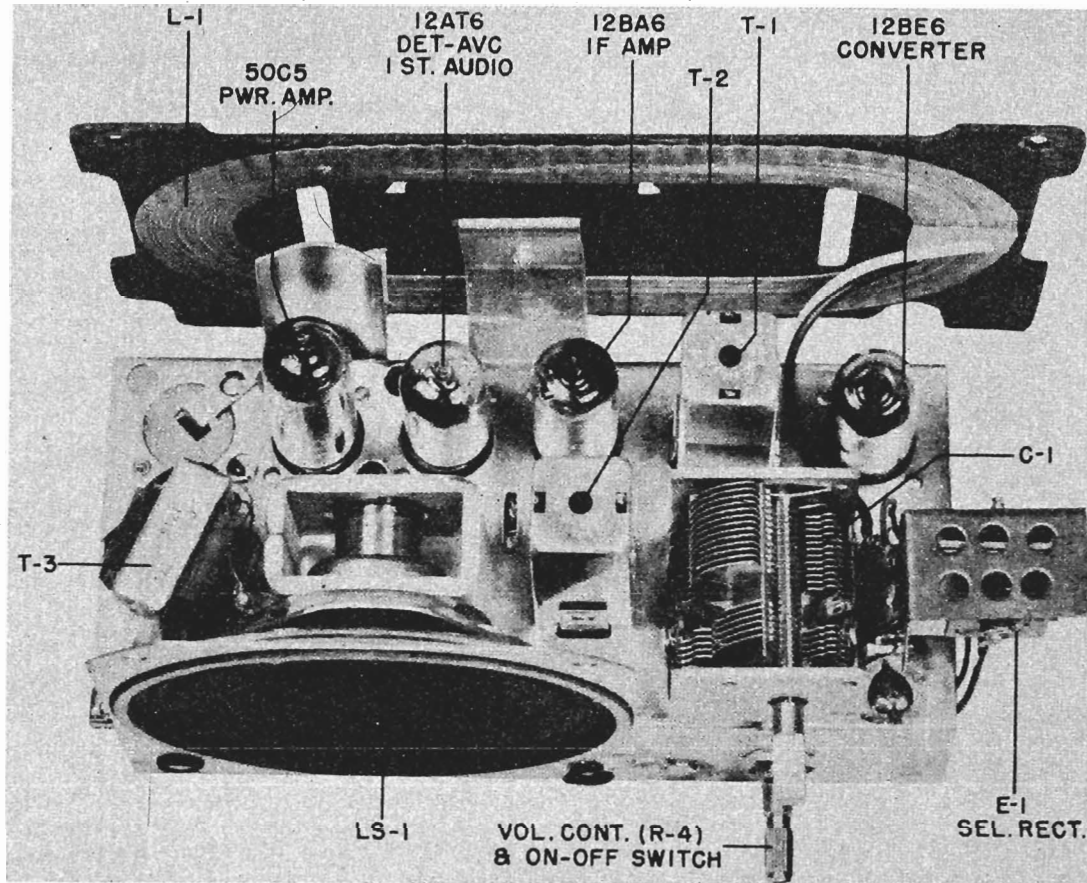


FIGURE 2. TOP VIEW OF CHASSIS

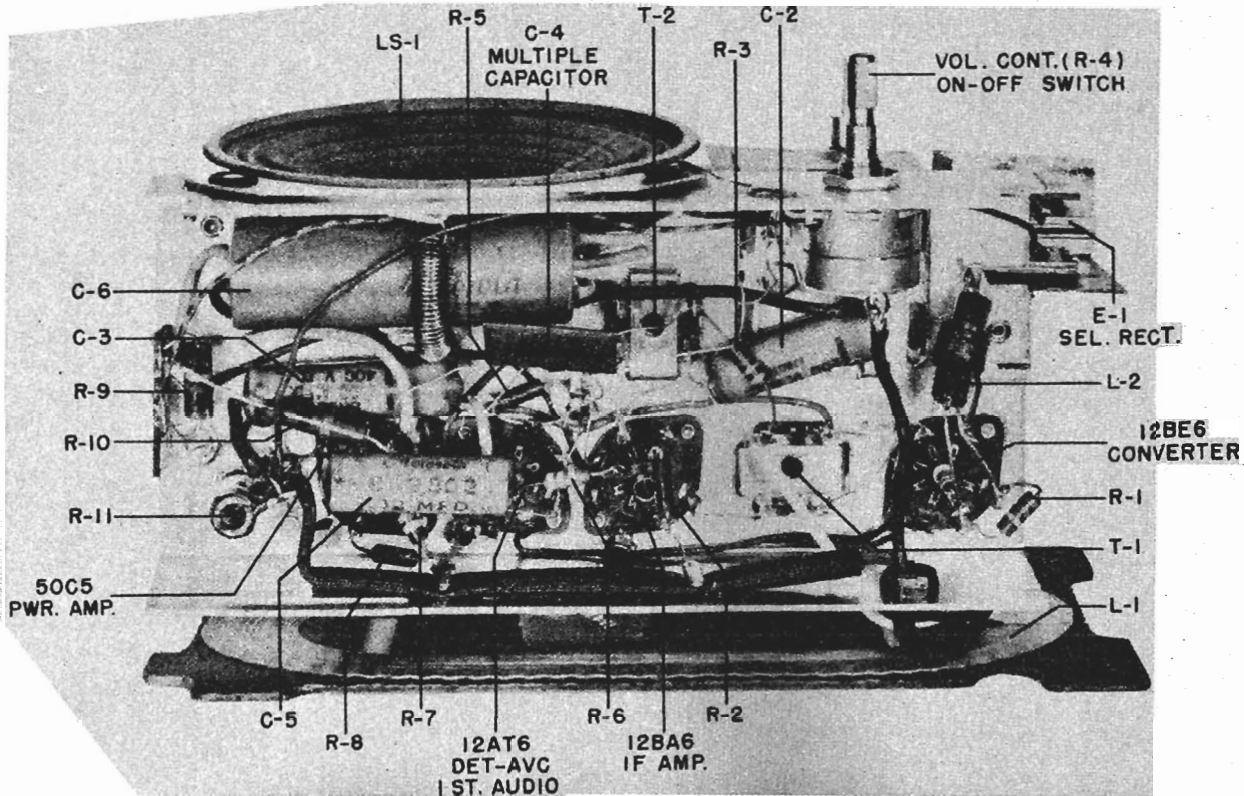


FIGURE 3. BOTTOM VIEW OF CHASSIS USING MULTIPLE CERAMIC CAPACITOR PLATE

MODELS 5R11A, 5R12A,
5R13A, 5R14A, 5R15A,
5R16A, Ch. HS-280

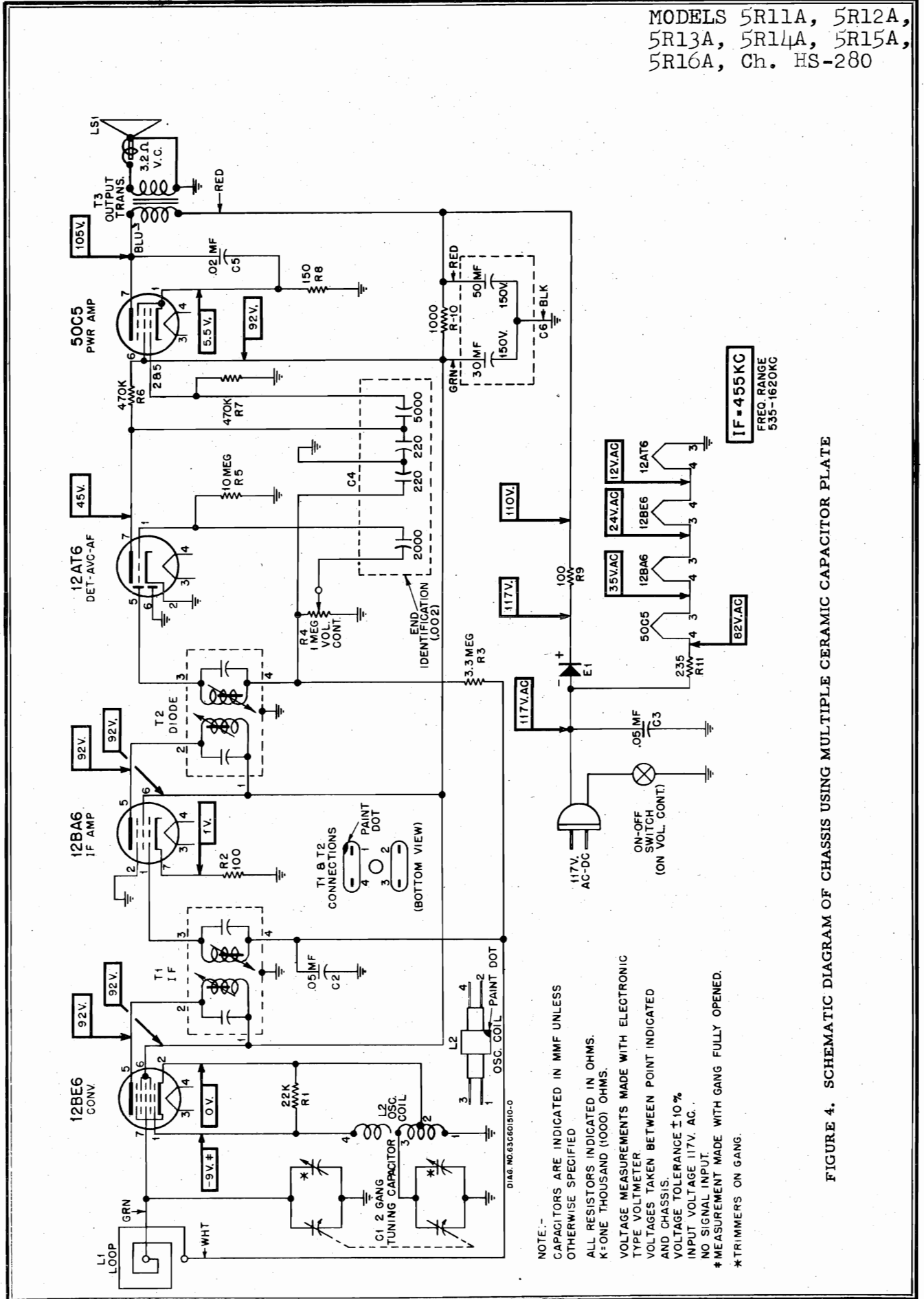


FIGURE 4. SCHEMATIC DIAGRAM OF CHASSIS USING MULTIPLE CERAMIC CAPACITOR PLATE

MODELS 5R11A, 5R12A,
5R13A, 5R14A, 5R15A,
5R16A, Ch. HS-280

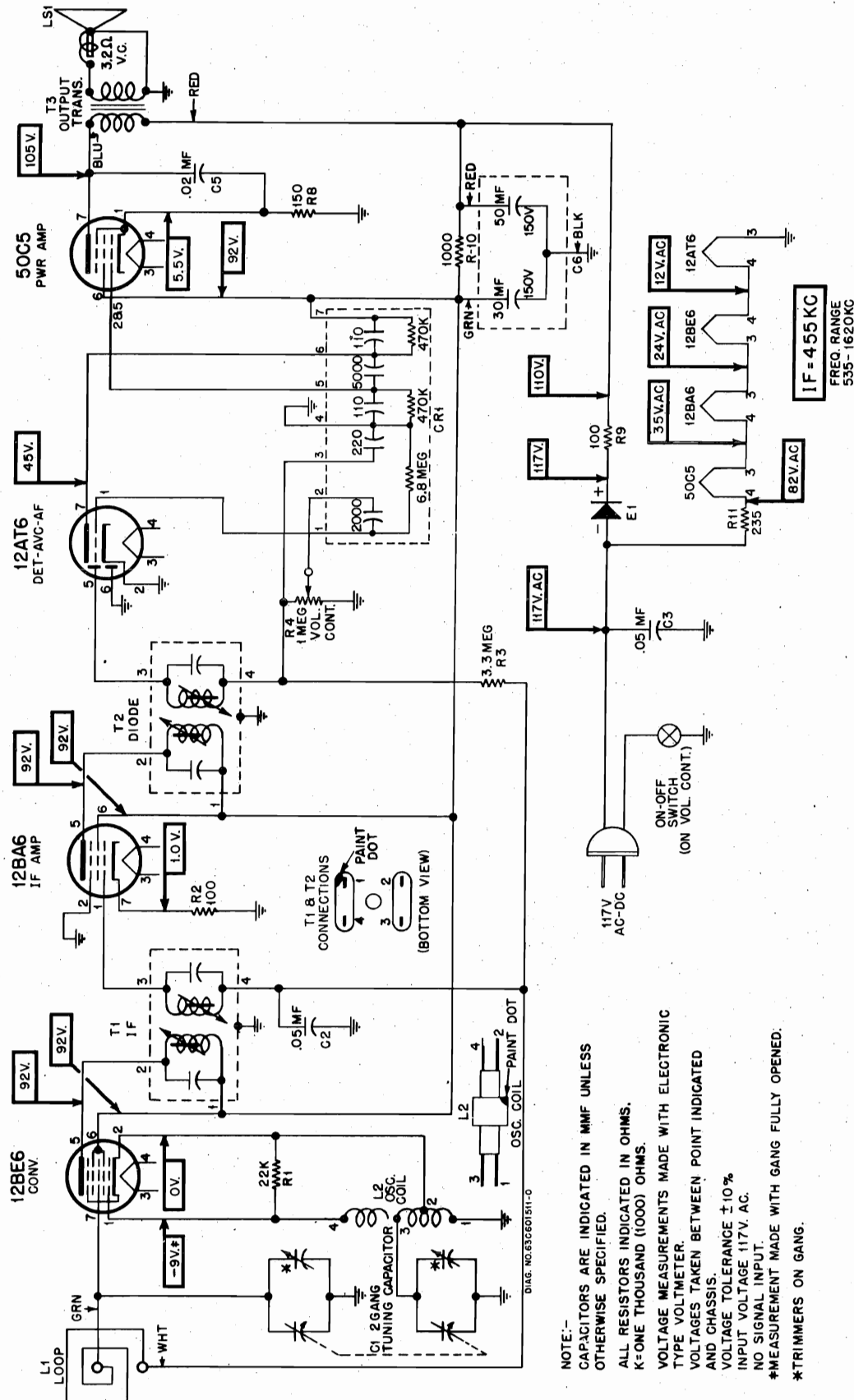


FIGURE 5. SCHEMATIC DIAGRAM OF CHASSIS USING MULTIPLE CERAMIC CAPACITOR-RESISTOR PLATE

REPLACEMENT PARTS LIST

MODELS 5R11A, 5R12A,
5R13A, 5R14A, 5R15A,
5R16A, Ch. HS-280

NOTE: When ordering parts, specify model number of set in addition to part number and description of part.

| Ref. No. | Part Number | Description | Part No. | Description |
|---------------------------------------------------------------------------|-------------|-------------------------------------------------------------------------------------------------------------|----------------------|--------------------------------------------------------------------------------------------|
| CHASSIS PARTS - ELECTRICAL | | | | |
| <u>Capacitors</u> | | | | |
| C-1 | 19B600485 | Variable: 2 gang; with pulley..... | 2S7051 | Nut, hex: 3/8-32 x 9/16; stl; cad pl (volume control mtg)..... |
| C-2 | 8R9821 | Paper: .05 mf 200V..... | 5S7771 | Rivet: .088 x 3/16; stl; nkl pl (tube socket mtg)..... |
| C-3 | 8R9816 | Paper: .05 mf 400V..... | 5S7707 | Rivet: .122 x 5/32; stl; nkl pl (output trans mtg & rect bracket mtg)..... |
| C-4 | 21B482847 | Ceramic, multiple: 2000 mmf, 220 mmf, 220 mmf, 5000 mmf..... | 5S7703 | Rivet: .122 x 7/32; stl; nkl pl (loop bracket and speaker mtg) |
| C-5 | 8R9802 | Paper: .02 mf 400V..... | | |
| C-6 | 23B600855 | Electrolytic: 50-30 mf/150V | | |
| <u>Capacitor-Resistor</u> | | | | |
| CR-1 | 21B601007 | Capacitor-Resistor: 2000 mmf, 220 mmf, 5000 mmf, 110 mmf, 110 mmf, 6.8 meg, 470,000 ohms, 470,000 ohms..... | 3S7247 | Screw, machine: 6-32 x 3/16 slotted hex head; locking type; stl; cad pl (gang mtg)..... |
| <u>Rectifier</u> | | | | |
| E-1 | 48B791092 | Rectifier, selenium: half wave..... | 3S490507 | Screw, sheet metal: #6 x 18 x 1 plain hex head; stl; cad pl (rectifier mtg)..... |
| <u>Coils</u> | | | | |
| L-1 | 24K601662 | Antenna Loop and Panel Assembly..... | 26A478117 | Shield, electrostatic (on rear of chassis)..... |
| L-2 | 24A478129 | Oscillator coil..... | 9A472534 | Socket, tube: miniature; 7 prong.. |
| <u>Speaker</u> | | | | |
| LS-1 | 50B690661 | Speaker: 4" PM; 3.2 ohm VC..... | 41A73996 | Spring, tension (electrolytic mtg) |
| <u>Resistors</u> | | | | |
| Note: All resistors are insulated carbon type unless otherwise specified. | | | | |
| R-1 | 6R6028 | 22,000 20% 1/2W..... | 31K83993 | Strip, terminal: 2 insulated lugs, #1 gnd; 3/8" spacing..... |
| R-2 | 6R6018 | 100 20% 1/2W..... | 46A478145 | Stud, tri-mount (loop mtg to bracket)..... |
| R-3 | 6R2118 | 3.3 meg 20% 1/2W..... | 14A11493 | Washer, shoulder: fibre (loop bracket mtg)..... |
| R-4 | 18K600449 | Volume control: 1 meg; with switch..... | CABINET PARTS | |
| R-5 | 6R2109 | 10 meg 20% 1/2W..... | 16K600181 | Cabinet, table model : walnut-mahogany (5R11A)..... |
| R-6 | 6R6032 | 470,000 20% 1/2W..... | 16E600157 | Cabinet, table model: ivory (5R12A)..... |
| R-7 | 6R6032 | 470,000 20% 1/2W..... | 16K600183 | Cabinet, table model: maroon (5R13A)..... |
| R-8 | 6R3992 | 150 20% 1/2W..... | 16K600184 | Cabinet, table model: gray (5R14A)..... |
| R-9 | 6R6415 | 100 10% 1W..... | 16K600185 | Cabinet, table model: green (5R15A)..... |
| R-10 | 6R3953 | 1000 20% 1W..... | 16K600186 | Cabinet, table model: yellow (5R16A)..... |
| R-11 | 17A601647 | Wirewound: 235 10% 5W. | 36B600485 | Knob, tuning: ivory (5R11A, 5R13A, 5R14A, and 5R15A)..... |
| <u>Transformers</u> | | | | |
| T-1,2 | 24B485553 | IF and Diode, Transformer (green dot): 455 KC; complete with capacitors, cores, and shield..... | 36K600486 | Knob, tuning: red (5R12A)..... |
| T-3 | 25B478121 | Output Transformer..... | 36K600487 | Knob, tuning: blue (5R16A)..... |
| CHASSIS PARTS - MECHANICAL | | | | |
| | 7A478118 | Bracket, loop mtg..... | 36B600544 | Knob, volume control: walnut (5R11A)..... |
| | 7B601649 | Bracket, rectifier mtg..... | 36K600545 | Knob, volume control: ivory (5R12A)..... |
| | 43A692012 | Bushing, strain relief(line cord) | 36K600546 | Knob, volume control: maroon (5R13A)..... |
| | 43A692013 | Bushing, retainer: strain relief (line cord)..... | 36K600547 | Knob, volume control: gray (5R14A)..... |
| | 42A485548 | Clip, IF & Diode Transformer mtg | 36K600548 | Knob, volume control: green (5R15A)..... |
| | | | 36K600549 | Knob, volume control: yellow (5R16A)..... |
| | | | 3S476083 | Screw, machine: 6-32 x 5/16; slotted hex head; stl; cad pl; locking type (chassis mtg).... |
| | | | 38A25507 | Plug, split (back mtg to cabinet) |
| | | | 11M488253 | Tape; aluminum foil: 2 1/2" wide |

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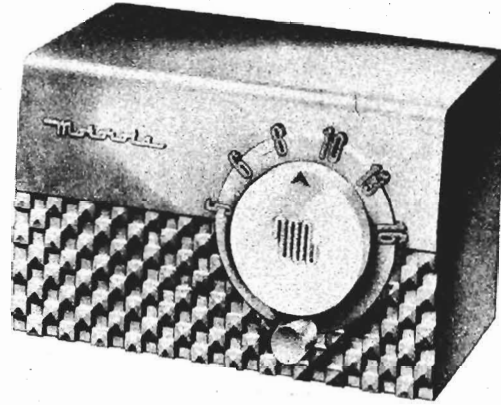
MODELS 5R11AU, 5R12AU,
5R13AU, 5R14AU, 5R15AU,
5R16AU, Ch. HS-281

GENERAL INFORMATION

TYPE - AC-DC table model superheterodyne receiver with loop antenna.

| RECEIVER MODELS - Model | Color |
|-------------------------|-----------------|
| 5R11AU | Walnut-Mahogany |
| 5R12AU | Ivory |
| 5R13AU | Maroon |
| 5R14AU | Gray |
| 5R15AU | Green |
| 5R16AU | Yellow |

| TUBE COMPLEMENT - Type | Function |
|------------------------|-------------------|
| 12BE6 | Converter |
| 12BA6 | IF Amplifier |
| 12AT6 | Det, AVC & AF Amp |
| 50C5 | Power Amplifier |
| Rectifier | Selenium Type |



TUNING RANGE - 535 to 1620 Kc IF - 455 Kc

POWER SUPPLY - 117 volts AC or DC; 35 watts

INSTALLATION & OPERATING INSTRUCTIONS

ON-OFF SWITCH & VOLUME. Operated with the small lower knob. NOTE: To operate from DC, the line plug must be inserted in the electrical outlet for correct polarity. If the receiver does not function, reverse the plug. When operating from AC, reversal of the line plug may improve reception.

TUNING. Stations are tuned in with the large upper knob.

ANTENNA. The built-in loop antenna provides satisfactory reception in most locations. When receiving a distant or weak station, rotate the receiver slightly to get maximum signal pick-up. If additional pick-up is necessary, connect an external antenna by following the instructions printed on the rear panel. CAUTION: Never connect the chassis to a water pipe, radiator or other ground.

SERVICE NOTES

The chassis of this receiver is isolated from the power line by a capacitor to eliminate the shock hazard, when handling the chassis outside the cabinet. However, as an additional precaution when aligning or servicing the receiver from AC, an isolation transformer should be inserted between the power line and the receiver.

TO REMOVE CHASSIS FROM CABINET:

1. Pull off the two control knobs from the front of the re-

ceiver.

2. Remove the two split plugs which hold the loop to the cabinet.

3. Remove the two hex head screws at the rear edge of the chassis.

4. Slide the chassis from the cabinet.

MODELS 5R11AU, 5R12AU,
5R13AU, 5R14AU, 5R15AU,
5R16AU, Ch. HS-281

ALIGNMENT

NOTE: If AC power is used, it is recommended that an isolation transformer be placed between the power line and the receiver to avoid hum and electrical shocks. If an isolation transformer is not available, connect the low side of the signal generator to B- through a .1 mf capacitor.

1. Connect a low range output meter across the speaker voice coil.
2. Connect the low side of the signal generator to B-.
3. Set the signal generator for 400 cycle, 30% modulation.

4. Turn the receiver volume control to maximum.
5. Use a small fibre screwdriver for aligning the IF and diode transformers.
6. As stages are brought into alignment, reduce the signal generator output to a level which produces less than .40 volts (.05 watt) across the voice coil to avoid overloading the receiver.
7. See Figure 1 for adjustment locations and the following chart for procedure.

ALIGNMENT CHART

| STEP | DUMMY ANTENNA | GENERATOR CONNECTION | GENERATOR FREQUENCY | GANG SETTING | ADJUST | REMARKS |
|--------------------|---------------|------------------------------|---------------------|--------------|------------------------|---------------------|
| IF ALIGNMENT 1. | .1 mf | Grid of conv. (pin 7, 12BE6) | 455 Kc | Fully open | 1, 2, 3 & 4 (IF cores) | Adjust for maximum. |
| RF ALIGNMENT 2. | .1 mf | Grid of conv. (pin 7, 12BE6) | 1620 Kc | Fully open | 5 (Osc) | Adjust for maximum. |
| 3. | - | Radiation loop* | 1400 Kc | Tune for max | 6 (Ant) | Adjust for maximum. |

*Connect generator output across 5" diameter, 5 turn loop and couple inductively to receiver loop. Keep loops at least 12" apart.

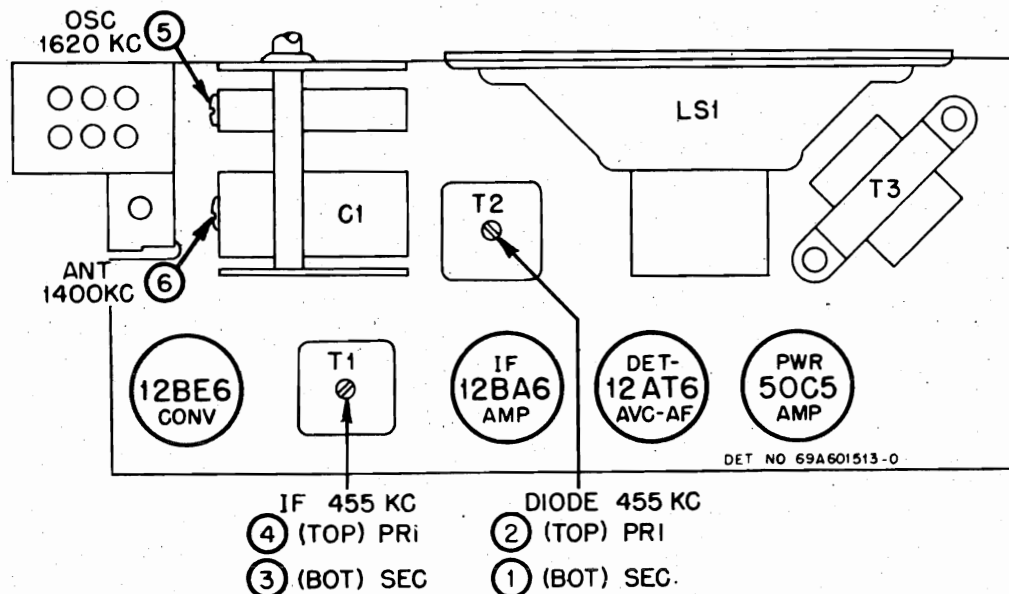


FIGURE 1. TUBE AND TRIMMER LOCATIONS

MODELS 5R11AU, 5R12AU,
5R13AU, 5R14AU, 5R15AU,
5R16AU, Ch. HS-281

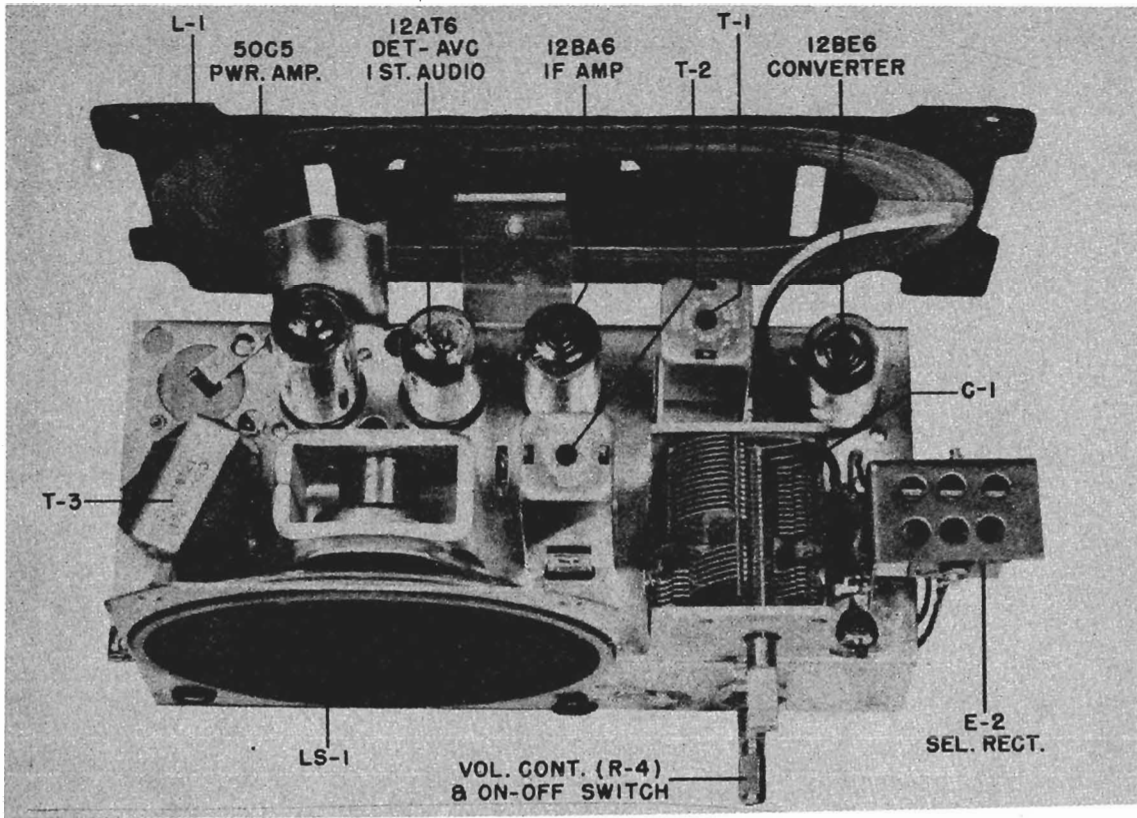


FIGURE 2. TOP VIEW OF CHASSIS

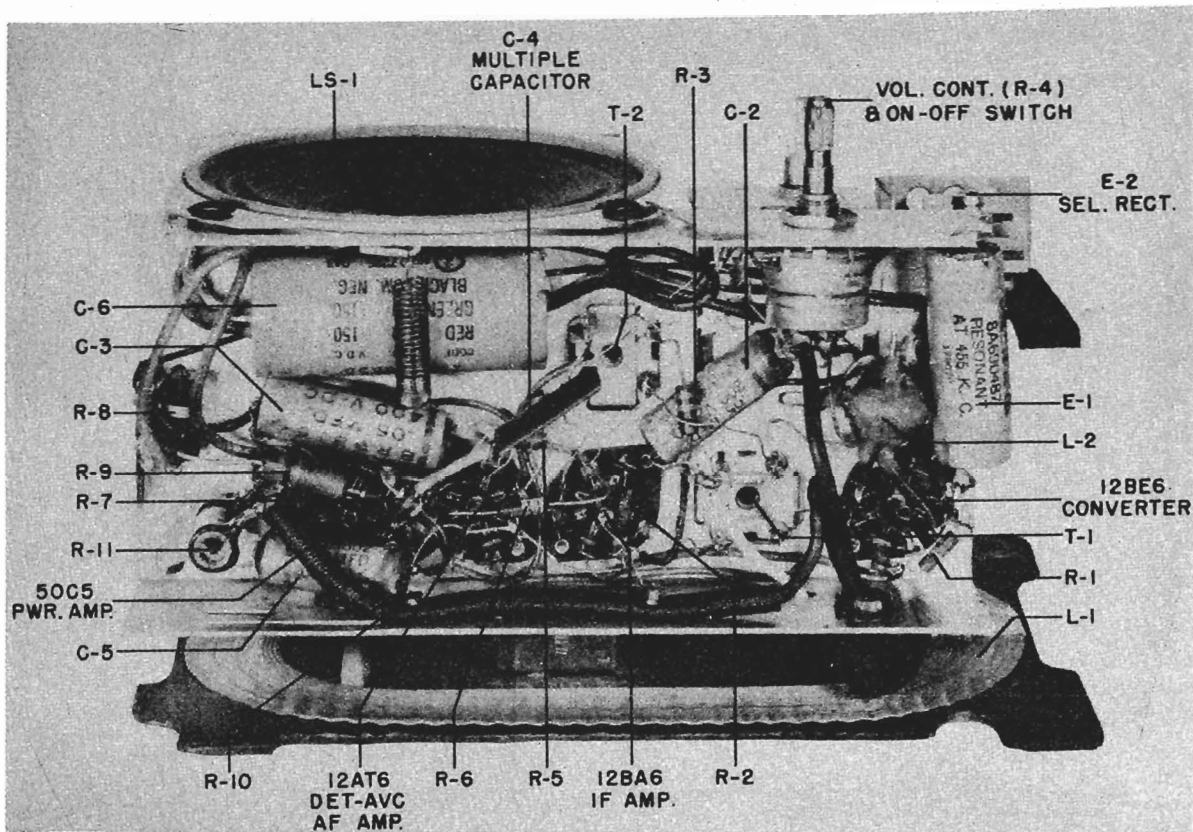


FIGURE 3. BOTTOM VIEW OF CHASSIS USING MULTIPLE CERAMIC CAPACITOR PLATE

MODELS 5R11AU, 5R12AU,
5R13AU, 5R14AU, 5R15AU,
5R16AU, Ch. HS-281

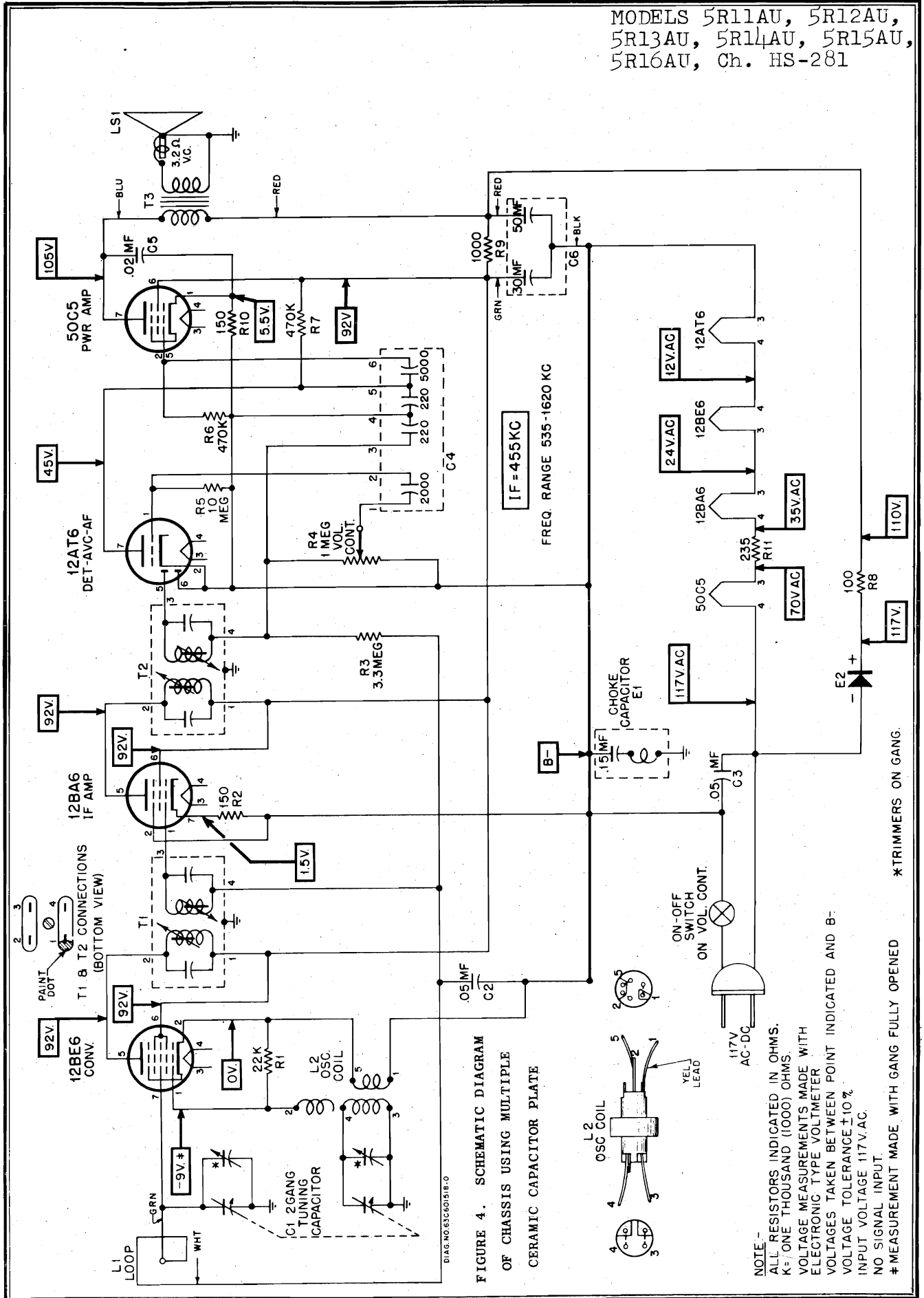
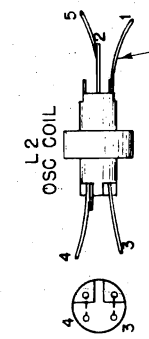


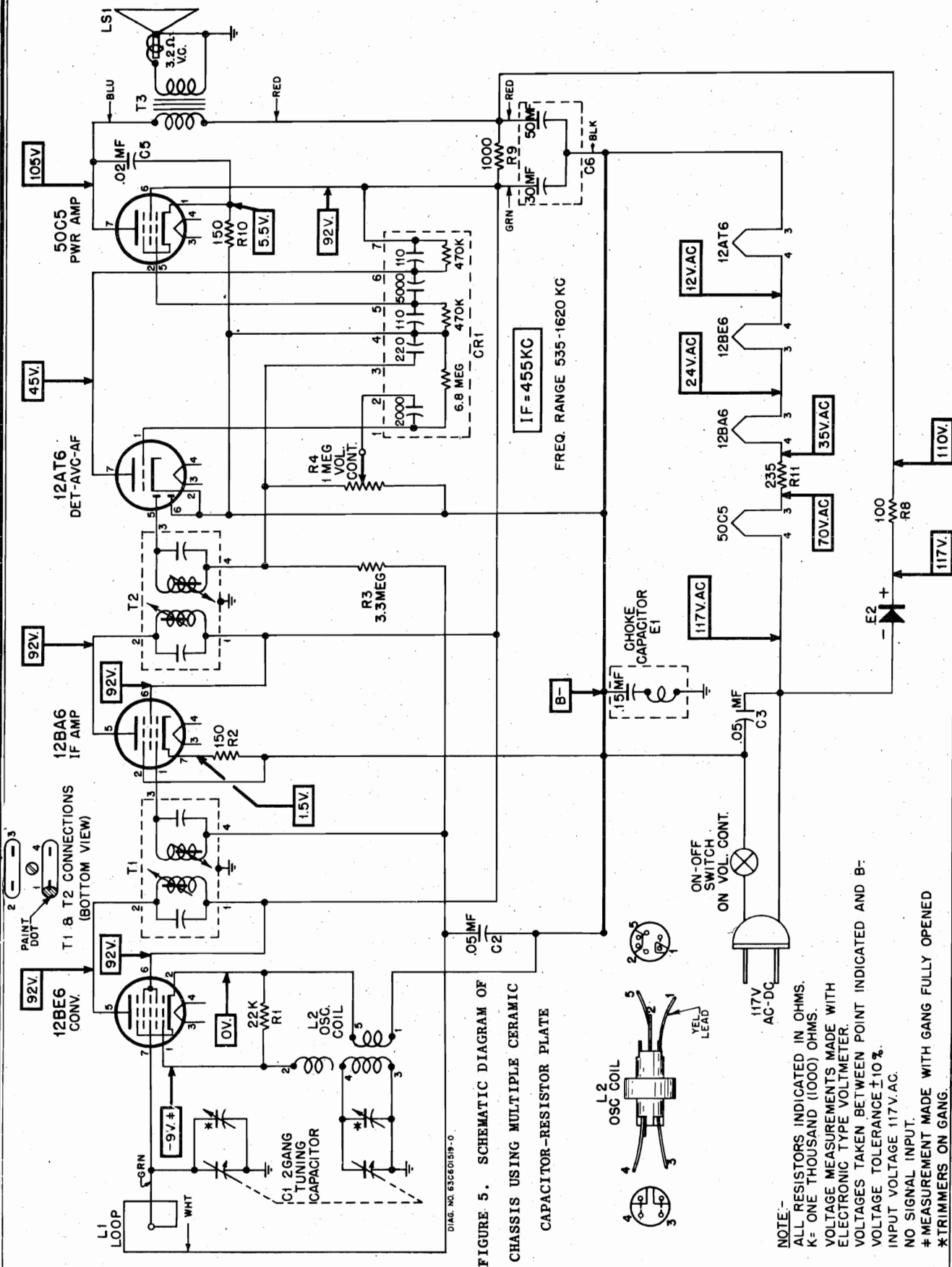
FIGURE 4. SCHEMATIC DIAGRAM OF CHASSIS USING MULTIPLE CERAMIC CAPACITOR PLATE



NOTE - ALL RESISTORS INDICATED IN OHMS. K = ONE THOUSAND (1000) OHMS. VOLTAGE MEASUREMENTS MADE WITH ELECTRONIC-TYPE VOLTMETER VOLTAGES TAKEN BETWEEN POINT INDICATED AND B- INPUT VOLTAGE 117V AC. NO SIGNAL INPUT. * MEASUREMENT MADE WITH GANG FULLY OPENED

* TRIMMERS ON GANG.

MODELS 5R11AU, 5R12AU,
5R13AU, 5R14AU, 5R15AU,
5R16AU, Ch. HS-281



REPLACEMENT PARTS LIST

MODELS 5R11AU, 5R12AU,
5R13AU, 5R14AU, 5R15AU,
5R16AU, Ch. HS-281

NOTE: When ordering parts, specify model number of set in addition to part number and description of part.

| Ref. No. | Part Number | Description | Part Number | Description |
|---------------------------------------------------------------------------|-------------|------------------------------------------------------------------------------------------------------------------|-----------------------------------|----------------------------------------------------------------------------------------------|
| CHASSIS PARTS - ELECTRICAL | | | CHASSIS PARTS - MECHANICAL | |
| C-1 | 19B600458 | Variable, 2 gang; with pulley | 7A478118 | Bracket, loop mtg |
| C-2 | 8R9821 | Paper: .05 mf 200V | 7B601649 | Bracket, rectifier mtg |
| C-3 | 8R9816 | Paper: .05 mf 400V | 43A692012 | Bushing, strain relief (line cord) |
| C-4 | 21B482847 | Ceramic, multiple: 2000 mmf, 220 mmf, 220 mmf, 5000 mmf.. | 43K692013 | Bushing, retainer: strain relief (line cord) |
| C-5 | 8R9802 | Paper: .02 mf 400V | 42A485548 | Clip, coil can mtg (for T-1 & T-2) |
| C-6 | 23B600855 | Electrolytic: 50-30 mf/150V.. | 30K680352 | Cord, line and plug: 6 ft long .. |
| CAPACITOR-RESISTOR | | | 5A484268 | Grommet, rubber (spkr mtg)..... |
| CR-1 | 21B601007 | Capacitor-Resistor: 7 lead; 2000 mmf, 220 mmf, 5000 mmf, 110 mmf, 110 mmf, 6.8 meg, 470,000 ohms, 470,000 ohms.. | 14A478119 | Insulator, fibre (loop bracket mtg)..... |
| CHOKES & CAPACITOR | | | 2S7051 | Nut, hex: 3/8-32 x 9/16; stl; cad pl (volume control mtg)..... |
| E-1 | 8A690487 | Choke & .15 mf paper capacitor | 5S7771 | Rivet: .088 x 3/16; stl; nkl pl (tube socket mtg) |
| RECTIFIER | | | 5S7707 | Rivet: .122 x 5/32; stl; nkl pl (output trans and shield mtg). |
| E-2 | 48B791092 | Rectifier, selenium | 5S7703 | Rivet: .122 x 7/32; stl; nkl pl (loop bracket and speaker mtg) |
| COILS | | | 3S490507 | Screw, sheet metal: #6 x 1; plain hex head; stl; cad pl (rectifier mtg) |
| L-1 | 24K601662 | Antenna Loop and Panel Assem. | 3S7247 | Screw, machine: 6-32 x 3/16 slotted hex head; locking type; stl; cad pl (gang mtg) |
| L-2 | 24B680364 | Oscillator coil | 26A478117 | Shield, electrostatic (on rear of chassis) |
| SPEAKER | | | 9A472534 | Socket, tube: 7-prong |
| LS-1 | 50B690661 | Speaker: .4" PM; 3.2 ohm VC... | 41A73996 | Spring, tension (electrolytic mtg) |
| Resistors | | | 46A478145 | Stud, tri-mount (back mtg to chassis) |
| Note: All resistors are insulated carbon type unless otherwise specified. | | | 14A11493 | Washer, shoulder: fibre (loop brkt mtg) |
| R-1 | 6R6028 | 22,000 20% 1/2W | CABINET PARTS | |
| R-2 | 6R3992 | 150 20% 1/2W | 16K600181 | Cabinet, table model: molded; walnut-mahogany finish (5R11AU)..... |
| R-3 | 6R2118 | 3.3 meg 20% 1/2W | 16E600157 | Cabinet, table model: molded; ivory finish (5R12AU) |
| R-4 | 18K600449 | Volume control: 1 meg; with switch | 16K600183 | Cabinet, table model: molded; maroon finish (5R13AU) |
| R-5 | 6R2109 | 10 meg 20% 1/2W | 16K600184 | Cabinet, table model: molded; gray finish (5R14AU) |
| R-6 | 6R6032 | 470,000 20% 1/2W | 16K600185 | Cabinet, table model: molded; green finish (5R15AU) |
| R-7 | 6R6032 | 470,000 20% 1/2W | 16K600186 | Cabinet, table model: molded; yellow finish (5R16AU) |
| R-8 | 6R6415 | 100 10% 1W | 36B600485 | Knob, tuning: ivory (5R11AU, 5R13AU, 5R14AU, and 5R15AU) |
| R-9 | 6R3953 | 1000 20% 1W | 36K600486 | Knob, tuning: red (5R12AU)..... |
| R-10 | 6R3992 | 150 20% 1/2W | 36K600487 | Knob, tuning: blue (5R16AU)..... |
| R-11 | 17A601647 | Wirewound: 235 10% 5W... | 36B600544 | Knob, volume control: walnut (5R11AU) |
| TRANSFORMERS | | | 36K600545 | Knob, volume control: ivory (5R12AU) |
| T-1,2 | 24B485553 | IF and Diode, 455 Kc: complete with capacitors, cores and shield | 36K600546 | Knob, volume control: maroon (5R13AU) |
| T-3 | 25K680345 | Output Transformer | 36K600547 | Knob, volume control: gray (5R14AU). |
| | | | 36K600548 | Knob, volume control: green (5R15AU) |
| | | | 36K600549 | Knob, volume control: yellow(5R16AU) |
| | | | 3S476083 | Screw, machine: 6-32 x 5/16; slotted hex head; stl; cad pl; locking type (chassis mtg) |
| | | | 38A25507 | Plug, split (back mtg to cabinet) |
| | | | 11M488253 | Tape, aluminum foil: 2-1/2" wide. |

MODELS 6L1, 6L2
 Rev.; 61L1, 61L2,
 Ch. HS-226

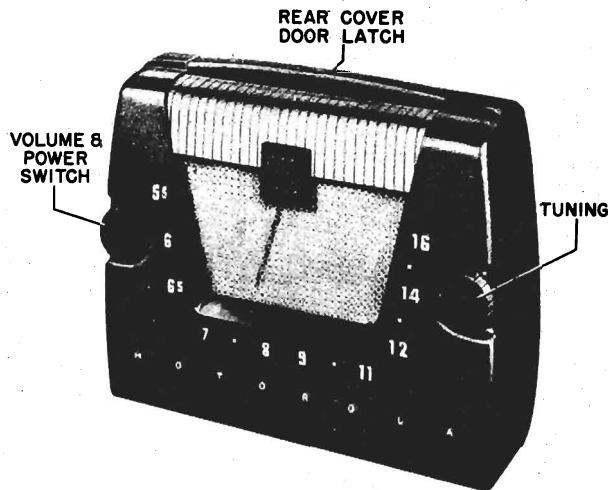
GENERAL INFORMATION

TYPE - Five tube, three-power (AC/DC, Battery) portable, with a selenium rectifier. A loop antenna is housed in the back cover.

| MODEL | COLOR |
|-------|----------------|
| 6L1 | Green plastic |
| 6L2 | Brown plastic |
| 61L1 | Green plastic |
| 61L2 | Maroon plastic |

TUNING RANGE - 535 to 1620 Kc IF - 455 Kc

TUBE COMPLEMENT - 1U4 - RF Amplifier
 1R5 - Converter
 1U4 - IF Amplifier
 1U5 - Det, AVC & 1st AF Amp
 3V4 - Power Amplifier
 Rectifier - Selenium type



POWER SUPPLY - Operates from 117 volts AC or DC (15 watts), or self-contained battery pack. Use an Eveready #753, A General #60A-6F6-5, or equivalent battery pack.

OPERATING INSTRUCTIONS

CONTROLS. The volume control and power switch are combined and are operated with the left-hand knob. Select stations with the right-hand knob.

TO OPEN BACK COVER. With your finger, press down on the latch button located at the top of the cabinet and pull the cover open: to close, press the latch button down and snap the cover shut.

CAUTION: When closing the cover, be careful not to pinch the line cord or other leads between the cover and cabinet.

HOUSE CURRENT OPERATION. The power cord is located inside the cabinet and can be reached by opening the back cover. Pass the cord through the slot in the side of the cabinet before closing the cover. Insert the power plug into any 117 volt AC or DC outlet. If the receiver does not operate from DC power, reverse the line cord plug in the power outlet.

BATTERY OPERATION. Open the back cover and install the battery pack, following the instructions in Figure 1. Insert the line cord plug into the receptacle on the receiver chassis or the receiver will not operate from its battery. If the receiver is to be operated for a long period of time from AC or DC, or is to be placed in storage, remove the battery and store it in a cool place. Replace the battery when low volume or fuzzy tone is noticed. The condition of the battery will not affect the operation of the receiver from AC or DC. Never leave a low or run-down battery in the receiver because it will leak or swell and damage the receiver.

ANTENNA. A loop antenna is built into the rear cover of this receiver. Because of the slightly directional characteristics of the loop antenna, reception from some stations may be improved by rotating the receiver. In extremely noisy locations, rotate the entire receiver until minimum noise and maximum signal pickup are obtained.

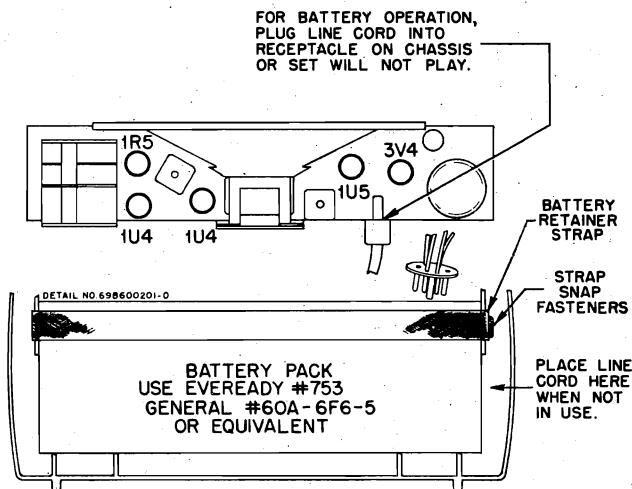


FIGURE 1. BATTERY REPLACEMENT & TUBE LOCATIONS

ALIGNMENT

NOTE: The receiver may be operated either from a battery or from the commercial power lines during alignment. If AC power is used, it is recommended that an isolation transformer be placed between the power line and the receiver. If an isolation transformer is not available, connect the low side of the signal generator to B- through a .1 mf capacitor.

PROCEDURE:-

1. Connect a low range output meter across the speaker voice coil.
2. Connect the low side of the signal generator to B-.

3. Set the signal generator for 400 cycle, 30% modulation.
4. Turn the receiver volume control to maximum.
5. Use a small fibre screwdriver for aligning the IF and diode transformers.
6. As stages are brought into alignment, reduce the signal generator input to keep the output of the receiver at approximately .05 watts (.05 watt - .40 volts on the output meter) to avoid overloading the receiver.
7. See Figure 2 for adjustment locations and the following chart for procedure.

ALIGNMENT CHART

| STEP | DUMMY ANTENNA | GENERATOR CONNECTION | GENERATOR FREQUENCY | GANG SETTING | ADJUST | REMARKS |
|---------------------|---------------|-----------------------------|---------------------|------------------|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IF ALIGNMENT | | | | | | |
| 1. | .1 mf | Grid of conv. (pin 6, 1R5) | 455 Kc | Fully open | 1, 2, 3 & 4 | Adjust for maximum. |
| RF ALIGNMENT | | | | | | |
| 2. | - | - | - | Fully closed | Pointer | Set pointer as shown in Figure 3. |
| 3. | .1mf | Grid of RF Amp (pin 6, 1U4) | 1620 Kc | Fully open | 5 | Adjust for maximum. |
| 4. | .1 mf | " | 1400 Kc | Tune for maximum | 6 | Adjust for maximum. |
| 5. | - | Radiation loop* | " | " | 7 | With chassis installed in cabinet and output meter connected to speaker, open rear cover slightly and adjust for maximum. NOTE: Battery pack should be in cabinet. |

*Connect generator output across 5" diameter, 5-turn loop and couple inductively to receiver loop. Keep loops at least 12" apart.

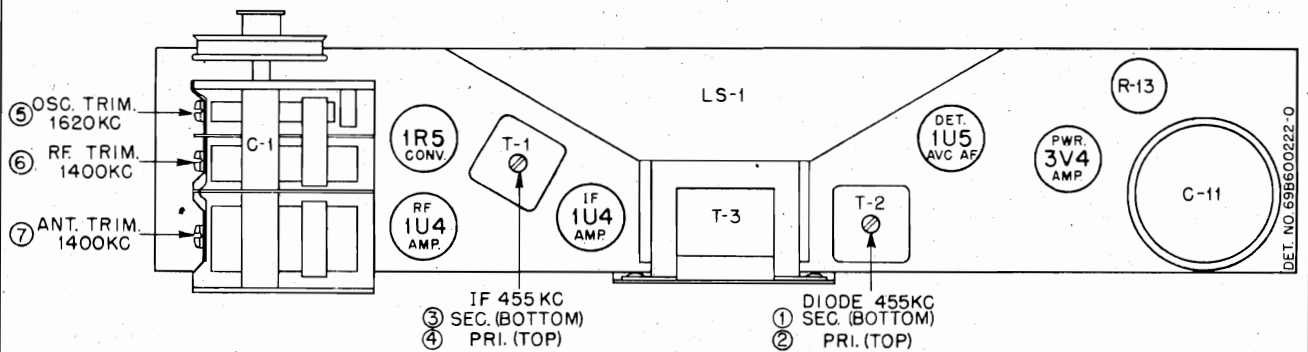


FIGURE 2. TUBE & TRIMMER LOCATIONS

MODELS 6L1, 6L2 Rev.;
61L1, 61L2, Ch. HS-226

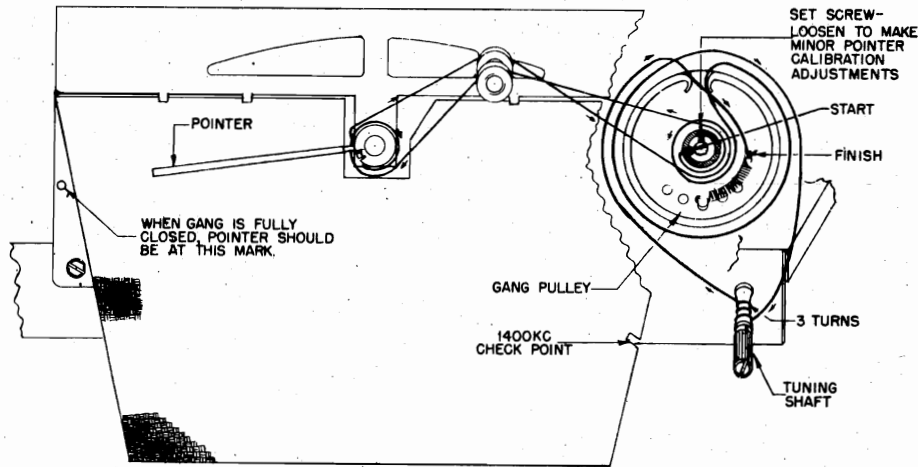


FIGURE 3. DIAL CORD RESTRINGING DETAIL

SERVICE NOTES

The chassis of this receiver is isolated from the AC power line circuit by a capacitor to eliminate the shock hazard when handling the receiver. However, as an additional precaution when aligning or servicing the receiver from AC, an isolation transformer should be inserted between the power line and the chassis.

The tubes are exposed when the rear cover is opened. It is not necessary to remove the chassis to replace tubes.

TO REMOVE THE CHASSIS FROM THE CABINET:

1. Open the rear cover and remove the battery pack.
2. Disconnect the two leads from the chassis to the loop antenna.
3. Remove screw holding stop cord to chassis. CAUTION: With stop cord removed back cover may be seriously damaged if it is allowed to fall back.
4. Pull off the two control knobs on the front of the cabinet.
5. Remove the two hexhead screws located under the knobs.
6. Slide the chassis out of the cabinet.

PRODUCTION REVISIONS (6L1 & 6L2)

REAR COVER LATCH ASSEMBLY

The rear cover latch was revised to provide better locking and to eliminate breakage of the projecting studs on the cover.

The new latch may be added to early cabinets by referring to Figure 5 and following the instructions below:

1. Remove the locking clips from the cabinet (optional).
2. File away the tongue in the top center of the back cover.
3. Drill a .136" hole in the top of the cabinet.
4. Drill a 5/16" hole in the top of the back cover.

5. Rivet the spring and stud assembly to the cabinet.

REAR COVER STOP CORD

A cord, fastened to the chassis and to the rear cover, was added to prevent the cover from opening too far and becoming damaged.

REAR COVER HINGE INSTALLATION

The proper method for installing a new hinge is shown in Figure 4. Note that the under side of the cabinet should rest on an iron block during the heating process to prevent the formation of a heat bubble on the bottom of the cabinet.

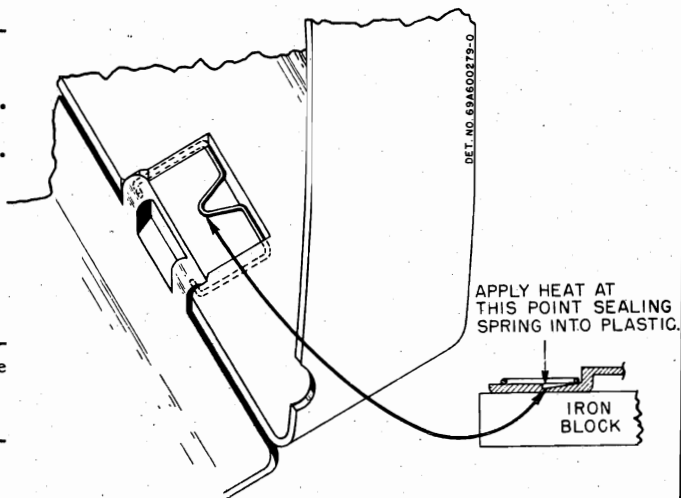


FIGURE 4. REAR COVER HINGE INSTALLATION

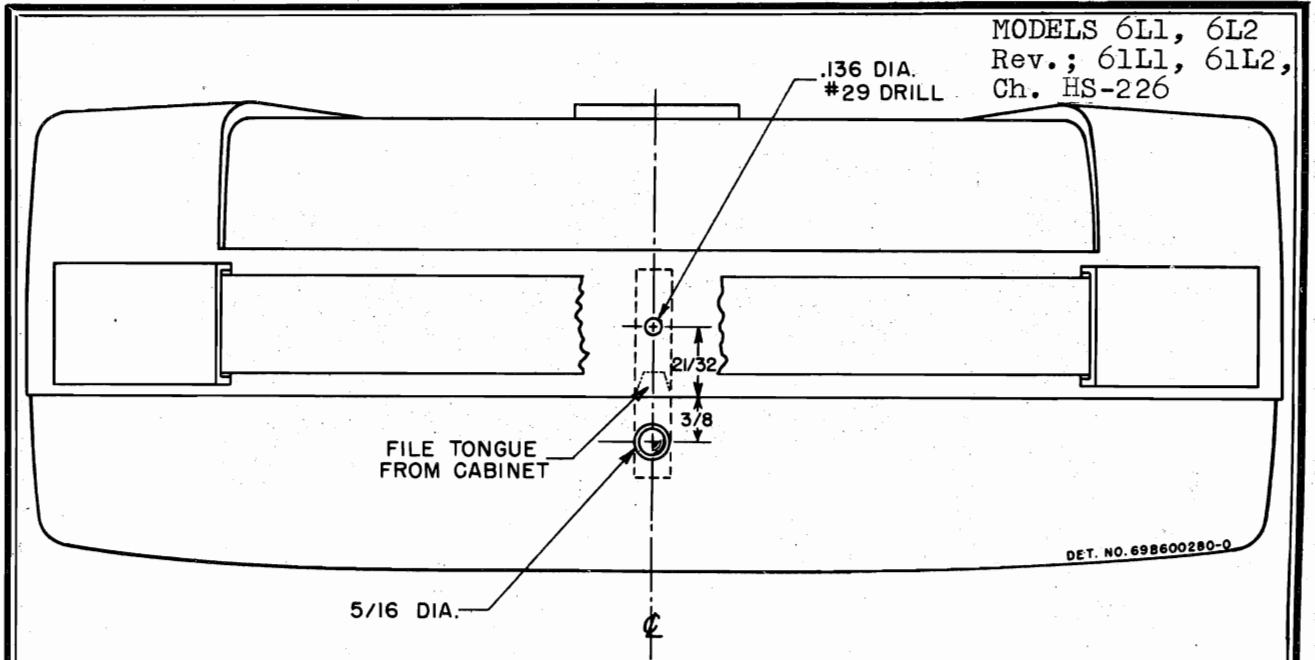


FIGURE 5. REAR COVER LATCH INSTALLATION

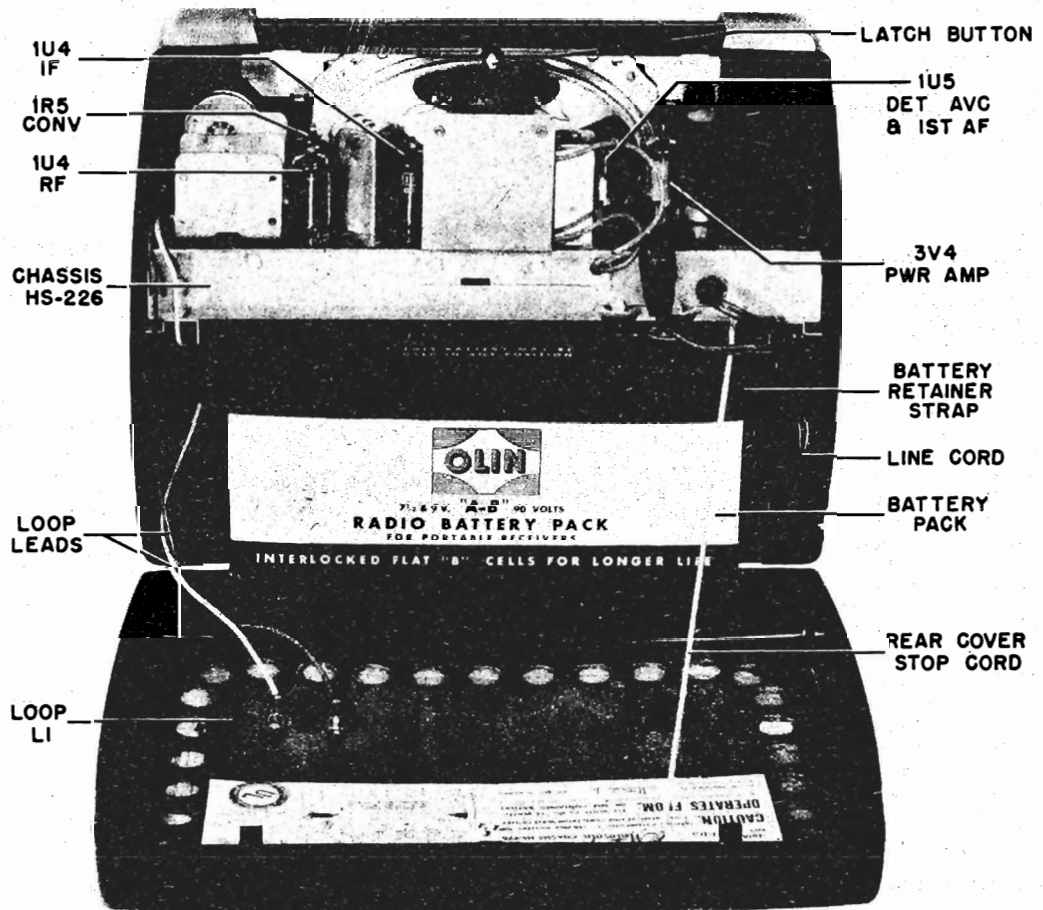


FIGURE 6. REAR VIEW OF CABINET

MODELS 6L1, 6L2 Rev.;
6L1L1, 6L1L2, Ch. HS-
226

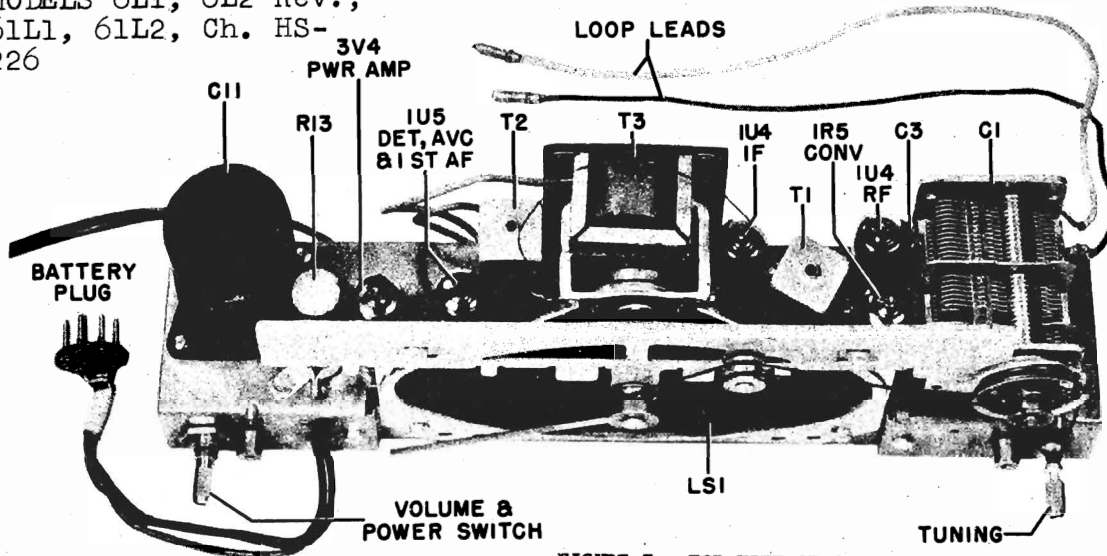


FIGURE 7. TOP VIEW OF CHASSIS

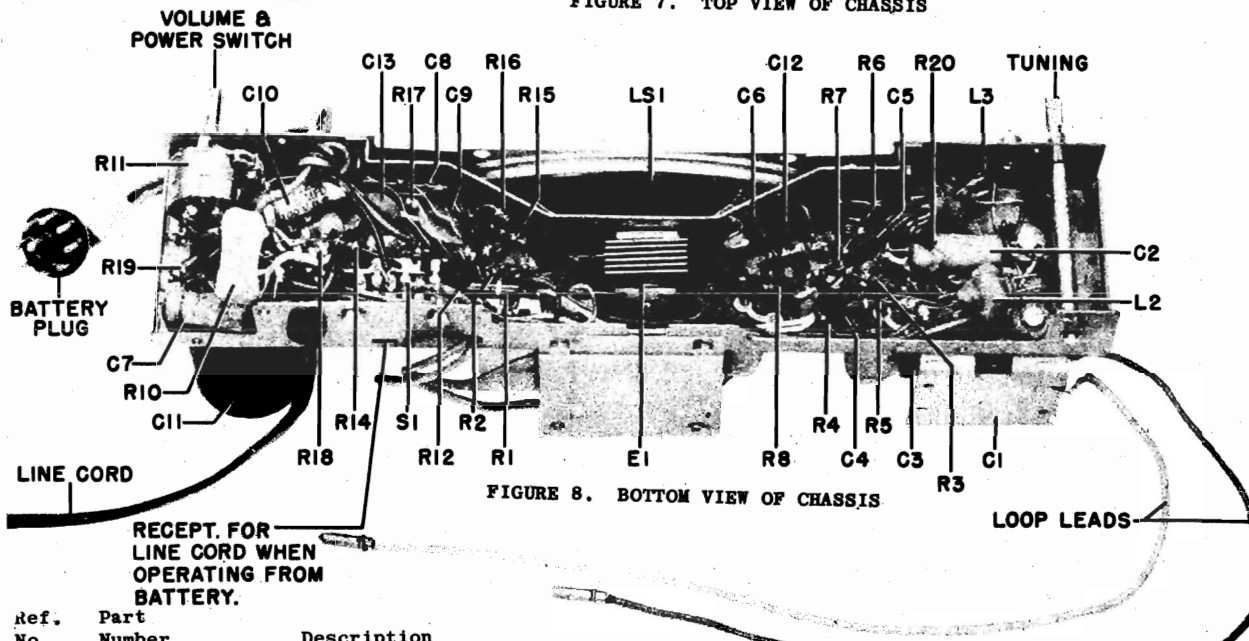


FIGURE 8. BOTTOM VIEW OF CHASSIS

RECEPT. FOR
LINE CORD WHEN
OPERATING FROM
BATTERY.

Ref. Part
No. Number Description

CHASSIS PARTS - ELECTRICAL

Capacitors

| | | |
|----------------|-----------|-----------------------------------------------------------------------|
| C-1 | 19B692045 | Variable: 3-gang..... |
| C-2 | 8K71213 | Paper: .05 mf 100V..... |
| C-3 | 21B77286 | Ceramic: 100 mmf 500V..... |
| C-4 | 21K482726 | Ceramic, disc type: 10,000 mmf 450V..... |
| C-5 | 21K482726 | Ceramic, disc type: 10,000 mmf 450V..... |
| C-6 | 21K482726 | Ceramic, disc type: 10,000 mmf 450V..... |
| C-7 | 8K471635 | Paper: .05 mf 400V..... |
| C-8A, B,C,D | 21B482847 | Ceramic, multiple: 2000 mmf, 220 mmf, 220 mmf, 5000 mmf |
| C-9 | 21K482726 | Ceramic, disc type: 10,000 mmf 450V..... |
| C-10 | 8K71213 | Paper: .05 mf 100V..... |
| C-11 | 23K76985 | Electrolytic: 40-40-20 mf/ 150V, 80 mf/25V; includes cover..... |
| C-12 | 8R490210 | Molded: .01 mf (100,000 mmf) 200V..... |
| C-13 | 21A470789 | Ceramic, disc type: 5000 mmf 450V..... |

Speaker

LS-1 50C692044 Speaker: 4" x 6" PM; 3.2 ohm
VC.....

Rectifier

E-1 48K692077 Selenium Rectifier: half-
wave; 75ma.....

Coils

L-1 24C692074 Loop Antenna Assembly: in-
cludes panel.....
L-2 24B692115 RF Coil.....
L-3 24B692114 Oscillator Coil.....

Resistors

Note: All resistors are insulated carbon type
unless otherwise specified.

| | | |
|-----|--------|-----------------------|
| R-1 | 6R3927 | 2.2 meg 20% 1/2W..... |
| R-2 | 6R3988 | 5.6 meg 10% 1/2W..... |
| R-3 | 6R2118 | 3.3 meg 20% 1/2W..... |
| R-4 | 6R3927 | 2.2 meg 20% 1/2W..... |
| R-5 | 6R6301 | 1000 20% 1/2W..... |
| R-6 | 6R6075 | 100,000 20% 1/2W..... |
| R-7 | 6R6012 | 33,000 20% 1/2W..... |
| R-8 | 6R5585 | 8.2 meg 10% 1/2W..... |
| R-9 | 6R6004 | 1 meg 20% 1/2W..... |

NOTE: When ordering parts, specify model number of set in addition to part number and description of part.

| | | |
|------|-----------|-----------------------------------------|
| R-10 | 17A76986 | Wire wound: 150 10% 2- $\frac{1}{2}$ W. |
| R-11 | 18K480039 | Volume control: 1 meg; with SW..... |
| R-12 | 6R2109 | 10 meg 20% $\frac{1}{2}$ W..... |
| R-13 | 17B692047 | Wire wound: 2000; center tapped..... |
| R-14 | 6R6269 | 820 10% $\frac{1}{2}$ W..... |
| R-15 | 6R3927 | 2.2 meg 20% $\frac{1}{2}$ W..... |
| R-16 | 6R6004 | 1 meg 20% $\frac{1}{2}$ W..... |
| R-17 | 6R2118 | 3.3 meg 20% $\frac{1}{2}$ W..... |
| R-18 | 6R3933 | 220 20% $\frac{1}{2}$ W..... |
| R-19 | 6R3949 | 470 20% $\frac{1}{2}$ W..... |
| R-20 | 6R6010 | 330 20% $\frac{1}{2}$ W..... |

Switches

| | | |
|-----|----------|--------------------------------------|
| S-1 | 40A27114 | Slider Switch: 3PDT..... |
| S-2 | - | Power Switch: on volume control..... |

Transformers

| | | |
|-------|-----------|-----------------------------------------------------------------------|
| T-1,2 | 24K600013 | IF & Diode Transformer, 455 Kc: includes capacitors; less shield..... |
| T-3 | 25B692076 | Output Transformer..... |

CHASSIS PARTS - MECHANICAL

| | |
|-----------|---------------------------------------------------------------------------------|
| 16K692102 | Baffle, speaker: includes cloth... |
| 1X692121 | Bottom Cover Assembly: includes brackets & battery strap..... |
| 7B600711 | Bracket, chassis front (sel rect mtg)..... |
| 43A692012 | Bushing, line cord strain relief (use with 43K692013)..... |
| 1X692118 | Cable Assembly, battery: includes 9-pin plug..... |
| 42A485548 | Clip, coil can mtg (IF coils).. |
| 11M8944 | Cord, dial: 18#; black..... |
| 30K692049 | Cord, line: with plug 6 ft long |
| 5A19658 | Eyelet, spacer (gang mtg)..... |
| 5A70404 | Grommet, rubber (gang mtg)..... |
| 9A22056 | Insulator, electrolytic mtg.... |
| 2S7051 | Nut, hex (Palnut): 3/8-32 x 9/16; cad pl (vol cont mtg)..... |
| 29K5401 | Pin, loop lead..... |
| 64A692072 | Plate, output trans mtg..... |
| 28K77272 | Plug, 9-pin (on battery cable). |
| 1X601811 | Pointer, dial: red..... |
| 49A21741 | Pulley, cord..... |
| 49A692078 | Pulley, pointer drive..... |
| 1A692119 | Pulley Assembly (on gang)..... |
| 1X692120 | Pulley and Plate Assembly: pointer drive: includes mtg plate and 3 pulleys..... |
| 43K692013 | Retainer, strain relief bushing (use with 43A692012)..... |
| 5K74560 | Rivet, shoulder (drive cord pulley mtg)..... |
| 5A692104 | Rivet, shoulder (pointer drive pulley mtg)..... |
| 3S9700 | Setscrew: 6-32 x 3/16 Allen head; cad pl (gang pulley mtg)..... |
| 47A692106 | Shaft, tuning..... |
| 9A690129 | Socket, tube: miniature; 7-prong. |
| 41A14244 | Spring, tension (dial drive).. |
| 35K692125 | Strap, battery: with button..... |
| 31K692075 | Strip, terminal: 1 insulated lug; end mtg; 3/8" spacing..... |
| 46A600011 | Stud, chassis mtg (on front of chassis)..... |
| 4A70015 | Washer, "C" (on tuning shaft)..... |
| 4S8253 | Washer, flat: 5/8 x .390 x .020 brass (vol cont mtg)..... |
| 4K71133 | Washer, spring (on tuning shaft) |

CABINET PARTS

| | |
|-----------|--------------------------------------------------------------------------------------------------|
| 16E691796 | Cabinet, front section: green plastic; less grille, handle and hardware (6L1 & 61L1)..... |
| 16K600109 | Cabinet, front section: brown plastic; less grille, handle and hardware (6L2)..... |
| 16K610027 | Cabinet, front section: maroon plastic; less grille, handle and hardware (61L2)..... |
| 16D691797 | Cabinet, rear section: green plastic; less antenna loop and hardware (6L1 & 61L1)..... |
| 16K600110 | Cabinet, rear section: brown plastic; less antenna loop and hardware (6L2)..... |
| 16K601710 | Cabinet, rear section: maroon plastic; less antenna loop and hardware (61L2)..... |
| 35A692073 | Channel, rubber (inside cabinet front)..... |
| 42K891863 | Clip, cabinet locking (inside cabinet front) (early models). |
| 42A480078 | Clip, cabinet locking (inside cabinet back) (early models). |
| 42A600010 | Clip, retainer (speaker grille).. |
| 1X600798 | Cord, cover stop: complete..... |
| 55A692127 | Cover, handle mtg (over ends of carrying handle)..... |
| 13B691958 | Grille, speaker: plastic..... |
| 55A691943 | Handle, carrying: green plastic; less spring (6L1 & 61L1)..... |
| 55K600111 | Handle, carrying: brown plastic; less spring (6L2)..... |
| 55K601711 | Handle, carrying: maroon plastic (61L2)..... |
| 14A600096 | Insulator: fibre (on carrying handle)..... |
| 36B691956 | Knob, control: green plastic (6L1 & 61L1)..... |
| 36K600112 | Knob, control: brown plastic (6L2). |
| 36K601713 | Knob, control: maroon plastic (61L2) |
| 4S7650 | Lockwasher, internal: #6; cad pl (handle mtg)..... |
| 13K691929 | Medallion (on front of cabinet). |
| 64A692129 | Plate, handle mtg: cad pl (under ends of carrying handle)..... |
| 64A691941 | Plate, medallion (under Medallion) |
| 5S400302 | Rivet: .122 x 7/32; stl; brs pl (mts back cover latch)..... |
| 3S2949 | Screw, machine: 6-32 x 5/16 plain hex head; cad pl (handle mtg) |
| 3S476083 | Screw, machine: 6-32 x 5/16 slotted locking hex head; cad pl (chassis mtg)..... |
| 3S488008 | Screw, thread cutting: #4 x $\frac{1}{4}$ Phillips round head; cad pl (cover stop cord mtg)..... |
| 2S490840 | Speednut: for 1/16" stud (medallion mtg)..... |
| 2S400170 | Speednut: for .156" stud (spkr grille and ant loop mtg) (replaces 2S476112)..... |
| 1X600686 | Spring & Stud Assembly: rear cover latch..... |
| 41A692126 | Spring, handle (inside carrying handle)..... |
| 41A691939 | Spring, hinge (on bottom of cabinet)..... |
| 4K780040 | Washer, felt (under knobs)..... |
| 4S7610 | Washer, flat: 3/8 x 5/32 x .015 stl; cad pl (chassis mtg).. |
| 4S490841 | Washer, flat: 3/4 x .156 x .032; cad pl (handle mtg)..... |

Ch. HS-226

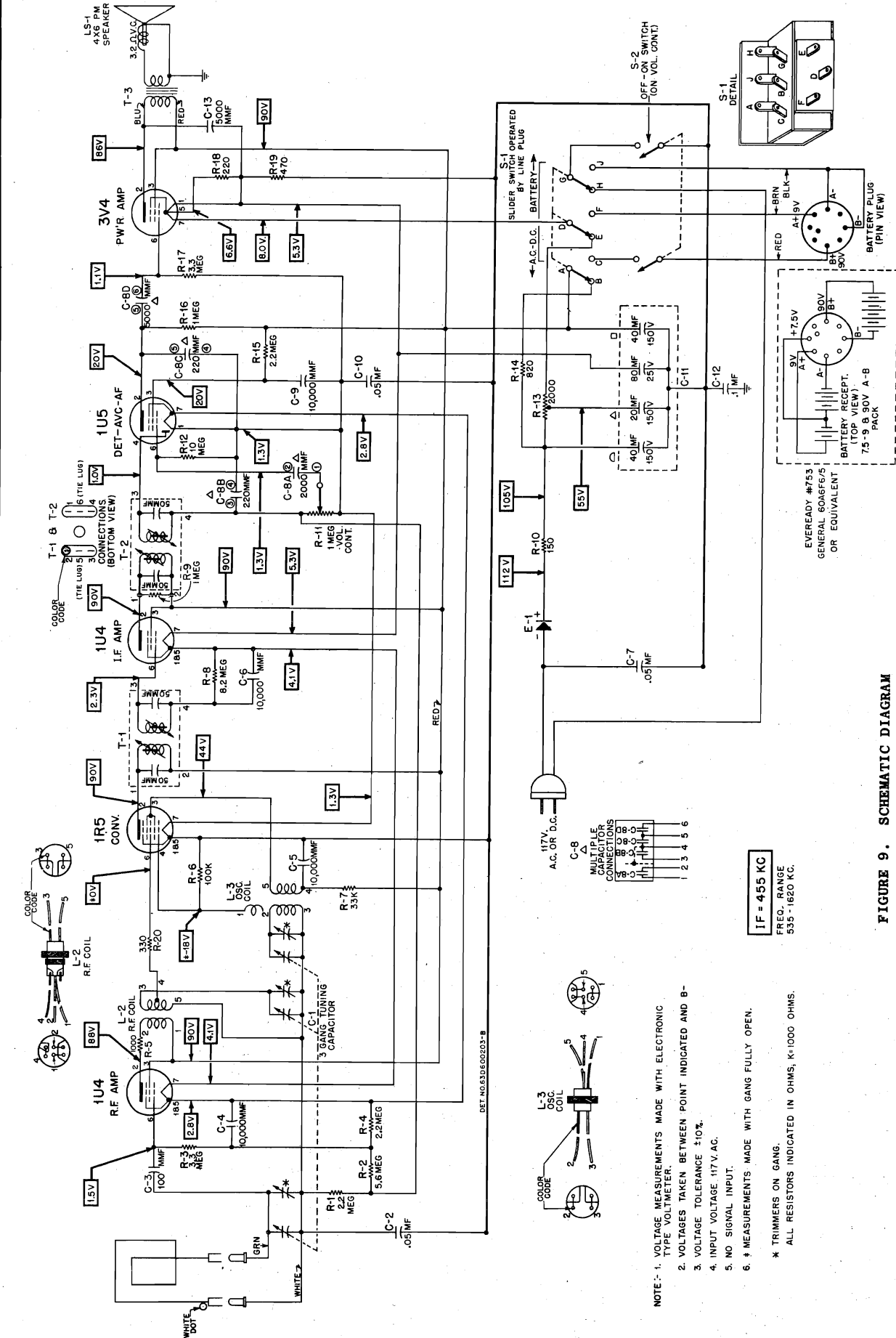


FIGURE 9. SCHEMATIC DIAGRAM

NOTE: 1. VOLTAGE MEASUREMENTS MADE WITH ELECTRONIC TYPE VOLTMETER.
 2. VOLTAGES TAKEN BETWEEN POINT INDICATED AND B-
 3. VOLTAGE TOLERANCE $\pm 10\%$.
 4. INPUT VOLTAGE 117V. AC.
 5. NO SIGNAL INPUT.
 6. * MEASUREMENTS MADE WITH GANG FULLY OPEN.
 * TRIMMERS ON GANG.
 ALL RESISTORS INDICATED IN OHMS, K=1000 OHMS.

IF = 455 KC
 FREQ. RANGE
 535 - 1620 KC.

MODELS 51C1, 51C2,
51C3, 51C4, Ch. HS-228

GENERAL INFORMATION

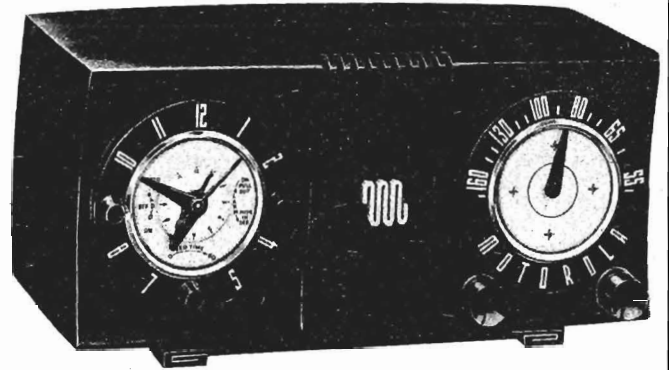
TYPE - AC table model superheterodyne with appliance outlet and self-contained electric clock for controlling automatically the operation of the radio and the outlet.

| RECEIVER MODELS - | Model | Color |
|-------------------|-------|--------|
| | 51C1 | Walnut |
| | 51C2 | Ivory |
| | 51C3 | Tan |
| | 51C4 | Green |

TUNING RANGE - 535 to 1620 Kc IF - 455 Kc

| TUBE COMPLEMENT - | Type | Function |
|-------------------|-------|-------------------|
| | 12BE6 | Converter |
| | 12BA6 | IF Amplifier |
| | 12AT6 | Det, AVC & AF Amp |
| | 50C5 | Power Amplifier |
| | 35W4 | Rectifier |

POWER SUPPLY - Operates from 117 volts, 60 cycle, alternating current only. Power consumption 37 watts.



APPLIANCE OUTLET - For use with 117 volt AC appliances only, rated at 1100 watts or less.

CLOCK - Telechron self-starting electric clock (Telechron basic movement No. C-57, with Motorola face, hands, and escutcheon).

OPERATING INSTRUCTIONS

The locations and functions of the clock and radio controls are shown in Figure 1.

NORMAL RADIO OPERATION

Knob "A" on the clock turns the radio on or off. Select stations with the TUNING knob, and adjust volume with the VOLUME control.

A built-in loop antenna eliminates the need for an outside antenna in most locations. When receiving a weak station, rotate the receiver slightly for best signal strength. If additional pick-up is necessary, connect an external antenna to the radio by following the instructions printed on the rear panel. **CAUTION:** Never connect the radio chassis to a water pipe, radiator, or other ground.

CLOCK OPERATION

The clock will start as soon as the receiver is plugged into an electrical outlet. To set the hands to the correct time, rotate the TIME SET knob (on the rear of the radio) in a clockwise direction only.

ALARM OPERATION

To set the alarm, pull out knob "C" and rotate it in a counterclockwise direction to the desired time on the alarm dial scale. The alarm will ring for one hour, or until knob "C" is pushed in. The alarm function is completely independent of the other controls on the clock.

APPLIANCE OUTLET

To control an electrical appliance automatically, plug it into the receptacle on the back of the radio. See Figure 2. It will then be turned on or off simultaneously with the radio. **CAUTION:** Note that the rating of the outlet is 1100 watts or less.

If radio reception is not desired when operating the appliance, rotate the radio volume control to the minimum volume position.

BEDTIME CONTROL

The BEDTIME control will turn the radio and appliance off after any pre-set interval of time up to one hour.

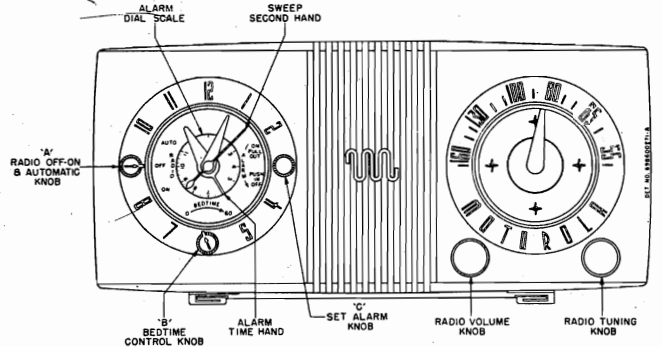
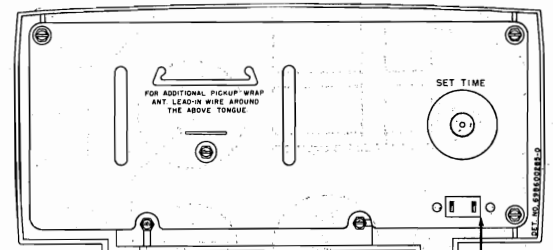


FIGURE 1. OPERATING CONTROLS

Turn knob "A" to the "OFF" position and rotate knob "B" to any period of time between 0 and 60 minutes. The radio and appliance will be turned off automatically after the proper time has elapsed, and they will remain off until turned on again manually.



APPLIANCE OUTLET
DO NOT PLUG IN ANY
APPLIANCE USING MORE
THAN 1100 WATTS
117V 60 CYCLES AC ONLY

FIGURE 2. REAR VIEW

MODELS 51C1, 51C2,
51C3, 51C4, Ch. HS-228

AUTOMATIC RADIO OPERATION

The clock controls may be pre-set to turn the radio on automatically at any time up to twelve hours in advance.

If an appliance is plugged into the receptacle on the back of the receiver, it will be turned on automatically, along with the radio.

Pull out knob "C", rotate it counterclockwise to the desired time on the alarm dial scale, and push the knob back in. Rotate knob "A" first to the "OFF" and then to the "AUTO" position. At the pre-set time, the radio will come on and will continue to play until turned off manually. The

alarm will ring also if the knob "C" is left pulled out. The radio will come on first and, after an interval of about ten minutes, the alarm will ring.

BEDTIME AND AUTOMATIC OPERATIONS COMBINED

By combining the operations in the two sections above the radio may be turned off automatically and on again automatically.

When setting the BEDTIME control, rotate knob "A" to the "AUTO" position instead of "OFF". IMPORTANT: It is necessary to turn knob "A" first to the "OFF" position before proceeding to "AUTO", otherwise the radio may not shut off.

ALIGNMENT

NOTE: It is recommended that an isolation transformer be placed between the power line and the receiver to avoid hum and electrical shocks. If an isolation transformer is not available, connect the low side of the signal generator to B- through a .1 mf capacitor.

1. Connect a low range output meter across the speaker voice coil.
2. Connect the low side of the signal generator to B-.
3. Set the signal generator for 400 cycle, 30% modulation.

4. Turn the receiver volume control to maximum.
5. Use a small fibre screwdriver for aligning the IF and diode transformers.
6. As stages are brought into alignment, reduce the signal generator output to a level which produces less than .40 volts (.05 watt) across the voice coil to avoid overloading the receiver.
7. See Figure 3 for adjustment locations and the following chart for procedure.

ALIGNMENT CHART

| STEP | DUMMY ANTENNA | GENERATOR CONNECTION | GENERATOR FREQUENCY | GANG SETTING | ADJUST | REMARKS |
|---------------------|---------------|------------------------------|---------------------|--------------|------------------------|-------------------------------------|
| IF ALIGNMENT | | | | | | |
| 1. | .1 mf | Grid of conv. (pin 7, 12BE6) | 455 Kc | Fully open | 1, 2, 3 & 4 (IF cores) | Adjust for maximum. |
| RF ALIGNMENT | | | | | | |
| 2. | - | - | - | Fully closed | - | Set pointer to horizontal position. |
| 3. | .1 mf | Grid of conv. (pin 7, 12BE6) | 1620 Kc | Fully open | 5 (Osc) | Adjust for maximum. |
| 4. | - | Radiation loop* | 1400 Kc | Tune for max | 6 (Ant) | Adjust for maximum. |

*Connect generator output across 5" diameter, 5 turn loop and couple inductively to receiver loop. Keep loops at least 12" apart.

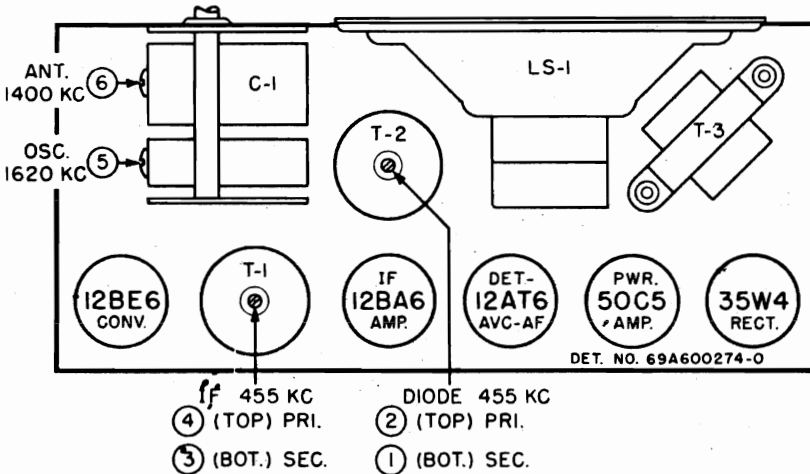
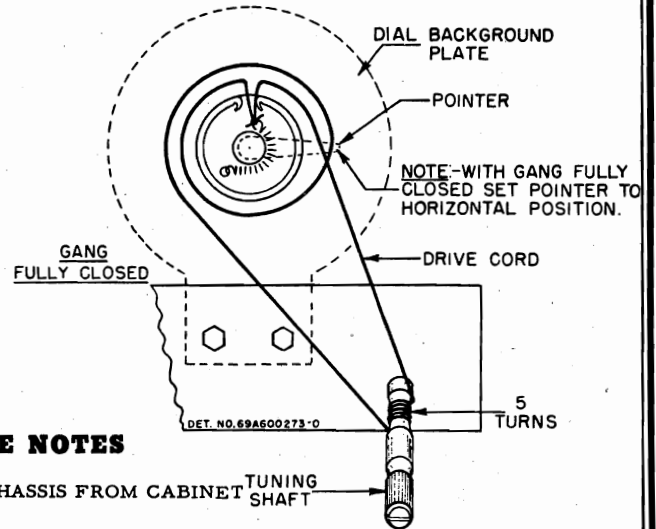


FIGURE 3. TUBE & TRIMMER LOCATIONS

MODELS 51C1, 51C2,
51C3, 51C4, Ch. HS-228

FIGURE 4. STRING DRIVE DETAIL



SERVICE NOTES

TO REMOVE RADIO CHASSIS FROM CABINET

- | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ol style="list-style-type: none"> 1. Pull off the two radio control knobs. 2. Remove the three hex head screws which hold the loop to the cabinet. 3. From the back of the cabinet, remove the two hex head | <ol style="list-style-type: none"> 4. Slide the radio chassis and loop from the cabinet. 5. Disconnect the power leads to the radio chassis and to the appliance receptacle. |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

TO REMOVE CLOCK FROM CABINET

- | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ol style="list-style-type: none"> 1. Remove radio chassis as above. 2. Remove the three nuts and lockwashers holding the shield behind the clock. 3. Slide the shield from the cabinet. 4. Turn the BEDTIME control knob to "60". | <ol style="list-style-type: none"> 5. Pull out the ALARM set knob. 6. Turn the RADIO control knob to "AUTO". 7. While observing the clock from the back to avoid bending or breaking any parts, gently push the clock forward, at the same time twisting it slightly to eliminate binding. |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

TO REPLACE CLOCK DIAL FACE

- | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ol style="list-style-type: none"> 1. Remove the clock from the cabinet as above. 2. Pull off the RADIO control and BEDTIME knobs. 3. Remove the ALARM set knob. 4. Remove the escutcheon and crystal. 5. Carefully pull off the three hands. 6. Remove the alarm dial and clock face. 7. Turn the radio control shaft to "AUTO" position. 8. Slowly rotate the time set shaft clockwise until the switch | <ol style="list-style-type: none"> 9. Reassemble the clock face, alarm dial and three hands. Set all the hands to indicate 12 o'clock. Set the figure "12" on the alarm dial to index with the small pointer on the hour hand. 10. Replace the crystal, the escutcheon, and the knobs. 11. Check the automatic operation to be sure the switch contacts close at the time indicated on the alarm dial. |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

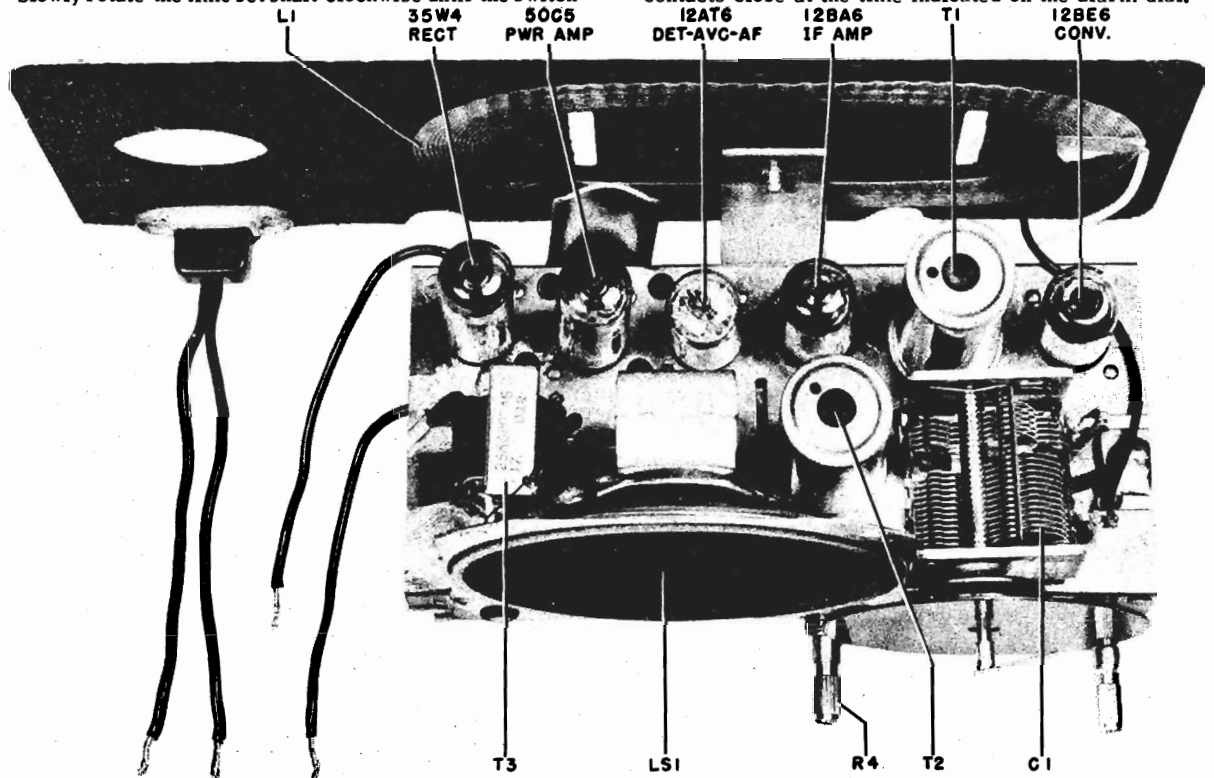


FIGURE 5. TOP VIEW OF CHASSIS

MODELS 51C1, 51C2,
51C3, 51C4, Ch. HS-228

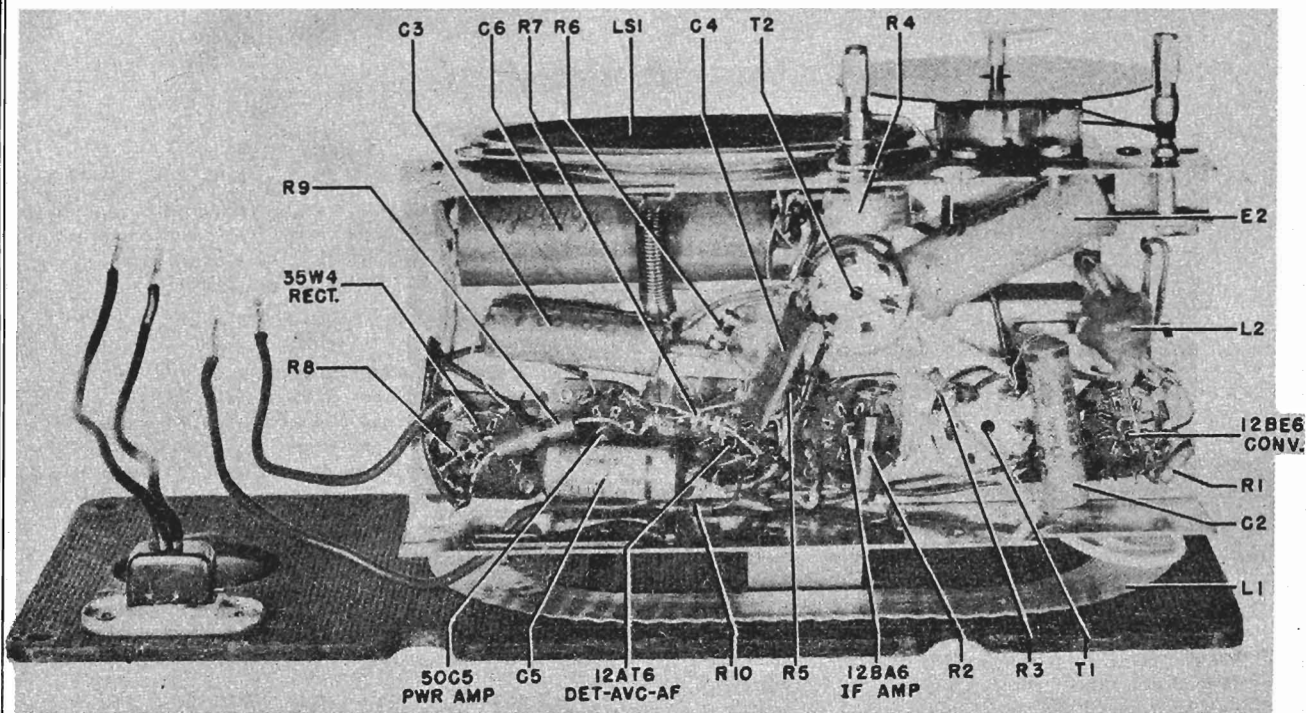


FIGURE 6. BOTTOM VIEW OF CHASSIS USING MULTIPLE CERAMIC CAPACITOR PLATE

REPLACEMENT PARTS LIST

NOTE: When ordering parts, specify model number of set in addition to part number and description of part.

| Ref. No. | Part Number | Description | Ref. No. | Part Number | Description |
|-----------------------------------|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|-------------------------------------------|------------------------------------------------------------|
| CHASSIS PARTS - ELECTRICAL | | | | 59K610059 or 1X610103 | Same as above except color (for green cabinet) (51C4). |
| Capacitors | | | Choke-Capacitor | | |
| C-1 | 19B600021 | Variable: 2 gang; with pulley | E-2 | 8A690487 | Choke and .15 mf paper capacitor..... |
| C-2 | 8R9821 | Paper: .05 mf 200V..... | Coils | | |
| C-3 | 8R490232 | Paper: .047 mf 400V..... | L-1 | 1X610073 | Antenna Loop, Panel and Receptacle Assembly: complete..... |
| C-4 | 21B482847 | Ceramic, multiple: 2000-220-220-5000 mmf/400V..... | | 24K610072 | Antenna Loop and Panel Assembly: less receptacle.. |
| C-5 | 8R9802 | Paper: .02 mf 400V..... | L-2 | 24B680364 | Oscillator coil..... |
| C-6 | 23B600855 | Electrolytic: 50-30 mf/150V | Speaker | | |
| Capacitor-Resistor | | | LS-1 | 50C600017 or 50B610052 or 50C600857 | Speaker: 4" PM; 3.2 ohm VC. |
| CR-1 | 21B601007 | Capacitor-Resistor: 2000-220 110-5000-110 mmf; 6.8 meg-470,000-470,000 ohms..... | Resistors | | |
| Clock | | | Note: All resistors are insulated carbon type unless otherwise specified. | | |
| E-1 | 59K610068 or 1X610107 | Electric Clock Assembly: Telechron movement No. C-57 with Motorola face, hands, crystal, escutcheon and knobs (for walnut cabinet) (51C1)..... | R-1 | 6R6028 | 22,000 20% 1/2W..... |
| | 59K610067 or 1X610109 | Same as above except color (for ivory cabinet) (51C2). | R-2 | 6R6018 | 100 20% 1/2W..... |
| | 59K610064 or 1X610105 | Same as above except color (for tan cabinet) (51C3)... | R-3 | 6R2118 | 3.3 meg 20% 1/2W..... |
| | | | R-4 | 18A600018 | Volume control: 1 meg... |
| | | | R-5 | 6R2109 | 10 meg 20% 1/2W..... |
| | | | R-6 | 6R6032 | 470,000 20% 1/2W..... |
| | | | R-7 | 6R6032 | 470,000 20% 1/2W..... |

| Part Number | Description | Part Number | Description |
|-----------------------------------|-------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| R-8 6R3992 | 150 20% 1/2W..... | 13K600197 | Escutcheon, radio dial: ivory (51C2)..... |
| R-9 6R5683 | 27 10% 1/2W..... | 13K610058 | Escutcheon, radio dial: tan (51C3) |
| R-10 6R3953 | 1000 20% 1W..... | 13K600003 | Escutcheon, radio dial: green (51C4)..... |
| Transformers | | | |
| T-1 24B482863 | IF Transformer (brown dot): 455 Kc: complete with capacitor and cores; less shield..... | 14A16304 | Grommet, fibre (on clock shield)... |
| T-2 24B482865 | Diode Transformer (red dot): 455 Kc: complete with capacitors and cores; less shield..... | 36K600787 | Knob, radio control: brown plastic (51C1)..... |
| T-3 25K680345 | Output Transformer..... | 36K600192 | Knob, radio control: ivory plastic (51C2)..... |
| CHASSIS PARTS - MECHANICAL | | | |
| 7A478118 | Bracket, loop mtg..... | 36K610054 | Knob, radio control: tan plastic (51C3)..... |
| 7A77337 | Bracket, tuning shaft..... | 36A600065 | Knob, radio control: green plastic (51C4)..... |
| 42B482867 | Clip, spring: blued finish (holds IF transformers)..... | 13A792195 | Medallion: brass (on front of speaker grille)..... |
| 5A484268 | Grommet, speaker mtg: rubber.... | 2S7019 | Nut, hex: 4-40 x 1/4 stl; cad pl (clock shield mtg)..... |
| 14A478119 | Insulator, loop brkt mtg: fibre. | 3S476083 | Screw, machine: 6-32 x 5/16 slotted locking hex head; cad pl (radio chassis mtg)..... |
| 4S7691 | Lockwasher, internal: 3/8; cad pl (vol control mtg)..... | 3S2991 | Screw, machine: 6-32 x 1/2 plain hex head; cad pl (mounts loop to cabinet)..... |
| 2A780465 | Nut, knurled (vol control mtg)..... | 1X600799 | Shield, clock: with grommet (covers rear of clock)..... |
| 64B610056 | Plate, dial background: ivory..... | 2S490840 | Speednut: for 1/16" stud (medallion mtg)..... |
| 52K610055 | Pointer, dial (black)..... | 11M488253 | Tape, aluminum foil (inside top of cabinet).....per ft |
| 9A601018 | Receptacle, appliance (on loop panel)..... | 4S7633 | Washer, flat: 9/16 x 11/64 x .033 stl; cad pl (mounts loop to cabinet)..... |
| 3S7506 | Screw, sheet metal: #6 x 1/4 PKZ plain hex head; cad pl (dial background plate mtg)..... | CLOCK PARTS | |
| 47A600022 | Shaft, tuning..... | Note: The following Motorola parts are for use with the basic Telechron clock movement No. C-57. | |
| 26K485936 | Shield, coil (for IF transformers). | 34K610061 | Alarm dial: ivory..... |
| 26A478117 | Shield, electrostatic (on rear of chassis)..... | 30K600980 | Cord, line: with plug; 6 ft long... |
| 43A600095 | Sleeve, paper (on pointer shaft) | 61A600001 | Crystal, plastic (clock face cover) |
| 9A472534 | Socket, tube: miniature; 7-prong... | 34K610060 | Dial face: ivory..... |
| 41A73996 | Spring, tension (electrolytic mtg). | 13K600789 | Escutcheon, clock: walnut (51C1)... |
| 41A73619 | Spring, tension (gang drive cord)..... | 13K600196 | Escutcheon, clock: ivory (51C2).... |
| 4A70015 | Washer, "C" (tuning shaft mtg) | 13K610057 | Escutcheon, clock: tan (51C3)..... |
| 4S7633 | Washer, flat: 9/16 x 11/64 x .033 stl; cad pl (loop mtg)..... | 13C600002 | Escutcheon, clock: green (51C4).... |
| 14A11493 | Washer, shoulder: fibre (loop bracket mtg)..... | 52K610062 | Hand, hour: black..... |
| CABINET PARTS | | | |
| 16K600791 | Cabinet, table model: plastic; walnut (51C1)..... | 52K610063 | Hand, minute: black..... |
| 16K600199 | Cabinet, table model: plastic; ivory (51C2)..... | 52K601001 | Hand, second: brass..... |
| 16K610069 | Cabinet, table model: plastic; tan (51C3)..... | 36K600989 | Knob, clock control: plain; threaded type; walnut (51C1)..... |
| 16E600005 | Cabinet, table model: plastic; green (51C4)..... | 36K600988 | Knob, clock control: plain; threaded type; ivory (51C2)..... |
| 28A600064 | Connector, wire (connects clock & radio power leads)..... | 36K610066 | Knob, clock control: plain; threaded type; tan (51C3)..... |
| 61A600001 | Crystal, plastic (radio dial cover) | 36K600987 | Knob, clock control: plain; threaded type; green (51C4)..... |
| 13K600790 | Escutcheon, radio dial: walnut (51C1)..... | 36K600986 | Knob, clock control: with arrow; push on type; walnut (51C1)..... |
| | | 36K600985 | Knob, clock control: with arrow; push on type; ivory (51C2)..... |
| | | 36K610065 | Knob, clock control: with arrow; push on type; tan (51C3)..... |
| | | 36K600984 | Knob, clock control: with arrow; push on type; green (51C4)..... |
| | | 36K601002 | Knob, time set..... |

MODELS 51C1, 51C2,
51C3, 51C4, Ch. HS-228

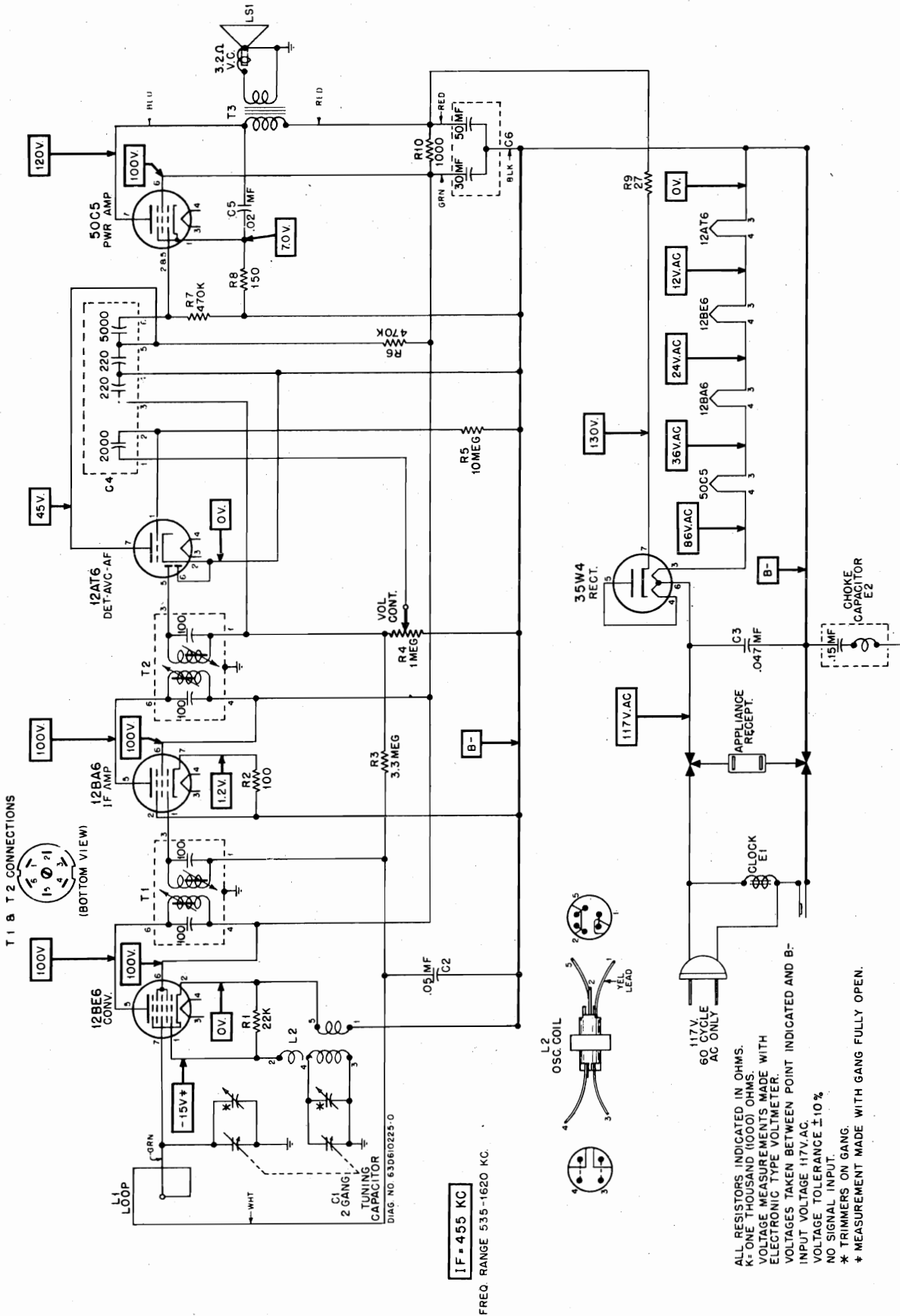


FIGURE 7. SCHEMATIC DIAGRAM OF CHASSIS USING MULTIPLE CERAMIC CAPACITOR PLATE

MODELS 51C1, 51C2,
51C3, 51C4, Ch. HS-228

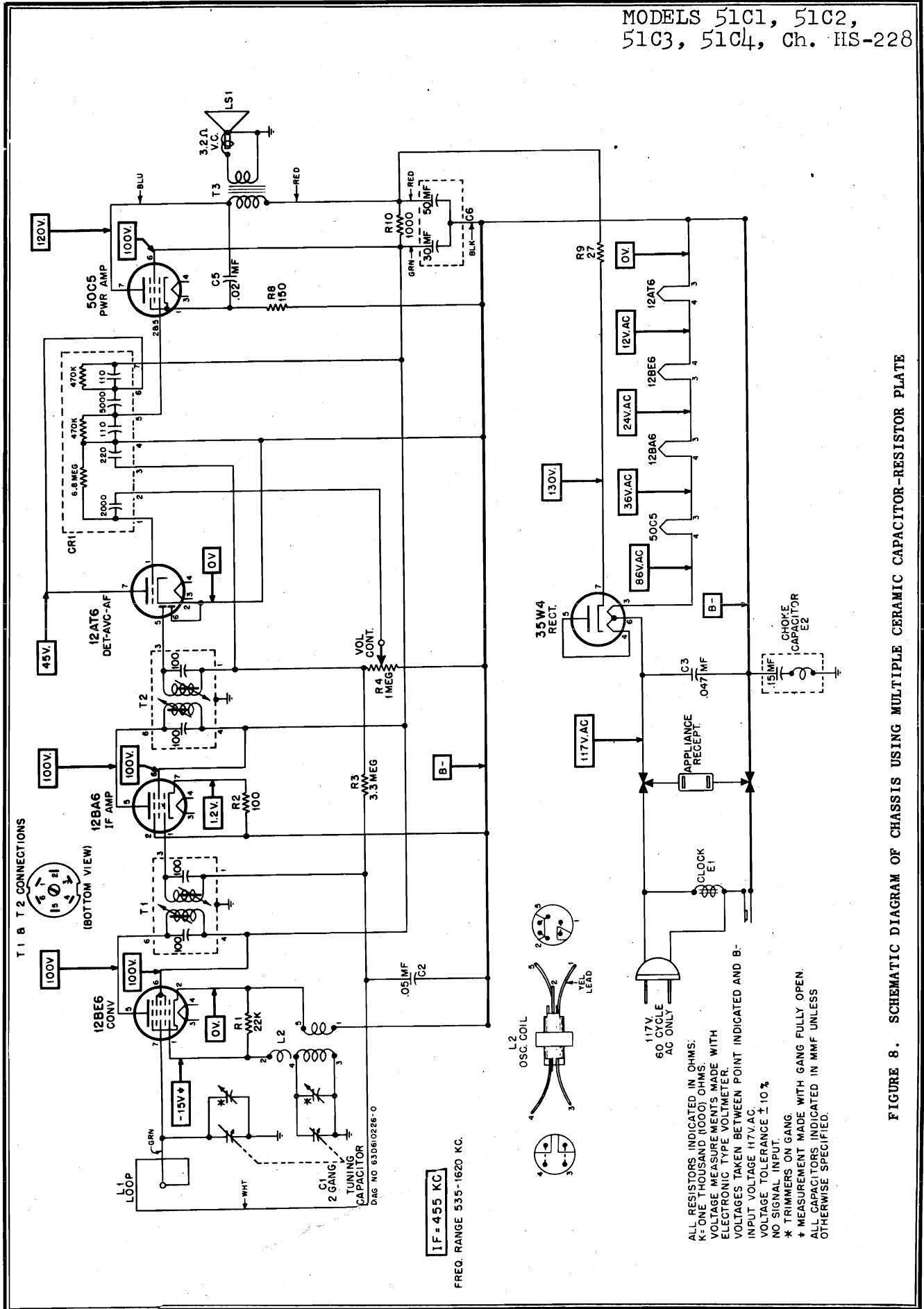


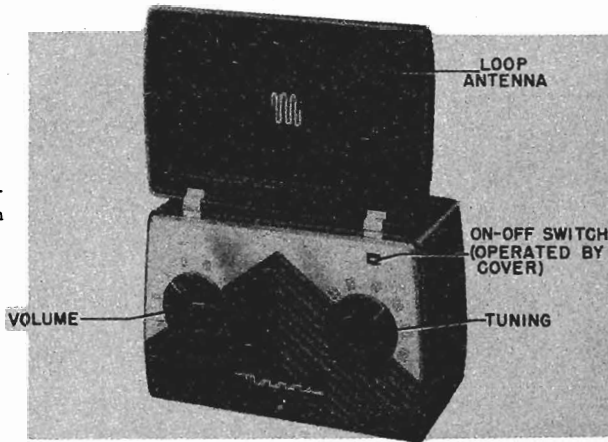
FIGURE 8. SCHEMATIC DIAGRAM OF CHASSIS USING MULTIPLE CERAMIC CAPACITOR-RESISTOR PLATE

MODELS 51M1U,
51M2U, Ch. HS-283

GENERAL INFORMATION

TYPE - Three-power (AC/DC, Battery) portable radio receiver. Four miniature type tubes and a selenium rectifier are used in a superheterodyne circuit.

| Model | Color |
|-------|--------|
| 51M1U | Green |
| 51M2U | Maroon |



TUNING RANGE - 535 to 1620 Kc IF - 455 Kc

| TUBE COMPLEMENT - Type | Function |
|------------------------|------------------------------------|
| 1R5 | Converter |
| 1U4 | IF Amplifier |
| 1U5 | Det, AVC & 1st AF Amp |
| 3S4 | Power Amplifier |
| Rectifier | Selenium type -for AC/DC operation |

POWER SUPPLY - Operates from 117V AC/DC (15 watts) or from the following batteries:

- 2 - 1-1/2V flashlight cells (Eveready #950 or equivalent)
- 1 - 67-1/2V "B" battery (Eveready #467 or equivalent)

OPERATING INSTRUCTIONS

TO OPEN FRONT COVER. The front cover is opened by pushing upward on the "M" bar located in the center of the cover. The receiver is automatically turned on when the front cover is opened and raised to a vertical position.

TO OPEN BACK COVER. The back cover may be opened by gently pulling it at the top. When closing the cover, be careful not to pinch the power line cord or other leads between the cover and the cabinet.

117 VOLT AC OR DC OPERATION. The power cord is located inside the cabinet and may be reached by opening the back cover. Pass the line cord through the slot on the side of the receiver, and plug it into any 117 volt AC or DC power outlet. If the receiver does not operate from DC power, reverse the plug in the power outlet. When operating from AC power, reception may sometimes be improved by reversing the power plug in the outlet. It is not necessary that batteries be installed if the receiver is to be operated only from house power lines.

BATTERY OPERATION. Open the back cover and install the batteries, following the instructions on the label inside the back cover (or see Figure 1). Insert the line cord plug into the receptacle on the chassis, or the receiver will not play from batteries. If the receiver is to be operated for a long period of time from 117 volts AC or DC, or is to be placed in storage, remove the batteries and store them in a

cool place. **IMPORTANT:** Never leave low or run-down batteries in the receiver, as they will leak or swell and damage it.

TUNING CONTROL. Stations are tuned in with the right-hand knob. The markings around the tuning knob may be read in kilocycles by adding one zero to the figures.

VOLUME CONTROL. The left-hand knob controls volume.

TO TURN OFF. Closing the front cover will automatically turn off the receiver.

ANTENNA. A loop antenna is built into the front cover. Because of the slightly directional characteristics of the loop antenna, reception from some stations may be improved by rotating the entire receiver. In extremely noisy locations, rotate the receiver until minimum noise and maximum signal pick-up are obtained.

BATTERY REPLACEMENT. If low volume or fuzzy tone is noticed when operating from batteries, replace the flashlight cells. Normally, the 67-1/2V "B" battery will last for 3 or 4 changes of the flashlight cells. The condition of the batteries will not affect the operation of the receiver from 117 volts AC or DC. Complete battery replacement instructions will be found inside the cabinet back cover (or see Figure 1).

MODELS 51M1U,
51M2U, Ch. HS-283

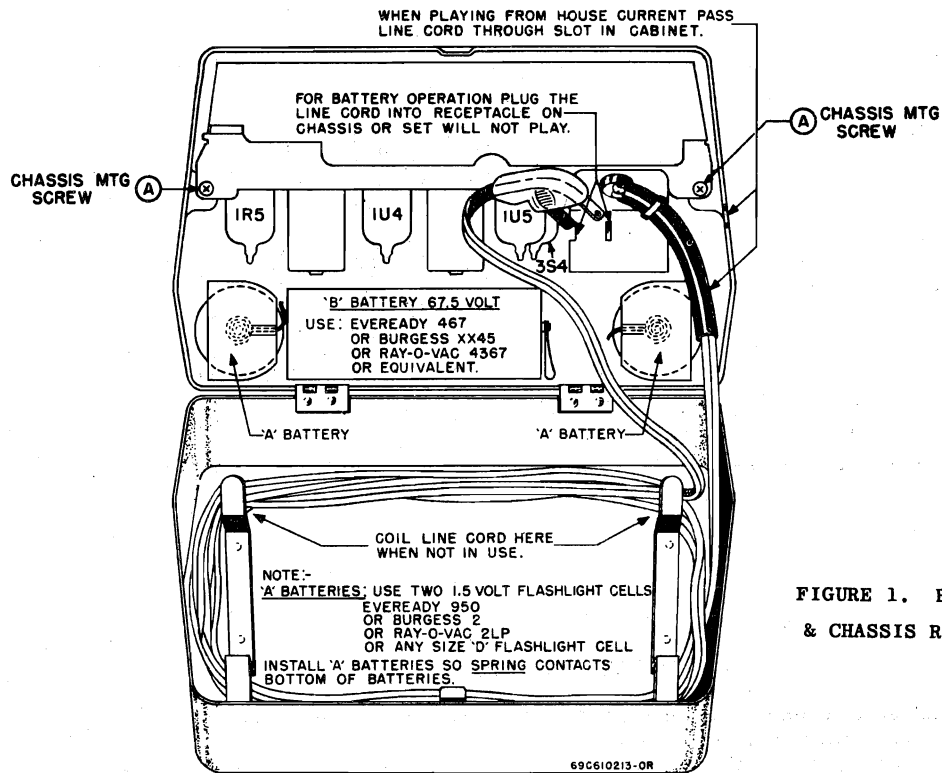


FIGURE 1. BATTERY INSTALLATION & CHASSIS REMOVAL INSTRUCTIONS

ALIGNMENT

NOTE: The receiver may be operated either from batteries or from the commercial power lines during alignment. If AC power is used, it is recommended that an isolation transformer be placed between the power line and the receiver. If an isolation transformer is not available, connect the low side of the signal generator to B- through a .1 mf capacitor.

1. Connect a low range output meter across the speaker voice coil.
2. Connect the low side of the signal generator to B-.
3. Set the signal generator for 400 cycle, 30% modulation.
4. Turn the receiver volume control to maximum.
5. Use a small fibre screwdriver for aligning the IF and diode transformers.
6. As stages are brought into alignment, reduce the signal generator input to keep the output of the receiver at approximately .05 watt (.40 volts on the output meter) to avoid overloading the receiver.
7. See Figure 2 for adjusting locations and the following chart for procedure.

ALIGNMENT CHART

| STEP | DUMMY ANTENNA | GENERATOR CONNECTION | GENERATOR FREQUENCY | GANG SETTING | ADJUST | REMARKS |
|---------------------|---------------|---------------------------|---------------------|---------------|---------------------|-------------------------------------------------------------------------------------------|
| IF ALIGNMENT | | | | | | |
| 1. | .1 mf | Grid of conv (pin 6, 1R5) | 455 Kc | Fully open | 1, 2 & 3 (IF cores) | Adjust for maximum. |
| RF ALIGNMENT | | | | | | |
| 2. | .1 mf | Grid of conv (pin 6, 1R5) | 1620 Kc | Fully open | 4 (Osc) | Adjust for maximum. |
| 3. | - | - | - | - | - | Install chassis in cabinet, leaving output meter connected to speaker. |
| 4. | - | Radiation loop* | 1400 Kc | Tune for max. | 5 (Ant) | Adjust for maximum. Trimmer is reached through hole under plug button on side of cabinet. |

* Connect generator output across 5" diameter, 5 turn loop and couple inductively to receiver loop. Keep loops at least 12" apart.

MODELS 51M1U,
51M2U, Ch. HS-283

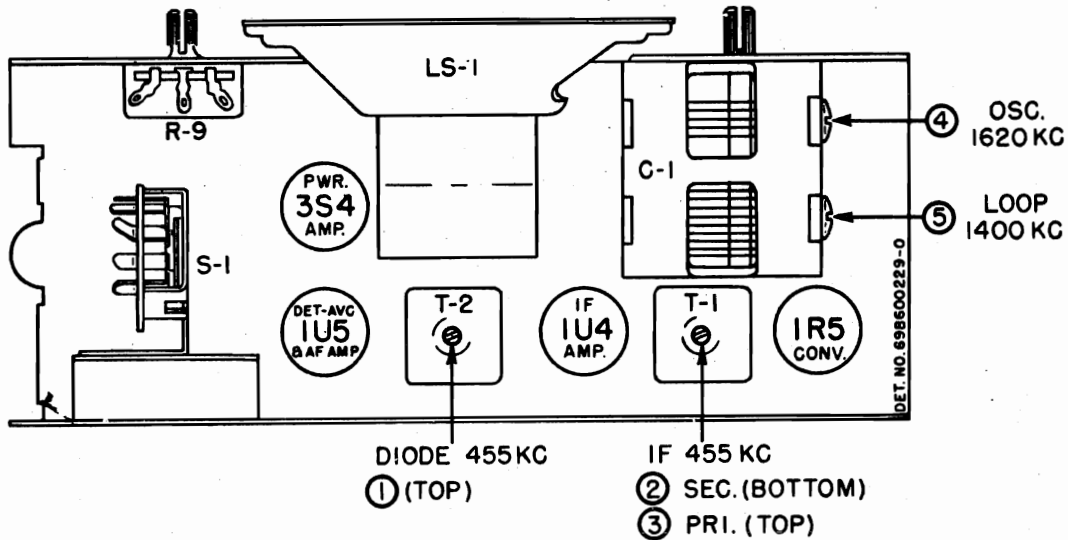


FIGURE 2. TUBE & TRIMMER LOCATIONS

SERVICE NOTES

The chassis of this receiver is isolated from the AC power line circuit by a capacitor-choke assembly to eliminate the shock hazard when handling the receiver. However, as an additional precaution when aligning or servicing the receiver from AC, an isolation transformer should be inserted between the power line and the chassis.

The tubes are exposed when the rear cover is opened. It is not necessary to remove the chassis to replace tubes.

TO REMOVE THE CHASSIS FROM THE CABINET:

1. Pull off the two control knobs on the front of the cabinet.
2. Open the rear cover and remove the batteries.
3. Remove the two Phillips head screws holding the chassis to the cabinet ("A" - "A" in Figure 1).
4. Slide the chassis out of the cabinet.
5. Disconnect the two leads from the chassis to the loop antenna hinges.

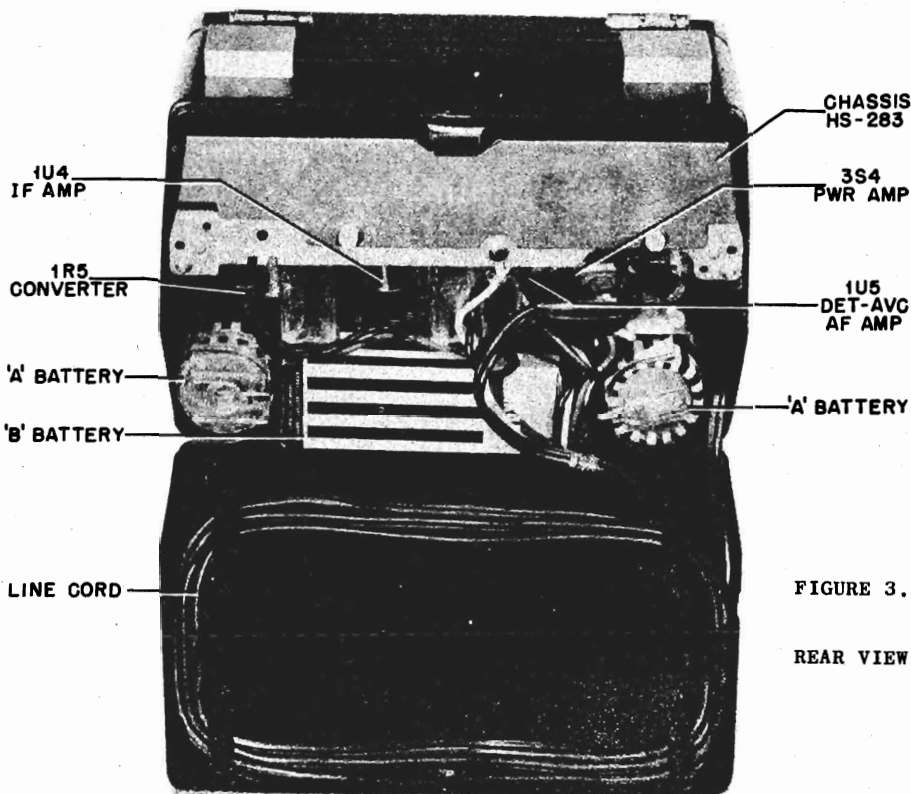


FIGURE 3.

REAR VIEW OF RECEIVER

MODELS 51M1U,
51M2U, Ch. HS-283

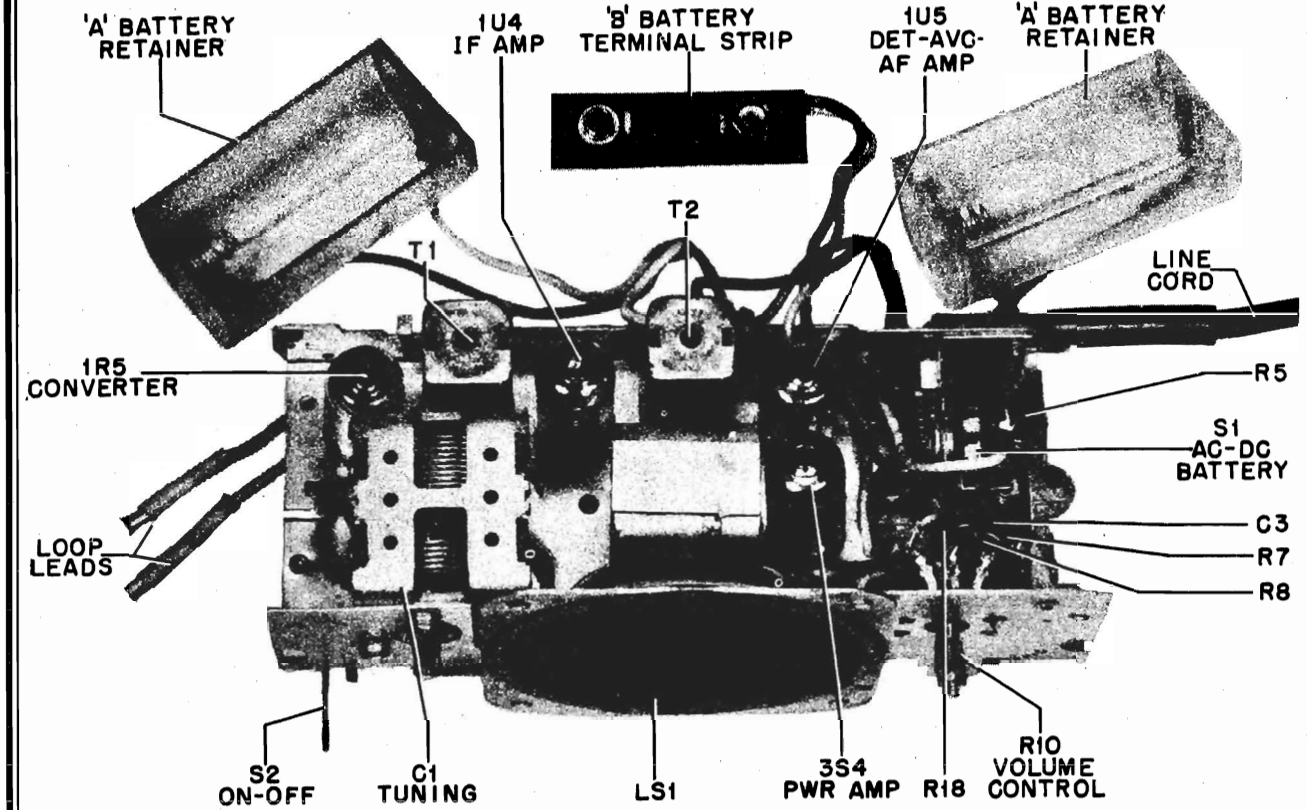


FIGURE 4. TOP VIEW OF CHASSIS

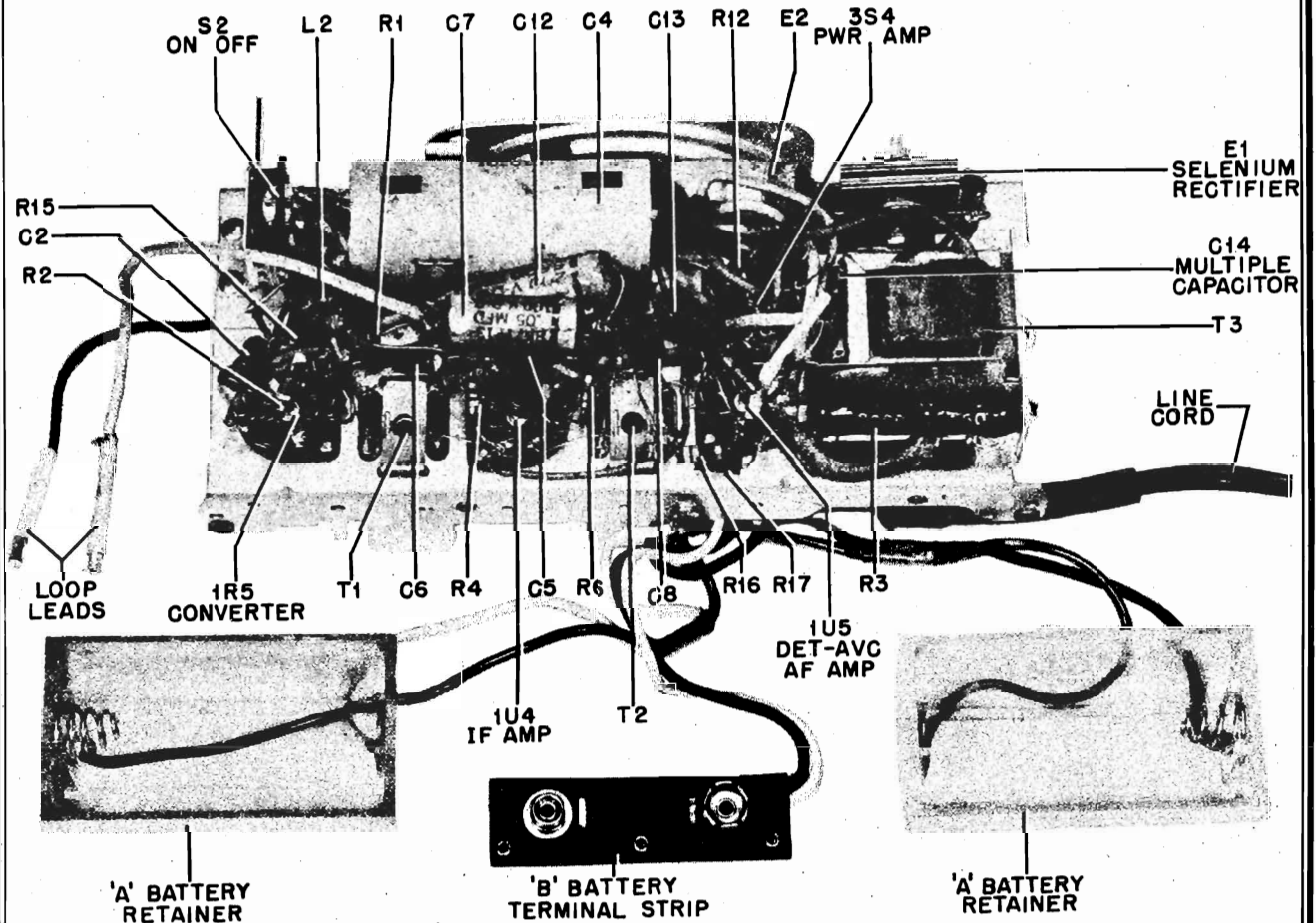


FIGURE 5. BOTTOM VIEW OF CHASSIS

MODELS 51M1U,
51M2U, Ch. HS-283

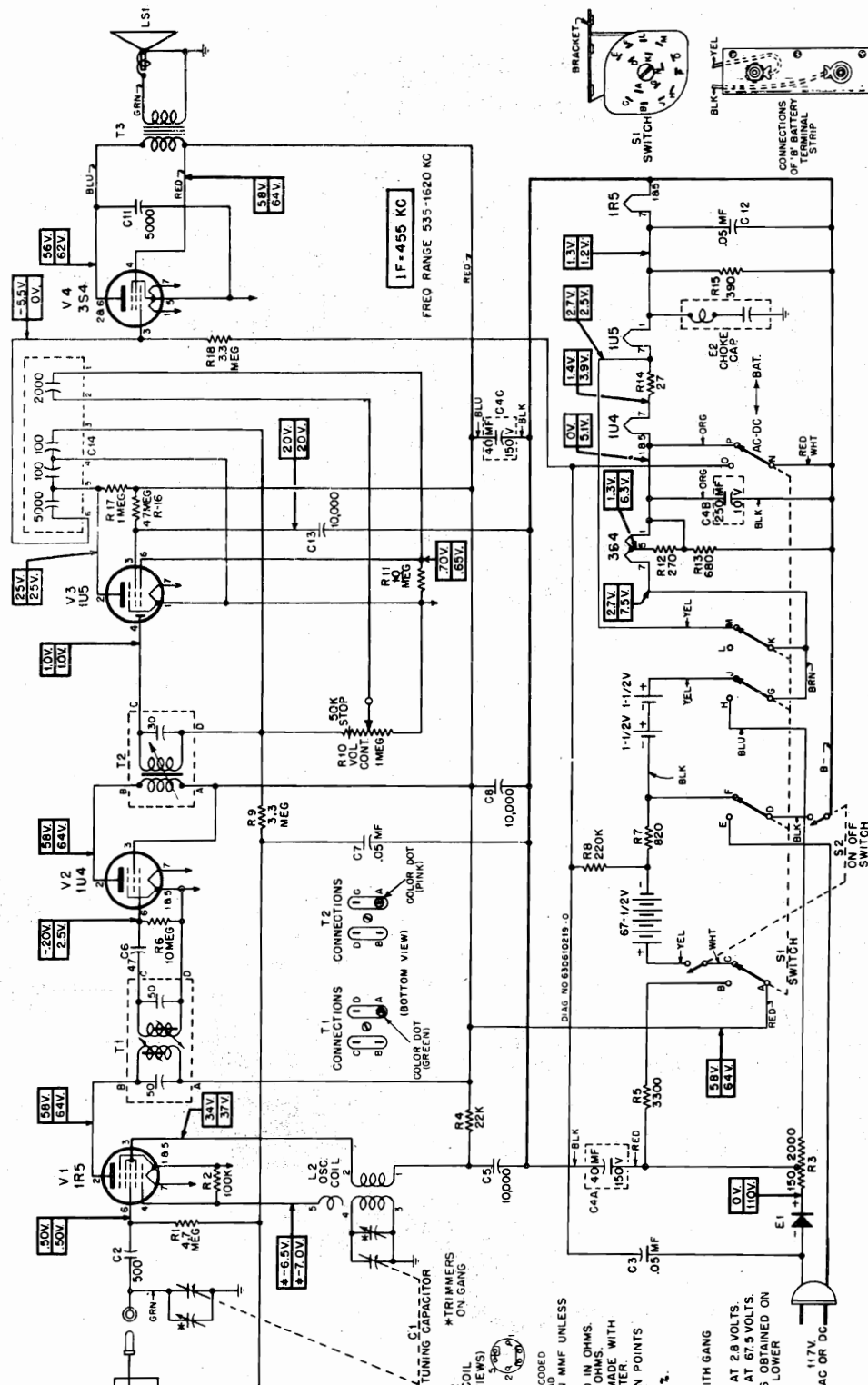


FIGURE 6. SCHEMATIC DIAGRAM OF CHASSIS USING MULTIPLE CERAMIC CAPACITOR PLATE

MODELS 51M1U,
51M2U, Ch. HS-283

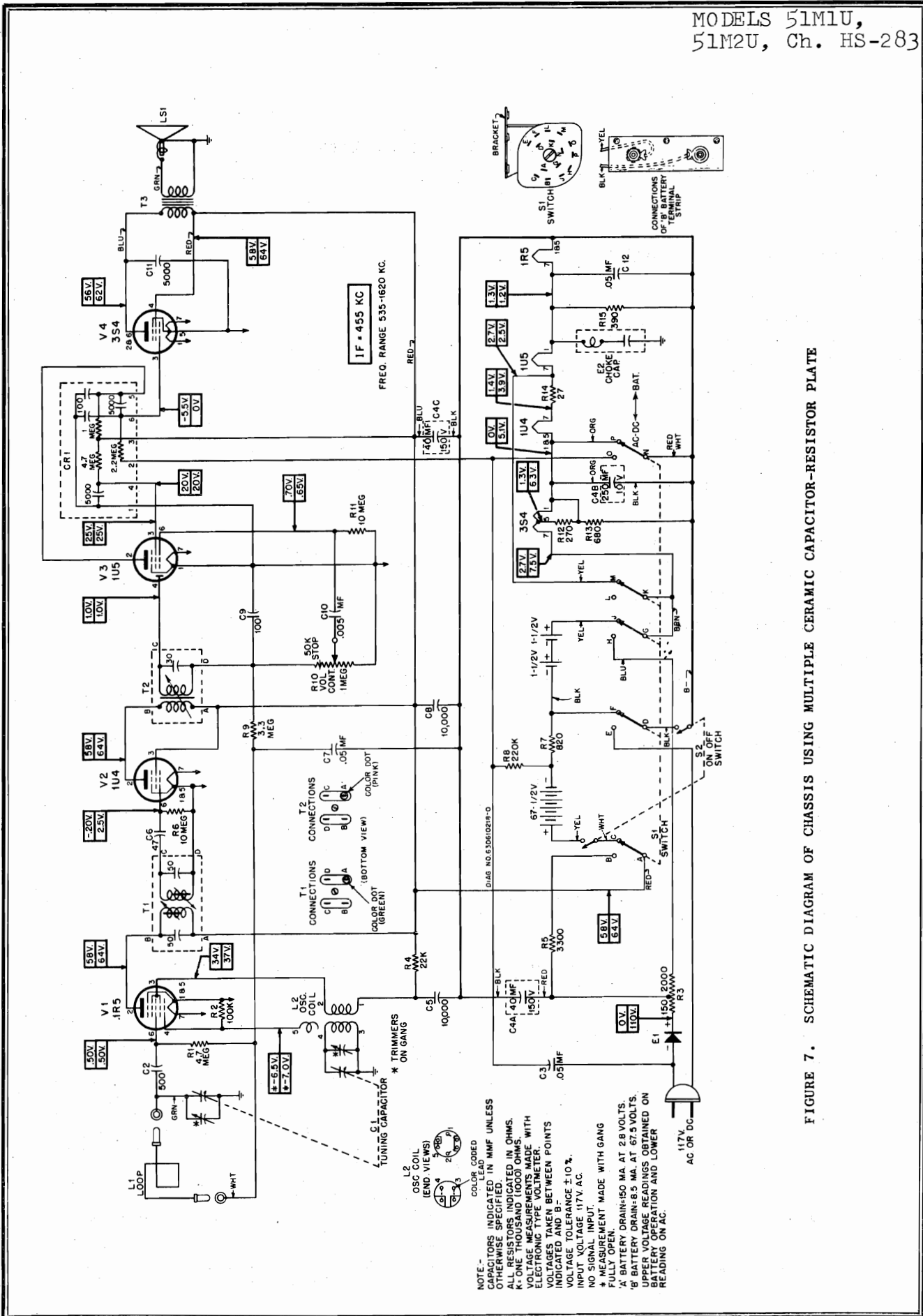


FIGURE 7. SCHEMATIC DIAGRAM OF CHASSIS USING MULTIPLE CERAMIC CAPACITOR-RESISTOR PLATE

MODELS 51M1U,
51M2U, Ch. HS-283

REPLACEMENT PARTS LIST

NOTE: When ordering parts, specify model number of set in addition to part number and description of part.

| Ref. No. | Part Number | Description |
|-----------------------------------|-------------|------------------------------------------------------------|
| CHASSIS PARTS - ELECTRICAL | | |
| C-1 | 19K692007 | Variable, 2-gang..... |
| C-2 | 21K481377 | Ceramic: 500 mmf 500V..... |
| C-3 | 8K471635 | Paper: .05 mf 400V..... |
| C-4 | 23B691995 | Electrolytic 40-40 mf 150V/ 250 mf 10V..... |
| C-5 | 21K482726 | Ceramic, disc type: 10,000 mmf 450V..... |
| C-6 | 21K77373 | Ceramic: 47 mmf 500V..... |
| C-7 | 8K71213 | Paper: .05 mf 100V..... |
| C-8 | 21K482726 | Ceramic, disc type: 10,000 mmf 450V..... |
| C-9 | 21B77286 | Ceramic, disc type: 100 mmf 100V..... |
| C-10 | 8K24966 | Ceramic, disc type: .005 mf 100V..... |
| C-11 | 21A470789 | Ceramic, disc type: 5000 mmf 450V..... |
| C-12 | 8K71213 | Paper: .05 mf 100V..... |
| C-13 | 21K482726 | Ceramic, disc type: 10,000 mmf 450V..... |
| C-14 | 21K691992 | Ceramic, multiple: 2000 mmf, 100 mmf, 100 mmf, 5000 mmf |

Capacitor-Resistor

| | | |
|------|-----------|----------------------------------------------------------------------------------------------|
| CR-1 | 21B601036 | Capacitor-Resistor: 5000 mmf, 5000 mmf; 100 mmf, 100 mmf, 4.7 meg, 2.2 meg, 1 meg..... |
|------|-----------|----------------------------------------------------------------------------------------------|

Choke Capacitor

| | | |
|-----|-----------|---------------------------------------------|
| E-2 | 24K691986 | Choke & .05 mf 200V paper capacitor..... |
|-----|-----------|---------------------------------------------|

Rectifier

| | | |
|-----|-----------|----------------------------------------|
| E-1 | 48B791092 | Selenium Rectifier: half- wave..... |
|-----|-----------|----------------------------------------|

Coils

| | | |
|-----|-----------|-------------------------------------------------------------------------------------------|
| L-1 | 1X692159 | Antenna Loop & Front Cover Assembly: complete; green plastic (51M1U)..... |
| | 1X692160 | Antenna Loop, Panel & Hinge Assembly: less front cover; green plastic (51M1U)..... |
| | 24B692200 | Antenna Loop & Panel Assem- bly: less hinges: green plastic (51M1U)..... |
| | 1X600129 | Antenna Loop & Front Cover Assembly: complete: maroon plastic (51M2U)..... |
| | 1X600130 | Antenna Loop, Panel & Hinge Assembly: less front cover; maroon plastic (51M2U)..... |
| | 24K600132 | Antenna Loop & Panel Assem- bly: less hinges; maroon plastic (51M2U)..... |
| L-2 | 24K600097 | Oscillator Coil (yellow code) |

| Ref. No. | Part Number | Description |
|----------|-------------|-------------|
|----------|-------------|-------------|

Resistors

Note: All resistors are insulated, carbon type unless otherwise specified.

| | | |
|------|-----------|-----------------------------------------|
| R-1 | 6R2122 | 4.7 meg 20% 1/2W..... |
| R-2 | 6R6031 | 100,000 10% 1/2W..... |
| R-3 | 17K692009 | Wire wound: 2150 5% 10W; tapped..... |
| R-4 | 6R6397 | 22,000 10% 1/2W..... |
| R-5 | 6R5581 | 3300 10% 1/2W..... |
| R-6 | 6R2109 | 10 meg 20% 1/2W..... |
| R-7 | 6R6269 | 820 10% 1/2W..... |
| R-8 | 6R6015 | 220,000 20% 1/2W..... |
| R-9 | 6R2118 | 3.3 meg 20% 1/2W..... |
| R-10 | 18A691993 | Volume control: 1 meg... |
| R-11 | 6R2109 | 10 meg 20% 1/2W..... |
| R-12 | 6R6432 | 270 10% 1/2W..... |
| R-13 | 6R6040 | 680 10% 1/2W..... |
| R-14 | 6R5683 | 27 10% 1/2W..... |
| R-15 | 6R5554 | 390 10% 1/2W..... |
| R-16 | 6R2122 | 4.7 meg 20% 1/2W..... |
| R-17 | 6R6004 | 1 meg 20% 1/2W..... |
| R-18 | 6R2118 | 3.3 meg 20% 1/2W..... |

Switches

| | | |
|-----|-----------|--------------------------------------------------------|
| S-1 | 40B471927 | Rotary Switch, 5 PDT (AC/DC- Battery selector)..... |
| S-2 | 40A691999 | Slide Switch (on-off)..... |

Transformers

| | | |
|-----|-----------|----------------------------------------------------------|
| T-1 | 24K600824 | IF Transformer, 455 Kc: complete with capacitors.. |
| T-2 | 24K600825 | Diode Transformer, 455 Kc: complete with capacitor... |
| T-3 | 25K692006 | Output transformer..... |

CHASSIS PARTS - MECHANICAL

| | |
|-----------|-------------------------------------------------------------------|
| 43A692011 | Bushing, insulator: fibre (chassis mtg screw insulators)..... |
| 43A692012 | Bushing, strain relief: line cord (use with 43K692013)..... |
| 42K75826 | Clip, electrolytic mtg..... |
| 42A485584 | Clip, IF transformer mtg..... |
| 30K601777 | Cord, line: with plug; 6 ft long.. |
| 29R3020 | Lug, soldering: battery contact (in "A" battery retainer)..... |
| 9A470980 | Receptacle, loop (on loop leads) |
| 15B481896 | Retainer, "A" battery: plastic... |
| 43K692013 | Retainer, strain relief (on line cord bushing)..... |
| 26B692001 | Shield, back (on rear of chassis) |
| 26A692005 | Shield heat (around R-3)..... |
| 26B691996 | Shield, switch (over AC/DC-Battery switch)..... |
| 9A690129 | Socket, tube: miniature; 7-prong.. |
| 41K680029 | Spring, battery contact (in "A" battery retainer)..... |

MODELS 51M1U,
51M2U, Ch. HS-283

| <u>Part Number</u> | <u>Description</u> | <u>Part Number</u> | <u>Description</u> |
|----------------------------------|------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| 31K470880 | Strip, "B" battery terminal: with leads..... | 3S400335 | Screw, sheet metal: #2 x 5/16; Phillips flat head; blk nkl (mounts loop to front cover)... |
| 31K37504 | Strip, terminal: 1 insulated lug, #1 mtg..... | 3S490739 | Screw, sheet metal: #4 x 1/4 PKZ; Phillips binder head (chassis mtg)..... |
| 31K470746 | Strip, terminal: 3 insulated lugs, #2 mtg..... | 3S2995 | Screw, machine: 5-40 x 5/16 pl hex head; cad pl (handle mtg).... |
| 4K470939 | Washer, fibre (R-3 mtg)..... | 41A470909 | Spring, door latch (inside front cover)..... |
| MODEL 51M1U CABINET PARTS | | | |
| 7A600092 | Bracket, escutcheon support (cabinet front support)..... | 41K692167 | Spring, handle (inside plastic handle)..... |
| 38K692050 | Button, plug: green finish (loop trimmer adj hole cover)..... | 41K601712 | Spring, rear cover latch..... |
| 1X601812 | Cabinet: complete; less handle, grille and antenna loop and front cover assembly; green plastic..... | 42A692189 | Strap, door latch retainer (inside front cover)..... |
| 42A600094 | Clip, grille retainer (holds grille to cabinet)..... | 46A692151 | Stud, latch retainer (front cover latch on grille)..... |
| 55A692058 | Cover, handle mtg (over ends of handle)..... | 46K690079 | Stud, trimount: blk nkl (on loop panel - for operating on-off switch)..... |
| 13D691949 | Escutcheon, dial & volume (on front of cabinet)..... | MODEL 51M2U CABINET PARTS-Same as Model 51M1U Except: | |
| 55A27113 | Foot, cabinet bottom: felt..... | 38K600106 | Button, plug: maroon finish (loop trimmer adj hole cover)..... |
| 1X692162 | Front Cover Assembly: complete; less loop; green plastic..... | 1X601816 | Cabinet: complete, less handle, grille and antenna loop and front cover assembly; maroon plastic.... |
| 1X692158 | Grille Assembly: complete with escutcheon: green plastic..... | 13K600956 | Escutcheon, dial & volume (on front of cabinet)..... |
| 55K692166 | Handle, carrying: green plastic; less spring..... | 1X600131 | Front Cover Assembly: complete, less loop; maroon plastic..... |
| 55C692202 | Hinge, front cover: complete; left-hand..... | 1X600128 | Grille Assembly: complete with escutcheon; maroon plastic..... |
| 55K600087 | Hinge, front cover: complete; right hand..... | 55K600107 | Handle, carrying: maroon plastic; less spring..... |
| 55K30198 | Hinge, rear cover..... | 36K600105 | Knob, control: maroon plastic..... |
| 36B691899 | Knob, control: green plastic..... | 5S2827 | Rivet: .088 x 5/32; stl; statuary bronze (front hinge mtg).... |
| 1X692163 | Latch and Plate Assembly (inside front cover)..... | 5S2828 | Rivet: .088 x 3/16; stl; statuary bronze (front cover hinge mtg)..... |
| 4S8406 | Lockwasher, int: #2 (loop)... | 3S400336 | Screw, sheet metal: #2 x 5/16; Phillips flat head; statuary bronze (mounts loop to front cover)... |
| 4S7695 | Lockwasher, int: #5 (handle mtg)..... | 46K680035 | Stud, trimount: statuary bronze (on loop panel - for operating on-off switch)..... |
| 29R5399 | Lug, soldering (under front hinge, for loop connection)..... | Speaker | |
| 13B691901 | Medallion (on front cover)..... | LS-1 | 50K600141 |
| 28A692198 | Pin, loop connector (on front hinge)..... | | or 50K600142 |
| 64K601618 | Plate, handle mtg (under handle mtg covers)..... | | or 50B610070 |
| 5S8487 | Rivet: .088 x 3/32; stl; blk nkl (rear cover hinges latch spring mtg)..... | | Speaker: 3 1/2" PM; 3.2 ohm VC |
| 5S8490 | Rivet: .088 x 5/32; stl; blk nkl; (front hinge mtg)..... | | |
| 5S7786 | Rivet: .088 x 3/16; stl; blk nkl (front hinge mtg)..... | | |
| 3S1512 | Screw, machine: 4-40 x 3/8; Phillips round head (mounts front hinges to cabinet)..... | | |

MODELS 59X11,
59X12I, Ch. HS-180

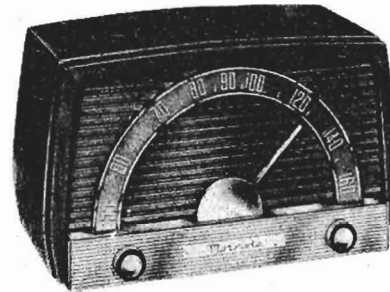
GENERAL INFORMATION

TYPE - AC-DC table model superheterodyne receiver with loop antenna

TUNING RANGE - 535 to 1620 Kc IF - 455 Kc

TUBE COMPLEMENT - 12BE6 Converter
12BA6 IF Amplifier
12AT6 Detector, AVC & 1st AF Amp
50C5 Power Amplifier
35W4 Rectifier

POWER SUPPLY - 117 volts AC or DC, 35 watts



MODEL 59X11 (Mahogany Plastic Cabinet) MODEL 59X12I (Ivory Plastic Cabinet)

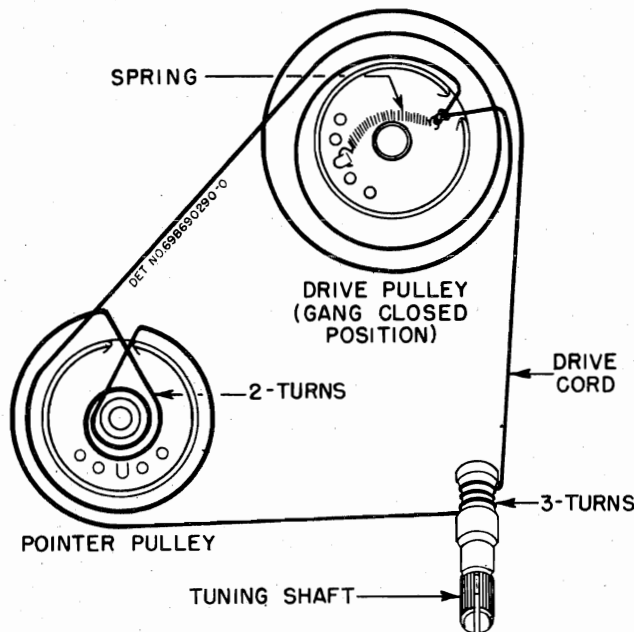


FIGURE 1. STRING DRIVE

INSTALLATION & OPERATING INSTRUCTIONS

POWER SWITCH AND VOLUME CONTROL. Operated with the left-hand knob. NOTE: Reverse the line cord plug in the wall outlet if radio does not operate from DC. When operating from AC, reversing the line cord plug in the wall outlet may sometimes improve reception and reduce hum.

TUNING. Tune stations with right-hand knob.

ANTENNA. A loop antenna is built into this receiver, eliminating the need for an external antenna. Reception from some stations may be improved by

rotating the whole receiver; this is due to the slight directional characteristic of the loop antenna. In extremely noisy locations, rotate the entire receiver till minimum noise and maximum signal pickup are obtained. For additional pickup, an external antenna may be connected by winding lead-in wire in slots on radio back panel.

GROUND. Never connect antenna or chassis to water pipe, radiator or other ground, as one side of the power line is connected directly to chassis.

PART NO. 54P691612

SERVICE NOTES

The chassis of this receiver is connected directly to the power line. When operating chassis (from AC line) outside of its cabinet, use an isolation transformer between power line and receiver to reduce possibility of electrical shock. If

isolation transformer is not available, check the AC voltage between chassis and bench ground; if there is any indication of voltage, reverse the line plug before handling set.

ALIGNMENT

If AC power is used, use an isolation transformer between power line and receiver. If isolation transformer is not available, connect low side of signal generator to chassis through .1 mf capacitor.

voice coil and set volume control at maximum. For greatest accuracy, keep output of receiver at approximately .05 watt (.05 watt = .40 volt on output meter) throughout alignment by reducing signal generator output as stages are brought into alignment. Use a small fibre screwdriver for aligning IF & diode transformers.

Connect low range output meter across speaker

| STEP | DUMMY ANTENNA | GENERATOR CONNECTION | GENERATOR FREQUENCY | GANG SET TO | ADJUST | REMARKS |
|--------------------|---------------|---------------------------------|---------------------|-------------------|-------------|---------------------|
| IF ALIGNMENT 1. | .1 mf | Rear stator of tuning capacitor | 455 Kc | Gang opened | 1, 2, 3 & 4 | Adjust for maximum. |
| RF ALIGNMENT 2. | - | Radiation loop* | 1620 Kc | Gang fully opened | 5 | Adjust for maximum |
| 3. | - | Radiation loop* | 1400 Kc | Tune for maximum | 6 | Adjust for maximum |

*Connect generator output to 5" diameter, 3 turn loop and couple to receiver loop. Keep loops at least 12" apart.

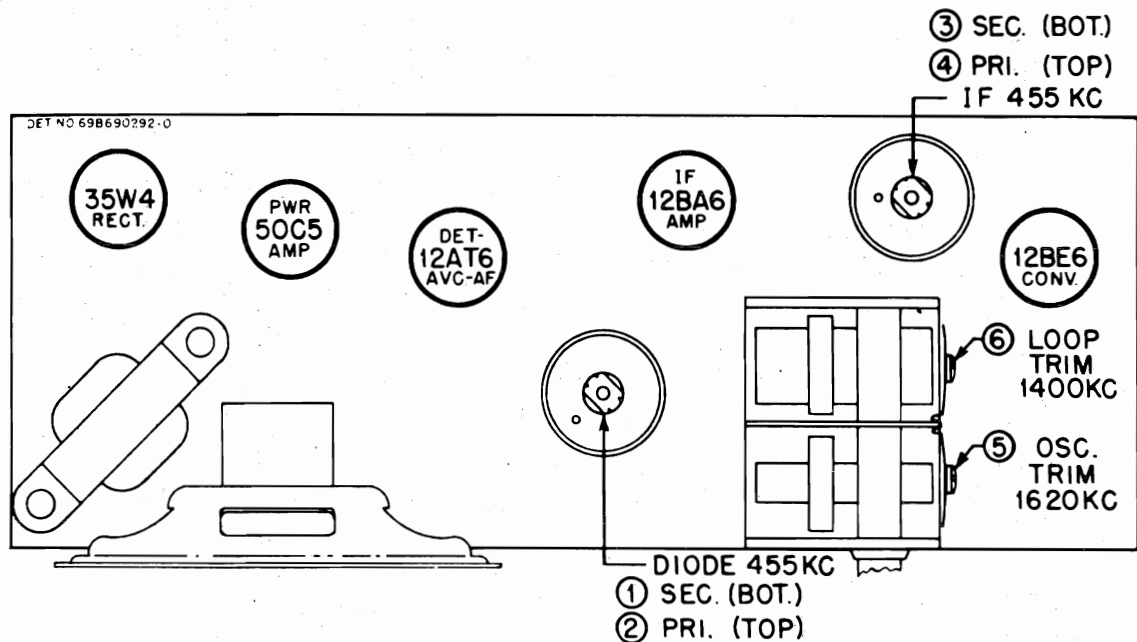
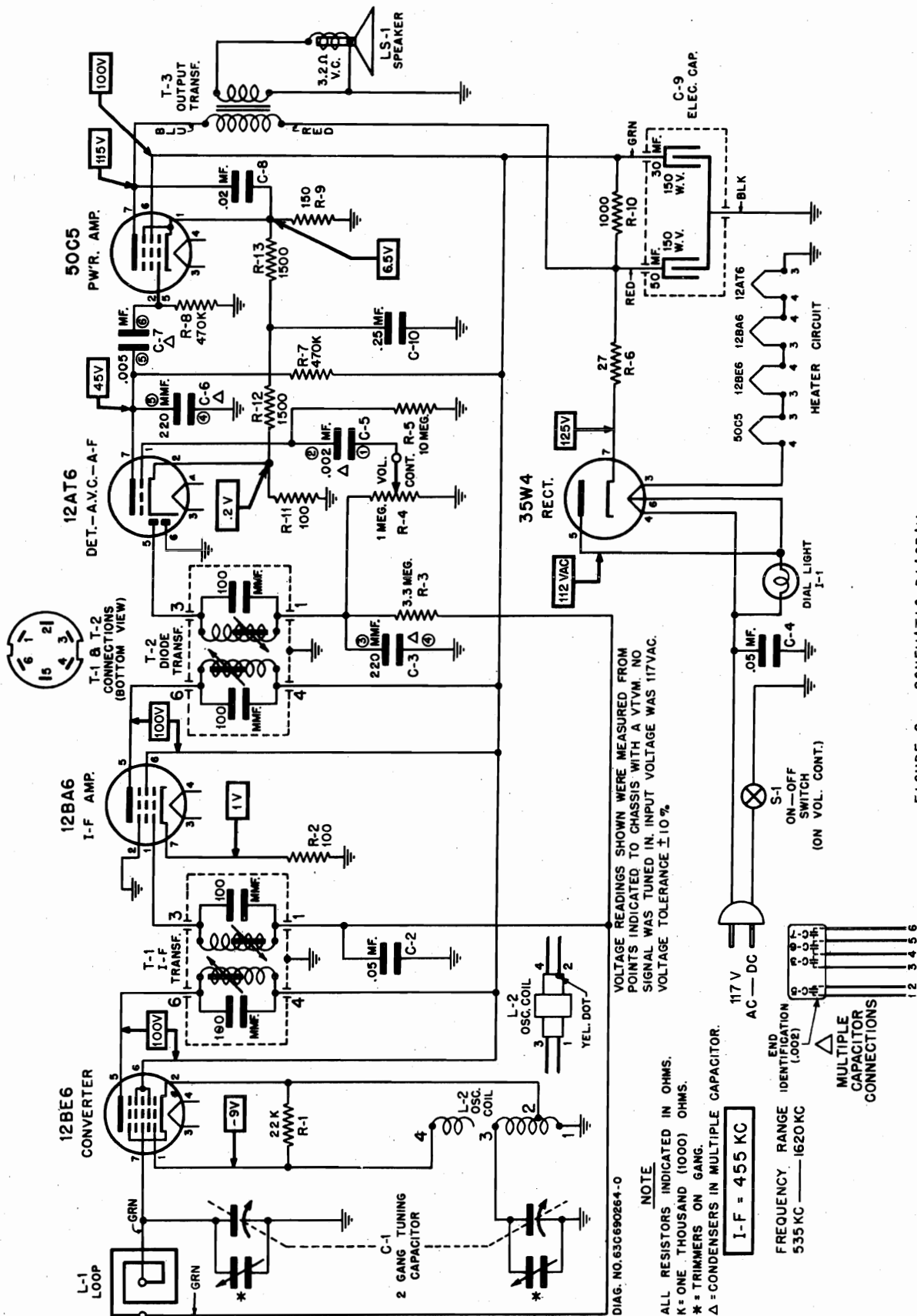


FIGURE 2. TUBE & TRIMMER LOCATIONS

MODELS 59X11,
59X12I, Ch. HS-180



VOLTAGE READINGS SHOWN WERE MEASURED FROM POINTS INDICATED TO CHASSIS WITH A VTVM. NO SIGNAL WAS TUNED IN. INPUT VOLTAGE WAS 117VAC. VOLTAGE TOLERANCE ±10%.

DIAG. NO. 63C690264-0
NOTE
ALL RESISTORS INDICATED IN OHMS.
K = ONE THOUSAND (1000) OHMS.
* = TRIMMERS ON GANG.
Δ = CONDENSERS IN MULTIPLE CAPACITOR.

I-F = 455 KC

| FREQUENCY RANGE | IDENTIFICATION |
|------------------|----------------|
| 535 KC — 1620 KC | (.002) |

END MULTIPLE CAPACITOR CONNECTIONS

FIGURE 3. SCHEMATIC DIAGRAM

MODELS 59X11,
59X12I, Ch. HS-180

REPLACEMENT PARTS LIST

| REF. NO. | PART NO. | DESCRIPTION | REF. NO. | PART NO. | DESCRIPTION |
|---------------------------------------------------------------------------------|-----------|----------------------------------------------------------------------------------------|----------|--------------|--------------------------------------------------------------------------------------------------------|
| CHASSIS PARTS - ELECTRICAL | | | | | |
| CAPACITORS | | | | | |
| C-1 | 1X690759 | Variable: 2 gang; with pulley | | 2S7051 | Nut, hex: 3/8-32 x 9/16; stl; cad pl; Palnut (volume control mtg) |
| C-2 | 8S9821 | Paper: .05 mf 200V | | 5S7771 | Rivet: .088 x 3/16; stl; nkl pl (tube socket mtg) |
| C-3, 5, 6, 7 | 21B482847 | Ceramic, multiple: includes 220 mmf (C-3), .002 mf (C-5) 220 mmf (C-6) & .005 mf (C-7) | | 5S7707 | Rivet: .122 x 5/32; stl; nkl pl (output trans and tube shield mtg) |
| C-4 | 8S9816 | Paper: .05 mf 400V | | 5S7701 | Rivet: .122 x 3/16; stl; nkl pl (tuning shaft bracket and pointer bracket assembly mtg) |
| C-8 | 8S9802 | Paper: .02 mf 400V | | 3S7477 | Screw, machine: 8-32 x 1/4; plain hex head; stl; cad pl (loop panel mtg) |
| C-9 | 23K482857 | Electrolytic: 50-30 mf 150V.. | | 3S2294 | Screw, machine: 6-32 x 1/2; plain hex head locking type; stl; cad pl (gang mtg) |
| C-10 | 8A470504 | Paper: .25 mf 50V | | 3S7454 | Screw, sheet metal: #8 x 1/4; PKZ plain hex head; stl; cad pl (speaker mtg) |
| PILOT LIGHT | | | | 3S3398 | Screw, sheet metal: #6 x 3/8; PKZ plain hex head; stl; cad pl (loop brkt and cord insulator mtg) |
| I-1 | 65K11854 | Bulb: 6.3V-.15 amp; tubular, clear, #47 | | 1X690775 | Shaft and Pulley Assembly, pointer |
| COILS | | | | 1X690774 | Shaft and Pulley Assembly, tuning |
| L-1 | 24K690657 | Loop Antenna: includes back panel | | 26K485936 | Shield, coil |
| L-2 | 24K482855 | BC Oscillator coil | | 26A470013 | Shield, light |
| SPEAKER | | | | 26A481521 | Shield, tube: spring |
| LS-1 | 50C478138 | Speaker: 4" PM; 3.2 ohm voice coil | | 9K690673 | Socket, pilot light |
| RESISTORS | | | | 9A472534 | Socket, tube |
| Note: All resistors are insulated carbon type, 20%, unless otherwise specified. | | | | 41A14244 | Spring, pointer cord (tension) |
| R-1 | 6R6028 | 22,000 1/2 watt | | 41A73996 | Spring, tension (electrolytic mounting) |
| R-2 | 6R6018 | 100 1/2 watt | | 4A70015 | Washer, 'C' (tuning shaft and pointer shaft retainer)..... |
| R-3 | 6R2118 | 3.3 meg 1/2 watt | | 4S7633 | Washer, flat: 9/16 x 11/64 x .033 thick; stl; cad pl (loop panel mtg) |
| R-4 | 18A70032 | Volume Control: 1 meg with SPST switch | | 4K482859 | Washer, shoulder (loop bracket and cord insulator mtg)..... |
| R-5 | 6R2109 | 10 meg 1/2 watt | | | |
| R-6 | 6R5683 | 27 10% 1/2 watt | | | |
| R-7 | 6R6032 | 470,000 1/2 watt | | | |
| R-8 | 6R6032 | 470,000 1/2 watt | | | |
| R-9 | 6R3992 | 150 1/2 watt | | | |
| R-10 | 6R3953 | 1000 1 watt | | | |
| R-11 | 6R6028 | 100 1/2 watt | | | |
| R-12 | 6R6161 | 1500 1/2 watt | | | |
| R-13 | 6R6161 | 1500 1/2 watt | | | |
| TRANSFORMERS | | | | | |
| T-1 | 24B482863 | IF, 455 Kc: complete with tuning cores & padding capacitors but less shield | | 16E690504 | Cabinet, table model: molded; mahogany (59X11) |
| T-2 | 24B482865 | Diode, 455 Kc: complete with tuning cores & padding capacitors but less shield | | or 16K690659 | Cabinet, table model: molded; ivory (59X12I) |
| T-3 | 25K485973 | Output Transformer | | 36K690668 | Knob, control: mahogany (59X11) |
| CHASSIS PARTS - MECHANICAL | | | | or 36K690669 | Knob, control: ivory (59X12I) |
| | 7K485971 | Bracket, loop mtg | | 64B690666 | Plate, trim |
| | 7A77337 | Bracket, tuning shaft mtg | | 38A25507 | Plug, split (antenna panel to cabinet mtg) |
| | 1X690679 | Bracket and Insulator Assembly, pointer shaft mtg | | 52K690744 | Pointer and Hub |
| | 46K680318 | Core, iron (for T-1 & T-2) | | 34C690662 | Scale, dial |
| | 11M8944 | Cord, dial: 18#; blk | | 3S7148 | Setscrew: 6-32 x 1/8 Allen head; stl; cad pl (pointer and hub mtg) |
| | 30K482856 | Cord, line & plug: 6 ft long.. | | 3S490381 | Screw, drive: #00 x 1/4 PKZ plain round head; brass (dial scale mtg) |
| | 5A19658 | Eyelet, spacer (gang mtg)..... | | 3S488098 | Screw, sheet metal: #8 x 3/8 type 25; plain hex head; stl; cad pl (chassis mtg) |
| | 5A70404 | Grommet, spacer (gang mtg)..... | | 46K690772 | Stud, trimount (trim plate mtg) |
| | 14A482844 | Insulator, cord outlet | | | |
| | 29R3010 | Lug, soldering: #6 hot-tinned. | | | |
| CABINET PARTS | | | | | |

MODELS 59X21U,
59X22IU, Ch. HS-192

GENERAL INFORMATION

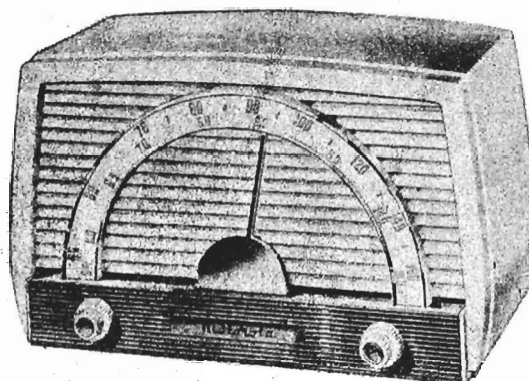
TYPE - A combination standard broadcast and short wave table model receiver.

TUNING RANGE - Standard broadcast - 535 to 1620 Kc
Shortwave - 5.85 Mc to 18.1 Mc

IF - 455 Kc

TUBE COMPLEMENT - 12BE6 - Converter
12BA6 - IF Amplifier
12AT6 - Detector, AVC & 1st Audio Amp
50C5 - Power Amplifier
35W4 - Rectifier

POWER SUPPLY - 117V AC/DC 35 watts



INSTALLATION & OPERATING INSTRUCTIONS

ANTENNAS. For short wave reception, it is necessary to connect a length of wire (at least 10 feet long) to the screw terminal located on the radio rear panel. A commercial short wave antenna is recommended for best results.

No outside antenna is normally required for standard broadcast station reception. A loop antenna for receiving broadcast stations is built into the radio. If radio is located at a considerable distance from broadcast stations, it may be necessary to secure additional signal pickup by using an external antenna. The same antenna that is used for short wave reception can be used for additional pickup of standard broadcast stations by leaving it connected to the short wave terminal screw and winding two turns of the same wire in the slots located at the top of the radio rear panel.

CAUTION: Do not connect antenna or chassis

to water pipe, radiator or other ground.

POWER SWITCH & VOLUME CONTROL. The power switch and volume control are combined and operated by the left-hand knob. If radio does not play from a DC power line after being turned on for a few minutes, reverse the power cord plug in the power outlet. When operating from AC power lines, reception can sometimes be improved by reversing the power cord in the power outlet.

BANDSWITCH. The small (inner) right-hand knob selects standard broadcast or short wave reception, as desired. Rotate this knob to the left for standard broadcast or to the right for short wave reception.

TUNING. The large (outer) right-hand knob is used for tuning both standard broadcast and short wave stations.

TO REMOVE CHASSIS FROM CABINET

1. Set pointer to extreme low frequency end to expose pointer setscrew. Loosen pointer setscrew through hole in bottom of cabinet.

2. Remove the knobs; they pull off.

3. Remove the two split plugs that hold the top of loop panel to cabinet.

4. Remove the two screws that hold the chassis to the cabinet. These screws are accessible through slots in the loop panel.

PART NO. 54P691601

ALIGNMENT

Use an isolation transformer between power line and receiver. If isolation transformer is not available, connect low side of signal generator to B- through .1 mf capacitor.

Connect low range output meter across speaker voice coil and set volume control at maximum. For greatest accuracy, keep output of receiver at approximately .05 watt (.05 watt = .40 volt on output meter) throughout alignment by reducing signal generator output as stages are brought into alignment. Use a small fibre screwdriver for aligning IF & diode transformers.

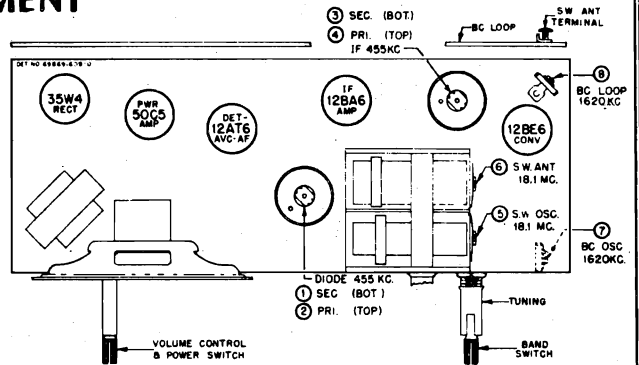


FIGURE 1. TUBE & TRIMMER LOCATION

| STEP | DUMMY ANTENNA | GENERATOR CONNECTION | GENERATOR FREQUENCY | BAND SWITCH | GANG SET TO | ADJUST | REMARKS |
|----------------------------|---------------|---------------------------------|---------------------|-------------|------------------|-------------|---------------------|
| IF ALIGNMENT 1. | .1 mf | Rear stator of tuning capacitor | 455 Kc | - | Gang opened | 1, 2, 3 & 4 | Adjust for maximum. |
| SW BAND RF ALIGNMENT 2. | 400 ohms | SW Ant terminal | 18.1 Mc | SW | Fully opened | 5 & 6 | Adjust for maximum. |
| BC BAND RF ALIGNMENT 3. | .1 mf | Rear stator of tuning capacitor | 1620 Kc | BC | Fully opened | 7 | Adjust for maximum. |
| 4. | None | Radiation loop* | 1400 Kc | BC | Tune for maximum | 8 | Adjust for maximum. |

* Connect generator output to 5" diameter, 3 turn loop and couple to receiver loop. Keep loops at least 12" apart.

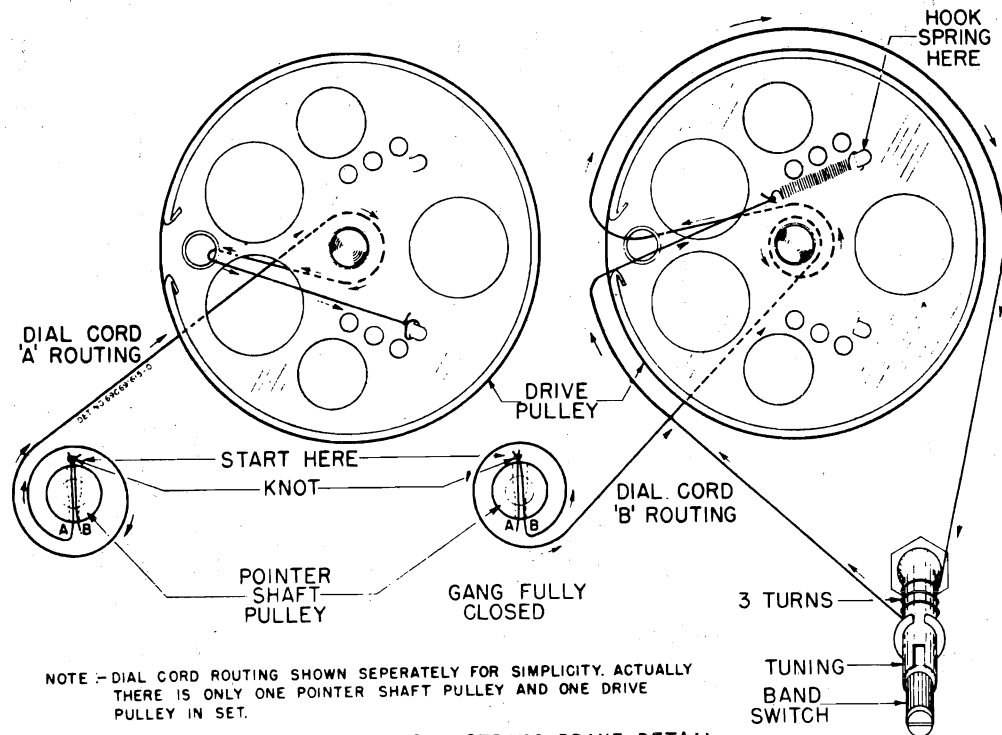


FIGURE 2. STRING DRIVE DETAIL

MODELS 59X21U,
59X22IU, Ch. HS-192

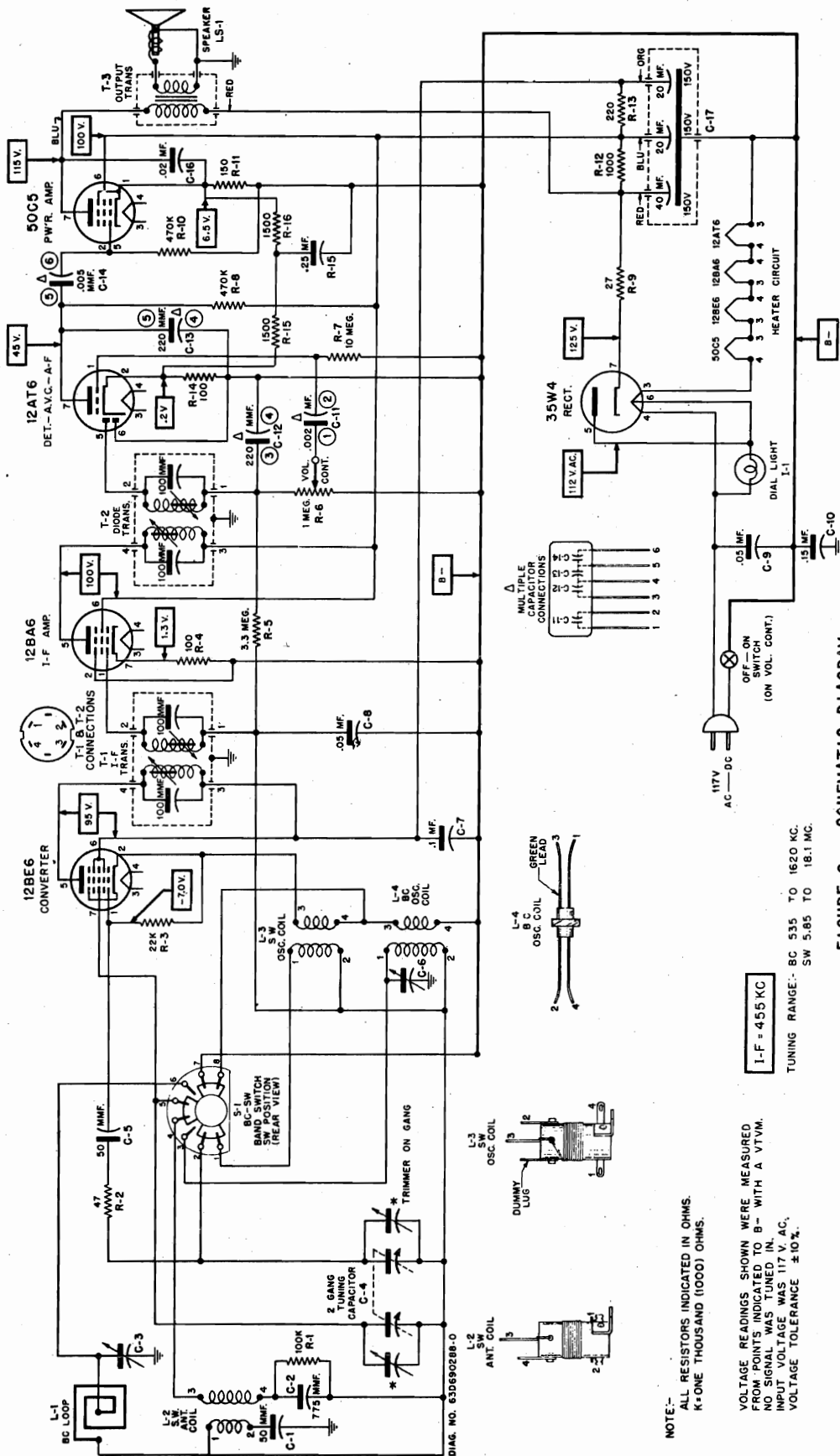


FIGURE 3. SCHEMATIC DIAGRAM

NOTE:-
ALL RESISTORS INDICATED IN OHMS.
K=ONE THOUSAND (1000) OHMS.

VOLTAGE READINGS SHOWN WERE MEASURED
FROM POINTS INDICATED TO B- WITH A VTVM.
NO SIGNAL WAS TUNED IN.
INPUT VOLTAGE WAS 117 V. AC.
VOLTAGE TOLERANCE ±10%.

I-F = 455 KC

TUNING RANGE: BC 535 TO 1620 KC.
SW 5.85 TO 18.1 MC.

REPLACEMENT PARTS LIST

| REF. NO. | PART NO. | DESCRIPTION | REF. NO. | PART NO. | DESCRIPTION |
|---------------------------------------------------------------------------|-----------|----------------------------------------------------------------------------------------------|----------|----------------------|----------------------------------------------------------------------------------------------------------------|
| CHASSIS PARTS - ELECTRICAL | | | | | |
| CAPACITORS | | | | | |
| C-1 | 21K77373 | Ceramic; 50 mmf 500V | | 5A70404 | Grommet, rubber (gang mtg)..... |
| C-2 | 21A690643 | Mica; 775 mmf 3% 300V | | 29R3010 | Lug, soldering |
| C-3 | 20K690655 | Mica, variable: 3 to 20 mmf | | 14A482844 | Insulator, cord outlet |
| C-4 | 1X690682 | Variable: 2 gang & pulley | | 2S7051 | Nut, hex: 3/8-32 x 9/16; stl; cad pl (band switch and volume control mtg) |
| C-5 | 21K77373 | Ceramic; 50 mmf 500V | | 4S7019 | Nut, hex: 4-40 x 1/4; stl; cad pl (coil and trimmer mtg)..... |
| C-6 | 20A680362 | Mica, variable: 10 to 50 mmf | | 5S7771 | Rivet: .088 x 3/16; stl; akl pl (tube socket mtg) |
| C-7 | 8S9807 | Paper: .1 mf 400V | | 5S7707 | Rivet: .122 x 5/32; stl; nkl pl (pointer bracket & insulator assembly and spring mtg) |
| C-8 | 8S9821 | Paper: .05 mf 200V | | 4S2950 | Screw, machine: 4-40 x 1/4 slotted binderhead; locking type; stl; cad pl (coil and trimmer mtg) |
| C-9 | 8S9816 | Paper: .05 mf 400V | | 3S2294 | Screw, machine: 6-32 x 1/2 plain hex head; locking type; stl; cad pl (gang mtg) |
| C-10 | 8A72686 | Paper: .15 mf 200V | | 3S7477 | Screw, machine: 8-32 x 1/4; type 1; plain hex head; stl; cad pl (loop back mtg) |
| C-11, 12, 13, 14 | 21B482847 | Ceramic, multiple: .002 mf, 220 mmf, 220 mmf & .005 mf | | 3S3398 | Screw, sheet metal: #6 x 3/8 PKZ plain hex head; stl; cad pl (bracket and insulator mtg).. |
| C-15 | 8A470504 | Paper: .25 mf 50V | | 3S7454 | Screw, sheet metal: #8 x 1/4 PKZ plain hex head; stl; cad pl (sprk mtg and diode shield mtg) |
| C-16 | 8S9802 | Paper: .02 mf 400 V | | 47A690645 | Shaft, pointer |
| C-17 | 23K690671 | Electrolytic: 40-20-20 mf/150V | | 47K690573 | Shaft, tuning |
| DIAL LIGHT | | | | 24K485936 | Shield, coil (for T-1 & T-2) .. |
| I-1 | 65X11854 | Bulb: 6.3V .15 amp; tubular bayonet base | | 26A690748 | Shield, diode |
| COILS | | | | 26A470013 | Shield, light |
| L-1 | 24K690656 | Loop Antenna Assembly: includes back panel | | 26A481521 | Shield, tube: spring |
| L-2 | 24B690641 | Coil, short wave antenna | | 9K690673 | Socket, pilot light: includes leads. |
| L-3 | 24B690651 | Coil, short wave oscillator | | 9A472534 | Socket, tube |
| L-4 | 24A690652 | Coil, BC oscillator | | 41A14111 | Spring, cord tension |
| SPEAKER | | | | 41A73996 | Spring, tension (electrolytic mtg). |
| LS-1 | 50C478138 | Speaker, PM: 4"; 3.2 ohm VC | | 4A70015 | Washer 'C' (pointer shaft retain- er) |
| RESISTORS | | | | 4A73639 | Washer 'C' (tuning shaft retain- er) |
| Note: All resistors are insulated carbon type unless otherwise specified. | | | | | |
| R-1 | 6R6075 | 100,000 20% 1/2W | | 4S7633 | Washer, flat: 9/16 x 11/64 x .033 thick; stl; cad pl (loop back mtg) |
| R-2 | 6R2108 | 47 20% 1/2W | | 4K482859 | Washer, shoulder: insulated (loop bracket and insulator mtg)..... |
| R-3 | 6R6028 | 22,000 20% 1/2W | | CABINET PARTS | |
| R-4 | 6R6326 | 100 10% 1/2W | | 16E690504 | Cabinet, table model: molded; mahogany (59X21U) |
| R-5 | 6R2118 | 3.3 meg 20% 1/2W | | 16K690659 | Cabinet, table model: molded; ivory (59X22IU) |
| R-6 | 18A70032 | Volume Control: 1 meg; includes ON-OFF switch | | 36K482767 | Knob, band control: mahogany (59X21U) |
| R-7 | 6R2109 | 10 meg 20% 1/2W | | 36K482788 | Knob, band control: ivory (59X22IU). |
| R-8 | 6R6032 | 470,000 20% 1/2W | | 36K690668 | Knob, tuning control: mahogany(59X21U) |
| R-9 | 6R5683 | 27 10% 1/2W | | 36K690669 | Knob, tuning control: ivory (59X22IU) |
| R-10 | 6R6032 | 470,000 20% 1/2W | | 36B690664 | Knob, volume & ON-OFF control: mahogany (59X21U) |
| R-11 | 6R3992 | 150 20% 1/2W | | 36K690665 | Knob, volume & ON-OFF control: ivory (59X22IU) |
| R-12 | 6R3953 | 1000 20% 1W | | 64B690666 | Plate, trim |
| R-13 | 6R3933 | 220 20% 1/2W | | 38A25507 | Plug, split (loop back to cabinet mtg) |
| R-14 | 6R6326 | 100 10% 1/2W | | 52K690744 | Pointer and hub |
| R-15 | 6R6038 | 1500 10% 1/2W | | 34K690663 | Scale, dial |
| R-16 | 6R6038 | 1500 10% 1/2W | | 3S490502 | Screw, drive: #00 x 1/4 PKU plain round head; brass (dial scale mtg) |
| SWITCH | | | | 3S488098 | Screw, sheet metal: #8 x 3/8; type 25; plain hex head; stl; cad pl (chassis mtg) |
| S-1 | 40K690672 | Switch, band: 2-position | | 3S7148 | Setscrew: 6-32 x 1/8; Allen head; stl; cad pl (pointer & hub mtg) |
| TRANSFORMERS | | | | 46K690772 | Stud, trimout: brass pl (trim plate mtg) |
| T-1 | 24B482863 | IF, 455 Kc: complete with tuning cores and padding capacitors but less shield | | | |
| T-2 | 24B482865 | Diode, 455 Kc: complete with tuning cores and padding capacitors but less shield | | | |
| T-3 | 25K471947 | Transformer, output | | | |
| CHASSIS PARTS - MECHANICAL | | | | | |
| | 1X690679 | Bracket and Insulator Assembly, pointer shaft mtg | | | |
| | 7K485971 | Bracket, loop mtg | | | |
| | 11M8944 | Cord, dial: 18# black | | | |
| | 30A470651 | Cord, line & plug: 6 ft lg | | | |
| | 46K680318 | Core, iron: threaded (for T-1 & T-2) | | | |
| | 5A19658 | Eyelet, spacer | | | |

MODEL 401

GENERAL INFORMATION

TYPE - Universal automotive type superheterodyne receiver with self-contained speaker. Designed for underdash mounting. Receiver may be mounted behind instrument panel of some cars by using Trim Plate AK-38.

TUNING RANGE - 535 to 1605 Kc IF - 455 Kc

TUBE COMPLEMENT - 6BA6 - RF Amplifier
 6BE6 - Converter
 6BA6 - IF Amplifier
 6AT6 - Detector-AVC-AF Amp
 6AQ5 - Power Amplifier
 6X4 - Rectifier

POWER INPUT - 6.3 volts DC, 5 amperes

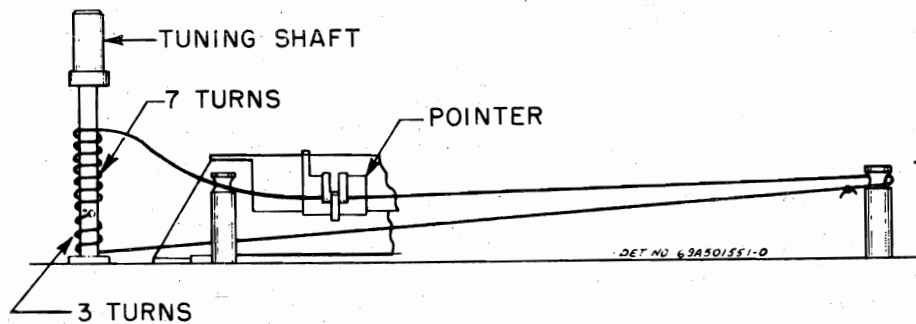
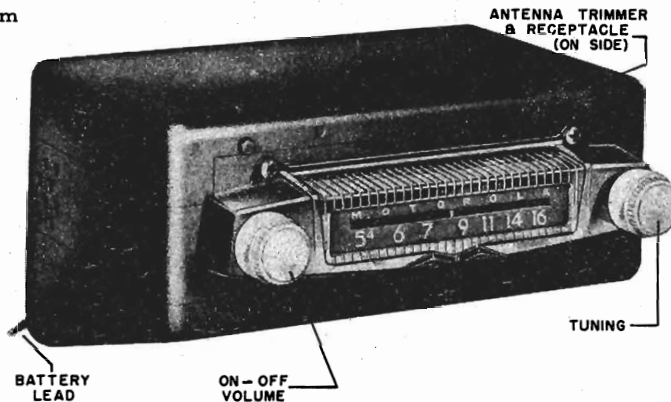


FIGURE 1. DIAL CORD RESTRINGING DETAIL

ALIGNMENT

Equipment Required:

1. A small fibre screwdriver for IF and RF adjustments.
2. An accurately calibrated AM signal generator
3. A low range output meter.
4. A dummy antenna for RF and tuner alignment. (Construct dummy antenna as shown in Figure 3.)

justments.

2. Connect output meter across voice coil of the speaker.
3. Connect a 6 volt DC source of power between "A" lead and receiver ground. Turn receiver on and permit it to warm up for a few minutes. Then proceed as per instructions in the alignment chart.

Procedure:

1. Remove top and bottom covers to expose alignment ad-

NOTE: Keep output of receiver at approximately 1 watt (1 watt = 1.79 volts on output meter) throughout alignment by reducing signal generator output as stages are brought into alignment.

ALIGNMENT CHART

| STEP | DUMMY ANTENNA | GENERATOR CONNECTION | GENERATOR FREQUENCY | TUNER SET TO | ADJUST | REMARKS |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|----------------------------------|---------------------|---------------------------------------------------------------------------------------------------------|-------------|--------------------------------------|
| IF ALIGNMENT 1. | .1 mf | 6BE6 grid (pin #7) | 455 Kc | High frequency end of dial (cores out) | 1, 2, 3 & 4 | Peak for maximum in order indicated |
| RF ALIGNMENT 2. | See Fig. 3 | Antenna receptacle through dummy | 1605 Kc | " | 5 | Peak for maximum. |
| 3. | " | " | 1400 Kc | Tune for max. | 6 & 7 | " |
| TUNER ALIGNMENT | | | | | | |
| NOTE: The tuner cores have been correctly aligned at the factory. Field alignment of the tuner is not recommended unless components have been replaced or tampered with. Construct two core alignment tools as shown in Figure 4. Refer to Figure 4 for proper use of tools, and proceed to align as follows: | | | | | | |
| 4. | See Fig. 3 | Antenna receptacle through dummy | 1610 Kc | High frequency end of dial; cores should project 1-1/32" from end of coil form - screw out if necessary | 5, 6 & 7 | Peak for maximum in order indicated. |
| 5. | " | " | 1400 Kc | 1400 Kc-per Figure 2 | 8, 9 & 10 | |

6. With receiver installed in car, the antenna fully extended and dial set to approximately 1400 Kc, adjust antenna trimmer (7) for maximum signal of a weak station or noise between stations.

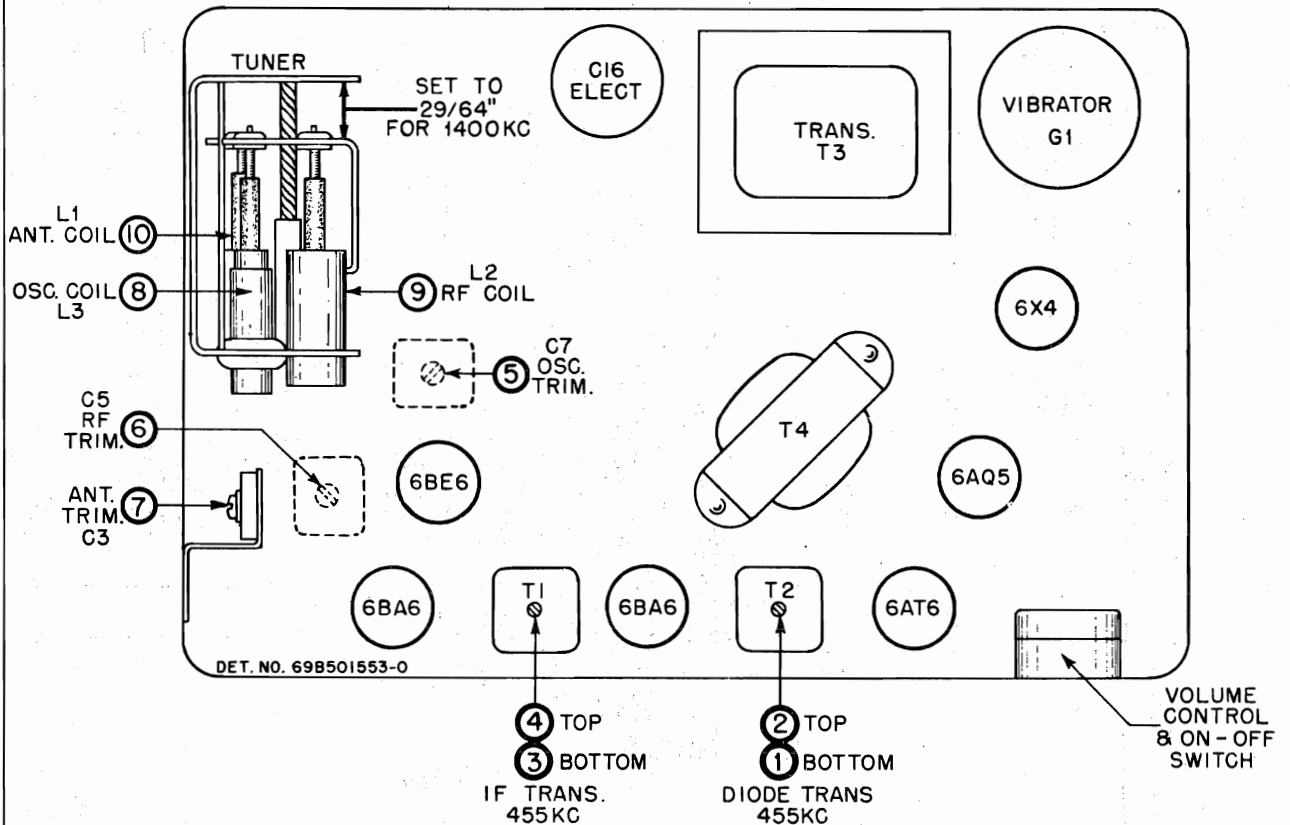


FIGURE 2. TUBE & TRIMMER LOCATIONS

MODEL 401

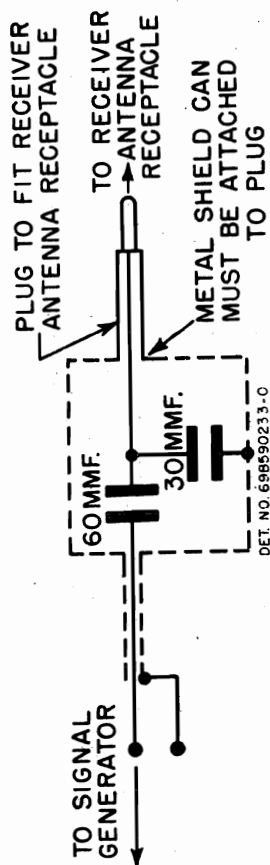


FIGURE 3. DUMMY ANTENNA

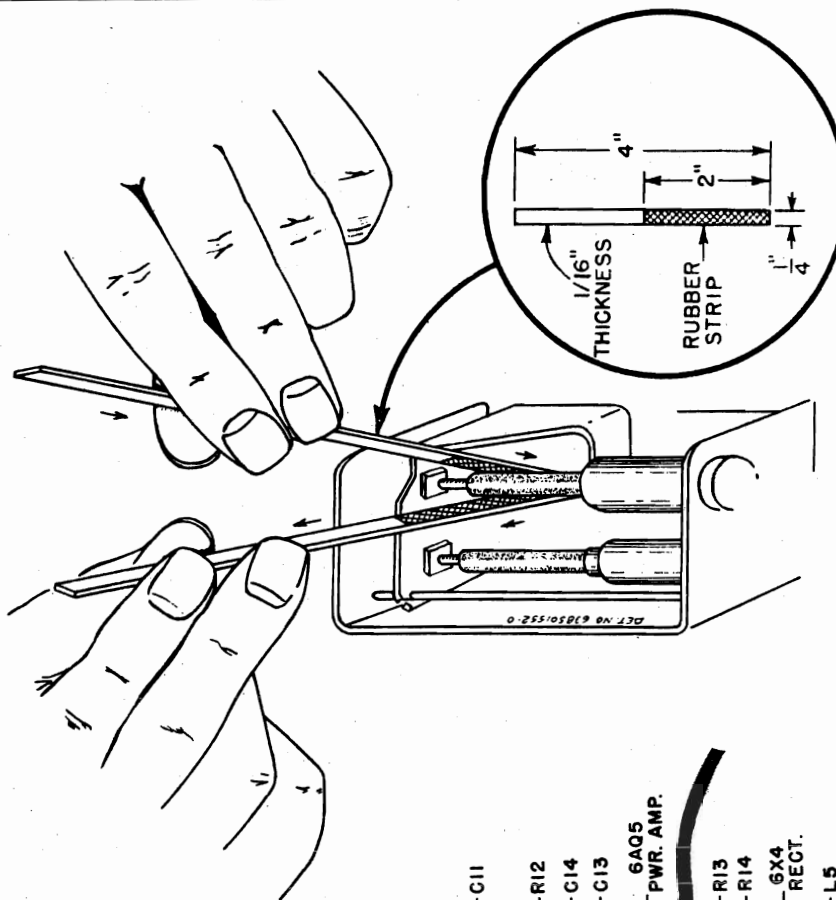


FIGURE 4. CORE ALIGNMENT DETAIL

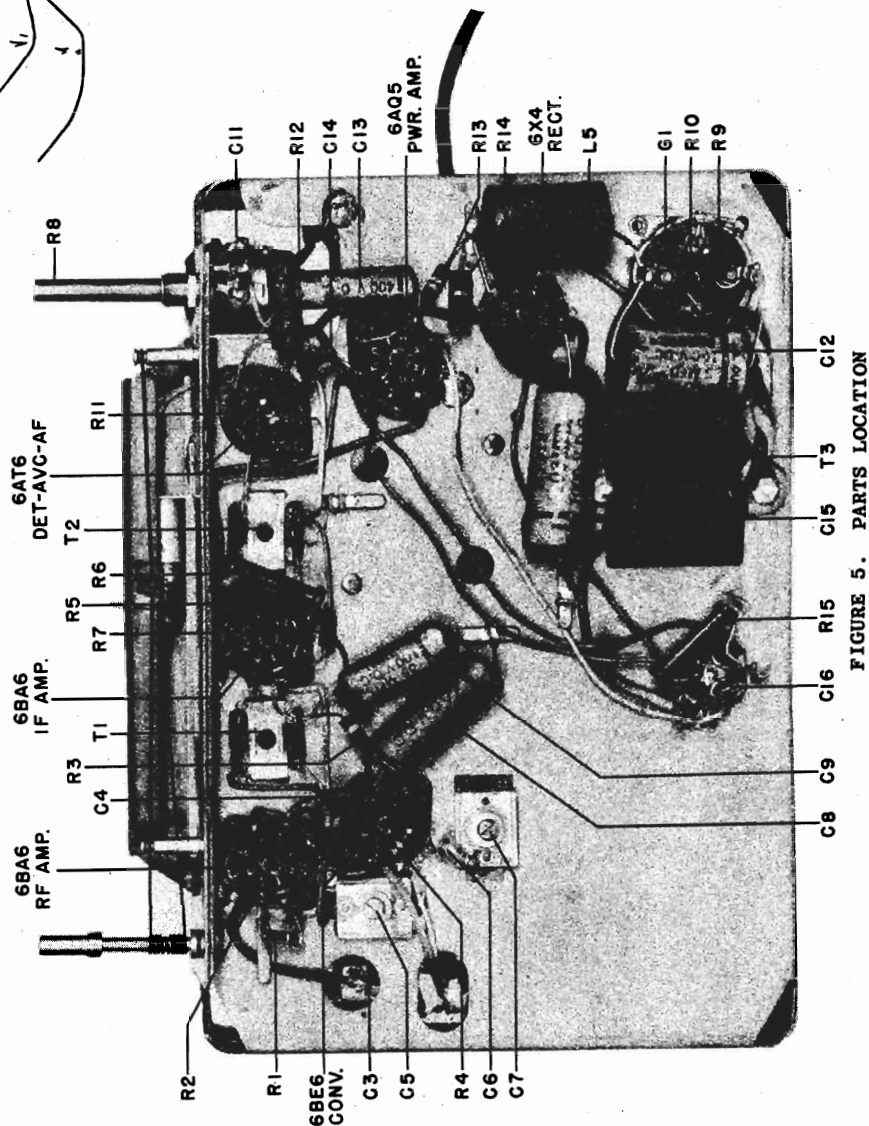


FIGURE 5. PARTS LOCATION

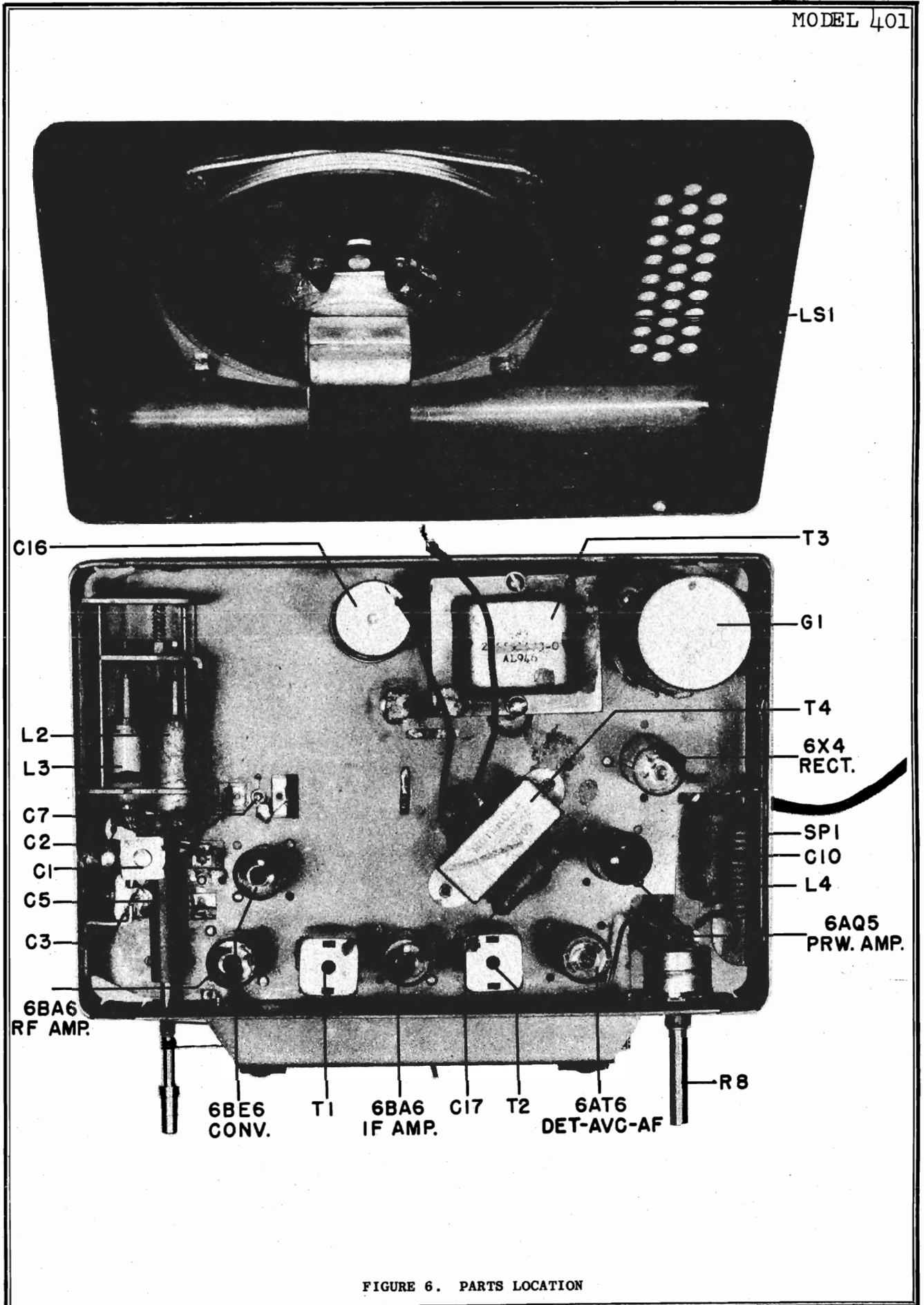
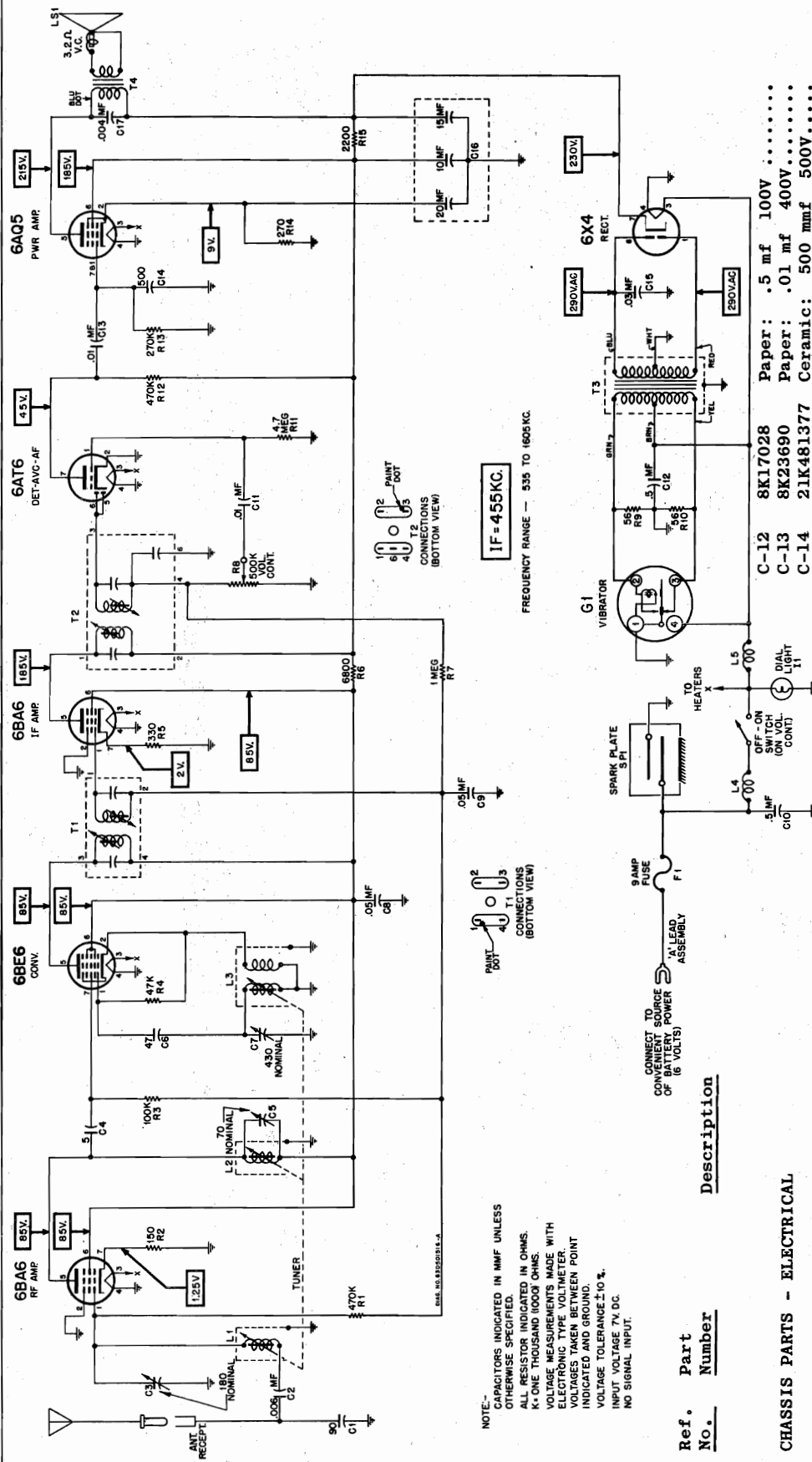


FIGURE 6. PARTS LOCATION

MODEL 401



IF = 455KC

FREQUENCY RANGE - 535 TO 1605KC.

NOTE - CAPACITORS INDICATED IN MMF UNLESS OTHERWISE SPECIFIED. ALL RESISTOR INDICATED IN OHMS. K - ONE THOUSAND 1000 OHMS. VOLTAGE MEASUREMENTS MADE WITH ELECTRONIC TYPE VOLTMETER. VOLTAGES TAKEN BETWEEN POINT INDICATED AND GROUND. VOLTAGE TOLERANCE ±10%. INPUT VOLTAGE 7V DC. NO SIGNAL INPUT.

| Ref. No. | Part Number | Description |
|----------|-------------|-------------------------------------------------|
| C-1 | 21A591682 | Ceramic: 90 mmf 500V..... |
| C-2 | 8A4529 | Paper: .006 mf 100V..... |
| C-3 | 20A502338 | Trimmer, mica: 50 to 180 mmf; with bracket..... |
| C-4 | 21K70720 | Molded: 5 mmf 500V..... |
| C-5 | 20A481526 | Trimmer, mica: 20 to 80 mmf. |
| C-6 | 21K77373 | Ceramic: 47 mmf..... |
| C-7 | 20A485708 | Trimmer, mica: 395 to 470 mmf |
| C-8 | 8K14791 | Paper: .05 mf 400V..... |
| C-9 | 8K13514 | Paper: .05 mf 100V..... |
| C-10 | 8K17028 | Paper: .5 mf 100V..... |
| C-11 | 8K47254 | Paper: .01 mf 100V..... |

CHASSIS PARTS - ELECTRICAL

| | | |
|------------|-----------|------------------------------------------------------------|
| C-12 | 8K17028 | Paper: .5 mf 100V..... |
| C-13 | 8K23690 | Paper: .01 mf 400V..... |
| C-14 | 21K481377 | Ceramic: 500 mmf 500V..... |
| C-15 | 8K400883 | Paper: .03 mf 1000V..... |
| C-16 | 23A485677 | Electrolytic: 15-10-20 mf/350-350-25V..... |
| C-17 | 8K71909 | Paper: .004 mf 400V..... |
| Fuse | F-1 | 65K16248 Fuse: 9 amp..... |
| Vibrator | G-1 | 48B3333 Vibrator: 4-pin; non-sync.... |
| Dial Light | I-1 | 65X10867 Bulb: 6.3V; .25A; tubular; bayonet base; #44..... |

FIGURE 7. SCHEMATIC DIAGRAM

| | | |
|-----------------------------------|------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| Coils | | MOUNTING PARTS AND ACCESSORIES |
| L-1 | 24B502472 Antenna Coil Assembly | Bracket, receiver mtg (recvr to instrument panel) |
| L-2 | 24B502473 RF Coil Assembly | Bracket, receiver mtg (on housing) |
| L-3 | 24B502474 Oscillator Coil Assembly | Bracket and Stud Assembly (receiver mtg) |
| L-4 | 24K580706 Chokey, RF | Capacitor, noise suppression (generator cap) |
| L-5 | 24A472535 Chokey, hash | Lead Assembly, fuse: complete with fuse |
| Speaker | | Lockwasher, int-ext: 1/4; cad pl (receiver mtg) |
| LS-1 | 50K500415 Speaker, PM: 5-1/4"; 3.2 ohm, voice coil | Nut, hex: 1/4-20 x 7/16; stl; cad pl (receiver mtg) |
| Resistors | | Screw, sheet metal: #8 x 1/4 slotted acorn head; cad pl (mtg brkt mtg-rear) |
| R-1 | 6R6032 470,000 20% 1/2W | Screw, sheet metal: #8 x 3/8; PKZ; slotted acorn head; cad pl (mtg brkt mtg -front) |
| R-2 | 6R3992 150 20% 1/2W | Screw, machine: 1/4-20 x 3/4; plain hex head; stl; cad pl (receiver mtg strap) |
| R-3 | 6R6075 100,000 20% 1/2W | Screw, machine: 1/4-20 x 1-1/2; plain hex head; stl; cad pl (receiver mtg to firewall) |
| R-4 | 6R6056 47,000 20% 1/2W | Strap, receiver mtg |
| R-5 | 6R6010 330 20% 1/2W | Suppressor, noise (distributor) |
| R-6 | 6R490001 6800 10% 1W N.I. | |
| R-7 | 6R6004 1 meg 20% 1/2W | |
| R-8 | 18K501294 Volume control: .5 meg; includes on-off switch | |
| R-9 | 6R5614 56 10% 1/2W | |
| R-10 | 6R5614 56 10% 1/2W | |
| R-11 | 6R2122 4.7 meg 20% 1/2W | |
| R-12 | 6R6032 470,000 20% 1/2W | |
| R-13 | 6R6414 270,000 10% 1/2W | |
| R-14 | 6R6336 270 10% 1W | |
| R-15 | 6R488312 2200 10% 1W N.I. | |
| Spark Plate | | |
| SP-1 | 64A501797 Spark Plate, top Ground | |
| | 14K501292 Insulator, spark plate: fibre | |
| | 64A501289 Spark Plate, "A" lead | |
| | 4K51142 Washer, insulating (spark plate) | |
| Transformer | | |
| T-1 | 24B485553 IF, 455 Kc: complete | |
| T-2 | 24K485554 Diode, 455 Kc: complete | |
| T-3 | 25C501303 Power Transformer | |
| T-4 | 25B70171 Output Transformer | |
| CHASSIS PARTS - MECHANICAL | | |
| 7B501415 | Bracket, dial background | |
| 42A485548 | Clip, coil can mtg (T-1 & T-2) | |
| 42A4215 | Clip, vibrator grounding | |
| 11M8977 | Cord, dial: 20 lb; black | |
| 58A501296 | Coupling, tuning shaft | |
| 4S7666 | Lockwasher, ext: #6; cad pl (power transformer mtg) | |
| 2S7005 | Nut, hex: 6-32 x 1/4; stl; cad pl (power transformer mtg) | |
| 2S7051 | Nut, hex: 3/8-32 x 9/16; Palmnut; stl; cad pl (volume control mtg) | |
| 1A501293 | Pointer and Slider Assembly | |
| 9A472148 | Receptacle, antenna | |
| 5S7770 | Rivet: .088 x 5/32; stl; nkl pl (min tube socket mtg) | |
| 5S7706 | Rivet: .122 x 1/8; stl; nkl pl (dial light mtg) | |
| 5S7707 | Rivet: .122 x 5/32; stl; nkl pl (output transformer & vibrator socket mtg) | |
| 5S7701 | Rivet: .122 x 3/16; stl; nkl pl (spark plate assembly mtg) | |
| 5K501365 | Rivet, shoulder (dial cord guide) | |
| 3S7247 | Screw, machine: 6-32 x 3/16; slotted locking head; stl; cad pl (tuner mtg) | |
| 3S7506 | Screw, sheet metal: #6 x 1/4 plain hex head; stl; cad pl (dial background bracket mtg) | |
| 47B501362 | Shaft, tuning | |
| 9K592354 | Socket, dial light: includes mtg bracket | |
| 9A472534 | Socket, tube: miniature; 7-prong | |
| 9K580218 | Socket, tube: miniature; 7-prong; with dummy lug | |
| 9A70208 | Socket, tube: 4-prong (vibrator) | |
| 41A485380 | Spring, insert (inside tuning shaft coupling) | |
| 4K501364 | Washer, "C" (tuning shaft retainer) | |
| HOUSING PARTS | | |
| 43A501295 | Bushing, mounting (on control shafts) | |
| 15D501312 | Cover, housing: bottom; less spkr | |
| 15D501305 | Cover, housing top | |
| 13D501197 | Escutcheon, dial: chrome pl | |
| 36B501297 | Knob, control: includes setscrew | |
| 4S7657 | Lockwasher, ext: #8; stl; cad pl (speaker mtg) | |
| 2S7003 | Nut, hex: 8-32 x 5/16; stl; cad pl (speaker mtg) | |
| 64B501445 | Plate, dial scale retaining: dark green | |
| 34B501360 | Scale, dial: glass | |
| 3S8114 | Screw, sheet metal: #8 x 1/4; slotted acorn head; antique copper finish (housing screws) | |
| 3S490733 | Screw, sheet metal: #8 x 1/4; Phillips head; chrome pl (escutcheon mtg) | |
| 3S7118 | Setscrew (control knobs) | |
| 2S7087 | Speednut (dial scale mtg) | |
| 7B501298 | Bracket, receiver mtg (recvr to instrument panel) | |
| 7A72256 | Bracket, receiver mtg (on housing) | |
| 7A484424 | Bracket and Stud Assembly (receiver mtg) | |
| 8A4491 | Capacitor, noise suppression (generator cap) | |
| 9K592648 | Lead Assembly, fuse: complete with fuse | |
| 9K580705 | Lockwasher, int-ext: 1/4; cad pl (receiver mtg) | |
| 4S7688 | Nut, hex: 1/4-20 x 7/16; stl; cad pl (receiver mtg) | |
| 2S2878 | Screw, sheet metal: #8 x 1/4 slotted acorn head; cad pl (mtg brkt mtg-rear) | |
| 3S8109 | Screw, sheet metal: #8 x 3/8; PKZ; slotted acorn head; cad pl (mtg brkt mtg -front) | |
| 3S7295 | Screw, machine: 1/4-20 x 3/4; plain hex head; stl; cad pl (receiver mtg strap) | |
| 3S9694 | Screw, machine: 1/4-20 x 1-1/2; plain hex head; stl; cad pl (receiver mtg to firewall) | |
| 42A485718 | Strap, receiver mtg | |
| 6A4141 | Suppressor, noise (distributor) | |
| TUNER - MODEL MT-87 | | |
| | Note: Electrical parts of the tuner are included in the Electrical Chassis Parts List. | |
| 51D502490 | Tuner, Model MT-87: complete | |
| 43A502513 | Bushing, stop (stop on manual drive shaft) | |
| 42A502507 | Clip, spring (manual drive shaft retainer) | |
| 46A502505 | Core, iron (L-1, 2 & 3 tuning-specify color coding on old core when ordering) | |
| 5A502510 | Grommet (L-1 & L-2 mtg) | |
| 5K502516 | Grommet (L-3 mtg) | |
| 5A501503 | Grommet (L-1, 2 & 3 core mtg) | |
| 2A502508 | Nut, tension drive (on tuner carriage) | |
| 47A502509 | Shaft, manual drive | |
| 46A502506 | Sleeve, iron (inside L-1 & L-2 shields) | |
| 4K502518 | Washer, fibre (on manual drive shaft) | |
| 4A502517 | Washer, paper (inside L-1 & L-2 shields) | |

MODEL 451

GENERAL INFORMATION

TYPE - Universal automotive type superheterodyne receiver. Designed for underdash mounting. Uses an external speaker. Receiver may be mounted behind instrument panel of some cars by using Trim Plate Kit AK-38.

TUNING RANGE - 535 to 1605 Kc IF - 455 Kc

TUBE COMPLEMENT - 6BA6 - RF Amplifier
 6BE6 - Converter
 6BA6 - IF Amplifier
 6AT6 - Detector-AVC-AF Amp
 6AQ5 - Power Amplifier
 6X4 - Rectifier

POWER INPUT - 6.3 volts DC, 5 amperes

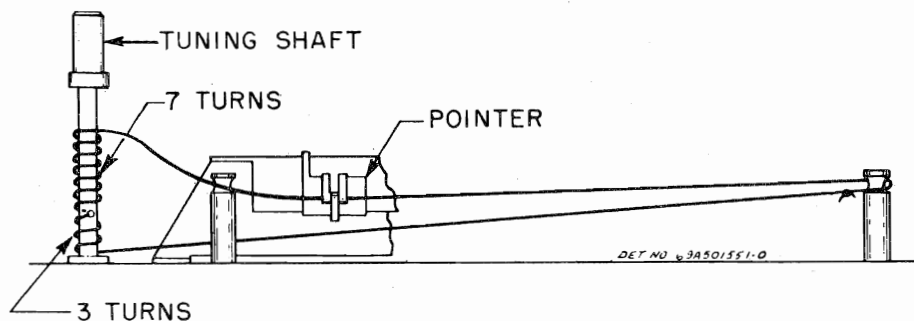
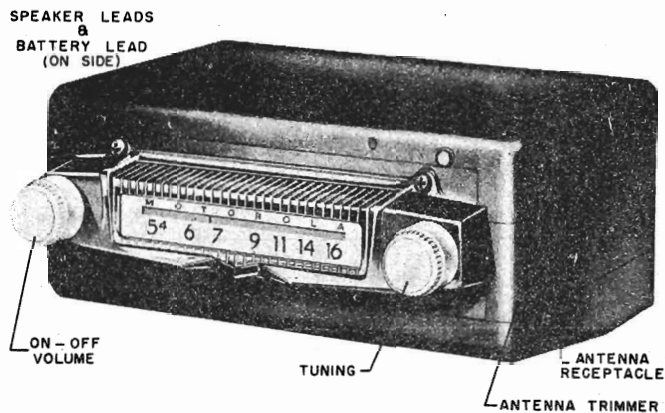


FIGURE 1. DIAL CORD RESTRINGING DETAIL

ALIGNMENT

Equipment Required:

1. A small fibre screwdriver for IF and RF adjustments.
2. An accurately calibrated AM signal generator.
3. A low range output meter.
4. A dummy antenna for RF and tuner alignment. (Construct dummy antenna as shown in Figure 3.)

Procedure:

1. Remove top and bottom covers to expose alignment ad-

justments.

2. Connect output meter across voice coil of the speaker.
3. Connect a 6 volt DC source of power between "A" lead and receiver ground. Turn receiver on and permit it to warm up for a few minutes. Then proceed as per instructions in the alignment chart.

NOTE: Keep output of receiver at approximately 1 watt (1 watt = 1.79 volts on output meter) throughout alignment by reducing signal generator output as stages are brought into alignment.

ALIGNMENT CHART

| STEP | DUMMY ANTENNA | GENERATOR CONNECTION | GENERATOR FREQUENCY | TUNER SET TO | ADJUST | REMARKS |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|----------------------------------|---------------------|---------------------------------------------------------------------------------------------------------|-------------|--------------------------------------|
| IF ALIGNMENT | | | | | | |
| 1. | .1 mf | 6BE6 grid (pin #7) | 455 Kc | High frequency end of dial (cores out) | 1, 2, 3 & 4 | Peak for maximum in order indicated. |
| RF ALIGNMENT | | | | | | |
| 2. | See Fig. 3 | Antenna receptacle through dummy | 1605 Kc | " | 5 | Peak for maximum. |
| 3. | " | " | 1400 Kc | Tune for max. | 6 & 7 | " |
| TUNER ALIGNMENT | | | | | | |
| NOTE: The tuner cores have been correctly aligned at the factory. Field alignment of the tuner is not recommended unless components have been replaced or tampered with. Construct two core alignment tools as shown in Figure 4. Refer to Figure 4 for proper use of tools, and proceed to align as follows: | | | | | | |
| 4. | See Fig. 3 | Antenna receptacle through dummy | 1610 Kc | High frequency end of dial; cores should project 1-1/32" from end of coil form - screw out if necessary | 5, 6 & 7 | Peak for maximum in order indicated. |
| 5. | " | " | 1400 Kc | 1400 Kc-per Figure 2 | 8, 9 & 10 | " |

6. With receiver installed in car, the antenna fully extended and dial set to approximately 1400 Kc, adjust the antenna trimmer (7) for maximum signal of a weak station or noise between stations.

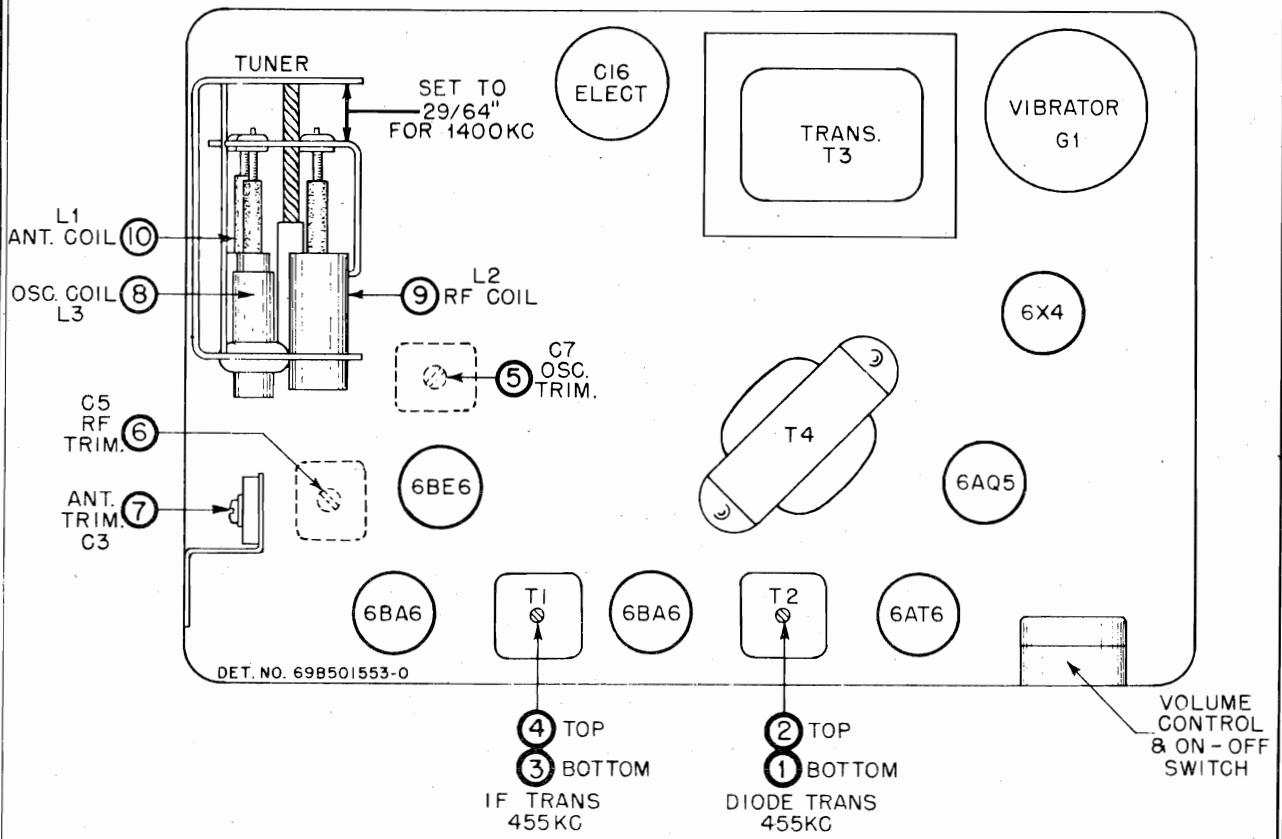


FIGURE 2. TUBE & TRIMMER LOCATIONS

MODEL 451

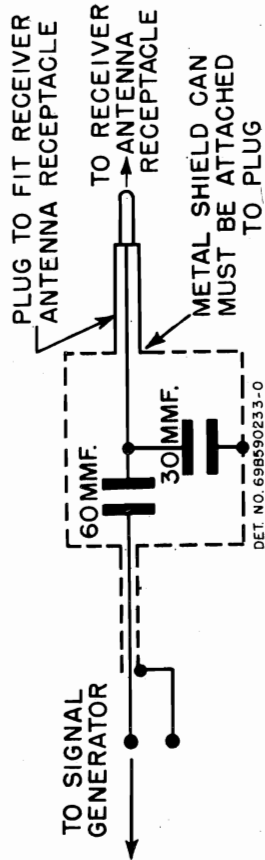


FIGURE 3. DUMMY ANTENNA

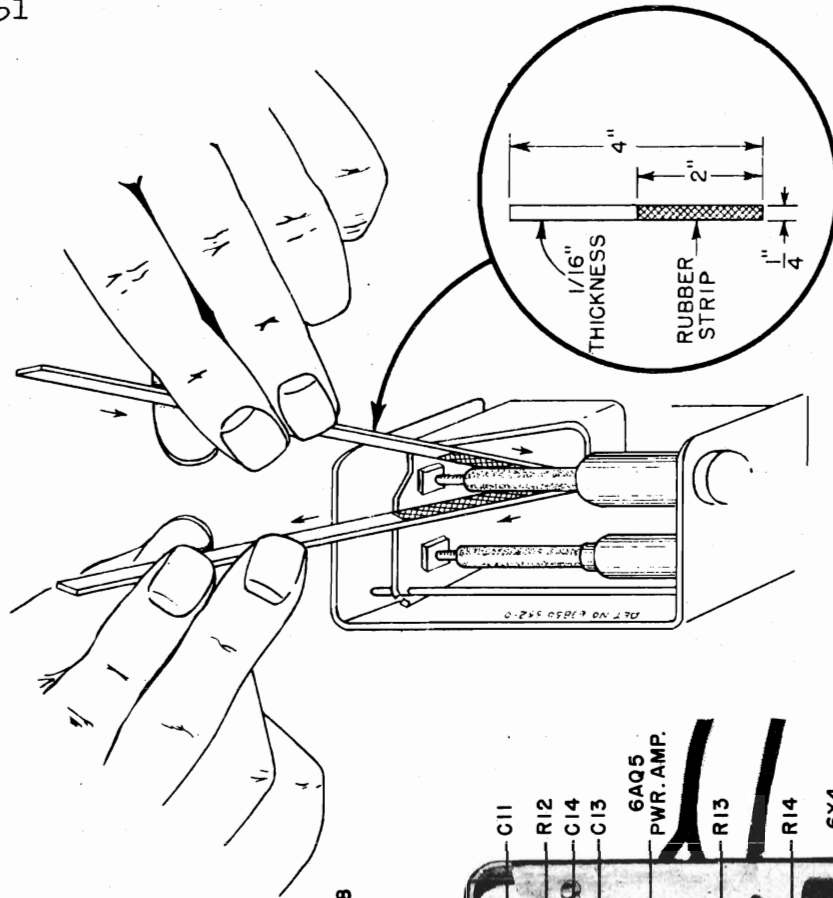


FIGURE 4. CORE ALIGNMENT DETAIL

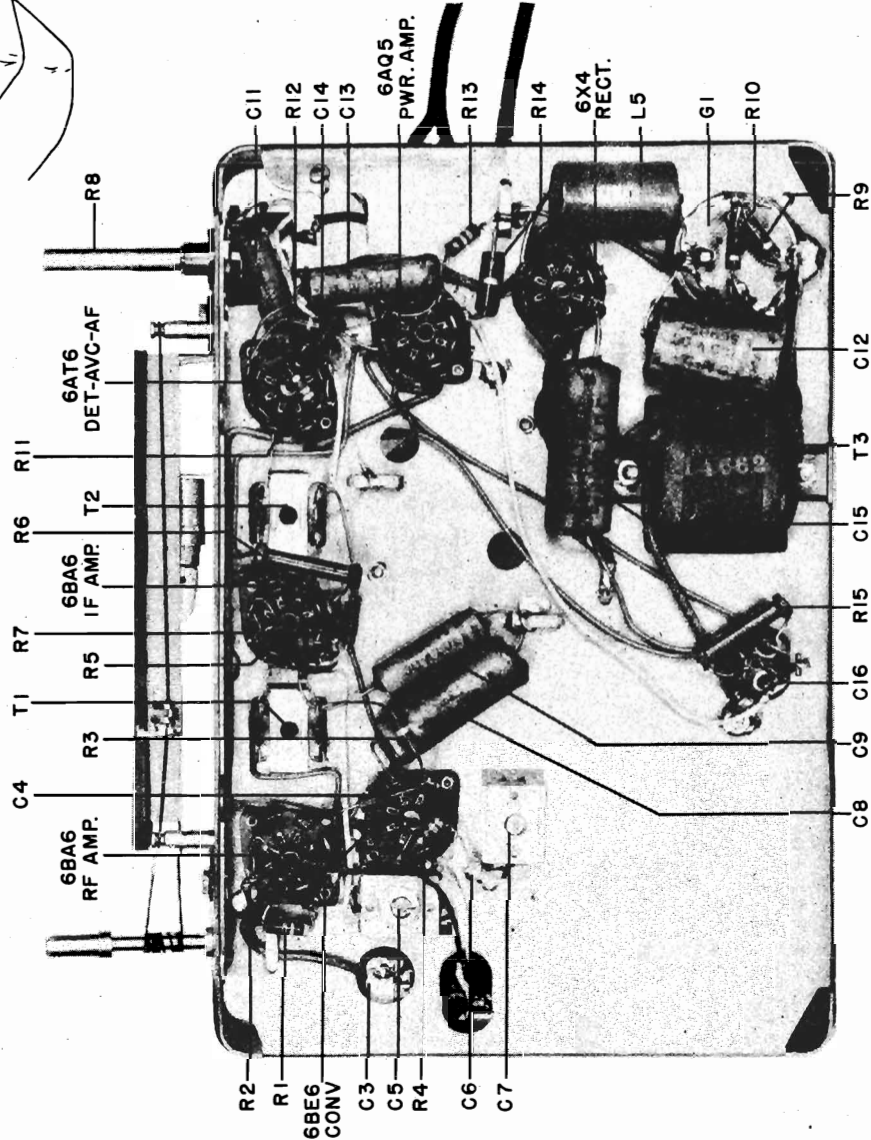


FIGURE 5. PARTS LOCATION

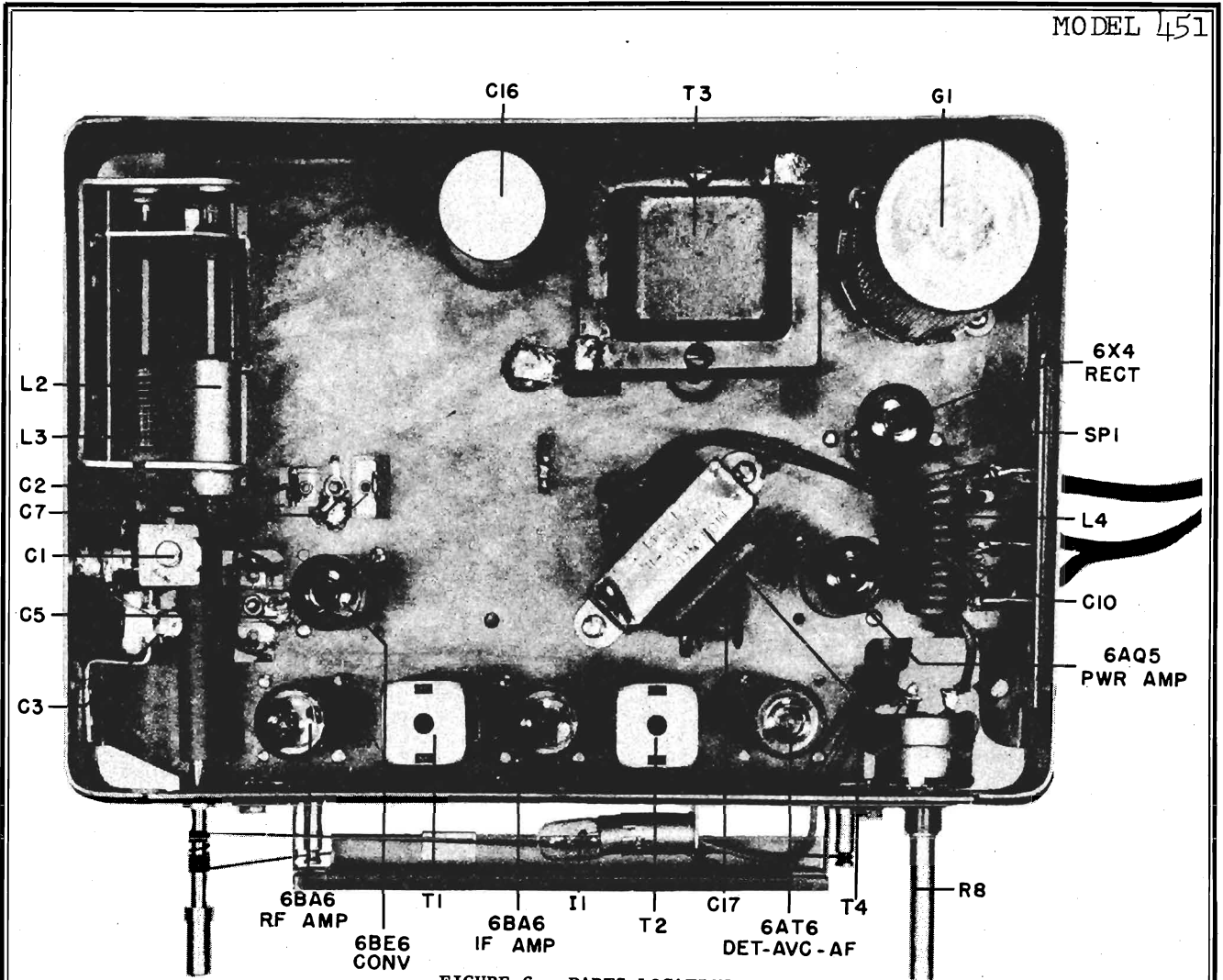


FIGURE 6. PARTS LOCATION

REPLACEMENT PARTS LIST

NOTE: When ordering parts, specify model number of set in addition to part number and description of part.

| Ref. No. | Part Number | Description | | |
|-----------------------------------|-------------|------------------------------------------------|----------------------------------------------------------------------------------|----------------------------------------|
| | | | Vibrator | |
| | G-1 | 48B3333 | Vibrator: 4-pin; non-sync... | |
| | | | Dial Light | |
| | I-1 | 65X10867 | Bulb: 6.3V; .25A; tubular; bayonet base; #44 | |
| CHASSIS PARTS - ELECTRICAL | | | | |
| Capacitors | | | | |
| C-1 | 21A591682 | Ceramic: 90 mmf 500V..... | Coils | |
| C-2 | 8A4529 | Paper: .006 mf 100V | L-1 | 24B502472 Antenna Coil Assembly |
| C-3 | 20A502338 | Trimmer, mica: 20 to 180 mmf | L-2 | 24B502473 RF Coil Assembly |
| C-4 | 21K70720 | Molded: 5 mmf 500V..... | L-3 | 24B502474 Oscillator Coil Assembly ... |
| C-5 | 20A481526 | Trimmer, mica: 20 to 80 mmf. | L-4 | 24K580706 Choke, RF |
| C-6 | 21K77373 | Ceramic: 47 mmf | L-5 | 24A472535 Choke, hash |
| C-7 | 20A485708 | Trimmer, mica: 395 to 470 mmf | Speaker | |
| C-8 | 8K14791 | Paper: .05 mf 400V..... | LS-1 | 50B501989 Speaker, PM: 5-1/4"; 3.2 ohm |
| C-9 | 8R13514 | Paper: .05 mf 100V | voice coil | |
| C-10 | 8K17028 | Paper: .5 mf 100V | Resistors | |
| C-11 | 8R472754 | Paper: .01 mf 100V | Note: All resistors are insulated carbon type unless otherwise specified. | |
| C-12 | 8K17028 | Paper: .5 mf 100V | R-1 | 6R6032 470,000 20% 1/2W |
| C-13 | 8R23690 | Paper: .01 mf 400V | R-2 | 6R3992 150 20% 1/2W |
| C-14 | 21K481377 | Ceramic: 500 mmf | R-3 | 6R6075 100,000 20% 1/2W |
| C-15 | 8R9883 | Paper: .03 mf 1000V | R-4 | 6R6056 47,000 20% 1/2W |
| C-16 | 23A485677 | Electrolytic: 15-10-20 mf/ 350-350-25V..... | R-5 | 6R6010 330 20% 1/2W |
| C-17 | 8K71909 | Paper: .004 mf 400V | R-6 | 6R490001 6800 10% 1W N.I. |
| Fuse | | | | |
| F-1 | 65K16248 | Fuse: 9 amp | | |

MODEL 451

| Ref. No. | Part Number | Description |
|----------|-------------|----------------------------------------------------|
| R-7 | 6R6004 | 1 meg 20% 1/2W |
| R-8 | 18K501294 | Volume Control: .5 meg; includes on-off switch.... |
| R-9 | 6R5614 | 56 10% 1/2W |
| R-10 | 6R5614 | 56 10% 1/2W |
| R-11 | 6R2122 | 4.7 meg 20% 1/2W |
| R-12 | 6R6032 | 470,000 20% 1/2W |
| R-13 | 6R6414 | 270,000 10% 1/2W |
| R-14 | 6R6336 | 270 10% 1W |
| R-15 | 6R488312 | 2200 10% 1W N.I. |

Spark Plate

| | | |
|------|----------|---------------------------|
| SP-1 | 1B501290 | Spark Plate Assembly |
|------|----------|---------------------------|

Transformers

| | | |
|-----|-----------|---------------------------|
| T-1 | 24B485553 | IF, 455 Kc: complete |
| T-2 | 24K485554 | Diode, 455 Kc: complete.. |
| T-3 | 25C501303 | Power Transformer |
| T-4 | 25B70171 | Output Transformer |

CHASSIS PARTS - MECHANICAL

| | |
|-----------|-----------------------------------------------------------------------------------------------|
| 7K501418 | Bracket, dial background: ivory |
| 1X76859 | Cable Assembly, speaker |
| 42A485548 | Clip, coil can mtg (T-1 & T-2).. |
| 42A4215 | Clip, vibrator grounding |
| 11M8877 | Cord, dial: 20 lb; black |
| 58A501296 | Coupling, tuning shaft |
| 4S7666 | Lockwasher, ext: #6; cad pl (power transformer mtg) |
| 2S7005 | Nut, hex: 6-32 x 1/4; stl; cad pl (power transformer mtg) |
| 2S7051 | Nut, hex: 3/8-32 x 9/16; Palnut; stl; cad pl (volume control mtg) |
| 1A501293 | Pointer and Sliver Assembly |
| 9A472148 | Receptacle, antenna |
| 5S7770 | Rivet: .088 x 5/32; stl; nkl pl (tube socket mtg) |
| 5S7706 | Rivet: .122 x 1/8; stl; nkl pl (dial light mtg) |
| 5S7707 | Rivet: .122 x 5/32; stl; nkl pl (output transformer, vibrator socket, and trimmer mtg) |
| 5S7703 | Rivet: .122 x 7/32; stl; nkl pl (spark plate assembly mtg)... |
| 5K501365 | Rivet, shoulder (dial cord guide) |
| 3S7247 | Screw, machine: 6-32 x 3/16; slotted locking head; stl; cad pl (tuner mtg) |
| 3S7506 | Screw, sheet metal: #6 x 1/4; plain hex head; stl; cad pl (dial background bracket mtg) |
| 47B501362 | Shaft, tuning |
| 9K592354 | Socket, dial light: includes mtg bracket |
| 9A472534 | Socket, tube: miniature; 7-prong... |
| 9K580218 | Socket, tube: miniature; 7-prong; with dummy lug |
| 9A70208 | Socket, tube: 4-prong (vibrator)... |
| 41A485380 | Spring, insert (inside tuning shaft coupling) |
| 29A76280 | Terminal, pin and washer: black (speaker cable) |
| 29K76282 | Terminal, pin and washer: white (speaker cable) |
| 4K501364 | Washer, "C" (tuning shaft retainer) |

| Part Number | Description |
|---------------|------------------------------------------------------------------------------------------------|
| HOUSING PARTS | |
| 43A501295 | Bushing, mounting (on control shafts) |
| 15D501282 | Cover, housing bottom |
| 15K501310 | Cover, housing top |
| 13D501197 | Escutcheon, dial: chrome pl |
| 36B501297 | Knob, control: includes setscrew... |
| 64K501447 | Plate, dial scale retaining: ivory. |
| 34B501360 | Scale, dial: glass |
| 3S8114 | Screw, sheet metal: #8 x 1/4; slotted acorn head; antique copper finish (housing screws) |
| 3S490733 | Screw, sheet metal: #8 x 1/4 Phillips head; chrome pl (escutcheon mtg) |
| 3S7118 | Setscrew (control knob) |
| 2S7087 | Speednut (dial scale mtg) ... |

MOUNTING PARTS AND ACCESSORIES

| | |
|-------------|---------------------------------------------------------------------------------------------|
| 7B501298 | Bracket, receiver mtg (recvr to instrument panel) |
| 7A72256 | Bracket, receiver mtg (on hsng).... |
| 7A484424 | Bracket and Stud Assembly (receiver mtg) |
| 8A4491 | Capacitor, noise suppression (generator cap) |
| 9K592648 or | Lead Assembly: complete with fuse.. |
| 9K580705 | Lockwasher. int-ext: 1/4; cad pl (receiver mtg)..... |
| 4S7688 | Nut, hex: 1/4-20 x 7/16; stl; cad pl (receiver mtg) |
| 2S2878 | Screw, sheet metal: #8 x 1/4 slotted acorn head; cad pl (mtg brkt mtg-rear) |
| 3S7475 | Screw, sheet metal: #8 x 3/8; PKZ; slotted acorn head; cad pl (mtg brkt mtg-front) |
| 3S8109 | Screw, machine: 1/4-20 x 3/4; plain hex head; stl; cad pl (receiver mtg strap) |
| 3S7295 | Screw, machine: 1/4-20 x 1-1/2; plain hex head; stl; cad pl (receiver mtg to firewall)..... |
| 3S9694 | Strap, receiver mtg |
| 42A485718 | Suppressor, noise (distributor).. |

TUNER - MODEL MT-87

Note: Electrical parts of the tuner are included in the Electrical Chassis Parts List

| | |
|-----------|-------------------------------------------------------------------------------------|
| 51D502490 | Tuner, Model MT-87: complete..... |
| 43A502513 | Bushing, stop (stop on manual drive shaft) |
| 42A502507 | Clip, spring (manual drive shaft retainer) |
| 46A502505 | Core, iron (L-1, 2 & 3 tuning-specify color coding on old core when ordering) |
| 5A502510 | Grommet (L-1 & L-2 mtg) |
| 5K502516 | Grommet (L-3 mtg) |
| 5A501503 | Grommet (L-1, 2 & 3 core mtg)... |
| 2A502508 | Nut, tension drive (on tuner carriage) |
| 47A502509 | Shaft, manual drive |
| 46A502506 | Sleeve, iron (inside L-1 & L-2 shields) |
| 4K502518 | Washer, fibre (on manual drive shaft) |
| 4A502517 | Washer, paper (inside L-1 & L-2 shields) |

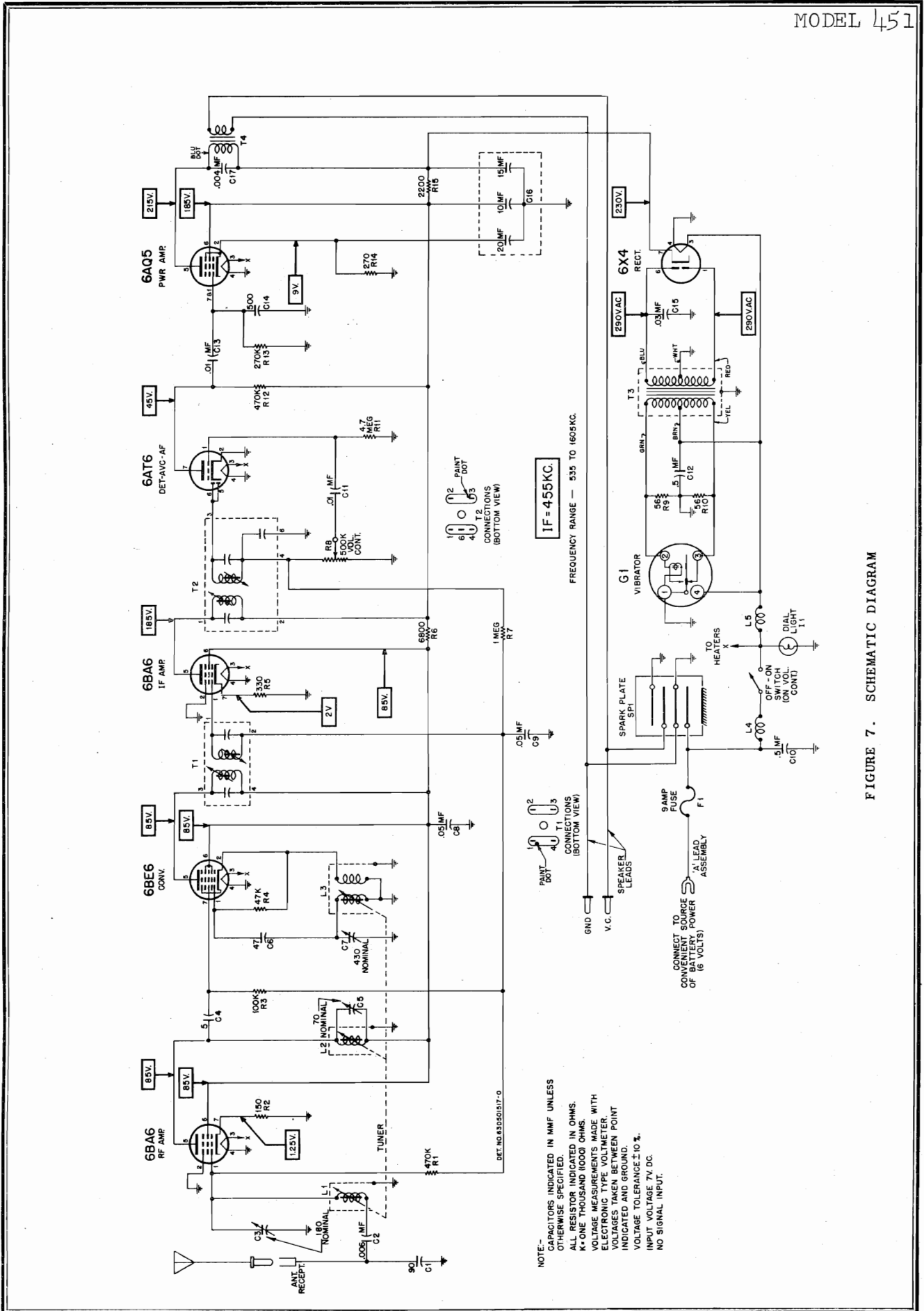


FIGURE 7. SCHEMATIC DIAGRAM

MODEL 501

GENERAL INFORMATION

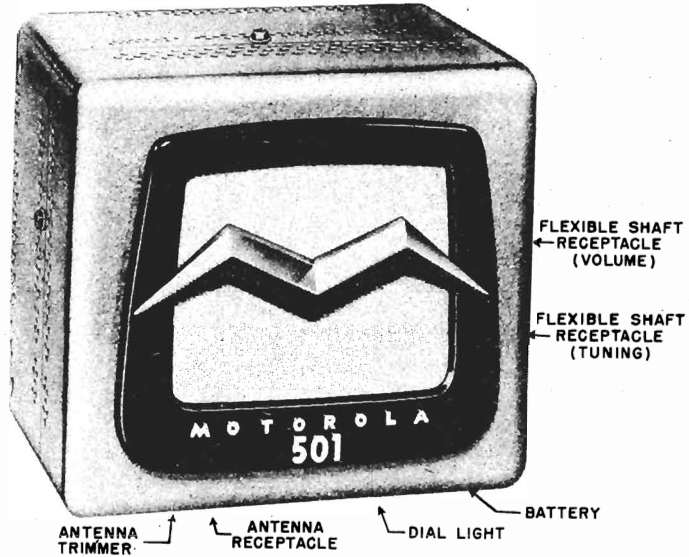
TYPE - Compact automotive type superheterodyne receiver with self-contained speaker. Receiver is designed for installation in any car when used with appropriate Motorola control head.

TUNING RANGE - 535 to 1600 Kc IF - 455 Kc

TUBE COMPLEMENT - 6BA6 - RF Amplifier
 6BE6 - Converter
 6BA6 - IF Amplifier
 6AT6 - Det, AVC & AF Amp
 6AQ5 - Power Amplifier
 6X4 - Rectifier

POWER INPUT - 6.8 amps at 6.3 volts

POWER OUTPUT - 3.5 watts (max)



REPLACEMENT PARTS LIST

NOTE: When ordering parts, specify model number of set in addition to part number and description of part.

| Ref. No. | Part Number | Description | Ref. No. | Part Number | Description |
|-----------------------------------|-------------|-------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|-------------|---------------------------------------------------------------------------------|
| CHASSIS PARTS - ELECTRICAL | | | | | |
| <u>Capacitors</u> | | | | | |
| C-1 | 21A591682 | Ceramic: 90 mmf 500V | C-18 | 8R71911 | Paper: .03 mf 400V |
| C-2 | 8C4529 | Paper: .006 mf 100V | C-19 | 8R23690 | Paper: .01 mf 400V..... |
| C-3 | 20K592078 | Trimmer, variable: 50 to 280 mmf; on same bracket as C-5 and C-7 (sold only as assembly) | C-20 | 23A485677 | Electrolytic: 15-10-20 mf/350-350-25V |
| C-4 | 21K70720 | Molded: 5 mmf 500V | <u>Fuse</u> | | |
| C-5 | 20K592078 | Trimmer, variable: 20 to 180 mmf; on same bracket as C-3 and C-7 (sold only as assembly) | F-1 | 65K16248 | 9 amp |
| C-6 | 8K17028 | Paper: .5 mf 100V | <u>Vibrator</u> | | |
| C-7 | 20K592078 | Trimmer, variable: 500 to 580 mmf; on same bracket as C-3 and C-5 (sold only as assembly) | G-1 | 48B3333 | Non-sync: 4-pin |
| C-8 | 21R6513 | Mica: 50 mmf 10% 300V.... | <u>Coils</u> | | |
| C-9 | 8R13166 | Paper: .1 mf 400V | L-1,2 | 24B71881 | RF & Antenna Coil (specify color of paint dots on old coil when ordering) |
| C-10 | 8R13514 | Paper: .05 mf 100V | L-3 | 24B592153 | Oscillator Coil (specify color of paint dots on old coil when ordering) |
| C-11 | 8R13514 | Paper: .05 mf 100V | L-4 | 24K78026 | Choke, ("A" lead)..... |
| C-14 | 21K70720 | Molded: 5 mmf 500V..... | L-5 | 24K78026 | Choke (dial light) |
| C-15 | 8K17028 | Paper: .5 mf 100V | L-6 | 24A472535 | Choke, hash |
| C-16 | 8R490449 | Paper: .02 mf 1000V..... | <u>Resistors</u> | | |
| C-17 | 21K478410 | Ceramic: 1000 mmf 500V..... | <u>Note:</u> All resistors are insulated carbon type, 20% unless otherwise specified. | | |
| | | | R-1 | 6R6032 | 470,000 1/2W |

| Ref. No. | Part Number | Description |
|----------|-------------|-------------------------------------------------------|
| R-2 | 6R6432 | 270 10% 1/2W |
| R-3 | 6R6075 | 100,000 1/2W |
| R-4 | 6R6056 | 47,000 1/2W' |
| R-5 | 6R6090 | 470 10% 1/2W |
| R-6 | 6R6287 | 6800 1W N.I. |
| R-7 | 6R6004 | 1 meg 1/2W |
| R-8 | 1A472531 | Volume Control: 500,000 ohms; includes SPST switch .. |
| R-9 | 6R6056 | 47,000 1/2W |
| R-10 | 6R6004 | 1 meg 1/2W |
| R-11 | 6R5614 | 56 10% 1/2W |
| R-12 | 6R5614 | 56 10% 1/2W |
| R-13 | 6R2118 | 3.3 meg 1/2W |
| R-14 | 6R6032 | 470,000 1/2W |
| R-15 | 6R6015 | 220,000 1/2W |
| R-16 | 6R6336 | 270 10% 1W |
| R-17 | 6R6184 | 1000 1W N.I. |
| R-18 | 6R5577 | 2700 10% 1/2W |

Spark Plate

| | | |
|------|----------|--------------------------------------|
| SP-1 | 1X592328 | Spark Plate Assembly: complete |
|------|----------|--------------------------------------|

Transformers

| | | |
|-----|-----------|------------------------------------------------------------------------|
| T-1 | 24B485553 | IF, 455 Kc: complete with tuning cores and padding capacitors |
| T-2 | 24B485555 | Diode, 455 Kc: complete with tuning cores and padding capacitors |
| T-3 | 25B70171 | Output Transformer |
| T-4 | 25B472533 | Power Transformer |

Part Number Description

CHASSIS PARTS - MECHANICAL

| | |
|-----------|-----------------------------------------------------------------------------------------------------------------|
| 42A485548 | Clip, coil can mtg |
| 42A13177 | Clip, center post grounding..... |
| 42A4215 | Clip, vibrator grounding |
| 4S7695 | Lockwasher, int: #5; stl; cad pl (terminal strip mtg)..... |
| 9A472148 | Receptacle, antenna |
| 5S7771 | Rivet: .088 x 3/16 stl; nkl pl (tube socket mtg) |
| 5S7706 | Rivet: .122 x 1/8; stl; nkl pl (center post ground clip mtg) |
| 5S7707 | Rivet: .122 x 5/32; stl; nkl pl (terminal strip and output transformer mtg) |
| 5S7701 | Rivet: .122 x 3/16; steel; nkl (vibrator grounding clip mtg) |
| 3S8140 | Screw, sheet metal: #8 x 3/16 PKZ plain hex head; cad pl (tuner mtg) |
| 3S7454 | Screw, sheet metal: #8 x 1/4 plain hex head; stl; cad pl (capacitor bracket assembly and spark plate mtg) |
| 3S3397 | Screw, sheet metal: #8 x 5/16 PKZ plain hex head; cad pl (power transformer mtg) |
| 9A70208 | Socket, tube: 4-pin; with grounding lug (vibrator socket) |
| 9A472534 | Socket, tube: miniature; 7-prong... |
| 9K580218 | Socket, tube: miniature; 8-prong... |
| 31C4079 | Strip, terminal: 1 insulated lug, end mtg |
| 31A472573 | Strip, terminal: 2 ins lugs, #2 mtg |

Part Number Description

HOUSING PARTS

| | |
|-----------|--------------------------------------------------------------------------------------------------|
| 42A472033 | Clip, chassis retainer |
| 13B501659 | Cloth, speaker escutcheon |
| 13D501358 | Escutcheon, speaker |
| 1X501347 | Housing and Bushing Assembly, rear. |
| 1X501349 | Housing, front: includes escutcheon. |
| 3S7456 | Screw, sheet metal: #8 x 1/4 PKA slotted acorn head; antique copper finish (housing screws)..... |

ACCESSORIES

| | |
|-----------|-------------------------------------------------------------|
| 65X4151 | Bulb, pilot light: 6-8V; clear bayonet base |
| 8A4491 | Capacitor, generator |
| 9B473111 | Lead Assembly, fuse: complete with 9 amp fuse |
| 1X74340 | Lead Assembly, dial light: complete with bulb |
| 4S7653 | Lockwasher, int-ext: 5/16; stl; cad pl (receiver mtg) |
| 4S7657 | Lockwasher, ext: #8; stl; cad pl (speaker mtg) |
| 2S7003 | Nut, hex: #8 x 5/16; stl; cad pl (speaker mtg) |
| 2S2863 | Nut, hex: 5/16-18 x 9/16; stl; cad pl (receiver mtg) |
| 1K75148 | Shaft, flexible: with housing 24" lg |
| 50K500415 | Speaker, PM: 5-1/4; 3.2 ohm VC..... |
| 3A77542 | Stud, receiver mtg |
| 6X4141 * | Suppressor, distributor |

TUNER PARTS - MECHANICAL

Note: Electrical parts of the tuner are included in the Electrical Chassis Parts List.

| | |
|-----------|----------------------------------------------------------------------------------|
| 1X592301 | Manual Tuner MT-75 |
| 1X592099 | Base, Sleeve, Shields and Channels Assembly |
| 1X78034 | Carriage Plate, Slug Insulator and Center Guide Rod Assembly..... |
| 42A70184 | Clip, core adjustment |
| 46K592080 | Core, iron and screw..... |
| 58K78012 | Coupling, manual lead screw ... |
| 14A70876 | Insulator, coil sleeve |
| 14B78007 | Insulator, slug: bakelite |
| 2A77596 | Nut, floating: without ear (on manual lead screw)..... |
| 2A78005 | Nut, floating: with ear (on manual lead screw) |
| 64A77593 | Plate, tuner front |
| 5S7770 | Rivet: .088 x 5/32; stl; nkl pl (slug insulator mtg) |
| 47A78002 | Rod, carriage guide..... |
| 3S7352 | Screw, machine: 8-32 x 2 slotted round head; stl; cad pl (front plate mtg) |
| 43A70881 | Sleeve, coil (iron) |
| 41A77595 | Spring, coil slug |
| 41A77592 | Spring, compression |
| 42A21577 | Washer, "C": spring (manual lead screw mtg) |
| 4A70873 | Washer, coil spacer |
| 4A74571 | Washer, fishpaper |
| 4A70956 | Washer, slug insulator |
| 4K485653 | Washer, spring (manual lead screw mtg) |

MODEL 501

ALIGNMENT

Remove receiver front and rear housings to expose all adjustments.

Connect a 6 volt battery to BAT terminal and chassis.

Connect a low range output meter across speaker voice coil and set volume control at maximum. For greatest accuracy, keep output of receiver at approximately 1 watt

(1 watt = 1.79 volts on output meter) throughout alignment by reducing signal generator output as stages are brought into alignment. Use a small fibre screwdriver when aligning IF and diode transformers. A special tool, Motorola Part No. 66A76278, is required for adjusting the tuner cores. **IMPORTANT:** Do not push in on the alignment tool when adjusting the tuner cores; the slightest inward pressure may move tuner carriage and result in inaccurate alignment.

ALIGNMENT CHART

| STEP | DUMMY ANTENNA | GENERATOR CONNECTION | GENERATOR FREQUENCY | TUNER SET TO | ADJUST | REMARKS |
|--------------------|---------------|----------------------------------|---------------------|------------------------------------------------------------------------------------|-------------|---------------------------------------------------------------|
| IF ALIGNMENT 1. | .1 mf | 6BE6 grid (pin #7) & chassis | 455 Kc | High frequency end (cores out) | 1, 2, 3 & 4 | Peak for maximum in order indicated. Check by repeating step. |
| RF ALIGNMENT 2. | See Fig. 1 | Antenna receptacle through dummy | 1610 Kc | High frequency end; cores should project 1-1/8" from cans (Screw out if necessary) | 5, 6 & 7 | Peak for maximum in order indicated. |
| 3. | " | " | 1425 Kc | 1425 Kc -per Fig. 1 | 8, 9 & 10 | Peak for maximum in order indicated. |

4. When receiver is installed in car, extend antenna fully, set dial to approximately 1400 Kc and repeak antenna trimmer (7) for maximum volume of a weak station or noise between stations.

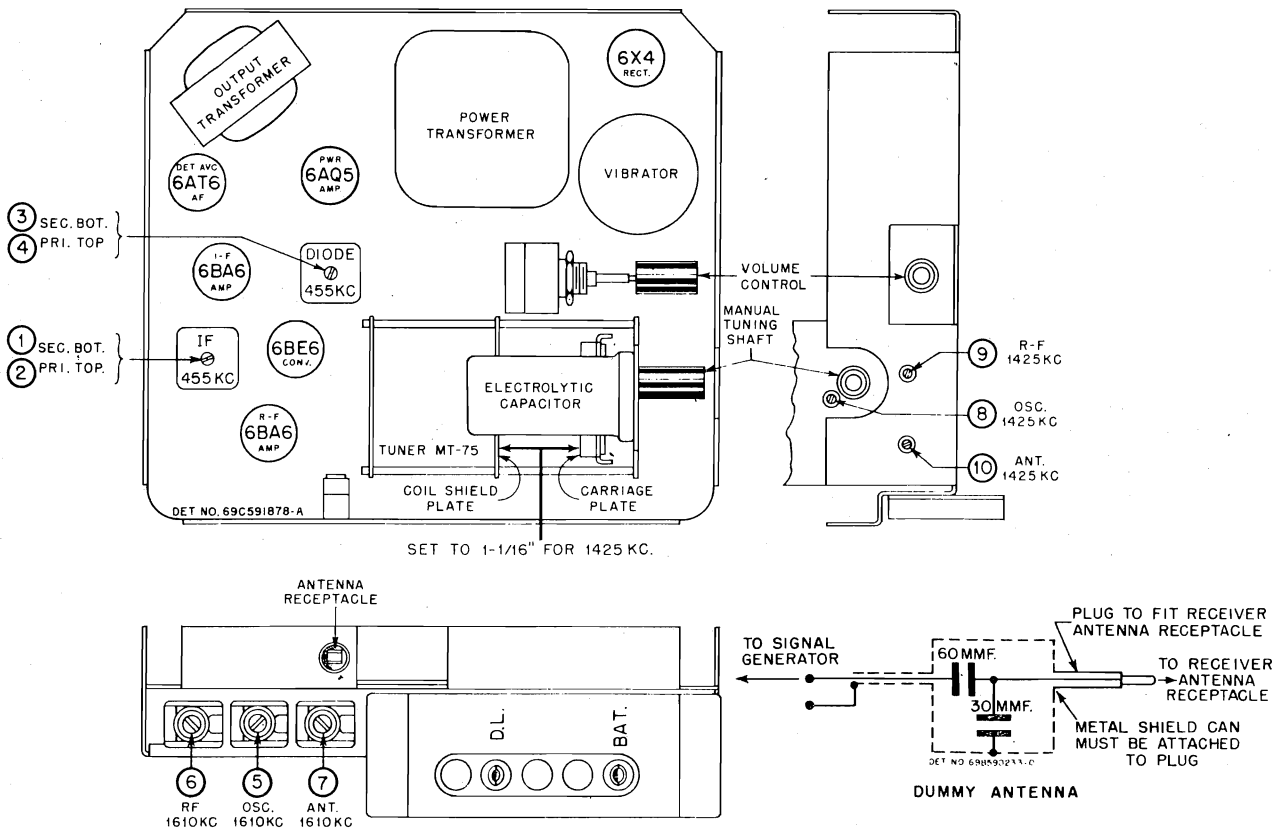


FIGURE 1. TUBE & TRIMMER LOCATIONS AND DUMMY ANTENNA

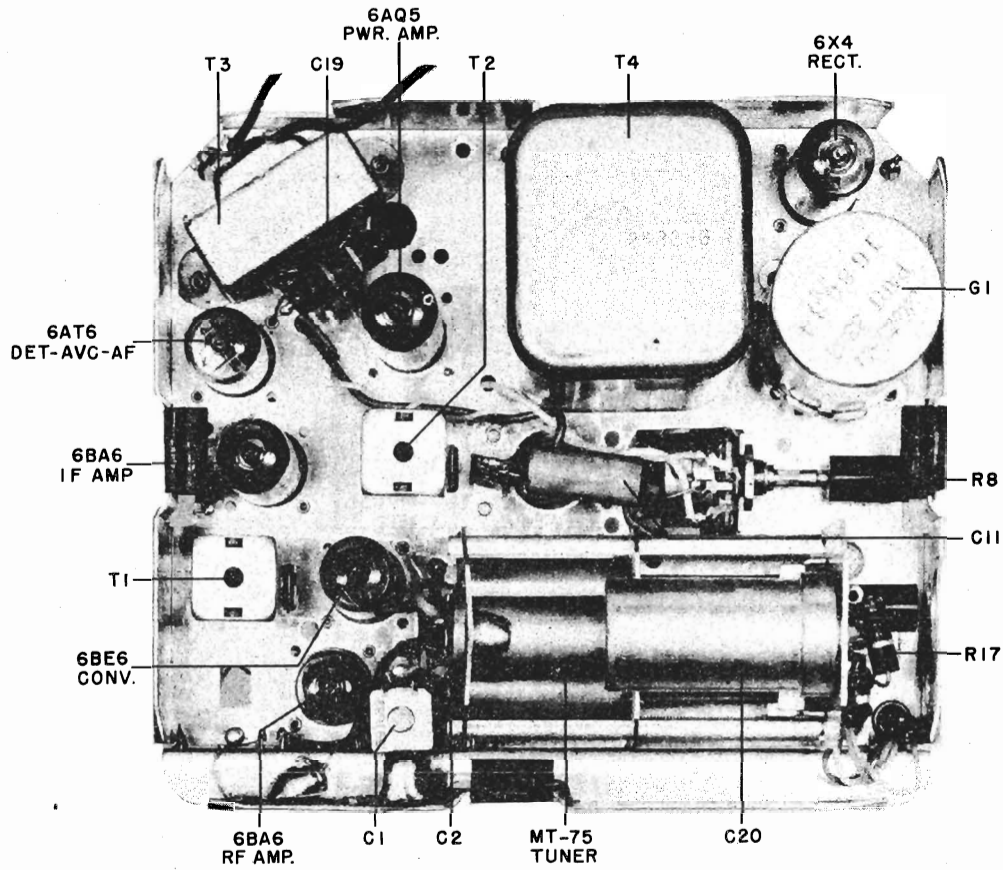


FIGURE 2. TOP VIEW OF CHASSIS

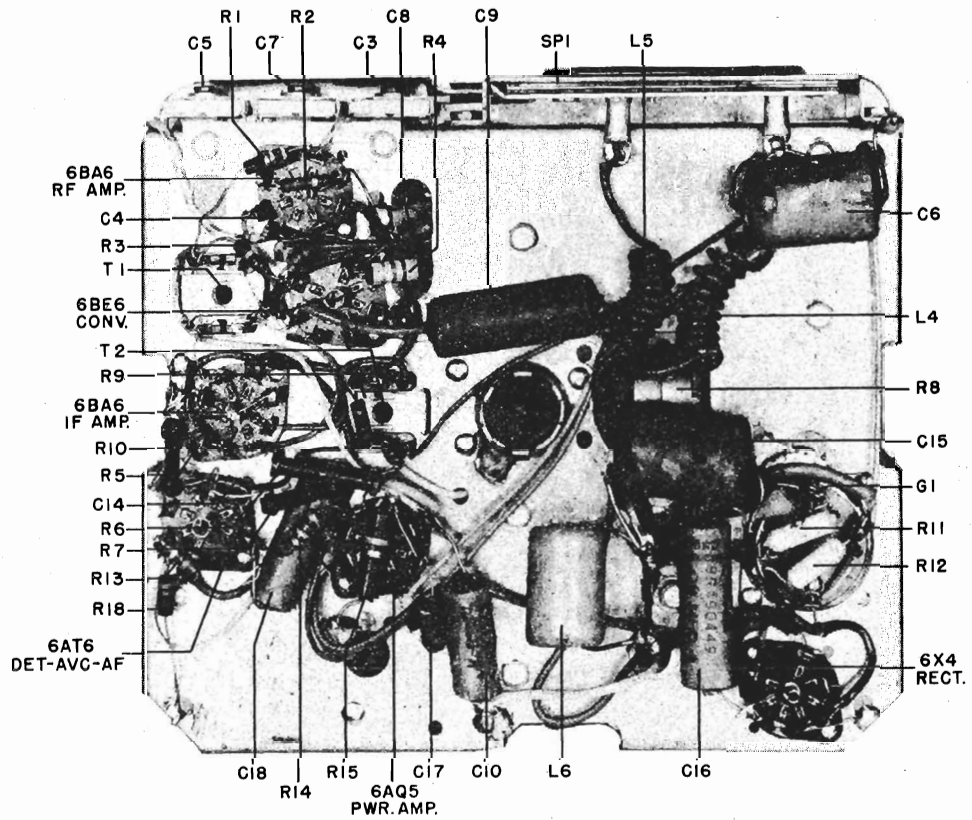
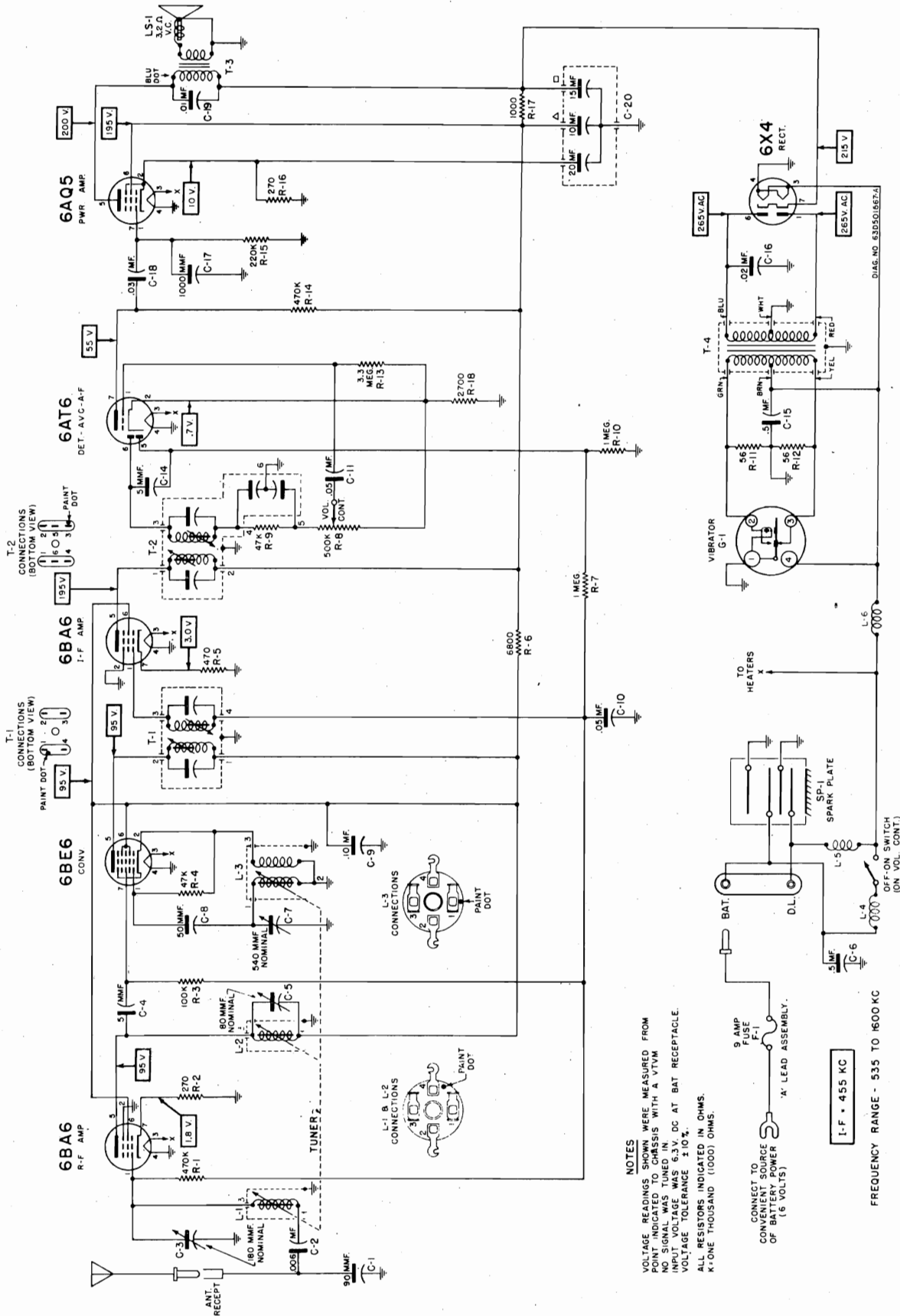


FIGURE 3. BOTTOM VIEW OF CHASSIS



NOTES
 VOLTAGE READINGS SHOWN WERE MEASURED FROM POINT INDICATED TO CHASSIS WITH A VTVM. NO SIGNAL WAS TUNED IN. INPUT VOLTAGE WAS 6.3V. DC AT BAT RECEPTACLE. VOLTAGE TOLERANCE ± 10%. ALL RESISTORS INDICATED IN OHMS. K=ONE THOUSAND (1000) OHMS.

CONNECT TO CONVENIENT SOURCE OF BATTERY POWER (6 VOLTS)
 9 AMP FUSE (F-1)
 * LEAD ASSEMBLY.
 SPARK PLATE
 OFF-ON SWITCH (ON VOL. CONT.)
 TO HEATERS
 L-1 B L-2
 L-1 F. 455 KC
 FREQUENCY RANGE - 535 TO 1600 KC

FIGURE 4. SCHEMATIC DIAGRAM

GENERAL INFORMATION

TYPE - Compact automotive type superheterodyne receiver with self-contained speaker. Receiver is designed for installation in any car when used with appropriate Motorola control head.

TUNING RANGE - 540 to 1600 Kc **IF** - 455 Kc

TUBE COMPLEMENT -
 6BA6 - RF Amplifier
 6BE6 - Converter
 6BA6 - IF Amplifier
 6AT6 - Det, AVC & AF Amp
 6AQ5 - Power Amplifier
 6X4 - Rectifier

POWER INPUT - 6.8 amps at 6.3 volts

POWER OUTPUT - 3.5 watts (max)

551 54P511221

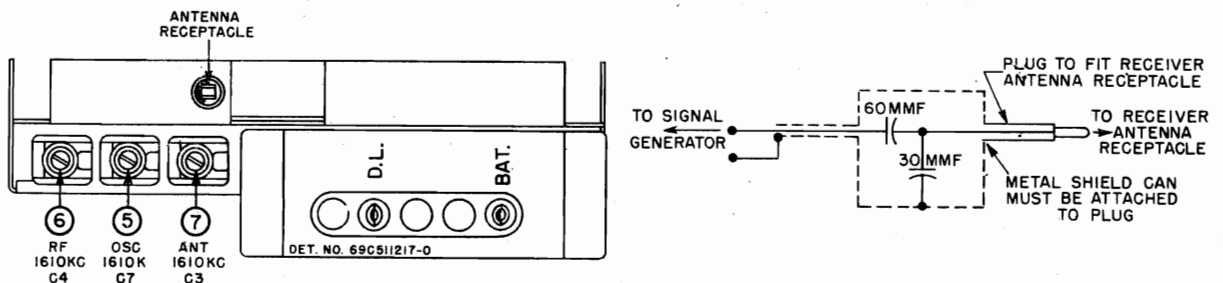
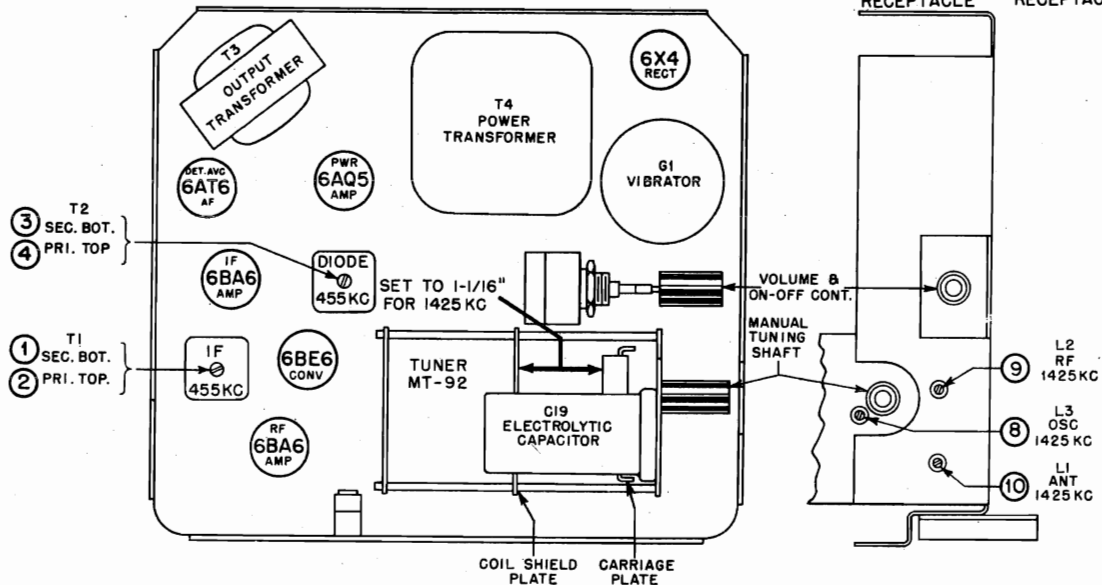
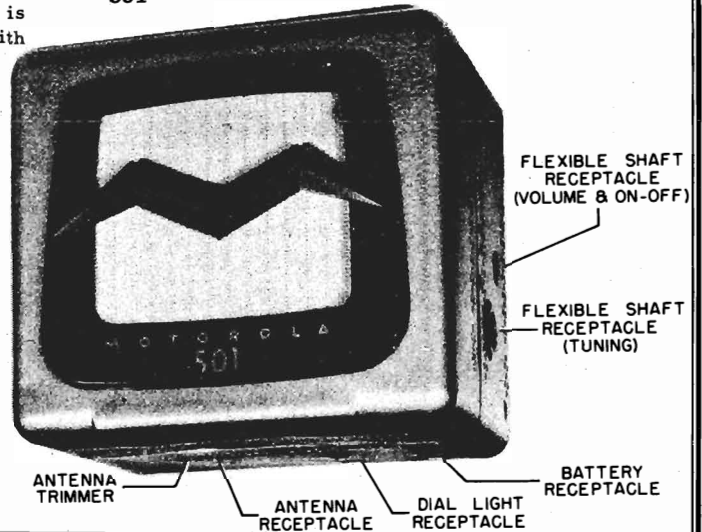


FIGURE 1. TUBE AND TRIMMER LOCATIONS AND DUMMY ANTENNA

ALIGNMENT

Remove receiver front and rear housings to expose all adjustments.

Connect a 6 volt battery to BAT terminal and chassis.

Connect a low range output meter across speaker voice coil and set volume control at maximum. For greatest accuracy, keep output of receiver at approximately 1 watt

(1 watt = 1.79 volts on output meter) throughout alignment by reducing signal generator output as stages are brought into alignment. Use a small fibre screwdriver when aligning IF and diode transformers. A special tool, Motorola Part No. 66A76278, is required for adjusting the tuner cores. **IMPORTANT:** Do not push in on the alignment tool when adjusting the tuner cores; the slightest inward pressure may move tuner carriage and result in inaccurate alignment.

MODEL 501A

ALIGNMENT CHART

| STEP | DUMMY ANTENNA | GENERATOR CONNECTION | GENERATOR FREQUENCY | TUNER SET TO | ADJUST | REMARKS |
|------|---------------|----------------------------------|---------------------|------------------------------------------------------------------------------------|-------------|---------------------------------------------------------------|
| 1. | .1 mf | 6BE6 grid (pin #7) & chassis | 455 Kc | High frequency end (cores out) | 1, 2, 3 & 4 | Peak for maximum in order indicated. Check by repeating step. |
| 2. | See Fig. 1 | Antenna receptacle through dummy | 1610 Kc | High frequency end; cores should project 1-1/8" from cans (screw out if necessary) | 5, 6 & 7 | Peak for maximum in order indicated. |
| 3. | " | " | 1425Kc | 1425 Kc -per Fig. 1 | 8, 9 & 10 | Peak for maximum in order indicated. |

4. When receiver is installed in car, extend antenna fully, set dial to approximately 1400 Kc and repeak antenna trimmer (7) for maximum volume of a weak station or noise between stations.

INSTALLATION INFORMATION

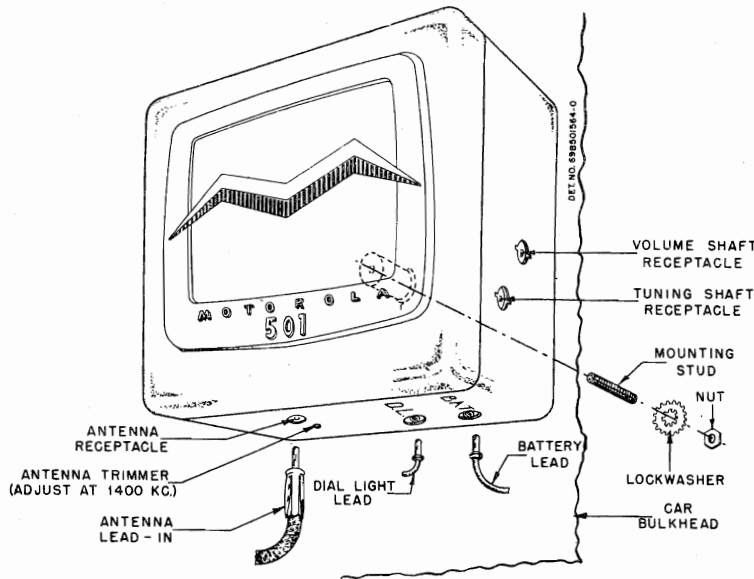


FIGURE 2. RECEIVER INSTALLATION DETAIL

INSTALL DISTRIBUTOR SUPPRESSOR

Cut the high tension lead, which runs from the center terminal of the car distributor to the ignition coil, approximately 1-1/2 inches from the distributor. See Figure 3. Screw the distributor suppressor in series with the two pieces of high tension wire, and plug the end terminal of the lead into the center receptacle of the distributor.

INSTALL CAPACITOR ON GENERATOR

Mount the noise suppression capacitor (Motorola Part Number 8A4491) on the generator frame, under the ground lead screw. See Figure 4. Connect the capacitor lead to the armature terminal of the generator. **WARNING: DO NOT CONNECT THE CAPACITOR LEAD TO THE FIELD TERMINAL.**

ADDITIONAL MOTOR NOISE HINTS

1. When checking the car for motor noise, clamp the

hood down tight.

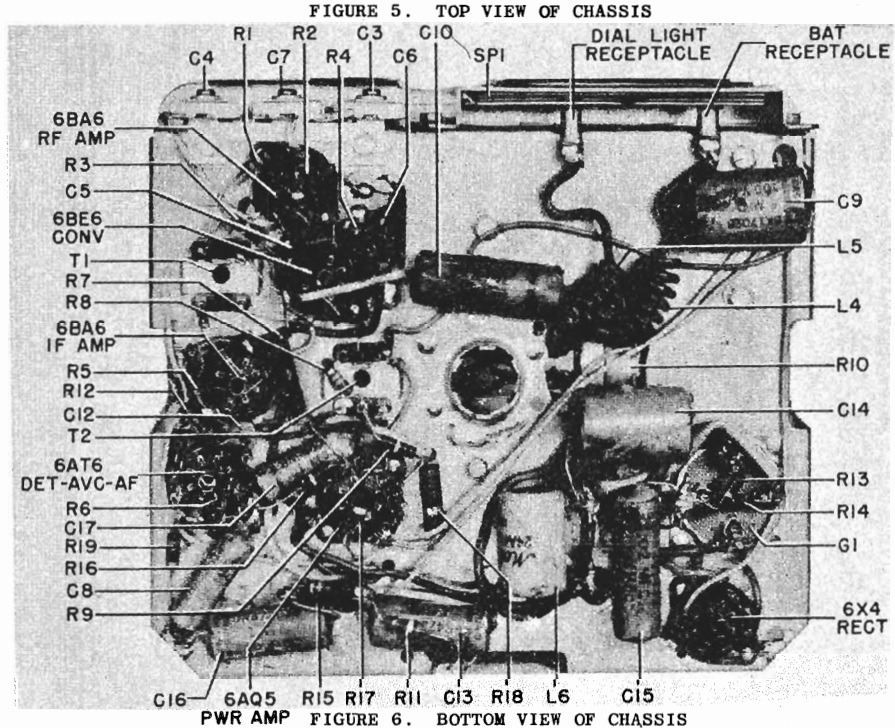
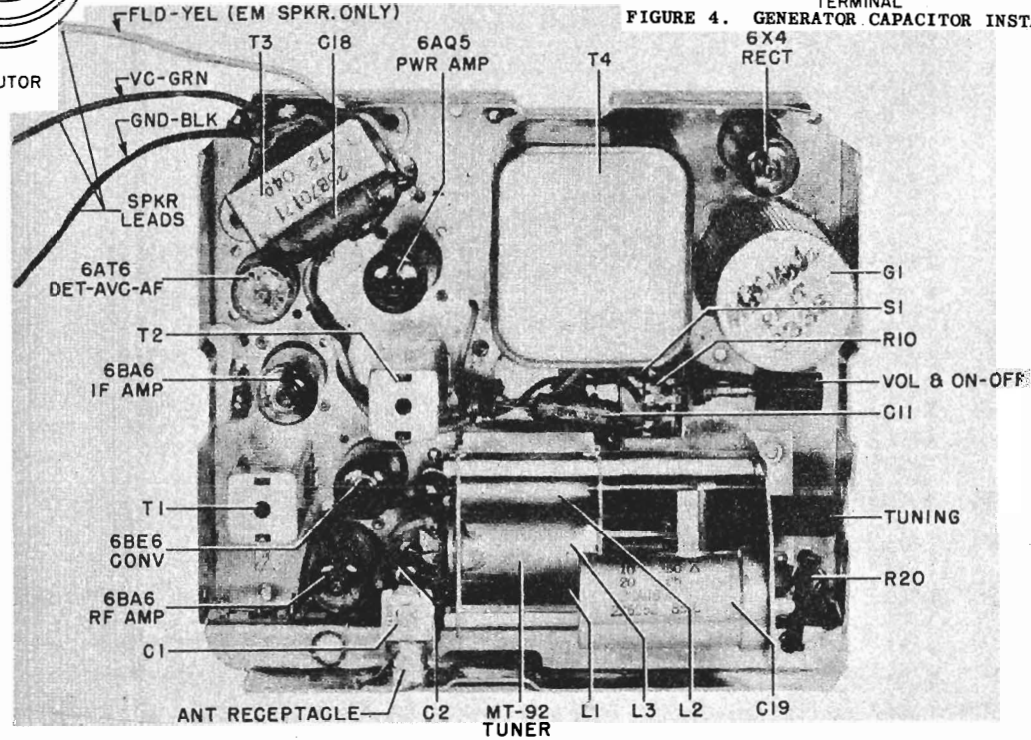
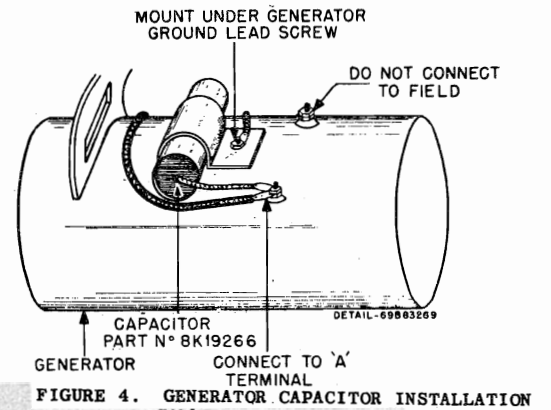
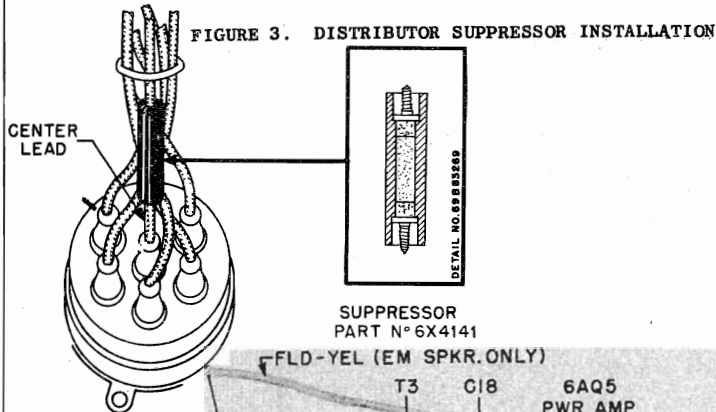
2. Hood Bonds (Motorola Part Number 39A4205) may be installed at the shoulders so that the hood makes a good ground to the cowl of the car.

TIRE STATIC

After completion of radio installation, road test car for tire static on dry concrete and blacktop pavements, under the following conditions:

1. At both low and high car speeds.
2. With antenna extended to operating position.
3. With radio at full volume and tuned off station.

If tire static noise is encountered, inject Tire Static Elimination Powder (available in kit form - Motorola Part Number 51B591494) into tires, following instructions given on the package.



MODEL 501A

REPLACEABLE PARTS LIST

NOTE: When ordering parts, specify model number of set in addition to part number and description of part.

| Ref. No. | Part Number | Description |
|-----------------------------------|-------------|---------------------------------------------------------------------------------------------|
| CHASSIS PARTS - ELECTRICAL | | |
| Capacitors | | |
| C-1 | 21A591682 | Ceramic: 90 mmf 500V..... |
| C-2 | 8A4529 | Paper: .006 mf 100V..... |
| C-3 | 20K592078 | Trimmer, variable: 50 to 280 mmf on same brkt as C-4 and 7 (sold only as a assem)... |
| C-4 | 20K592078 | Trimmer, variable: 20 to 180 mmf; on same brkt as C-3 and 7 (sold only as a assem) |
| C-5 | 21K70720 | Molded: 5 mmf 500V..... |
| C-6 | 21R6513 | Mica: 50 mmf 10% 300V.... |
| C-7 | 20K592078 | Trimmer, variable: 500 to 580 mmf; on same brkt as C-3 and 4 (sold only on as a assem)..... |
| C-8 | 8R13514 | Paper: .05 mf 100V..... |
| C-9 | 8K17028 | Paper: .5 mf 100V..... |
| C-10 | 8R13166 | Paper: .1 mf 400V..... |
| C-11 | 8R472754 | Paper: .01 mf 100V..... |
| C-12 | 21R410089 | Molded Disc: 27 mmf..... |
| C-13 | 8R472035 | Paper: 1 mf 100V..... |
| C-14 | 8K17028 | Paper: .5 mf 100V..... |
| C-15 | 8R490449 | Paper: .02 mf 1000V..... |
| C-16 | 8R472035 | Paper: .1 mf 100V..... |
| C-17 | 8R9809 | Paper: .01 mf 400V..... |
| C-18 | 8R23690 | Paper: .01 mf 400V..... |
| C-19 | 23A485677 | Electrolytic: 15-10-20 mf/350-350-25V..... |
| Fuse | | |
| F-1 | 65K16248 | 9 amp..... |
| Vibrator | | |
| G-1 | 48B3333 | Non-sync: 4-pin..... |
| Coils | | |
| L-1,2 | 24B71881 | RF and Antenna Coil (Specify color of paint dots on old coil when ordering)..... |
| L-3 | 24B592153 | Oscillator Coil (specify color of paint dots on old coil when ordering)..... |
| L-4 | 24K78026 | Choke, ("A" lead)..... |
| L-5 | 24K78026 | Choke (dial light)..... |
| L-6 | 24A472535 | Choke, hash..... |

Resistors

Note: All resistors are insulated carbon type, 20%, unless otherwise specified.

| | | |
|------|-----------|---------------------------------------------------------|
| R-1 | 6R6032 | 470,000 20% 1/2W..... |
| R-2 | 6R6432 | 270 10% 1/2W..... |
| R-3 | 6R6075 | 100,000 20% 1/2W..... |
| R-4 | 6R6056 | 47,000 20% 1/2W..... |
| R-5 | 6R3933 | 220 20% 1/2W..... |
| R-6 | 6R6004 | 1 meg 20% 1/2W..... |
| R-7 | 6R6287 | 6800 20% 1W..... |
| R-8 | 6R6074 | 68,000 10% 1/2W..... |
| R-9 | 6R6015 | 220,000 20% 1/2W..... |
| R-10 | 18A510819 | Volume control: 1 meg; with Spst switch; incl mtg nut.. |
| R-11 | 6R5554 | 390 10% 1/2W..... |
| R-12 | 6R6004 | 1 meg 20% 1/2W..... |
| R-13 | 6R5614 | 56 10% 1/2W..... |
| R-14 | 6R5614 | 56 10% 1/2W..... |
| R-15 | 6R6039 | 4700 20% 1/2W..... |
| R-16 | 6R6075 | 100,000 20% 1/2W..... |
| R-17 | 6R6075 | 100,000 20% 1/2W..... |
| R-18 | 6R6389 | 220 10% 1W..... |
| R-19 | 6R6406 | 22 10% 1/2W..... |
| R-20 | 6R6184 | 1000 20% 1W..... |

| Ref. No. | Part Number | Description |
|-----------------------------------|-------------|-----------------------------------------------------------------------|
| Spark Plate | | |
| SP-1 | 1X592328 | Spark Plate Assembly: complete..... |
| Transformers | | |
| T-1 | 24B485553 | IF, 455 Kc: complete with tuning cores and padding capacitors..... |
| T-2 | 24B485555 | Diode, 455 Kc: complete with tuning cores and padding capacitors..... |
| T-3 | 25B70171 | Output Transformer..... |
| T-4 | 25B472533 | Power Transformer..... |
| CHASSIS PARTS - MECHANICAL | | |

| | |
|----------------------|---------------------------------------------------------------------------------------------------|
| 42A485548 | Clip, coil can mtg..... |
| 42A13177 | Clip, center post grounding.... |
| 42A4215 | Clip, vibrator grounding..... |
| 9A472148 | Receptacle, antenna..... |
| 5S7771 | Rivet: .088 x 3/16 stl; nkl pl (tube socket mtg)..... |
| 9A70208 | Socket, tube: 4-pin; with grounding lug (vibrator socket)..... |
| 9A472534 | Socket, tube: miniature; 7-prong... |
| 9K580218 | Socket, tube: miniature; 7-prong; with dummy lug..... |
| 31C4079 | Strip, terminal: 1 insulated lug, end mtg..... |
| 31A472573 | Strip, terminal: 2 ins lugs, #2 mtg..... |
| HOUSING PARTS | |
| 42A472033 | Clip, chassis retainer..... |
| 13B510654 | Cloth, speaker grille..... |
| 13D501358 | Escutcheon, speaker: plastic..... |
| 1X510826 | Housing and Bushing Assembly, rear. |
| 1X510828 | Housing, front: includes escutcheon |
| 3S7456 | Screw, sheet metal: #8 x 1/4 PKA slot-ted acorn head; antique copper finish (housing screws)..... |

ACCESSORIES

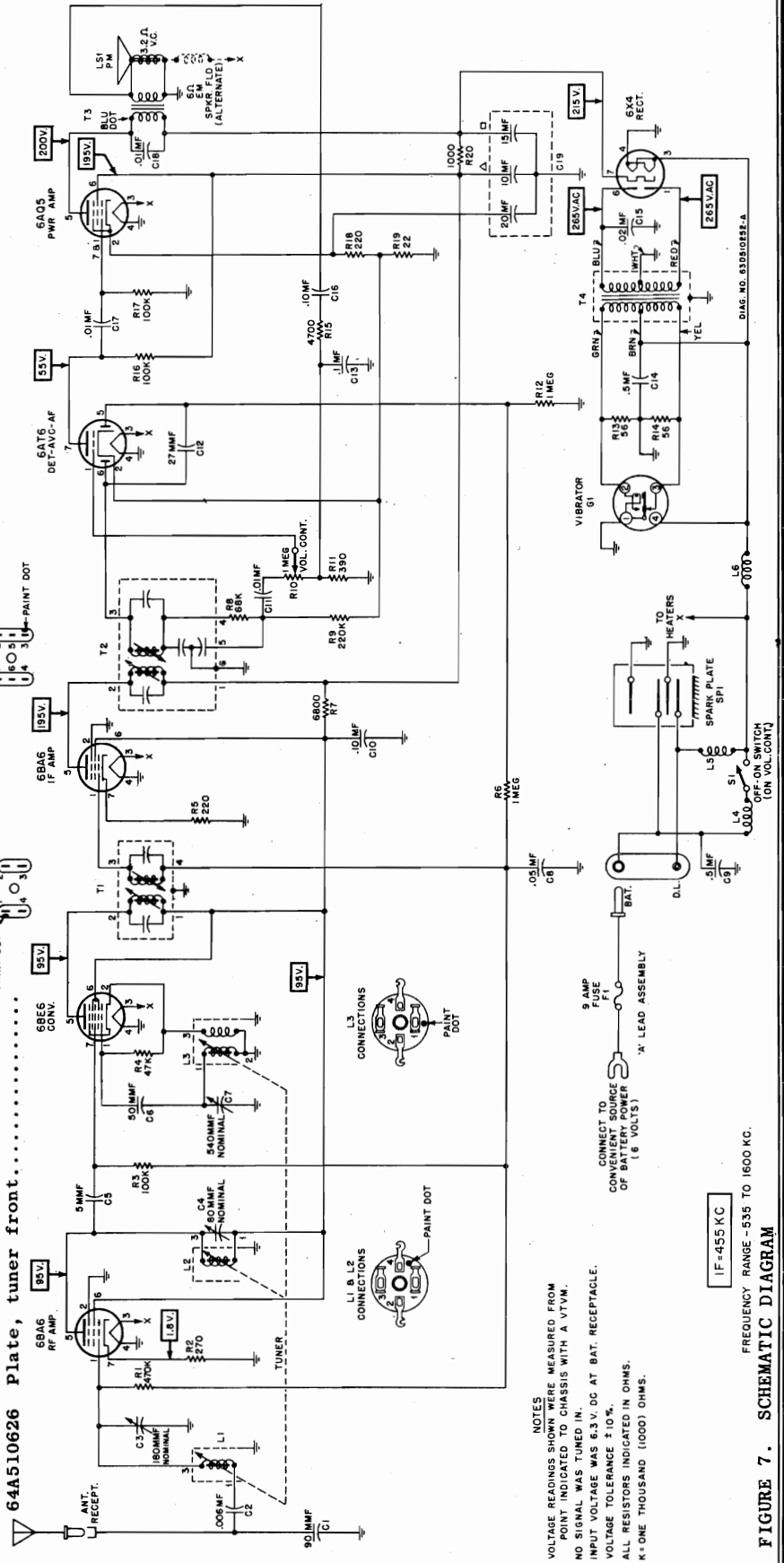
| | |
|-----------|------------------------------------------------------------|
| 65X4151 | Bulb, pilot light: 6-8V; bayonet base; #51..... |
| 8A4491 | Capacitor, generator..... |
| 9B473111 | Lead Assembly, fuse: complete with 9 amp fuse..... |
| 1X74340 | Lead Assembly, dial light: complete with bulb..... |
| 4S7653 | Lockwasher, int-ext: 5/16; stl; cad pl (receiver mtg)..... |
| 4S7657 | Lockwasher, ext: #8; stl; cad pl (speaker mtg)..... |
| 2S7003 | Nut, hex: #8 x 5/16; stl; cad pl (speaker mtg)..... |
| 2S2863 | Nut, hex: 5/16-18 x 9/16; stl; cad pl (receiver mtg)..... |
| 1K75148 | Shaft, flexible: with housing; 24" lg..... |
| 50B510485 | or |
| 50B510878 | Speaker, EM: 5 1/4; 3.2 ohm VC; 6V fld |
| 50K500415 | or |
| 50B510427 | Speaker, PM: 5 1/4; 3.2 ohm VC..... |
| 3A77542 | Stud, receiver mtg..... |
| 6A4141 | Suppressor, distributor..... |
| 29K76284 | Terminal, pin: red (fuse lead).... |
| 29K76287 | Terminal, pin: gray (dial light lead)..... |

TUNER PARTS - MECHANICAL

Note: Electrical parts of the tuner are included in the Electrical Chassis Parts List

- 1X510840 Manual Tuner MT-92: complete.....
- 1X592099 Base, Sleeve, Shields and Channels Assembly.....
- 1X78034 Carriage Plate, Slug Insulator and Center Guide Rod Assembly.....
- 42A70184 Clip, core adjustment.....
- 46K592080 Core, iron and screw.....
- 58K78012 Coupling and Manual Lead Screw.....
- 14A70876 Insulator, coil sleeve.....
- 14B78007 Insulator, slug: bakelite.....
- 2A77596 Nut, floating: without ear (on manual lead screw).....
- 2A78005 Nut, floating: with ear (on manual lead screw).....

- 5S7770 Rivet: .088 x 5/32; stl; nkl pl (slug insulator mtg).....
- 47A78002 Rod, carriage guide.....
- 3S7352 Screw, machine: 8-32 x 2 slotted round head; stl; cad pl (front plate mtg).....
- 43A70881 Sleeve, coil (iron).....
- 41A77595 Spring, core.....
- 41A77592 Spring, compression (on manual tuning shaft).....
- 42A21577 Washer, "C": spring (manual lead screw mtg).....
- 4A70873 Washer, coil spacer.....
- 4A74571 Washer, fishpaper.....
- 4A70956 Washer, slug insulator.....
- 4K485653 Washer, spring (manual lead screw mtg).....



NOTES
 VOLTAGE READINGS SHOWN WERE MEASURED FROM POINT INDICATED TO CHASSIS WITH A VTVM.
 NO SIGNAL WAS TUNED IN.
 INPUT VOLTAGE WAS 6.3 V. DC AT BAT. RECEPTACLE.
 VOLTAGE TOLERANCE ± 10%.
 ALL RESISTORS INDICATED IN OHMS.
 K = ONE THOUSAND (1000) OHMS.

IF-455 KC
 FREQUENCY RANGE - 535 TO 1600 KC.

FIGURE 7. SCHEMATIC DIAGRAM

MODEL 601

GENERAL INFORMATION

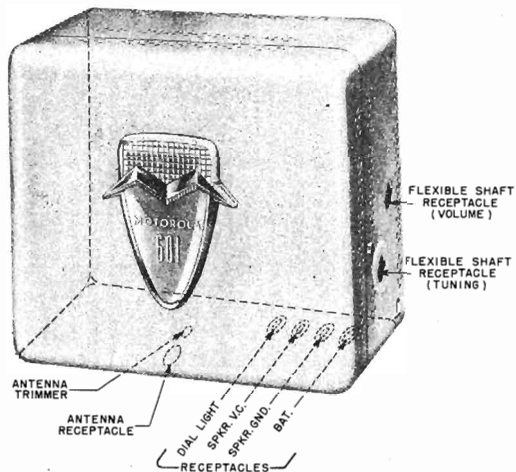
TYPE - Compact automotive type superheterodyne receiver designed for installation in any car when used with appropriate Motorola control head and speaker.

TUNING RANGE - 535 to 1600 Kc IF - 455 Kc

TUBE COMPLEMENT - 6BA6 - RF Amplifier
 6BE6 - Converter
 6BA6 - IF Amplifier
 6AT6 - Det, AVC & AF Amp
 6AQ5 - Power Amplifier
 6X4 - Rectifier

POWER INPUT - 6.8 amps at 6.3 volts

POWER OUTPUT - 3.5 watts (max)



REPLACEMENT PARTS LIST

NOTE: When ordering parts, specify model number of set in addition to part number and description of part.

| Ref. No. | Part Number | Description | Ref. No. | Part Number | Description |
|-----------------------------------|-------------|-------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|-------------|-----------------------------------------------------------------------------------|
| CHASSIS PARTS - ELECTRICAL | | | | | |
| <u>Capacitors</u> | | | | | |
| C-1 | 21A591682 | Ceramic: 90 mmf 500V..... | C-18 | 8R71911 | Paper: .03 mf 400V..... |
| C-2 | 8C4529 | Paper: .006 mf 100V..... | C-19 | 8R23690 | Paper: .01 mf 400V..... |
| C-3 | 20K592078 | Trimmer, variable: 50 to 280 mmf; on same bracket as C-5 and C-8 (sold only as assembly) | C-20 | 23A485677 | Electrolytic: 15-10-20 mf/350-350-25V |
| C-4 | 8R13166 | Paper: .1 mf 400V | <u>Fuse</u> | | |
| C-5 | 20K592078 | Trimmer, variable: 20 to 180 mmf; on same bracket as C-3 and C-8 (sold only as assembly) | F-1 | 65K16248 | 9 amp |
| C-6 | 21K70720 | Molded: 5 mmf 500V..... | <u>Vibrator</u> | | |
| C-7 | 21R6513 | Mica: 50 mmf 10% 300V.... | G-1 | 48B3333 | Non-sync: 4-pin |
| C-8 | 20K592078 | Trimmer, variable: 500 to 580 mmf; on same bracket as C-3 and C-5 (sold only as assembly) | <u>Coils</u> | | |
| C-9 | 8K17028 | Paper: .5 mf 100V..... | L-1,2 | 24B71881 | RF and Antenna Coil (specify color of paint dots on old coil when ordering) |
| C-10 | 8R13514 | Paper: .05 mf 100V..... | L-3 | 24B592153 | Oscillator Coil (specify color of paint dots on old coil when ordering) |
| C-11 | 8R13514 | Paper: .05 mf 100V..... | L-4 | 24K78026 | Choke (A' lead) |
| C-14 | 21K70720 | Molded: 5 mmf 500V..... | L-5 | 24K78026 | Choke (dial light) |
| C-15 | 8K17028 | Paper: .5 mf 100V..... | L-6 | 24A472535 | Choke, hash |
| C-16 | 8R490449 | Paper: .02 mf 1000V..... | <u>Resistors</u> | | |
| C-17 | 21K478410 | Ceramic: 1000 mmf 500V..... | <u>Note:</u> All resistors are insulated carbon type, 20% unless otherwise specified. | | |
| | | | R-1 | 6R6032 | 470,000 1/2W |

| Ref. No. | Part Number | Description | Part Number | Description | |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|--|
| R-2 | 6R6432 | 270 10% 1/2W | HOUSING PARTS | | |
| R-3 | 6R6075 | 100,000 1/2W | 42A501270 | Clip, escutcheon retainer..... | |
| R-4 | 6R6056 | 47,000 1/2W | 42A472033 | Clip, chassis retainer | |
| R-5 | 6R6090 | 470 10% 1/2W | 13D501271 | Escutcheon, complete | |
| R-6 | 6R6287 | 6800 1W N.I. | 1X501390 | Housing and Bushing Assembly, rear. | |
| R-7 | 6R6004 | 1 meg 1/2W | 1X501375 | Housing, front; with escutcheon.... | |
| R-8 | 1A472531 | Volume Control: 500,000 ohms; includes SPST switch.... | 3S400356 | Screw, sheet metal: #4 x 1/4 plain hex head; stl; cad pl (escutcheon mtg) | |
| R-9 | 6R6056 | 47,000 1/2W..... | 3S7456 | Screw, sheet metal: #8 x 1/4 PKA slotted acorn head; antique copper finish (housing screws) | |
| R-10 | 6R6004 | 1 meg 1/2W | ACCESSORIES | | |
| R-11 | 6R5614 | 56 10% 1/2W | 65X4151 | Bulb, pilot light: 6-8V; clear; bayonet base | |
| R-12 | 6R5614 | 56 10% 1/2W | 8A4491 | Capacitor, generator | |
| R-13 | 6R5577 | 2700 10% 1/2W | 9B473111 | Lead Assembly, fuse: complete with 9 amp fuse | |
| R-14 | 6R2118 | 3.3 meg 1/2W | 1X74340 | Lead Assembly, dial light: complete with bulb | |
| R-15 | 6R6032 | 470,000 1/2W | 1X76859 | Lead Assembly, speaker: 2-conductor, 36" long, with pin terminals on one end | |
| R-16 | 6R6015 | 220,000 1/2W | 4S7653 | Lockwasher, int-ext: 5/16; stl; cad pl (receiver mtg) | |
| R-17 | 6R6336 | 270 10% 1W | 2S2863 | Nut, hex: 5/16-18 x 9/16; cad pl (receiver mtg) | |
| R-18 | 6R6184 | 1000 1W N.I. | 1K75148 | Shaft, flexible: with housing: 24" long | |
| Spark Plate | | | 50B500708 or | | |
| SP-1 | 1X78041 | Spark Plate Assembly: com- plete | 50B500684 | Speaker: 6" PM; 3.2 ohm VC; less speaker lead | |
| Transformers | | | 3A77542 | Stud, receiver mtg | |
| T-1 | 24B485553 | IF, 455 Kc: complete with tuning cores and padding capacitors | 6X4141 | Suppressor, distributor | |
| T-2 | 24B485555 | Diode, 455 Kc: complete with tuning cores and padding capacitors | TUNER PARTS - MECHANICAL | | |
| T-3 | 25B70171 | Output Transformer | Note: Electrical parts of the tuner are included in the Electrical Chassis Parts List | | |
| T-4 | 25B472533 | Power Transformer | 1X592301 | Manual Tuner MT-75 | |
| Part Number Description | | | 1X592099 | Base, Sleeve, Shields and Channels Assembly | |
| CHASSIS PARTS - MECHANICAL | | | 1X78034 | Carriage Plate, Slug Insulator and Center Guide Rod Assembly | |
| 42A13177 | Clip, center post grounding..... | | 42A70184 | Clip, core adjustment | |
| 42A485548 | Clip, coil can mtg | | 46K592080 | Core, iron and screw | |
| 42A4215 | Clip, vibrator grounding | | 58K78012 | Coupling, manual lead screw | |
| 4S7695 | Lockwasher, int: #5; stl; cad pl (terminal strip mtg) | | 14A70876 | Insulator, coil sleeve | |
| 9A472148 | Receptacle, antenna | | 14B78007 | Insulator, slug: bakelite | |
| 5S7771 | Rivet: .088 x 3/16 stl; nkl pl (tube socket mtg) | | 2A77596 | Nut, floating: without ear (on manual lead screw) | |
| 5S7706 | Rivet: .122 x 1/8; stl; nkl pl (center post ground clip mtg) | | 2A78005 | Nut, floating: with ear (on manual lead screw) | |
| 5S7707 | Rivet: .122 x 5/32; stl; nkl pl (terminal strip and output trans mtg) | | 64A77593 | Plate, tuner front | |
| 5S7701 | Rivet: .122 x 3/16; stl; nkl pl (vibrator grounding clip mtg) | | 5S7770 | Rivet: .088 x 5/32; stl; nkl pl (slug insulator mtg) | |
| 3S8140 | Screw, sheet metal: #8 x 3/16 PKZ plain hex head; cad pl (tuner mtg) | | 47A78002 | Rod, carriage guide | |
| 3S7454 | Screw, sheet metal: #8 x 1/4 plain hex head; stl; cad pl (capacitor bracket assembly and spark plate mtg) | | 3S7352 | Screw, machine: 8-32 x 2 slotted round head; stl; cad pl (front plate mtg) | |
| 3S3397 | Screw, sheet metal: #8 x 5/16 PKZ plain hex head; cad pl (power transformer mtg) | | 43A70881 | Sleeve, coil (iron) | |
| 9A70208 | Socket, tube: 4-pin; with grounding lug (vibrator socket) | | 41A77595 | Spring, coil slug | |
| 9A472534 | Socket, tube: miniature; 7-prong... | | 41A77592 | Spring, compression | |
| 9K580218 | Socket, tube: miniature; 8-prong... | | 42A21577 | Washer, "C": spring (manual lead screw mtg) | |
| 31C4079 | Strip, terminal: 1 insulated lug, end mtg | | 4A70873 | Washer, coil spacer | |
| 31A472573 | Strip, terminal: 2 insulated lugs, #2 mtg | | 4A74571 | Washer, fishpaper | |
| | | | 4A70956 | Washer, slug insulator | |
| | | | 4K485653 | Washer, spring (manual lead screw mtg) | |

MODEL 601

ALIGNMENT

Remove receiver front and rear housings to expose all adjustments.

Connect a 6 volt battery to BAT terminal and chassis.

Connect a low range output meter across speaker voice coil and set volume control at maximum. For greatest accuracy, keep output of receiver at approximately 1 watt

(1 watt = 1.79 volts on output meter) throughout alignment by reducing signal generator output as stages are brought into alignment. Use a small fibre screwdriver when aligning IF and diode transformers. A special tool, Motorola Part No. 56A76278, is required for adjusting the tuner cores. **IMPORTANT:** Do not push in on the alignment tool when adjusting the tuner cores; the slightest inward pressure may move tuner carriage and result in inaccurate alignment.

ALIGNMENT CHART

| STEP | DUMMY ANTENNA | GENERATOR CONNECTION | GENERATOR FREQUENCY | TUNER SET TO | ADJUST | REMARKS |
|--------------------|---------------|----------------------------------|---------------------|------------------------------------------------------------------------------------|--------------|---------------------------------------------------------------|
| IF ALIGNMENT 1. | .1 mf | 6BE6 grid (pin #7) & chassis | 455 Kc | High frequency end (cores out) | 1, 2, 3, & 4 | Peak for maximum in order indicated. Check by repeating step. |
| RF ALIGNMENT 2. | See Fig. 1 | Antenna receptacle through dummy | 1610 Kc | High frequency end; cores should project 1-1/8" from cans (Screw out if necessary) | 5, 6, & 7 | Peak for maximum in order indicated. |
| 3. | " | " | 1425 Kc | 1425 Kc -per Fig. 1 | 8, 9 & 10 | Peak for maximum in order indicated. |

4. When receiver is installed in car, extend antenna fully, set dial to approximately 1400 Kc and repeak antenna trimmer (7) for maximum volume of a weak station or noise between stations.

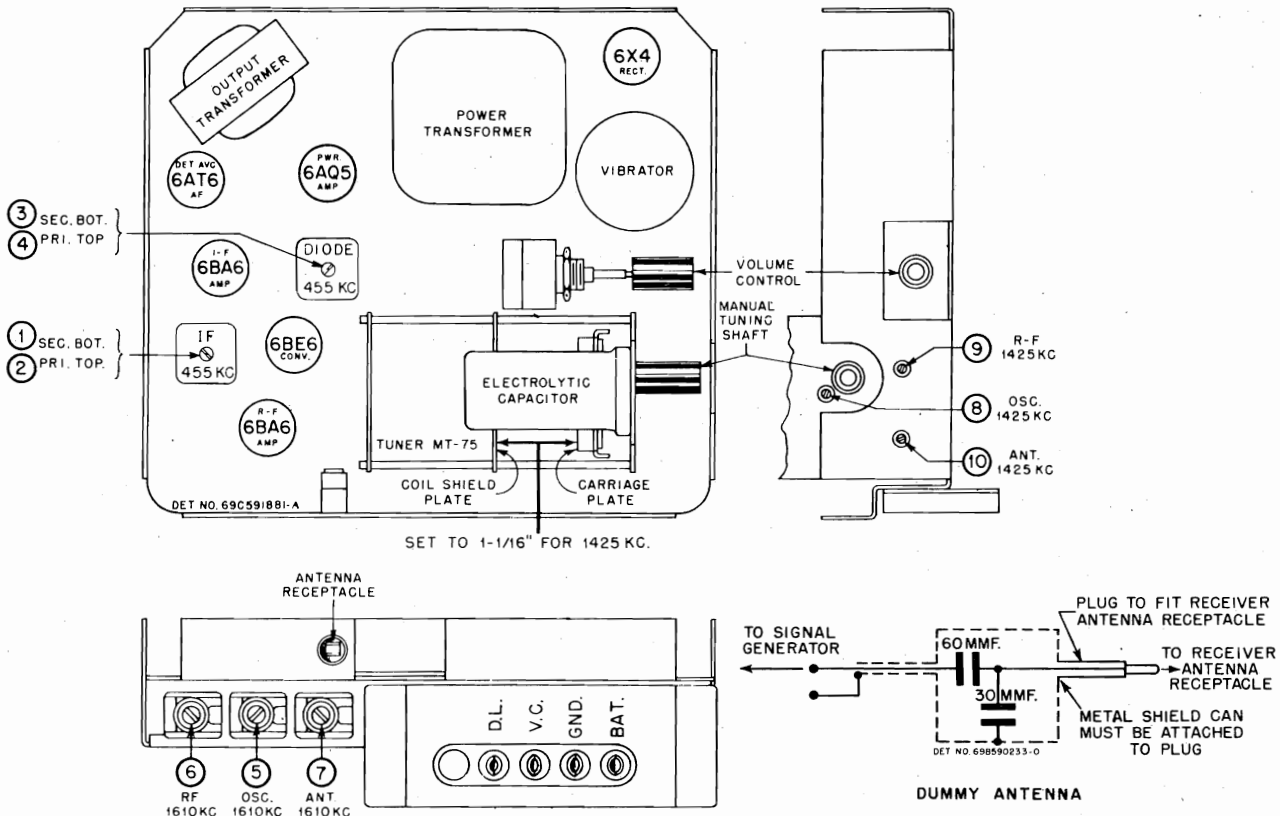


FIGURE 1. TUBE & TRIMMER LOCATIONS AND DUMMY ANTENNA

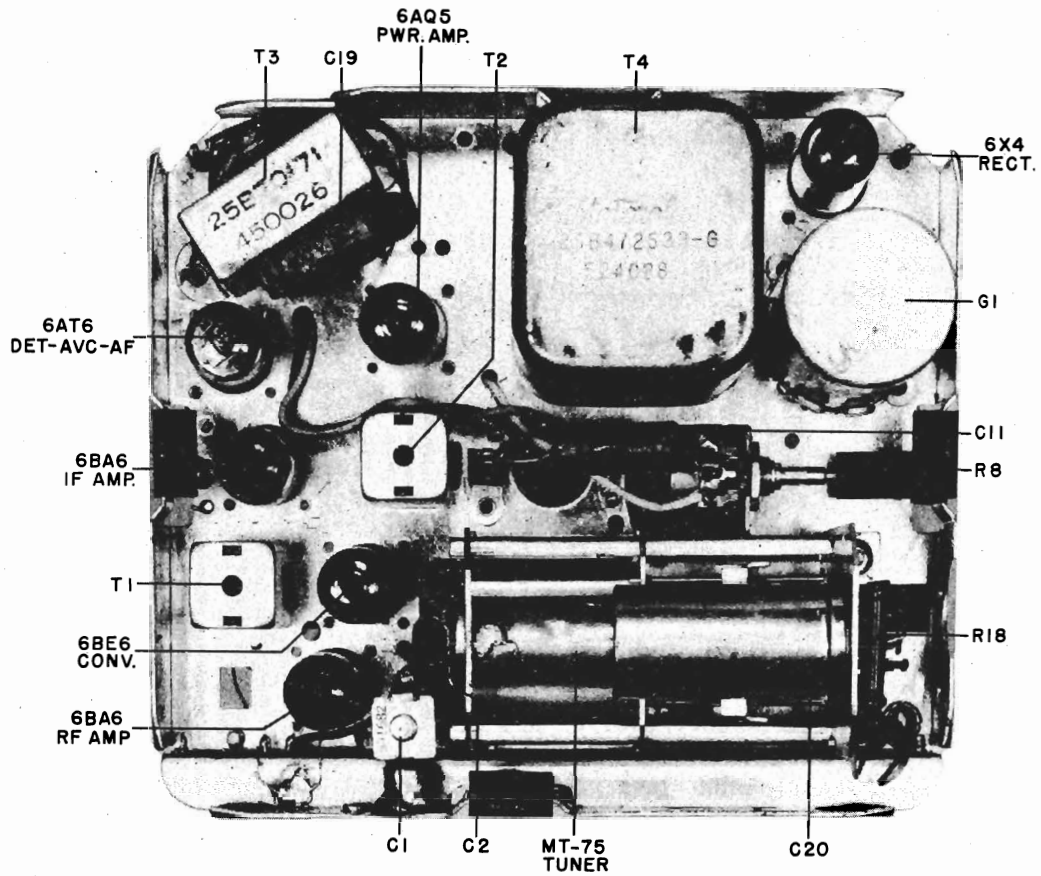


FIGURE 2. TOP VIEW OF CHASSIS

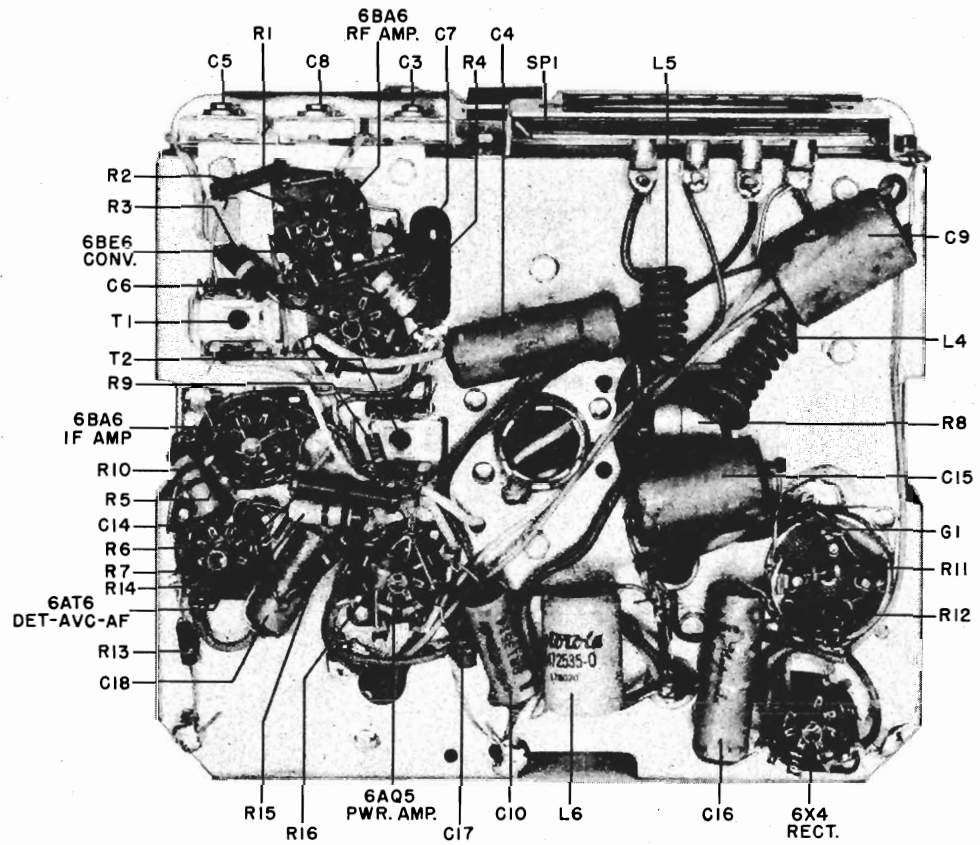


FIGURE 3. BOTTOM VIEW OF CHASSIS

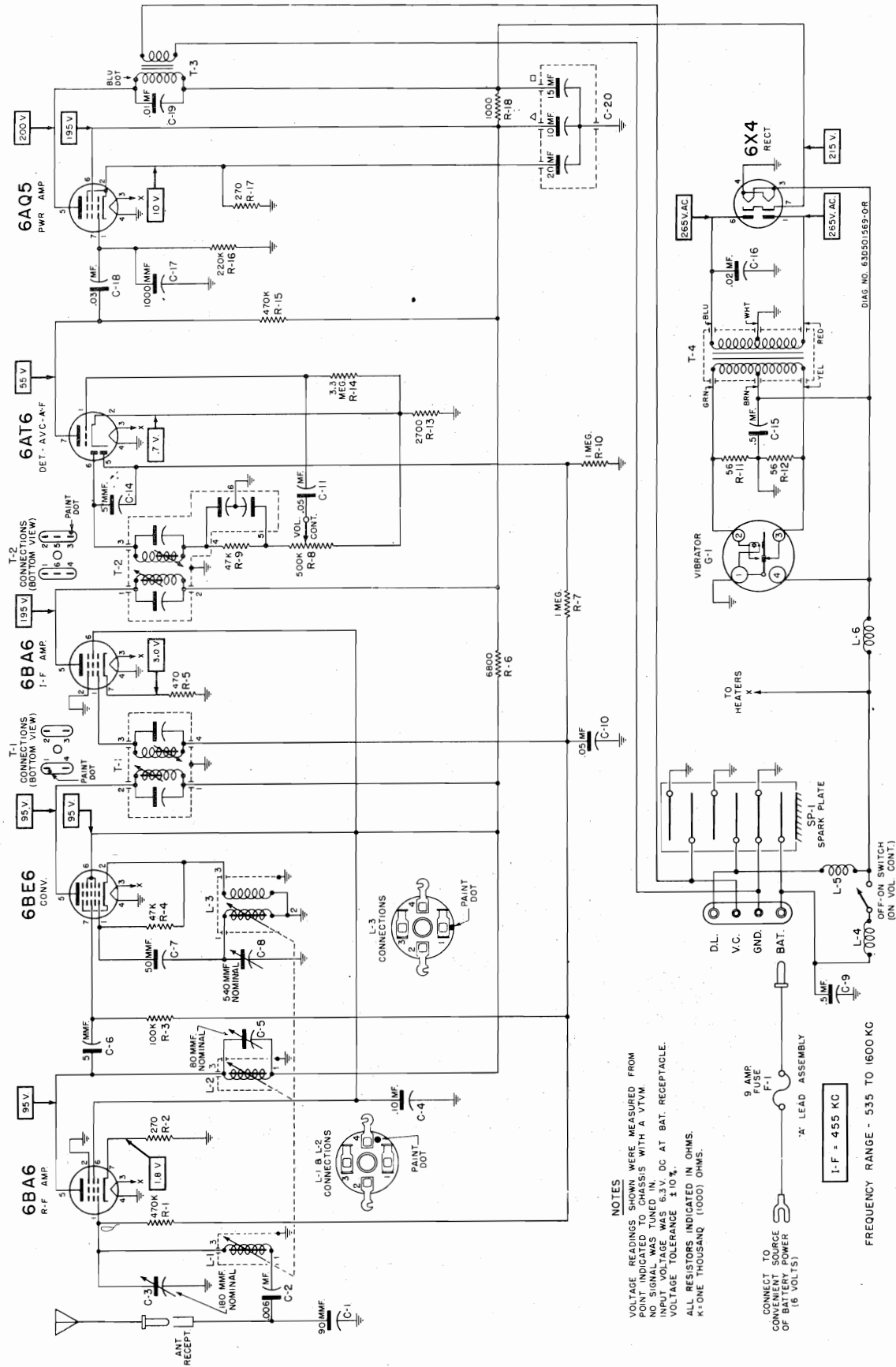


FIGURE 4. SCHEMATIC DIAGRAM

NOTES
 VOLTAGE READINGS SHOWN WERE MEASURED FROM POINT INDICATED TO CHASSIS WITH A VTVM. NO SIGNAL WAS TUNED IN.
 INPUT VOLTAGE WAS 6.3 DC AT BAT. RECEPTACLE. VOLTAGE TOLERANCE ±10%.
 ALL RESISTORS INDICATED IN OHMS. K-TONE THOUSAND (1000) OHMS.

CONNECT TO POINT OF BATTERY POWER (6 VOLTS)
 9 AMP FUSE F-1
 * LEAD ASSEMBLY
 I-F = 455 KC
 FREQUENCY RANGE - 535 TO 1600 KC
 OFF-ON SWITCH (ON VOL. CONT.)

MODEL 604,
Dodge, Plymouth**GENERAL INFORMATION**

TYPE - Automotive type superheterodyne receiver, designed to operate from a 6 volt storage battery. This receiver is specifically designed to fit Plymouth P-19, P-20 and Dodge D-33 and D-34 cars.

TUNING RANGE - 535 to 1605 Kc

IF FREQUENCY - 455 Kc

TUBE COMPLEMENT - 6BA6 - RF Amplifier
6BE6 - Oscillator-Modulator
6BA6 - IF Amplifier

6AT6 - Detector, AVC & 1st Amplifier
6V6GT - Power Amplifier
6X4 - Rectifier

POWER SUPPLY - Input is 6.3V DC at 7.1 amperes

INSTALLATION & OPERATING INSTRUCTIONS

Refer to Figure 1 for operating control locations.

TO TURN THE RADIO ON. Turn the left-hand knob (volume control) clockwise until a click is heard.

MANUAL TUNING. Tune stations with the right-hand knob.

PUSH BUTTON TUNING. After stations have been set up, it is only necessary to push in the button (1, 2, 3 or 4) that has been set to the desired station. Push the button all the way in, to make sure that the station will be tuned in correctly.

TONE CONTROL. The TONE push button operates a three-position tone control. Push the button until the most pleasing tone is obtained.

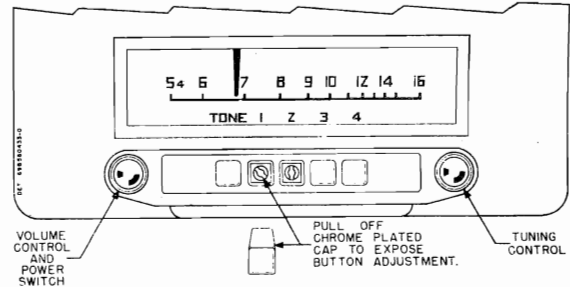


FIGURE 1. PUSH BUTTONS AND CONTROLS

TO SET THE PUSH BUTTONS

Push buttons should preferably be set up in daytime since weak station signals are stronger at night and the button may be set on a distant station carrying the same program as the desired station.

1. Turn radio ON (see Operating Instructions) and allow it to warm up for at least 15 minutes. Antenna should be fully extended and tone control in high position.

2. Pull off the chrome plated push button caps from buttons 1, 2, 3 and 4, exposing the knurled metal buttons. See Figure 1.

3. Unlock the four push button settings by turning each knurled button counterclockwise about one turn.

CAUTION: Never turn buttons more than two turns in a counterclockwise direction.

4. With the tuning knob, tune in the station to be set up on No. 1 button. Select only the best and most powerful local stations.

5. Push in the No. 1 button as far as it will go and tighten knurled button securely.

6. Perform steps 4 and 5 for the remaining three push buttons.

7. After all buttons have been set up, check if they can be tuned in more accurately with the tuning knob. If so, unlock button and reset it.

8. A push button may be reset at any time by unlocking the push button, tuning in a new station, and resetting as in step 5.

9. Replace push button caps with the notched side down.

ALIGNMENT**EQUIPMENT REQUIRED**

1. A special tool for adjusting the tuner cores. Use Alignment Tool, Motorola Part No. 66A76278.
2. A small fibre screwdriver for IF & RF alignment.
3. An accurately calibrated AM modulated signal generator.
4. A low range output meter.
5. A dummy antenna for RF alignment. Construct dummy antenna as shown in Figure 2.

PROCEDURE

1. Remove the housing and dial scale to expose all alignment adjustment screws.
2. Connect the output meter across speaker voice coil.
3. Connect a 6 volt storage battery to receiver battery receptacle and chassis. Turn receiver on and allow it to warm up for a few minutes. Set receiver volume control at maximum and tone control

to treble (high) position.

4. For greatest accuracy, keep output of receiver at approximately 1 watt (1 watt = 1.79 volts on output meter) throughout alignment by reducing generator output (not receiver volume control) as stages are brought into alignment.

5. IF & RF ALIGNMENT. See Alignment Chart & Figure 2.

IMPORTANT: Do not push in on the alignment tool when adjusting the tuner cores. The slightest inward pressure on the alignment tool may move the tuner carriage and result in inaccurate alignment.

CAUTION: Do not press hard on the alignment screwdriver when aligning the IF & diode transformers as damage to the core or transformer may result.

6. ANTENNA TRIMMER ADJUSTMENT. Once alignment has been satisfactorily performed, no further adjustment of any alignment screws should be made except to align the antenna trimmer (7) to car antenna after receiver is installed in car. This adjustment should be made with antenna fully extended and receiver set to approximately 1400 Kc. Peak the trimmer for maximum volume of a weak station or background noise between stations.

MODEL 604, Dodge,
Plymouth

ALIGNMENT CHART

| STEP | TUNER SET TO | DUMMY ANTENNA | SIGNAL GENERATOR CONNECTED TO | SIGNAL GENERATOR FREQUENCY | ADJUST TRIMMER OR CORE | REMARKS |
|---------------------|------------------------------------------------------------------------|---------------|-------------------------------------------------|----------------------------|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| IF ALIGNMENT | | | | | | |
| 1. | High frequency end (cores out) | .1 mf | Hi side - 6BE6 grid (pin #7) Lo side-chassis | 455 Kc | 1, 2, 3 & 4 | Peak for maximum in order indicated. Check by repeating procedure. |
| RF ALIGNMENT | | | | | | |
| 2. | High frequency end, cores should project 1-1/8" from cans. (Screw out) | See Fig. 2 | Ant receptacle through dummy | 1605 Kc | 5, 6 & 7 | Peak for maximum in order indicated. |
| 3. | Set spacing between treadle bar & tuner frame to 21/32". See Fig. 2 | " | " | 1300 Kc | 8, 9 & 10 | Peak for maximum in order indicated. Replace dial scale and set pointer to 1300 Kc by means of pointer adjustment eccentric. See Figure 2- |

REF. NO. PART NO. DESCRIPTION

CHASSIS PARTS - ELECTRICAL

CAPACITORS

| | | |
|------|-----------|----------------------------------------------|
| C-1 | 21B77562 | Ceramic: 100 mmf 500V |
| C-2 | 8C4529 | Paper: .006 mf 100V |
| C-3 | 20A77536 | Variable, mica: 50 mmf to 280 mmf 500V |
| C-4 | 8K13514 | Paper: .05 mf 100V |
| C-5 | 21K70720 | Molded: 5 mmf 500V |
| C-6 | 20A481526 | Variable, mica: 20 mmf to 180 mmf 500V |
| C-7 | 8K13166 | Paper: .1 mf 400V |
| C-8 | 8C580845 | Paper: .5 mf 100V |
| C-9 | 8K13514 | Paper: .05 mf 100V |
| C-10 | 20A77537 | Variable, mica: 5 mmf to 88 mmf 500V |
| C-11 | 21K74661 | Ceramic: 50 mmf 300V |
| C-12 | 21K580276 | Ceramic: 220 mmf 5% 500V |
| C-13 | 8C580845 | Paper: .5 mf 100V |
| C-14 | 8K13514 | Paper: .05 mf 100V |
| C-15 | 21K74661 | Ceramic: 50 mmf 300V |
| C-16 | 8K12840 | Paper: .006 mf 1600V |
| C-17 | 21K481377 | Ceramic: 500 mmf |
| C-18 | 8K71910 | Paper: .006 mf 400V |
| C-19 | 8K71911 | Paper: .03 mf 400V |
| C-20 | 8K71910 | Paper: .006 mf 400V |
| C-21 | 23A473015 | Electrolytic: 30-30-20 mf/350-300-25V |

FUSE

F-1 65X12894 Fuse, tubular: 14 amp

VIBRATOR

G-1 48B3333 Vibrator, non-sync: 4-pin

PILOT LIGHT

I-1 65X10867 Bulb: 6.3V .25A tubular; bayonet base; clear; #44

COILS

| | | |
|-----|-----------|------------------------------------------------------------------------|
| L-1 | 24B580278 | Antenna coil (specify color coding on old coil when ordering) |
| L-2 | 24K580557 | RF coil (specify color coding on old coil when ordering) |
| L-3 | 24B580279 | Oscillator coil (specify color coding on old coil when ordering) |
| L-4 | 24A472535 | Choke, hash |

SPEAKER

LS-1 50B580175 or
50B580176 or
50B485788 Speaker: 5 x 7 oval type; PM; 3.2 ohm voice coil

RESISTORS

Note: All resistors are carbon insulated type unless otherwise specified.

| | | |
|-----|--------|------------------------|
| R-1 | 6R6032 | 470,000 20% 1/2W |
| R-2 | 6R6075 | 100,000 20% 1/2W |

REF. NO.

PART NO.

| | | |
|------|-----------|----------------------------------|
| R-3 | 6R6012 | 33,000 20% 1/2W |
| R-6 | 6R5554 | 390 10% 1/2W |
| R-7 | 6R6287 | 6800 20% 1W N.I. |
| R-8 | 6R6004 | 1 meg 20% 1/2W |
| R-9 | 6R5614 | 56 10% 1/2W |
| R-10 | 6R5614 | 56 10% 1/2W |
| R-11 | 18A485390 | Volume Control: .5 meg; with sw. |
| R-12 | 6R6056 | 47,000 20% 1/2W |
| R-13 | 6R2118 | 3.3 meg 20% 1/2W |
| R-14 | 6R6428 | 6800 10% 1/2W |
| R-15 | 6R6054 | 10,000 20% 1/2W |
| R-16 | 6R6032 | 470,000 20% 1/2W |
| R-17 | 6R6032 | 470,000 20% 1/2W |
| R-18 | 6R6434 | 27,000 10% 1/2W |
| R-19 | 6R6004 | 1 meg 20% 1/2W |
| R-20 | 6R6389 | 220 10% 1W |
| R-21 | 6R476004 | 1000 20% 2W |
| R-22 | 6R6432 | 270 10% 1/2W |

SWITCHES

| | |
|-----|--------------------------------------------------|
| S-1 | Power Switch (part of volume control R-11) |
| S-2 | Tone Control (see Tuner AT-63A Parts List) |

SPARK PLATE

SP-1 1B485528 Spark Plate Assembly

TRANSFORMERS

| | | |
|-----|-----------|-------------------------------|
| T-1 | 24B485553 | IF, 455 Kc: complete |
| T-2 | 24K485554 | Diode, 455 Kc: complete |
| T-3 | 25B70171 | Output Transformer |
| T-4 | 25K580539 | Power Transformer |

PART NUMBER

DESCRIPTION

CHASSIS PARTS - MECHANICAL

| | |
|-----------|-------------------------------------------------------------------------|
| 43A489319 | Bearing, pointer link mtg |
| 43A580213 | Bushing, receiver mounting |
| 42A485548 | Clip, can mounting (T-1 & T-2 mtg). |
| 42A4215 | Clip, vibrator grounding |
| 29R5282 | Lug, soldering: #10; plain long tab |
| 52A580636 | Pointer, dial |
| 1X580507 | Pointer Link Plate, Arm and Rivets Assembly: less pointer |
| 9A472148 | Receptacle, antenna input |
| 5S7771 | Rivet: .088 x 3/16; stl; nkl pl (min tube socket mtg) |
| 5S7706 | Rivet: .122 x 1/8; stl; nkl pl (ground strip and light shield mtg) |
| 5S7701 | Rivet: .122 x 3/16; stl; nkl pl (vibrator socket mtg) |

MODEL 604,
Dodge, Plymouth

| PART NUMBER | DESCRIPTION |
|------------------------|------------------------------------------------------------------------------------------------------|
| 5S7707 | Rivet: .122 x 5/32; stl; nkl pl (oc-tal tube socket and terminal strip mtg) |
| 5S7700 | Rivet: .122 x 1/4; stl; nkl pl (out-put trans mtg) |
| 34C591923 | Scale, dial |
| 3S7506 | Screw, sheet metal: #6 x 1/4 PKZ plain hex head; stl; cad pl (dial scale mtg) |
| 3S7454 | Screw, sheet metal: #8 x 1/4 PKZ plain hex head; stl; cad pl (tuner, spkr plate and wiper mtg) |
| 3S3397 | Screw, sheet metal: #8 x 5/16 PKZ plain hex head; stl; cad pl (power trans mtg) |
| 3S8176 | Screw, sheet metal: #10 x 3/8 PKZ plain hex head; stl; cad pl (spkr mtg).. |
| 26A485262 | Shield, light: end; (on spkr plate) |
| 24B485268 | Shield, light: painted (on spkr plate) |
| 30B580838 | Shield, spiral (lead shield)..... |
| 26A592419 | Shield, tube: spring type |
| 9A485228 | Socket, pilot light: includes bracket. |
| 9A472534 | Socket, tube: miniature; 7-prong |
| 9K580218 | Socket, tube: miniature; 7-prong (for 6BE6 tube) |
| 9A6788 | Socket, tube: octal |
| 9A70208 | Socket, vibrator: 4-prong |
| 1X485536 | Speaker Plate, Stud and Shield Assembly |
| 41A590038 | Spring, pointer arm backlash |
| 42A580578 | Strip, ground (grounds tuner to chassis) |
| 31K86126 | Strip, terminal: 2 insulated lugs, #2 mtg |
| 31A472573 | Strip, terminal: 2 insulated lugs, #2 mtg (choke mtg) |
| 46A485229 | Stud, speaker plate mtg |
| 4S1719 | Washer, flat: 3/8 x .140 x .030 thick; stl; cad pl (output trans mtg). |
| 4A590466 | Washer, spring (pointer bearing re-tainer) |
| 39A591197 | Wiper, ground |
| HOUSING PARTS | |
| 42A580509 | Clip, dial crystal retainer..... |
| 39A28036 | Clip, grounding (on rear cover)..... |
| 39A580575 | Clip, tension (on front hsng)..... |
| 15K591954 | Cover, housing bottom |
| 61K580238 | Crystal, dial: glass |
| 13D590448 | Escutcheon, push button: chrome plated |
| 32B580722 | Gasket, radio mounting: rubber |
| 1X580506 | Housing, front: includes receiver mtg gasket & crystal |
| 1X590344 | Housing, rear |
| 2S2869 | Nut, mounting: 7/16-28; round; knurled (PB escutcheon mtg) |
| 32A580577 | Pad, dial crystal cushion; 6-1/4" long |
| 32K590510 | Pad, dial crystal cushion; 1-5/8" long |
| 5S7706 | Rivet: .122 x 1/8; stl; nkl pl (front housing clip mtg) |
| 3S7205 | Screw, machine: 8-32 x 1/4; slotted hex head; locking type; stl; cad pl (front housing mtg) |
| 3S7475 | Screw, sheet metal: #8 x 1/4 PKZ slot-ted acorn head; stl; cad pl (housing screws) |
| 2A580224 | Thumbscrew (bottom cover retaining)... |
| ACCESSORY PARTS | |
| 7B580009 | Bracket, radio mounting (Dodge) |
| 7B580877 | Bracket, radio mounting (Plymouth).... |
| 15A485225 | Cap, push button: chrome plated |
| 8A580014 | Capacitor, radio interference |
| 15A485342 | Cover, receiver mounting nut: chrome pl |
| 1X580809 | Knob, control: chrome plated |
| 9K591242 | Lead Assembly, radio to ignition sw.... |
| 4S2641 | Lockwasher, int-ext tooth: 3/4 x 1/4; stl; cad pl (for radio mtg brkt mtg screw) |
| 2S7022 | Nut, hex: 1/4-20 x 7/16; stl; cad pl (for radio mtg brkt mtg screw).... |

| PART NUMBER | DESCRIPTION |
|-------------------------------|--------------------------------------------------------------------------------------------|
| 2S1393 | Nut, hex: 5/16-18 x 1/2; stl; cad pl (radio mtg) |
| 2A485540 | Nut, hex: 7/16-28 x 9/16; cad pl (radio mtg) |
| 3A591799 | Screw, machine: special; with cup washer; 21/32" lg; stl; cad pl (radio mtg) |
| 3K591900 | Screw, machine: special; with cup washer; 15/16" lg; stl; cad pl (radio bracket mtg) |
| 4A590795 | Washer, cup: stl; cad pl (radio mtg) |
| AUTOMATIC TUNER AT-63A | |

Note: Tuner replacement electrical parts not listed here are listed under Chassis Parts - Electrical. When ordering replacement coils or tuning cores, specify color coding on old coil or core.

| | |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 51D590440 | AT-63A Automatic Tuner Assembly: comp |
| 45A485508 | Arm, push button cap support |
| 42A70184 | Clip, core adjustment (on tuning core screws) |
| 42A472671 | Clip, guide rod retainer: spring steel |
| 1A580751 | Core Bar Assembly: complete with bake-lite core insulator, carriage guide brkt, pointer actuating arm with link drive pin, pointer adjustment eccentric & 2 bearing eyelets |
| 46K580518 | Core, Iron & Screw (ant, RF & osc tuning cores)(specify color coding on old core when ordering) |
| 5S7862 | Eyelet: .130 x .155; brass (coil shield mtg) |
| 5S7819 | Eyelet: .185 x .187; brass (core bar bearings) |
| 51X591557 | Gear Assembly, crown drive |
| 5K580504 | Grommet, insulating: rubber (ant & RF coil mtg) |
| 5K580503 | Grommet, insulating: rubber (osc coil mtg) |
| 29A580756 | Lug, carriage retainer |
| 51A591149 | Pinion Shaft & Drive Disc Assembly.... |
| 51X590124 | Ratchet & Contact Assembly (tone control) |
| 5S8497 | Rivet: .088 x 1/8; stl; nkl pl (ratchet stop spring mounting) |
| 5S7771 | Rivet: .088 x 3/16; stl; nkl pl (tone control assem mtg) |
| 5S7707 | Rivet: .122 x 5/32; stl; nkl pl (term strip mtg) |
| 47K580230 | Rod, guide (core bar guide) |
| 1A580209 | Screw, push button locking |
| 3S8140 | Screw, sheet metal: #8 x 3/16 PKZ; plain hex head; cad pl (trimmer mtg) |
| 51A591148 | Shaft Assembly, tuning (manual tuning shaft) |
| 26A485610 | Shield, coil |
| 41A77595 | Spring, coil core..... |
| 41A580287 | Spring, ratchet stop (tone control) |
| 41A580220 | Spring, treadle bar tension..... |
| 41A580223 | Spring, tuner locking screw (on push button locking screw) |
| 31A71802 | Strip, terminal: 1 insulated lug, #2 mtg |
| 46A485513 | Stud, tone switch push arm |
| 51X590123 | Tone Control Contact Assembly |
| 4K24124 | Washer, 'C' (tone ratchet retainer) |
| 4A21577 | Washer, 'C' (on core bar assembly) |
| 4A70956 | Washer, core insulator: bake-lite |
| 4A111189 | Washer, fibre (on core bar assembly) |
| 4A580644 | Washer, spring (on core bar assembly) |
| 4K580283 | Washer, spring (tone control assembly) |

MODEL 604,
Dodge, Plymouth

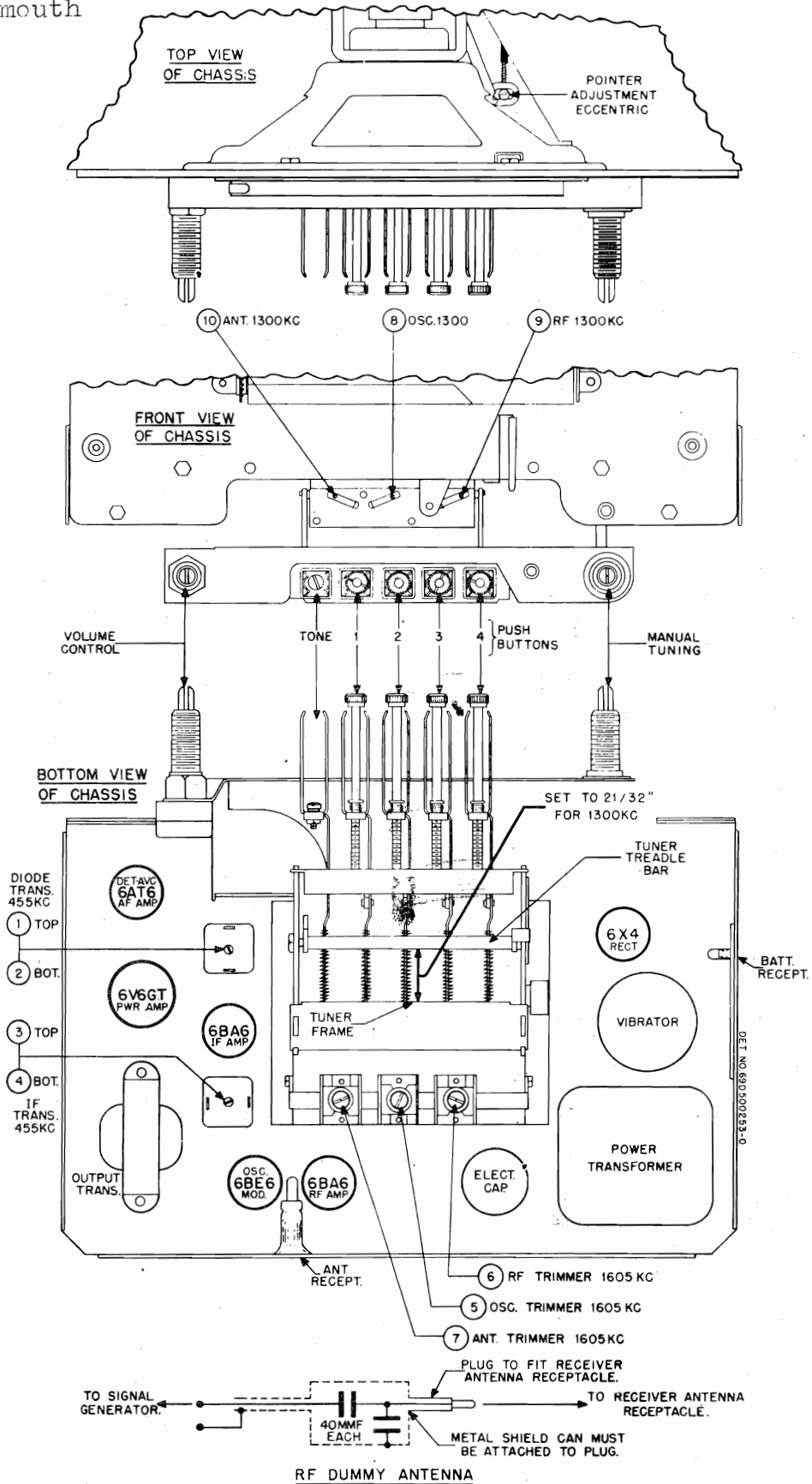


FIGURE 2. TUBE & TRIMMER LOCATION

MODEL 604,
Dodge, Plymouth

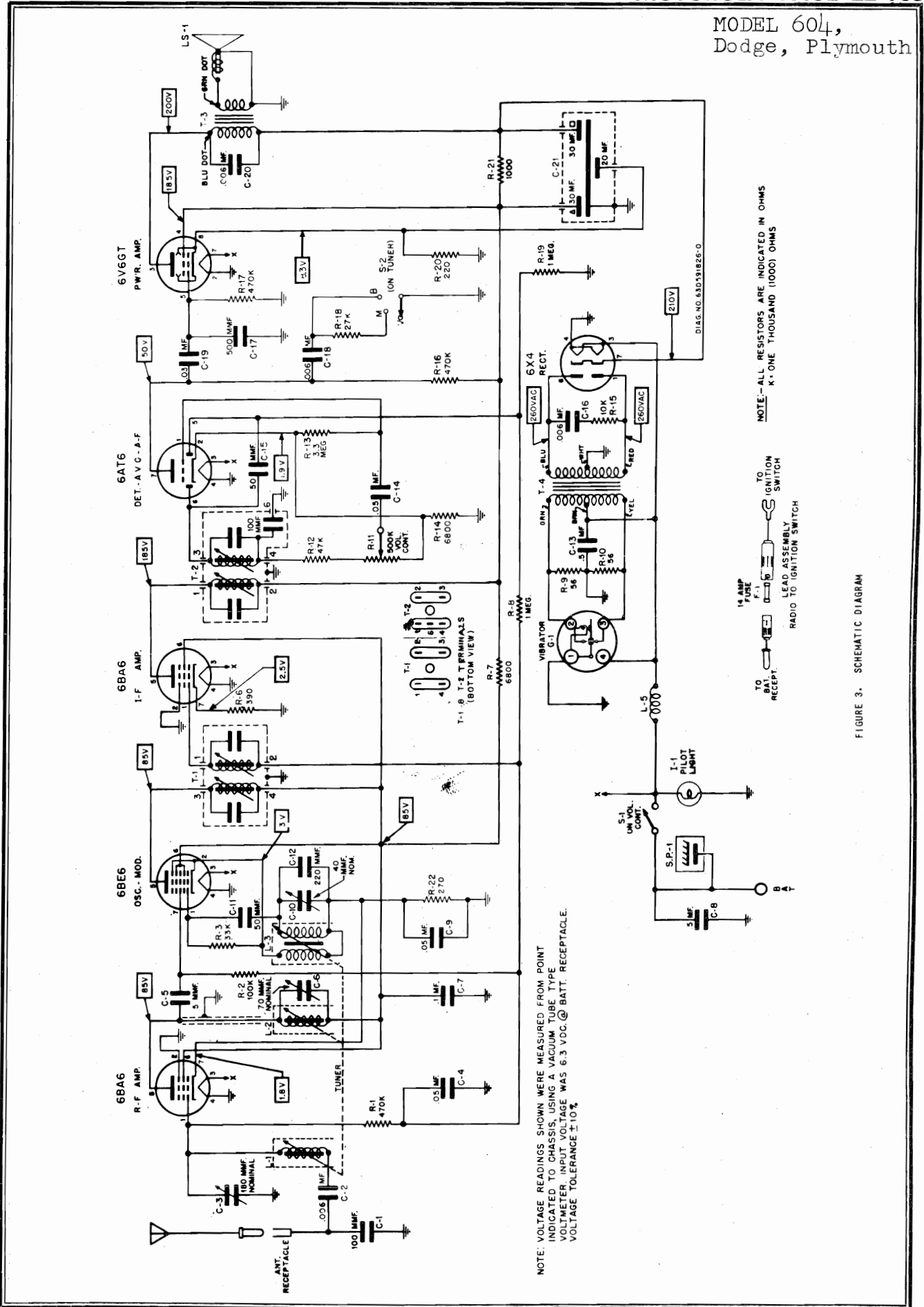
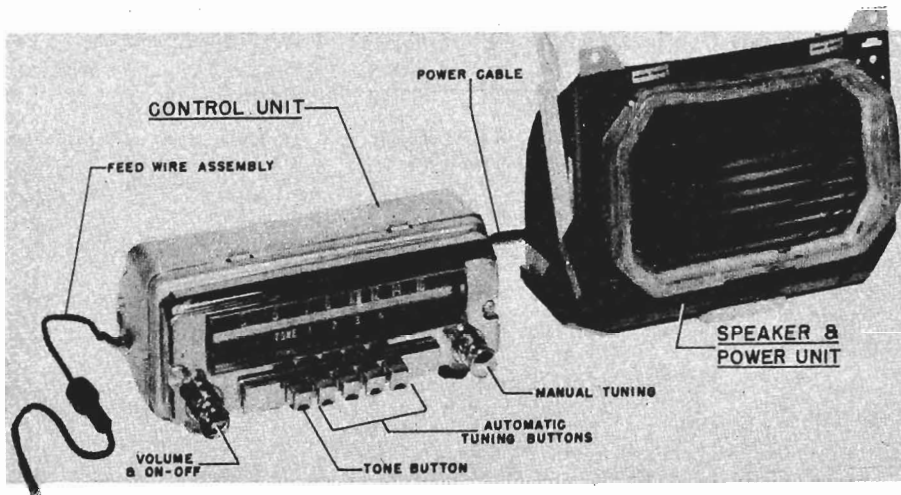


FIGURE 3. SCHEMATIC DIAGRAM

MODEL 606,
Plymouth



GENERAL INFORMATION

TYPE - Two-piece automotive type receiver, specifically designed for installation in Plymouth P-22 and P-23 cars.

TUNING RANGE - 540 to 1600 Kc. **IF FREQUENCY** - 455 Kc

POWER OUTPUT - 1.25 watts undistorted

TUNER - Model AT-84 or AT-89. See AT-84 and AT-89 Service Manuals for Replacement Parts.

TUBE COMPLEMENT - Control Unit

- 6BA6 - RF Amplifier
- 6BE6 - Converter
- 6BA6 - IF Amplifier
- 6AT6 - Det, AVC & AF Amplifier

Speaker & Power Unit

- 6AQ5 - Power Amplifier
- 6X4 - Rectifier

OPERATES FROM - 6.3 volts DC; 7.1 amperes

ALIGNMENT

EQUIPMENT REQUIRED:

1. A special tool for adjusting the tuner cores. Use alignment tool, Motorola Part No. 66A76278.
2. A small screwdriver for IF & RF alignment.
3. An accurately calibrated AM modulated signal generator.
4. A low range output meter.
5. A special dummy antenna for RF alignment. Construct dummy antenna as shown in Figure 1.

4. Connect 6.6 volts (measured at the "on-off" switch) to the receiver "BAT" terminal and chassis.

5. Turn the receiver on and allow it to warm up for a few minutes. Set receiver volume control at maximum and tone control to "high" position.

6. For greatest accuracy, keep the output of the receiver at 1 watt (1 watt = 1.79 volts on output meter) by reducing signal generator output (not receiver volume control) as stages are brought into alignment.

IMPORTANT: Do not push in on the alignment tool when adjusting the tuner cores. The slightest inward pressure on the alignment tool may move the tuner carriage and result in inaccurate alignment.

PROCEDURE:

1. To expose the alignment adjustments, remove the rear housing, escutcheon and dial scale & bracket assembly.
2. Connect Control Unit & Speaker and Power Unit together by means of the power cable.
3. Connect an output meter across the speaker voice coil.

7. Antenna Trimmer Adjustment. Once alignment has been satisfactorily performed, no further adjustment of any alignment screws should be made except to align the antenna trimmer (7) to car antenna after receiver is installed in car. This adjustment should be made with antenna fully extended and receiver set to approximately 1400 Kc. Peak the trimmer for maximum volume of a weak station or background noise between stations.

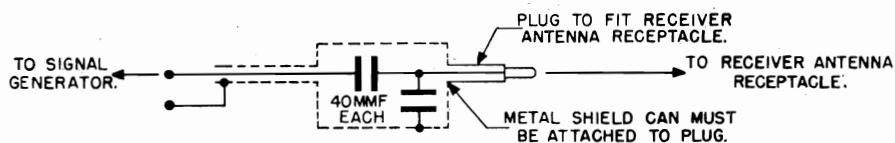


FIGURE 1. DUMMY ANTENNA

MODEL 606,
Plymouth

ALIGNMENT CHART

| STEP | DUMMY ANTENNA | GENERATOR CONNECTION | GENERATOR FREQUENCY | TUNER SET TO | ADJUST | REMARKS |
|-----------------------------------------------------------------------------------------------------------------|---------------------|------------------------------------------------|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------------------------------------------------------------------|
| IF ALIGNMENT | | | | | | |
| 1. | .1 mf | Hi side-6BE6 grid (pin #7) Low side-chassis | 455 Kc | Extreme high frequency end of travel | 1, 2 3 & 4 | Peak for maximum in order indicated. Check by repeating procedure. |
| RF ALIGNMENT | | | | | | |
| Note: Back out tuner cores 8, 9 & 10 until 1-3/16" of core projects from end of coil, before performing step 2. | | | | | | |
| 2. | Dummy-see Figure 1. | Ant receptacle through dummy antenna | 1610 Kc | Extreme high frequency end of travel | 5, 6 & 7 | Peak for maximum in order indicated. |
| 3. | " | " | 1400 Kc | With tuning knob, move carriage "in" until pointer is located 1-45/64" \pm 1/32" from tip of pointer to center of middle push button arm. | 8, 9, & 10 | Peak for maximum in order indicated. |
| 4. | " | " | 1610 Kc | With tuning knob, tune for maximum signal at high frequency end. | 6 & 7 | Peak for maximum in order indicated. |
| 5. | " | " | 1400 Kc | With tuning knob, tune to maximum signal | 9 & 10 | Peak for maximum in order indicated. |
| 6. | - | - | - | - | - | Repeat step 4. |

7. With set installed in car, peak ant trim (7) for maximum signal at approximately 1400 Kc. Car antenna should be fully extended.

OPERATING INSTRUCTIONS

ON-OFF SWITCH AND VOLUME CONTROL. To turn the receiver on, turn the left-hand control knob to the right until it "clicks" and the dial is illuminated. Allow the receiver to reach operating temperature (approximately 20 seconds). To increase the volume, continue to turn this control to the right. To turn the receiver off, turn this control knob to the left until it "clicks".

TUNING. Tuning is accomplished manually or automatically. Any one of four stations may be selected automatically by means of pushbutton control. To receive stations that are not set for automatic selection, use Manual tuning.

MANUAL TUNING. Select the desired station or program by turning the manual tuning knob (right-hand knob). Tune to the exact frequency position for clearest reception. The

pointer indicates the frequency to which the receiver is tuned.

AUTOMATIC TUNING. The four pushbuttons, located beneath the dial scale, may be set to four favorite local stations. Firmly pressing one of the pushbuttons automatically selects the station for which the pushbutton was set. The dial pointer will automatically indicate the frequency of the selected station.

TONE CONTROL. The TONE pushbutton operates a three-position tone control. Push the button until the most pleasing tone is obtained. You will find that static and other types of electrical interference will be minimized in the "Bass" position.

TO SET THE PUSHBUTTONS

The receiver has 4 buttons for automatic station selection.

To set the pushbuttons for automatic tuning, proceed as follows:

1. Turn volume up until stations can be heard.
2. Pull out button and with the manual tuning knob tune to the station desired.
3. Push button in. This station is now set for automatic

tuning.

4. Follow the same procedure for the remaining three buttons.

NOTE: The numbers on the dial scale indicate the frequency range of the receiver. Before setting the pushbutton, tune carefully until you are exactly on the station; tuning to either side of it will result in poor tone quality and excessive noise. When setting automatic tuning, it is preferred that the left-hand buttons tune in the lower KC stations and the right-hand buttons tune in the higher KC stations.

MODEL 606,
Plymouth

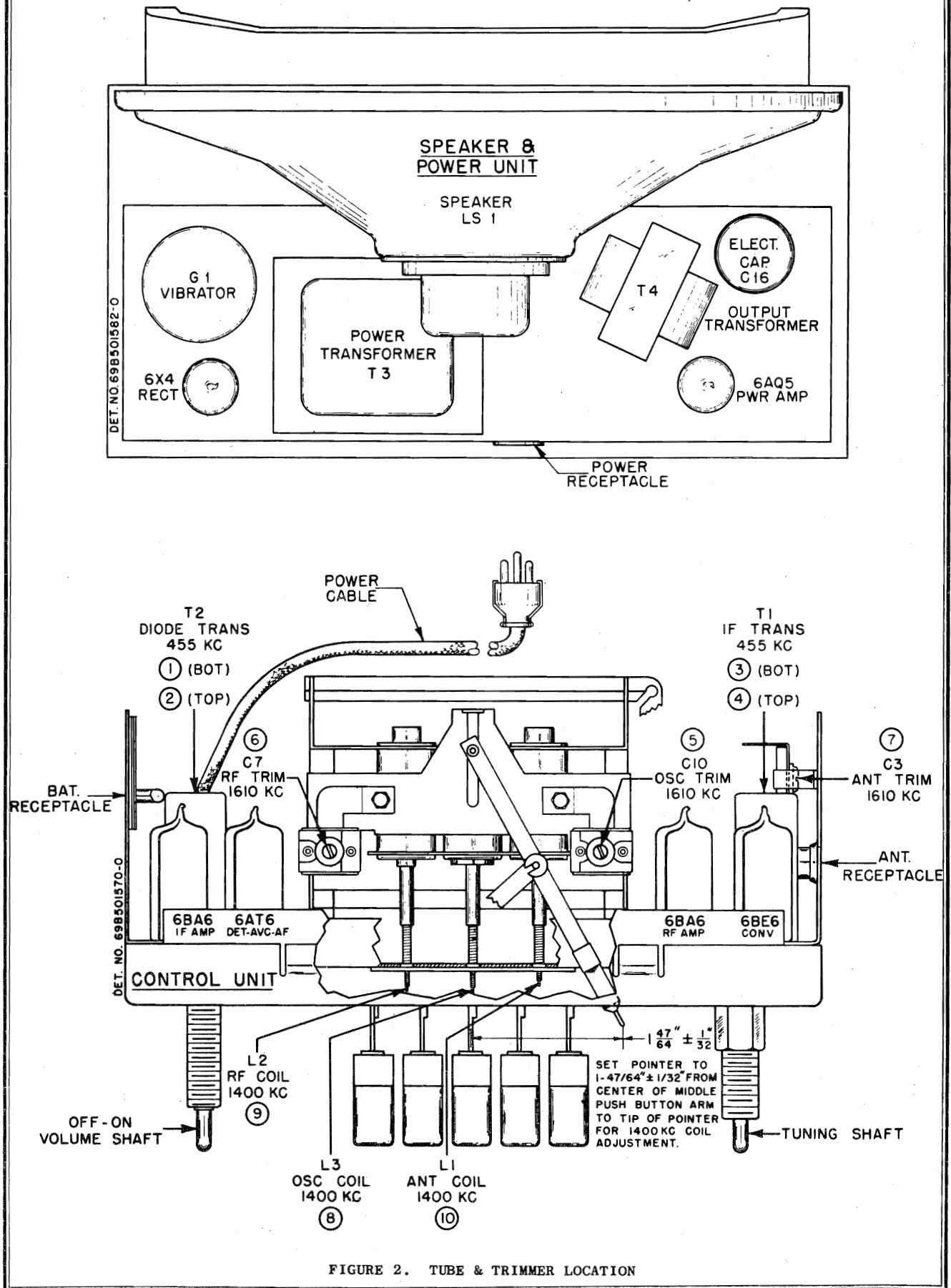


FIGURE 2. TUBE & TRIMMER LOCATION

MODEL 606,
Plymouth

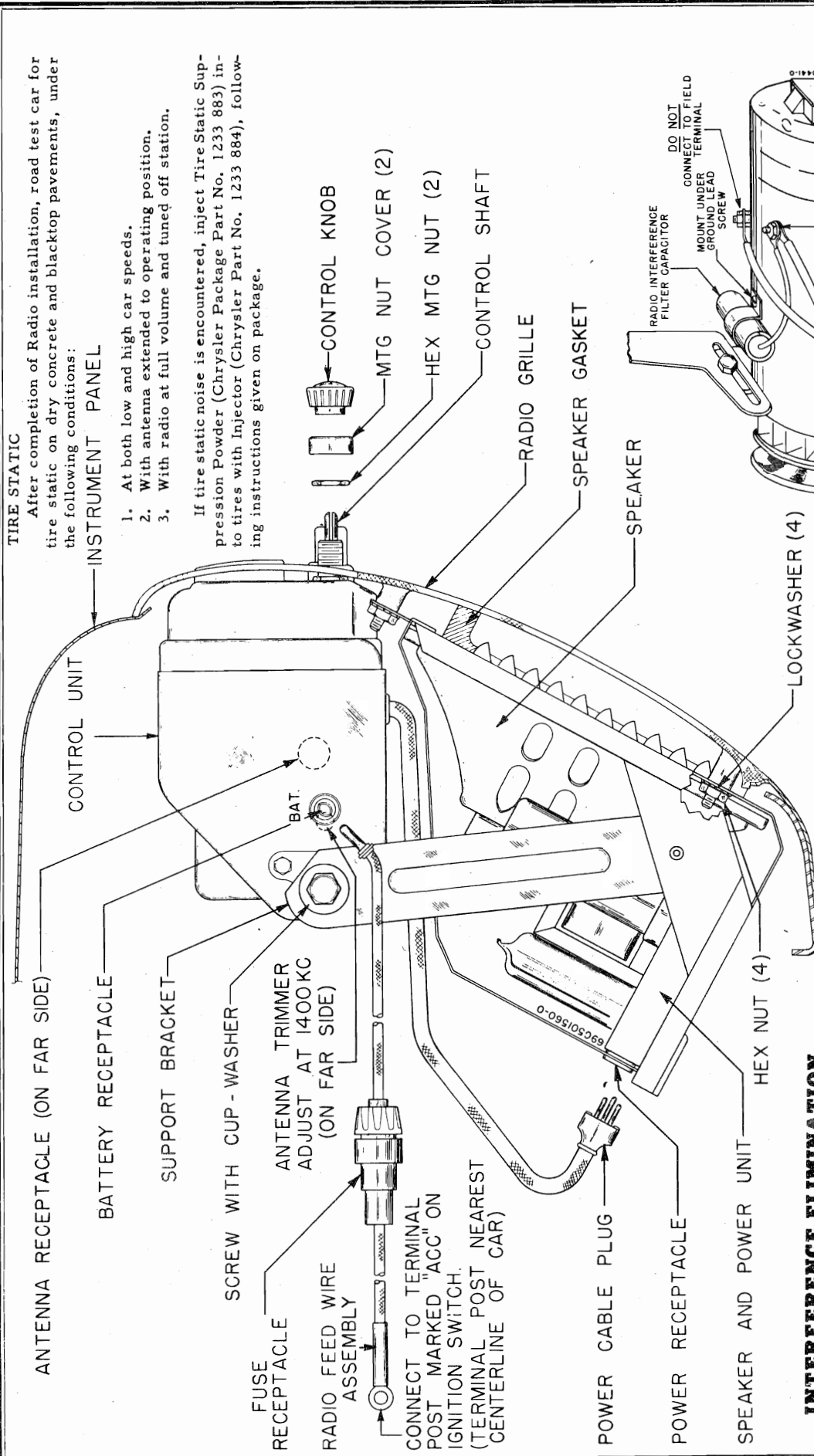


FIGURE 4. RADIO INSTALLATION

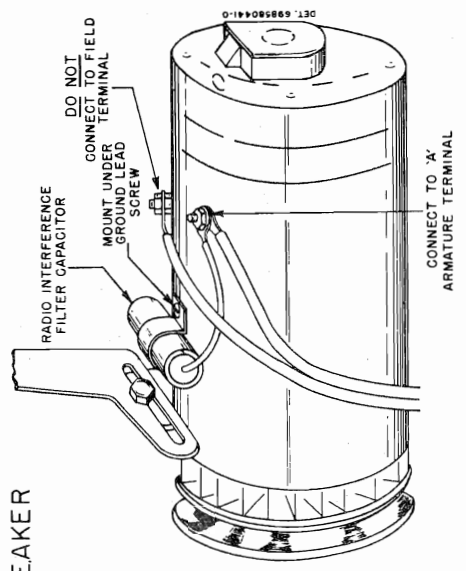


FIGURE 3. GENERATOR CAPACITOR INSTALLATION

INTERFERENCE ELIMINATION
GENERATOR INTERFERENCE

Install radio interference filter capacitor on generator as shown in Figure 3. Mount the capacitor on the generator frame under the ground lead screw. Connect the eyelet terminal on the capacitor lead to the armature terminal of the generator.

WARNING: Do not connect to field terminal; to do so will result in damage to voltage regulator.

MODEL 606,
Plymouth

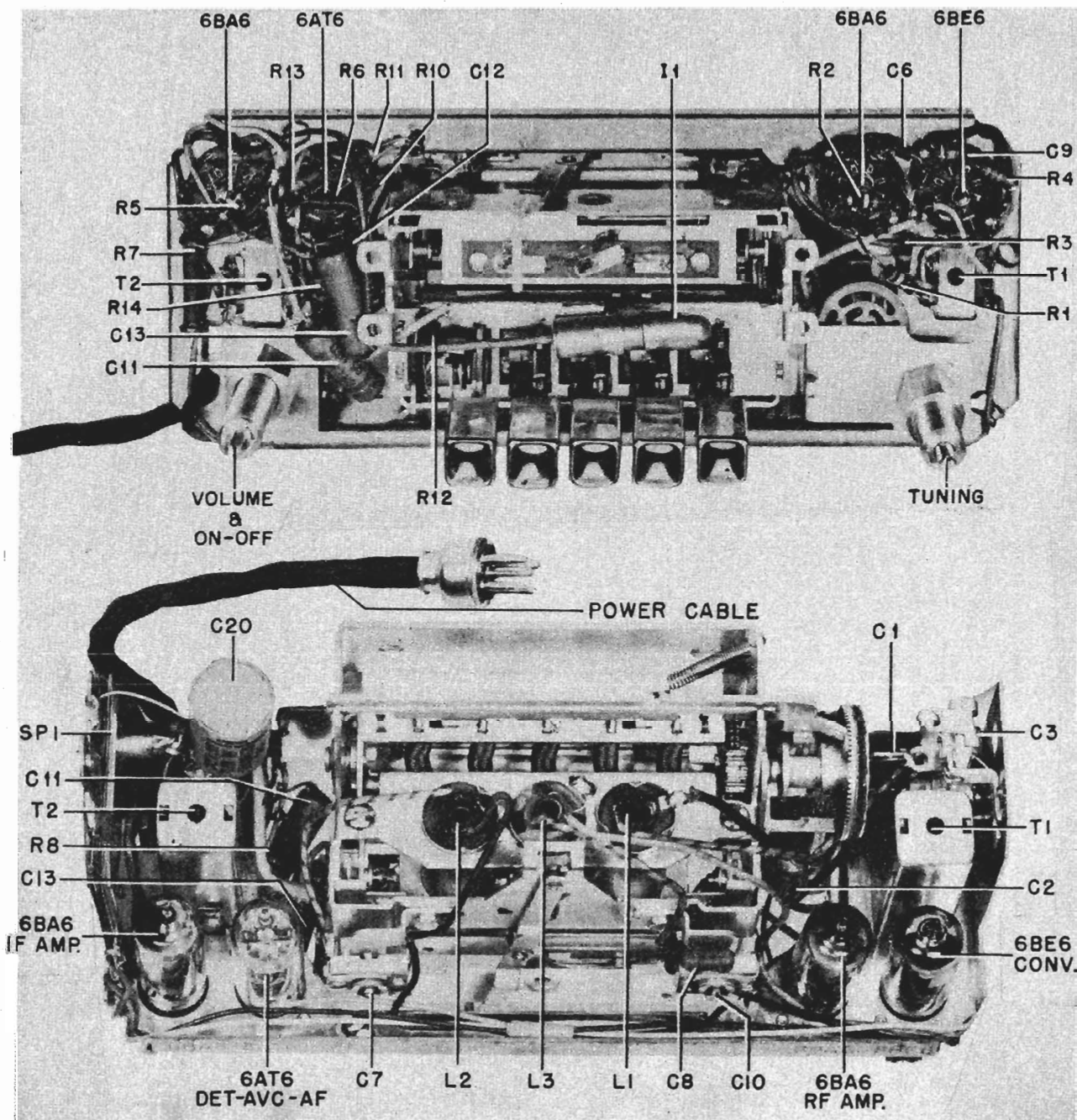


FIGURE 5. PARTS LOCATION - CONTROL UNIT

REPLACEMENT PARTS LIST

NOTE: When ordering parts specify model number of set in addition to part number and description of part.

| Ref. No. | Part Number | Description | Part Number | Description |
|--------------------------------------------------|-------------|-------------------------------------------------------|-------------|-------------------------------------------------------|
| CONTROL UNIT - CHASSIS PARTS - ELECTRICAL | | | | |
| Capacitors | | | | |
| C-1 | 21A591682 | Mica, metal: 90 mmf | C-9 | 21R6513 Mica: 50 mmf 10% 500V..... |
| C-2 | 8A4529 | Paper: .006 mf 100V | C-10 | - (Refer to AT-84 & AT-89 Tuner Service Manual) |
| C-3 | 20A502338 | Variable, mica: 50 to 280 mmf | C-12 | 21K70720 Molded: 5 mmf 500V |
| C-4 | 8R13514 | Paper: .05 mf 100V | C-13 | 8K71910 Paper: .006 mf 400V..... |
| C-5 | 8R14791 | Paper: .05 mf 400V | C-20 | 8C580845 Paper: .5 mf 100V |
| C-6 | 21K70720 | Molded: 5 mmf 500V | Fuse | |
| C-7,8 | - | (Refer to AT-84 & AT-89 Tuner Service Manual) | F-1 | 65K12894 Fuse, tubular: 14 amp |
| Pilot Light | | | | |
| I-1 | 65X10867 | Bulb: 6.3V; .25A; tubular bayonet base; clear; #44... | | |

MODEL 606,
Plymouth

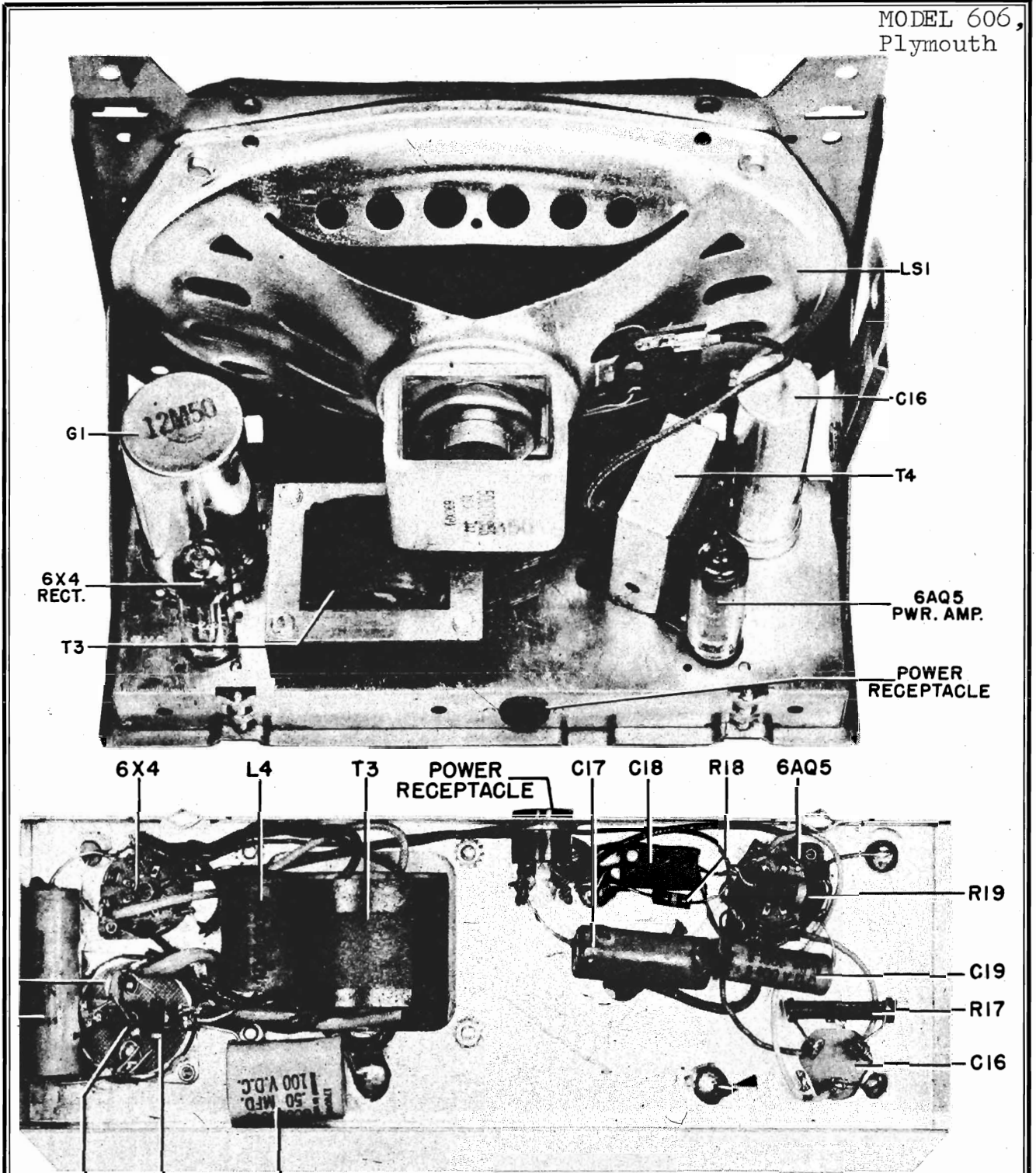


FIGURE 6. PARTS LOCATION - SPEAKER & POWER UNIT

Coils
L-1,2,3 -

(Refer to AT-84 & AT-89 Tuner Service Manual)

Resistors

Note: All resistors are insulated carbon type unless otherwise specified.

| | | | | | |
|-----|--------|---------|-----|------|-------|
| R-1 | 6R6032 | 470,000 | 20% | 1/2W | ..... |
| R-2 | 6R5554 | 390 | 10% | 1/2W | ..... |
| R-3 | 6R6028 | 22,000 | 20% | 1/2W | ..... |
| R-4 | 6R6012 | 33,000 | 20% | 1/2W | ..... |
| R-5 | 6R5554 | 390 | 10% | 1/2W | ..... |

| | | | | | |
|------|-----------|--------------------------------------------|-----|------|-------|
| R-6 | 6R6004 | 1 meg | 20% | 1/2W | ..... |
| R-7 | 6R490349 | 6800 | 20% | 2W | ..... |
| R-8 | 6R6056 | 47,000 | 20% | 1/2W | ..... |
| R-9 | 18A501616 | Volume control: 500,000; with switch | | | |
| R-10 | 6R6004 | 1 meg | 20% | 1/2W | ..... |
| R-11 | 6R6428 | 6800 | 10% | 1/2W | ..... |
| R-12 | 6R6434 | 27,000 | 10% | 1/2W | ..... |
| R-13 | 6R2118 | 3.3 meg | 20% | 1/2W | ..... |
| R-14 | 6R6032 | 1 meg | 20% | 1/2W | ..... |

Spark Plate

| | | | |
|------|----------|----------------------|-------|
| SP-1 | 1A501489 | Spark Plate Assembly | |
|------|----------|----------------------|-------|

MODEL 606,
Plymouth

Transformers

T-1 24B485553 IF, 455 Kc: complete.....
or 24K502819
T-2 24K485554 Diode, 455 Kc: complete.....

Tuners

51D501988 Automatic Tuner Model AT-84:
complete (See AT-84 Tuner
Service Manual for break-
down)

or 51D501875 Automatic Tuner Model AT-89:
complete (See AT-89 Tuner
Service Manual for break-
down)

SPEAKER AND POWER UNIT - CHASSIS PARTS - ELECTRICAL

Capacitors

C-14 8C580845 Paper: .5 mf 100V
C-15 8R490449 Paper: .02 mf 1000V.....
C-16 23A473015 Electrolytic: 30-30-20 mf/
350-300-25V
C-17 8R71911 Paper: .03 mf 400V
C-18 21R6590 Mica: 500 mmf 20% 500V...
C-19 8K71910 Paper: .006 mf 400V

Vibrator

G-1 48B3333 Vibrator: non-sync; 4-pin...

Coil

L-4 24K472535 Choke, hash

Speaker

LS-1 50C502449 Speaker, PM: 6" x 9" oval;
or 50C501656 3.2 ohm VC

Resistors

Note: All resistors are carbon insulated
unless otherwise specified.

R-15 6R5614 56 10% 1/2W
R-16 6R5614 56 10% 1/2W
R-17 6R476004 1000 20% 2W
R-18 6R6032 470,000 20% 1/2W
R-19 6R6389 220 10% 1W

Transformers

T-3 25C501644 Power Transformer
T-4 25B501684 Output Transformer.....

Part

Number Description

CONTROL UNIT - CHASSIS PARTS - MECHANICAL

30B501680 Cable and Plug Assembly, power.....
42A485548 Clip, coil can mtg
42A501477 Clip, pointer (pointer retainer)...
1X501683 Dial Scale and Background Assembly.
5A470399 Grommet, rubber (on power cable)
2A501485 Nut, hex: 7/16-28 x 3/4 (volume
control mtg)

64D501492 Plate, front: painted white.....
28K38360 Plug, 5-pin (on power cable).....
52B501601 Pointer, dial
9A472148 Receptacle, antenna contact.....
34D501619 Scale, dial
15A22087 Shell, receptacle (on power cable).
26A470013 Shield, pilot light
9A501497 Socket, pilot light: includes brkt.
9K580218 Socket, tube: 7-prong; miniature;
with dummy lug

CONTROL UNIT - HOUSING PARTS

1X501673 Bracket Assembly, dial crystal re-
taining
61A501603 Crystal, dial
1X501672 Escutcheon & Dial Crystal Assembly.
1X500377 Housing, rear: includes speed grip
nut
2A485540 Nut, hex: special; 7/16-28 x 9/16;
stl; cad pl (escutcheon mtg).....
2S7035 Nut, speed (dial crystal retainer
mtg)doz
2K501944 Nut, speed grip retaining (on rear
housing)
3S400458 Screw, machine: 10-32 x 7/8; Phillips
round head; stl; cad pl (escutcheon
mtg)doz

SPEAKER AND POWER UNIT - MECHANICAL PARTS

7B501620 Bracket, support (on spkr plate)...
42A501782 Clip, speed (rain shield mtg)...doz
42A4215 Clip, vibrator grounding.....
32C501637 Gasket, speaker: rubber
1X501667 Plate, Gasket and Bracket Assembly,
speaker: less speaker
9A501887 Receptacle, 5-prong (for power cable)
3S7457 Screw, sheet metal: #8 x 7/8; plain
hex head; stl; cad pl (spkr plate
mtg)doz
3S8188 Screw, sheet metal: #10 x 1/2; plain
hex head; stl; cad pl (spkr
mtg)doz
1X502364 Shield, rain: includes pads
9A70208 Socket, tube: 4-prong (for vibrator)
9K580218 Socket, tube: 7-prong; miniature;
with dummy lug

MOUNTING PARTS AND ACCESSORIES

1X500376 Button, push: with shell and clip.
8B580014 Capacitor, noise suppression
15A485342 Cover, control unit mtg nut:
chrome pl
1X501984 Knob, control: chrome pl (volume
or tuning)
9K502069 or
9K502083 Lead Assembly, radio to ignition
switch: includes fuse
4S7652 Lockwasher, ext: #10; stl; cad pl
(speaker & power unit mtg)..per/c
2S2883 Nut, hex: 10-32 x 3/8; stl; cad pl
(spkr & power unit mtg).....doz
2A485540 Nut, hex: 7/16-28 x 9/16 (control
unit mtg)
3A501943 Screw and Cup Washer: 1/4-20 x 1/2
(support bracket attaching).....

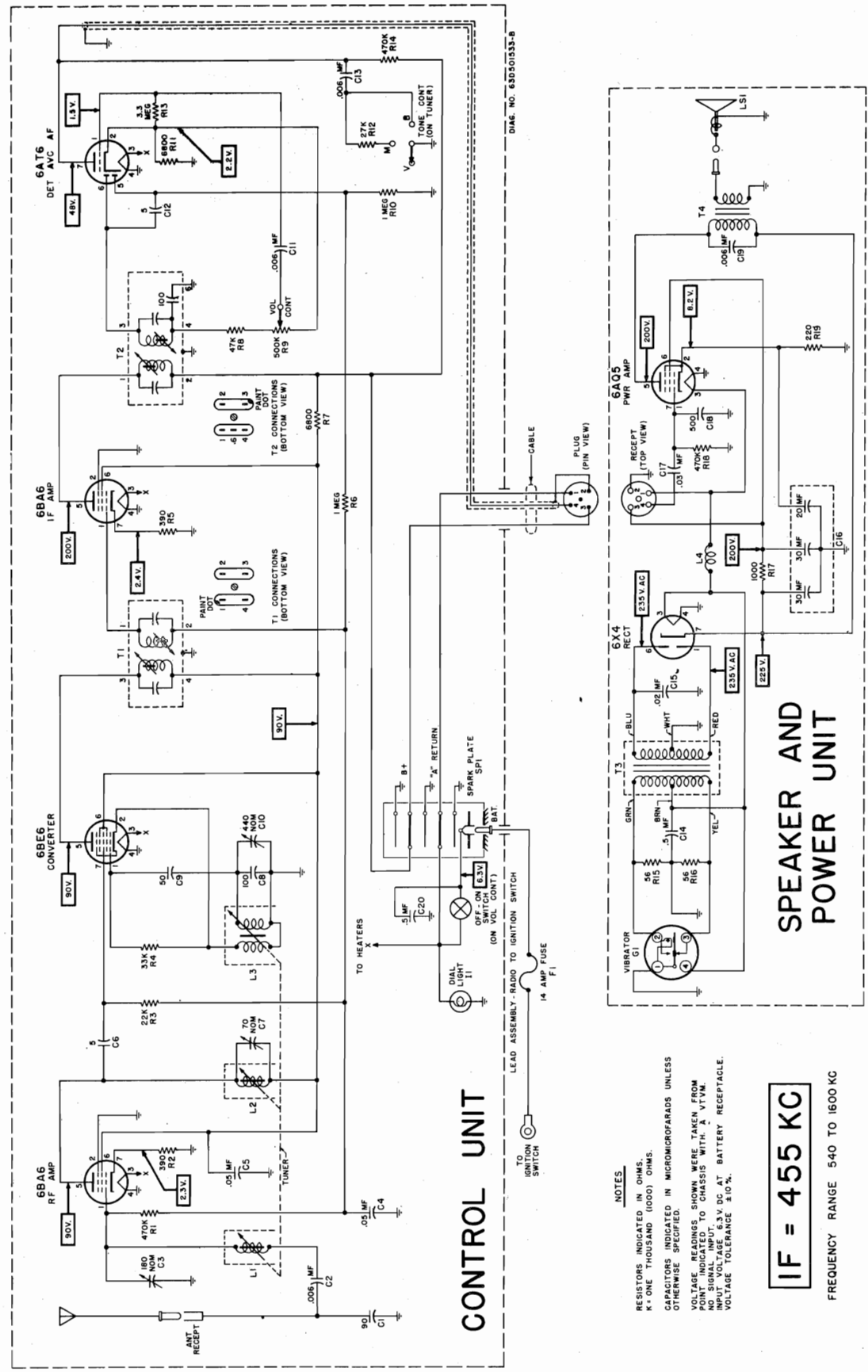
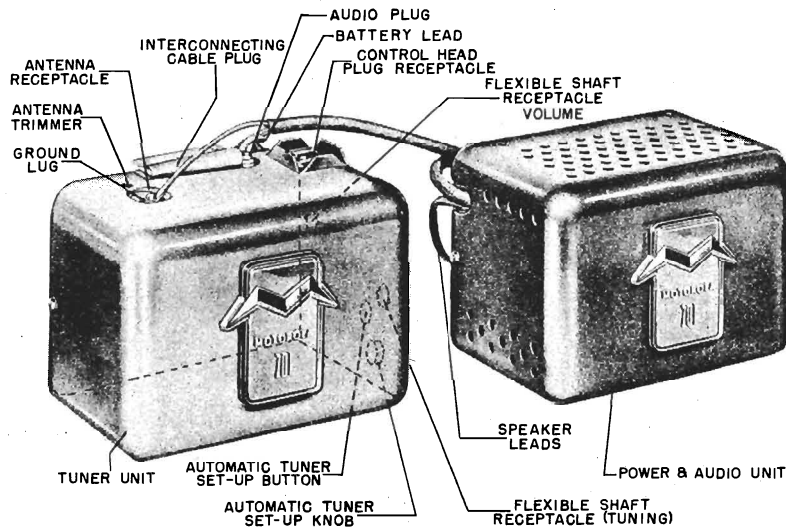


FIGURE 7. SCHEMATIC DIAGRAM

MODEL 701



GENERAL INFORMATION

TYPE - Compact two-piece automotive type superheterodyne receiver. Receiver consists of a tuning unit and audio & power unit which are connected together by means of an interconnecting cable. This receiver is designed for installation in any car by using with appropriate Motorola control head and speaker kit.

TUBE COMPLEMENT - Tuner Unit
 6BA6 - RF Amplifier
 6BE6 - Converter
 6BA6 - IF Amplifier
 6AT6 - Det-AVC-AF Amp

TUNING RANGE - 535 to 1600 Kc IF - 455 Kc

Audio & Power Unit
 6AQ5 - Power Amplifier
 6X4 - Rectifier

POWER INPUT - 7.0 amps at 6.3 volts

POWER OUTPUT - 3.5 watts (max)

TUNER - Solenoid Tuner ST-78. Refer to ST-78 Tuner Service Manual for complete service information.

TO SET UP AUTOMATIC TUNING

To set push buttons to the desired stations:

- a. Turn receiver on and allow it to warm up for a few minutes.
- b. Collapse antenna until signal is weak.
- c. Press Manual "M" button on control head.
- d. Turn tuning knob until desired station is tuned in. (Make a mental note of the program). For best results choose only local stations.
- e. Press desired button and wait until tuning mechanism completes its operation.
- f. Press automatic tuner set-up button until "click" is heard. (See detail above.)
- g. Turn automatic tuner set-up knob until previously noted program is heard. **NOTE:** Check the setting of the automatic button just set up by pressing the "M" button and manually tune in the station. There should be no difference in volume or clarity when the station is tuned in either manually or automatically. If a difference is noted, reset the automatic tuner push button more accurately by repeating above procedure. Also make sure the push button is set to same station that was selected manually and not to a weak distant station carrying the same network program.
- h. Repeat steps c, d, e, f & g for balance of buttons.

TONE CONTROL

This receiver has a three-position tone control which may be operated by pushing "in" volume knob. Do not hold the knob "in"; merely push in and release. Each push changes the tone one step.

out on the shaft, to allow the minimum amount of travel to actuate the switch when the knob is depressed. Too much motion may cause the shaft to stick and prevent the tone switch from opening when the knob is released. **CAUTION:** Failure of the tone switch to release will cause the tone relay to overheat. If the tone control knob does not operate the tone control switch, with a reasonable amount of pressure, loosen the acorn nuts and adjust the outer housing of the flexible shaft until proper action is obtained.

To operate the tone control, push in on the volume control knob. Make certain the volume control knob is properly adjusted to operate the tone switch. Adjust the knob in or

ALIGNMENT

Remove tuner unit front housing and bottom cover to expose all alignment adjustments. Connect power and audio unit to tuner unit. Connect a 6 volt battery to "A" lead and power & audio unit chassis.

Connect a low range output meter across speaker voice coil and set volume control at maximum.

Place tuner in manual position, either by actuating carriage plate manually or by connecting a control head to receiver and pressing "M" button.

For greatest accuracy, keep output of receiver at approximately 1 watt (1 watt = 1.79 volts on output meter) throughout alignment by reducing generator output as stages are brought into alignment. Use a small fibre screwdriver when aligning IF and diode transformers. A special tool, Motorola Part Number 66A76278, is required for adjusting the tuner cores.

IMPORTANT: Do not push in on the alignment tool when adjusting tuner cores; the slightest inward pressure may move tuner carriage and result in inaccurate alignment.

| STEP | DUMMY ANTENNA | GENERATOR CONNECTION | GENERATOR FREQUENCY | TUNER SET TO | ADJUST | REMARKS |
|--------------------|---------------|----------------------------------|---------------------|------------------------------------------------------------------------------------|-------------|---------------------------------------------------------------|
| IF ALIGNMENT 1. | .1 mf | 6BE6 grid (pin #7) & chassis | 455 Kc | High frequency end (cores out) | 1, 2, 3 & 4 | Peak for maximum in order indicated. Check by repeating step. |
| RF ALIGNMENT 2. | See Fig. 1 | Antenna receptacle through dummy | 1610 Kc | High frequency end; cores should project 1-1/8" from cans (Screw out if necessary) | 5, 6, & 7 | Peak for maximum in order indicated. |
| 3. | " | " | 1425 Kc | 1425 Kc -per Figure 1 | 8, 9 & 10 | Peak for maximum in order indicated. |

4. When receiver is installed in car, extend antenna fully, set dial to approximately 1400 Kc and repeak antenna trimmer (7) for maximum volume of a weak station or noise between stations.

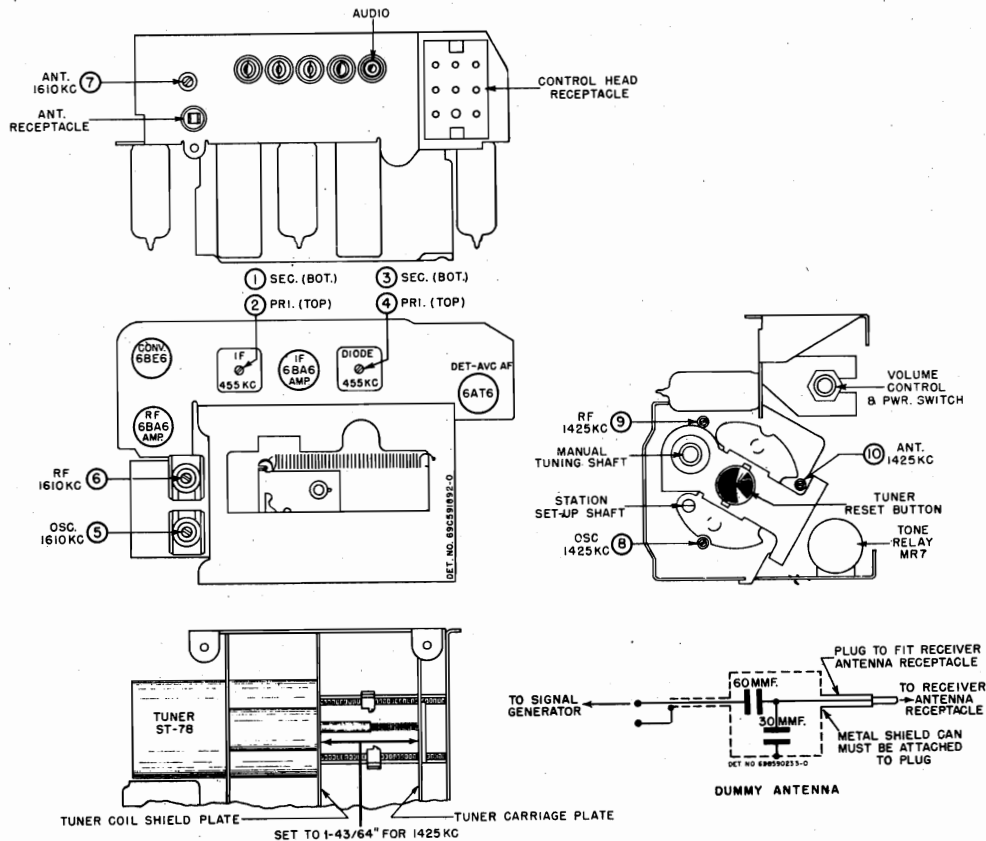


FIGURE 1. TUBE & TRIMMER LOCATIONS AND DUMMY ANTENNA DETAIL

MODEL 701

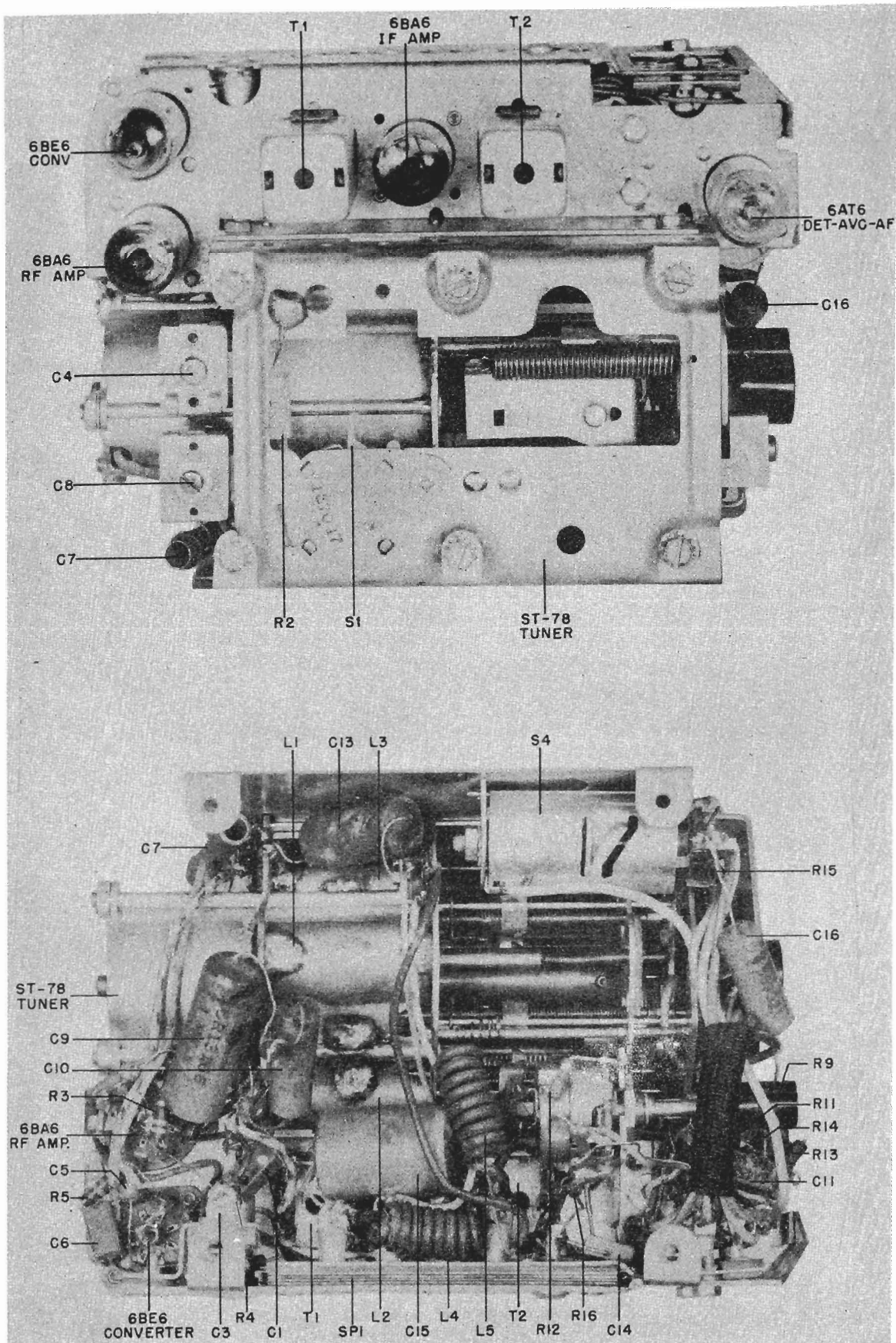


FIGURE 2. PARTS LOCATION - TUNING UNIT

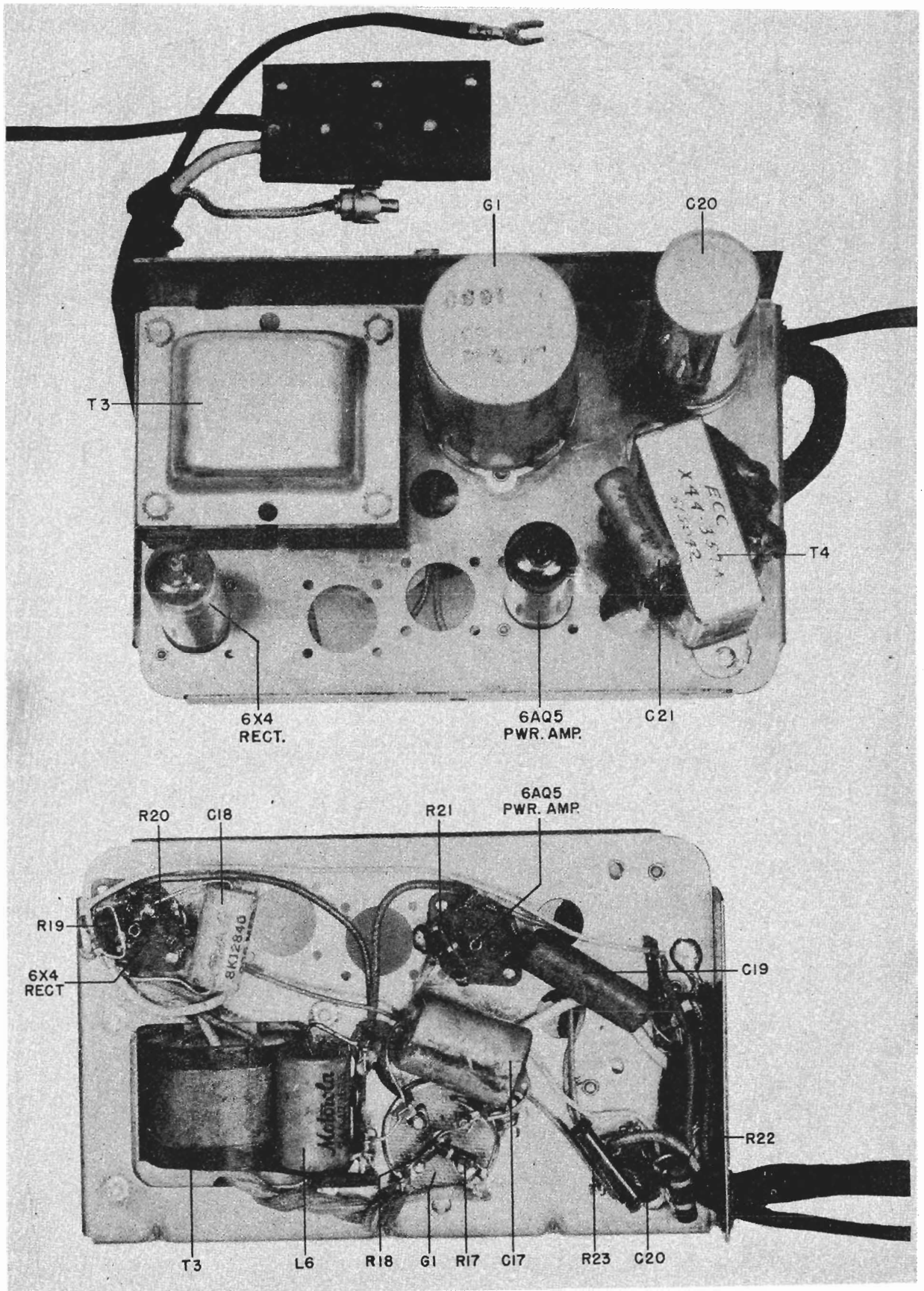


FIGURE 3. PARTS LOCATION - AUDIO & POWER UNIT

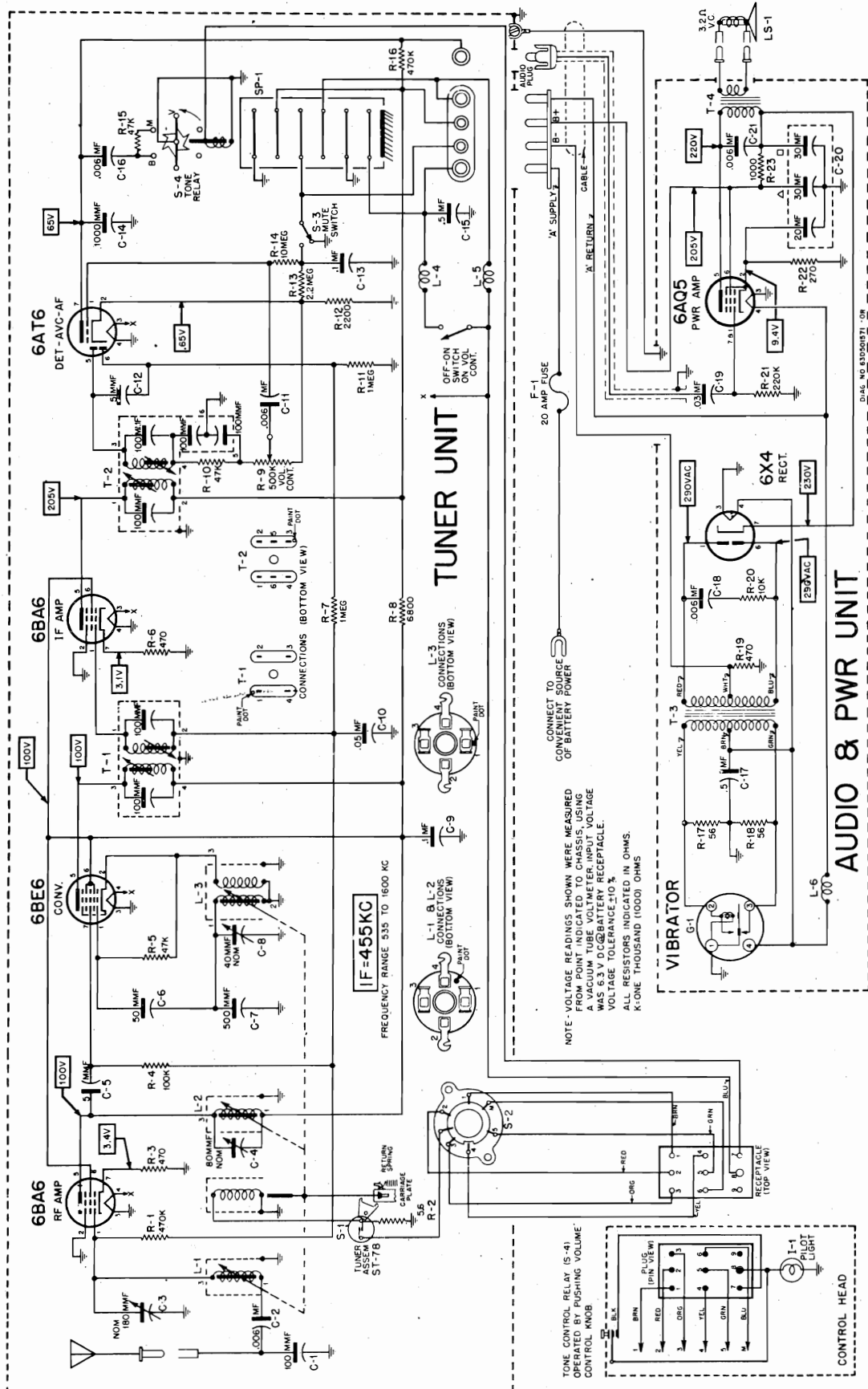


FIGURE 4. SCHEMATIC DIAGRAM

REPLACEMENT PARTS LIST

NOTE: When ordering parts, specify model number of set in addition to part number and description of part.

| <u>Ref. No.</u> | <u>Part Number</u> | <u>Description</u> | <u>Ref. No.</u> | <u>Part Number</u> | <u>Description</u> |
|-------------------------------------------------------------------------|--------------------|-------------------------------------------------------------------------------|---------------------------------------------------------------------------|--------------------|------------------------------------------------------------------------|
| TUNER UNIT | | | Switches | | |
| CHASSIS PARTS - ELECTRICAL | | | S-1* | 1B70944 | Solenoid Switch |
| Capacitors | | | S-2* | 40B70952 | Selector Switch |
| C-1 | 21B77562 | Ceramic: 100 mmf 500V..... | S-3* | 40A472644 | Mute Switch |
| C-2 | 8A4529 | Paper: .006 mf 100V..... | S-4 | 1X592220 | Tone Relay MR-7 |
| C-3* | 20A592135 | Variable, trimmer: 50 to 280 mmf; includes bracket..... | Spark Plate | | |
| C-4* | 20K481527 | Variable, trimmer: 20 to 180 mmf; includes bracket..... | SP-1 | 1B592133 | Spark Plate Assembly |
| C-5 | 21K70720 | Molded: 5 mmf 500V..... | Transformers | | |
| C-6 | 21K74661 | Ceramic: 50 mmf 300V..... | T-1 | 24B485553 | IF, 455 Kc: complete with tuning cores and padding capacitors |
| C-7 | 21K592327 | Ceramic: 500 mmf 5% 500V... | T-2 | 24K485555 | Diode, 455 Kc: complete with tuning cores and padding capacitors |
| C-8* | 20K472612 | Variable, trimmer: 5 to 80 mmf; includes bracket..... | Tuner | | |
| C-9 | 8R13166 | Paper: .1 mf 400V..... | | 1X592280 | Solenoid Tuner ST-78 ... |
| C-10 | 8A13514 | Paper: .05 mf 100V..... | POWER & AUDIO UNIT | | |
| C-11 | 8A4529 | Paper: .006 mf 100V..... | CHASSIS PARTS - ELECTRICAL | | |
| C-12 | 21K70720 | Molded: 5 mmf 500V..... | Capacitors | | |
| C-13 | 8R472035 | Paper: .1 mf 100V..... | C-17 | 8K17028 | Paper: .5 mf 100V |
| C-14 | 21R6638 | Mica: 1000 mmf 500V..... | C-18 | 8K12840 | Paper: .006 mf 1600V..... |
| C-15 | 8K17028 | Paper: .5 mf 100V..... | C-19 | 8R71911 | Paper: .03 mf 400V..... |
| C-16 | 8K71910 | Paper: .006 mf 400V..... | C-20 | 23A473015 | Electrolytic: 30-30-20 mf/350-300-25V |
| Pilot Light | | | C-21 | 8K71910 | Paper: .006 mf 400V..... |
| I-1 | 65X4151 | Bulb: 6-8V; bayonet base; type #51 | Fuse | | |
| Coils | | | F-1 | 65K4637 | Fuse: 20 amp |
| L-1,2* | 24B71881 | RF & Antenna Coil (specify color of paint dot on old coil when ordering)..... | Vibrator | | |
| L-3* | 24B592153 | Oscillator Coil (specify color of paint dot on old coil when ordering) | G-1 | 48B3333 | Vibrator, non-sync: 4-pin .. |
| L-4 | 24K592269 | Choke ("A" lead)..... | Coils | | |
| L-5 | 24K592269 | Choke (dial light)..... | L-6 | 24A472535 | Choke, hash |
| Resistors | | | Resistors | | |
| Note: All resistors are carbon insulated ty unless otherwise specified. | | | Note: All resistors are carbon insulated type unless otherwise specified. | | |
| R-1 | 6R6032 | 470,000 20% 1/2W | R-17 | 6R5614 | 56 10% 1/2W |
| R-2 | 17K484497 | Wirewound: 5.6 | R-18 | 6R5614 | 56 10% 1/2W |
| or | 6R488139 | 5.6 10% 1W | R-19 | 6R3949 | 470 20% 1/2W |
| R-3 | 6R6090 | 470 10% 1/2W | R-20 | 6R6054 | 10,000 20% 1/2W |
| R-4 | 6R6075 | 100,000 20% 1/2W | R-21 | 6R6015 | 220,000 20% 1/2W |
| R-5 | 6R6056 | 47,000 20% 1/2W | R-22 | 6R6336 | 270 10% 1W |
| R-6 | 6R6090 | 470 10% 1/2W | R-23 | 6R6184 | 1000 20% 1W N.I. |
| R-7 | 6R6004 | 1 meg 20% 1/2W | *Part of Solenoid Tuner ST-78 | | |
| R-8 | 6R6287 | 6800 20% 1W N.I. | | | |
| R-9 | 1A472531 | Volume Control and Shaft Assembly: .5 meg | | | |
| R-10 | 6R6056 | 47,000 20% 1/2W..... | | | |
| R-11 | 6R6004 | 1 meg 20% 1/2W | | | |
| R-12 | 6R6290 | 2200 20% 1/2W | | | |
| R-13 | 6R3927 | 2.2 meg 20% 1/2W | | | |
| R-14 | 6R2109 | 10 meg 20% 1/2W | | | |
| R-15 | 6R6056 | 47,000 20% 1/2W | | | |
| R-16 | 6R6032 | 470,000 20% 1/2W | | | |

MODEL 701

Transformers

| | | |
|-----|-----------|--------------------------|
| T-3 | 25K590650 | Power Transformer |
| T-4 | 25B502330 | Output Transformer |

| | |
|------------------------------|--------------------|
| <u>Part</u> <u>Number</u> | <u>Description</u> |
|------------------------------|--------------------|

Part
Number

Description

TUNER UNIT

CHASSIS PARTS - MECHANICAL

| | |
|-----------|--------------------------------------------------------------------------------------------------------------------------|
| 7A592127 | Bracket, volume control mtg ... |
| 42A485548 | Clip, coil can mtg |
| 4S7657 | Lockwasher, ext: #8; stl; cad pl (tone relay mtg) |
| 2S7000 | Nut, hex: 8-32 x 5/16; stl; cad pl (tone relay mtg) |
| 1X70646 | Receptacle, antenna |
| 5S7771 | Rivet: .088 x 3/16; stl; nkl pl (tube socket mtg) |
| 5S7719 | Rivet: .088 x 5/32; stl; nkl pl (terminal strip mtg) |
| 5S7728 | Rivet: .122 x 5/16; stl; nkl pl (spark plate mtg) |
| 3S7152 | Screw, machine: 6-32 x 1/4 plain hex head; stl; cad pl (volume control bracket and capacitor bracket mtg) |
| 3S8140 | Screw, sheet metal: #8 x 3/16; plain hex head; stl; cad pl (tuner mtg) |
| 3S7454 | Screw, sheet metal: #8 x 1/4; PKZ plain hex head; stl; cad pl (tuner bracket mtg) |
| 9A472534 | Socket, tube: 7-prong; miniature. |
| 9K580218 | Socket, tube: 8-prong; miniature. |
| 31A41318 | Strip, terminal: 1 insulated lug, #2 mtg |

POWER & AUDIO UNIT

CHASSIS PARTS - MECHANICAL

| | |
|-----------|-----------------------------------------------------------------------|
| 1X590362 | Cable and Plug Assembly: includes fuse lead, power cable and plug. |
| 42A4215 | Clip, vibrator grounding |
| 14A592132 | Insulator, connector plug |
| 9K592646 | Lead Assembly, fuse: includes "A" lead and fuse receptacle |
| 1X76859 | Lead Assembly, speaker |
| 4S7666 | Lockwasher, ext: #6; stl; cad pl (power transformer mtg) |
| 2S7005 | Nut, hex: 6-32 x 1/4; stl; cad pl (power transformer mtg) |
| 28A592119 | Plug, connector: 4-pin |
| 28K71775 | Plug, insulated |
| 5S7771 | Rivet: .088 x 3/16; stl; nkl pl (tube socket mtg) |
| 5S7706 | Rivet: .122 x 1/8; stl; nkl pl (terminal strip mtg) |

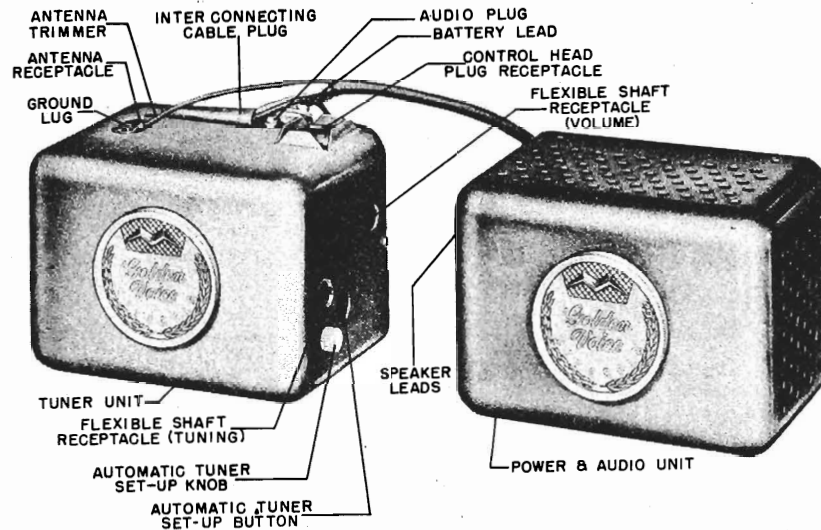
| | |
|-----------|-----------------------------------------------------------------|
| 5S7701 | Rivet: .122 x 3/16; stl; nkl pl (vi- brator clip mtg) |
| 5S7707 | Rivet: .122 x 5/32; stl; nkl pl (output trans mtg) |
| 9A472534 | Socket, tube: miniature; 7-prong . |
| 9A70208 | Socket, tube: 4-pin (for vibrator). |
| 31K490143 | Strip, terminal: 2 insulated lugs, #2 mtg; 1-1/8" long |
| 31A592258 | Strip, terminal: 2 insulated lugs, #2 mtg; 1-3/8" long |
| 29A76280 | Terminal, insulated pin: black (on speaker leads) |
| 29K76282 | Terminal, insulated pin: white (on speaker leads) |

HOUSING PARTS

| | |
|-----------|---------------------------------------------------------------------------------------------------------|
| 38A71874 | Button, push: includes spring clamp |
| 42A501255 | Clip, escutcheon retainer |
| 15K592124 | Cover, bottom: with bushing |
| 13C501269 | Escutcheon |
| 1X501273 | Housing and Escutcheon Assembly (Tuner Unit) |
| 1X501275 | Housing and Escutcheon Assembly (Power & Audio Unit) |
| 3S400356 | Screw, sheet metal: #4 x 1/4; plain hex head; stl; cad pl (escutcheon mtg) |
| 3S7454 | Screw, sheet metal: #8 x 1/4 PKZ; plain hex head; stl; cad pl (bottom cover mtg) |
| 3S8114 | Screw, sheet metal: #8 x 1/4 PKZ slotted acorn head; antique copper finish (housing screws) |

ACCESSORIES

| | |
|-----------|----------------------------------------------------------------|
| 8A4491 | Capacitor, generator |
| 4S7653 | Lockwasher, int-ext: 5/16; stl; cad pl (receiver mtg) |
| 2S2863 | Nut, hex: 5/16; stl; cad pl (re- ceiver mtg) |
| 1K75148 | Shaft and Housing Assembly, flexible 24" long |
| 50K502269 | or |
| 50B502802 | Speaker, PM; 6"; 3.2 ohm VC.... |
| 3S77542 | Stud, threaded (receiver mtg) .. |
| 6A4141 | Suppressor, distributor |



GENERAL INFORMATION

TYPE - Compact two-piece automotive type superheterodyne receiver. Receiver consists of a tuning unit and audio & power unit which are connected together by means of an interconnecting cable. This receiver is designed for installation in any car by using with appropriate Motorola control head and speaker kit.

TUNING RANGE - 535 to 1600 Kc **IF** - 455 Kc

POWER INPUT - 8.2 amps at 6.3 volts

POWER OUTPUT - 4.5 watts.(max)

TUBE COMPLEMENT - Tuner Unit

6BA6 - RF Amplifier
6BE6 - Converter
6BA6 - IF Amplifier
6AT6 - Det-AVC-AF Amp

Audio & Power Unit

6AT6 - Audio Inverter
6AQ5 - Power Amplifier
6AQ5 - Power Amplifier
6X4 - Rectifier

TUNER - Solenoid Tuner ST-78. Refer to ST-78 Tuner Service Manual for complete service information.

TO SET UP AUTOMATIC TUNING

To set push buttons to the desired stations:

- a. Turn receiver on and allow it to warm up for a few minutes.
- b. Collapse antenna until signal is weak.
- c. Press Manual "M" button on control head.
- d. Turn tuning knob until desired station is tuned in. (Make a mental note of the program). For best results choose only local stations.
- e. Press desired button and wait until tuning mechanism completes its operation.
- f. Press automatic tuner set-up button until "click" is heard. (See detail above).
- g. Turn automatic tuner set-up knob until previously noted program is heard. **NOTE:** Check the setting of the automatic button just set up by pressing the "M" button and manually tune in the station. There should be no difference in volume or clarity when the station is tuned in either manually or automatically. If a difference is noted, reset the automatic tuner push button more accurately by repeating above procedure. Also make sure the push button is set to same station that was selected manually and not to a weak distant station carrying the same network program.
- h. Repeat steps c, d, e, f & g for balance of buttons.

TONE CONTROL

This receiver has a three-position tone control which may be operated by pushing "in" volume knob. Do not hold the knob "in"; merely push in and release. Each push changes the tone one step.

To operate the tone control, push in on the volume control knob. Make certain the volume control knob is properly adjusted to operate the tone switch. Adjust the knob in or

out on the shaft, to allow the minimum amount of travel to actuate the switch when the knob is depressed. Too much motion may cause the shaft to stick and prevent the tone switch from opening when the knob is released. **CAUTION:** Failure of the tone switch to release will cause the tone relay to overheat. If the tone control knob does not operate the tone control switch, with a reasonable amount of pressure, loosen the acorn nuts and adjust the outer housing of the flexible shaft until proper action is obtained.

MODEL 801

ALIGNMENT

Remove tuner unit front housing and bottom cover to expose all alignment adjustments. Connect power and audio unit to tuner unit. Connect a 6 volt battery to "A" lead and power & audio unit chassis.

Connect a low range output meter across speaker voice coil and set volume control at maximum.

Place tuner in manual position, either by actuating carriage plate manually or by connecting a control head to receiver and pressing "M" button.

For greatest accuracy, keep output of receiver at approximately 1 watt (1 watt = 1.79 volts on output meter) throughout alignment by reducing signal generator output as stages are brought into alignment. Use a small fibre screwdriver when aligning IF and diode transformers. A special tool, Motorola Part Number 66A76278, is required for adjusting the tuner cores.

IMPORTANT: Do not push in on the alignment tool when aligning the tuner cores; the slightest inward pressure may move tuner carriage and result in inaccurate alignment.

| STEP | DUMMY ANTENNA | GENERATOR CONNECTION | GENERATOR FREQUENCY | TUNER SET TO | ADJUST | REMARKS |
|--------------------|---------------|----------------------------------|---------------------|------------------------------------------------------------------------------------|-------------|---------------------------------------------------------------|
| IF ALIGNMENT 1. | .1 mf | 6BE6 grid (pin #7) & chassis | 455 Kc | High frequency end (cores out) | 1, 2, 3 & 4 | Peak for maximum in order indicated. Check by repeating step. |
| RF ALIGNMENT 2. | See Fig. 1 | Antenna receptacle through dummy | 1610 Kc | High frequency end; cores should project 1-1/8" from cans (Screw out if necessary) | 5, 6, & 7 | Peak for maximum in order indicated. |
| 3. | " | " | 1425 Kc | 1425 Kc -per Figure 1 | 8, 9 & 10 | Peak for maximum in order indicated |

4. When receiver is installed in car, extend antenna fully, set dial to approximately 1400 Kc and repeak antenna trimmer (7) for maximum volume of a weak station or noise between stations.

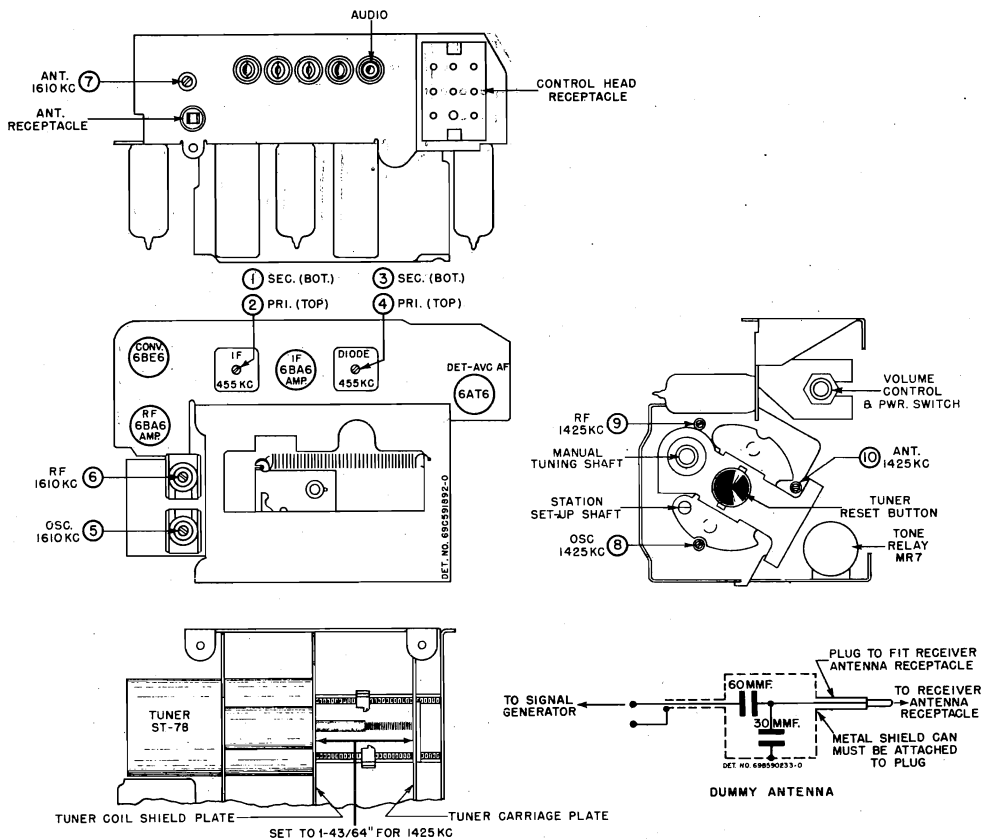


FIGURE 1. TUBE & TRIMMER LOCATIONS AND DUMMY ANTENNA DETAIL

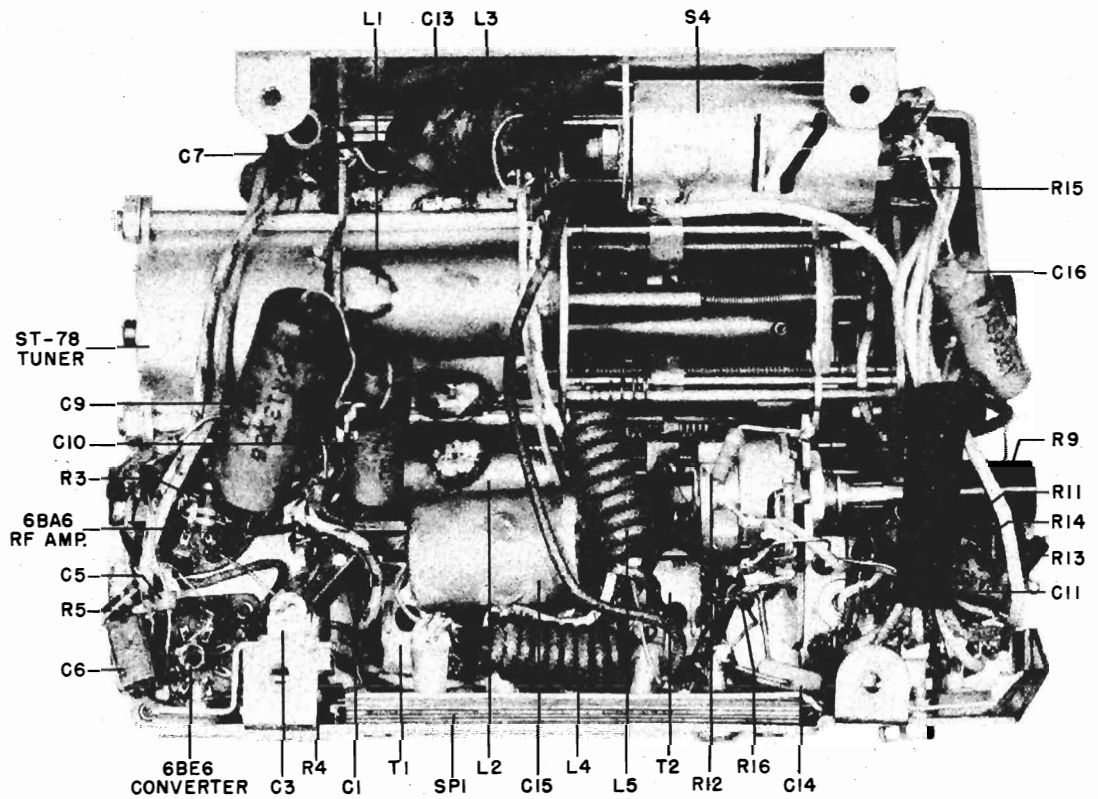
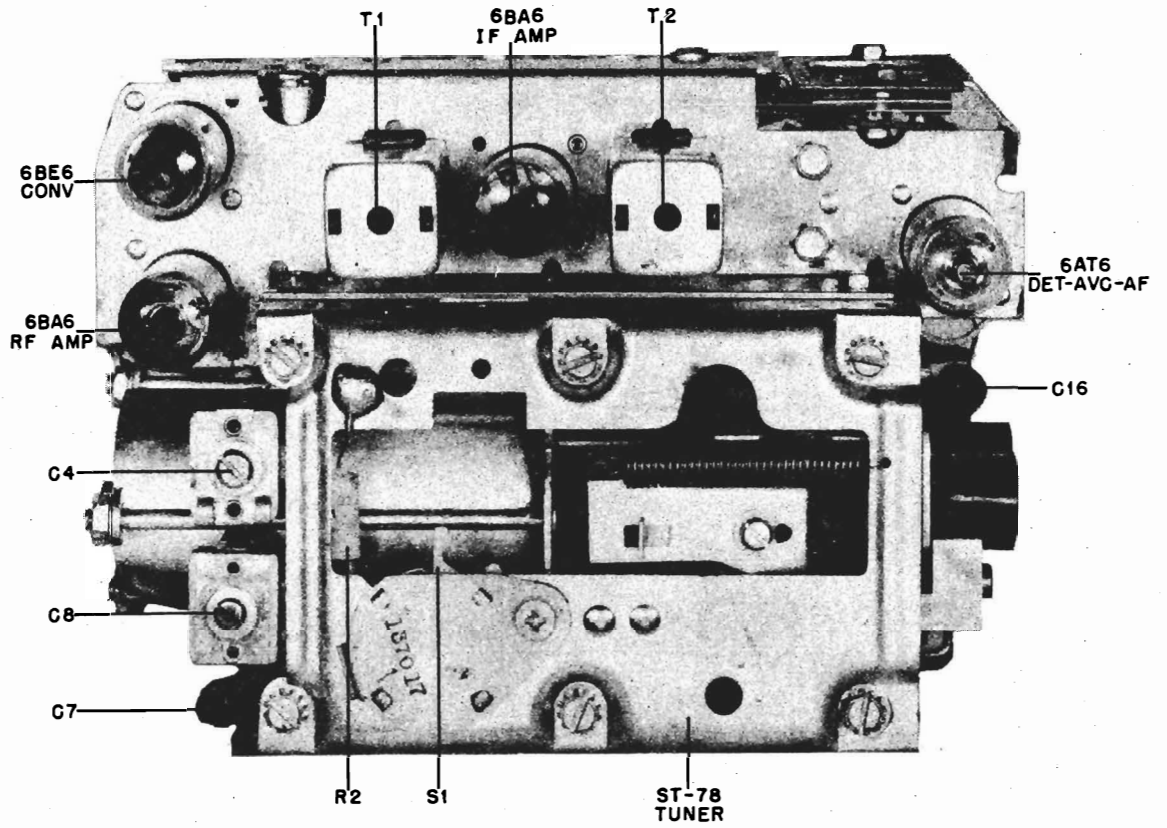


FIGURE 2. PARTS LOCATION - TUNING UNIT

MODEL 801

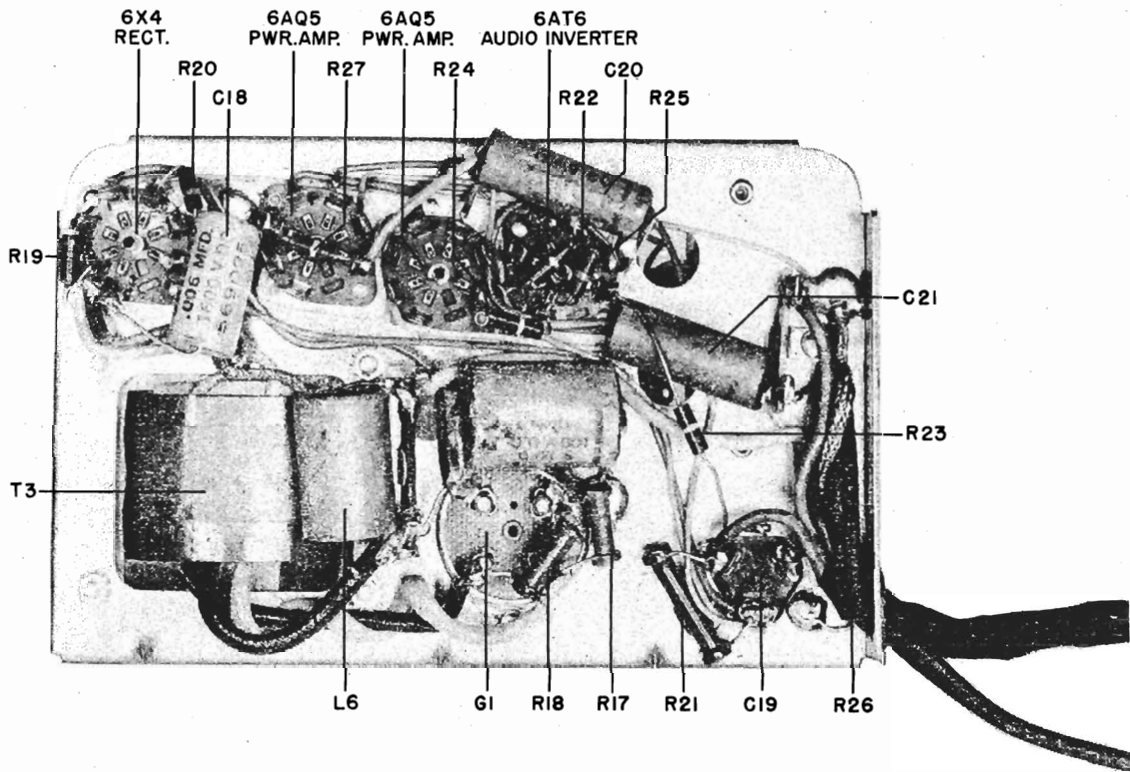
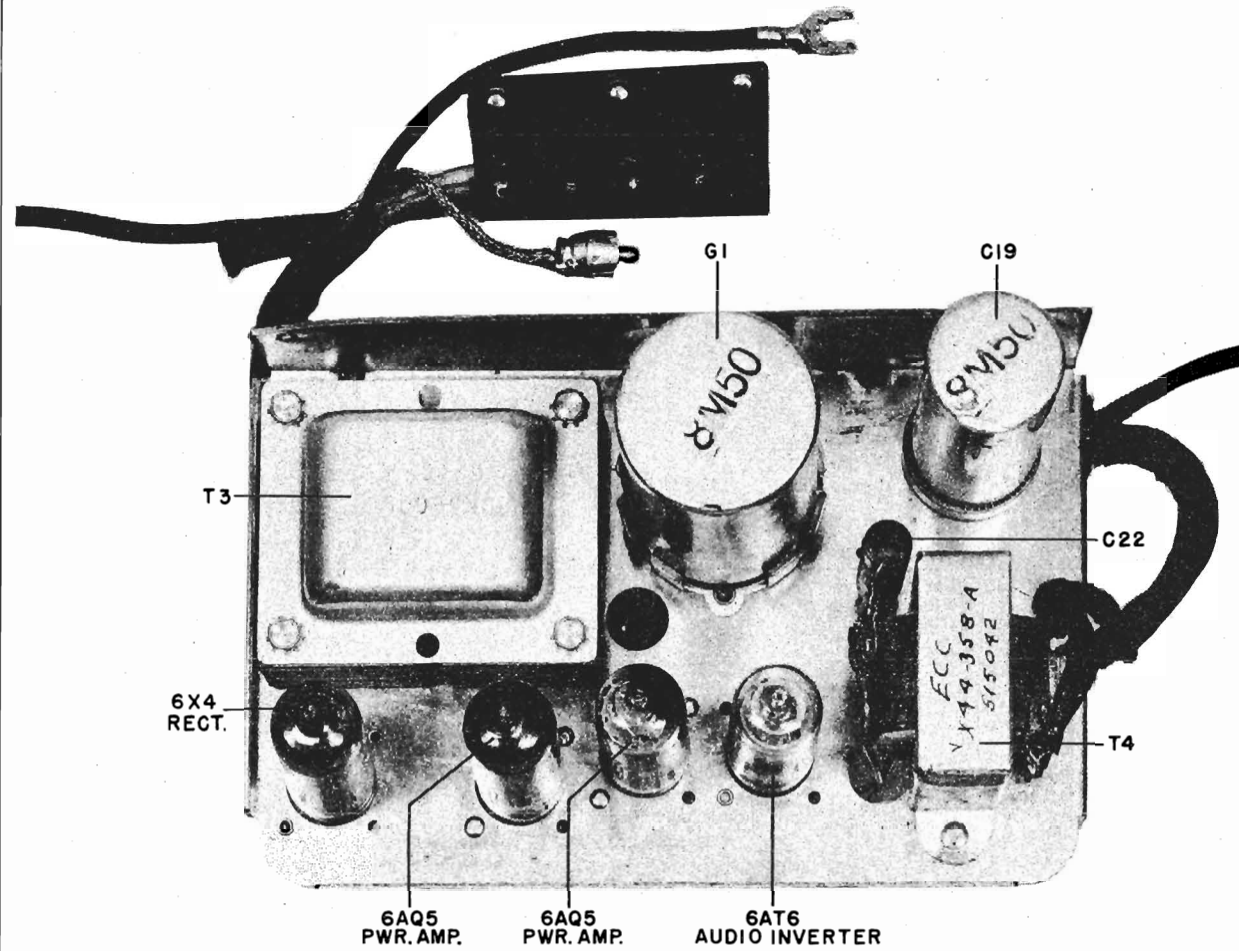


FIGURE 3. PARTS LOCATION - AUDIO & POWER UNIT

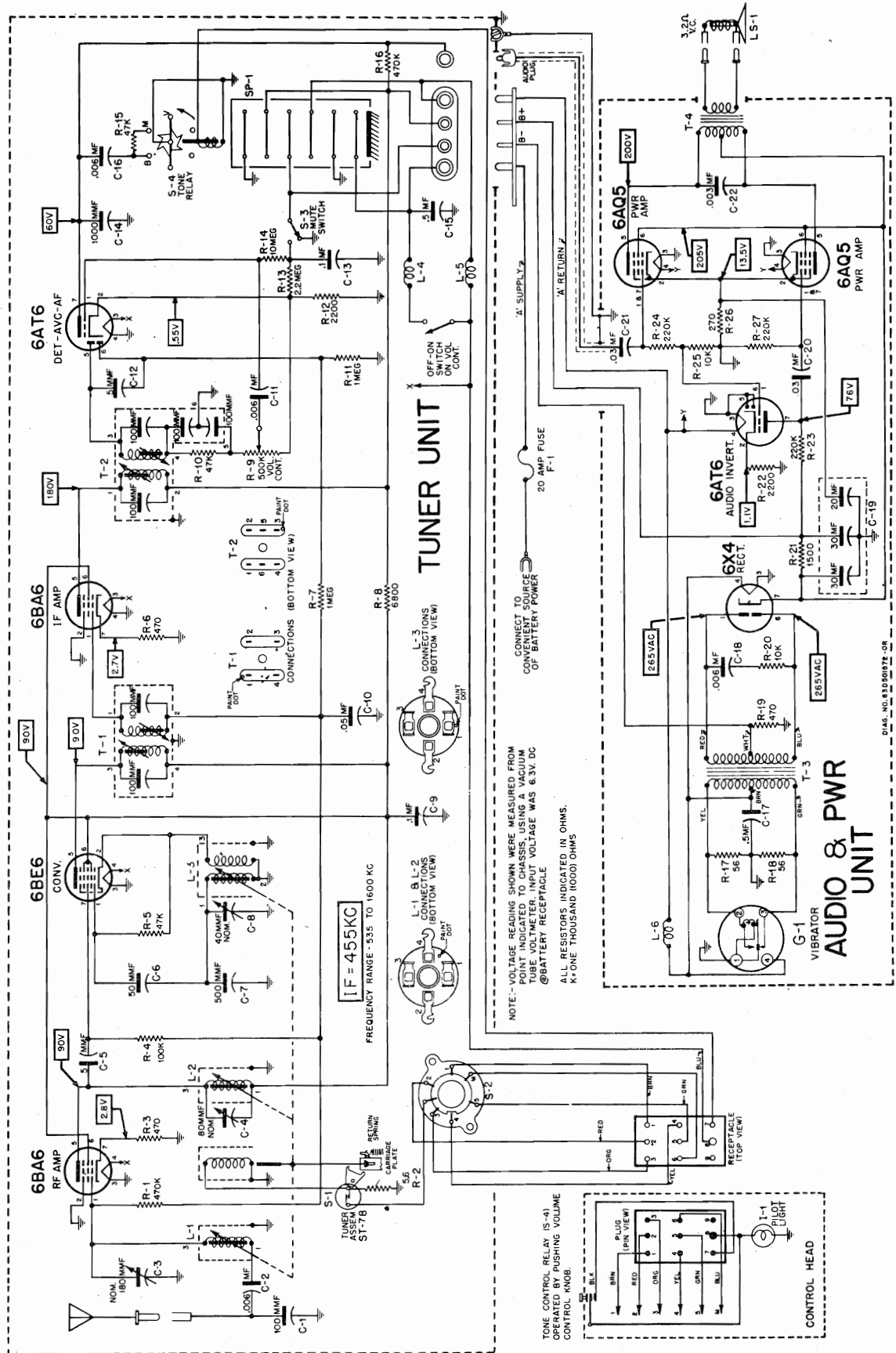


FIGURE 4. SCHEMATIC DIAGRAM

MODEL 801

REPLACEMENT PARTS LIST

NOTE: When ordering parts, specify model number of set in addition to part number and description of part.

| Ref. No. | Part Number | Description | Ref. No. | Part Number | Description |
|---------------------------------------------------------------------------|-------------|--------------------------------------------------------------------------------|-----------------------------------|-------------|------------------------------------------------------------------------|
| TUNER UNIT | | | R-10 | 6R6056 | 47,000 20% 1/2W |
| CHASSIS PARTS - ELECTRICAL | | | R-11 | 6R6004 | 1 meg 20% 1/2W |
| <u>Capacitors</u> | | | R-12 | 6R6290 | 2200 20% 1/2W |
| C-1 | 21B77562 | Ceramic: 100 mmf 500V | R-13 | 6R3927 | 2.2 meg 20% 1/2W |
| C-2 | 8A4529 | Paper: .006 mf 100V | R-14 | 6R2109 | 10 meg 20% 1/2W |
| C-3* | 20A592135 | Variable, trimmer: 50 to 280 mmf; includes bracket | R-15 | 6R6056 | 47,000 20% 1/2W |
| C-4* | 20K481527 | Variable, trimmer: 20 to 180 mmf; includes bracket | R-16 | 6R6032 | 470,000 20% 1/2W |
| C-5 | 21K70720 | Molded: 5 mmf 500V | <u>Switches</u> | | |
| C-6 | 21K74661 | Ceramic: 50 mmf 300V | S-1* | 1B70944 | Solenoid Switch |
| C-7 | 21K592327 | Ceramic: 500 mmf 5% 500V.. | S-2* | 40B70952 | Selector Switch |
| C-8* | 20K472612 | Variable, trimmer: 5 to 80 mmf; includes bracket | S-3* | 40A472644 | Mute Switch |
| C-9 | 8R13166 | Paper: .1 mf 400V | S-4 | 1X592220 | Tone Relay MR-7 |
| C-10 | 8A13514 | Paper: .05 mf 100V | <u>Spark Plate</u> | | |
| C-11 | 8A4529 | Paper: .006 mf 100V | SP-1 | 1B592133 | Spark Plate Assembly |
| C-12 | 21K70720 | Molded: 5 mmf 500V | <u>Transformers</u> | | |
| C-13 | 8R472035 | Paper: .1 mf 100V | T-1 | 24B485553 | IF, 455 Kc: complete with tuning cores and padding capacitors |
| C-14 | 21R6638 | Mica: 1000 mmf 500V | T-2 | 24K485555 | Diode, 455 Kc: complete with tuning cores and padding capacitors |
| C-15 | 8K17028 | Paper: .5 mf 100V | <u>Tuner</u> | | |
| C-16 | 8K71910 | Paper: .006 mf 400V | | 1X592280 | Solenoid Tuner ST-78 |
| <u>Pilot Light</u> | | | POWER & AUDIO UNIT | | |
| I-1 | 65X4151 | Bulb: 6-8V; bayonet base; type #51 | CHASSIS PARTS - ELECTRICAL | | |
| <u>Coils</u> | | | <u>Capacitors</u> | | |
| L-1,2* | 24B71881 | RF & Antenna Coil (specify color of paint dot on old coil when ordering) | C-17 | 8K17028 | Paper: .5 mf 100V |
| L-3* | 24B592153 | Oscillator Coil (specify color of paint dot on old coil when ordering) | C-18 | 8K12840 | Paper: .006 mf 1600V |
| L-4 | 24K592269 | Choke ("A" lead) | C-19 | 23A473015 | Electrical: 30-30-20 mf/350-300-25V |
| L-5 | 24K592269 | Choke (dial light) | C-20 | 8R71911 | Paper: .03 mf 400V |
| <u>Resistors</u> | | | C-21 | 8R71911 | Paper: .03 mf 400V |
| Note: All resistors are carbon insulated type unless otherwise specified. | | | C-22 | 8R13165 | Paper: .003 mf 1000V |
| R-1 | 6R6032 | 470,000 20% 1/2W | <u>Fuse</u> | | |
| R-2 | 17K484497 | Wirewound: 5.6 | F-1 | 65K4637 | Fuse, 20 amp |
| or | 6R488139 | 5.6 10% 1W | <u>Vibrator</u> | | |
| R-3 | 6R6090 | 470 10% 1/2W | G-1 | 48B3333 | Vibrator, non-sync: 4-pin... |
| R-4 | 6R6075 | 100,000 20% 1/2W | <u>Coil</u> | | |
| R-5 | 6R6056 | 47,000 20% 1/2W | L-6 | 24A472535 | Choke, hash |
| R-6 | 6R6090 | 470 10% 1/2W | *Part of Solenoid Tuner ST-78 | | |
| R-7 | 6R6004 | 1 meg 20% 1/2W | | | |
| R-8 | 6R6287 | 6800 20% 1W N.I. | | | |
| R-9 | 1A472531 | Volume Control and Shaft Assembly: .5 meg | | | |

Resistors

Note: All resistors are carbon insulated type unless otherwise specified.

| | | | | Part Number | Description | | |
|------|--------|---------|-----|-------------|-------------|-----------|-----------------------------------------------------------|
| R-17 | 6R5614 | 56 | 10% | 1/2W | ..... | 1X76859 | Lead Assembly, speaker |
| R-18 | 6R5614 | 56 | 10% | 1/2W | ..... | 4S7666 | Lockwasher, ext: #6; stl; cad pl (power transformer mtg) |
| R-19 | 6R3949 | 470 | 20% | 1/2W | ..... |  |  |
| R-20 | 6R6054 | 10,000 | 20% | 1/2W | ..... | 2S7005 | Nut, hex: 6-32 x 1/4; stl; cad pl (power transformer mtg) |
| R-21 | 6R6286 | 1500 | 20% | 1W | N.I. | | |
| R-22 | 6R6069 | 2200 | 10% | 1/2W | ..... | 28A592119 | Plug, connector: 4-pin |
| R-23 | 6R6015 | 220,000 | 20% | 1/2W | ..... | 28K71775 | Plug, insulated |
| R-24 | 6R6015 | 220,000 | 20% | 1/2W | ..... | 5S7771 | Rivet: .088 x 3/16; stl; nkl pl (tube socket mtg) |
| R-25 | 6R6054 | 10,000 | 20% | 1/2W | ..... | 5S7706 | Rivet: .122 x 1/8; stl; nkl pl (terminal strip mtg) |
| R-26 | 6R6336 | 270 | 10% | 1W | ..... | 5S7707 | Rivet: .122 x 5/32; stl; nkl pl (output transformer mtg) |
| R-27 | 6R6015 | 220,000 | 20% | 1/2W | ..... | 5S7701 | Rivet: .122 x 3/16; stl; nkl pl (vibrator clip mtg) |

Transformers

| | | | |
|-----|-----------|--------------------|-------|
| T-3 | 25K590650 | Power Transformer | ..... |
| T-4 | 25B502331 | Output Transformer | ..... |

Part Number

Description

TUNER UNIT

CHASSIS PARTS - MECHANICAL

| | | |
|-----------|-----------------------------------------------------------------------------------------------------|-------|
| 7A592127 | Bracket, volume control mtg | .... |
| 42A485548 | Clip, coil can mtg | ..... |
| 4S7657 | Lockwasher, ext: #8; stl; cad pl (tone relay mtg) | ..... |
| 2S7000 | Nut, hex: 8-32 x 5/16; stl; cad pl (tone relay mtg) | ..... |
| 1X70646 | Receptacle, antenna | ..... |
| 5S7719 | Rivet: .088 x 5/32; stl; nkl pl (terminal strip mtg) | ..... |
| 5S7771 | Rivet: .088 x 3/16; stl; nkl pl (tube socket mtg) | ..... |
| 5S7728 | Rivet: .122 x 5/16; stl; nkl pl (spark plate mtg) | ..... |
| 3S7152 | Screw, machine: 6-32 x 1/4 plain hex head; stl; cad pl (volume control brkt and capacitor brkt mtg) | ..... |
| 3S8140 | Screw, sheet metal: #8 x 3/16; plain hex head; stl; cad pl (tuner mtg) | ..... |
| 3S7454 | Screw, sheet metal: #8 x 1/4 PKZ plain hex head; stl; cad pl (tuner bracket mtg) | ..... |
| 9A472534 | Socket, tube: 7-prong; miniature... | |
| 9K580218 | Socket, tube: 8-prong; miniature... | |
| 31A41318 | Strip, terminal: 1 insulated lug, #2 mtg | ..... |

POWER & AUDIO UNIT

CHASSIS PARTS - MECHANICAL

| | | |
|-----------|--------------------------------------------------------------------|-------|
| 1X592233 | Cable and Plug Assembly: includes fuse lead, power cable and plug. | |
| 42A4215 | Clip, vibrator grounding | ..... |
| 14A592132 | Insulator, connector plug | ..... |
| 9K592237 | Lead Assembly, fuse: includes "A" lead and fuse receptacle | ..... |

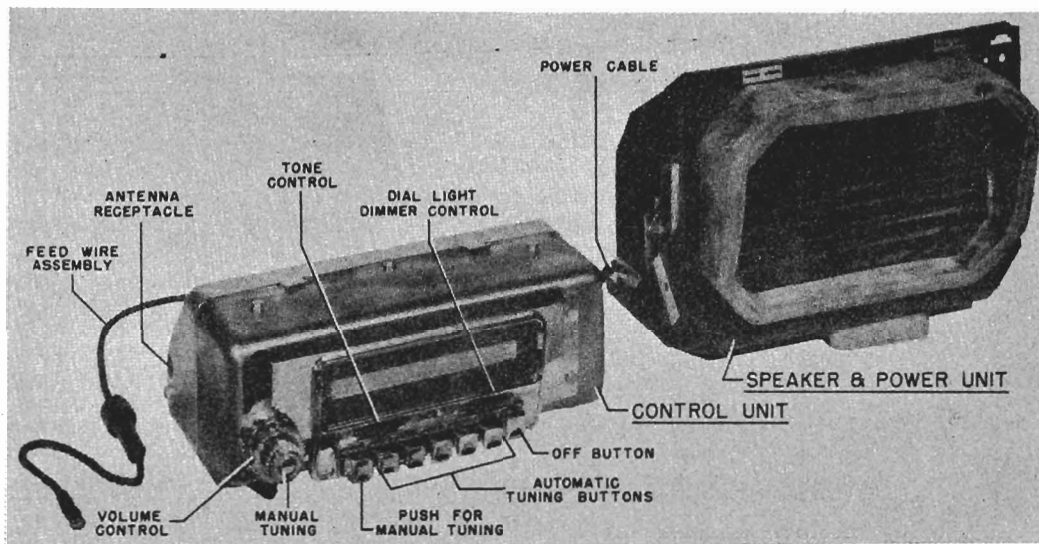
HOUSING PARTS

| | | |
|-----------|---------------------------------------------------------------------------------------------|-------|
| 9A472534 | Socket, tube: miniature; 7-prong... | |
| 9A70208 | Socket, tube: 4-pin (for vibrator) | |
| 31K490143 | Strip, terminal: 2 insulated lugs, #2 mtg; 1-1/8" long | ..... |
| 31A592258 | Strip, terminal: 2 insulated lugs, #2 mtg; 1-3/8" long | ..... |
| 29A76280 | Terminal, insulated pin: black (on speaker leads) | ..... |
| 29K76282 | Terminal, insulated pin: white (on speaker leads) | ..... |
| 38A71874 | Button, push | ..... |
| 42A501255 | Clip, escutcheon retainer | ..... |
| 15K592124 | Cover, bottom: with bushing | ..... |
| 13C501302 | Escutcheon (golden voice) | ..... |
| 1X501276 | Housing and Escutcheon Assembly (Power & Audio Unit) | ..... |
| 1X501278 | Housing and Escutcheon Assembly (Tuner Unit) | ..... |
| 3S400356 | Screw, sheet metal: #4 x 1/4; plain hex head; stl; cad pl (escutcheon mtg) | ..... |
| 3S7454 | Screw, sheet metal: #8 x 1/4 PKZ plain hex head; stl; cad pl (bottom cover mtg) | ..... |
| 3S8114 | Screw, sheet metal: #8 x 1/4 PKZ slotted acorn head; antique copper finish (housing screws) | .... |

ACCESSORIES

| | | |
|-----------|-------------------------------------------------------|-------|
| 8A4491 | Capacitor, generator | ..... |
| 4S7653 | Lockwasher, int-ext: 5/16; stl; cad pl (receiver mtg) | ..... |
| 2S2863 | Nut, hex: 5/16; stl; cad pl (receiver mtg) | ..... |
| 1K75148 | Shaft and Housing Assembly, flexible 24" long | ..... |
| 50B502802 | or | |
| 50K502269 | Speaker, PM: 6"; 3.2 ohm VC | .. |
| 3A77542 | Stud, threaded (receiver mtg) | |
| 6A4141 | Suppressor, distributor | ..... |

MODEL 814,
De Soto



GENERAL INFORMATION

TYPE - Two-piece automotive type receiver, specifically designed for installation in DeSoto S-15 cars.

TUNING RANGE - 535 to 1605 Kc. IF FREQUENCY - 455 Kc

OPERATES FROM - 6.3 volts DC; 9 amperes

POWER OUTPUT - 4 watts undistorted

TUNER - Model AT-82. A breakdown of the tuner will be found in the Replacement Parts List.

- TUBE COMPLEMENT - Control Unit
 6BA6 - RF Amplifier
 6BE6 - Converter
 6BA6 - IF Amplifier
 6AT6 - Det, AVC & AF Amplifier
- Speaker & Power Unit
 6AT6 - Audio Inverter
 6AQ5 - Power Amplifier
 6AQ5, - Power Amplifier
 6X4 - Rectifier

ALIGNMENT

EQUIPMENT REQUIRED:

1. A special tool for adjusting the tuner cores. Use alignment Tool, Motorola Part No. 66A76278.
2. A small fibre screwdriver for IF & RF alignment.
3. An accurately calibrated AM modulated signal generator.
4. A low range output meter.
5. A dummy antenna for RF alignment. Construct dummy antenna as shown in Figure 1.

PROCEDURE:

1. Remove the front and rear housings and dial scale to expose alignment adjustment screws.
2. Connect the Control Unit & Speaker and Power Unit together by means of the power cable.

3. Connect an output meter across speaker voice coil.
4. Connect 6.6 volts (measured at the "on-off" switch) to receiver feed wire assembly and chassis.
5. Turn receiver on and allow it to warm up for a few minutes. Set receiver volume control at maximum. Push DIAL button to place tuner in manual position. Turn tone control to VOICE position.
6. For greatest accuracy keep output of receiver at approximately 1 watt (1 watt = 1.79 volts on output meter) throughout alignment by reducing generator output (not receiver volume control) as stages are brought into alignment.
7. IMPORTANT: Do not push in on the alignment tool when adjusting the tuner cores. The slightest inward pressure on the alignment tool may move the tuner carriage and result in inaccurate alignment. CAUTION: Do not press hard on the alignment screwdriver when aligning IF & diode transformers as damage to the core or transformer may result.

8. ANTENNA TRIMMER ADJUSTMENTS. Once alignment has been satisfactorily performed, no further adjustment of any alignment screws should be made except to align the antenna trimmers (7 & 12) to car antenna after receiver is installed in car. These adjustments should be made with antenna fully extended. Trimmer (7) is adjusted with the DIAL button pushed in and dial set to approximately 1400 Kc; trimmer (12) is adjusted with #5 push button pushed in and tuned

to approximately 1400 Kc. Peak these trimmers for maximum volume of a weak station or background noise between stations.

9. POINTER ADJUSTMENT. Pointer should be calibrated to dial scale by tuning in 1400 Kc signal and then adjusting pointer to 1400 Kc.

ALIGNMENT CHART

| STEP | DUMMY ANTENNA | GENERATOR CONNECTION | GENERATOR FREQUENCY | TUNER SET TO | ADJUST | REMARKS |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|---------------------------------------------|--------------------------|------------------------------------------------------------------------|-------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IF ALIGNMENT | | | | | | |
| 1. | .1 mf | Hi side-6BE6 grid (pin #7) Lo side -chassis | 455 Kc | High frequency end (cores out) | 1, 2, 3 & 4 | Peak for maximum in order indicated. Check by repeating procedure. |
| RF ALIGNMENT - MANUAL | | | | | | |
| 2. | See Fig. 1 | Ant. receptacle through dummy | 1605 Kc | High frequency end. Cores should project 1-1/8" from cans. (Screw out) | 5, 6, & 7 | Peak for maximum in order indicated. |
| 3. | " | " | 1400 Kc | Set spacing between carriage plate & coil shield plate to 3/8" | 8, 9, & 10 | Peak for maximum in order indicated. |
| 4. NOTE: The following oscillator padder coil adjustment has been correctly made at the factory. Unless components have been changed in the oscillator circuit, this adjustment should not be made in the field. Front cover must be attached to chassis for this adjustment. | | | | | | |
| | See Fig. 1 | Ant. receptacle through dummy | Turn generator power off | Set tuner to 600 Kc ("6" on dial scale) | 11 | Peak oscillator padder for maximum noise. If padder core (11) must be moved more than 1/2 turn from its original position, repeat steps 2, 3, & 4 until it is necessary to move the padder core less than 1/2 turn in this step. |
| 5. Repeat steps 2, 3, & 4 but eliminate preliminary step of moving cores to project 1-1/8" from cans. | | | | | | |
| RF ALIGNMENT - PUSH BUTTON | | | | | | |
| 6. | PUSH BUTTON #5: See Fig. 1. | Ant. receptacle through dummy | 1400 Kc | Set PB #5 to 1400 Kc | 12 | Peak PB ant. trimmer for max. |
| NOTE: The following push button tracking nut adjustments have been made at the factory. Unless components have been changed in the push button assembly circuit, these adjustments should not be made in the field. | | | | | | |
| 7. | PUSH BUTTON #5: | | | | | |
| a. | See Fig. 1 | Ant. receptacle through dummy | 1605 Kc | Set PB #5 to 1605 Kc | 12 | Peak PB ant. trimmer (12) for max. |
| b. | " | " | 1400 Kc | Set PB #5 to 1400 Kc | 13 | Peak tracking nut (13) for max. |
| c. Recheck pushbutton antenna trimmer (12) adjustment at 1605 Kc for max. response and repeat steps 7a & 7b if sensitivity rises with a change of push button antenna trimmer (12) setting. | | | | | | |
| 8. | PUSH BUTTONS #4, 3 & 2: See Fig. 1 | Ant. receptacle through dummy | 1020 Kc | Set PB's #4, 3, 2 to 1020 Kc | 14 for #4 15 for #3 16 for #2 | Peak tracking nuts for max. |
| 9. | PUSH BUTTON #1: See Fig. 1 | " | 600 Kc | Set PB #1 to 600 Kc | 17 | Peak tracking nut for max. |
| IF TRAP ADJUSTMENT | | | | | | |
| 10. | See Fig. 1 | " | 455 Kc | Set PB #1 to 600 Kc | 18 | Tune wavetrap for minimum response. |

MODEL 814,
De Soto

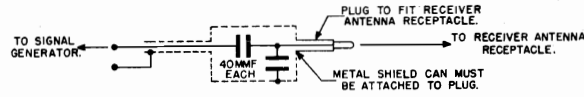


FIGURE 1. DUMMY ANTENNA

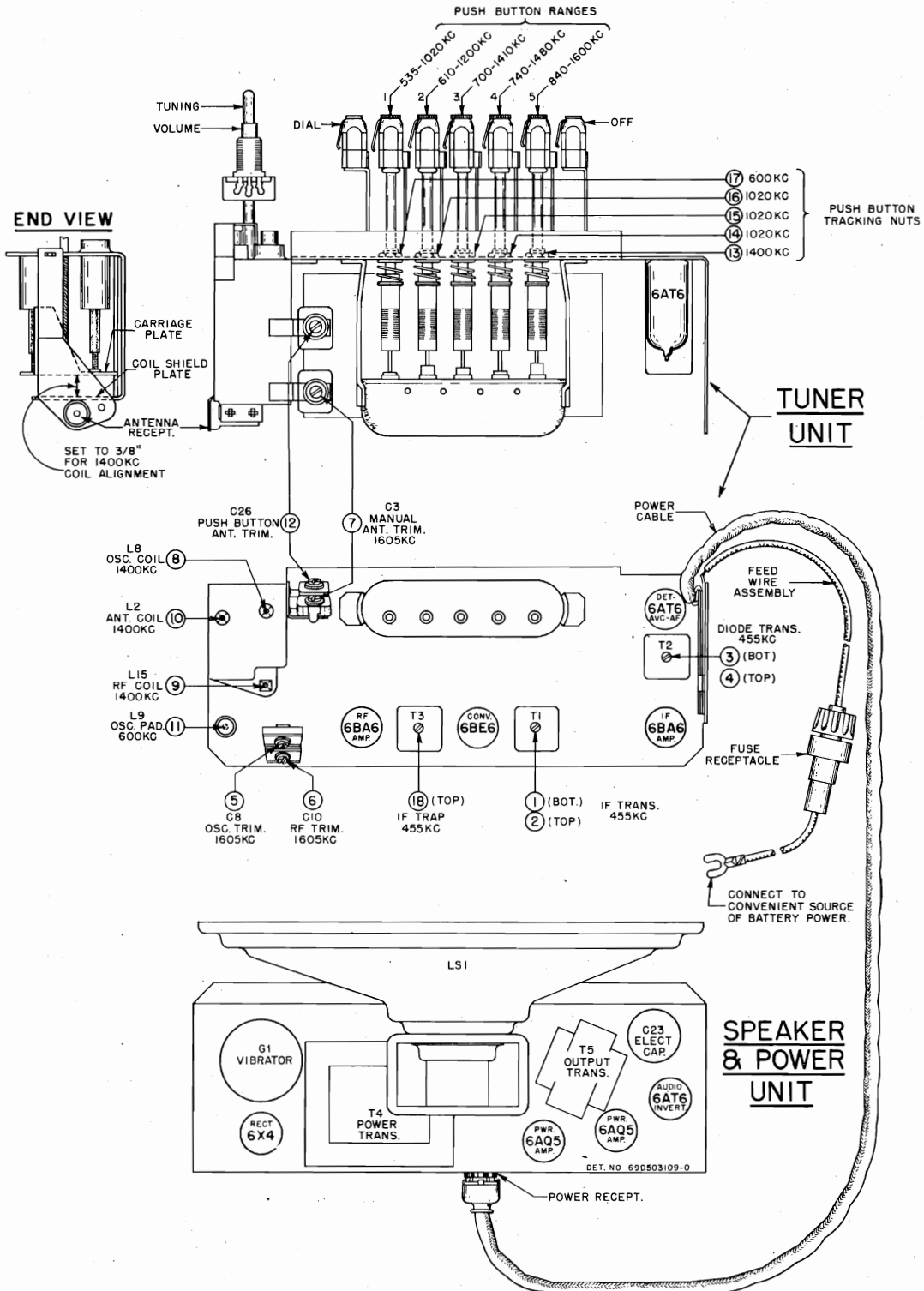


FIGURE 2. TUBE & TRIMMER LOCATION

OPERATING INSTRUCTIONS

TO TURN THE RADIO ON. The on-off switch is combined with pushbutton operation. Pushing any button, other than the OFF button, will turn the radio on. Allow the receiver to reach operating temperature (approximately 20 seconds) before selecting a station.

TUNING. Tuning is accomplished manually or automatically. Any one of five stations may be selected automatically by means of pushbutton control. To receive stations that are not set for automatic selection, use Manual Tuning.

MANUAL TUNING. Push in the DIAL button (extreme left-hand button) then select the desired station or program by turning the manual tuning knob. Tune to the exact frequency or position for clearest reception. The pointer indicates the frequency to which the receiver is tuned.

AUTOMATIC TUNING. The five pushbuttons (1, 2, 3, 4 & 5) located beneath the dial scale, may be set for five favorite local stations. Firmly pressing one of the pushbuttons automatically selects the station for which the pushbutton

was set.

VOLUME CONTROL. To increase the volume, turn the volume knob (located concentrically and behind the manual tuning knob) to the right.

STONE CONTROL. The knurled horizontal control at the left side of the dial escutcheon operates a variable tone control. Tuning this control to the right or to the left will change the tone of the receiver, as indicated on the dial escutcheon. With the control set at midway, the full tonal range is obtained. Static and other types of electrical interference will be minimized in the MELLO position.

DIMMER CONTROL. The knurled horizontal control at the right side of the dial escutcheon controls the intensity of the dial light. Turning this control to the left or right will vary the dial light intensity.

TO TURN THE RADIO OFF. Push in the OFF button (extreme right-hand button).

TO SET THE PUSHBUTTONS

The pushbuttons should preferably be set up during the day, since weak station signals are stronger at night and the button may be set to a distant station carrying the same program as the desired station.

1. Turn radio ON (see Operating Instructions) and allow it to warm up for at least 15 minutes. Antenna should be fully extended and tone control in VOICE position.

2. Pull off the chrome plated pushbutton caps from buttons 1, 2, 3, 4 and 5, exposing the knurled metal buttons.

3. Push in DIAL button and tune in station selected for No. 1 button, making sure it is within the 535 to 1020 kilocycle range as shown in Figure 2. Select only the most powerful local stations.

4. Push in No. 1 button. Turn No. 1 knurled button to right or left to tune in station already tuned in with manual control. Turning button counterclockwise will increase the frequency and turning clockwise will decrease the frequency. Check station by pushing in the DIAL button again to identify program. Tune carefully and do not force button beyond stop.

5. Perform steps 3 and 4 for the remaining four push buttons.

IMPORTANT: Check with Figure 2 for frequency range of each button.

6. Replace chrome plated pushbutton caps.

INTERFERENCE ELIMINATION**GENERATOR INTERFERENCE**

Install radio interference filter capacitor on generator as shown in Figure 3. Mount the capacitor on the generator frame under the ground lead screw. Connect the eyelet terminal on the capacitor lead to the armature terminal of the generator.

WARNING: Do not connect to field terminal; to do so will result in damage to voltage regulator.

TIRE STATIC

After completion of Radio installation, road test car for tire static on dry concrete and blacktop pavements, under the following conditions:

1. At both low and high car speeds
2. With antenna extended to operating position
3. With radio at full volume and tuned off station.

If tire static noise is encountered, inject Tire Static Suppression Powder (Chrysler Package Part No. 1233 883) in-

to tires with Injector (Chrysler Part No. 1233 884), following instructions given on package.

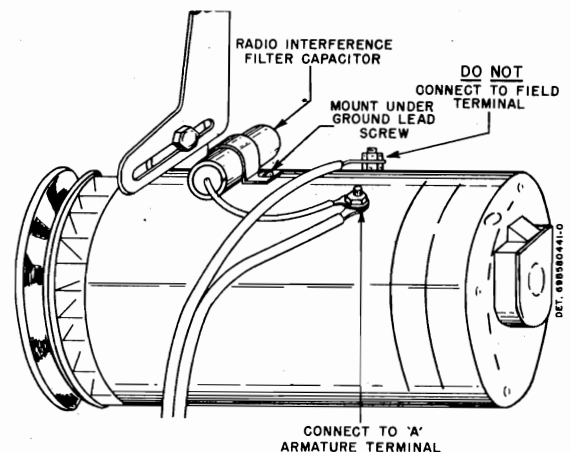


FIGURE 3. GENERATOR CAPACITOR INSTALLATION

PAGE 22-190 MOTOROLA

MODEL 814,
De Soto

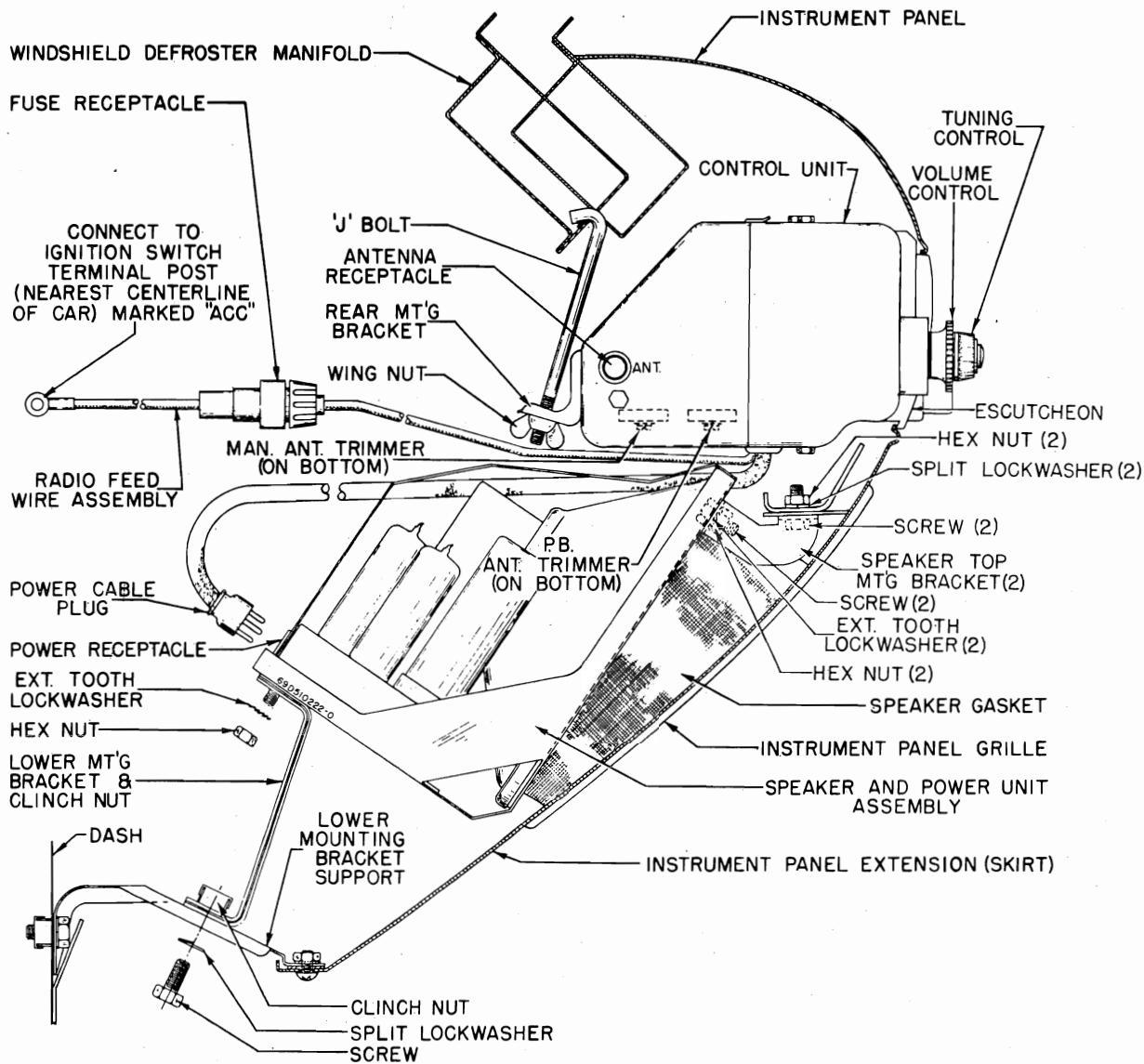


FIGURE 4. RADIO INSTALLATION

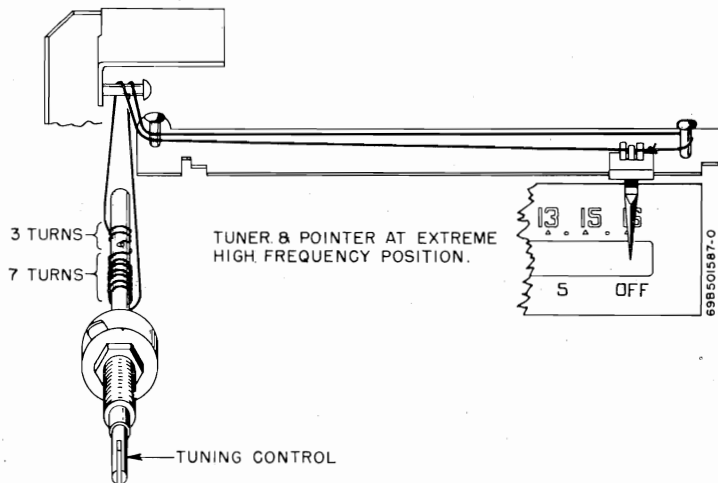


FIGURE 5. DIAL RESTRINGING

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De Soto

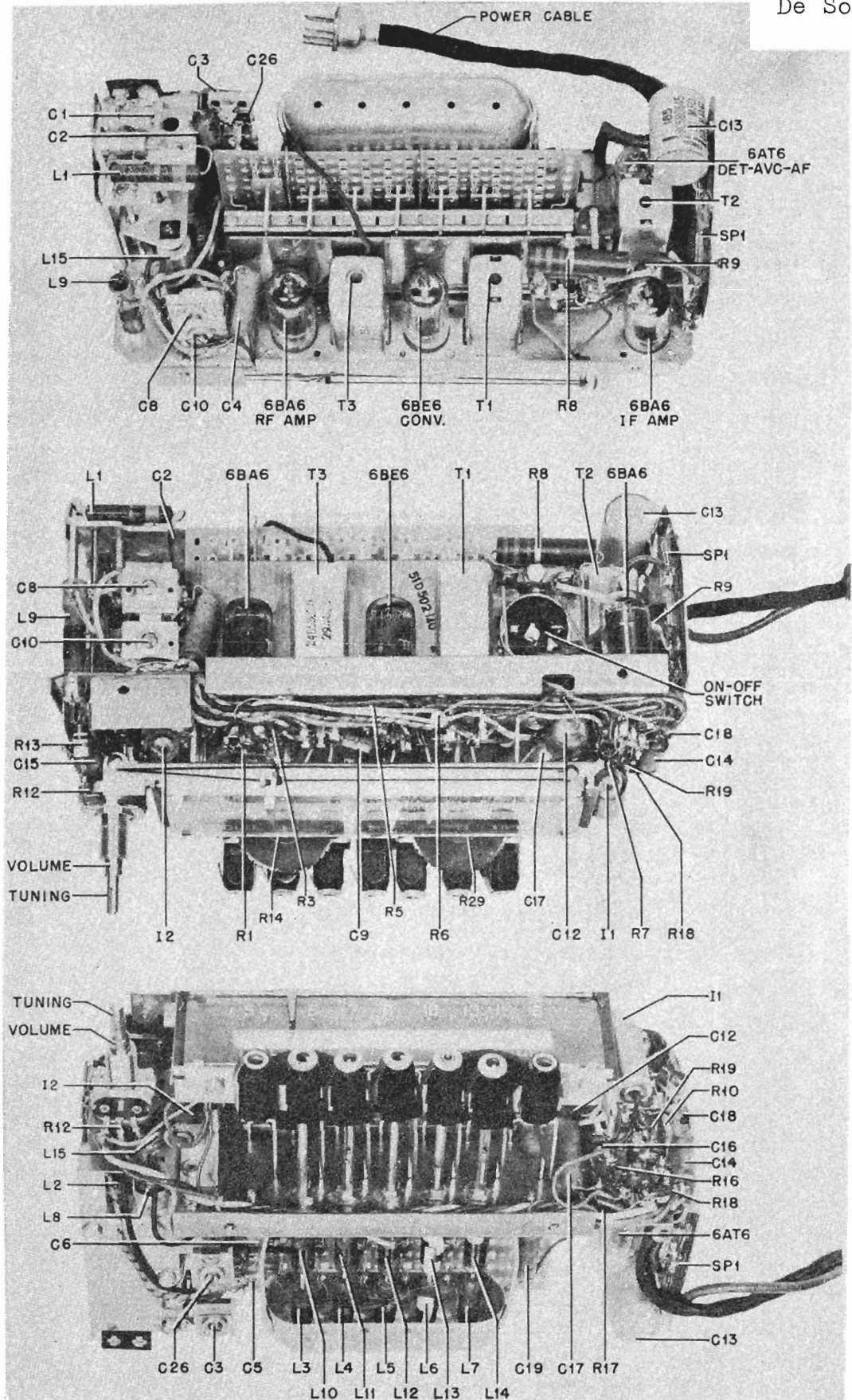


FIGURE 6. PARTS LOCATION - CONTROL UNIT

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De Soto

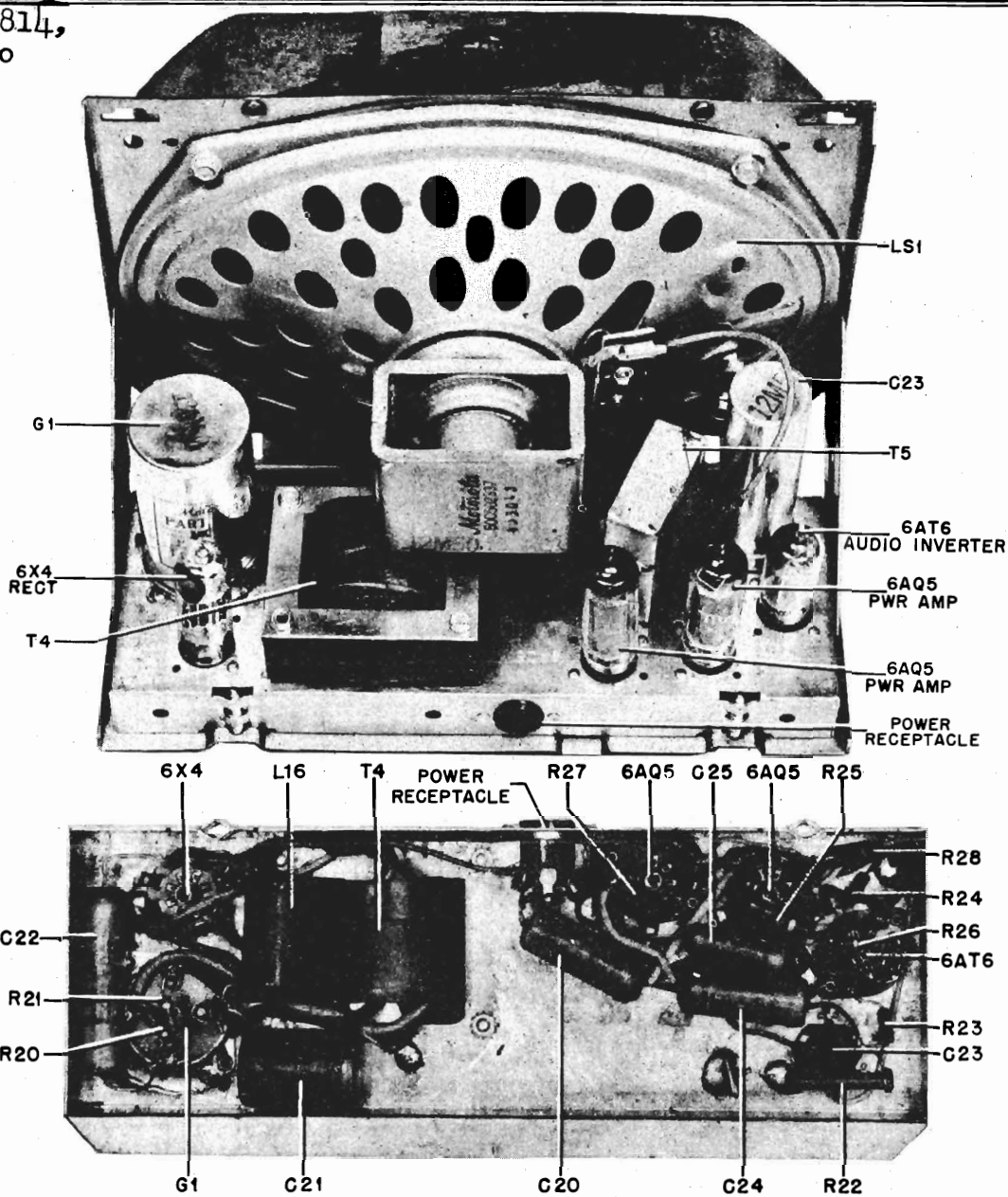


FIGURE 7. PARTS LOCATION - SPEAKER & POWER UNIT

REPLACEMENT PARTS LIST

NOTE: When ordering parts, specify model number of set in addition to part number and description of part.

| Ref. No. | Part Number | Description |
|----------------------------------------------------------------------------------|-------------|----------------------------------------------|
| CONTROL UNIT - CHASSIS PARTS - ELECTRICAL | | |
| <u>Capacitors</u> | | |
| C-1 | - | Part of Tuner AT-82..... |
| C-2 | - | Part of Tuner AT-82..... |
| C-3 | - | Part of Tuner AT-82..... |
| C-4 | 8R13514 | Paper: .05 mf 100V..... |
| C-5 | - | Part of Tuner AT-82..... |
| C-6 | - | Part of Tuner AT-82..... |
| C-7 | 21K70720 | Molded: 5 mmf 500V..... |
| C-8 | - | Part of Tuner AT-82..... |
| C-9 | 21R6513 | Mica: 50 mmf 10% 500V..... |
| C-10 | - | Part of Tuner AT-82..... |
| C-11 | 8R13166 | Paper: .1 mf 400V..... |
| C-12 | 8R14791 | Paper: .05 mf 400V..... |
| C-13 | 8C580845 | Paper: .5 mf 100V..... |
| C-14 | 8R472754 | Paper: .01 mf 100V..... |
| C-15 | 8R51209 | Paper: .02 mf 100V..... |
| C-16 | 21K70720 | Molded: 5 mmf 500V..... |
| C-17 | 8R13514 | Paper: .05 mf 100V..... |
| C-18 | 21R6590 | Mica: 500 mmf 20% 500V.... |
| C-19 | 8R23690 | Paper: .01 mf 400V..... |
| C-26 | - | Part of Tuner AT-82..... |
| <u>Fuse</u> | | |
| F-1 | 65K12894 | Fuse, tubular: 14 amp..... |
| <u>Pilot Light</u> | | |
| I-1,2 | 65X11854 | Bulb: 6.3V; .15A; tubular; bayonet base..... |
| <u>Coils</u> | | |
| L-1 thru | | |
| L-15 | - | Part of Tuner AT-82..... |
| <u>Resistors</u> | | |
| <u>Note:</u> All resistors are insulated carbon type unless otherwise specified. | | |
| R-1 | 6R6270 | 220 10% 1/2W..... |
| R-2 | 6R6032 | 470,000 20% 1/2W..... |

| | | | | |
|------|-----------|---------------------------------------------------|-----|-----------|
| R-3 | 6R6182 | 150,000 | 20% | 1/2W..... |
| R-4 | 6R6075 | 100,000 | 20% | 1/2W..... |
| R-5 | 6R6056 | 47,000 | 20% | 1/2W..... |
| R-6 | 6R5656 | 12,000 | 10% | 1W..... |
| R-7 | 6R5554 | 390 | 10% | 1/2W..... |
| R-8 | 6R5732 | 15,000 | 10% | 2W..... |
| R-9 | 6R6010 | 330 | 20% | 1/2W..... |
| R-10 | 6R6001 | 68,000 | 20% | 1/2W..... |
| R-11 | 6R6056 | 47,000 | 20% | 1/2W..... |
| R-12 | 18A501857 | Volume control: 500,000; tapped at 50,000..... | | |
| R-13 | 6R6054 | 10,000 | 20% | 1/2W..... |
| R-14 | 18A501754 | Tone control: 500,000... | | |
| R-15 | 6R6004 | 1 meg | 20% | 1/2W..... |
| R-16 | 6R6004 | 1 meg | 20% | 1/2W..... |
| R-17 | 6R6161 | 1500 | 20% | 1/2W..... |
| R-18 | 6R2122 | 4.7 meg | 20% | 1/2W..... |
| R-19 | 6R6015 | 220,000 | 20% | 1/2W..... |
| R-29 | 17A502225 | Wirewound: 30 | | |

Spark Plate

| | | |
|------|----------|--------------------------|
| SP-1 | 1A501755 | Spark Plate Assembly ... |
|------|----------|--------------------------|

Transformers

| | | |
|-----|--------------|-------------------------------|
| T-1 | 24B485553 | |
| | or 24K502819 | IF, 455 Kc: complete.... |
| T-2 | 24K485555 | Diode, 455 Kc: complete..... |
| T-3 | 24B580274 | IF trap, 455 Kc: complete.... |

SPEAKER AND POWER UNIT -CHASSIS PARTS -ELECTRICAL

Capacitors

| | | | |
|------|-----------|------------------------------------------------|------------|
| C-20 | 8R71911 | Paper: .03 mf | 400V..... |
| C-21 | 8C580845 | Paper: .5 mf | 100V..... |
| C-22 | 8R490449 | Paper: .02 mf | 1000V..... |
| C-23 | 23A473015 | Electrolytic: 30-30-20 mf/ 350-300-25V..... | |
| C-24 | 8R71911 | Paper: .03 mf | 400V..... |
| C-25 | 8R490437 | Paper: .003 mf | 400V..... |

Vibrator

| | | |
|-----|---------|-------------------------------|
| G-1 | 48B3333 | Vibrator, non-sync: 4-pin.... |
|-----|---------|-------------------------------|

Coil

| | | |
|------|-----------|------------------|
| L-16 | 24A472535 | Choke, hash..... |
|------|-----------|------------------|

Speaker

| | | |
|------|--------------|------------------------------------------------|
| LS-1 | 50C502337 | |
| | or 50C501778 | |
| | or 50C502190 | Speaker, PM: 6" x 9" oval; 3.2 ohm VC |

Resistors

Note: All resistors are carbon insulated type unless otherwise specified.

| | | | | |
|------|----------|---------|-----|-----------|
| R-20 | 6R5614 | 56 | 10% | 1/2W..... |
| R-21 | 6R5614 | 56 | 10% | 1/2W..... |
| R-22 | 6R476130 | 2200 | 20% | 2W..... |
| R-23 | 6R6015 | 220,000 | 20% | 1/2W..... |
| R-24 | 6R6069 | 2200 | 10% | 1/2W..... |
| R-25 | 6R6407 | 220,000 | 10% | 1/2W..... |
| R-26 | 6R6320 | 10,000 | 10% | 1/2W..... |
| R-27 | 6R6015 | 220,000 | 20% | 1/2W..... |
| R-28 | 6R6336 | 270 | 10% | 1W..... |

Transformers

| | | |
|-----|-----------|-------------------------|
| T-4 | 25C501644 | Power transformer..... |
| T-5 | 25B501722 | Output transformer..... |

CONTROL UNIT - CHASSIS PARTS - MECHANICAL

| | |
|-------------------------|------------------------------------------------------------------------------------------------------|
| 7B501750 | Bracket, dimmer and tone control retainer..... |
| 30K501917 | Cable and Plug Assembly, power.... |
| 42B485548 | Clip, coil can mtg.....doz |
| 42A501781 | Clip, hair-pin (dial scale bracket retainer).....doz |
| 11M8944 | Cord, dial: #18; nylon; black....yd |
| 1X502120 | Dial Scale and Bracket Assembly.... |
| 1X502091 | Dial Scale Support Bracket Assembly: includes dimmer control resistor and shoulder rivets..... |
| 9K471264 | Grommet, insulating (on power & battery leads)..... |
| 36B501748 | Knob, dimmer control..... |
| 36B501747 | Knob, tone control..... |
| 9K502087 or 9K502241 | Lead Assembly, radio to ignition switch: includes fuse..... |
| 1K501718 | Pointer and Slider Assembly..... |
| 1X502121 | Pushbutton and Arm Assembly (for OFF and DIAL)..... |
| 1X502122 | Pushbutton and Arm Assembly (for 1, 2, 3, 4 & 5)..... |
| 5K71246 | Rivet, shoulder: stl; nkl pl (dial cord guide)..... |
| 34B501752 | Scale, dial: plastic..... |
| 43K501785 | Sleeve, pushbutton coupling.... |
| 9A502226 | Socket, pilot light: includes bracket; R.H; 2-1/4" & 4-1/2" leads |
| 9A502227 | Socket, pilot light: includes bracket; L.H; 7" & 10" leads..... |
| 9K580218 | Socket, tube: 7-prong; miniature; with dummy lug..... |
| 1A502228 | Stud and Spring Wiper Assembly (dimmer control contact arm)..... |

CONTROL UNIT - HOUSING PARTS

| | |
|-----------|-------------------------------------------------------------------------|
| 61A501709 | Crystal, dial: glass..... |
| 1X502102 | Escutcheon & Dial Crystal Assembly. |
| 7B501715 | Frame, dial crystal retainer..... |
| 15D501724 | Housing, front: painted white..... |
| 15K501732 | Housing, rear..... |
| 2A485540 | Nut, hex: special; 7/16-28 x 9/16; stl; cad pl (escutcheon mtg)..... |
| 2S7999 | Speednut (dial crystal retainer)doz |

SPEAKER AND POWER UNIT - MECHANICAL PARTS

| | |
|-----------|-----------------------------------------------------------------------------------|
| 42A501782 | Clip, speed (rain shield mtg)... |
| 42A4215 | Clip, vibrator grounding..... |
| 32B501634 | Gasket, speaker: rubber..... |
| 1X510121 | Plate & Gasket Assembly, spkr mtg.. |
| 9A501887 | Receptacle, 5-prong (for power cable)..... |
| 3S7457 | Screw, sheet metal: #8 x 7/8 plain hex head; stl; cad pl (chassis mtg)..... |
| 3S8188 | Screw, sheet metal: #10 x 1/2 plain hex head; stl; cad pl (spkr mtg)..... |
| 1X502364 | Shield, rain: includes pads..... |
| 9A70208 | Socket, tube: 4-prong (for vibrator) |
| 8A472534 | Socket, tube: 7-prong; miniature... |
| 8K580218 | Socket, tube: 7-prong; miniature; with dummy lug..... |

MODEL 814,
De Soto

MOUNTING HARDWARE AND ACCESSORIES

3A501915 Bolt, "J" (control unit assembly mtg).....

7B501623 or
7K501624 Bracket, spkr plate top mtg: right-hand.....

Part
Number Description

7K501626 or
7K501627 Bracket, spkr plate top mtg: left-hand.....

1X502104 Bracket and Clinch Nut Assembly (spkr & power unit mtg).....

15A485225 Cap, pushbutton: chrome pl.....

8B580014 Capacitor, radio interference.....

2K501944 Clinch Nut: 1/4-20 (lower mounting bracket support mtg).....

1X500387 Knob, tuning control: chrome pl....

36B501858 Knob, volume control: chrome pl....

4S7652 Lockwasher, ext: tooth; #10; stl; cad pl (spkr & power unit assembly mtg)

4S400449 Lockwasher, split: 1/4"; stl; cad pl (bracket and clinch nut assembly, lower mounting bracket support mtg & speaker plate top mounting bracket mtg).....

2S7009 Nut, hex: 10-32 x 3/8; stl; cad pl (speaker & power unit assembly mtg)

2S2890 Nut, hex: 1/4-20 x 7/16; stl; cad pl (speaker plate top mounting bracket mtg)

2K502076 Nut, wing: 10-24; stl; cad pl (control unit assembly mtg).....

3S400938 Screw, machine: 10-32 x 3/8; Phillips round head; stl; cad pl (lower mounting bracket support mtg).

4S400495 Screw, machine: 10-32 x 1/2; slotted hex head; stl; cad pl (speaker & power unit assembly mtg).....

3S7297 Screw, machine: 1/4-20 x 1/2; plain hex head; stl; cad pl (bracket & clinch nut assembly, speaker top mounting bracket and lower mounting bracket support mtg).....doz

7C502482 Support, lower mounting bracket....

Ref. Part
No. Number Description

Capacitors

C-1 21K74661 Ceramic: 50 mmf 500V.....

C-2 8C4529 Paper: .006 mf 100V.....

C-3 20A501889 Variable, mica: 20-80 mmf; includes brkt.....

C-5 21K580178 Ceramic: 10 mmf 500V.....

C-6 21K502851 Ceramic: 115 mmf 500V.....

C-8 20A501888 Variable, mica: 395-470 mmf; on same bracket as C-10....

Coils

L-1 24B580540 Choke, antenna.....

L-2 24A510162 Antenna coil, manual.....

L-3 thru
L-7 - Antenna coil, PB (part of 51K510171; not replaceable separately).....

L-8 24K510163 RF coil, manual.....

L-9 24K501921 Oscillator padder coil, manual.....

L-10 thru
L-14 - Oscillator coil, PB (part of 51K510171; not replaceable separately).....

L-15 24A510164 Oscillator coil, manual.....

Miscellaneous Tuner Parts

42A502507 Clip, spring (manual drive shaft retainer).....

46A510160 Core, powdered iron: with screw (L-2, 8 & 15 tuning)

5A501013 Grommet, rubber (L-2,8 & 15 tuning core mtg).....

2S9647 Nut, hex: 12-28 x 5/16 (PB osc coil mtg & tracking nut)

2A510167 Nut, floating: 1 ear (on manual drive shaft).....

2A510165 Nut, lock: 2 ears (on manual drive shaft).....

9A472148 Receptacle, antenna.....

5A470101 Rivet, shoulder (pointer cord guide).....

47B501910 Shaft, manual drive.....

46A510161 Sleeve, coil: powdered iron (inside L-2, 8 & 15 coil shield cans).....

41A510169 Spring, loading (on manual drive shaft).....

31A502144 Strip, terminal: 1 insulated lug, #2 mtg.....

31K590446 Strip, terminal: 2 insulated lugs, #2 mtg.....

31A502143 Strip, terminal: 2 insulated lugs, #3 mtg.....

Ref. Part
No. Number Description

TUNER - MODEL AT-82

51D502140 Automatic Tuner Model AT-82, complete: includes 51K510170 & 51K510171.....

51K510170 Manual Tuner Assembly only: complete; includes L-1,2,8, 15, C-1,2,3,26 & ant receptacle.....

51K510171 Pushbutton Tuner Assembly, only: complete; includes L-3, 4,5,6,7,9,10,11,12,13,14, PB switch, C-5,6,8 & 10....

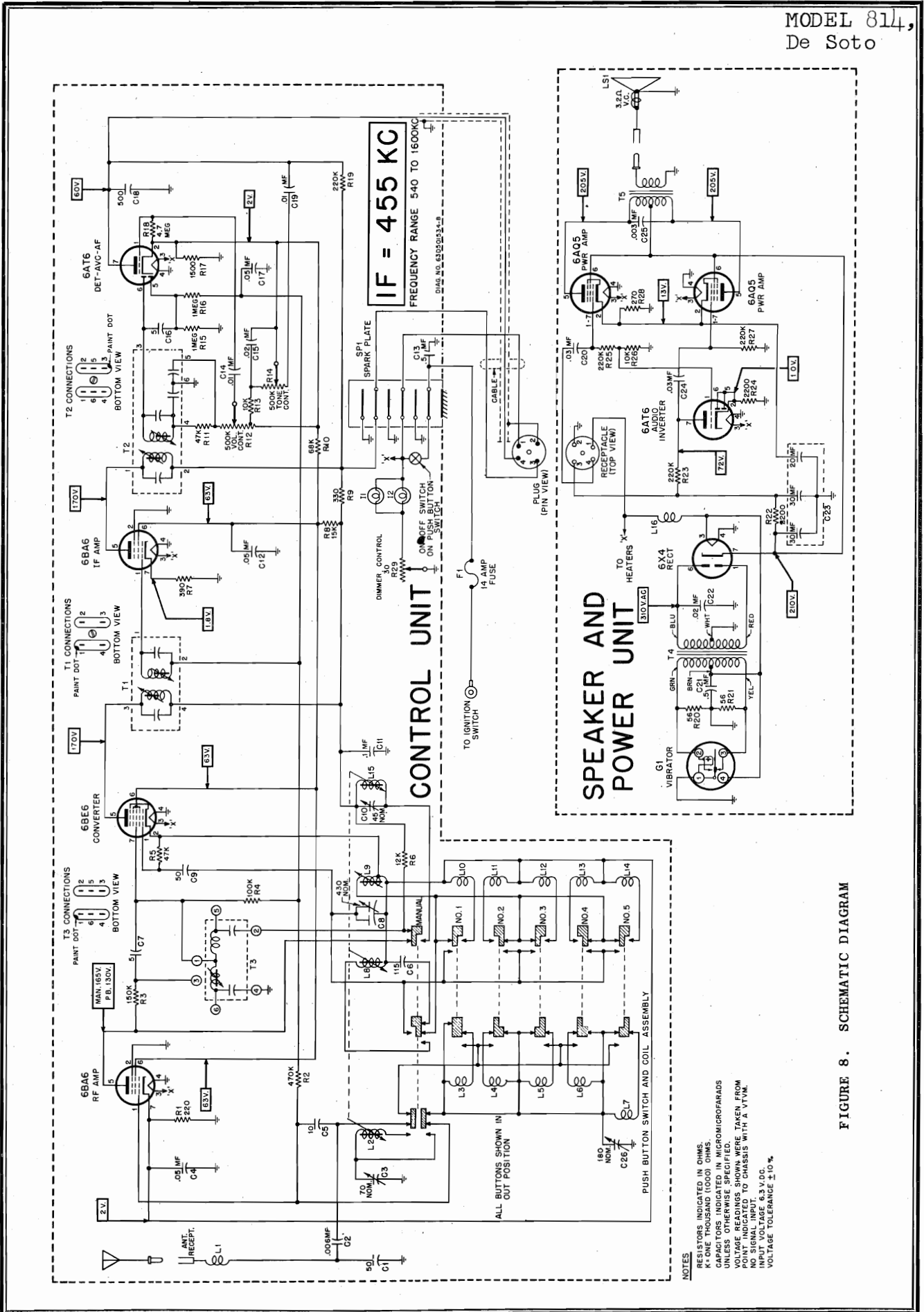


FIGURE 8. SCHEMATIC DIAGRAM

MODEL 7XM21,
Ch. HS-218

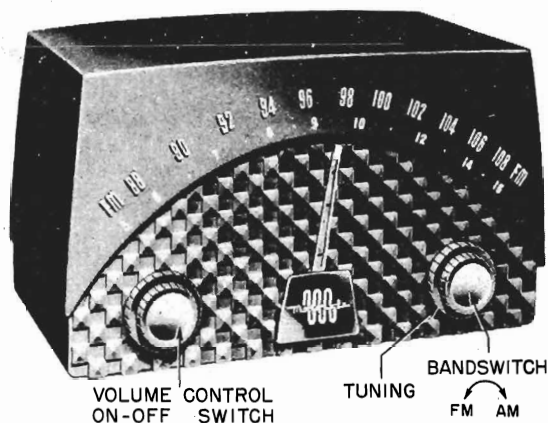
GENERAL INFORMATION

TYPE - FM-AM table model receiver

TUNING RANGE - AM 535 to 1620 Kc IF - 455 Kc
FM 88 to 108 Mc IF - 10.7 Mc

TUBE COMPLEMENT - 12BA6 - FM-AM RF Amplifier
12BA7 - FM-AM Converter
12BA6 - FM-AM IF Amplifier
12BA6 - FM IF Amplifier
19T8 - FM Ratio Detector, AM
Detector & 1st Audio Amp
50C5 - Power Amplifier
Rectifier - Selenium type

POWER SUPPLY - 117V AC or DC, 40 watts



INSTALLATION & OPERATING INSTRUCTIONS

ANTENNA & GROUND

No outside antenna or ground is required for standard broadcast (AM) reception. A loop antenna for broadcast reception is located at the rear of the cabinet.

An FM antenna, built into the power cord, eliminates the need for an external FM antenna when the receiver is used in normal FM service areas such as are found in and for a few miles around metropolitan areas. In 'fringe' or weak signal areas, improved FM reception can be obtained by using an FM antenna mounted as high as possible. The FM antenna should be connected through a 300 ohm twin transmission line to the two screws on the rear of the set. Refer to the instructions on the antenna panel for proper transmission line connections. Orient the antenna so that maximum volume of FM station or stations is obtained.

NOTE: When the built-in FM antenna is used, connect the green lead from the chassis to the RIGHT-HAND terminal on the loop. Since the FM antenna is incorporated in the power line cord,

OPERATING NOTES:

The chassis of this receiver is connected directly to the power line. When operating the chassis (from AC line) outside of its cabinet, use an isolation transformer between the power line and the receiver to reduce the possibility of electrical shock. If an isolation transformer is not available, check the AC voltage between the chassis and the bench ground. If there is any indication of voltage, reverse the line plug before handling the set.

When operating the receiver from an AC power line, reception can sometimes be improved by reversing the plug in the power outlet. If the receiver does not operate from a DC power line, after being turned on for a few minutes, reverse the plug in the power outlet.

TO CALIBRATE DIAL:

1. Turn the tuning knob counterclockwise until the end of its travel is reached.
2. Through the hole in the bottom of the cabinet, loosen the Allen head setscrew in the pointer sleeve.
3. Move the pointer until it coincides with the center of the "5" on the AM broadcast scale.
4. Tighten the setscrew.

NOTE: If the pointer is accidentally moved

stretch the line cord to its full length to obtain strong FM reception.

CAUTION: Do not connect antenna or chassis to water pipe, radiator, or other ground.

CONTROLS

POWER SWITCH & VOLUME CONTROL. The power switch and volume control are combined and are operated by the left-hand knob.

BANDSWITCH. The small (inner) right-hand knob selects FM or AM reception. Rotate the knob clockwise for AM or counterclockwise for FM.

TUNING. Tuning of both FM and AM is accomplished with the large (outer) right-hand knob. The standard broadcast dial (AM) is read in kilocycles by adding two zeros to the figures. The frequency modulation (FM) dial scale is read in megacycles (88 to 108).

Tuning of FM stations should be done very carefully, for best sound reproduction, not necessarily for strongest volume received.

SERVICE NOTES

by hand, it will be released from a detent in the pointer collar assembly, and no damage to the tuning mechanism will result. To reset the pointer, merely move it back and forth until it again engages in the detent.

TO REMOVE POINTER:

1. Remove the two screws holding the medallion, from beneath the cabinet.
2. Turn the tuning knob until the pointer reaches the low frequency end of its range.
3. Through the hole in the bottom of the cabinet, insert an Allen head wrench into the setscrew in the pointer sleeve and hold the wrench. This keeps the sleeve from turning and breaking the dial string.
4. Remove the nut and washers from the front of the pointer.
5. Pull off the pointer.

TO REMOVE CHASSIS FROM CABINET:

1. Remove the pointer, as described above.
2. Pull off the control knobs.
3. From the rear of the cabinet, remove the two screws holding the chassis to the cabinet.
4. Remove the two split plugs at the top of the loop, which hold the loop to the cabinet.
5. Slide the chassis from the cabinet.

54P600253

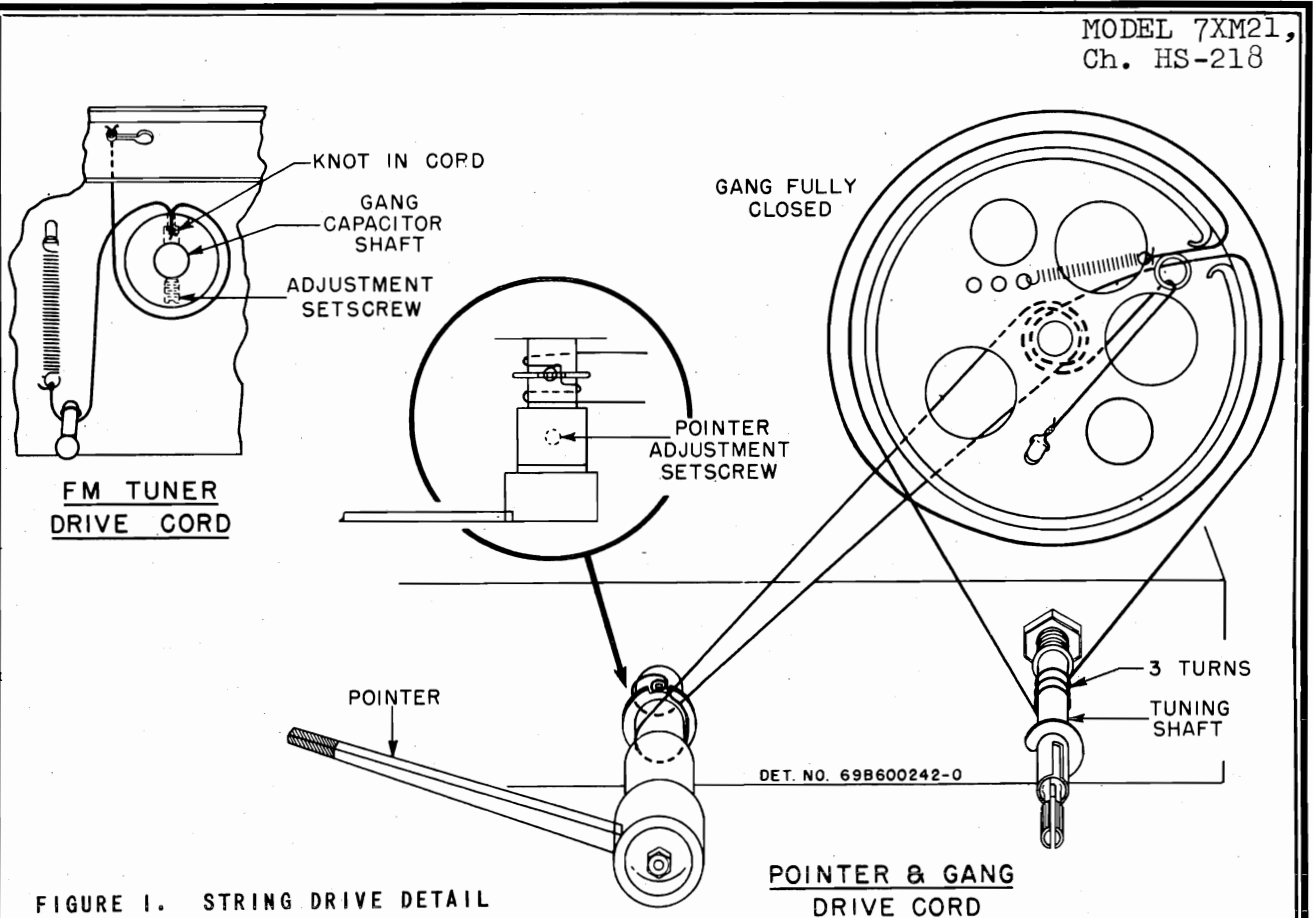


FIGURE 1. STRING DRIVE DETAIL

ALIGNMENT

GENERAL INFORMATION

1. Maximum performance can be obtained only if extreme care is exercised during alignment.
2. If AC power is used, it is recommended that an isolation transformer be placed between the power line and the receiver during alignment to avoid hum and electrical shocks. If an isolation transformer is not available, connect the low side of the signal generator to the receiver chassis through a .1 mf capacitor.
3. Use a small fibre screwdriver for aligning the IF transformers.
4. Refer to Figure 2 for the location of all alignment trimmers and cores.
5. As the stages are brought into alignment, reduce the signal generator output to a low value to avoid overloading the receiver.

ORDER OF ALIGNMENT AND EQUIPMENT REQUIRED

1. Broadcast Band IF & RF Alignment
 - a. 455 to 1620 Kc AM signal generator
 - b. Low range output meter
- 2 (A) FM Band IF & RF Alignment (Preferred Method)
 - a. 10.7 to 108 Mc FM signal generator
 - b. Oscilloscope
- (B) FM Band IF & RF Alignment (Alternate Method)
 - a. 10.7 to 108 Mc signal generator (unmod.)
 - b. Low range DC electronic voltmeter.

BROADCAST BAND - IF & RF ALIGNMENT

1. Connect the AM signal generator as in chart below, with 400 cycle, 30% modulation.
2. Connect the output meter across the speaker voice coil. Throughout alignment reduce the generator output to a level which produces less than .40 volts across the voice coil, to avoid overloading the receiver.
3. Set the bandswitch to the AM position.
4. Turn the receiver volume control to maximum.
5. Proceed as shown in the following chart.

| STEP | DUMMY ANTENNA | GENERATOR CONNECTION | GENERATOR FREQUENCY | GANG SETTING | ADJUST | REMARKS |
|--------------|---------------|----------------------------------|---------------------|----------------|------------------------|----------------------|
| IF ALIGNMENT | | | | | | |
| 1. | .1 mf | Grid of conv. V-2 (pin 7, 12BA7) | 455 Kc | Fully opened | 1, 2, 3 & 4 (IF cores) | Adjust for maximum. |
| RF ALIGNMENT | | | | | | |
| 2. | .1 mf | Grid of conv. V-2 (pin 7, 12BA7) | 1620 Kc | Fully opened | 5 (BC osc) | Adjust for maximum.* |
| 3. | - | Across radiation loop** | 1400 Kc | Tune in signal | 8 (BC ant) | Adjust for maximum. |

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4. If, after the receiver has been aligned as above, it is found to be badly off calibration, it will be necessary to adjust oscillator core (7) as follows: connect the generator to the grid of the converter tube and, with the gang fully closed, adjust core (7) at 535 Kc. It is advisable to repeat the oscillator adjustments at 1620 Kc and 535 Kc several times until the tuning range is correct. Core (7) has been pre-set at the factory and normally should require no retuning.

* If difficulty is encountered in tuning trimmer (5), adjust trimmer (6) to 1/2 turn from tight.

**Connect generator output across 5" diameter, 5 turn loop and couple inductively to receiver loop. Keep loops at least 12" apart.

FM BAND - IF & RF ALIGNMENT (PREFERRED METHOD)

1. The following FM alignment procedure, using an FM signal generator and an oscilloscope, is to be preferred because the actual response pattern may be observed on the scope and adjusted for best symmetry and maximum amplitude.

2. Connect the vertical input terminals of the oscilloscope between the chassis and the junction of resistor R-24 (33K) and capacitor C-29 (1000 mmf).

3. Connect the FM signal generator sync voltage output terminals, through a phase shifting network, to the horizontal input terminals of the scope, as in Figure 3. (Other values of resistance and capa-

citance may be required, depending upon the scope). The phasing control should be adjusted to give only one trace on the scope. NOTE: If the FM generator has a built-in phase control, the phase shifting network is not necessary.

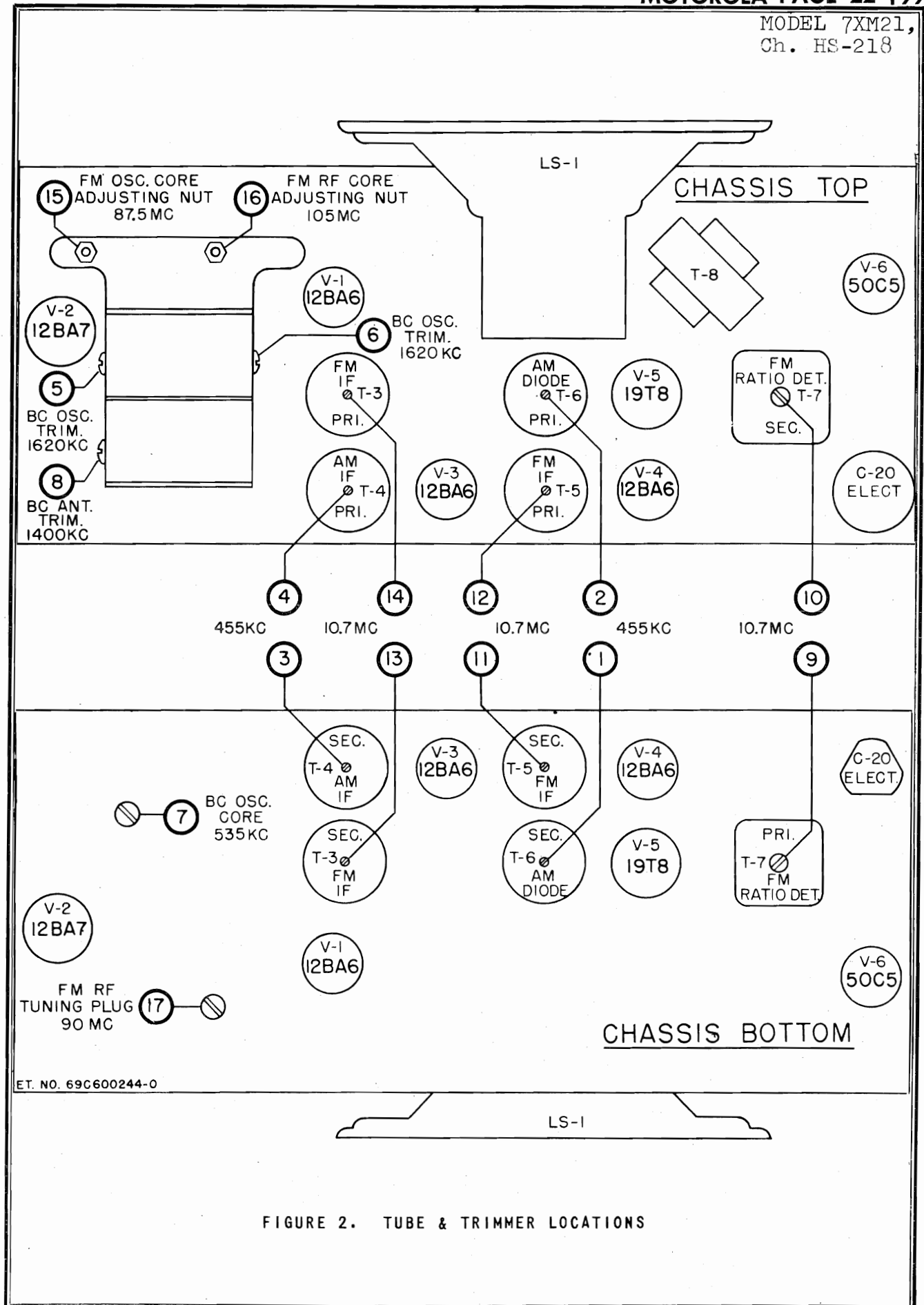
4. Set the handswitch to the FM position.

5. Throughout alignment, reduce the generator output to keep the signal just above the noise level, to avoid overloading the receiver.

6. Proceed as shown in the following chart.

| STEP | DUMMY ANTENNA | GENERATOR CONNECTION | GENERATOR FREQUENCY | TUNER SETTING | ADJUST | REMARKS |
|---------------------|---------------|---------------------------------------|----------------------------|----------------|-------------------------------|----------------------------------------------------------------------------------------|
| IF ALIGNMENT | | | | | | |
| 1. | 1000 mmf | Grid of 2nd IF Amp V-4 (pin 1, 12BA6) | 10.7 Mc ± 100 Kc dev. | Fully opened | 9 (ratio det pri) | Adjust for maximum amplitude of pattern.* |
| 2. | 1000 mmf | Grid of 2nd IF Amp V-4 (pin 1, 12BA6) | 10.7 Mc ± 100 Kc dev. | Fully opened | 10 (ratio det sec) | Adjust for symmetrical curve, as shown in Figure 4. |
| 3. | - | - | - | - | - | Repeat steps 1 & 2 for maximum amplitude and best symmetry. |
| 4. | 1000 mmf | Grid of 1st IF Amp V-3 (pin 1, 12BA6) | 10.7 Mc ± 100 Kc dev | Fully opened | 11 & 12 (2nd IF sec & pri) | Adjust for maximum amplitude of pattern.* |
| 5. | 1000 mmf | Grid of conv. V-2 (pin 7, 12BA7) | 10.7 Mc ± 100 Kc dev | Fully opened | 13 & 14 (1st IF sec & pri) | Adjust for maximum amplitude of pattern.* |
| 6. | 1000 mmf | Grid of conv. V-2 (pin 7, 12BA7) | 10.7 Mc ± 100 Kc dev | Fully opened | 11, 12, 13 & 14 | Readjust for maximum amplitude and best symmetry. |
| RF ALIGNMENT | | | | | | |
| 7. | 270 ohms | FM terminals on loop | 87.5 Mc ± 22 1/2 Kc dev | Fully closed | 15 (osc adj nut) | Adjust for maximum amplitude of pattern.* |
| 8. | - | - | - | Fully closed | 16 (RF adj nut) | Turn counterclockwise until core is at bottom of pipe, then turn four turns clockwise. |
| 9. | 270 ohms | FM terminals on loop | 90 Mc ± 22 1/2 Kc dev | Tune in signal | 17 (RF tuning plug) | Adjust for maximum amplitude of pattern.* |
| 10. | 270 ohms | FM terminals on loop | 105 Mc ± 22 1/2 Kc dev | Tune in signal | 16 (RF adj nut) | Adjust for maximum amplitude of pattern.* |
| 11. | - | - | - | - | - | Repeat steps 9 & 10 until no further adjustment is necessary. |

*An output meter across the speaker voice coil will also indicate maximum amplitude. It should not be used in place of the scope, however, since it will not show symmetry of the curve.



ET. NO. 69C600244-0

FIGURE 2. TUBE & TRIMMER LOCATIONS

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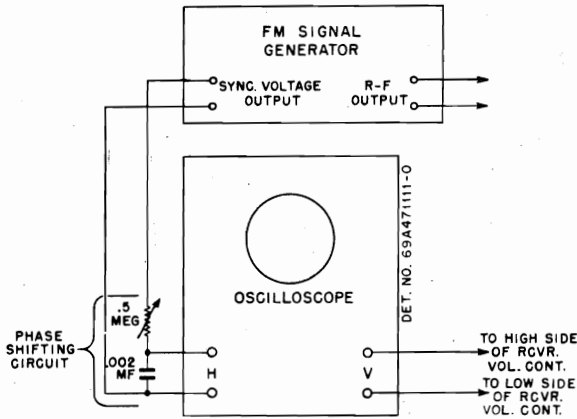


FIGURE 3.

FM SIGNAL GENERATOR & OSCILLOSCOPE HOOK-UP

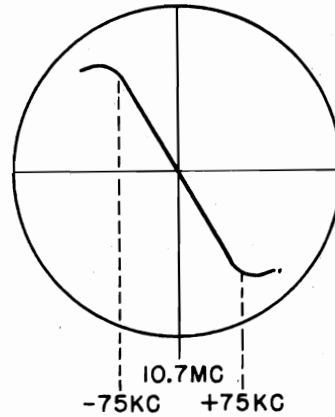


FIGURE 4.

RATIO DETECTOR WAVEFORM

FM BAND - IF & RF ALIGNMENT (ALTERNATE METHOD)

1. The following procedure for FM alignment, with an unmodulated carrier generator and a DC electronic voltmeter, is not as desirable as the preceding method; but it may be used if no FM generator is available.
2. Connect the signal generator as in chart below, with no modulation.
3. Set the bandswitch to the FM position.
4. Except in step 2 below, connect the electronic voltmeter across resistor R-23 (15K) in the ratio detector stage.
5. Throughout alignment reduce the signal generator output to a value which produces no more than a 5 volt rise above no signal voltage, to avoid overloading the receiver.
6. In step 2 below, connect two 100K ohm resistors in series across R-23. Connect the electronic voltmeter between the volume control side of resistor R-24 (33K) and the junction of the two 100K resistors, with the low side of the meter at the 100K resistors.
7. Proceed as shown in the following chart.

| STEP | DUMMY ANTENNA | GENERATOR CONNECTION | GENERATOR FREQUENCY | TUNER SETTING | ADJUST | REMARKS |
|---------------------|---------------|----------------------------------|---------------------|----------------|-------------------------------|----------------------------------------------------------------------------------------|
| IF ALIGNMENT | | | | | | |
| 1. | 1000 mmf | Grid of conv. V-2 (pin 7, 12BA7) | 10.7 Mc | Fully opened | 9, 11, 12, 13 & 14 (IF cores) | Adjust for maximum. |
| 2. | 1000 mmf | Grid of conv. V-2 (pin 7, 12BA7) | 10.7 Mc | Fully opened | 10 (ratio det sec) | Adjust for zero. (Connect meter as in step 6 above). |
| RF ALIGNMENT | | | | | | |
| 3. | 270 ohms | FM terminals on loop | 87.5 Mc | Fully closed | 15 (oso adj nut) | Adjust for maximum. |
| 4. | - | - | - | Fully closed | 16 (RF adj nut) | Turn counterclockwise until core is at bottom of pipe, then turn four turns clockwise. |
| 5. | 270 ohms | FM terminals on loop | 90 Mc | Tune in signal | 17 (RF tuning plug) | Adjust for maximum. |
| 6. | 270 ohms | FM terminals on loop | 105 Mc | Tune in signal | 16 (RF adj nut) | Adjust for maximum. |
| 7. | - | - | - | - | - | Repeat steps 5 & 6 until no further adjustment is necessary. |

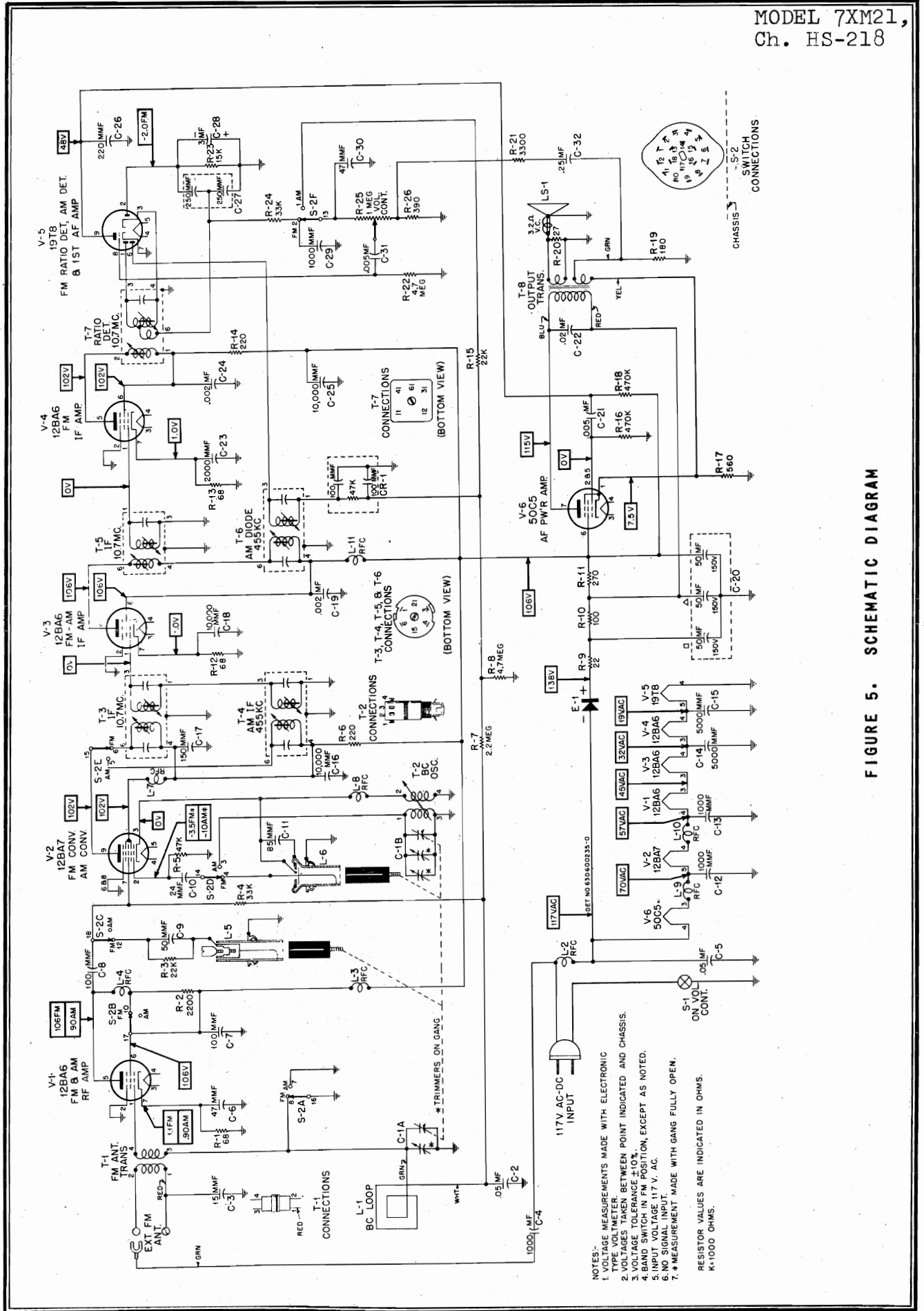


FIGURE 5. SCHEMATIC DIAGRAM

- NOTES:-
1. VOLTAGE MEASUREMENTS MADE WITH ELECTRONIC TYPE VOLTMETER.
 2. VOLTAGE TAKEN BETWEEN POINT INDICATED AND CHASSIS.
 3. VOLTAGE TOLERANCE $\pm 10\%$.
 4. BAND SWITCH IN FM POSITION, EXCEPT AS NOTED.
 5. INPUT VOLTAGE 117 V. AC.
 6. NO SIGNAL INPUT.
 7. * MEASUREMENT MADE WITH GANG FULLY OPEN.
- RESISTOR VALUES ARE INDICATED IN OHMS.
K=1000 OHMS.

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REPLACEMENT PARTS LIST

| REF. NO. | PART NO. | DESCRIPTION | REF. NO. | PART NO. | DESCRIPTION |
|----------|----------|-------------|----------|----------|-------------|
|----------|----------|-------------|----------|----------|-------------|

CHASSIS PARTS - ELECTRICAL

CAPACITORS

| | | |
|--------|-----------|-------------------------------------------|
| C-1A,B | 19B691877 | Variable: 2-gang |
| C-2 | 8R9821 | Paper: .05 mf 200V |
| C-3 | 21K470323 | Ceramic: 15 mmf 500V |
| C-4 | 21K478410 | Ceramic: 1000 mmf 500V |
| C-5 | 8K470606 | Paper: .05 mf 400V |
| C-6 | 21K77373 | Ceramic: 47 mmf 500V |
| C-7 | 21B77286 | Ceramic: 100 mmf 500V |
| C-8 | 21B77286 | Ceramic: 100 mmf 500V |
| C-9 | 21R2743 | Mica: 50 mmf 5% 300V |
| C-10 | 21K28816 | Ceramic: 24 mmf 500V |
| C-11 | 21A690688 | Ceramic: 85 mmf 500V |
| C-12 | 21K478410 | Ceramic: 1000 mmf 500V |
| C-13 | 21K478410 | Ceramic: 1000 mmf 500V |
| C-14 | 21A470789 | Ceramic, disc type: 5000 mmf 450V |
| C-15 | 21A470789 | Ceramic, disc type: 5000 mmf 450V |
| C-16 | 21K482726 | Ceramic, disc type: 10,000 mmf 450V |
| C-17 | 21K691948 | Ceramic: 150 mmf 500V |
| C-18 | 21K482726 | Ceramic, disc type: 10,000 mmf 450V |
| C-19 | 8K9824 | Paper: .002 mf 400V |
| C-20 | 23B690539 | Electrolytic: 50-50-50 mf/150V.. |
| C-21 | 8R9813 | Paper: .005 mf 600V |
| C-22 | 8R9802 | Paper: .02 mf 400V |
| C-23 | 21K790912 | Ceramic: 2000 mmf 500V |
| C-24 | 8K9824 | Paper: .002 mf 400V |
| C-25 | 21K482726 | Ceramic, disc type: 10,000 mmf 450V |
| C-26 | 21K77375 | Ceramic: 220 mmf 500V |
| C-27 | 21B484337 | Ceramic, dual: 250 mmf, 250 mmf. |
| C-28 | 23K690543 | Electrolytic: 3 mf 50V |
| C-29 | 21K478410 | Ceramic: 1000 mmf 500V..... |
| C-30 | 21K77373 | Ceramic: 47 mmf 500V |
| C-31 | 8R9813 | Paper: .005 mf 600V |
| C-32 | 8R9810 | Paper: .25 mf 100V |

CAPACITOR-RESISTOR

| | | |
|------|-----------|-----------------------------------------------------|
| CR-1 | 21A473040 | Capacitor-Resistor: 100-100 mmf & 47,000 ohms |
|------|-----------|-----------------------------------------------------|

RECTIFIER

| | | |
|-----|-----------|----------------------------------------------|
| E-1 | 48B482807 | Rectifier, selenium; half-wave; 150 ma |
|-----|-----------|----------------------------------------------|

COILS

| | | |
|------|-----------|--------------------------------------------------------------|
| L-1 | 24C692186 | Antenna Loop & Panel Assembly: complete..... |
| L-2 | 24A692148 | RF Choke |
| L-3 | 24A692148 | RF Choke |
| L-4 | 24A484025 | RF Choke |
| L-5 | 24C690584 | Inductor & Capacitor Assembly: FM RF; less tuning core..... |
| L-6 | 24K600519 | Inductor & Capacitor Assembly: FM osc; less tuning core..... |
| L-7 | 24A691847 | RF Choke |
| L-8 | 24A791081 | RF Choke |
| L-9 | 24A692148 | RF Choke |
| L-10 | 24K780128 | RF Choke |
| L-11 | 24A692148 | RF Choke |

SPEAKER

| | | |
|------|-----------|-------------------------------------|
| LS-1 | 50C600135 | Speaker: 5-1/4" PM; 3.2 ohm VC exch |
|------|-----------|-------------------------------------|

RESISTORS

Note: All resistors are insulated carbon type unless otherwise specified.

| | | |
|------|-----------|-------------------------------------------------|
| R-1 | 6R2039 | 68 10% 1/2W |
| R-2 | 6R6069 | 2200 10% 1/2W |
| R-3 | 6R6028 | 22,000 20% 1/2W |
| R-4 | 6R6012 | 33,000 20% 1/2W |
| R-5 | 6R6056 | 47,000 20% 1/2W |
| R-6 | 6R3933 | 220 20% 1/2W |
| R-7 | 6R3927 | 2.2 meg 20% 1/2W |
| R-8 | 6R2122 | 4.7 meg 20% 1/2W |
| R-9 | 17A690578 | Wire wound: 22 10% 1.5W.... |
| R-10 | 6R3963 | 100 10% 2W |
| R-11 | 6R476116 | 270 10% 2W |
| R-12 | 6R2039 | 68 10% 1/2W |
| R-13 | 6R2039 | 68 10% 1/2W |
| R-14 | 6R3933 | 220 20% 1/2W |
| R-15 | 6R6028 | 22,000 20% 1/2W |
| R-16 | 6R6032 | 470,000 20% 1/2W |
| R-17 | 6R6291 | 560 10% 1/2W |
| R-18 | 6R6032 | 470,000 20% 1/2W |
| R-19 | 6R5660 | 180 10% 1/2W |
| R-20 | 6R5683 | 27 10% 1/2W |
| R-21 | 6R6036 | 3300 20% 1/2W |
| R-22 | 6R2122 | 4.7 meg 20% 1/2W |
| R-23 | 6R6477 | 15,000 10% 1/2W |
| R-24 | 6R6012 | 33,000 20% 1/2W |
| R-25 | 18A690549 | Volume Control: 1 meg; with on-off switch |
| R-26 | 6R5554 | 390 10% 1/2W |

SWITCHES

| | | |
|-----|-----------|----------------------------------|
| S-1 | | On-Off Switch (on vol control).. |
| S-2 | 40B690538 | Bandswitch, AM-FM |

TRANSFORMERS

| | | |
|-----|-----------|----------------------------------------------------------------------------------------------------|
| T-1 | 24A690544 | FM Antenna Input Transformer.... |
| T-2 | 24K691878 | BC Oscillator Coil |
| T-3 | 24B690540 | 1st FM IF Transformer (orange dot): 10.7 mc; complete with capacitors and cores, less shield |
| T-4 | 24B692193 | AM IF Transformer (blue dot): 455 Kc; complete with capacitors and cores; less shield.... |
| T-5 | 24B690541 | 2nd FM IF Transformer (yellow dot): 10.7 mc; complete with capacitors and cores; less shield |
| T-6 | 24B692193 | AM Diode Transformer (blue dot): 455 Kc; complete with capacitors and cores; less shield.... |
| T-7 | 24B690542 | Ratio Detector Transformer: 10.7 mc; complete with capacitors, cores, and shield..... |
| T-8 | 25B690536 | Audio Output Transformer..... |

| PART NUMBER | DESCRIPTION | PART NUMBER | DESCRIPTION |
|-----------------------------------|------------------------------------------------------------------------------------------|----------------------|-----------------------------------------------------------------------------------|
| CHASSIS PARTS - MECHANICAL | | 3S9705 | Setscrew: 8-32 x 1/4 Allen head; cad pl (pointer adj sleeve mtg)..... |
| 43A4326 | Ball, steel: 1/8" dia (pointer detent)..... | 1X692225 | Shaft & Pulley Assembly, pointer: complete, but less pointer |
| 1X690717 | Bracket Assembly, tuning core mtg: includes shoulder rivet & anti-backlash clip | 47K690573 | Shaft, tuning: brass (fits over band-switch shaft)..... |
| 7K692144 | Bracket, loop mtg | 9K485936 | Shield, coil (for IF transformers).... |
| 7K692146 | Bracket, rectifier mtg | 26A481521 | Shield, tube: spring type |
| 7C690567 | Bracket, tuner mtg (gang mtg)..... | 43K692185 | Sleeve, pointer: die cast; less pointer adj setscrew |
| 43A692172 | Bushing, pointer shaft: brass | 9K484167 | Socket, tube: miniature; 7-prong |
| 42K690561 | Clip, anti-backlash: single (on core mtg bracket) | 9B692196 | Socket, tube: noval; 9-prong (for V-5) |
| 42A690560 | Clip, anti-backlash: double (on tuner mtg bracket) | 9K692197 | Socket, tube: noval; 9-prong (for V-2) |
| 42B482867 | Clip, spring: blued finish (holds IF transformers) | 41A690598 | Spring, coil: 7 turns; cosmoline dipped (FM-RF core mtg)..... |
| 1X692227 | Collar Assembly, pointer detent: with pin | 41K691840 | Spring, coil: 8 turns; copper plated (FM osc core mtg)..... |
| 11M488137 | Cord, dial: core drive | 41A690732 | Spring, compression (in pointer sleeve)..... |
| 11M8944 | Cord, dial: pointer drive | 41A14244 | Spring, tension (core & pointer drive cord)..... |
| 30K21859 | Cord, fine: with plug; 9 ft long..... | 31K85348 | Strip, terminal: 1 insulated lug; #2 mtg; 3/8" spacing |
| 46K692165 | Core, iron and screw (RF tuning core). | 31K86126 | Strip, terminal: 2 insulated lugs; #2 mtg; 3/8" spacing |
| 46B692164 | Core, iron and screw: green dot (osc tuning core) | 31K37493 | Strip, terminal: 2 insulated lugs; #2 mtg; 1/2" spacing |
| 5S7866 | Eyelet: .125 x .091 brass; nkl pl (core drive cord retainer)..... | 31K14655 | Strip, terminal: 3 insulated lugs; #3 mtg; 3/8" spacing |
| 5A19658 | Eyelet, speaker mtg | 31K22174 | Strip, terminal: 4 insulated lugs; #4 mtg; 3/8" spacing |
| 37A12691 | Grommet, rubber (spkr cushion)..... | 31K470747 | Strip, terminal: 5 insulated lugs; #3 mtg; 3/8" spacing |
| 14A690548 | Insulator, bakelite (vol control & bandswitch mtg) | 29A70422 | Terminal, screw (antenna terminal on loop back) |
| 14A482844 | Insulator, line cord: fibre; without lugs | 4A73639 | Washer, 'C' (holds tuning shaft)... |
| 14K692187 | Insulator, line cord: fibre; with lugs | 4K692188 | Washer, 'C' (pointer shaft mtg).... |
| 4S9751 | Lockwasher, int-ext: #8; cad pl (pointer drive pulley mtg)..... | 4A70873 | Washer, fibre (pointer drive pulley mtg) |
| 29R3036 | Lug, soldering: #8 (on spkr mtg screw) | 4S7582 | Washer, flat: 1/2 x .195 x .033; cad pl (pointer drive pulley mtg)..... |
| 29R5285 | Lug, soldering: #8 (on FM ant lead) | 4S7614 | Washer, flat: 11/16 x 11/64 x .036 stl; cad pl (loop mtg)..... |
| 2S70019 | Nut, hex: 4-40 x 1/4; cad pl (tuning core mtg) | 4K690571 | Washer, shoulder: fibre (vol control & bandswitch mtg)..... |
| 2S7051 | Nut, hex palnut: 3/8-32 x 9/16; cad pl (vol control & bandswitch mtg)..... | 4K482859 | Washer, shoulder: fibre (loop mtg brkt) |
| 35K691846 | Pad, rubber: 1 hole (gang mtg)..... | 4B600149 | Washer, spring (under pointer shaft pulley) |
| 35A691845 | Pad, rubber: 2 hole (gang mtg)..... | CABINET PARTS | |
| 1X692216 | Pulley Assembly, pointer drive: 3/2" dia; | 16E691951 | Cabinet, table model: plastic; brown... |
| 49A690562 | Pulley, core drive: brass | 36B692149 | Knob, control: brown plastic (tuning knob) |
| 5S8497 | Rivet: .088 x 1/8 stl; nkl pl (anti-backlash clip mtg) | 36B692150 | Knob, control: brown plastic (AM-FM selector) |
| 5S7771 | Rivet: .088 x 3/16 stl; nkl pl (min socket mtg) | 36B692181 | Knob, control: brown plastic (volume control) |
| 5S7774 | Rivet: .088 x 1/4 stl; nkl pl (noval socket mtg) | 4S7650 | Lockwasher, internal: #6; cad pl (pointer mtg) |
| 5S7707 | Rivet: .122 x 5/32 stl; nkl pl (term strip mtg) | 2S7005 | Nut, hex: 6-32 x 1/4 stl; cad pl (pointer mtg)..... |
| 5K13896 | Rivet, shoulder (on core mtg brkt) | 13B692039 | Medallion: brass plated |
| 3S7477 | Screw, machine: 8-32 x 1/4 plain hex head; thread cutting type; cad pl (loop mtg) | 38A25507 | Plug, split (mounts loop to cabinet) |
| 3S7205 | Screw, machine: 8-32 x 1/4 slotted locking head; cad pl (gang mtg)... | 52B692173 | Pointer, dial |
| 3S7163 | Screw, machine: 8-32 x 1/4 plain hex head; cad pl (pointer drive pulley mtg) | 3S2999 | Screw, machine: 6-32 x 5/8 slotted locking hex head; cad pl (medallion mtg) |
| 3S488011 | Screw, machine: 8-32 x 5/8 slotted locking hex head; cad pl (spkr mtg) | 3S3371 | Screw, thread cutting: #8 x 3/8 plain hex head; cad pl (chassis mtg)... |
| 3S2695 | Screw, sheet metal: #6 x 3/16 PKZ plain hex head; cad pl (tuner bracket mtg) | 4S1720 | Washer, flat: 3/8 x .156 x .030 stl; cad pl (medallion mtg)..... |
| 3S490851 | Screw, sheet metal: #6 x 1/2 PKA plain hex head; cad pl (loop mtg brkt) | 4S1765 | Washer, flat: 1/2 x .147 x .015 stl; cad pl (pointer mtg)..... |
| 3S490325 | Screw, sheet metal: #6 x 1-1/8 PKZ plain hex head; cad pl (selenium rectifier mtg) | 4K485672 | Washer, spring (pointer mtg)..... |
| 3S7103 | Setscrew: 8-32 x 1/8 Allen head; cad pl (core drive pulley mtg)..... | | |

MODEL 9MF, Ford
#8A-18805-A3

GENERAL INFORMATION

TYPE - Automotive superheterodyne receiver with external speaker.

TUNING RANGE - 540 to 1610 Kc IF - 265 Kc

| | |
|-----------------------------------------|---------------------------------------|
| TUBE COMPLEMENT - 6SK7GT - RF Amplifier | 6SQ7GT - Detector, AVC & AF Amplifier |
| 6SA7GT - Converter | 6V6GT - AF Output Amplifier |
| 6SK7GT - IF Amplifier | 6X5GT - Rectifier |

OPERATES FROM - 6 volt storage battery

TO SET THE PUSH BUTTONS

Automatic push button tuning is provided for selection of five favorite local stations. The five push buttons may be adjusted to any of the desired stations. In order to simplify the identification of these stations, it is advisable to set the push buttons in sequence according to their frequencies, beginning with the station broadcasting on the lowest frequency and progressing to the station broadcasting on the highest frequency. The push buttons should be set up during the daytime because at night, distant stations will be heard with the same intensity as local stations, making it difficult to select local stations. To set the push buttons proceed as follows:

1. Collapse the antenna.
2. Turn the receiver on and allow it to operate for at least fifteen minutes in order for each part to reach normal operating temperature.
3. Loosen the first push button on the left by

turning it (with your fingers) counterclockwise one turn.

4. Select the station desired and with low volume tune it in by turning the manual tuning knob. Tune very carefully for clearest reception.
5. Press the first push button in firmly, then release and tighten (with your fingers) by turning clockwise.

The first push button is now set for this station selection. Follow the above procedure for setting each of the other four buttons.

When the five push buttons have been set to the desired stations, return the antenna to the lowest position necessary for good reception. It is only necessary to press a push button to receive the station for which the adjustment was made. The dial pointer will automatically indicate the frequency of the selected station.

IF TRANSFORMER CHANGES

The Detrola 1st IF transformer T-1, Detrola Part No. D71193-1 and the Detrola 2nd IF transformer T-2, Detrola Part No. D71192-1 have been replaced by transformer of another make, Motorola Part Nos. 24B580193 and 24K580194 respectively. The above mentioned Motorola Transformers are mechanically and electrically not interchangeable with the Detrola Transformers. A 33,000 ohm resistor, which was mounted internally on the Detrola 2nd IF transformer, will be mounted externally to the transformer where the Motorola transformer Part No. 24K580194 is used.

ALIGNMENT

Connect the receiver 'A' lead and receiver chassis to a 6 volt storage battery. Rotate volume and tone controls to maximum clockwise position. Connect an output meter across the speaker voice coil. Use an insulated screwdriver for making all adjustments. For greatest accuracy, keep output of receiver at approximately 1 watt (1 watt = 1.79 volts on output meter) throughout alignment by reducing generator output (not re-

ceiver volume control) as stages are brought into alignment. Remove receiver escutcheon and top & bottom covers to expose all alignment adjustments. See Figure 1.

Pointer is calibrated by tuning in a 1300 Kc signal and then set pointer to 1300 Kc after loosening its adjusting screw. See Figure 1.

| STEP | DUMMY ANTENNA | GENERATOR CONNECTION | GENERATOR FREQUENCY | TUNER SET TO | ADJUST | REMARKS |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|-------------------------------------|--------------------------------------------------------------------|---------------------|---------------------------------------------------------------------------------------------------------|
| IF ALIGNMENT | | | | | | |
| 1. | .1 mf | Converter grid (6SA7GT pin 8) | 265 Kc | HF end stop | 1,2,3 & 4 | Adjust for maximum. Repeat for greater accuracy. |
| RF ALIGNMENT | | | | | | |
| 2. | See Fig. 1 | Ant. receipt | 1610 Kc | HF end stop* | C-14, C-11 C-1 | Adjust for maximum. |
| 3. | See Fig. 1 | Ant. receipt | 1400 Kc | Move carriage 'in' .5/16" from HF end stop position. See Figure 1. | L-6, L-5, L-2 | Adjust for maximum. |
| 4. | See Fig. 1 | Ant. receipt | 1610 Kc | HF end stop | C-14 C-11 C-1 | Adjust for maximum. |
| 5. | Repeat steps 3 & 4 until no further increase is obtainable. After final adjustment is made, stake core adjustments in place with speaker cement. | | | | | |
| SENSITIVITY CONTROL | | | | | | |
| 6. | See Fig. 1 | Ant. receipt | Set to 600 Kc & 4 microvolts output | Tune for maximum | Sensitivity control | Set sensitivity control for 1 watt output (1.79 volts on output meter) |
| ANTENNA TRIMMER ADJUSTMENT | | | | | | |
| 7. | - | - | - | Weak station at approx. 1400 Kc | C-1 | With receiver installed in car, peak antenna trimmer for maximum volume. Ant. should be fully extended. |

* Tuner cores should be backed out to project 1-3/8" from end of coil forms so they will have no effect on trimmer adj.

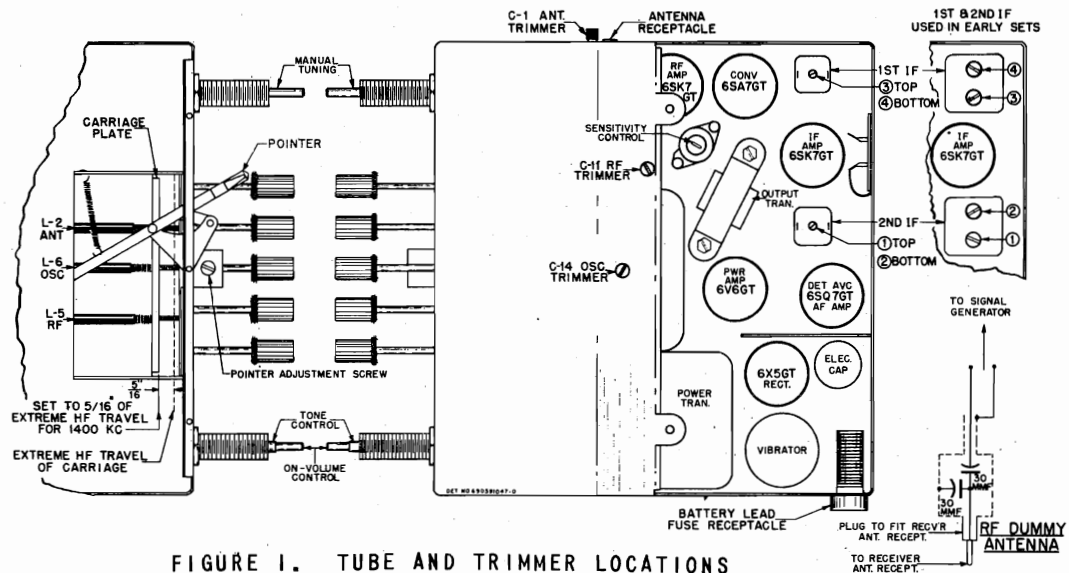
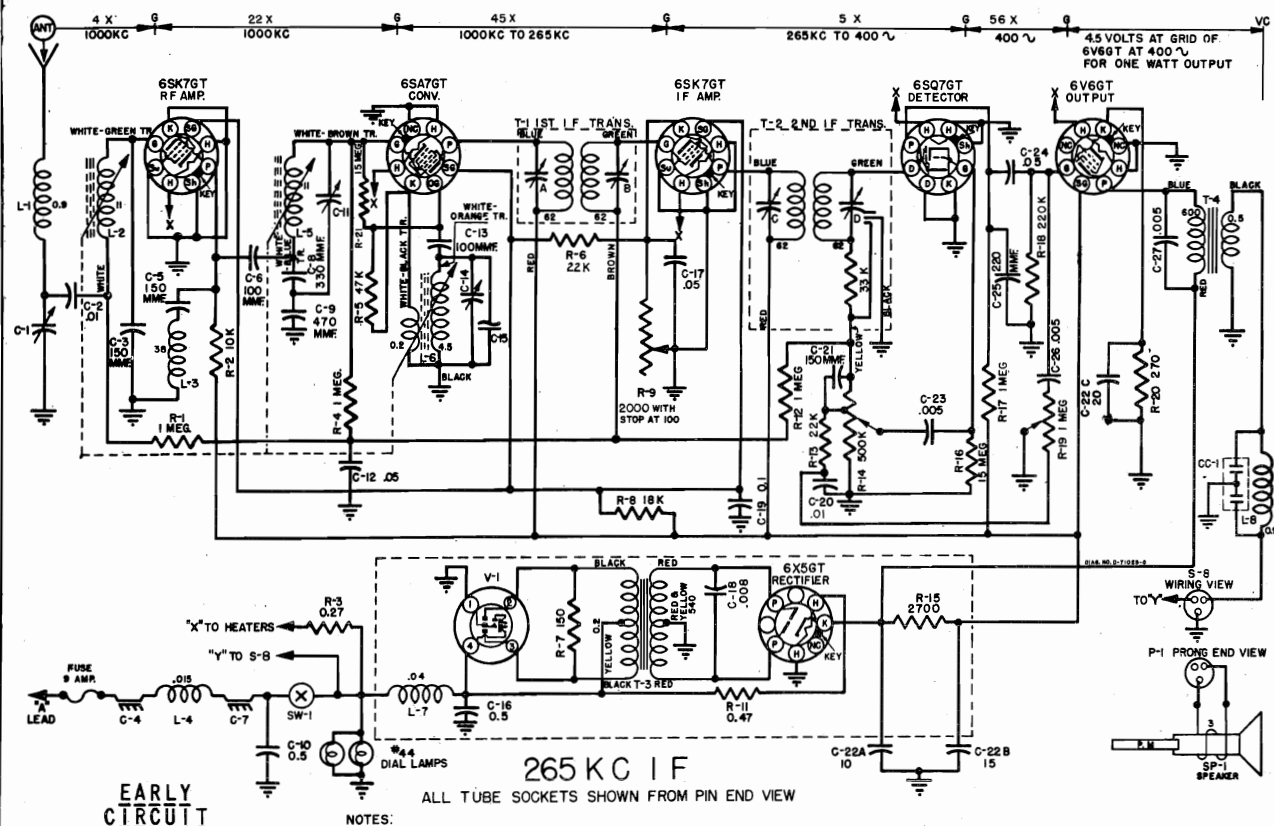
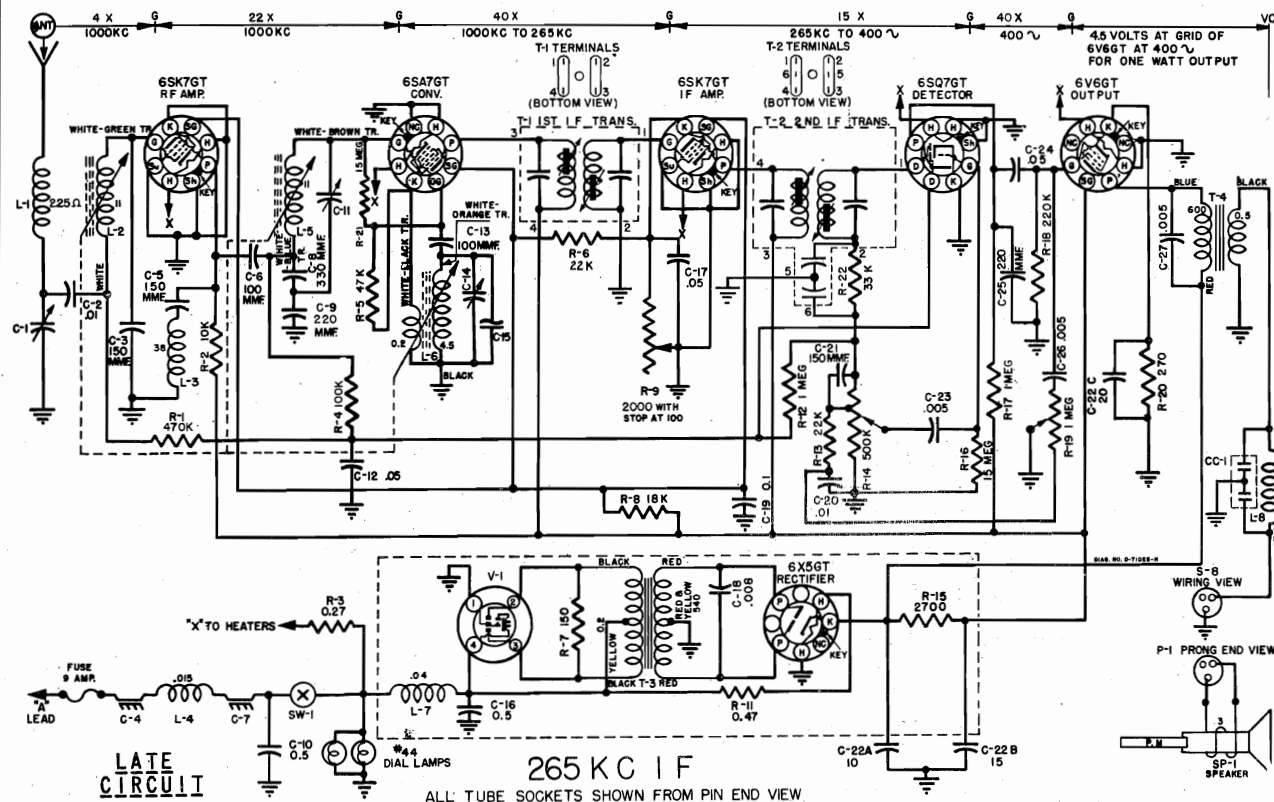


FIGURE 1. TUBE AND TRIMMER LOCATIONS

MODEL 9MF, Ford
#8A-18805-A3



EARLY
CIRCUIT



LATE
CIRCUIT

NOTES:

RESISTANCE VALUES ARE IN OHMS UNLESS OTHERWISE NOTED.

*K EQUALS 1000 OHMS, *MEG EQUALS 1,000,000 OHMS.

CAPACITY VALUES ARE IN MICROFARADS UNLESS OTHERWISE NOTED.

STAGE GAINS

TAKEN AT ANT. SOCKET, R.F. GRID AND CONV. GRID AT 1000 KC.

TAKEN AT IF GRID AT 265 KC, AUDIO MEASUREMENTS TAKEN AT 400 ν .

DUMMY ANTENNA

30 MMFD. SERIES & 30 MMFD. SHUNT AT ANT. SOCKET & 0.1 MFD. SERIES AT TUBE GRIDS.

BATTERY CONDITIONS

7.2 VOLTS MEASURED BETWEEN END OF "A" LEAD AND CHASSIS

FIGURE 2. SCHEMATIC DIAGRAM

MODEL 9MF, Ford
#8A-18805-A3

REPLACEMENT PARTS LIST

RESISTORS
Note: All resistors are insulated carbon type, 20% unless otherwise specified.

| REF. NO. | FORD PART NO. | DETROLA PART NO. | MOTOROLA PART NO. | DESCRIPTION | R-1 | R-2 | R-3 | R-4 | R-5 | R-6 | R-7 | R-8 | R-9 | R-10 | R-11 | R-12 | R-13 | R-14 | R-15 | R-16 | R-17 | R-18 | R-19 | R-20 | R-21 | R-22 | | |
|-------------------|---------------|------------------|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|--|--|
| CAPACITORS | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C-1 | B-55481 | | B-912124 | Mica, variable; includes bracket | | | | | | | | | | | | | | | | | | | | | | | | |
| C-2 | ED430103 | | X910013 | Paper: .01 mf 400V; tubular | | | | | | | | | | | | | | | | | | | | | | | | |
| C-3 | EM64A151 | | 21R6649 | Mica: 150 mmf 10% 500V | | | | | | | | | | | | | | | | | | | | | | | | |
| C-4 | | | | Spark Plate Assembly consists of: One A-70255 plate, capacitor One A-70282 disc, mica; silvered One A-71048 washer, shoulder Two BF12HJ02 washer One BV321H02 rivet | | | | | | | | | | | | | | | | | | | | | | | | |
| C-5 | B-58906 | | B-912152 | Mica: 150 mmf 5% 300V | | | | | | | | | | | | | | | | | | | | | | | | |
| C-6 | EM64A101 | | 21R6554 | Mica: 100 mmf 10% 500V | | | | | | | | | | | | | | | | | | | | | | | | |
| C-7 | EM74A331 | | 21R2744 | Same as C-4 | | | | | | | | | | | | | | | | | | | | | | | | |
| C-8 | EM74A221 | | 21R2745 | Mica: 330 mmf 20% 500V | | | | | | | | | | | | | | | | | | | | | | | | |
| C-9 | A-55528 | | A-912100 | Mica: 220 mmf 20% 500V | | | | | | | | | | | | | | | | | | | | | | | | |
| C-10 | B-55525 | | B-912125 | Paper: .5 mf 100V; tubular | | | | | | | | | | | | | | | | | | | | | | | | |
| C-11 | ED230503 | | X910008 | Mica: variable; includes bracket | | | | | | | | | | | | | | | | | | | | | | | | |
| C-12 | EM64A101 | | 21R6554 | Paper: .05 mf 200V; tubular | | | | | | | | | | | | | | | | | | | | | | | | |
| C-13 | B-55523-4 | | B-912126 | Mica: 100 mmf 10% 500V | | | | | | | | | | | | | | | | | | | | | | | | |
| C-14 | A-55495 | | A-912101 | Trimmer: 100 mmf-160 mmf (Part of Tuner Assembly) | | | | | | | | | | | | | | | | | | | | | | | | |
| C-15 | A-55528 | | A-912100 | Compensating: 180 mmf 5% 500V (Part of Tuner Assembly) | | | | | | | | | | | | | | | | | | | | | | | | |
| C-16 | ED230503 | | X910008 | Paper: .5 mf 100V; tubular same as C-10 | | | | | | | | | | | | | | | | | | | | | | | | |
| C-17 | A-55383 | | A-912102 | Paper: .05 mf 200V; tubular | | | | | | | | | | | | | | | | | | | | | | | | |
| C-18 | EDB30104 | | X910009 | Paper: .08 mf 1600V; tubular | | | | | | | | | | | | | | | | | | | | | | | | |
| C-19 | ED430103 | | X910013 | Paper: .1 mf 200V; tubular | | | | | | | | | | | | | | | | | | | | | | | | |
| C-20 | B-58816-2 | | B-912127 | Paper: .01 mf 400V; tubular | | | | | | | | | | | | | | | | | | | | | | | | |
| C-21 | B-71011 | | B-912128 | Paper: .01 mf 200V; tubular | | | | | | | | | | | | | | | | | | | | | | | | |
| C-22 | ED630502 | | X910010 | Ceramic: 150 mmf | | | | | | | | | | | | | | | | | | | | | | | | |
| A, B, C | | | | Electrolytic: 10-15-20 mf; 350-350-25V | | | | | | | | | | | | | | | | | | | | | | | | |
| C-23 | ED430503 | | X910011 | Paper: .005 mf 600V; tubular | | | | | | | | | | | | | | | | | | | | | | | | |
| C-24 | EM74A221 | | 21R2745 | Paper: .05 mf 400V; tubular | | | | | | | | | | | | | | | | | | | | | | | | |
| C-25 | ED630502 | | X910010 | Mica: 220 mmf 20% 500V | | | | | | | | | | | | | | | | | | | | | | | | |
| C-26 | ED630502 | | X910010 | Paper: .005 mf 600V; tubular | | | | | | | | | | | | | | | | | | | | | | | | |
| C-27 | A-55526 | | A-912103 | Paper: .005 mf 600V; tubular | | | | | | | | | | | | | | | | | | | | | | | | |
| CC-1 | | | | Dual Filter | | | | | | | | | | | | | | | | | | | | | | | | |
| COILS | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| L-1 | X-71258 | | 24E580540 | Choke, antenna spark | | | | | | | | | | | | | | | | | | | | | | | | |
| L-2 | A-71097 | | A-912153 | Ant. coil (Part of Tuner Assembly) | | | | | | | | | | | | | | | | | | | | | | | | |
| L-3 | A-71046 | | A-912104 | Choke, IF trap | | | | | | | | | | | | | | | | | | | | | | | | |
| L-4 | X-71257 | | A-912105 | Choke, "A" spark | | | | | | | | | | | | | | | | | | | | | | | | |
| L-5 | X-71259 | | A-912154 | RF coil (Part of Tuner Assembly) | | | | | | | | | | | | | | | | | | | | | | | | |
| L-6 | A-71047 | | A-912155 | Osc. coil (Part of Tuner Assembly) | | | | | | | | | | | | | | | | | | | | | | | | |
| L-7 | A-70242 | | A-912106 | Choke, hash | | | | | | | | | | | | | | | | | | | | | | | | |
| L-8 | A-71047 | | A-912107 | Choke, antenna spark | | | | | | | | | | | | | | | | | | | | | | | | |
| DIAL LIGHT | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 8A-18828 | | A-9285 | Bulb, pilot: 6.3V; .25A tubular, bayonet base: #44 | | | | | | | | | | | | | | | | | | | | | | | | |
| FUSE | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 8M15608 | | B-55541-1 | Fuse, 9 amp | | | | | | | | | | | | | | | | | | | | | | | | |

Part of R-14, ON-OFF switch: SPDT.....
1st IF Transformer: iron core tuning
2nd IF Transformer: trimmer tuning
2nd IF Transformer: iron core tuning
Transformer, power
Transformer, output

SWITCH
SW-1
TRANSFORMERS
T-1
T-2
T-3
T-4

50C580855 Speaker, Pm: 6 x 9"
D-71060-1
6R6336
6R488264
6R6012
B-55511-4
A-71069
BR46CA7B
BR17B105
BR17B223
B-71013-1
B-55511-3
BR17B156
BR17B105
BR17B224
6R476014
A-912108
17K488266
6R6004
6R6028
B-912130
6R5764
6R488264
6R6004
6R6015

MODEL 9MF, Ford
#8A-18805-A3

| REF. NO. | FORD PART NO. | DETROLA PART NO. | MOTOROLA PART NO. | DESCRIPTION |
|-----------------------------------|---------------|------------------|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TUBES | | | | |
| | | A-54514-2 | | Tube, vacuum: 6SA7GT (Converter) |
| | | A-54517-2 | | Tube, vacuum: 6SK7GT (RF Amplifier) |
| | | A-54517-2 | | Tube, vacuum: 6SK7GT (IF Amplifier) |
| | | A-54518-2 | | Tube, vacuum: 6SQ7GT (Detector) |
| | | A-54519-3 | | Tube, vacuum: 6V6GT (Output) |
| | | A-54577-2 | | Tube, vacuum: 6X5GT (Rectifier) |
| VIBRATOR | | | | |
| V-1 | 51A18885 | B-70347 | B-912131 | Vibrator, 4-prong |
| CHASSIS PARTS - MECHANICAL | | | | |
| | | A-71086-1 | A-912109 | Bracket, front cover mounting |
| | | B-71088 | B-912132 | Bracket, dial scale |
| | | A-71191 | A-912110 | Clip, pointer retaining |
| | | A-55261 | A-912111 | Clip, vibrator ground |
| | | C-71062-1 | C-912145 | Cover, bottom front |
| | | B-71035 | 1X580306 | Cover, power supply |
| | | B-71039 | B-912133 | Crystal, dial |
| | | X-71230 | 1X580303 | Escutcheon Assembly: includes bracket & grounding spring. |
| | | A-71076 | 30K580711 | Housing, fuse |
| | | A-55247 | A-912112 | Insulator, armite (volume control mounting) |
| 8A-18824-A2 | | B-71090-1 | 1X580525 | Knob, manual: includes spring; chrome plated |
| 8A-18830-A2 | | B-71057-1 | B-912134 | Knob, tone control: chrome plated |
| 8A-18817-A2 | | X-71235 | 1X580521 | Knob, volume control: includes spring; chrome plated ... |
| | | EK122E02 | 4S7666 | Lockwasher, external: #6; steel; cad pl (filter capacitor mounting) |
| | | A-54901 | 29R3025 | Lug, soldering: hot tin |
| | | EN141T02 | 2A590913 | Nut, hex: 1/2-28 x 11/16-1/8 thick; stl; cad pl (vol. cont mtg) |
| | | EN111T02 | 2S2876 | Nut, hex: 1/2-28 x 3/4; steel; cad pl |
| | | BH1A120A | 2S488296 | Nut, speed |
| | | B-71189 | B-912135 | Pointer, dial |
| | | BR393C03 | 5S8497 | Rivet: .088 x 1/8 steel; nkl plated (dial scale brkt mtg) |
| | | BV321C05 | X910007 | Rivet: .122 x 1/8 steel; black dip (spring grounding mtg) |
| | | BV321C02 | X910022 | Rivet: .122 x 1/8 steel; cad pl (power supply cover spring mounting) |
| | | BV321D02 | X910002 | Rivet: .122 x 5/32 steel; cad pl (tube socket mtg, dial light socket mtg, filter capacitor mtg, sensitivity control mtg, terminal strip mtg and antenna socket mtg).... |
| | | | 5S7703 | Rivet: .122 x 7/32 steel; pol nkl (vib. clip mtg., soldering lug mounting) |
| | | BV321H02 | X910006 | Rivet: .122 x 9/32 steel; cad pl (spark plate mtg) |
| | | D-71045 | D-912146 | Scale, dial |
| | | BSF14C02 | 3S7205 | Screw, machine: 8-32 x 1/4 slotted hex head; steel; cad pl (power transformer mounting and variable capacitor bracket mounting) |
| | | BP928C02 | 3S488298 | Screw, sheet metal: #8 x 1/4 PKZ slotted hex head; steel; cad pl (output transformer mounting, shield mounting, etc.) |
| | | B-71089 | B-912136 | Shield, dial |
| | | B-71044 | B-912137 | Shield, interference |
| | | A-70302 | A-912113 | Socket, antenna connector |
| | | B-71074-1 | B-912138 | Socket, dial light & lead (4") |
| | | B-71074-2 | B-912139 | Socket, dial light & lead (12") |
| | | A-71079 | A-912114 | Socket, speaker: 3-prong |
| | | A-55366 | 9A590099 | Socket, tube: octal; molded |
| | | A-70301 | A-912116 | Socket, tube: 4-prong, wafer |
| | | A-71096 | A-912150 | Spring, grounding (used on escutcheon) |
| 51A18847 | | A-70300 | 41A485380 | Spring, knob retaining (used on manual and volume cont).. |
| | | A-70277 | A-912115 | Spring, shield (used on power supply cover) |

MODEL 9MF, Ford
#8A-18805-A3

| | | |
|----------|----------|-------------------------------------------------------------------------|
| BY510101 | X910003 | Strip, terminal: 1 insulated lug, #1 mtg, 3/8" spacing... |
| BY520102 | X910004 | Strip, terminal: 2 insulated lugs, #2 gnd; 3/8" spacing.. |
| BY550104 | X910005 | Strip, terminal: 4 insulated lugs, #2 mtg, 3/8" spacing.. |
| A-54901 | 29R3025 | Terminal, ground |
| BF12HJ02 | 4S1719 | Washer, flat: 3/8-9/64-1/32; steel; cad pl (spark plate mounting) |
| A-70311 | A-912149 | Washer, flat: armitite (fuse housing) |
| A-71048 | A-912117 | Washer, shoulder: nylon (spark plate mounting) |

HOUSING, MOUNTING PARTS & ACCESSORIES

| | | | |
|------------|-----------|-----------|------------------------------------------------------------------------------------------------------|
| | | 51A580607 | Bracket, replacement rear mounting (to be used when welded stud on back of housing breaks off) |
| | | 30K580703 | Cable, fuse |
| 8C18801 | B-71078 | B-912140 | Capacitor, distributor: .5 mfd |
| 51AF-18827 | B-70323 | B-912141 | Capacitor, generator: .1 mfd |
| | D-71063-1 | D-912147 | Cover, bottom: rear |
| | D-71061-1 | D-912148 | Cover, top |
| | A-71211 | A-912118 | Folder, operating instructions |
| | PK202K02 | 4S7693 | Lockwasher, split: 1/4" steel; cad pl (rear mtg) |
| | FN121B02 | 2S7022 | Nut, hex: 1/4-20 x 7/16 steel; cad pl (rear brkt mtg)... |
| | FN141202 | 2S8397 | Nut, hex: 1/2-28 x 5/8 steel; cad pl (rear mtg)..... |
| | FN141T02 | 2A590913 | Nut, hex: 1/2-28 x 11/16; -1/8 thick; steel; cad pl (volume control mtg, escutcheon mtg) |
| | A-55243-1 | A-912119 | Nut, wing: 8-32 steel; cad pl (speaker mounting) |
| | C-71059 | 32C580584 | Screen and Gasket Assembly, speaker |
| | B-55207-1 | B-912151 | Screw, machine: 10-32; hex head special (bottom cover mounting) |
| | BP928C02 | 3S488298 | Screw, sheet metal: #8 x 1/4 PKZ slotted hex head; steel; cad pl (top cover mounting) |
| | BP238G02 | 3S7463 | Screw, sheet metal: #8 x 1/2 PKZ slotted round head; steel; cad pl (hood bonding strap mtg) |
| 8A-18888 | B-71040 | A-912142 | Bracket, rear support |
| 8A-18870 | A-71091 | A-912120 | Strap, hood bonding |
| 1GA18811-A | A-70259 | A-912121 | Suppressor, distributor |
| | A-71083 | 1X580308 | Suppression kit |
| | A-71082 | 1X580307 | Installation kit |

G. I. TUNER UNIT & PARTS - MECHANICAL - 8072

| | | |
|------------|-----------|---------------------------------------------|
| X-71280 | B-912080 | Bracket - Shaft Supported |
| X-71276 | B-912043 | Bushing & Disc Assembly Clutch |
| X-71275 | B-912037 | Clutch Disc Assembly (Crown Gear) |
| X-71277 | | Clutch Pressure Spring |
| X-71256 | | Grommet - Coil Mtg - Osc |
| B-51427-12 | | Grommet - Coil Mtg RF & Ant |
| B-71240 | B-912065 | Push Button & Screw Assembly 8-32 thd |
| X-71278 | B-912013 | Shaft & Bush. Assembly - Manual Drive |
| X-71279 | B-912044 | Spring - Tension Drive Shaft |
| A-71198 | 41A912090 | Spring - Pointer |
| X-71285 | B-912084 | Spring - Pointer Link |
| X-71281 | B-912033 | Pinion & Shaft Assembly |

SANTAY TUNER UNIT & PARTS - MECHANICAL - 8072

| | | |
|------------|-----------|---------------------------------------------|
| B-71160 | | Bushing & Disc Assembly Clutch |
| B-71150 | | Clutch Disc Assembly (Crown Gear) |
| A-71137 | | Clutch Pressure Spring |
| B-51427-12 | | Grommet - Coil Mounting Osc. |
| B-51427-8 | | Grommet - Coil Mtg. RF & Ant |
| A-71198 | 41A912090 | Pointer Spring |
| B-71145 | B-912160 | Push Button & Screw Assembly 8-40 thd |
| B-71195 | | Shaft & Bushing Assembly, Man. Drive |
| A-71251 | A-912123 | Spring Tension Drive Shaft |
| B-71168 | | Spring Tension |
| B-71155 | | Pinion & Shaft Assembly |

G. I. OR SANTAY TUNER UNIT & PARTS - ELECTRICAL - 8072

| | | |
|-----------|----------|-----------------------------------------|
| A-55495 | A-912101 | Capacitor - Compensating 180 mmfd |
| B-55523-4 | A-912158 | Capacitor - Trimmer |
| X-71258 | A-912153 | Coil - Antenna |
| X-71259 | A-912155 | Coil - Osc. |
| X-71257 | A-912154 | Coil - RF |
| X-71262 | A-912156 | Cores |
| X-71286 | X-912159 | (Cores Kit - Hardware |
| | | (T-nut |
| | | (Core Spring |
| | | (Flat Washer |

THE HRO-50-1 RADIO RECEIVER

SECTION I. DESCRIPTION

1-1. GENERAL

The HRO-50-1 is a deluxe radio receiver featuring performance and versatility. Sixteen tubes, including a rectifier and a voltage regulator tube, are utilized in a superheterodyne circuit for the reception of code and phone signals throughout its frequency range of 50 to 430 kilocycles and 480 to 35,000 kilocycles. The HRO type receivers have long been outstanding and proven performers in Communication and Amateur services. This new series of HRO-50-1 receivers feature many desirable innovations emanating from the latest advances in receiver circuitry and mechanical design. It is housed in a new and enlarged cabinet styled in an attractive gray finish with a self-contained power supply adequately isolated from the R.F. circuits. A calibrated, illuminated slide-rule dial provides direct reading in megacycles for each of the General Coverage coil sets as well as an additional bandspread scale for those coil sets incorporating this feature. A front-panel mounted oscillator trimmer control is provided to assure precise calibration. Of course, the dial-driving mechanism still features the micrometer dial. Temperature compensation and voltage regulation of the high-frequency oscillator as well as utilization of ceramic insulation in the coil sets and associated connecting brush blocks provide stable operation and freedom from drift. A single front-panel mounted Control switch selects any one of the four modes of operation, C.W., Phone, Narrow-Band F.M. or Phono. Sockets are mounted on the receiver chassis to accommodate the National Type NFM-83-50 FM adaptor and the National Type XCU-50-2 Crystal Calibrator Unit. These accessories may be permanently installed and switched On and Off by means of the front-panel switches. At the rear of the receiver sockets are available for external use of the National Type SOJ-3 Select-O-Ject and National Type 650S Vibrator Power Supply or battery power supply. The S-Meter circuit is designed so that the operator may adjust the sensitivity of the S-Meter. A push-pull audio system delivers the utmost in audio frequency response and undistorted power output from the built-in output transformer. Other highlights include a six-position crystal filter, maximum bandspreading of the amateur bands, a quick-acting bandspread switch and a dimmer control for the slide-rule dial and S-Meter lamps.

A standard equipment consists of a receiver, loudspeaker and coil sets A, B, C and D. Coil sets Type E, F, G, H, J, AA, AB and AC may be obtained as desired. Accessories available include the National types NFM-83-50 Narrow-Band F.M. adaptor, XCU-50-2 Crystal Calibrator, SOJ-3 Select-O-Ject and 650S Vibrator Power Supply.

1-2. CIRCUIT

For all frequency ranges the circuit utilizes two tuned stages of radio frequency amplification, a tuned mixer stage, a high-frequency oscillator employing a tube separate from the mixer tube, a first intermediate frequency amplifier stage employing a variable-selectivity crystal filter and two additional I.F. amplifier stages all operating at 455 kilocycles, a combined second detector-automatic volume control stage, an S-Meter amplifier, a double-action adjustable threshold double-diode noise limiter, a first audio amplifier, a phase inverter, a push-pull audio amplifier and a beat frequency oscillator coupled to the second detector to provide for C.W. reception.

All voltages required by the receiver are supplied by a built-in power supply. A voltage regulator tube is used to regulate the plate supply to the high-frequency oscillator and the S-Meter amplifier stages.

1-3. ANTENNA INPUT

Antenna input terminals are provided at the rear of the receiver. The input circuit is suitable for operation with a single-wire antenna, a balanced feed line or a low impedance 72-ohm unbalanced concentric transmission cable. The actual antenna input impedance is between 300 and 600 ohms depending on the frequency of the input signal.

MODEL HRO-50-1

1-4. TUBE COMPLEMENT

The HRO-50-1 receiver is supplied complete with tubes which are tested in the receiver at the time of alignment.

The tubes employed are as follows:

| | |
|------------------------------------|--------|
| First R.F. Amplifier | 6BA6 |
| Second R.F. Amplifier | 6BA6 |
| Mixer | 6BE6 |
| High-Frequency Oscillator | 6C4 |
| First I.F. Amplifier | 6K7 |
| Second I.F. Amplifier | 6SG7 |
| Third I.F. Amplifier | 6SG7 |
| Second Detector - A.V.C. | 6H6 |
| Noise Limiter | 6H6 |
| S-Meter Amplifier - Phase Inverter | 6SN7GT |
| First A.F. Amplifier | 6SJ7 |
| Audio Output (2) | 6V6GT |
| Beat Frequency Oscillator | 6J7 |
| Voltage Regulator | 0B2 |
| Rectifier | 5V4G |

1-5. TUNING SYSTEM

The frequency coverage of the HRO-50-1 is covered in twelve bands as follows:

| COIL SET | GENERAL COVERAGE | BANDSPREAD |
|----------|------------------|-----------------|
| A | 14.0 - 30.0 Mc. | 27.0 - 30.0 Mc. |
| B | 7.0 - 14.4 Mc. | 14.0 - 14.4 Mc. |
| C | 3.5 - 7.3 Mc. | 7.0 - 7.3 Mc. |
| D | 1.7 - 4.0 Mc. | 3.5 - 4.0 Mc. |
| E | 900 - 2050 Kc. | |
| F | 480 - 960 Kc. | |
| G | 180 - 430 Kc. | |
| H | 100 - 200 Kc. | |
| J | 50 - 100 Kc. | |
| AA | | 27.5 - 30 Mc. |
| AB | 25 - 35 Mc. | |
| AC | | 21.0 - 21.5 Mc. |

As shown above plug-in coil set types AA, AC, A, B, C and D provide bandspread coverage of the 10-11, 15, 20, 40 and 80 meter amateur bands. The AA, AC, B, C, and D bands are spread out so as to cover 400 dial divisions while the A band is spread 430 divisions on the 500-division main tuning dial. This is accomplished by switching a small variable capacitor in series with each section of the main tuning capacitor, thus reducing its effective capacity range. All of the coil sets are factory aligned in the receiver using accurate crystal-controlled test oscillators thus assuring precise alignment.

The micrometer type dial drives the main tuning capacitor through a worm drive having a reduction ratio of approximately 20 to 1. Backlash is eliminated by the use of a spring-loaded split worm wheel which assures positive drive in either direction at all times. This dial has an effective scale length of approximately twelve feet and is calibrated from zero to 500.

A slide-rule type dial is synchronized with the micrometer dial by means of an anti-backlash gear and an efficient string drive arrangement to the main tuning dial. A dial drum provides a

means of mounting eight scales. Each of these scales is calibrated in megacycles for the general coverage and/or bandspread frequencies depending on the coil set. Mounted on the front panel is a band selector switch for ease in rotating the dial drum to select the proper band scale to correspond to the coil set in use. Each scale is clearly marked with the band designation. Two pilot lamps are used, one at each end of the dial scale drum, for illumination. The degree of illumination is controlled by the front-panel mounted Dimmer control.

1-6. CRYSTAL FILTER

The selectivity characteristics of the HRO-50-1 are made adjustable by means of a crystal filter. Located in the first intermediate frequency amplifier this crystal filter is designed for extreme flexibility and efficiency of operation. A six-position Selectivity switch and a crystal Phasing control are front-panel mounted for adjustment of the filter. Figure Number 1 shows the selectivity characteristics of the receiver for each of the six degrees of selectivity.

The crystal filter may be used for either C.W. or phone reception; any degree of selectivity from true single-signal to wide band A.M. broadcast reception being available. Operation of the Phasing control provides for efficient suppression of interfering C.W. signals or M.C.W. signals which may produce objectionable heterodynes.

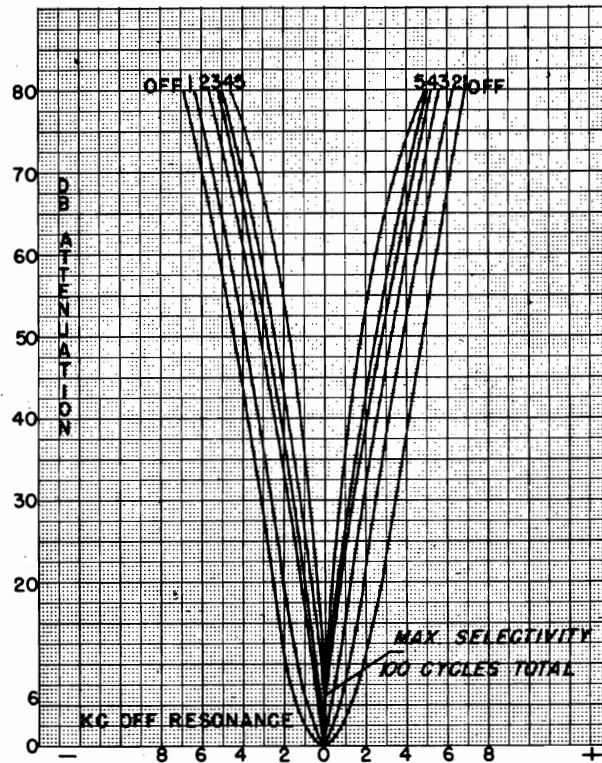


Figure No. 1. Crystal Filter Selectivity Curves

1-7. NOISE LIMITER

The noise limiter in the HRO-50-1 receiver uses an automatic type double-action circuit resulting in the limiting of noise pulses on both the positive and negative peaks. It is equally effective on both C.W. and phone reception. The usefulness of this limiter will be most appreciated on the higher frequency bands of the receiver where automobile ignition noise and other high frequency disturbances are effectively suppressed. A threshold control on the front panel permits adjustment of the level at which limiting action starts.

1-8. TONE CONTROL

The Tone control circuit has been especially designed to provide a versatile variance of the frequency characteristics of the audio amplifier output. In the extreme counter-clockwise position the greatest degree of high audio frequency response is obtained. Rotating the control clockwise until the switch mounted on the control just closes provides a comparatively flat response over the entire usable audio frequency range. Further clockwise rotation will result in the high audio frequencies being attenuated as illustrated in Figure Number 2. This control is particularly helpful when receiving weak signals through interference. If a signal is weak and partially obscured by background noise or static, an improvement in signal-to-noise ratio will be obtained by rotating the Tone control in a clockwise direction thereby attenuating the higher audio frequencies.

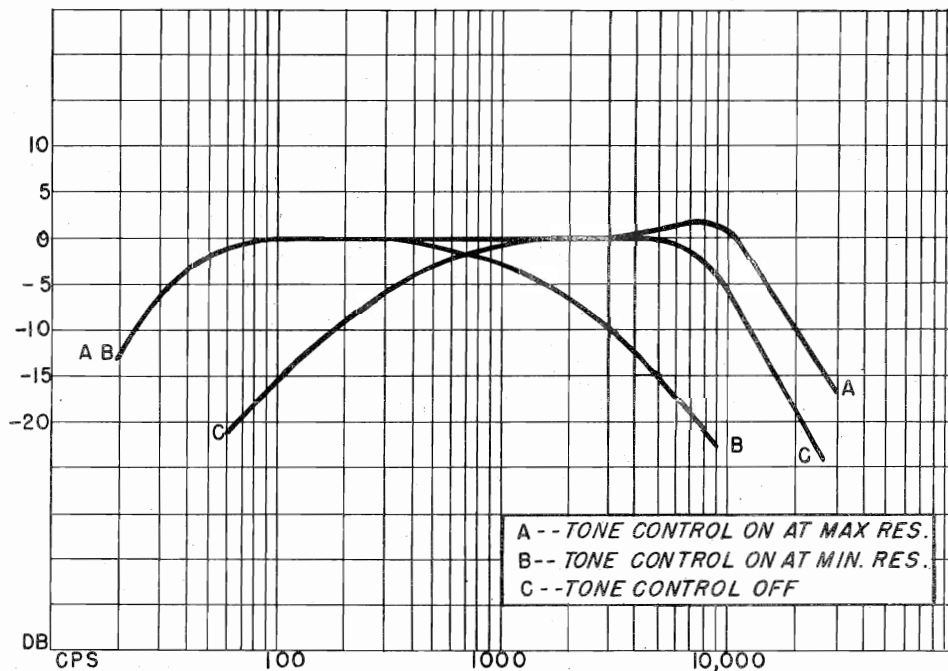


Figure No. 2. Audio Amplifier Response

1-9. TEMPERATURE COMPENSATION

The HRO-50-1 is compensated for frequency drift due to temperature changes which may detune the receiver from the desired signal over long or short periods of reception. The most objectionable cause of frequency drift is the change of inductance of the high-frequency oscillator coil as heat from the tubes causes the interior of the receiver to increase in temperature. This undesirable heating effect in the R.F. coils is minimized by the position of the plug-in coil sets in that they are placed at the bottom of the receiver underneath the chassis in a separately shielded compartment. A further safeguard against frequency drift is provided for on bandspread operation. The heat which is dissipated in the high-frequency oscillator may change the inter-electrode capacity of the tube and thus cause frequency drift. To offset this effect a small negative temperature coefficient capacitor is placed adjacent to the high-frequency oscillator tube to compensate for any change caused by the internal heating of the tube.

The coil set terminal connecting boards of each shielded coil can as well as their mating brush blocks have been made of ceramic type material. As a result freedom from any possible leakage due to poor insulation assures a low degree of drift. This will be found especially true of the coils operating at the higher frequencies.

1-10. SIGNAL STRENGTH METER

Signal input readings are indicated in S-units from 1 to 9 and in decibels above S-9 from zero to 40 db. on the panel-mounted signal strength meter. A reading of S-9 is obtained with an input signal of approximately 25 microvolts. The meter employs a zero to 1 milliampere movement with its mechanical zero at 40 db. on the dial scale. The S-Meter is connected in series with the plate input of the S-Meter Amplifier tube V-8A and measures the plate current of this tube. With the A.C. supply switch On and the A.V.C. switch set at A.V.C. the S-Meter will read zero in the absence of signal input. A variable resistor is shunted across the meter and with no antenna connected this resistor allows correct adjustment of the pointer to its electrical zero. Any increase in A.V.C. voltage caused by signal input will give a corresponding increase in the meter reading. At the 40 db. meter reading the A.V.C. grid voltage applied reaches the cut-off point of the amplifier tube. Therefore the pointer cannot be harmed by violent contact with the full-scale meter pin. For the purpose of comparing strong signals (which cause the meter to contact the full-scale meter pin) with other stronger and/or weaker signals the sensitivity of the S-Meter may be lowered by retarding the R.F. Gain control. The meter dial lamp illumination is regulated by a Dimmer control mounted on the front panel of the receiver.

1-11. NARROW-BAND F.M. SOCKET

A standard octal socket, X-1, is mounted inside the receiver on the center portion of the power supply compartment chassis. It is designed to mount the National Type NFM-83-50 Narrow-Band F.M. adaptor. A control switch is front-panel mounted to provide a means of switching the adaptor into the output of the intermediate amplifier circuit. With the Control switch set at the N.F.M. position the receiver is adjusted for the reception of narrow-band F.M. signals. With the A.V.C. switch set at A.V.C. the S-Meter is operative in the N.F.M. position and the receiver should be tuned for maximum meter reading to assure efficient operation. Further information concerning the NFM-50 unit is contained in a separate data sheet at the rear of this manual.

1-12. CRYSTAL CALIBRATOR SOCKET

The Crystal Calibrator socket, X-2, is of the standard octal type mounted on top of the power supply compartment chassis inside the receiver. It is designed to accommodate a National Model XCU-50-2 Crystal Calibrator. The Model XCU-50-2 is compactly constructed and furnished with a drive screw clamping arrangement to hold it firmly in place. A double-pole, three-position toggle type front-panel mounted Calibrate switch marked 100-Off-1000 provides a means of connecting B-plus to the unit for instantaneous use. At the same time by using this toggle switch a resonant crystal-controlled frequency of either 100 or 1000 kcs. may be selected. The output of this unit is loosely coupled to the first R.F. amplifier stage through the socket wiring. Further information concerning the Model XCU-50-2 unit is covered by a separate data sheet included at the rear of this manual.

1-13. SELECT-O-JECT SOCKET

The Select-O-Ject socket, X-3, is a standard octal type socket accessible at the rear of the receiver. It is primarily designed to accommodate a National Model SOJ-3 Select-O-Ject unit. The mating plug attached to the SOJ-3 permits a direct connection into this socket in place of the audio jumper plug originally plugged into the Select-O-Ject socket. By proper adjustment of the controls any single audio frequency selected in the range of approximately 80 to 10,000 cycles may be boosted or rejected. Detailed instructions for proper operation of the Select-O-Ject are contained with the unit.

For convenience a source of 6.3 V.A.C. filament voltage, a 240 V.D.C. high voltage as well as the 105 V.D.C. regulated voltage is available for operation of external apparatus. The Schematic diagram, Figure Number 13, shows a pin view of the Select-O-Ject socket thus providing the information necessary for making the proper connections. External equipment MUST NOT be utilized if the Narrow-Band F.M. adaptor, Crystal Calibrator and Select-O-Ject units are all operated at the same time. Consideration must also be given to the fact that the 105-volt regulated power supply cannot

MODEL HRO-50-1

be switched off by the B+ On-Off switch.

1-14. PHONO INPUT JACK

A Phono jack is mounted at the rear of the Receiver and can be used for connecting auxiliary apparatus, such as a record player pick-up or microphone into the audio system of the receiver. This input circuit is of high-impedance providing a suitable match for such external equipment into the high-gain first audio amplifier stage. The front-panel mounted Control switch must be set at the Phono position when using the Phono jack. Both the A.F. Gain and Tone controls are operative with this type of operation.

The majority of record player pick-ups are terminated in a single shielded wire. The Phono jack on the HRO-50-1 is the type that accommodates a standard phono tip plug and if the record player to be used is not fitted with such a plug one can easily be attached. If the output circuit of the record player is of low impedance (less than 100,000 ohms) improved efficiency will be obtained if a suitable resistor, with a value as specified for the particular record player, is connected across the phono tip plug or its mating jack to properly load the record player output circuit.

1-15. AUDIO OUTPUT

The HRO-50-1 features a push pull output amplifier using inverse feed-back. See Figure No. 2 for the audio system response characteristic. The matching transformer located inside the receiver provides two audio output circuits as follows:

(1) The transformer secondary leads are brought to a three-terminal Output board located at the rear of the receiver, having both 8 and 500-ohm terminals and a common ground terminal. The eight-ohm terminal provides output for the speaker voice coil. The 500-ohm terminal is available for connection to a 500-ohm line. Approximately 8 watts of undistorted audio output power is available at the output terminal board and a maximum power of 10 watts is obtainable.

(2) A headphones jack is front-panel mounted and is wired so as to silence the Loudspeaker upon insertion of the headphones plug. The headphones output load impedance is not critical and varying types of headphones may be used including crystal types, as no direct current flows through the headphones.

1-16. POWER SUPPLY

The power supply is built in a separate compartment inside the receiver cabinet incorporating a heat-resistant shielded barrier isolating it from the R.F. chassis portion. It is designed for operation from a 110/120 or 220/240-volt, 50/60 cycle A.C. supply source. A toggle switch is mounted on top of the chassis for selection of either 110/120 or 220/240-volt operation. Normal power consumption is approximately 115 watts. The built-in power unit supplies all of the voltages required by the heater and B supply circuits, 5.1 amperes at 6.3 volts and 145 milliamperes at 240 volts respectively. In addition this supply is also capable of furnishing all voltages required by the accessories such as the NFM-83-50, XCU-50-2 and SOJ-3. A 2-ampere fuse is connected in one side of the A.C. input supply to protect the receiver circuits against possible voltage surges in the power line or short circuits in the receiver. It is located at the rear of the receiver and is easily removed for examination or replacement.

A Power Socket, X-4, is provided at the rear of the receiver so that either a battery or vibrator power supply may be utilized for portable or emergency service. The National Type 650S Vibrator Power Supply is designed to provide efficient operation of the receiver with the use of a 6-volt storage battery input. Further information concerning the 650S is contained at the rear of this manual on a separate data sheet.

1-17. LOUDSPEAKER

The HRO-50TS or HRO-50RS loudspeakers in table or rack mounting styles respectively are designed for use with the receiver. These are both permanent-magnet type loudspeakers furnished with a shielded connecting cable from the 8-ohm voice coil for connection to the output terminal board located at the rear of the receiver. If desirable a 500-ohm shielded line may be used from the receiver output terminals to the speaker and/or externally operated equipment. In the event a dynamic type loudspeaker is used external means for supplying field excitation voltage will be necessary.

A cabinet finished to match the receiver design houses the HRO-50TS loudspeaker for table mounting. The cabinet is lined with sound absorbent material to avoid mechanical resonance.

SECTION 2. INSTALLATION**2-1. GENERAL**

All HRO-50-1 receivers are supplied with the following eight scales mounted on the slide-rule dial drum, irrespective of the type of coil sets ordered, A, B, C, D, E-F, AA, AB and AC. If a coil set or coil sets are ordered with the receiver and the corresponding scale does not appear on the dial drum it will be found packed with the coil set. The new scale is installed in place of any one of the unused scales previously mounted on the dial drum. A Phillips head type screw at one end and a spring clip at the other end of the scale hold it properly in place. The drum scales for the A, B, C and D coil sets are frequency calibrated in megacycles for both of the available ranges i.e., General Coverage and Bandsread. The E and F coil set ranges are on the same scale, while the remaining scales carry just the one frequency range calibrated in megacycles. Each scale is clearly marked with the band designation.

2-2. LOCATION

The receiver should not be installed in small, unventilated or warm spaces. Wherever practicable placement should be made to allow freedom of air circulation on all four sides. The loudspeaker may be located in any desirable position although it is not recommended that it be placed on top of the receiver as undesirable microphonics may result. The loudspeaker should not be placed near the antenna terminals.

2-3. ANTENNA RECOMMENDATIONS

The radio frequency input of the receiver is designed for operation from either a single-wire antenna or other types employing transmission lines having impedances of 70 ohms or more. There is an antenna terminal panel at the rear of the receiver with three screw-type terminals marked A, A and G respectively. A link is provided on the antenna terminal panel to allow connection of two-wire or single-wire type antennae to the receiver.

For best impedance matching to the receiver input circuit an antenna with a 300 to 600 ohm transmission line is recommended. The antenna should be cut to the proper length for the most used frequency. The antenna transmission line feeders should be connected to the two antenna terminals marked A; the grounding link is not used. It must be remembered, however, that an antenna installation of this type will have maximum efficiency over a band of frequencies near that frequency for which it is designed and will be most useful in installations where the receiver is tuned to one frequency or band of frequencies. For other frequencies, it would be desirable to connect the two transmission line leads together at the antenna terminal at the left of the antenna terminal panel, grounding the other terminal by means of the link. The antenna is thus utilized as a single wire type.

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The most practicable antenna for use in installations where the receiver is to be used over a wide range of frequencies is the single-wire type. An antenna length of from 50 to 100 feet is recommended. The antenna lead-in should be connected to the antenna terminal marked A at the left of the antenna terminal panel; the other terminal marked A should be grounded by means of the link.

When a doublet is used, the antenna feeders or balanced transmission line are connected to the two terminals marked A. The grounding link is not used.

The inner conductor of a concentric transmission line should be connected to the terminal marked A at the left of the antenna terminal panel. The outer conductor should be connected to the other terminal marked A and grounded by means of the link to G.

In some cases where a doublet antenna is used with a low impedance concentric or other type transmission line it may be necessary to re-trim the first R.F. amplifier stage at the high end of each band to provide a better impedance match between antenna and receiver input circuit. Paragraph 4-6 describes this procedure.

In an installation where the receiver is to be used as the receiving unit in a transmitting station the most efficient operation will result from use of the transmitting antenna as receiving antenna also. This is especially true if the transmitting antenna is of the multi-element, directional type since the same antenna gain is available for both receiving and transmitting - a very desirable condition. For switching the antenna from the receiver to transmitter, an antenna change-over relay should be used. A double-pole, double-throw relay possessing good high-frequency insulation is suitable. A second relay and a three position switch may be used to control the transmitter plate supply and the receiver B+ circuits. This second relay should be a single-pole, single-throw type having one normally open pair of contacts. The schematic diagram of this type of control circuit is shown in Figure 3. With S-1 in the receive position the antenna transmission line is connected to the receiver by contacts 2, 3, 5 and 6 on relay RY-1; the B+ circuit of the receiver is completed by the switch. (The B+ switch on the receiver should be at B+ Off). With the switch in the transmit position RY-1 contacts 1, 3, 4 and 6 are closed transferring the antenna transmission line to the transmitter; contacts 7 and 8 of relay RY-2 close to complete the plate supply circuit to the transmitter. Contacts 7 and 8 of relay RY-2 should be in series with the primary of the transmitter plate supply transformer. Thus, the station is in the receiving condition with switch S-1 in the receive position and in the transmitting condition with S-1 in the transmit position. With S-1 in the mid-position the receiver B+ circuit and transmitter plate supply circuit are both open thus permitting coil set changing in the receiver and transmitter. In the mid-position the receiver B+ circuit is controlled by the B+ switch on the front panel of the receiver.

NOTE

The high-frequency oscillator, C.W. oscillator, S-Meter amplifier and the push-pull audio output amplifier are not affected by the external relay connection to the B.S.W. terminal block. Unless the A.C. On-Off switch is set at Off these circuits will obtain an uninterrupted B-plus supply.

2-4. A.C. OPERATION

After unpacking the HRO-50-1 receiver and associated equipment proceed as follows:

(1) Make sure that all tubes are firmly seated in their sockets, tube clamps are properly in place and all grid clips securely fastened.

(2) Make sure the plug-in coil set used in the receiver is firmly in position by pressing down the lever type handles on the front panel to their maximum vertical position.

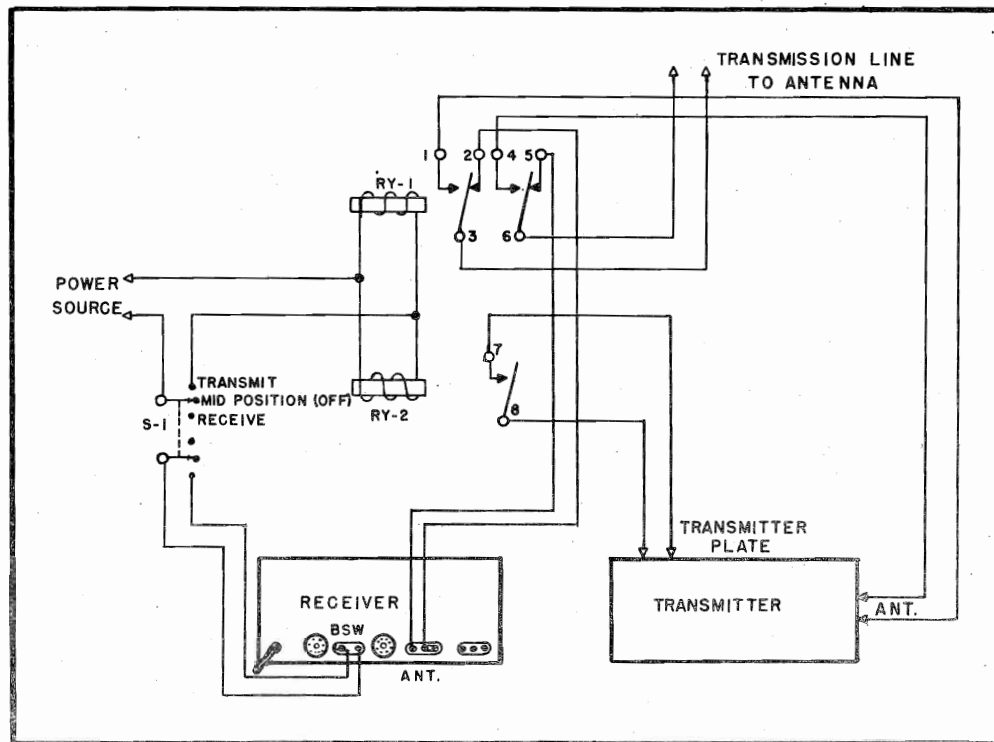


Figure No. 3. Typical Antenna Switching System

(3) Connect the antenna as recommended in Section 2-2.

(4) Connect the loudspeaker cable to the Output terminal board at the rear of the receiver. This is accomplished by connecting the outer shield lead to the common terminal and the other to the 8-ohm terminal. A 500-ohm terminal is also available on the Output terminal board in cases where a 500-ohm line is utilized for loudspeaker connection.

(5) Connect the receiver A.C. line cord to the proper source of voltage. The Primary switch, S-10, must be set at the position corresponding to the line voltage to be used i.e., 110/120 or 220/240 volts, 50/60 cps.

(6) Set the controls as recommended in Section 3 for reception of signals.

NOTE

Where the receiver is located in the R.F. field of a relatively powerful transmitter, it is advisable to provide some means of preventing damage to the receiver R.F. coil. If a separate receiving antenna is used a means of disconnecting or grounding it during transmission periods should be provided.

2-5. BATTERY OPERATION

The HRO-50-1 is readily adaptable for emergency, portable operation or operation in localities where a 115 or 230-volt A.C. power source is not available. It may be operated directly from batteries or a National Type 650S Vibrator Power Supply designed for operation from a 6-volt storage battery. The Type 650S power unit draws 9.5 amperes at 6-volts when furnishing power to the receiver if the Narrow-Band F.M. Adaptor, Crystal Calibrator and Select-O-Ject units are not used. If these plug-in units are utilized typical operating conditions and power consumption data will be found in Section 6.

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The Schematic Diagram Figure Number 13 illustrates pin connections of the receiver Power Socket X-4. This provides the information necessary for wiring the octal type battery plug which is used to place of the regular A.C. jumper plug. To conserve battery power the battery plug must be disconnected when the receiver is not being used. For stand-by operation in all cases it is recommended that a switch be placed in the battery B-plus lead as the B-plus switch in the receiver does not open the B-plus circuit supplying the high-frequency oscillator, C.W. oscillator, S-Meter Amplifier or the push-pull audio output tubes. A suggested refinement is to include a switch in the A-plus input lead so that the tube heaters may be turned off when the receiver is not in use without the necessity of removing the battery plug from the Power socket.

2-6. ACCESSORY SOCKETS

Three octal type sockets are available for additional accessories as follows:

(1) A N.B. F.M. socket, X-1, is mounted on top of the chassis inside the power supply compartment. A National Type NFM-83-50 Narrow-Band F.M. adaptor is designed to fit into this socket and is supplied with a mounting bracket and drive screws to hold it firmly in place. The front-panel mounted control switch, S-7, provides a means of switching the NFM-50 unit into instant service, as required.

(2) A Crystal Calibrator socket, X-2, is top chassis mounted in the power supply compartment. This socket is wired to accommodate a National plug-in Type XCU-50-2 Crystal Calibrator unit. A slotted head screw arrangement bolts the unit firmly in place. The front panel Calibrate switch provides a means of applying B-plus to the unit as well as the selection of either a 100 or 1000 kc. marker signal.

(3) A Select-O-Ject socket, X-3, of the standard octal type is mounted so as to be accessible from the rear of the receiver. This socket is designed primarily for the use of a National Model SOJ-3 Select-O-Ject unit. The SOJ-3 is fitted with an interconnecting cable and plug for direct connection to the Select-O-Ject socket.

Reference to the Schematic Diagram will show the various connections made to the socket if it is desired to use the voltages available for accessories other than the Select-O-Ject. It will be noted that B+ (240 V.D.C. and 105 V.D.C. regulated) and filament voltages are available. There is a definite limitation on the drain permissible at this socket. The total permissible drain (if the NFM-83-50, XCU-50-2 and SOJ-3 are not used) is 1.8 amps at 6.3 V.A.C., 10 milliamperes at 240 V.D.C. and 5 milliamperes at 105 V.D.C. If the 105-volt supply is used it must be remembered that it cannot be switched Off by the B+ On-Off switch or external switching devices connected to the B.S.W. panel unless an additional relay is used.

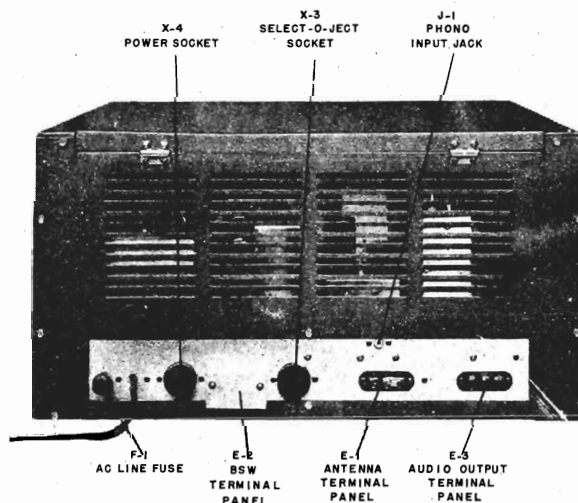


Figure No. 4. Rear View of Receiver

SECTION 3. OPERATION

3-1. CONTROLS

All controls are identified by front-panel markings for ease of identification. The controls are located in a symmetrical manner and are arranged for ease of operation.

The main tuning HRO type micrometer dial is arranged so that the frequency to which the receiver tunes increases as the dial reading increases. The slide-rule dial pointer mechanism is synchronized with the main tuning dial using an anti-backlash gear plus an efficient string-drive arrangement to provide an accurate relationship between the main tuning dial and the direct frequency calibrated scales on the slide-rule drum assembly. Front-panel mounted is a Band selector switch for switching the proper scale in place for the coil set to be used.

The R.F. Gain control serves to adjust the amplification of the second R.F., first, and second and third I.F. amplifier stages. Maximum sensitivity is obtained by rotating the control knob to the extreme clockwise position (10 on its circular scale). At the extreme clockwise position all tubes are operating at maximum gain with minimum bias. As the control is rotated counter-clockwise, increasing bias is applied to the cathodes of the second R.F., first, second and third I.F. tubes, thus reducing their amplification.

The A.C. On-Off switch is associated with the A.F. Gain control and A.C. power is turned on as the A.F. Gain control is advanced from A.C. Off to zero on its scale.

The B+ On-Off switch is connected in the positive lead of the power supply circuit and its purpose is to disconnect the B-plus during periods of transmission or WHEN CHANGING COIL SETS. This last function is important. The B+ circuits are completed when the switch is set at On. However, the B-plus circuits of the high-frequency oscillator, S-Meter amplifier, C.W. oscillator and push-pull audio output tubes remain On at all times regardless of the position of the B+ On-Off switch providing the A.C. On-Off switch is set at On.

Connected in parallel with the B+ switch and mounted at the rear of the chassis is a pair of contacts marked B.S.W. intended for use with relay control of the receiver. The B.S.W. panel is covered by a metal shield to prevent accidental contact with the terminals by the operator. Two slots are provided in this shield to bring out wires to connect to an external switch or relay. Care should be taken that these wires for external connection do not short to the B.S.W. shield.

The Phasing control and Selectivity switch are part of the crystal filter. When the Selectivity switch is set at Off the crystal is switched out of the circuit. With the crystal switched out the Phasing control has no influence on receiver performance. With the Selectivity switch set at any point between 1 and 5, inclusive, the crystal filter is in operation, selectivity increasing as the switch is progressively advanced to position 5. The Phasing control is then used to balance the crystal bridge circuit and eliminate interfering signals or heterodynes. It is recommended that the Tone control be rotated counter-clockwise until the switch is turned Off. This will provide optimum reception of the high audio frequencies when using the crystal filter for A.M. reception. The resultant boost of the higher frequencies tends to compensate for the side-band cutting action of the crystal filter.

The C.W. oscillator is turned on by setting the front-panel mounted Control switch at the C.W. position. The C.W.O. control provides a vernier tuning adjustment for the C.W. oscillator transformer. This oscillator is used to produce an audible beat note when receiving C.W. signals or to locate the carrier of a weak phone station. With the control switch set at the C.W. position, B-plus is applied to the C.W. oscillator tube providing a constant B-plus supply regardless of the B+ On-Off switch setting or the B.S.W. external control devices. Normally the C.W.O. control is set at zero, however by rotating it either to the right or left of zero the operator can select an audio tone suitable to the ear, or he may set the control for best reception. The C.W. code characters are made audible through the heterodyning action of the C.W. oscillator with that of the incoming signal. Care

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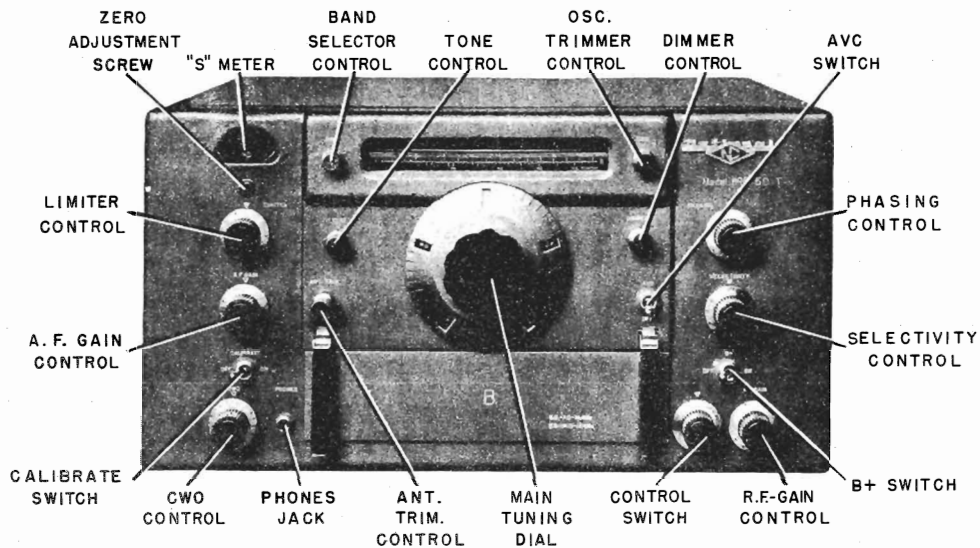


Figure No. 5. Front View of Receiver

should be taken to retard the R.F. Gain control to a point where the receiver does not overload.

The Limiter control serves to switch on the limiter and following this, to adjust the threshold at which limiting action starts. With the Limiter control turned on (at position 0 on the dial scale) limiting action automatically takes place at a relatively high percentage modulation. Rotating the control clockwise progressively lowers the threshold, or percentage modulation, at which limiting action starts until maximum clipping is achieved at 10. This limiter is double-acting in that limiting is accomplished by clipping of both positive and negative peaks. Limiting action is equally effective for both phone or C.W. reception.

The Tone control is used to vary the audio frequency characteristic of the audio system. In the extreme counter-clockwise position the greatest degree of high audio frequency response is obtained. Rotating the control clockwise until the switch mounted on the control just closes provides a comparatively flat response over the entire usable audio frequency range. Rotating the control further in a clockwise direction will attenuate the high audio frequencies as shown in Figure Number 2. If a signal is weak and partially obscured by background noise or static an improvement in signal-to-noise ratio is possible by the attenuation of the higher audio frequencies. Excessive attenuation of these frequencies, however, may result in an impairment of A.M. speech intelligibility. When receiving C.W. signals it will be possible to advance the Tone control considerably further than is possible in A.M. reception since audio distortion is relatively unimportant.

The A.V.C. switch is a two-position toggle marked A.V.C.-Off. The automatic volume control circuits are operative with the toggle switch in the A.V.C. or upper position.

The A.F. Gain control adjusts the volume level of the signal at both the Phones jack and loud-speaker terminals. Clockwise rotation of this control increases the signal applied to the grid of the first audio amplifier tube. The A.F. Gain control is operative when an audio signal is applied to the Phono input jack with the Control switch set at the Phono position.

A Bandsread switch is mounted on the A, B, C and D coil sets. Inspection of the coil set ceramic terminal panel will show a silver-plated spring metal strip with a slotted center screw. Four silver-plated contacts are provided on the terminal panels; two for each type of reception i.e., General Coverage or Bandsread. The metal strip may be turned either to the right or left thereby selecting the type of reception required. A spring tension detent arrangement provides for proper placement and a firm trouble-free electrical contact in each position. It is only necessary to switch this from the right to the left hand side to change from General Coverage to Bandsread. The

lower calibrated scale on the slide rule dial is used when operating in the Bandsread position. A typical coil set showing adjustment locations is illustrated in Figure Number 7 contained in Section 4.

The Ant. Trim. control operates a tuning capacitor which is connected across the first R.F. amplifier section of the main tuning capacitor. This trimmer control is used to tune the first R.F. amplifier stage properly under a wide variety of antenna loading conditions over the entire frequency range of the receiver.

The Dimmer control is a variable resistor actuated by a front-panel mounted dial. It is connected in series with one of the filament supply wires to the S-Meter and slide-rule dial pilot lamps and furnishes a means of varying the degree of illumination as desired by the operator.

The front-panel mounted Osc. trimmer control drives a variable air capacitor connected in parallel with the oscillator main tuning capacitor. Assuming that the receiver is properly aligned this compensating trimmer may be used for minor calibration adjustments. Calibration can be checked by the use of accurate crystal-controlled test oscillators or by using the National Model XCU-50-2 Crystal Calibrator. Use of the Osc. trimmer should not be attempted until the receiver has had a warm-up period of at least five minutes.

A four position Control switch is mounted on the front panel of the receiver. In the C.W. position the C.W. oscillator is placed in operation. The A.M. position provides normal reception of phone or broadcast signals. In the N.F.M. position the reception of narrow-band F.M. signals is possible provided a National Type NFM-83-50 adaptor is plugged into the N.B.F.M. socket. With the Control switch in this position the adaptor is connected between the output of the intermediate amplifier and the input of the audio system. When the Control switch is set in the Phono position the Phono jack is connected to the input of the audio amplifier. In the Phono position all of the receiver circuits except the audio system are rendered inoperative. The A.F. Gain and Tone controls remain operative. If it is so desired the record player may remain connected to the receiver and normal receiving operation resumed by setting the Control switch to any of the other positions.

3-2. PHONE RECEPTION

After the HRO-50-1 is properly installed as outlined in Section 2, it is placed in operation by the following adjustments:

1. Set the Control switch at A.M.
2. Set the A.V.C. switch at A.V.C.
3. Set the Selectivity switch at Off.
4. Set the Phasing control at zero.
5. Set the Limiter control at Off.
6. Set the R.F. Gain control at 10.
7. Check the position of the Osc. trimmer control pointer. It is aligned at the factory so that proper calibration is obtained with the pointer in a vertical position with the arrow head pointed to the "S" in the Osc. panel engraving.
8. Turn the A.C.-On-Off switch mounted on the A.F. Gain control to On i.e., zero on the dial scale.
9. Set the receiver B+ switch at On.
10. Adjust the Band control to select the scale corresponding to the plug-in coil set in use.
11. Turn the A.F. Gain control to the position giving the desired audio volume.
12. Adjust the Ant. Trim. control for a maximum S-Meter reading after the desired station has been selected. Alternately in the absence of a signal the Ant. Trim. control may be set for maximum receiver background noise.
13. Turn the Tone control to a position giving the desired audio output response.

The receiver is now adjusted for the reception of phone signals and will tune to the frequency

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corresponding to the plug-in coil set in use and the setting of the main tuning dial. If a dual-coverage plug-in coil set is used the position of the Bandsread switch, as previously described in paragraph 1 of this section, will determine the frequency coverage i.e., General Coverage or Bandsread.

The settings given above are for the reception of signals of average strength. Exceptionally strong or weak signals may require modification of the above settings. Very strong signals may cause overload or distortion in the receiver with the R.F. Gain control at 10. In this case retarding this control slightly until the overload or distortion disappears is recommended. However, the operator must remember that automatic volume control action will be restricted unless the R.F. Gain control is fully advanced. Audio output should be adjusted entirely by means of the A.F. Gain control.

The A.V.C. - Off switch may be set at the Off position to provide increased sensitivity in some cases. With such a setting the operator must be careful not to advance the R.F. Gain control to a point where I.F. or audio amplifier overload occurs. Such overload is indicated by distortion.

Various types of interference which may be encountered due to adverse receiving conditions can be minimized by utilization of the following controls in the manner described.

Noise Limiter — When a signal is accompanied by static peaks or noise pulses of high intensity and short duration, the best signal-to-noise ratio will be obtained by turning On the Limiter control. In general, it will be found that turning the Limiter control On to 0 on the dial scale will effectively minimize interference caused by external noise pulses. In cases where the noise pulses are extremely pronounced a higher degree of noise suppression will be realized by advancing the Limiter control to a higher dial setting.

Tone control — An improvement in signal-to-noise ratio can be realized by setting the Tone control to attenuate the high audio frequencies. When receiving weak signals which are partially obscured by background noise or static an improvement in reception will be noticed by rotating the Tone control in a clockwise manner. However, too much attenuation of the high audio frequencies may impair the intelligibility of speech.

Selectivity and Phasing — The selectivity of the receiver is adjusted by means of the crystal filter Selectivity switch. The normal setting of the Selectivity switch in phone or broadcast reception is at one of the positions affording broad selectivity. Positions marked Off, 1 or 2 are recommended. Selectivity may be progressively increased by turning the Selectivity switch to position 3, 4 or 5. Increasing selectivity will result in the attenuation of the higher audio frequency tones of the signal as well as sharper tuning. If the selectivity is increased too much these higher frequency audio tones will be attenuated to such an extent that phone or broadcast signals may become unintelligible due to excessive side-band cutting. The Phasing control is part of the crystal filter and is used to eliminate or attenuate interfering heterodynes. The Phasing control is inoperative with the Selectivity switch set in the Off position but is operative in all other settings. The normal setting of the Phasing control with the crystal filter On (i.e., the Selectivity switch set at 1, 2, 3, 4 or 5) in phone reception is at zero on its scale. If, after a desired signal has been tuned in, an interfering signal causes a heterodyne or whistle the Phasing control should be adjusted until this interference is reduced to a minimum. The setting of the Phasing control should be that which provides a maximum attenuation of the objectionable heterodyne. If the heterodyne is below 1,000 cycles the optimum Phasing control setting will be near either one or the other end of the dial scale, depending upon whether the interfering signal has a higher or lower frequency than the desired signal.

3-3. C.W. RECEPTION

The initial adjustment of the receiver controls for C.W. reception is the same as given in Section 3-2 except that the Control switch must be set at C.W.

For the reception of C.W. signals the action of the crystal filter is similar to that for phone reception except that full use of the sharp selectivity position may be used without the loss of intelligibility experienced in phone reception. When maximum selectivity is used, (Selectivity switch at position 5) care must be exercised since tuning is very critical. When the receiver is slowly tuned across the carrier at the received signal the beat-note produced will be very sharply peaked in output at a particular audio pitch. This peak in response indicates the correct receiver dial setting. The setting of the C.W.O. control must be such that the beat-note peak is well within the audible range so that the receiver peak response may be readily observed. A C.W.O. dial setting near zero is recommended. After the receiver has been correctly tuned, the pitch of the beat-note peak may be adjusted by means of the C.W.O. control to provide an audio tone which is pleasing to copy or coincides with any response peaks in the speaker or headphones. Under these conditions the receiver will exhibit pronounced single-signal properties which may be demonstrated by tuning the receiver to the other side of "zero-beat" so that the pitch is the same as before and observe the marked reduction in output. This dial setting is not recommended for use other than to demonstrate the single-signal properties of the receiver. With the receiver tuned to "crystal peak", an interfering signal may be attenuated by proper setting of the Phasing control since this control has little effect on the desired signal.

Similar to phone reception the Limiter control can be used to great advantage in C.W. reception for the reduction of interference due to external noise pulses. For C.W. reception, however, the Limiter control may be set at a well advanced position on the dial scale as excessive clipping of the modulation peaks will not be experienced as might be the case in phone reception. Also the Tone control may be advanced considerably further for C.W. reception since audio distortion is relatively unimportant.

3-4. N. B. F. M. OPERATION

The HRO-50-1 receiver is adaptable for Narrow-Band F.M. reception by utilizing a National Type NFM-83-50 Narrow-Band F.M. adaptor. Operating instructions as given in paragraph 3-2 of this section are applicable for the reception of narrow-band F.M. signals except that the Control switch must be set at N.F.M. It is recommended when the operator is scanning a band for signals that the Control switch is set at A.M. An F.M. signal is indicated by the presence of an audio null in the center of the signal carrier. When an F.M. signal is encountered the Control switch should then be set at N.F.M. and with the A.V.C. switch set at A.V.C. the signal tuned for maximum S-Meter reading.

3-5. MEASUREMENT OF SIGNAL STRENGTH

To measure the strength or intensity of a signal the R.F. Gain control must be advanced to 10, the Control switch set at A.M. and the A.V.C.-Off switch at A.V.C. The crystal filter should be turned Off by means of the Selectivity switch and the Phasing control set at zero. The Ant. Trim. control should be adjusted for a maximum S-Meter reading after a signal has been tuned in. The Limiter, Tone and A.F. Gain controls do not affect the S-Meter reading.

Tuning the receiver to a signal will cause the S-Meter to read, indicating the signal input in S-units from 1 to 9 and in decibels above the S-9 level from zero to 40 db. With no R.F. input to the receiver, or with the antenna disconnected, the S-Meter should read zero plus or minus one-half an S-unit. If it does not the S-Meter circuit compensator requires adjustment. See Section 4-7 for adjustment procedure.

Design of the S-Meter actuating circuit is such that a signal stronger than 40 db. above S-9 cannot cause the meter pointer to come in violent contact with the full-scale meter stop pin thus preventing the possible bending of the meter pointer.

For the purpose of comparing strong signals, which cause the meter pointer to read full scale, with other stronger and/or weaker signals the sensitivity of the S-Meter may be lowered by retarding the R.F. Gain control.

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Measurements of the signal strength of C.W. signals cannot be made with the C.W. oscillator in operation.

With the receiver A.C.-On-Off switch set at Off the meter pointer will return to its mechanical zero located on the right hand or 40 db. end of the meter.

SECTION 4. ALIGNMENT DATA

4-1. GENERAL

All circuits in the HRO-50-1 receiver are carefully aligned before shipment using precision test equipment insuring accurate conformability to the alignment frequency. No realignment of the various adjustments will be required unless the receiver is tampered with or component parts or tube replacements have been necessary.

A definite need for realignment can be determined by checking the performance of the receiver against its normal operation as outlined in Section 3. A simple check to assure the need of realignment of the I.F. Amplifier is provided in paragraph 4-2 of this section. In no case should realignment be attempted unless tests indicate that such realignment is necessary. Even then it must be remembered that the HRO-50-1 is a communications receiver and should not be serviced or realigned by any individual who does not have a complete understanding of the functioning of the equipment and who has not had previous experience adjusting receivers of this type.

Complete alignment of the receiver can be divided into three steps as follows:

- (a) Intermediate Frequency Amplifier alignment including crystal filter adjustments.
- (b) General Coverage Alignment
- (c) Bandspread Alignment

All circuits must be tuned in the above order when complete alignment is required. All alignment adjustments and controls are shown on Figure Numbers 6, 7 and 10.

4-2. I.F. AMPLIFIER CHECK

The making of any adjustment indiscriminately is cautioned against and no circuit should be realigned unless tests definitely indicate that realignment is necessary.

The alignment of the intermediate frequency amplifier may be easily checked in the following manner:

1. Adjust the receiver for normal operation with the antenna disconnected.
2. Connect a pair of headphones to the Phones jack.
3. Set the A.V.C. switch at Off.
4. Set the Control switch at C.W.
5. Set the Phasing control at zero.
6. Set the Selectivity switch at 5.
7. Set the R.F. Gain control at 10.

The setting of the A.F. gain control does not affect the measurement and may be adjusted to provide sufficient headphone output to make the required observations. Adjust the C.W.O. control

until a point is found where the predominant pitch of the background noise is lowest and a distinct crystal ring is heard. Note this setting of the C.W.O. control. Disconnect the crystal filter from the circuit by turning the Selectivity switch to the Off position. Once more adjust the C.W.O. control for the lowest predominant pitch of background noise and note the setting. If the I.F. amplifier is correctly aligned to the crystal filter frequency the setting of the C.W.O. control will be the same for both tests outlined above. If the two settings differ perform the complete I.F. amplifier alignment procedures in the following paragraph 4-3.

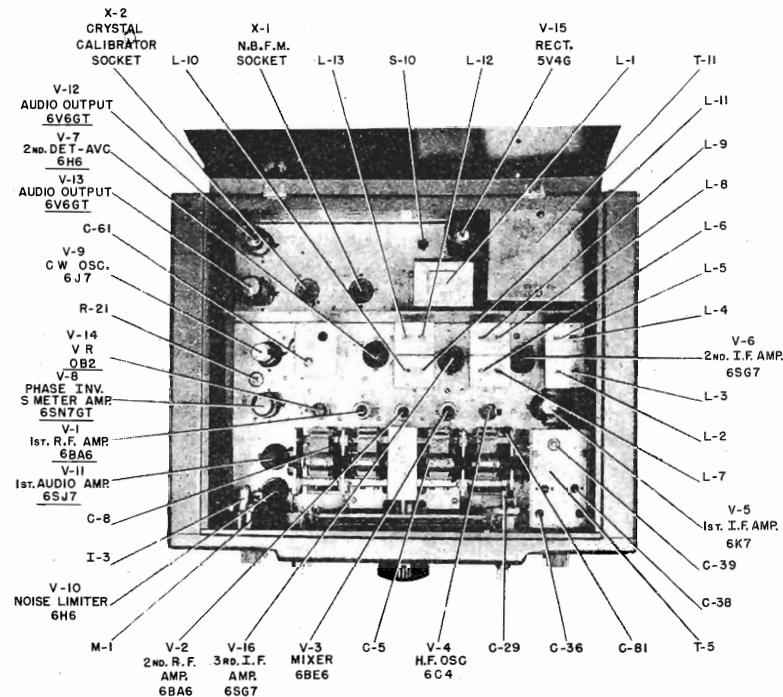


Figure No. 6. Top View of Receiver

4-3. I.F. AMPLIFIER ALIGNMENT

The intermediate frequency of the HRO-50-1 is 455 kilocycles plus or minus 2 kilocycles. The exact frequency is determined by the quartz crystal resonator, Y-1, used in the crystal filter.

The crystal filter and C.W. oscillator transformer are fitted with air-type variable trimmer capacitors for alignment purposes. The I.F. transformers are aligned by means of variable iron cores. These adjustments are located on Figure Numbers 6 and 10.

The preliminary alignment procedure is as follows:

- (1) Connect the high output lead of an accurately calibrated signal generator to the stator portion of the mixer section of the main tuning capacitor, C-5C, and the grounded lead to any convenient point on the chassis. This is a direct connection.
- (2) Connect an output meter having an 8 or 500 ohm resistive load to the matching output terminals on the receiver. As an alternative a high-impedance A.C. voltmeter may be connected to the phones jack.
- (3) Set the Control switch at C.W.
- (4) Set the A.V.C. switch at Off.
- (5) Set the Phasing control at zero.
- (6) Set the Selectivity switch at 5.
- (7) Set the A.F. Gain control at 10.
- (8) Set the R.F. Gain control at 9.
- (9) Turn the modulation of the signal generator off to provide a steady C.W. test signal

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tuned to approximately 455 kilocycles.

Adjust the output attenuator of the signal generator to provide a signal of approximately 100 microvolts. The C.W.O. control must be set to provide an audio beat-note at some frequency between 400 and 1000 cycles per second. The presence of this beat note can readily be determined by temporarily connecting headphones or a loudspeaker to the receiver. If difficulty is encountered in obtaining such a beat-note an adjustment of the C.W.O. transformer trimmer capacitor, C-61, must be made.

Vary the tuning control of the signal generator very slowly between the frequencies of 453 and 457 kilocycles. At one frequency between these limits the I.F. amplifier of the receiver will show a very definite sharply peaked response, as indicated on the output meter. This frequency is that of the crystal filter crystal, Y-1, and I.F. alignment, as outlined below, is made at this frequency.

While making I.F. amplifier adjustments it will be necessary to retard the attenuator of the signal generator if I.F. amplifier gain increases to a point where overload occurs. Without altering the frequency setting of the signal generator set the Selectivity switch at Off, the Control switch at A.M. and turn the modulation of the signal generator On. Capacitors C-33, C-39 and inductors L-2 through L-13 should at this point each be carefully adjusted to give a maximum reading on the output meter. The order in which these adjustments are performed is not important.

Upon completion of the above adjustments set the Selectivity switch at 1. Set the frequency of the signal generator 2 kilocycles higher and adjust the crystal filter trimmer capacitor C-39 for a maximum output meter indication. After making this adjustment set the Selectivity control at Off and return the signal generator to the exact crystal frequency (2 kilocycles lower). Tune the Selectivity compensating trimmer capacitor C-38 for a maximum reading on the output meter.

The Phasing control as set at the factory should need no further attention. When correctly set a predominant decrease in background level will be found with the Selectivity switch at position 5 and the Phasing control set at zero. This same null point should be found by rotating the Phasing control exactly 180 degrees. If not, a slight adjustment of the phase balancing capacitor C-36 will provide the proper setting.

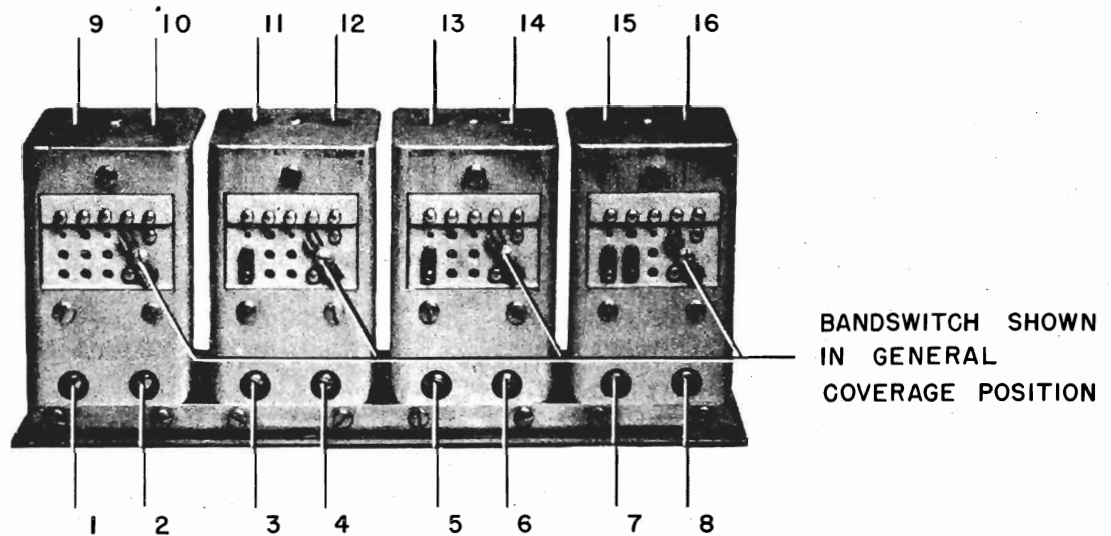
Turn the modulation of the signal generator Off and set the Control switch at C.W. Rotate the C.W.O. control to its full clockwise position. If in this position the dial control does not coincide with 5 on its scale loosen the dial knob and reset it at 5. Set the C.W.O. control to zero beat with the signal generator signal. If zero beat does not occur at 0 on the control dial carefully readjust the air trimmer capacitor C-61 of the C.W. oscillator transformer T-8.

4-4. GENERAL COVERAGE ALIGNMENT

The data given in this section applies to the General Coverage alignment of the H.F. oscillator and R.F. amplifier stages of all coil sets. The original alignment at the National Laboratories is accomplished by the use of precision, crystal-controlled test oscillators. No realignment should be attempted unless a reliable test signal source is available. In the case of General Coverage H.F. oscillator alignment, a test signal source with an accuracy of 1% or better is required. For Band-spread alignment the calibration accuracy demands that the test signal source have the accuracy of precision-calibrated crystals. The entire range of test frequencies required may be obtained by the use of nine crystals operating at their fundamental and harmonic frequencies. The frequency of these crystals is as follows: 0.05, 0.1, 1.0, 2.0, 3.5, 5.0, 6.8, 7.0, 7.3, 14.4 and 15 megacycles.

The need for realignment of the H.F. oscillator of any band is indicated when the frequency calibration of the receiver dial is in error by more than 1% at the high frequency end of the band in question. If it is determined that realignment is necessary proceed as follows:

(1) Connect an output meter to the receiver as described in paragraph 4-3 of this Section and disconnect the antenna.



NOTE: INDUCTANCE ADJUSTMENTS AT POSITION NO. 16 ARE AS FOLLOWS:

1. A, B & C COIL SETS---LOOP OF WIRE INSIDE COIL FORM--- BENDING THE LOOP ONE WAY OR THE OTHER ADDS OR SUBTRACTS TO THE INDUCTANCE.
2. D COIL SET---ADJUSTABLE DISC INSIDE COIL FORM---MOVING THE DISC TOWARD THE CENTER OF THE COIL DECREASES INDUCTANCE.
3. E, F, G, H & J COIL SETS--- A SHORT-CIRCUITED TURN OF WIRE AROUND THE OUTSIDE OF THE COIL---MOVING THIS TURN UP OR DOWN VARIES THE INDUCTANCE.

INDUCTANCE ADJUSTMENT AT POSITION NOS. 9, 11 & 13 OF COIL SETS A, B, C, D, AA, AB & AC IS A LOOP OF WIRE INSIDE COIL FORM--- BENDING THE LOOP ONE WAY OR THE OTHER VARIES THE INDUCTANCE.

Figure No. 7. Typical Coil Set Showing Alignment Adjustment Locations

- (2) Set the Control switch at A.M.
- (3) Set the A.V.C. switch at Off.
- (4) Set the Selectivity switch at Off.
- (5) Set the R.F. Gain control at 10.
- (6) Set the Bandsread switch in the General Coverage position.
- (7) Set the A.F. Gain control to provide a suitable output level.
- (8) Check the position of the Ant. Trim. and Osc. trimmer controls. Alignment should be made with both of the pointers on these controls in a vertical position with the arrow-head pointed towards the top of the receiver.

The following Alignment chart gives the step-by-step procedure to follow in effecting the General Coverage alignment of each coil set. It is important that the chart of adjustments is adhered to in the order shown. It will be noted that General Coverage alignment affects Bandsread alignment, but that adjustment of Bandsread alignment does not affect General Coverage.

Particular care must be taken when adjusting the high-frequency oscillator trimmer C-26 in each coil set. It is imperative that the high-frequency oscillator is set to operate at a frequency above the R.F. amplifier frequency and not below. This can be checked by tuning in the image of the test signal which must appear 910 kilocycles lower on the receiver dial. If it is found that the image does not appear at this dial setting the H.F. oscillator is incorrectly adjusted and the capacity of the trimmer capacitor C-26 must be decreased until the image and fundamental signals appear at the proper points on the dial. After the high-frequency oscillator is correctly calibrated the R.F. amplifier trimmers C-2 and C-15 and the mixer trimmer C-21 should be adjusted for maximum receiver gain as measured by the output meter. Coil sets A and D do not use a first R.F. amplifier trimmer but are peak-tuned by the use of the Ant. Trim. control over the full frequency range of each

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coil set. It may be desirable to align the R.F. Amplifier trimmers C-2 and C-15 and the mixer trimmer C-21 using receiver background noise as an indication of maximum gain, rather than the signal source. If this alternate method of alignment is used the point of maximum gain is that setting of the trimmers which provides the loudest receiver background noise. However, it is possible to align the R.F. amplifier and mixer stages to the image frequency using background noise as an indicator. A check of this possibility is to tune in the image signal — if the image is weaker than the fundamental signal the R.F. amplifier and mixer stages are correctly aligned.

Correction of tracking errors of the R.F. amplifier and mixer stages at the low frequency limit of each coil set is accomplished by the adjustments listed on the Alignment Chart. The actual tracking of these stages may be checked by pressing the outside rotor plates of the main tuning capacitor section toward or away from the stator in a manner assuring that the rotor plates will spring back to their original position. Any change in capacity should decrease the receiver gain if the stage is tracking properly.

The locations of the adjustments referred to on the General Coverage Chart are shown on Figure Number 7. Each variable on the chart is followed by a number in parenthesis to identify its position on the respective coil set. Schematic diagrams of each of the plug-in coil sets are furnished on Figure Numbers 11 and 12.

GENERAL COVERAGE CHART

| Step | Coil Set | Adjust Signal Source and Receiver To: | Adjust to Receive Test Signal | Adjust for Maximum Output |
|------|----------|---------------------------------------|----------------------------------|----------------------------------------------------------------|
| 1 | A | 30.0 Mc. | Trimmer capacitor C-26 (Pos. 8). | Trimmer capacitors C-21 (Pos. 6), C-15 (Pos. 4). |
| 2 | A | 14.4 Mc. | Inductance at Pos. No. 16. | Inductance at Pos. Nos. 13, 11, 9. |
| 3 | A | 30.0 Mc. | | Check step 1. Repeat steps 1 and 2 if necessary. |
| 1 | B | 14.4 Mc. | Trimmer capacitor C-26 (Pos. 8). | Trimmer capacitors C-21 (Pos. 6), C-15 (Pos. 4), C-2 (Pos. 2). |
| 2 | B | 7.0 Mc. | Inductance at Pos. No. 16. | Inductance at Pos. Nos. 13, 11, 9. |
| 3 | B | 14.4 Mc. | | Check step 1. Repeat steps 1 and 2 if necessary. |
| 1 | C | 7.3 Mc. | Trimmer capacitor C-26 (Pos. 8). | Trimmer capacitors C-21 (Pos. 6), C-15 (Pos. 4), C-2 (Pos. 2). |
| 2 | C | 3.5 Mc. | Inductance at Pos. No. 16. | Inductance at Pos. Nos. 13, 11, 9. |
| 3 | C | 7.3 Mc. | | Check step 1. Repeat steps 1 and 2 if necessary. |
| 1 | D | 4.0 Mc. | Trimmer capacitor C-26 (Pos. 8). | Trimmer capacitors C-21 (Pos. 6), C-15 (Pos. 4), C-2 (Pos. 2). |
| 2 | D | 1.8 Mc. | Inductance at Pos. No. 16. | Inductance at Pos. Nos. 13, 11, 9. |
| 3 | D | 4.0 Mc. | | Check step 1. Repeat steps 1 and 2 if necessary. |

GENERAL COVERAGE CHART (CONT'D)

| Step | Coil Set | Adjust Signal Source and Receiver to: | Adjust to Receive Test Signal | Adjust for Maximum Output |
|------|----------|---------------------------------------|----------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| 1 | E | 2.0 Mc | Trimmer capacitor C-26 (Pos. 8). | Trimmer capacitors C-21 (Pos. 6) C-15 (Pos. 4). Check step 1. Repeat steps 1, 2 and 3 if necessary. |
| 2 | E | 1.0 Mc. | Padder capacitor C-100 (Pos. 7). | |
| 3 | E | 1.4 Mc. | Inductance at Pos. No. 16. | |
| 4 | E | 2.0 Mc. | | |
| 1 | F | 0.9 Mc. | Trimmer capacitor C-26 (Pos. 8). | Trimmer capacitors C-21 (Pos. 6), C-15 (Pos. 4), C-2 (Pos. 2). Check step 1. Repeat steps 1, 2 and 3 if necessary. |
| 2 | F | 0.5 Mc. | Padder capacitor C-100 (Pos. 7). | |
| 3 | F | 0.7 Mc. | Inductance at Pos. No. 16. | |
| 4 | F | 0.9 Mc. | | |
| 1 | G | 400 Kc. | Trimmer capacitor C-26 (Pos. 8). | Trimmer capacitors C-21 (Pos. 6), C-15 (Pos. 4). Check step 1. Repeat steps 1, 2 and 3 if necessary. |
| 2 | G | 200 Kc. | Padder capacitor C-100 (Pos. 7). | |
| 3 | G | 300 Kc. | Inductance at Pos. No. 16. | |
| 4 | G | 400 Kc. | | |
| 1 | H | 200 Kc. | Trimmer capacitor C-26 (Pos. 8). | Trimmer capacitors C-21 (Pos. 6), C-15 (Pos. 4), C-2 (Pos. 2). Check step 1. Repeat steps 1, 2 and 3 if necessary. |
| 2 | H | 100 Kc. | Padder capacitor C-100 (Pos. 7). | |
| 3 | H | 150 Kc. | Inductance at Pos. No. 16. | |
| 4 | H | 200 Kc. | | |
| 1 | J | 100 Kc. | Trimmer capacitor C-26 (Pos. 8). | Trimmer capacitors C-21 (Pos. 6), C-15 (Pos. 4), C-2 (Pos. 2). Check step 1. Repeat steps 1, 2 and 3 if necessary. |
| 2 | J | 50 Kc. | Padder capacitor C-100 (Pos. 7). | |
| 3 | J | 75 Kc. | Inductance at Pos. No. 16. | |
| 4 | J | 100 Kc. | | |

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GENERAL COVERAGE CHART (CONT'D)

| Step | Coil Set | Adjust Signal Source and Receiver to: | Adjust to Receive Test Signal | Adjust for Maximum Output |
|------|----------|---------------------------------------|----------------------------------|-------------------------------------------------------------------|
| 1 | AA | 30 Mc. | Trimmer capacitor C-26 (Pos. 7). | Trimmer capacitors C-21 (Pos. 6), C-15 (Pos. 4), C-2 (Pos. 2). |
| 2 | AA | 27.2 Mc. | Padder capacitor C-100 (Pos. 8). | Padder capacitors C-99 (Pos. 5), C-98 (Pos. 3), C-97 (Pos. 1). |
| 3 | AA | 28 Mc. | Inductance at Pos. No. 16. | Inductance at Pos. Nos. 13, 11, 9. |
| 4 | AA | 30 Mc. | | Check step 1. Repeat steps 1, 2 and 3 if necessary. |
| 1 | AB | 35 Mc. | Trimmer capacitor C-26 (Pos. 8). | Trimmer capacitors C-21 (Pos. 6), C-15 (Pos. 4), C-2 (Pos. 2). |
| 2 | AB | 25 Mc. | Padder capacitor C-100 (Pos. 7). | Padder capacitors C-99 (Pos. 5), C-98 (Pos. 3), C-97 (Pos. 1). |
| 3 | AB | 30 Mc. | Inductance at Pos.No. 16. | Inductance at Pos. Nos. 13, 11, 9. |
| 4 | AB | 35 Mc. | | Check step 1. Repeat steps 1, 2 and 3 if necessary. Check step 1. |
| 1 | AC | 21.5 Mc. | Trimmer capacitor C-26 (Pos. 7). | Trimmer capacitors C-21 (Pos. 6), C-15 (Pos. 4), C-2 (Pos. 2). |
| 2 | AC | 21 Mc. | Padder capacitor C-100 (Pos. 8). | Padder capacitors C-99 (Pos. 5), C-98 (Pos. 3), C-97 (Pos. 1). |
| 3 | AC | 21.3 Mc. | Inductance at Pos. No. 16. | Inductance at Pos. Nos. 13, 11, 9. |
| 4 | AC | 21.5 Mc. | | Check step 1. Repeat steps 1, 2 and 3 if necessary. Check step 1. |

4-5. BANDSPREAD ALIGNMENT

The data given in this section applies to the Bandsread Alignment of the high-frequency oscillator, R.F. amplifier and mixer stages of coil sets A, B, C and D. It is important that no Bandsread adjustments are made until after completion of General Coverage alignment as General Coverage adjustments affect Bandsread alignment.

The need for realignment of the H.F. oscillator of any band is indicated when the frequency calibration of the main tuning dial is in error by more than ± 5 divisions. To effect alignment the receiver controls are adjusted the same as outlined in Section 4-4. except that the Bandsread switch on each of the plug-in coils must be in the right-hand or Bandsread position.

The procedure in effecting Bandsread alignment is accomplished by adhering to the instructions given in the Bandsread Alignment Chart. The procedure is similar to that for General Coverage except for the method followed in checking tracking errors of the R.F. amplifier and mixer stages at the low-frequency limit of each coil set. To secure an indication of proper tracking, check the setting of the Bandsread trimmer capacitors C-3, C-16 and C-22 for the position of maximum receiver gain. Any change in capacity should decrease the receiver gain indicating proper tracking. The use of the trimmer capacitors C-3, C-16 and C-22 for a tracking check may destroy their proper settings therefore they must be carefully rechecked at the high-frequency limit of the coil set. The location

BANDSPREAD ALIGNMENT CHART

NOTE: Do not effect Bandsread Alignment until after completion of General Coverage.

| Step | Coil Set | Adjust Signal Source and Receiver to: | Adjust to Receive Test Signal | Adjust for Maximum Output |
|------|----------|---------------------------------------|----------------------------------|------------------------------------------------------------------|
| 1 | A | 30.0 Mc. | Trimmer capacitor C-27 (Pos. 7). | Trimmer capacitors C-22 (Pos. 5), C-16 (Pos. 3), C-3 (Pos. 1). |
| 2 | A | 27.2 Mc. | Padder capacitor C-25 (Pos. 15). | Padder capacitors C-20 (Pos. 14), C-14 (Pos. 12), C-1 (Pos. 10). |
| 3 | A | 30.0 Mc. | | Check step 1. Repeat steps 1 and 2 if necessary. Check step 1. |
| 1 | B | 14.4 Mc. | Trimmer capacitor C-27 (Pos. 7). | Trimmer capacitors C-22 (Pos. 5), C-16 (Pos. 3), C-3 (Pos. 1). |
| 2 | B | 14.0 Mc. | Padder capacitor C-25 (Pos. 15). | Padder capacitors C-20 (Pos. 14), C-14 (Pos. 12), C-1 (Pos. 10). |
| 3 | B | 14.4 Mc. | | Check step 1. Repeat steps 1 and 2 if necessary. Check step 1. |
| 1 | C | 7.3 Mc. | Trimmer capacitor C-27 (Pos. 7). | Trimmer capacitors C-22 (Pos. 5), C-16 (Pos. 3), C-3 (Pos. 1). |
| 2 | C | 7.0 Mc. | Padder capacitor C-25 (Pos. 15). | Padder capacitors C-20 (Pos. 14), C-14 (Pos. 12), C-1 (Pos. 10). |
| 3 | C | 7.3 Mc. | | Check step 1. Repeat steps 1 and 2 if necessary. Check step 1. |
| 1 | D | 4.0 Mc. | Trimmer capacitor C-27 (Pos. 7). | Trimmer capacitors C-22 (Pos. 5), C-16 (Pos. 3), C-3 (Pos. 1). |
| 2 | D | 3.5 Mc. | Padder capacitor C-25 (Pos. 15). | Padder capacitors C-20 (Pos. 14), C-14 (Pos. 12), C-1 (Pos. 10). |
| 3 | D | 4.0 Mc. | | Check step 1. Repeat steps 1 and 2 if necessary. Check step 1. |

of the adjustments referred to in this section are shown on Figure Number 7. Each variable on the chart is followed by a number in parenthesis to identify its position on the respective coil set. Schematic diagrams of each of the four combination Bandsread and General Coverage coil sets A, B, C and D are furnished on Figure Number 11.

4-6. FIRST R.F. STAGE ALIGNMENT WITH LOW IMPEDANCE TRANSMISSION LINE

If a low impedance transmission line is to be used with the receiver, it may be necessary to re-align the first R.F. amplifier at the high-frequency end of each band. The tracking of the first R.F. amplifier stage on each of the coil ranges may be checked by rotating the Ant. Trim. control. If two definite peaks in output are observed while rotating the Ant. Trim. control, the first R.F. amplifier stage is tracking correctly and the setting at either peak is correct. The lack of a peak in output or the presence of only one peak indicates the stage is not tracking properly and correction should be made. The General Coverage adjustments affect the Bandsread adjustments and must therefore be performed first. The following procedure should be adhered to:

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(a) GENERAL COVERAGE

(1) Set the Bandspread switch on each coil to the left-hand side or General Coverage position. Adjust the receiver for normal operation as follows: Control switch at A.M., Selectivity switch at Off, Ant. Trim. control pointer set in a vertical position with the arrow head towards the top of the receiver, A.F. Gain control set at 10 and the R.F. Gain control set to provide a suitable signal level.

(2) Connect the antenna feeders to the receiver antenna terminals and tune the receiver to the signal shown in step 1 on the General Coverage Alignment Chart for the coil set to be aligned. Adjust the trimmer capacitor C-2 for maximum signal output. Coil sets A and D do not use a first R.F. amplifier General Coverage trimmer but are peak-tuned by the Ant. Trim. control over the full frequency range of each coil set.

(b) BANDSPREAD

(1) With the receiver adjusted in the same manner as for General Coverage shift the Bandspread switch on each coil terminal panel to the right-hand side or Bandspread position.

(2) Connect the Antenna feeders to the receiver antenna terminal and tune the receiver to the signal shown in Step 1 on the Bandspread Alignment Chart for the coil set being aligned. Adjust the Bandspread trimmer capacitor C-3 for maximum signal output. If no signal can be received the trimmer may be adjusted for maximum background noise.

4-7. S-METER ADJUSTMENT

The S-Meter balancing resistor R-21 is used to obtain a zero meter reading in the absence of signal input to the receiver. To make this adjustment set the controls as follows: set the R.F. Gain control at 0, A.V.C. switch at A.V.C., Control switch at A.M. and the A.C. switch at On. Adjust the S-Meter balancing resistor R-21 for a zero reading on the S-Meter. This is a screwdriver type adjustment located on the top of the chassis.

SECTION 5. MAINTENANCE

5-1. GENERAL MAINTENANCE DATA

Any repairs in the HRO-50-1 receiver which necessitates resoldering of joints must be made with care. A good mechanical connection must be made before the solder is applied.

Failure of a vacuum tube in the receiver may reduce the sensitivity, produce intermittent operation or cause the equipment to be completely inoperative. In such cases, all tubes should be checked either in an analyzer or similar tube testing equipment or by replacement with tubes of proven quality. When any tube is tested, it should be tapped or jarred to make sure that it has no internal loose connection or intermittent short circuit.

Tubes of the same type will vary slightly in their individual characteristics and this fact should be borne in mind when replacements become necessary. The C.W. oscillator, high-frequency oscillator and I.F. tubes should be chosen with care to select a replacement which most nearly approaches the characteristic of the original tube. A replacement high frequency oscillator tube can be readily checked by noting any change in dial calibration, particularly on the amateur bandspread bands. Substitution of new I.F. amplifier tubes may possibly alter overall gain and selectivity characteristics. The necessity for realignment as well as alignment procedures is discussed in Section 4.

In case of breakdown or failure of the receiver, the fault must first be localized. This can

often be accomplished by observation of some peculiar action of one of the controls. Reference to the circuit diagram will aid in checking voltages at the various tube elements. Measurement of voltages in accordance with Section 5-4. will most likely indicate where failure has occurred.

5-2. CIRCUIT FAILURES

All components parts in the HRO-50-1 receiver have been selected to assure an ample factor of safety. Failure may occur in individual cases and the most common cause of failure, excluding tubes, will probably be due to breakdown of a capacitor or resistor.

Bypass or filter capacitors which develop poor connections internally, or which become open-circuited, will cause decreased sensitivity, oscillation or poor stability. The defective unit can be located by temporarily connecting a good capacitor in parallel with each capacitor that is under suspicion.

Failure of any bypass or filter capacitor may seriously overload resistors in associated circuits. Overload of sufficient magnitude to permanently damage a resistor will cause the surface of the resistor to be scorched, making the defective unit easy to locate by visual inspection.

Open or short-circuited resistors can be definitely located by measuring the resistance of each individual resistor. The schematic diagram should be consulted to make sure that any particular resistor under test is not connected in parallel with some other circuit element which might produce a false measurement.

Loose connections which cause intermittent or noisy operation can often be found by tapping or shaking any component under suspicion with the receiver adjusted for normal operation.

5-3. STAGE GAIN MEASUREMENTS

The sensitivity measurements listed herein are made with the receiver set up as specified in Section 3-2 except that the A.F. Gain control is set at 10. Connect an output meter with an impedance to match the receiver output circuit i.e., 8 or 500 ohms to the output terminal panel in place of the loudspeaker. It is important that the proper output impedance match be observed.

Connect the high output lead of the signal generator through a 0.1 mf coupling capacitor to the grid of each tube as specified in the following table. The ground lead of the generator is connected to any convenient chassis point.

The signal generator, using modulation, is varied between 453 and 457 kilocycles until a pronounced peak reading is obtained on the output meter.

With the generator attenuated to provide a one watt reading on the output meter the signal generator attenuator should read within the limits specified on the following table:

| TERMINAL | TEST SIGNAL |
|------------------|--------------------------|
| Mixer Grid | 60 ± 20 Microvolts |
| First I.F. Grid | 530 ± 50 Microvolts |
| Second I.F. Grid | 2800 ± 250 Microvolts |
| Third I.F. Grid | 48,000 ± 5000 Microvolts |

5-4. VOLTAGE TABULATION

All voltage measurements should be made using a high-impedance vacuum tube voltmeter. Readings taken with any other type of instrument will differ somewhat depending upon the input resistance of the meter. Voltmeter resistance should be ten times larger than the resistance of the circuit across which the voltage is measured otherwise the voltmeter will indicate a voltage lower than the

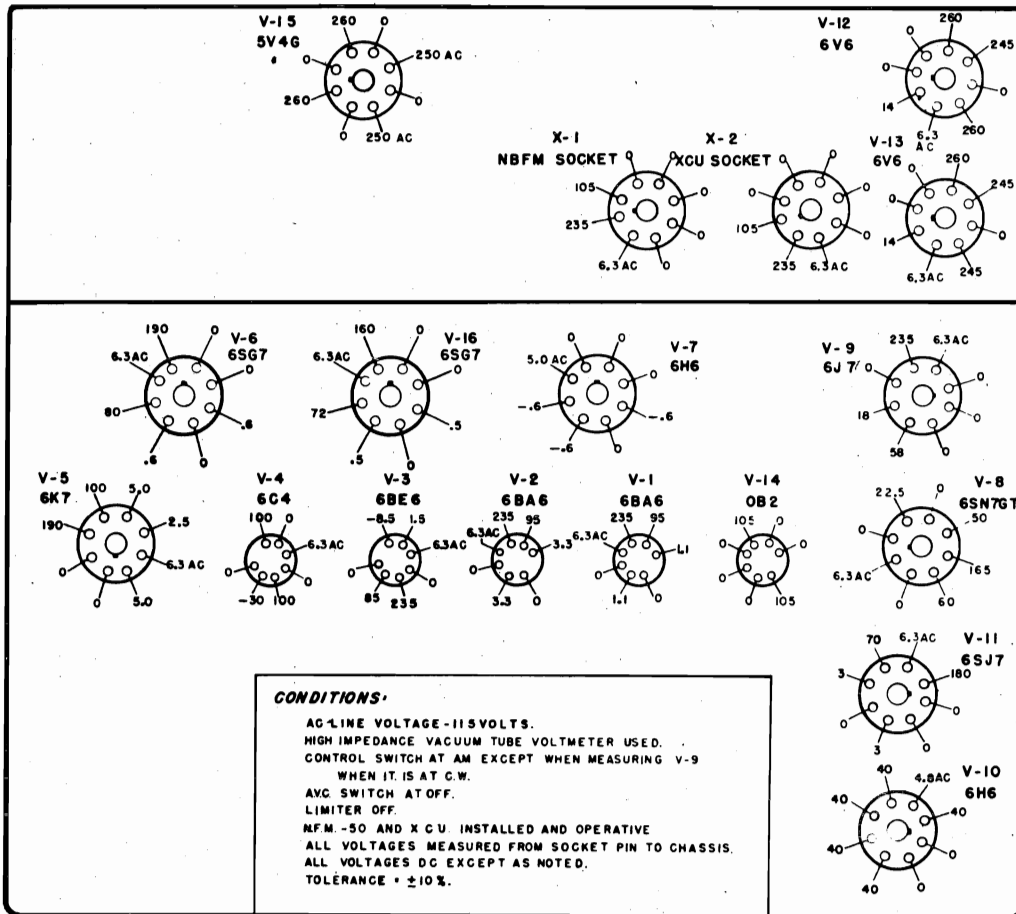


Figure No. 8. Tube Socket Voltages

actual voltage present. The tube socket voltage tabulations contained in Figure Number 8 were taken using a vacuum tube voltmeter with an input resistance of 11 megohms. All voltages are measured between specified socket terminals and chassis. The control settings to be observed are shown on Figure Number 8.

5-5. MAIN TUNING DIAL

The main tuning dial should normally give no trouble. If, however, the dial should become removed from the receiver it must NOT be operated until mounted on the capacitor shaft WITH SET-SCREWS TIGHT. This is because the dial is only designed to rotate for ten revolutions (0 to 500) and if turned farther than this the mechanism will be damaged. When mounted on the capacitor, limit stops protect the dial provided the assembly is made properly. The procedure for re-mounting the dial is as follows:

- (a) Place the dial on the capacitor shaft, tighten set-screws and turn the dial counter-clockwise to fully mesh capacitor rotor plates so that the tips of the rotor plates are flush with the edge of the stator plates.
- (b) Loosen set-screws and rotate dial slowly until the dial reading has decreased to zero.
- (c) Tighten the set-screws.
- (d) Check position of rotor plates at zero. The tips of the rotor plates must be flush with the edge of the stator plates. A slight adjustment may be necessary and this is done by loosening the set-screws, adjusting the position of the dial and tightening the set-screws again.

If it is necessary to remove the dial at any future time, turn to 250 before removing the dial

and do not disturb the setting of either the dial or capacitor until reassembled. If in doubt about the correct position, inspect the springs on the back of the dial. When the dial reads 250 these springs should be straight-up-and-down, they must not be tipped to one side.

It is important that the backplate and dial do not become separated. The backplate is held in place by two springs so that its gear teeth mesh with the dial gear teeth in correct relationship for proper dial operation. If this backplate should be sprung out of place, it may return to an incorrect position and the proper dial numbers will not appear in the windows when the dial is used. To ascertain that the two parts are in correct position proceed as follows:

- (a) Locate small window near outer periphery of dial backplate and also locate dial number window on face of dial which is 180° removed from the small backplate window.
- (b) Hold dial so backplate lies flat in palm of left-hand and with right hand rotate dial knob until 250 appears in previously located dial window.
- (c) If dial is properly adjusted it will be noted that the pointer at the outer edge of the small window lines up with a marked tooth on the dial itself. It will be found that the dial and backplate can be moved so that the backplate pointer will mesh between teeth at points equidistant from marked tooth in either direction.
- (d) If by checking as in paragraph (c) the dial is found not properly adjusted, it will be necessary to separate the backplate from the dial far enough to bring the two gears out of mesh and then re-mesh the two parts until the proper setting is found. A number of trial settings may be required before the correct mesh is found.

5-6. SLIDE-RULE TUNING DIAL

The slide-rule tuning dial assembly has been adjusted at the factory for accurate synchronization with the micrometer dial. If not tampered with this mechanism will provide complete freedom of mechanical trouble over a long period of continuous use. It is driven by an anti-backlash tuning gear ganged with the main tuning dial. The slide-rule dial pointer is controlled by a string-drive assembly.

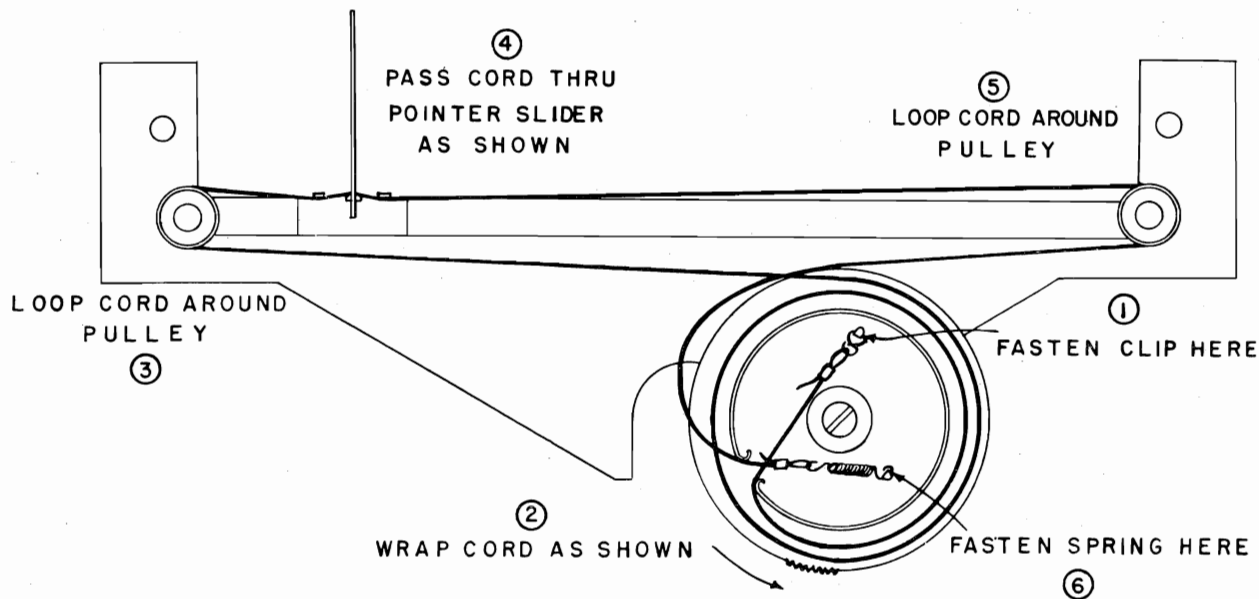
If replacement of the string-drive cord is required it will be necessary to remove the receiver chassis from its cabinet or wraparound. Before removing the micrometer dial reference should be made to Paragraph 5 of this section for proper method of removal. Figure Number 9 illustrates the proper method of replacing the cord. After the cord has been replaced and before the receiver is returned to its cabinet the micrometer dial should temporarily be replaced (See Paragraph 5-5) and the slide-rule pointer correctly set in the following manner:

NOTE

This procedure may also be used if a check is desired to assure that the slide-rule dial pointer is properly synchronized with that of the main tuning dial.

- (a) Check the main tuning dial at zero on its dial scale. The tips of the rotor plates should be flush with the edge of the stator plates.
- (b) Set the Band Selector control so that the D coil set scale appears.
- (c) Set the main tuning dial at 490 on its dial scale. Correct setting of the slide-rule dial pointer is 4 megacycles on the dial scale. Draw the slide-rule pointer along the cord to its proper position being careful not to disturb the setting of the micrometer dial. After the correct setting has been obtained use a small amount of glyptol or household cement to fasten the dial pointer securely in place on the cord.

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NOTE: CORD SHOWN EXPOSED FOR CLARITY
CORD LENGTH 33 7/8" INCLUDING
SPRING AND CLIP

Figure No. 9. Instructions for Dial Cord Replacement

PARTS LIST

| SYMBOL | FUNCTION | DESCRIPTION | DRAWING NO. |
|------------|--------------------------------------------------------------------------|-------------------------------|-------------|
| CAPACITORS | | | |
| C-1 | T-1 Bandsread Padder used on A, B, C, D coil sets | Mica, variable, 3.5 - 35 mmf | D832-2 |
| C-2 | T-1 General Coverage Trimmer used on B, C, F, H, J, AA, AB, AC coil sets | Variable, air dielectric | |
| C-3 | T-1 Bandsread Trimmer used on A, B, C, D coil sets | Variable, air dielectric | |
| C-4 | Antenna Trimmer | Variable, air dielectric | SA:6577 |
| C-5 | Main Tuning | Four section ganged | SA:6592 |
| C-5A | V-1 Tuning | Air dielectric, 225 mmf. max. | |
| C-5B | V-2 Tuning | Air dielectric, 225 mmf. max. | |
| C-5C | V-3 Tuning | Air dielectric, 225 mmf. max. | |
| C-5D | V-4 Tuning | Air dielectric, 225 mmf. max. | |
| C-6 | V-1 Grid Filter | Ceramic, .01 mfd. 450 vdcw | K946-2 |
| C-7 | Not Used | | |
| C-8 | V-1 Grid Filter | Mica, .01 mfd. 300 vdcw | J666-56 |
| C-9 | V-1 Cathode Bypass | Paper, .1 mfd. 400 vdcw | D827-12 |
| C-10 | V-1 Screen Bypass | Ceramic, .005 mfd. 450 vdcw | K946-1 |
| C-11 | V-1 Screen Bypass | Paper, .1 mfd. 400 vdcw | D827-12 |
| C-12 | V-1 Plate Filter | Paper, .1 mfd. 600 vdcw | D827-13 |
| C-13 | V-2 Grid Return Bypass | Ceramic, .005 mfd. 450 vdcw | K946-1 |

PARTS LIST (CONT'D)

| SYMBOL | FUNCTION | DESCRIPTION | DRAWING NO. |
|---------------------|----------------------------------------------------|-------------------------------|-------------|
| CAPACITORS (CONT'D) | | | |
| C-14 | T-2 Bandsread Padder used on A, B, C, D coil sets | Mica, variable, 3.5 - 35 mmf. | D832-2 |
| C-15 | T-2 General Coverage Trimmer used on all coil sets | Variable, air dielectric | |
| C-16 | T-2 Bandsread Trimmer used on A, B, C, D coil sets | Variable, air dielectric | |
| C-17 | V-2 Cathode Bypass | Paper, .1 mfd. 400 vdcw | D827-12 |
| C-18 | V-2 Screen Bypass | Ceramic, .005 mfd. 450 vdcw | K946-1 |
| C-19 | V-2 Plate Filter | Paper, .1 mfd. 600 vdcw | D827-13 |
| C-20 | T-3 Bandsread Padder used on A, B, C, D coil sets | Mica, variable, 3.5 - 35 mmf. | D832-2 |
| C-21 | T-3 General Coverage Trimmer used on all coil sets | Variable, air dielectric | |
| C-22 | T-3 Bandsread Trimmer used on A, B, C, D coil sets | Variable, air dielectric | |
| C-23 | V-3 Cathode Bypass | Ceramic, .01 mfd. 450 vdcw | K946-2 |
| C-24 | V-3 Screen Bypass | Paper, .1 mfd. 400 vdcw | D827-12 |
| C-25 | T-4 Bandsread Padder used on A, B, C, D coil sets | Variable, air dielectric | |
| C-26 | T-4 General Coverage Trimmer used on all coil sets | Variable, air dielectric | |
| C-27 | T-4 Bandsread Trimmer used on A, B, C, D coil sets | Variable, air dielectric | |
| C-28 | T-4 General Coverage Padder: | | |
| | A coil set | Mica, .0012 mfd. 300 vdcw | J666-63 |
| | B coil set | Mica, .003 mfd. 500 vdcw | J666-30 |
| | C coil set | Mica, .0016 mfd. 500 vdcw | J666-21 |
| | D coil set | Mica, .0009 mfd. 500 vdcw | J666-62 |
| | E coil set | Mica, 470 mmf. 500 vdcw | H500-18 |
| | F coil set | Mica, 330 mmf. 500 vdcw | H500-22 |
| | G coil set | Ceramic, 100 mmf. 500 vdcw | D825C-304 |
| | J coil set | Ceramic, 50 mmf. 500 vdcw | D825D-417 |
| | AA coil set | Ceramic, 10 mmf. 500 vdcw | D825D-402 |
| | AB coil set | Ceramic, 120 mmf. 500 vdcw | D825C-340 |
| C-29 | Osc. Trimmer | Variable, air dielectric | |
| C-30 | V-4 Grid | Ceramic, 100 mmf. 500 vdcw | D825D-421 |
| C-31 | V-4 Plate | Paper, .1 mfd. 400 vdcw | D827-12 |
| C-32 | V-4 to V-3 coupling | Mica, .01 mfd. 300 vdcw | J666-56 |
| C-33 | T-5 Primary Trimmer | Variable, air dielectric | |
| C-34 | Bridge Balancing | Ceramic, 62 mmf. 500 vdcw | J695-3 |
| C-35 | Bridge Balancing | Ceramic, 47 mmf. 500 vdcw | J695-1 |
| C-36 | Phasing Balance Adjustment | Mica, variable, 3.5 - 35 mmf. | D832-2 |
| C-37 | Phasing Control | Variable, air dielectric | SA:3655 |
| C-38 | Selectivity Compensator | Mica, variable, 3.5 - 35 mmf. | D832-2 |
| C-39 | T-5 Output adjustment | Variable, air dielectric | SA:1841 |
| C-40 | Selectivity Adjusting | Ceramic, 5 mmf. 500 vdcw | D825D-401 |
| C-41 | Selectivity Adjusting | Ceramic, 10 mmf. 500 vdcw | D825D-426 |
| C-42 | Selectivity Adjusting | Ceramic, 10 mmf. 500 vdcw | D825D-426 |
| C-43 | V-5 A.V.C. Filter | Ceramic, .01 mfd. 450 vdcw | K946-2 |
| C-44 | V-5 Cathode Bypass | Ceramic, .01 mfd. 450 vdcw | K946-2 |

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PARTS LIST (CONT'D)

| SYMBOL | FUNCTION | DESCRIPTION | DRAWING NO. |
|---------------------|-------------------------------|-------------------------------------|-------------|
| CAPACITORS (CONT'D) | | | |
| C-45 | L-2 Tuning | Mica, 510 mmf. 500 vdcw | H500-5 |
| C-46 | L-3 Tuning | Mica, 510 mmf. 500 vdcw | H500-5 |
| C-47 | L-4 Tuning | Mica, 510 mmf. 500 vdcw | H500-5 |
| C-48 | L-5 Tuning | Mica, 510 mmf. 500 vdcw | H500-5 |
| C-49 | V-6 A.V.C. Filter | Ceramic, .01 mfd. 450 vdcw | K946-2 |
| C-50 | V-6 Cathode Bypass | Ceramic, .01 mfd. 450 vdcw | K946-2 |
| C-51 | V-6 Screen Bypass | Ceramic, .01 mfd. 450 vdcw | K946-2 |
| C-52 | V-6 Plate Filter | Ceramic, .01 mfd. 450 vdcx | K946-2 |
| C-53 | V-7 Load | Ceramic, 270 mmf. 500 vdcw | J633-2 |
| C-54 | V-7 Coupling | Ceramic, 100 mmf. 500 vdcw | D825D-421 |
| C-55 | A.V.C. Filter | Paper, .01 mfd. 600 vdcw | D827-7 |
| C-56 | V-9 to V-7 Coupling | Ceramic, 3 mmf. 500 vdcw | J695-4 |
| C-57 | V-9 Screen Bypass | Mica, .01 mfd. 300 vdcw | J666-56 |
| C-58 | C.W. Osc. Control | Variable, air dielectric | SA:6580 |
| C-59 | V-9 Grid | Mica, .001 mfd. 500 vdcw | J666-14 |
| C-60 | T-9 Fixed Tuning | Ceramic, 100 mmf. 500 vdcw | D825C-304 |
| C-61 | T-9 Tuning | Variable, air dielectric | |
| C-62 | D.C. Bypass | Paper, .01 mfd. 600 vdcw | D827-7 |
| C-63 | A.C. Line Bypass | Mica, .01 mfd. 300 vdcw | J666-56 |
| C-64 | A.C. Line Bypass | Mica, .01 mfd. 300 vdcw | J666-56 |
| C-65 | Power Supply Filter | Electrolytic, 40 + 40 mfd. 475 vdcw | K945-3 |
| C-65A | Power Supply Input Filter | Part of C-65 | |
| C-65B | Power Supply Output Filter | Part of C-65 | |
| C-66 | V-7 to V-10 Coupling | Paper, .01 mfd. 600 vdcw | D827-7 |
| C-67 | V-10 Threshold Filter | Paper, .1 mfd. 400 vdcw | D827-12 |
| C-68 | V-10 Plate Filter | Paper, .1 mfd. 400 vdcw | D827-12 |
| C-69 | V-10 to X-3 Coupling | Paper, .01 mfd. 600 vdcw | D827-7 |
| C-70 | Tone Compensator | Electrolytic, 25 mfd. 50 vdcw | E338-4 |
| C-71 | V-11 Cathode Bypass | Paper, .5 mfd. 100 vdcw | D827-49 |
| C-72 | V-11 Screen Bypass | Paper, .1 mfd. 400 vdcw | D827-12 |
| C-73 | V-11 Plate Filter | Paper, .1 mfd. 400 vdcw | D827-12 |
| C-74 | Tone | Paper, .01 mfd. 600 vdcw | D827-7 |
| C-75 | V-8B to V-11 Coupling | Paper, .01 mfd. 600 vdcw | D827-7 |
| C-76 | V-8B Grid | Ceramic, 100 mmf. 500 vdcw | D825D-421 |
| C-77 | V-8B to V-12 Coupling | Paper, .01 mfd. 600 vdcw | D827-7 |
| C-78 | V-8B to V-13 Coupling | Paper, .01 mfd. 600 vdcw | D827-7 |
| C-79 | V-12 and V-13 Cathode Bypass | Electrolytic, 25 mfd. 50 vdcw | E338-4 |
| C-80 | Tone Compensator | Mica, .0024 mfd. 1000 vdcw | J667-68 |
| C-81 | Temperature Drift Compensator | Ceramic, 5 mmf. 500 vdcw | H872-3 |
| C-82 | T-1 Fixed Bandsread Padder: | Ceramic | |
| | A coil set | 12 mmf. 500 vdcw | D825D-404 |
| | B coil set | 5 mmf. 500 vdcw | D825D-401 |
| | C coil set | 12 mmf. 500 vdcw | D825D-404 |
| | D coil set | 25.7 mmf. 500 vdcw | D825D-412 |
| C-83 | T-2 Fixed Bandsread Padder: | Ceramic | |
| | A coil set | 21 mmf. 500 vdcw | D825D-410 |
| | B coil set | 5 mmf. 500 vdcw | D825D-401 |
| | C coil set | 12 mmf. 500 vdcw | D825D-404 |
| | D coil set | 25.7 mmf. 500 vdcw | D825D-412 |

PARTS LIST (CONT'D)

| SYMBOL | FUNCTION | DESCRIPTION | DRAWING NO. |
|--------|----------------------------------------------------------------------------|--------------------------------------|---------------------------|
| C-84 | T-3 Fixed Bandsread Padder: | Ceramic | |
| | A coil set | 21 mmf. 500 vdcw | D825D-410 |
| | B coil set | 5 mmf. 500 vdcw | D825D-401 |
| | C coil set | 12 mmf. 500 vdcw | D825D-404 |
| C-85 | D coil set | 25.7 mmf. 500 vdcw | D825D-412 |
| | T-4 Bandsread Padder used on | Ceramic, 10 mmf. 500 vdcw | D825D-437 |
| | A coil set | | |
| | C-86 | T-4 Fixed Divider used on D coil set | Ceramic, 21 mmf. 500 vdcw | D825D-410 |
| C-87 | T-4 Fixed General Coverage Trimmer: | Ceramic | |
| | A coil set | 20 mmf. 500 vdcw | D825D-446 |
| | B coil set | 5 mmf. 500 vdcw | D825D-440 |
| | AA coil set | 10 mmf. 500 vdcw | D825D-402 |
| | AB coil set | 35 mmf. 500 vdcw | D825D-413 |
| | AC coil set | 68 mmf. 500 vdcw | D825D-439 |
| C-88 | T-1 Fixed General Coverage Padder: | | |
| | A coil set | Mica, 1200 mmf. 500 vdcw | J666-16 |
| C-89 | AB coil set | Ceramic, 120 mmf. 500 vdcw | D825C-305 |
| | T-4 Fixed Temperature Compensator: | Ceramic | |
| | B coil set | 5 mmf. 500 vdcw | D825D-440 |
| C-90 | A coil set | 5 mmf. 500 vdcw | D825D-440 |
| | T-2 Primary Trimmer used on H coil set | Ceramic, 21 mmf. 500 vdcw | D825D-410 |
| C-91 | T-1 General Coverage Trimmer: | Ceramic | |
| | AA coil set | 5 mmf. 500 vdcw | D825D-401 |
| | AB coil set | 21 mmf. 500 vdcw | D825D-410 |
| | AC coil set | 50 mmf. 500 vdcw | D825D-417 |
| C-92 | T-2 coupling used on AB coil set | Mica, 470 mmf. 500 vdcw | J665-56 |
| C-93 | T-2 General Coverage Padder used on AB coil set | Ceramic, 100 mmf. 500 vdcw | D825C-304 |
| C-94 | T-3 Coupling used on AB coil set | Mica, 470 mmf. 500 vdcw | J665-56 |
| C-95 | T-3 General Coverage Trimmer: | | |
| | AB coil set | Ceramic, 10 mmf. 500 vdcw | D825D-402 |
| | AC coil set | Ceramic, 68 mmf. 500 vdcw | D825D-429 |
| C-96 | V-2 Cathode Bypass | Ceramic, .005 mfd. 450 vdcw | K946-1 |
| C-97 | T-1 General Coverage Padder used on AA, AB and AC coil sets | Variable, air dielectric | |
| C-98 | T-2 General Coverage Padder used on AA and AB coil sets | Variable, air dielectric | |
| C-99 | T-3 General Coverage Padder used on AA, AB and AC coil sets | Variable, air dielectric | |
| C-100 | T-4 General Coverage Padder used on E, F, G, H, J and AA, AB, AC coil sets | Variable, air dielectric | |
| C-101 | T-3 General Coverage Padder used on AB coil set | Ceramic, 100 mmf. 500 vdcw | D825C-304 |
| C-102 | T-2 General Coverage Trimmer: | Ceramic | |
| | AC coil sets | 68 mmf. 500 vdcw | D825D-439 |
| | AB coil sets | 10 mmf. 500 vdcw | D825D-402 |
| C-103 | I.F. coupling to X-1 | Ceramic, 100 mmf. 500 vdcw | D825D-402 |

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PARTS LIST (CONT'D)

| SYMBOL | FUNCTION | DESCRIPTION | DRAWING NO. |
|---------------------|------------------------------------------------|-------------------------------|-------------|
| CAPACITORS (CONT'D) | | | |
| C-104 | T-4 General Coverage Padder used on A coil set | Ceramic, 20 mmf. 500 vdcw | D825D-446 |
| C-105 | V-5 Plate Filter | Paper, .25 mfd. 600 vdcw | D827-19 |
| C-106 | L-8 Tuning | Mica, 510 mmf. 500 vdcw | H500-5 |
| C-107 | L-9 Tuning | Mica, 510 mmf. 500 vdcw | H500-5 |
| C-108 | V-16 AVC Filter | Ceramic, .01 mfd. 450 vdcw | K946-2 |
| C-109 | V-16 Cathode Bypass | Ceramic, .01 mfd. 450 vdcw | K946-2 |
| C-110 | R.F. Filter | Paper, .25 mfd. 200 vdcw | D827-15 |
| C-111 | V-16 Screen | Ceramic, .01 mfd. 450 vdcw | K946-2 |
| C-112 | V-16 Plate Filter | Ceramic, .01 mfd. 450 vdcw | K946-2 |
| C-113 | L-10 Tuning | Mica, 510 mmf. 500 vdcw | H500-5 |
| C-114 | L-11 Tuning | Mica, 510 mmf. 500 vdcw | H500-5 |
| C-115 | L-12 Tuning | Mica, 510 mmf. 500 vdcw | H500-5 |
| C-116 | L-13 Tuning | Mica, 510 mmf. 500 vdcw | H500-5 |
| C-117 | V-2 Plate Filter | Ceramic, .005 mfd. 450 vdcw | K946-1 |
| C-118 | V-15 Plate Filter | Paper, .1 mfd. 600 vdcw | D827-13 |
| C-119 | Osc. Padder | Ceramic, 10 mmf. 500 vdcw | D825D-437 |
| C-120 | L-6 Tuning | Mica, 510 mmf. 500 vdcw | H500-5 |
| C-121 | L-7 Tuning | Mica, 510 mmf. 500 vdcw | H500-5 |
| C-122 | V-5 Screen Bypass | Ceramic, .01 mfd. 450 vdcw | K946-2 |
| C-123 | V-3 Plate Filter | Ceramic, .01 mfd. 450 vdcw | K946-2 |
| C-124 | V-5 Screen Bypass | Paper, .1 mfd. 400 vdcw | D827-12 |
| RESISTORS | | | |
| R-1 | V-1 Grid Filter | Fixed, 470,000 ohms, 1/2 W | J569-57 |
| R-2 | V-1 Cathode | Fixed, 100 ohms, 1/2 W | J569-13 |
| R-3 | V-1 and V-2 Screen | Fixed, 2,200 ohms, 1/2 W | J569-29 |
| R-4 | V-2 Grid | Fixed, 470,000 ohms, 1/2 W | J569-57 |
| R-5 | V-2 Cathode | Fixed, 560 ohms, 1/2 W | J569-22 |
| R-6 | RF Gain Control | Variable, W.W. 10,000 ohms | K349-3 |
| R-7 | V-3 Injector Grid | Fixed, 22,000 ohms, 1/2 W | J569-41 |
| R-8 | V-3 Cathode | Fixed, 220 ohms, 1/2 W | J569-17 |
| R-9 | V-3 Screen | Fixed, 33,000 ohms, 1 W | J571-43 |
| R-10 | V-4 Grid | Fixed, 22,000 ohms, 1/2 W | J569-41 |
| R-11 | V-4 Plate | Fixed, 22 ohms, 1/2 W | J569-5 |
| R-12 | V-5 Grid Filter | Fixed, 470,000 ohms, 1/2 W | J569-57 |
| R-13 | V-1, V-2, V-5 Screen Bleeder | Fixed, 27,000 ohms, 2 W | J572-42 |
| R-14 | V-5 Cathode | Fixed, 220 ohms, 1/2 W | J569-17 |
| R-15 | V-5 Cathode | Fixed, 330/1000 ohms, 1/2 W | |
| R-16 | V-1, V-2, V-5 Screen Dropping | Fixed, 15,000 ohms, 2 W | J572-39 |
| R-17 | V-5 Plate Filter | Fixed, 2,200 ohms, 1/2 W | J569-29 |
| R-18 | V-6 Grid Filter | Fixed, 470,000 ohms, 1/2 W | J569-57 |
| R-19 | V-6 Cathode | Fixed, 68 ohms, 1/2 W | J569-11 |
| R-20 | V-8A Plate Load | Fixed, 47,000 ohms, 1/2 W | J569-45 |
| R-21 | "S" Meter Zero Adjustment | Variable, W.W. 1000 ohms, 1 W | D831-2 |
| R-22 | V-7 Plate Load | Fixed, 1.5 meg. 1/2 W | J569-63 |
| R-23 | AVC Filter | Fixed, 1.5 meg. 1/2 W | J569-63 |
| R-24 | V-9 Plate | Fixed, 220,000 ohms, 1/2 W | J569-53 |
| R-25 | V-9 Screen Filter | Fixed, 100,000 ohms, 1/2 W | J569-49 |
| R-26 | V-9 Screen Bleeder | Fixed, 100,000 ohms, 1/2 W | J569-49 |
| R-27 | V-9 Grid | Fixed, 47,000 ohms, 1/2 W | J569-45 |
| R-28 | Dimmer Control | Variable, W.W. 25 ohms | K915-13 |

PARTS LIST (CONT'D)

| SYMBOL | FUNCTION | DESCRIPTION | DRAWING NO. |
|--------------------|----------------------------------|-----------------------------|-------------|
| RESISTORS (CONT'D) | | | |
| R-29 | V-7 Filament Dropping | Fixed, 4.3 ohms, 1 W | K098-48 |
| R-30 | V-10 Filament Dropping | Fixed, 4.3 ohms, 1 W | K098-48 |
| R-31 | V-14 Dropping | Fixed, 5,000 ohms, 10 W | E959-10 |
| R-32 | V-7 Load | Fixed, 22,000 ohms, 1/2 W | J569-41 |
| R-33 | V-7 Load | Fixed, 470,000 ohms, 1/2 W | J569-57 |
| R-34 | V-10 Plate | Fixed, 220,000 ohms, 1/2 W | J569-53 |
| R-35 | V-10 Cathode | Fixed, 220,000 ohms, 1/2 W | J569-53 |
| R-36 | Limiter Threshold control | Variable, 500,000 ohms | J681-2 |
| R-37 | Limiter Threshold Filter | Fixed, 220,000 ohms, 1/2 W | J569-53 |
| R-38 | Limiter Plate Filter | Fixed, 820,000 ohms, 1/2 W | J569-60 |
| R-39 | V-10 Plate Load | Fixed, 470,000 ohms, 1/2 W | J569-57 |
| R-40 | Audio Gain Control | Variable, 500,000 ohms | K347-1 |
| R-41 | Limiter Output Divider | Fixed, 220,000 ohms, 1/2 W | J569-53 |
| R-42 | V-11 Cathode | Fixed, 2200 ohms, 1/2 W | J569-29 |
| R-43 | V-11 Cathode Divider | Fixed, 150 ohms, 1/2 W | J569-15 |
| R-44 | Degeneration Feedback | Fixed, 6800 ohms, 1/2 W | J569-35 |
| R-45 | V-11 Screen Filter | Fixed, 470,000 ohms, 1/2 W | J569-57 |
| R-46 | V-11 Plate Load | Fixed, 100,000 ohms, 1/2 W | J569-49 |
| R-47 | V-11 Plate Filter | Fixed, 47,000 ohms, 1/2 W | J569-45 |
| R-48 | Tone control | Variable, 500,000 ohms | K347-1 |
| R-49 | V-8B Grid | Fixed, 220,000 ohms, 1/2 W | J569-53 |
| R-50 | V-8B Cathode Bias | Fixed, 4700 ohms, 1/2 W | J569-33 |
| R-51 | V-8B Cathode Load | Fixed, 47,000 ohms, 1/2 W | J569-45 |
| R-52 | V-8B Plate Load | Fixed, 47,000 ohms, 1/2 W | J569-45 |
| R-53 | V-13 Grid | Fixed, 220,000 ohms, 1/2 W | J569-53 |
| R-54 | V-12 Grid | Fixed, 220,000 ohms, 1/2 W | J569-53 |
| R-55 | V-12 and V-13 Cathode Bias | Fixed, 220 ohms, 2 W | J572-17 |
| R-56 | Output Load | Fixed, 470 ohms, 2 W | J572-21 |
| R-57 | T-1 Ant. Load used on A coil set | Fixed, 22 ohms, 1/2 W | J569-5 |
| R-58 | V-6 Screen Dropping | Fixed, 47,000 ohms, 1/2 W | J569-45 |
| R-59 | V-16 AVC Filter | Fixed, 470,000 ohms, 1/2 W | J569-57 |
| R-60 | V-16 Cathode | Fixed 68 ohms, 1/2 W | J569-11 |
| R-61 | V-16 Screen Dropping | Fixed, 47,000 ohms, 1/2 W | J569-45 |
| R-62 | V-16 Plate Filter | Fixed, 2200 ohms, 1/2 W | J569-29 |
| MISCELLANEOUS | | | |
| E-1 | Antenna Input Terminal | Screw type, three terminals | E261-3 |
| E-2 | B+ Switch Terminal | Screw type, two terminals | E265-19 |
| E-3 | Audio Output Terminal | Screw type, three terminals | E259-2 |
| F-1 | Fuse 3AG | 2 Amps at 250 V | F135-4 |
| I-1 | Dial Lamp | #47 | F136-6 |
| I-2 | Dial Lamp | #47 | F136-6 |
| I-3 | "S" Meter Lamp | #47 | F136-6 |
| J-1 | Phono Jack | Single Circuit | J993-1 |
| J-2 | Phone Jack | Multi-Circuit | F316-1 |

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PARTS LIST (CONT'D)

| SYMBOL | FUNCTION | DESCRIPTION | DRAWING NO. |
|------------------------|-----------------------------------|----------------------------------------------|-------------|
| MISCELLANEOUS (CONT'D) | | | |
| L-1 | Filter Choke | 17 Henries | SA:1694 |
| L-2 | T-6 Tuning | Variable iron-core inductor | SA:3905 |
| L-3 | T-6 Tuning | Variable iron-core inductor | SA:3366 |
| L-4 | T-6 Tuning | Variable iron-core inductor | SA:3905 |
| L-5 | T-6 Tuning | Variable iron-core inductor | SA:3366 |
| L-6 | T-7 Tuning | Variable iron-core inductor | SA:3905 |
| L-7 | T-7 Tuning | Variable iron-core inductor | SA:3366 |
| L-8 | T-7 Tuning | Variable iron-core inductor | SA:3905 |
| L-9 | T-7 Tuning | Variable iron-core inductor | SA:3366 |
| L-10 | T-8 Tuning | Variable iron-core inductor | SA:3905 |
| L-11 | T-8 Tuning | Variable iron-core inductor | SA:8951 |
| L-12 | T-8 Tuning | Variable iron-core inductor | SA:3905 |
| L-13 | T-8 Tuning | Variable iron-core inductor | SA:8951 |
| L-14 | T-6 Coupling | R.F. choke, 1.1 uh. | SA:6072 |
| L-15 | T-7 Coupling | R.F. choke, 1.1 uh. | SA:6072 |
| L-16 | T-8 Coupling | R.F. choke, 1.1 uh. | SA:8952 |
| M-1 | "S" Meter | 0-1 ma. W/S scale | J984-5 |
| P-1 | Select-0-Ject Plug | Octal | SA:6569 |
| P-2 | A.C. Jumper Plug | Octal | SA:3731 |
| S-1 | T-1 B.S. - G.C. Switch | Twist Type, Two position | SA:6748 |
| S-2 | T-2 B.S. - G.C. Switch | Twist Type, Two position | SA:6749 |
| S-3 | T-3 B.S. - G.C. Switch | Twist Type, Two position | SA:6749 |
| S-4 | T-4 B.S. - G.C. Switch | Twist Type, Two position | SA:6749 |
| S-5 | Selectivity Switch | Six Position, Double Pole | E195-3 |
| S-6 | A.V.C. ON-OFF switch | SPST Bat Handle, Toggle | E230-2 |
| S-7 | Control Switch | Double-Wafer, four-position | SA:6564 |
| S-8 | Calibrator Switch | DPDT Bat Handle, Toggle center position open | P738-1 |
| S-9 | A.C. Line Switch | Part. off R-40 | |
| S-10 | T-10 Primary Selector Switch | DPDT, Toggle | H340-4 |
| S-11 | B+ Switch | SPST, Bat Handle, Toggle | E230-2 |
| T-1 | First R.F. Amplifier Transformer | | |
| | A Band | 14.0 - 30 Mc. | SA:6654 |
| | B Band | 7.0 - 14.4 Mc. | SA:6755 |
| | C Band | 3.5 - 7.3 Mc. | SA:6759 |
| | D Band | 1.7 - 4.0 Mc. | SA:6635 |
| | E Band | 900 - 2050 Kc. | SA:6513 |
| | F Band | 480 - 960 Kc. | SA:6660 |
| | G Band | 180 - 430 Kc. | SA:6665 |
| | H Band | 100 - 200 Kc. | SA:6803 |
| | J Band | 50 - 100 Kc. | SA:6806 |
| | AA Band | 27 - 30 Mc. | SA:6814 |
| | AB Band | 25 - 35 Mc. | SA:6675 |
| | AC Band | 21 - 21.5 Mc. | SA:8073 |
| T-2 | Second R.F. Amplifier Transformer | | |
| | A Band | 14.0 - 30 Mc. | SA:6751 |
| | B Band | 7.0 - 14.4 Mc. | SA:6650 |
| | C Band | 3.5 - 7.3 Mc. | SA:6641 |
| | D Band | 1.7 - 4.0 Mc. | SA:6637 |

PARTS LIST (CONT'D)

| SYMBOL | FUNCTION | DESCRIPTION | DRAWING NO. |
|------------------------|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| MISCELLANEOUS (CONT'D) | | | |
| T-2 | Cont'd | | |
| | E Band | 900 - 2050 Kc. | SA:6540 |
| | F Band | 480 - 960 Kc. | SA:6662 |
| | G Band | 180 - 430 Kc. | SA:6667 |
| | H Band | 100 - 200 Kc. | SA:6669 |
| | J Band | 50 - 100 Kc. | SA:6809 |
| | AA Band | 27 - 30 Mc. | SA:6673 |
| | AB Band | 25 - 35 Mc. | SA:6818 |
| | AC Band | 21 - 21.5 Mc. | SA:8074 |
| T-3 | Mixer Transformer | | |
| | A Band | 14.0 - 30 Mc. | SA:6752 |
| | B Band | 7.0 - 14.4 Mc. | SA:6756 |
| | C Band | 3.5 - 7.3 Mc. | SA:6642 |
| | D Band | 1.7 - 4.0 Mc. | SA:6638 |
| | E Band | 900 - 2050 Kc. | SA:6789 |
| | F Band | 480 - 960 Kc. | SA:6794 |
| | G Band | 180 - 430 Kc. | SA:6800 |
| | H Band | 100 - 200 Kc. | SA:6804 |
| | J Band | 50 - 100 Kc. | SA:6810 |
| | AA Band | 27 - 30 Mc. | SA:6815 |
| | AB Band | 25 - 35 Mc. | SA:6676 |
| | AC Band | 21 - 21.5 Mc. | SA:8075 |
| T-4 | H.F. Oscillator Transformer | | |
| | A Band | 14.0 - 30 Mc. | SA:6656 |
| | B Band | 7.0 - 14.4 Mc. | SA:6678 |
| | C Band | 3.5 - 7.3 Mc. | SA:6760 |
| | D Band | 1.7 - 4.0 Mc. | SA:6776 |
| | E Band | 900 - 2050 Kc. | SA:6631 |
| | F Band | 480 - 960 Kc. | SA:6795 |
| | G Band | 180 - 430 Kc. | SA:6785 |
| | H Band | 100 - 200 Kc. | SA:6805 |
| | J Band | 50 - 100 Kc. | SA:6811 |
| | AA Band | 27 - 30 Mc. | SA:6816 |
| | AB Band | 25 - 35 Mc. | SA:6819 |
| | AC Band | 21 - 21.5 Mc. | SA:8076 |
| T-5 | Crystal Filter | 455 kc. | SA:3654 |
| T-6 | 2nd. I.F. Amp. Transformer | 455 kc. | SA:8448 |
| T-7 | 3rd. I.F. Transformer | 455 kc. | SA:8448 |
| T-8 | Det. Input Transformer | 455 kc. | SA:8948 |
| T-9 | C.W. Osc. Transformer | 455 kc. | SA:3361 |
| T-10 | Audio Output Transformer | Pri. 10,000 ohms Sec. 8/600 ohms 10 watts | P187-1 |
| T-11 | Power Transformer | Primary: #4 and #5, 115 volts #4 and #7, 230 volts Secondary: #1 and #3, 6.3 V at 6.5 A. Secondary: #8, #9 and #10, 275-0-275 V. Secondary: #11 and #12, 5 V. at 2 A. #2 electrostatic shield | SA:6566 |
| V-1 | First R.F. Amplifier | 6BA6 | |
| V 2 | Second R.F. Amplifier | 6BA6 | |

| MODEL HRO-50-1 | | PARTS LIST (CONT'D) | |
|-----------------------------------------------------------------------------------------------------|----------------------------|---------------------------------------------------------------------|---------------|
| SYMBOL | FUNCTION | DESCRIPTION | DRAWING NO. |
| MISCELLANEOUS (CONT'D) | | | |
| V-3 | Mixer | 6BE6 | |
| V-4 | H.F. Oscillator | 6C4 | |
| V-5 | First I.F. Amplifier | 6K7 | |
| V-6 | Second I.F. Amplifier | 6SG7 | |
| V-7 | Second Detector and A.V.C. | 6H6 | |
| V-8A | "S" Meter Amplifier | 1/2 6SN7GT | |
| V-8B | Phase Inverter | 1/2 6SN7GT | |
| V-9 | C.W. Oscillator | 6J7 | |
| V-10 | Noise Limiter | 6H6 | |
| V-11 | Audio Amplifier | 6SJ7 | |
| V-12 | Audio Output | 6V6GT | |
| V-13 | Audio Output | 6V6GT | |
| V-14 | Voltage Regulator | 0B2 | |
| V-15 | Rectifier | 5V4G | |
| V-16 | Third I.F. Amplifier | 6SG7 | |
| X-1 | Accessory Connector Socket | Octal | J625-2 |
| X-2 | Crystal Calibrator Socket | Octal | J625-2 |
| X-3 | Select-O-Ject Socket | Octal | J625-2 |
| Y-1 | Crystal Resonator | Quartz, 455 kc. | E979-1 |
| DESCRIPTION | NAT. CO. TYPE | DESCRIPTION | NAT. CO. TYPE |
| MECHANICAL PARTS | | MECHANICAL PARTS (CONT'D) | |
| Flexible coupling on Control switch shaft | SA:22 | Drum positioning spring | P131-1 |
| Flexible coupling on C.W.O. control shaft | SA:22 | Gear assembly for driving dial pointer (includes pulley and gears) | SA:6595 |
| Knurled nut to mount Calibrate Switch | Q163-2 | Loading spring for above gears (2) | P216-1 |
| Knurled nut to mount B+ and AVC switches (2) | J703-2 | Bearing for pulley | P226-1 |
| Knurled nut to mount phones jack | J704-2 | Washer to mount pulley and bearing to dial drum supporting assembly | M953-2 |
| Knob for Tone control, Ant. trimmer and Dimmer controls | SA:7021 | Spring washer to position pulley and gears | J728-7 |
| Main Tuning dial control knob | SA:6586 | Shaft, for rotating dial scale drum | P221-2 |
| Spring washer to ground main tuning knob | L087-1 | Rubber "O" ring on above shaft | L792-3 |
| Shaft extension for Selectivity switch | SA:3664 | Retaining washer on above shaft | E229-3 |
| Coupling on phasing control shaft | D694-2 | Snap ring on above shaft | L936-1 |
| Set screws for mounting above coupling (4) | G879-2 | Dial cord | SA:6596 |
| Shaft extension for Phasing control | C696-4 | Spring to maintain tension on dial cord | P223-1 |
| Cast aluminum hub on main tuning capacitor shaft | SA:8800 | Dial scale drum stop, mounted on Osc. control shaft | P472-1 |
| Window for dial scales | P211-1 | Tension spring for above stop | P471-1 |
| Bracket for dial scale window | P539-1 | Dial light socket (2) | SA:6600 |
| Base plate for mounting tuning capacitor | SA:6581 | Dial scale drum assembly (no scales included) | SA:7922 |
| Spacer plate between base plate and tuning capacitor | P106-1 | Dial scale for Band A | P136-1 |
| Triangular bracket for main tuning capacitor shaft | SA:6582 | Dial scale for Band B | P136-2 |
| Dial drum supporting assembly (includes pointer, pointer rail, pulleys and drum positioning spring) | SA:6594 | Dial scale for Band C | P136-3 |
| | | Dial scale for Band D | P136-4 |
| | | Dial scale for Band A (bandspread calibration only) | P136-5 |
| | | Dial scale for Band B (bandspread calibration only) | P136-6 |
| | | Dial scale for Band C (bandspread calibration only) | P136-7 |

PARTS LIST (CONT'D)

| DESCRIPTION | NAT. CO. TYPE |
|----------------------------------------------------------------------------------------|---------------------------------|
| MECHANICAL PARTS (CONT'D) | |
| Dial scale for Band D (bandspread calibration only) | P136-8 |
| Dial scale for Band E-F | P136-9 |
| Dial scale for Band G-H | P136-10 |
| Dial scale for Band J | P136-11 |
| Dial scale for Band AA | P136-12 |
| Dial scale for Band AB | P136-13 |
| Dial scale for Band AC | P136-14 |
| End bearing for main tuning capacitor rotor shaft | SA:2127 |
| Ceramic brush insulators on main tuning capacitor (4) | D679-1 |
| Ceramic brush insulator with cutaway surface (5) | D680-1 |
| Rotor brush (5) | SA:8675 |
| Worm for driving main tuning capacitor | M939-2 |
| Worm loading spring | Q544-1 |
| Ball bearing used with worm loading spring | F150-2 |
| Spring thrust collar used with worm loading spring | P112-1 |
| Coil set levers | SA:7001 |
| Nut to mount coil set levers (2) | P207-2 |
| Coil set brush board (4) | SA:6575 |
| Fibre washer for mounting brush-board (16) | E181-3 |
| Bakelite slide for coil sets (2) | D393-1 |
| Shield cap for type 6K7 and 6J7 tubes (2) | E726-1 |
| Shield for miniature tubes (3) | SA:3387 |
| Shield base for miniature tubes (3) | SA:3847 |
| Socket for miniature tubes (5) | SA:4916 |
| Fibre washer for mounting miniature sockets (10) | H285-2 |
| Octal tube sockets (15) | J625-2 |
| Spring clamp for type 6C4 tube | L532-3 |
| Spring clamp for type 0B2 tube | L532-2 |
| Nut for mounting miniature sockets | B111-2 |
| Ceramic standoff insulated terminals (2) (one top of chassis one on bottom of chassis) | B425-1 |
| Insulation between chassis and heat shield | P942-1 (short) P942-2 (long) |
| Heat shield (with grommets and lugs) | SA:6563 |
| Plate, heat shield | P202-1 |
| R.F. Gain control knob | SA:6867 |
| Phasing and C.W.O. control knob (2) | SA:6868 |

| DESCRIPTION | NAT. CO. TYPE |
|------------------------------------------------|------------------|
| MECHANICAL PARTS USED ON TABLE MODEL ONLY | |
| Selectivity control knob | SA:6869 |
| Limiter control knob | SA:6870 |
| CW - AM - NFM - Phono switch knob | SA:6587 |
| A.F. Gain control knob | SA:6871 |
| End bearing for main tuning capacitor | SA:8669 |
| Cover, gear housing | C898-4 |
| 1/4" length of rubber tubing on capacitor stop | F234-2 |
| Stop washer (10) | P149-3 |
| Stop | Q543-1 |
| Spacer, stop | Q541-1 |
| Spring washer in stop | J728-4 |
| Stop washer | P149-4 |
| Collar in stop with set screws | Q542-2 |
| Set screws in above | G879-4 G879-2 |
| Balls in capacitor bearing (6) | H613-3 |
| C.W.O. shaft | Q534-1 |
| Washer on above | D802-4 |
| Retaining ring on above | Q102-1 |
| Bracket from chassis to dial support plate | Q538-1 |
| Chassis mounting angle bracket (left) | P244-1 |
| Chassis mounting angle bracket (right) | P244-2 |
| National Co. insignia | J791-4 |
| Rubber mounting foot (4) | K499-1 |
| S-Meter bracket | J970-2 |
| Band or Osc. control knob (2) | SA:7021 |
| cover hinge (2) | J825-2 |
| Cover stop angle (2) | K788-1 |
| Socket assembly for S-Meter lamp | K377-4 |
| Cabinet wraparound | SA:8663 |
| Cabinet back | SA:8664 |
| Cabinet cover | J701-8 |
| Cabinet bottom | SA:6588 |
| MECHANICAL PARTS USED ON RACK MODEL ONLY | |
| Front panel | SA:8716 |
| Blister for front panel | SA:6765 |
| Side plate (left) | P302-1 |
| Side plate (right) | P302-3 |
| National Co. insignia | J791-3 |
| Band control knob | SA:7470 |
| Osc. control knob | SA:7469 |
| Dust cover | SA:8717 |
| Thumb screw for dust cover (2) | L309-2 |

MODEL HRO-50-1

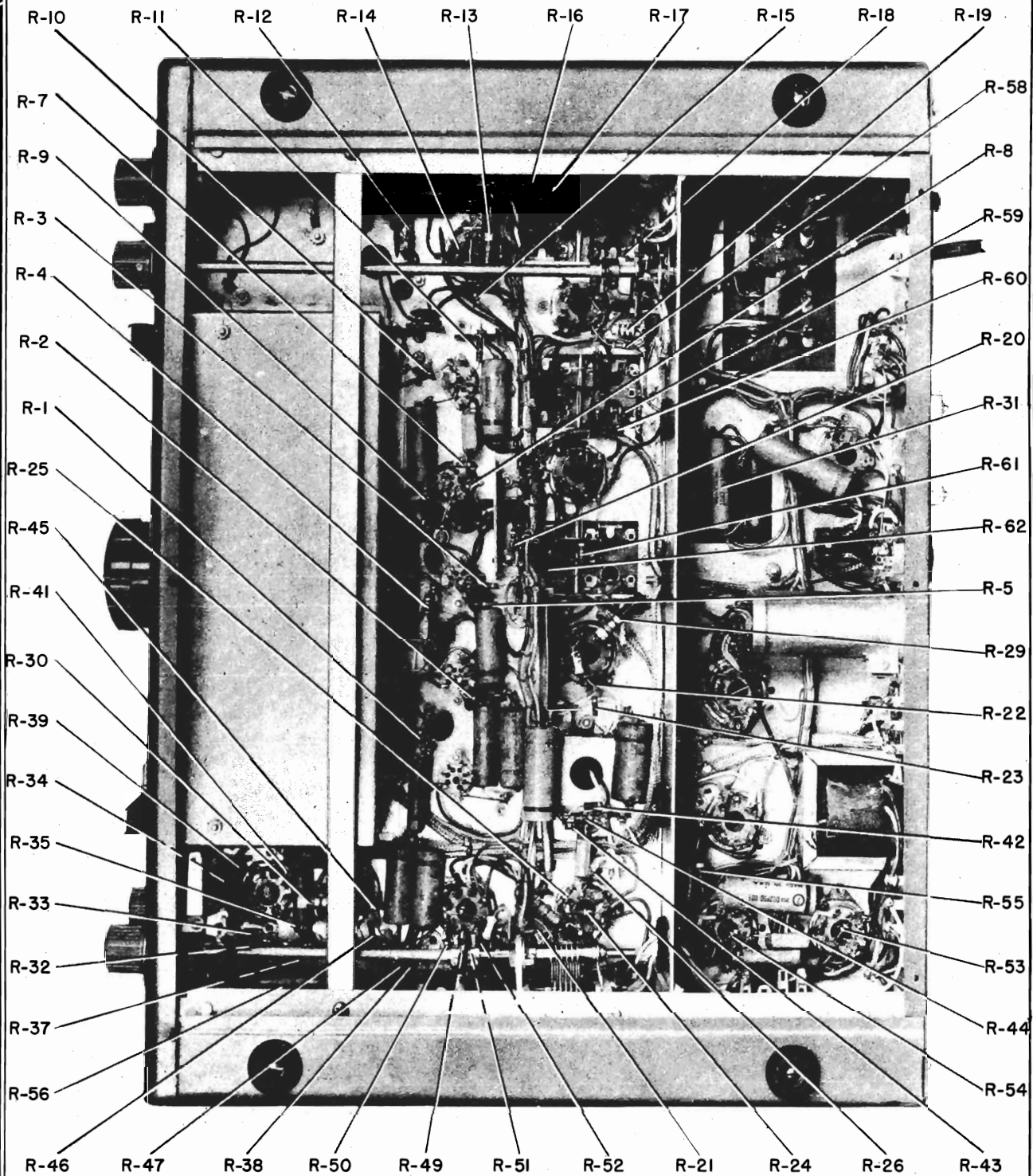


Figure No. 10A. Resistor Locations, Bottom View of Receiver

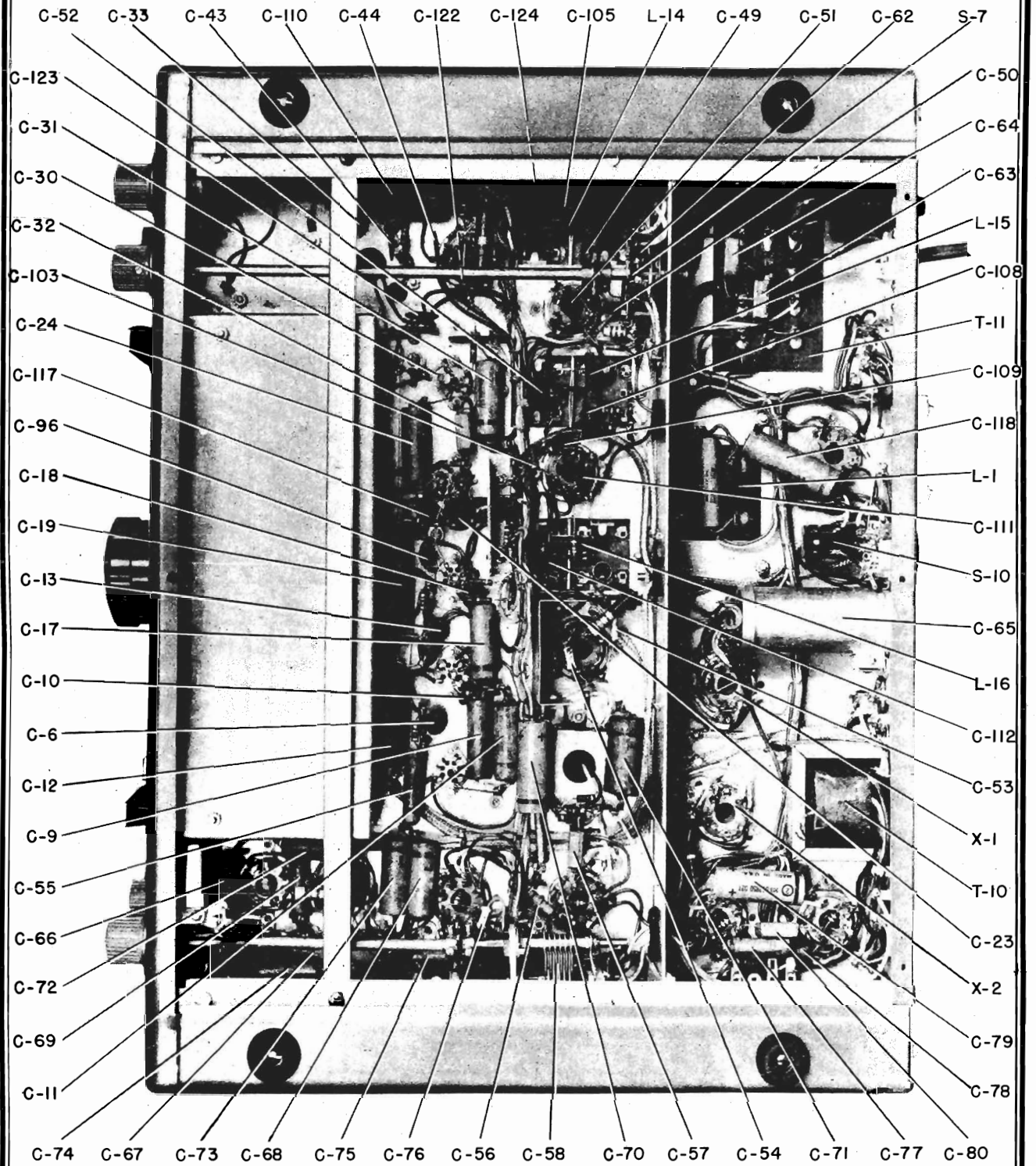


Figure No. 10B. Capacitor and Miscellaneous Component Locations, Bottom View of Receiver

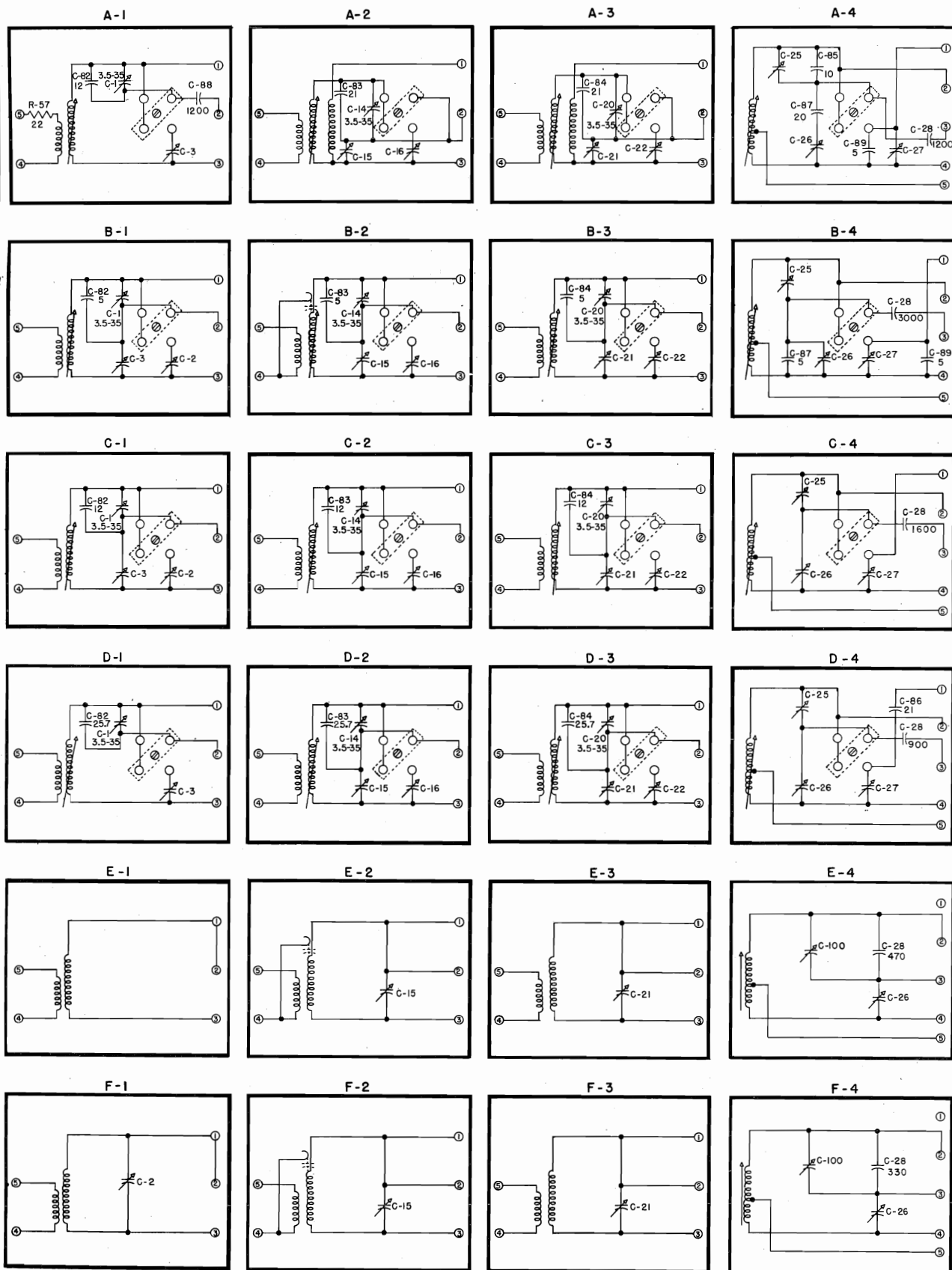


Figure No. 11. Schematic Diagrams, Coil Sets A, B, C, D, E and F

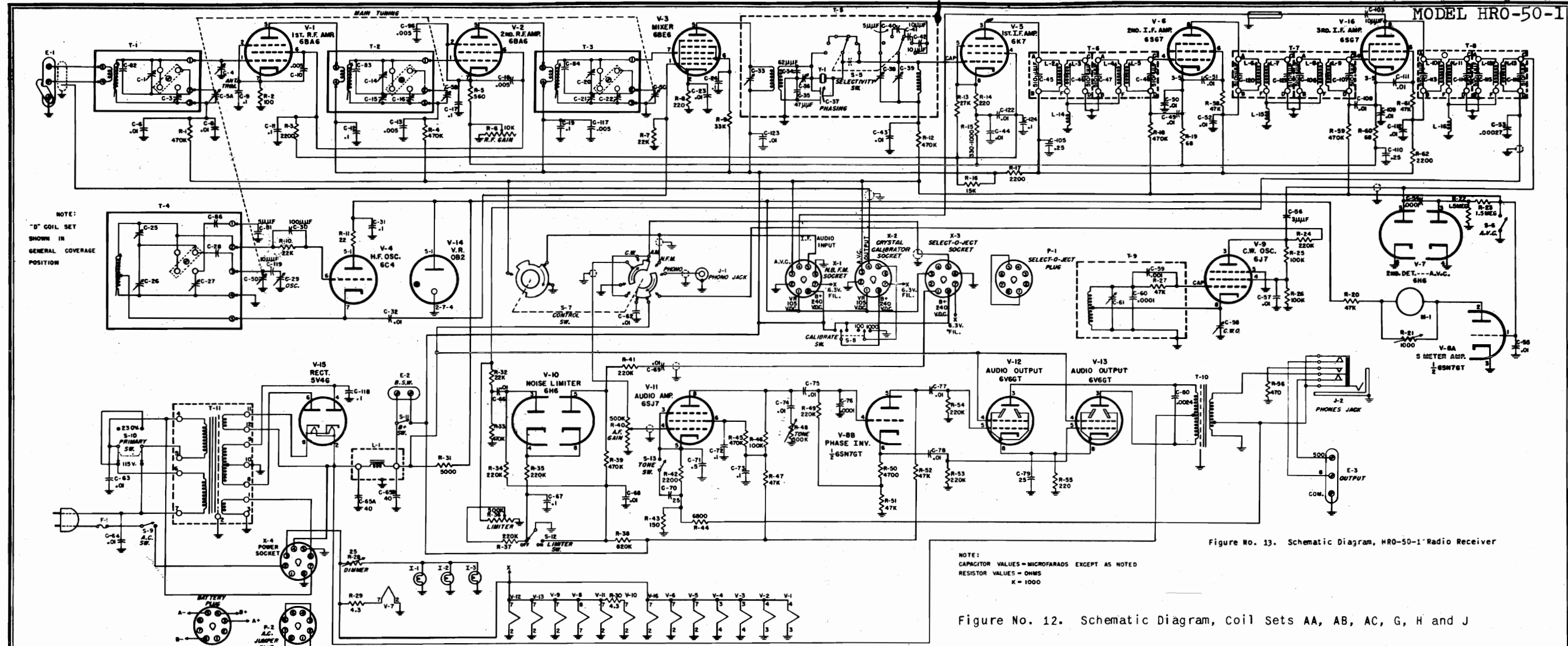
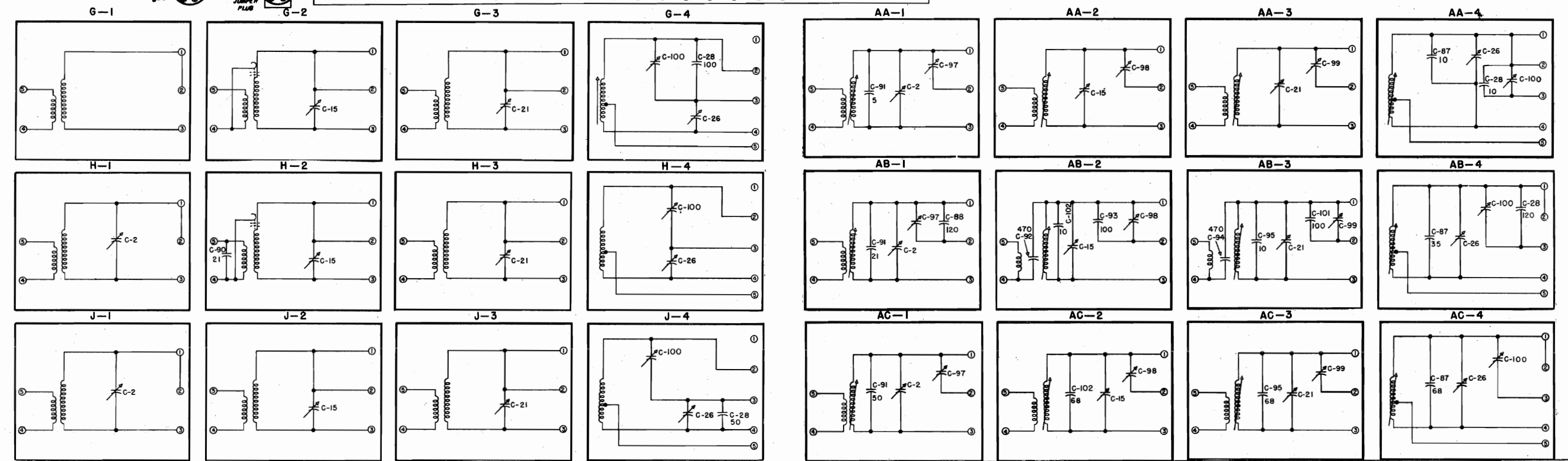


Figure No. 13. Schematic Diagram, HRO-50-1 Radio Receiver

Figure No. 12. Schematic Diagram, Coil Sets AA, AB, AC, G, H and J



INSTRUCTIONS
FOR THE
NATIONAL XCU-50-2
CRYSTAL CALIBRATOR UNIT

MODEL HRO-50-1

GENERAL

The type XCU-50-2 Crystal Calibrator Unit is designed expressly for use within the HRO-50 receiver. It utilizes an electron-coupled oscillator circuit controlled by a dual crystal (Valpey type DFS). This type of crystal provides two crystal-controlled marker frequencies of 100 kilocycles and 1 megacycle. When plugged into the Crystal Calibrator Socket, X-2, the XCU output is loosely coupled to the first R.F. amplifier input circuit. Selection of either the 100 kilocycle or 1000 kilocycle crystal-controlled signal is made possible by the front-panel mounted Calibrate switch on the receiver.

INSTALLATION

The XCU-50-2 calibrator is installed in the HRO-50-1 receiver by plugging the unit into the Crystal Calibrator Socket, X-2, on top of the chassis. A slotted-head screw mounted through the top of the unit is provided to bolt the unit to the chassis.

A trimmer capacitor, C-1, is connected across the crystal to permit adjustment of the frequency of the 100 kilocycle output marker when the unit is operated at locations where the temperature is vastly removed from that of normal room temperature. This capacitor should never require adjustment unless such abnormal temperatures are experienced. To make the adjustment proceed as follows:

- (1) Plug in a coil set suitable for the reception of WWV on one of the various frequencies utilized by this standard frequency station.
- (2) Adjust the receiver for normal A.M. operation as explained in Section 3-3.
- (3) Set the front-panel mounted Calibrate switch at the 100 kilocycle position.
- (4) Tune in the signal from WWV at a time when the signal is unmodulated.
- (5) Adjust the trimmer capacitor, C-1, located at the top of the calibrator unit so that the 100 kilocycle marker signal harmonic is zero beat with the signal received from WWV.

OPERATION

The XCU-50-2 Crystal Calibrator provides a means of checking the accuracy of the frequency calibration of the receiver. The front-panel mounted Calibrate switch marked 100-Off-1000 connects B-plus to the Calibrator for instantaneous service. At the same time this switch selects either the 100 or 1000 kilocycle marker signal. To check calibration accuracy tune in the desired marker signal with the Control switch set at C.W. and zero beat the receiver with the harmonic marker. If the micrometer dial and the slide-rule dial do not read accurately correction should be made by adjusting the front-panel mounted Osc. trimmer control. Only a slight adjustment of the Osc. trimmer control should be necessary. If calibration is way off the plug-in coil set probably requires re-alignment and reference should be made to Section 4.

PARTS LIST

| SYMBOL | FUNCTION | DESCRIPTION | NAT. CO. TYPE |
|--------|-------------------|-------------------------------|---------------|
| C-1 | 100 Kc. Tuning | Ceramic, variable, 6 -20 mmf. | E311-2 |
| C-2 | E+ Filter | Paper, .1 mfd. 400 vdcw | D827-12 |
| C-3 | Cathode by-pass | Paper, .1 mfd. 400 vdcw | D827-12 |
| C-4 | Output Coupling | Ceramic, 10 mmf. 500 vdcw | H872-1 |
| C-5 | Feedback | Ceramic, 3 mmf. 500 vdcw | J695-4 |
| L-1 | 100 Kc. inductor | 5 mh. type R-100 | SA:2608 |
| L-2 | 1000 Kc. inductor | .5 mh. type R-50 | SA:2514 |
| P-1 | Plug | Octal | K783-1 |
| R-1 | Grid | Fixed, 4.7 megohms, 1/2 W. | J569-69 |
| R-2 | Not Used | | |
| R-3 | Screen dropping | Fixed, 22,000 ohms, 1 W. | J571-41 |
| R-4 | Plate | Fixed, 470,000 ohms, 1 W. | J571-57 |
| V-1 | Oscillator tube | 6AK6 | |
| Y-1 | Crystal Resonator | Quartz, 100 - 1000 Kc. | Q560-1 |

MODEL HRO-50-1

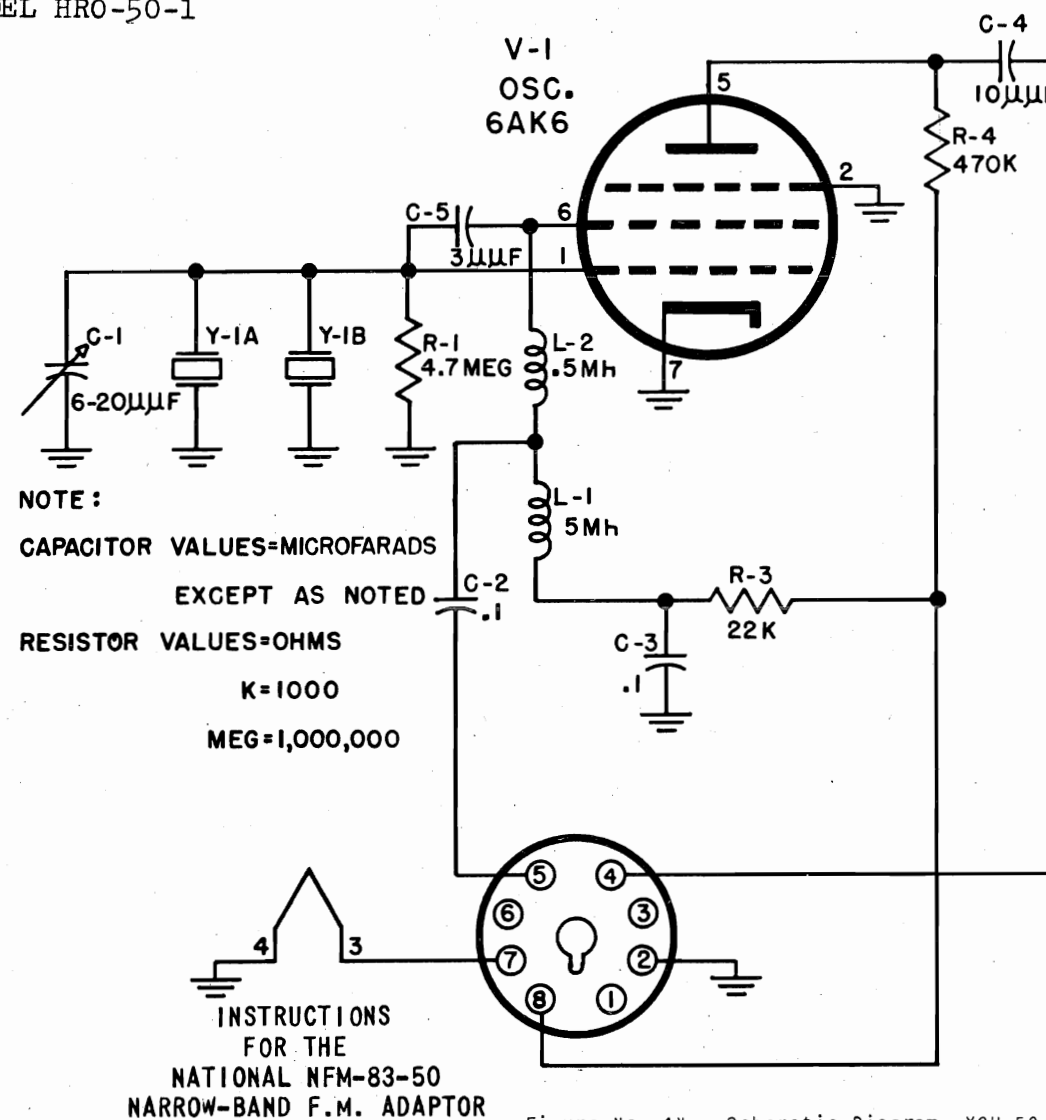


Figure No. 14. Schematic Diagram, XCU-50-2 Calibrator

INSTALLATION

The NFM-83-50 is installed in the HRO-50-1 receiver by plugging the adaptor unit into the N.B.F.M. Socket X-1 on the top of the chassis. A mounting bracket is furnished to hold the adaptor unit securely in position. The adaptor unit is aligned at National Company laboratories and realignment is not necessary.

ALIGNMENT

The NFM-83-50 is carefully aligned before shipment and no realignment is required unless the adaptor is accidentally misaligned. The necessity of realignment can be determined by the A.M. rejection capabilities of the adaptor unit. Proper alignment will be indicated when the maximum A.M. rejection occurs at the center of the A.M. carrier. Maximum S-meter reading will indicate the center of the carrier.

The equipment required for alignment is a high-impedance vacuum tube voltmeter and an A.M. signal generator. The signal generator used should have an output reasonably free of any frequency modulation. The use of a broadcast station as a signal source, in place of a signal generator, would provide a test signal meeting the above requirement. In any case, the signal strength of the test signal should be of the order to provide an S-meter reading of from 2 to 5 S-units when the HRO-50-1 is correctly tuned to the test signal.

The preliminary alignment procedure is as follows:

1. Connect the high-impedance voltmeter between the test point jack, J-1, and chassis. The polarity of the voltage will depend on the alignment of the adaptor, connect the voltmeter to obtain an up-scale reading.

2. Connect a signal source to the antenna terminals, A and A, at the rear of the HRO-50-1. If a signal generator is used make the connection through a 300 ohm dummy load and select a frequency in the standard broadcast band.
3. Set the Control switch at N.F.M.
4. Set the Selectivity switch at Off.
5. Set the Limiter control at Off.
6. Plug in the E coil set, 900 to 2,050 Kc. If this coil set is not available use the D coil set, 1.7 to 4.0 Mc.
7. Set the B plus switch at On.
8. Set the A.V.C.-Off switch at A.V.C.
9. Turn the R.F. Gain control to 10.
10. Adjust the A.F. Gain control for the desired volume.
11. Tune the test signal by adjustment of the Main Tuning knob. The correct tuning point is the setting that produces maximum S-meter reading.

Alignment is effected as follows:

1. Detune both primary, L-1, and secondary L-2, I.F. trimmers by rotating the screw adjustments until they are withdrawn from the shield can as far as possible. The adjustment with the dot of red paint opposite it is the primary trimmer L-1.
2. Tune the primary trimmer, L-1, for maximum reading on the voltmeter. If two peaks in output are observed, the correct peak will be the first one encountered when rotating the screw adjustment into the shield can.
3. Tune the secondary trimmer, L-2, for a zero reading on the voltmeter. It will be noted that there is a crossover in the polarity of the test voltage at this point.
4. Adjust the capacitor, C-9, for a null in the audio output. This capacitor is accessible after removal of the button plug on the side of the adaptor unit.
5. Adjustment of capacitor, C-9, may affect the zero voltage reading obtained by adjustment of the secondary trimmer, L-2. Retrim L-2 and C-9, as necessary, until both a zero voltage reading on the voltmeter and a null in the audio output are obtained.

PARTS LIST

| SYMBOL NO. | FUNCTION | DESCRIPTION | NAT. CO. TYPE |
|------------|-----------------------------|------------------------------|---------------|
| C-1 | I.F. Amp. Coupling | Ceramic, 10 Mmf, 500 vdcw | D825D-402 |
| C-2 | Input Divider | Ceramic, 38.5 Mmf, 500 vdcw | D825D-414 |
| C-3 | I.F. Amp. Cathode Bypass | Mica, 0.01 Mfd, 300 vdcw | J666-56 |
| C-4 | I.F. Amp. Screen Bypass | Mica, 0.001 Mfd, 300 vdcw | J665-71 |
| C-5 | T-1 Primary Tuning | Mica, 100 Mmf, 500 vdcw | H500-7 |
| C-6 | T-1 Secondary Tuning | Mica, 180 Mmf, 500 vdcw | H500-3 |
| C-7 | T-1 Secondary Tuning | Mica, 180 Mmf, 500 vdcw | H500-3 |
| C-8 | T-1 Secondary Tuning | Ceramic, 38 Mmf, 500 vdcw | D825D-424 |
| C-9 | T-1 Sec. Balance Adjustment | Ceramic, Variable, 7-35 Mmf. | E311-4 |
| C-10 | Disc. Cathode Filter | Elect. 1 Mfd, 450 vdcw | E338-10 |
| C-11 | B Supply Bypass | Mica, 0.01 Mfd, 300 vdcw | J666-56 |
| C-12 | R.F. Filter | Mica, 470 Mmf, 500 vdcw | J665-56 |
| C-13 | Audio Coupling | Mica, 0.01 Mfd, 300 vdcw | J666-56 |
| R-1 | I.F. Amp. Grid Leak | Fixed, 1 Megohm, 1/2 W. | K379-61 |
| R-2 | I.F. Amp. Cathode Bias | Fixed, 1,000 Ohms, 1/2 W. | K379-25 |
| R-3 | I.F. Amp. Screen Dropping | Fixed, 47,000 Ohms, 1/2 W. | K379-45 |
| R-4 | R.F. Filter | Fixed, 47,000 Ohms, 1/2 W. | K379-45 |
| R-5 | Diode Load | Fixed, 15,000 Ohms, 1/2 W. | K379-39 |
| R-6 | Diode Load | Fixed, 15,000 Ohms, 1/2 W. | K379-39 |
| R-7 | Decoupling | Fixed, 4,700 Ohms, 1/2 W. | J569-33 |
| J-1 | Test Point | Tip Jack, Bakelite | K421-1 |
| L-1 | T-1 Primary Inductor | Adjustable Iron-Core | SA:4892 |
| L-2 | T-1 Secondary Inductor | Adjustable Iron-Core | SA:4891 |
| P-1 | Adaptor Unit Plug | 8 Prong Octal | K783-1 |
| T-1 | Discriminator Transformer | Ratio Type 455 Kc. | SA:4890 |
| V-1 | I.F. Amplifier | 6SK7 | |
| V-2 | Discriminator | 6H6 | |

MODEL HRO-50-1

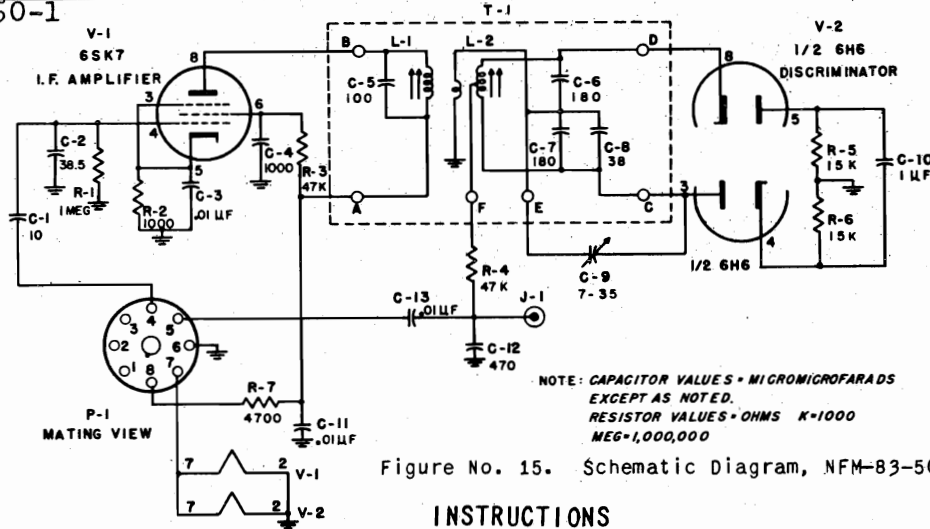


Figure No. 15. Schematic Diagram, NFM-83-50 Adaptor

INSTRUCTIONS FOR THE NATIONAL TYPE 650S VIBRATOR POWER SUPPLY

GENERAL

The National Type 650S Table Model Vibrator Power Unit has been designed to furnish complete operating voltages for the HRO-50-1 receiver. The unit operates from a 6-volt D.C. supply and provides approximately 150 volts D.C. at 70 milliamperes in normal operation. Output voltages for both A and B supply are available at a four prong socket for convenient connection to the Receiver.

The 650S consists of a vibrator unit utilizing an 0Z4A type rectifier tube and a vibrator in a circuit employing efficient R.F. filtering of vibrator hash. Further filtering of the low frequency or audio hum component in the output is accomplished by using the regular filter system in the receiver.

INSTALLATION

The 650S unit is supplied with a battery connecting cable as well as an interconnecting cable to facilitate connection to the receiver.

Battery clips are provided on the battery connecting cable W-1 for convenient connection to a 6-volt storage battery or similar source of power. The interconnecting cable W-2 is terminated at one end in a four-prong plug to mate with the socket X-1 of the 650S. The other end utilizes an octal plug to mate with the power socket X-1 at the rear of the HRO-50-1 receiver. The receiver A.C. jumper plug P-1 used for A.C. operation must be removed from the power socket. Figure Number 16 shows the Schematic Wiring Diagram.

The 650S Vibrapack Unit has been completely tested and adjusted at the factory to provide efficient and economical service when used with the HRO-50-1 receiver. An adjustment control switch has been furnished for increasing the B-plus output. This is a screw driver control available through an entry hole provided at the rear of the 650S. The control switch has four steps from approximately 150 volts of filtered D.C. at 70 milliamperes in the extreme counterclockwise position (step 1) to approximately 210 volts at 90 milliamperes in the fully clockwise position (step 4). It is recommended that the receiver be operated at the lower B voltage of step 1. The total battery drain is approximately 11 amperes when furnishing power to the receiver if the NFM-83-50, XCU-50-2 and SOJ-3 units are used. If the receiver is used without these accessories the total drain is approximately 9.5 amperes. The V.R. tube does not light under these conditions but the receiver will operate normally and operation from a storage battery becomes practical. In step 4 the V.R. tube will light and full receiver output will be obtained but the drain on the storage battery will be approximately 15.5 amperes when all accessories are utilized. Without these accessories the total receiver drain from the battery will be approximately 13.8 amperes.

The two intermediate control switch steps 2 and 3 should not be used as the voltage obtained is approximately the value required to fire the V.R. tube in the receiver. Under this condition the V.R. tube may fire on and off sporadically resulting in erratic operation of the receiver.

PARTS LIST

| SYMBOL | FUNCTION | DESCRIPTION | NAT. CO. TYPE |
|--------|-----------------------|---------------------------------------------------------------|---------------|
| C-1 | Filter Capacitor | Elec. 500 mfd. 15 vdcw | E338-7 |
| E-1 | Vibrapack Unit | 6 V.D.C. Mallory Type VP554 | Q371-1 |
| F-1 | Fuse | 20 Amperes 25 volts type 3 AG | F135-18 |
| L-1 | 6-volt Line Filter | 16 microhenries, iron core | SA:869 |
| S-1 | 6-volt Line Switch | Toggle S.P.S.T. | E230-2 |
| V-1 | Rectifier Tube | Type 0Z4A | |
| W-1 | 6-volt Line Connector | Two-Contact | SA:1999 |
| W-2 | Interconnecting Cable | One end terminated in four prong plug; other in an octal plug | |
| Y-1 | Vibrator | 6 V.D.C. Mallory Type 825C | |
| X-1 | Output Socket | Four Prong Female | E319-9 |

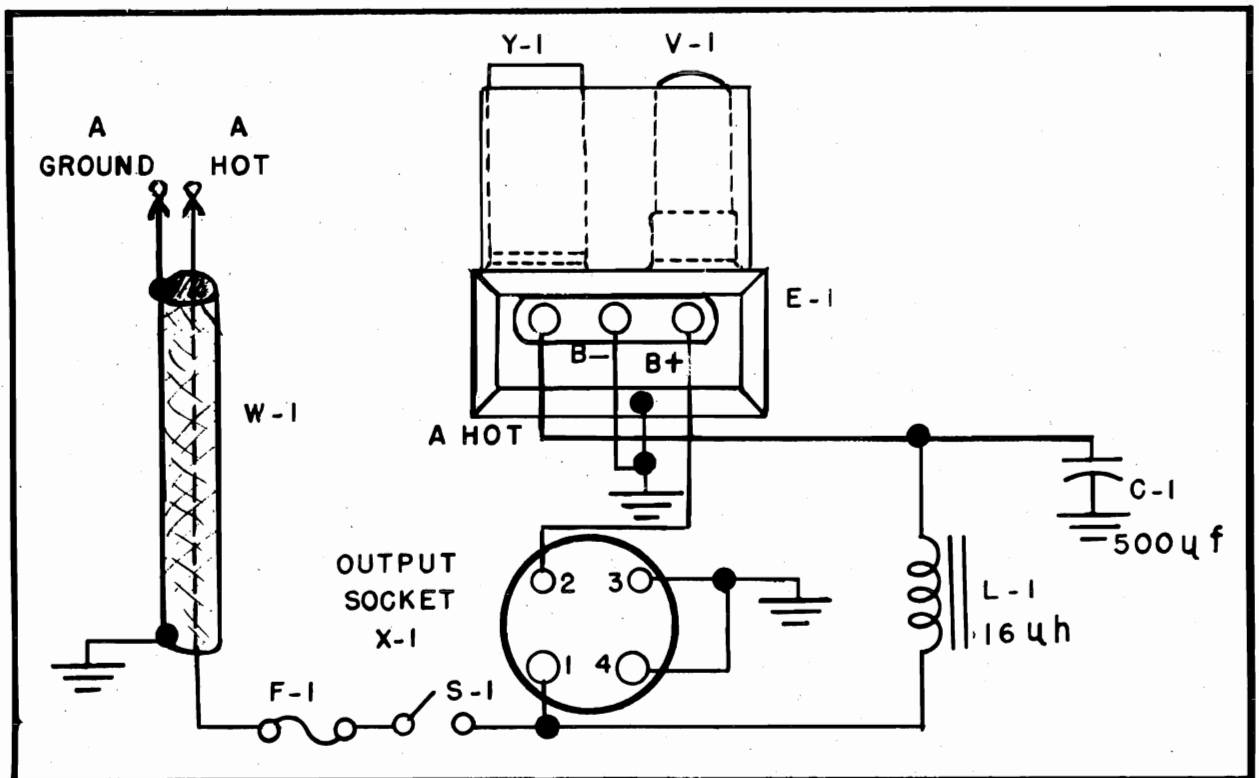


Figure No. 16. Schematic Diagram, 650S Vibrator Power Supply

1-1. INSTALLATION PROCEDURE

The SW-54 Receiver is designed to operate from a 105/130 volt, 50/60 cycle, A.C. source of supply or a 105/130 volt, D.C. source of supply. Normal power consumption is approximately 25 watts at 115 volts.

Installation of the SW-54 is accomplished as follows:

1. Connect the antenna as recommended in Section 1-2.
2. Connect a good external ground (radiator or water pipe) to the cabinet. A screw-type terminal is provided at the top center of the cabinet back to facilitate this connection. This connection, if used, serves two purposes:
 - a. Achieves a considerable reduction in noise interference in certain localities.
 - b. Eliminates the possibility of shock occurring if the operator makes bodily contact between the Receiver and ground.
3. Connect the power cable and plug to the proper source of supply i.e., 105/130 volts, 50/60 cycles, A.C. or 105/130 volts D.C. Proper polarity of the plug should be observed when connection is made to a power source although no damage to the Receiver will occur if the polarity is reversed. Reversed polarity will be evidenced as follows and is corrected by simply reversing the plug prongs in the power outlet.
 - a. D.C. Power Source — The Receiver will be inoperative, although the tubes and pilot lamp will light.
 - b. A.C. Power Source — A hum may be heard in the output of the Receiver.

Proper polarization of the plug will eliminate the possibility of shock occurring in installations where one side of the power line is grounded, if the operator should make bodily contact between the Receiver and ground.
4. Adjust controls as recommended in Section 2 for the reception of signals.

1-2. ANTENNA RECOMMENDATIONS

The antenna input circuit of the SW-54 is arranged for operation from either a single-wire type, doublet type or other types of antennas having impedances of 70 ohms or more. The input impedance of the antenna circuit is approximately 300 ohms.

The most practical antenna for use in installations where the Receiver is to be used over a wide range of frequencies is the single-wire type. An antenna length of from 50 to 75 feet is recommended although the length is not critical and any length from 25 to 75 feet may be used. If the Receiver is to be operated on one frequency or a narrow band of frequencies, best results will be obtained by the use of a tuned antenna, such as the folded doublet or half-wave dipole type, designed for the operating frequency.

The methods of connecting the various types of antennas to the antenna terminal strip at the rear of the Receiver are as follows:

1. Single-wire type — Connect the antenna to terminal A at the left of the strip and connect the metal link to the unused A terminal.
2. Doublet-type — Connect the antenna feeders to the two terminals marked A; the metal link is not used.
3. Concentric transmission line type — Connect the inner conductor to terminal A at the left of the strip and the outer conductor to the other A terminal. Connect the metal link to the center A terminal.

2-1. GENERAL DESCRIPTION

The SW-54 is an A.C./D.C. superheterodyne Receiver having a complement of four tubes plus a rectifier with a continuous frequency range of from 540 kilocycles to 30 megacycles. The Receiver is designed to provide reception of amplitude modulated voice or music and code telegraphy signals throughout its entire frequency range.

A stage outline of the circuit employed in the Receiver is given below together with the tube type associated with each stage.

| | |
|---------------------------------------|-------|
| Converter | 12BE6 |
| C.W. Osc. -- I.F. Amplifier (455 Kc.) | 12BA6 |
| Second Det. - A.V.C. - First Audio | 12AV6 |
| Audio Output | 50C5 |
| Rectifier | 35Z5 |

Two audio output circuits are provided in the SW-54:

1. The built-in loudspeaker is a permanent magnet type.
2. Phone tip jacks are mounted at the rear of the receiver to accommodate headphones. The headphones load impedance is not critical, permitting the use of various types of headphones including crystal types.

2-2. TUNING SYSTEM

The two-gang main tuning capacitor and four set of coils are used to cover the frequency range of the SW-54 in four tuning bands as shown on the following table. A bandsread tuning dial scale calibrated from 0 to 100 is provided to permit bandsread tuning of any portion of the frequency range of the receiver.

| BAND | FREQUENCY COVERAGE |
|------|--------------------|
| A | .54 to 1.6 mc. |
| B | 1.6 to 4.7 mc. |
| C | 4.6 to 14.5 mc. |
| D | 12 to 30 mc. |

The main dial has four scales accurately calibrated directly in megacycles. The respective scales are marked with heavy black scorings to clearly locate for the operator such short-wave features as the Amateur, Police, Foreign Broadcast and Ship bands. These locating markers are identified by letters AM, P, F and S respectively.

2-3. OPERATING INSTRUCTIONS

After the SW-54 has been installed as outlined in Section 1, it is placed in operation for voice

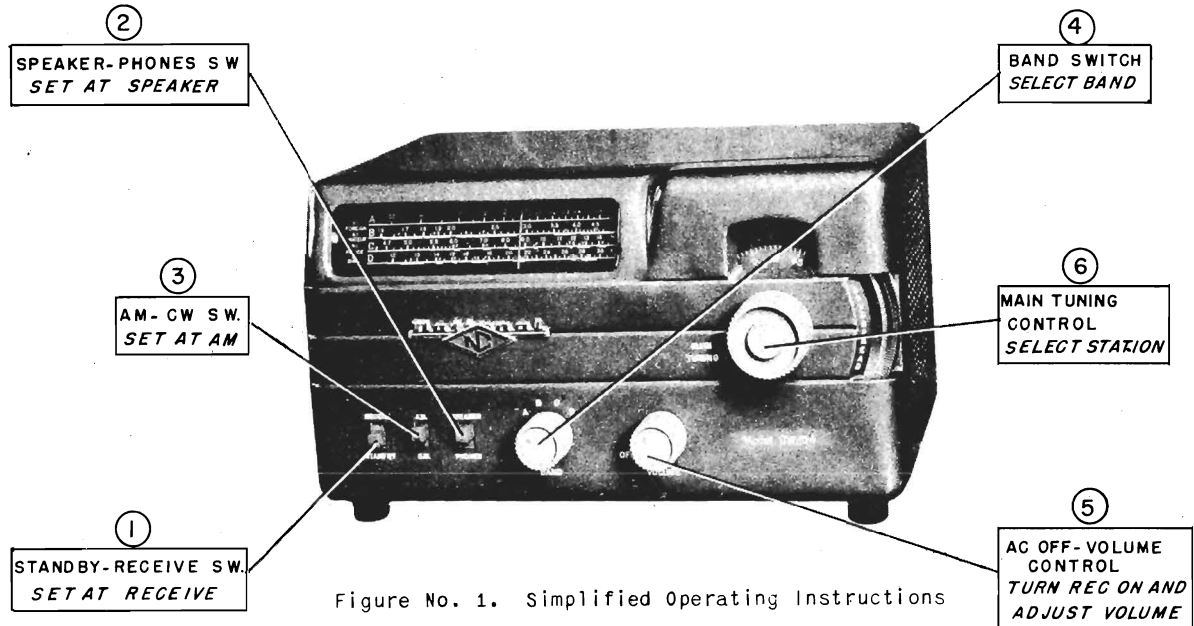


Figure No. 1. Simplified Operating Instructions

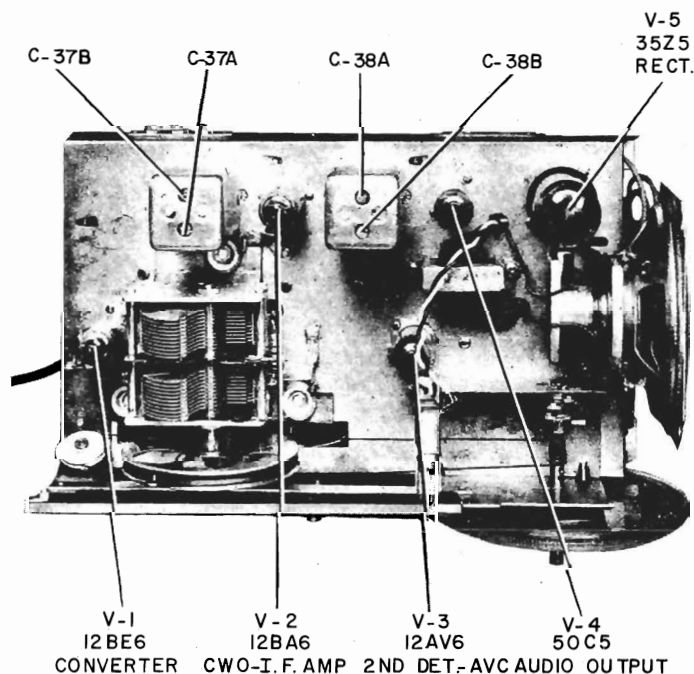
MODEL SW-54

or music reception by adjustment of the receiver controls. Figure No. 1 gives the step-by-step procedure to follow for the reception of signals. The same procedure is outlined below with a brief description of the function of each control.

1. Set the Standby-Receive switch at Receive. This switch, in the Standby position is used to quiet the Receiver for a period of time such as during a transmitting period, when it is desirable to resume reception immediately without waiting for the tubes to warm up.
2. Set the Speaker-Phones switch at Speaker. Should headphone operation be desired set the switch at Phones and connect headphones to the Phones jack located at the rear of the receiver.
3. Set the AM-CW switch at AM.
4. Set the Band switch at the band of frequencies to be tuned. The four positions of the Band switch select the proper set of coils to cover the frequency range of the four tuning bands of the SW-54. Each position is marked with a band letter designation which corresponds to the markings appearing on the main dial.
5. Turn the Volume control from the A.C. off position to the point providing the desired audio volume. In the A.C. Off position the SW-54 is turned off; advancing the control knob in a clockwise direction turns on the Receiver and increases the audio output volume to a maximum at the extreme clockwise position.
6. Set the main tuning dial pointer at the desired frequency. The main tuning control knob and dial scale are used to tune the entire frequency range of the Receiver and tunes at any one time the band of frequencies selected by the Band switch.
7. To utilize the advantages of bandspread (fine) tuning and logging provided by the SW-54 proceed as follows:
 - (a) Set the main tuning dial pointer at the Low frequency limit of the band of frequencies to be tuned.
 - (b) Hold the main tuning control knob (or the outer edge of the Bandspread dial) firmly enough to prevent the main tuning dial pointer from moving and set the bandspread dial at Zero by rotating the inner segment of the Bandspread dial.
 - (c) Bandspread tuning can now be accomplished by rotation of the entire Bandspread dial in a clockwise direction. Logging of stations is accomplished by noting the frequency setting of the main dial pointer and the numerical setting of the bandspread dial.

2-4. CODE TELEGRAPHY RECEPTION

The adjustment of the receiver controls for code reception is the same as that for voice and music except that the AM-CW switch must be set at CW.



NOTE: ALTERNATE IF TRANS. HAVE L-9 & L-11 AT BOTTOM OF CAN, L-10 & L-12 AT THE TOP.

Figure No. 2. Tube and Alignment Adjustment Locations

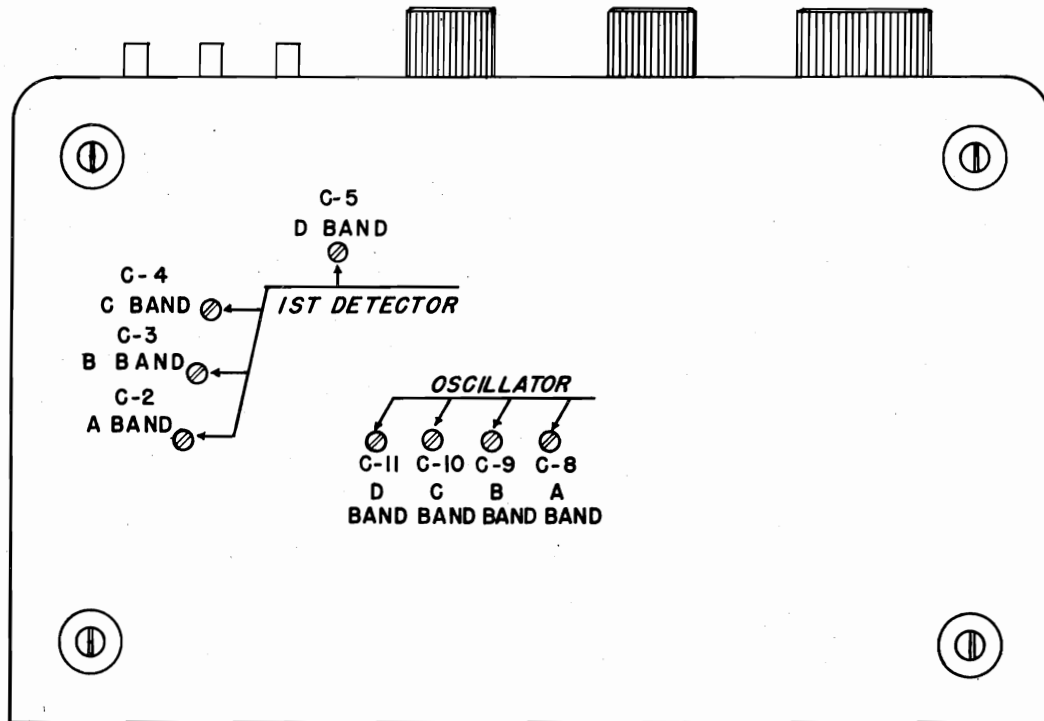
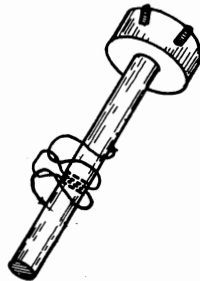
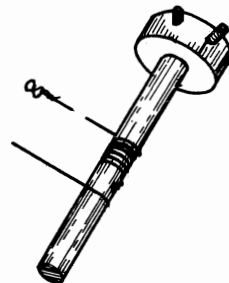


Figure No. 3. R.F. Alignment Trimmer Locations

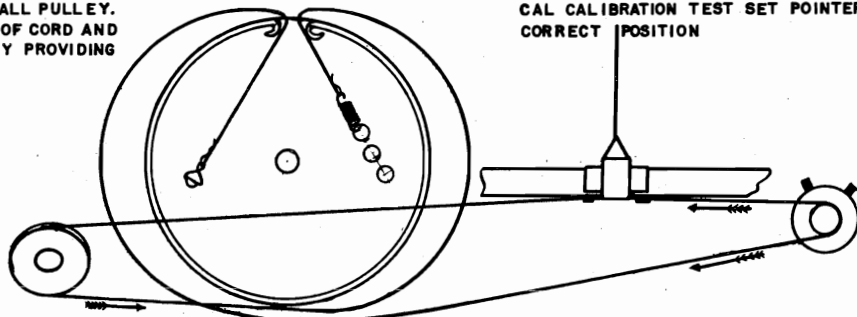
1 LENGTH OF CORD = 38" INCLUDING CLIP AT ONE END AND LOOP IN OTHER.
 MEASURE 16 3/4" FROM CLIP END AND MARK THIS POINT.
 LOOP CORD AT MARK AND PUSH THRU HOLE IN SHAFT.
 BRING ENDS OF CORD THRU LOOP AS SHOWN AND PULL TAUT KEEPING MARKED POINT OVER HOLE.



2a WIND CLIP END OF CORD 6 1/2 TURNS AROUND SHAFT AND WITH TUNING CAPACITOR AT MAXIMUM HOOK CLIP TO LARGE PULLEY.
 b TURN CAPACITOR TO MINIMUM ALLOWING OTHER END OF CORD TO WIND ITSELF AROUND SHAFT.



3 SET PULLEY AT POSITION SHOWN AND PASS CORD AROUND SMALL PULLEY.
 FASTEN SPRING TO END OF CORD AND CLIP TO HOLE IN PULLEY PROVIDING CORRECT TENSION.



4. ATTACH POINTER TO CORD AND BY ELECTRICAL CALIBRATION TEST SET POINTER AT CORRECT POSITION

Figure No. 4. Dial Stringing Instructions

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ALIGNMENT AND TEST INSTRUCTIONS

- Note: 1. An isolation transformer should be used wherever possible: If the transformer is not available, the set may be handled with safety if the following precautions are observed:
- a. Find out with an AC volt meter which side of power socket is at ground potential.
 - b. With receiver plug out of power socket, turn on power switch and with an ohmmeter find which tab of power cord is connected directly to the chassis through the volume control switch. Insert the cord into the power socket so that both grounds come together. When these precautions have been taken one may connect other grounds to receiver chassis without danger. If the power source is DC, the set will not operate unless proper polarity of the plug is observed.
2. A dummy antenna of 300 ohms is also needed. Alignment should not be made without this resistor.
 3. A blocking condenser .01 to .1 mfd. should be used. This condenser should be used in series with the hot lead of the signal source at all times. Having observed polarity of plug as under Note #1, the ground lead of the signal source may be connected directly to the chassis.
- I Check tuning condenser and dial pointer setting--
- a. Rotate tuning dial fully counter-clockwise against stop.
 - b. Look at tuning condenser. The rotor should be fully meshed. This is very, very important. This is your reference, and will avoid tracking and calibration troubles. When we say fully meshed, we do not mean 1/2 of a degree or one degree, but that the plates be flush.
 - c. To set the condenser rotate dial fully counter-clockwise. Loosen the two set screws on dial shaft. Hold the collar, which has the two set screws, against the stop. Turn dial until tuning condenser hits its stop. Tighten set screws.
 - d. Set the pointer over the first calibration mark on band "B".
- II Connect the power to the receiver.
- III Connect headphones and output meter to output jack.
- IV Connect the 300 ohm dummy to hot antenna terminal.
- V Put band change switch in the "A" position.
- VI Set dial to 1000 kc.
- VII Set signal to 455 kc \pm 1 kc.
Caution: Do not depend on the accuracy of your signal generator, unless you know it is good.
- VIII Connect the signal source to the top contact on the front switch wafer (flue lead). This is the mixer grid connection with the band change switch at "A".
- IX Adjust L9, 10, 11 and 12 or C-37A C37B, C38A and C38B for maximum output. The maximum input required for 50 mw output should not be over 75 micro-volts. The minimum may run as low as 10 micro-volts. If the set is stable-10 micro-volts will be all right. A normal set will require 25 micro-volts. Use approximately 100 micro-volts input when making IF adjustments. The IF alignment is now complete.
- X Set the frequency at the high end of band "A" with condenser C-8 (osc.) Adjust det. trimmer C-2 for maximum gain. Check calibration at the low end of band. 600 kc should fall within \pm 10 kc.
Note: A chart is being supplied which will show calibration and alignment points for each band. This chart will also show tolerances on calibration.
- XI Set the band change switch at "B". Set the frequency at the high end of the band. Peak mixer trimmer while rocking the dial for maximum output. Check the calibration at the low end of the band.

XII Repeat Operation XI for band "C" (Band switch at "C".)

XIII Set band switch at "D". Set the frequency at the high end of the band. Peak the mixer trimmer on signal for maximum output while rocking the dial. Check the frequency at the low end of band. On Band "D", adjust loop in det. coil at 14 mc for maximum gain.

Check chart below for calibration and alignment points.

| Band | Set | Peak Det. Trimmer at | Check Cal. at Tol. | Check Tracking at |
|------|----------|----------------------|--------------------|-------------------|
| "A" | 1.5 mc. | 1.5 mc. | .6 mc±10kc. | .6 mc. |
| "B" | 4.0 mc. | 3.8 mc. | 2.0 mc 20kc. | 1.8 mc. |
| "C" | 14.0 mc. | 13.5 mc. | 5.0 mc±60kc. | 5.5 mc. |
| "D" | 28.0 mc. | 29.0 mc. | 14.0 mc±150kc. | 13.5 mc. |

The above tolerances apply to the whole band.

SELECTIVITY

Input: 100 micro-volts
Output: level 10 milliwatts

| | | |
|-------|----------|----------------------------|
| 6 db | 3.4 kc. | |
| 20 db | 14.0 kc. | |
| 40 db | 28.2 kc. | |
| 60 db | 49.5 kc. | AVC at 2 MC 300 ohm dummy- |

Measurement taken here to avoid noise pick-up.

| | | | | |
|----------------|-----|------|---|-------|
| 10 micro-volts | = | 0 db | = | 1 mw. |
| 100 | - " | - | + | 15 |
| 1000 | - " | - | + | 20 |
| 10000 | - " | - | + | 24 |
| 100000 | - " | - | + | 28.0 |

Overall distortion at 1 MC

Maximum power 1.8 watts

30% mod. 1000 CPS

Overall fidelity at 2 mc.

| | | | |
|-----------|-----|----------|-------|
| 100 mw. | 2 % | 100 | -11.0 |
| 200 | 2.2 | 200 | - 5.0 |
| 300 | 2.6 | 400 cp.s | 0 db |
| 500 | 2.8 | 1000 | + 2.0 |
| .7 | 3.5 | 2000 | - 2.0 |
| .8 | 4.2 | 3000 | - 6.5 |
| 1.0 | 6.5 | 4000 | -12.5 |
| 1.5 watts | 10+ | 5000 | -18.0 |

GAIN Dial set at 1000 kc.

| Location | Frequency | Input | Output |
|-------------|-----------|-----------|--------|
| Mixer Grid | 455 kc. | 26 uv | 50 mw |
| IF Grid | 455 kc. | 3000 uv | 50 mw |
| First Audio | 400 cps | .5 volts | 50 mw |
| Last Audio | 400 cps | 1.8 volts | 50 mw |

Audio response from first audio grid.

| | | |
|-----------------------------|-------|-------|
| Input constant at .4 volts. | 100 | -12.0 |
| | 200 | - 5.5 |
| | 400 | 0 |
| | 1000 | + 1.8 |
| | 2000 | + 1.0 |
| | 3000 | - .75 |
| | 4000 | - 3.5 |
| | 5000 | - 6.5 |
| | 10000 | -19.0 |

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HUM

As measured on 4 ohms with Ballantine volt meter
 IF grid grounded
 Audio gain off 1.8 micro-watts
 Audio gain full 1.8 micro-watts
 Line cord reversed 1.8 micro-watts

OVERALL GAIN, S/N RATIO, AND IMAGE RATIO

| FREQ. MC. | GAIN FOR 50 MW | 10 DB SIG/NOISE 300 OHMS | 10 DB SIG/NOISE NO. DUMMY | IMAGE DB | 50 MW DIRECT | OSC. VOLTS |
|-----------------|-------------------|--------------------------------|---------------------------------|-------------|-----------------|---------------|
| <u>BAND "A"</u> | | | | | | |
| .6 | 21.5 uv | 18 uv | 18 uv | 43 | 22 | 6.6 |
| 1.0 | 11 | 10 | 10 | 42 | 16.5 | 9.0 |
| 1.5 | 15 | 10 | 10 | 35 | 19 | 9.6 |
| <u>BAND "B"</u> | | | | | | |
| 1.7 | 11 | 11 | 3.1 | 30 | 5.5 | 4.2 |
| 2.5 | 6 | 6 | 2.8 | 32 | 2.8 | 6.2 |
| 4.0 | 7.2 | 7.7 | 4.5 | 20 | 4.0 | 7.2 |
| <u>BAND "C"</u> | | | | | | |
| 5.0 | 14.0 | 13 | 4.5 | 22 | 5.5 | 2.6 |
| 8.0 | 9.4 | 7.0 | 2.4 | 16.0 | 4.5 | 3.6 |
| 14.0 | 4.0 | 4.0 | 3.8 | 18.0 | 3.0 | 2.2 |
| <u>BAND "D"</u> | | | | | | |
| 15 | 28.0 | 28.0 | 8.5 | 8.0 | 13.5 | 2.4 |
| 20 | 10 | 10 | 8.5 | 12.0 | 6.5 | 2.6 |
| 29 | 4.5 | 4.5 | 4.0 | 6.0 | 6.0 | 1.6 |

SOCKET VOLTAGES

Meter - High impedance D.C. 100 ohms per volt A.C.

All measurements to ground
 Bandswitch at "A"
 No signal
 Dial at 1000 kc.
 Audio gain turned down.

| Tube | Pin #1 | Pin #2 | Pin #3 | Pin #4 | Pin #5 | Pin #6 | Pin #7 |
|-------|--------|--------|--------|--------|--------|--------|--------|
| 12BE6 | 9 DC | .6AC | 11AC | 22 AC | 98 DC | 98 DC | .3 DC |
| 12BA6 | .3DC | 0 AC | 22AC | 35 AC | 35 AC | 105 DC | 1.1 DC |
| 12AV6 | .9DC | 0 | 11AC | 0 | .45DC | .45DC | 72 DC |
| 50C5 | 7.0DC | 0 | 80AC | 35 AC | 0 | 100 DC | 120 DC |
| 35Z5 | 100 DC | 115 AC | 110AC | 0 | 110 AC | 125 DC | 80 AC |

RESISTANCE MEASUREMENTS TAKEN TO CHASSIS (POWER REMOVED).

| Tube | Pin #1 | Pin #2 | Pin #3 | Pin #4 | Pin #5 | Pin #6 | Pin #7 | Pin #8 |
|-------|----------|--------|--------|--------------|--------|--------|--------|--------|
| 12BE6 | 22K | .2 | 11 | 22 | 20K | 20K | 3 meg | |
| 12BA6 | 2.5 meg. | 0 | 20 | 30 | 20K | 20K | 100 | |
| 12VA6 | 10 meg. | 0 | 11 | 0 | .5 meg | .5 meg | 260K | |
| 50C5 | 150 | .5 meg | 100 | 40 | .5 meg | .5 meg | 20K | |
| 35Z5 | 22K | 120 | 120 | Open Cir. | 120 | 120 | 85 | 20K |

Primary-output trans. 100 ohms
 Secondary .2 ohms

RESISTANCE OF RF COILS

| | | | |
|-------------------|-----------|-------------------|-----------|
| A Det. Coil Sec. | 3.5 ohms | A Det. Coil Prim | 29.5 ohms |
| B Det. Coil Sec. | .83 " | B Det. Coil Prim. | .93 " |
| C Det. Coil Sec. | .05 " | C Det. Coil Prim | .93 " |
| | | | |
| A Osc. Coil Total | 2.34 ohms | | |
| cold end to trap | .35 ohms | | |
| B Osc. Coil Total | 1.01 ohms | | |
| C Osc. Coil Total | .06 ohms | | |
| D Osc. Coil Total | .04 ohms | | |

Caution: Be sure that no part of the metal frame of the speaker touches the chassis.

Never substitute 10% condensers for the 5% as called for on the parts list. These 5% condensers are used as padders and are C-12, C-13 and 4...470 mmfd ...1000 mmfd and 3000 mmfd.

Length of wires on tuning condenser should not be changed.

SOME TROUBLES AND FAULTY PARTS WHICH COULD BE THE CAUSE

Mushy audio and loud hum.

Defective condenser C-29C or C-29D.

Off signal, audio not mushy on signal.

Be sure the shield on the 12AV6 tube V-3 is properly seated.

Hum modulation in broadcast band.

Try replacing C-33.

Hum modulation in the higher frequency bands-check C-32.

C-39 may be defective.

Oscillation in the IF stage.

C-36 defective

C-35 defective

CW switch does not ground the feed back wire with the CW off.

Plate and grid leads should be down near the chassis.

Pin #2 and center shield on the socket not grounded.

Shorted cathode resistor.

Poor sensitivity at low end of band "B" with almost normal gain at the high end of the band.

C-1 may be open.

Poor sensitivity on all bands and trimmers C-2, 3 and 4 do not peak properly.

C-6 open.

High frequency oscillator does not work at some spot in one of the bands.

Poor contact on shorting rotor on band change switch.

PARTS LIST

| Symbol No. | Description | Nat. Co. Type | | |
|------------|-----------------------------------|---------------|-------|-----------------------------------|
| CAPACITORS | | | | |
| C-1 | Paper .01 mfd 400 vdcw | D827-5 | C-7 | Ceramic 10 mmf 500 vdcw D827D-426 |
| C-2 | Variable mica 2.2-40 mmf 500 vdcw | D832-5 | C-8 | Variable mica 2.2-40 mmf D832-5 |
| C-3 | Variable mica 2.2-40 mmf | D832-5 | C-9 | Variable mica 2.2-40 mmf D832-5 |
| C-4 | Variable mica 2.2-40 mmf | D832-5 | C-10 | Variable mica 2.2-40 mmf D832-5 |
| C-5 | Variable mica 2.2-40 mmf | D832-5 | C-11 | Variable mica 2.2-40 mmf D832-5 |
| C-6 | Paper .02 mfd 200 vdcw | D827-51 | C-12 | Mica 470 mmf 500 vdcw J665-55 |
| | | | C-13 | Mica 1000 mmf 300 vdcw J665-70 |
| | | | C-14 | Mica 3000 mmf 500 vdcw J666-30 |
| | | | C-15 | Ceramic 21 mmf 500 vdcw D825D-410 |
| | | | C-16 | 2 section variable K577-2 |
| | | | C-16A | 12 to 441.7 mmf Part of C-16 |

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| | | |
|-------|----------------------------|--------------|
| C-16B | 12 to 441.7 mmf | Part of C-16 |
| C-17 | Ceramic 3 mmf | J695-4 |
| C-18 | Ceramic 100 mmf | J695-6 |
| C-19 | 87 mmf | Part of T-1 |
| C-20 | 87 mmf | Part of T-1 |
| C-21 | Paper .01 mfd 400 vdcw | D827-5 |
| C-22 | 110 mmf | Part of T-2 |
| C-23 | 110 mmf | Part of T-2 |
| C-24 | 110 mmf | Part of T-2 |
| C-25 | 110 mmf | Part of T-2 |
| C-26 | Paper .005 mmf 200 vdcw | D827-50 |
| C-27 | Paper .005 mmf 200 vdcw | D827-50 |
| C-28 | Mica 4700 mmf 500 vdcw | J665-56 |
| C-29 | 4 section dry electrolytic | Q252-1 |
| C-29A | 5 mfd | Part of C-29 |
| C-29B | 40 mfd | Part of C-29 |
| C-29C | 40 mfd | Part of C-29 |
| C-29D | 60 mfd | Part of C-29 |
| C-30 | Paper .02 mfd 600 vdcw | D827-44 |
| C-31 | Paper .02 mfd 200 vdcw | D827-51 |
| C-32 | Mica 470 mmf 500 vdcw | J665-56 |
| C-33 | Paper .1 mfd 400 vdcw | D827-12 |
| C-34 | Paper .02 mfd 600 vdcw | D827-44 |
| C-35 | Paper .02 mfd 200 vdcw | D827-51 |
| C-36 | Paper .25 mfd 200 vdcw | D827-15 |
| C-37 | Variable ceramic 2 section | Part of T-1* |
| C-37A | 35-150 mmf | Part of C-37 |
| C-37B | 35-150 mmf | Part of C-37 |
| C-38 | Variable ceramic 2 section | Part of T-2* |
| C-38A | 35-150 mmf | Part of C-38 |
| C-38B | 35-150 mmf | Part of C-38 |

RESISTORS

| | | |
|------|--------------------------------|---------|
| R-1 | Fixed 470,000 ohms 1/2 watt | J569-57 |
| R-2 | Fixed 47 ohms 1/2 watt | J569-9 |
| R-3 | Fixed 47 ohms 1/2 watt | J569-9 |
| R-4 | Fixed 100 ohms 1/2 watt | J569-13 |
| R-5 | Fixed 47,000 ohms 1/2 watt | J569-45 |
| R-6 | Variable 500,000 ohms w/switch | K347-6 |
| R-7 | Fixed 2,200,000 ohms 1/2 watt | J569-65 |
| R-8 | Fixed 10,000,000 ohms 1/2 watt | J569-73 |
| R-9 | Fixed 220,000 ohms 1/2 watt | J569-53 |
| R-10 | Fixed 470,000 ohms 1/2 watt | J569-57 |
| R-11 | Fixed 150 ohms 1/2 watt | J569-15 |
| R-12 | Fixed 15,000 ohms 1 watt | J571-39 |
| R-13 | Fixed 220 ohms 1/2 watt | J569-5 |
| R-14 | Fixed 22 ohms 1/2 watt | J569-22 |
| R-15 | Fixed 1000 ohms 1 watt | J571-25 |
| R-16 | Fixed 330 ohms 1/2 watt | J569-19 |
| R-17 | Fixed 22,000 ohms 1/2 watt | J569-41 |

*Alternate IF Trans.

MISCELLANEOUS

| | | |
|-----|-----------------------------------|--------|
| E-1 | Antenna terminal board 3 terminal | E261-3 |
|-----|-----------------------------------|--------|

| | | |
|------|--------------------------------------------------------------------------------|-------------|
| E-2 | Terminal board, speaker output, 2 terminal | E264-1 |
| I-1 | Lamp, #47 bayonet type 6-8 v 15 amps | F136-11 |
| L-1 | Inductor, detector "A" coil air core | SA:7971 |
| L-2 | Inductor, detector "B", "C" and "D" coils air core | SA:7973 |
| L-2A | | Part of L-2 |
| L-2B | | Part of L-2 |
| L-2C | | Part of L-2 |
| L-3 | Inductor, oscillator "A", "B", "C" and "D" coils air core | SA:7981 |
| L-3A | | Part of L-3 |
| L-3B | | Part of L-3 |
| L-3C | | Part of L-3 |
| L-3D | | Part of L-3 |
| L-4 | Inductor, variable, iron core tuning | Part of T-1 |
| L-5 | Inductor, variable, iron core tuning | Part of T-1 |
| L-6 | Inductor, variable iron core | Part of T-2 |
| L-7 | Inductor, variable iron core | Part of T-2 |
| LS-1 | Loudspeaker, 4" PM | Q374-1 |
| S-1 | Switch, band selector, 2 pole 4 pos | SA:7972 |
| S-1A | | Part of S-1 |
| S-1B | | Part of S-1 |
| S-2 | Switch, CW-AM, 2 pole 3 pos | SA:7977 |
| S-3 | Switch, standby, 2 pole 3 pos | SA:7978 |
| S-4 | Switch, phone, 2 pole 3 pos | SA:7976 |
| S-5 | Switch, on off, spst | Part of R-6 |
| T-1 | Transformer, IF, 455 Kc., shielded | Q242-1 |
| T-1* | Transformer, IF, 455 Kc., shielded | Q243-1 |
| T-2 | Transformer, IF, 455 Kc., shielded | Q242-2 |
| T-2* | Transformer, IF, 455 Kc., shielded | Q243-2 |
| T-3 | Transformer: speaker matching, primary 2500 ohms secondary 3.2 ohms, iron core | K588-2 |
| V-1 | Tube, converter, 12BE6 | |
| V-2 | Tube, pentode, 12BA6 | |
| V-3 | Tube, duo diode triode, 12AV6 | |
| V-4 | Tube, beam power amplifier, 50C5 | |
| V-5 | Tube, full wave rectifier, 35Z5 | |
| Z-1 | Filter, one 47,000 ohm resistor and two 100 mmf. capacitors | Q262-1 |

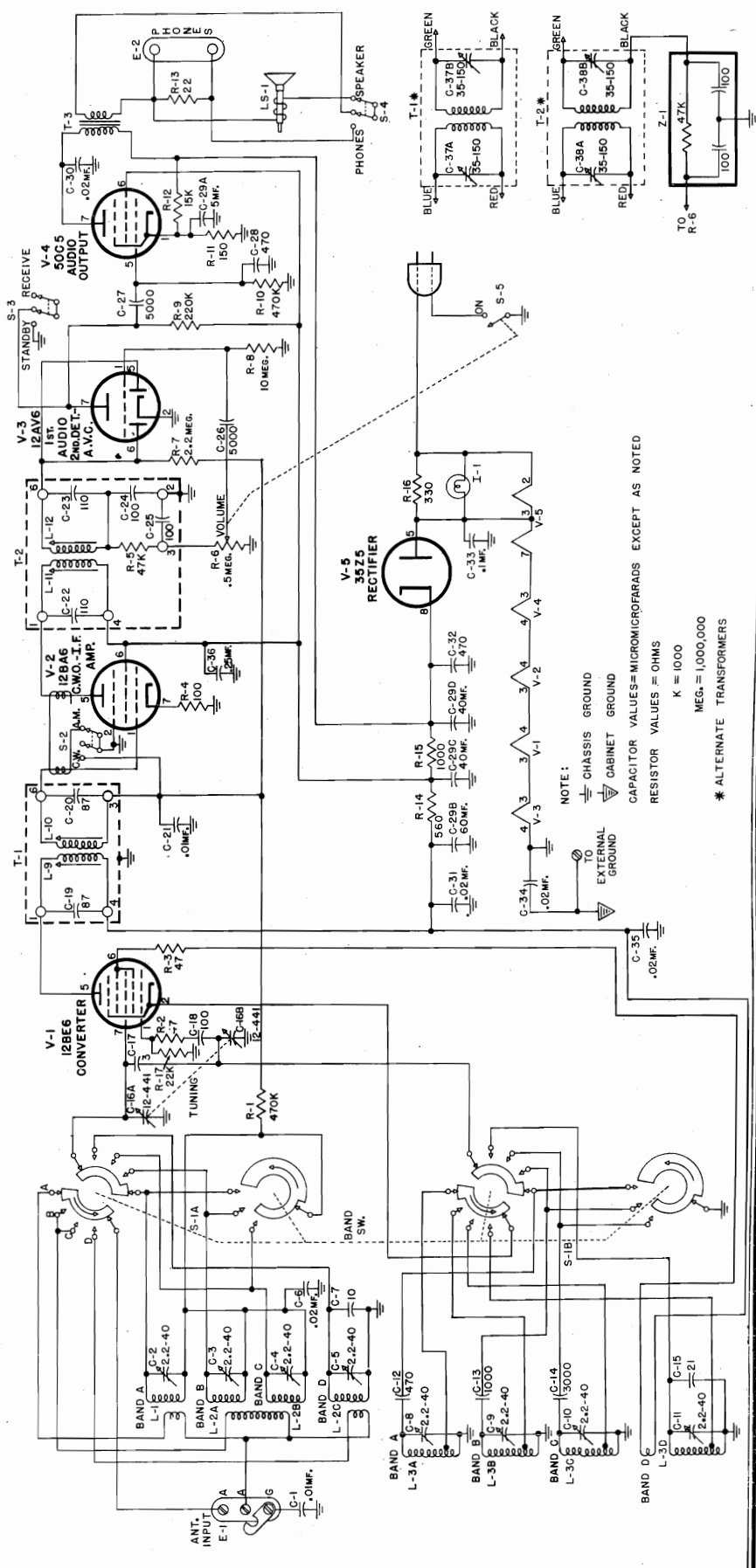
*Alternate IF Trans.

MECHANICAL PARTS

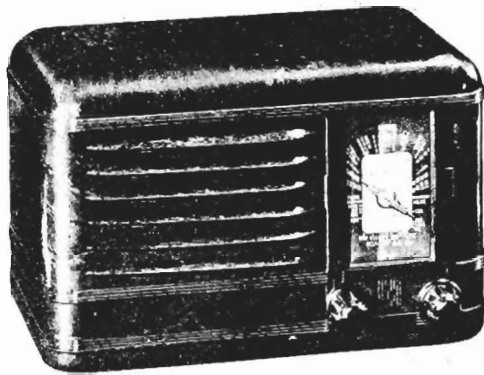
| | |
|-----------------------------------------------|---------|
| Bracket, main support | Q228-1 |
| Bracket, to mount coil (2) | Q249-1 |
| Bracket, pulley support | SA:7969 |
| Bumper, rubber: chassis insulator | Q258-1 |
| Cabinet | SA:7979 |
| Channel, rubber | Q255-1 |
| Chassis, metal wraparound less all components | Q227-1 |
| Clip for miniature tube | K925-1 |
| Collar for dial shaft | D637-4 |

| | |
|------------------------------|-----------|
| Cord, AC Line | Q241-1 |
| Cord, dial | SA:7975 |
| Cover, bottom of cabinet | Q224-1 |
| Cover, rear of cabinet | Q223-1 |
| Foot (4) | Q237-1 |
| Knob, large | SA:5692-2 |
| Knob, small (2) | SA:7984 |
| Pad, rubber | Q254-1 |
| Plate, for switch | Q235-1 |
| Pointer, dial scale | Q240-1 |
| Rail, for pointer | Q234-1 |
| Ring, retaining (dial shaft) | P491-3 |
| Scale, slide rule type | Q233-1 |

| | |
|----------------------------------|---------|
| Shaft, dial | SA:7974 |
| Shield, for miniature tube | K924-1 |
| Socket, for dial light | J721-2 |
| Socket, miniature 7 pin (4) | K926-2 |
| Socket, octal type | Q236-1 |
| Strap, for speaker mounting | Q235-1 |
| Washer, stop, for dial shaft | P149-2 |
| Washer, stop, for dial shaft (6) | P149-1 |
| Window for the slide rule scale | Q225-1 |



NOTE:
 TO CHASSIS GROUND
 TO EXTERNAL GROUND
 CHASSIS GROUND
 CABINET GROUND
 CAPACITOR VALUES = MICROMICROFARADS EXCEPT AS NOTED
 RESISTOR VALUES = OHMS
 K = 1000
 MEG. = 1,000,000
 * ALTERNATE TRANSFORMERS



SPECIFICATIONS

OVERALL DIMENSIONS:

Height 6"
 Width 10-1/8"
 Depth 5-5/8"
 Shipping Weight 6 Lbs.

ELECTRICAL RATING:

Line Voltage 110-120 volts AC-DC
 Power Consumption 28 watts @ 115 volts

TUNING FREQUENCY RANGE:

540 to 1620 KC

INTERMEDIATE FREQUENCY:

455 KC

ELECTRICAL POWER OUTPUT:

1.75 watts (maximum)

LOUDSPEAKER:

Type Permanent Magnet
 Outside Cone Diameter 4"
 Voice Coil Impedance 3.2 ohms @ 400 C.P.S.
 Magnet Rating68 Oz. Alnico V

TUBES:

| NO. | TUBE | FUNCTION |
|-------|---------|------------------------|
| V-1 | 12SA7 | Frequency Converter |
| V-2 | 12SK7 | I-F Amplifier |
| V-3 | 12SQ7 | 2nd Detector—1st Audio |
| * V-4 | 50L6-GT | Power Amplifier |
| V-5 | 35Z5-GT | Rectifier |

* V-4 in a few late sets is a 50C5.

GENERAL INFORMATION

Model 100-A is a superheterodyne receiver employing four tubes plus one rectifier. It is for operation on AC or DC current and is housed in a plastic table model cabinet of walnut, ivory, or maroon design.

SPECIAL SERVICE INFORMATION

STAGE GAIN MEASUREMENTS:

Measurements taken with Volume Control maximum and A.V.C. shorted out.

Standard Output—50 milliwatts

Dummy Antenna—200 Mmf.

Converter Grid to 1st I-F Grid 71X at 1000 KC

Converter Grid to 1st I-F Grid 78X at 455 KC

1st I-F Grid to 2nd Detector 77X at 455 KC

Overall Audio Gain 20 milliwatts in for 50 milliwatts out.

D.C. RESISTANCE MEASUREMENTS:

1st I-F Coil:

Primary 17.5 ohms

Secondary 17.5 ohms

2nd I-F Coil:

Primary 14.5 ohms

Secondary 14.5 ohms

Oscillator Coil:

Primary 1.2 ohms

Secondary 4.5 ohms

Due to the variation of winding methods, the D.C. resistance measurements shown are subject to a 20% tolerance.

OSCILLATOR CATHODE VOLTAGES:

The following voltages were measured at 117 volts AC line with an A.C. vacuum tube voltmeter input loading above 10 megohms.

| | |
|-------------------|---------|
| 1500 KC | 2.3 VAC |
| 1000 KC | 2.0 VAC |
| 600 KC | 2.6 VAC |

ALIGNMENT PROCEDURE

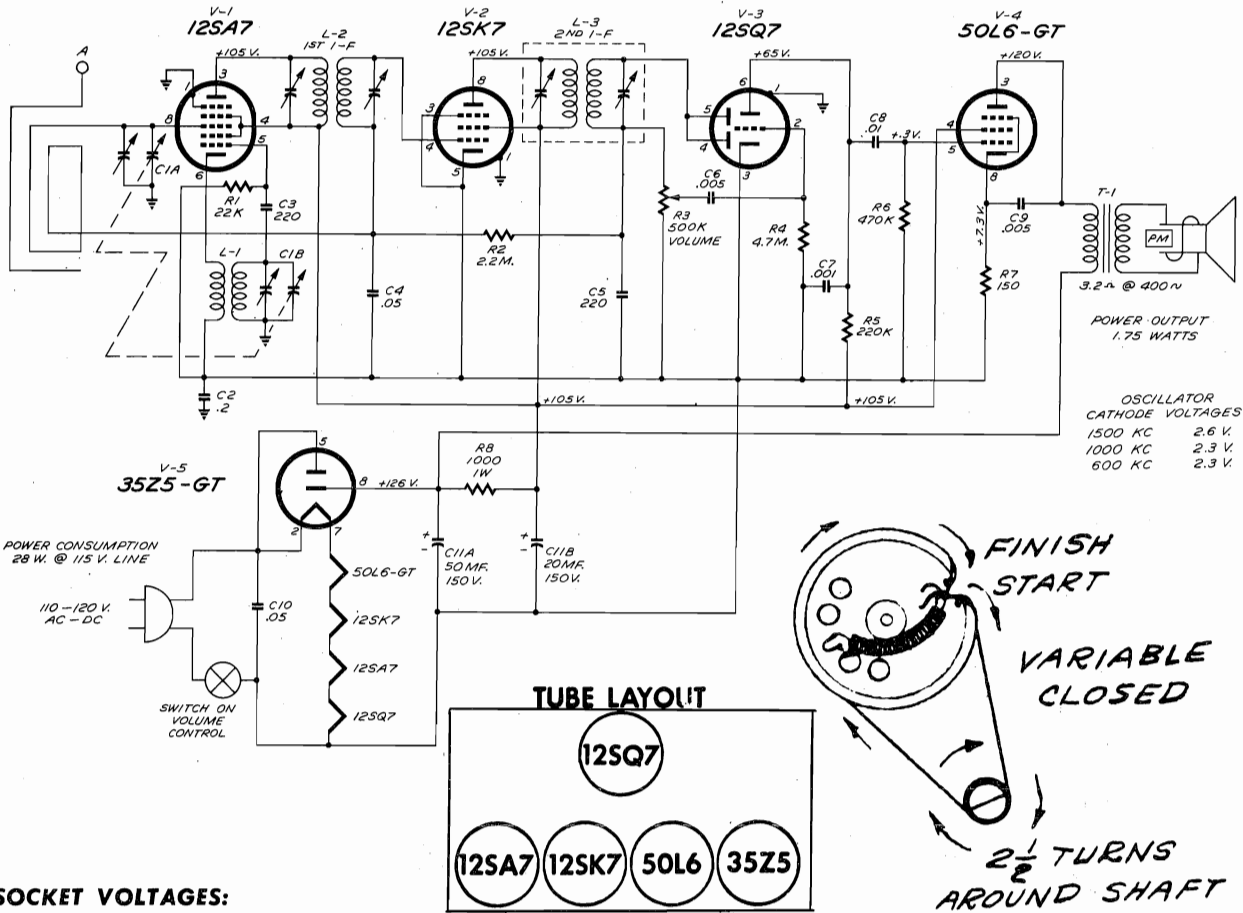
Alignment Procedure consists of the steps outlined in the Alignment Chart. Make certain each step is done with a minimum input signal.

Connect output meter to speaker voice coil.

ALIGNMENT CHART

| STEP | CONNECT TEST OSC. TO | TEST OSC. SETTING | POINTER SETTING | ADJUST FOR MAX. OUTPUT |
|------|-------------------------------------------------------------------------|-------------------|-----------------|------------------------|
| 1 | Mixer Grid & Ground | 455 KC | 540 KC | Trimmers A, B, C, & D |
| 2 | R-F Grid & Ground | 1500 KC | 1500 KC | Trimmer E |
| 3 | R-F Grid & Ground | 1500 KC | 1500 KC | Trimmer F |
| 4 | REPEAT STEPS 2 & 3 | | | |
| 5 | Check Stationizing. Adjust pointer so that all stations tune correctly. | | | |

MODEL 100-A

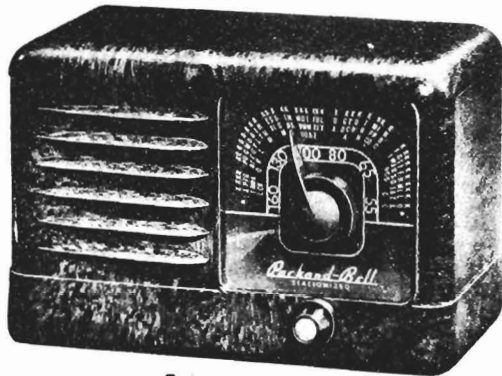


SOCKET VOLTAGES:

The socket voltages shown in the schematic diagram were measured as follows:
 D.C. voltages measured with a vacuum tube voltmeter . . . A.C. voltages measured with a 1,000 ohms per volt A.C. meter
 . . . all voltages shown are positive D.C. and were measured from socket contacts to negative buss unless otherwise specified.

TABLE OF REPLACEABLE PARTS

| REF. SYMBOL | DESCRIPTION | PB PART NO. | REF. SYMBOL | DESCRIPTION | PB PART NO. |
|---------------------------------|-----------------------------|-------------|----------------------------------|--------------------------|-------------|
| CAPACITOR, TUBULAR, | | | RESISTORS, 1/2 WATT, 20%, | | |
| C-7 | .001 Mfd. 600 volt | 23001 | R-5 | 220,000 ohms | 73153 |
| C-6, 9 | .005 Mfd. 600 volt | 23004 | R-6 | 470,000 ohms | 73157 |
| C-4, 10 | .05 Mfd. 200 volt | 23017 | R-2 | 2.2 megohms | 73165 |
| C-2 | .2 Mfd. 200 volt | 23018 | R-4 | 4.7 megohms | 73169 |
| C-8 | .01 Mfd. 600 volt | 23022 | RESISTORS, 1 WATT, 10%, | | |
| CAPACITOR, VARIABLE, | | | R-8 | 1,000 ohms | 73225 |
| C-1A & B | Two Gang | 23523E | TRANSFORMER, | | |
| CAPACITOR, CERAMIC, | | | T-1 | Output, 2500 to 3.2 ohms | 89417 |
| C-3, 5 | 220 Mmf. 20% GP | 23915 | MISC. PARTS, | | |
| CAPACITOR, ELECTROLYTIC, | | | Cabinet (specify color) | | |
| C-11A & B | 50-20 Mfd. 150 volt | 24041 | A.C. Cord | | |
| CONTROL, | | | Dial, Stationized | | |
| R-3 | Volume, 500K w/AC Switch | 25014 | Handle (specify color) | | |
| COILS, | | | Knobs (specify color) | | |
| L-2 | 1st I-F, 455 KC | 29045 | Dial Crystal | | |
| L-3 | 2nd I-F, 455 KC | 29046 | Back Panel (loop Mtg.) | | |
| L-1 | Oscillator | 29220 | Dial Pointer | | |
| | Loop | 29331 | Tube Socket, Std. Octal | | |
| RESISTOR, 1/2 WATT, 10%, | | | Tube Socket, 7 Pin miniature | | |
| R-7 | 150 ohms | 73015 | "(50C5) | | |
| R-1 | 22,000 ohms | 73041 | Speaker, 4" PM | | |



SPECIFICATIONS

OVERALL DIMENSIONS:

Height 6-7/16"
 Width 10-1/8"
 Depth 5-5/8"
 Shipping Weight 8 Lbs.

ELECTRICAL RATING:

Line Voltage 110-120 volts AC-DC
 Power Consumption28 watts @ 115 volts

TUNING FREQUENCY RANGE:

540 to 1620 KC

INTERMEDIATE FREQUENCY:

455 KC

ELECTRICAL POWER OUTPUT:

1.75 watts (Maximum)

LOUDSPEAKER:

Type Permanent Magnet
 Outside Cone Diameter 4"
 Voice Coil Impedance 3.2 ohms @ 400 C.P.S.
 Magnet Rating68 Oz. Alnico V

TUBES:

| NO. | TUBE | FUNCTION |
|-----|---------|------------------------|
| V-1 | 12SA7 | Frequency Converter |
| V-2 | 12SK7 | I-F Amplifier |
| V-3 | 12SQ7 | 2nd Detector—1st Audio |
| V-4 | 50L6-GT | Power Amplifier |
| V-5 | 35Z5-GT | Rectifier |

ALIGNMENT PROCEDURE

Alignment procedure consists of the steps outlined in the Alignment Chart. Make certain each step is done with a minimum input signal.

Connect output meter to speaker voice coil.

ALIGNMENT CHART

| STEP | CONNECT TEST OSC. TO | TEST OSC. SETTING | POINTER SETTING | ADJUST FOR MAX. OUTPUT |
|------|-------------------------------------------------------------------------|-------------------|-----------------|----------------------------|
| 1 | Mixer Grid & Ground | 455 KC | 540 KC | A, B, C & D (I-F Trimmers) |
| 2 | R-F Grid & Ground | 1500 KC | 1500 KC | E (Osc. Trimmer) |
| 3 | R-F Grid & Ground | 1500 KC | 1500 KC | F (Ant. Trimmer) |
| 4 | REPEAT STEPS 2 & 3 | | | |
| 5 | Check Stationizing. Adjust pointer so that all stations tune correctly. | | | |

GENERAL INFORMATION

Model 501 is a superheterodyne receiver employing four tubes plus one rectifier. It is for operation on AC or DC current and is housed in a plastic table model cabinet of walnut, ivory or maroon design.

SPECIAL SERVICE INFORMATION

STAGE GAIN MEASUREMENTS:

Measurements taken with Volume and Tone Controls maximum and A.V.C. shorted out.
 Standard Output—50 milliwatts
 Dummy Antenna—200 Mmf.
 Converter Grid to 1st I-F Grid 71X at 1000 KC
 Converter Grid to 1st I-F Grid 78X at 455 KC
 1st I-F Grid to 2nd Detector 77X at 455 KC
 Overall Audio Gain 20 millivolts in for 50 milliwatts out.

D.C. RESISTANCE MEASUREMENTS:

1st I-F Coil:
 Primary 17.5 ohms
 Secondary 17.5 ohms
2nd I-F Coil:
 Primary 14.5 ohms
 Secondary 14.5 ohms

Oscillator Coil:
 Primary 1.2 ohms
 Secondary 4.5 ohms

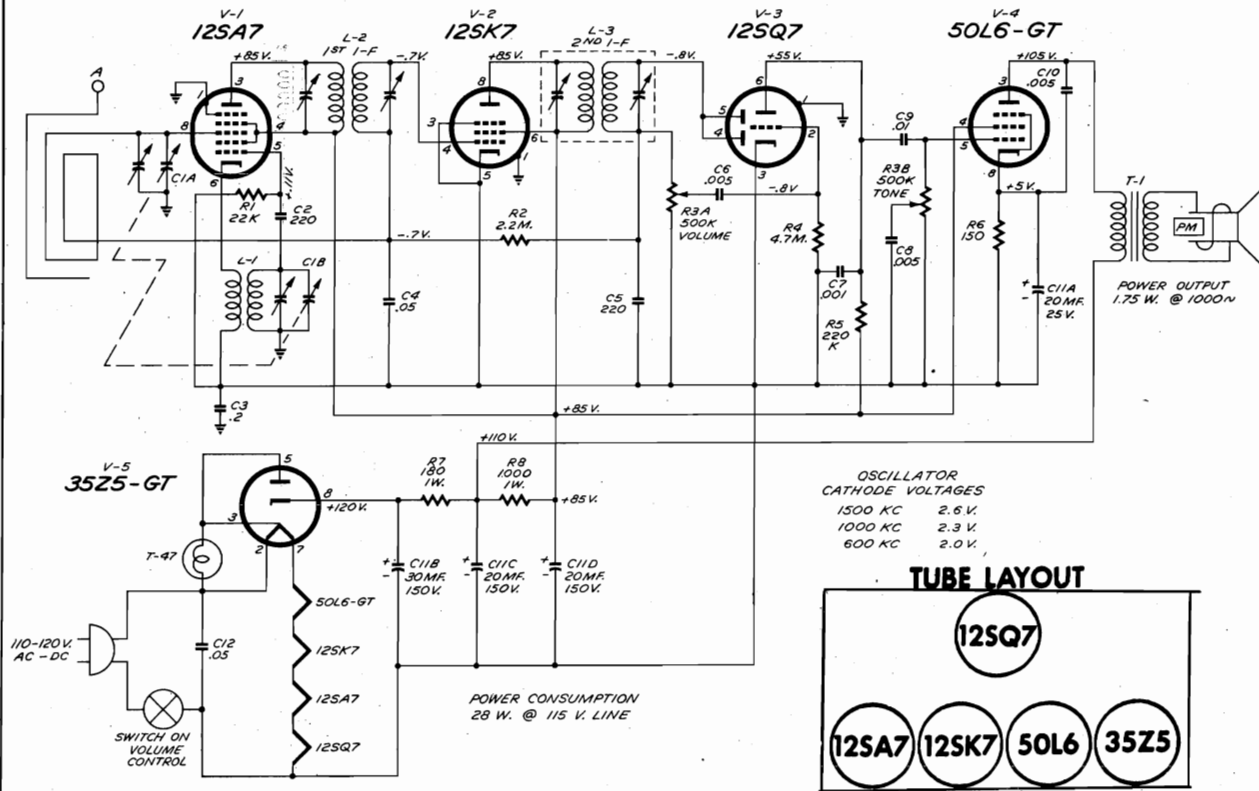
Due to the variation of winding methods, the D.C. resistance measurements shown are subject to a 20% variation.

OSCILLATOR CATHODE VOLTAGES:

The following voltages were measured at 117 volt AC line with an A.C. vacuum tube voltmeter input loading above 10 megohms.

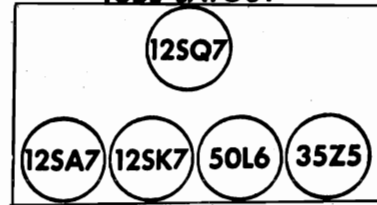
| | |
|-------------------|---------|
| 1500 KC | 2.6 VAC |
| 1000 KC | 2.3 VAC |
| 600 KC | 2.0 VAC |

MODEL 501



OSCILLATOR
CATHODE VOLTAGES
1500 KC 2.6 V.
1000 KC 2.3 V.
600 KC 2.0 V.

TUBE LAYOUT



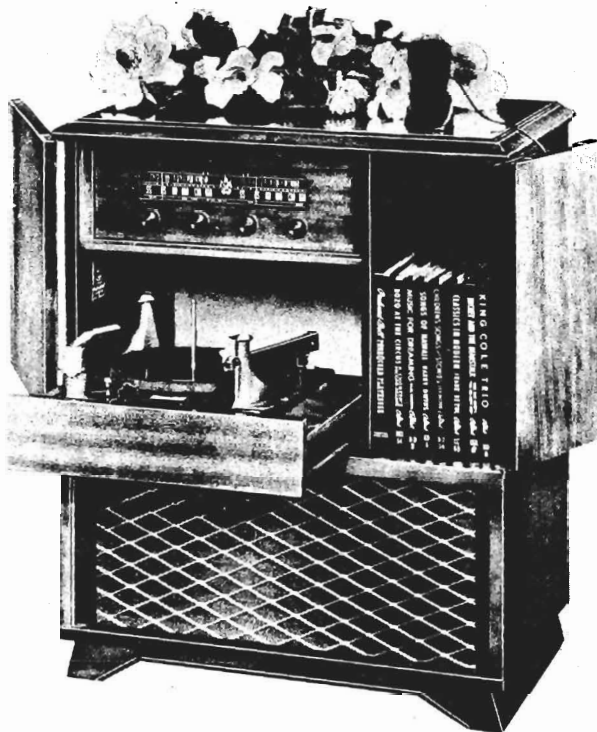
SOCKET VOLTAGES:

The socket voltages shown on the schematic diagram were measured as follows:

D.C. voltages measured with a vacuum tube voltmeter . . . A.C. voltages measured with a 1,000 ohms per volt A.C. meter . . . all voltages shown are positive D.C. and were measured from socket contacts to negative buss unless otherwise specified.

TABLE OF REPLACEABLE PARTS

| REF. SYMBOL | DESCRIPTION | PB PART NO. | REF. SYMBOL | DESCRIPTION | PB PART NO. |
|----------------------------------|----------------------------------------|-------------|----------------------------------|--------------------------|-------------|
| CAPACITORS, TUBULAR, | | | RESISTORS, 1/2 WATT, 20%, | | |
| C-7 | .001 Mfd. 600 volt | 23001 | R-5 | 220,000 ohms | 73153 |
| C-6, 10 | .005 Mfd. 600 volt | 23004 | R-2 | 2.2 megohms | 73165 |
| C-4, 12 | .05 Mfd. 200 volt | 23017 | R-4 | 4.7 megohms | 73169 |
| C-3 | .2 Mfd. 200 volt | 23018 | RESISTORS, 1 WATT, 10%, | | |
| C-9 | .01 Mfd. 600 volt | 23023 | R-7 | 180 ohms | 73216 |
| CAPACITORS, VARIABLE, | | | R-8 | 1,000 ohms | 73225 |
| C-1A & B | 2 gang | 23528 | TRANSFORMERS, | | |
| CAPACITORS, ELECTROLYTIC, | | | T-1 | Output, 2500 to 3.2 ohms | 89417 |
| C-2, 5 | 220 Mmf. 20% GP | 23915 | MISC. PARTS, | | |
| C-8 | .005 Mfd. Hy-Kap | 23931 | Cabinet (specify color) | | |
| CAPACITOR, ELECTROLYTIC, | | | A.C. Cord, 6' | | |
| C-11A, B, C, D, | 30/20/20-150; 20/25 | 24034B | Dial, Stationized | | |
| CONTROLS, | | | Handle (specify color) | | |
| R-3A & B | Dual w/AC Switch—Volume—500K Tone-500K | 25024 | Dial Lamp—T-47 | | |
| COILS, | | | Back Panel (Loop Mtg.) | | |
| L-2 | 1st I-F, 455 KC | 29045 | Speaker, 4" PM | | |
| L-3 | 2nd I-F, 455 KC | 29046 | KNOBS, | | |
| L-1 | Oscillator | 29220 | Tuning (specify color) | | |
| | Loop | 29331 | Tone (specify color) | | |
| RESISTORS, 1/2 WATT, 10%, | | | Volume (specify color) | | |
| R-6 | 150 ohms | 73015 | SOCKETS, | | |
| R-1 | 22,000 ohms | 73041 | Tube, Standard Octal | | |
| | | | Dial Lamp, Bayonet Base | | |



GENERAL DESCRIPTION

Model 801 is a PhonOcord console employing seven tubes plus one rectifier. The following are the outstanding features incorporated in this model.

1. Superheterodyne receiver.
 2. Automatic Home Recording with Public Address System.
 3. Phonograph with Automatic Record Changer.
- Cabinet finishes are Walnut, Mahogany, Maple and Modern Blonde Oak.

Service Information concerning the automatic record changer-recorder will be found in "Service Instructions—Automatic Record Changer-Recorder Combination (Packard-Bell Part No. 58004B)". Published in 1946.

SPECIFICATIONS

OVERALL DIMENSIONS:

- Height 35"
- Width 29"
- Depth 18"
- Shipping Weight 110 Lbs.

ELECTRICAL RATING:

- Line Voltage 110-120 volts, 50-60 C.P.S.
- Power Consumption 92 watts

TUNING FREQUENCY RANGE:

540 to 1620 KC

INTERMEDIATE FREQUENCY:

455 KC

ELECTRICAL POWER OUTPUT:

- Maximum 5.0 watts
- Undistorted 3.0 watts

LOUDSPEAKER:

- Type Permanent Magnet
- Outside Cone Diameter 10"
- Voice Coil Impedance 3.2 ohms @ 400 C.P.S.
- Magnet Rating 3.16 Oz. Alnico V

TUBE COMPLEMENT:

| No. | Tube | Function |
|-----|--------|-------------------------------|
| V-1 | 6SK7 | R-F Amplifier |
| V-2 | 6SA7 | Frequency Converter |
| V-3 | 6SK7 | I-F Amplifier |
| V-4 | 6H6 | Compressor Rectifier |
| V-5 | 6SF7 | 1st Audio Amplifier |
| V-6 | 6SQ7 | 2nd Detector & Mike Amplifier |
| V-7 | 6V6-GT | Power Amplifier |
| V-8 | 5Y3-GT | Rectifier |

SPECIAL SERVICING INFORMATION

BRIEF DESCRIPTION OF COMPRESSION CIRCUIT:

Model 801 automatic home recording circuit employs volume compression. Referring to the schematic diagram, it will be noted that V-4 (6H6) rectifies a portion of the output voltage and varies the grid bias of V-5 (6SF7). The compression system is automatic and is in the circuit on both record positions.

The compression voltage is approximately a minus 2.25 volts. This voltage may be checked by turning the switch to Radio Record position and feeding a 1 volt (RMS) 1,000 cycle signal into the diode return of the 2nd I-F (brown lead). Connect a vacuum tube voltmeter to the point indicated on the schematic diagram.

RECORDING HEAD PRESSURE:

The proper recording head pressure is 1/4 ounces. It is important, for best recording results, that this pressure be maintained at all times.

The cutting head pressure may be adjusted by turning the small screw on the top of the Recording Arm—CLOCKWISE TO INCREASE THE CUTTING DEPTH and COUNTER CLOCKWISE TO DECREASE THE CUTTING DEPTH. This adjustment is very critical and should be made in quarter turns employing a small postal scale or its equivalent as a means of accurate measurement.

STAGE GAIN MEASUREMENTS:

Measurements taken with Volume and Tone Controls maximum; Selector Switch in Radio position. A.V.C. shorted to ground.

- Standard Output 50 milliwatts
- Dummy Antenna 200 Mmf.
- Antenna to R-F Grid 7X at 1000 KC
- R-F Grid to Converter Grid 9X at 1000 KC
- Converter Grid to 1st I-F Grid 48X at 455 KC
- 1st I-F Grid to 2nd Detector 50X at 455 KC
- Overall Audio Gain 65 millivolts in — 50 milliwatts out (1st Audio Grid) (Voice Coil)

D. C. RESISTANCE MEASUREMENTS:

Due to a variation in winding methods, the D. C. resistance on all coils is subject to a 20% tolerance.

1st I-F Coil:

- Primary 17 ohms
- Secondary 14.5 ohms

2nd I-F Coil:

- Primary 17 ohms
- Secondary 14.5 ohms*

Oscillator Coil:

- Primary 1 ohm
- Secondary 6 ohms

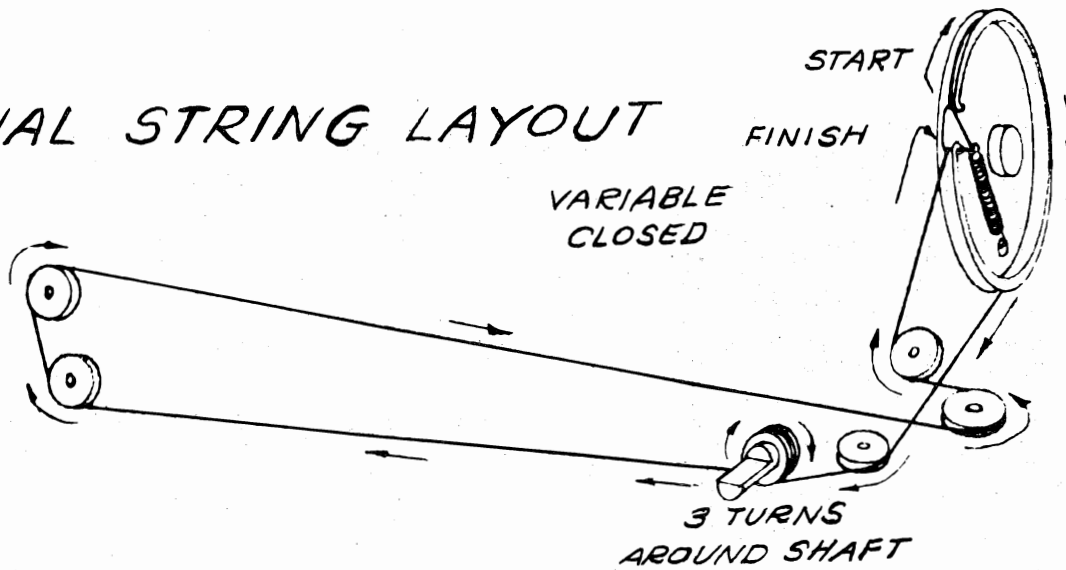
R-F Coil:

- Primary 58 ohms
- Secondary 4.2 ohms

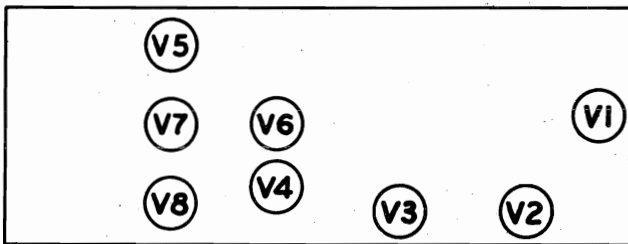
*Because of the 47K resistor in series with the secondary of the 2nd I-F, the reading shown can only be obtained by removing the coil from the can.

MODEL 801

DIAL STRING LAYOUT



SOCKET VOLTAGES



The socket voltages shown were measured under the following conditions:

1. D. C. voltages measured from socket contacts to chassis with a D. C. vacuum tube voltmeter.
2. A. C. voltages measured with a 1,000 ohms per volt A. C. meter.
3. Volume and Tone Controls maximum.
4. Selector Switch in Radio Receive position; no signal.
5. All voltages are positive D. C. unless otherwise noted.
6. Voltage readings subject to a 10% variation.

V-1-6SK7, R-F Amplifier:

| Pin | Element | Voltage |
|-----|---------|---------|
| 1 | Shield | 0 |
| 2 | Heater | 0 |
| 3 | Grid 3 | 0 |
| 4 | Grid 1 | -.5 |
| 5 | Cathode | .5 |
| 6 | Grid 2 | 80 |
| 7 | Heater | 6.0 VAC |
| 8 | Plate | 187 |

V-4-6H6, Compressor Rectifier:

| Pin | Element | Voltage |
|-----|-----------------|---------|
| 1 | Shield | 0 |
| 2 | Heater | 0 |
| 3 | Plate-Diode 2 | 0 |
| 4 | Cathode-Diode 2 | 0 |
| 5 | Plate-Diode 1 | -.15 |
| 6 | No Connection | 0 |
| 7 | Heater | 6.0 VAC |
| 8 | Cathode-Diode 1 | .5 |

V-7-6V6-GT, Power Amplifier:

| Pin | Element | Voltage |
|-----|---------------|---------|
| 1 | No Connection | 0 |
| 2 | Heater | 0 |
| 3 | Plate | 225 |
| 4 | Grid 2 | 187 |
| 5 | Grid 1 | -10 |
| 6 | No Connection | 0 |
| 7 | Heater | 6.0 VAC |
| 8 | Cathode | 0 |

V-2-6SA7, Frequency Converter:

| Pin | Element | Voltage |
|-----|-------------|---------|
| 1 | Grid 3 | 0 |
| 2 | Heater | 0 |
| 3 | Plate | 187 |
| 4 | Grids 2 & 4 | 80 |
| 5 | Grid 1 | -8.5 |
| 6 | Cathode | 0 |
| 7 | Heater | 6.0 VAC |
| 8 | Grid #3 | -.6 |

V-5-6SF7, 1st Audio Amplifier:

| Pin | Element | Voltage |
|-----|---------------|---------|
| 1 | Shield | 0 |
| 2 | Grid 1 | -.5 |
| 3 | Cathode | 0 |
| 4 | Grid 2 | 11 |
| 5 | Plate (Diode) | 0 |
| 6 | Plate | 54 |
| 7 | Heater | 6.0 VAC |
| 8 | Heater | 0 |

V-8-5Y3-GT, Rectifier:

| Pin | Element | Voltage |
|-----|---------------|-------------------------------|
| 1 | No Connection | 0 |
| 2 | Heater | 245 (5.0 VAC to pin 8) |
| 3 | No Connection | 0 |
| 4 | Plate | 260 VAC (to Pow. Trans. C.T.) |
| 5 | No Connection | 0 |
| 6 | Plate | 260 VAC (to Pow. Trans. C.T.) |
| 7 | No Connection | 0 |
| 8 | Heater | 245 (5.0 VAC to pin 2) |

V-3-6SK7, I-F Amplifier:

| Pin | Element | Voltage |
|-----|---------|---------|
| 1 | Shield | 0 |
| 2 | Heater | 0 |
| 3 | Grid 3 | 0 |
| 4 | Grid 1 | -.5 |
| 5 | Cathode | 2.6 |
| 6 | Grid 2 | 80 |
| 7 | Heater | 6.0 VAC |
| 8 | Plate | 187 |

V-6-6SQ7, Detector & Microphone Amplifier

| Pin | Element | Voltage |
|-----|----------------|---------|
| 1 | Shield | 0 |
| 2 | Grid (Triode) | -.55 |
| 3 | Cathode | 0 |
| 4 | Plate (Diode) | 0 |
| 5 | Plate (Triode) | 0 |
| 6 | Plate (Triode) | 91 |
| 7 | Heater | 6.0 VAC |
| 8 | Heater | 0 |

ALIGNMENT PROCEDURE

MODEL 801

Alignment procedure consists of the steps outlined in the alignment procedure chart. Make certain each step is done with a minimum input signal.

Connect output meter to speaker voice coil.

ALIGNMENT CHART

| STEP | CONNECT TEST OSC. TO | TEST OSC. SETTING | POINTER SETTING | ADJUST FOR MAX. OUTPUT |
|------|---------------------------------------------------------------------------------------------|-------------------|-----------------|------------------------|
| 1 | Mixer Grid & Ground | 455 KC | 540 KC | Trimmers A, B, C, D |
| 2 | R-F Grid & Ground | 1500 KC | 1500 KC | Trimmer E |
| 3 | R-F Grid & Ground | 600 KC | 600 KC | Trimmer H |
| 4 | R-F Grid & Ground | 1500 KC | 1500 KC | Trimmers F & G |
| 5 | Repeat Steps 2, 3, & 4 | | | |
| 6 | Check Stationizing. Slide pointer on string if stations are uniformly off in one direction. | | | |

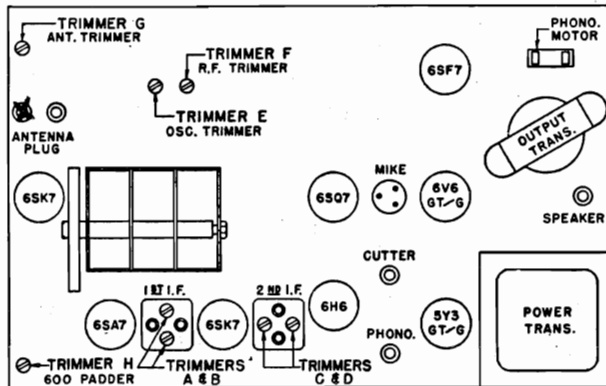


Figure 3 Trimmer Location

TABLE OF REPLACEABLE PARTS

| REF. SYMBOL | DESCRIPTION | PB PART NO. | RESISTORS, 1/2 WATT, 20% |
|-------------|---------------------------------|-------------|-------------------------------------------------------------------|
| | CAPACITORS, TUBULAR | | R-12, 15, 20, 27 220,000 ohms 73153 |
| C-13 | .001 Mfd. 600 volt | 23001 | R-14, 19, 25 470,000 ohms 73157 |
| C-15, 22 | .005 Mfd. 600 volt | 23004 | R-21 680,000 ohms 73159 |
| C-14, 17 | .02 Mfd. 600 volt | 23007 | R-8 1 megohm 73161 |
| C-4, 5 | .05 Mfd. 600 volt | 23010 | R-26 1.5 megohms 73163 |
| C-16 | .1 Mfd. 400 volt | 23011 | R-1, 3, 18 2.2 megohms 73165 |
| C-9, 18 | .05 Mfd. 200 volt | 23017 | R-13, 16, 17 4.7 megohms 73169 |
| C-21 | .1 Mfd. 200 volt | 23019 | |
| C-20, 23 | .01 Mfd. 600 volt | 23023 | RESISTORS, 1 WATT 10% |
| | CAPACITORS, TRIMMER | | R-31 150 ohms 73215 |
| C-2, 10 | 3-30 Mmf. Dual | 23400 | RESISTORS, 2 WATT, 10% |
| C-12 | 300-800 Mmf. (Padder) | 23402 | R-5 10,000 ohms 73437 |
| | CAPACITORS, VARIABLE | | RESISTORS, WIRE WOUND |
| C-1A, B, C | 3 gang | 23521 | R-6 1/2 ohm, 1 watt, 10% 73601 |
| | CAPACITORS, CERAMIC | | R-29 15 ohms, 1 watt, 10% 73605 |
| C-6, 11 | 47 Mmf. 20% | 23912 | R-30 2,000 ohms, 5 watt, 10% 73631 |
| C-3, 8 | 220 Mmf 20% | 23915 | TRANSFORMERS |
| | CAPACITORS, ELECTROLYTIC | | T-2 Power (Plate Winding 520 volts center tapped; @ 70 MA)—89016C |
| C-25 | 20 Mfd. 350 volt | 24003 | T-1 Output—5,000 to 3.2 ohms—89409D |
| C-24 | 40 Mfd. 350 volt | 24063 | PLUGS |
| | CONTROLS | | Antenna, Phono, Cutter & Speaker 66004 |
| R-9 | Volume, 1 megohm—tapped | 25010C | Microphone 66013 |
| R-10 | Tone, 5 megohms | 25506C | SOCKETS |
| | COILS | | Tube, Std. octal 79002 |
| L-3 | 1st I-F—455 KC | 29004E | Microphone 79004 |
| L-4 | 2nd I-F—455 KC | 29007 | Phono Pick-up 79005 |
| L-1 | R-F | 29102F | A.C. Motor 79007 |
| L-2 | Oscillator Loop | 29205C | Dial Lamp 79010 |
| | RESISTORS, 1/2 WATT, 10% | | MISC. PARTS |
| R-2, 22 | 39 ohms | 73008 | Cabinet (specify finish) 21105 |
| R-7 | 390 ohms | 73020 | A.C. Cord, 8' 32003 |
| R-23 | 560 ohms | 73022 | Cutter Cartridge 36024 |
| R-11 | 15,000 ohms | 73039 | Dial, Stationizing 38121 |
| R-4 | 22,000 ohms | 73041 | Knobs 52037-1 |
| R-24, 28 | 47,000 ohms | 73045 | Lamp, Dial 54001 |
| | | | Microphone with cable 57010 |
| | | | Record Changer-Recorder 58004E |
| | | | Speaker, 10" PM 83705 |
| | | | Switch, wafer type 86009B |

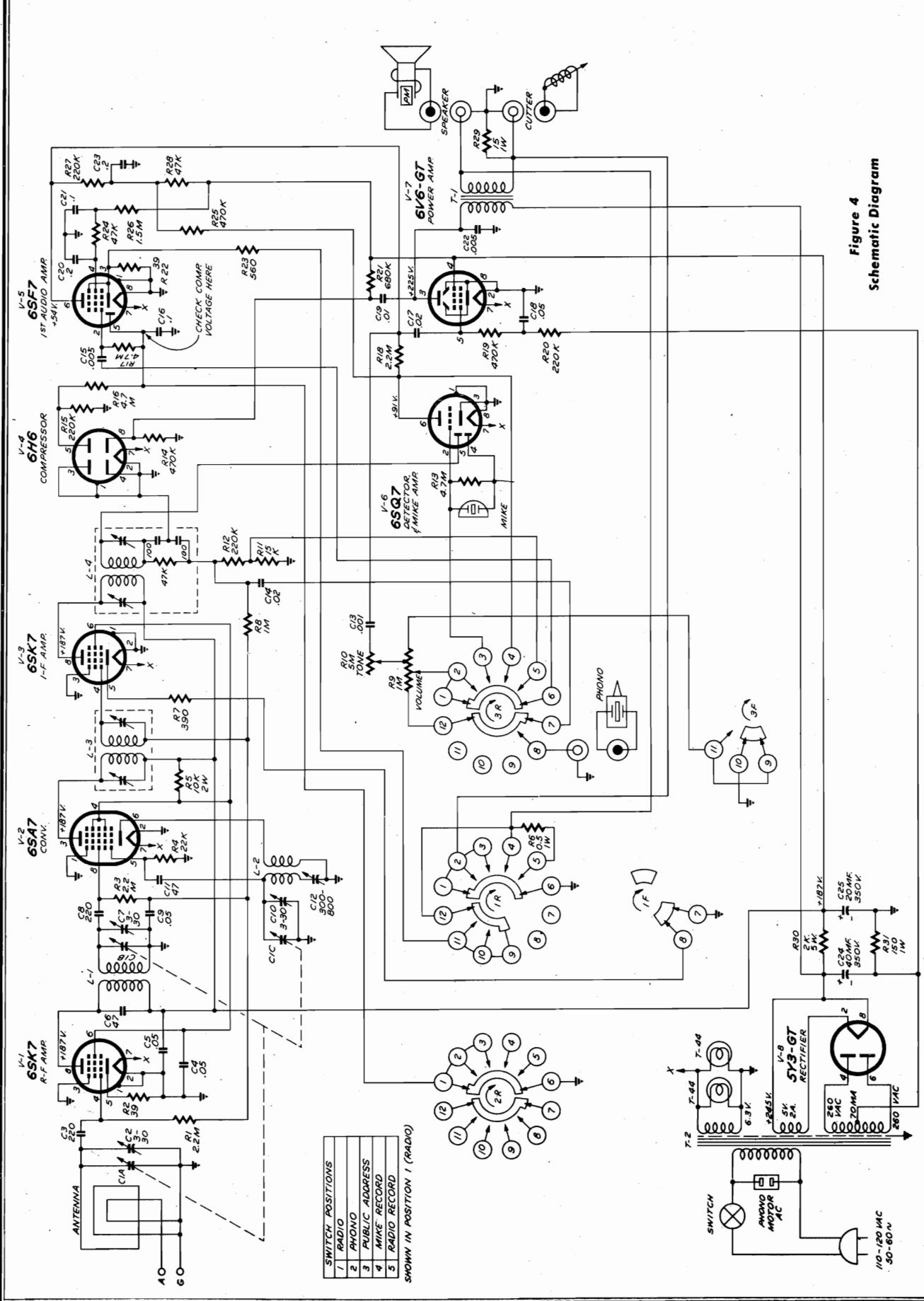


Figure 4
Schematic Diagram



Model 901

GENERAL DESCRIPTION

Model 901 is a console AM-FM radio-phonograph combination employing eight tubes plus one rectifier. Cabinet finishes are walnut, mahogany, maple and modern blonde oak.

SPECIFICATIONS

OVERALL DIMENSIONS:

| | |
|---------------------------|----------|
| Height | 35" |
| Width | 29" |
| Depth | 18" |
| Shipping Weight | 100 Lbs. |

ELECTRICAL RATING:

| | |
|-----------------------------|-----------------------|
| Line Voltage | 110-120, 50-60 C.P.S. |
| Power Consumption | 90 watts @ 115 V.A.C. |

TUNING FREQUENCY RANGE:

| | |
|----|----------------|
| AM | 540 to 1620 KC |
| FM | 88 to 108 MC |

INTERMEDIATE FREQUENCY:

| | |
|----|---------|
| AM | 455 KC |
| FM | 10.7 MC |

ELECTRICAL POWER OUTPUT:

| | |
|-----------------------|-----------|
| Maximum | 6.0 watts |
| Undistorted | 4.0 watts |

LOUDSPEAKER:

| | |
|---------------------------------|-----------------------|
| Type | permanent magnet |
| Outside Cone Diameter | 10" |
| Voice Coil Impedance | 3.2 ohms @ 400 C.P.S. |
| Magnet Rating | 3.16 Oz. Alnico V |

TUBES:

| Tube | No. | Function |
|--------|-----|---------------------------------|
| 6BA6 | V-1 | R-F Amplifier |
| 6BA6 | V-2 | Mixer |
| 6BA6 | V-3 | I-F Amplifier |
| 6AU6 | V-4 | I-F Driver |
| 6AL5 | V-5 | Ratio Detector |
| 6AU6 | V-6 | Oscillator |
| 5Y3-GT | V-7 | Rectifier |
| 6SF7 | V-8 | AM Detector-1st Audio Amplifier |
| 6V6-GT | V-9 | Power Amplifier |

SPECIAL SERVICING INFORMATION

D. C. RESISTANCE MEASUREMENTS:

1st AM I-F Coil:

| | |
|---------------------|----------|
| Primary | 7.5 ohms |
| Secondary | 7.5 ohms |

2nd AM I-F Coil:

| | |
|---------------------|----------|
| Primary | 8.0 ohms |
| Secondary | 8.0 ohms |

1st FM I-F Coil:

| | |
|---------------------|-----------|
| Primary | 0.75 ohms |
| Secondary | 0.75 ohms |

2nd FM I-F Coil:

| | |
|---------------------|----------|
| Primary | 1.5 ohms |
| Secondary | 0.5 ohms |

Ratio Detector:

| | |
|---------------------------------|-----------|
| Primary | 1.5 ohms |
| Secondary | 0.1 ohms |
| Each side to Tertiary | 0.25 ohms |

AM R-F Coil:

| | |
|---------------------|----------|
| Primary | 5.8 ohms |
| Secondary | 4.2 ohms |

AM Oscillator Coil:

| | |
|---------------------|--------|
| Primary | 1 ohm |
| Secondary | 6 ohms |

All D.C. Resistance measurements are subject to a 20% tolerance.

STAGE GAIN MEASUREMENTS AM:

Measurements taken with Volume and Tone Controls maximum; Band Switch in AM position; A.V.C. shorted to ground.

Standard Output—50 milliwatts . . . Dummy Antenna—200 Mmf.

Antenna to R-F Grid 12X at 1000 KC

R-F Grid to Converter Grid 9X at 1000 KC

Converter Grid to 1st I-F Grid 20X at 455 KC

1st I-F Grid to 2nd Detector 40X at 455 KC

Overall Audio Gain 30 millivolts to produce 50 milliwatts at 400 C.P.S.

STAGE GAIN MEASUREMENTS FM:

Measurements taken with Volume and Tone Controls maximum; Band Switch in FM position; A.V.C. shorted to ground.

Dummy Antenna—270 ohms.

Dipole Terminal to R-F Grid 0.9X at 98 MC

Converter Grid to 1st I-F Grid 12X at 10.7 MC

1st I-F Grid to Driver Grid 45X at 10.7 MC

SOCKET VOLTAGES

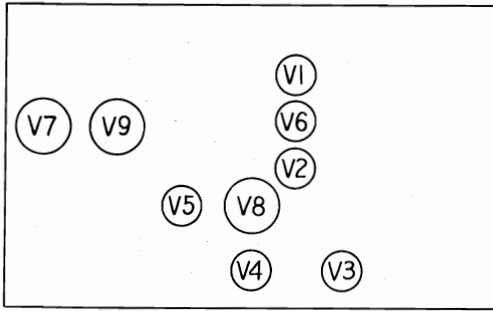


Figure 2 Tube Location Chart

The socket voltages shown were measured with the following conditions existent:

1. D.C. voltages measured from socket contacts to chassis with a D.C. vacuum tube voltmeter.
2. A.C. voltages measured with a 1,000 ohms per volt A.C. meter.
3. Volume and Tone Controls maximum.
4. Selector Switch in AM Radio position.
5. No signal.
6. All voltages are positive D.C. unless otherwise noted.
7. Voltage readings subject to a 10% variation.

VOLTAGES SHOWN IN PARENTHESIS WERE MEASURED WITH THE SELECTOR SWITCH IN FM POSITION.

V-1-6BA6, R-F Amplifier:

| Pin | Element | Voltage |
|-----|-------------------|-----------|
| 1 | Grid 1 | -.2 (-.5) |
| 2 | Grid 3 | 0 |
| 3 | Heater | 6.0 VAC |
| 4 | Heater | 0 |
| 5 | Plate | 175 (160) |
| 6 | Grid 2 | 115 (90) |
| 7 | Cathode | 2.35 (.4) |

**V-4-6AU6, F-M Driver
(Used on F-M only):**

| Pin | Element | Voltage |
|-----|-------------------|---------|
| 1 | Grid 1 | 0 |
| 2 | Grid 3 | 0 |
| 3 | Heater | 6.0 VAC |
| 4 | Heater | 0 |
| 5 | Plate | 165 |
| 6 | Grid 2 | 165 |
| 7 | Cathode | 1.5 |

V-7-5Y3-GT, Rectifier:

| Pin | Element | Voltage |
|-----|------------------|------------------------|
| 1 | No Connection | 0 |
| 2 | Heater | 320 (5.0 VAC to pin 8) |
| 3 | No Connection | 0 |
| 4 | Plate | 340 VAC |
| 5 | No Connection | 0 |
| 6 | Plate | 340 VAC |
| 7 | No Connection | 0 |
| 8 | Heater | 320 (5.0 VAC to pin 2) |

V-2-6BA6, Mixer:

| Pin | Element | Voltage |
|-----|-------------------|-----------|
| 1 | Grid 1 | -.4 (0) |
| 2 | Grid 3 | 0 |
| 3 | Heater | 0 |
| 4 | Heater | 6.0 VAC |
| 5 | Plate | 180 (190) |
| 6 | Grid 2 | 140 (95) |
| 7 | Cathode | 7.2 (2.1) |

**V-5-6AL5, FM Ratio Detector
(Used on FM only):**

| Pin | Element | Voltage |
|-----|---------------------|---------|
| 1 | Cathode 1 | 0 |
| 2 | Plate 2 | 0 |
| 3 | Heater | 0 |
| 4 | Heater | 6.0 VAC |
| 5 | Cathode 2 | .25 |
| 6 | Shield | 0 |
| 7 | Plate 1 | -.25 |

V-8-6SF7, 1st Audio-AM Detector:

| Pin | Element | Voltage |
|-----|-----------------------|---------|
| 1 | Shield | 0 |
| 2 | Grid 1 | -.5 |
| 3 | Cathode & Grid 3 | 0 |
| 4 | Grid 2 | 10 |
| 5 | Diode Plate | -.7 |
| 6 | Plate | 80 |
| 7 | Heater | 6.0 VAC |
| 8 | Heater | 0 |

V-3-6BA6, I-F Amplifier:

| Pin | Element | Voltage |
|-----|-------------------|-----------|
| 1 | Grid 1 | -.3 (-.2) |
| 2 | Grid 3 | 0 |
| 3 | Heater | 6.0 VAC |
| 4 | Heater | 0 |
| 5 | Plate | 135 (125) |
| 6 | Grid 2 | 135 (125) |
| 7 | Cathode | 1.2 (1.1) |

V-6-6AU6, Oscillator:

| Pin | Element | Voltage |
|-----|-------------------|-----------|
| 1 | Grid 1 | -6 (-1) |
| 2 | Grid 3 | 0 |
| 3 | Heater | 0 |
| 4 | Heater | 6.0 VAC |
| 5 | Plate | 185 (170) |
| 6 | Grid 2 | 185 (170) |
| 7 | Cathode | 0 |

V-9-6V6-GT, Power Amplifier:

| Pin | Element | Voltage |
|-----|-------------------|---------|
| 1 | No Connection | 0 |
| 2 | Heater | 6.0 VAC |
| 3 | Plate | 310 |
| 4 | Grid 2 | 240 |
| 5 | Grid 1 | 0 |
| 6 | No Connection | 0 |
| 7 | Heater | 0 |
| 8 | Cathode | 12.5 |

ALIGNMENT PROCEDURE

AM ALIGNMENT:

AM Alignment consists of the steps outlined in the AM Alignment Chart. Make certain each step is done with a minimum signal input.

Connect output meter to speaker voice coil.

AM ALIGNMENT CHART:

| STEP | CONNECT TEST OSC. TO | TEST OSC. SETTING | POINTER SETTING | ADJUST FOR MAX. OUTPUT |
|------|---------------------------------------------------------------------------------------------|-------------------|-----------------|------------------------|
| 1 | Mixer Grid & Ground | 455 KC | 540 KC | S-7, 8, 9, 10 |
| 2 | R-F Grid & Ground | 1500 KC | 1500 KC | Trimmers F & G |
| 3 | R-F Grid & Ground | 600 KC | 600 KC | Padder B |
| 4 | R-F Grid & Ground | 1500 KC | 1500 KC | Trimmer A |
| 5 | Repeat Steps 2, 3, & 4 in sequence. | | | |
| 6 | Check Stationizing. Slide pointer on string if stations are uniformly off in one direction. | | | |

FM ALIGNMENT:

It is important that the FM trimmers be adjusted in the sequence shown in the FM Alignment Chart. Rock variable for Steps 4 & 5.

FM ALIGNMENT CHART:

| STEP | CONNECT TEST OSC. TO | TEST OSC. SETTING | POINTER SETTING | CONNECT VOLTMETER TO | ADJUST FOR MAX. OUTPUT |
|------|---------------------------------|-------------------|-----------------|----------------------|------------------------|
| 1 | R-F Grid & Ground | 10.7 MC | 88 MC | Point I | S-11, 6, 4, 3 |
| 2 | R-F Grid & Ground | 10.7 MC | 88 MC | Point H | S-12 for zero center |
| 3 | RECHECK STEPS 1 & 2 | | | | |
| 4 | Doublet terminals thru 270 ohms | 108 MC | 108 MC | Point I | Trimmers D, C & E |
| 5 | Doublet terminals thru 270 ohms | 88 MC | 88 MC | Point I | S-1 & 2 |
| 6 | RECHECK STEPS 4 & 5 | | | | |

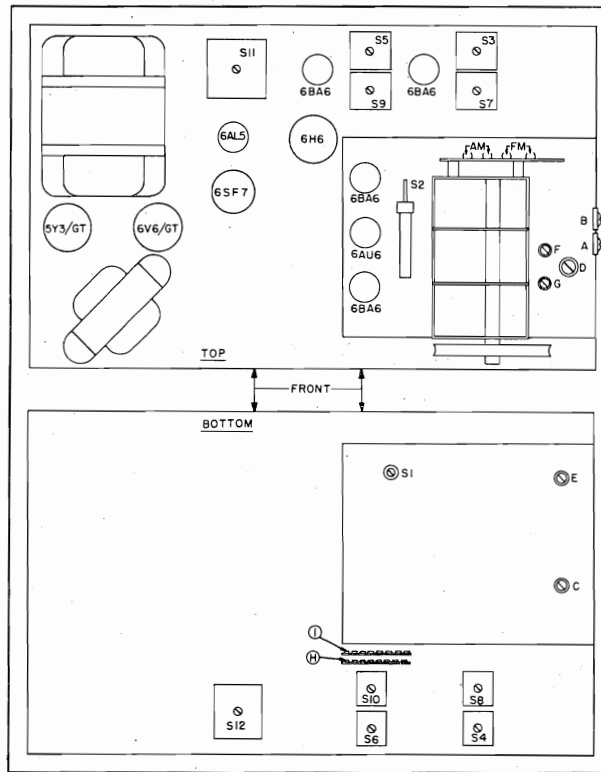


Figure 3 Trimmer Location

ALIGNMENT TRIMMERS:

- | | | | |
|-----|-----------------------------|------|-----------------------------------|
| A | AM Antenna Trimmer | S-3 | 1st FM I-F Secondary (Top) |
| B | 600 KC Padder | S-4 | 1st FM I-F Primary (Bottom) |
| C | FM R-F Trimmer (108 MC) | S-5 | 2nd FM I-F Secondary (Top) |
| D | FM Oscillator Trimmer | S-6 | 2nd FM I-F Primary (Bottom) |
| E | FM Antenna Trimmer (108 MC) | S-7 | 1st AM I-F Secondary (Top) |
| F | AM Oscillator Trimmer | S-8 | 1st AM I-F Primary (Bottom) |
| G | AM R-F Trimmer | S-9 | 2nd AM I-F Secondary (Top) |
| S-1 | FM Antenna (88 MC) | S-10 | 2nd AM I-F Primary (Bottom) |
| S-2 | FM R-F (88 MC) | S-11 | Ratio Detector Primary (Top) |
| | | S-12 | Ratio Detector Secondary (Bottom) |

MODEL 901

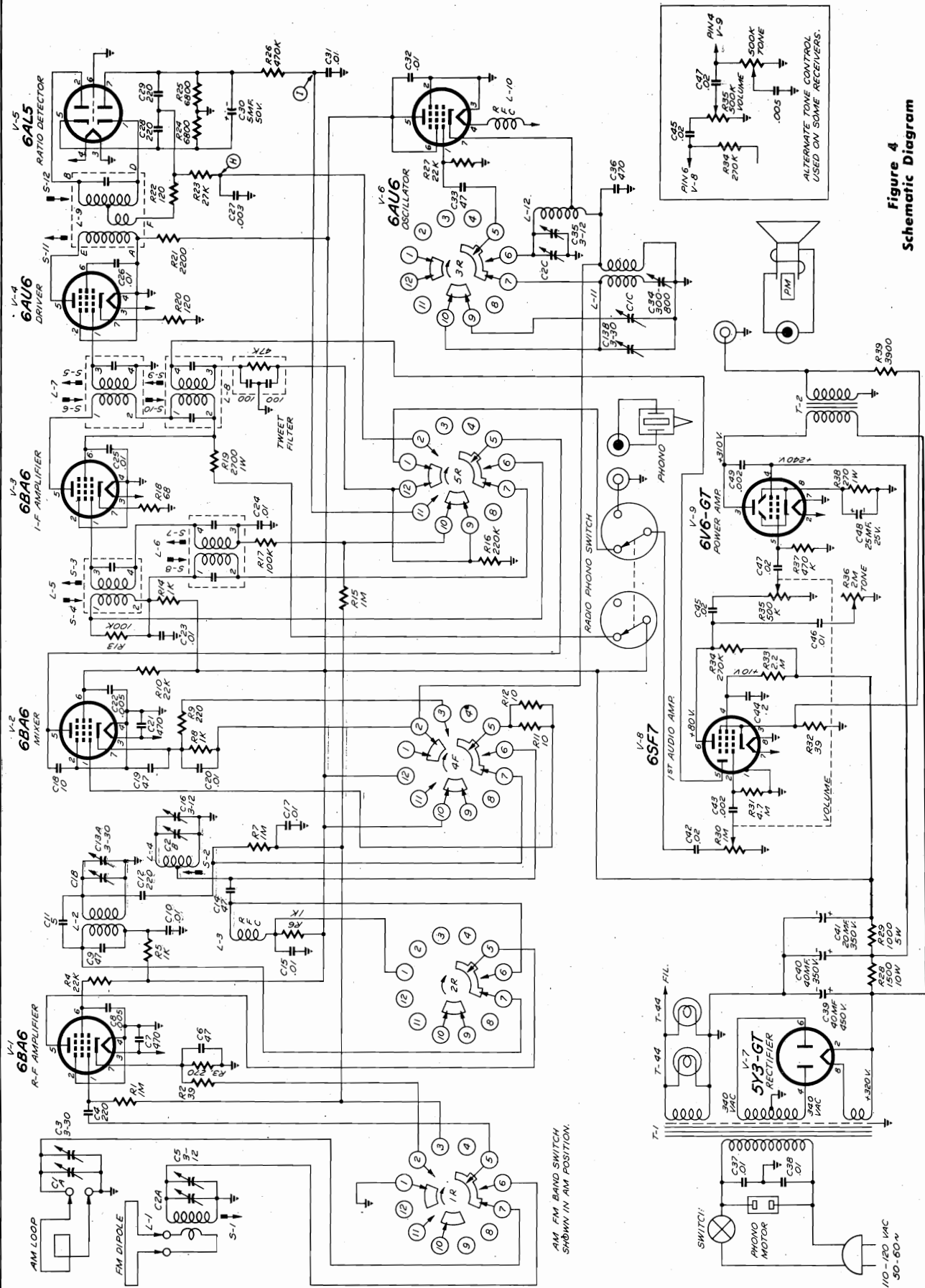


Figure 4 Schematic Diagram

TABLE OF REPLACEABLE PARTS TABLE OF REPLACEABLE PARTS

| REF. SYMBOL | DESCRIPTION | PB PART NO. | REF. SYMBOL | DESCRIPTION | PB PART NO. |
|----------------------------------------------------|-------------------------------------|--------------------|------------------------------------------------|----------------------------------------------------------|-------------|
| CAPACITOR, TUBULAR, | | | RESISTORS, 1/2 WATT, 10%, | | |
| C-43, 49 | .002 Mfd. 600 volt | 23002 | R-11, 12 | 10 ohms | 73001 |
| C-42, 45, 47 | .02 Mfd. 600 volt | 23007 | R-2, 32 | 39 ohms | 73008 |
| C-27 | .003 Mfd. 600 volt | 23016 | R-18 | 68 ohms | 73011 |
| C-44 | .2 Mfd. 400 volt | 23020 | R-20, 22 | 120 ohms | 73014 |
| C-10, 15, 17, 20, 23, 24, 25, 26, 31, 32, 46 | .01 Mfd. 600 volt | 23023 | R-9 | 220 ohms | 73017 |
| CAPACITOR, TRIMMER, | | | R-3 | 270 ohms | 73018 |
| C-13A & B | Dual 3-30 Mmf. | 23400 | R-5, 6, 8, 14 | 1,000 ohms | 73025 |
| C-34 | Padder, 300-800 Mmf. | 23402 | R-21 | 2,200 ohms | 73029 |
| C-3 | Single 3-30 Mmf. | 23406 | R-39 | 3,900 ohms | 73032 |
| C-5, 16 | Tubular 3-12 Mmf. | 23408 | R-24, 25 | 6,800 ohms | 73035 |
| C-35 | Single 3-12 Mmf. | 23412 | R-4, 10, 27 | 22,000 ohms | 73041 |
| CAPACITOR, VARIABLE, | | | R-23 | 27,000 ohms | 73042 |
| C-1A, B, C, C-2A, B, C | 3 gang AM-FM | 23525 | R-34 | 270,000 ohms | 73054 |
| CAPACITOR, CERAMIC, | | | RESISTORS, 1/2 WATT, 20%, | | |
| C-11 | 5 Mmf. 20° | 23908 | R-13, 17 | 100,000 ohms | 73149 |
| C-6, 9, 14 | 47 Mmf. 20° GP | 23912 | R-16 | 220,000 ohms | 73153 |
| C-4, 12, 28, 29 | 220 Mmf. 20° GP | 23915 | R-26, 37 | 470,000 ohms | 73157 |
| C-2, 21, 36 | 470 Mmf. 20° GP | 23916 | R-1, 7, 15 | 1 megohm | 73161 |
| C-18 | 10 Mmf. 10° Tweet Filter | 23923 23930 | R-33 | 2.2 megohms | 73165 |
| C-8, 22 | .005 Mfd. Hy-Kap | 23931 | R-31 | 4.7 megohms | 73169 |
| C-37, 38 | .01 Mfd. 125 VAC | 23932 | RESISTORS, 1 WATT, 10%, | | |
| CAPACITOR, ELECTROLYTIC; | | | R-38 | 270 ohms | 73218 |
| C-48 | 25 Mfd. 25 volts | 24006 | R-19 | 2,700 ohms | 73230 |
| C-39 | 40 Mfd. 450 volts | 24030 | RESISTORS, WIRE WOUND, | | |
| C-30 | 5 Mfd. 50 volts | 24038 | R-29 | 1,000 ohms, 10 watt, 10% | 73623 |
| C-40 | 40 Mfd. 350 volts | 24063 | R-28 | 1,500 ohms, 10 watt, 10% | 73629 |
| C-41 | 20 Mfd. 350 volts | 24064 | TRANSFORMERS, | | |
| CONTROLS, | | | T-1 | Power, plate winding 105 MA @ 340 volts to center tap | 89024 |
| R-36 | Tone, 2 megohms w/AC switch | 25014 | T-2 | Output, 5,000 to 3.2 ohms | 89409 |
| R-30, 35 | Volume, 2 deck, 1 megohm & 500 K | 25021 | SOCKETS, | | |
| REF. SYMBOL | DESCRIPTION | PB PART NO. | TRANSFORMERS, | | |
| COILS, | | | Tube, Std. octal 79002 | | |
| L-9 | Ratio Detector | 29018 | AC Motor 79007 | | |
| L-6 | 1st I-F-AM | 29041 | Lamp-Comp. light 79010 | | |
| L-5 | 1st I-F-FM | 29042 | Dual-Phono and speaker 79018 | | |
| L-8 | 2nd I-F-AM | 29051 | Antenna 79045 | | |
| L-7 | 2nd I-F-FM | 29044 | Tube, 7 pin miniature 79051 | | |
| L-2 | AM-R-F | 29102F | PLUGS, | | |
| L-3, 10 | R-F Choke | 29104 | Antenna, (pin type) 66001 | | |
| L-4, 12 | FM R-F Osc. (same form) | 29109 | Speaker & Phono 66004 | | |
| L-11 | AM Osc. | 29205C | MISC. PARTS, | | |
| L-1 | Loop | 29335A | Cabinet (specify finish) 21117 | | |
| | FM Antenna | 29409 | AC Cord 8' 32003 | | |
| | | | Dial, Stationized 38122 | | |
| | | | Lamp, T-47 54001 | | |
| | | | 3-Speed Record Changer V-M 950 58037 | | |
| | | | 3-Speed Record Changer Webster 100-11 58036 | | |
| | | | Dial Pointer 67030 | | |
| | | | Loudspeaker, 10" PM 83705 | | |
| | | | Radio-Phono Switch 86008 | | |
| | | | Band Switch 86017C | | |

MODEL 602

GENERAL DESCRIPTION

Model 602 is a six tube superheterodyne receiver contained in a table model cabinet of natural or bleached mahogany finish.

Production of this model is divided into two sections: these sections are referred to as "Early" and "Late". There are two major differences between early and late production:

1. Dual 4" PM speakers were used in early production, while late production used a single 4 x 6" PM speaker.
2. Miniature tubes are used throughout in later production.

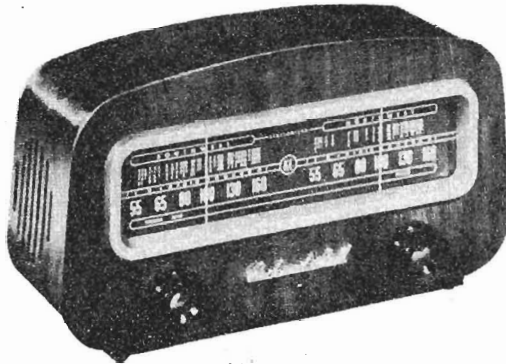


Figure 1

Model 602 "Early"

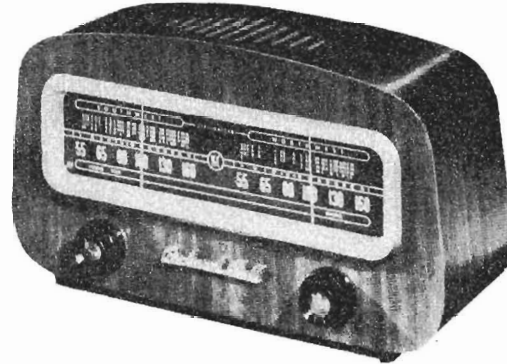


Figure 2

Model 602 "Late"

SPECIFICATIONS

OVERALL DIMENSIONS:

Height — 8½" Width — 13½"
 Depth — 6" Weight — 7 Lbs.

ELECTRICAL RATING:

Line Voltage — 110-120 volts A.C. or D.C.
 Power Consumption — 28 watts

TUNING FREQUENCY RANGE:

540 to 1620 KC

INTERMEDIATE FREQUENCY:

455 KC

ELECTRICAL POWER OUTPUT (MAXIMUM):

1.7 watts

LOUDSPEAKER:

Type — permanent magnet
 Outside Cone Diameter — 4" (4 x 6" "Late")
 Voice Coil Impedance — 3.2 ohms @ 400 C.P.S.
 Magnet Rating — .68 Oz. Alnico V

TUBE COMPLEMENT:

Tubes shown in parenthesis indicate late production.

| NO. | TUBE | FUNCTION |
|-----|----------------|--------------------------|
| V-1 | 6BJ6 | R-F Amplifier |
| V-2 | 12SA7 (12BE6) | Frequency Converter |
| V-3 | 6BJ6 | I-F Amplifier |
| V-4 | 12SQ7 (12AT6) | 2nd Detector — 1st Audio |
| V-5 | 50L6-GT (50C5) | Power Amplifier |
| V-6 | 35Z5-GT (35W4) | Rectifier |

**V-1 — 6BJ6,
R-F Amplifier**

| Pin | Element | Voltage |
|-----|---------|---------|
| 1 | Grid 1 | -3.5 |
| 2 | Cathode | .25 |
| 3 | Heater | 6.0 VAC |
| 4 | Heater | 6.0 VAC |
| 5 | Plate | 60 |
| 6 | Grid 2 | 85 |
| 7 | Grid 3 | 0 |

**V-2 — 12SA7,
Frequency Converter**

| Pin | Element | Voltage |
|-----|-------------|----------|
| 1 | Grid 5 | 0 |
| 2 | Heater | 12.0 VAC |
| 3 | Plate | 85 |
| 4 | Grids 2 & 4 | 85 |
| 5 | Grid 1 | -11 |
| 6 | Cathode | 0 |
| 7 | Heater | 12.0 VAC |
| 8 | Grid 3 | -3.5 |

**V-2 — 12BE6,
Frequency Converter**

| Pin | Element | Voltage |
|-----|-------------|----------|
| 1 | Grid 1 | -11 |
| 2 | Cathode | 0 |
| 3 | Heater | 12.0 VAC |
| 4 | Heater | 12.0 VAC |
| 5 | Plate | 85 |
| 6 | Grids 2 & 4 | 85 |
| 7 | Grid 3 | -3.5 |

SPECIAL SERVICE INFORMATION

D.C. RESISTANCE MEASUREMENTS:

- 1st I-F Coil:
 Primary — 11.8 ohms
 Secondary — 11.5 ohms
- 2nd I-F Coil:
 Primary — 12.2 ohms
 Secondary — 11.5 ohms
- Oscillator Coil:
 Primary — 1 ohm
 Secondary — 5.5 ohms

OSCILLATOR CATHODE VOLTAGES:

- Measured with an A.C. vacuum tube voltmeter (input impedance above 10 megohms) at 117 volts A.C. line.
- 1500 KC — 1.0 VAC
 - 1000 KC — 1.0 VAC
 - 750 KC — 1.1 VAC
 - 540 KC — 1.1 VAC

SOCKET VOLTAGES:

The voltages shown were measured under the following conditions:

1. D.C. Voltages with a vacuum tube voltmeter from socket contacts to B minus buss.
2. Filament voltages measured with a 1,000 ohms per volt meter across the filament of each tube.
3. Volume and Tone Controls maximum.
4. 117 volts A.C. line.
5. Voltages are positive D.C. unless otherwise noted.
6. Voltages are subject to a 10% variation.

**V-4 — 12AT6,
2nd Detector — 1st Audio**

| Pin | Element | Voltage |
|-----|-------------|----------|
| 1 | Grid | -.6 |
| 2 | Cathode | 0 |
| 3 | Heater | 12.0 VAC |
| 4 | Heater | 12.0 VAC |
| 5 | Plate Diode | -.4 |
| 6 | Plate Diode | -.4 |
| 7 | Plate | 56 |

**V-5 — 50L6-GT,
Power Amplifier**

| Pin | Element | Voltage |
|-----|----------|----------|
| 1 | No Conn. | 0 |
| 2 | Heater | 50.0 VAC |
| 3 | Plate | 105 |
| 4 | Grid 2 | 105 |
| 5 | Grid 1 | -10 |
| 6 | No Conn. | 0 |
| 7 | Heater | 50.0 VAC |
| 8 | Cathode | 5.6 |

**V-5 — 50C5,
Power Amplifier**

| Pin | Element | Voltage |
|-----|----------------|----------|
| 1 | Grid 3-Cathode | 5.6 |
| 2 | Grid 1 | -10 |
| 3 | Heater | 50.0 VAC |
| 4 | Heater | 50.0 VAC |
| 5 | Grid 1 | -10 |
| 6 | Grid 2 | 105 |
| 7 | Plate | 105 |



Figure 3

Top View of 602 "Late" Chassis

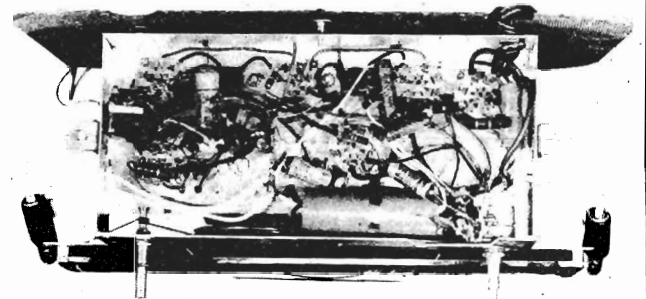


Figure 4

Bottom View of 602 "Late" Chassis

**V-3 — 6BJ6,
I-F Amplifier**

| Pin | Element | Voltage |
|-----|---------|---------|
| 1 | Grid 1 | -3.5 |
| 2 | Cathode | 1.15 |
| 3 | Heater | 6.0 VAC |
| 4 | Heater | 6.0 VAC |
| 5 | Plate | 85 |
| 6 | Grid 2 | 85 |
| 7 | Grid 3 | 0 |

**V-4 — 12SQ7,
2nd Detector — 1st Audio**

| Pin | Element | Voltage |
|-----|-------------|----------|
| 1 | Shield | 0 |
| 2 | Grid | -.6 |
| 3 | Cathode | 0 |
| 4 | Diode Plate | -.4 |
| 5 | Diode Plate | -.4 |
| 6 | Plate | 56 |
| 7 | Heater | 12.0 VAC |
| 8 | Heater | 12.0 VAC |

**V-6 — 35Z5-GT,
Rectifier**

| Pin | Element | Voltage |
|-----|---------------------------|---------------------------|
| 1 | No Conn. | 0 |
| 2 | Heater | 35.0 VAC |
| 3 | Heater Tap (Dial Life) | 6.0 VAC to pins 2 or 7 |
| 4 | No Conn. | 0 |
| 5 | Plate | 109 VAC |
| 6 | No Conn. | 0 |
| 7 | Heater | 35.0 VAC |
| 8 | Cathode | 120 |

**V-6 — 35W4,
Rectifier**

| Pin | Element | Voltage |
|-----|------------|----------|
| 1 | No Conn. | 0 |
| 2 | No Conn. | 0 |
| 3 | Heater | 35.0 VAC |
| 4 | Heater | 35.0 VAC |
| 5 | Plate | 109 VAC |
| 6 | Heater Tap | 6.0 VAC |
| 7 | Cathode | 120 |

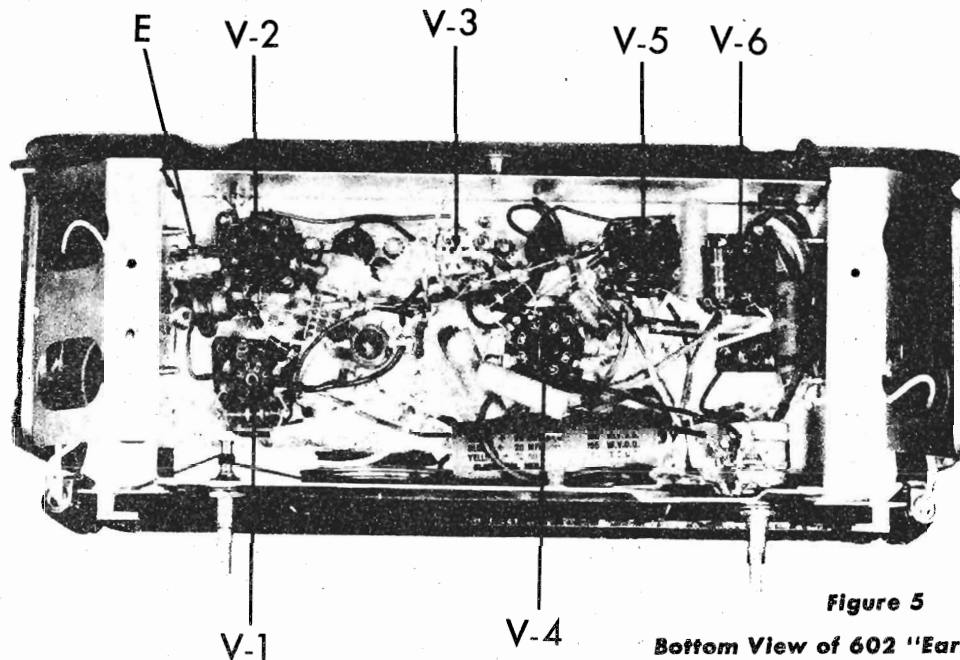


Figure 5

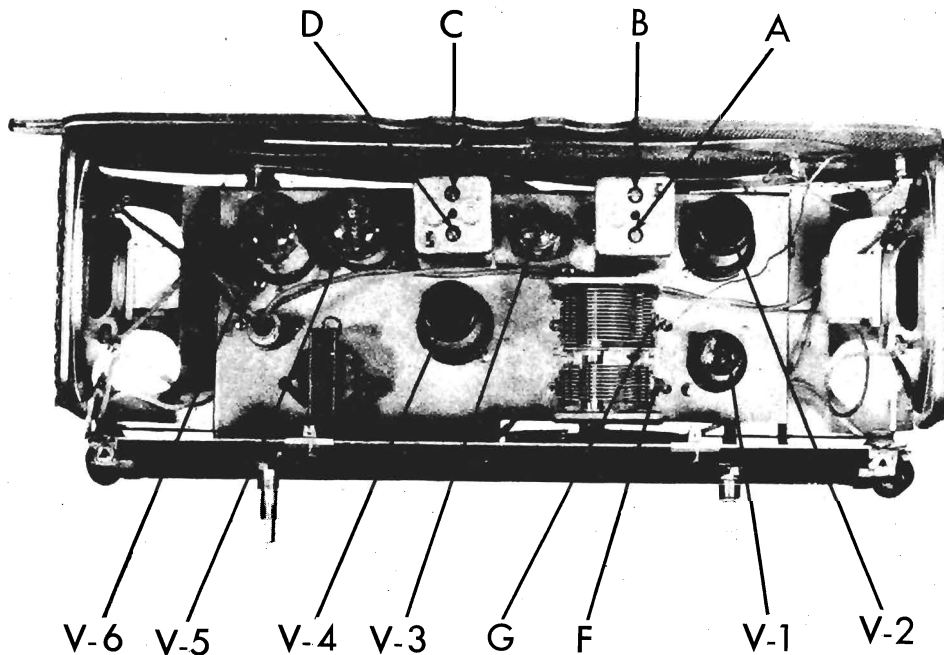
Bottom View of 602 "Early" Chassis

MODEL 602

ALIGNMENT PROCEDURE

Alignment procedure consists of the steps outlined in the Alignment Chart. See Figures 5 and 6 for location of trimmers. Make certain each step is done with a minimum input signal. Connect output meter to speaker voice coil.

| STEP | CONNECT TEST OSC. TO | TEST OSC. SETTING | POINTER SETTING | ADJUST FOR MAX. OUTPUT |
|------|---------------------------------------------------------------------------------------------|-------------------|-----------------|------------------------------|
| 1 | Mixer Grid & Ground | 455 KC | 540 KC | Trimmers A, B, C & D |
| 2 | Mixer Grid & Ground | 455 KC | 540 KC | Trimmer E for minimum output |
| 3 | Mixer Grid & Ground | 1620 KC | 1620 KC | Trimmer F |
| 4 | Test Loop | 1500 KC | 1500 KC | Trimmer G |
| 5 | REPEAT STEPS 3 & 4 | | | |
| 6 | CHECK STATIONIZING. SLIDE POINTER ON STRING IF STATIONS ARE UNIFORMLY OFF IN ONE DIRECTION. | | | |



- A, B, C, D — I-F Trimmers
- E — I-F Trap
- F — Osc. Trimmer
- G — Ant. Trimmer

Figure 6
Top View of 602 "Early" Chassis

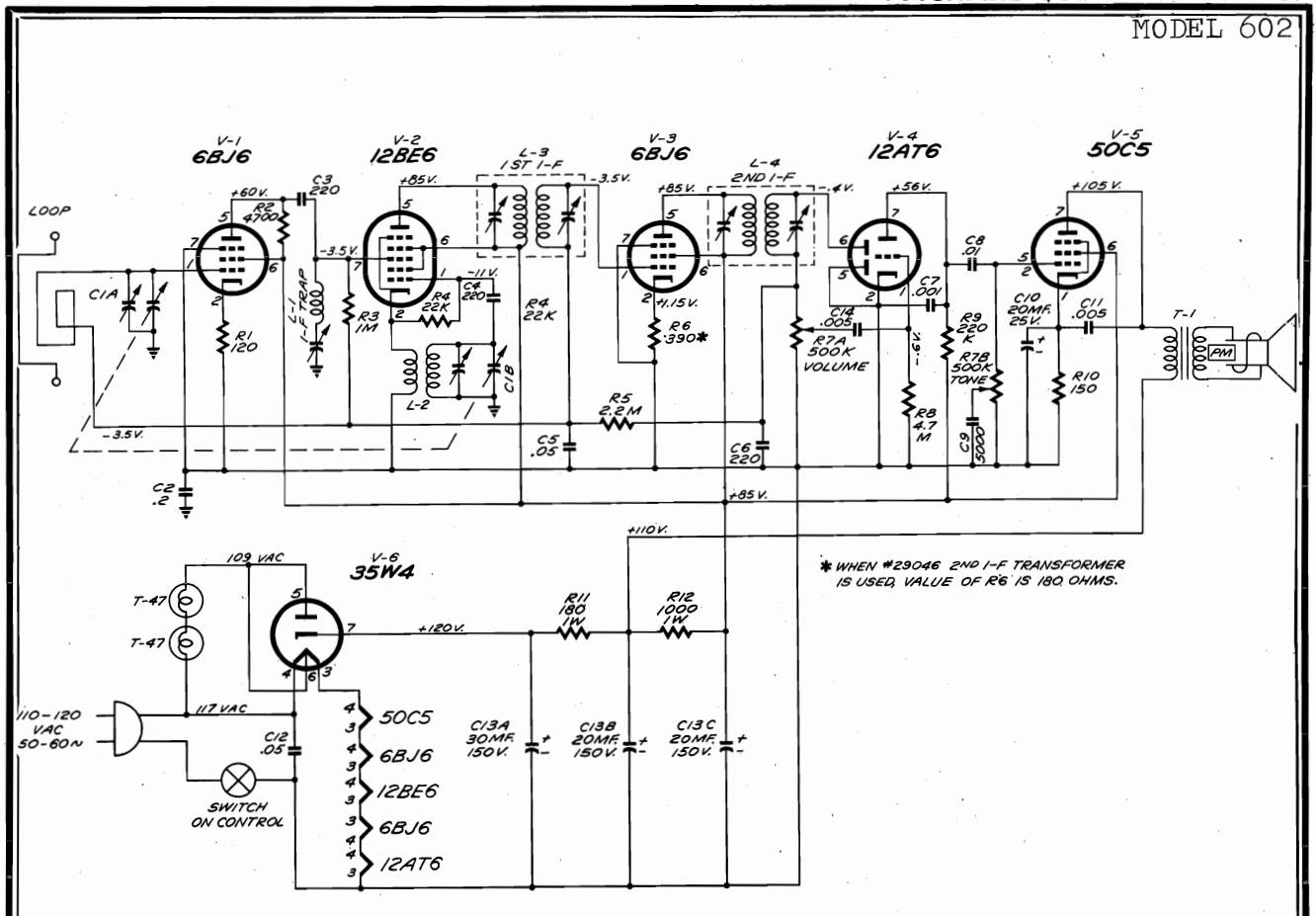


Figure 7

Schematic Diagram 602 "Late"

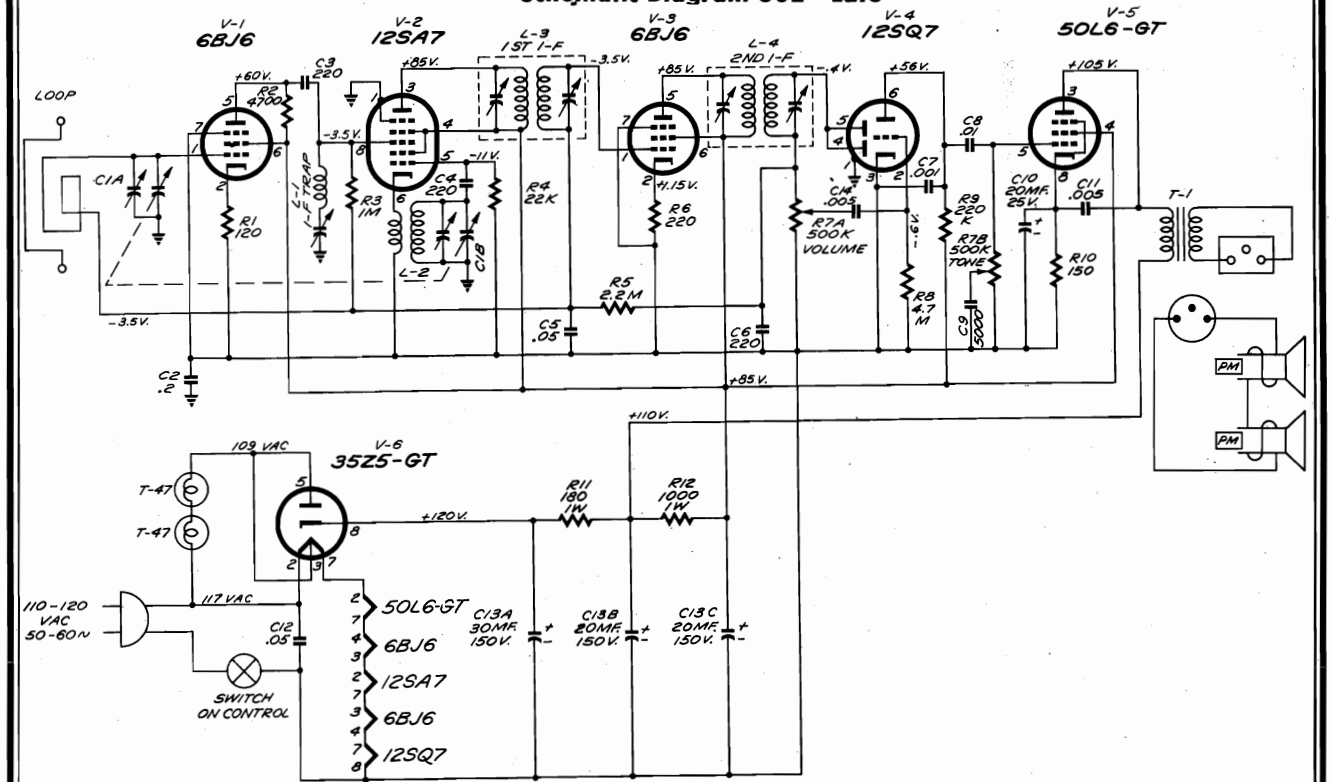


Figure 8

Schematic Diagram 602 "Early"

MODEL 602

TABLE OF REPLACEABLE PARTS

| COILS | | | TRANSFORMERS | | | MISC. PARTS | | |
|-------------|-----------------------------|----------------|--------------|--------------------------------------------|----------------|------------------------------|--------|----------------|
| REF. SYMBOL | DESCRIPTION | P. B. PART NO. | REF. SYMBOL | DESCRIPTION | P. B. PART NO. | DESCRIPTION | | P. B. PART NO. |
| L-1 | I-F Trap | 29005 | T-1 | Output, 2,500 to 6 ohms (dual speakers) | 89433 | Cabinet (2 speakers—"Early") | walnut | 602 BG |
| L-2 | Oscillator | 29220 | | | | | bleach | 602 AL |
| L-3 | 1st I-F, 455 KC (Alternate) | 29059 | T-1 | Output, 2,500 to 3.2 ohms (single speaker) | 89417 | Cabinet (1 speaker—"Late") | walnut | 612 BG |
| L-4 | 2nd I-F, 455 KC (Alternate) | 29046 | | | | Loop Antenna | bleach | 612 AL |

| CAPACITORS | | | RESISTORS | | |
|--------------|--------------------------------------------------------|----------------|-------------|-------------------------------------|----------------|
| REF. SYMBOL | DESCRIPTION | P. B. PART NO. | REF. SYMBOL | DESCRIPTION | P. B. PART NO. |
| C-1A & B | Variable, 2 gang | 23529 | R-1 | Carbon, 120 ohms, 1/2 watt, 10% | 73014 |
| C-2 | Tubular, .2 Mfd. 200 volt | 23018 | R-2 | Carbon, 4,700 ohms 1/2 watt, 10% | 73033 |
| C-3 | Ceramic, 220 Mmf. 500 volt | 23915 | R-3 | Carbon, 1 megohm, 1/2 watt, 20% | 73161 |
| C-4 | Ceramic, 220 Mmf. 500 volt | 23915 | R-4 | Carbon, 22,000 ohms, 1/2 watt, 10% | 73041 |
| C-5 | Tubular, .05 Mfd. 200 Volt | 23017 | R-5 | Carbon, 2.2 megohms, 1/2 watt, 20% | 73165 |
| C-6 | Ceramic, 220 Mmf. 500 volt | 23915 | R-6 | Carbon, 220 ohms, 1/2 watt, 10% | 73017 |
| C-7 | Tubular, .001 Mfd. 600 volt | 23001 | R-8 | Carbon, 4.7 megohms, 1/2 watt, 20% | 73169 |
| C-8 | Tubular, .01 Mfd. 600 volt | 23006 | R-9 | Carbon, 220,000 ohms, 1/2 watt, 20% | 73153 |
| C-9 | Ceramic, 5000 Mmf. 500 volt | 23931 | R-10 | Carbon, 150 ohms, 1/2 watt, 10% | 73015 |
| C-10 | Electrolytic, 20 Mfd. 25 volt (part of C-13 A, B, & C) | 24034B | R-11 | Carbon, 180 ohms, 1 watt, 10% | 73216 |
| C-11 | Tubular, .005 Mfd. 600 volt | 23004 | R-12 | Carbon, 1,000 ohms, 1 watt, 10% | 73225 |
| C-12 | Tubular, .05 Mfd. 200 volt | 23017 | | | |
| C-13 A, B, C | Electrolytic, 30-20-20 Mfd. 150 volt | 24034B | | | |
| C-14 | Tubular, .005 Mfd. 600 volt | 23004 | | | |

| CONTROLS | | |
|-------------|-----------------------------------|----------------|
| REF. SYMBOL | DESCRIPTION | P. B. PART NO. |
| R-7 A & B | Volume & Tone (Dual) 500,000 ohms | 25024 |

LINE VOLTAGE: This receiver is designed for operation on 105-125 Volts; 60 Cycles, Alternating Current (AC) only.

POWER CONSUMPTION INCLUDING RECORD CHANGER: 115 Watts.

TUNING RANGE:

Broadcast Band: 540 to 1650 Kilocycles
(182 to 555 Meters)
F-M Band: 87.5 to 108.5 Megacycles
(2.7 to 3.4 Meters)

DIAL SCALE: The Dial Scale is calibrated in Kilocycles times 10 for the Broadcast Band, and in Megacycles for the F-M Band, corresponding to newspaper or periodical listings.

TUBES: The Tubes used, and their functions, are as follows:

- 12AT7 R-F Amplifier and Mixer (F-M)
- 6BE6 A-M Converter and F-M Oscillator
- 6BA6 1st I-F Amplifier (A-M & F-M)
- 6BA6 2nd I-F Amplifier (F-M)

- 6AL5 F-M Detector
- 6AV6 A-M Detector, A.V.C. and Audio Amp.
- 6V6GT Beam Power Amplifier
- 5Y3GT Rectifier

For the placement of these tubes, refer to the diagram on page 3 of this folder.

INSTALLATION: This receiver is complete in every detail for efficient and immediate operation. The following installation procedure should be followed in setting up the receiver for use:

- (1) Remove all packing material.
- (2) Examine the tubes on the receiver chassis and be sure that they are firmly in their sockets.
- (3) Remove all shipping screws from the receiver and record changer compartments as noted on the attached instruction tags. Failure to remove the shipping screws from the rubber cushioned chassis brackets retaining the receiver chassis in place during shipment, may cause microphonic howl.
- (4) Retain all screws and hardware removed from the receiver chassis and record changer for future re-use in shipping.

During the alignment procedure all adjustments should be made under the following conditions:

- (A) Line voltage set at 117 Volts A.C.
- (B) Volume control at maximum position.
- (C) Tone control set at extreme left position (Treble).
- (D) Minimum input from the signal generator. This procedure should be adhered to, otherwise adjustments will be broad, due to the action of the automatic volume control.

Refer to the trimmer and tube location diagram below for trimmer and core locations. Follow the sequence in the alignment chart for proper procedure.

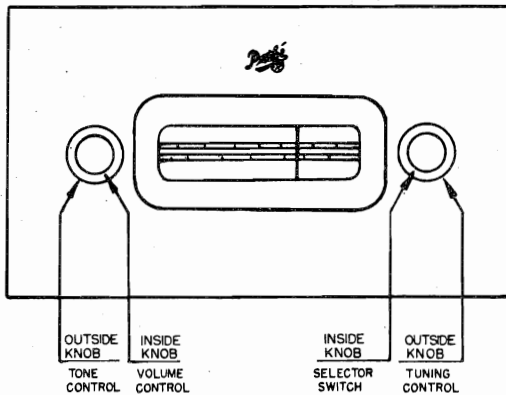


FIG. 1—FRONT PANEL CONTROLS

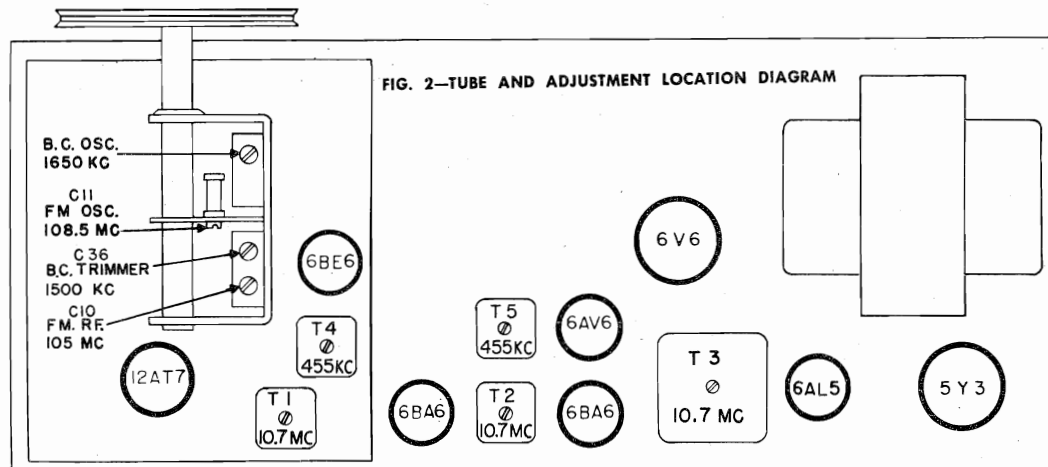


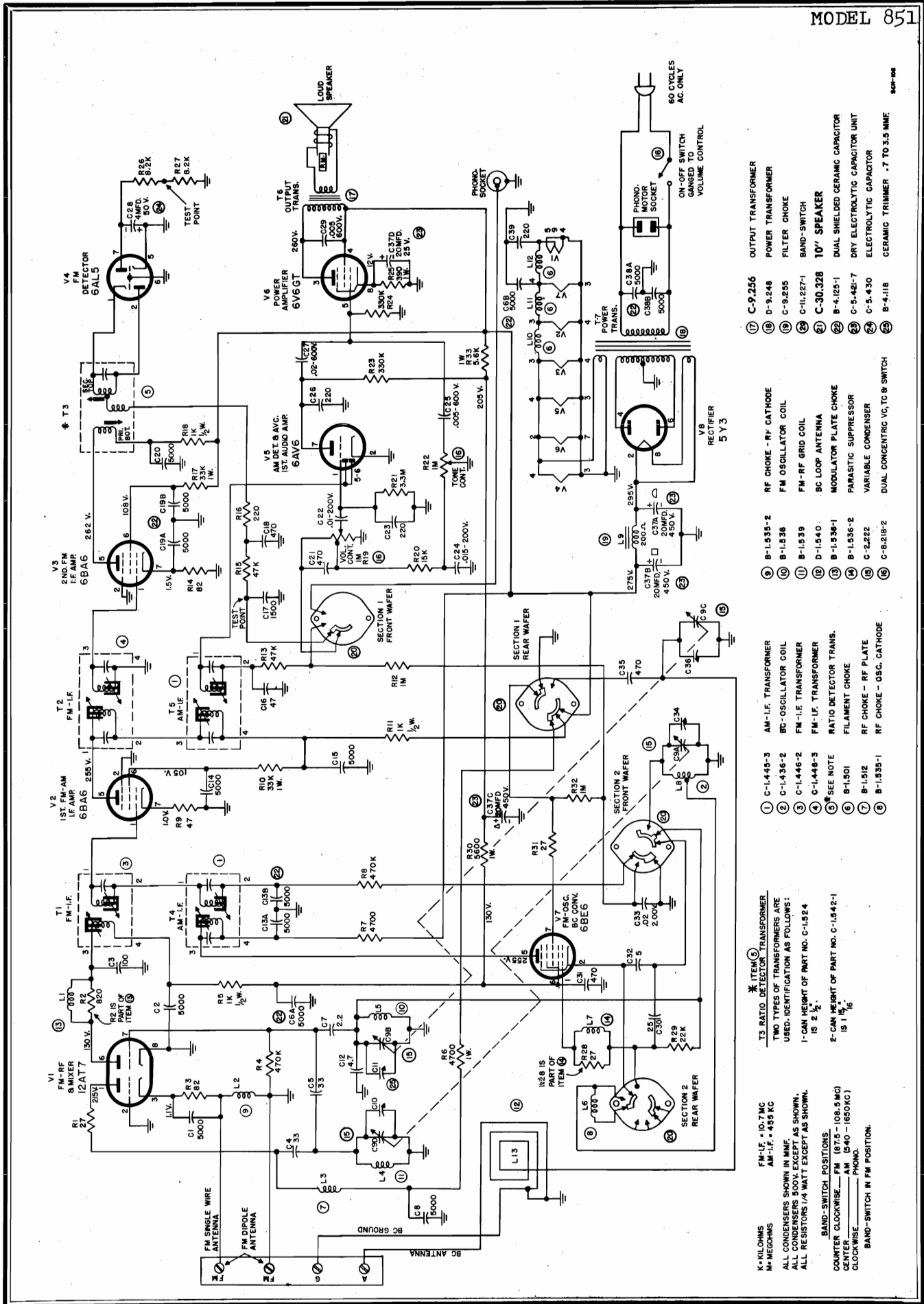
FIG. 2—TUBE AND ADJUSTMENT LOCATION DIAGRAM

ALIGNMENT CHART

| STEP | CIRCUIT ALIGNED | RECEIVER DIAL AT | SIGNAL GENERATOR | | CONNECTIONS | | TYPE | METER CONNECTIONS | ADJUST | METER INDICATION |
|--------------------------|-----------------|-------------------------|------------------|-----------------------|-----------------------------------------------------------------------------------------|------------------|---------------------------------------------------------------------------|-----------------------------------------------|------------------------------------------------|------------------|
| | | | T TYPE | FREQ. | CONNECTIONS | CONNECTIONS | | | | |
| 1 | B.C. I.F. | B.C. BAND MAX. FREQ. | A.M. | 455 KC 30% MOD. | REAR B.C. SECTION OF VARIABLE CONDENSER | OUTPUT | ACROSS VOICE COIL | TOP & BOT. OF T4 & T5 | MAX. OUTPUT | |
| PREFERRED METHOD 2 | F.M. | F.M. BAND MAX. FREQ. | F.M. | 10.7 MC. 30% MOD. | HIGH SIDE THROUGH .005 MF. (APPROX.) CAP TO PIN 7 OF 12A T7 | OUTPUT | ACROSS VOICE COIL | TOP & BOT. OF T1 & T2; BOT. OF T3 | MAX. OUTPUT | |
| ALTERNATE METHOD 2 | I.F. | | R.F. OR A.M. | 10.7 MC. UNMOD. | | D.C. V.T.V.M. | NEGATIVE TO PIN 7 OF 6A L5; POSITIVE TO GROUND | | MAX. DEFLECTION | |
| PREFERRED METHOD 3 | F.M. | F.M. BAND MAX. FREQ. | F.M. | 10.7 MC. 30% MOD. | EACH SIDE OF GEN. OUTPUT THROUGH 150 OHM RESISTOR TO F.M. ANT. TERMINALS | OUTPUT | ACROSS VOICE COIL | TOP | MAX. OUTPUT | |
| ALTERNATE METHOD 3 | DET. | | R.F. OR A.M. | 10.7 MC. UNMOD. | | D.C. V.T.V.M. | NEG. TO JUNCTION OF 8.2K'S AT 6A L5; POS. TO JUNCTION OF R15 & C17. | | ZERO BETWEEN TWO OPPOSITE POLARITY PEAKS | |
| PREFERRED METHOD 4 | F.M. | F.M. BAND MAX. FREQ. | F.M. | 108.5 MC. 30% MOD. | EACH SIDE OF GEN. OUTPUT THROUGH 150 OHM RESISTOR TO F.M. ANT. TERMINALS | OUTPUT | ACROSS VOICE COIL | TRIMMER ON TOP | MAX. OUTPUT | |
| ALTERNATE METHOD 4 | O.S.C. | | R.F. OR A.M. | 108.5 MC. UNMOD. | | D.C. V.T.V.M. | NEGATIVE TO PIN 7 OF 6A L5; POSITIVE TO GROUND | | MAX. DEFLECTION | |
| PREFERRED METHOD 5 | F.M. | F.M. BAND 105 MC | F.M. | 105 MC. 30% MOD. | REAR B.C. SECTION OF VARIABLE CONDENSER | OUTPUT | ACROSS VOICE COIL | TRIMMER AT REAR OF VAR. COND. (C10) | MAX. OUTPUT | |
| ALTERNATE METHOD 5 | R.F. | | R.F. OR A.M. | 105 MC. UNMOD. | | D.C. V.T.V.M. | NEGATIVE TO PIN 7 OF 6A L5; POSITIVE TO GROUND | | MAX. DEFLECTION | |
| 6 | B.C. OSC. | B.C. BAND MAX. FREQ. | A.M. | 1650 KC 30% MOD. | REAR B.C. SECTION OF VARIABLE CONDENSER | OUTPUT | ACROSS VOICE COIL | TRIMMER AT FRONT OF VAR. COND. (C34). | MAX. OUTPUT | |
| 7 | B.C. R.F. | B.C. BAND 1500 KC | A.M. | 1500 KC 30% MOD. | EACH SIDE OF GEN. OUTPUT TO 2 OR 3-TURN LOOP (1 FOOT DIA.) SEVERAL FEET FROM ANT. | OUTPUT | ACROSS VOICE COIL | B.C. TRIM. AT REAR OF VAR. COND. (C36). | MAX. OUTPUT | |

29.498

- NOTES:
- 1-TURN VOLUME CONTROL FULLY CLOCKWISE.
 - 2-MAINTAIN SIGNAL INPUT LOW ENOUGH TO HAVE LESS THAN 2 VOLTS ACROSS METERS.
 - 3-UNLESS OTHERWISE NOTED, CONNECT LOW SIDE OF SIGNAL GENERATOR TO CHASSIS.
 - 4-UNLESS OTHERWISE NOTED, SET VARIABLE CONDENSER TO MINIMUM CAPACITY (MAX. FREQ.)
 - 5-USE PROPER TOOL FOR SMALL I.F. TRANS. ADJUSTMENTS— I.E., .150 DIA. BAKELITE WITH BLADE .075 THICK.
 - 6-MAINTAIN 60 CYCLE LINE VOLTAGE AT APPROX. 117 VOLTS.



- K** - KILOHMS
M - MEGOHMS
 ALL CONDENSERS SHOWN IN MFD
 ALL CONDENSERS 500V EXCEPT AS SHOWN.
 ALL RESISTORS 1/4 WATT EXCEPT AS SHOWN.
- BAND-SWITCH POSITIONS**
 COUNTER CLOCKWISE - FM (87.5 - 108.5 MC)
 CENTER CLOCKWISE - AM (540 - 1650 KC)
 CLOCKWISE - PHONO.
 BAND-SWITCH IN FM POSITION.
- * ITEM 5 DETECTOR TRANSFORMER**
 TWO TYPES OF TRANSFORMERS ARE USED. IDENTIFICATION AS FOLLOWS:
 1 - CAN HEIGHT OF PART NO. C-1524 IS 2 1/2".
 2 - CAN HEIGHT OF PART NO. C-1542-1 IS 1 1/2".
- T3 RATIO DETECTOR TRANSFORMER**
 TWO TYPES OF TRANSFORMERS ARE USED. IDENTIFICATION AS FOLLOWS:
 1 - CAN HEIGHT OF PART NO. C-1544-3 IS 2 1/2".
 2 - C-1-436-2
 3 - C-1-446-2
 4 - C-1-446-3
 5 - SEE NOTE
 6 - B-1-501
 7 - B-1-512
 8 - B-1-535-1
- FM-AM**
 V1 FM-RF 8 MIXER 12A17
 T1 FM-IF
 T2 FM-IF
 V2 1ST FM-AM LF AMP 6BA6
 T3 2ND FM-AM LF AMP 6BA6
 V3 2ND FM-AM LF AMP 6BA6
 T4 AM-IF
 T5 AM-IF
 V4 FM DETECTOR 6AL5
 V5 AM DET & AVC 6AV5
 V6 POWER AMPLIFIER 6V6GT
- TRANSFORMERS**
 T1 FM-IF
 T2 FM-IF
 T3 RATIO DETECTOR TRANS.
 T4 AM-IF
 T5 AM-IF
 T6 OUTPUT TRANS.
 T7 POWER TRANS.
- RECTIFIER**
 V8 5Y5
- RESISTORS**
 R1 10K
 R2 1M
 R3 10K
 R4 82
 R5 47K
 R6 470K
 R7 4700
 R8 470K
 R9 10K
 R10 33K
 R11 1K
 R12 1M
 R13 33K
 R14 82
 R15 47K
 R16 220
 R17 470
 R18 5000
 R19 10K
 R20 15K
 R21 33M
 R22 330K
 R23 330K
 R24 330K
 R25 10K
 R26 220
 R27 8.2K
 R28 27
 R29 22K
- CAPACITORS**
 C1 5000
 C2 5000
 C3 100
 C4 33
 C5 3.3
 C6 5000
 C7 2.2
 C8 5000
 C9 100
 C10 100
 C11 100
 C12 4.7
 C13 5000
 C14 5000
 C15 5000
 C16 47
 C17 1500
 C18 5000
 C19 5000
 C20 5000
 C21 470
 C22 0.001
 C23 220
 C24 0.001
 C25 220
 C26 220
 C27 4MFD
 C28 4MFD
 C29 1000
 C30 1000
 C31 2000
 C32 5
 C33 5000
 C34 100
 C35 470
 C36 100
 C37 20MFD
 C38 5000
 C39 220
- INDUCTORS**
 L1 1000
 L2 100
 L3 100
 L4 100
 L5 100
 L6 1000
 L7 100
 L8 100
 L9 275V
 L10 100
 L11 100
 L12 100
 L13 100
- OTHER COMPONENTS**
 T1, T2, T4, T5: AM-IF TRANSFORMERS
 T3: RATIO DETECTOR TRANSFORMER
 T6: OUTPUT TRANSFORMER
 T7: POWER TRANSFORMER
 V8: 5Y5 RECTIFIER
 V1-V6: VACUUM TUBES
 V3, V4: 6BA6 2ND FM-AM LF AMP
 V5: 6AV5 AM DET & AVC
 V6: 6V6GT POWER AMPLIFIER
 C27, C37: 20MFD 450V CAPACITORS
 C38: 5000V 5000 OHM RESISTOR
 C39: 220 OHM RESISTOR
 L9: 275V 200MA CHOKES
 L10-L12: 100 OHM RESISTORS
 L13: 100 OHM RESISTOR
 R28, R29: 27 OHM AND 22K OHM RESISTORS
- ITEMS LIST**
- | | | | |
|-------------|---------------------------------|--------------|---------------------------------|
| ① C-1-445-3 | AM-IF TRANSFORMER | ⑪ B-1-535-2 | RF CHOKE - RY CATHODE |
| ② C-1-436-2 | BC-OSCILLATOR COIL | ⑫ B-1-338 | FM OSCILLATOR COIL |
| ③ C-1-446-2 | FM-IF TRANSFORMER | ⑬ B-1-539 | FM-RF GRID COIL |
| ④ C-1-446-3 | FM-IF TRANSFORMER | ⑭ D-1-540 | BC LOOP ANTENNA |
| ⑤ SEE NOTE | RATIO DETECTOR TRANS. | ⑮ B-1-536-1 | MODULATOR PLATE CHOKE |
| ⑥ B-1-501 | FILAMENT CHOKE | ⑯ B-1-535-2 | PARASITIC SUPPRESSOR |
| ⑦ B-1-512 | RF CHOKE - RF PLATE | ⑰ C-2-222 | VARIABLE CONDENSER |
| ⑧ B-1-535-1 | RF CHOKE - OSC. CATHODE | ⑱ C-8-218-2 | DUAL CONCENTRIC VC, TC & SWITCH |
| ⑨ C-9-255 | OUTPUT TRANSFORMER | ⑳ B-4-118 | CERAMIC TRIMMER .7 TO 3.5 MME |
| ⑩ D-9-248 | POWER TRANSFORMER | ㉑ C-3-255 | FILTER CHOKE |
| ⑰ C-9-255 | FILTER CHOKE | ㉒ C-11-227-1 | BAND-SWITCH |
| ⑱ C-9-255 | FILTER CHOKE | ㉓ C-30-328 | 10" SPEAKER |
| ⑲ C-9-255 | FILTER CHOKE | ㉔ B-4-125-1 | DUAL SHIELDED CERAMIC CAPACITOR |
| ⑳ B-4-125-1 | DUAL SHIELDED CERAMIC CAPACITOR | ㉕ C-5-481-7 | DRY ELECTROLYTIC CAPACITOR UNIT |
| ㉑ C-5-481-7 | DRY ELECTROLYTIC CAPACITOR UNIT | ㉖ C-5-430 | ELECTROLYTIC CAPACITOR |
| ㉒ C-5-430 | ELECTROLYTIC CAPACITOR | ㉗ B-4-118 | CERAMIC TRIMMER .7 TO 3.5 MME |

SPECIFICATIONS

| | |
|------------------------------|---------------------------------|
| CIRCUIT | Six-tube superheterodyne |
| FREQUENCY RANGE | 540—1605 kc. |
| AUDIO OUTPUT | 1.2 watts |
| POWER INPUT | 5.5 amperes at 6.6 volts, d.c. |
| INTERMEDIATE FREQUENCY | 455 kc. |
| PHILCO TUBES (6) | 6BA6 (2), 6BE6, 6AV6, 6AS5, 6X4 |

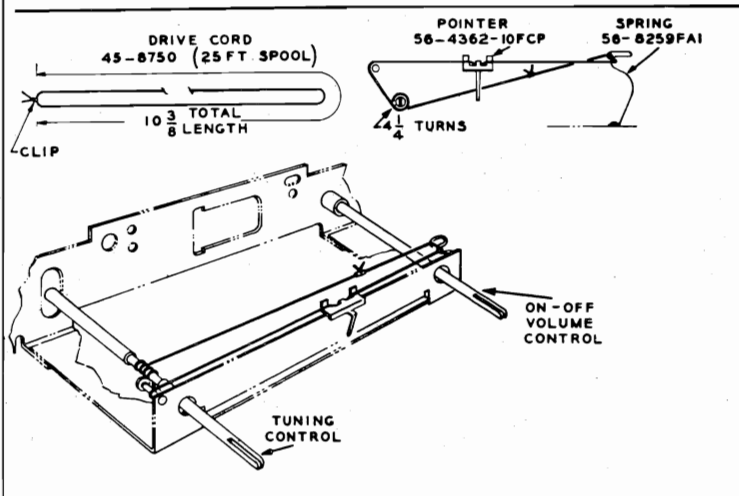


Figure 1. Drive-Cord Installation Details

TP0-1189

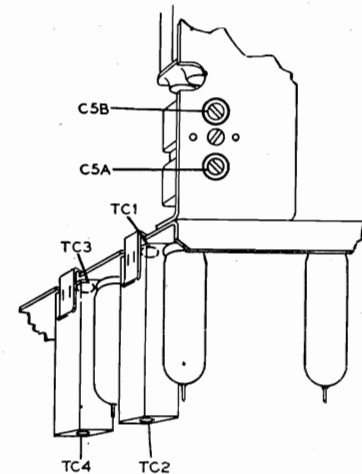


Figure 2. View Showing Trimmer Locations

TP0-1190

ALIGNMENT PROCEDURE

OUTPUT METER — Connect across voice coil.

SIGNAL GENERATOR — Connect ground lead to chassis; connect output lead as indicated in chart. Use modulated output.

RADIO CONTROLS — Set volume control to maximum, and tuning control as indicated in chart.

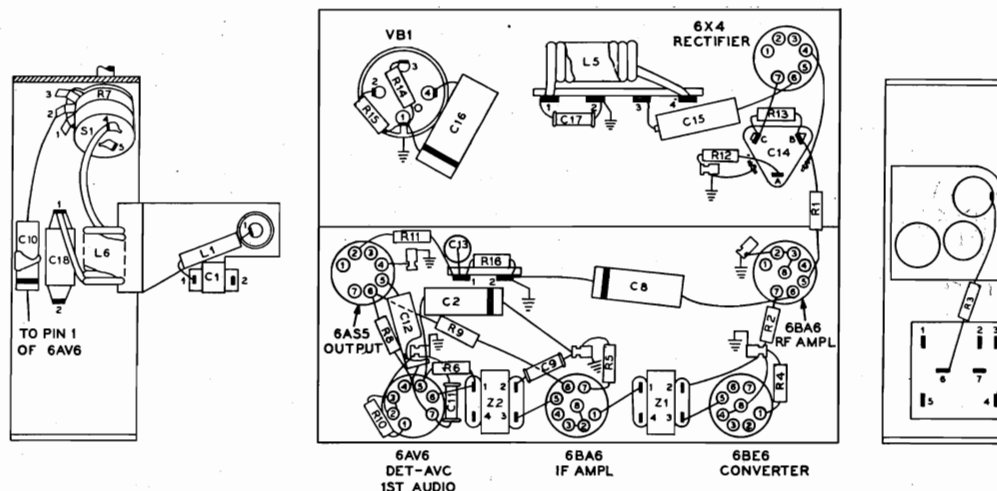
OUTPUT LEVEL — During alignment, attenuate signal generator to maintain an output-meter indication below 1.5 volts.

DUMMY AERIAL — Connect signal-generator output lead through a 30- μ f. condenser to aerial socket; connect a 30- μ f. condenser from aerial socket to ground.

| STEP | SIGNAL GENERATOR | | RADIO | | ADJUST TRIMMER |
|------|--------------------------------------------------------------------|--------------|------------------------------------|------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| | CONNECTION TO RADIO | DIAL SETTING | DIAL SETTING | SPECIAL INSTRUCTIONS | |
| 1 | Through .05- μ f. condenser to converter grid (pin 7 of 6BE6). | 455 kc. | Maximum counterclockwise | Adjust cores, in order given, for maximum output. TC1 and TC3 are reached through holes in bottom of i-f transformers. | TC4—2nd i-f sec. TC3—2nd i-f pri. TC2—1st i-f sec. TC1—1st i-f pri. |
| 2 | Through dummy aerial. | 1605 kc. | 1605 kc. | Adjust for maximum output. | C5B—osc. trimmer C5A—r-f trimmer C1—aerial trimmer |
| 3 | | | Tune to weak station near 1600 kc. | Readjust trimmer C1, with radio installed in car and aerial fully extended. | C1—aerial trimmer |

PR-1861

MODEL .CR-501



TPO-1191

Figure 3. View Showing Locations of Components

REPLACEMENT PARTS LIST

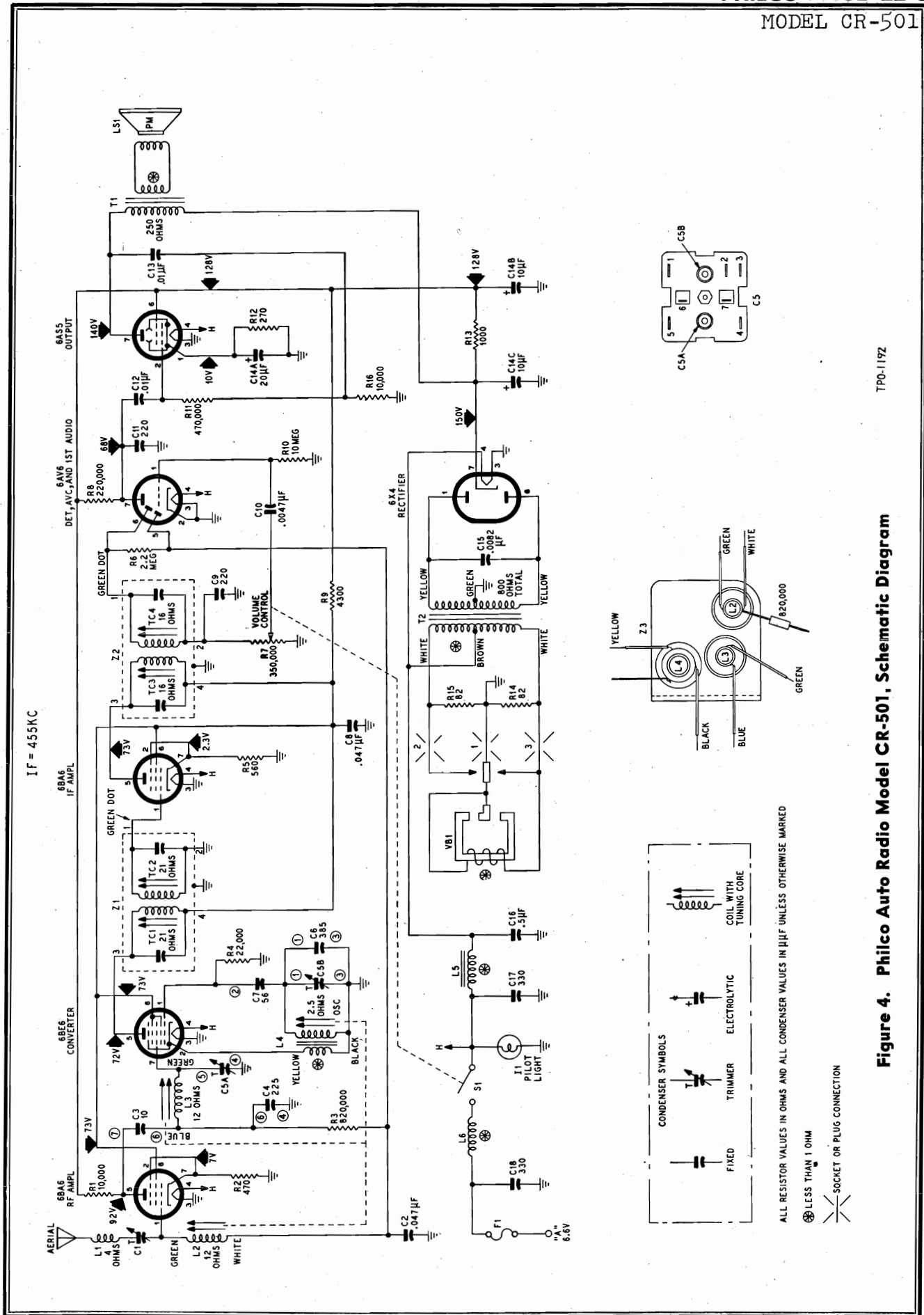
NOTE: Part numbers identified by an asterisk (*) are general replacement items. These numbers may not be identical with those on factory parts. Also, the electrical values of some replacement items may differ from the values indicated in the schematic diagram and parts list. The values substituted in any case are so chosen that the operation will be either unchanged or improved. When ordering replacements, use only the "Service Part No."

| Reference Symbol | Description | Service Part No. |
|------------------|---------------------------------------------------|------------------|
| C1 | Condenser, aerial trimmer | 31-6502 |
| C2 | Condenser, a-v-c filter, .047 μ f. | 45-3505-45* |
| C3 | Condenser, d-c blocking, 10 μ f. | Part of C5 |
| C4 | Condenser, r-f fixed trimmer, 225 μ f. | Part of C5 |
| C5 | Condenser, 2-section trimmer | 31-6522 |
| C5A | Condenser, r-f trimmer | Part of C5 |
| C5B | Condenser, oscillator trimmer | Part of C5 |
| C6 | Condenser, fixed osc. trimmer, 385 μ f. | Part of C5 |
| C7 | Condenser, d-c blocking, 56 μ f. | Part of C5 |
| C8 | Condenser, by-pass, .047 μ f. | 45-3505-45* |
| C9 | Condenser, i-f filter, 220 μ f. | 62-122001001 |
| C10 | Condenser, d-c blocking, .0047 μ f. | 45-3505-56* |
| C11 | Condenser, plate by-pass, 220 μ f. | 62-122001001 |
| C12 | Condenser, d-c blocking, .01 μ f. | 45-3505-41* |
| C13 | Condenser, tone compensation, .01 μ f. | 45-3505-58* |
| C14 | Condenser, 3-section electrolytic | 61-0068A |
| C14A | Condenser, cathode by-pass, 20 μ f. | Part of C14 |
| C14B | Condenser, filter, 10 μ f. | Part of C14 |
| C14C | Condenser, filter, 10 μ f. | Part of C14 |
| C15 | Condenser, buffer, .0082 μ f., 1000v | 30-4651-2* |
| C16 | Condenser, line filter, 5 μ f. | 61-0137* |
| C17 | Condenser, hash filter, 330 μ f. | 62-133001001 |
| C18 | Condenser, hash filter, 330 μ f. | 62-133001001 |
| F1 | Fuse, 14-amp. | 45-2559 |
| I1 | Pilot lamp, brown bead, bayonet, .15 amp. at 6.3v | 34-2068 |
| L1 | Choke, aerial | 32-4422-24 |
| L2 | Coil, aerial | Part of Z3 |
| L3 | Coil, r-f | Part of Z3 |
| L4 | Transformer, oscillator | Part of Z3 |
| L5 | Choke, line filter | 32-4170 |
| L6 | Choke, "A" lead hash filter | 32-1374 |
| LS1 | Speaker | 36-1636-1 |
| R1 | Resistor, plate load, 10,000 ohms | 66-3108340* |
| R2 | Resistor, cathode bias, 470 ohms | 66-1478340* |
| R3 | Resistor, grid return, 820,000 ohms | 66-4828340* |
| R4 | Resistor, grid return, 22,000 ohms | 66-3228340* |
| R5 | Resistor, cathode bias, 560 ohms | 66-1568340* |
| R6 | Resistor, diode load, 2.2 megohms | 66-5228340* |
| R7 | Volume control, 350,000 ohms (with off-on switch) | 33-5556-7 |
| R8 | Resistor, plate load, 220,000 ohms | 36-4228340* |
| R9 | Resistor, dropping, 4300 ohms | 66-2403340* |
| R10 | Resistor, grid return, 10 megohms | 66-6108340* |
| R11 | Resistor, grid return, 470,000 ohms | 66-4478340* |
| R12 | Resistor, cathode bias, 270 ohms, 1 watt | 66-1274340* |
| R13 | Resistor, filter, 1000 ohms, 1 watt | 66-2104340* |

| Reference Symbol | Description | Service Part No. |
|------------------|--------------------------------------------------|------------------|
| R14 | Resistor, damping, 82 ohms, 1 watt | 56-0824340* |
| R15 | Resistor, damping, 82 ohms, 1 watt | 66-0824340* |
| R16 | Resistor, feed back voltage divider, 10,000 ohms | 66-3108340* |
| S1 | Switch, off-on | Part of R7 |
| T1 | Transformer, output | 32-8450 |
| T2 | Transformer, power | 32-8451 |
| VB1 | Vibrator | 45-6307 |
| Z1 | Transformer, 1st i-f | 32-4160A |
| Z2 | Transformer, 2nd i-f | 32-4161A |
| Z3 | Tuner, complete with coils and tuning cores | 76-6011 |

MISCELLANEOUS

| Description | Service Part No. |
|-----------------------------------------------------------|------------------|
| "A" lead | 41-3910-11 |
| Bezel | 56-8247FA8 |
| Clip, grounding spring, brass (2 required) | 57-1335 |
| Clip, pilot-lamp mounting | 56-3545-5FA3 |
| Cover, top (tube end) | 56-8274FJ52 |
| Dial backplate | 56-8273FA3 |
| Dial scale | 54-5096 |
| Drive cord, 25-foot spool | 45-8750* |
| Fuse lead | 41-3910-12 |
| Housing | 76-6135FJ52 |
| Knob assembly (2 required) | 27-4687-15 |
| Master Kit | |
| Bolt, carriage, No. 10-24, 3/4" long (2 required) | 1W18005FA3 |
| Condenser, interference filter | 30-4007 |
| Lock washer, No. 10 (2 required) | 1W24258FA1 |
| Nut, No. 10-24 (2 required) | 1W19990FA3 |
| Resistor, distributor | 33-1196 |
| Screw, drive, No. 10, 5/8" long (2 required) | 1W19765FA3 |
| Screw, drive, slotted hex-head, No. 8 x 3/8" (2 required) | 1W19751FA3 |
| Screw, drive, slotted hex-head, No. 10 x 1-1/2" | 1W19770FA3 |
| Washer, No. 10, 1-1/4" diameter | 1W52359FA3 |
| Washer, flat (2 required) | 1W52692FA3 |
| Pilot-lamp assembly | 27-6233-4* |
| Pointer | 55-4362-10FCP |
| Socket, aerial | 57-1243FA3 |
| Socket, miniature, with center shield | 27-6203 |
| Socket, miniature, without center shield | 27-6203-12 |
| Socket, vibrator | 27-6243 |
| Spring, dial-cord | 56-8259FA1 |
| Strap, universal | 56-4767FA3 |



TP0-1192

Figure 4. Philco Auto Radio Model CR-501, Schematic Diagram

SPECIFICATIONS

| | |
|------------------------------|---------------------------------|
| CIRCUIT | Six-tube superheterodyne |
| FREQUENCY RANGE | 540—1605 kc. |
| AUDIO OUTPUT | 3.2 watts |
| POWER INPUT | 6.0 amperes at 6.6 volts, d.c. |
| INTERMEDIATE FREQUENCY | 455 kc. |
| PHILCO TUBES (6) | 6BA6 (2), 6BE6, 6AV6, 6AQ5, 6X4 |

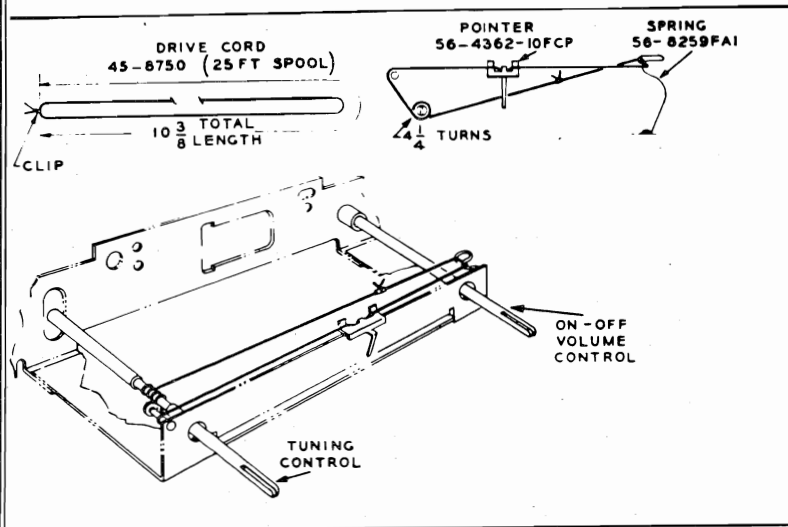


Figure 1. Drive-Cord Installation Details

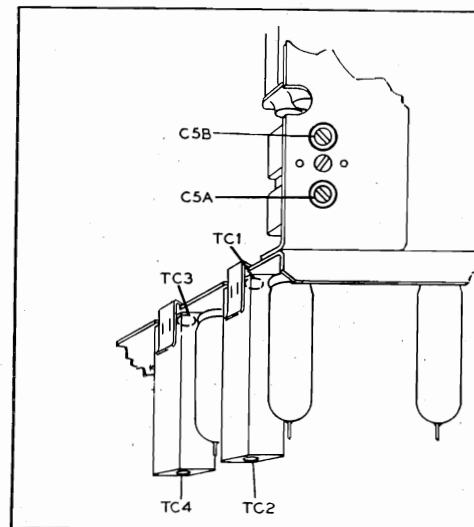


Figure 2. View Showing Trimmer Locations

ALIGNMENT PROCEDURE

OUTPUT METER — Connect across voice coil.

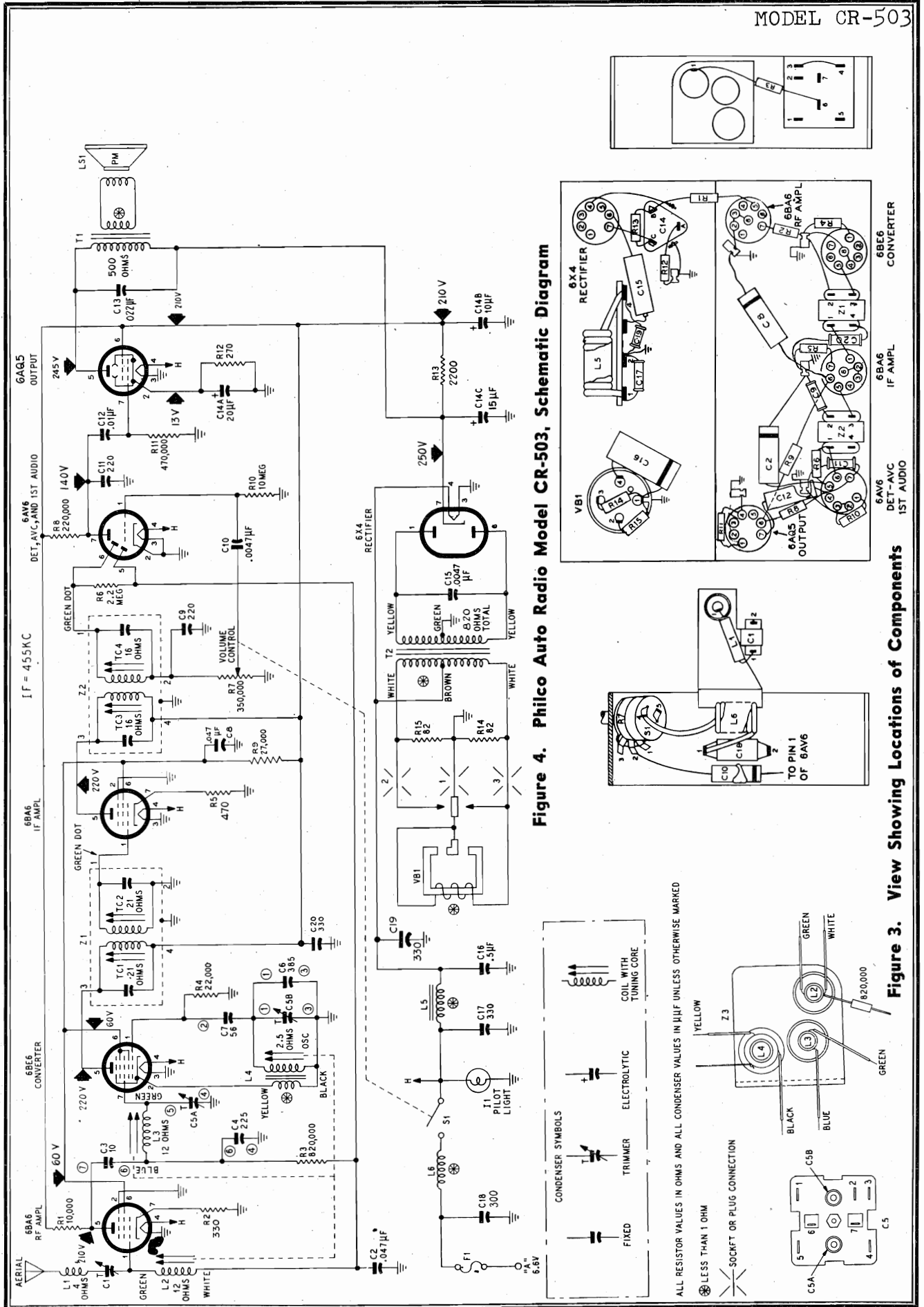
SIGNAL GENERATOR — Connect ground lead to chassis; connect output lead as indicated in chart. Use modulated output.

RADIO CONTROLS — Set volume control to maximum, and tuning control as indicated in chart.

OUTPUT LEVEL — During alignment, attenuate signal generator to maintain an output-meter indication below 1.5 volts.

DUMMY ANTENNA — Connect signal-generator output lead through a 30- μ f. condenser to antenna socket; connect a 30- μ f. condenser from antenna socket to ground.

| STEP | SIGNAL GENERATOR | | RADIO | | ADJUST TRIMMER |
|------|--------------------------------------------------------------------|--------------|------------------------------------|------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| | CONNECTION TO RADIO | DIAL SETTING | DIAL SETTING | SPECIAL INSTRUCTIONS | |
| 1 | Through .05- μ f. condenser to converter grid (pin 7 of 6BE6). | 455 kc. | Maximum counterclockwise | Adjust cores, in order given, for maximum output. TC1 and TC3 are reached through holes in bottom of i-f transformers. | TC4—2nd i-f sec. TC3—2nd i-f pri. TC2—1st i-f sec. TC1—1st i-f pri. |
| 2 | Through dummy antenna. | 1605 kc. | Maximum clockwise | Adjust for maximum output. | C5B—osc. trimmer C5A—r-f trimmer C1—ant. comp. |
| 3 | | | Tune to weak station near 1600 kc. | Readjust trimmer C1, with radio installed in car and antenna fully extended. | C1—ant. comp. |



MODEL CR-503

REPLACEMENT PARTS LIST

NOTE: Part numbers identified by an asterisk (*) are general replacement items. These numbers may not be identical with those on factory parts. Also, the electrical values of some replacement items may differ from the values indicated in the schematic diagram and parts list. The values substituted in any case are so chosen that the operation will be either unchanged or improved. When ordering replacements, use only the "Service Part No."

| Reference Symbol | Description | Service Part No. | Reference Symbol | Description | Service Part No. |
|------------------|---------------------------------------------------|------------------|------------------|---------------------------------------------|------------------|
| C1 | Condenser, antenna compensator | 31-6502 | R12 | Resistor, cathode bias, 270 ohms, 1 watt | 66-1274340* |
| C2 | Condenser, a-v-c filter, .047 μ f. | 45-3505-45* | R13 | Resistor, filter, 2200 ohms, 1 watt | 66-2224340* |
| C3 | Condenser, d-c blocking, 10 μ f. | Part of C5 | R14 | Resistor, damping, 82 ohms, 1 watt | 66-0824340* |
| C4 | Condenser, r-f fixed trimmer, 225 μ f. | Part of C5 | R15 | Resistor, damping, 82 ohms, 1 watt | 66-0824340* |
| C5 | Condenser, 2-section trimmer | 31-6522 | S1 | Switch, off-on | Part of R7 |
| C5A | Condenser, r-f trimmer | Part of C5 | T1 | Transformer, output | 32-8315-1 |
| C5B | Condenser, oscillator trimmer | Part of C5 | T2 | Transformer, power | 32-8457 |
| C6 | Condenser, fixed osc. trimmer, 385 μ f. | Part of C5 | VB1 | Vibrator | 83-0025* |
| C7 | Condenser, d-c blocking, 56 μ f. | Part of C5 | Z1 | Transformer, 1st i-f | 32-4160-6A |
| C8 | Condenser, by-pass, .047 μ f. | 45-3505-45* | Z2 | Transformer, 2nd i-f | 32-4161A |
| C9 | Condenser, i-f filter, 220 μ f. | 62-122001001 | Z3 | Tuner, complete with coils and tuning cores | 76-6011 |
| C10 | Condenser, d-c blocking, .0047 μ f. | 45-3505-56* | | | |
| C11 | Condenser, plate by-pass, 220 μ f. | 62-122001001 | | | |
| C12 | Condenser, d-c blocking, .01 μ f. | 45-3505-41* | | | |
| C13 | Condenser, tone compensation, .022 μ f. | 45-3505-60* | | | |
| C14 | Condenser, 3-section electrolytic | 61-0089A | | | |
| C14A | Condenser, cathode by-pass, 20 μ f. | Part of C14 | | | |
| C14B | Condenser, filter, 10 μ f. | Part of C14 | | | |
| C14C | Condenser, filter, 15 μ f. | Part of C14 | | | |
| C15 | Condenser, buffer, .0047 μ f., 1000v | 30-4661-1* | | | |
| C16 | Condenser, line filter, .5 μ f. | 61-0137* | | | |
| C17 | Condenser, hash filter, 330 μ f. | 62-133001001 | | | |
| C18 | Condenser, hash filter, 300 μ f. | 30-1235 | | | |
| C19 | Condenser, vibrator filter, 330 μ f. | 62-133001001 | | | |
| C20 | Condenser, 330 μ f. | 62-133001001 | | | |
| F1 | Fuse, 14-amp | 45-2559 | | | |
| I1 | Pilot lamp, brown bead, bayonet, .15 amp. at 6.3v | 34-2068 | | | |
| L1 | Choke, antenna | 32-4422-24 | | | |
| L2 | Coil, antenna | Part of Z3 | | | |
| L3 | Coil, r-f | Part of Z3 | | | |
| L4 | Transformer, oscillator | Part of Z3 | | | |
| L5 | Choke, line filter | 32-4170 | | | |
| L6 | Choke, "A" lead hash filter | 32-1374 | | | |
| LS1 | Speaker | 36-1638 | | | |
| R1 | Resistor, plate load, 10,000 ohms | 66-3108340* | | | |
| R2 | Resistor, cathode bias, 330 ohms | 66-1338340* | | | |
| R3 | Resistor, grid return, 820,000 ohms | 66-4828340* | | | |
| R4 | Resistor, grid return, 22,000 ohms | 66-3228340* | | | |
| R5 | Resistor, cathode bias, 470 ohms | 66-1478340* | | | |
| R6 | Resistor, diode load, 2.2 megohms | 66-5228340* | | | |
| R7 | Volume control, 350,000 ohms (with off-on switch) | 33-5556-7 | | | |
| R8 | Resistor, plate load, 220,000 ohms | 66-4228340* | | | |
| R9 | Resistor, dropping, 27,000 ohms | 66-3278340* | | | |
| R10 | Resistor, grid return, 10 megohms | 66-6108340* | | | |
| R11 | Resistor, grid return, 470,000 ohms | 66-4478340* | | | |

MISCELLANEOUS

| Description | Service Part No. |
|-----------------------------------------------------------|------------------|
| "A" lead | 41-3910-11 |
| Clip, grounding spring, brass (2 required) | 57-1335 |
| Clip, pilot-lamp mounting | 56-3545-5FA3 |
| Cover, top (tube side) | 56-8274FJ52 |
| Dial backplate | 56-8273FA3 |
| Drive cord, 25-foot spool | 45-8750 |
| Fuse lead | 41-3910-12 |
| Housing | 76-6135-1FA2 |
| Knob assembly (2 required) | 27-4687-15 |
| Master Kit | |
| Braid | 95-0073 |
| Condenser, interference filter | 30-4007 |
| Lock washer, No. 10 (2 required) | 1W24258FA1 |
| Resistor, distributor | 33-1196 |
| Screw, drive, No. 8, 1/2" long (4 required) | 1W19752FA3 |
| Screw, drive, slotted hex-head, No. 8 x 3/8" (2 required) | 1W19751FA3 |
| Screw, drive, slotted hex-head, No. 10 x 1 1/2" | 1W19770FA3 |
| Washer, No. 10, 1 1/4" diameter | 1W52359FA3 |
| Washer, flat (2 required) | 1W52692FA3 |
| Pilot-lamp assembly | 27-6233-4* |
| Pointer | 56-4362-10 |
| Socket, aerial | 57-1243FA3 |
| Socket, miniature with center shield | 27-6203 |
| Socket, miniature, without center shield | 27-6203-12 |
| Socket, speaker | 27-6149 |
| Socket, vibrator | 27-6245 |
| Spring, dial-cord | 56-8259FA1 |
| Strap, universal | 56-4767FA3 |

SPECIFICATIONS

| | |
|------------------------------|---------------------------------|
| CIRCUIT | Six-tube superheterodyne |
| FREQUENCY RANGE | 540—1605 kc. |
| AUDIO OUTPUT | 3.2 watts |
| POWER INPUT | 6.0 amperes at 6.6 volts, d.c. |
| INTERMEDIATE FREQUENCY | 455 kc. |
| PHILCO TUBES (6) | 6BA6 (2), 6BE6, 6AV6, 6AQ5, 6X4 |

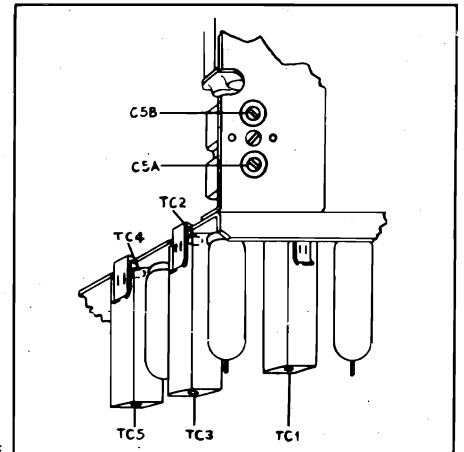


Figure 1. View Showing Trimmer Locations

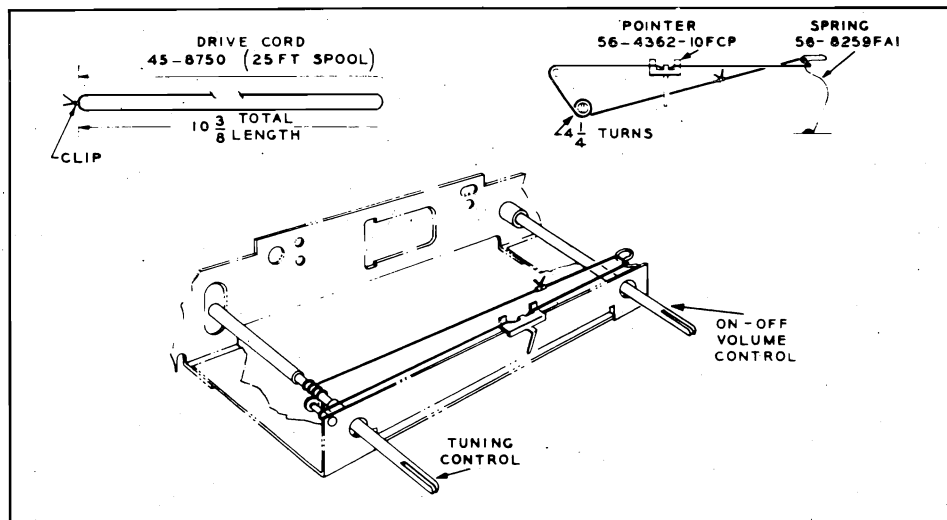


Figure 2. Drive-Cord Installation Details

ALIGNMENT PROCEDURE

OUTPUT METER — Connect across voice coil.

SIGNAL GENERATOR — Connect ground lead to chassis; connect output lead as indicated in chart. Use modulated output.

RADIO CONTROLS — Set volume control to maximum, and tuning control as indicated in chart.

OUTPUT LEVEL — During alignment, attenuate signal generator to maintain an output-meter indication below 1.5 volts.

DUMMY ANTENNA — Connect signal-generator output lead through a 30- $\mu\mu\text{f}$. condenser to antenna socket; connect a 30- $\mu\mu\text{f}$. condenser from antenna socket to ground.

MODEL CR-505

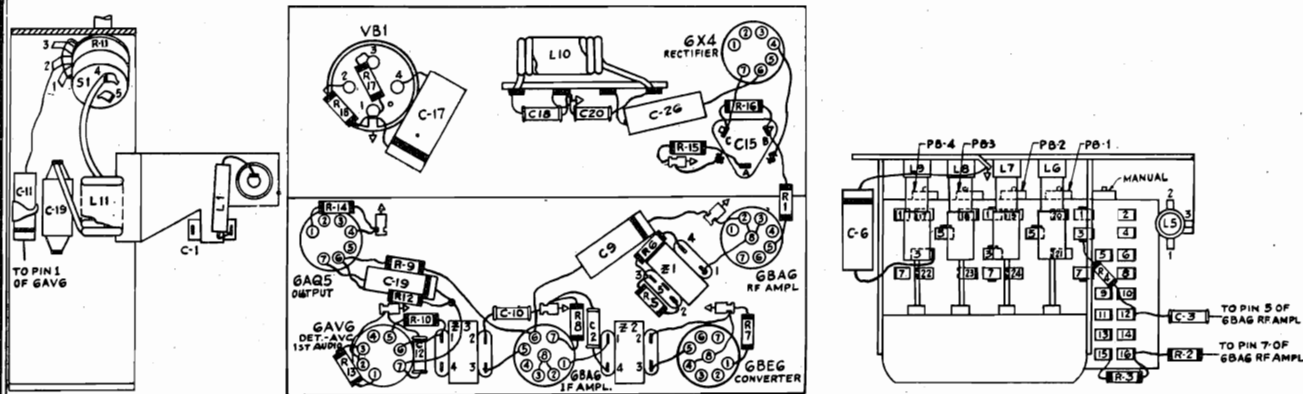


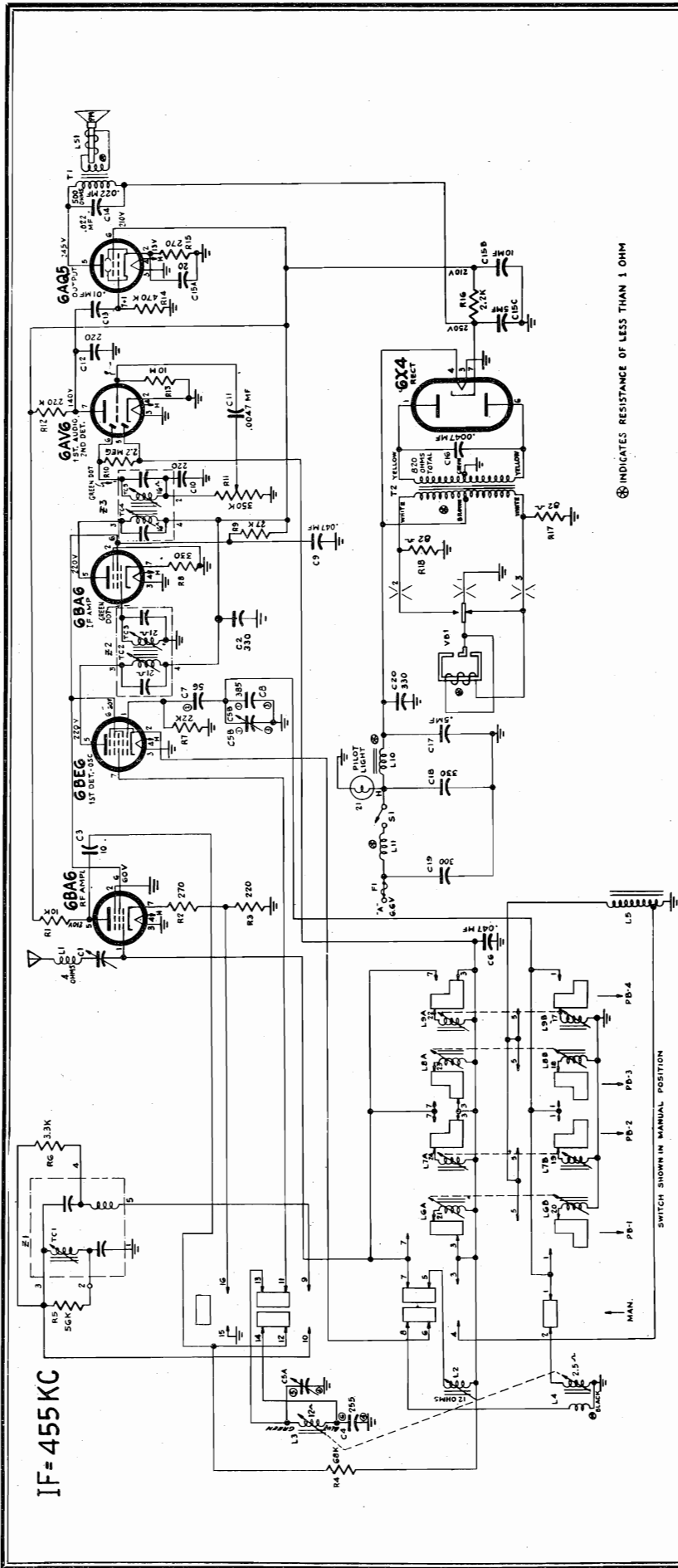
Figure 3. View Showing Locations of Components

| STEP | SIGNAL GENERATOR | | RADIO | | ADJUST TRIMMER |
|------|--------------------------------------------------------------------|--------------|------------------------------------|------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| | CONNECTION TO RADIO | DIAL SETTING | DIAL SETTING | SPECIAL INSTRUCTIONS | |
| 1 | Through .05- μ f. condenser to converter grid (pin 7 of 6BE6). | 455 kc. | Maximum counterclockwise | Adjust cores, in order given, for maximum output. TC5 and TC3 are reached through holes in bottom of i-f transformers. | TC5—2nd i-f sec. TC4—2nd i-f pri. TC3—1st i-f sec. TC2—1st i-f pri. |
| 2 | Through dummy antenna. | 1605 kc. | Maximum clockwise | Adjust for maximum output. | C5B—osc. trimmer C5A—r-f trimmer C1—ant. comp. |
| 3 | | | Tune to weak station near 1600 kc. | Readjust trimmer C1; with radio installed in car and antenna fully extended. | C1—ant. comp. |

PUSH BUTTON ALIGNMENT

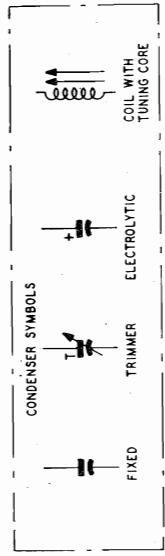
Make the Manual alignment first.

| STEP | SIGNAL GENERATOR | | RADIO | | ADJUST TRIMMER |
|------|------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| | CONNECTION TO RADIO | DIAL SETTING | PUSH BUTTON | SPECIAL INSTRUCTIONS | |
| 1 | Through dummy antenna. | 455 kc. | PB1 | Adjust for minimum output. | TC1 |
| 2 | Same as step 1. | 730 kc. | PB1 and PB2 | Tune for maximum output by turning core key. Then adjust for maximum with the hex-nut that holds core and osc. section to front frame. Re-cement. | |
| 3 | Same as step 2. | 1000 kc. | PB3 | Same as step 2. | |
| 4 | Same as step 2. | 1200 kc. | PB4 | Same as step 2. | |
| 5 | Same as step 2. | Frequency of desired station | PB1 PB2 PB3 PB4 | Adjust by rotating core key. Adjust lowest frequency first. | |
| 6 | Repeat Step No. 5 with radio installed and antenna fully extended while listening to the station for which the adjustment is being made. | | | | |



⊗ INDICATES RESISTANCE OF LESS THAN 1 OHM

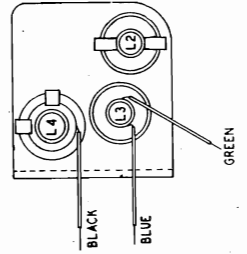
Figure 4. Philco Auto Radio Model CR-505, Schematic Diagram



ALL RESISTOR VALUES IN OHMS AND ALL CONDENSER VALUES IN μ F UNLESS OTHERWISE MARKED

⊗ LESS THAN 1 OHM

⊗ SOCKET OR PLUG CONNECTION



REPLACEMENT PARTS LIST

NOTE: Part numbers identified by an asterisk (*) are general replacement items. These numbers may not be identical with those on factory parts. Also, the electrical values of some replacement items may differ from the values indicated in the schematic diagram and parts list. The values substituted in any case are so chosen that the operation will be either unchanged or improved. When ordering replacements, use only the "Service Part No."

| Reference Symbol | Description | Service Part No. | Reference Symbol | Description | Service Part No. |
|--------------------|------------------------------------------------------------|------------------|------------------|---------------------------------------------|------------------|
| C1 | Condenser, antenna compensator | 31-6502 | R13 | Resistor, grid return, 10 megohms | 66-6108340* |
| C2 | Condenser, by-pass, 330 $\mu\mu\text{f}$. | 62-133001001 | R14 | Resistor, grid return, 470,000 ohms | 66-4478340* |
| C3 | Condenser, d-c blocking, 10 $\mu\mu\text{f}$. | 62-010009001* | R15 | Resistor, cathode bias, 270 ohms, 1 watt | 66-1274340* |
| C4 | Condenser, fixed trimmer, 255 $\mu\mu\text{f}$. | Part of C5 | R16 | Resistor, filter, 2,200 ohms, 1 watt | 66-2224340* |
| C5 | Condenser, 4 sections fixed and 2 section variable trimmer | 31-6522-1 | R17 | Resistor, vibrator damping, 82 ohms, 1 watt | 66-0824340* |
| C5A | Condenser, r-f trimmer | Part of C5 | R18 | Resistor, vibrator damping, 82 ohms, 1 watt | 66-0824340* |
| C5B | Condenser, osc. trimmer | Part of C5 | S1 | Switch, off-on | Part of R11 |
| C6 | Condenser, a-v-c by-pass, .047 μf . | 45-3505-45* | T1 | Transformer, output | 32-8315-1 |
| C7 | Condenser, d-c blocking, 56 $\mu\mu\text{f}$. | Part of C5 | T2 | Transformer, power | 32-8457 |
| C8 | Condenser, fixed osc. trimmer, 385 $\mu\mu\text{f}$. | Part of C5 | VB1 | Vibrator | 83-0025* |
| C9 | Condenser, screen by-pass, .047 μf . | 45-3505-45* | Z1 | Transformer, r-f | 32-4349 |
| C10 | Condenser, i-f by-pass, 220 $\mu\mu\text{f}$. | 62-122001001 | Z2 | Transformer, 1st i-f | 32-4160-6A |
| C11 | Condenser, d-c blocking, .0047 μf . | 45-3505-56* | Z3 | Transformer, 2nd i-f | 32-4161A |
| C12 | Condenser, plate by-pass, 220 $\mu\mu\text{f}$. | 62-122001001 | | | |
| C13 | Condenser, d-c blocking, .01 μf . | 45-3505-41* | | | |
| C14 | Condenser, tone compensation, .022 μf . | 45-3505-60* | | | |
| C15 | Condenser, electrolytic, 3 section | 61-0089A | | | |
| C15A | Condenser, cathode by-pass, 20 μf . | Part of C15 | | | |
| C15B | Condenser, filter, 10 μf . | Part of C15 | | | |
| C15C | Condenser, filter, 15 μf . | Part of C15 | | | |
| C16 | Condenser, buffer, .0047 μf ., 1600v | 30-4661-1 | | | |
| C17 | Condenser, vibrator damping, .5 μf . | 61-0137 | | | |
| C18 | Condenser, hash filter, 330 $\mu\mu\text{f}$. | 62-133001001 | | | |
| C19 | Condenser, hash filter, 300 $\mu\mu\text{f}$. | 30-1235 | | | |
| C20 | Condenser, vibrator filter, 330 $\mu\mu\text{f}$. | 62-133001001 | | | |
| F1 | Fuse, 14 amp. | 45-2559 | | | |
| I1 | Pilot lamp, brown bead, bayonet, .15 amp. at 6.3v | 34-2068 | | | |
| L1 | Choke, antenna | 32-4422-24 | | | |
| L2 | Coil, antenna | Part of Z4 | | | |
| L3 | Coil, r-f | Part of Z4 | | | |
| L4 | Coil, oscillator | Part of Z4 | | | |
| L5 | Coil, osc. shunt | Part of Z5 | | | |
| L6A, L7A, L8A, L9A | Coil, push button r-f | Part of Z5 | | | |
| L6B, L7B, L8B, L9B | Coil, push button oscillator | Part of Z5 | | | |
| L10 | Choke, line filter | 32-4170 | | | |
| L11 | Choke, "A" lead hash filter | 32-1374 | | | |
| LS1 | Speaker | 36-1638 | | | |
| R1 | Resistor, plate load, 10,000 ohms | 66-3108340* | | | |
| R2 | Resistor, cathode bias, 270 ohms | 66-1278340* | | | |
| R3 | Resistor, cathode bias, 220 ohms | 66-1228340* | | | |
| R4 | Resistor, grid return, 68,000 ohms | 66-3688340* | | | |
| R5 | Resistor, r-f primary loading, 56,000 ohms | 66-3568340* | | | |
| R6 | Resistor, band pass, 3,300 ohms | 66-2338340* | | | |
| R7 | Resistor, grid return, 22,000 ohms | 66-3228340* | | | |
| R8 | Resistor, cathode bias, 330 ohms | 66-1338340* | | | |
| R9 | Resistor, screen dropping, 27,000 ohms | 66-3278340* | | | |
| R10 | Resistor, diode load, 2.2 megohms | 66-5228340* | | | |
| R11 | Volume control, 350,000 ohms | 33-5556-8 | | | |
| R12 | Resistor, plate load, 220,000 ohms | 66-4228340* | | | |

MISCELLANEOUS

| Description | Service Part No. |
|-------------------------------------------------------------------|------------------|
| "A" lead | 41-3910-11 |
| Clip, ground spring (2) | 57-1335 |
| Cover, top, tube side | 56-8274FJ52 |
| Dial Backplate | 56-8273FA3 |
| Dial cord, 25-foot spool | 45-8750* |
| Spring, drive cord | 56-8259FA1 |
| Fuse lead | 41-3910-12 |
| Housing Assembly | 76-6135-1FA2 |
| Knob assembly (2) | 27-4687-15 |
| Master Kit | |
| Braid | 95-0073 |
| Condenser, interference filter | 30-4007 |
| Resistor, distributor | 33-1196 |
| Screw, No. 10 x 1-1/2" slotted hex-head drive, strap to fire wall | 1W19770FA3 |
| Screw, No. 8 x 1/2" slotted hex-head drive, speaker to plate (4) | 1W19752FA3 |
| Screw, No. 8 x 3/8" slotted hex-head drive, strap to set | 1W19751FA3 |
| Washer, No. 10 x 1-1/4" diam., .056" thick for No. 10 screw | 1W52359FA3 |
| Nut, bezel mounting (2) | 56-6464FA7 |
| Pilot lamp assembly | 27-6233-4 |
| Clip, pilot lamp mounting | 56-3545-5FA3 |
| Pointer | 56-4362-10 |
| Push button and key assembly (station buttons) (4) | 76-6239 |
| Push button and key assembly (manual) | 76-6239-1 |
| Socket, aerial | 57-1243FA3 |
| Socket, miniature, with center shield (3) | 27-6203 |
| Socket, miniature, without center shield (3) | 27-6203-12 |
| Socket, speaker | 27-6149 |
| Socket, vibrator | 27-6245 |
| Strap, universal, set mounting | 56-4767FA3 |
| Tuner, manual | 76-6011-1 |
| Tuner and switch assembly, push button, complete | 76-5940 |
| Tuner and switch assembly | 76-6053 |

Production Changes

The following changes occurred early in production but were not identified by run number.

C10, the .022 *uf* tone compensation condenser, is now .0068 *uf* part number 45-3505-57*.

The wiring of C9 is reversed to use C9B, 220 *uuf* section, as plate by-pass for the 7C6, C9A, the .007 *uf* section is still used as the d-c blocking.

SPECIFICATIONS

| | |
|------------------------------|----------------------------------------------------------------------------------------------------------------------|
| CABINET | Molded plastic, mottled mahogany |
| CIRCUIT | Five-tube superheterodyne |
| FREQUENCY RANGE | 540—1620 kc. |
| AUDIO OUTPUT | One watt |
| OPERATING VOLTAGE | 105—120 volts, 60 cycles, a.c. |
| POWER CONSUMPTION | |
| Radio | 30 watts |
| Phonograph | 45 watts |
| INTERMEDIATE FREQUENCY | 455 kc. |
| AERIAL | Built-in high-impedance loop; provision for external aerial |
| PHILCO TUBES (5) | 7A8 converter, 7B7 i-f amplifier, 7C6 2nd det. 1st audio, 50L6GT output, 35Z5GT rectifier |
| PHONOGRAPH | Philco Model M-22 All-Speed Automatic Record Changer. (For service information, refer to Service Manual PR-1923.) |

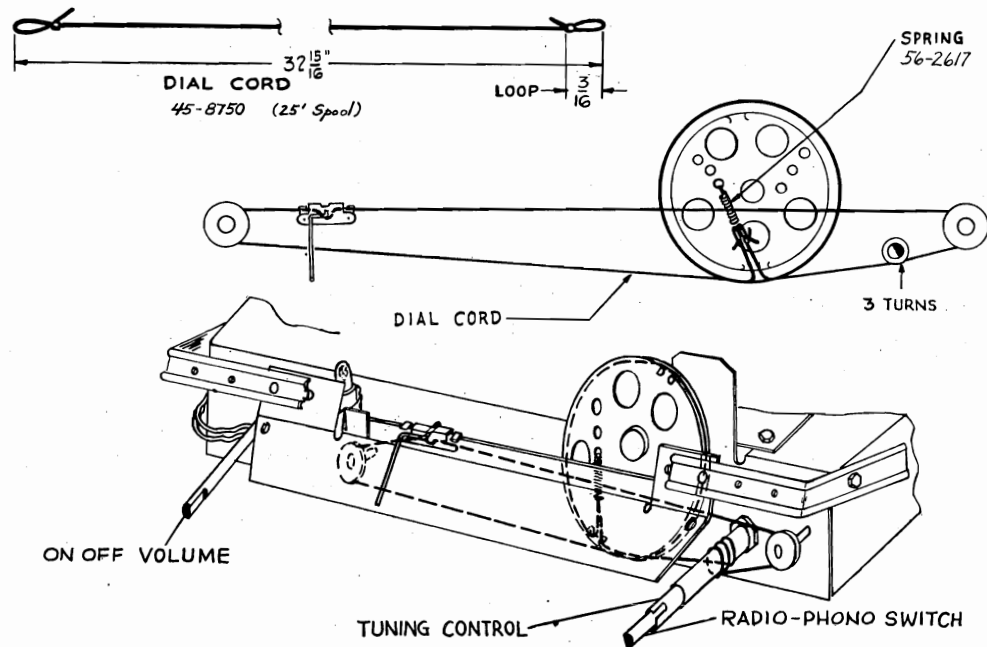


Figure 1. Drive-Cord Installation Details

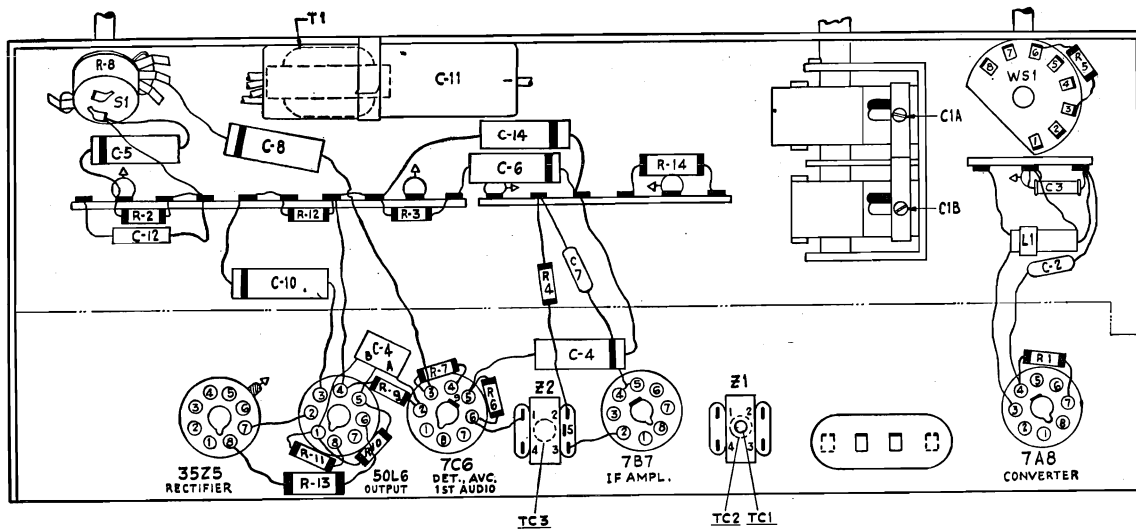


Figure 2. Base View, Showing Parts Placement and Alignment Points

ALIGNMENT PROCEDURE

DIAL POINTER—Turn tuning condenser to full-mesh position. Set dial pointer to the index mark, located to the left of "55".

CONTROLS—Set volume control to maximum, "Phono-Radio" switch to Radio position, and the tuning control as indicated in the chart.

OUTPUT METER—Connect across voice coil terminals.

SIGNAL GENERATOR—Ground lead to B-, output lead as indicated in chart.

OUTPUT LEVEL—During alignment, attenuate signal-generator output to hold output-meter indication below 1.25 volts.

| STEP | SIGNAL GENERATOR | | RADIO | | ADJUST TRIMMER |
|------|-----------------------------------------------------------------------|--------------|--------------------|-----------------------------------------------------------------------------------------------------|----------------------------------------------------------|
| | CONNECTION TO RADIO | DIAL SETTING | DIAL SETTING | SPECIAL INSTRUCTIONS | |
| 1 | Through a .01 μ f. condenser to pin #6 of the 7A8 converter tube. | 455 kc. | Gang fully closed. | Adjust, in order given, for maximum output. TC2 and TC3 are located at the top of the transformers. | TC3—2nd i-f sec. TC2—1st i-f sec. TC1—1st i-f pri. |
| 2 | Radiating loop (see note below). | 1600 kc. | 1600 kc. | Adjust for maximum. | C1B—osc. trimmer |
| 3 | Same as Step 2. | 1500 kc. | 1500 kc. | Adjust for maximum. | C1A—ant. trimmer |

RADIATING LOOP: Make up a 6-8-turn, 8-inch-diameter loop from insulated wire, connect to signal generator output leads, and place near radio loop.

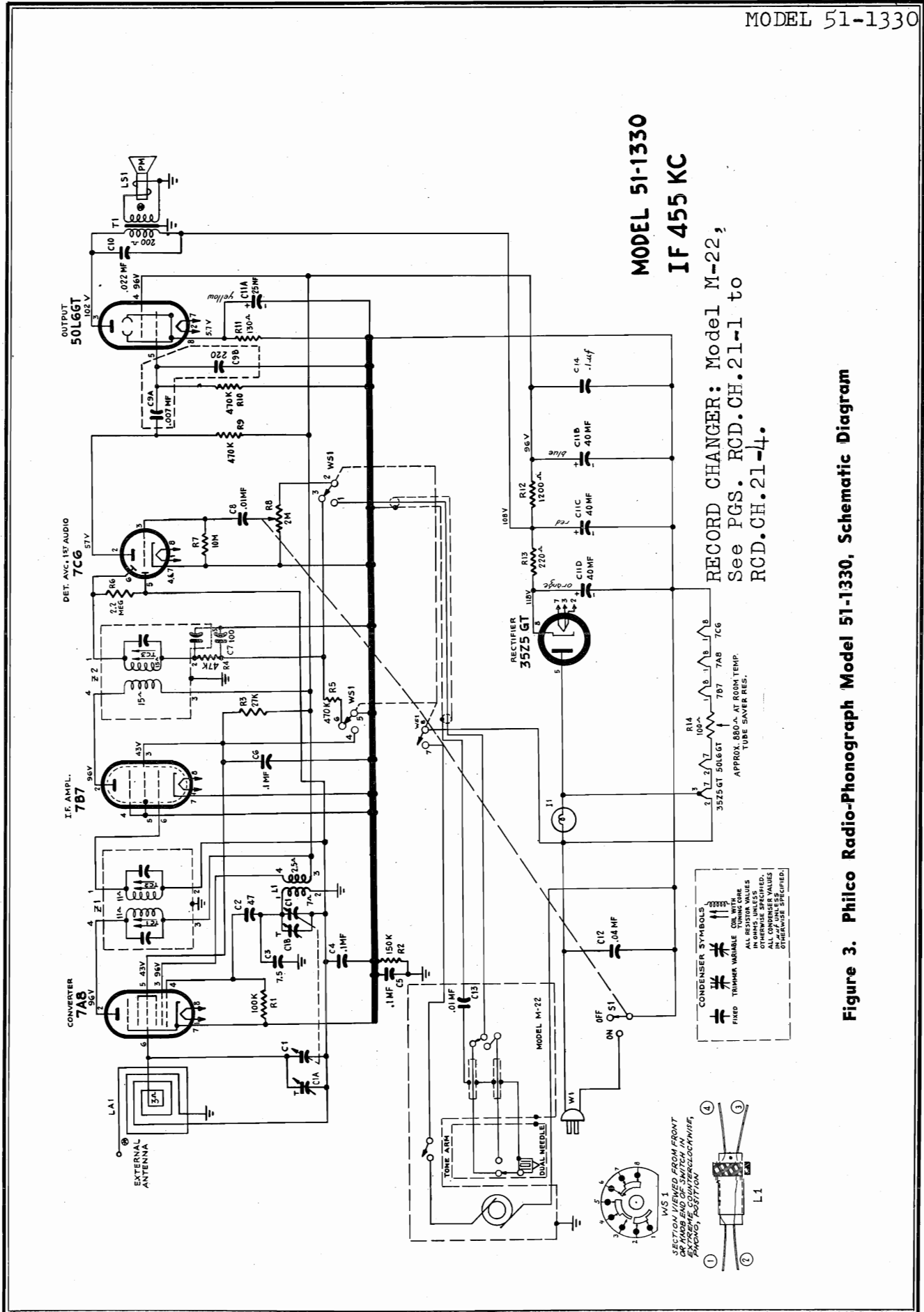


Figure 3. Philco Radio-Phonograph Model 51-1330, Schematic Diagram

MODEL 51-1330

CORRECTIONS TO MANUAL

Drive-Cord Installation Details

The spring, part number 56-2617 should be shown as terminating in the middle hole of the drive drum.

Run No. 2

The 2nd i-f transformer, Z2, is now part number 32-4240. This transformer is double tuned and has two 100 μmf . i-f filter condensers built-in. The transformer wiring is shown in figure 4.

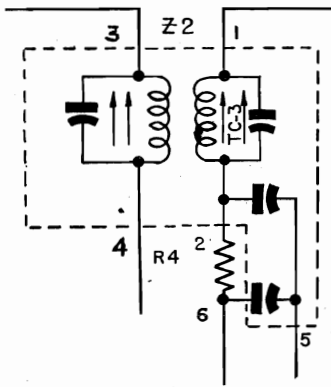


Figure 4. Run 2 I-F Transformer

Also, the 1st i-f transformer, Z1, is reversed. The transformer is rotated 180° on the chassis and the wiring is as follows: No. 1 is plate, No. 2 is B+, No. 3 is grid, No. 4 is a-v-c.

REPLACEMENT PARTS LIST

NOTE: Part numbers marked with an asterisk (*) are general replacement items. These numbers may not be identical with those on factory assemblies; also, the electrical values of some replacement items may differ from the values indicated in the schematic diagram and parts list. The values substituted in any case are so chosen that the operation of the receiver will be either unchanged or improved. When ordering replacements, use only the "Service Part No."

| Reference Symbol | Description | Service Part No. |
|------------------|-----------------------------------------------------------|------------------|
| C1 | Condenser, tuning gang | 31-2751-9 |
| C2 | Condenser, osc. grid, d-c blocking, 47 μmf . | 60-00515307* |
| C3 | Condenser, temperature compensating, 7.5 μmf . | 30-1224-65 |
| C4 | Condenser, a-v-c by-pass, .1 μf . | 61-0113* |
| C5 | Condenser, by-pass, .1 μf . | 61-0113* |
| C6 | Condenser, screen by-pass, .1 μf . | 61-0113* |
| C7 | Condenser, i-f filter, 100 μmf . | 62-110009001* |
| C8 | Condenser, d-c blocking, .01 μf . | 61-0120* |
| C9 | Condenser, dual ceramic | 30-1239-4 |
| C9A | Condenser, d-c blocking, .007 μf . | Part of C9 |
| C9B | Condenser, grid by-pass, 220 μmf . | Part of C9 |
| C10 | Condenser, tone compensation, .022 μf . | 45-3505-43* |
| C11 | Condenser, electrolytic, 4 section | 30-2575-32' |
| C11A | Condenser, cathode by-pass, 25 μf . | Part of C11 |
| C11B | Condenser, filter, 40 μf . | Part of C11 |
| C11C | Condenser, filter, 40 μf . | Part of C11 |
| C11D | Condenser, filter, 40 μf . | Part of C11 |
| C12 | Condenser, line by-pass, .04 μf . | 45-3505-62* |

| Reference Symbol | Description | Service Part No. |
|------------------|---------------------------------------------------------------|------------------|
| C13 | Condenser, phono isolation, .01 μf . | 61-0120* |
| C14 | Condenser, r-f by-pass, .1 μf . | 61-0113* |
| I1 | Pilot lamp, type 47 | 34-2068 |
| L1 | Coil, oscillator | 32-4263 |
| LA1 | Loop antenna | 76-2127-11 |
| LS1 | Speaker, 5 1/4" round | 36-1639 |
| R1 | Resistor, grid return, 100,000 ohms | 66-4108340* |
| R2 | Resistor, leakage, 150,000 ohms | 66-4158340* |
| R3 | Resistor, dropping, 27,000 ohms | 66-3274340* |
| R4 | Resistor, i-f filter, 47,000 ohms | 66-3478340* |
| R5 | Resistor, diode return, 470,000 ohms | 66-4478340* |
| R6 | Resistor, diode load, 2.2 megohms | 66-5228340* |
| R7 | Resistor, grid return, 10 megohms | 66-6108340* |
| R8 | Volume control, 2 megohms (with switch) | 33-5564-11 |
| R9 | Resistor, plate load, 470,000 ohms | 66-4478340* |
| R10 | Resistor, grid return, 470,000 ohms | 66-4478340* |
| R11 | Resistor, cathode bias, 130 ohms | 66-1128340* |
| R12 | Resistor, filter, 1200 ohms | 66-2128340* |
| R13 | Resistor, filter, 220 ohms, 2 watts | 66-1225340* |
| R14 | Resistor, surge limiting, 880 Ω cold, 100 Ω hot | 33-1343-3 |
| S1 | Switch, off-on | Part of R8 |
| T1 | Transformer, output | 32-8384* |
| W1 | Line cord | L-2183 |
| WS1 | Wafer switch, radio-phono | 42-1949 |
| Z1 | Transformer, 1st i-f | 32-4160A |
| Z2 | Transformer, 2nd i-f | 32-4454-1A |

MISCELLANEOUS

| Description | Service Part No. |
|----------------------------------|------------------|
| Backplate assembly | 76-6232 |
| Cabinet, complete | 10840-2 |
| Hinge (2) | 56-6603 |
| Lid | 54-4838 |
| Lid support | 56-6604 |
| Changer Mounting Hardware | |
| Sleeve, rubber (3) | 54-7798 |
| Speed nut (3) | W-2554 |
| Spring, heavy, top (3) | 56-7059FA9 |
| Spring, light, bottom (3) | 56-7059-1FJ47 |
| Dial scale | 54-5107 |
| Knob, off-on-volume | 54-4843 |
| Knob, phono-radio | 54-4842 |
| Knob, tuning | 54-4841 |
| Pilot lamp socket assembly | 76-1179-1 |
| Fastener, pilot lamp shield | W2235-1FA9 |
| Pointer | 56-5630-31 |
| Spring, pointer drive | 56-2617 |
| Socket, Loktal (3) | 27-6207 |
| Socket, octal (2) | 27-6174 |
| Tuning shaft | 56-8370 |

PRIVAT-EAR INSTRUCTION AND
SERVICE NOTES

OPERATION - To place the PRIVAT-EAR radio in operation, pull out the plastic bead on top of case. This extends the built-in telescopic antenna. When all four telescoping sections are exposed, the receiver power is automatically turned "ON". The radio is turned "OFF" by pushing the plastic bead down until all sections of the telescopic antenna are inside the case.

Note: The set is not turned "ON" and "OFF" by means of volume control knob.

EARPHONE - Place earphone on ear so that it fits comfortably.

VOLUME CONTROL - This control appears above the VOL marking on the case. Turn the knob about 3/4 of its full clockwise rotation.

STATION SELECTOR - The right hand knob is the station selector. Numbers 6 and 9 and 16 on the case correspond to approximately 600, 900 and 1600 kilocycles. Turn knob slowly until maximum volume of desired station is obtained. Adjust the volume control to desired volume.

NOTE: DO NOT TRY TURNING SET "ON" OR "OFF" BY ROTATING VOLUME CONTROL BEYOND STOP.

RECOMMENDED SERVICE PROCEDURE

1. Set Does Not Work:

- a) Remove bottom half of back and check batteries.
- b) With antenna fully extended, press down on metal contact which is actuated by antenna section. If set plays when the contact is pressed, it indicates a dirty contact or insufficient pressure. A slight bend near the riveted section of this contact will increase the pressure.

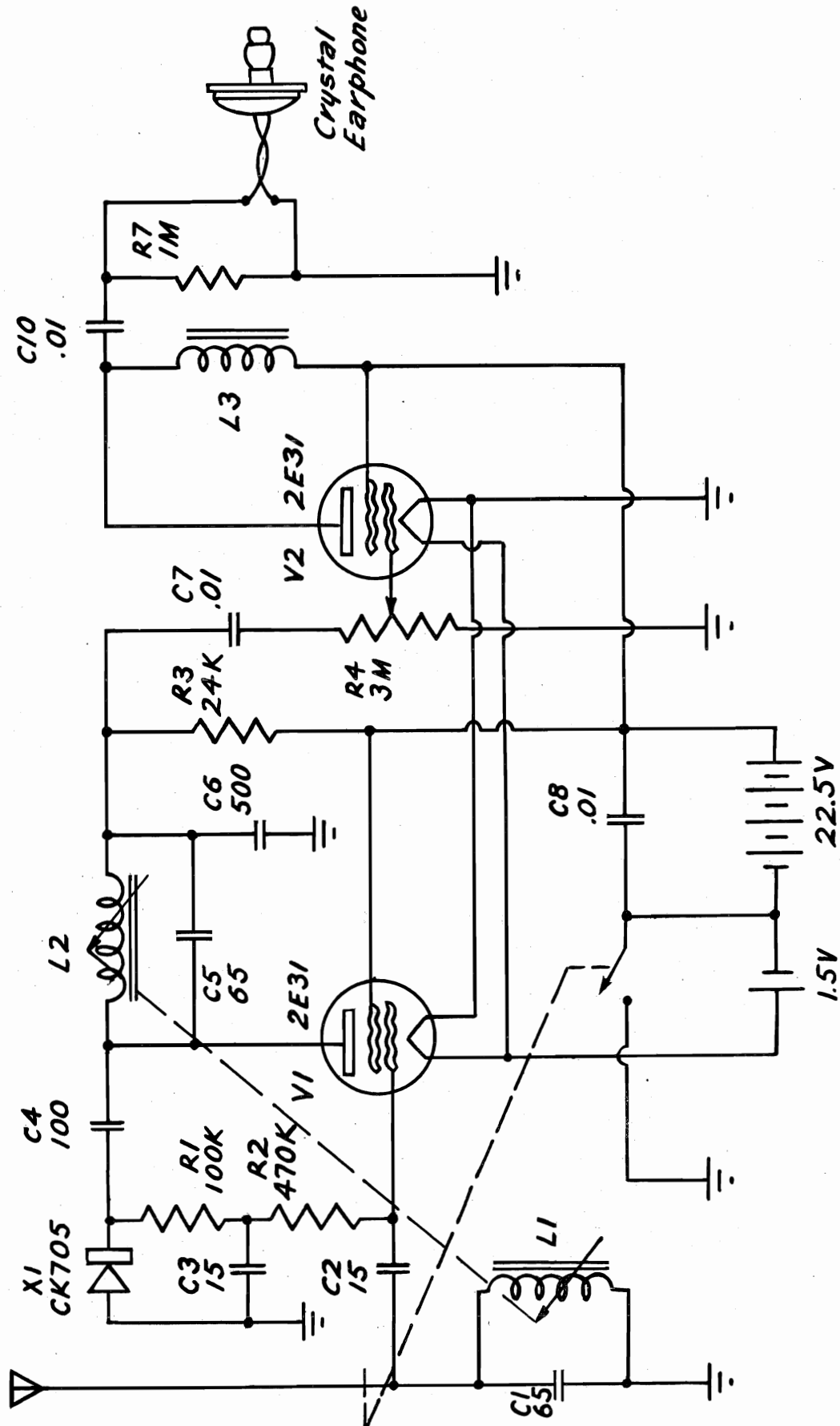
2. Set Performs, But Is Weak:

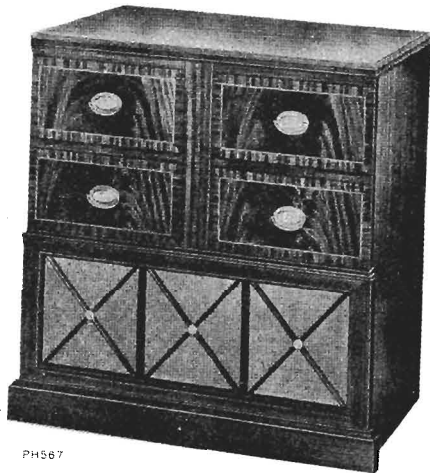
- a) Check batteries.
- b) Set may be operating in a poor reception area.
- c) Antenna may not be extended fully.

3. Receiver Alignment:

NOTE: The receiver was properly aligned before it left the factory. Actual alignment will be required if a coil is being replaced or if it has become loose.

- a) Remove upper half of back of case.
- b) Adjust modulated signal generator to 1600 kilocycles.
- c) Place "hot" side of generator output lead about 2 inches away from telescopic antenna.
- d) Turn station selector knob so that iron slugs are as far as possible outside the coils.
- e) Move each coil relative to the slug until maximum signal from the signal generator is heard.
- f) Carefully fasten coils to plastic chassis, using a quick drying radio cement.





PH567

Specifications

Tuning Range

Standard Broadcast (AM) 540-1,600 kc.
 Frequency Modulation (FM) 88-108 mc.
 Intermediate Frequencies AM—455 kc., FM—10.7 mc.

Tube Complement

- (1) RCA 6CB6..... R-F Amplifier
- (2) RCA 6J6..... Mixer and Oscillator
- (3) RCA 6BA6..... I-F Amplifier
- (4) RCA 6AU6..... Driver
- (5) RCA 6AL5..... Ratio Detector
- (6) RCA 6AV6..... AM Det.—AVC—A-F Amplifier
- (7) RCA 6C4..... Ph. Inv.
- (8) RCA 6V6GT..... Output
- (9) RCA 6V6GT..... Output
- (10) RCA 5Y3GT..... Rectifier

Dial Lamps (2).....Type No. 51, 6-8 volts, 0.2 amp.
 Jewel Lamp Type No. 51, 6-8 volts, 0.2 amp.

Tuning Drive Ratio10:1 (5 turns of knob)

Power Supply Rating 115 volts, 60 cycles, 115 watts

Loudspeaker (92569-12W)

Size and type 12 in. PM
 Voice coil impedance 3.2 ohms at 400 cycles

Power Output

(Radio) Undistorted 8 watts.....Maximum 9 watts
 (Phono.) Undistorted 10 watts..... Maximum 11 watts

Weight97 lbs.

Cabinet Dimensions

Height 32 in. Width 32 in. Depth 19 1/4 in.

Record Changer (RP-190-2)

Turntable speed 45 r.p.m.
 Pickup (RP-190—Stock No. 75575)Crystal

Record Changer 960282-4 or 5

Turntable speed78 or 33 1/3 r.p.m.
 Pickup (Stock No. 75475) Crystal

FOR RECORD CHANGER SERVICE INFORMATION REFER TO RP-190 SERIES SERVICE DATA FOR 45 R.P.M. AND MODEL 960282 SERVICE DATA FOR 78/33 1/3 R.P.M.

Socket Voltages

Voltages measured with Chanalyst or VoltOhmyst and should hold within ±20% with rated line voltage. Tuning condenser closed—no signal input.

| Tube | Terminal | Voltage | | |
|-----------------------------|------------|---------|-------|-------|
| | | Phono | A.M. | F.M. |
| V1 6CB6 R.F. Amp. | Plate 5 | — | 203 | 132 |
| | Screen 6 | — | 48 | 39 |
| | Cathode 2 | — | 0.2 | 0.2 |
| | Grid 1 | — | -1.1 | -0.9 |
| V2 6J6 Mixer and Osc. | Plate 2 | — | 55 | 51 |
| | Grid 5 | — | -1.4 | -1.2 |
| | Plate 1 | — | 33 | 27 |
| | Grid 6 | — | -2.1 | -1.9 |
| V3 6BA6 I.F. Amp. | Plate 5 | — | 192 | 188 |
| | Screen 6 | — | 106 | 101 |
| | Cathode 7 | — | 0.9 | — |
| | Grid 1 | — | -1.1 | -0.35 |
| V4 6AU6 Driver | Plate 5 | — | 186 | 180 |
| | Screen 6 | — | 122 | 120 |
| | Cathode 7 | — | 1.05 | 1.07 |
| V5 6AL5 Ratio Det. | — | — | — | — |
| V6 6AV6 A.F. Amp. | Plate 7 | 112 | 94 | 94 |
| | Grid 1 | -0.7 | -0.7 | -0.7 |
| V7 6C4 Ph. Inverter | Plate 1-5 | 125 | 87 | 85 |
| | Grid 6 | -19.2 | -16 | -16 |
| | Cathode 7 | -11.1 | -11.4 | -11.4 |
| V8 6V6GT or Output V9 | Plate 3 | 305 | 295 | 298 |
| | Screen 4 | 299 | 208 | 204 |
| | Grid 5 | -19.2 | -16 | -16 |
| V10 5Y3GT Rectifier | Filament 2 | 314 | 313 | 313 |

Cathode Currents (Ma.)

| Tube | Terminal | Phono | A.M. | F.M. |
|-----------|----------|--------|------|------|
| V1 6CB6 | 2 | — | 3 | 3 |
| V2 6J6 | 7 | — | 2.6 | 2.6 |
| V3 6BA6 | 7 | — | 13.2 | 14.7 |
| V4 6AU6 | 7 | — | 9.3 | 9 |
| V5 6AL5 | 1 & 5 | — | — | — |
| V6 6AV6 | 2 | 0.8 | 0.5 | 0.5 |
| V7 6C4 | 7 | 2.2 | 1.5 | 1.5 |
| V8 6V6GT | 8 | 35.6 | 17.8 | 17.7 |
| V9 6V6GT | 8 | 35.6 | 17.8 | 17.7 |
| V10 5Y3GT | 2 | 74 1/2 | 73.6 | 74.2 |

MODEL A-101,
Ch. RC-1096

ALIGNMENT PROCEDURE—CIRCUIT DESCRIPTION—LEAD DRESS

Alignment Procedure

CORRECT ALIGNMENT OF THE FM BAND
REQUIRES THAT THE AM BAND BE
ALIGNED FIRST

Alignment Indicators:

An RCA VoltOhmyst or equivalent meter is necessary for measuring developed d-c voltage during FM alignment. Connections are specified in the alignment tabulation. An output meter is also necessary to indicate minimum audio output during FM Ratio Detector alignment. Connect the output meter across the speaker voice coil.

The RCA VoltOhmyst can also be used as an AM alignment indicator, either to measure audio output or to measure a-v-c voltage.

When audio output is being measured the volume control should be turned to maximum.

Signal Generator:

For all alignment operations connect the low side of the signal generator to the receiver chassis. The output should be adjusted to provide accurate resonance indication at all times. If output measurement is used for AM alignment the output of the signal generator should be kept as low as possible to avoid a-v-c action.

Circuit Description

This instrument has a ten-tube (including rectifier) chassis which is very similar to those used in other RCA Victor radio-phonograph combinations designed for AM-FM reception.

The selector switch has five functions:

- (1) Selection of tuning range.
- (2) Selection and distribution of a.v.c. voltages.
- (3) Application of B+ voltage to tubes.
- In "Phono 78/33" and "Phono 45" positions the B+ voltage is removed from tubes V1, V2, V3 and V4.
- (4) Selection of audio input applied to the volume control.
- (5) Change in output tube bias.

In Radio positions R6 is in parallel with R42.

This receiver has built-in antennas for standard broadcast (AM) and frequency modulation (FM) reception. Provision is made for the use of external antennas if desired.

Critical Lead Dress

Note: The leads listed may not be critical in all receivers. However, by dressing the leads as specified, unusual difficulties will be minimized.

1. The 2.2 meg mixer grid resistor (R10) should have a minimum practicable amount of lead extending on the grid end.
2. The first A.M. and first F.M. I.F. plate leads should be dressed away from the range switch wafer.
3. The ground strap between the R.F. shelf and the main chassis should be well soldered and kept as short as practicable.
4. Arrange wiring to prevent the filament wire between the mixer (6J6) and 1st I.F. (6BA6) tubes from passing near either the mixer grid, or the A.V.C. wiring.
5. Dress filament wires away from all audio coupling condensers.
6. Dress A.C. power switch wires away from the audio coupling condenser (C20) which is wired to the volume control.

7. Dress the mixer grid coupling condenser (C7) away from the lugs on the front range switch wafer.
8. The 1st I.F. tube A.V.C. by-pass condenser (C16) should ground at the same point as the cathode neutralizing loop.
9. The driver tube plate and screen by-pass condensers (C27, C28) should ground at the same point as the neutralizing loop.
10. The mixer plate by-pass condenser (C15) should ground as close to the R.F. shelf ground strap as practicable.
11. The shielded audio leads connecting to the front function switch wafer should have a minimum of exposed lead on the function switch end.

FM Alignment

FUNCTION SWITCH IN FM POSITION—VOLUME
CONTROL MAXIMUM

| Steps | Connect high side of sig. gen. to— | Sig. gen. output | Turn radio dial to— | Adjust for max. output |
|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|---------------------|--------------------------------------------------------------------------------------|
| 1 | Connect the d-c probe of a VoltOhmyst to the negative lead of the 2 mid. capacitor C40 and the common lead to chassis. Adjust sig. gen. output to provide approx. —3 v. indication during alignment. | | | |
| 2 | Pin #1 of 6AU6 (V4) in series with .01 mf. | 10.7 mc AM modulated | — | Top of driver trans. T5 for max. d-c voltage |
| 3 | | | | † Bottom of driver trans. T5 for min. audio output |
| 4 | Repeat steps 2 and 3 | | | |
| 5 | Thru 470 ohms to C1-3. Connect gnd. end of cable close to V2 cathode ground on r-f shelf | 10.7 mc | 88 mc | * Top (sec.) & bottom (pri.) cores of T3 * Top (sec.) & bottom (pri.) cores of T3 |
| 6 | | 90 mc | 90 mc | L8 (osc.) |
| 7 | To FM antenna terminals thru 120 ohms in each side of line | 106 mc | 106 mc Signal | C1-6 trimmer (ant.) and C1-3 trimmer (r. f.) |
| 8 | | 90 mc | 90 mc Signal | L1 (ant.) and L2 (r. f.) |
| 9 | Repeat steps 6, 7 and 8 | | | |
| 10 | Connect a sweep generator to the antenna terminals thru 120 ohms in each side of line. Connect an oscilloscope to junction of R44 and C41 to check response and linearity of FM band. Peak to peak separation should not be less than 180 kc. | | | |

† Two or more points may be found which lower the audio output. At the correct point the minimum audio output is approached rapidly and is much lower than at any incorrect point.

* Use a 680 ohm resistor to load the plate winding while the grid winding of the same trans. is being peaked. Then the grid winding is loaded with the 680 ohm resistor while the plate winding is being peaked. When windings are loaded, it is necessary to increase the 10.7 mc input to maintain the —3 volts indication.

L8, L1 and L2 are adjustable by increasing or decreasing the spacing between turns. Oscillator signal tracks above signal frequency.

AM Alignment

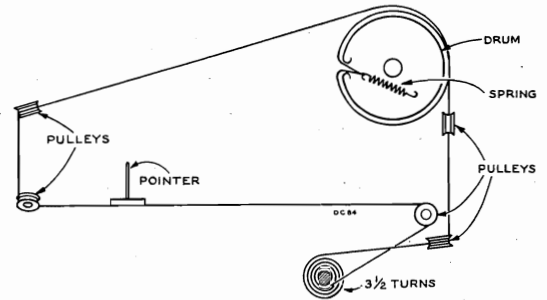
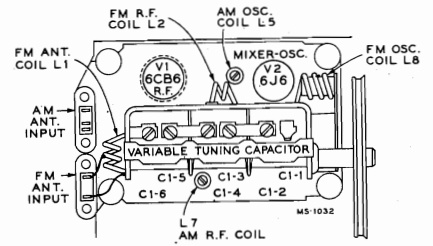
FUNCTION SWITCH IN AM POSITION

| Steps | Connect high side of sig. gen. to— | Sig. gen. output | Turn radio dial to— | Adjust for max. output |
|-------|------------------------------------|------------------|-------------------------------|--------------------------------------------------------------------------------------|
| 1 | Stator of C1-4 | 455 KC | Quiet point at low freq. end. | † Bottom (sec.) & top (pri.) cores of T4 † Top (sec.) & bottom (pri.) cores of T2 |
| 2 | AM ant. terminal thru 200 mmf. | 1620 KC | Extreme high frequency end. | C1-2 trimmer (osc.) |
| 3 | | 1400 KC | 1400 KC Signal | C1-4 trimmer (r. f.) C1-5 trimmer (ant.) |
| 4 | | 600 KC | 600 KC Signal | ‡ L5 (osc.) L7 (r. f.) |
| 5 | Repeat steps 2, 3 and 4 | | | |

† First peak T2 and T4 then starting with T4, use alternate loading. Connect a 47,000-ohm resistor across the primary to load the plate winding while the grid winding of the same transformer is being peaked. Then load the grid winding with the 47,000-ohm resistor while the plate winding is being peaked.

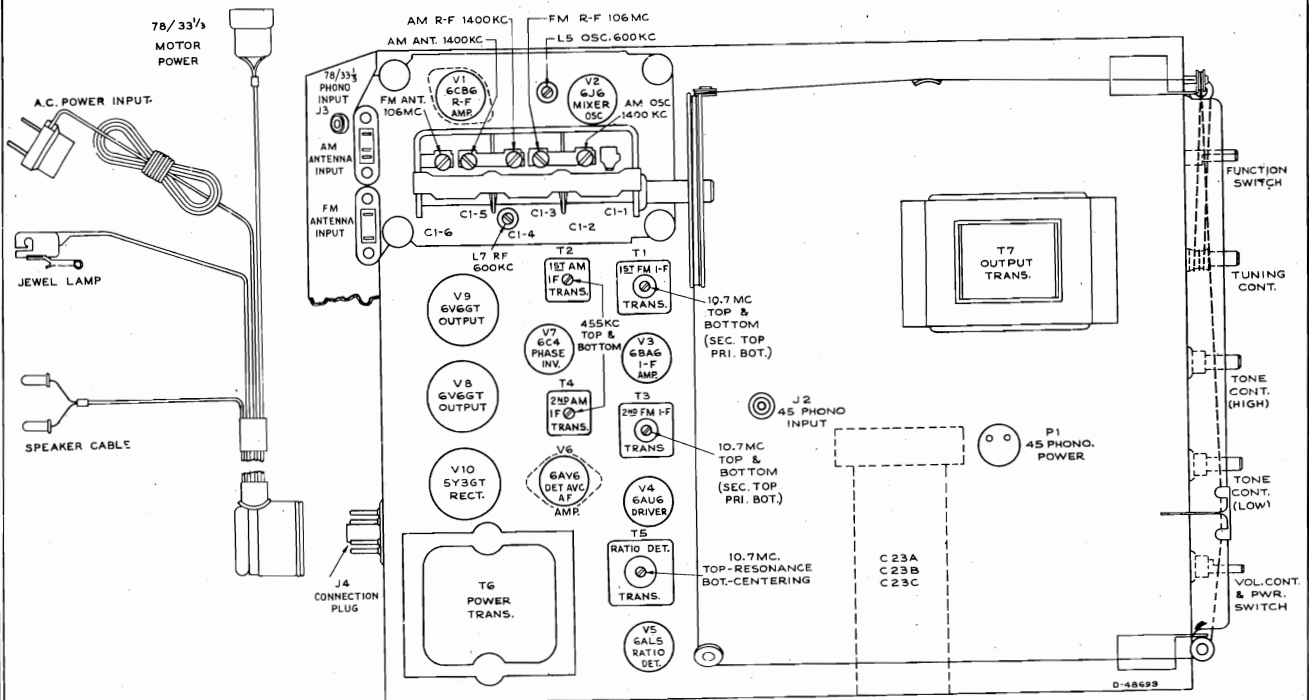
‡ With a 10,000-ohm resistor shunted across C1-4, peak the oscillator core L5, simultaneously "rocking" the gang condenser for maximum output. Then, remove the 10,000-ohm shunt resistor and peak L7 for maximum output.

F. M. Coil Locations



Dial Cord and Drive Assembly

TUBE AND TRIMMER LOCATIONS



Tube and Trimmer Locations

MODEL A-101,
Ch. RC-1096

MISC. SERVICE INFORMATION—REPLACEMENT PARTS

Record Changer Mounting

Each record changer is mounted in a roll-out carriage. The changer mechanisms are mounted on rubber grommets (45 r.p.m.) or springs (78/33 r.p.m.) and should be free floating.

Two shipping screws hold the 45 r.p.m. changer to its roll-out carriage. They are accessible from the under-side of the carriage and should be REMOVED at time of installation.

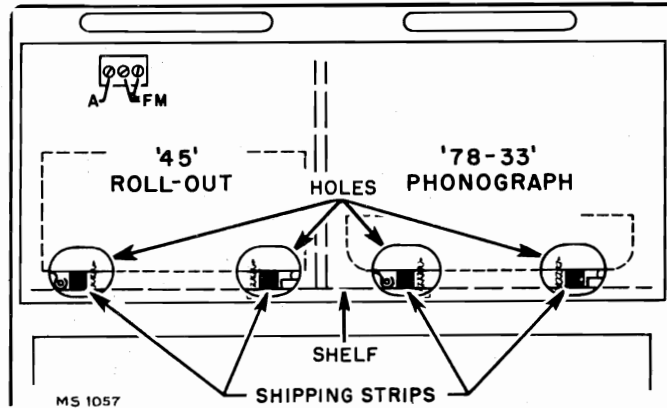
Two shipping screws hold the 78/33 r.p.m. changer to its roll-out carriage. They are accessible after the turntable is lifted off and should be LOOSENED at time of installation.

Roll-out Carriage Removal

Each roll-out carriage has two stop pins, (one at the back end of each slide) held in place by retaining spring. To remove roll-out carriage, it is first necessary to pull the retaining springs out of the slides with a pair of long nose pliers, the stop pins are then easily removed. The roll-out carriage may then be removed from the front of the cabinet after disconnecting its connecting cables.

Roll-out Carriage Travel

The roll-out carriages have a normal movement limitation of approximately 10 inches. If they do not have this amount of movement, it may be due to an obstruction or from slippage or creeping of the balls of the slide mechanism. Travel restriction due to slippage or creeping of balls in the slide mechanism can be corrected by exerting slightly greater pull until the normal travel limitation is reached. The carriage should then operate to its full travel with normal pull.



Rear View of Cabinet

Before attempting to operate mechanism remove shipping bolts and strips. Slide shipping strips out through the elongated holes which have been cut in the cabinet back cover.

Replacement Parts

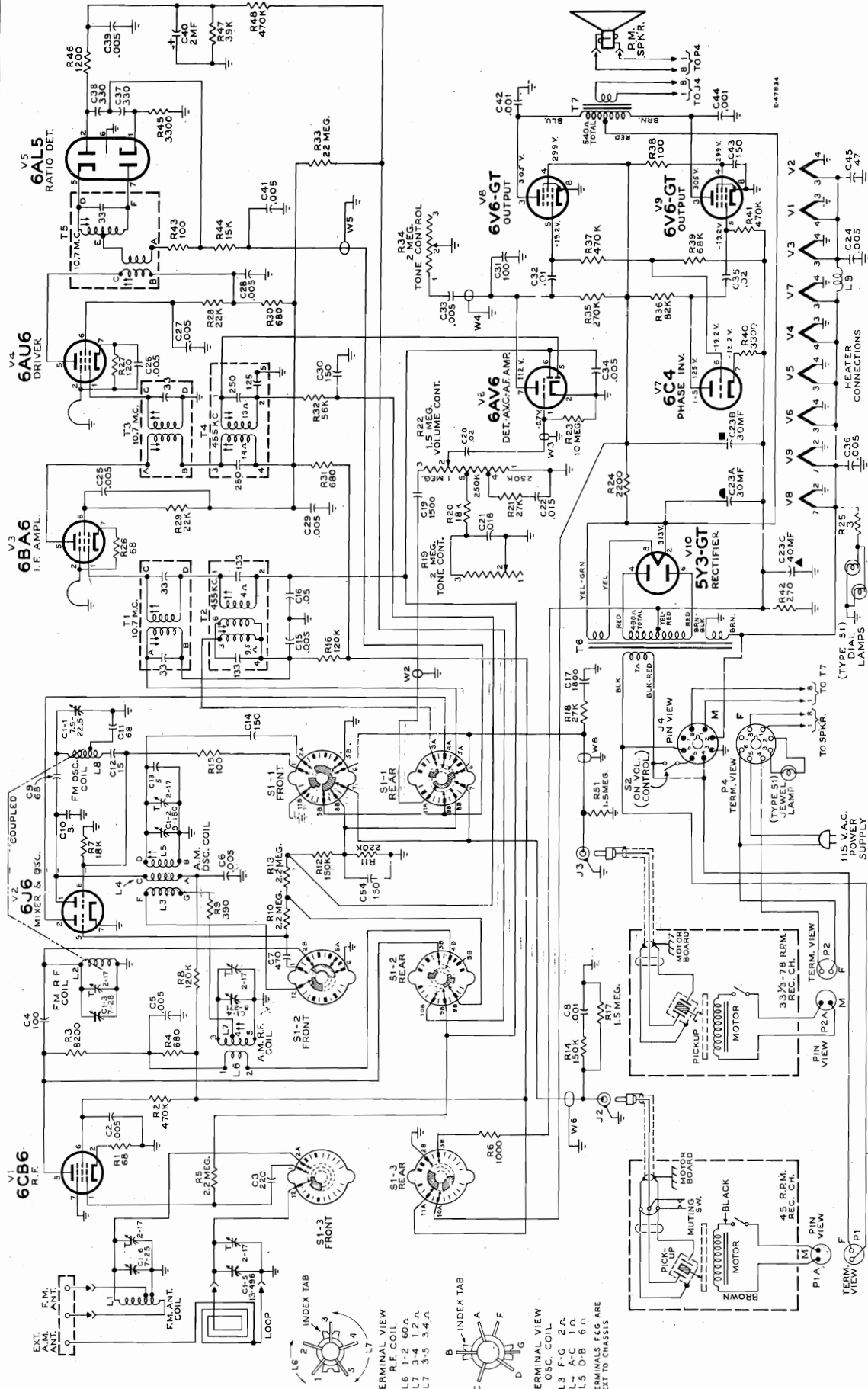
| STOCK NO. | DESCRIPTION | STOCK NO. | DESCRIPTION |
|---------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|---------------------------------------------------------------------------|
| CHASSIS ASSEMBLIES RC 1096 | | | |
| 75567 | Capacitor—Variable tuning capacitor complete with drive drum (C1-1, C1-2, C1-3, C1-4, C1-5, C1-6) | 75627 | Clip—Clip for main cable—on rear of chassis |
| 74733 | Capacitor—Ceramic, 3 mmf. (C10) | 75569 | Coil—Oscillator coil (A-M) complete with adjustable core (L3, L4, L5) |
| 75613 | Capacitor—Ceramic, 5 mmf. (C13) | 75570 | Coil—R.F. coil complete with adjustable core (L6, L7) |
| 39396 | Capacitor—Ceramic, 100 mmf. (C4) | 71942 | Coil—Filament choke coil (L9) |
| 75609 | Capacitor—Ceramic, 47 mmf. (C45) | 75615 | Coil—Antenna coil—F-M (L1) |
| 75612 | Capacitor—Ceramic, 68 mmf. (C9, C11) | 74815 | Coil—R.F. coil—F-M (L2) |
| 39396 | Capacitor—Ceramic, 100 mmf. (C4) | 74817 | Coil—Oscillator coil—F-M (L8) |
| 75437 | Capacitor—Ceramic, 100 mmf. (C31) | 35787 | Connector—Single contact female connector for phono cables (J2, J3) |
| 75614 | Capacitor—Ceramic, 150 mmf. (C14, C30, C43, C54) | 75542 | Connector—8 contact male connector for power input cable (J4) |
| 75611 | Capacitor—Ceramic, 220 mmf. (C3) | 75543 | Connector—2 contact female connector for 45 RPM motor cable (P1) |
| 39640 | Capacitor—Mica, 330 mmf. (C37, C38) | 74879 | Connector—2 contact female connector for antenna leads |
| 39644 | Capacitor—Mica, 470 mmf. (C7) | 75537 | Control—Volume control and power switch (R22, S2) |
| 75610 | Capacitor—Ceramic, 1500 mmf. (C19) | 75561 | Control—Tone control—L.F. (R19) |
| 74850 | Capacitor—Ceramic, 1800 mmf. (C17) | 75562 | Control—Tone control—H.F. (R34) |
| 73473 | Capacitor—Ceramic, 5000 mmf. (C2, C5, C6, C15, C24, C25, C27, C28, C29, C34, C36) | +72953 | Cord—Drive cord (approx. 66" overall length required) |
| 73801 | Capacitor—Tubular, paper, .001 mfd, 400 volts (C8) | 75554 | Coupling—Spring coupling for function switch extension shaft |
| 70642 | Capacitor—Tubular, paper, .001 mfd, 1000 volts (C42, C44) | 75556 | Cover—Insulating cover for electrolytic capacitor #72052 |
| 71926 | Capacitor—Tubular, paper, .005 mfd, 200 volts (C26, C39, C41) | 74839 | Fastener—Push fastener for mounting R.F. shelf (4 req'd) |
| 73920 | Capacitor—Tubular, paper, .005 mfd, 400 volts (C33) | 16058 | Grommet—Rubber grommet for mounting R.F. shelf (4 req'd) |
| 71925 | Capacitor—Tubular, paper, .01 mfd, 400 volts (C32) | 75547 | Grommet—Rubber grommet to mount slide mechanism to bottom—rear (2 req'd) |
| 72120 | Capacitor—Tubular, paper, .015 mfd, 200 volts (C22) | 75548 | Grommet—Rubber grommet to mount slide mechanism to bottom—front (2 req'd) |
| 58476 | Capacitor—Tubular, paper, oil impregnated, .018 mfd, 400 volts (C21) | 11765 | Lamp—Dial lamp—Mazda 51 |
| 74010 | Capacitor—Tubular, paper, .02 mfd, 400 volts (C20, C35) | 75544 | Nut—Rivnut to fasten screw for mounting chassis (4 req'd) |
| 73553 | Capacitor—Tubular, paper, .05 mfd, 400 volts (C16) | 18469 | Plate—Bakelite mounting plate for electrolytic capacitor #72052 |
| 73747 | Capacitor—Electrolytic 2 mfd, 50 volts (C40) | 75535 | Plate—Dial back plate complete with three (3) pulleys |
| 72052 | Capacitor—Electrolytic comprising 1 section of 30 mfd, 450 volts, 1 section of 30 mfd, 350 volts and 1 section of 40 mfd, 25 volts (C23A, C23B, C23C) | 75536 | Pointer—Station selector indicator |
| 73935 | Clip—Mounting clip for A-M, I-F transformers | | |

+ Stock No. 72953 is a reel containing 250 feet of cord.

Replacement Parts—Concluded

| STOCK NO. | DESCRIPTION | STOCK NO. | DESCRIPTION |
|-----------|----------------------------------------------------------------------------------------------------------------------|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 72602 | Pulley—Drive cord pulley | | |
| 72323 | Resistor—Wire wound, 3 ohms, 1/2 watt (R25) | | |
| 73637 | Resistor—Wire wound, 2200 ohms, 5 watts (R24) | | |
| | Resistor—Fixed, composition:— | | |
| | 68 ohms, ±10%, 1/2 watt (R1, R26) | | |
| | 100 ohms, ±10%, 1/2 watt (R15, R38, R43) | | |
| | 120 ohms, ±10%, 1/2 watt (R27) | | |
| | 270 ohms, ±5%, 2 watts (R42) | | |
| | 390 ohms, ±10%, 1/2 watt (R9) | | |
| | 680 ohms, ±10%, 1/2 watt (R4) | | |
| | 680 ohms, ±20%, 1/2 watt (R30, R31) | | |
| | 1000 ohms, ±10%, 1/2 watt (R6) | | |
| | 1200 ohms, ±5%, 1/2 watt (R46) | | |
| | 3300 ohms, ±5%, 1/2 watt (R40, R45) | | |
| | 8200 ohms, ±10%, 1 watt (R3) | | |
| | 15,000 ohms, ±10%, 1/2 watt (R44) | | |
| | 18,000 ohms, ±10%, 1/2 watt (R7, R20) | | |
| | 22,000 ohms, ±10%, 1/2 watt (R28, R29) | | |
| | 27,000 ohms, ±10%, 1/2 watt (R18, R21) | | |
| | 39,000 ohms, ±5%, 1/2 watt (R47) | | |
| | 56,000 ohms, ±10%, 1/2 watt (R32) | | |
| | 68,000 ohms, ±10%, 1/2 watt (R39) | | |
| | 82,000 ohms, ±10%, 1/2 watt (R36) | | |
| | 120,000 ohms, ±10%, 1/2 watt (R8, R16) | | |
| | 150,000 ohms, ±10%, 1/2 watt (R12, R14) | | |
| | 220,000 ohms, ±20%, 1/2 watt (R11) | | |
| | 270,000 ohms, ±10%, 1/2 watt (R35) | | |
| | 470,000 ohms, ±10%, 1/2 watt (R2, R37, R41, R48) | | |
| | 1.5 megohm, ±10%, 1/2 watt (R17, R51) | | |
| | 2.2 megohm, ±20%, 1/2 watt (R5, R10, R13) | | |
| | 10 megohm, ±20%, 1/2 watt (R23) | | |
| | 22 megohm, ±20%, 1/2 watt (R33) | | |
| 75540 | Shaft—Tuning knob shaft | | |
| 75565 | Shaft—Extension shaft for function switch | | |
| 73584 | Shield—Tube shield for V1 and V6 | | |
| 75546 | Slide—Slide mechanism complete for radio chassis bottom | | |
| 31251 | Socket—Tube socket, octal, wafer | | |
| 73117 | Socket—Tube socket, 7 pin, miniature | | |
| 74179 | Socket—Tube socket, 7 pin, miniature for 6CB6 and 6J6 tubes only. | | |
| 31364 | Socket—Dial lamp socket | | |
| 75563 | Spring—Retaining spring for function switch extension shaft | | |
| 74038 | Spring—Drive cord spring | | |
| 74847 | Support—Polystyrene support for F-M oscillator coil complete with mounting bracket | | |
| 75602 | Switch—Function switch (S1-1, S1-2, S1-3) | | |
| 75557 | Transformer—Output transformer (T7) | | |
| 73743 | Transformer—Ratio detector transformer (T5) | | |
| 75558 | Transformer—First I-F transformer (A-M) complete with adjustable cores (T2) | | |
| 73037 | Transformer—Second I-F transformer (A-M) complete with adjustable cores (T4) | | |
| 75559 | Transformer—First I-F transformer (F-M) complete with adjustable cores (T1) | | |
| 75560 | Transformer—Second I-F transformer (F-M) complete with adjustable cores (T3) | | |
| 75566 | Transformer—Power transformer, 117 volts, 60 cycle (T6) | | |
| 33726 | Washer—"C" washer for tuning knob shaft | | |
| | RADIO ROLLOUT CARRIAGE | | |
| 75603 | Decal—Function decal for controls | | |
| 75572 | Dial—Polystyrene dial scale | | |
| 75571 | Frame—Moulded frame (maroon) for mounting radio chassis and 45 RPM record changer—for mahogany or walnut instruments | | |
| 75684 | Frame—Moulded frame (light brown) for mounting radio chassis and 45 RPM record changer—for oak instruments | | |
| 75551 | Handle—Metal pullout handle for mounting frame. | | |
| 75555 | Screw—#8-32 x 5/8" cross recessed pan head machine screw to mount radio chassis (4 req'd) | | |
| | | | SPEAKER ASSEMBLY |
| | | | Stamped 92569—12W RMA 274 |
| | | | RL 111-A1 |
| | | 13867 | Cap—Dust cap |
| | | 75682 | Cone—Cone and voice coil assembly (3.2 ohms) |
| | | 75681 | Speaker—12" P.M. speaker complete with cone and voice coil (3.2 ohms) |
| | | | NOTE:—If stamping on speaker does not agree with above number, order replacement parts by referring to model number of instrument, number stamped on speaker and full description of part required. |
| | | | MISCELLANEOUS |
| | | 71864 | Antenna—F-M antenna |
| | | 75705 | Antenna—Antenna loop complete less cable |
| | | 75898 | Back—Back cover—maroon—for 33 1/2/78 RPM record changer compartment—for mahogany or walnut instruments (assembled to rollout) |
| | | 75901 | Back—Back cover—light brown—for radio—45 RPM record changer compartment—for oak instruments (assembled to rollout) |
| | | 75900 | Back—Back cover—maroon—for radio—45 RPM record changer compartment—for mahogany or walnut instruments (assembled to rollout) |
| | | 73680 | Board—"A-F-M" terminal board |
| | | 75694 | Bracket—Stop bracket (less rubber bumper) for rollouts |
| | | 71599 | Bracket—Pilot lamp bracket |
| | | 75696 | Bumper—Rubber bumper for record changer rollout stop bracket |
| | | 75919 | Button—Rosette button for speaker grille |
| | | 74296 | Cable—Shielded pickup cable complete with pin plug for 33 1/2/78 RPM record changer |
| | | 72437 | Cable—Shielded pickup cable complete with pin plug for 45 RPM record changer |
| | | 13103 | Cap—Pilot lamp cap |
| | | 71892 | Catch—Bullet catch and strike for cabinet door |
| | | X3189 | Cloth—Grille cloth for mahogany or walnut instruments |
| | | X3093 | Cloth—Grille cloth for oak instruments |
| | | 74882 | Connector—2 contact (polarized) male connector for antenna loop cable |
| | | 74752 | Connector—2 contact male connector for FM antenna terminal board cable |
| | | 75709 | Connector—8 contact female connector for main cable (less shell) (P4) |
| | | 30868 | Connector—2 contact female connector for 33 1/2/78 RPM record changer motor cable (P2) |
| | | 75474 | Connector—Single contact male connector for speaker cable (2 req'd) |
| | | 71984 | Decal—Trade mark decal (RCA Victor) |
| | | 74273 | Decal—Trade mark decal (Victrola) |
| | | 74838 | Grommet—Power cord strain relief (1 set) |
| | | 37396 | Grommet—Rubber grommet for mounting speaker |
| | | 75697 | Grommet—Rubber grommet for mounting 45 RPM changer |
| | | 75551 | Handle—Metal pullout handle for 33 1/2/78 RPM record changer mounting frame |
| | | 74308 | Hinge—Cabinet door hinge (1 set) |
| | | 75712 | Knob—Tuning control, tone control or volume control and power switch knob—maroon—for mahogany or walnut instruments |
| | | 75713 | Knob—Tuning control, tone control or volume control and power switch knob—tan—for oak instruments |
| | | 75714 | Knob—Function switch knob—maroon—for mahogany or walnut instruments |
| | | 75715 | Knob—Function switch knob—tan—for oak instruments |
| | | 11765 | Lamp—Pilot lamp—Mazda #51 |
| | | 75917 | Nail—Rosette headnail for grille (3 required) |
| | | 73634 | Nut—Speed nut for speaker mounting screw |
| | | 75916 | Pull—Door pull |
| | | 74279 | Screw—#8-32 x 7/8" trimit head screw for door pull |
| | | 75708 | Shell—Shell for 8 contact female connector #75709 |
| | | 75546 | Slide—Slide mechanism for 33 1/2/78 RPM record changer mounting frame |
| | | 31364 | Socket—Pilot lamp socket and lead |
| | | 74734 | Spring—Retaining spring for knobs |
| | | 75902 | Spring—Suspension spring for main cable |
| | | 72936 | Stop—Cabinet door stop |

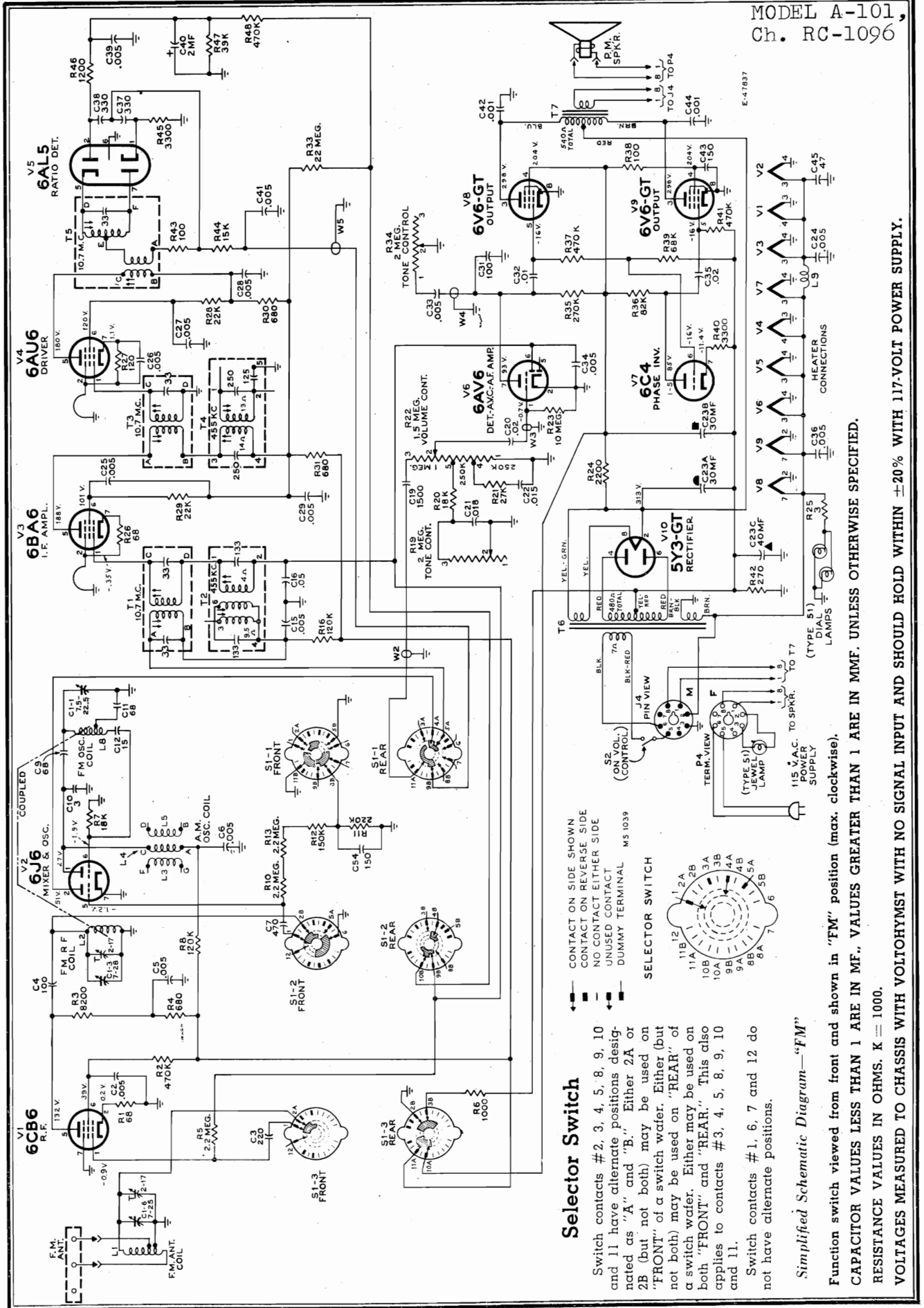
MODEL A-101



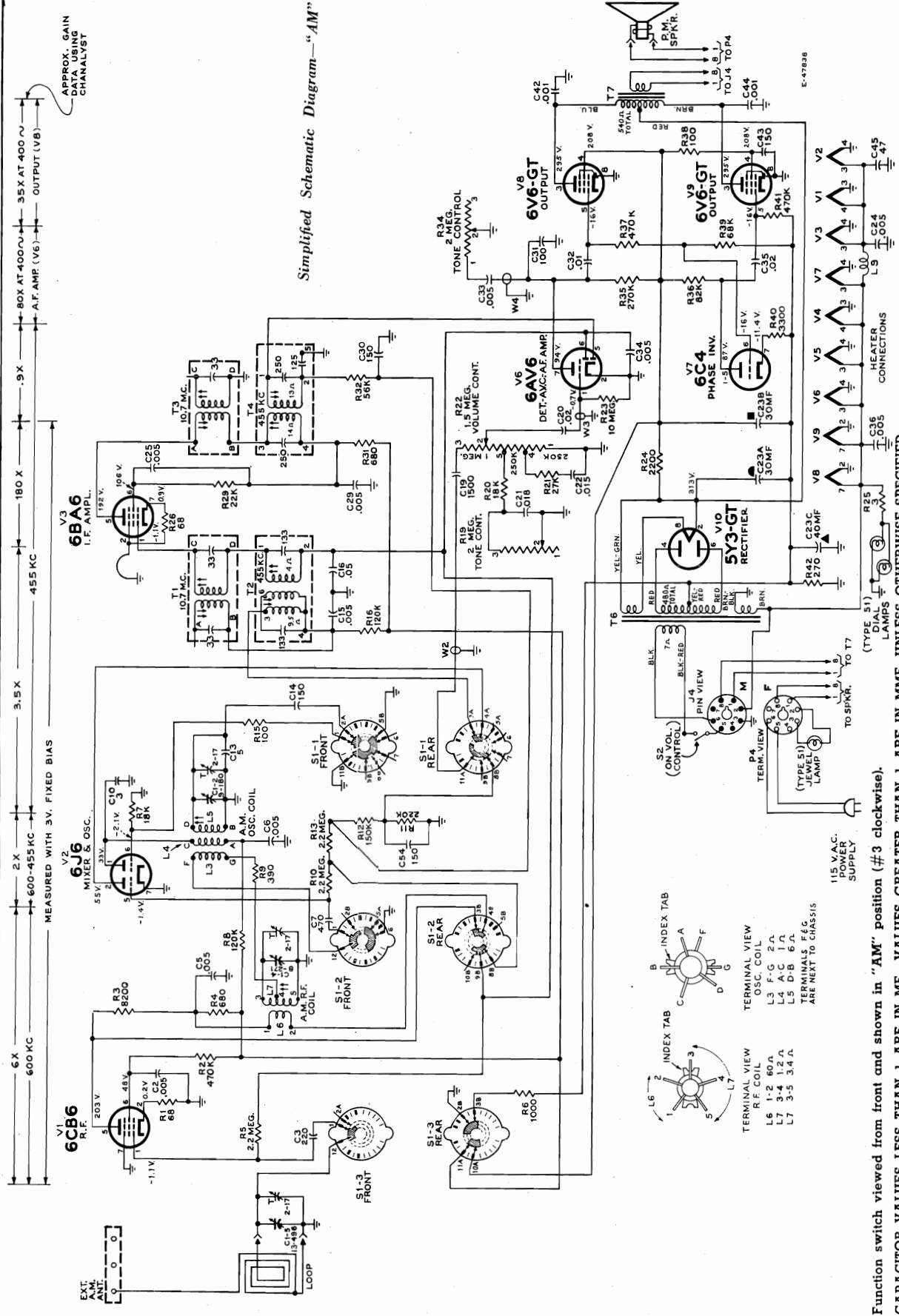
RESISTANCE VALUES IN OHMS. K = 1000.
 Function switch viewed from front and shown in "Phono 78/33" position (max. c/clockwise).
 CAPACITOR VALUES LESS THAN 1 ARE IN MF., VALUES GREATER THAN 1 ARE IN MMF. UNLESS OTHERWISE SPECIFIED.
 VOLTAGES MEASURED TO CHASSIS WITH VOLTOHYMST WITH NO SIGNAL INPUT AND SHOULD HOLD WITHIN $\pm 20\%$ WITH 117-VOLT POWER SUPPLY.

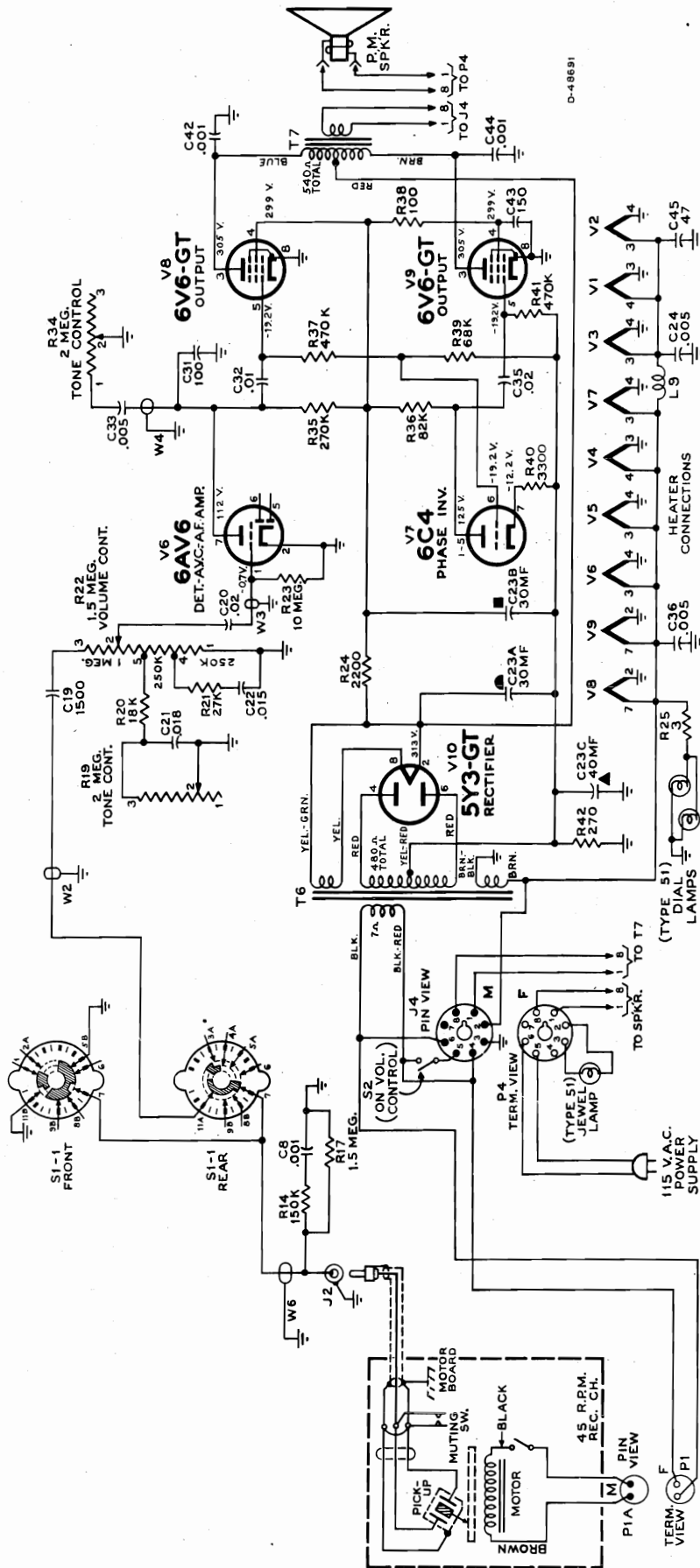
The cathode neutralizing loops of V3 (6BA6) and V4 (6AU6) are insulated wires approx. 2 in. long. Do not alter length.

Complete Schematic Diagram



MODEL A-101,
Ch. RC-1096





D-48681

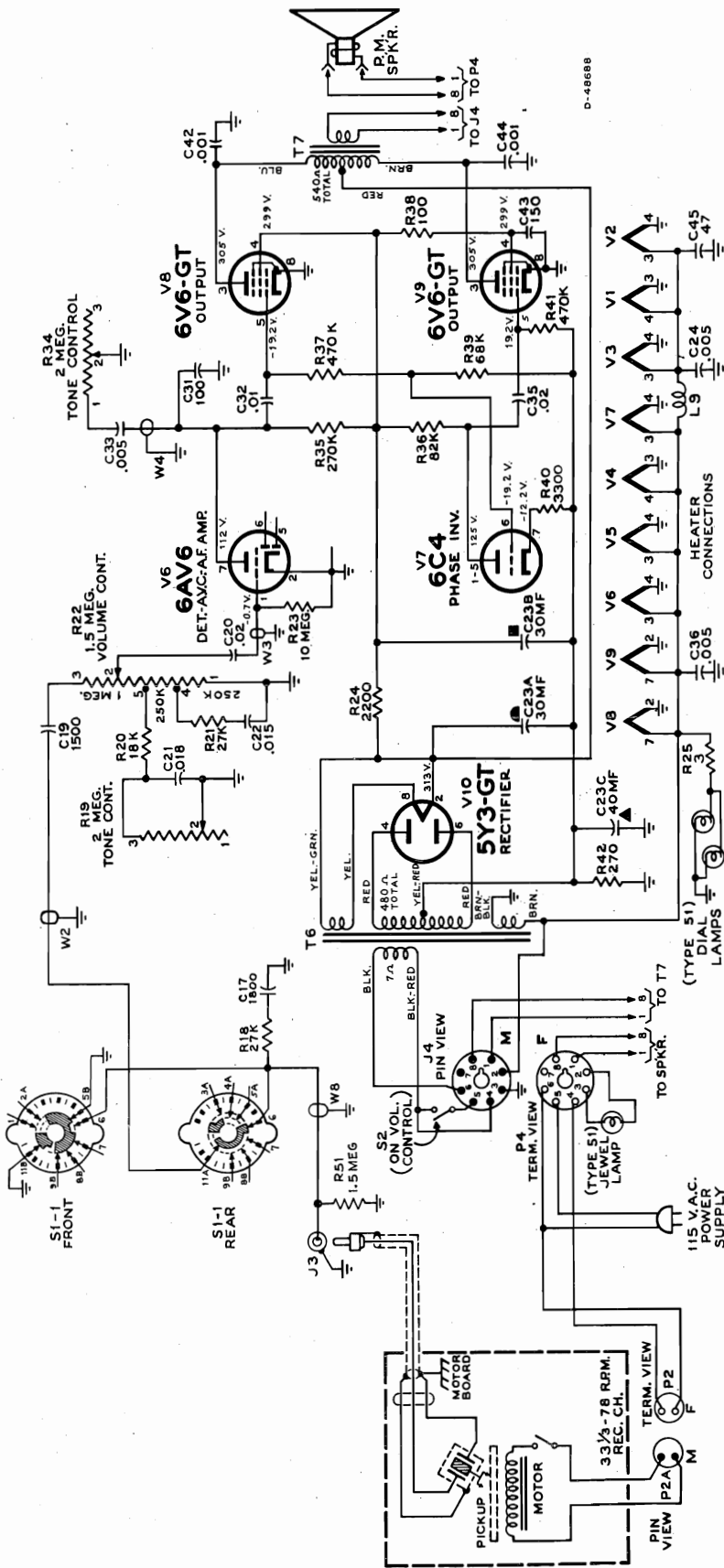
Note: When the function switch is in "Phono 45" or "Phono 78/33" position the B+ supply voltage to tubes V1, V2, V3 and V4 is disconnected at switch section S1-3 rear. This results in higher plate and screen voltages on V6, V7, V8 and V9.
The bias resistor R6 (in parallel with R42 in AM and FM positions) is also disconnected at S1-3 rear. This results in higher grid bias voltage on V8 and V9.

FUNCTION SWITCH VIEWED FROM FRONT AND SHOWN IN "PHONO 45" POSITION (#2 CLOCKWISE).
CAPACITOR VALUES LESS THAN 1 ARE IN MF., VALUES GREATER THAN 1 ARE IN MMF. UNLESS OTHERWISE SPECIFIED.
RESISTANCE VALUES IN OHMS. K = 1000.
VOLTAGES MEASURED TO CHASSIS WITH VOLTOHYMST WITH NO SIGNAL INPUT AND SHOULD HOLD WITHIN ±20% WITH 117-VOLT POWER SUPPLY.

Simplified Schematic Diagram—"Phono 45"

RECORD CHANGER: Model RP-190-2,
Pgs. RCD.CH.21-1 to RCD.CH.21-11.

MODEL A-101,
Ch. RC-1096



Note:

When the function switch is in "Phono 45" or "Phono 78/33" position the B+ supply voltage to tubes V1, V2, V3 and V4 is disconnected at switch section S1-3 rear. This results in higher plate and screen voltages on V6, V7, V8 and V9.

The bias resistor R6 (in parallel with R42 in AM and FM positions) is also disconnected at S1-3 rear. This results in higher grid bias voltage on V8 and V9.

FUNCTION SWITCH VIEWED FROM FRONT AND SHOWN IN "PHONO 78/33" POSITION (MAX. C/CLOCKWISE).

CAPACITOR VALUES LESS THAN 1 ARE IN MF. VALUES GREATER THAN 1 ARE IN MMF. UNLESS OTHERWISE SPECIFIED.

RESISTANCE VALUES IN OHMS. K = 1000.

VOLTAGES MEASURED TO CHASSIS WITH VOLTOHYMST WITH NO SIGNAL INPUT AND SHOULD HOLD WITHIN ±20% WITH 117-VOLT POWER SUPPLY.

RECORD CHANGER: Model 960282-4,

See Pgs. RCD.CH.21-18 to RCD.Ch.

21-33.

Simplified Schematic Diagram—"Phono 78/33"

MODELS B-411, Ch.
RC-1098, RC-1098A



PH566

Specifications

Tuning Range 540-1600 kc
Intermediate Frequency 455 kc

Tube complement:

1. RCA 1R5 Converter
2. RCA 1U4 I.F. Amplifier
3. RCA 1U5 2nd Det.-A.F. Amp.-A.V.C.
4. RCA 3V4 Output

Loudspeaker

Size and type 2" x 3" P.M.
Voice coil impedance 11 3/4 ohms at 1000 cycles

Batteries Required:

| | | |
|--------------------------------------|---------------------|-------------------------------------|
| Type of Battery | Current Consumption | Approx. Life (Intermittent Service) |
| "A"—1.5 volt RCA VS 036 or VS 001 | } 0.25 amp. | 7 to 10 hrs. |
| "B"—67.5 volts RCA VS 016 | | |
| | } 8.45 ma. | 40 to 60 hrs. |

Power Output:

Undistorted075 watt
Maximum 0.10 watt

Dimensions (over-all) 5 1/2" x 7 7/8" x 2 1/8"

Weight (with batteries) slightly under 3 lbs.

Production Changes:

There are three types of case assemblies in use (two types are stocked) using two types of case backs (one type is stocked). SEE PAGE 4 FOR EXPLANATION OF CASE ASSEMBLY DIFFERENCES.

Two chassis have been used; RC-1098 has all individual resistors and capacitors, RC-1098A has two "Printed Circuit" units which replace ten individual resistors and capacitors.

Replacement Parts

| STOCK No. | DESCRIPTION | STOCK No. | DESCRIPTION |
|-----------|------------------------------------------------------------------------------------------------------------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | CHASSIS ASSEMBLIES RC 1098, RC 1098A | | |
| 75778 | Antenna—Ferrite rod antenna (L1) | | 15,000 ohms, ±10%, 1/2 watt (R2) |
| 75783 | Capacitor—Variable tuning capacitor (C1-1, C1-2) | | 47,000 ohms, ±20%, 1/2 watt (R5) |
| 73153 | Capacitor—Ceramic, 4 mmf. (C5) | | 100,000 ohms, ±20%, 1/2 watt (R1) |
| 75784 | Capacitor—Ceramic, 56 mmf. (C2, C7) | | 1 megohm, ±20%, 1/2 watt (R9) |
| 75785 | Capacitor—Ceramic, 82 mmf. (C9, C10) | | 3.3 megohm, ±20%, 1/2 watt (R4, R10) |
| 73960 | Capacitor—Ceramic, 10,000 mmf. (C4) | | 4.7 megohm, ±20%, 1/2 watt (R3, R7) |
| 73964 | Capacitor—Electrolytic, 10 mfd., 70 volts (C15) | 70527 | 10 megohm, ±20%, 1/2 watt (R8) |
| 72792 | Capacitor—Tubular, paper, .001 mfd., 200 volts (C12) | | Screw—#6-32 x 3/16" socket head set screw for volume control knob |
| 72315 | Capacitor—Tubular, paper, .002 mfd., 200 volts (C11, C14) | 75780 | Socket—Tube socket, 7 pin, miniature |
| 73961 | Capacitor—Tubular, paper, .003 mfd., 200 volts (C6) | 75775 | Transformer—First I-F transformer (T1) |
| 71928 | Capacitor—Tubular, paper, .02 mfd., 200 volts (C13) | 75776 | Transformer—Second I-F transformer (T2) |
| 73553 | Capacitor—Tubular, paper, .05 mfd., 400 volts (C8) | 75777 | Transformer—Output transformer (T3) |
| 75781 | Clip—"A" Battery mounting clip (negative) | | SPEAKER ASSEMBLY 92523-4 |
| 75010 | Clip—Output transformer mounting screw clip | 76373 | Speaker—2" x 3" P.M. speaker complete with cone and voice coil |
| 75774 | Coil—Oscillator coil complete with adjustable core (L2, L3) | | MISCELLANEOUS |
| 75782 | Contact—"A" Battery contact (positive) | 75787 | Back—Case back |
| 75773 | Control—Volume control and power switch (R6, S1) | 75647 | Case—Case assembly (front and back) complete with metal side trim, metal grille and emblem—less handle and links (early type—does not have "ON" indication opening) |
| 37396 | Grommet—Rubber grommet for antenna rod | 76320 | Case—Case assembly (front and back) complete with metal side trim, metal grille and emblem—less handle and links (late type has "ON" indication opening) |
| 75779 | Knob—Volume control knob—less set screw (early type—does not have "ON" indication) | 75651 | Emblem—"RCA Victor" emblem |
| 76321 | Knob—Volume control knob—less set screw (late type—has "ON" indication) | 75648 | Grille—Metal grille |
| 75786 | Lead—"B" battery lead complete with connector | 75649 | Handle—Carrying handle |
| 76372 | Plate—Four element "Printed Circuit" plate stamped 942660-1 (diode filter unit C7, C9, R4, R5) | 75788 | Knob—Dial knob less spring clip |
| 76371 | Plate—Six element "Printed Circuit" plate stamped 942659-1 (audio coupling unit C10, C12, R2, R7, R9, R10) | 75650 | Link—Carrying handle link |
| | Resistor—Fixed, composition:— | 75801 | Screen—Criminoline screen (black) for case front |
| | 390 ohms, ±10%, 1/2 watt (R11) | 74734 | Spring—Spring clip for dial knob |
| | 1000 ohms, ±20%, 1/2 watt (R12) | | |

MODELS B-411, Ch.
RC-1098, RC-1098A

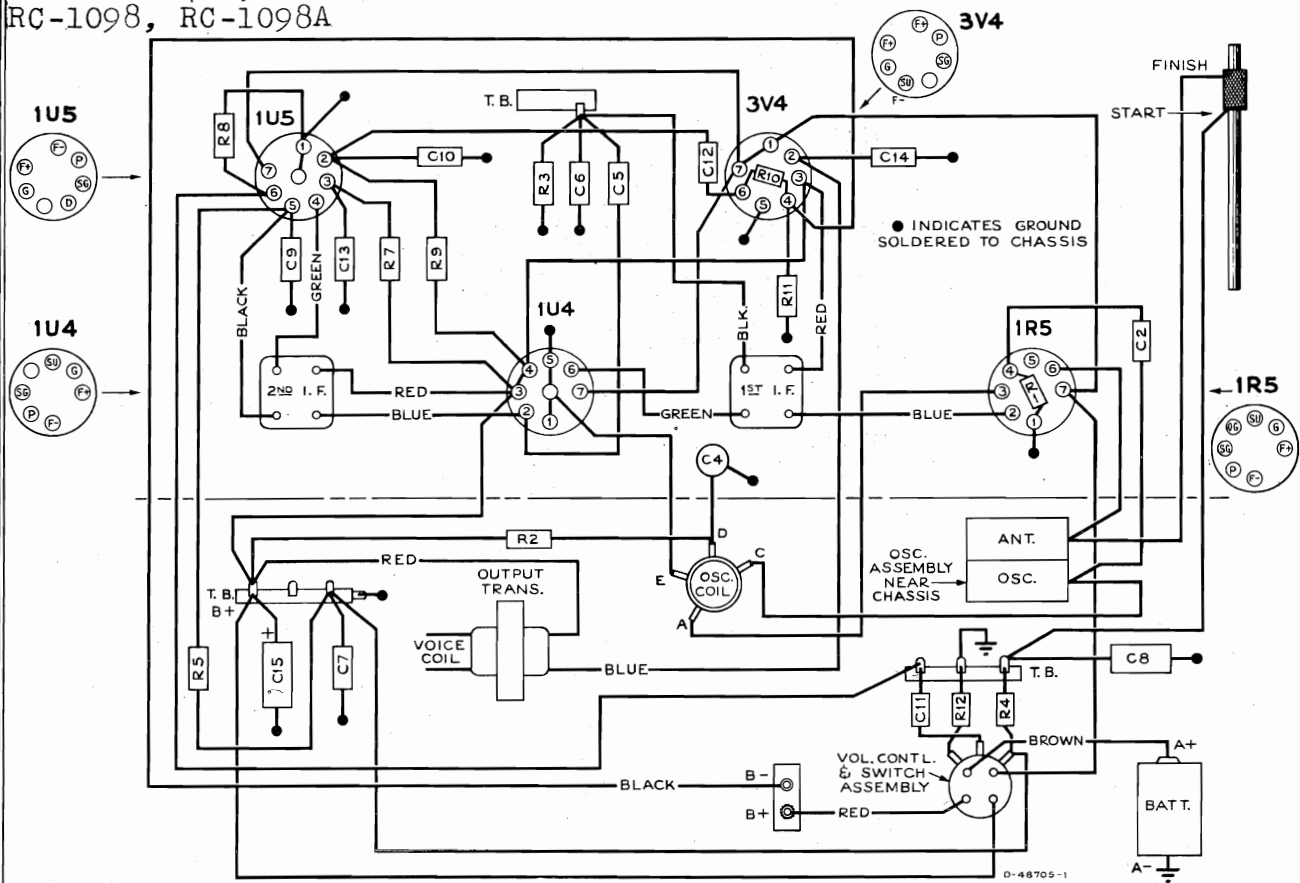
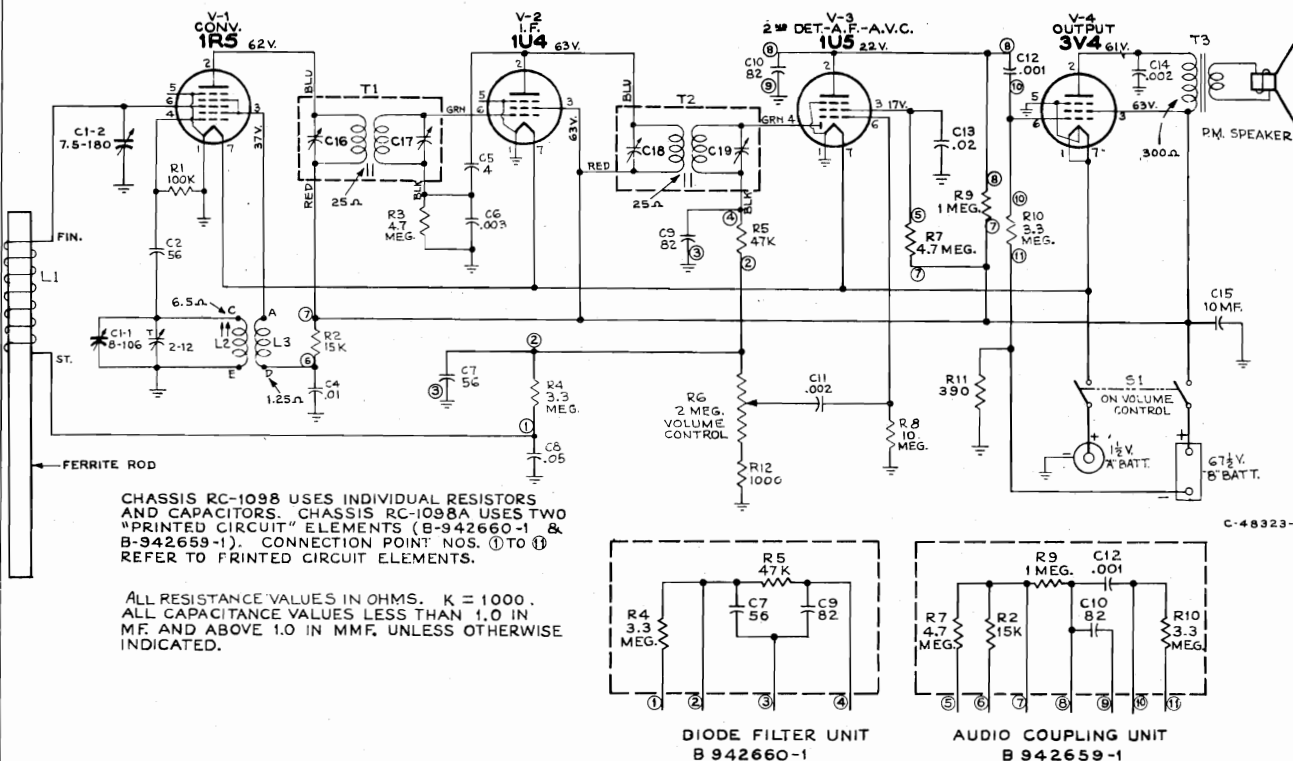


Fig. 1—Connection Diagram

In late production chassis:

"Printed Circuit" unit stamped 942659-1 replaces individual parts C10, C12, R2, R7, R9 and R10.
"Printed Circuit" unit stamped 942660-1 replaces individual parts C7, C9, R4 and R5.



CHASSIS RC-1098 USES INDIVIDUAL RESISTORS AND CAPACITORS. CHASSIS RC-1098A USES TWO "PRINTED CIRCUIT" ELEMENTS (B-942660-1 & B-942659-1). CONNECTION POINT NOS. ① TO ⑪ REFER TO PRINTED CIRCUIT ELEMENTS.

ALL RESISTANCE VALUES IN OHMS. K = 1000. ALL CAPACITANCE VALUES LESS THAN 1.0 IN MF. AND ABOVE 1.0 IN MMF. UNLESS OTHERWISE INDICATED.

Fig. 2—Schematic Diagram

Alignment Procedure

Output Meter.—Connect meter from No. 2 terminal of V4 (plate of 3V4) to ground. Turn volume control to maximum position.

Test-Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the oscillator output as low as possible to avoid a-v-c action.

Note.—The inductance of the antenna coil is adjusted by sliding the coil along the Ferrite rod. This ant. coil is supplied pre-adjusted and cemented to rod. This makes further adjustment unnecessary. However when replacing ant. assembly make certain that the coil end of the rod extends two inches beyond the tube shelf.

CRITICAL LEAD DRESS

1. Dress all I-F transformer leads down to base and push any excess lead back in can.
2. Black lead from 1st I-F should lay down against top of tube shelf with capacitor C6 over it.
3. Dress neutralizing capacitor C5 direct and above chassis base, avoid lead length.
4. Dress blue lead from volume control and green lead from terminal board near volume control down to base and under gang frame diagonally to termination.
5. Dress blue lead from output transformer under clamp on back of gang condenser and direct to terminal 2 of V4.
6. Adjust Ferrite antenna so that coil end of rod extends two inches beyond tube shelf.
7. Dress all bare wires, pigtail leads and non-insulated components to prevent shorts.

| Steps | Connect the high side of test osc. to— | Tune test-osc. to— | Turn radio dial to— | Adjust the following for max. peak output— |
|----------------------|-----------------------------------------------------------------------|----------------------|--------------------------|--------------------------------------------|
| 1 | Connection lug of C1-2 located on rear of gang in series with .01 mf. | 455 kc | Quiet point near 1600 kc | C18, C19 2nd I-F trans. |
| 2 | | | | C16, C17 1st I-F trans. |
| Repeat steps 1 and 2 | | | | |
| 4 | *Antenna coupling loop (Chassis in case) | 1400 kc | 14 Rock gang | C1-1T (osc.) |
| 5 | | 600 kc | 60 Rock gang | L2 (osc.) |
| 6 | | Repeat steps 4 and 5 | | |

*Steps 4 and 5 require a coupling loop from the signal generator to feed a signal into the receiver ant. coil. This loop should be loosely coupled to the receiver antenna coil so as not to disturb the receiver ant. coil inductance.

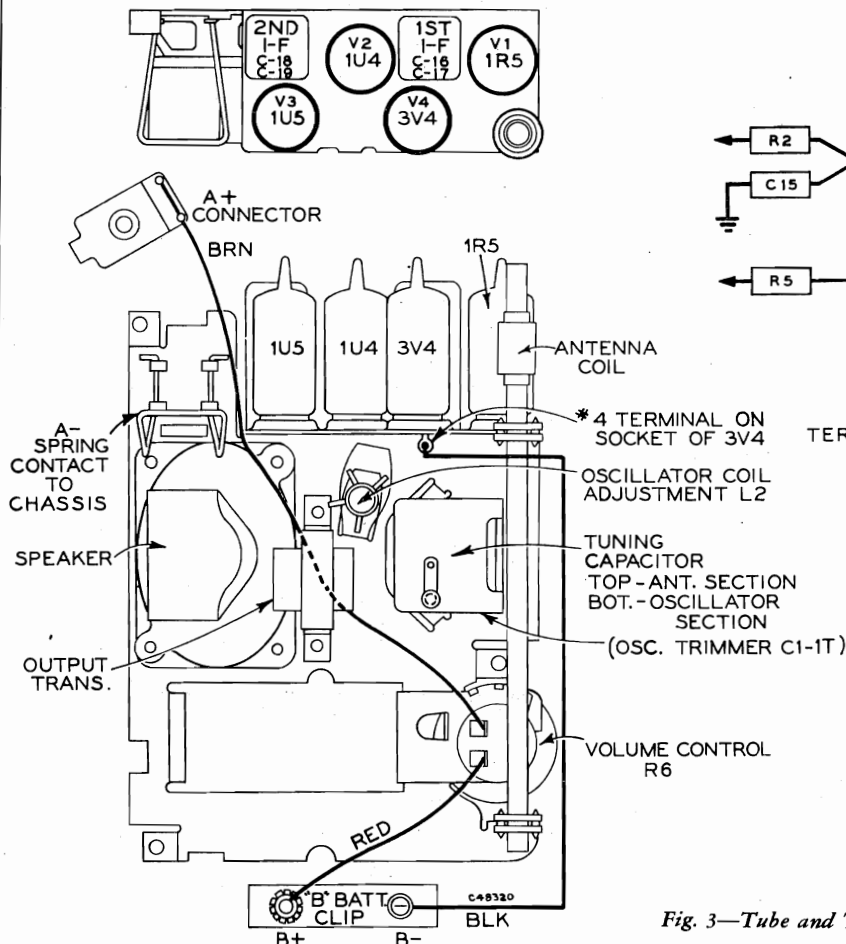


Fig. 3—Tube and Trimmer Locations

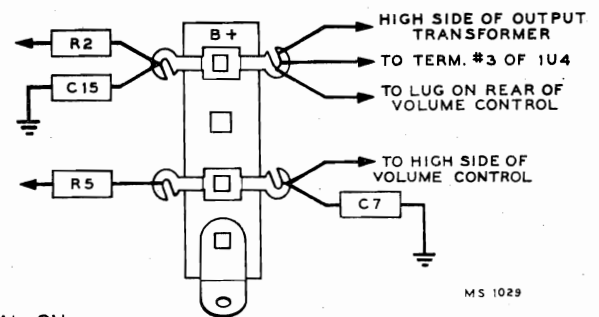


Fig. 4—Terminal Strip

MODELS B-411, Ch.
RC-1098, RC-1098A

CHANGES IN CASE ASSEMBLIES:

1. The original back (not stocked) had slots in the bottom edge which engaged with extension tabs of the metal trim of the case front.
2. Late production backs (Stock No. 75787) have molded lips on the bottom edge which fit into slots of the case front. When installing this back on early type case fronts, it will be necessary to break off the locking tabs on each side of the original trim strip.
3. The latest production of case assemblies (Stock No. 76320) have an "ON" indication opening in front of the volume control knob. Volume control knob (Stock No. 76321) is used with this case assembly.

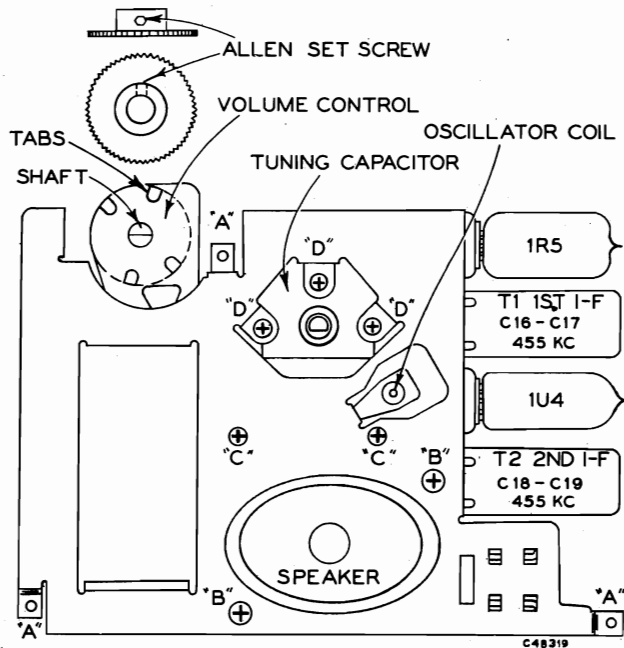
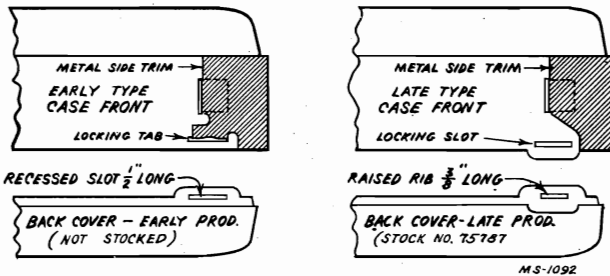


Fig. 5—Chassis assembly

REPLACEMENT OF COMPONENT PARTS

- I. To Remove Back Cover
 - a. Depress top of case midway between the handle supports, until the top end of the back separates from the main case.
 - b. Pull the back cover back and up, thereby unhooking the retaining lugs in the bottom of the main case.
- II. To Replace Batteries
 - a. Remove back cover.
 - b. Remove either or both "A" and "B" batteries as may be necessary. The "B" battery snap fasteners can best be removed by inserting a screwdriver under the snap fastener strip and prying upward.
 - c. The "A" battery can easily be removed by pulling back on the spring wire and lifting out.
- III. To Remove Main Case
 - a. Remove front dial. (Just Pull).
 - b. Remove back cover.
 - c. Remove the three screws "A".
 - d. Remove "A+" clip (Squeeze and lift out of slot in case).
 - e. Grasp the assembly by the speaker housing and pull the bottom end of the chassis outward then down so the Volume Control knob clears the case.
- IV. To Replace Front Metal Grille
 - a. Remove front dial.
 - b. Remove back cover.
 - c. Remove chassis.
 - d. Bend small tabs inside case and separate metal strips from cabinet.
 - e. Bend small tabs inside case and separate grille from cabinet. Insert new grille and bend tabs.
Note:—A black non-metallic screen is placed between the grille and the cabinet.
- V. To Remove Handle
 - a. Remove handle by separating the square spring wire clips on each end of handle and lift out.
- VI. To Remove Tubes

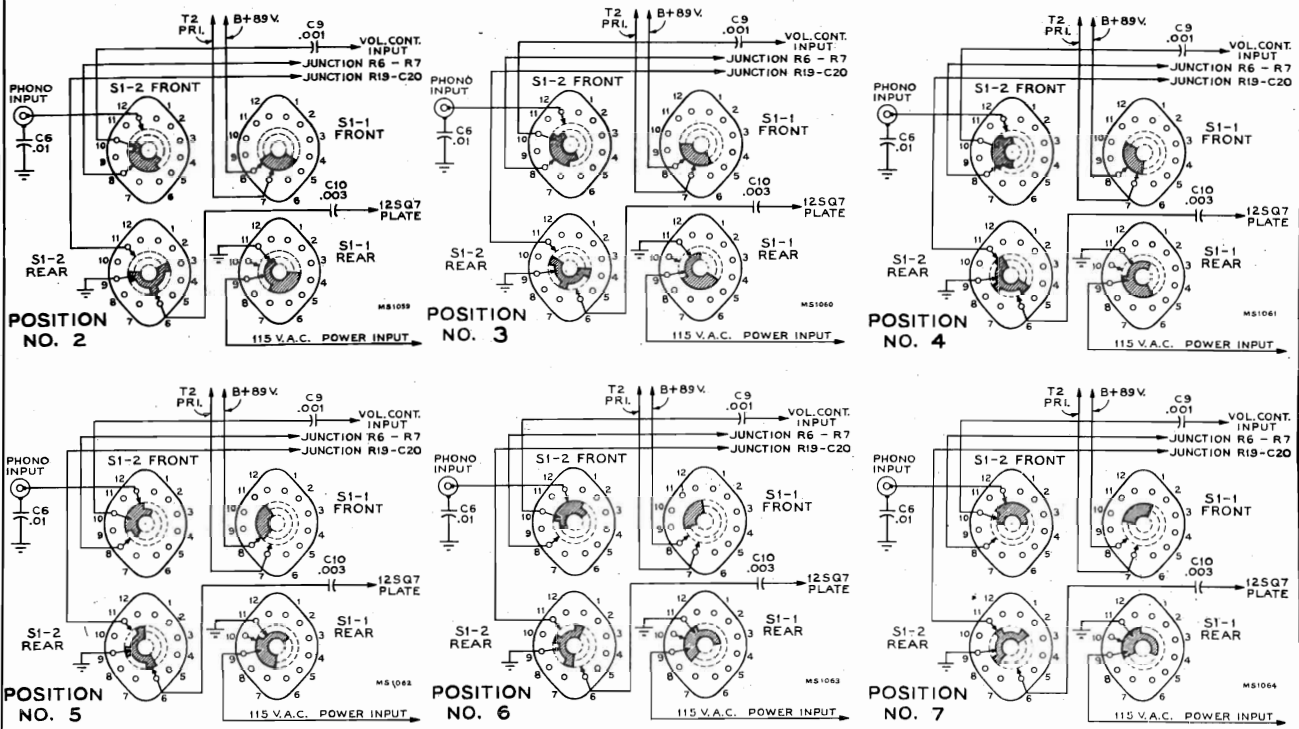
There is very little room in the cabinet so it is suggested the chassis be removed from the cabinet to replace tubes.

 - a. Remove front dial.
 - b. Remove back cover.
 - c. Remove chassis
 - d. Remove tubes.
- VII. To Remove Speaker
 - a. Remove front dial.
 - b. Remove back cover.
 - c. Remove chassis from cabinet.
 - d. Unsolder voice coil leads.
 - e. Remove two screws "B" and lift speaker out.
- VIII. To Remove Output Transformer
 - a. Remove front dial.
 - b. Remove back cover.
 - c. Remove chassis from cabinet.
 - d. Unsolder leads.
 - e. Remove two screws "C" and lift transformer out.
- IX. To Remove Volume Control
 - a. Remove front dial.
 - b. Remove back cover.
 - c. Remove chassis from cabinet.
 - d. Unsolder leads.
 - e. Loosen Allen Set screw on Volume Control knob and remove knob. (Just Pull).
 - f. Bend tabs holding Volume Control to chassis and lift the Volume Control out.
- X. To Remove Tuning Capacitor
 - a. Remove front dial.
 - b. Remove back cover.
 - c. Remove chassis from cabinet.
 - d. Unsolder leads to tuning capacitor.
 - e. Remove three screws "D" holding capacitor and lift out.
- XI. To Remove Oscillator Coil
 - a. Remove front dial.
 - b. Remove back cover.
 - c. Remove chassis
 - d. Unsolder leads to coil.
 - e. Remove coil by unsnapping mounting clips from angle bracket.
- XII. To Remove First I-F Transformer
 - a. Remove front dial.
 - b. Remove back cover.
 - c. Remove chassis.
 - d. Remove the mounting screws of both speaker and output transformer and move the speaker and transformer as found necessary for access to 1st I-F transformer leads.
 - e. Unsolder four leads from transformer.
 1. Blue lead from #2 terminal (Plate of 1R5 tube).
 2. Red lead from #3 terminal (Screen grid of 3V4 tube).
 3. Green lead from #6 terminal (Control grid of 1U4 tube).
 4. Black lead from lug on small terminal board on top of tube shelf.
 - f. Bend one mounting lug and unsolder the other lug from the chassis and lift the transformer out.
- XIII. To Remove 2nd I-F Transformer
 - a. Remove front dial.
 - b. Remove back cover.
 - c. Remove chassis.
 - d. Remove the mounting bolts of both speaker and output transformer and move the speaker and transformer as found necessary for access to 2nd I-F transformer leads.
 1. Blue lead from #2 terminal (Plate of 1U4 tube).
 2. Red lead from #3 terminal (Screen grid of 1U4 tube).
 3. Green lead from #4 terminal (Diode of 1U5 tube).
 4. Black lead from #5 terminal (Dummy terminal of 1U5 tube).
 - Unsolder the tabs from the chassis and lift the transformer out.

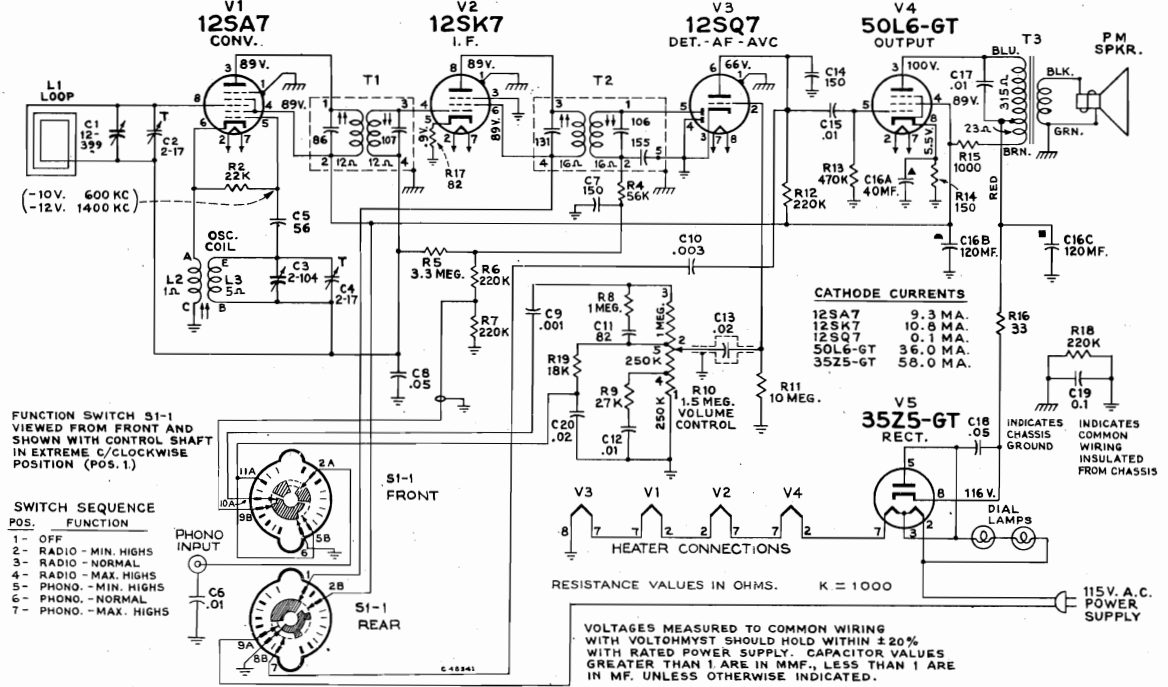
NOTE: For Add. data, See 9X571, on Pgs. 20-17 to 20-18.

| Stock No. | DESCRIPTION |
|-----------|--------------------------------------------------------------------------------------|
| 75936 | Switch—Function switch for RC-1079E, RC-1079F S1 SPEAKER ASSEMBLIES STAMPED 92586-4W |
| 74759 | Cone—Cone and voice coil assembly |
| 74664 | Speaker—8" P.M. speaker complete with cone and voice coil |

MODELS 9X571, Ch. RC-1079E; 9X572, Ch. RC-1079A, RC-1079F



Switch Position Schematic Diagrams—RC-1079, RC-1079A



Schematic Diagram—RC-1079E, RC-1079F

SPEAKER GRILLE DIFFUSER RINGS

In early production the speaker diffuser rings were fastened in place to the metal speaker grille with speed nuts slipped over plastic tabs protruding through the metal grille base.

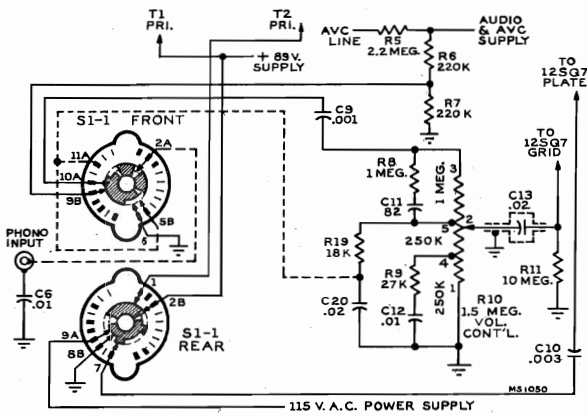
In late production these protruding plastic tabs are deformed by heat application, securely fastening the diffuser rings to the metal grille base.

If replacement of any of the diffuser rings is required, it is only necessary to tightly press the rings against the cabinet, and deform the plastic tabs from the inside with a hot soldering iron.

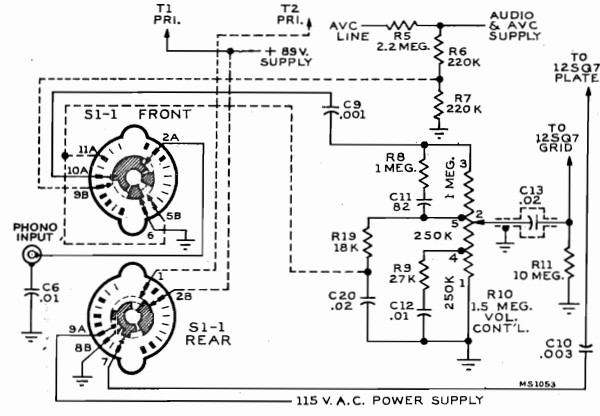
Any ring may be removed or installed without removing any of the other rings. This may be done by pressing on opposite outer edges to form an ellipse large enough to slip over the next smaller ring. Before any ring can be removed, it is necessary to unfasten the plastic tabs which project into the cabinet.

CHASSIS RC-1079A,
RC-1079E, RC-1079F

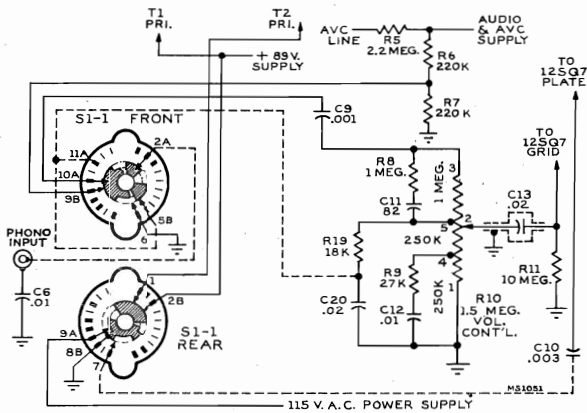
Loudspeaker (92586-2W or 92586-4W)
Size and Type..... 8 in. PM
Voice Coil Impedance..... 3.2 ohms at 400 cycles



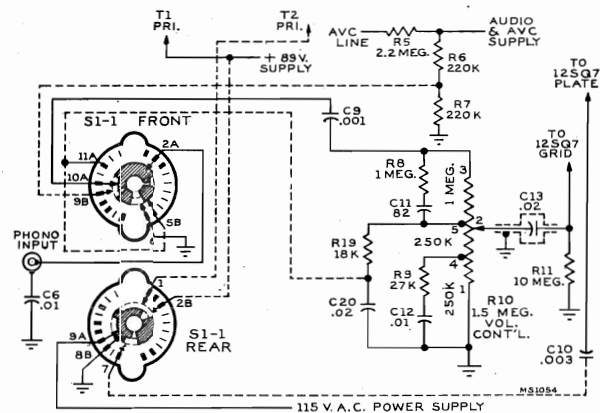
POSITION No. 2—RADIO MIN. HIGHS



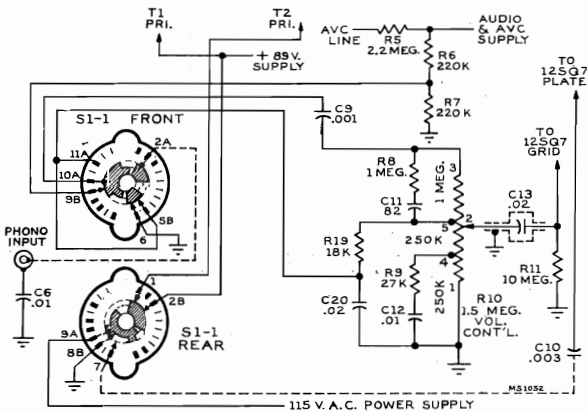
POSITION No. 5—PHONO MIN. HIGHS



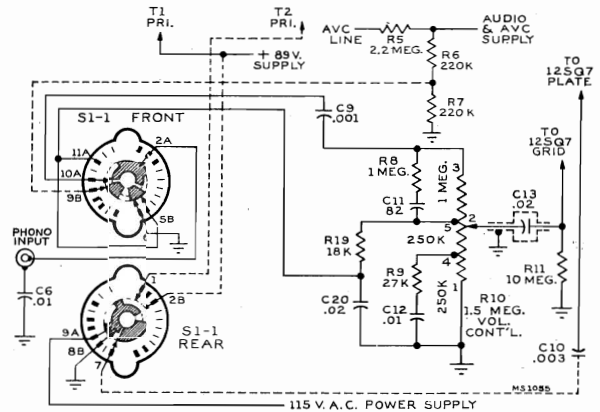
POSITION No. 3—RADIO NORMAL



POSITION No. 6—PHONO NORMAL



POSITION No. 4—RADIO MAX. HIGHS



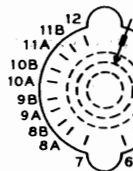
POSITION No. 7—PHONO MAX. HIGHS

Selector Switch

Switch contacts #2, 3, 4, 5, 8, 9, 10 and 11 have alternate positions designated as "A" and "B." Either 2A or 2B (but not both) may be used on "FRONT" of a switch wafer. Either (but not both) may be used on "REAR" of a switch wafer. Either may be used on both "FRONT" and "REAR." This also applies to contacts #3, 4, 5, 8, 9, 10 and 11.

Switch contacts #1, 6, 7 and 12 do not have alternate positions.

SELECTOR SWITCH



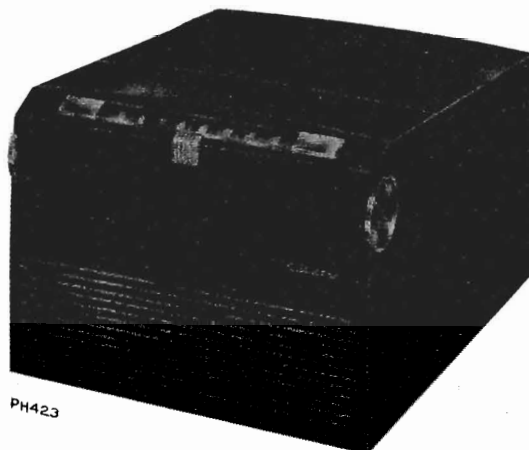
Switch Position Schematic Diagrams
Chassis RC-1079E, RC-1079F

- CONTACT ON SIDE SHOWN
- CONTACT ON REVERSE SIDE
- NO CONTACT EITHER SIDE
- UNUSED CONTACT
- DUMMY TERMINAL

HUM REDUCTION

Due to the excellent bass reproduction of these instruments the critical lead dress should be closely observed to obtain minimum hum. The outside foil polarity of capacitors in the audio circuit should not be reversed.

MODEL 9Y511,
Ch. RC-1077B

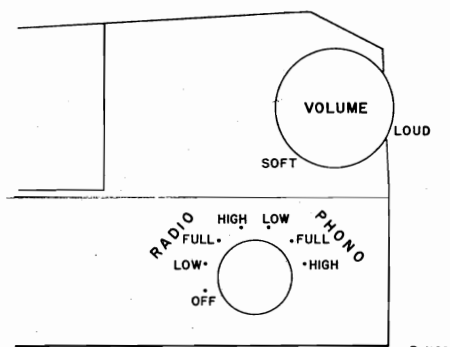


Specifications

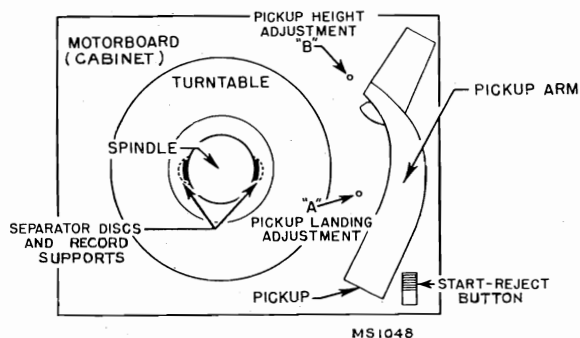
Tuning Range..... 540-1600 kc
Intermediate Frequency..... 455 kc
Tube Complement
 1. RCA-12BE6..... Converter
 2. RCA-12BA6..... I-F Amplifier
 3. RCA-12AV6..... Det., AVC., A-F Amplifier
 4. RCA-50L6GT..... Output
 5. RCA-35W4..... Rectifier
Power Supply Rating... 115 volts, 60 cycles a.c., 60 watts
Dial Lamps (2)..... Mazda type 1490, 3.2 volts, 0.16 amp.
Loudspeaker (92585-1)
 Size and type..... 5" x 7" P.M.
 Voice coil impedance..... 3.2 ohms at 400 cycles

Power Output
 Undistorted..... 1 watt
 Maximum..... 1.5 watts
Cabinet Dimensions
 Height 7 $\frac{3}{4}$ " Width 12 $\frac{3}{4}$ " Depth 14 $\frac{1}{4}$ "
Tuning Drive Ratio..... 7 $\frac{1}{2}$:1 (3 $\frac{3}{4}$ turns of knob)
Record Changer (RP 168K-4)
 Turntable speed..... 45 r.p.m.
 Records used..... RCA—7 in. fine groove
 Record capacity..... Up to 10 records
 Pickup (Stock No. 74068)..... Crystal (medium output)

FOR RECORD CHANGER SERVICE INFORMATION
—REFER TO RP 168 SERIES SERVICE DATA



Controls—End View



Record Changer—Top View

Care of Stylus

The record changer stylus is protected by a permanent metal guard. LINT MAY COLLECT TO CLOG THE OPENING IN THE GUARD AT THE STYLUS POINT AND CAUSE POOR RECORD REPRODUCTION. This may require occasional cleaning of the guard opening—clean by carefully brushing with a small soft brush.

Service Hints

The tubes and the dial lamps are accessible by removing the panel in the front of the record changer compartment. The chassis metal mounting plate should be flush against the front of the cabinet. The position of the speaker is adjustable. When correctly positioned, it should set firmly against the front of the cabinet but with no undue strain on the speaker.

RECORD CHANGER: See Model RP-168 Series, Pgs. RCD.CH.19-1 to 19-8.

MODEL 9Y511,
Ch. RC-1077B

Alignment Procedure

Output Meter—Connect meter across speaker voice coil. Turn volume control to maximum.

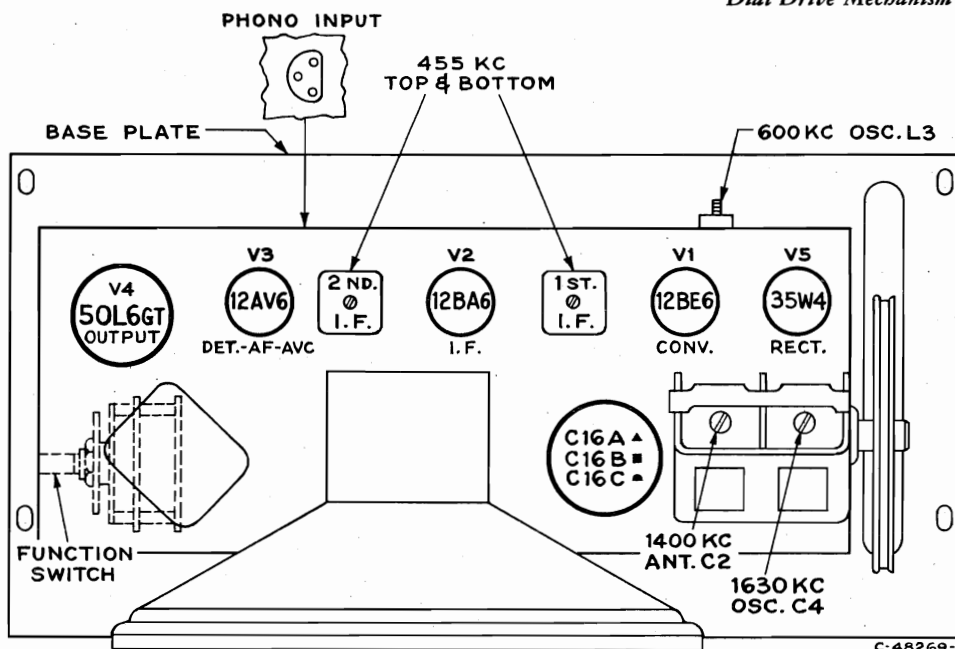
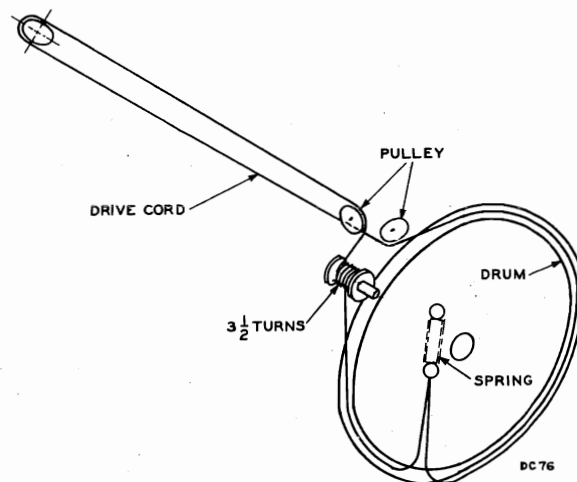
Test Oscillator—Connect low side of test oscillator to common wiring in series with a .1 mfd. capacitor. If the test oscillator is a.c. operated it may be necessary to use an isolation transformer for the receiver during alignment and the low side of the test oscillator connected directly to common wiring at the electrolytic capacitor. Keep the oscillator output low to prevent a-v-c action.

Dial Pointer Adjustment—Rotate tuning condenser until the plates are fully open. Adjust indicator pointer to 1630 kc (extreme high frequency end of the scale).

| Steps | Connect the high side of test to— | Tune test-osc. to— | Turn radio dial to— | Adjust the following for max. output |
|------------------------------------------------------------------------------------|-------------------------------------------------|--------------------|----------------------------------|--------------------------------------|
| 1 | I.F. grid, in series with .1 mfd. | 455 kc | Quiet point 1,600 kc end of dial | Pri. & Sec. 2nd I.F. transformer |
| 2 | Converter grid in series with .1 mfd. | | | Pri. & Sec. 1st I.F. transformer |
| NOTE — ANTENNA LOOP AND RECORD CHANGER MUST BE IN CABINET FOR THE FOLLOWING | | | | |
| 3 | Short wire placed near loop for radiated signal | 1,630 kc | Extreme R. H. end (gang open) | 1,630 KC trimmer (osc.) |
| | | 1,400 kc | 1,400 kc | 1,400 KC trimmer (ant.) |
| 5 | | 600 kc | 600 kc | Osc. Coil L3 Rock gang |
| 6 | Repeat steps 3, 4, & 5 if necessary | | | |

LEAD DRESS

1. Dress all heater leads and pilot light leads down to chassis and as far as possible from all audio grid and plate wiring.
2. Dress all exposed leads away from each other and away from chassis to prevent short circuits.
3. Dress lead from R.F. section of gang to V1 pin 7 direct but away from chassis base to reduce capacity, also away from fuse resistor.
4. Dress lead from oscillator section of gang to oscillator coil direct but away from chassis base to reduce capacity.
5. Connect capacitor C20 with short leads between gang frame and mounting bracket.
6. Dress output transformer leads down to base.
7. Dress loop antenna leads away from gang plates and tubes.
8. Dress 33 ohm limiting resistor away from chassis.



Tube and Trimmer Locations

MODEL 9Y511,
Ch. RC-1077B

Replacement Parts

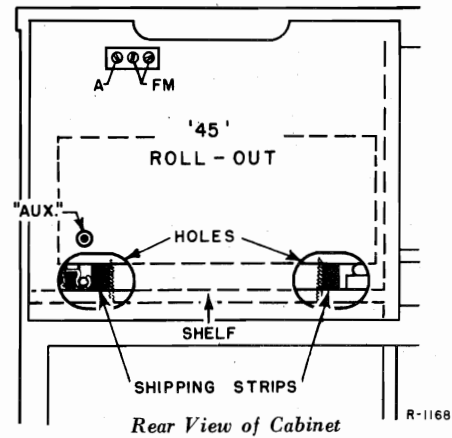
| STOCK NO. | DESCRIPTION | STOCK NO. | DESCRIPTION |
|---------------------------------------|---------------------------------------------------------------------------------------------------------------------|--------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| CHASSIS ASSEMBLIES RC 1077B | | | |
| 74703 | Antenna—Antenna loop assembly.....L1 | 74654 | Transformér—Output transformer.....T3 |
| 74705 | Bracket—Drive cord pulley bracket (R.H.) complete with two (2) pulleys less long bracket. | 75486 | Transformer—First I.F. transformer complete with adjustable cores.....T1 |
| 74704 | Capacitor—Variable tuning capacitor—less bracket..C1-1, C1-2 | 75487 | Transformer—Second I.F. transformer complete with adjustable cores.....T2 |
| 39624 | Capacitor—Mica, 68 mmf.....C5 | 33726 | Washer—"C" washer for tuning knob shaft |
| 39630 | Capacitor—Mica, 120 mmf.....C14 | SPEAKER ASSEMBLIES 92585-1 | |
| 39632 | Capacitor—Mica, 150 mmf.....C20 | 74706 | Speaker—5" x 7" P.M. speaker complete with cone and voice coil |
| 73803 | Capacitor—Tubular, paper, .002 mfd, 400 volts.....C9 | MISCELLANEOUS | |
| 73599 | Capacitor—Tubular, paper, .0025 mfd, 400 volts.....C10 | Y2137 | Cabinet—Plastic cabinet—maroon—less lid, lid support, meta grille and hinge assemblies |
| 73920 | Capacitor—Tubular, paper, .005 mfd, 400 volts.....C12, C17 | 74713 | Clamp—Dial clamp (2 req'd) |
| 73561 | Capacitor—Tubular, paper, .01 mfd., 200 volts.....C15 | 73508 | Clip—Spring clip for knob #74710 |
| 73562 | Capacitor—Tubular, paper, .02 mfd., 400 volts.....C13 | 74719 | Clip—Spring clip for radio compartment back panel |
| 73553 | Capacitor—Tubular, paper, .05 mfd., 400 volts, C6, C8, C18, C19 | 74192 | Connector—3 contact male connector for phono cable |
| 75911 | Capacitor—Electrolytic comprising 1 section of 80 mfd., 150 volts and 1 section of 50 mfd, 150 volts.....C16A, C16B | 74682 | Decal—Function switch decal |
| 73935 | Clip—Mounting clip for I.F. transformer | 74273 | Decal—Trade mark decal (Victrola) |
| 74448 | Coil—Oscillator coil.....L2 | 74722 | Dial—Polystyrene dial scale |
| 36422 | Connector—3 contact female connector for phono input cable, J1 | 74782 | Emblem—"RCA Victor" emblem |
| 30868 | Connector—2 contact female connector for motor cable, P3 | 72894 | Foot—Rubber foot (4 req'd) |
| 74702 | Control—Volume control.....R10 | 74707 | Grille—Metal grille |
| †72953 | Cord—Drive cord (approx. 49" over-all length required) | 72692 | Hinge—Cabinet lid hinge (2 req'd) |
| 70392 | Cord—Power cord and plug | 74709 | Indicator—Station selector indicator |
| 74454 | Gasket—Rubber gasket between speaker and cabinet | 74710 | Knob—Volume control or tuning knob |
| 74838 | Grommet—Strain relief grommet (1 set) | 74210 | Knob—"Start-Reject" Knob |
| 72283 | Grommet—Rubber grommet to mount tuning capacitor | 74711 | Knob—Function switch knob |
| 72602 | Pulley—Drive cord pulley | 71116 | Lamp—Dial lamp—Type 1490 |
| 72313 | Resistor—Fuse type, 33 ohms.....R16 | 74940 | Lever—"Start-Reject" actuating lever |
| | Resistor—Fixed, composition: | 74720 | Lid—Cabinet lid only |
| | 82 ohms, ±10%, ½ watt.....R17 | 74717 | Mask—End mask for dial (2 req'd) |
| | 150 ohms, ±10%, ½ watt.....R14 | 74708 | Motif—Decorative motif for front of cabinet |
| | 270 ohms, ±10%, ½ watt.....R1 | 74623 | Mounting—One set of hardware consisting of 3 rubber grommets, 3 flat washers, and 3 eyelets to mount record changer |
| | 1000 ohms, ±10%, 1 watt.....R15 | 74212 | Nut—Speed nut for reject knob |
| | 22,000 ohms, ±20%, ½ watt.....R2 | 74788 | Nut—Speed nut for "Start-Reject" actuating lever |
| | 47,000 ohms, ±20%, ½ watt.....R6 | 72765 | Nut—Speed nut to fasten motif (1 req'd) or to fasten dial (2 req'd) |
| | 56,000 ohms, ±10%, ½ watt.....R9 | 74715 | Panel—Radio compartment back panel |
| | 220,000 ohms, ±20%, ½ watt.....R12 | 74721 | Plate—Dial back plate—less dial |
| | 470,000 ohms, ±20%, ½ watt.....R7, R13 | 73728 | Screen—Ventilation screen |
| | 1.0 megohm, ±10%, ½ watt.....R19 | 74716 | Screw—#6-32 x ¼" cross recessed oval head machine screw for radio compartment back panel (3 req'd) |
| | 2.7 megohms, ±10%, ½ watt.....R18 | 76000 | Screw—#6-32 x ¼" special head screw to mount hinges |
| | 3.3 megohms, ±20%, ½ watt.....R5 | 74718 | Spring—Return spring for "Start-Reject" actuating lever |
| | 10 megohms, ±20%, ½ watt.....R11 | 14270 | Spring—Retaining spring for knob #74711 |
| 74701 | Shaft—Tuning knob shaft and pulley | 71824 | Stud—Cabinet lid hinge stud and screw (2 req'd) |
| 73584 | Shield—Tube shield for 12AV6 | 74714 | Support—Lid support |
| 70827 | Socket—Tube socket, octal, wafer | | |
| 73117 | Socket—Tube socket, 7 pin, miniature | | |
| 72998 | Socket—Dial lamp socket and lead | | |
| 74038 | Spring—Drive cord spring | | |
| 75910 | Switch—Function switch.....S1-1 | | |

† Stock No. 72953 is a reel containing 250 feet of cord.

MODEL 45-W-10,
Ch. RC-1096A



PH571



Rear View of Cabinet

R-1168

FOR RECORD CHANGER SERVICE INFORMATION REFER TO RP-190 SERIES SERVICE DATA.

Specifications

Tuning Range

Standard Broadcast (AM) 540-1,600 kc.
Frequency Modulation (FM) 88-108 mc.
Intermediate Frequencies AM—455 kc., FM—10.7 mc.

Tube Complement

- (1) RCA 6CB6..... R-F Amplifier
- (2) RCA 6J6..... Mixer and Oscillator
- (3) RCA 6BA6..... I-F Amplifier
- (4) RCA 6AU6..... Driver
- (5) RCA 6AL5..... Ratio Detector
- (6) RCA 6AV6..... AM Det.—AVC—A-F Amplifier
- (7) RCA 6C4..... Ph. Inv.
- (8) RCA 6V6GT..... Output
- (9) RCA 6V6GT..... Output
- (10) RCA 5Y3GT..... Rectifier

Dial Lamps (2).....Type No. 51, 6-8 volts, 0.2 amp.
Jewel LampType No. 51, 6-8 volts, 0.2 amp.
Tuning Drive Ratio10:1 (5 turns of knob)
Power Supply Rating 115 volts, 60 cycles, 115 watts

Loudspeaker (92569-12W)

Size and type 12 in. PM
Voice coil impedance 3.2 ohms at 400 cycles

Power Output

(Radio) Undistorted 8 watts.....Maximum 9 watts
(Phono.) Undistorted 10 watts..... Maximum 11 watts

Weight97 lbs.

Cabinet Dimensions

Height 32 in. Width 29¼ in. Depth 19¼ in.

Record Changer (RP-190-2)

Turntable speed 45 r.p.m.
Pickup crystalStock No. 75575

MISC. SERVICE INFORMATION

Roll-out Carriage Removal

Each roll-out carriage has two stop pins, (one at the back end of each slide) held in place by retaining spring. To remove roll-out carriage, it is first necessary to pull the retaining springs out of the slides with a pair of long nose pliers, the stop pins are then easily removed. The roll-out carriage may then be removed from the front of the cabinet after disconnecting its connecting cables.

Roll-out Carriage Travel

The roll-out carriages have a normal movement limitation of approximately 10 inches. If they do not have this amount of movement, it may be due to an obstruction or from slippage or creeping of the balls of the slide mechanism. Travel restriction due to slippage or creeping of balls in the slide mechanism can be corrected by exerting slightly greater pull until the normal travel limitation is reached. The carriage should then operate to its full travel with normal pull.

Pickup Height Adjustment

Adjust knurled nut (A) until the distance (during change cycle) between the top of the turntable and the stylus point is approximately 1½".

Pickup Landing Adjustment

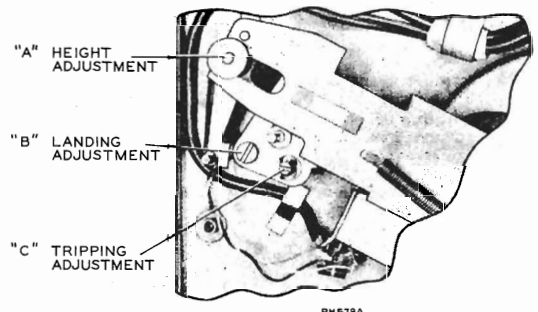
Adjust the screw driver landing adjustment stud (B) so the stylus lands 2% ± ¼" from the side of the center post.

Tripping Adjustment

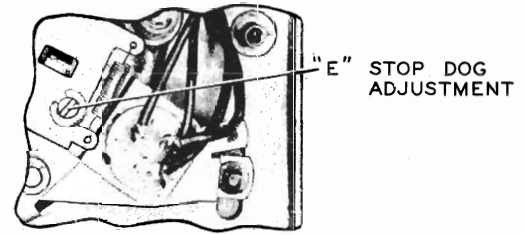
Adjust the eccentric tripping stud (C) until the mechanism trips when the stylus is 1 19/32" from the side of the center post.

Stop Dog Adjustment

Turn the eccentric screw (E) until the record drops to the turntable without striking the pickup arm.



PH579A



PH579B

MODEL 45-W-10,
Ch. RC-1096A

ALIGNMENT PROCEDURE—CIRCUIT DESCRIPTION—LEAD DRESS

Alignment Procedure
CORRECT ALIGNMENT OF THE FM BAND
REQUIRES THAT THE AM BAND BE
ALIGNED FIRST

Alignment Indicators:

An RCA VoltOhmyst or equivalent meter is necessary for measuring developed d-c voltage during FM alignment. Connections are specified in the alignment tabulation. An output meter is also necessary to indicate minimum audio output during FM Ratio Detector alignment. Connect the output meter across the speaker voice coil.

The RCA VoltOhmyst can also be used as an AM alignment indicator, either to measure audio output or to measure a-v-c voltage.

When audio output is being measured the volume control should be turned to maximum.

Signal Generator:

For all alignment operations connect the low side of the signal generator to the receiver chassis. The output should be adjusted to provide accurate resonance indication at all times. If output measurement is used for AM alignment the output of the signal generator should be kept as low as possible to avoid a-v-c action.

Circuit Description

This instrument has a ten-tube (including rectifier) chassis which is very similar to those used in other RCA Victor radio-phonograph combinations designed for AM-FM reception.

The selector switch has five functions:

- (1) Selection of tuning range.
- (2) Selection and distribution of a.v.c. voltages.
- (3) Application of B+ voltage to tubes.

In "Phono Aux." and "Phono 45" positions the B+ voltage is removed from tubes V1, V2, V3 and V4.

- (4) Selection of audio input applied to the volume control.
- (5) Change in output tube bias.

In Radio positions R6 is in parallel with R42.

This receiver has built-in antennas for standard broadcast (AM) and frequency modulation (FM) reception.

Provision is made for the use of external antennas if desired.

Critical Lead Dress

Note: The leads listed may not be critical in all receivers. However, by dressing the leads as specified, unusual difficulties will be minimized.

1. The 2.2 meg mixer grid resistor (R10) should have a minimum practicable amount of lead extending on the grid end.
2. The first A.M. and first F.M. I.F. plate leads should be dressed away from the range switch wafer.
3. The ground strap between the R.F. shelf and the main chassis should be well soldered and kept as short as practicable.
4. Arrange wiring to prevent the filament wire between the mixer (6J6) and 1st I.F. (6BA6) tubes from passing near either the mixer grid, or the A.V.C. wiring.
5. Dress filament wires away from all audio coupling condensers.
6. Dress A.C. power switch wires away from the audio coupling condenser (C20) which is wired to the volume control.
7. Dress the mixer grid coupling condenser (C7) away from the lugs on the front range switch wafer.
8. The 1st I.F. tube A.V.C. by-pass condenser (C16) should ground at the same point as the cathode neutralizing loop.
9. The driver tube plate and screen by-pass condensers (C27, C28) should ground at the same point as the neutralizing loop.
10. The mixer plate by-pass condenser (C15) should ground as close to the R.F. shelf ground strap as practicable.
11. The shielded audio leads connecting to the front function switch wafer should have a minimum of exposed lead on the function switch end.

AM Alignment

FUNCTION SWITCH IN AM POSITION

| Steps | Connect high side of sig. gen. to— | Sig. gen. output | Turn radio dial to— | Adjust for max. output |
|-------|------------------------------------|------------------|-------------------------------|--------------------------------------------------------------------------------------|
| 1 | Stator of C1-4 | 455 KC | Quiet point at low freq. end. | † Bottom (sec.) & top (pri.) cores of T4 † Top (sec.) & bottom (pri.) cores of T2 |
| 2 | AM ant. terminal thru 200 mmf. | 1620 KC | Extreme high frequency end. | C1-2 trimmer (osc.) |
| 3 | | 1400 KC | 1400 KC Signal | C1-4 trimmer (r. f.) C1-5 trimmer (ant.) |
| 4 | | 600 KC | 600 KC Signal | † L5 (osc.) L7 (r. f.) |
| 5 | Repeat steps 2, 3 and 4 | | | |

† First peak T2 and T4 then starting with T4, use alternate loading. Connect a 47,000-ohm resistor across the primary to load the plate winding while the grid winding of the same transformer is being peaked. Then load the grid winding with the 47,000-ohm resistor while the plate winding is being peaked.

† With a 10,000-ohm resistor shunted across C1-4, peak the oscillator core L5, simultaneously "rocking" the gang condenser for maximum output. Then, remove the 10,000-ohm shunt resistor and peak L7 for maximum output.

FM Alignment

FUNCTION SWITCH IN FM POSITION—VOLUME CONTROL MAXIMUM

| Steps | Connect high side of sig. gen. to— | Sig. gen. output | Turn radio dial to— | Adjust for max. output |
|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|---------------------|--------------------------------------------------------------------------------------|
| 1 | Connect the d-c probe of a VoltOhmyst to the negative lead of the 2 mfd. capacitor C40 and the common lead to chassis. Adjust sig. gen. output to provide approx. —3 v. indication during alignment. | | | |
| 2 | Pin #1 of 6AU6 (V4) in series with .01 mf. | 10.7 mc AM modulated | — | Top of driver trans. T5 for max. d-c voltage |
| 3 | | | | † Bottom of driver trans. T5 for min. audio output |
| 4 | Repeat steps 2 and 3 | | | |
| 5 | Thru 470 ohms to C1-3. Connect gnd. end of cable close to V2 cathode ground on r-f shelf | 10.7 mc | 88 mc | * Top (sec.) & bottom (pri.) cores of T3 * Top (sec.) & bottom (pri.) cores of T3 |
| 6 | To FM antenna terminals thru 120 ohms in each side of line | 90 mc | 90 mc | L8 (osc.) |
| 7 | | 106 mc | 106 mc Signal | C1-6 trimmer (ant.) and C1-3 trimmer (r. f.) |
| 8 | | 90 mc | 90 mc Signal | L1 (ant.) and L2 (r. f.) |
| 9 | Repeat steps 6, 7 and 8 | | | |
| 10 | Connect a sweep generator to the antenna terminals thru 120 ohms in each side of line. Connect an oscilloscope to junction of R44 and C41 to check response and linearity of FM band. Peak to peak separation should not be less than 180 kc. | | | |

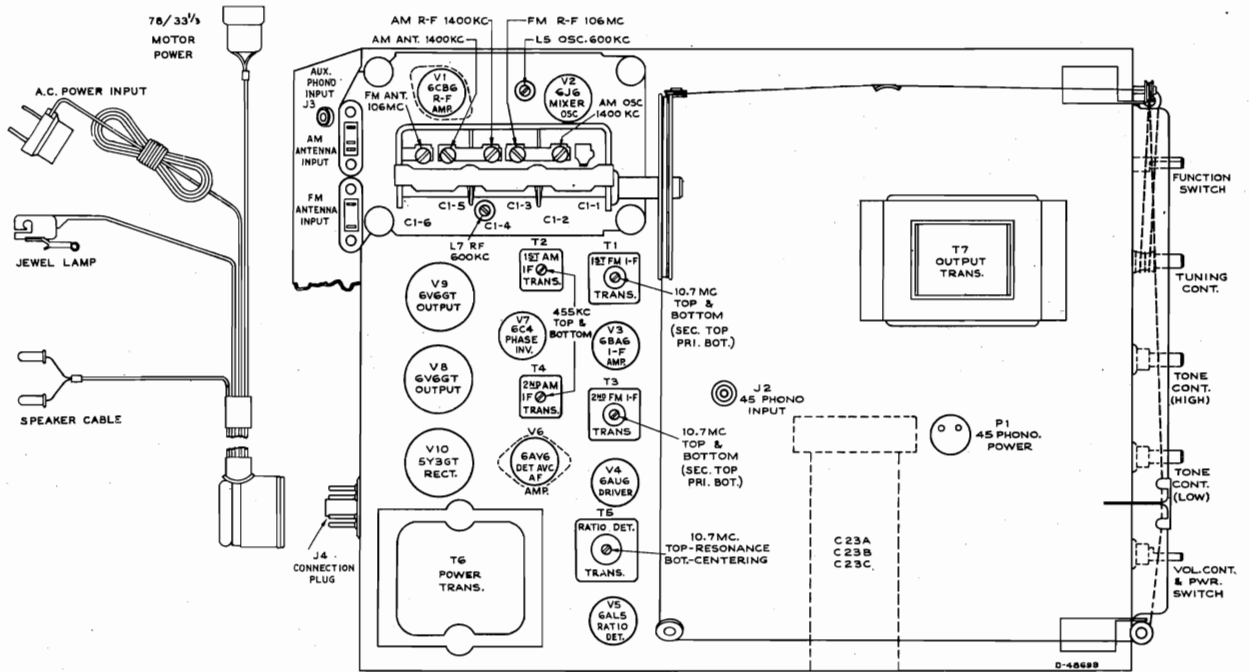
† Two or more points may be found which lower the audio output. At the correct point the minimum audio output is approached rapidly and is much lower than at any incorrect point.

* Use a 680 ohm resistor to load the plate winding while the grid winding of the same trans. is being peaked. Then the grid winding is loaded with the 680 ohm resistor while the plate winding is being peaked. When windings are loaded, it is necessary to increase the 10.7 mc input to maintain the —3 volts indication.

L8, L1 and L2 are adjustable by increasing or decreasing the spacing between turns. Oscillator signal tracks above signal frequency.

MODEL 45-W-10,
Ch. RC-1096A

TUBE AND TRIMMER LOCATIONS—VOLTAGE DATA



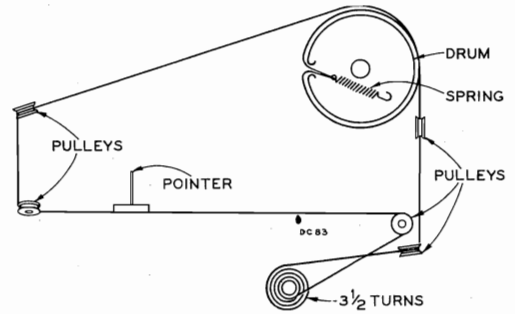
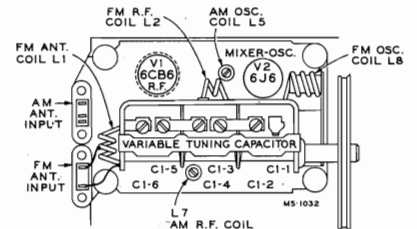
Tube and Trimmer Locations

Socket Voltages

Voltages measured with Chanalyst or VoltOhmyst and should hold within $\pm 20\%$ with rated line voltage. Tuning condenser closed—no signal input.

| Tube | Terminal | Voltage | | |
|-----------------------------|------------|---------|-------|-------|
| | | Phono | A.M. | F.M. |
| V1 6CB6 R.F. Amp. | Plate 5 | — | 203 | 132 |
| | Screen 6 | — | 48 | 39 |
| | Cathode 2 | — | 0.2 | 0.2 |
| | Grid 1 | — | -1.1 | -0.9 |
| V2 6J6 Mixer and Osc. | Plate 2 | — | 55 | 51 |
| | Grid 5 | — | -1.4 | -1.2 |
| | Plate 1 | — | 33 | 27 |
| | Grid 6 | — | -2.1 | -1.9 |
| V3 6BA6 LF. Amp. | Plate 5 | — | 192 | 188 |
| | Screen 6 | — | 106 | 101 |
| | Cathode 7 | — | 0.9 | — |
| | Grid 1 | — | -1.1 | -0.35 |
| V4 6AU6 Driver | Plate 5 | — | 186 | 180 |
| | Screen 6 | — | 122 | 120 |
| | Cathode 7 | — | 1.05 | 1.07 |
| V5 6AL5 Ratio Det. | — | — | — | — |
| V6 6AV6 A.F. Amp. | Plate 7 | 112 | 94 | 94 |
| | Grid 1 | -0.7 | -0.7 | -0.7 |
| V7 6C4 Ph. Inverter | Plate 1-5 | 125 | 87 | 85 |
| | Grid 6 | -19.2 | -16 | -16 |
| | Cathode 7 | -11.1 | -11.4 | -11.4 |
| V8 6V6GT or Output V9 | Plate 3 | 305 | 295 | 298 |
| | Screen 4 | 299 | 208 | 204 |
| | Grid 5 | -19.2 | -16 | -16 |
| V10 5Y3GT Rectifier | Filament 2 | 314 | 313 | 313 |

F. M. Coil
Locations

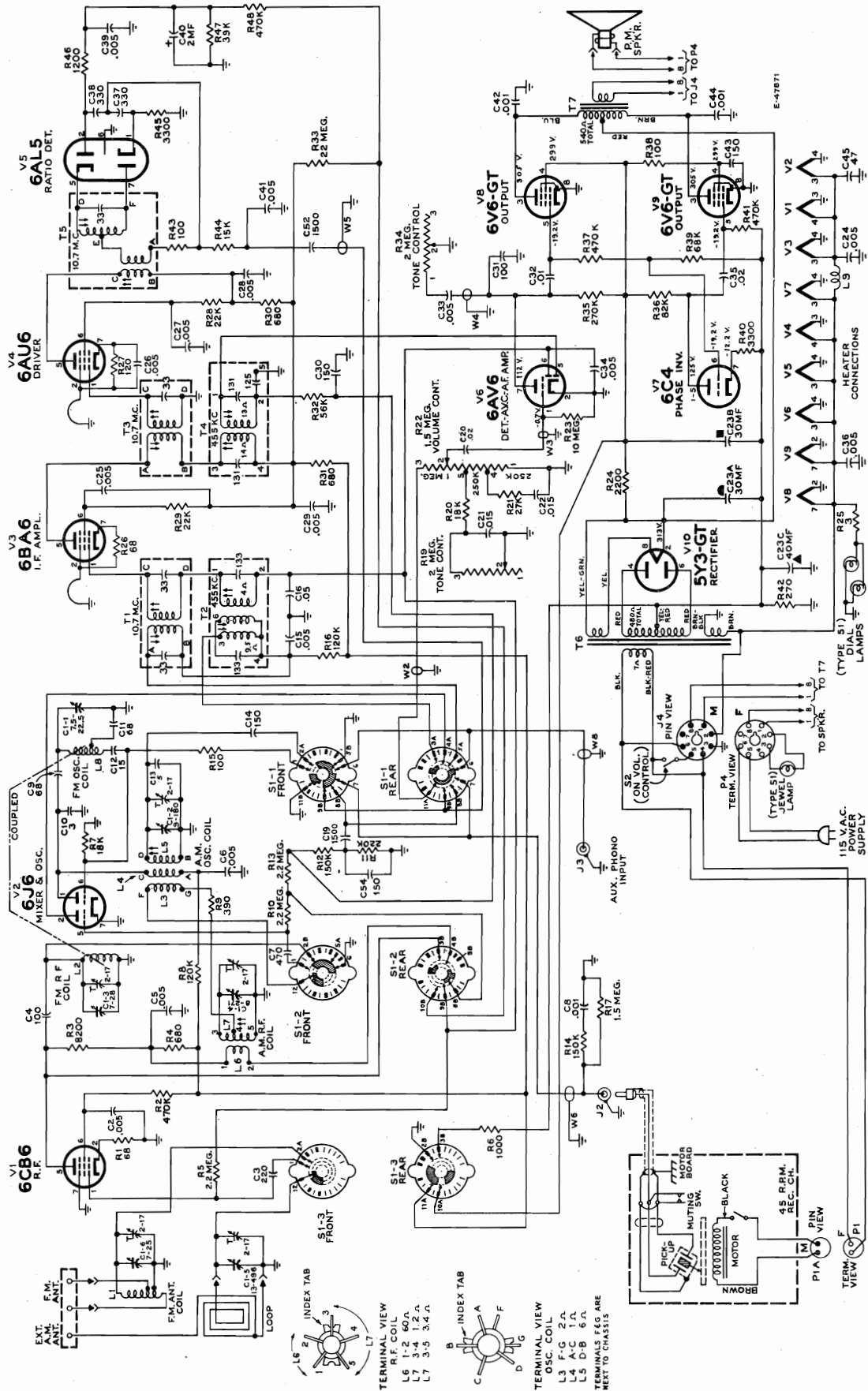


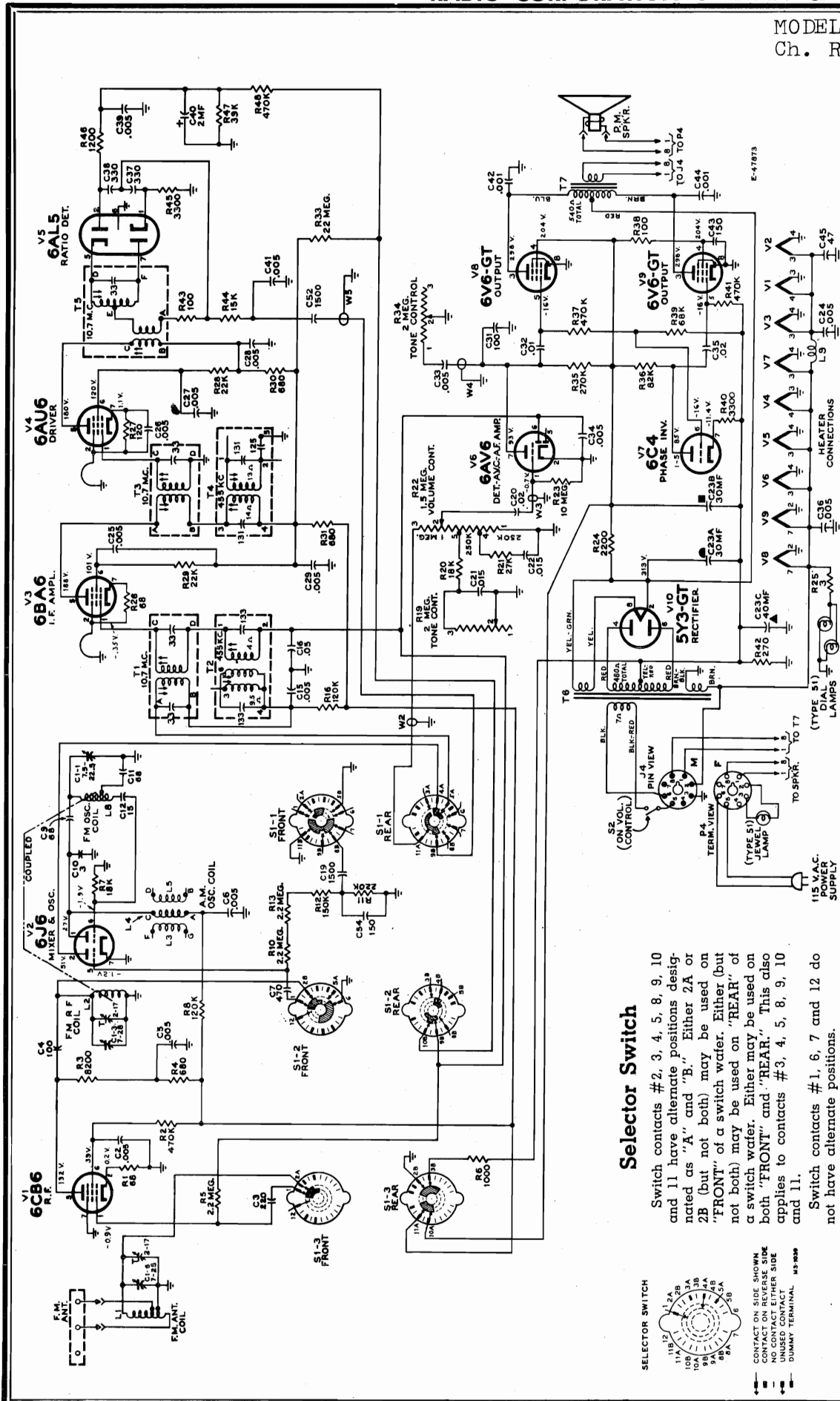
Dial Cord and Drive Assembly

Cathode Currents (Ma.)

| Tube | Terminal | Phono | A.M. | F.M. |
|-----------|----------|-------|------|------|
| V1 6CB6 | 2 | — | 3 | 3 |
| V2 6J6 | 7 | — | 2.6 | 2.6 |
| V3 6BA6 | 7 | — | 13.2 | 14.7 |
| V4 6AU6 | 7 | — | 9.3 | 9 |
| V5 6AL5 | 1 & 5 | — | — | — |
| V6 6AV6 | 2 | 0.8 | 0.5 | 0.5 |
| V7 6C4 | 7 | 2.2 | 1.5 | 1.5 |
| V8 6V6GT | 8 | 35.6 | 17.8 | 17.7 |
| V9 6V6GT | 8 | 35.6 | 17.8 | 17.7 |
| V10 5Y3GT | 2 | 74.2 | 73.6 | 74.2 |

MODEL 45-W-10,
Ch. RC-1096A

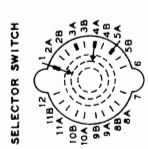




Selector Switch

Switch contacts #2, 3, 4, 5, 8, 9, 10 and 11 have alternate positions designated as "A" and "B." Either 2A or 2B (but not both) may be used on "FRONT" of a switch wafers. Either (but not both) may be used on "REAR" of a switch wafers. Either may be used on both "FRONT" and "REAR." This also applies to contacts #3, 4, 5, 8, 9, 10 and 11.

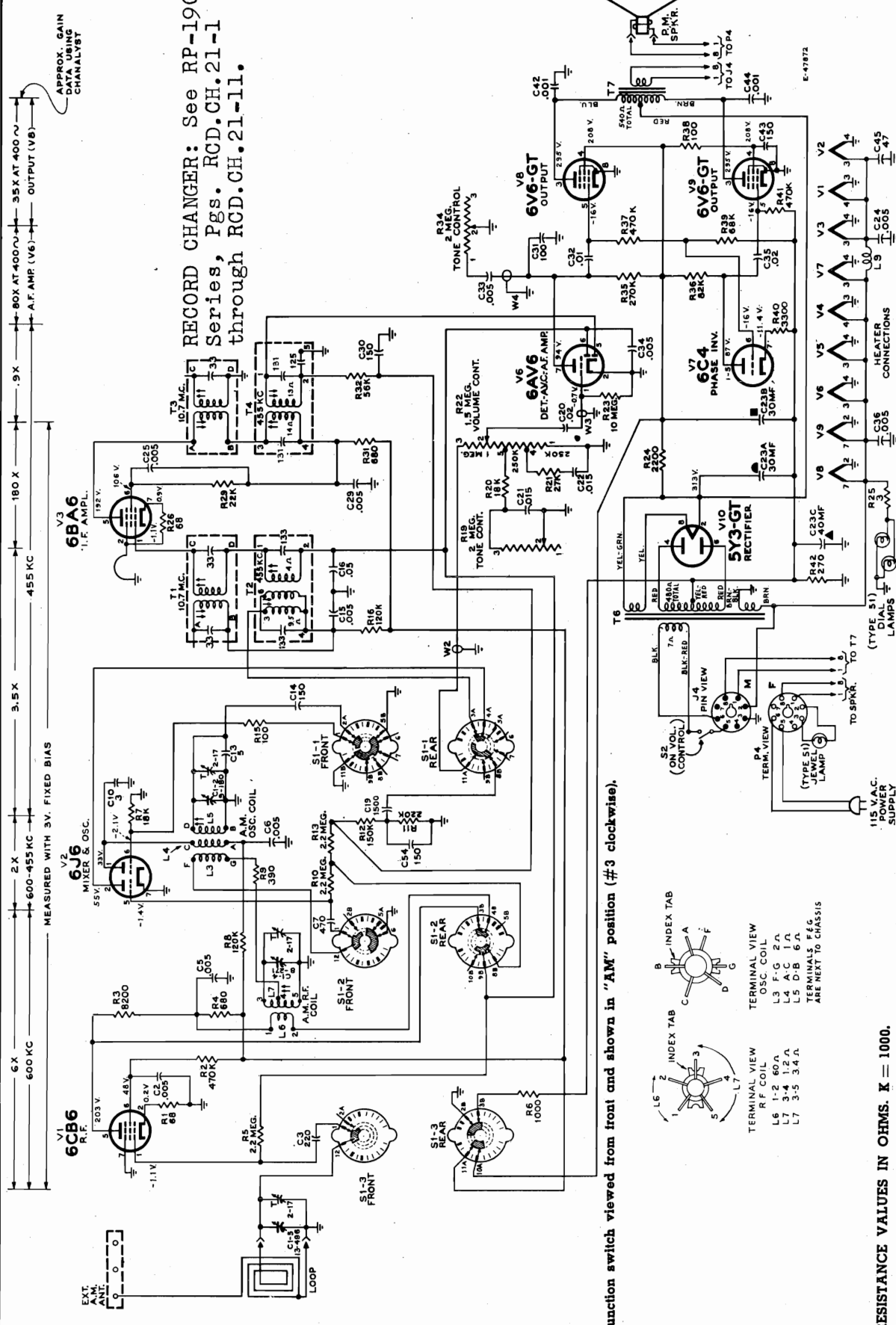
Switch contacts #1, 6, 7 and 12 do not have alternate positions.



Function switch viewed from front and shown in "FM" position (max. clockwise). CAPACITOR VALUES LESS THAN 1 ARE IN MF., VALUES GREATER THAN 1 ARE IN MMF. UNLESS OTHERWISE SPECIFIED. RESISTANCE VALUES IN OHMS. K = 1000. VOLTAGES MEASURED TO CHASSIS WITH VOLTOHMYST WITH NO SIGNAL INPUT AND SHOULD HOLD WITHIN ±20% WITH 117-VOLT POWER SUPPLY.

Simplified Schematic Diagram—"FM"

MODEL 45-W-10,
Ch. RC-1096A

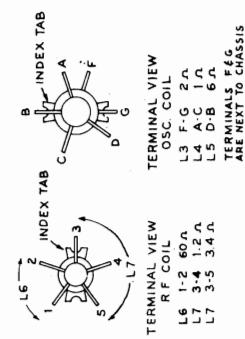


APPROX. GAIN DATA USING CHANNELYST

6X 600 KC MEASURED WITH 3V. FIXED BIAS
 2X 600-455 KC MEASURED WITH 3V. FIXED BIAS
 3.5X 455 KC MEASURED WITH 3V. FIXED BIAS
 180X 80X AT 400V ~ 35X AT 400V ~
 A.F. AMP. (V6) OUTPUT (V8)

RECORD CHANGER: See RP-190 Series, Pgs. RCD.CH.21-1 through RCD.CH.21-11.

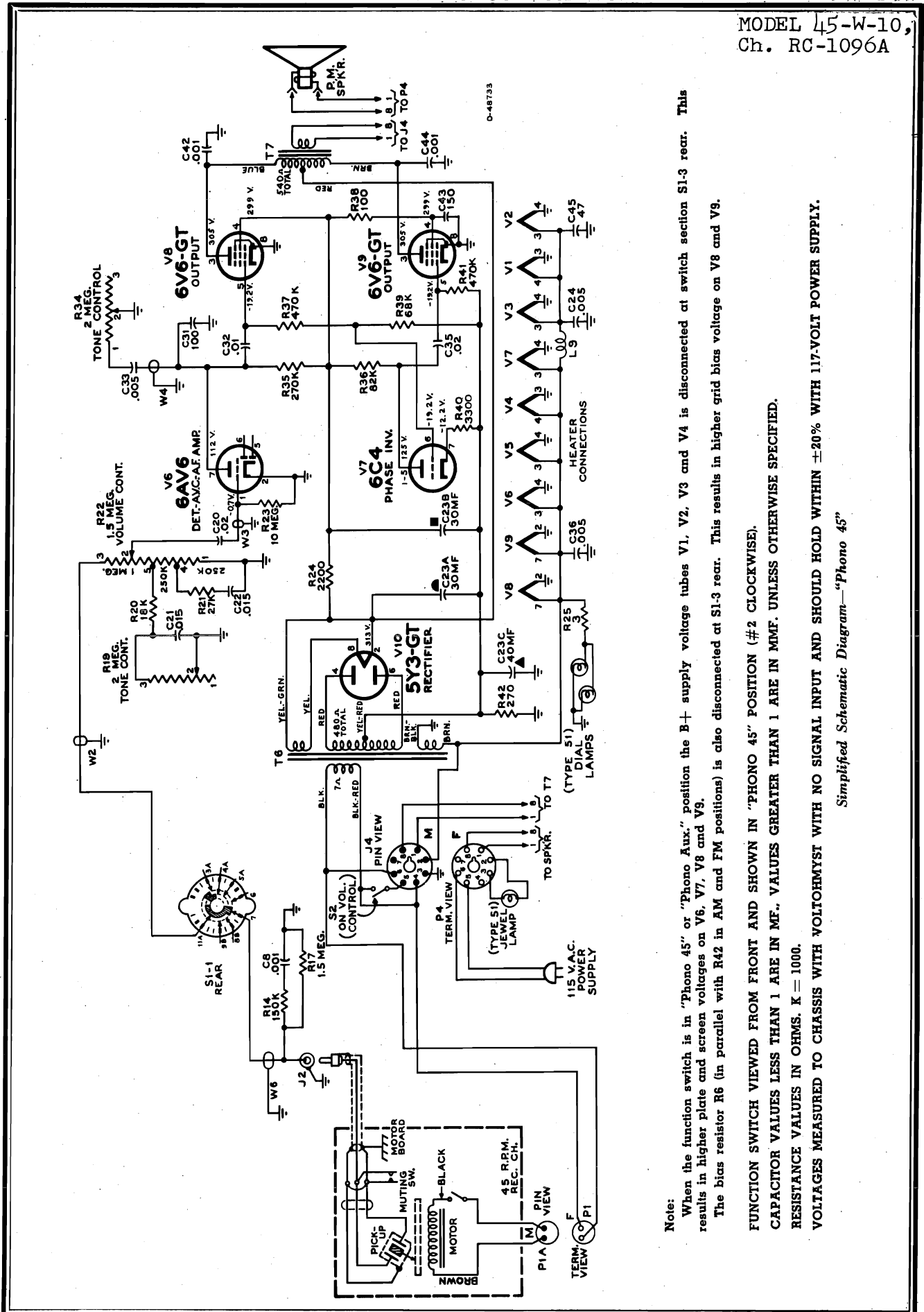
Function switch viewed from front and shown in "AM" position (#3 clockwise).



RESISTANCE VALUES IN OHMS. K = 1000.
 CAPACITOR VALUES LESS THAN 1 ARE IN MF., VALUES GREATER THAN 1 ARE IN MMF. UNLESS OTHERWISE SPECIFIED.
 VOLTAGES MEASURED TO CHASSIS WITH VOLTOHMIST WITH NO SIGNAL INPUT AND SHOULD HOLD WITHIN ±20% WITH 117-VOLT POWER SUPPLY.

Simplified Schematic Diagram—"AM"

MODEL 45-W-10,
Ch. RC-1096A

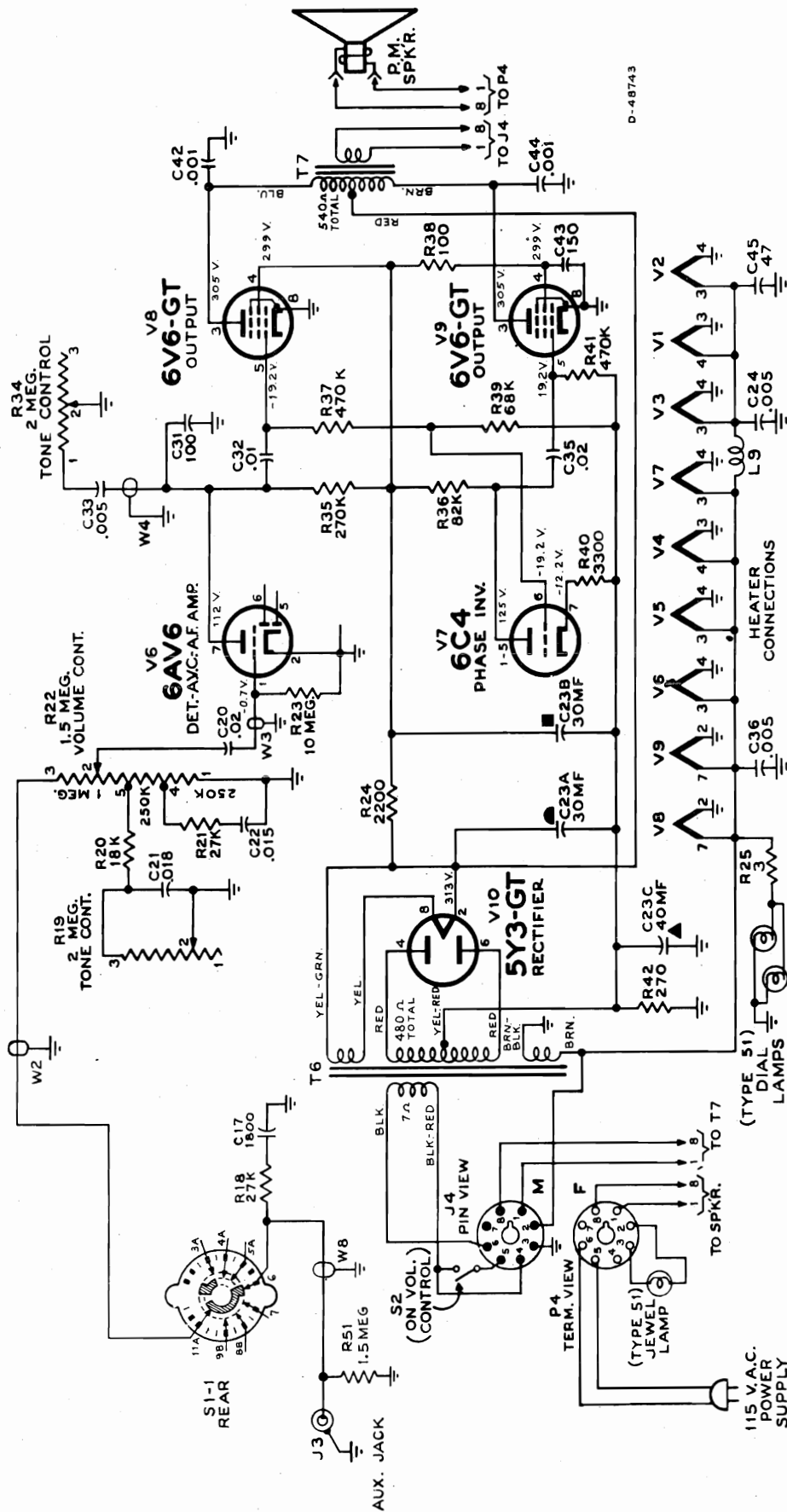


Note: When the function switch is in "Phono 45" or "Phono Aux." position the B+ supply voltage tubes V1, V2, V3 and V4 is disconnected at switch section S1-3 rear. This results in higher plate and screen voltages on V6, V7, V8 and V9. The bias resistor R6 (in parallel with R42 in AM and FM positions) is also disconnected at S1-3 rear. This results in higher grid bias voltage on V8 and V9.

FUNCTION SWITCH VIEWED FROM FRONT AND SHOWN IN "PHONO 45" POSITION (#2 CLOCKWISE). CAPACITOR VALUES LESS THAN 1 ARE IN MF., VALUES GREATER THAN 1 ARE IN MMF. UNLESS OTHERWISE SPECIFIED. RESISTANCE VALUES IN OHMS. K = 1000. VOLTAGES MEASURED TO CHASSIS WITH VOLTOHMIST WITH NO SIGNAL INPUT AND SHOULD HOLD WITHIN $\pm 20\%$ WITH 117-VOLT POWER SUPPLY.

Simplified Schematic Diagram—"Phono 45"

MODEL 45-W-10,
Ch. RC-1096A



Note:

When the function switch is in "Phono 45" or "Phono 78/33" position the B+ supply voltage to tubes V1, V2, V3 and V4 is disconnected at switch section S1-3 rear. This results in higher plate and screen voltages on V6, V7, V8 and V9.

The bias resistor R6 (in parallel with R42 in AM and FM positions) is also disconnected at S1-3 rear. This results in higher grid bias voltage on V8 and V9.

FUNCTION SWITCH VIEWED FROM FRONT AND SHOWN IN "PHONO 78/33" POSITION (MAX. C/CLOCKWISE).

CAPACITOR VALUES LESS THAN 1 ARE IN MF., VALUES GREATER THAN 1 ARE IN MMF. UNLESS OTHERWISE SPECIFIED.

RESISTANCE VALUES IN OHMS. K = 1000.

VOLTAGES MEASURED TO CHASSIS WITH VOLTOHMYST WITH NO SIGNAL INPUT AND SHOULD HOLD WITHIN $\pm 20\%$ WITH 117-VOLT POWER SUPPLY.

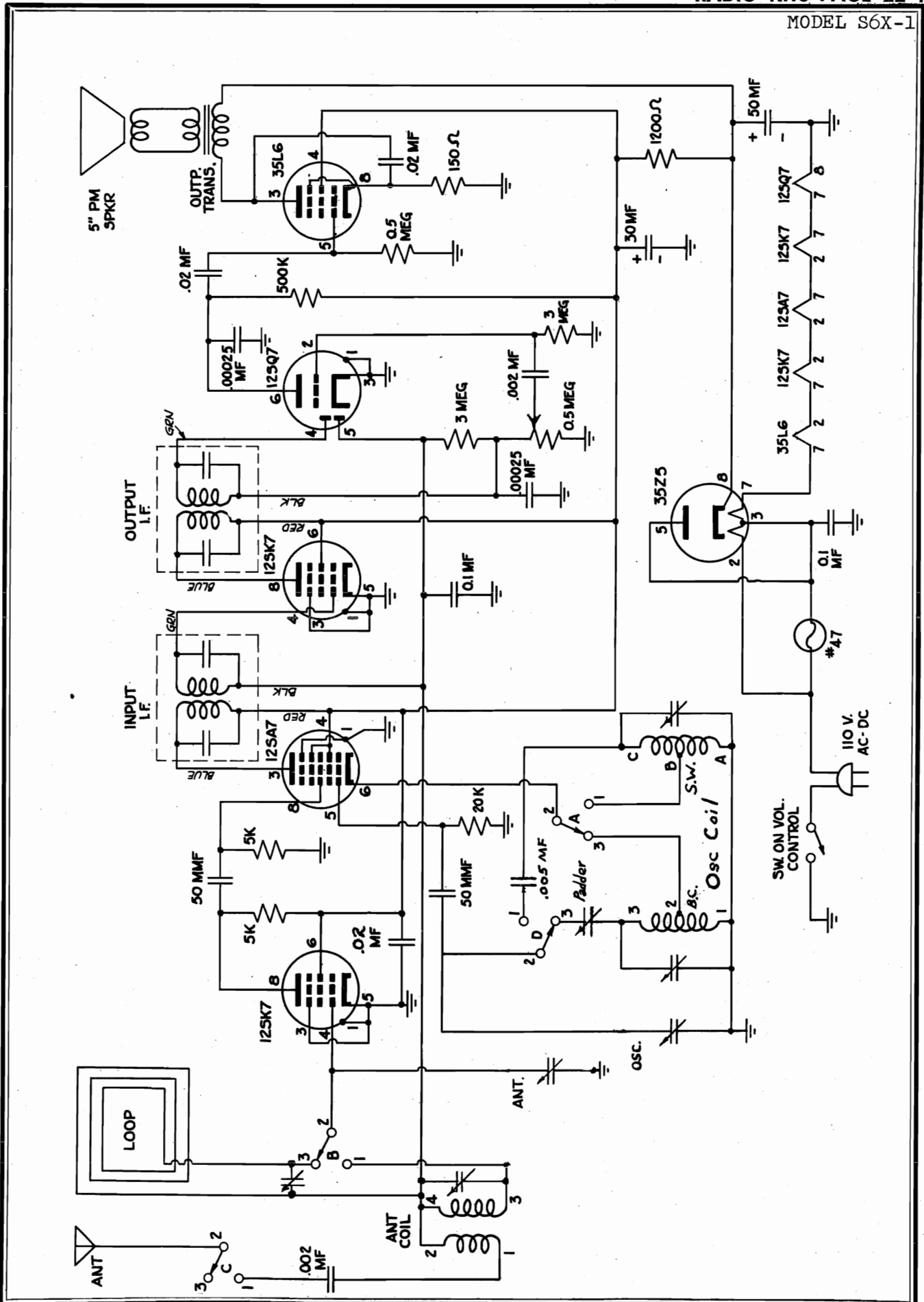
Simplified Schematic Diagram—"Phono Aux."

D-48743

Replacement Parts

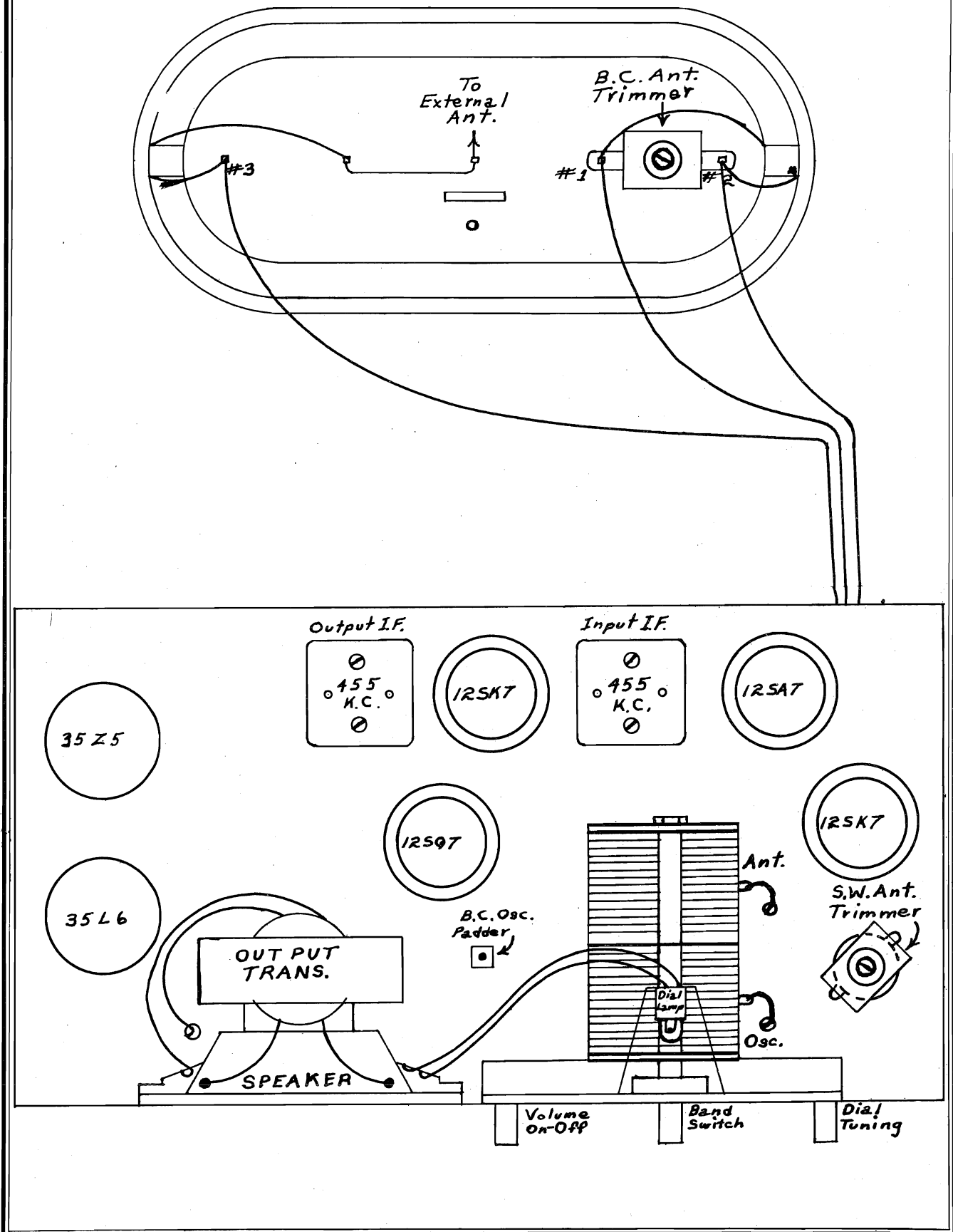
| STOCK NO. | DESCRIPTION |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| CHASSIS ASSEMBLIES | |
| RC1096A | |
| 75567 | Capacitor—Variable tuning capacitor (C1-1, C1-2, C1-3, C1-4, C1-5, C1-6) |
| 74733 | Capacitor—Ceramic, 3 mmf. (C10) |
| 75613 | Capacitor—Ceramic, 5 mmf. (C13) |
| 39044 | Capacitor—Ceramic, 15 mmf. (C12) |
| 75609 | Capacitor—Ceramic, 47 mmf. (C45) |
| 75612 | Capacitor—Ceramic, 68 mmf. (C9, C11) |
| 39396 | Capacitor—Ceramic, 100 mmf. (C4) |
| 75437 | Capacitor—Ceramic, 100 mmf. (C31) |
| 75614 | Capacitor—Ceramic, 150 mmf. (C14, C30, C43, C54) |
| 75611 | Capacitor—Ceramic, 220 mmf. (C3) |
| 39640 | Capacitor—Mica, 330 mmf. (C37, C38) |
| 39644 | Capacitor—Mica, 470 mmf. (C7) |
| 75610 | Capacitor—Ceramic, 1500 mmf. (C19, C52) |
| 73473 | Capacitor—Ceramic, 5000 mmf. (C2, C5, C6, C15, C24, C25, C27, C28, C29, C34, C36) |
| 73747 | Capacitor—Electrolytic, 2 mfd, 50 volts (C40) |
| 72052 | Capacitor—Electrolytic, comprising 1 section of 30 mfd, 450 volts, 1 section of 30 mfd, 350 volts, and 1 section of 40 mfd, 25 volts (C23A, C23B, C23C) |
| 73801 | Capacitor—Tubular, paper, .001 mfd, 400 volts (C8) |
| 70642 | Capacitor—Tubular, paper, .001 mfd, 1000 volts (C42, C44) |
| 73920 | Capacitor—Tubular, paper, .005 mfd, 400 volts (C26, C33, C39, C41) |
| 73561 | Capacitor—Tubular, paper, .01 mfd, 400 volts (C32) |
| 73797 | Capacitor—Tubular, paper, .015 mfd, 400 volts (C21, C22) |
| 71928 | Capacitor—Tubular, paper, .02 mfd, 200 volts (C20) |
| 73562 | Capacitor—Tubular, paper, .02 mfd, 400 volts (C35) |
| 73553 | Capacitor—Tubular, paper, .05 mfd, 400 volts (C16) |
| 73935 | Clip—Mounting clip for A-M, I-F transformers |
| 75569 | Coil—Oscillator coil—A.M.—complete with adjustable screws (L3, L4, L5) |
| 75570 | Coil—R.F. coil—A.M.—complete with adjustable core (L6, L7) |
| 71942 | Coil—Filament choke coil (L9) |
| 75615 | Coil—Antenna coil—F-M (L1) |
| 74815 | Coil—R-F coil—F-M (L2) |
| 74817 | Coil—Oscillator coil—F-M (L8) |
| 35787 | Connector—Single contact female connector for phono cables (J2, J3) |
| 75542 | Connector—8 contact male connector for power input cable (J4) |
| 75543 | Connector—2 contact female connector for 45 RPM motor cable (P1) |
| 74879 | Connector—2 contact female connector for antenna leads |
| 75537 | Control—Volume control and power switch (R22, S2) |
| 75561 | Control—Tone control—L.F. (R19) |
| 75562 | Control—Tone control—H.F. (R34) |
| 72953 | Cord—Drive cord (approx. 66" overall) |
| 75564 | Coupling—Spring coupling for function switch extension shaft |
| 75556 | Cover—Insulating cover for electrolytic |
| 74839 | Fastener—Push fastener for mounting R.F. shelf (4 req'd) |
| 16058 | Grommet—Rubber grommet for mounting R.F. shelf (4 req'd) |
| 75547 | Grommet—Rubber grommet to mount slides to bottom—rear (2 req'd) |
| 75548 | Grommet—Rubber grommet to mount slides to bottom—front (2 req'd) |
| 11765 | Lamp—Dial lamp—Mazda #51 |
| 75544 | Nut—Rivnut to fasten screw for mounting chassis (4 req'd) |
| 18469 | Plate—Bakelite mounting plate for electrolytic |
| 75535 | Plate—Dial back plate complete with three (3) pulleys |
| 75536 | Pointer—Station selector indicator |
| 72602 | Pulley—Drive cord pulley |
| 72323 | Resistor—Wire wound, 3 ohms, 1/2 watt (R25) |
| 73637 | Resistor—Wire wound, 2200 ohms, 5 watts (R24) |
| | Resistor—Fixed, composition— |
| | 68 ohms, ±10%, 1/2 watt (R1, R26) |
| | 100 ohms, ±10%, 1/2 watt (R15, R38, R3) |
| | 120 ohms, ±10%, 1/2 watt (R27) |
| | 270 ohms, ±5%, 2 watts (R42) |
| | 390 ohms, ±10%, 1/2 watt (R9) |
| | 680 ohms, ±10%, 1/2 watt (R4) |
| | 680 ohms, ±20%, 1/2 watt (R30, R31) |
| | 1000 ohms, ±10%, 1/2 watt (R6) |
| | 1200 ohms, ±5%, 1/2 watt (R46) |
| | 3300 ohms, ±5%, 1/2 watt (R40, R45) |
| | 8200 ohms, ±10%, 1 watt (R3) |
| | 15,000 ohms, ±10%, 1/2 watt (R44) |
| | 18,000 ohms, ±10%, 1/2 watt (R7, R20) |
| | 22,000 ohms, ±10%, 1/2 watt (R28, R29) |
| | 27,000 ohms, ±10%, 1/2 watt (R21) |
| | 39,000 ohms, ±5%, 1/2 watt (R47) |
| | 56,000 ohms, ±10%, 1/2 watt (R32) |
| | 68,000 ohms, ±10%, 1/2 watt (R39) |
| | 82,000 ohms, ±10%, 1/2 watt (R36) |
| | 120,000 ohms, ±10%, 1/2 watt (R8, R16) |
| | 150,000 ohms, ±10%, 1/2 watt (R12, R14) |
| | 220,000 ohms, ±20%, 1/2 watt (R11) |
| | 270,000 ohms, ±10%, 1/2 watt (R35) |
| | 470,000 ohms, ±10%, 1/2 watt (R2, R37, R41, R48) |
| | 1.5 megohm, ±10%, 1/2 watt (R17) |
| | 2.2 megohm, ±20%, 1/2 watt (R5, R10, R13) |
| | 10 megohm, ±20%, 1/2 watt (R23) |
| | 22 megohm, ±20%, 1/2 watt (R33) |
| 75540 | Shaft—Tuning knob shaft |
| 75565 | Shaft—Extension shaft for function switch |
| 73584 | Shield—Tube shield |
| 75546 | Slide—Slide mechanism complete for radio chassis bottom |
| 31251 | Socket—Tube socket, octal, wafer |
| 73117 | Socket—Tube socket, 7 pin, miniature |
| 74179 | Socket—Tube socket, 7 pin, miniature for 6BC6—6J6 |
| 31364 | Socket—Dial lamp socket |
| 75563 | Spring—Retaining spring for function switch extension shaft |

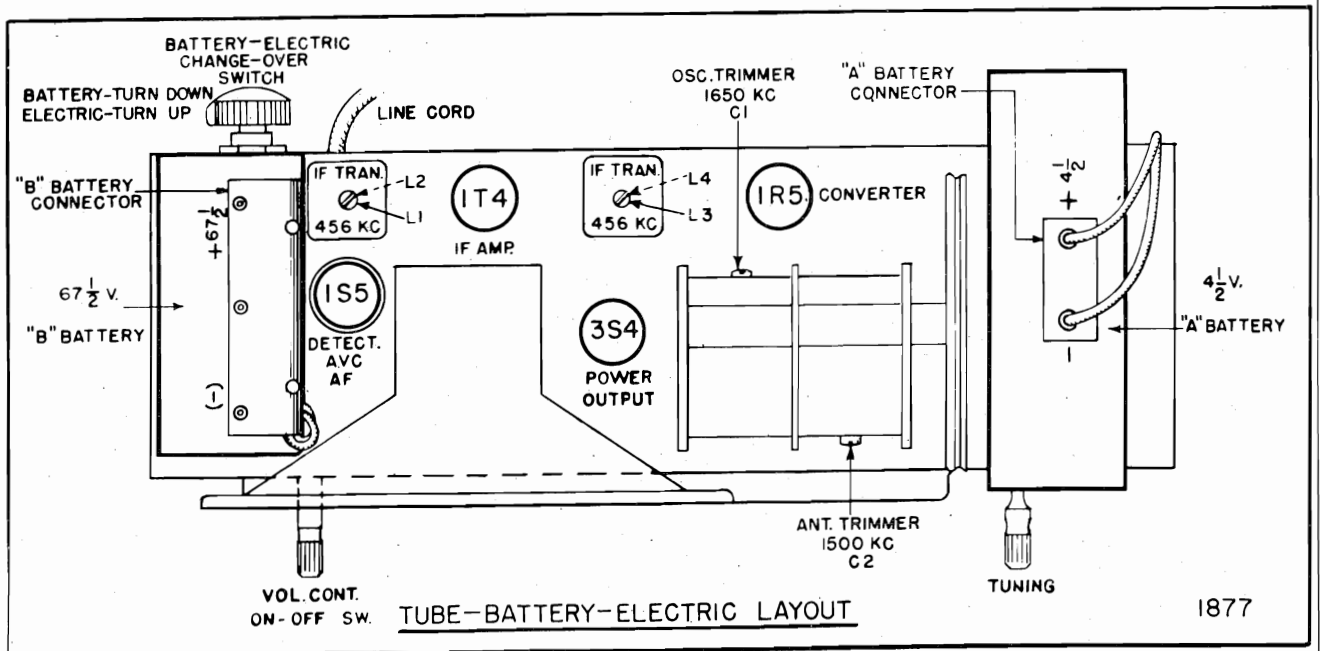
| STOCK NO. | DESCRIPTION |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| 74038 | Spring—Drive cord spring |
| 74847 | Support—Polystyrene support for F-M oscillator coil complete with mounting bracket |
| 75602 | Switch—Function switch (S1) |
| 75557 | Transformer—Output transformer (T7) |
| 75566 | Transformer—Power transformer, 117 volts/60 cycle (T6) |
| 73743 | Transformer—Ratio detector transformer (T5) |
| 75558 | Transformer—First I-F transformer (A.M.) complete with adjustable screws (T2) |
| 73037 | Transformer—Second I-F transformer (A.M.) complete with adjustable screws (T4) |
| 75559 | Transformer—First I-F transformer (F.M.) complete with adjustable screws (T1) |
| 75560 | Transformer—Second I-F transformer (F.M.) complete with adjustable screws (T3) |
| 33726 | Washer—"C" washer for tuning knob shaft |
| ROLLOUT MECHANISM | |
| 76206 | Decal—Control function decal |
| 75572 | Dial—Polystyrene dial scale |
| 76161 | Frame—Moulded frame—maroon—for mounting radio chassis and 45 RPM changer for mahogany or walnut instruments |
| 76162 | Frame—Moulded frame—light brown—for mounting radio chassis and 45 RPM changer for oak instruments |
| 76165 | Handle—Metal pullout handle for mounting frame |
| 75555 | Screw—#8-32 x 3/8" cross recessed pan head screw to mount radio chassis (4 req'd) |
| SPEAKER ASSEMBLIES | |
| 92569-12W | |
| RL 111A1 | |
| 13867 | Cap—Dust cap |
| 75682 | Cone—Cone complete with voice coil (3.2 ohms) |
| 75681 | Speaker—12" P.M. speaker complete with cone and voice coil (3.2 ohms) |
| NOTE:—If stamping on speaker in instrument does not agree with above speaker number, order replacement parts by referring to model number of instrument, number stamped on speaker and full description of part required. | |
| MISCELLANEOUS | |
| 71864 | Antenna—F-M antenna |
| 75705 | Antenna—Antenna loop complete less cable |
| 75900 | Back—Back cover—maroon—for radio-phonograph compartment for mahogany or walnut instruments (assembled to rollout) |
| 75901 | Back—Back cover—light brown—for radio-phonograph compartment for oak instruments (assembled to rollout) |
| 73680 | Board—"A-F.M." terminal board |
| 75694 | Bracket—Stop bracket less rubber bumper for radio phonograph compartment rollout |
| 71599 | Bracket—Pilot lamp bracket |
| 75696 | Bumper—Rubber bumper for rollout stop bracket |
| 72437 | Cable—Shielded pickup cable complete with pin plug |
| 13103 | Cap—Pilot lamp cap |
| 71892 | Catch—Bullet catch and strike for cabinet doors |
| X3144 | Cloth—Grille cloth for mahogany or walnut instruments |
| X3089 | Cloth—Grille cloth for oak instruments |
| 74882 | Connector—2 contact (polarized) male connector for A-M antenna loop cable |
| 75709 | Connector—8 contact female connector less shell for main cable |
| 75474 | Connector—Single contact male connector for speaker (2 req'd) |
| 74752 | Connector—2 contact male connector for FM antenna terminal board cable |
| 30870 | Connector—2 contact male connector for AC power cable for 45 RPM changer |
| 71984 | Decal—Trade mark decal (RCA Victor) |
| 74273 | Decal—Trade mark decal (Victrola) |
| 37396 | Grommet—Rubber grommet for mounting speaker |
| 74838 | Grommet—Power cord strain relief (1 set) |
| 75697 | Grommet—Rubber grommet for mounting record changer (3 req'd) |
| 74308 | Hinge—Cabinet door hinge (1 set) |
| 75714 | Knob—Function switch knob—maroon—for mahogany or walnut instruments |
| 75715 | Knob—Function switch knob—tan—for oak instruments |
| 75712 | Knob—Tuning control, tone control or volume control and power switch knob—maroon—for mahogany or walnut instruments |
| 75713 | Knob—Tuning control, tone control or volume control and power switch knob—tan—for oak instruments |
| 11765 | Lamp—Pilot lamp—Mazda #51 |
| 73634 | Nut—Speed nut for speaker mounting screws |
| 75908 | Pull—Door pull |
| 75920 | Screw—#10-24 x 1" tritrit head screw for door pull |
| 75708 | Shell—Shell for 8 contact female connector #75709 |
| 31364 | Socket—Pilot lamp socket |
| 74734 | Spring—Retaining spring for knobs |
| 75902 | Spring—Suspension spring for main cable |
| 72936 | Stop—Cabinet door stop |



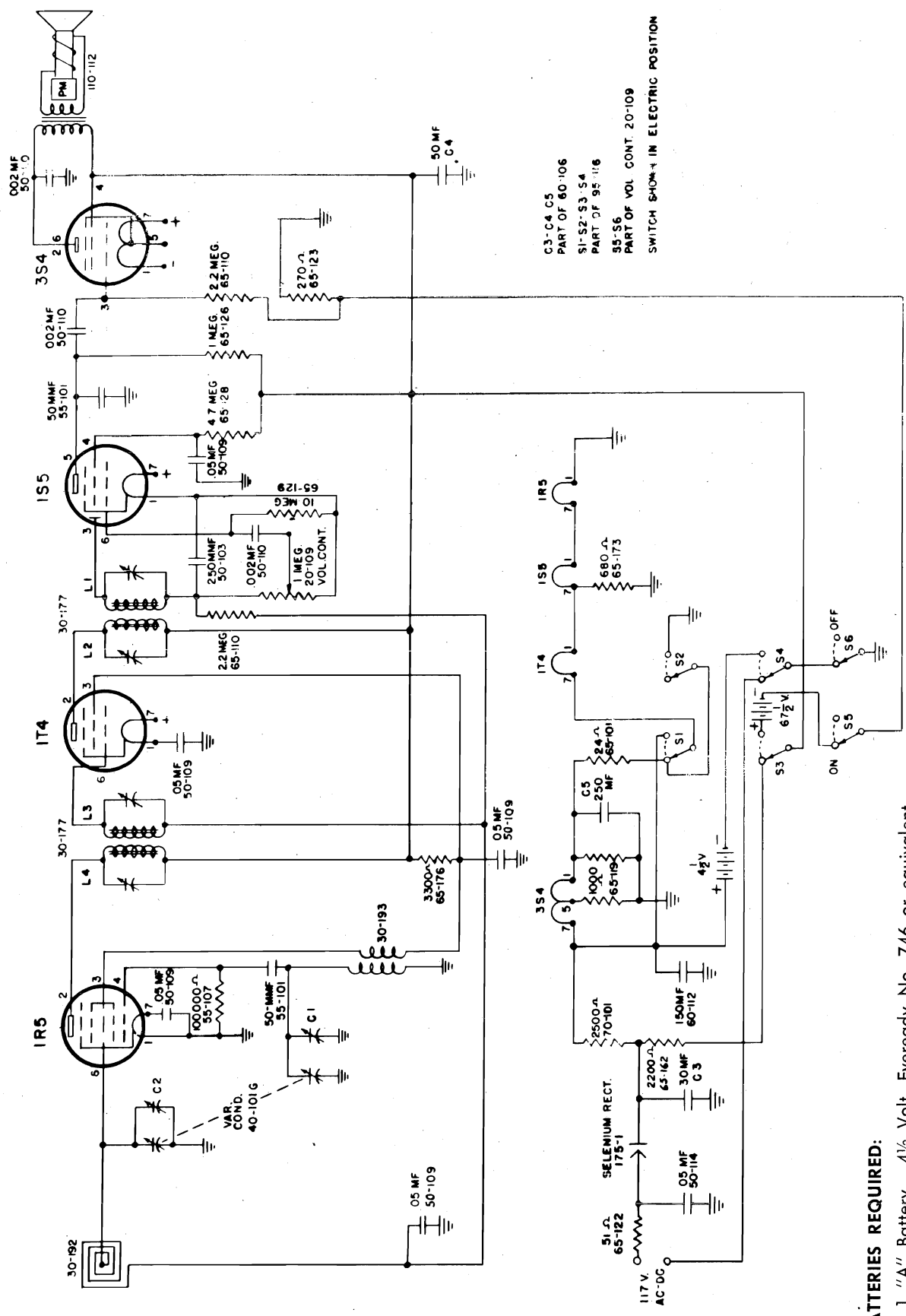
PAGE 22-2 RADIO KITS

MODEL S6X-1





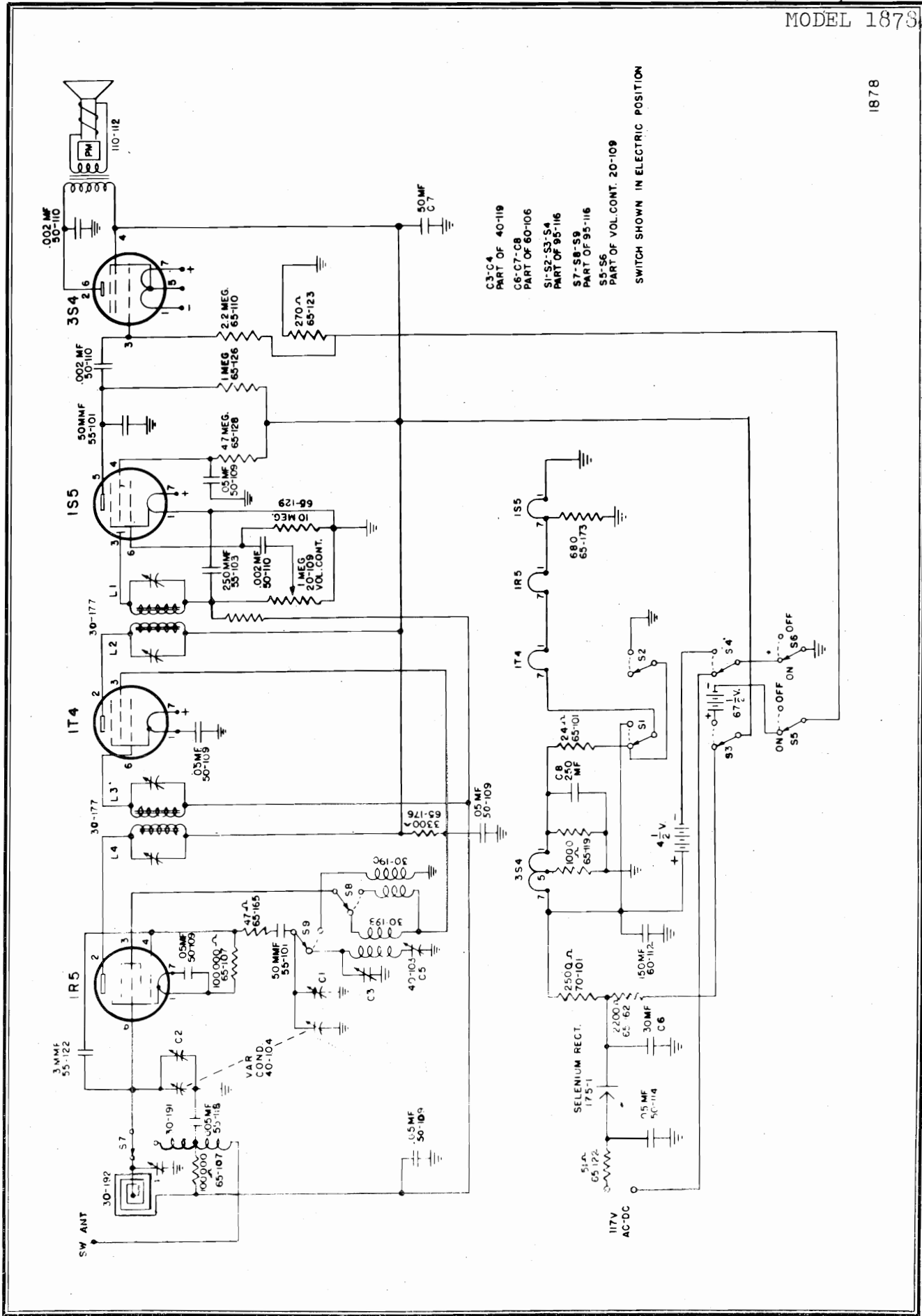
MODEL 1877



C3-C4 C5
PART OF 60-106
S1-S2-S3-S4
PART OF 95-116
S5-S6
PART OF VOL. CONT. 20-109
SWITCH 640M-1 IN ELECTRIC POSITION

BATTERIES REQUIRED:

- 1 "A" Battery, 4½ Volt, Eveready No. 746 or equivalent.
- 1 "B" Battery, 67½ Volt, Eveready No. 467 or equivalent.



MODEL 1878

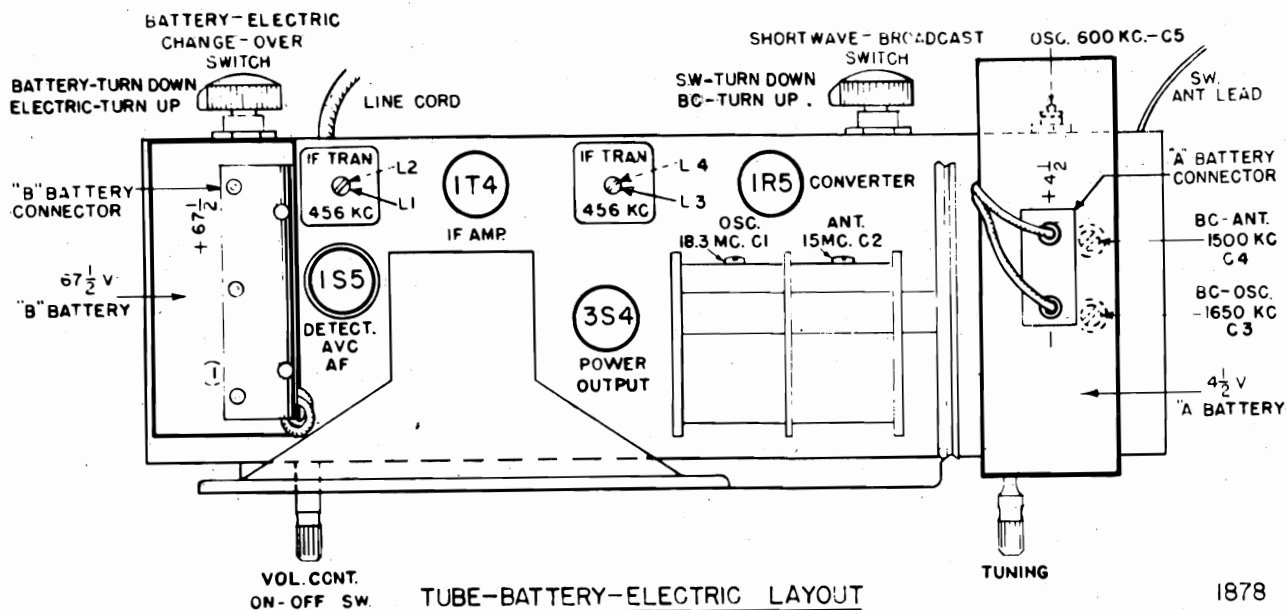
BATTERIES REQUIRED:

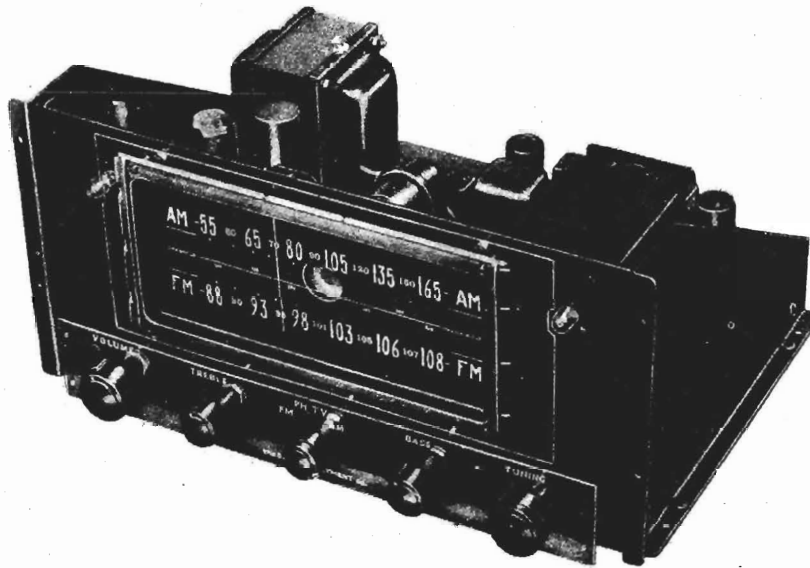
- 1 "A" Battery, 4½ Volt, Eveready No. 746 or equivalent.
- 1 "B" Battery, 67½ Volt, Eveready No. 467 or equivalent.

- 1. INSTALLATION OF "A" BATTERY:** To replace or install battery, open rear cover, remove old battery and pull out connector and insert same into new battery; then very carefully push battery into space provided for it, making certain that battery is pushed forward to front of cabinet.
- 2. INSTALLATION OF "B" BATTERY:** Swing down the battery holding clip, remove old battery and pull out connector and insert same into new battery; then slip into space provided for it and swing holding clip upward to press against battery.
- 3. TO OPERATE ON BATTERIES:** Open rear cover, turn changeover switch knob to battery position. The left hand knob in front operates the volume control and turns set on and off. Adjust to desired volume. The right hand knob is calibrated in kilocycles (KC) with the final zero omitted.
- 4. SW OPERATION:** Open rear cover, turn band switch to SW position. It will be necessary to connect an antenna wire of about 30 to 50 feet to the single wire coming through the rear of chassis. The short-wave portion of the dial is calibrated in megacycles (MC) and in meters (M).
- 5. TO OPERATE ON ELECTRIC:** Open rear cover, turn changeover switch knob to electric position. Remove line cord and plug into nearest wall outlet; then

proceed to operate receiver as outlined in previous paragraph. A slot is provided in the lower part of the cover so that it may be closed.

- 6. NOTE** — If receiver does not operate on DC after being turned on for a few minutes, reverse the line cord in the wall outlet. If the receiver is to be operated for a long period of time on AC or DC, or it is to be placed in storage, we recommend that the batteries be removed and stored in a cool place. This will insure maximum battery life.
- 7. CAUTION** Be sure to turn the volume control knob "OFF" (extreme counter clock-wise position) when receiver is not in use to avoid discharge of batteries. Do not leave exhausted batteries in receiver.
- 8. REAR COVER WILL NOT STAY CLOSED:** This is generally due to batteries not being properly installed. Refer to previous paragraph on battery installation.
- 9. ELECTRICAL SPECIFICATIONS:** This receiver employs a 4-tube super-heterodyne circuit of 8 tuned stages. The frequency range is from 1650 to 540 KC, and 18.3 to 5.8 MC. The tube complement is as follows: 1-1R5, 1-1T4, 1-1S5 and 1-3S4. See diagram for location of batteries and tubes.
- 10. IF SET DOES NOT OPERATE ON ELECTRIC OR BATTERY** Check and be sure tubes are firmly in position in their sockets.
If Tubes have a milky white formation they should be removed and tested or replaced.
- 11. SET DEVELOPS MICROPHONIC HOWL** Check 1S5 Tube. Replace with new tube if necessary.





GENERAL INFORMATION.

SR 51 has been especially designed to fill the need for a high quality replacement or custom tuner of such mechanical and circuit simplicity as to preclude the possibility of unit obsolescence. Separate standard components are used throughout.

No special instructions for circuit adjustment are necessary. There are no trick circuits. To any technician skilled in AM-FM the alignment procedure is obvious. Oscillator parallel trimmer adjustment at 1500 KC. Series padder at 600 KC.

INSTALLATION INSTRUCTIONS.

SR 51 control shafts and escutcheon are designed for a face panel of not more than one quarter of an inch in thickness. Carefully check the unit with the proposed cabinet placement using the furnished paper templet for cut-out marking.

The machine screws which now hold the bronze escutcheon to the transparent dial are for shipping convenience only and may be discarded. Bronze oval head woodscrews are supplied to fasten the escutcheon to the cabinet panel.

The transparent control designation strip should be placed over the control shafts and fastened into place after the tuner is in the cabinet to insure perfect placement.

Chassis mounting screws with retaining washers should not be so tight as to nullify the cushioning effect of the rubber feet.

CAUTION

VENTILATION IS EXTREMELY IMPORTANT. No multi-tube unit should be housed in an insufficiently ventilated cabinet. Damage to the unit and the cabinet will result.

USE ONLY 1 $\frac{1}{2}$ AMP. FUSE.

ANTENNA REQUIREMENTS.

For best non-directional standard AM broadcast results a single wire ten to twenty ft. in length connected to antenna terminal ANT will be sufficient. Additional selectivity to this efficient input circuit would tend to restrict the wide band reception capabilities of the detector.

For best F.M. results a 100 M.C. dipole should be installed well above surrounding obstructions. The twisted 300 ohm line from the dipole should be connected to antenna terminals D1 and D2. (GND also grounds unit.)

A console type folded dipole is supplied with the tuner and will prove a satisfactory substitute in most cases where an external dipole is impractical.

INPUT JACKS.

All phono or TV audio signals as well as the AM and FM radio are subject to the volume and tone controls of the tuner unless DETECTOR output is used.

The jack marked "MAG" is the input for a properly compensated pre amplifier when using the variable reluctance cartridge.

CRYSTAL is the phono input for a standard crystal pickup.

The TV jack makes it possible to channel the audio of a television tuner thru the radio's amplifier and speaker.

The OUTPUT jack should be connected to the high impedance input control (250,000 to 500,000 ohms) of a quality audio amplifier. Use the prepared shielded lead supplied with the tuner. Choose a speaker capable of wide range reproduction.

A.C. POWER. SR 51 is completely powered for 110-125 volts 50-60 cycles. The power switch (on the Volume Control) also controls the A.C. receptacle on the back of the chassis for convenience in amplifier installation.

The A. M. or Standard Broadcast section consists of a pre-stage tuned Radio Frequency section and one broad band stage of I. F. terminating in a new LOW DISTORTION detector for those who insist on the best in a Standard Broadcast Receiver. A "Null T" type 10 KC filter eliminates adjacent station whistle without impairing maximum frequency response.

The Frequency Modulation section employs a tuned R. F. stage preceded by an input coupling tube for added sensitivity and stability. An A. F. C. controlled Triode Oscillator, two stages of permeability tuned I. F. for superior F. M. performance and fully balanced static free Ratio Detector.

Input jacks are for phono pickups, either crystal pickup or properly compensated pre-amp for Variable Reluctance type pickup and a jack for aural television.

Two output jacks, one direct from detector for feeding a high quality recording amplifier, etc., the other allowing for full tuner control. A phono pre-amplifier power supply socket is provided for SR3 or similar unit.

SR51 has the new SR tone-gate circuit for smooth electro-acoustical control of bass and treble emphasis allowing the controls of the audio amplifier to be pre-set. The newest in TWO TUBE tone control. Bass and treble variable from flat, minus 18 DB to plus 18 DB.

A. M. detector distortion only .35% at 400 cycles and .8% at 4000 cycles 100% modulation.

10 K. C. filter attenuation zero at 9 K. C. and -47 DB at 10 K. C.

F. M. Sensitivity: - 5 microvolts. Ratio Detector A. M. absorption 70%.

Tubes: - Three 6BA6; two 6SN7GT and one each 6BE6; 6C4; 6J6; 6AL5; 6SA7; 6SK7; 6SF7; 6E5 and 5Y3.

Power Consumption: - 85 watts, 110-125 volts, 50-60 cycles.

Model 515 Radio-Phonograph

GENERAL FEATURES

The Model 515 is a combination designed for the reception of radio broadcast programs and for the reproduction of phonograph records, and other external sound. The receiver includes the following separate pieces of equipment: (1) radio-phono chassis, (2) power amplifier, (3) record changer, and (4) coaxial high fidelity speaker.

TECHNICAL DATA

| | |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <u>Power Input</u> | 140-150 watts at 50-60 cycles. (Phono motor 60 cycles, 25 watts additional.) Taps are available to accommodate power line voltages of 105, 125, 150, 210, and 250. |
| <u>Tubes</u> | Total 11 and 2 rectifiers. |
| <u>Circuits</u> | Superheterodyne with RF amplifier stage (three gang tuning condenser) on all bands. Two stage AM-IF (455 kc) Push-pull output with 6 db inverse feedback. Separate B plus supplies for power amplifier and tuner sections for reduction of temperatures and to prevent damage to components through surges. Sound input for phono and other external sound. |
| <u>Tuning Range</u> | AM - 535 - 1620 kc SW - 2 - 6 mc SW - 6 - 18 mc |
| <u>Output</u> | 20 watts (2-6L6 tubes in push-pull). Less than 5% distortion at full output. |
| <u>Sensitivity</u> | Less than 10 microvolts on any band. (Carrier modulated 30% at 400 cycles. Output 500 milliwatts with 10 db signal to noise ratio.) |
| <u>Fidelity</u> | Overall 30 to 20,000 cps plus or minus 1 db. Separate bass and treble control. Phono input equalized for elimination of objectionable scratch level. |
| <u>Speaker</u> | Hi-fidelity 12-inch coaxial PM. 8 ohm voice coil. |
| <u>General</u> | Tuner chassis 12 1/4" wide x 8 1/2" high x 13" deep. Weight 10 lbs. Polished chrome. Power amplifier chassis 12 1/4" wide x 7" high x 9" deep. Weight 23 lbs. Polished chrome. Five controls - Station Selector, Function Switch, Volume, Treble, Off-On Bass. Hum level 65 db below maximum output. Antenna - AM (built-in) loop and SW (built-in) antenna. Provision for connection of external antenna. Dial counter weighted - slide rule type - illuminated glass scale - full 7 inch travel - color dots to identify function - 0-100 logging scale. Unit construction of chassis, dial escutcheon, and knobs permits complete ease of installation, nothing to remove. |

MODEL 515

INSTALLATION

The Model 515 Radio-Phonograph comes complete with all equipment installed and ready for operation after taking the following few precautions:

1. Remove any packing material which may be used to hold the larger tubes in place.
2. Release the hold-down screws which hold the phono mechanism securely for shipment. These screws require only a few turns and when they are in the correct position the mechanism will be observed to float freely on the spring suspension. Do not remove the screws. Remove any tape or rubber bands which may be holding the pickup arm or accessories in place.
3. Check to make sure that power transformer tap is connected for the power line voltage.
4. Plug in the a.c. line cord.

ANTENNA CONNECTION

The Model 515 is equipped with built-in antennas for both AM and SW reception. These antennas will be found adequate in most locations to receive all the stations in the service area. In locations remote from broadcast transmitters, or in locations shielded from the transmitters, outdoor antennas will give improved reception.

For reception under difficult conditions, the installation of a SCOTT Super Double Doublet All-Wave antenna is recommended. When this all-wave antenna system is used, connections to the antenna terminal strip should be as follows: One of the wires in the twisted pair is connected to terminal marked "GND". The other wire in the twisted pair is connected to the terminal marked "2". A short wire jumper should be connected from terminal "1" to terminal "2".

For single wire antenna installation the connections at the antenna terminal strip should be as follows: Connect antenna lead to terminal marked "2". A short wire jumper should be connected from terminal "1" to terminal "2".

OPERATION OF CONTROLS

Station Selector - The large center knob serves to adjust the receiver to the desired station. The dial pointer follows the rotation of the knob and indicates the frequency to which the receiver is tuned. Assigned frequencies of broadcast stations are listed on the radio page of your newspaper.

Volume Control - The knob directly to the left of the large station selector knob serves to adjust the volume of sound. Turned to the right the volume is increased, and turned to the left the volume is decreased. The control is designed as to give a smooth and gradual control of the sound volume.

Service Functions - The knob directly to the right of the large station selector knob serves to adjust for the various functions desired. As indicated on the escutcheon, and identified by colored dots on escutcheon and dial glass, the functions are AM broadcast, shortwave 1, shortwave 2, phono reproduction, and an external connection which may be a separate record player or a crystal microphone.

Treble Control - Second knob to the left of station selector. This control acts to regulate the degree of higher audible tones sent to the loudspeaker. Turned completely to the right gives the maximum of high audio response. Turned to the left gives a minimum. The range of control gives the user an opportunity of adjusting the reproduction to his own desires.

Off-On Bass Control - This knob is the second to the right of the station selector. Turned slightly from its extreme left position it serves to turn on the power to the radio receiver. Turned further to the right it increases the amount of low frequency audio, or bass reproduction. The control may, therefore, be set at the position giving the listener the amount of bass reproduction he desires. Generally the treble and bass controls, being independent, can be individually adjusted for the best balance in reproduction which, naturally, will vary somewhat with individual preferences.

TUNING THE RECEIVER

To receive broadcast stations after the Model 515 is installed proceed as follows:

1. Turn the knob marked "OFF-ON BASS" to the right and advance about half-way. The dial lights will illuminate indicating the receiver is correctly connected to a power source. Allow about thirty seconds as a warm-up time for the radio tubes.
2. Turn the function knob to the position where the arrow points to the blue dot on the escutcheon.
3. Turn the large knob, or station selector, to the frequency position of one of the local broadcasting stations.
4. Turn the knob marked "VOLUME" slowly to the right until the station is heard. Then readjust the large knob until reception is clearest.
5. Adjust "BASS" and "TREBLE" controls until the reproduction is most pleasing.

To receive shortwave stations turn the function knob to the green or yellow positions and proceed exactly as described.

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RECORD CHANGER

The motor of the changer is permanently connected to the 125 volt tap so that it will not be necessary to modify this for various power line voltages. For 50 cycle operation a special drive wheel is required and is available.

FUSE REPLACEMENT

A fuse is provided for protection of the receiver against excessive power line voltages and against failure of any component in the receiver which would cause heavy current drain and fire hazard. This fuse is accessible at the rear panel of the tuner chassis. CAUTION: Always replace the fuse with one of the same rating in the event the fuse is blown. If the fuse continues to blow after replacement trouble is indicated and the equipment should be removed from the cabinet for examination.

TUBE REPLACEMENT

The Model 515 has the following tube complement:

| Symbol | Tube | Application | Symbol | Tube | Application |
|--------|------|-----------------------------------------|--------|--------|---------------------------------|
| V1 | 6BA6 | RF Amplifier | V7 | 6SN7 | 2nd Audio Amplifier |
| V2 | 6C4 | Converter | V8 | 6SN7 | 3rd Audio Amplifier |
| V3 | 6C4 | Oscillator | V9 | 6L6G | Audio Power Output |
| V4 | 6BA6 | IF Amplifier | V10 | 6L6G | Audio Power Output |
| V5 | 6BA6 | IF Amplifier | V11 | 5Y3GT | Rectifier |
| V6 | 6SQ7 | 2nd Detector and 1st Audio Amplifier | V12 | 25Z6GT | Rectifier |
| | | | V13 | 6SC7 | Preamplifier, reluctance pickup |

ALIGNMENT PROCEDURETest Equipment

1. Electronic type voltmeter for DC measurements - RCA Voltohmyst.
2. AM signal generator for 455 kc, 600 kc, 1000 kc, 1500 kc, 2 mc, 6 mc, and 16 mc.
3. AC voltmeter such as Ballantine Output Meter.
4. An aligning tool is included with each receiver and is taped on the 1st IF transformer can. Additional aligning tools may be ordered under part number 94V4707.

Alignment Procedure

The alignment is preferably performed in the following order: See Figures 1 and 2 for location of adjustments on chassis.

1. 455 KC I.F.
2. Band 1 R.F.
3. Band 2 R.F.
4. Band 3 R.F.

455 KC I.F. Alignment

A signal generator should be connected through a .01 MFD mica capacitor to the junction of converter grid coupling capacitor (C11) and middle gang condenser section (C2) which can be found on band selector switch (SW2). A good ground point for the generator is the rear support bracket of the switch assembly.

The AC voltmeter is connected across the secondary of the audio output transformer, which is loaded with an 8 ohm 10 watt resistor connected in place of the speaker voice coil. In the event this resistor is not available the speaker may be used if the sound volume can be tolerated. The volume, bass, and treble controls must be full on, the band selector switch in Band 1 position, and the receiver dial set at 1600 kc.

Apply sufficient input signal at 455 kc 400 cycles 30% modulation to give an indication of 2 volts r.m.s. AC on the AC output meter. With the use of the aligning tool peak the primary (bottom core) and secondary (top core) of the 455 kc I.F. transformers for maximum reading on the output meter. Begin alignment with peaking 3rd I.F. (T7), next the 2nd I.F. (T6) and last the 1st I.F. (T5). As the I.F. stages approach correct alignment, reduce the input signal level so the output never exceeds 2 volts AC. Repeat above procedure if stages have been found to be badly mis-aligned.

The normal 455 kc I.F. sensitivity is 5 uv for 10 db signal to noise ratio with 400 cycles 30% modulation. An alternative method for determining sensitivity is to measure with the electronic voltmeter the DC voltage applied to the AGC line (solid white wiring in tuner chassis). With this method the 455 kc I.F. input is 15 uv for a reading of 1 V DC

Band 1 R.F. Alignment

Connect the signal generator to terminal 1 on the antenna terminal strip through a .01 MFD mica capacitor. The Band 1 loop antenna must be plugged into the receiver. Operating controls and AC voltmeter connections remain as for 455 kc I.F. alignment.

Set the signal generator and receiver dial at 1000 kc and adjust Band 1 oscillator (T3) core for maximum indication on the output meter. Reset generator and receiver dial at 600 kc and adjust Band 1 low frequency trimmer (C14). Reduce input signal so the output never exceeds 2 V AC.

The Band 1 converter transformer (T1) is now adjusted for maximum reading. The signal generator and receiver dial are re-set to 1500 kc and the Band 1 oscillator trimmer (C58), Band 1 converter trimmer (C55) and Band 1 loop trimmer (C52) are adjusted. Repeak C55 and C52 if considerable increase in output reading has been noted.

Normal sensitivity at any frequency on Band 1 is less than 0.5 uv for 10 db signal to noise ratio with 400 cycles 30% modulation.

Band 2 R.F. Alignment

Connect signal generator to terminal 2 on the antenna terminal strip through a dummy antenna load of 100 ohms resistor in series with 125 MMFD capacitor. Operating controls setting and AC voltmeter connections remain as for Band 1 R.F. alignment.

Set the signal generator and receiver dial at 2.2 mc and adjust in step procedure Band 2 oscillator coil (T4) core, next Band 2 converter transformer (T2) core and Band 2 antenna coil (L2) for maximum reading on output meter.

Reset signal generator and receiver dial at 5 mc and adjust in step procedure Band 2 oscillator trimmer (C59), Band 2 converter trimmer (C56) and Band 2 antenna trimmer (C53). Repeat above procedure until no further adjusting of cores and trimmers is needed.

Normal sensitivity at any frequency on Band 2 is less than 8 uv for 10 db signal to noise ratio with 400 cycles 30% modulation.

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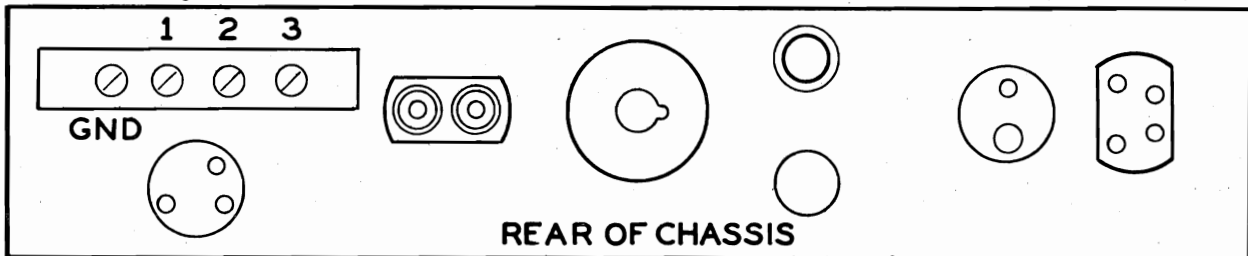
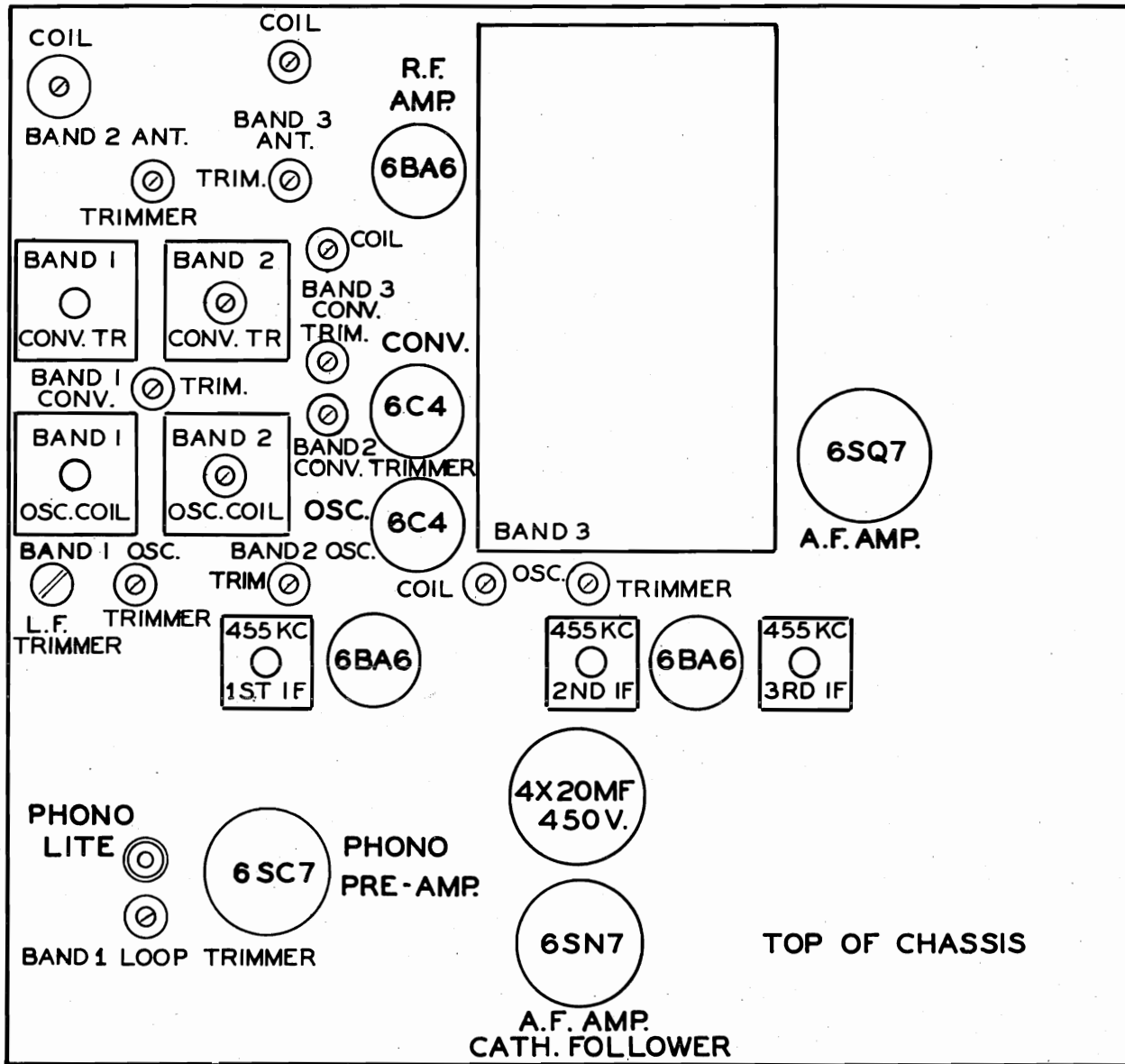


FIG. 1

Model 515 Tuner Assembly

Band 3 R.F. Alignment

The signal generator connection through dummy antenna, AC output volt-meter connections and operating controls setting remain as for Band 2 R.F. alignment.

Set signal generator and receiver dial at 6 mc and adjust in step procedure Band 3 oscillator coil (L5) core, next Band 3 converter transformer (L4) core and Band 3 antenna coil (L3) core for maximum indication on output meter.

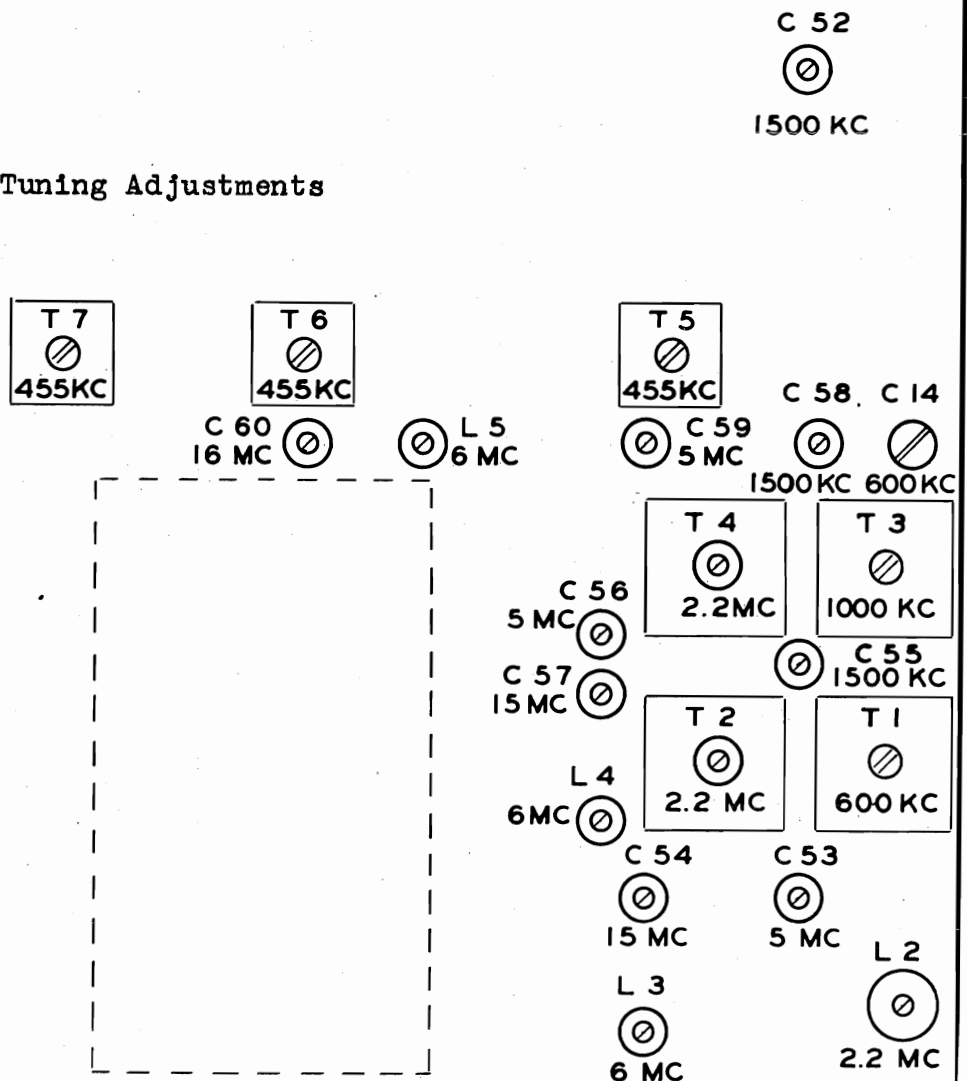
Reset the signal generator and receiver dial at 15 mc and adjust in step procedure Band 3 oscillator trimmer (C60), Band 3 converter trimmer (C57), and Band 3 antenna trimmer (C54).

Repeat above procedure until the 6 mc and 15 mc points require no further adjusting of cores and trimmers.

Normal sensitivity at any frequency on Band 3 is less than 10 uv for 10 db signal to noise ratio with 400 cycles 30% modulation.

FIG. 2

Location Of Tuning Adjustments



MODEL 515

VOLTAGE TABLE

| Tube | Type | Pin 1 | Pin 2 | Pin 3 | Pin 4 | Pin 5 | Pin 6 | Pin 7 | Pin 8 |
|------|------|-------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| V1 | 6BA6 | -.3 | 0 | AC 6.5 | 0 | 120 | 120 | 1.25 | - |
| V2 | 6C4 | 140 | 0 | AC 6.5 | 0 | 140 | -.2 | 7 | - |
| V3 | 6C4 | 130 | 0 | AC 6.5 | 0 | 130 | -3.5 | 0 | - |
| V4 | 6BA6 | -.3 | 0 | AC 6.5 | 0 | 120 | 120 | 3 | - |
| V5 | 6BA6 | 0 | 0 | AC 6.5 | 0 | 110 | 110 | 2.5 | - |
| V6 | 6SQ7 | 0 | -.8 | 0 | 0 | 0 | 90 | AC 6.8 | 0 |
| V7 | 6SN7 | 0 | 110 | 5 | 35 | 235 | 50 | AC 6.8 | 0 |
| V13 | 6SC7 | 0 | 110 | -.5 | -.5 | 90 | 0 | 0 | AC 6.8 |
| V8 | 6SN7 | 66 | 210 | 78 | 66 | 210 | 78 | 0 | AC 6.8 |
| V9 | 6L6G | 0 | AC 6.8 | 360 | 275 | 0 | 73 | 0 | 15 |
| V10 | 6L6G | 0 | AC 6.8 | 360 | 275 | 0 | 73 | 0 | 15 |
| V11 | 5Y3 | 0 | 400 | 0 | AC 390 | 0 | AC 390 | 0 | 400 |
| V12 | 25Z6 | 0 | 0 | AC 170 | 200 | AC 170 | 0 | 0 | 200 |

Voltage readings made with Voltchmyst. Line voltage adjusted to 117 V AC. All voltages measured between indicated pin and chassis frame. Unless noted all voltages are DC and positive to chassis.

No signal input.

Voltages taken with the service selector switch in Band 1 position.

Volume control in the counterclockwise position.

Tone controls clockwise.

RESISTANCE TABLE

| Tube | Type | Pin 1 | Pin 2 | Pin 3 | Pin 4 | Pin 5 | Pin 6 | Pin 7 | Pin 8 |
|------|------|--------|-------|-------|-------|-------|-------|-------|-------|
| V1 | 6BA6 | 1.75 M | 0 | 0 | 0 | inf. | inf. | 82 | - |
| V2 | 6C4 | inf. | inf. | 0 | 0 | inf. | 3.5 M | 4.7 K | - |
| V3 | 6C4 | inf. | inf. | 0 | 0 | inf. | 33 K | 0 | - |
| V4 | 6BA6 | 1.4 M | 0 | 0 | 0 | inf. | inf. | 220 | - |
| V5 | 6BA6 | 0 | 0 | 0 | 0 | inf. | inf. | 220 | - |
| V6 | 6SQ7 | 0 | 4.7 M | 0 | 0 | 0 | inf. | 0 | 0 |
| V7 | 6SN7 | 19 K | inf. | 2.2 K | 500 K | inf. | 12 K | 0 | 0 |
| V13 | 6SC7 | 0 | inf. | 3.3 M | 3.3 M | inf. | 0 | 0 | 0 |
| V8 | 6SN7 | 230 K | inf. | 11 K | 230 K | inf. | 11 K | 0 | 0 |
| V9 | 6L6G | inf. | .2 | inf. | inf. | 470 K | 10 K | 0 | 170 |
| V10 | 6L6G | inf. | .2 | inf. | inf. | 470 K | 10 K | 0 | 170 |
| V11 | 5Y3 | inf. | inf. | inf. | 5 | inf. | 5 | inf. | inf. |
| V12 | 25Z6 | inf. | inf. | 2 | inf. | 2 | inf. | inf. | inf. |

Resistance readings taken with Voltohmyst connected between pin indicated and chassis frame. Values given are in ohms except where K indicates times 1000 and M indicates times 1 megohm.

All controls to the counterclockwise or off position.
Range switch in Band 1 position.

MODEL 515

Parts List By Symbol Designation

| Symbol Desig. | Function | Description | Part No. |
|-------------------------|--------------------------------------|---------------------------------------------------------------------|----------|
| (C1 (C2 (C3 C4 | Main tuning capacitor | Capacitor, variable, 3 gang | 15W4895 |
| C4 | Grid coupling, RF | Capacitor, mica 240 MMFD 10% 500 V | 15A366 |
| C5 | Cathode bypass, RF | Capacitor, paper, .05 MFD 400 V, miniature tubular | 15L3466 |
| C6 | Grid decoupling, RF | Same as C5 | |
| C7 | Cathode bypass, RF | Capacitor, ceramic 5000 MMFD hi-kap 500 V | 15L3462 |
| C8 | Screen bypass, RF | Capacitor, paper .05 MFD 600 V, miniature tubular | 15L3467 |
| C9 | Screen bypass, RF | Same as C7 | |
| C10 | Shunt capacity | Capacitor, mica 10 MMFD 10% 500 V | 15E3207 |
| C11 | Grid coupling, Conv. | Capacitor, ceramic 100 MMFD 10% 500 V | 15L3460 |
| C12 | Grid decoupling, Conv. | Same as C5 | |
| C13 | Cathode coupling, Conv. | Capacitor, paper 5000 MMFD 20% 600 V | 15H2603 |
| C14 | Variable padder, Band 1, Osc. | Capacitor, mica trimmer, 30-200 MMFD | 15E2675 |
| C15 | Fixed padder, Band 1, Osc. | Capacitor, mica 460 MMFD 10% 500 V | 15E1935 |
| C16 | Shunt capacity | Capacitor, ceramic 30 MMFD 5% | 15W4936 |
| C17 | Fixed padder, Band 2, Osc. | Capacitor, mica 1000 MMFD 20% 500 V | 15A35 |
| C18 | Fixed padder, Band 3, Osc. | Capacitor, mica 6200 MMFD 20% 500 V | 15A40 |
| C19 | Grid coupling, Osc. | Capacitor, ceramic 51 MMFD 5% 500 V | 15L3458 |
| C20 | Plate decoupling, Osc. | Capacitor, ceramic 1500 MMFD 350 V | 15L3459 |
| C21 | Feedback coupling, Osc. plate | Same as C13 | |
| C22 | Plate decoupling, IF | Same as C8 | |
| C23 | Grid decoupling, IF | Same as C5 | |
| C24 | Plate decoupling, IF | Same as C8 | |
| C25 | Plate decoupling, IF | Same as C8 | |
| C26 | RF bypass, Diode | Same as C11 | |
| C27 | Bypass, AGC | Capacitor, paper .1 MFD 200 V, miniature tubular | 15S4298 |
| C28A | RF filter | Capacitor, silver ceramic, 2x100 MMFD 20% 500 V, 3 wire leads | 15D2923 |
| C28B | RF filter | | |
| C29 | Audio input coupling | Same as C5 | |
| C30 | Grid coupling, Phono Preamplifier | Same as C5 | |
| C31 | Grid coupling, Phono Preamplifier | Same as C5 | |
| C32 | Equalizing capacity | Capacitor, paper .015 MFD 400 V, miniature tubular | 15L3464 |

Parts List By Symbol Designation

| Symbol Desig. | Function | Description | Part No. |
|---------------|----------------------------|------------------------------------------------------|----------|
| C33 | Coupling, Audio Amp. | Capacitor, paper .1 MFD 600 V, miniature tubular | 15L3468 |
| C34 | Coupling, Audio Amp. | Capacitor, paper .02 MFD 200 V, miniature tubular | 15U4580 |
| C35 | Grid coupling, Audio Amp. | Capacitor, paper .01 MFD 200 V, miniature tubular | 15L3463 |
| C36 | RF filter, Audio Amp. | Same as C11 | |
| C37 | Grid coupling, Audio Amp. | Same as C33 | |
| C38 | Bypass, Treble control | Same as C35 | |
| C39 | Bypass, Treble control | Same as C13 | |
| C40 | Bypass, Bass control | Same as C13 | |
| C41 | Bypass, Bass control | Same as C34 | |
| C42A | Decoupling | Capacitor, electrolytic, 4x20 MFD, 450 V | 15L3588 |
| C42B | Filter, low frequency | | |
| C42C | Filter, low frequency | | |
| C43 | Cathode bypass, Audio Amp. | Capacitor, electrolytic, 25 MFD, 25 V, tubular | 15B795 |
| C44 | Grid coupling, Audio Amp. | Same as C8 | |
| C45 | Coupling, cathode follower | Same as C5 | |
| C46 | Shunt capacity | Capacitor, mica 25 MMFD 10% 500 V | 15E1849 |
| C47 | Grid coupling, Audio Amp. | Same as C8 | |
| C48 | Grid coupling, Audio Amp. | Same as C8 | |
| C49 | Cathode bypass, Power Amp. | Capacitor, electrolytic 25 MFD, 50 V, tubular | 15B638 |
| C50A | Filter, low voltage | Capacitor, electrolytic, 2x60 MFD 200 V | 15L3438 |
| C50B | Filter, low voltage | | |
| C51A | Filter, high voltage | Same as C42 | |
| C51B | Filter, high voltage | | |
| C51C | Filter, high voltage | | |
| C52 | Trimmer, Band 1 Ant. | Capacitor, trimmer, 1-8 MMFD | 15W5079 |
| C53 | Trimmer, Band 2 Ant. | Same as C52 | |
| C54 | Trimmer, Band 3 Ant. | Same as C52 | |
| C55 | Trimmer, Band 1 Conv. | Same as C52 | |
| C56 | Trimmer, Band 2 Conv. | Same as C52 | |
| C57 | Trimmer, Band 3 Conv. | Same as C52 | |
| C58 | Trimmer, Band 1 Osc. | Same as C52 | |
| C59 | Trimmer, Band 2 Osc. | Same as C52 | |
| C60 | Trimmer, Band 3 Osc. | Same as C52 | |
| C61 | RF bypass, Audio | Same as C20 | |
| E1 | Dial light | Lamp, 6-8 V .150 A #47 brown | 49A168 |
| E2 | Dial light | Same as E1 | |
| E3 | Phono compt. light | Same as E1 | |
| E4 | Overload protection | Fuse, 3 amp, 3 AG | 37A162 |

MODEL 515

Parts List By Symbol Designation

| Symbol Desig. | Function | Description | Part No. |
|---------------|-------------------------------------------------|---------------------------------------------------|----------|
| E5 | Main tuning knob | Knob, station selector 1 7/8" dia. brass | 47V4603 |
| E6 | Control knob | Knob, 1 1/8" dia. black bakelite, push-on type | 47V4604 |
| E7 | Align IF | Aligning tool | 94V4707 |
| J1 | Loop connector to receiver | Receptacle, 3 contact | 67U4716 |
| J2 | Phono pickup, external audio sound connector | Receptacle, dual, insulated | 67V4657 |
| J3 | Phono compartment light connector | Receptacle, single, insulated | 67E3226 |
| J4 | Power cable connector | Socket, 12 contact | 82S4305 |
| J5 | Speaker connector | Receptacle, 2 contact | 67V4673 |
| J6 | Phono motor power connector | Receptacle, 4 contact | 67B645 |
| L1 | Signal interceptor | Loop | 1V4594 |
| L2 | Band 2 antenna tuning | Coil | 20W4915 |
| L3 | Band 3 antenna tuning | Coil | 20W4916 |
| L4 | Band 3 conv. tuning | Transformer | 20W4918 |
| L5 | Band 3 osc. tuning | Coil | 20W4920 |
| L6 | Filter choke, ripple | Choke | 17L3312 |
| LS1 | Loudspeaker | Speaker, 12" coaxial, PM 8 ohm voice coil | 85V4593 |
| P1 | Loop connector to receiver | Plug, 3 contact | 65U4714 |
| P2 | Phono compartment light connector | Plug, single contact | 65E3225 |
| P3 | Amplifier connector to tuner | Plug, 12 contact | 65S4301 |
| R1 | Grid load, RF | Resistor, composition, .47 meg, 10% 1/2 watt | 70L3404 |
| R2 | Grid decoupling, RF | Resistor, composition, .1 meg, 10% 1/2 watt | 70L3401 |
| R3 | Cathode bias, RF | Resistor, composition, 82 ohms 5% 1/2 watt | 70L3391 |
| R4 | Plate decoupling, RF | Resistor, composition, 1000 ohms 10% 1/2 watt | 70L3393 |
| R5 | Grid load, Conv. | Resistor, composition, 2.2 meg, 20% 1/2 watt | 70L3408 |

| Parts List By Symbol Designation | | | |
|----------------------------------|-----------------------------------|---------------------------------------------------------------|----------|
| Symbol Desig. | Function | Description | Part No. |
| R6 | Grid decoupling, Conv. | Same as R2 | |
| R7 | Cathode bias, Conv. | Resistor, composition, 4700 ohms, 10% $\frac{1}{2}$ watt | 70L3395 |
| R8 | Plate decoupling, Conv. | Same as R4 | |
| R9 | Grid decoupling, IF | Same as R2 | |
| R10 | Grid load, Osc. | Resistor, composition, 33,000 ohms, 10% $\frac{1}{2}$ watt | 70L3398 |
| R11 | Plate load, Osc. | Same as R4 | |
| R12 | Cathode bias, IF | Resistor, composition, 220 ohms, 5% $\frac{1}{2}$ watt | 70V4783 |
| R13 | Plate decoupling, IF | Same as R4 | |
| R14 | Cathode bias, IF | Same as R12 | |
| R15 | Plate decoupling, IF | Resistor, composition, 3300 ohms, 10% $\frac{1}{2}$ watt | 70L3394 |
| R16 | Diode load, IF | Resistor, composition, .22 meg 10% $\frac{1}{2}$ watt | 70L3403 |
| R17 | Diode decoupling, IF | Resistor, composition, 47,000 ohms 10% $\frac{1}{2}$ watt | 70L3399 |
| R18 | Decoupling, AGC | Resistor, composition, 1 meg 20% $\frac{1}{2}$ watt | 70L3406 |
| R19 | Decoupling, Audio | Resistor, composition, 22,000 ohms 10% $\frac{1}{2}$ watt | 70L3397 |
| R20 | Power filter | Resistor, 750 ohms, 10% 5 watt, wirewound | 70W4912 |
| R21 | Compensation, Phono Pickup | Resistor, composition, 6800 ohms, 10% $\frac{1}{2}$ watt | 70L3534 |
| R22 | Grid load, Phono Preamplifier | Resistor, composition, 3.3 meg, 20% $\frac{1}{2}$ watt | 70L3422 |
| R23 | Plate load, Phono Preamplifier | Resistor, composition, 68,000 ohms, 10% $\frac{1}{2}$ watt | 70L3515 |
| R24 | Plate load, Phono Preamplifier | Same as R10 | |
| R25 | Equalizing, Phono Audio Freq. | Same as R16 | |
| R26 | Grid load, Phono Preamplifier | Same as R22 | |
| R27 | Equalizing, Phono Audio Freq. | Same as R19 | |
| R28 | Volume control | Potentiometer, volume, .5 meg, 20% | 70V4583 |
| R29 | Grid load, Audio Amp. | Resistor, composition, 4.7 meg, 20% $\frac{1}{2}$ watt | 70L3530 |
| R30 | Plate load, Audio Amp. | Same as R2 | |
| R31 | Tone control network | Same as R17 | |
| R32 | Treble control | Potentiometer, treble, .5 meg, 20% | 70V4584 |
| R33 | Bass control | Potentiometer, bass off-on, .5 meg, 20% | 70V4585 |
| R34 | Bass control network | Same as R19 | |
| R35 | Grid load, Audio Amp. | Same as R2 | |
| R36 | Cathode follower | Resistor, composition, 56 ohms, 10% $\frac{1}{2}$ watt | 70V4628 |

MODEL 515

Parts List By Symbol Designation

| Symbol Desig. | Function | Description | Part No. |
|---------------|-----------------------------------|------------------------------------------------------------|----------|
| R37 | Cathode bias, Audio Amp. | Resistor, composition, 2200 ohms, 10% $\frac{1}{2}$ watt | 70L3432 |
| R38 | Plate load, Audio Amp. | Same as R17 | |
| R39 | Cathode follower decoupling | Resistor, composition, 560 ohms, 10% $\frac{1}{2}$ watt | 70L3527 |
| R40 | Cathode circuit | Resistor, composition, 10,000 ohms, 10% $\frac{1}{2}$ watt | 70L3396 |
| R41 | Cathode bias, Cathode Follower | Resistor, composition, 1800 ohms, 10% $\frac{1}{2}$ watt | 70V4700 |
| R42 | Grid load, Cathode Follower | Same as R1 | |
| R43 | Plate decoupling, Audio Amp. | Same as R4 | |
| R44 | Grid load, Phase Inverter | Same as R16 | |
| R45 | Cathode bias, Phase Inverter | Resistor, composition, 680 ohms, 10% $\frac{1}{2}$ watt | 70V4691 |
| R46 | Cathode coupling | Resistor, composition, 10,000 ohms, 10% 1 watt | 70L3427 |
| R47 | Plate load, Phase Inverter | Same as R46 | |
| R48 | Grid load, Power Amp. | Same as R1 | |
| R49 | Grid load, Power Amp. | Same as R1 | |
| R50 | Cathode bias, Power Amp. | Resistor, 167 ohms, 10% 5 watt, wirewound | 70W4910 |
| R51 | Filter | Resistor, 375 ohms, 10% 5 watt, wirewound | 70W4911 |
| R52 | Filter | Resistor, composition, 3900 ohms, 10% 2 watt | 70V4693 |
| SW1 | Band 1, 2, 3, Phono Switching | Switch, range, 4 position | 89W4899 |
| T1 | Interstage coupling, Band 1 Conv. | Transformer | 20V4620 |
| T2 | Interstage coupling, Band 2 Conv. | Transformer | 20W4917 |
| T3 | Oscillator, Band 1 | Coil | 20V4621A |
| T4 | Oscillator, Band 2 | Coil | 20W4919 |
| T5 | Interstage coupling, IF | Transformer | 20V4622A |
| T6 | Interstage coupling, IF | Same as T5 | |
| T7 | Interstage coupling, IF | Same as T5 | |
| T8 | Power | Transformer | 91W4900 |
| T9 | Output | Transformer | 91V4667 |

| | | | |
|-------|------------------------------|----------------------------------------------------|---------|
| V1 | RF Amplifier | Tube - 6BA6 | 92G2871 |
| V2 | Converter | Tube - 6C4 | 92B597 |
| V3 | Oscillator | Same as V2 | |
| V4 | IF Amplifier | Same as V1 | |
| V5 | IF Amplifier | Same as V1 | |
| V6 | 2nd detector, 1st Audio Amp. | Tube - 6SQ7 | 92V4632 |
| V7 | 2nd Audio Amp. | Tube - 6SN7 | 92A230 |
| V8 | Phase Inverter | Same as V7 | |
| V9 | Audio Power Output | Tube - 6L6G | 92A233 |
| V10 | Audio Power Output | Same as V9 | |
| V11 | Low Voltage Rectifier | Tube - 25Z6GT | 92E1419 |
| V12 | High voltage Rectifier | Tube - 5Y3GT | 92B480 |
| * V13 | Phono Pickup Preamplifier | Tube - 6SC7 | 92E4695 |
| X1 | Socket for V1 | Socket, 7 contact, miniature, bakelite | 82B663 |
| X2 | Socket for V2 | Socket, 7 contact, miniature mica filled bakelite | 82V4636 |
| X3 | Socket for V3 | Same as X2 | |
| X4 | Socket for V4 | Same as X1 | |
| X5 | Socket for V5 | Same as X1 | |
| X6 | Socket for V6 | Socket, 8 contact octal, black bakelite, type MIP8 | 82S4412 |
| X7 | Socket for V7 | Same as X6 | |
| X8 | Socket for V8 | Socket, 8 contact octal, bakelite | 82E1322 |
| X9 | Socket for V9 | Same as X8 | |
| X10 | Socket for V10 | Same as X8 | |
| X11 | Socket for V11 | Same as X8 | |
| X12 | Socket for V12 | Same as X8 | |
| X13 | Socket for V13 | Same as X6 | |

* In some models 6SL7 tube is substituted for the 6SC7 tube with changes in socket wiring.

ALL RESISTORS 1/2 W UNLESS NOTED
ALL CAPACITORS IN MMF UNLESS NOTED

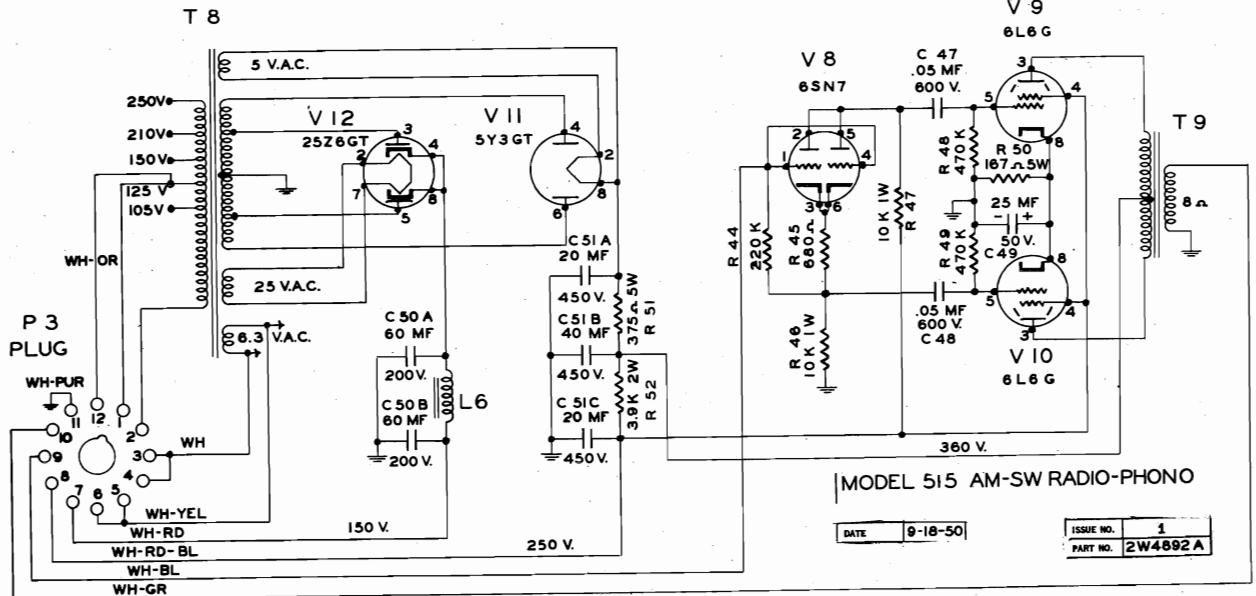
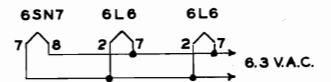


Figure 3 Schematic Diagram Model 515 Amplifier

MODEL 515

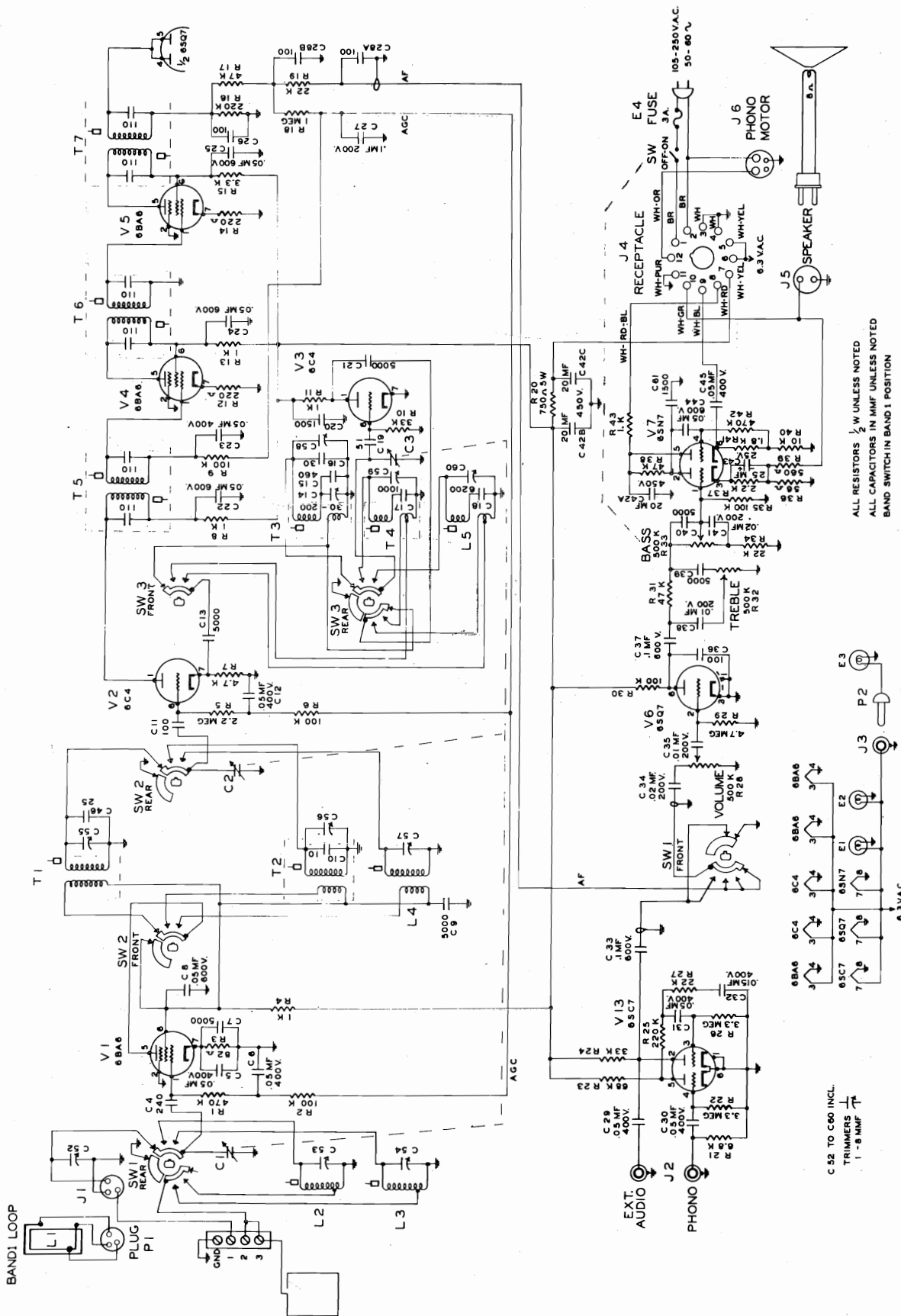


Figure 4 Schematic Diagram Model 515 Tuner

MODEL 515 AM-SW RADIO-PHONO

| | |
|-----------|---------|
| DATE | 9-15-50 |
| ISSUE NO. | 1 |
| PART NO. | PW4891A |

MODELS 15, 16,
Ch. 132.844,
132.844-1

Specifications

Power Supply
105-125 Volts AC-DC 35 Watts

Frequency Range
Broadcast 540-1600 KC

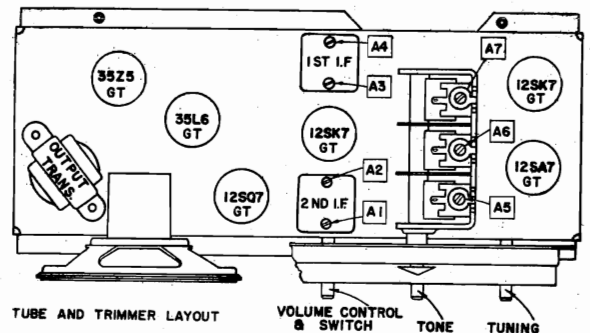
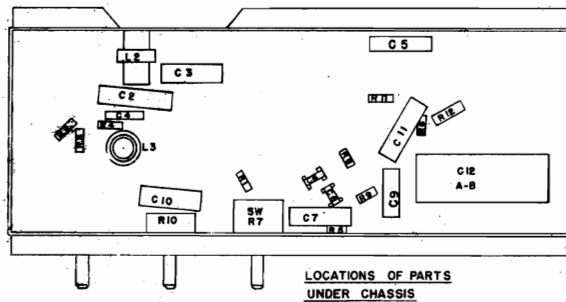
Power Output
Undistorted 1.0 Watt
Maximum 2.0 Watt

Speaker Voice Coil Impedance 3.2 ohms

ALIGNMENT DATA

With variable condenser closed, set the pointer horizontally to the left.
Generator ground lead connected to floating ground.

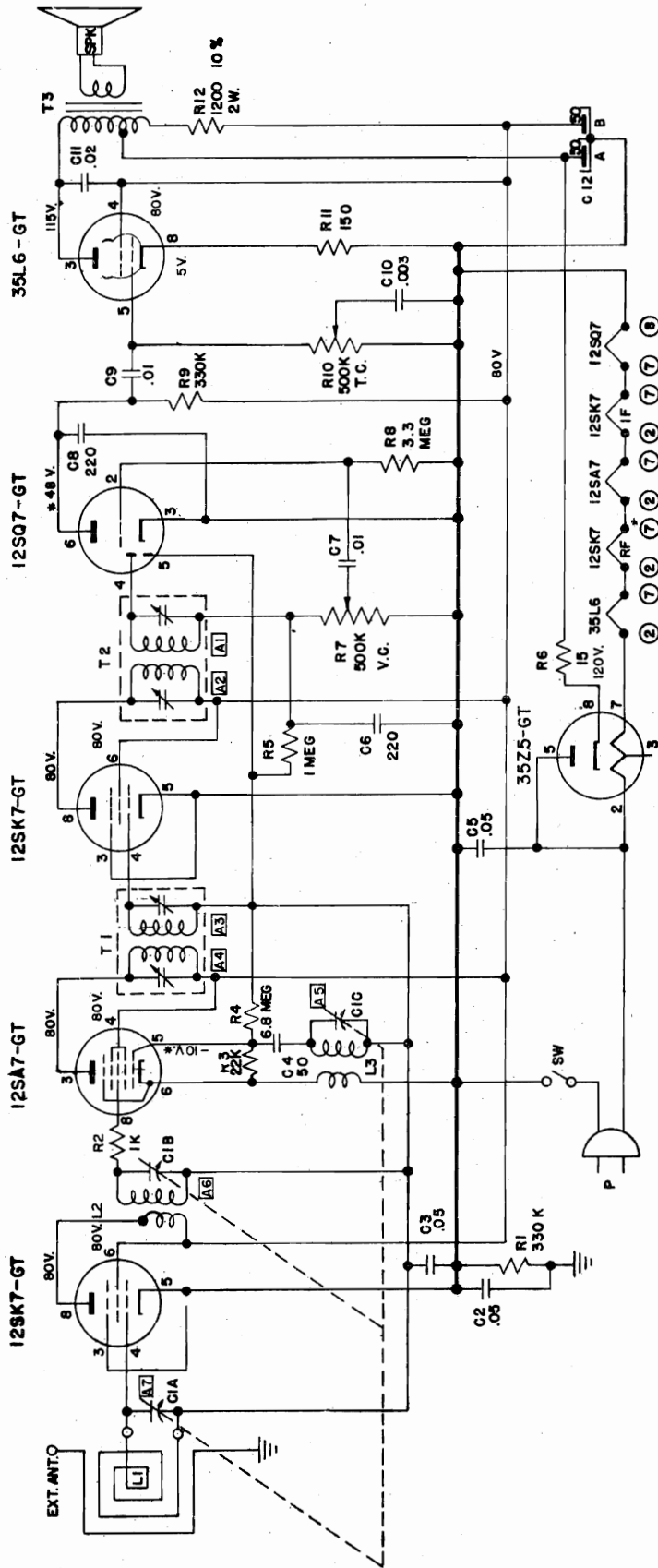
| Position of Variable | Generator Frequency | Dummy Antenna | Generator Connections | Adjust Trimmers (In order shown for max. output) | Trimmer Function |
|----------------------|---------------------|---------------|-----------------------|--------------------------------------------------|------------------|
| Open | 455 Kc | .05 mfd. | Mixer Grid | A1, A2, A3, A4, | I.F. |
| 1400 Kc | 1400 Kc | 50 mmfd. | Ext. Ant. Conn. | A5, A6, A7 | Osc. R.F., Ant. |
| 600 Kc | 600 Kc | 50 mmfd. | Ext. Ant. Conn. | Check Point | |



REPAIR PARTS LIST

| Schematic Location | Part No. | Description | Schematic Location | Part No. | Description |
|--------------------|----------|----------------------------------------------|--------------------|-----------|-------------------------------------------------|
| L1 | N23159 | Antenna Loop Assembly | | N22940-2 | Cover, Rear Cabinet (Ivory - Cat. No. 16) |
| | N22953 | Bracket, Antenna Loop Mtg. | | N2260L-5A | Knob, On-Off-Volume (Brown - Cat. No. 15) |
| | N23207 | Bracket, Var. Con. Mtg. | | N22604-5B | Knob, Tone (Brown - Cat. No. 15) |
| | N22964 | Bracket, Dial Scale Mtg. (left) | | N22604-5C | Knob, Tuning (Brown - Cat. No. 15) |
| | N22965 | Bracket, Dial Scale Mtg. (right) | | N22604-3A | Knob, On-Off-Volume (Ivory - Cat. No. 16) |
| | N23561 | Cabinet Assembly (Brown - Cat. No. 15) | | N22604-3B | Knob, Tone (Ivory - Cat. No. 16) |
| | N23562 | Cabinet Assembly (Ivory - Cat. No. 16) | | N22604-3C | Knob, Tuning (Ivory - Cat. No. 16) |
| | N22823-2 | Cabinet (Brown - Cat. No. 15) | | N23144 | Leaflet, Instruction |
| | N22823-1 | Cabinet (Ivory - Cat. No. 16) | P | N20138-15 | Line Cord w/it. Plug |
| | N22369-1 | Cloth, Grille (Brown - Cat. No. 15) | | N22956 | Pointer, Dial |
| | N22369-2 | Cloth, Grille (Ivory - Cat. No. 16) | R1, R9 | | Resistor, 330,000 ohms, 1/2 watt |
| | N22937 | Crystal, Dial | R2 | | Resistor, 1000 ohms, 1/2 watt |
| | N22939 | Emblem "S" | R3 | | Resistor, 22,000 ohms, 1/2 watt |
| | N19361 | Clip, Hairpin | R4 | | Resistor, 6.8 megohms, 1/2 watt |
| L2 | N23163 | Coil, R.F. | R5 | | Resistor, 1 megohm, 1/2 watt |
| L3 | N23160 | Coil, Oscillator | R6 | | Resistor, 15 ohm, 1/2 watt |
| C1A, C1B, C1C | N23155 | Condenser, Variable, 3 Gang | R7 | N22963 | Resistor, Volume Control & Switch, 500,000 ohms |
| C2, C5 | | Condenser, .05 mfd., 400 Volt | R8 | | Resistor, 3.3 megohm, 1/2 watt |
| C3 | | Condenser, .05 mfd., 200 Volt | R10 | N23156 | Resistor, Tone Control, 500,000 ohms |
| C4 | | Condenser, .00005 mfd., 500 Volt | R11 | | Resistor, 150 ohm, 1/2 watt |
| C6, C8 | | Condenser, .0002 mfd., 350 Volt | R12 | | Resistor, 1200 ohms, 2 watt |
| C7, C9, C11 | | Ceramic Condenser, .01 mfd., 400 Volt | | N22954-2 | Scale, Dial |
| C10 | | Condenser, .003 mfd., 500 Volt | | N22957 | Shaft, Tuning |
| C12A, C12B | N22111 | Condenser, Electrolytic, 50-50 mfd. 150 Volt | | N22760-1 | Speaker, 5" P.M. |
| | N19132 | Cord, Dial Drive | | N19133 | Spring |
| | N22940-1 | Cover, Rear Cabinet (Brown - Cat. No. 15) | | N23161 | Transformer, 1st I.F. |
| | | | | N23162 | Transformer, 2nd I.F. |
| | | | | N23164 | Transformer, Output |

MODELS 15, 16,
Ch. 132.844,
132.844-1



SUBJECT: Parts Changes and addition of -1 to the Chassis Number

Chassis No. 132.884-1 incorporates the following changes to prevent microphonics:

1. Part No. N23160 Oscillator Coil changed to Part No. N23751 Oscillator Coil.
2. Part No. N23155 Variable Condenser changed to Part No. N23743 Variable Condenser.

Variable Condenser N23743 has a wide spaced oscillator section with a lower capacity than N23155, and Oscillator Coil N23743 has a higher inductance than N23160. Therefore, for proper tracking, N23155 and N23160 should be used together, and N23743 and N23751 should be used together when making service replacements of the Variable Condenser or Oscillator Coil.

MODELS 18, 20,
Ch. 132.877

TECHNICAL INFORMATION

Specifications

Power Supply
105-120 Volts AC 50 Watts

Frequency Range
Broadcast 540-1600 Kc
FM 88-108 Mc

Power Output
Undistorted 1.0 Watt
Maximum 2.5 Watt

Speaker Voice Coil Impedance 3.2 ohms

AM Tuning range – 540 Kc to 1600 Kc. Intermediate Frequency – 455 Kc. I.F. and R.F. measurements made at 500 milliwatts output – approximately 1.27 volts on a rectifier type voltmeter connected across speaker voice coil.

Approximately input for 500 MW output: I.F. 300 uv; R.F. with standard loop: at 600 Kc, 1200 uc/m; at 1000 Kc, 1050 uv/m; at 1400 Kc, 800 uv/m.

FM Tuning range – 88 megacycles to 108 megacycles. Intermediate Frequency 10.7 megacycles. I.F. and R.F. measurements made at 500 milliwatts output – approximately 1.27 volts on a rectifier type voltmeter connected across speaker voice coil. Approximate input for 500 MW output: I.F. 300 uv; R.F. "Absolute Measurements": 91 megacycles, 125 uv; 105 megacycles, 100 uv.

ALIGNMENT PROCEDURE

PRELIMINARY:

Output meter connection ----- Across speaker voice coil.
Output meter reading to indicate 500 MW ----- 1.27 volts.
Generator Modulation ----- 30%, 400 cycles.
Position of volume control ----- Fully clockwise.
Set dial pointer ----- Horizontal, variable condenser closed.
Set band switch ----- To left for AM alignment, to right for FM alignment.

AM ALIGNMENT

| Position of Variable | Generator Frequency | Dummy Ant. | Generator Connection (high) | Generator Connection Ground Lead | Adjust Trimmer In Order Shown For Max. Output | Trimmer Function |
|----------------------|---------------------|------------|-----------------------------|----------------------------------|-----------------------------------------------|------------------|
| Open | 455 Kc | .05 mfd. | Mixer Grid | Chassis | A1, A2, A3, A4, | I.F. Oscillator |
| Open | 1650 Kc | | *Test Loop | Test Loop | A5 | Antenna |
| 1400 Kc | 1400 Kc | | *Test Loop | Test Loop | A6 | Antenna |
| *600 Kc | 600 Kc | | *Test Loop | Test Loop | Check Point | Antenna |

* Connect generator lead to a Standard Hazeltine Test Loop, Model 1150, placed two feet from the set loop, or three turns of wire about six inches in diameter, placed about one foot from the set loop. Or the generator can be connected with the high side lead to the AM antenna screw terminal and the ground lead to the chassis.

** With a generator signal of 600 Kc, tune the set to the point where maximum output is obtained, which should be approximately 600 Kc on the dial. Adjust antenna section places of variable for maximum output.

The alignment procedure should be repeated in the original order for greatest accuracy.
Always keep the output from the signal generator at its lowest possible value to make the A. V. C. action of the receiver ineffective.

FM ALIGNMENT

Detector and I.F. alignment using Signal Generator and Oscilloscope.

1. Connect FM Generator, High side, to grid (pin 1) of 6BA6 2nd I.F. tube through .005 mfd. dummy.
2. Set generator frequency to 10.7 Mc. modulated either 60 cycles or 400 cycles, 250 Kc sweep (125 Kc. deviation).
3. Connect vertical input of scope across volume control of receiver (grounded terminal to chassis, ungrounded terminal to high side of control).
4. Set scope switch for internal synchronization and set horizontal oscillator to 2X frequency of modulating voltage of generator. (120 or 800 cycles)
5. Turn variable condenser fully open, and band switch to right (FM).
6. Adjust frequency vernier of horizontal oscillator on scope until the pattern becomes stationary.
7. Adjust ratio detector primary slug No. A7 for maximum vertical sweep of the scope pattern.
8. Adjust ratio detector secondary slug No. A8 to center the cross over point of the pattern. Pattern should look like Fig. 1, with the same amount of curve on both ends, and the cross over point in the center.
9. Connect generator, high side, to center antenna screw terminal on bottom of chassis.
10. Adjust I.F. slugs A9, A10 and All for the greatest vertical sweep of the pattern, consistent with linearity. If the I.F. slugs are adjusted for maximum sweep of the pattern, the pattern may become non-linear. Therefore, adjustment should be made for the greatest sweep which can be obtained and still have all four ends of the "X" pattern similar in size and shape.
11. Check the alignment of the I.F. and detector circuits by varying the signal generator frequency above and below the center frequency of 10.7 Mc. If the receiver is perfectly aligned, two smaller "X" patterns of similar size and shape will result, one on either side of the center frequency. See Figure 2.

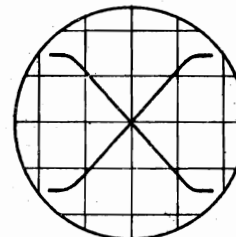
X PATTERN
CENTER FREQUENCY

FIG 1

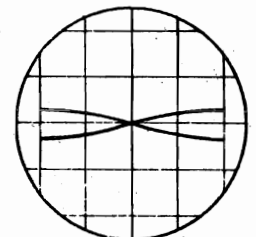
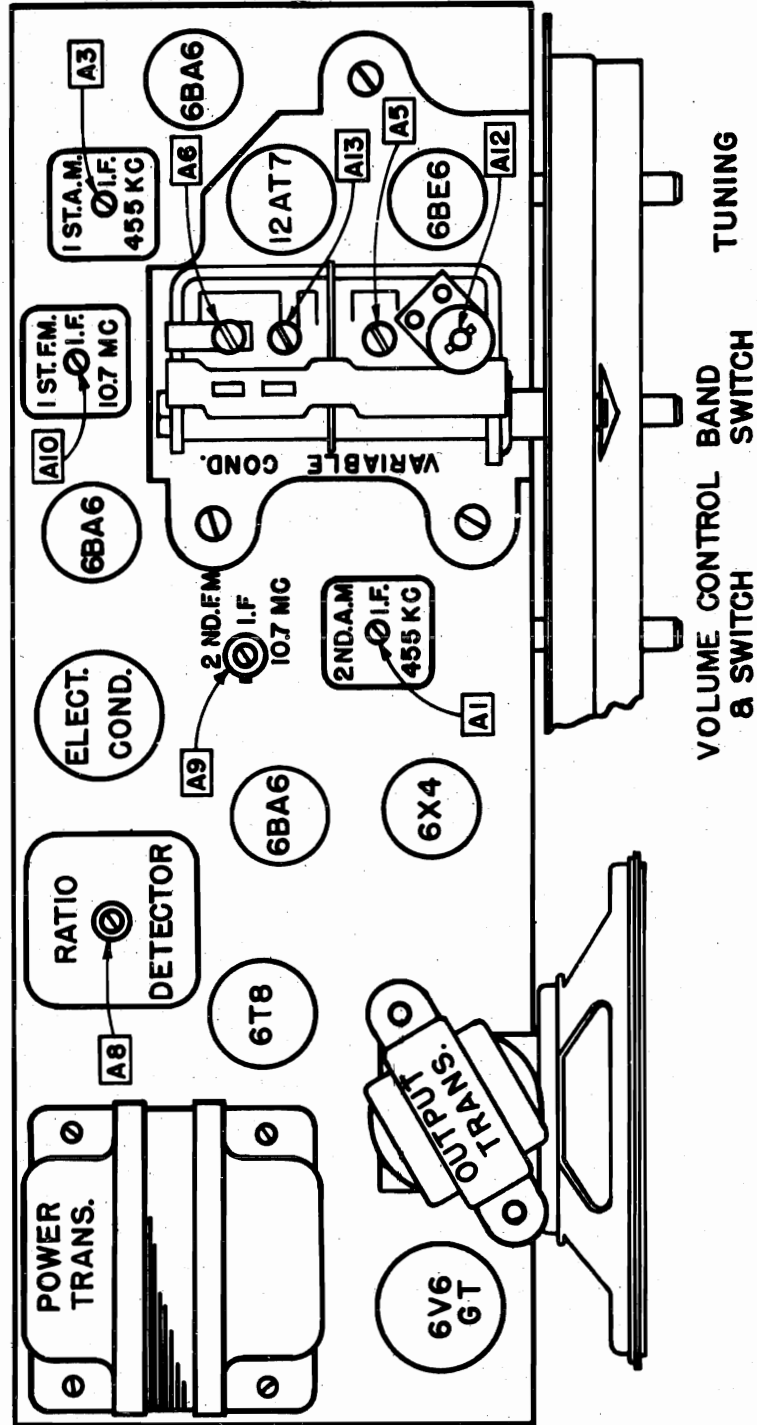
SMALL X PATTERN
ABOVE AND BELOW
CENTER FREQUENCY

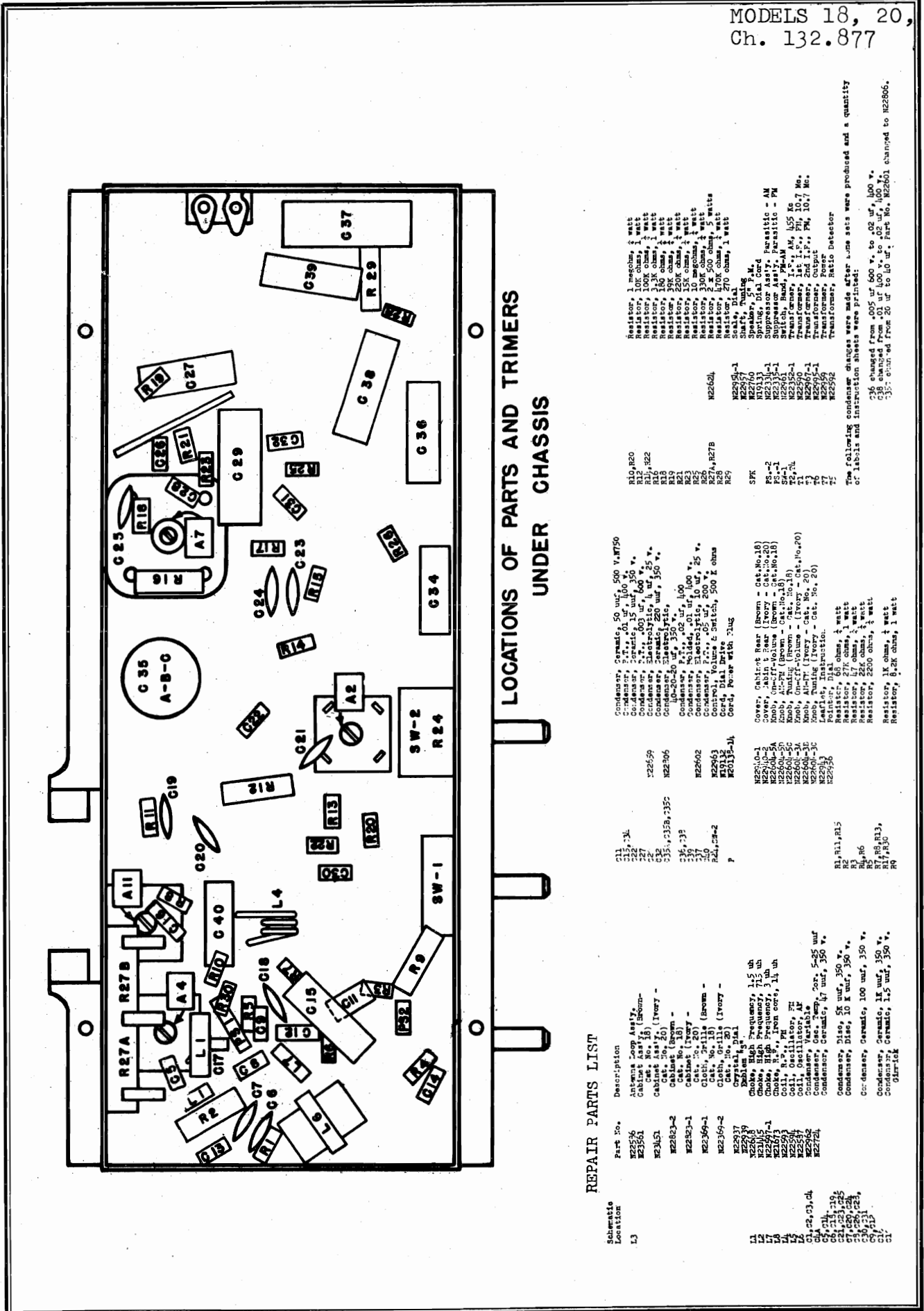
FIG 2

MODELS 18, 20,
Ch. 132.877

| Position of Variable | Generator Frequency | Dummy Ant. | Generator Connection High Side Ant. (FM) Terminal | Generator Connection Ground Lead Ground (G) Terminal | Adjust Trimmers In Order Shown | Trimmer Function |
|----------------------|---------------------|------------|---------------------------------------------------|------------------------------------------------------|--------------------------------|------------------|
| Fully Open | 108.5 Mc. | *300 ohm | Ant. (FM) Terminal | Ground (G) Terminal | A12 | Oscillator |
| Fully Closed | 87.5 Mc. | *300 ohm | Ant. (FM) Terminal | Ground (G) Terminal | A13 | Oscillator R.F. |
| 105 Mc. | 105 Mc. | *300 ohm | Ant. (FM) Terminal | Ground (G) Terminal | Check Point | |
| 91 Mc. | 91 Mc. | *300 ohm | Ant. (FM) Terminal | Ground (G) Terminal | Check Point | R.F. |

For R.F. alignment use FM generator signal modulated with 400 cycles 45 Kc. sweep (22.5 Kc.) deviation).
 * The 300 ohm dummy should be made up to two 150 ohm resistors, one placed in each lead at the receiver antenna terminals





LOCATIONS OF PARTS AND TRIMERS
UNDER CHASSIS

REPAIR PARTS LIST

| Schematic Location | Part No. | Description |
|--------------------|-----------------------|-------------------------------------|
| L3 | R27A | Antenna Loop Assy. |
| | R27B | Cabinet Case (Broom) |
| | R27C | Cabinet Assy. (Ivory) |
| | R27D | Cat. No. 20 |
| | R27E | Cat. No. 18 |
| | R27F | Cabinet (Ivory) |
| | R27G | Cat. No. 20 |
| | R27H | Cat. No. 18 |
| | R27I | Cloth, Grille (Ivory) |
| | R27J | Cat. No. 20 |
| | R27K | Cat. No. 18 |
| | R27L | Knobs, High Frequency, 1 1/2 oh |
| | R27M | Knobs, High Frequency, 3 oh |
| | R27N | Knobs, R.F., Iron core, 1 1/2 oh |
| | R27O | Cell, Resistor, 10 oh |
| | R27P | Cell, Resistor, 20 oh |
| | R27Q | Cell, Oscillator, AF |
| | R27R | Condenser, Variable |
| | R27S | Condenser, Ceramic, Cat. 5-35 uuf |
| | R27T | Condenser, Ceramic, 47 uuf, 350 v. |
| | R27U | Condenser, Disc, 5K uuf, 350 v. |
| | R27V | Condenser, Disc, 10 uuf, 350 v. |
| | R27W | Condenser, Ceramic, 100 uuf, 350 v. |
| | R27X | Condenser, Ceramic, 1K uuf, 350 v. |
| | R27Y | Condenser, Ceramic, 1.5 uuf, 350 v. |
| | R27Z | Grid-lick |
| | R11, R15 | Resistor, 1K ohms, 1 watt |
| | R3 | Resistor, 27K ohms, 1/2 watt |
| | R4, R6 | Resistor, 250K ohms, 1/2 watt |
| | R7, R8, R13, R17, R30 | Resistor, 1K ohms, 1 watt |
| | R9 | Resistor, 5-2K ohms, 1 watt |
| | R10, R20 | Resistor, 1 megohm, 1/2 watt |
| | R11, R22 | Resistor, 100K ohms, 1/2 watt |
| | R16 | Resistor, 20K ohms, 1/2 watt |
| | R18 | Resistor, 30K ohms, 1/2 watt |
| | R21 | Resistor, 220K ohms, 1/2 watt |
| | R23 | Resistor, 15K ohms, 1/2 watt |
| | R24 | Resistor, 33K ohms, 1/2 watt |
| | R25 | Resistor, 39K ohms, 1/2 watt |
| | R27A, R27B | Resistor, 2 x 500 ohms, 5 watts |
| | R28 | Resistor, 270 ohms, 1 watt |
| | R29 | Scale, Dial |
| | R29-1 | Shaft, Tuning |
| | R29-2 | Speaker, Dial Feed |
| | R29-3 | Suppressor Assy. Parasitic - AM |
| | R29-4 | Suppressor Assy. Parasitic - FM |
| | R29-5 | Transformer, 1.5, 5M, 455 Kc |
| | R29-6 | Transformer, 1st I.P., FM, 10-7 Mc. |
| | R29-7 | Transformer, 2nd I.P., FM, 10-7 Mc. |
| | R29-8 | Transformer, Power |
| | R29-9 | Transformer, Ratio Detector |
| | R29-10 | Transformer, Ratio Detector |
| | R29-11 | Transformer, Ratio Detector |
| | R29-12 | Transformer, Ratio Detector |
| | R29-13 | Transformer, Ratio Detector |
| | R29-14 | Transformer, Ratio Detector |
| | R29-15 | Transformer, Ratio Detector |
| | R29-16 | Transformer, Ratio Detector |
| | R29-17 | Transformer, Ratio Detector |
| | R29-18 | Transformer, Ratio Detector |
| | R29-19 | Transformer, Ratio Detector |
| | R29-20 | Transformer, Ratio Detector |
| | R29-21 | Transformer, Ratio Detector |
| | R29-22 | Transformer, Ratio Detector |
| | R29-23 | Transformer, Ratio Detector |
| | R29-24 | Transformer, Ratio Detector |
| | R29-25 | Transformer, Ratio Detector |
| | R29-26 | Transformer, Ratio Detector |
| | R29-27 | Transformer, Ratio Detector |
| | R29-28 | Transformer, Ratio Detector |
| | R29-29 | Transformer, Ratio Detector |
| | R29-30 | Transformer, Ratio Detector |
| | R29-31 | Transformer, Ratio Detector |
| | R29-32 | Transformer, Ratio Detector |
| | R29-33 | Transformer, Ratio Detector |
| | R29-34 | Transformer, Ratio Detector |
| | R29-35 | Transformer, Ratio Detector |
| | R29-36 | Transformer, Ratio Detector |
| | R29-37 | Transformer, Ratio Detector |
| | R29-38 | Transformer, Ratio Detector |
| | R29-39 | Transformer, Ratio Detector |
| | R29-40 | Transformer, Ratio Detector |
| | R29-41 | Transformer, Ratio Detector |
| | R29-42 | Transformer, Ratio Detector |
| | R29-43 | Transformer, Ratio Detector |
| | R29-44 | Transformer, Ratio Detector |
| | R29-45 | Transformer, Ratio Detector |
| | R29-46 | Transformer, Ratio Detector |
| | R29-47 | Transformer, Ratio Detector |
| | R29-48 | Transformer, Ratio Detector |
| | R29-49 | Transformer, Ratio Detector |
| | R29-50 | Transformer, Ratio Detector |
| | R29-51 | Transformer, Ratio Detector |
| | R29-52 | Transformer, Ratio Detector |
| | R29-53 | Transformer, Ratio Detector |
| | R29-54 | Transformer, Ratio Detector |
| | R29-55 | Transformer, Ratio Detector |
| | R29-56 | Transformer, Ratio Detector |
| | R29-57 | Transformer, Ratio Detector |
| | R29-58 | Transformer, Ratio Detector |
| | R29-59 | Transformer, Ratio Detector |
| | R29-60 | Transformer, Ratio Detector |
| | R29-61 | Transformer, Ratio Detector |
| | R29-62 | Transformer, Ratio Detector |
| | R29-63 | Transformer, Ratio Detector |
| | R29-64 | Transformer, Ratio Detector |
| | R29-65 | Transformer, Ratio Detector |
| | R29-66 | Transformer, Ratio Detector |
| | R29-67 | Transformer, Ratio Detector |
| | R29-68 | Transformer, Ratio Detector |
| | R29-69 | Transformer, Ratio Detector |
| | R29-70 | Transformer, Ratio Detector |
| | R29-71 | Transformer, Ratio Detector |
| | R29-72 | Transformer, Ratio Detector |
| | R29-73 | Transformer, Ratio Detector |
| | R29-74 | Transformer, Ratio Detector |
| | R29-75 | Transformer, Ratio Detector |
| | R29-76 | Transformer, Ratio Detector |
| | R29-77 | Transformer, Ratio Detector |
| | R29-78 | Transformer, Ratio Detector |
| | R29-79 | Transformer, Ratio Detector |
| | R29-80 | Transformer, Ratio Detector |
| | R29-81 | Transformer, Ratio Detector |
| | R29-82 | Transformer, Ratio Detector |
| | R29-83 | Transformer, Ratio Detector |
| | R29-84 | Transformer, Ratio Detector |
| | R29-85 | Transformer, Ratio Detector |
| | R29-86 | Transformer, Ratio Detector |
| | R29-87 | Transformer, Ratio Detector |
| | R29-88 | Transformer, Ratio Detector |
| | R29-89 | Transformer, Ratio Detector |
| | R29-90 | Transformer, Ratio Detector |
| | R29-91 | Transformer, Ratio Detector |
| | R29-92 | Transformer, Ratio Detector |
| | R29-93 | Transformer, Ratio Detector |
| | R29-94 | Transformer, Ratio Detector |
| | R29-95 | Transformer, Ratio Detector |
| | R29-96 | Transformer, Ratio Detector |
| | R29-97 | Transformer, Ratio Detector |
| | R29-98 | Transformer, Ratio Detector |
| | R29-99 | Transformer, Ratio Detector |
| | R29-100 | Transformer, Ratio Detector |

The following condenser changes were made after June sets were produced and a quantity of labels and instruction sheets were printed:

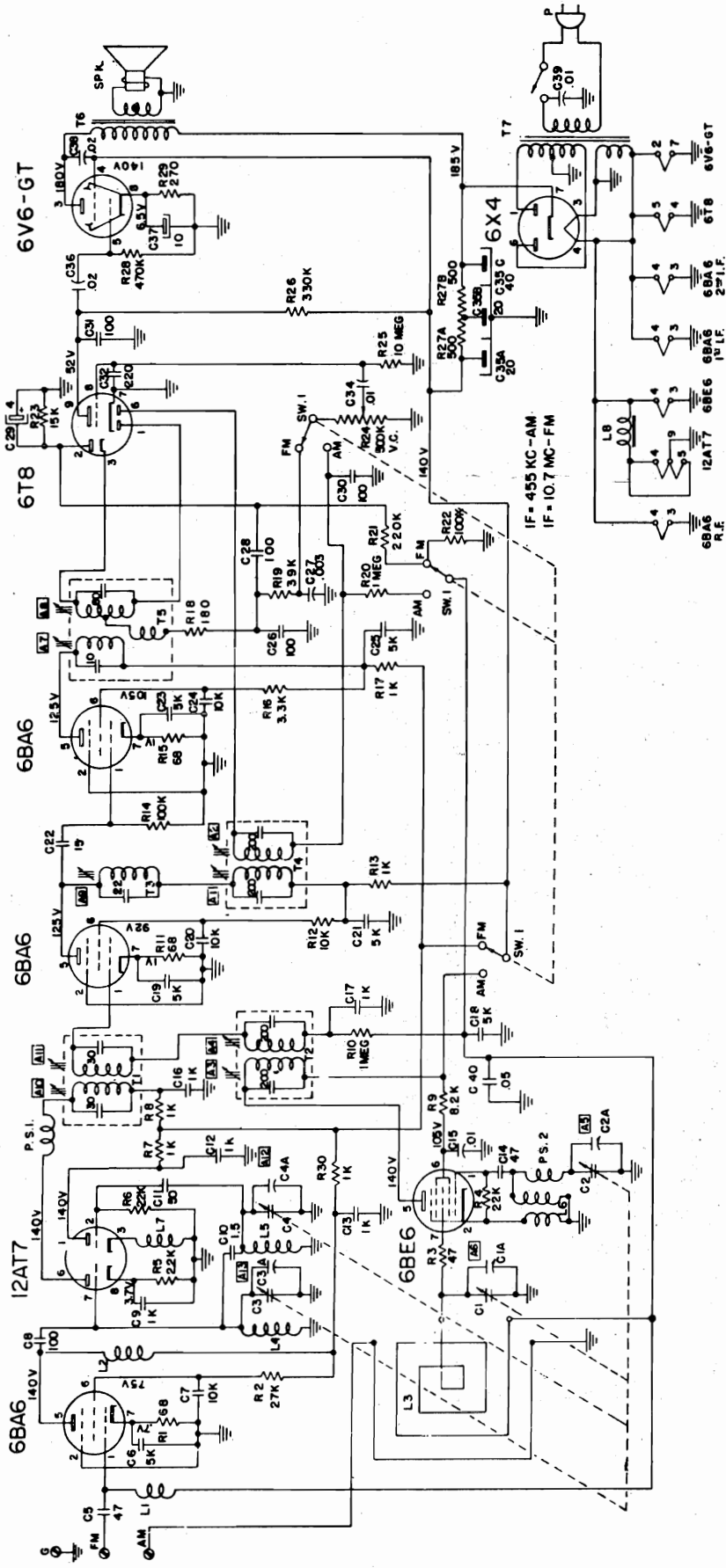
C36 changed from .005 uf 600 v. to .02 uf, 100 v.

C38 changed from .01 uf 100 v. to .02 uf, 100 v.

C39 changed from 20 uf to 10 uf, Part No. M22601 changed to M22806.

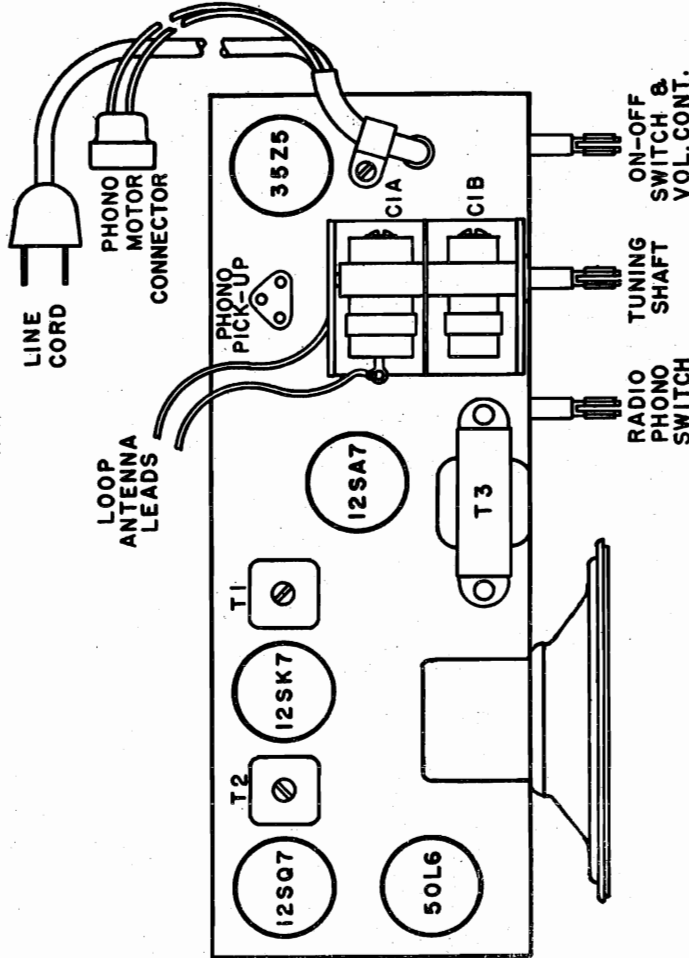
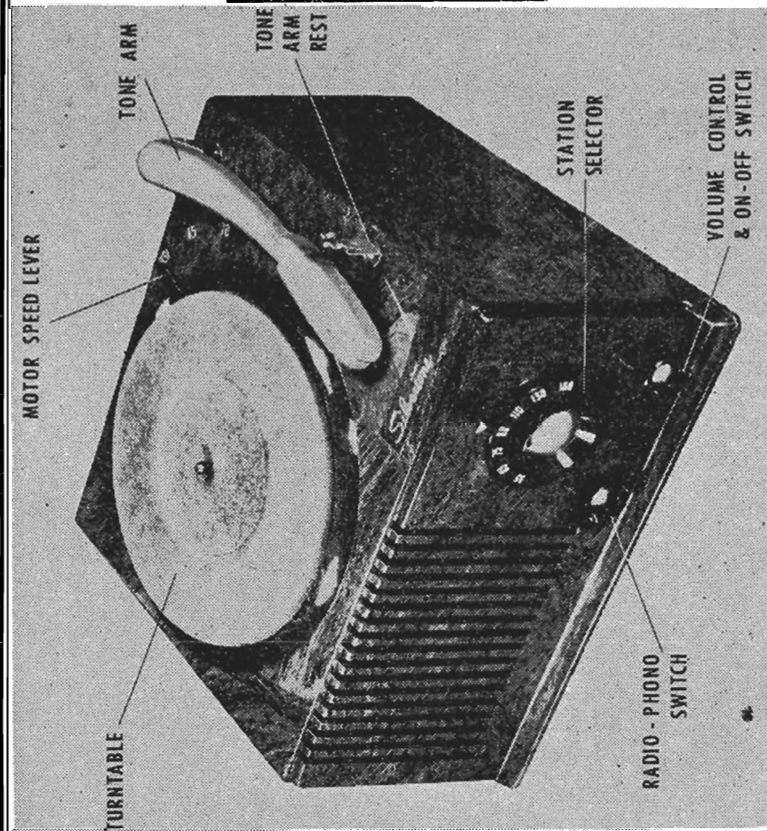
PAGE 22-6 SEARS, ROEBUCK

MODELS 18, 20,
Ch. 132.877



ALL VOLTAGE MEASUREMENTS ARE MADE WITH AN ELECTRONIC VOLT-METER WITH A LINE VOLTAGE OF 117 V. AC WITH NO LOAD.
ALL VOLTAGE READINGS GIVEN ARE POSITIVE.
† INDICATES MICA OR CERAMIC COND. VALUES SHOWN IN MINFD.
‡ INDICATES PAPER TUBULAR COND. VALUES SHOWN IN MFD.
§ INDICATES ELECTROLYTIC COND. VALUES SHOWN IN MFD.

MODEL 1032,
Ch. 528.196



IMPORTANT ALIGNMENT NOTES:

The alignment must be done in the order given.
The entire alignment procedure should be repeated step by step in the original order for greatest accuracy.

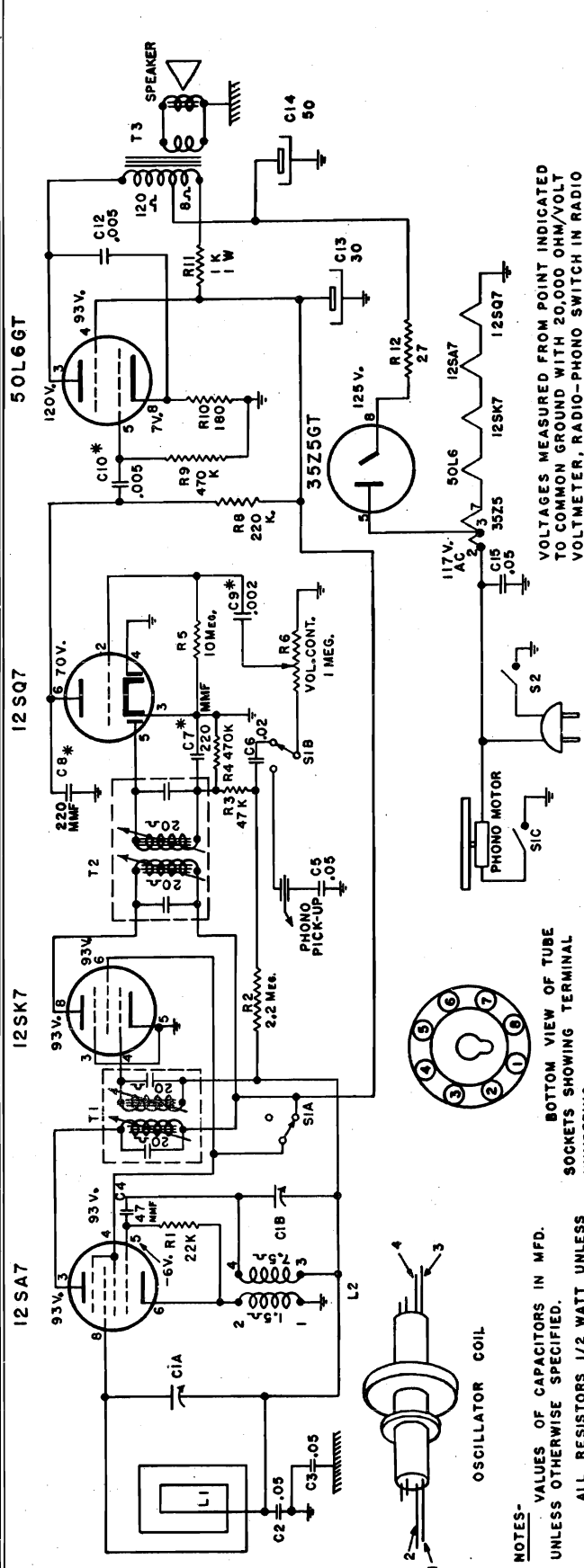
ALIGNMENT PROCEDURE

Preliminary:

Output meter reading to indicate 0.05 watt across voice coil.....0.4 volt
Generator ground lead connection.....common ground
Generator modulation.....30%, 400 cycles
Position of Volume Control.....Fully on

| POSITION OF TUNER | GENERATOR FREQUENCY | DUMMY ANTENNA | GENERATOR CONNECTION | TRIMMER ADJUSTMENT | TRIMMER FUNCTION |
|-------------------|---------------------|----------------|----------------------|---------------------------|------------------|
| Open | 455 KC | .1 mfd. | Pin 8 12SA7 | T1 and T2 top & bottom | I.F. |
| Open | 1630 KC | .1 mfd. | Pin 8 12SA7 | C1B | Oscillator |
| 1400 KC | 1400 KC | HAZELTINE LOOP | C1A | C1A | Antenna |

MODEL 1032,
Ch. 528.196



VOLTAGES MEASURED FROM POINT INDICATED TO COMMON GROUND WITH 20,000 OHM/VOLT VOLTMETER, RADIO-PHONO SWITCH IN RADIO POSITION, LINE VOLTAGE SET AT 117 V. AC.

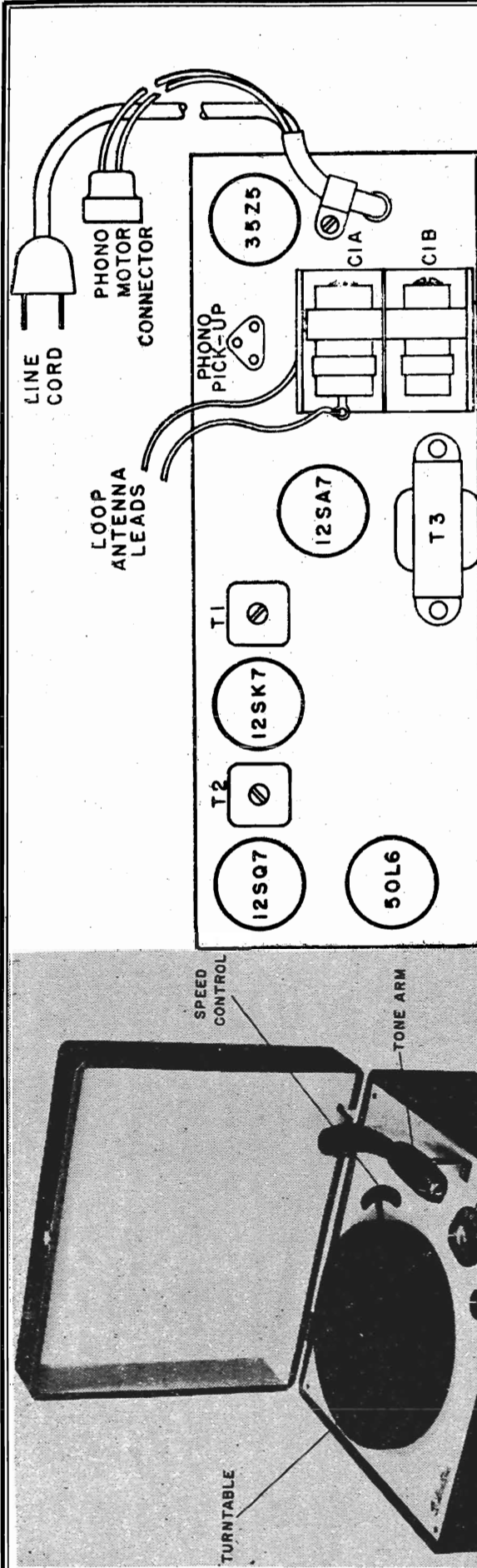
NOTES-
VALUES OF CAPACITORS IN MFD.
UNLESS OTHERWISE SPECIFIED.
ALL RESISTORS 1/2 WATT UNLESS OTHERWISE SPECIFIED.
* THESE CAPACITORS ARE IN CERAMIC UNIT PART NO. T17-104.

OSCILLATOR COIL
BOTTOM VIEW OF TUBE SOCKETS SHOWING TERMINAL NUMBERING.

PARTS LIST FOR CHASSIS

| SCHEMATIC LOCATION | PART NUMBER | DESCRIPTION | | |
|--------------------|-------------|--------------------------------------------|------------------------------|--------------------------------|
| C1A, C1B | L1 | Capacitor, variable (2 gang) | | |
| C2 | T19-213 | Capacitor, .05 mfd. 200 v. | | |
| C3, C5, C15 | T16-189 | Capacitor, .05 mfd. 400 v. | | |
| C4 | T15-229 | Capacitor, .47 mmfd. mica | | |
| C6 | T16-150 | Capacitor, .02 mfd. 400 v. | | |
| C7, C8, C9, C10 | T17-104 | Capacitor, ceramic unit | | |
| C12 | T16-190 | Capacitor, .005 mfd. 600 v. | | |
| C13, C14 | T18-304 | Capacitor, electrolytic, 50-30 mfd. 150 v. | | |
| | T83-702 | Cartridge | | |
| | T11-187 | Clamp, line cord | | |
| | T83-421 | Clip, IF transformer mounting | | |
| | L2 | T10-572 | Coil, oscillator | |
| | R6, S2 | T24-195 | Control, VOLUME and ON-OFF | |
| | R8 | T23-151 | Cord, power line | |
| | R10 | T21-169 | Cover, plate, chassis | |
| | R11 | T98-18 | Grille cloth | |
| | R12 | T47-108 | Grommet (gang mounting) | |
| | | T52-324 | Knob, TUNING | |
| | | T52-323 | Knob, VOLUME and ON-OFF | |
| | | T52-328 | Knob, RADIO-PHONO | |
| | | T88-186 | Label, tube position | |
| | | T88-187 | Label, schematic | |
| | | T88-217 | Label, parts list | |
| | | T82-71 | Loop, antenna | |
| | | T59-25 | Motor, phono, 3 speed | |
| | | T83-703 | Needle | |
| | | T45-124 | Plug, phono | |
| | | T22-143 | Plug, phono motor | |
| | | T39-289 | Pulley, 3 speed, stepped | |
| | | T60-659 | Resistor, 22K ohm, 1/2 w. | |
| | | T60-726 | Resistor, 2.2 megohm, 1/2 w. | |
| | | T60-730 | Resistor, 47K ohm, 1/2 w. | |
| | | R4, R9 | T60-731 | Resistor, 470K ohm, 1/2 w. |
| | | R5 | T60-728 | Resistor, 10 megohm, 1/2 w. |
| | | | T60-667 | Resistor, 220K ohm, 1/2 w. |
| | | | T60-774 | Resistor, 180 ohm, 1/2 w. 10% |
| | | | T60-732 | Resistor, 1000 ohm, 1 w. 10% |
| | | | T60-690 | Resistor, 27 ohm, 1/2 w. 10% |
| | | | T22-142 | Socket, phono motor |
| | | | T68-11 | Socket, octal, tube |
| | | | T68-41 | Socket, phono |
| | | | T77-151 | Spacer, (gang mounting) |
| | | | T79-393 | Speaker, 4" P.M. |
| | | | T70-175 | Spring, hair pin |
| | | | T69-189 | Switch, RADIO-PHONO |
| | | | T83-692 | Tone arm (with cartridge) |
| | | | T10-508 | Transformer, 1st I.F. |
| | | | T10-479 | Transformer, 2nd I.F. |
| | | | T80-268 | Transformer, output |
| | | | T83-691 | Turntable, 8" dia. |
| | | | T86-146 | Washer, "C", turntable spindle |
| | | | T39-288 | Wheel idler |

MODEL 1035,
Ch. 528.195



LINE CORD
PHONO MOTOR CONNECTOR
LOOP ANTENNA LEADS
PHONO PICK-UP
35Z5
C1A
C1B
TUNING SHAFT
RADIO PHONO SWITCH
TONE CONTROL SWITCH & ON-OFF VOL. CONT.

IMPORTANT ALIGNMENT NOTES:

The alignment must be done in the order given.

The entire alignment procedure should be repeated step by step in the original order for greatest accuracy.

Always keep the output of the generator at its lowest possible value to prevent the AVC of the receiver from interfering with accurate alignment.

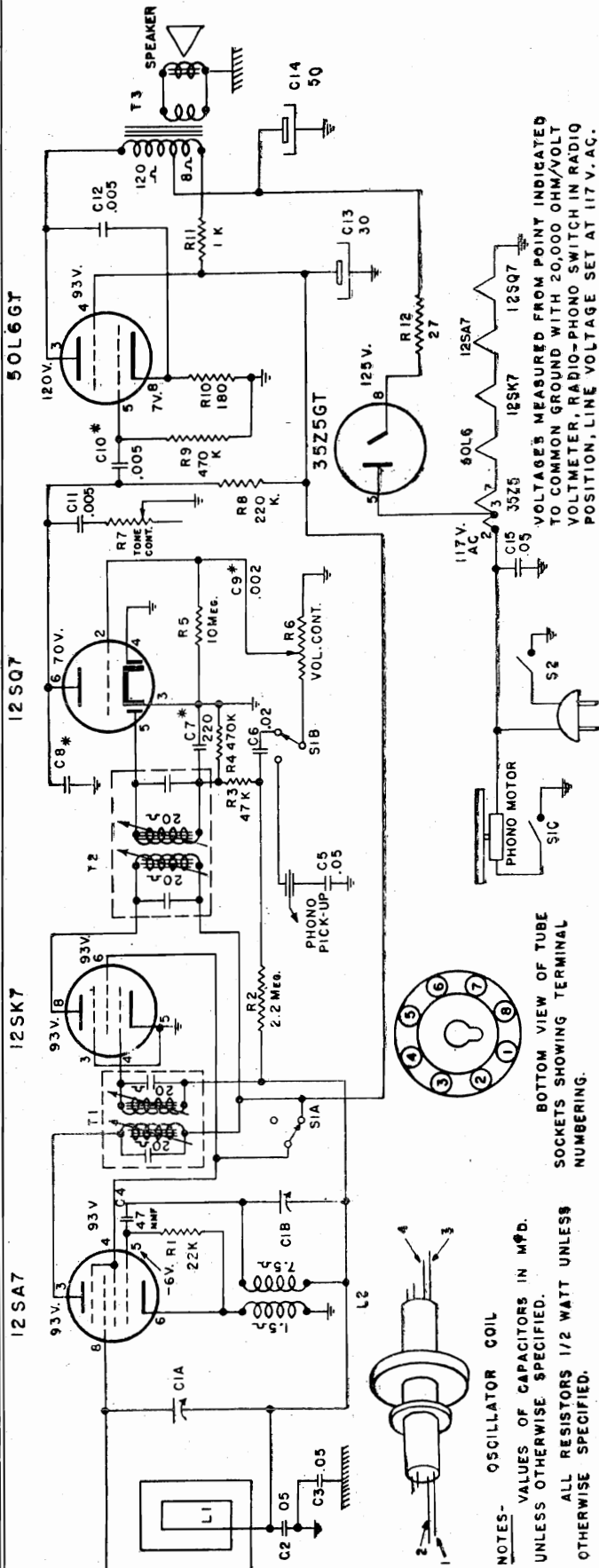
ALIGNMENT PROCEDURE

Preliminary:

Output meter reading to indicate 0.05 watt across voice coil . . . 0.4 volt
 Generator ground lead connection common ground
 Generator modulation 30%, 400 cycles
 Position of Volume Control Fully on

| POSITION OF TUNER | GENERATOR FREQUENCY | DUMMY ANTENNA | GENERATOR CONNECTION | TRIMMER ADJUSTMENT | TRIMMER FUNCTION |
|-------------------|---------------------|----------------|----------------------|---------------------------|------------------|
| Open | 455 KC | .1 mfd. | Pin 8 12SA7 | T1 and T2 top & bottom | I.F. |
| Open | 1630 KC | .1 mfd. | Pin 8 12SA7 | C1B | Oscillator |
| 1400 KC | 1400 KC | HAZELTINE LOOP | | C1A | Antenna |

MODEL 1035,
Ch. 528.195



NOTES-
OSCILLATOR COIL
VALUES OF CAPACITORS IN MFD.
UNLESS OTHERWISE SPECIFIED.
ALL RESISTORS 1/2 WATT UNLESS
OTHERWISE SPECIFIED.

* THESE CAPACITORS ARE IN CERAMIC
UNIT PART NO. T17-104

OSCILLATOR COIL
VALUES OF CAPACITORS IN MFD.
UNLESS OTHERWISE SPECIFIED.
ALL RESISTORS 1/2 WATT UNLESS
OTHERWISE SPECIFIED.

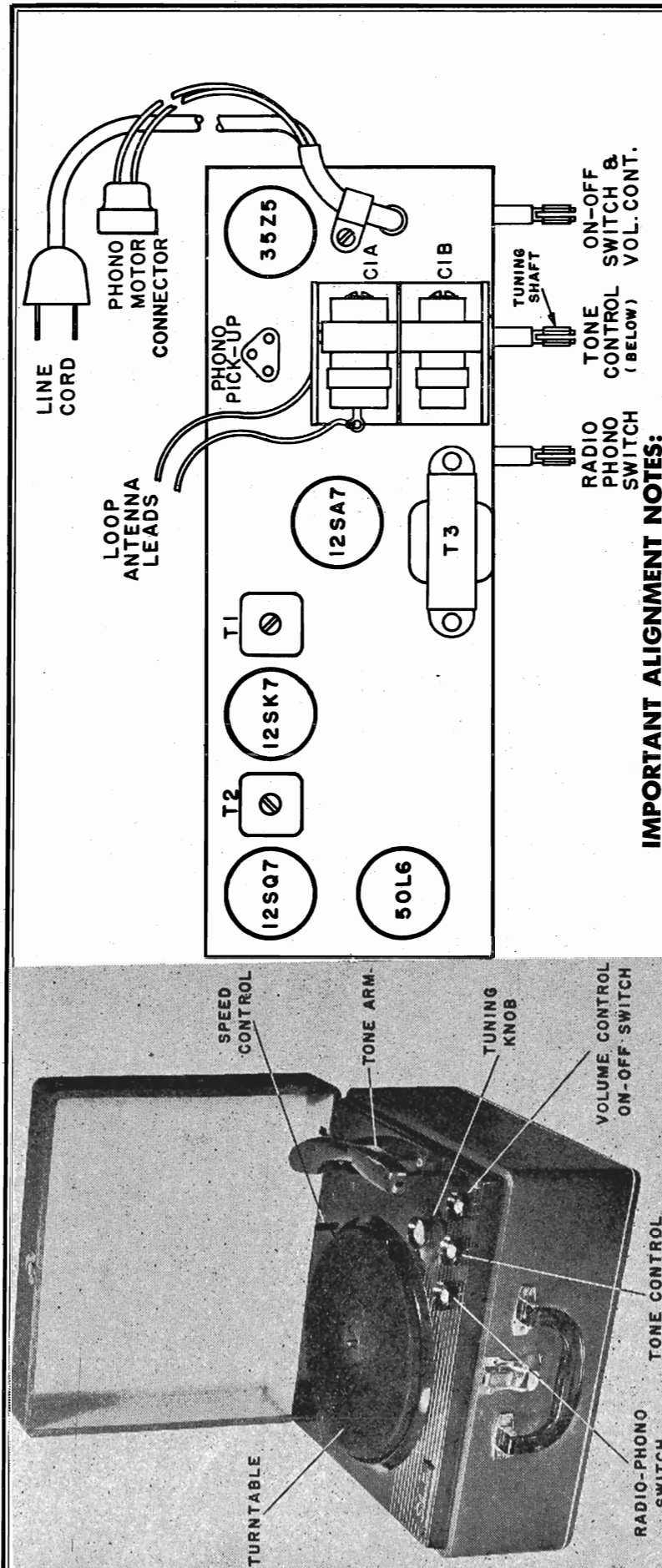
VOLTAGES MEASURED FROM POINT INDICATED
TO COMMON GROUND WITH 20,000 OHM/VOLT
VOLT-METER, RADIO-PHONO SWITCH IN RADIO
POSITION, LINE VOLTAGE SET AT 117 V. AC.

PARTS LIST FOR CHASSIS

Schematic Part Location Number Description

| Location | Part Number | Description |
|---------------|-------------|--------------------------------------------|
| C1A, C1B | T83-699 | Adapter, 45 RPM |
| C2 | T11-464 | Bracket, tone arm rest |
| C3, C5, C15 | T42-488 | Cabinet |
| C4 | T19-214 | Capacitor, variable (2 gang) |
| C6 | T16-197 | Capacitor, .05 mfd. 200 v. |
| C7, C8 | T16-189 | Capacitor, .05 mfd. 400 v. |
| C9, C10 | T15-229 | Capacitor, 47 mmfd. mica |
| C11, C12 | T16-150 | Capacitor, .02 mfd. 400 v. |
| C13, C14 | T17-104 | Capacitor, ceramic unit |
| C15 | T16-190 | Capacitor, .005 mfd. 600 v. |
| C1 | T18-304 | Capacitor, electrolytic, 50-30 mfd. 150 v. |
| T1 | T83-702 | Cartridge |
| T2 | T11-187 | Clamp, line cord |
| T3 | T83-421 | Clip, IF transformer mounting |
| R1 | T60-726 | Resistor, 2.2 megohm, 1/2 w. |
| R2 | T60-726 | Resistor, 2.2 megohm, 1/2 w. |
| R3 | T10-572 | Coil, oscillator |
| R4, R9 | T24-196 | Control, VOLUME and ON-OFF |
| R5 | T26-128 | Control, TONE |
| R6, S2 | T23-151 | Cord, power line |
| R7 | T21-168 | Cover, plate, chassis |
| R8 | T36-128 | Grille, flocked screen |
| R10 | T47-108 | Grommet (gang mounting) |
| R11 | T52-322 | Knob, TUNING |
| R12 | T52-323 | Knob, VOLUME and ON-OFF |
| S1A, S1B, S1C | T52-327 | Knob, TONE |
| S1D | T88-188 | Knob, RADIO-PHONO |
| S1A, S1B, S1C | T88-189 | Label, tube position |
| S1A, S1B, S1C | T82-70 | Label, schematic |
| S1A, S1B, S1C | T83-696 | Motor-board, masonite |
| S1A, S1B, S1C | 59-27 | Motor, phono, 3 speed |
| S1A, S1B, S1C | T83-703 | Needle |
| S1A, S1B, S1C | T22-143 | Plug, phono motor |
| S1A, S1B, S1C | T39-289 | Pulley, 3 speed stepped |
| S1A, S1B, S1C | T60-659 | Resistor, 22K ohm, 1/2 w. |
| S1A, S1B, S1C | T60-726 | Resistor, 2.2 megohm, 1/2 w. |
| S1A, S1B, S1C | T60-730 | Resistor, 47K ohm, 1/2 w. |
| S1A, S1B, S1C | T60-731 | Resistor, 470K ohm, 1/2 w. |
| S1A, S1B, S1C | T60-728 | Resistor, 10 megohm, 1/2 w. |
| S1A, S1B, S1C | T60-667 | Resistor, 220K ohm, 1/2 w. |
| S1A, S1B, S1C | T60-774 | Resistor, 180 ohm, 1/2 w. 10% |
| S1A, S1B, S1C | T60-732 | Resistor, 1000 ohm, 1 w. 10% |
| S1A, S1B, S1C | T60-690 | Resistor, 27 ohm, 1/2 w. 10% |
| S1A, S1B, S1C | T22-142 | Socket, phono motor |
| S1A, S1B, S1C | T68-11 | Socket, octal, tube |
| S1A, S1B, S1C | T68-41 | Socket, phono |
| S1A, S1B, S1C | T77-151 | Spacer (gang mounting) |
| S1A, S1B, S1C | T79-392 | Speaker, 4" x 6", P.M. |
| S1A, S1B, S1C | T70-175 | Spring, hair pin |
| S1A, S1B, S1C | T69-190 | Switch, RADIO-PHONO |
| S1A, S1B, S1C | T83-692 | Tone arm, with cartridge |
| S1A, S1B, S1C | T83-701 | Tone arm (less cartridge) |
| S1A, S1B, S1C | T10-508 | Transformer, 1st I.F. |
| S1A, S1B, S1C | T10-479 | Transformer, 2nd I.F. |
| S1A, S1B, S1C | T80-268 | Transformer, output |
| S1A, S1B, S1C | T83-691 | Turntable, 8" dia. |
| S1A, S1B, S1C | T86-146 | Washer, "C," turntable spindle |
| S1A, S1B, S1C | T39-288 | Wheel, idler |

MODEL 1035A,
Ch. 528.195-1



IMPORTANT ALIGNMENT NOTES:

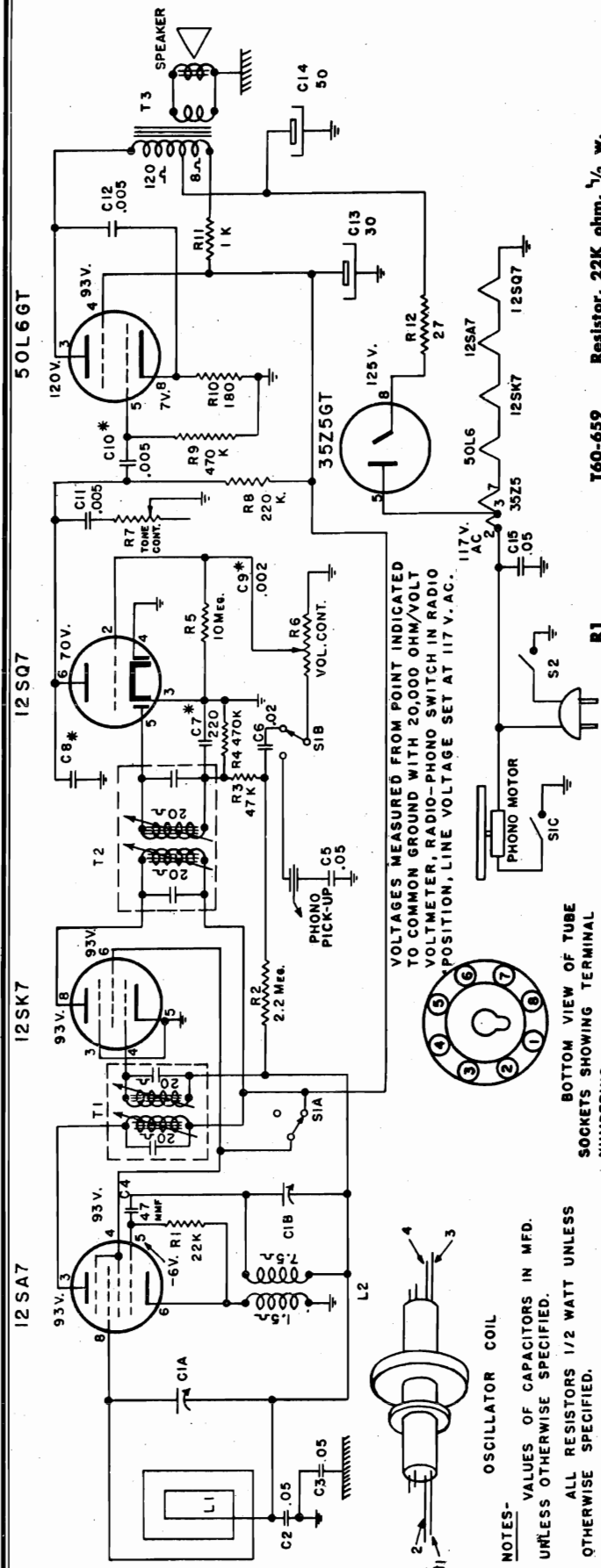
The alignment must be done in the order given.
The entire alignment procedure should be repeated step by step in the original order for greatest accuracy.
Always keep the output of the generator at its lowest possible value to prevent the AVC of the receiver from interfering with accurate alignment.

ALIGNMENT PROCEDURE

Preliminary:
Output meter reading to indicate 0.05 watt across voice coil... 0.4 volt
Generator ground lead connection..... common ground
Generator modulation..... 30%, 400 cycles
Position of Volume Control..... Fully on

| POSITION OF TUNER | GENERATOR FREQUENCY | DUMMY ANTENNA | GENERATOR CONNECTION | TRIMMER ADJUSTMENT | TRIMMER FUNCTION |
|-------------------|---------------------|----------------|----------------------|---------------------------|------------------|
| Open | 455 KC | .1 mfd. | Pin 8 12SA7 | T1 and T2 top & bottom | I.F. |
| Open | 1630 KC | .1 mfd. | Pin 8 12SA7 | C1B | Oscillator |
| 1400 KC | 1400 KC | HAZELTINE LOOP | C1A | C1A | Antenna |

MODEL 1035A,
Ch. 528.195-1



NOTES -
VALUES OF CAPACITORS IN MFD.
UNLESS OTHERWISE SPECIFIED.
ALL RESISTORS 1/2 WATT UNLESS
OTHERWISE SPECIFIED.
* THESE CAPACITORS ARE IN CERAMIC
UNIT PART NO. T17-104

OSCILLATOR COIL
VALUES MEASURED FROM POINT INDICATED
TO COMMON GROUND WITH 20,000 OHM/VOLT
VOLTMETER. RADIO-PHONO SWITCH IN RADIO
POSITION. LINE VOLTAGE SET AT 117 V. AC.

PARTS LIST FOR CHASSIS

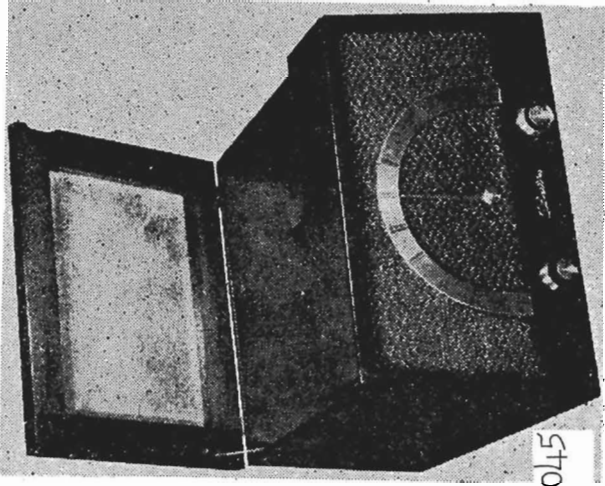
| SCHEMATIC LOCATION | PART NUMBER | DESCRIPTION |
|-----------------------|-------------|--------------------------------------------|
| C1A, C1B | T83-699 | Adapter, 45 RPM |
| C2 | T11-456 | Bracket, tone arm rest |
| C3, C5, C15 | T16-197 | Capacitor, .05 mfd. 200 v. |
| C4 | T15-229 | Capacitor, .05 mfd. 400 v. |
| C6 | T16-150 | Capacitor, .02 mfd. 400 v. |
| C7, C8 } C9, C10 } | T17-104 | Capacitor, ceramic unit |
| C11, C12 | T16-190 | Capacitor, .005 mfd. 600 v. |
| C13, C14 | T18-304 | Capacitor, electrolytic, 50-30 mfd. 150 v. |
| T83-702 | | Cartridge |
| T11-187 | | Clamp, line cord |

SOCKETS SHOWING TUBE
NUMBERING.

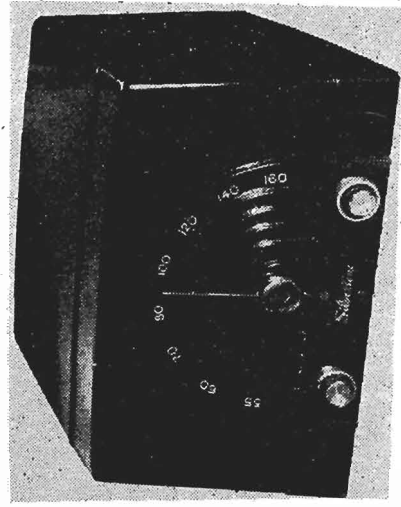
117V. AC

| | |
|---------|-----------------------------------|
| T60-659 | Resistor, 22K ohm, 1/2 w. |
| T60-726 | Resistor, 2.2 megohm, 1/2 w. |
| T60-730 | Resistor, 47K ohm, 1/2 w. |
| T60-731 | Resistor, 470K ohm, 1/2 w. |
| T60-728 | Resistor, 10 megohm, 1/2 w. |
| T60-667 | Resistor, 220K ohm, 1/2 w. |
| T60-774 | Resistor, 180 ohm, 1/2 w. 10% |
| T60-732 | Resistor, 1000 ohm, 1 w. 10% |
| T60-690 | Resistor, 27 ohm, 1/2 w. 10% |
| T83-709 | Retainer, centering discs, 45 RPM |
| T22-142 | Socket, phono motor |
| T68-11 | Socket, octal, tube |
| T68-41 | Socket, phono |
| T77-151 | Spacer (gang mounting) |
| T79-392 | Speaker, 4" x 6", P.M. |
| T70-175 | Spring, hair pin |
| T69-189 | Switch, RADIO-PHONO |
| T83-692 | Tone arm, with cartridge |
| T83-701 | Tone arm (less cartridge) |
| T10-508 | Transformer, 1st I.F. |
| T10-479 | Transformer, 2nd I.F. |
| T80-268 | Transformer, output |
| T83-691 | Turntable, 8" dia. |
| T86-146 | Washer, "C," turntable spindle |
| T39-288 | Wheel, idler |

MODELS 1040, 1045,
Ch. 528.194

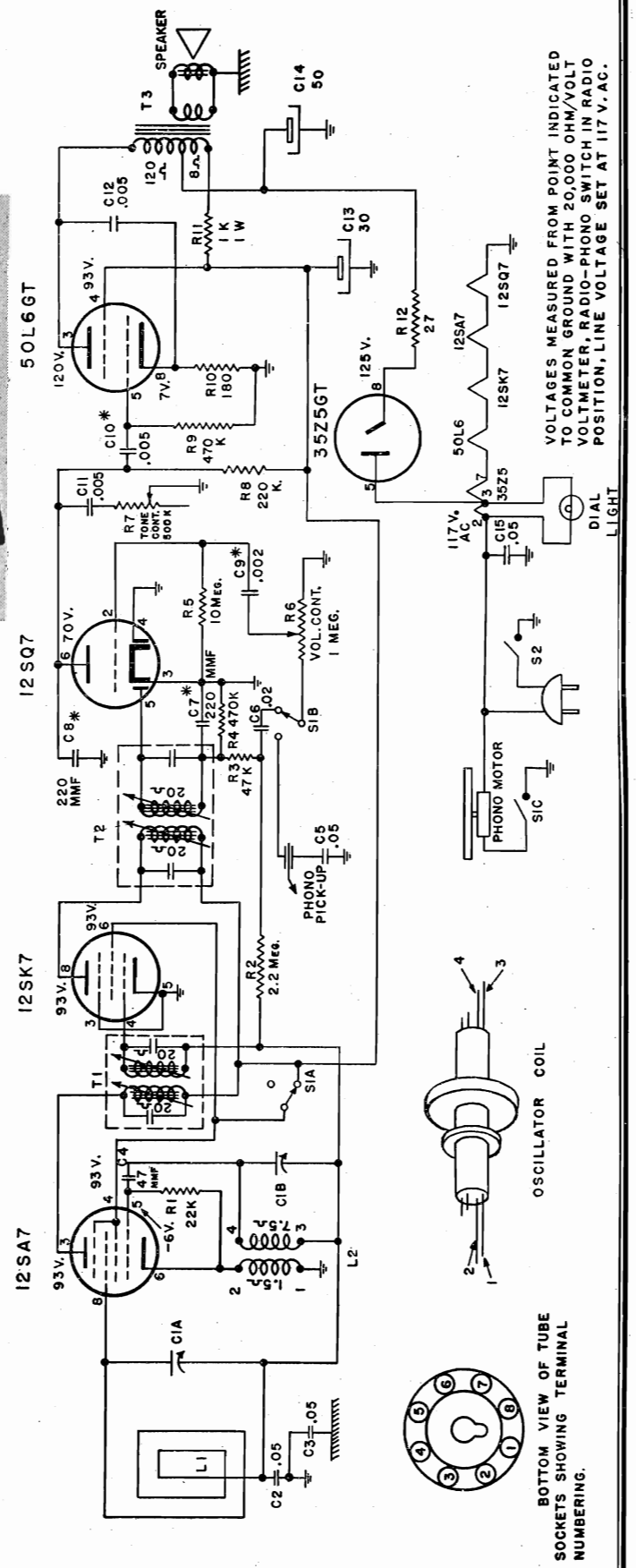


MODEL 1045

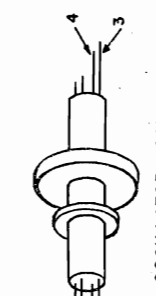


MODEL 1040

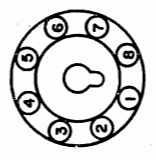
NOTES-
UNLESS VALUES OF CAPACITORS IN MFD
UNLESS OTHERWISE SPECIFIED.
ALL RESISTORS 1/2 WATT UNLESS
OTHERWISE SPECIFIED.
* THESE CAPACITORS ARE IN CERAMIC
UNIT PART NO. T17-104.



VOLTAGES MEASURED FROM POINT INDICATED
TO COMMON GROUND WITH 20,000 OHM/VOLT
VOLTMETER. RADIO-PHONO SWITCH IN RADIO
POSITION, LINE VOLTAGE SET AT 117 V. AC.



OSCILLATOR COIL



BOTTOM VIEW OF TUBE
SOCKETS SHOWING TERMINAL
NUMBERING.

MODELS 1040, 1045,
Ch. 528.194

ALIGNMENT PROCEDURE

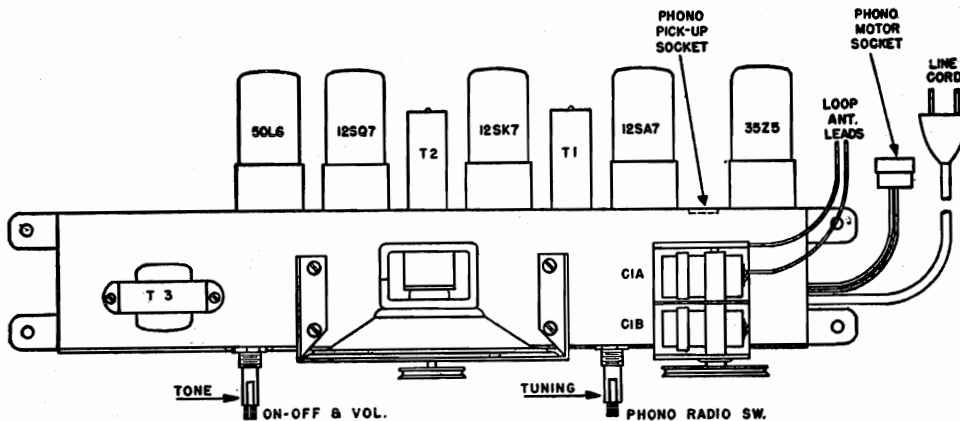
PRELIMINARY:

Output meter reading to indicate 0.05 Watt across Voice Coil.....0.4 Volt
 Generator ground lead connection..... Floating Ground
 Generator Modulation30%, 400 cycles
 Position of Volume Control..... Fully on

IMPORTANT ALIGNMENT NOTES:

The Alignment must be done in the order given.
 The entire Alignment Procedure should be repeated step by step in the original order for greatest accuracy.
 Always keep the output from the generator at its lowest possible value to prevent the AVC of the receiver from interfering with accurate alignment.

| POSITION OF TUNER | GENERATOR FREQUENCY | DUMMY ANTENNA | GENERATOR CONNECTION | TRIMMER ADJUSTMENT | TRIMMER FUNCTION |
|-------------------|---------------------|---------------------|----------------------|-----------------------------|------------------|
| open | 455 KC | .1 mfd. | pin 8 12SA7 | T1 and T2 top and bottom | I.F. |
| open | 1630 KC | .1 mfd. | pin 8 12SA7 | C1B | Oscillator |
| 1400 KC | 1400 KC | HAZELTINE TEST LOOP | | C1A | Antenna |



LOCATION OF PARTS OF TOP OF CHASSIS

MODEL 1040

MODELS 1040, 1045,
Ch. 528.194

PARTS LIST

| SCHEMATIC LOCATION | PART NUMBER | DESCRIPTION | SCHEMATIC LOCATION | PART NUMBER | DESCRIPTION |
|--------------------|-------------|---------------------------------------------------|--------------------|-------------|---------------------------------|
| | T62-17 | Bumper, foot | | T88-171 | Label, schematic |
| | T72-56 | Bushing, pulley | | T89-7 | Lamp, pilot |
| | T42-486 | Cabinet, less cover | | T82-69 | Loop, antenna |
| C1A, C1B | T19-212 | Capacitor, variable (2 gang)... | | T58-83 | Pointer, dial |
| C2 | T16-197 | Capacitor, .05 mfd. 200 v.... | | T39-287 | Pulley, pointer drive..... |
| C3, C5, C15 | T16-189 | Capacitor, .05 mfd. 400 v.... | R1 | T60-659 | Resistor, 22K ohm, 1/2 w.... |
| C4 | T15-229 | Capacitor, 47 mmfd. mica.... | R2 | T60-726 | Resistor, 2.2 megohm, 1/2 w.... |
| C6 | T16-150 | Capacitor, .02 mfd. 400 v.... | R3 | T60-730 | Resistor, 47K ohm, 1/2 w.... |
| C7, C8, C9, C10 | T17-104 | Capacitor, ceramic unit..... | R4, R9 | T60-731 | Resistor, 470K ohm, 1/2 w.... |
| C11, C12 | T16-190 | Capacitor, .005 mfd. 600 v.... | R5 | T60-728 | Resistor, 10 megohm, 1/2 w.... |
| C13, C14 | T18-304 | Capacitor, electrolytic, 50-30 mfd. 150 v..... | R8 | T60-667 | Resistor, 220K ohm, 1/2 w.... |
| | T11-187 | Clamp, line cord, chassis..... | R10 | T60-774 | Resistor, 180 ohm, 1/2 w. 10%. |
| | T11-232 | Clamp, line cord, cabinet..... | R11 | T60-732 | Resistor, 1000 ohm, 1 w. 10%. |
| | T83-421 | Clip, I.F. transformer mounting | R12 | T60-690 | Resistor, 27 ohm, 1/2 w. 10%. |
| L2 | T10-572 | Coil, oscillator | | T75-85 | Shaft, pulley |
| R6, R7, S2 | T24-194 | Control, dual, ON-OFF- VOLUME and TONE | | T71-39 | Shield, pilot lamp..... |
| | T51-109 | Cord, dial drive, approx. 30" .. | | T87-33 | Socket, pilot lamp..... |
| | T23-151 | Cord, power line..... | | T68-11 | Socket, octal, tube..... |
| | T21-167 | Cover, plate, chassis..... | | T68-41 | Socket, phono |
| | T42-487 | Cover, cabinet | | T22-142 | Socket, phono motor..... |
| | T47-108 | Grommet (gang mounting).... | | T77-151 | Spacer (gang mounting).... |
| | T83-690 | Hinge, cabinet cover..... | | T79-391 | Speaker, 5" P.M..... |
| | T48-54 | Jewel, pilot light..... | | T70-135 | Spring (dial cord)..... |
| | T52-321 | Knob, ON-OFF-VOLUME and PHONO-RADIO | S1A, S1B, S1C | T84-513 | Support, lid |
| | T52-320 | Knob, TUNING and TONE..... | T2 | T69-188 | Switch, RADIO-PHONO |
| | T88-170 | Label, tube position..... | T1 | T10-479 | Transformer, 2nd I.F..... |
| | | | T1 | T10-508 | Transformer, 1st I.F..... |
| | | | T3 | T80-268 | Transformer, output |

MODEL 1045

PARTS LIST

| SCHEMATIC LOCATION | PART NUMBER | DESCRIPTION | SCHEMATIC LOCATION | PART NUMBER | DESCRIPTION |
|--------------------|-------------|---------------------------------------------------------|--------------------|-------------|-----------------------------------------------------|
| | T44-16 | Baffle, wood | R1 | T60-659 | Resistor, 22K ohm, 1/2 w.... |
| | T44-18 | Baffle, cardboard | R2 | T60-726 | Resistor, 2.2 megohm, 1/2 w.... |
| | T72-56 | Bushing, pulley | R3 | T60-730 | Resistor, 47K ohm, 1/2 w.... |
| | T42-506 | Cabinet | R4, R9 | T60-731 | Resistor, 470K ohm, 1/2 w.... |
| C1A, C1B | T19-212 | Capacitor, variable (2 gang)... | R5 | T60-728 | Resistor, 10 megohm, 1/2 w.... |
| C2 | T16-197 | Capacitor, .05 mfd. 200 v.... | R8 | T60-667 | Resistor, 220K ohm, 1/2 w.... |
| C3, C5, C15 | T16-189 | Capacitor, .05 mfd. 400 v.... | R10 | T60-774 | Resistor, 180 ohm, 1/2 w. 10%. |
| C4 | T15-229 | Capacitor, 47 mmfd. mica.... | R11 | T60-732 | Resistor, 1000 ohm, 1 w. 10%. |
| C6 | T16-150 | Capacitor, .02 mfd. 400 v.... | R12 | T60-690 | Resistor, 27 ohm, 1/2 w. 10%. |
| C7, C8, C9, C10 | T17-104 | Capacitor, ceramic unit..... | | T97-171 | Screw, wood—# 8 x 3/4"— chassis mounting |
| C11, C12 | T16-190 | Capacitor, .005 mfd. 600 v.... | | T97-172 | Screw, wood—# 6 x 3/4"— cleat mounting |
| C13, C14 | T18-304 | Capacitor, electrolytic, 50-30 mfd. 150 v..... | | T74-228 | Screw, 6-32 x 1/2"— dial plate mounting |
| | T83-700 | 45 RPM Record Inserts (package of 12) | | T75-85 | Shaft, pulley |
| | T11-187 | Clamp, line cord, chassis..... | | T71-39 | Shield, pilot lamp..... |
| | T83-710 | Cleat, wood (triangular piece, supports baffle | | T87-33 | Socket, pilot lamp..... |
| | T83-421 | Clip, I.F. transformer mounting | | T68-11 | Socket, octal, tube..... |
| L2 | T10-572 | Coil, oscillator | | T68-41 | Socket, phono |
| R6, R7, S2 | T24-194 | Control, dual, ON-OFF- VOLUME and TONE | | T22-142 | Socket, phono motor..... |
| | T51-109 | Cord, dial drive, approx. 30" .. | | T77-151 | Spacer (gang mounting).... |
| | T23-151 | Cord, power line..... | | T79-391 | Speaker, 5" P.M..... |
| | T21-167 | Cover, plate, chassis..... | | T70-135 | Spring (dial cord)..... |
| | T98-20 | Grille cloth | S1A, S1B, S1C | T69-188 | Switch, RADIO-PHONO |
| | T47-108 | Grommet (gang mounting).... | T2 | T10-479 | Transformer, 2nd I.F..... |
| | T48-54 | Jewel, pilot light..... | T1 | T10-508 | Transformer, 1st I.F..... |
| | T52-342 | Knob, ON-OFF-VOLUME and PHONO-RADIO | T3 | T80-268 | Transformer, output |
| | T52-341 | Knob, TUNING and TONE..... | | T86-125 | Washer, flat—7/16" O.D.— dial plate screws |
| | T88-218 | Label, tube position..... | | T86-120 | Washer, flat—3/4" O.D.— shipping bolts |
| | T88-219 | Label, schematic | | T86-151 | Washer, "C"—shipping bolts .. |
| | T89-7 | Lamp, pilot | | T56-161 | Wing-nut—1/4"—28— shipping bolts |
| | T82-72 | Loop, antenna | | | |
| | T67-564 | Plate, dial scale | | | |
| | T58-83 | Pointer, dial | | | |
| | T39-287 | Pulley, pointer drive..... | | | |

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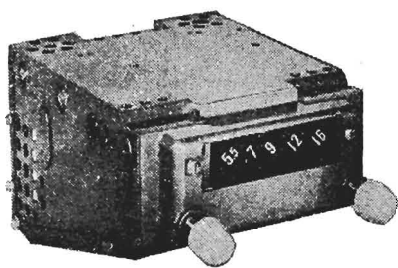


Fig. 1. Radio and Speaker

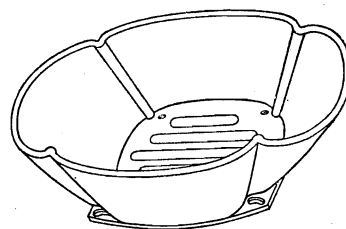
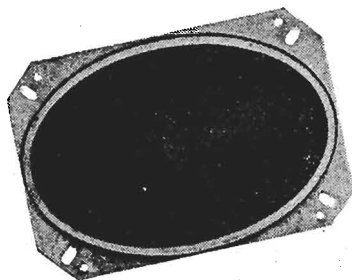


Fig. 2 Universal baffle.
Catalog No. 6275T

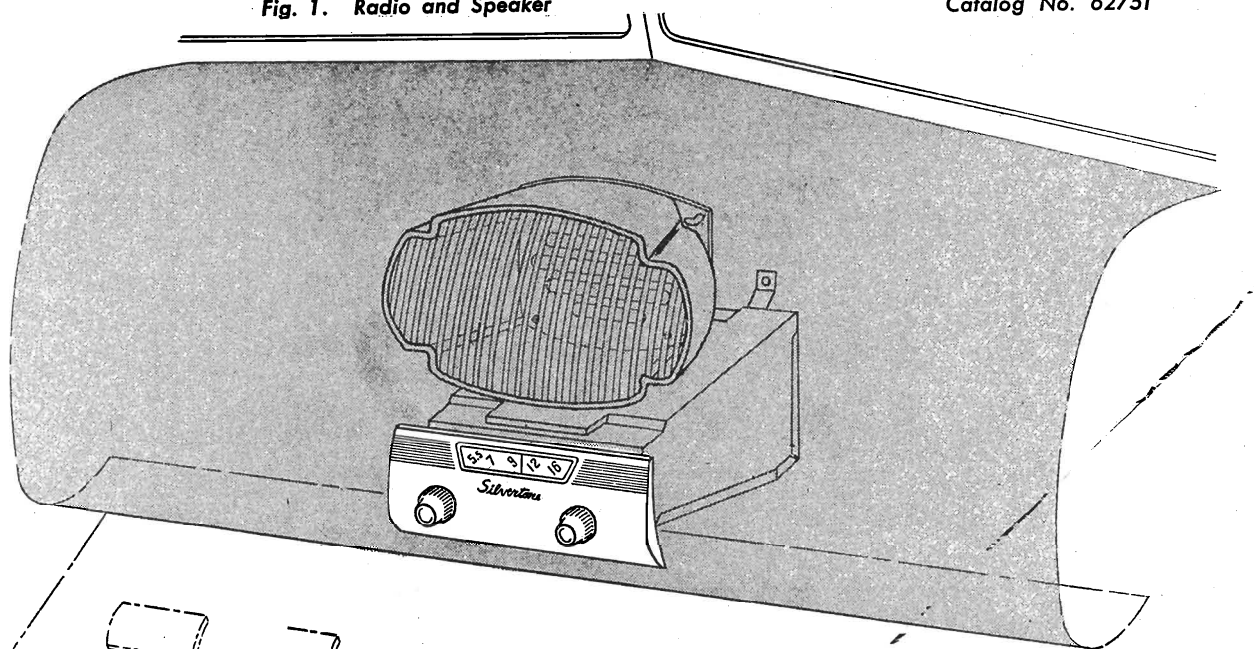


Fig. 3. Custom Style Mounting

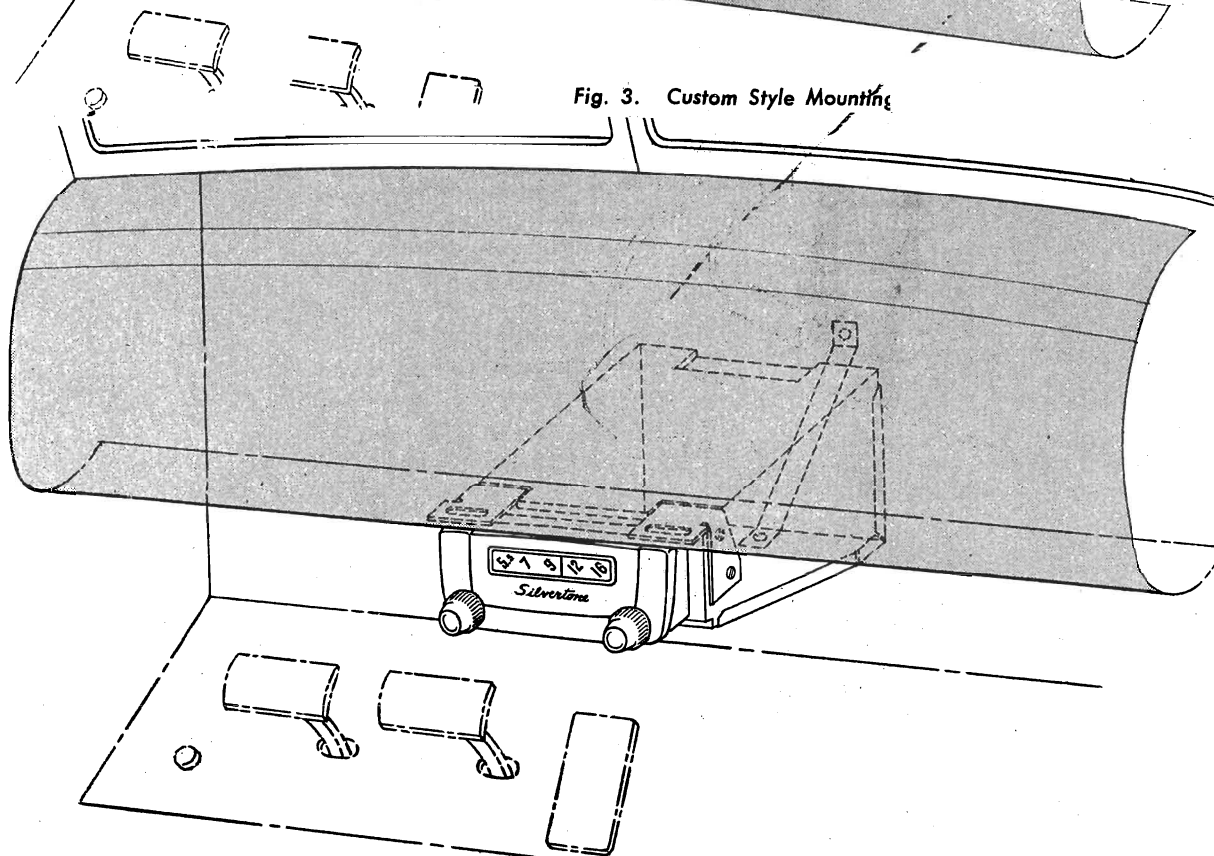


Fig. 4. Underdash Mounting

INSTALLATION

The speaker is mounted inside the radio case when it is shipped from the factory. The radio may be installed in your car with the speaker inside the case and it will render very satisfactory service. However, if you wish to take advantage of the finer acoustical improvement that results when the speaker is mounted on the instrument panel it is simple to do so. Simply take off the top cover of the radio case and remove the speaker, then replace the top cover. The speaker may then be mounted on the instrument panel by means of an adapter plate and baffle kit (see Fig. 2) which is available at the Sears Retail or Mail Order Store where you bought the radio. The special speaker baffle adapter plate and kit is sold as a separate item so that the purchaser of the radio is not put to unnecessary expense if he does not wish to mount the speaker on the instrument panel.

SPECIFIC INSTRUCTIONS PERTAINING TO THE MOUNTING OF THE SPEAKER AND RADIO IN THE CAR FOR WHICH YOU ORDERED YOUR RADIO ARE CONTAINED IN THE LEAFLET PACKED IN THE ESCUTCHEON KIT.

CONNECTING THE RADIO

When the radio is mounted in the car, the antenna cable should be connected to the radio by inserting the plug into the antenna receptacle on the side of the case. See Fig. 5. Then connect the "A" lead to the ignition switch. (If the "A" lead is connected to the switched or "cold" side of the ignition switch, the radio can be turned on only when the ignition switch is on. There is no danger then that the radio will be left on inadvertently while the car is parked and the battery unnecessarily drained.) The fuse should then be inserted into the fuse holder in the "A" lead. See Fig. 5.

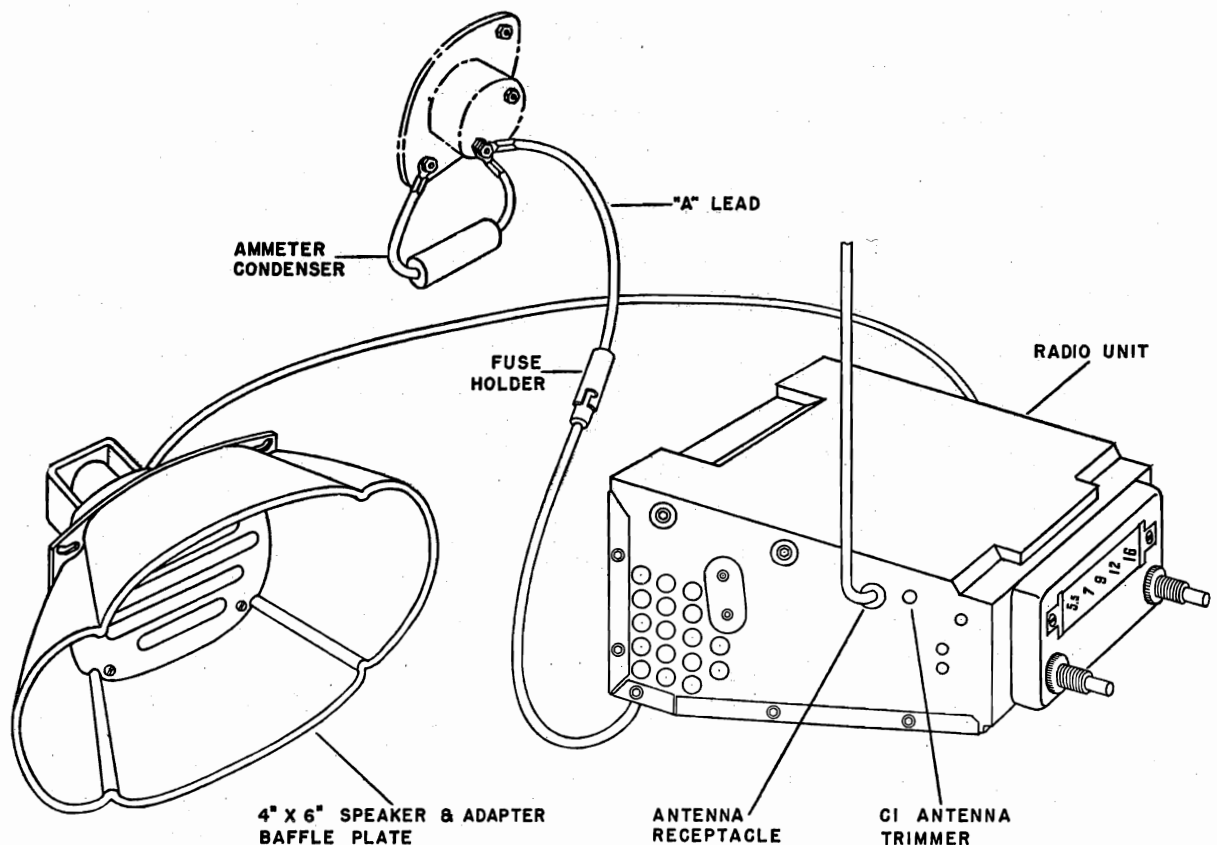


Fig. 5. Connecting the Radio

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6287, Ch. 528.6287

OPERATION

THE ON-OFF SWITCH AND VOLUME CONTROL

This is the righthand knob. When it is turned all the way to the left the receiver is switched off and there is no drain from the car's battery. Rotating the knob part of a turn toward the right switches the receiver on and illuminates the dial. Further rotation of the knob increases the volume. After a station has been tuned in properly the volume control knob should be adjusted to give the desired volume.

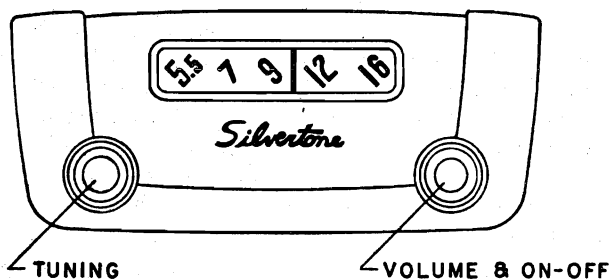


Fig. 6. Radio Front View

The Automatic Volume Control circuit, built into this receiver, will tend to maintain the volume once it has been adjusted by means of the Volume Control knob. However, because of the very great differences in receiving conditions encountered when driving a car, the volume may change beyond the limits for which automatic compensation is possible. As the sensitivity of the receiver automatically changes to compensate for changes in station strength, the background noise may also vary. When the station is strong, there will be little or no background noise but as the station becomes weaker, the background noise will increase. Reception may also be noisy when driving in "electrically noisy" districts. This will be particularly true when driving near trolley lines, high tension power lines, and power stations, etc.

TUNING IN STATIONS

Use the left knob to tune in stations. The dial is numbered in kilocycles minus the final two zeroes. Always tune carefully for the clearest sound and minimum background noise. This can be best accomplished by tuning in a station with the Volume Control turned down. The volume can be adjusted to the proper level when the station has been tuned in. Do not detune the station to reduce volume; use the Volume Control knob.

MATCHING THE ANTENNA

An adjusting screw for matching the receiver to the particular antenna used is accessible through a hole in the case. (See Fig. 5). Set the dial pointer between 1300 KC and 1400 KC, where no station is heard with the Volume Control fully on. Use a small screwdriver to turn the adjusting screw to the point giving the most hiss or noise. The set is now ready for operation.

S84—509 SUPPRESSION KIT AND MISCELLANEOUS PARTS

- 1 S84-233—"A" lead assembly
- 1 A43-10—Fuse
- 1 A81-13—Sleeve (for fuse)
- 2 A16-183—.5 MFD condensers
- 1 A96-4—Distributor Suppressor
- 20" wire braid

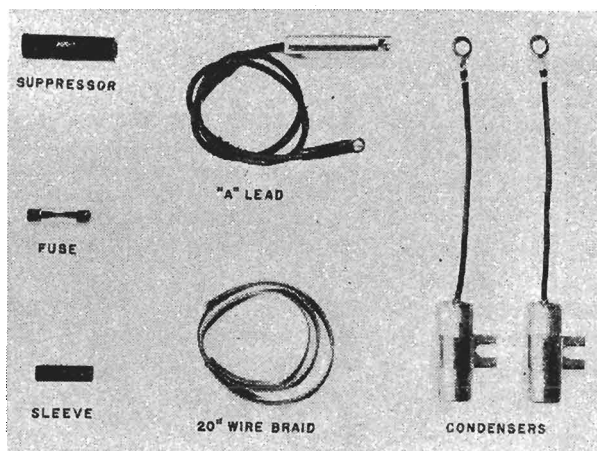


Fig. 7. Suppression Kit and Miscellaneous Parts

ELIMINATING MOTOR NOISE

Every precaution was taken in the design of this radio to eliminate motor noise interference. However, in the remote instance that it may be found desirable to take further steps, the following notes are added for your guidance. It may not be necessary to use all of the following suggestions to correct a noise condition in any one car. We recommend using these helpful hints in the manner of a process of elimination, using only those methods that correct your condition.

IMPORTANT: Special care should be taken when mounting the radio to make sure all paint, grease, rust, etc., is removed from all mounting points. A good electrical contact at these points will aid materially in eliminating motor noise.

GENERATOR CONDENSER

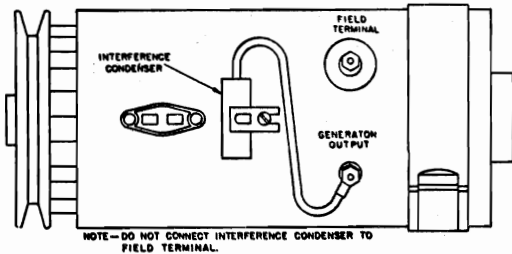


Fig. 8

The generator condenser must be connected to the battery terminal of the generator in all cases. If your car is equipped with a generator using an automatic regulator, make sure the condenser IS NOT fastened to the field winding terminal. If in doubt, your local car dealer can advise you as to where the car manufacturer recommends connecting it.

DISTRIBUTOR SUPPRESSOR

Remove from distributor cap the high tension lead from coil to distributor. Cut the lead two inches from the end, and screw the distributor resistor on to the coil lead, then screw the short length into the resistor and plug the cable into the distributor cap.

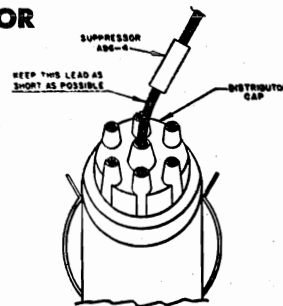


Fig. 9

AMMETER CONDENSER

A .5 MFD bypass condenser is furnished for attaching to the ammeter. This should be connected to either side of the ammeter with the ground lug fastened to a good ground nearby. In most cases the use of this condenser, the distributor suppressor, and the generator condenser, will eliminate all objectionable ignition interference.

VOLTAGE REGULATOR

It is normal to connect a .5 mfd condenser from the battery terminal on the voltage regulator to ground; however, in a number of cars the voltage regulator is mounted on rubber grommets. In such instances, the condenser should be grounded directly to the case of the regulator, rather than to some other ground point. Do not use a larger condenser than .5 mfd or else it will affect the timing of the regulator rendering it less useful.

ELECTRICAL ACCESSORIES

In some cases, it may be found that car accessories such as electric heaters, lighters, automatic relays, or gauges, may cause interference while in operation. Proper procedure in such cases is to try another by-pass condenser from ground to the suspected accessory until the source of the interference is found. The condenser then should be permanently mounted in this location.

HIGH AND LOW TENSION LEADS

Considerable ignition interference is experienced from leads in cables that run along the inside of the fire wall near the auto radio. For example, the battery lead to the low voltage side of the ignition coil on a 1950 Model Oldsmobile '88' runs through the fire wall and along the inside past the auto radio to a point beyond the steering column. This lead has heavy radiation. It can be disconnected at the ignition coil and pulled through the fire wall and pushed back through the fire wall at a point to the left of the steering column and run along the outside to its original point of connection on the ignition coil. Such types of leads should be watched for in all installations. They should be rerouted, if possible, or shielded with braid material. It is advisable in extreme cases to bond all leads by wrapping braid around them, and grounding the braid at the closest point. In wrapping a braid around a lead, do not remove the insulation from the leads as this is a radiation type of shield. Keep all ground leads as short as possible, or they will pick up interference.

IGNITION COILS

In cars where the ignition coil is located on the back side of the instrument panel it is often necessary to use an additional condenser. It must be installed from the battery side of the ignition coil to the closest ground on the instrument panel.

Short leads are very important. Where coils are mounted either on the instrument panel or in the driver's compartment, it may be necessary to shield the high tension lead from the coil to the distributor.

WHEEL STATIC

Wheel Static is a form of interference caused by the rotation of the front wheels of the car, and it is, of course, only noticed when the car is in motion. If this form of interference is present it can be eliminated by installing wheel static collector springs between the inner hub cap and the spindle shaft.

Bonding of Ungrounded Engine and Body Parts

The best rule is to keep the ignition interference underneath the hood as much as possible. This is best accomplished by using filters and suppressors on all points that would produce radiation as well as effectively bonding the hood, motor block, and any engine and body parts that are isolated from each other. It would be advisable to check all bolt-on fenders on which antennas are mounted, in that these fenders frequently are not sufficiently well grounded to the rest of the car. Use bonding braid wherever necessary to ground such fenders. Use wide bonding braid and keep all such braid as short as possible. Bonding all cables and tubes that go through the fire wall is necessary in some cases.

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ELECTRICAL SPECIFICATIONS

| | |
|----------------------|-----------------------------------------------|
| Power Supply..... | 6.3 volts DC |
| Current..... | 5.1 amp. average |
| Frequency Range..... | 535 to 1605 KC |
| I. F. Frequency..... | 455 KC |
| Speaker..... | 4" x 6" P.M. |
| Power Output..... | 1.25 watts, undistorted 2 watts, maximum |
| Sensitivity..... | 5 microvolt average for 1 watt output |
| Selectivity..... | .44KC broad at 1000 times signal at 1000KC |

The set contains the following:

- 1—6BA6—R.F. Amplifier.
 - 1—6BE6—Converter.
 - 1—6BA6 or 6AU6—I.F. Amplifier.
 - 1—6AT6 or 6AV6—Detector—1st audio—AVC.
 - 1—6AQ5—Power Output.
-
- 1—6X5—Rectifier.

SERVICE NOTES

Voltages taken at the various points of the circuit to chassis are measured with the volume control in maximum position, all tubes and the rectifier in their sockets and no signal applied. The voltages are shown on the schematic diagram (Fig. 12) and were measured with a Vacuum Tube Voltmeter. An input voltage of 6.6 volts D.C. should always be used when checking voltages.

ALIGNING INSTRUCTIONS

Never attempt any adjustments on this receiver unless it becomes necessary to replace the coils or transformer, or if the adjustments have been tampered with in the field. Always make certain that other circuit components, such as tubes, the rectifier, condensers, resistors, etc., are normal before proceeding with realignment.

If realignment is necessary follow the instructions given under the heading "ALIGNMENT PROCEDURE." After realignment has been completed repeat the procedure as a final check.

INSTRUCTIONS FOR REMOVING THE CHASSIS FROM THE CASE

Remove the two control knobs by pulling them straight from their shafts. Remove the cover. It is held in place by nine (9) screws; four (4) on each side and one at the back. Remove the four (4) screws, two (2) on each side which hold the chassis in place. Now to remove the chassis, hold the case with one hand, grasp the chassis by the power transformer, lift up and pull back and the chassis will slide out.

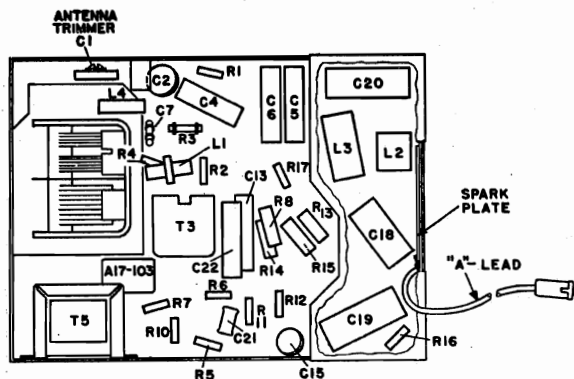


Fig. 10 Chassis—Bottom View

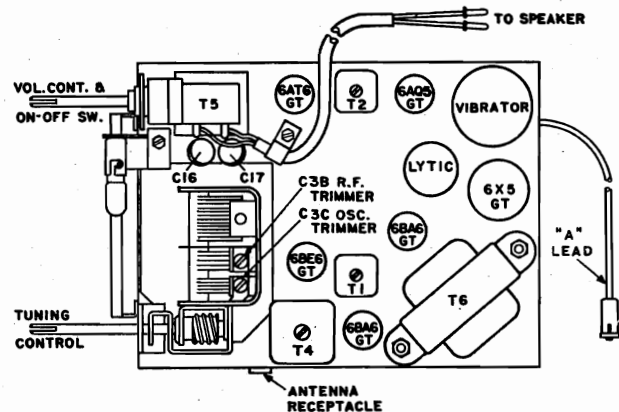


Fig. 11. Chassis—Top View

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6287, Ch. 528.6287

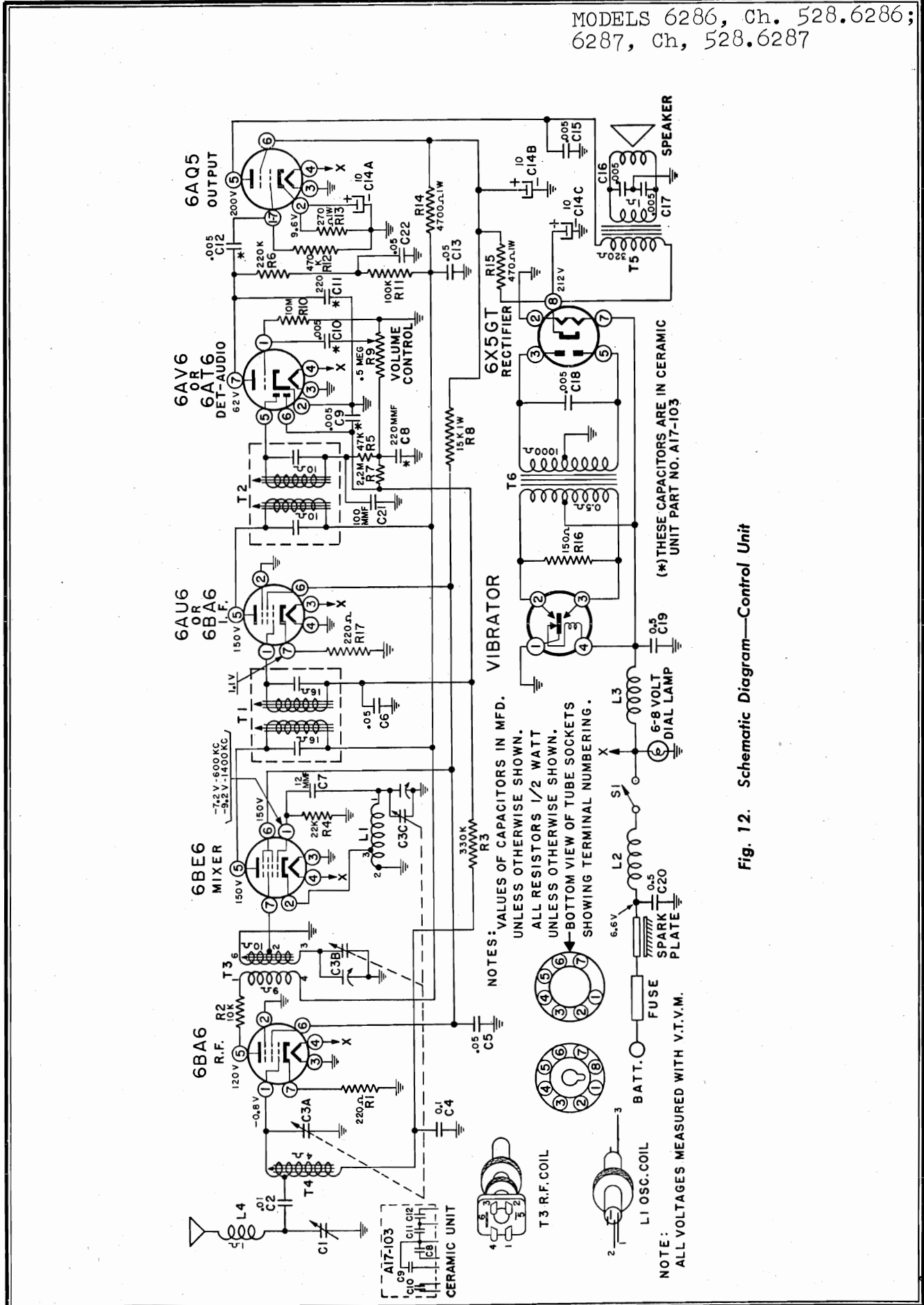


Fig. 12. Schematic Diagram—Control Unit

MODELS 6286, Ch. 528.6286;
6287, Ch. 528.6287

ALIGNMENT PROCEDURE

The following equipment is necessary for proper alignment:
 Signal generator that will provide the test frequencies as listed, modulated 400 cycles, 30%.
 Non-metallic screwdriver.
 Output meter. (1.8 volt for 1 watt output.)
 Dummy antennas—.1 MFD., 75 MMFD., 30 MMFD.
 For alignment points refer to Figures 10 and 11.

Volume control—Maximum, all adjustments.
 No signal applied to antenna.
 Power input—6.6 volts.
 Connect dummy antenna in series with output lead of signal generator.
 Connect output meter across voice coil.
 Connect ground lead of signal generator to chassis.
 Repeat alignment procedure as a final check.

| Gang Position | Generator Frequency | Dummy Antenna | Generator Connections | Trimmer Reference | Trimmer Adjustment | Trimmer Function |
|---------------------------------|---------------------|---------------|-----------------------|--------------------|--------------------|------------------|
| 1—Fully Open | 455KC | .1 MFD | 6BE6 GRID (Pin 7) | T2 Top & bottom | Maximum | Output I.F. |
| 2—Fully Open | 455KC | .1 MFD | 6BE6 GRID (Pin 7) | T1 Top & bottom | Maximum | Input I.F. |
| 3—Fully Open | 1605KC | * | Antenna Input | C3C (Trimmer) | Maximum | Oscillator |
| 4—Tune in Signal from Generator | 1400KC | * | Antenna Input | C3B (Trimmer) | Maximum | R.F. |
| 5—Tune in Signal from Generator | 1400KC | * | Antenna Input | C1 | Maximum | Antenna |
| 6—Tune in Signal from Generator | 600KC | * | Antenna Input | T4 | Maximum | R.F. |
| 7—Tune in Signal from Generator | 600KC | * | Antenna Input | T3 | Maximum | Antenna |

Repeat steps 5 through 7 until adjustment is correct at both 600KC and 1400 KC.
 *30 MMFD across input terminals and 75 MMFD in series with "hot" side of generator leads.

MODELS 6286, Ch. 528.6286;
6287, Ch. 528.6287

PARTS LIST

| Schematic Location | Part Number | Description | Schematic Location | Part Number | Description |
|-----------------------|-------------|---------------------------------------------------------|--------------------|-------------|-----------------------------------------------|
| | 84-233 | "A" lead assembly | R7 | 60-726 | Resistor, 2.2 megohm, 1/2 W. |
| | 11-373 | Clamp—"A" lead | R8 | 60-716 | Resistor, 15K ohm, 1 W. 10% |
| | 11-380 | Clamp—Speaker leads | R10 | 60-728 | Resistor, 10 megohm, 1/2 W. |
| | 83-421 | Clip—I.F. Transformer mounting | R11 | 60-727 | Resistor, 100K ohm, 1/2 W. |
| L1 | 10-569 | Coil—Oscillator | R12 | 60-731 | Resistor, 470K ohm, 1/2 W. |
| L2 | 33-229 | Coil—"A" line choke | R13 | 60-754 | Resistor, 270 ohm, 1 W. 10% |
| L3 | 33-234 | Coil—Vibrator hash choke | R14 | 60-765 | Resistor, 4700 ohm, 1 W. 10% |
| L4 | 10-527 | Coil—Antenna noise choke | R15 | 60-694 | Resistor, 470 ohm 1 W. 10% |
| C1 | 20-150 | Capacitor, antenna trimmer | R16 | 60-767 | Resistor, 150 ohm, 1/2 W. 10% |
| C2 | 15-211 | Capacitor, ceramic—.01—600 V. | | 83-646 | Retainer, dial scale—left |
| C3A, C3B, C3C | 19-211 | Capacitor, variable (3 gang) | | 83-647 | Retainer, dial scale—right |
| C4 | 16-203 | Capacitor, .1 mfd.—200 V. 85°C | | 83-516 | Retainer, vibrator |
| C5, C6, C13 | 16-189 | Capacitor, .05 mfd.—400 V. 85°C | | 75-84 | Shaft—tuning, chassis 528.6286 |
| C7 | 15-205 | Capacitor, ceramic—12 mmfd. | | 75-86 | Shaft—tuning, chassis 528.6287 |
| C8, C9, C10, C11, C12 | 17-103 | Capacitor, ceramic unit | | 70-172 | Sleeve—rubber—tuning shaft |
| C14A, C14B, C14C | 18-303 | Capacitor, electrolytic-10-10 mfd. 250 V. 10 mfd. 25 V. | | 81-13 | Sleeve—fuse |
| C15, C16, C17 | 16-177 | Capacitor, ceramic—.005 mfd. | | 68-39 | Socket—miniature—wafer |
| C18 | 16-185 | Capacitor, .005 mfd.—1600 V. oil filled | | 68-11 | Socket—octal—wafer |
| C19 | 16-215 | Capacitor, .5 mfd.—100 V. 85°C | | 68-33 | Socket—vibrator |
| C20 | 16-214 | Capacitor, .5 mfd.—100 V. 100°C | | 87-46 | Socket & bracket—pilot lamp, chassis 528.6286 |
| C21 | 15-196 | Capacitor, ceramic—100 mmfd. | | 87-37 | Socket—pilot lamp, chassis 528.6287 |
| C22 | 16-197 | Capacitor, .05 mfd.—200 V. 85°C | | 77-135 | Spacer—variable condenser mounting |
| R9, S1 | 24-192 | Control—volume, 500 K Chassis 528.6286 | | 79-390 | Speaker—"4" x 6" P.M. |
| R9, S1 | 24-193 | Control—volume, 500K chassis 528.6287 | | 70-173 | Spring—dial cord, chassis 528.6286 |
| | 67-559 | Dial scale | | 70-174 | Spring—dial cord, chassis 528.6287 |
| | 43-10 | Fuse—15 amp.—3AG | | 88-163 | Sticker—schematic |
| 47-112 | 47-112 | Grommet—Variable condenser mounting | | 88-175 | Sticker—tube location, chassis 528.6287 |
| 52-326 | 52-326 | Knob, volume and tuning | | 88-164 | Sticker—tube location, chassis 528.6286 |
| | 89-7 | Lamp—pilot—No. 47 Bayonet | | 88-179 | Sticker—parts list, chassis 528.6287 |
| | 56-146 | Nut—knurled—control shafts | | 88-166 | Sticker—parts list, chassis 528.6286 |
| 31-180 | 31-180 | Plate—dial backing, chassis 528.6286 | | 31-185 | Strap—rear mounting |
| 31-182 | 31-182 | Plate—dial backing, chassis 528.6287 | | 51-109 | String—pointer drive—"12" |
| 45-129 | 45-129 | Plug—speaker leads | | 84-509 | Suppressor Kit |
| 22-153 | 22-153 | Plugbutton—antenna trimmer hole | | 96-4 | Suppressor resistor—10K ohm |
| | 58-84 | Pointer | T1 | 10-521 | Transformer—1st I.F. |
| | 87-38 | Receptacle—antenna | T2 | 10-529 | Transformer—2nd I.F. |
| R1, R17 | 60-753 | Resistor, 220 ohm, 1/2 W. 10% | T3 | 10-570 | Transformer—R.F. |
| R2 | 60-760 | Resistor, 10K ohm, 1/2 W. 10% | T4 | 10-568 | Transformer—antenna |
| R3 | 60-661 | Resistor, 330K ohm, 1/2 W. | T5 | 80-267 | Transformer—output |
| R4 | 60-744 | Resistor, 22K ohm, 1/2 W. 10% | T6 | 80-266 | Transformer—power |
| R5 | 60-730 | Resistor, 47K ohm, 1/2 W. | | 34-105 | Vibrator |
| R6 | 60-667 | Resistor, 220K ohm, 1/2 W. | | | |

IMPORTANT: All tubular condensers must be high temperature (85°C.) wax type.

MODELS 1U338-I, 1U338-R,
1U338-W, 338-I, 338-R,
338-W

OPERATION AND SERVICE INSTRUCTIONS

FOR

MODELS 338-W, 338-I, 338-R,
1U338-W, 1U338-I, 1U338-R,
AC-DC SUPERHETERODYNE RECEIVER

VOLTAGE RATING

THIS RADIO IS DESIGNED FOR USE ON EITHER:
110-120 VOLTS 50-60 CYCLES ALTERNATING CURRENT (AC)
OR
110-120 VOLTS DIRECT CURRENT (DC)

SPECIAL INSTRUCTIONS FOR "DIRECT CURRENT" OPERATION:

If the current supply is DIRECT CURRENT, and the radio does not play after it has been turned on for approximately one minute, simply reverse radio power cord plug in electric power receptacle.

LOOP AERIAL

THE LOOP AERIAL SUPPLIED with the radio should provide ample reception in average locations.

Loop aerials are directional—the volume of a weak station may be improved, or undesired electrical noise may be reduced, by lifting and turning the radio to a different position. A trial will reveal position of best reception with least interference.

FUNCTION OF CONTROLS ON RADIO

THE LEFT HAND KNOB controls the volume control and off-and-on switch.

THE RIGHT HAND KNOB is the station selector.

OPERATING INSTRUCTIONS

PLACE VOLUME CONTROL KNOB IN one-half to maximum volume position.

TURN TUNING CONTROL KNOB until the desired station is heard with greatest volume and clearest tone.

MODELS 1U338-I, 1U338-R,
1U338-W, 338-I, 338-R,
338-W

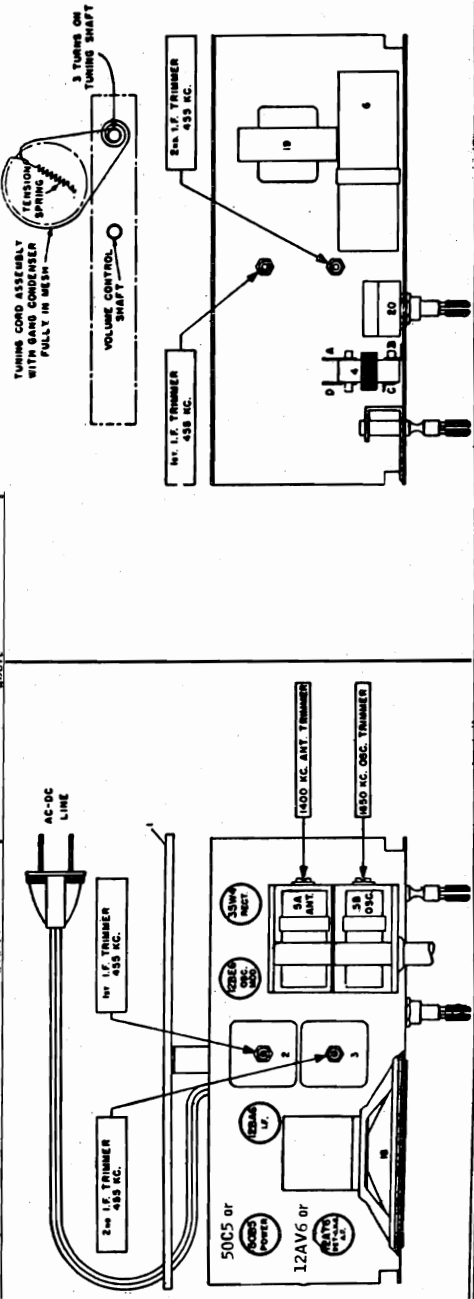
ALIGNMENT PROCEDURE

For alignment procedure read tabulations from left to right, and make the adjustment marked (1) first, (2) next, (3) third.
Before starting alignment:

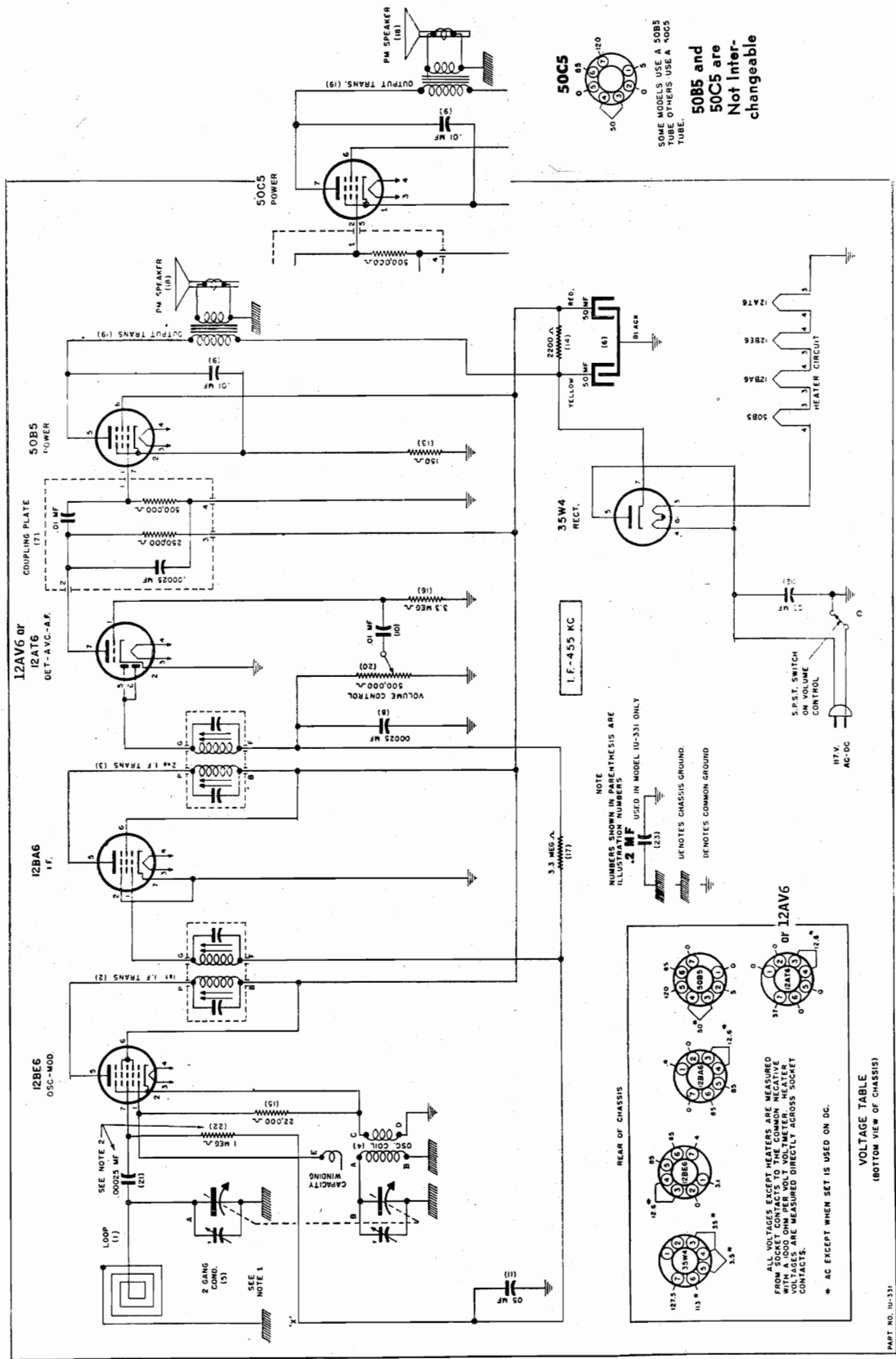
- (A) Check tuning dial adjustment by tuning gang condenser until plates touch maximum capacity stop (completely in mesh) at which point the dial needle must be exactly even with the last line at the low frequency end of the dial calibration. If dial needle does not point exactly to last line move to correct position.
- (B) Use an accurately calibrated test oscillator with some type of output measuring device.
- (C) **WHEN ADJUSTING THE 1650 KC OSCILLATOR TRIMMER**, remove chassis from cabinet and disconnect the loop connection wires from the loop. Attach a 1 megohm resistor across these connections and feed output of test oscillator across the 1 megohm resistor.
- (D) **THE 1400 KC LOOP ANTENNA TRIMMER** should be adjusted only after all other adjustments have been made. **PLACE LOOP ANTENNA IN THE SAME POSITION IT WILL BE IN WHEN THE SET IS IN THE CABINET — APPROXIMATELY 5/8" SPACE BETWEEN LOOP AND CHASSIS.**

When aligning the 1400 KC Antenna Trimmer, couple test oscillator to receiver loop by: (1) make loop consisting of five to ten turns of No. 20 to No. 30 size wire, wound on a 2" or 3" form; (2) connect this loop across output of test oscillator; (3) place test oscillator loop near radio loop. **BE SURE THAT NEITHER LOOP MOVES WHILE ALIGNING.**

| Steps | Set receiver dial to: | Adjust test oscillator frequency to: | Use dummy antenna in series with output of test oscillator consisting of: | Attach output of test oscillator to: | Refer to parts layout diagram for location of trimmers mentioned below: |
|-------|----------------------------------------------------|--------------------------------------|---------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Any point where no interfering signal is received. | 155 K. C. | .02 MPFD. condenser | High slide to rear stator plates of tuning condenser. Low slide to common negative on 1U338 or to frame of condenser on 338, through a .02 MPFD. blocking condenser. | Adjust each of the second I.F. transformer trimmers for maximum output then adjust each of the first I.F. trimmers for maximum output. |
| 2 | Exactly 1650 K. C. | Exactly 1650 K. C. | See paragraph (C) above | See paragraph (C) above | Adjust 1650 K. C. oscillator trimmer for maximum output. |
| 3 | Approx. 1400 K. C. | Approx. 1400 K. C. | See paragraph (D) above | See paragraph (D) above | Adjust 1400 K. C. antenna trimmer for maximum output. |

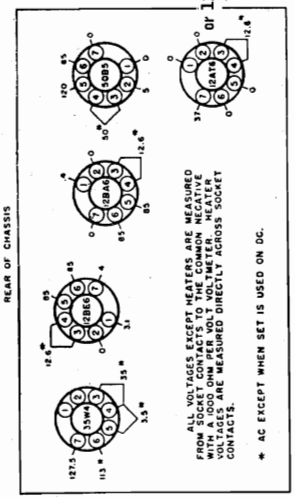


MODELS 1U338-I, 1U338-R,
1U338-W, 338-I, 338-R,
338-W



50C5
SOME MODELS USE A 50B5 TUBE OTHERS USE A 50C5
50B5 and 50C5 are Not Inter-changeable

NOTE
NUMBERS SHOWN IN PARENTHESIS ARE ILLUSTRATION NUMBERS
USED IN MODEL 1U-331 ONLY
Ω DENOTES CHASSIS GROUND
Ω DENOTES COMMON GROUND



VOLTAGE TABLE
(BOTTOM VIEW OF CHASSIS)

ALL VOLTAGES EXCEPT HEATERS ARE MEASURED FROM SOCKET CONTACTS TO CHASSIS GROUND. HEATER VOLTAGES ARE MEASURED DIRECTLY ACROSS SOCKET CONTACTS.
* AC EXCEPT WHEN SET IS USED ON DC.

NOTE 1: Connected as shown in Model 1U338 only. Loop return connected to A.V.C. at point X in Model 338.
NOTE 2: Items with illustration numbers (21) and (22) used in 1U338 only. Loop and gang connected directly to pin #7 on 12BE6 in Model 338.

MODELS 1U338-I, 1U338-R,
1U338-W, 338-I, 338-R,
338-W

TO SERVICE TUBES, it is necessary to remove the cabinet back by gently pulling out the two trimount studs, used to hold the back to the cabinet, and detaching the two leads from the loop.

Before remounting the back on the cabinet, be sure to properly re-connect these leads. The green-white wire must be attached to the terminal which has the word "GREEN" printed close to it.

TO REMOVE CHASSIS FROM CABINET:

(A) Remove cabinet back.

(B) Unscrew the two screws holding the chassis to the rear of the cabinet.

(C) Remove pointer by gently pulling it away from cabinet.

(D) Pull knobs off of control shafts.

(E) Unscrew and remove slotted nut on volume control shaft—accessible when knob is removed.

(F) Slide Chassis out of cabinet.

TO REINSTALL, reverse the above procedure. DO NOT tighten nut too much—otherwise, cabinet may crack.

PARTS LIST

| Illus. No. | Part No. | Part Name | Description |
|------------|-----------|-----------|---------------------------------------|
| 1 | 64E33 | Antenna | Loop and cabinet back |
| 2 | 20E402 | Coil | 1st I. F. Transformer |
| 3 | 20E402 | Coil | 2nd I. F. Transformer |
| 4 | 20E333 | Coil | Oscillator |
| 4 | 20E346 | Coil | Oscillator (used in 1U338 only) |
| 5 | 24E45 | Condenser | Two Gang, Tuning |
| 6 | 25E24 | Condenser | Dry Electrolytic, 50-50 Mfd. 150 Volt |
| 7 | 23E2041-2 | Condenser | Ceramic, Coupling Plate |
| 8 | 23E42 | Condenser | Mica, .00025 Mfd. 500 V. |
| | OR | | |
| 8 | 23E2027 | Condenser | Ceramic, .00025 Mfd. 500 V. |
| 9 | 23E411 | Condenser | Tubular, .01 Mfd. 400 V. |
| 10 | 23E211 | Condenser | Tubular, .01 Mfd. 200 V. |

| Illus. No. | Part No. | Part Name | Description |
|------------|----------|----------------|--------------------------------------------------|
| 11 | 23E216 | Condenser | Tubular, .05 Mfd. 200 V. |
| 12 | 23E416 | Condenser | Tubular, .05 Mfd. 400 V. |
| 13 | 27E151 | Resistor | Carbon, 150 Ohm, 1/3 W. |
| 14 | 27E222-3 | Resistor | Carbon, 2200 Ohm, 1 W. |
| 15 | 27E223 | Resistor | Carbon, 22,000 Ohm, 1/3 W. |
| 16 | 27E335 | Resistor | Carbon, 3.3 Megohm, 1/3 W. |
| 17 | 27E335 | Resistor | Carbon, 3.3 Megohm, 1/3 W. |
| 18 | 1E32 | Speaker | 3 1/2" P.M. |
| 19 | 22E49 | Transformer | Output |
| 20 | 28E27 | Volume Control | 500,000 Ohm, with Switch |
| 21 | 23E2027 | Condenser | Ceramic, .00025 Mfd. 500 V. (used in 1U338 only) |
| 22 | 27E105 | Resistor | Carbon, 1 Megohm, 1/3 W. (used in 1U338 only) |
| 23 | 23E2021 | Condenser | Tubular, .2 Mfd. 400 V. (used in 1U338 only) |

IMPORTANT: When ordering complete cabinet or cabinet parts, be sure to mention required color in addition to part number.

MISCELLANEOUS PARTS

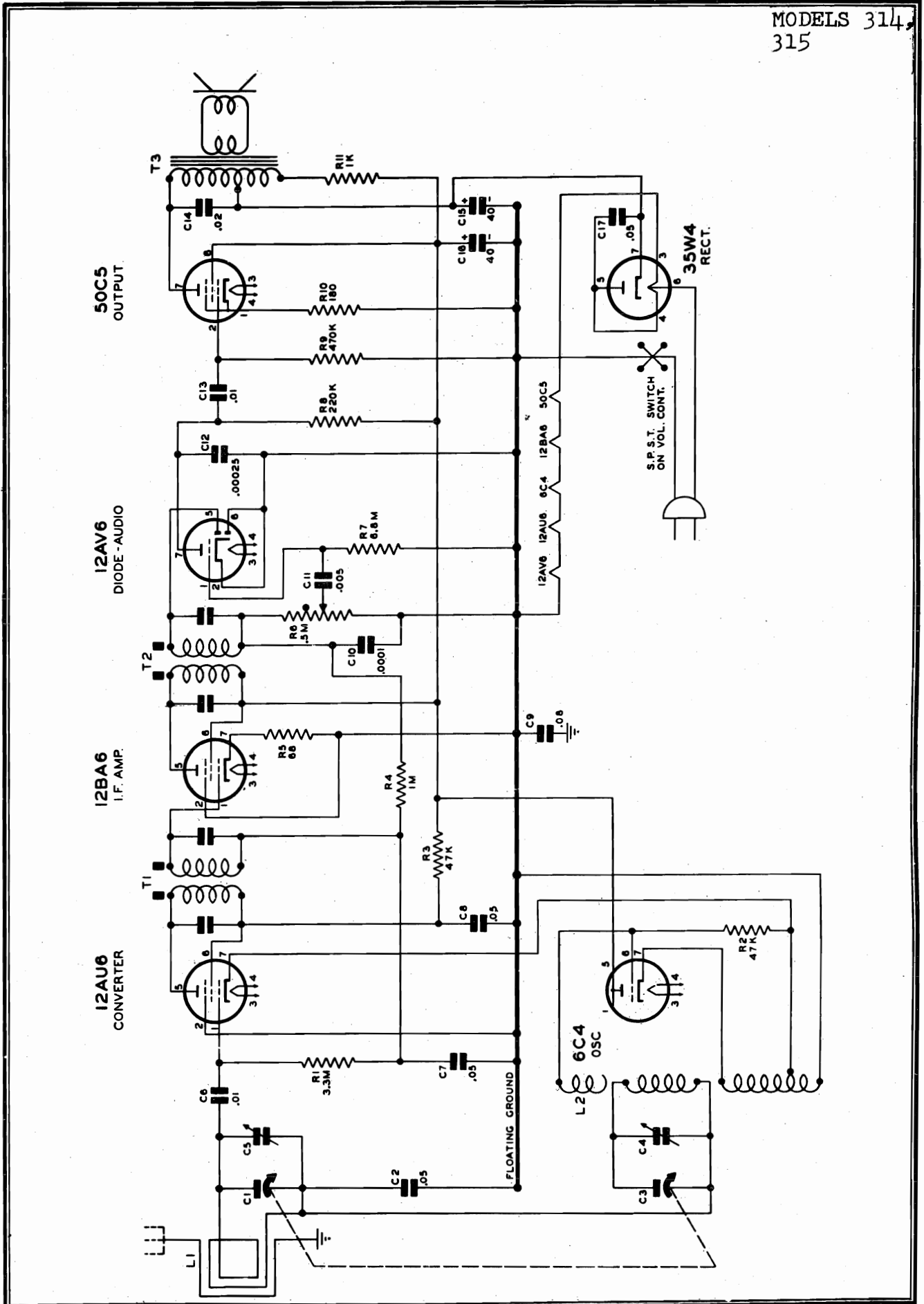
| Part No. | Part Name | Description |
|-----------|---------------------|-------------------------------|
| 7E248 | Cabinet | Walnut Plastic |
| 7E248-2 | Cabinet | Ivory Plastic |
| 7E248-3 | Cabinet | Red Plastic |
| 41E14 | Line Cord | 5 Ft. Rubber Line Cord |
| 20E253-25 | Dial Cord | Dial Drive Cord |
| 20E348-3 | Dial Shaft Assembly | Dial Drive Shaft with Bracket |
| 35E29 | Dial Pointer | Dial Indicator |

| Part No. | Part Name | Description |
|----------|----------------------|----------------------------------------------------------|
| 33E99 | Pointer Insulator | Plastic, used to mount and insulate Pointer from Chassis |
| 13E103-8 | Pointer Tension Clip | Tension Spring for 33E99 Pointer Insulator |
| 65E2 | Dial Spring Knob | Tension Spring for Dial Cord |
| 37E52-15 | Knob | For Walnut Cabinet |
| 37E52-16 | Knob | For Ivory and Red Cabinet |
| 20E612 | Speaker Baffle | Baffle Assembly with Grille Cloth |

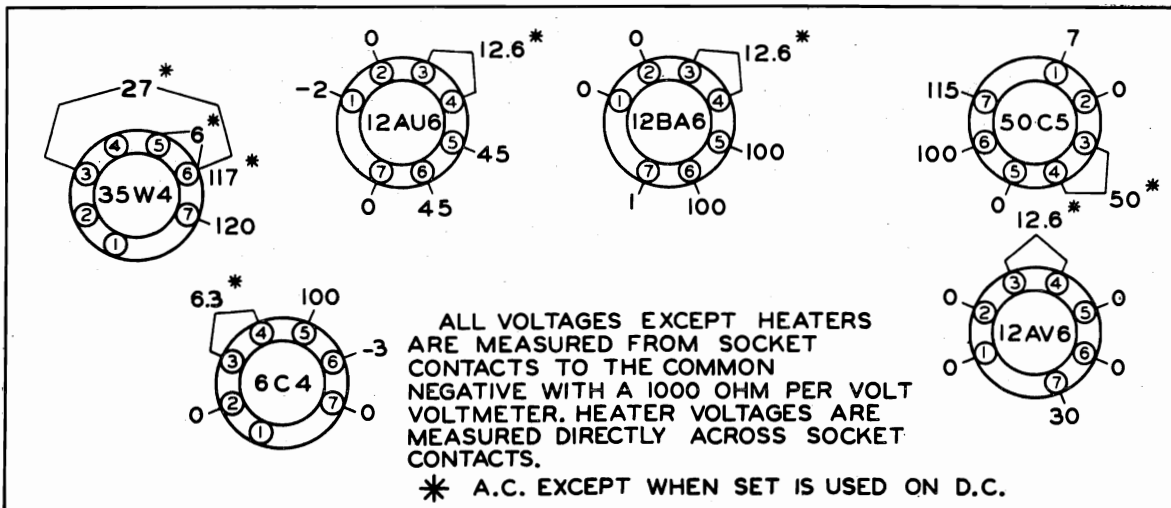
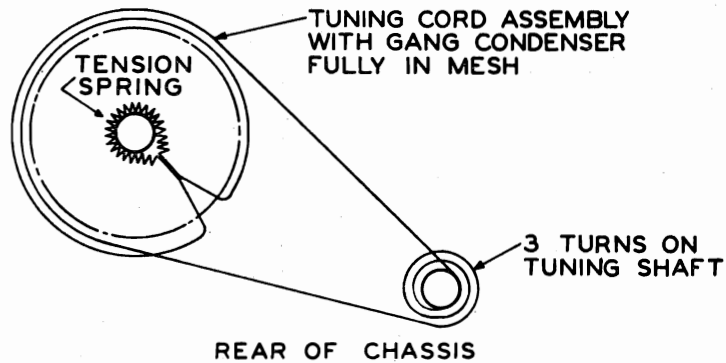
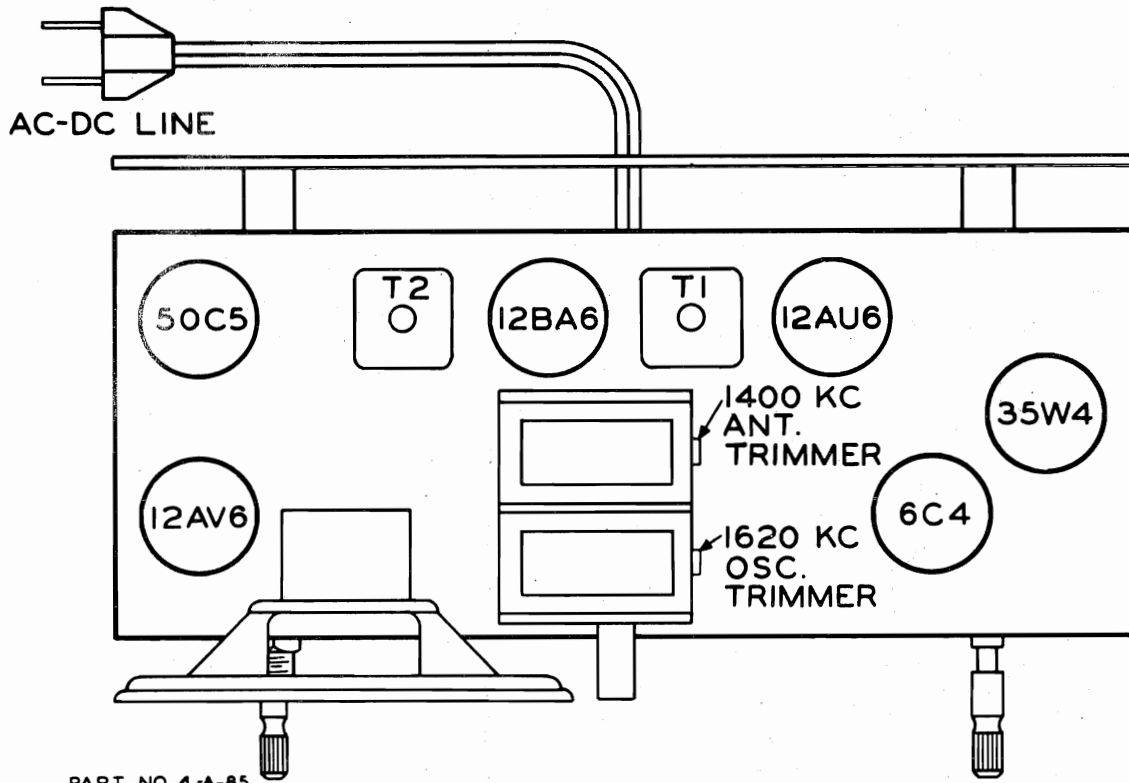
MOUNTING HARDWARE

| Part No. | Part Name | Description |
|-----------|-----------|-------------------------------------------------------------|
| 10E42 | Stud | Trimount Stud for mounting Loop and Cabinet Back to Cabinet |
| 82E37-F10 | Screw | Recessed 6-20 x 3/8 holds Chassis in Cabinet |

| Part No. | Part Name | Description |
|----------|-----------|-----------------------------------------------|
| 19E29 | Nut | Slotted Head, used to hold Chassis in Cabinet |



MODELS 314,
315



VOLTAGE TABLE
(BOTTOM VIEW OF CHASSIS)

ALIGNMENT PROCEDURE

For alignment procedure read tabulations from left to right and make the adjustments marked (1) first, (2) next, (3) third.

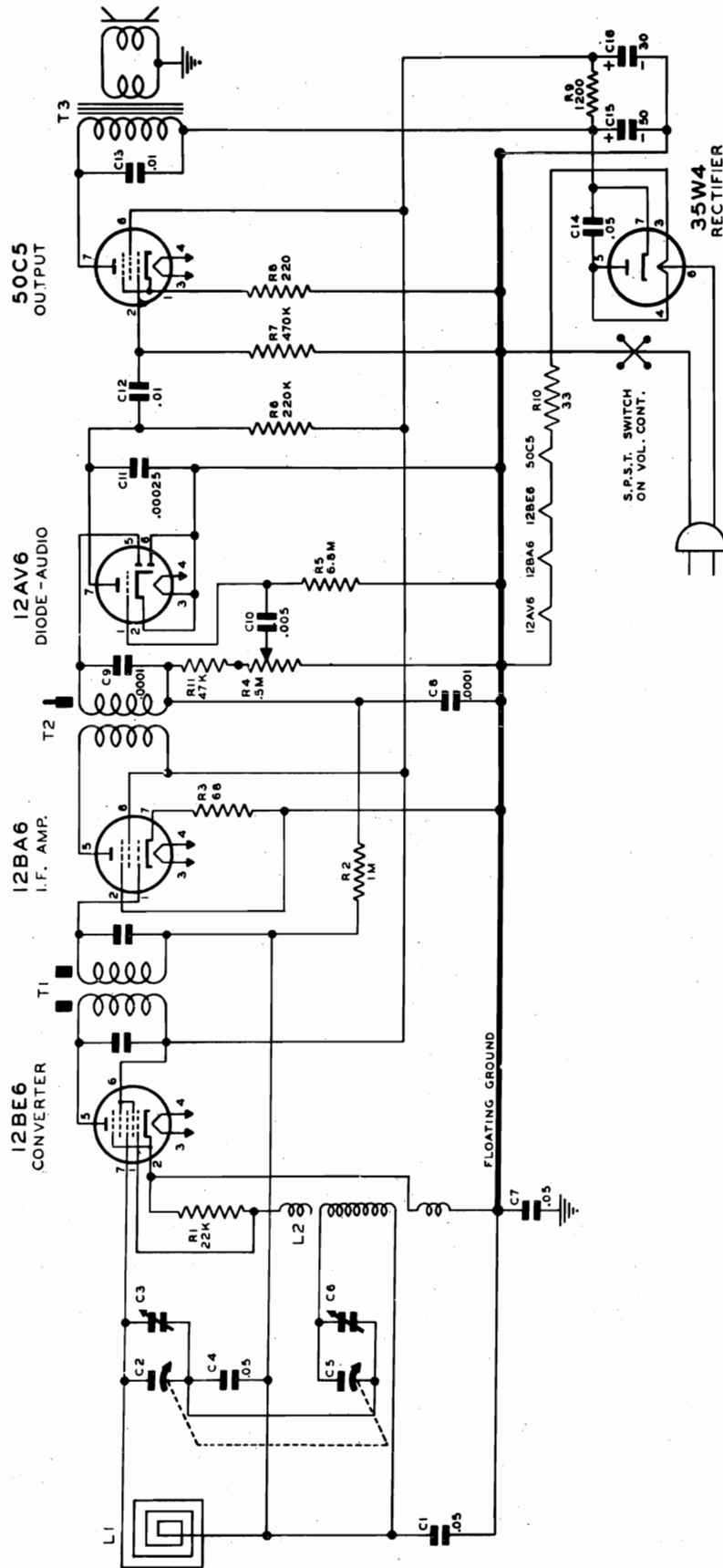
Before starting alignment:

(A) Remove the chassis and loop antenna from the cabinet at the same time. To accomplish this, remove the two fasteners holding the top of the back to the cabinet and remove the two screws on the rear apron of the chassis which fasten the chassis to the cabinet.

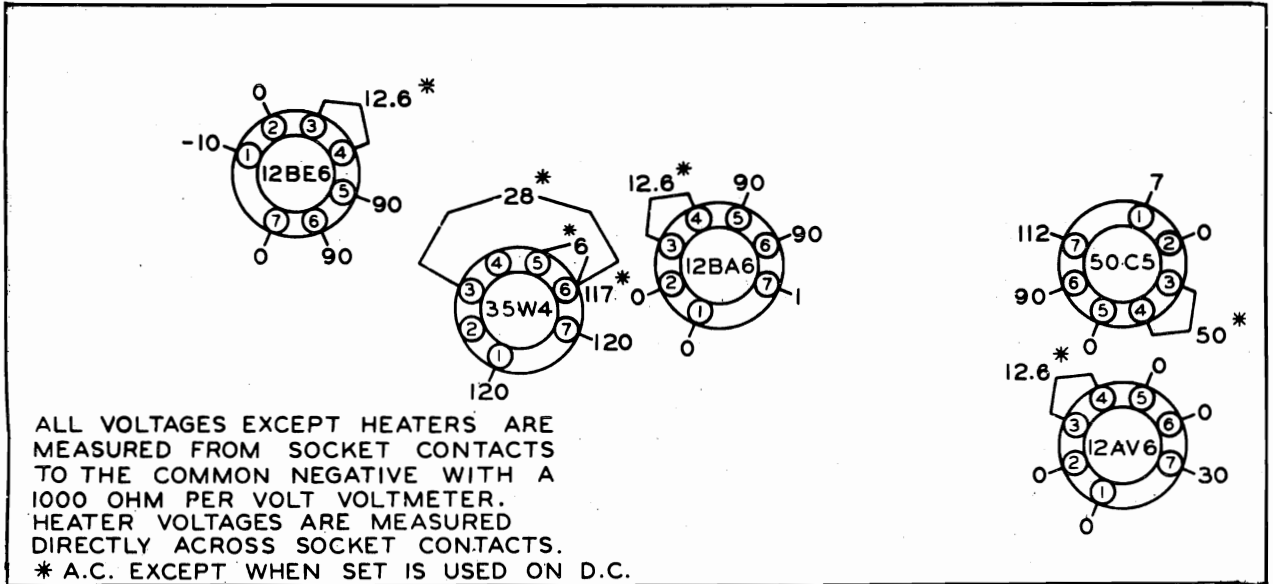
(B) Use an accurately calibrated test oscillator with some type of output measuring device.

| STEP | Set Receiver dial to: | TEST OSCILLATOR | | DUMMY ANTENNA | ADJUSTMENT |
|------|----------------------------------------------------|--------------------------------------|------------------------------------------------------------------|---------------------|-----------------------------------------------------------------------------------------------------------------------|
| | | Adjust test oscillator Frequency to: | Attach output of test oscillator to: | | |
| 1 | Any point where no interfering signal is received. | Exactly 455 KC. | High side to grid of 12AU6 Tube. Low side to common negative. | .05 MFD Conden-ser. | Adjust slugs at top and bottom of 2nd. I.F. (T2) and then each of the slugs of the 1st. I.F. (T1) for maximum output. |
| 2 | Exactly 1620 KC. | Exactly 1620 KC. | External Antenna. Blue lead on loop. | 100 MMFD Conden-ser | Adjust 1620 KC Oscillator trimmer for maximum output. |
| 3 | Approx. 1400 KC. | Approx. 1400 KC. | External Antenna. Blue lead on loop. | 100 MMFD Conden-ser | Adjust 1400 KC Antenna trimmer for maximum output. |

MODELS 316,
317, Ch. YHU

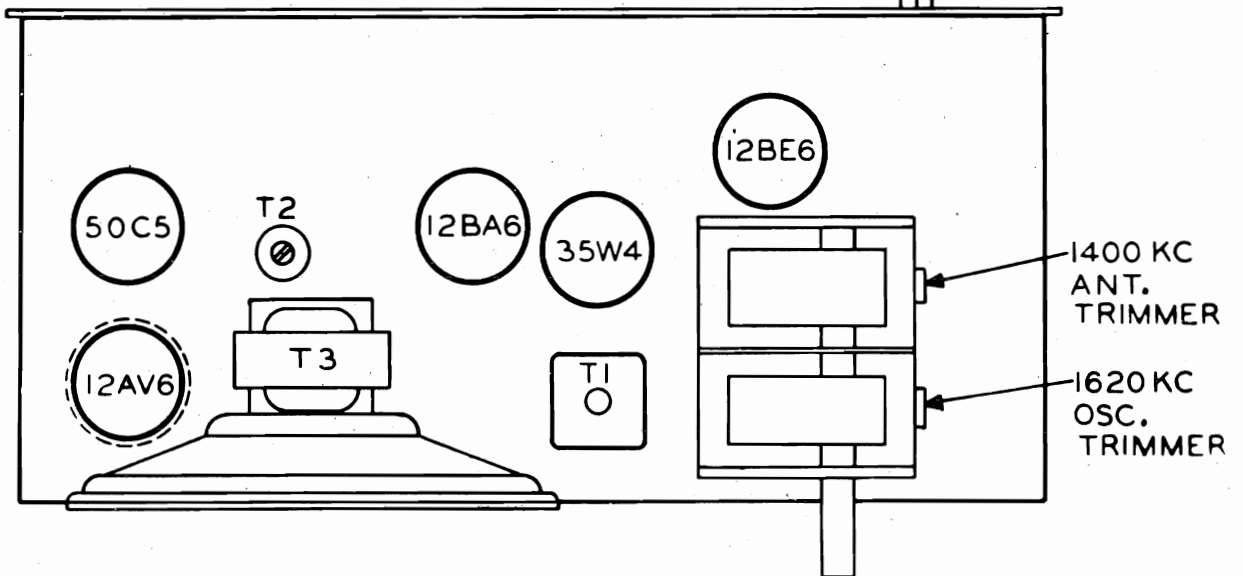
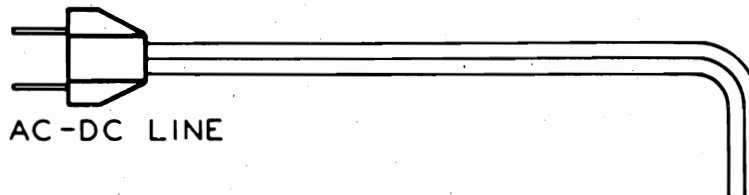


REAR OF CHASSIS



VOLTAGE TABLE
(BOTTOM VIEW OF CHASSIS)

PART NO. 4-A-90



PART NO. 4-A-90

MODELS 316, 317,
Ch. YHU, YHAU

ALIGNMENT PROCEDURE

For alignment procedure read tabulations from left to right and make the adjustments marked (1) first, (2) next, (3) third.

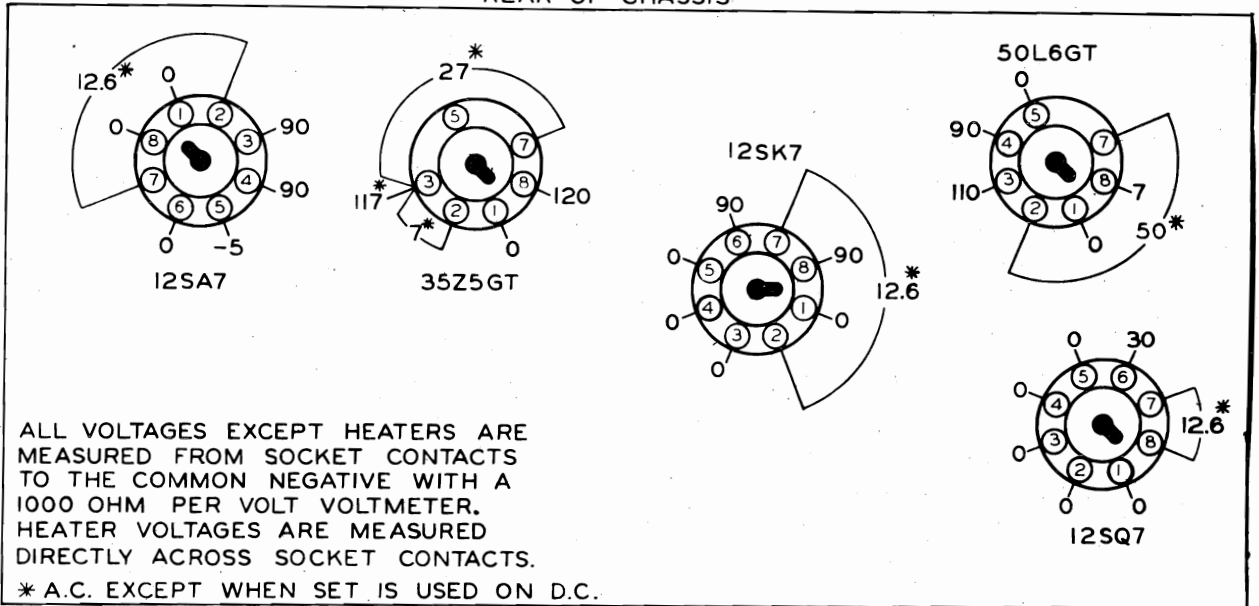
BEFORE STARTING ALIGNMENT:

- (A) Remove the chassis and loop antenna from the cabinet at the same time by removing the two screws on the rear apron of the chassis which fasten the chassis to cabinet.
- (B) Use an accurately calibrated test oscillator with some type of output measuring device.

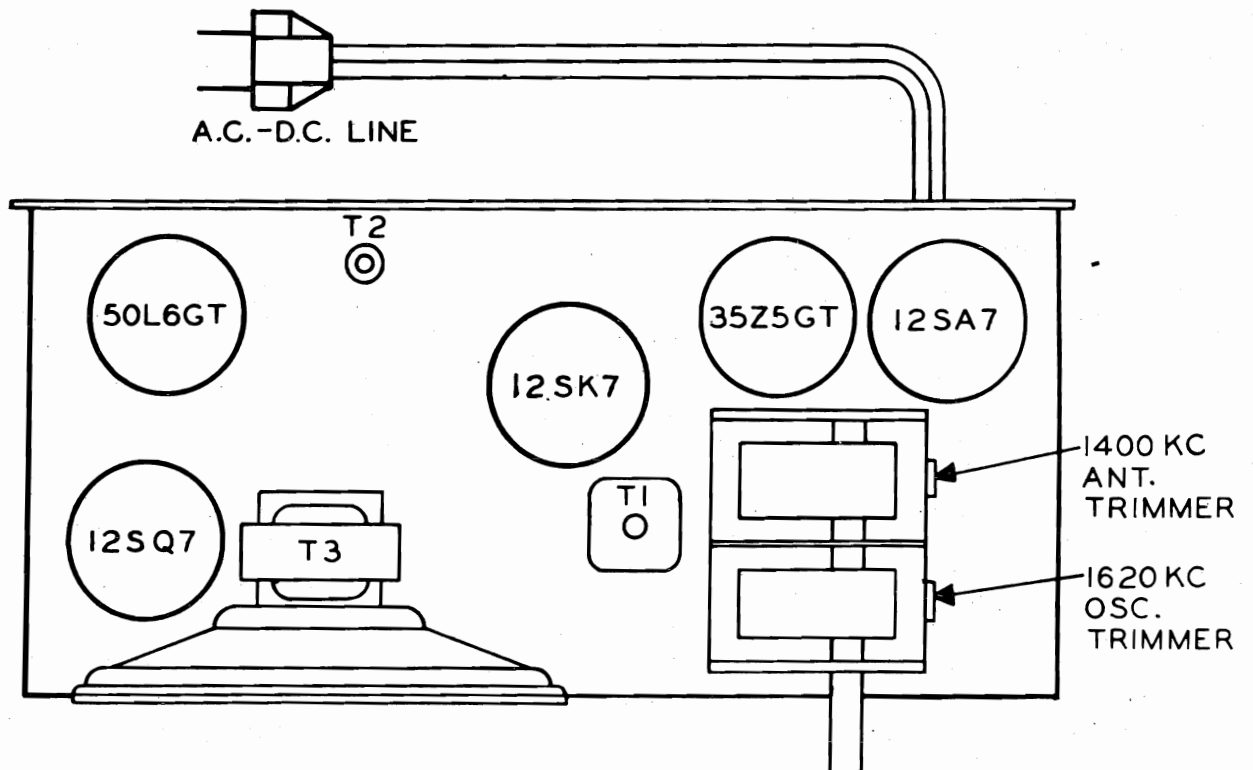
| S T E P S | Set Receiver dial to: | TEST OSCILLATOR | | Refer to parts designations in schematic drawing for trimmers mentioned below: |
|-----------|----------------------------------------------------|--------------------------------------|------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| | | Adjust test Oscillator Frequency to: | Attach Output of test oscillator to: | |
| 1 | Any point where no interfering signal is received. | EXACTLY 455 KC | High side to grid of Converter tube (*). Low side to common negative | Dummy Antenna .1 MFD CONDEN-SER Adjust 2nd. I. F. (T2) and then each of the slugs of the 1st. I.F. (T1) for maximum output. |
| 2 | Exactly 1620 KC | Exactly 1620 KC | Dummy Antenna | Adjust 1620 KC oscillator trimmer for maximum output. |
| 3 | Approx. 1400 KC | Approx. 1400 KC | Dummy Antenna | Adjust 1400 KC antenna trimmer for maximum output. |

* Insert 12AU6 for S.R. & T.C. No. YHU. Insert 12SA7 for S.R. & T.C. No. YHAU

REAR OF CHASSIS

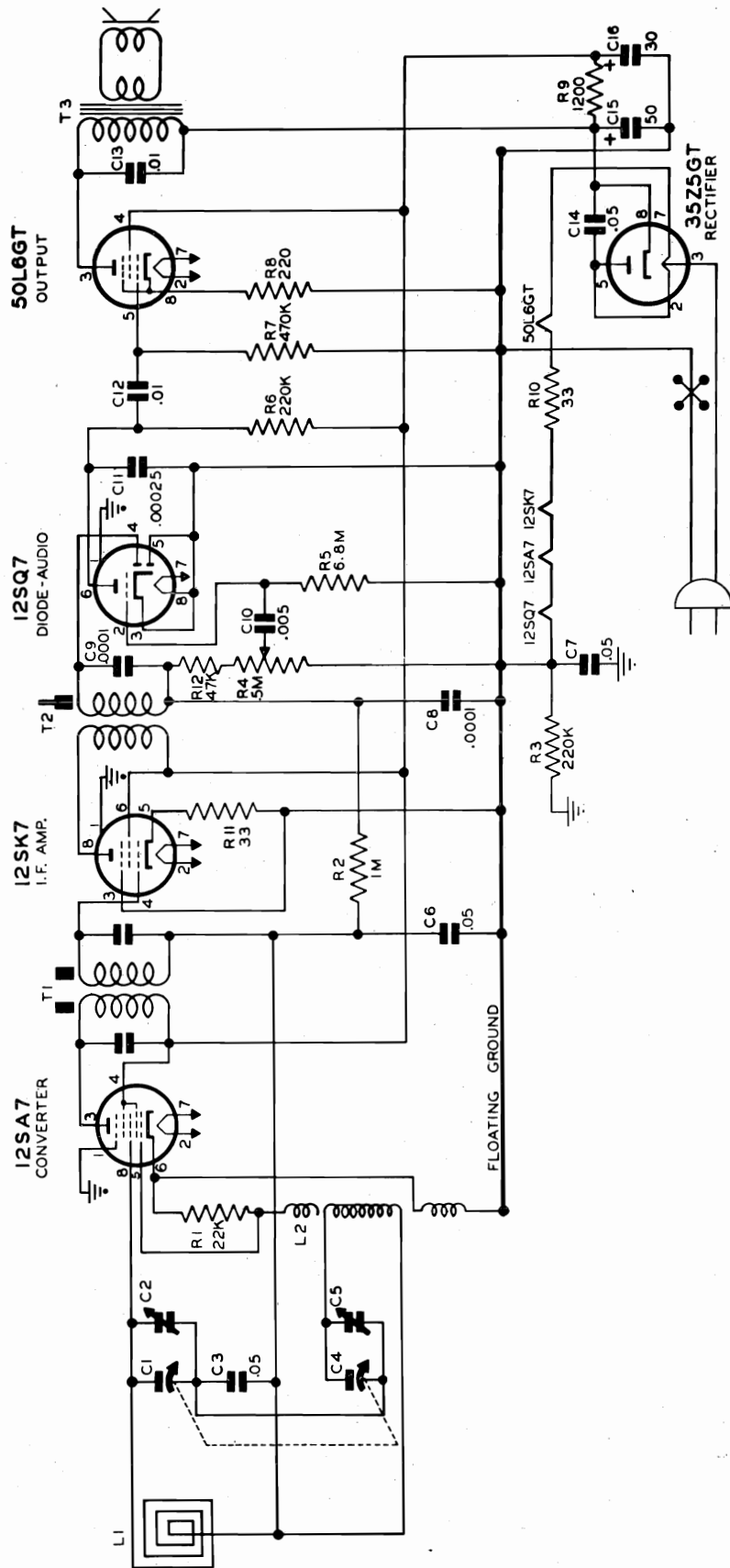


VOLTAGE TABLE
(BOTTOM VIEW OF CHASSIS)



PART NO. 4-A-90A

MODELS 316,
317, Ch. YHAU



BATTERY SUPPLIERS

The batteries for this receiver may be purchased from any reliable dealer. For proper operation this receiver requires two "A" batteries and one "B" battery. The "A" batteries are size "D" flashlight cells and are made by all battery manufacturers. The "B" battery is a 67 1/2 volt battery and is made by the following manufacturers.

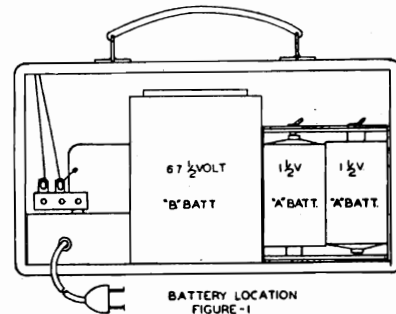
Eveready 67 1/2 vlt. #467

Furgess 67 1/2 vlt. #XX45

General 67 1/2 vlt. #W45A

Ray-O-Vac 67 1/2 vlt. #4367

Aircastle 67 1/2 vlt. #1523



BATTERY LOCATION
FIGURE-1

BATTERY SERVICING

(See Fig. No. 1)

To replace the batteries in this receiver.

Remove the back.

To the right, looking into the gear of the cabinet is the "A" or flashlight battery container. To the left is the "B" or 67 1/2 volt battery.

To replace the "A" batteries, pull the old batteries out of the container. Replace with fresh batteries, making sure the batteries are inserted according to the diagram on the inside of the container.

To replace the "B" battery, disconnect the snap fastener connectors. Replace with a fresh battery and snap the connectors into place. Replace the battery in the cabinet as shown in Fig. No. 1, making sure that the connector end faces the top of the cabinet.

After the batteries have been installed, replace the back, making sure that the two washers in the bottom of the back fit into the slot near the bottom edge of the cabinet.

ALIGNMENT AND SERVICE DATA

Remove chassis from cabinet for alignment.

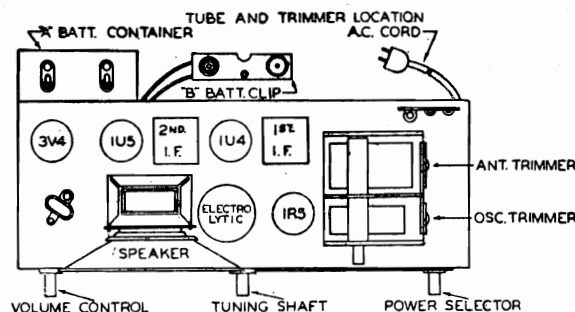
A Signal Generator is required having the following frequencies: 455 KC, 1400 KC, 1650 KC. An output meter should be connected across the speaker.

The volume control of the receiver should be turned to maximum during the I. F. and all subsequent alignment and the generator output as low as possible to prevent the A. V. C. from working and giving false readings.

FIRST STEP: Connect the hot lead from the generator to the ANT. Section of the gang condenser through a .1 MFD. condenser. The ground lead from the generator must be connected to "B" minus under the chassis. Turn the gang condenser to complete minimum capacity. Set the generator to 455 KC. Adjust the movable iron cores in the IF cans. These IF adjustments are made in the top and in the bottom of the can under the chassis. Adjust the cores until a maximum reading is noted on the output meter.

SECOND STEP: With the leads from the generator still connected in the same manner, adjust the Signal Generator to 1650 KC. Adjust the OSC. trimmer until the 1650 KC signal is tuned in. The gang condenser must be at complete minimum capacity for this adjustment.

THIRD STEP: Remove the generator leads from the gang condenser and replace the chassis in the cabinet. Loosely couple the generator to the receiver loop by making a complete turn of wire over the outside of the cabinet. With the receiver and generator set at 1400 KC, increase the generator output. Adjust the ANT. trimmer through the hole which is provided in the end of the cabinet until a maximum signal is noted on the output meter. The ANT. trimmer hole in the side of the cabinet is covered by a small plug button. Replace this button after adjustment has been made. No further adjustment should be made as the coils and gang condenser in this receiver have been specially handled at the factory to insure proper alignment at the lower frequencies.



MODEL-5022
FIGURE-2

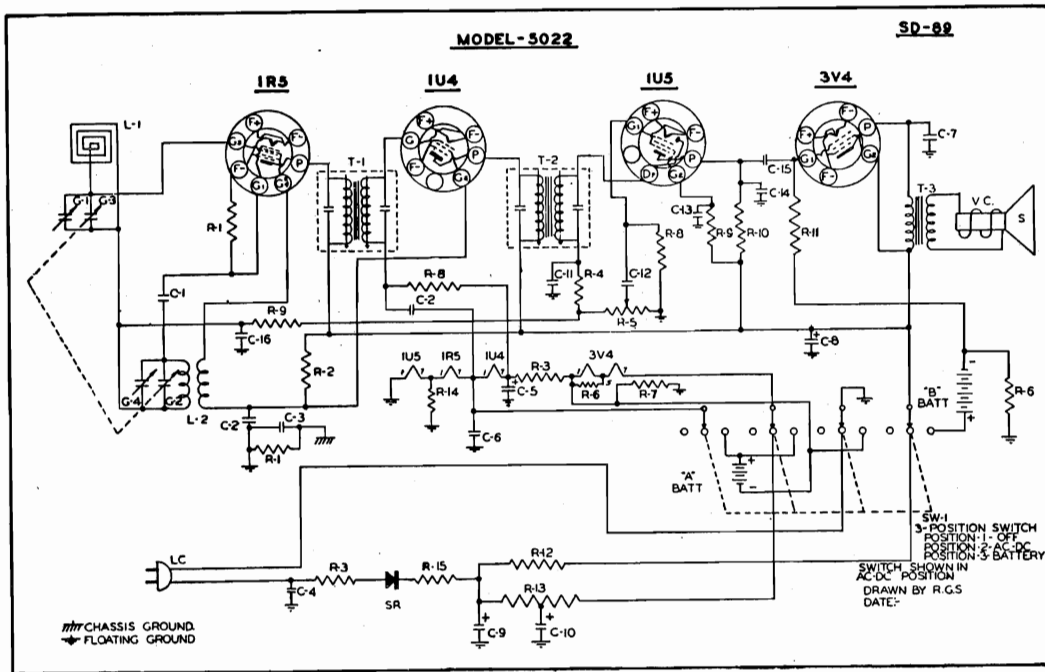
TL-89

16454-76

(5-50)

MODEL 459:5022

SCHMATIC DIAGRAM - Model No. 459.5022



PARTS LIST

| PART NO. | SCHEMATIC LOCATION | DESCRIPTION. | PART NO. | SCHEMATIC LOCATION | DESCRIPTION |
|----------|--------------------|----------------------------------|----------|--------------------|-------------------------------------|
| IR-20 | R- 1 | 220MΩ RESISTOR 1/2W 20% | | C-11 | 150MMFD. |
| IR-37 | R- 2 | 10MΩ RESISTOR 1/2W 20% | | C-12 | .002MFD. |
| IR-17 | R- 3 | 33Ω RESISTOR 1/2W 20% | MC-7 | C-13 | .005MFD. |
| IR-31 | R- 4 | 82MΩ RESISTOR 1/2W 10% | | C-14 | 100MFD. |
| VC-11 | R- 5 | MEG. VOLUME CONTROL | | C-15 | .005MFD. |
| IR-33 | R- 6 | 270Ω RESISTOR 1/2W 10% | PC-2 | C-16 | .05MFD. CONDENSER 200W.V. |
| IR-39 | R- 7 | 620Ω RESISTOR 1/2W 5% | | G-1 | ANT. TRIMMER |
| IR-3 | R- 8 | 10MEG. RESISTOR 1/2W 20% | GC-6 | G-2 | GANG CONDENSER |
| IR-23 | R- 9 | 3.3MEG. RESISTOR 1/2W 20% | | G-3 | |
| IR-12 | R-10 | 1MEG. RESISTOR 1/2W 20% | LL-23 | L- 1 | LOOP ANTENNA |
| IR-13 | R-11 | 2.2MEG. RESISTOR 1/2W 20% | LO-8 | L- 2 | OSC. COIL |
| IR-40 | R-12 | 3900Ω RESISTOR 1W 10% | SR-2 | SR | SELENIUM RECTIFIER |
| WR-7 | R-13 | 1050-1050 CANDOHM RESISTOR 5W 5% | CO-1 | LC | LINE CORD |
| IR-1 | R-14 | 470Ω RESISTOR 1/2W 20% | SW-8 | SW-1 | 4 POLE 3 POSITION SWITCH |
| IR-41 | R-15 | 47Ω RESISTOR 1W 10% | | "A"BATT. | 2 "D" SIZE FLASHLITE CELLS 1½ VOLTS |
| MC-2 | C- 1 | 100MMFD MICA CONDENSER | | "B"BATT. | 1-67½ VOLT BATTERY |
| PC-7 | C- 2 | .01MFD. CONDENSER 400W.V. | LI-5 | T-1 | INPUT IF TRANSFORMER |
| PC-8 | C- 3 | .1MFD. CONDENSER 400W.V. | LI-5 | T-2 | OUTPUT IF TRANSFORMER |
| PC-5 | C- 4 | .05MFD. CONDENSER 400W.V. | | T-3 | SPEAKER OUTPUT TRANSFORMER |
| EC-6 | C- 5 | 70MFD. 10WV ELECTROLYTIC | SPK-16 | VC | VOICE COIL |
| PC-3 | C- 6 | .1MFD. CONDENSER 200W.V. | | S | 3½" P.M. SPEAKER |
| PC-6 | C- 7 | .005MFD. CONDENSER 600W.V. | | G-4 | OSC. TRIMMER |
| | C- 8 | 40MFD. | TU-39 | — | IR5-IU4-IU5-3V4 |
| EC-14 | C- 9 | 40MFD. -150W.V. ELECTROLYTIC | | | |
| | C-10 | 20MFD. | | | |

OPERATING INSTRUCTIONS

POWER SOURCES: This combination will operate on alternating (AC) current only, of 105 to 125 volts at 60 cycles.

CAUTION: Always predetermine voltage of power source. Never try to plug this combination into a 220 volt line, this will cause serious damage. (Check your local power company if voltage is not known)

Never try to operate this combination on 50 cycle current, as this will cause the motor to rotate at an incorrect speed. The normal speed is 78 R.P.M. (revolutions per minute) and to insure proper reproduction of recordings 60 cycle current must be used.

Never plug the combination into a direct current (DC) source, this will seriously damage the motor which has been designed for AC operation only.

This receiver is equipped with a short hank of wire for an antenna and under ordinary conditions further external antenna is not required. However, in steel constructed buildings or if located some distance from station, the reception may be improved by using an outside antenna. This should be a single wire not more than 50 feet long and should be connected to the antenna lead that projects from the back of the receiver. Do not attach to Radiator or other grounded object as this can burn out the antenna coil. No ground wire is required at any time.

INSTALLATION: Unwind power cord and plug into a convenient power outlet. Follow instructions under 'controls' to operate receiver.

CONTROLS: Three controls are provided on the front panel for operation of this combination. The right hand control is the station selector which is used only in 'Radio' operation. The left hand control is a switch which selects operation of either 'Radio' or 'Phonograph'. The center control is used to adjust volume on either 'Radio' or 'Phonograph' and is also used as a power switch to turn the combination 'On' or 'Off.'

RADIO RECEPTION: After the power cord plug has been connected to your power outlet, turn the center control to the right in a clockwise direction and a click will be heard. This indicates that the power is turned on, and the pilot light in the dial should begin to glow. After about 30 seconds, the set will be ready for operation.

Make sure that the left hand control is turned to the left, in 'Radio' position. Turn the center control about halfway on, in a clockwise direction to increase volume. Rotate the right hand control to the right or left to select the desired station. By mentally adding a zero to the figures on the upper half of the dial, the result will be read directly in kilocycles (i.e., 60 plus 0 equals 600KC or 140 plus 0 equals 1400KC). After a station has been tuned in, adjust the center control to your desired volume.

ALIGNMENT AND SERVICE DATA

Remove chassis from cabinet for alignment.

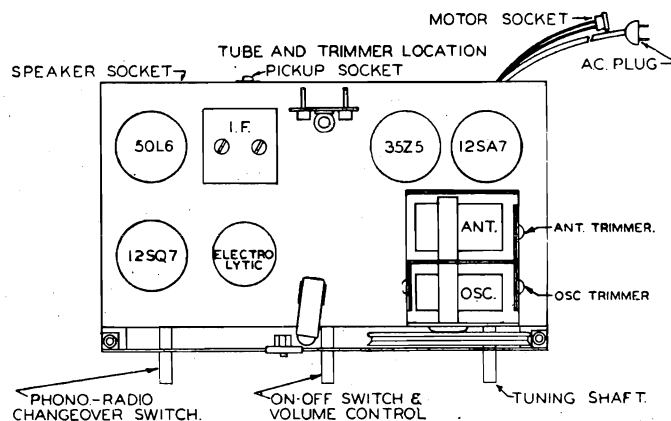
A Signal Generator is required having the following frequencies: 455 KC, 1400 KC, 1720 KC. An output meter should be connected across the speaker.

The receiver volume control should be turned to maximum during the I.E. and all subsequent alignments to keep the AVC from working and giving false readings. Keep the generator output as low as possible to prevent overloading.

FIRST STEP: Connect the hot lead from the generator to the ANT. section of the gang condenser, through a .1 MFD condenser. The ground lead from the generator must be connected to the floating ground buss under the chassis. Turn the gang condenser to complete minimum capacity. Adjust the generator to 455KC and adjust the trimmers of the 1st and 2nd I.F. transformers until a maximum reading is noted on the output meter.

SECOND STEP: With the leads from the generator still connected in the same manner, adjust the Signal Generator to 1720 KC. The OSC. trimmer is located on the front of the chassis. Adjust this trimmer until the 1720 KC signal is tuned in.

THIRD STEP: Remove the hot lead of the generator from the ANT section of the gang condenser. Connect this lead to the primary of the loop antenna through a 200 MMFD condenser. Adjust the Signal Generator to 1400 KC. Rotate the tuning control until this signal is tuned in. The ANT trimmer is located on the top of the ANT. section of the gang condenser. Adjust this trimmer until a maximum reading is noted on the output meter. No further adjustment should be necessary, unless the set has been damaged, as the coils and condenser in this receiver have been specially handled at the factory to insure proper alignment at the lower frequencies.



16294-76 T-249

MODELS 594-306,
594-307

Instructions for Using Your RADIO-ALARM CLOCK Combination Receiver

This skillfully designed and carefully constructed combination will give you long and enjoyable service. This Receiver can perform the following services for the user:

1. Provide accurate time.
2. Receive broadcast programs being transmitted and within range—at any time.
3. Turn off radio program at will of user up to 60-minute interval or less.
4. Turn on radio program for awakening.
5. Turn buzzer alarm on 10 minutes after radio starts playing.
6. Turn on buzzer alarm for awakening — with radio silenced.

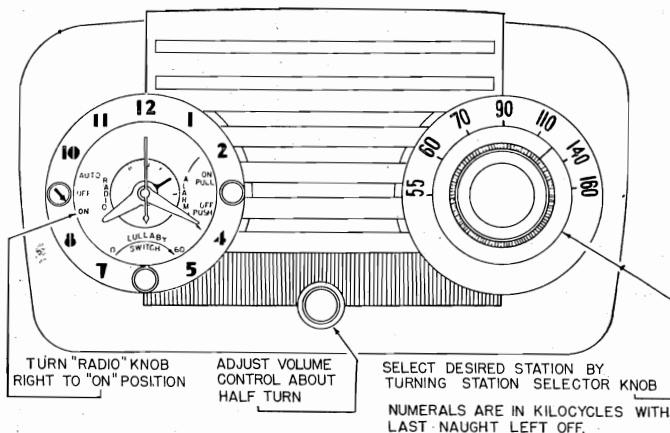
INSTALLATION—Check the voltage and cycles of the electric power supplied to your home. This combination will operate ONLY on 60 cycle alternating current (ac), from 105 to 125 volts. THIS SET WILL NOT OPERATE ON ANY OTHER TYPE OF CURRENT OR CYCLES. Your electric company will help you make certain that you have the correct kind of power.

This combination includes a sensitive five multi-purpose tube super-heterodyne radio including a rectifier tube. Your radio has a self contained duro-loop antenna capable of supplying sufficient volume in areas of normal reception. If you live in an area where radio reception is poor, you can improve the performance by connecting an outside antenna to the screw marked EXT. ANT. which you will find on the right hand side of the rear of the cabinet.

(1) TO SET THE CLOCK

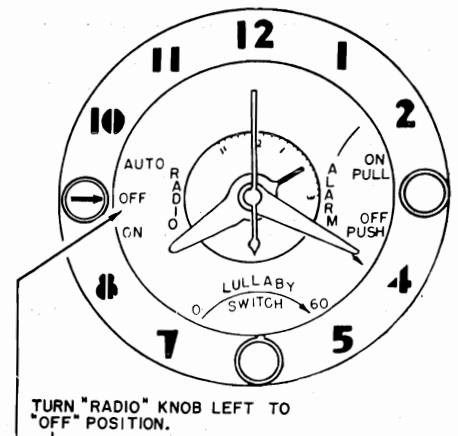
Your self-starting TELECHRON movement will begin operating when the set is plugged into the proper outlet and your sweep second hand begins to rotate. Set the correct time by means of the small knob at the right REAR of the cabinet. Turn ONLY in the direction shown on the back cover.

(2) TO TURN RADIO ON MANUALLY

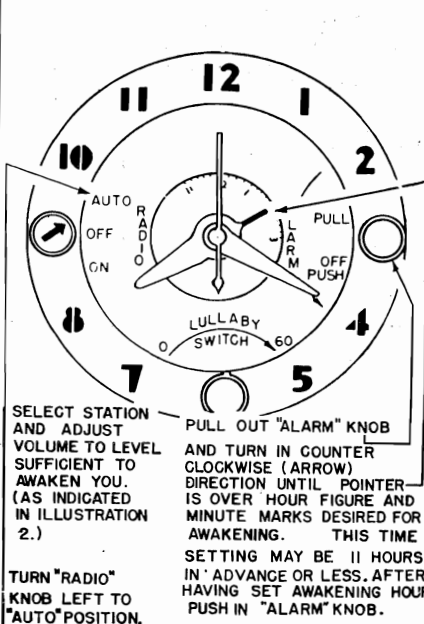


16015-76F

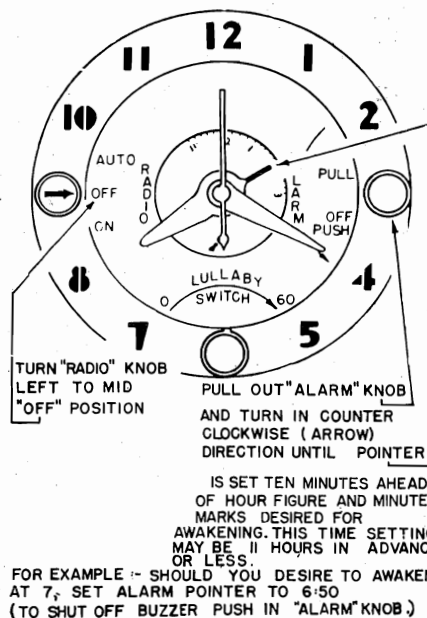
(3) TO TURN OFF RADIO MANUALLY



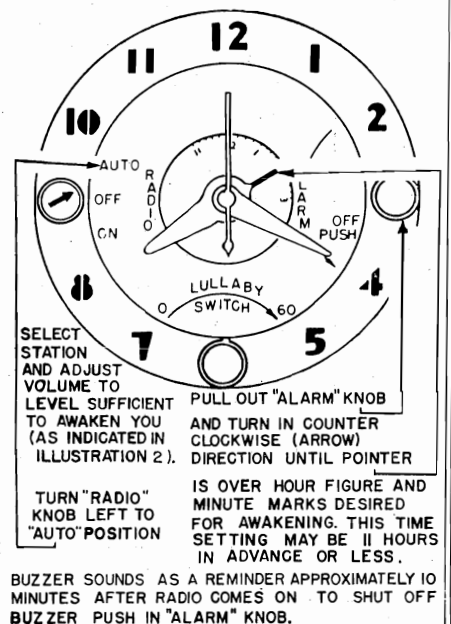
(4) TO AWAKEN TO MUSIC



(5) TO AWAKEN TO BUZZER ALARM

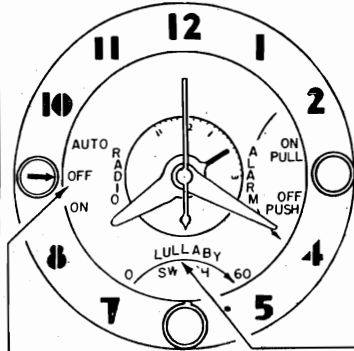


(6) TO AWAKEN TO MUSIC AND BUZZER ALARM



MODELS 594-306,
594-307

**(7) TO TURN RADIO OFF
AUTOMATICALLY WHEN RETIRING**



TURN "RADIO" KNOB
TO MID "OFF" POSITION

TURN LULLABY KNOB CLOCKWISE
(TO RIGHT) FOR PLAYING TIME
DESIRED. ESTIMATE TIME
BETWEEN 0 AND 60 MARKS
ALONG ARROW

**(8) - To Turn Radio Off Automatically When Retiring and
Awaken to Music**

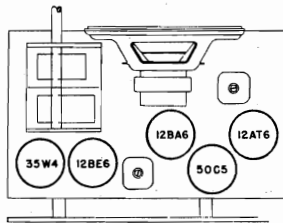
Set Controls as in Illustration 4.
Set "Lullaby" Knob as in Illustration 7.

**(9) - To Turn Radio Off Automatically When Retiring and
Awaken to Buzzer Alarm**

Set Controls as in Illustration 5.
Set "Lullaby" Knob as in Illustration 7.

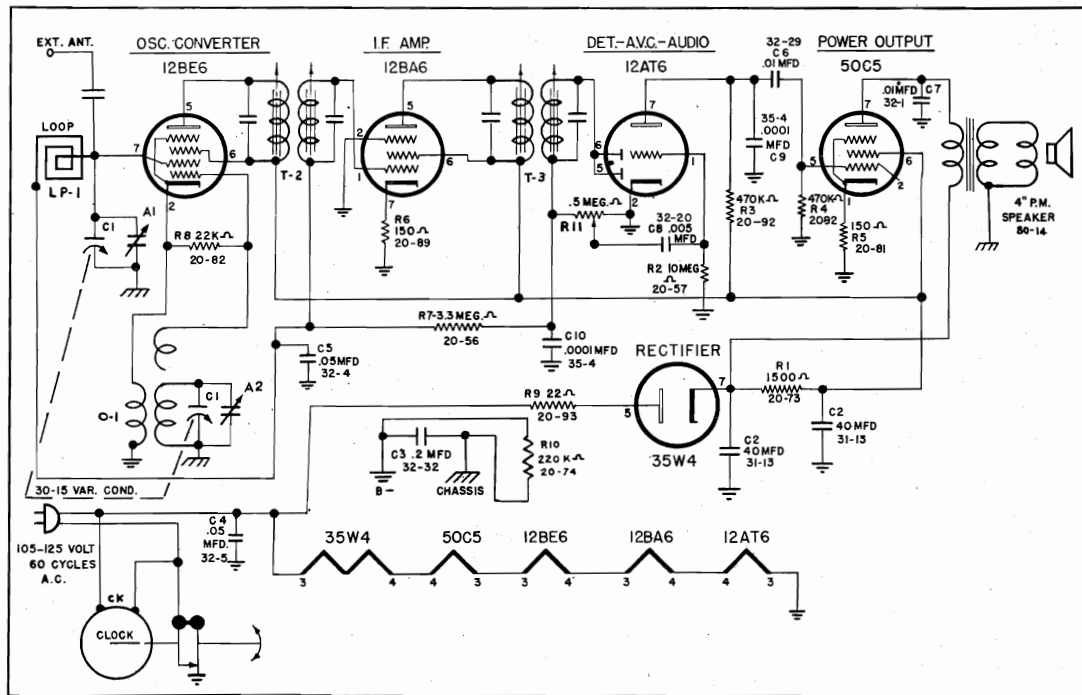
**(10) - To Turn Radio Off Automatically When Retiring, Awaken
to Music and Buzzer Alarm**

Set Controls as in Illustration 6.
Set "Lullaby" Knob as in Illustration 7.



TUBE COMPLEMENT

| | |
|----------------------|-------------------|
| 12BE6 Converter | 50C5 Power Output |
| 12BA6 I.F. Amplifier | 35W4 Rectifier |
| 12AT6 Det. AVC-AUDIO | |



MODELS 594-306,
594-307

SERVICE DATA

ALIGNMENT PROCEDURE

- Output meter across voice coil (3.2 ohm)
- Volume control at maximum for all adjustments.
- Align for maximum output. Reduce input as needed to keep output near 1.28 volts (0.5 watt).

| SIGNAL GENERATOR | | | | TUNER SETTING | ADJUST TRIMMERS TO MAXIMUM OUTPUT (in order shown) |
|------------------|--------------------|-------------------------|-------------------|--------------------------------------|----------------------------------------------------|
| Frequency | Coupling Capacitor | Connections to Receiver | Ground Connection | | |
| 455 kc | 0.1 mfd. | 12BE6 grid | B— | Rotor full open (Plates out of mesh) | Input and output slugs of IF cans |
| 1650 kc | 0.1 mfd. | 12BE6 grid | B— | Rotor full mesh (Plates out of mesh) | Oscillator trimmer A2 |
| 1500 kc | | Radiating Loop | | 1500 kc* | Antenna trimmer A1 |

* Seven markings on the dial bracket represent respectively 550 kc, 600 kc, 700 kc, 900 kc, 1100 kc, 1400 kc, and 1600 kc reading from left to right. These points are to be used for the alignment of the receiver.

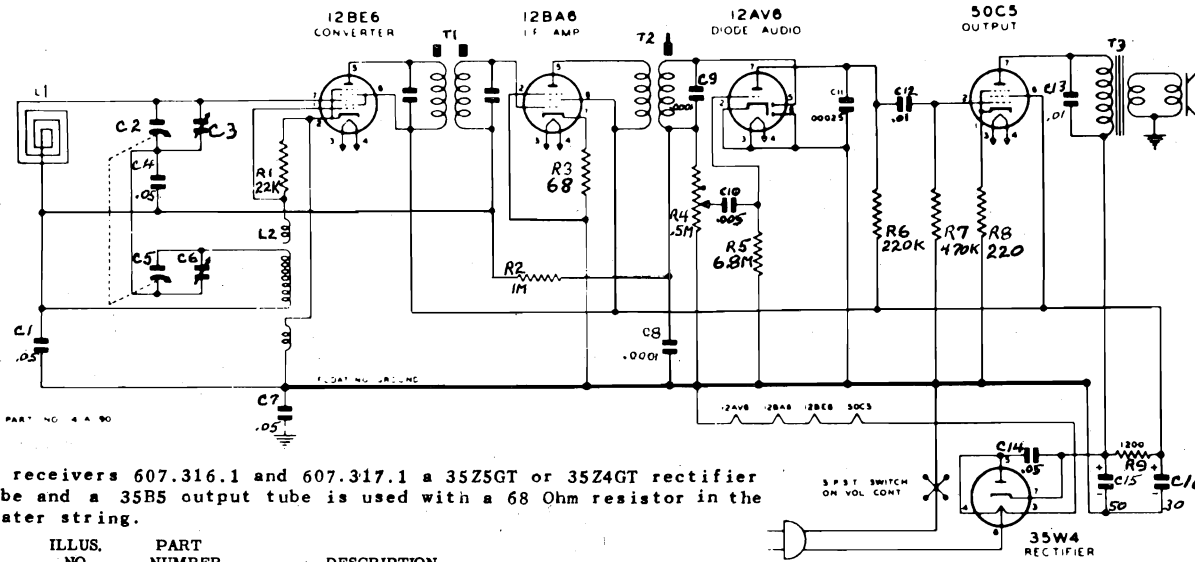
REPLACEMENT PARTS LIST

When ordering parts, specify part number and model number.

| Ref. No. | Part No. | DESCRIPTION | Ref. No. | Part No. | DESCRIPTION |
|------------|----------|-------------------------------------------------------|-------------------------|----------|---------------------------------------------|
| CAPACITORS | | | RESISTORS — (Continued) | | |
| C1 | 30-15 | Variable Condenser, 2 gang | R8 | 20-82 | 22,000 ohm, 1/4 watt 20% |
| C2 | 31-13 | 40 mfd.—40 mfd., 150 volt dual electrolytic condenser | R9 | 20-93 | 22 ohm, 1/2 watt 20% |
| C3 | 32-32 | .2 mfd., 200 volt, paper | R10 | 20-74 | 220,000 ohm, 1/4 watt 20% |
| C4 | 32-5 | .05 mfd., 400 volt, paper | R11 | 50-15B | 1/2 meg. volume control with switch |
| C5 | 32-4 | .05 mfd., 200 volt, paper | COILS AND TRANSFORMERS | | |
| C6 | 32-1 | .01 mfd., 400 volt, paper | O-1 | 60-9 | Oscillator coil |
| C7 | 32-1 | .01 mfd., 400 volt, paper | T-2 | 61-11 | Input IF transformer |
| C8 | 32-20 | .005 mfd., 600 volt, paper | T-3 | 61-11 | Output IF transformer |
| C9 | 35-4 | .0001 mfd., 500 volt, mica | LP-1 | 62-15 | Loop antenna |
| C10 | 35-4 | .0001 mfd., 500 volt, mica | MISCELLANEOUS | | |
| RESISTORS | | | 80-14 | 80-14 | 4 inch P.M. speaker with output transformer |
| R1 | 20-73 | 1500 ohm, 1 watt 20% | 122-19 | | Selector knob |
| R2 | 20-57 | 10 megohm, 1/4 watt 20% | 122-15 | | Volume knob |
| R3 | 20-92 | 470,000 ohm, 1/4 watt 20% | 120-33 | | Cabinet—walnut |
| R4 | 20-92 | 470,000 ohm, 1/4 watt 20% | | | ivory |
| R5 | 20-81 | 150 ohm, 1/2 watt 20% | | | (Specify color) |
| R6 | 20-89 | 150 ohm, 1/4 watt 20% | CK | 140-6 | Clock |
| R7 | 20-56 | 3.3 megohm, 1/4 watt 20% | | | |

* Prices subject to change.

MODELS 607-316, 607-316-1,
607-317, 607-317-1



In receivers 607.316.1 and 607.317.1 a 35Z5GT or 35Z4GT rectifier tube and a 35B5 output tube is used with a 68 Ohm resistor in the heater string.

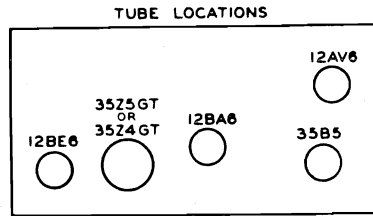
| ILLUS. NO. | PART NUMBER | DESCRIPTION |
|------------|-------------------------|--------------------------------------------------------------------------------------------------------|
| C1,C4,C7 | N-1345 | Condenser, Paper .05 MFD. 200 V. |
| C8 | N-8015 | Condenser, Ceramic 100 MMFD. 500 V. 20% |
| * C9 | N-7549 | Condenser, Ceramic 100 MMFD. 500 V. 10% |
| C10 | N-4894 | Condenser, Paper .005 MFD. 600 V. |
| C11 | N-8488 | Condenser, Ceramic 250 MMFD. 500 V. 20% |
| C12,C13 | N-1344 | Condenser, Paper .01 MMFD. 400V. |
| C14 | N-1346 | Condenser, Paper .05 MFD 400 V. |
| C15 | N-7889 | Condenser, Dry Electrolytic (50 MFD. 150 V.) |
| C16 | | (30 MFD. 150 V.) |
| R1 | N-4025 | Resistor, Carbon 22,000 Ohm 1/2 W. 20% |
| R2 | N-1262 | Resistor, Carbon 1.0 Megohm 1/2 W. 20% |
| R3 | N-6485 | Resistor, Carbon 68 Ohm 1/2 W. 10% |
| R4 | N-7890 | Volume Control 500,000 Ohm with Switch |
| R5 | N-4028 | Resistor, Carbon 6.8 Megohm 1/2 W. 20% |
| R6 | N-4026 | Resistor, Carbon 220,000 Ohm 1/2 W. 20% |
| R7 | N-4027 | Resistor, Carbon 470,000 Ohm 1/2 W. 20% |
| R8 | N-4024 | Resistor, Carbon 220 Ohm 1/2 W. 10% |
| R9 | N-4900 | Resistor, Carbon 1,200 Ohm 1.0 W. 10% |
| T1 | N-7888 | Transformer, 1st I.F. |
| * T2 | (N-7542 OR N-8150) | Transformer, 2nd. I.F. |
| T3 | | Output Transformer (Part of N-7824 Speaker Assembly) |
| L1 | N-8138 | Coil, Loop Antenna and Cabinet Back |
| L2 | N-7139 #316 #317 N-7824 | Coil, Oscillator Cabinet, Ivory Plastic Cabinet, Walnut Plastic Speaker, 4" PM with Output Transformer |

* C9 (N-7549 Ceramic Condenser) is required only with N-7542 Transformer. This capacity is included in N-8150 Transformer.

Note: In some receivers the following components - R6,R7,C11, and C12 are replaced by the assembly listed below:

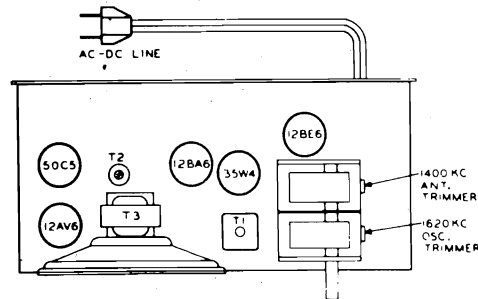
N-6477 Audio Coupling Plate

TUBE LOCATION CHART



TUBE LOCATIONS

REAR OF CHASSIS
607.316.1
607.317.1



PART NO. 4 A-90 607.316
607.317

ALIGNMENT PROCEDURE

| Step No. | Position of Gang | Signal Generator Frequency | Generator Connection | Dummy Antenna | Adjustment | Type of Adjustment |
|----------|------------------|----------------------------|----------------------|-----------------------------------------------------------------------------------|--------------------|---------------------------|
| 1. | Open | 455 KC. | Rear Gang Terminal | .1 Mfd. | I.F. Slugs | Adjust for Maximum Output |
| 2. | Open | 1620 KC. | Dummy Antenna | 2 Turns of Hookup Wire 6" in Dia. (Place Approx. a Foot from & parallel to loop.) | Front Gang Trimmer | Adjust for Maximum Output |
| 3. | 1400 KC | 1400 KC. | | | Rear Gang Trimmer | Adjust for Maximum Output |
| 4. | 600 KC | 600 KC. | | | | Check Gang Alignment |

(9-50)

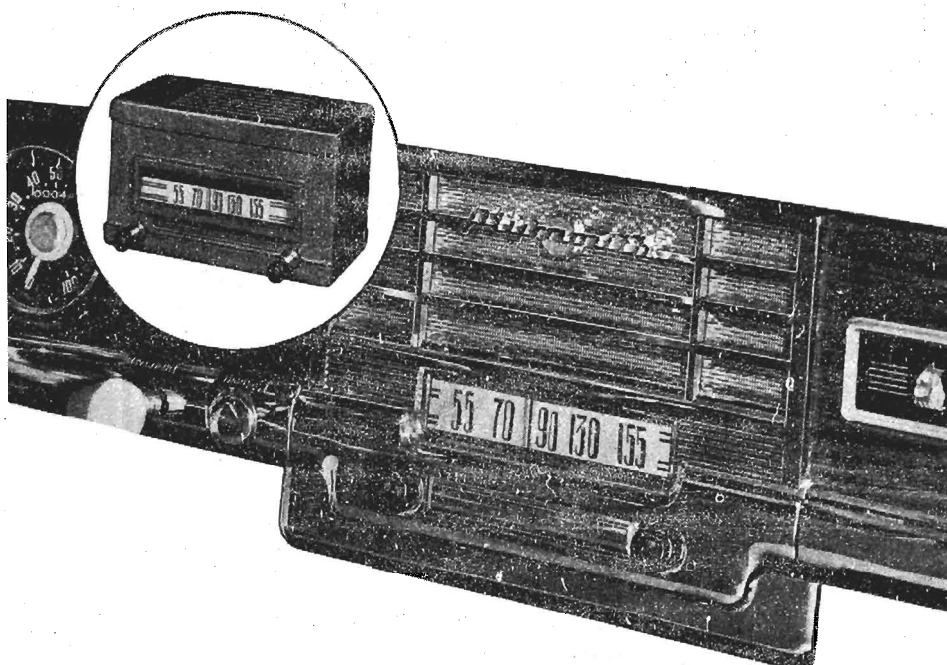
51249

MODEL 610.D200,
Dodge, Plymouth

DESCRIPTION

Your new **AIRCASTLE** Receiver is a 6-tube (including rectifier) superhetrodyne, designed to operate from the 6-volt storage battery in your car. It is custom-built to mount behind the instrument panel in the place provided for a radio by the automobile manufacturer. It has a self-contained PM oval speaker and covers the frequency range 538 to 1600 KC. Two simple controls are provided for operating the receiver. (See Fig. 1.)

This receiver has been designed with a tuned RF stage and a 3-gang tuning condenser thereby insuring the finest in sensitivity and selectivity. Any standard two or three section whip or "fish pole" antenna will provide good reception of distant or weak stations. The unit is simple to install and requires no electrical adjustment after installation.



OPERATION

VOLUME CONTROL KNOB

This knob is located on the left side of the radio. Turning this knob slightly to the right until a slight click is heard will put the radio into operation. Turning this knob further to the right will increase the volume and turning it to the left will decrease the volume. After a station has been selected, the volume control should be adjusted to the required loudness. The volume should never be reduced by detuning the station selector knob.

STATION SELECTOR KNOB

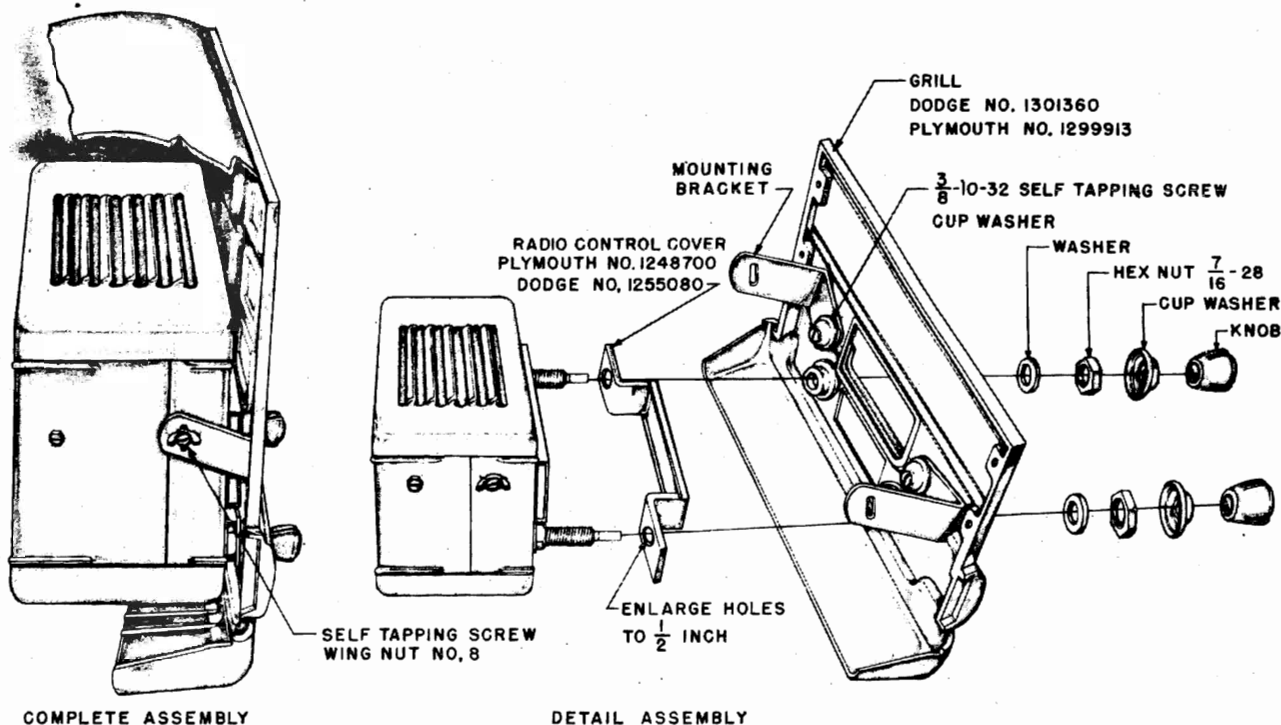
This knob is located on the right side of the radio. This knob should be turned until a desired station has been selected. Adjust this knob very carefully until the station comes in with the most natural tone.

INSTALLATION

PLYMOUTH P18 SPECIAL DELUXE

1. Remove four screws securing Radio Grill in place and remove Radio Grill.
2. Remove dummy plates covering radio dial and control openings.
3. Enlarge holes in radio control cover plate to $\frac{1}{2}$ inch.
4. Remove knobs, cup washers, hex nuts and washers from control shafts and mounting bushings.
5. Secure two mounting brackets to Radio Grill with $\frac{3}{8}$ inch long 10-32 self-tapping screws and cup washers as shown in detail assembly drawing.
6. Place radio control cover plate over mounting bushings.
7. Position receiver behind Radio Grill so that mounting bushings and shafts protrude through the grill.
8. Attach receiver by replacing washers and hex nuts on mounting bushings.
9. Replace cup washers and knobs over shafts.
10. Secure receiver to mounting brackets with two No. 8 self-tapping wing nuts.
11. Insert radio with attached grill through front opening on instrument panel.
12. Replace grill mounting screws.
13. Connect battery lead to terminal marked "ACC" on ignition switch.
14. Plug antenna cable into receiver.

MODEL 610.D200,
Dodge, Plymouth



DODGE "CORONET"

Install in the same manner as outlined for the P18 DeLuxe Plymouth except do not remove radio grill.

PLYMOUTH P17, P18 4-DOOR DELUXE AND
P18 CLUB COUPE DELUXE
DODGE "WAYFARER" AND "MEADOWBROOK"

These models are not equipped by the car manufacturers with a radio grill or a radio control cover plate. The following parts must be obtained from any authorized Plymouth or Dodge dealer before an installation can be made in any of these cars.

- Plymouth P17, P18 4-Door DeLuxe, P18 Club Coupe DeLuxe
 - Radio Grill No. 1299913
 - Radio control cover No. 1248700
- Dodge "Meadowbrook" or "Wayfarer"
 - Radio Grill No. 1301360
 - Radio control cover No. 1255080

ACCESSORIES FURNISHED FOR INSTALLATION

MOUNTING PARTS KIT

The following mounting hardware parts are shipped attached to the receiver. (See detail assembly drawing FIG. 2)

- 2 Washers
- 2 7/8-28 hex nuts
- 2 Cup washers
- 2 Knobs
- 2 Mounting Brackets
- 2 No. 8 self-tapping wing nut screws

An envelope containing additional mounting hardware is supplied with this receiver. It contains the following parts:

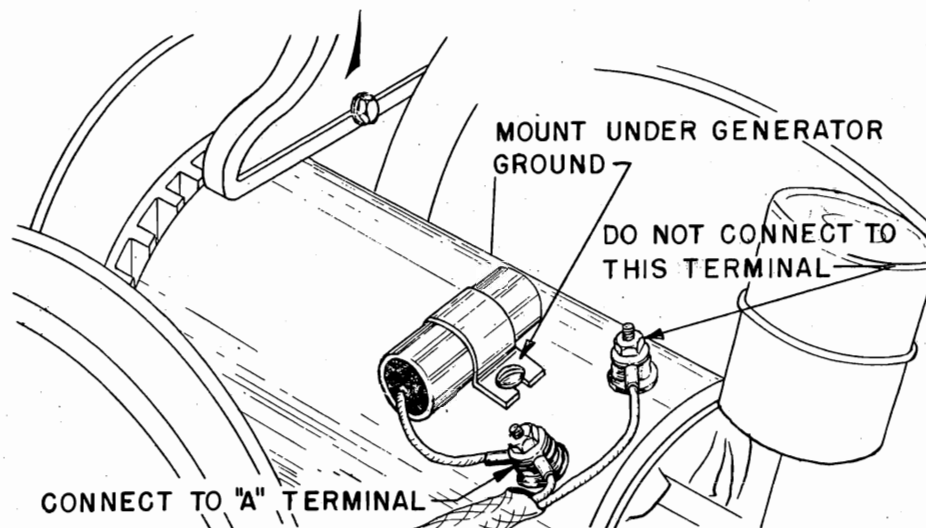
- 2 3/8 10-32 self-tapping screws
- 2 Cup washers

SUPPRESSION KIT

- 1 Distributor Suppressor
- 1 .5 MFD Generator Condenser

MOTOR NOISE ELIMINATION

GENERATOR CONDENSER



DISTRIBUTOR SUPPRESSOR

NOTE: 1950 Dodge and Plymouth automobiles do *not* require distributor suppressors.

1949 DODGE AND PLYMOUTH

Remove metal tip from the distributor center tower lead and screw lead into the suppressor. Plug suppressor with attached lead back into distributor head.

The generator condenser and distributor suppressor should eliminate all objectionable motor noise in most cases. If the motor noise persists the following steps should be taken. Check operation of radio as each step is made.

WHEEL STATIC

Wheel static is a form of interference caused by the rotation of the front wheels of the car, and it is, of course, only noticed when the car is in motion. If this form of interference is present, it can be eliminated by installing wheel static collector springs between the inner hub cap and the spindle shaft.

AMMETER CONDENSER

A .5 MFD by-pass condenser should be connected to either side of the ammeter with the ground lug fastened to a good ground nearby.

ELECTRICAL ACCESSORIES

In some cases, it may be found that car accessories such as electric heaters, lighters, automatic relays or gauges, may cause interference while in operation. Proper procedure in such cases is to connect a .5 MFD by-pass condenser from ground to the suspected accessory until the source of interference is found. The condenser then should be permanently mounted in this location.

MODEL 610.D200,
Dodge, Plymouth

ALIGNMENT PROCEDURE

Volume control—Maximum, all adjustments.
No signal applied to antenna.
Power input—6.3 volts.
Connect dummy antenna in series with output lead of signal generator.
Connect ground lead of signal generator to chassis.
Repeat alignment procedure as a final check.

The following equipment is necessary to proper alignment:
Signal generator that will provide the test frequencies as listed, modulated 400 cycles, 30%.
Non-metallic screwdriver.
Output meter. (1.8 volt for 1 watt output.)
Dummy antennas—.1 MFD., 100 MMFD.
For alignment points refer to *Schematic Diagram*

| Dial Setting | Generator Frequency | Dummy Ant. | Generator Connector | Trimmer Reference | Trimmer Adjustment | Trimmer Function |
|----------------------------------|---------------------|------------|---------------------|-------------------|--------------------|------------------|
| 1) Fully open | 455 KC | .1 MFD | 6BE6 Grid | T4 Top & bottom | Maximum | Output I.F. |
| 2) Fully open | 455 KC | .1 MFD | 6BE6 Grid | T3 Top & bottom | Maximum | Input I.F. |
| 3) Fully open | 1600 KC | 100 MMFD | Ant. lead | CV2 | Maximum | Oscillator |
| 4) Tune in signal from generator | 1400 KC | 100 MMFD | Ant. lead | CV3 | Maximum | RF Stage |
| 5) Tune in signal from generator | 1400 KC | 100 MMFD | Ant. lead | CV1 | Maximum | Antenna |
| 6) Tune in signal from generator | 600 KC | 100 MMFD | Ant. lead | T2 | Maximum | RF Stage |
| 7) Tune in Signal from generator | 600 KC | 100 MMFD | Ant. lead | T1 | Maximum | Antenna |
| 8) Repeat steps 4 and 5 | | | | | | |

PARTS AND PRICE LIST

CONDENSERS

| Schematic Diagram Reference | Part No. | Description |
|-----------------------------|----------|---------------------------------------------|
| C2, C3, C4 | C207 | .05 MFD 200 volt condenser |
| C5 | CC200 | 100 MMFD ceramic condenser D200 |
| C6, C13, C14 | CC201 | 200 MMFD ceramic condenser PS200 |
| C7 | C203 | .002 MFD 200 volt condenser DS200 |
| C8, C9 | C206 | .01 MFD 600 volt condenser H201 |
| C10, C11 | C209 | .5 MFD 100 volt condenser T51 |
| C12 | C205 | .008 MFD 1600 volt condenser H202 |
| CE-86 | CE-86 | 20 MFD 350 volt electrolytic condenser H203 |
| | | 20 MFD 350 volt electrolytic condenser H204 |
| | | 20 MFD 25 volt electrolytic condenser H205 |
| CV-200 | CV-200 | 3 section variable tuning condenser H205 |

DIAL PARTS

| | |
|-----------------------------------|-------|
| Dial Scale | ..... |
| Dial Pointer | ..... |
| Drive shaft assembly | ..... |
| Grommet, rubber drive | ..... |
| Pilot light | ..... |
| Pilot light socket | ..... |
| Pulley, idler | ..... |
| Spring, Dial Drive Spring Tension | ..... |
| String | ..... |

RESISTORS

| | | | |
|----------|--------|---------------------------------------|--------|
| R1 | R309 | 1 megohm 1/2 watt 20% resistor | A200 |
| R2 | R306 | 20K ohm 1/2 watt 20% resistor | H206 |
| R3 | R305 | 2K ohm 1/2 watt 20% resistor | H207 |
| R4 | R310 | 2 megohm 1/2 watt 20% resistor | H208 |
| R5 | R311 | 10 megohm 1/2 watt 20% resistor | H209 |
| R6 | R307 | 250K ohm 1/2 watt 20% resistor | H210 |
| R7 | R308 | 500K ohm 1/2 watt 20% resistor | A201 |
| R8 | R303 | 330 ohm 1/2 watt 20% resistor | H211 |
| R9 | R313 | 20K ohm 2 watt 20% resistor | H212 |
| R10, R11 | R301 | 100 ohm 1/2 watt 20% resistor | PM-200 |
| R12 | R312 | 1K ohm 1 watt 20% resistor | V-83 |
| RV-200 | RV-200 | Volume control 3/4 megohm with switch | |

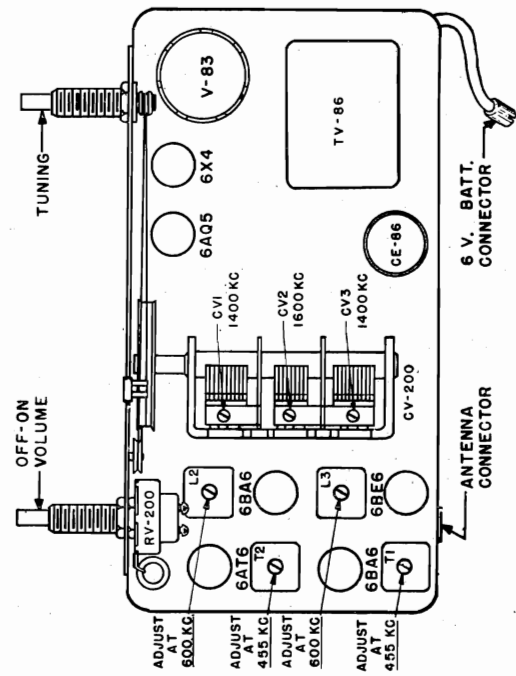
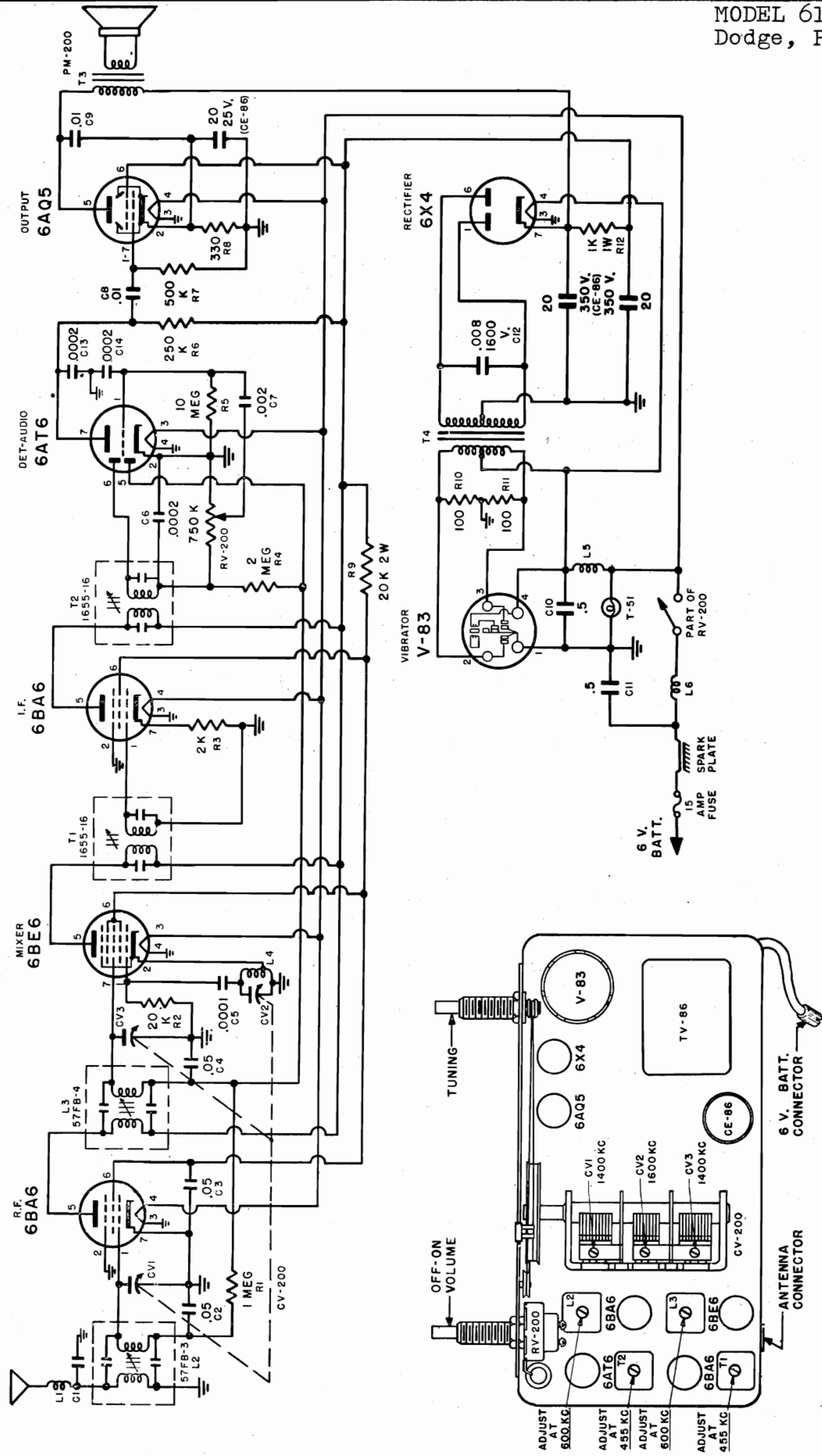
MISCELLANEOUS

| | |
|--------------------------------------------------|-------|
| "A" lead assembly | ..... |
| Case (less covers) | ..... |
| Clip, anti-rattle | ..... |
| Clip, coil mounting | ..... |
| Cover, bottom case | ..... |
| Cover, top case (with speaker louvres) | ..... |
| Fuse, 15 Amp. | ..... |
| Grommet, rubber, gang mounting | ..... |
| Receptacle, antenna cable | ..... |
| Speaker 4" x 6" PM (includes output transformer) | ..... |
| Vibrator | ..... |

COILS AND TRANSFORMERS

| | | | |
|-------|---------|---------------------------------------------------------------|-------|
| L1-C1 | L200 | Motor noise elimination unit | ..... |
| L2 | 57FB-3 | Antenna Coil | ..... |
| L3 | 57FB-4 | RF coil | ..... |
| L4 | L201 | RF Oscillator coil | ..... |
| L5 | L202 | Choke, vibrator hash | ..... |
| L6 | L203 | Choke, "A" line | ..... |
| T1 | 1655-16 | 1st IF transformer | ..... |
| T2 | 1655-16 | 2nd IF transformer | ..... |
| T3 | | Output transformer (Part of speaker not furnished separately) | ..... |
| T4 | TV-200 | Vibrator transformer | ..... |

MODEL 610.D200,
Dodge, Plymouth



NOTE: T1 AND T2 HAVE TOP AND
BOTTOM ADJUSTMENTS.
ADJUST AT 455 KC.

MODELS 610,
F151, 1951 Ford

DESCRIPTION

Your new Automobile Receiver is a 6-tube (including rectifier) superhetrodyne, designed to operate from the 6-volt storage battery in your car. It is custom-built to mount behind the instrument panel in the place provided for a radio by the automobile manufacturer. It has a self-contained PM speaker and covers the frequency range 538 to 1600 KC. Two simple controls are provided for operating the receiver. (See Fig. 1.)

This receiver has been designed with a tuned RF stage and a 3-gang tuning condenser thereby insuring the finest in sensitivity and selectivity. Any standard two or three section whip or "fish pole" antenna will provide good reception of distant or weak stations. The unit is simple to install and requires no electrical adjustment after installation.

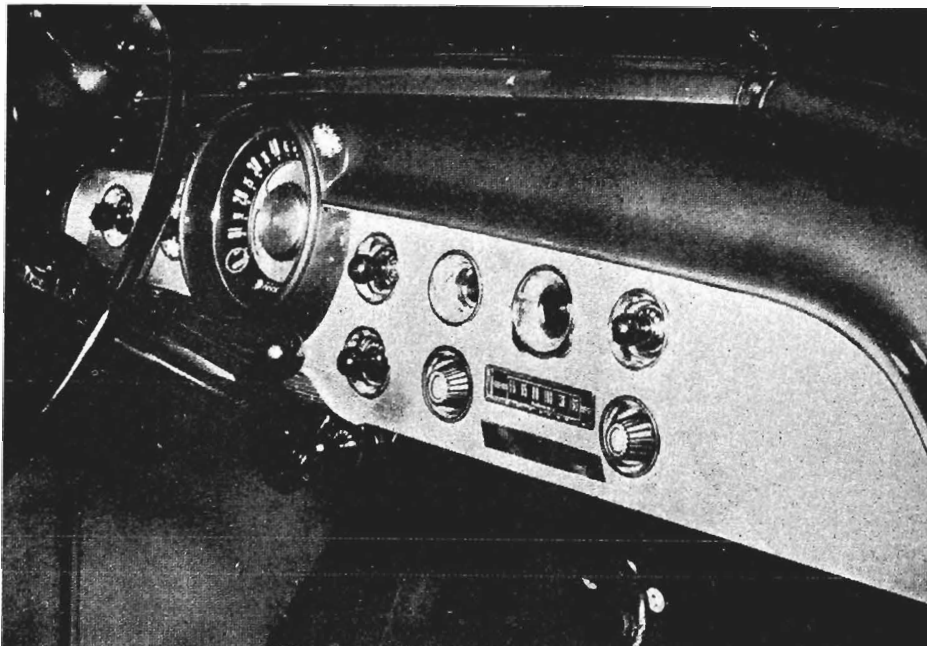


Fig. 1

OPERATION

VOLUME CONTROL KNOB

This knob is located on the left side of the radio. Turning this knob slightly to the right until a slight click is heard will put the radio into operation. Turning this knob further to the right will increase the volume and turning it to the left will decrease the volume. After a station has been selected, the volume control should be adjusted to desired level. The volume should never be reduced by detuning the station selector knob.

STATION SELECTOR KNOB

This knob is located on the right side of the radio. This knob should be turned until a desired station has been selected. Adjust this knob very carefully until the station comes in with the most natural tone.

INSTALLATION

1. Remove the radio opening cover plate by removing the speed nuts at the rear of the instrument panel.
2. Remove and discard radio bezel cups on car by removing hex nuts securing bezel cups to instrument panel.
3. Remove knobs, hex nuts, and bezel cups from tuning unit.
4. Carefully position tuning unit behind instrument panel so the mounting bushings and shafts protrude through the front panel.
5. Place bezel cups over mounting bushings.
6. Attach tuning unit and bezel cups to instrument panel with a hex nut on each mounting bushing.
7. Replace knobs.
8. Position mounting bracket over mounting stud located behind instrument panel and secure with a $\frac{1}{4}$ " lockwasher and a $\frac{1}{4}$ - 20 nut.
9. Secure mounting bracket to side of tuning unit with hex head No. 8 self tapping screw, as shown in Fig. 2
10. Place speaker and power pack unit over three threaded stud bolts behind the instrument panel. (Position power pack unit so that power cable is located near the tuning unit.) See Fig. 2.
11. Secure power pack into position with the wing nuts supplied in the kit of mounting hardware.
12. Insert power cable plug into socket on rear of tuning unit.
13. Secure power cable under cable clamp and tighten clamp screw.
14. Plug antenna cable into tuning unit.
15. Connect "A" lead to terminal on ignition switch.

17347-86

MODELS 610,
F151, 1951 Ford

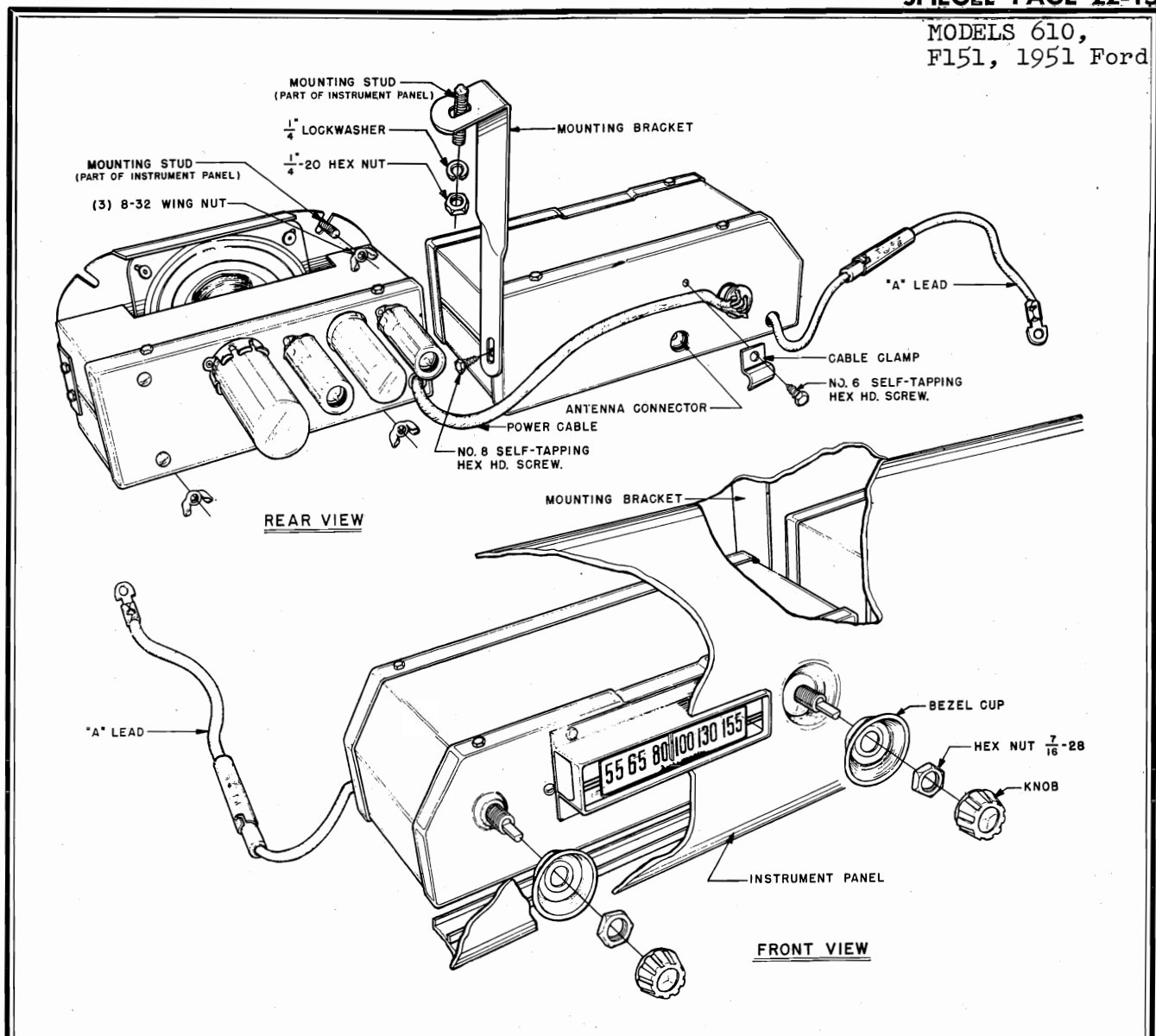


Fig. 2 DETAIL ASSEMBLY

ACCESSORIES FURNISHED FOR INSTALLATION

MOUNTING PARTS KIT

The following mounting hardware parts are shipped attached to the receiver.

(See detail assembly drawing FIG. 2)

- 2 Bezel cups
- 2 7/16 — 28 hex nuts
- 2 Knobs
- 1 Cable clamp

An envelope containing additional mounting hardware is supplied with this receiver. It contains the following parts:

- 1 Supporting bracket
- 1 No. 8 self-tapping screw
- 1 1/4" lockwasher
- 1 1/4 — 20 nut
- 3 No. 8 — 32 wing nuts

MOTOR NOISE ELIMINATION

SUPPRESSION KIT

A suppression kit is shipped with this receiver. It contains the following parts:

- 1 Generator Condenser
- 1 Distributor suppressor

Disconnect high tension wire that runs from the ignition coil to the center hole of the distributor head. Cut lead one and one-half inches back from metal tip end for 8 cylinder Ford or two and one-half inches back for 6 cylinder Ford. Screw suppressor into cut end of long lead. Screw cut end of short lead into suppressor. Plug lead with attached suppressor, back into distributor head.

MODELS 610,
F151, 1951 Ford

DISTRIBUTOR SUPPRESSOR

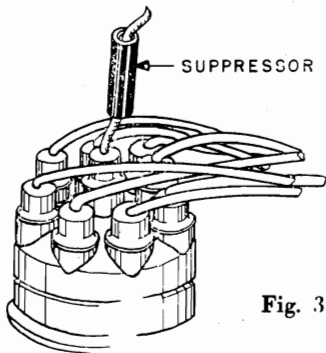


Fig. 3

DISTRIBUTOR 8 CYLINDER

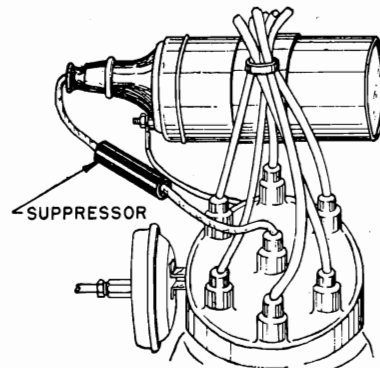


Fig. 4

DISTRIBUTOR-6 CYLINDER

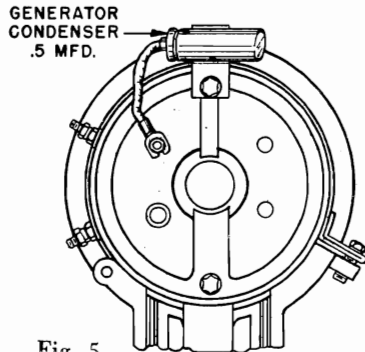


Fig. 5

GENERATOR CONDENSER

Loosen the top assembly bolt from the rear end plate of the generator. **DO NOT REMOVE.** Mount .5 MFD generator condenser under this bolt. Tighten bolt and connect condenser lead to the armature terminal of the generator.

The generator condenser and distributor suppressor will normally eliminate all objectionable motor noise. If the motor noise persists, a .5 MFD by-pass condenser may be connected to either side of the ammeter with the ground lug fastened to a good ground nearby.

WHEEL STATIC

Wheel static is a form of interference caused by the rotation of the front wheels of the car, and it is, of course, only noticed when the car is in motion. If this form of interference is present, it can be eliminated by installing wheel static collector springs between the inner hub cap and the spindle shaft.

ELECTRICAL ACCESSORIES

In some cases, it may be found that car accessories such as electric heaters, lighters, automatic relays or gauges, may cause interference while in operation. Proper procedure in such cases is to connect a .5 MFD by-pass condenser from ground to the suspected accessory until the source of interference is found. The condenser then should be permanently mounted in this location.

**SERVICE DATA
ELECTRICAL SPECIFICATIONS**

| | |
|----------------------|----------------------------------------------|
| Power Supply..... | 6.3 Volts DC |
| Current..... | 5.5 Amp. average |
| Frequency Range..... | 538-1600 KC |
| Speaker..... | 5 1/4" PM |
| Power Output..... | 2 watts, undistorted |
| | 3 watts, maximum |
| Sensitivity..... | 2-3 microvolts average for 1 watt output |
| Selectivity..... | 40 KC broad at 1000 times signal, at 1000 KC |

This receiver contains the following:
 1-6BA6—RF Amplifier
 1-6BE6—Converter
 1-6BA6—I. F. Amplifier
 1-6AT6—Detector—AVC—1st Audio
 1-6AQ5—Power Output
 1-6X4—Rectifier
 (6AV6 used in place of 6AT6 on some models)

SERVICE NOTES

Voltage taken from the different points of the circuit to the chassis are measured with volume control in maximum position, all tubes in their sockets, no signal applied, and with a voltmeter having a resistance of 20,000 Ohms per volt. These voltages are clearly shown on the voltage chart, (Fig. 7 and 7A).

All voltages should be measured with an input voltage of 6.3 volts DC.

To check for open by-pass condensers, shunt each condenser with another one having the same capacity and voltage rating which is known to be good until the defective unit is located.

ALIGNING INSTRUCTION

Never attempt any adjustments on this receiver unless it becomes necessary to replace a coil or transformer, or the adjustments have been tampered with in the field. Always make certain that other circuit components, such as tubes, condensers, resistors, etc., are normal before proceeding with realignment.

If realignment is necessary follow the instructions given under the heading "Alignment Procedure." After realignment has been completed repeat the procedure as final check.

DIAL CORD DRIVE

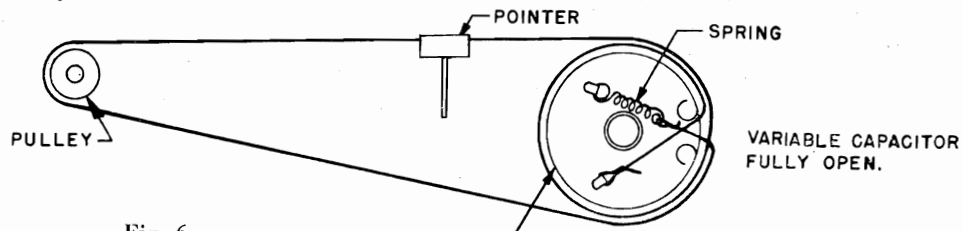


Fig. 6

**DIAL DRUM
HOW TO ORDER PARTS**

Always give the part No. (No. printed on the part if different from that shown on this list) and the name of the part. When No. is not available, give complete description of part and the Model No. of this receiver.

REPLACEMENT PARTS LIST

| SCHEMATIC DIAGRAM REF. NO. | PART NO. | DESCRIPTION |
|-------------------------------|-----------------|----------------------------------------|
| CONDENSERS | | |
| C2, C3, C5 | C207 | .05 MFD 200 volt condenser |
| C4, C12 | C209 | .5 MFD 100 volt condenser |
| C6 | CC200 | 100 MMFD ceramic condenser |
| C7, C9 | CC201 | 200 MMFD ceramic condenser |
| C8 | C203 | .002 MFD 400 volt condenser |
| C10, C13 | C206 | .01 MFD 400 volt condenser |
| C11 | C205 | .008 MFD 1600 volt condenser |
| CE-86 | CE-86 | 20 MFD 350 volt electrolytic condenser |
| | | 20 MFD 350 volt electrolytic condenser |
| | | 20 MFD 25 volt electrolytic condenser |
| CV1-CV2-CV3 | CV-100A | 3 section variable |
| RESISTORS | | |
| R1 | R309 | 1 megohm 1/2 watt 20% resistor |
| R2, R14 | R303 | 330 ohm 1/2 watt 20% resistor |
| R3 | R306 | 20K ohm 1/2 watt 20% resistor |
| R4 | R314 | 1.5K ohm 1/2 watt 20% resistor |
| R5 | RV-100 | Volume control 3/4 megohm with switch |
| R6 | R310 | 2 megohm 1/2 watt 20% resistor |
| R7 | R311 | 10 megohm 1/2 watt 20% resistor |
| R8 | R313 | 20K ohm 2 watt 20% resistor |
| R9 | R307 | 250K ohm 1/2 watt 20% resistor |
| R10, R11 | R301 | 100 ohm 1/2 watt 20% resistor |
| R12 | R312 | 1K ohm 1 watt 20% resistor |
| R13 | R303 | 500K ohm 1/2 watt 20% resistor |
| COILS AND TRANSFORMERS | | |
| L1-C1 | L200 | Motor noise elimination unit |
| L2 | 15353 or 57FB-3 | Antenna coil |
| L3 | 15054 or 57FB-4 | R.F. coil |
| L4 | L201 | R.F. oscillator coil |
| L5 | L203 | Choke "A" line |
| L6 | L202 | Choke, vibrator hash |

| PART NO. | DESCRIPTION |
|----------------------|---------------------------------------------------------------|
| T2 | 14977 or 1655-16 2nd IF transformer |
| T1 | 14977 or 1655-16 1st IF transformer |
| T3 | TV-100 or 318V-2 Vibrator transformer |
| T4 | Output transformer (Part of speaker not furnished separately) |
| DIAL PARTS | |
| D151 | Dial Scale |
| H151 | Dial Scale Holder |
| PS151 | Dial Pointer |
| T47 | Pilot Light |
| H114 | Pilot Light Socket |
| H203 | Pulley, idler |
| H204 | Spring, Dial Drive String Tension |
| H115 | String, dial drive |
| MISCELLANEOUS | |
| A300 | "A" lead assembly |
| H152 | Bezel Cup |
| H153 | Case, less covers for Power Supply Unit |
| H154 | Case, complete with covers for R.F. tuning unit |
| H207 | Clip, Anti-rattle |
| H208 | Clip, coil mounting |
| H102 | Cover, power supply unit mounting (with speaker louvres) |
| A201 | Fuse 15 Amp. |
| H155 | Knob |
| H156 | Mounting Bracket |
| 504PC-300 | Power Cable Assembly (complete with plug) |
| H212 | Receptacle, Antenna cable |
| 504-FC | Socket, power cable |
| PM-705 | Speaker, 5/4" PM (includes output transformer) |
| V-83 | Vibrator |
| H311 | Cup washer |
| H113 | 7/16-28 Hex nut |
| C100 | .5 MFD generator condenser |
| R100 | Distributor suppressor |

MODELS 610, F151,
1951 Ford

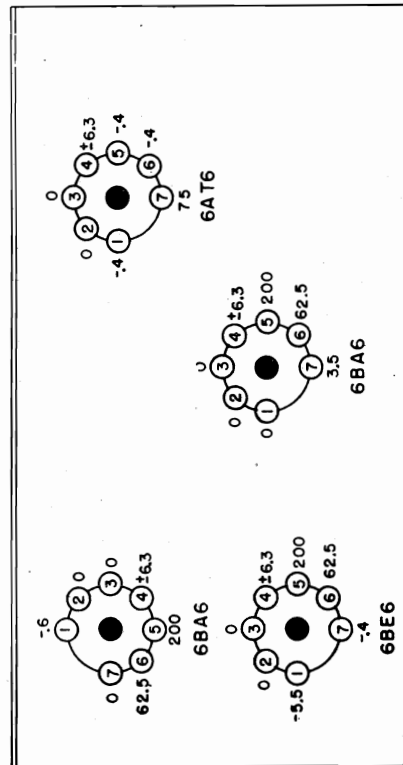
ALIGNMENT PROCEDURE

Volume control—Maximum, all adjustments.
 No signal applied to antenna.
 Power input—6.3 volts.
 Connect dummy antenna in series with output lead of signal generator.
 Connect ground lead of signal generator to chassis.
 Repeat alignment procedure as a final check.

The following equipment is necessary for proper alignment:
 Signal generator that will provide the test frequencies as listed, modulated 400 cycles, 30%.
 Non-metallic screwdriver.
 Output meter. (1.8 volt for 1 watt output.)
 Dummy antennas—.1 MFD., 100 MMFD.
 For alignment points refer to Schematic Diagram.

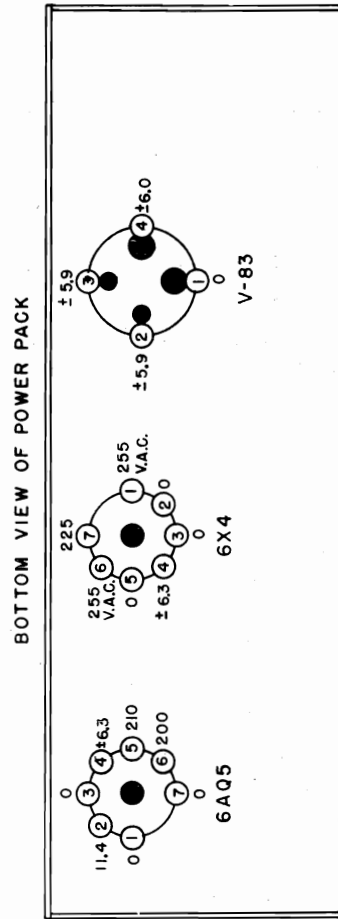
| Dial Setting | Generator Frequency | Dummy Ant. | Generator Connection | Trimmer Reference | Trimmer Adjustment | Trimmer Function |
|----------------------------------|---------------------|------------|----------------------|-------------------|--------------------|------------------|
| 1) Fully open | 455 KC | .1 MFD | 6BE6 Grid | T2 Top & bottom | Maximum | Output I.F. |
| 2) Fully open | 455 KC | .1 MFD | 6BE6 Grid | T1 Top & bottom | Maximum | Input I.F. |
| 3) Fully open | 1600 KC | 100 MMFD | Ant. lead | CV2 | Maximum | Oscillator |
| 4) Tune in signal from generator | 1400 KC | 100 MMFD | Ant. lead | CV3 | Maximum | RF Stage |
| 5) Tune in signal from generator | 1400 KC | 100 MMFD | Ant. lead | CV1 | Maximum | Antenna |
| 6) Tune in signal from generator | 600 KC | 100 MMFD | Ant. lead | I.3 | Maximum | RF Stage |
| 7) Tune in signal from generator | 600 KC | 100 MMFD | Ant. lead | L2 | Maximum | Antenna |

8) Repeat steps 4 and 5



FRONT OF CHASSIS

Fig. 7

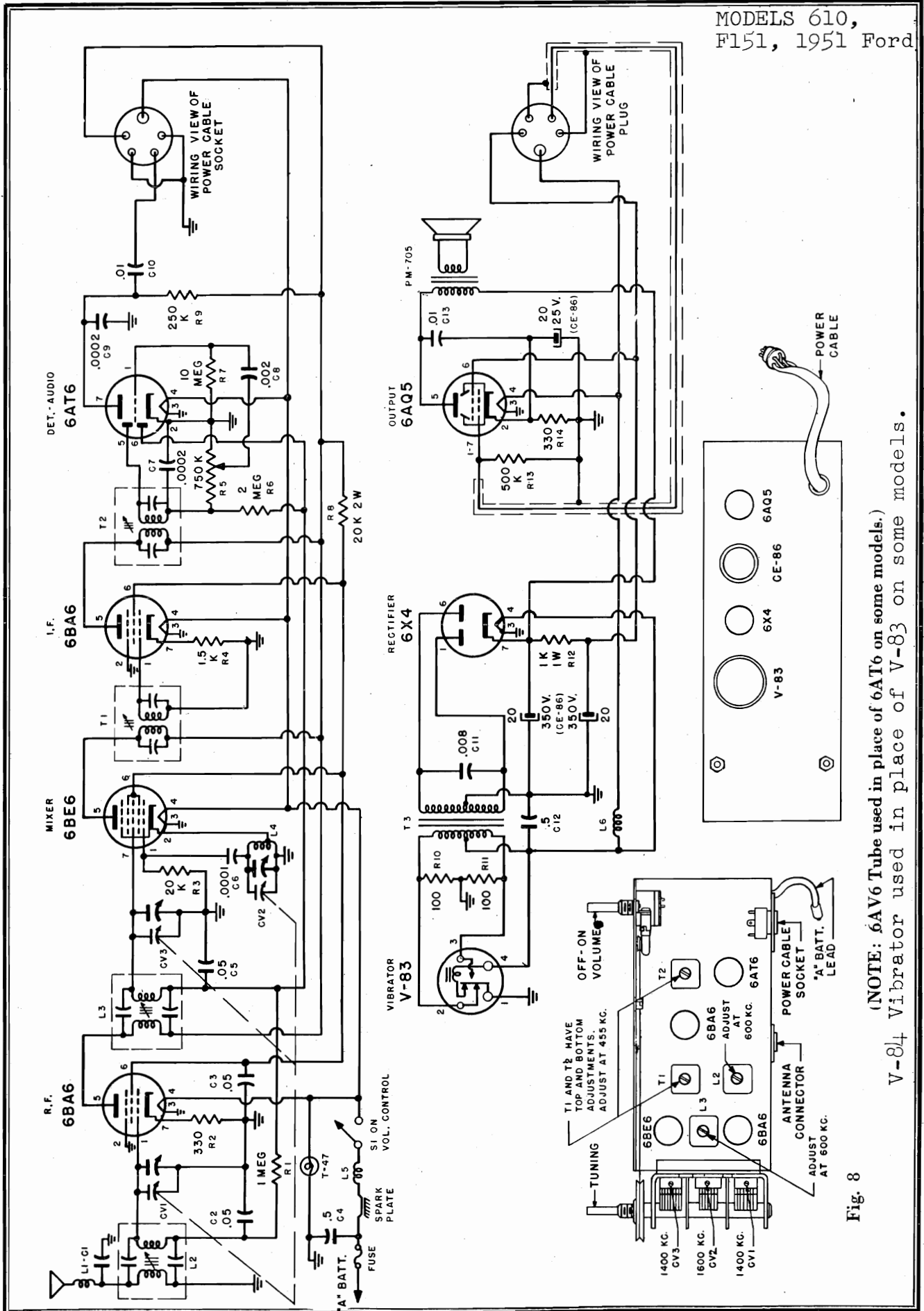


BOTTOM VIEW OF POWER PACK

SOCKET VOLTAGES

Fig. 7A

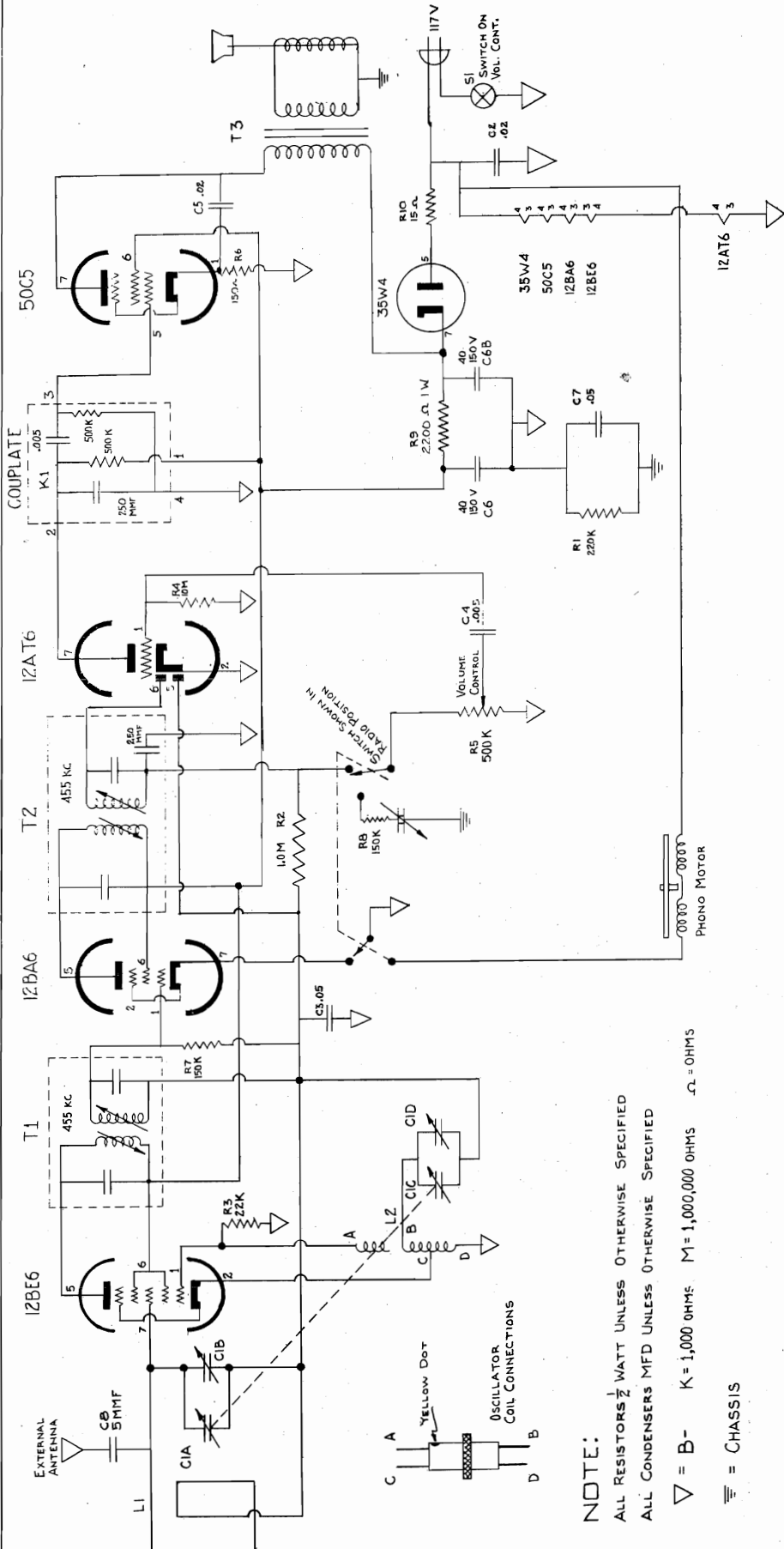
MODELS 610,
F151, 1951 Ford



(NOTE: 6AV6 Tube used in place of 6AT6 on some models.)
V-84 Vibrator used in place of V-83 on some models.

Fig. 8

MODEL 672.053



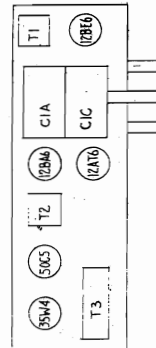
NOTE:
 ALL RESISTORS 1/2 WATT UNLESS OTHERWISE SPECIFIED
 ALL CONDENSERS MFD UNLESS OTHERWISE SPECIFIED

∇ = B- K = 1,000 OHMS M = 1,000,000 OHMS Ω = OHMS
 ≡ = CHASSIS

ALIGNMENT PROCEDURE

Feed a 455 K.C. modulated signal from grid (pin No. 7 12BE6 through a .01 M.F.D. condenser) and B-. Connect an output meter across the voice coil. Tune slugs on first and second I.F. transformers for maximum indication on meter. Set signal generator to 1600 KC modulated signal and couple loosely to loop antenna. Set dial to 1600 K.C. and tune oscillator trimmer for maximum indication on meter.

Set signal generator and dial to 1400 K.C. and tune R.F. trimmer, for maximum indication on meter. Check tracking at 600 K.C., knife gang if necessary. Repeat these adjustments until the receiver tracks correctly.



9-28-50

VOLTAGE CHART

| PIN | #1 | #2 | #3 | #4 | #5 | #6 | #7 |
|-------|------|----|------|-------|-------|------|-----|
| 12BE6 | -7.5 | 0 | 12AC | 23AC | 90 | 90 | 0 |
| 12BA6 | -0.8 | 0 | 23AC | 35AC | 90 | 90 | 0 |
| 12AT6 | -0.8 | 0 | 0 | 12AC | -0.8 | -0.5 | 45 |
| 50C5 | 6 | 0 | 35AC | 83AC | 0 | 90 | 120 |
| 35W4 | 0 | 0 | 83AC | 117AC | 115AC | 0 | 130 |

NOTES:

1. Measured with VTVM from indicated pin to B - line.
2. Phono-radio switch in radio position.
3. Line voltage set at 117V 60~AC.
4. Voltage s may vary considerably due to variations in line voltage and components.

PARTS LIST

CAPACITORS

| REF. NO. | PART NO. | DESCRIPTION |
|----------------|---------------|---------------------------------------------|
| C ₁ | A-1200-6 | TUNING CAPACITOR |
| C ₂ | CWZ 04203 M | .02 Mfd 400 volts |
| C ₃ | CWZ 04503 M | .05 Mfd 400 volts |
| C ₄ | CWZ 06502 M | .005 Mfd 600 volts |
| C ₅ | CWZ 04203 M | .02 Mfd 400 volts |
| C ₆ | CED - 4415 | DUAL 40 Mfd 150 volt electrolytic capacitor |
| C ₇ | CWR - 04503 M | .05 Mfd resonant |
| C ₈ | CCC, 05050 M | 5 Mmf ceramic or mica |

RESISTORS

| REF. NO. | PART NO. | DESCRIPTION |
|-----------------|-------------|-----------------------------------------------------|
| R ₁ | RCC 224 M | 220,000 ohms ± 20% ½ watt Resistor |
| R ₂ | RCC 105 M | 1.0 megohms ± 20% ½ watt Resistor |
| R ₃ | RCC 223 M | 22,000 ohms ± 20% ½ watt Resistor |
| R ₄ | RCC 106 M | 10 megohms ± 20% ½ watt Resistor |
| R ₅ | RVC - 301 S | 500,000 ohms volume control audio taper with switch |
| R ₆ | RCC 151 M | 150 ohms ± 20% ½ watt |
| R ₇ | RCC 154 M | 150,000 ohms ± 20% ½ watt |
| R ₈ | RCC 154 M | 150,000 ohms ± 20% ½ watt |
| R ₉ | RCF 222 M | 2,200 ohms ± 20% 1 watt |
| R ₁₀ | RCC 150 M | 15 ohms ± 20% ½ watt |

COILS AND TRANSFORMERS

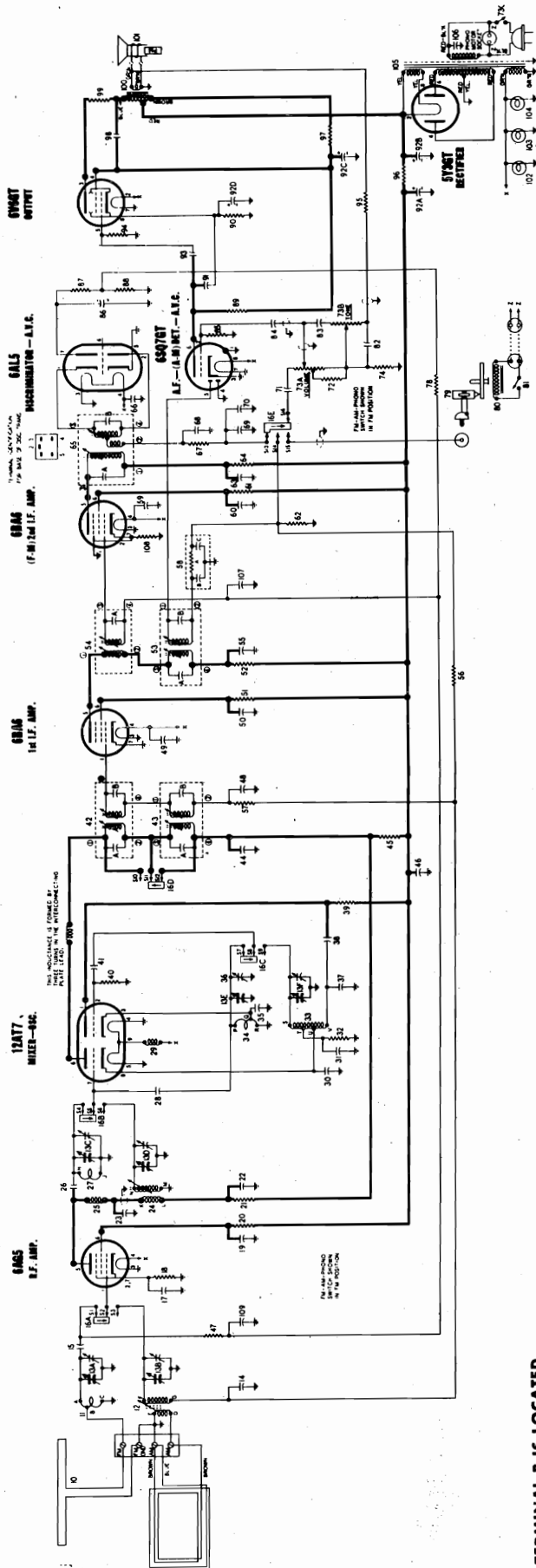
| REF. NO. | PART NO. | DESCRIPTION |
|----------------|---------------|---------------------------------------|
| L ₁ | A - 1493 - 10 | Loop Antenna |
| L ₂ | A - 1492 - 10 | Oscillator Coil |
| T ₁ | A - 1490 - 10 | Input IF Transformer |
| T ₂ | A - 1491 - 10 | Output IF Transformer |
| T ₃ | A - 1656 - 13 | Audio Output Transformer 2500Ω to 3.2 |

MISCELLANEOUS

| | |
|---------------|--------------------------|
| C - 2500 - 14 | Record changer - VM |
| A - 1059 - 4 | Control knob |
| A - 1060 - 4 | Pointer knob |
| 100-84 | Record Changer - Webster |

MODELS 9150-D,
9150-DZ

SERVICE DATA FOR STEWART-WARNER MODELS 9150-D & 9150-DZ



NOTE: For additional data, See Model 9150-B, Pgs. 21-1 to 21-8.

SOCKET VOLTAGES

Voltages measured at certain tube socket terminals on 9150-D and 9150-DZ chassis will differ as follows from those shown on the voltage chart for Model 9150-B on Page 1950-47; all other socket voltages remain unchanged.

Pin 1 of 12AT7 Mixer Osc.....203 v.
Pin 7 of 12BA6 (FM) 2nd I.F. Amp..... 1 v.

TERMINAL B IS LOCATED 1 1/4 TURN FROM TERMINAL A

FM ANT. COIL 506353

AM ANT. COIL 506354

FM R.F. COIL 506351

FM OSC. COIL 506352

TERMINAL Q IS LOCATED 3/8 TURN FROM TERMINAL R

AM OSC. COIL 506335

BAND SWITCH 506347

★ Not used; may serve as wiring junction point.

Lettered terminals in illustrations correspond to similarly lettered terminals on the circuit diagram.

MODELS 9150-D,
9150-DZ

PRODUCTION CHANGES

The Models 9150-D and 9150-DZ chassis have been designed to provide greater stability in the oscillator circuit and to adapt a single needle, ceramic type cartridge in the phono circuit, making it possible to play both standard and long playing records without changing cartridge or needle position. The phono pick-up filter circuit has been eliminated.

The circuit shown on this page applies to Models 9150-D and 9150-DZ chassis.

The following tabulation furnishes complete details on the circuit differences between the Model 9150-B chassis and the Models 9150-D and 9150-DZ chassis. Chassis incorporating these changes have the letter "A" stamped on rear surface of the chassis.

| Dia-gram No. | Description | Used On 9150-B | Used On 9150-D and/or 9150-DZ |
|--------------|------------------------------------|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| 39 | Resistor | 1,000 Ohms | 4,700 Ohms |
| 75 | Resistor | 68,000 Ohms | Omitted |
| 76 | Condenser | .01 MFD | Omitted |
| 77 | Resistor | 220,000 Ohms | Omitted |
| 95 | Resistor | 4,700 Ohms $\pm 20\%$ | 4,700 Ohms $\pm 10\%$ |
| 108 | Resistor | Omitted | 68 Ohms |
| 109 | Condenser | Omitted | 5000 Mmfd. |
| 79 | Pick-Up Cartridge | Crystal | Ceramic |
| 80 | Phono Motor | 508120—Used with VM-508222 Record Changer. | { 509301—Used with VM-509032 Record Changer on Model 9150-D. 520053—Used with GI-509522 Record Changer on Model 9150-DZ. |
| 81 | Switch—"ON-OFF" for Record Changer | 505269—Used with VM-508222 Record Changer. | { 509205—Used with VM-509032 Record Changer on Model 9150-D. 520037—Used with GI-509522 Record Changer on Model 9150-DZ. |

PARTS LIST

These parts are common to Models 9150-D and 9150-DZ only.
(Complete parts list given on service data sheet for Model 9150-B, Page 1950-48.)

| DIA-GRAM NO. | PART NO. | DESCRIPTION |
|--------------|----------|-------------|
|--------------|----------|-------------|

ELECTRICAL PARTS

- 39.....510249 Resistor—carbon 4,700 ohms $\pm 20\%$, 1 W....
- 95.....510148 Resistor—carbon 4,700 ohms $\pm 10\%$, 1/2 W....
- 108.....510115 Resistor—carbon 68 ohms $\pm 10\%$, 1/2 W....
- 109.....513013 Condenser—ceramic 5,000 Mmfd. 450 Volt....

RECORD CHANGER PARTS

(For mechanical parts, see page 129 in Record Changer Section of manual for information on VM-509032 used on Model 9150-D; or page 145 in Record Changer Section of manual for information on GI-509522 used on Model 9150-DZ.)

- 509032 Record Changer (3 speed) for Model 9150D....
- 509522 Record Changer (3 speed) for Model 9150-DZ
- 79.....509160 Cartridge, ceramic (includes needle).....
- 80.....{ 509301 Motor—115 Volt, 60 Cycle; Model 9150-D....
- { 520053 Motor—115 Volt, 60 Cycle; Model 9150-DZ
- 509161 Needle, phonograph; Models 9150-D and 9150-DZ
- 81.....{ 509205 Switch-changer, "OFF-ON"; Model 9150-D
- { 520037 Switch-changer, "OFF-ON"; Model 9150-DZ
- 508533 Inserts for 45 R.P.M. records; package of 12..

CABINET PARTS

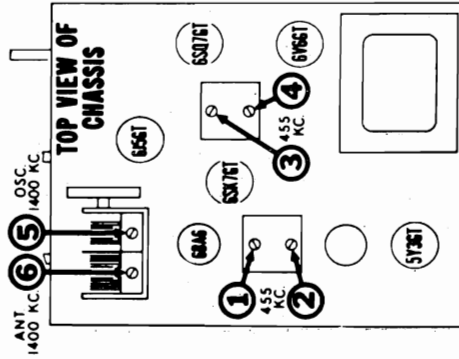
- 508991 Bracket-tie, for record changer pull-out mechanism; Models 9150-D and 9150-DZ.....
- 509033 Cabinet for Model 9150-D.....
- 509533 Cabinet for Model 9150-DZ.....
- 509025 Door, changer compartment; Models 9150-D and 9150-DZ
- 509026 Door, radio tilt, assembly (less pivot screws and door pull); Models 9150-D and 9150-DZ
- 509027 Door, record compartment; Models 9150-D and 9150-DZ
- 509051 Record changer base assembly; Model 9150-D
- 509781 Record changer base assembly; Model 9150-DZ
- 508990 Rod-tie, for record changer pull-out mechanism; Models 9150-D and 9150-DZ.....

MODELS 9154-C,
9154-CZ

ALIGNMENT PROCEDURE

1. With the gang condenser fully meshed, the dial pointer should be in a horizontal position at low end of dial, parallel to the bottom edge of dial scale. If it is set incorrectly, merely hold tuning control shaft steady and turn pointer to correct position.
2. Connect an output meter across the speaker voice coil or from the plate of the 6V6GT tube to chassis through a .1 Mfd. condenser.
3. Connect the ground lead of signal generator to the receiver chassis.
4. Set volume control at maximum position and use a weak signal from the signal generator.

| DUMMY ANT. IN SERIES WITH SIGNAL GENERATOR | CONNECT HIGH SIDE OF SIG. GENERATOR TO | SIGNAL GENERATOR FREQUENCY | RECEIVER DIAL SETTING | TRIMMER NUMBER | TRIMMER DESCRIPTION | TYPE OF ADJUSTMENT |
|--------------------------------------------|---------------------------------------------------------------------------------------------|---------------------------------|------------------------------------------------|----------------|----------------------|----------------------------------------------------|
| .1 MFD. Condenser | Lug on trimmer No. 6 on antenna section of gang (see figure below for location of trimmer). | 455 KC 400 cycle Modulation | Any point where it does not affect the signal. | 1-2 3-4 | 2nd I.F. 1st I.F. | Adjust for maximum output. Then repeat adjustment. |
| 200 MMFD. Mica Condenser | External Antenna Clip | 1400 KC 400 cycle Modulation | 1400 KC | 5 | Broadcast Oscillator | Adjust for maximum output. |
| 200 MMFD. Mica Condenser | External Antenna Clip | 1400 KC 400 cycle Modulation | Tune to 1400 KC generator signal | 6 | Broadcast Antenna | Adjust for maximum output. |

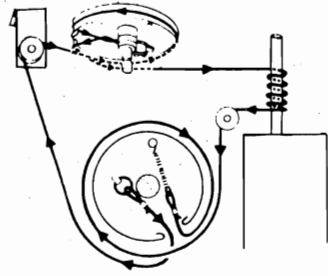
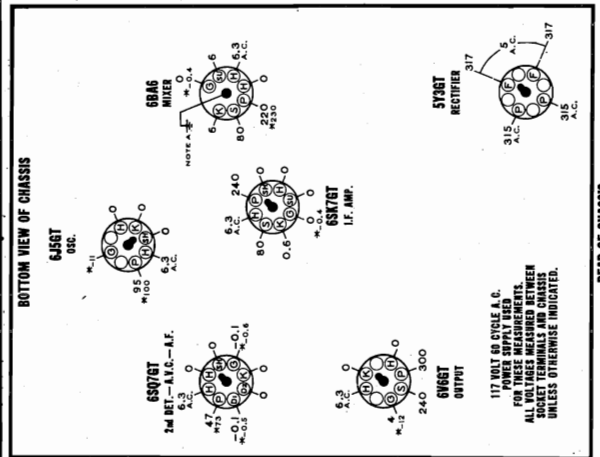


TRIMMER LOCATIONS

SOCKET VOLTAGES

All measurements made with a voltmeter having a sensitivity of 1000 ohms per volt except where indicated by (*). The (*) symbol designates a vacuum tube voltmeter measurement.

DIAL TUNED TO 540 KC.
VOLUME ON FULL WITH NO SIGNAL
"RADIO-BASS" POSITION



DIAL AND POINTER DRIVE CORD ARRANGEMENT

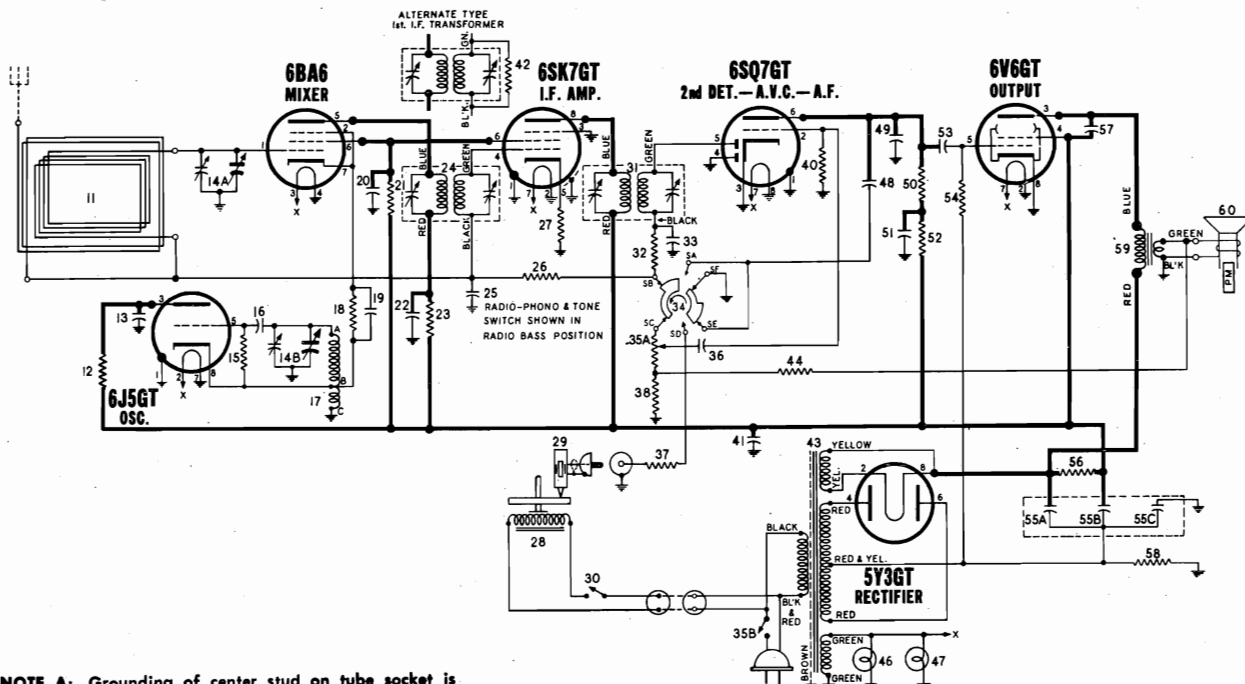
SIDE VIEW

To string dial cord, set gang condenser to fully open position and use the following parts:
 114955 Clip on end of cord
 117057 Cord (3 feet)
 119087 Ring for dial cord
 505161 Tension spring
 To replace and properly position pointer see step 1 in "Alignment Procedure" above.

AUDIO OSCILLATION

The audio system of this receiver utilizes a two stage type of inverse feed-back arrangement and should it ever be necessary to replace the speaker or output transformer it is important to maintain a definite phase relationship in the feed-back circuit. If the connections to the output transformer are reversed or if the feed-back connection is made to the wrong side of the output transformer secondary, the system will become regenerative instead of degenerative. Under those conditions, audio oscillation may result. If that occurs, oscillation may be prevented by reversing the connections to the speaker.

MODELS 9154-G,
9154-CZ

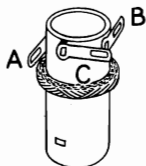


NOTE A: Grounding of center stud on tube socket is necessary to reduce capacity coupling between other pins. Oscillation may result if this ground is omitted.

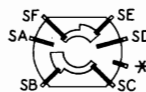
I.F. 455 KC.

PARTS LIST

OSCILLATOR COIL
505326



RADIO-PHONO & TONE SWITCH
505317



REAR VIEW
*Not used; may serve as wiring junction point.

Lettered terminals in illustrations correspond to similarly lettered terminals on the circuit diagram.

| DIA-GRAM. NO. | PART NO. | DESCRIPTION |
|-------------------------------|----------|----------------------------------------------------------------------------------------------|
| CONDENSERS | | |
| 13 | 512010 | Condenser—.01 Mfd. 400 volt..... |
| 14-A,B, | 505315 | Condenser—variable gang (with drum)..... |
| 16 | 512503 | Condenser—mica 100 Mmfd. 500 volt..... |
| 19 | 512026 | Condenser—.05 Mfd. 200 volt..... |
| 20 | 512028 | Condenser—.05 Mfd. 400 volt..... |
| 22 | 512016 | Condenser—.02 Mfd. 400 volt..... |
| 25 | 512026 | Condenser—.05 Mfd. 200 volt..... |
| 33 | 512503 | Condenser—mica 100 Mmfd. 500 volt..... |
| 36 | 512006 | Condenser—.005 Mfd. 600 volt..... |
| 41 | 512028 | Condenser—.05 Mfd. 400 volt..... |
| 48 | 512006 | Condenser—.005 Mfd. 600 volt..... |
| 49 | 512509 | Condenser—mica 260 Mmfd. 500 volt..... |
| 51 | 512034 | Condenser—.1 Mfd. 400 volt..... |
| 53 | 512016 | Condenser—.02 Mfd. 400 volt..... |
| 55-A, B, C, | 502207 | Condenser—electrolytic A—20 Mfd.—400 volt B—10 Mfd.—400 volt C—20 Mds.—25 volt..... |
| 57 | 512006 | Condenser—.005 Mfd. 600 volt..... |
| RESISTORS | | |
| 12 | 510263 | Resistor—carbon 33,000 Ohms ± 10% 1 watt..... |
| 15 | 510167 | Resistor—carbon 47,000 Ohms 1/2 watt..... |
| 18 | 510143 | Resistor—carbon 2,200 Ohms 1/2 watt..... |
| 21 | 510267 | Resistor—carbon 47,000 Ohms 1 watt..... |
| 23 | 510152 | Resistor—carbon 6,800 Ohms 1/2 watt..... |
| 26 | 510194 | Resistor—carbon 3.3 Meg. 1/2 watt..... |
| 27 | 510112 | Resistor—carbon 47 Ohms ± 10% 1/2 watt..... |
| 32 | 510167 | Resistor—carbon 47,000 Ohms 1/2 watt..... |
| 35-A,B, | 505318 | Volume Control 1 Meg. (with switch)..... |
| 37 | 510185 | Resistor—carbon 470,000 Ohms 1/2 watt..... |
| 38 | 510122 | Resistor—carbon 150 Ohms 1/2 watt..... |
| 40 | 510195 | Resistor—carbon 4.7 Meg. 1/2 watt..... |
| 42 | 510191 | Resistor—carbon 1 Meg. 1/2 watt..... |
| 44 | 510146 | Resistor—carbon 3,300 Ohms 1/2 watt..... |
| 50, 52 | 510179 | Resistor—carbon 220,000 Ohms 1/2 watt..... |
| 54 | 510185 | Resistor—carbon 470,000 Ohms 1/2 watt..... |
| 56 | 510346 | Resistor—carbon 3,300 Ohms 2 watt..... |
| 58 | 510707 | Resistor—wire wound 200 Ohms ± 5% 2 watt..... |
| COILS AND TRANSFORMERS | | |
| 11 | 505306 | Loop antenna..... |
| 17 | 505326 | Coil—oscillator..... |
| 24 | 502657 | Transformer—1st I.F..... |
| 31 | 502658 | Transformer—2nd I.F..... |
| 43 | 502174 | Transformer—power..... |
| 59 | 505305 | Transformer—output..... |

OTHER ELECTRICAL PARTS

| | |
|--------|-----------------------------------------------------------------------------------------|
| 509301 | Motor—115 V., 60 cycle, for type VM-509032 record changer; used on Model 9154-C |
| 28 | 520053 Motor—115 V., 60 cycle, for type GI-509522 record changer; used on Model 9154-CZ |
| 29 | 509160 Pick-up cartridge |
| | 509205 Switch—"OFF-ON" for type VM-509032 record changer; used on Model 9154-C. |
| 30 | 520037 Switch—"OFF-ON" for type GI-509522 record changer; used on Model 9154-CZ |
| 34 | 505317 Switch—radio-phono-tone |
| 46, 47 | 110629 Lamp—dial (Mazda #44) 6.3 V. 0.25 A. |
| 60 | 508174 Speaker—P. M. dynamic (6" x 9") |

MISCELLANEOUS PARTS

| | |
|--------|--------------------------------------------|
| 116467 | Base for mtg. electrolytic condenser..... |
| 505165 | "C" Washer..... |
| 509300 | Cabinet for Model 9154-C |
| 509530 | Cabinet for Model 9154-CZ |
| 112745 | Clip for mounting oscillator coil..... |
| 114955 | Clip—retainer on end of dial cord..... |
| 160326 | Clip—retains dial background..... |
| 117057 | Cord—dial drive (3 ft. required)..... |
| 509471 | Dial scale (foil)..... |
| 509819 | Drawer assembly for Model 9154-C..... |
| 509473 | Drawer assembly for Model 9154-CZ..... |
| 508350 | Escutcheon and dial window assembly..... |
| 508404 | Handle for record changer drawer..... |
| 505344 | Knob—tuning..... |
| 505345 | Knob—"VOLUME"..... |
| 505346 | Knob—"RADIO-PHONO"..... |
| 509161 | Needle for record changer..... |
| 500966 | Plug—phono. pick-up cable..... |
| 501031 | Plug—phono. motor cable..... |
| 505686 | Pointer..... |
| 509472 | Rail for drawer..... |
| 509032 | Record changer (3 speed) for Model 9154-C |
| 509522 | Record changer (3 speed) for Model 9154-CZ |
| 119087 | Ring for dial cord..... |
| 505944 | Rubber pad for mounting chassis..... |
| 79993 | Screw—No. 8 x 1 1/4" for mtg. chassis..... |
| 162054 | Shaft and drum for pointer..... |
| 505313 | Shaft, tuning..... |
| 117716 | Shield—tube..... |
| 504397 | Socket—miniature..... |
| 116690 | Socket—octal base..... |
| 160392 | Socket—octal (rectifier)..... |
| 160039 | Socket—phono. input..... |
| 505307 | Socket and phono. motor cable..... |
| 505459 | Socket—dial lamp..... |
| 505161 | Spring—dial cord tension..... |
| 111456 | Washer—spring washer for tuning shaft..... |

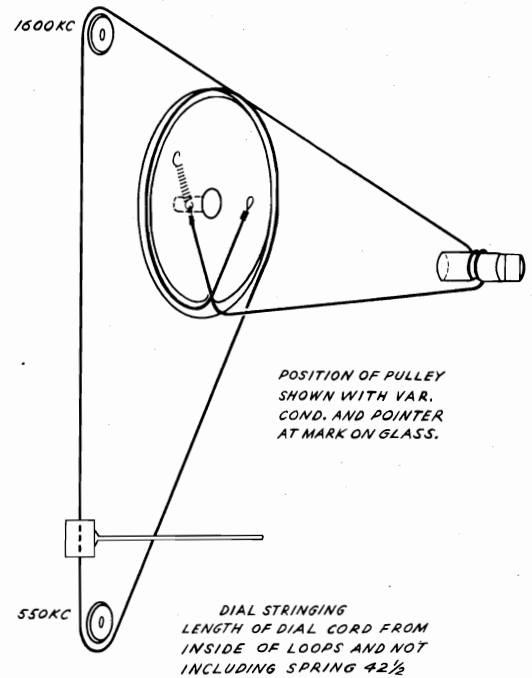
MODELS 1507PLA,
1507PLM, Ch. 112113

SPECIFICATIONS

Voltage Rating.....117 Volts, 60-Cycle
 Type of Circuit.....Superhetrodyne
 Tuning Range.....
 {AM — 535 KC to 1630 KC
 {FM — 87 MC to 109 MC
 Input Power Rating.....
 {Radio 80 Watts
 {Phono 110 Watts
 Intermediate Frequency.....
 {AM — 455 KC
 {FM — 10.7 MC
 Speaker Voice Coil Impedance.....3.2 Ohms
 Power Output.....3.8 Watts at 10% Distortion

TUBE COMPLEMENT

- 4 6BA6 RF & IF Amplifiers
- 1 12AT7 FM Converter
- 1 6BE6 AM Converter
- 1 6AL5 Ratio Detector
- 1 6AU6 Audio Amplifier
- 1 6V6GT Power Output
- 1 5Y3GT Rectifier



ALIGNMENT PROCEDURE 1507

On IF and Radio Detector transformers, primary slugs are under chassis and secondary slugs above chassis.
 Adjust AM loop trimmer after chassis is in cabinet for best reception at 1500 Kc.
 Adjust dial pointer to marker at top left of dial with condenser plates fully meshed.

A.M. - I.F.

| Band & Pointer | Signal Generator | VTVM or Scope Connection | Adjustment and Notes |
|------------------------|--------------------------------------------------------------------|----------------------------|---------------------------------------------------|
| 1. AM low end of dial. | 455 Kc. 400 cy. mod. to Pin 7 (Grid) of 6BE6 tube through .01 cap. | Term. 1 of T-2 and ground. | Adj. two AM-IF trans. using —3V DC Scale. |
| 2. " " | 455 Kc. swept 15 Kc. | " " | Adjust same for best double-trace curve on scope. |

F.M. - I.F.

| | | | |
|------------------------|------------------------------------------------------------------------------------|------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|
| 1. FM low end of dial. | 10.7 Mc. 400 cy. mod. to Pin 2 (Grid) of 12AT7 tube at RF Coil thru .01 capacitor. | Across C-72 (5 MF electrolytic) | Adj. two FM-IF trans. and pri. ratio det. trans., using—3 VDC scale. |
| 2. " " | 10.7 Mc. swept 150 Kc. | " " | Disconnect ground end of C-72 (5 mfd. electrolytic). Adj. as step 1 for best double-trace curve on scope. |
| 3. " " | 10.7 Mc. 400 cy. mod. to Pin 2 (Grid) of 12AT7 tube at RF Coil thru .01 capacitor. | Center of 2-100K resistors placed across C-72 and junction of C-73 and R-71. | Be sure VTVM is not grounded. Connect C-72, Adj. sec. ratio det. for 0 voltage. |

A.M. - R.F.

| | | | |
|----------------|------------------------------------------------------|----------------------------|---------------------------------------------------------|
| 1. AM 1500 Kc. | 1500 Kc. 400 cy. mod. coupled loosely to loop leads. | Term. 1 of T-2 and ground. | Adj. two trimmers on tuning cond., using low —DC scale. |
|----------------|------------------------------------------------------|----------------------------|---------------------------------------------------------|

F.M. - R.F.

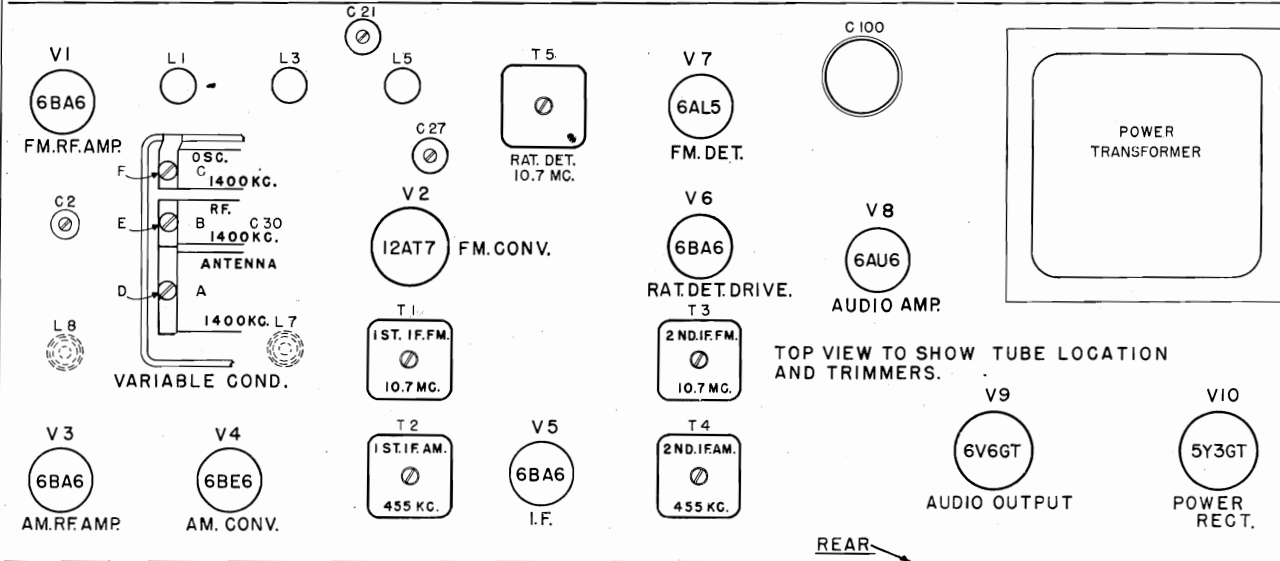
| | | | |
|---------------|----------------------------------------------------------------|--------------|-------------------------------------------------------------|
| 1. FM 100 mc. | 100 Mc. 400 cy. mod. to FM Ant. Terms., thru 270 ohm resistor. | Across C-72. | Adj. C-27 (Osc.) C-21 (RF) and C-2 (Ant.) on low —DC scale. |
|---------------|----------------------------------------------------------------|--------------|-------------------------------------------------------------|

Align both IF channels if either is out of adjustment.
 Use a non-metallic screwdriver and light pressure for slug adjustment.
 If FM osc. coil is replaced, adjust placement of its ground lead for tracking at 88 mc.

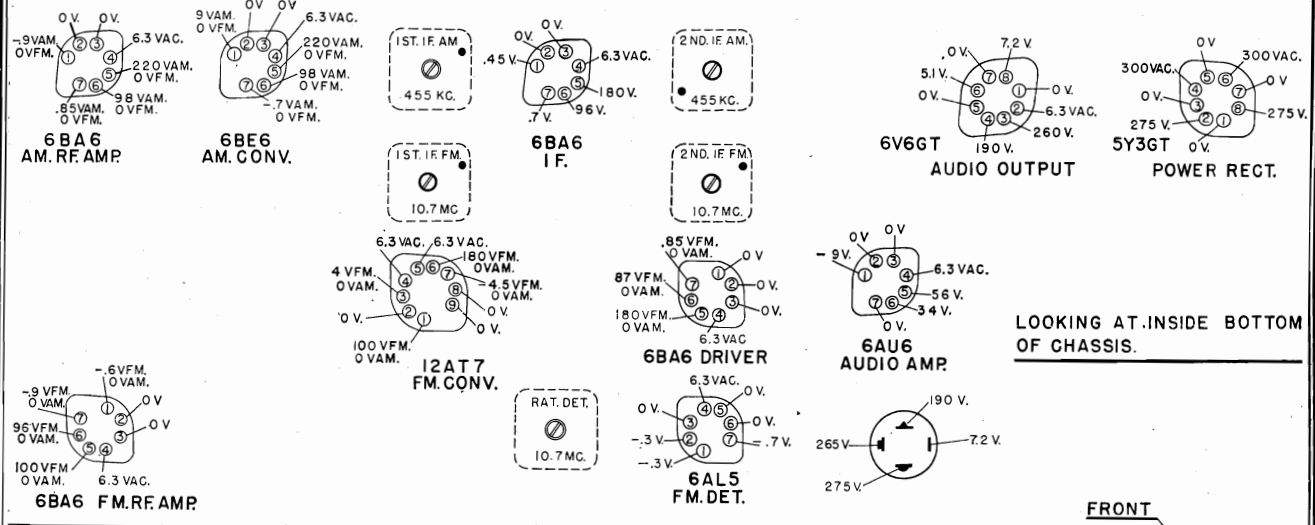
PAGE 22-2 STROMBERG-CARLSON

MODELS 1507PLA,
1507PLM, Ch. 112113

No. 1507 TUBE LOCATION CHART

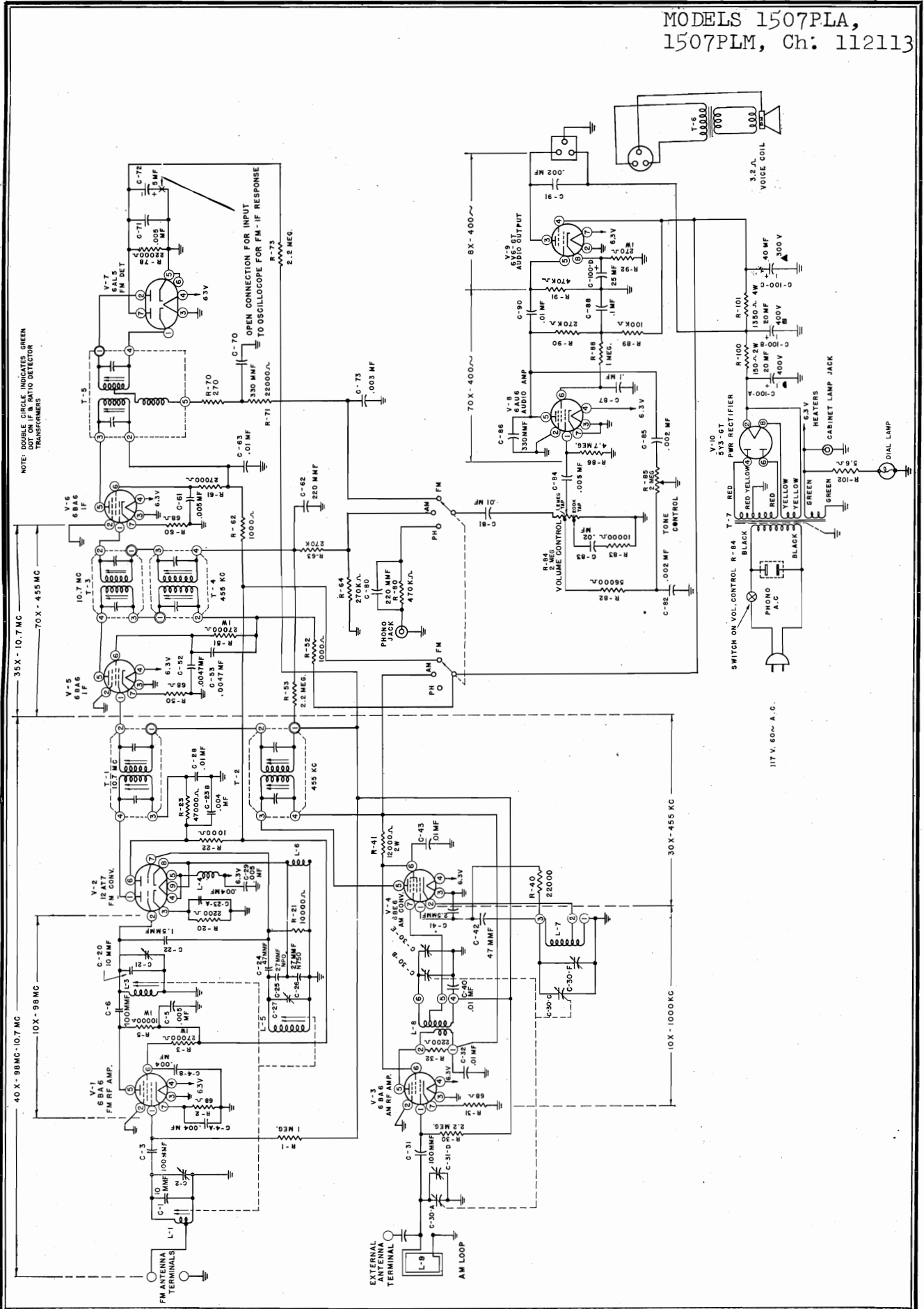


No. 1507 VOLTAGE CHART



ALL MEASUREMENTS MADE WITH SWITCH IN FM POSITION UNLESS OTHERWISE SPECIFIED. VOLTAGES MEASURED WITH RESPECT TO CHASSIS GROUND. DOTS ON I.F. TRANSFORMERS INDICATE THE POSITION OF THE COLOR CODED TERMINAL.

MODELS 1507PLA,
1507PLM, Ch: 112113



PAGE 22-4 STROMBERG-CARLSON

MODELS 1507PLA,
1507PLM, Ch. 112113

Resistors

| Circuit Symbol | S-C Part No. | Resistance | Watt | Tol. |
|----------------|--------------|------------|------|------|
| R-80 | 149117 | 470K ohms | 1/2 | 20% |
| R-82 | 28178 | 56K ohms | 1/2 | 10% |
| R-83 | 149107 | 10K ohms | 1/2 | 20% |
| R-84 | 114118 | 2 Meg. | Pot. | |
| R-85 | 145119 | 2 Meg. | Pot. | |
| R-86 | 149123 | 4.7 Meg. | 1/2 | 20% |
| R-88 | 149119 | 1 Meg. | 1/2 | 20% |
| R-89 | 149113 | 100K ohms | 1/2 | 20% |
| R-90 | 28184 | 270K ohms | 1/2 | 10% |
| R-91 | 149117 | 470K ohms | 1/2 | 20% |
| R-92 | 149170 | 270 ohms | 1W | 10% |
| R-100 | 149071 | 150 ohms | 2W | 20% |
| R-101 | 149321 | 1350 ohms | 4W | 10% |
| R-102 | 149374 | 5.6 ohms | 1/2 | 10% |

Coils

| Circuit Symbol | S-C Part No. | Type |
|----------------|--------------|--------------------|
| L-1 | 114097 | ANT. COIL (FM) |
| L-3 | 114098 | RF COIL (FM) |
| L-4 | 114693 | RF CHOKE (HEATER) |
| L-5 | 114098 | OSC. COIL (FM) |
| L-6 | 114693 | RF CHOKE (CATHODE) |
| L-7 | 114096 | OSC. COIL (AM) |
| L-8 | 114095 | RF COIL (AM) |
| L-9 | 139043 | LOOP ASM. |

Transformers

| Circuit Symbol | S-C Part No. | Description |
|----------------|--------------|--------------------------|
| T-1 | 114403 | 1st IF (10.7 Mc. FM) |
| T-2 | 114364 | 1st IF (455 KC. AM) |
| T-3 | 114363 | 2nd IF (10.7 Mc. FM) |
| T-4 | 114337 | 2nd IF (455 KC. AM) |
| T-5 | 114404 | RATIO DETECTOR |
| T-6 | 161257 | AUDIO OUTPUT TRANSFORMER |
| T-7 | 161032 | POWER TRANSFORMER |

Miscellaneous Chassis Parts

| Description | Chassis Model |
|--------------------------|---------------|
| Chassis Assembly | 112113 |
| Dial Lamp | 29956 |
| Phono Socket | 31539 |
| Dial Cord | 81702 |
| IF Transformer Mtg. Clip | 113030 |
| Core, FM Tuner Coil | 118045 |
| Dial Glass | 122039 |
| Pointer | 144022 |
| Drum Pulley Assembly | 147072 |
| Shield, 12A7 | 151067 |
| Shield Base, 12A7 | 151069 |
| Socket, Octal | 152014 |
| Socket, Speaker | 152033 |
| Socket, 12A7 | 152076 |
| Socket, 7 Pt. min. | 152098 |
| Socket, Dial Lamp | 152099 |
| Spring, Dial Cord | 156042 |
| Switch, Range | 158044 |

General Assembly Parts

| Description | PLM | PLA |
|-----------------------------------|--------|--------|
| Phono Back Panel | 101165 | 101165 |
| Phono Drawer Panel Bracket, Left | 105263 | 105263 |
| Phono Drawer Panel Bracket, Right | 105264 | 105264 |
| Cabinet Assembly | 108184 | 108183 |
| Escutcheon | 125057 | 125057 |
| Phono Slide | 132160 | 132160 |
| Knob | 134058 | 134058 |
| Knob — Indicator | 134070 | 134070 |
| Phono Assembly | 148045 | 148045 |
| Cab Light Socket & Plug Assem. | 152009 | 152009 |
| Speaker Assembly | 155190 | 155190 |
| Speaker | 155154 | 155154 |
| Lamp Cap Red | 801401 | 801401 |

Capacitors

| Circuit Symbol | S-C Part No. | Capacity | Type | Voltage |
|----------------|--------------|-----------------|--------------|---------|
| C-1 | 110469 | 10 MMF | NPO Ceramic | 500 |
| C-2 | 110045 | 1-12 MMF | Trimmer | |
| C-3 | 110460 | 100 MMF | GP Ceramic | 500 |
| C-4 | 110685 | .004 MF Dual | Disc Ceramic | |
| C-5 | 110586 | .005 MF | Disc Ceramic | 500 |
| C-6 | 110451 | 100 MMF | GP Ceramic | 500 |
| C-20 | 110469 | 10 MMF | NPO Ceramic | 400 |
| C-21 | 110045 | 1-12 MMF | Trimmer | |
| C-22 | 110438 | 1.5 MMF | | 500 |
| C-23 | 110685 | .004 MF Dual | Disc Ceramic | |
| C-24 | 110458 | 47 MMF | GP Ceramic | 500 |
| C-25 | 110689 | 27 MMF | NPO Ceramic | 400 |
| C-26 | 110690 | 27 MMF | N750 Ceramic | 400 |
| C-27 | 110045 | 1-12 MMF | Trimmer | |
| C-28 | 110687 | .01 MF | Tubular | 400 |
| C-29 | 110586 | .005 MF | Disc Ceramic | 500 |
| C-30 | 110044 | 3 Gang Variable | | |
| C-31 | 110451 | 100 MMF | GP Ceramic | 500 |
| C-32 | 110687 | .01 MF | Tubular | 400 |
| C-40 | 110672 | .01 MF | Disc Ceramic | 450 |
| C-41 | 110412 | 2.5 MMF | N750 Ceramic | 400 |
| C-42 | 110458 | 47 MMF | GP Ceramic | 500 |
| C-43 | 110687 | .01 MF | Tubular | 400 |
| C-52 | 110538 | .0047 MF | Tubular | 400 |
| C-53 | 110538 | .0047 MF | Tubular | 400 |
| C-61 | 110586 | .005 MF | Disc Ceramic | |
| C-62 | 110462 | 220 MMF | GP Ceramic | 350 |
| C-63 | 110540 | .01 MF | Tubular | 400 |
| C-70 | 110463 | 330 MMF | GP Ceramic | 350 |
| C-71 | 110586 | .005 MF | Disc Ceramic | 500 |
| C-72 | 111047 | 5 MF | Electrolytic | 50 |
| C-73 | 46315 | .003 MF | Tubular | 400 |
| C-80 | 110462 | 220 MMF | GP Ceramic | |
| C-81 | 110687 | .01 MF | Tubular | 400 |
| C-82 | 27646 | .002 MF | Tubular | 600 |
| C-83 | 25150 | .02 MF | Tubular | 400 |
| C-84 | 110688 | .005 MF | Tubular | 400 |
| C-85 | 27646 | .002 MF | Tubular | 600 |
| C-86 | 110463 | 330 MMF | GP Ceramic | |
| C-87 | 25483 | .1 MF | Tubular | 400 |
| C-88 | 25483 | .1 MF | Tubular | 400 |
| C-90 | 25485 | .01 MF | Tubular | 600 |
| C-91 | 27646 | .002 MF | Tubular | 600 |
| C-100 | 111090 | 20-20 MF | Electrolytic | 450 |
| | | 40 MF | Electrolytic | 350 |
| | | 25 MF | Electrolytic | 25 |

Resistors

| Circuit Symbol | S-C Part No. | Resistance | Watt | Tol. |
|----------------|--------------|------------|------|------|
| R-1 | 149119 | 1 Meg. | 1/2 | 20% |
| R-2 | 28144 | 68 ohms | 1/2 | 10% |
| R-3 | 34578 | 27K ohms | 1W | 10% |
| R-5 | 30417 | 10K ohms | 1W | 10% |
| R-20 | 28162 | 2200 ohms | 1/2 | 10% |
| R-21 | 149107 | 10K ohms | 1/2 | 20% |
| R-22 | 149101 | 1000 ohms | 1/2 | 20% |
| R-23 | 149111 | 47K ohms | 1/2 | 20% |
| R-30 | 149121 | 2.2 Meg. | 1/2 | 20% |
| R-31 | 28144 | 68 ohms | 1/2 | 10% |
| R-32 | 28162 | 2200 ohms | 1/2 | 10% |
| R-40 | 149109 | 22K ohms | 1/2 | 20% |
| R-41 | 149055 | 12K ohms | 2W | 10% |
| R-50 | 28144 | 68 ohms | 1/2 | 10% |
| R-51 | 34578 | 27K ohms | 1W | 10% |
| R-52 | 149101 | 1000 ohms | 1/2 | 20% |
| R-53 | 149121 | 2.2 Meg. | 1/2 | 20% |
| R-60 | 28144 | 68 ohms | 1/2 | 10% |
| R-61 | 34578 | 27K ohms | 1W | 10% |
| R-62 | 149101 | 1000 ohms | 1/2 | 20% |
| R-63 | 28184 | 270K ohms | 1/2 | 10% |
| R-64 | 28184 | 270K ohms | 1/2 | 10% |
| R-70 | 28151 | 270 ohms | 1/2 | 10% |
| R-71 | 149109 | 22K ohms | 1/2 | 20% |
| R-72 | 149107 | 10K ohms | 1/2 | 20% |
| R-73 | 149121 | 2.2 Meg. | 1/2 | 20% |

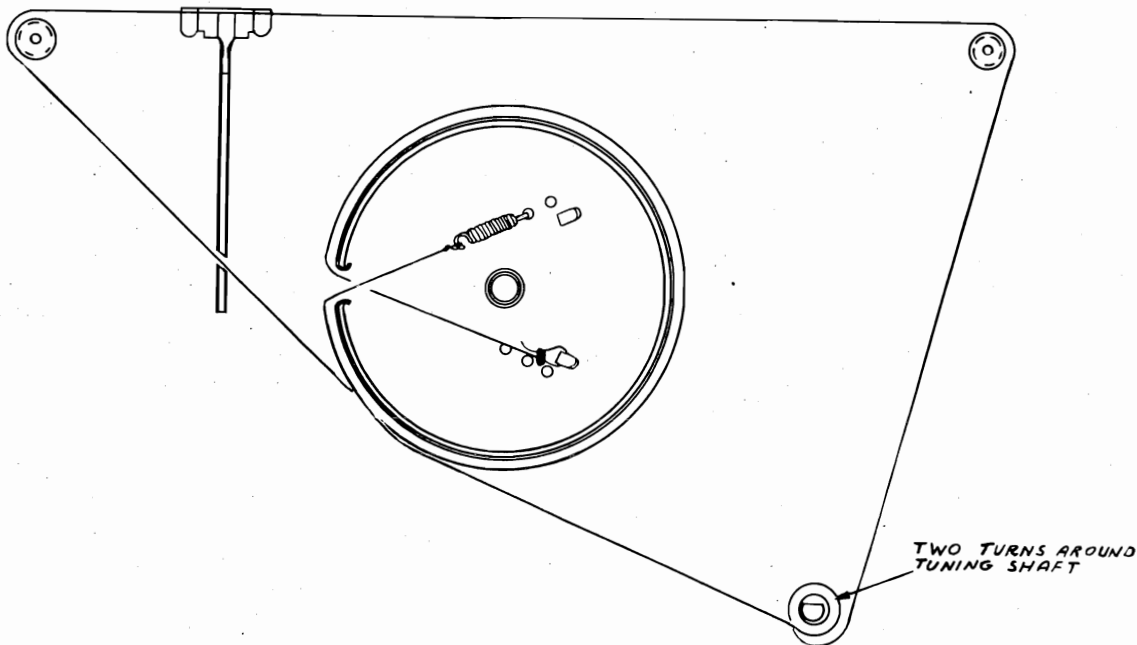
MODEL 1608,
Ch. 112125

TUBE COMPLEMENT

- 1 6BA6 RF Amplifier
- 1 6BE6 Converter
- 1 6BA6 IF Amplifier
- 1 6AV6 Detector and Phase Inverter
- 1 6AV6 Audio Amplifier
- 2 6V6-GT Push Pull Power Output
- 1 5Y3-GT Rectifier

SPECIFICATIONS

- Voltage Rating.....117 Volts, 60 Cycle
- Type of Circuit..... Superhetrodyne
- Tuning Range.....540 KC to 1630 KC
- Input Power Rating.....115 Watts
- Intermediate Frequency..... 455 KC
- Speaker Voice Coil Impedance..... 3.2 Ohms
- Power Output.....10 Watts at 10% distortion



POSITION OF PULLEY SHOWN WITH VARIABLE CONDENSER CLOSED AND POINTER AT MARK ON DIAL

ALIGNMENT PROCEDURE 1608

Adjust dial pointer to marker at extreme low frequency end of dial with variable condenser fully meshed.

Adjust AM loop trimmer after chassis is in cabinet for best reception at 1500 Kc.

Use a non-metallic screwdriver and light pressure for slug adjustment.

Set volume and tone controls for maximum.

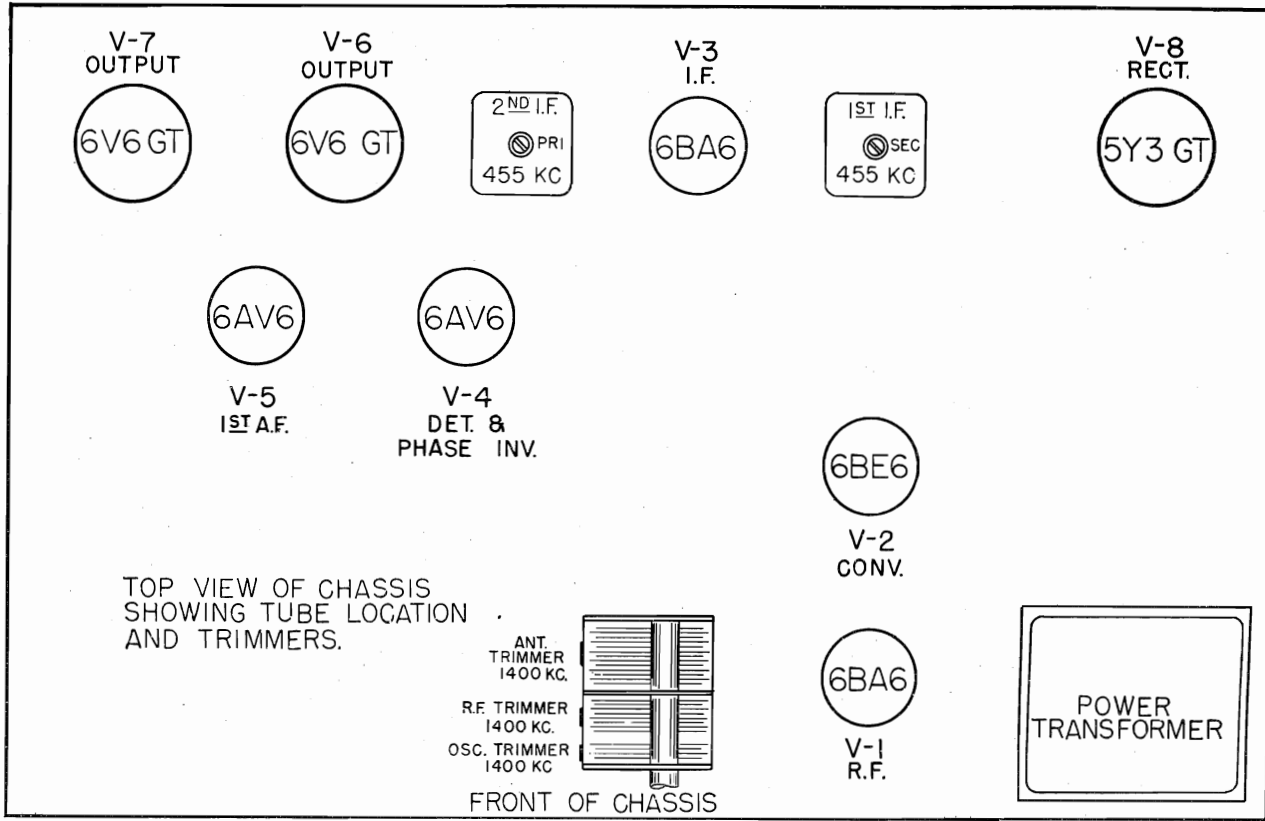
A.M. - I.F.

| Pointer | Signal Generator | VTVM Connection | Adjustment and Notes |
|--------------------------------|-----------------------------------------------------------------------|--------------------|------------------------------------------------------------------------|
| 1. Pointer at 1000 Kc. approx. | 455 Kc.-400 cy. modulation to grid of converter (pin 7 of V-2, 6BE6). | Terminal 2 of T-3. | Adjust top and bottom slugs of T-3 and T-4 for maximum output on VTVM. |
| 2. Pointer at 1400 Kc. | 1400 Kc.-400 cy. modulation to stator terminal of C-1-A. | Same as 1. | Adjust C-1-F and C-1-D for maximum output on VTVM. |
| 3. Pointer at 1400 Kc. | 1400 Kc.-400 cy. coupled through radiating loop. | Same as 1. | Readjust C-1-F, C-1-D, and C-1-B for maximum output on VTVM. |

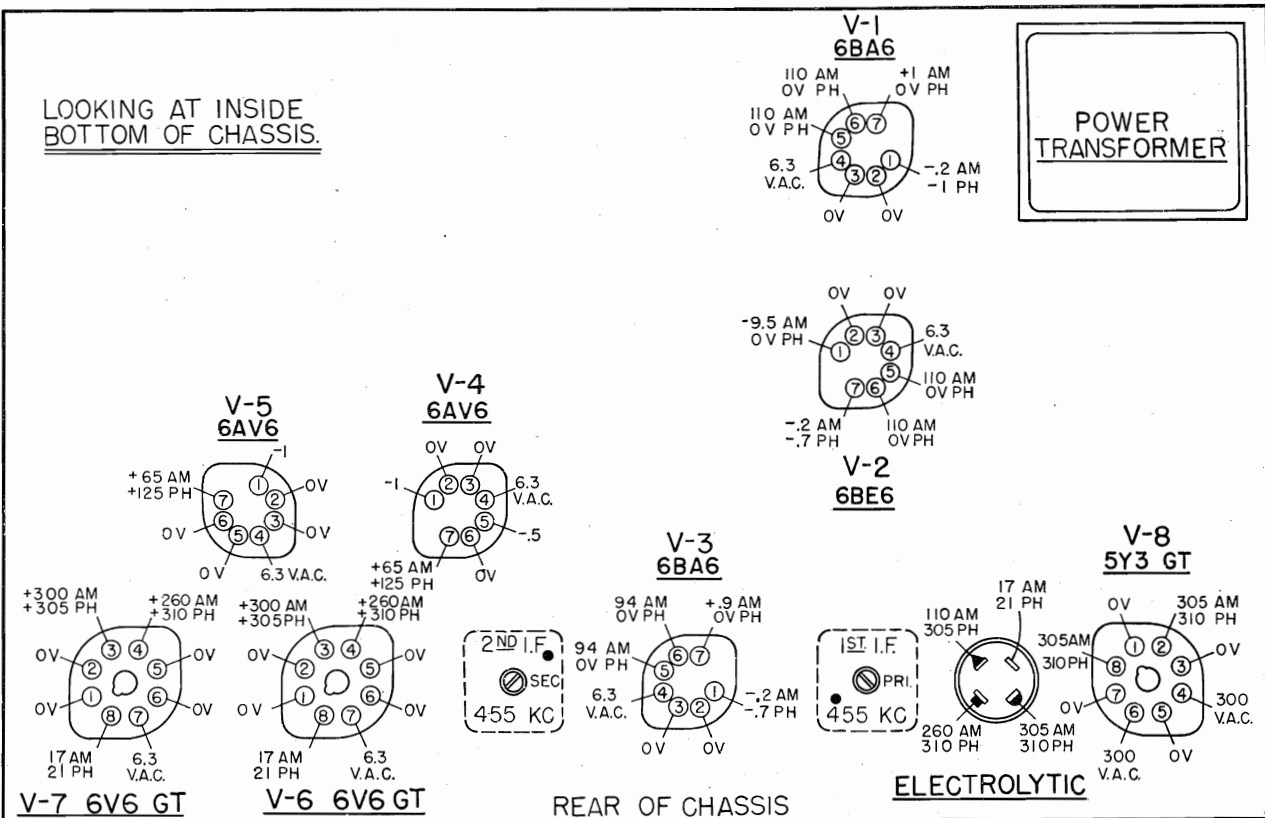
PAGE 22-6 STROMBERG-CARLSON

MODEL 1608,
Ch. 112125

No. 1608 TUBE LOCATION CHART

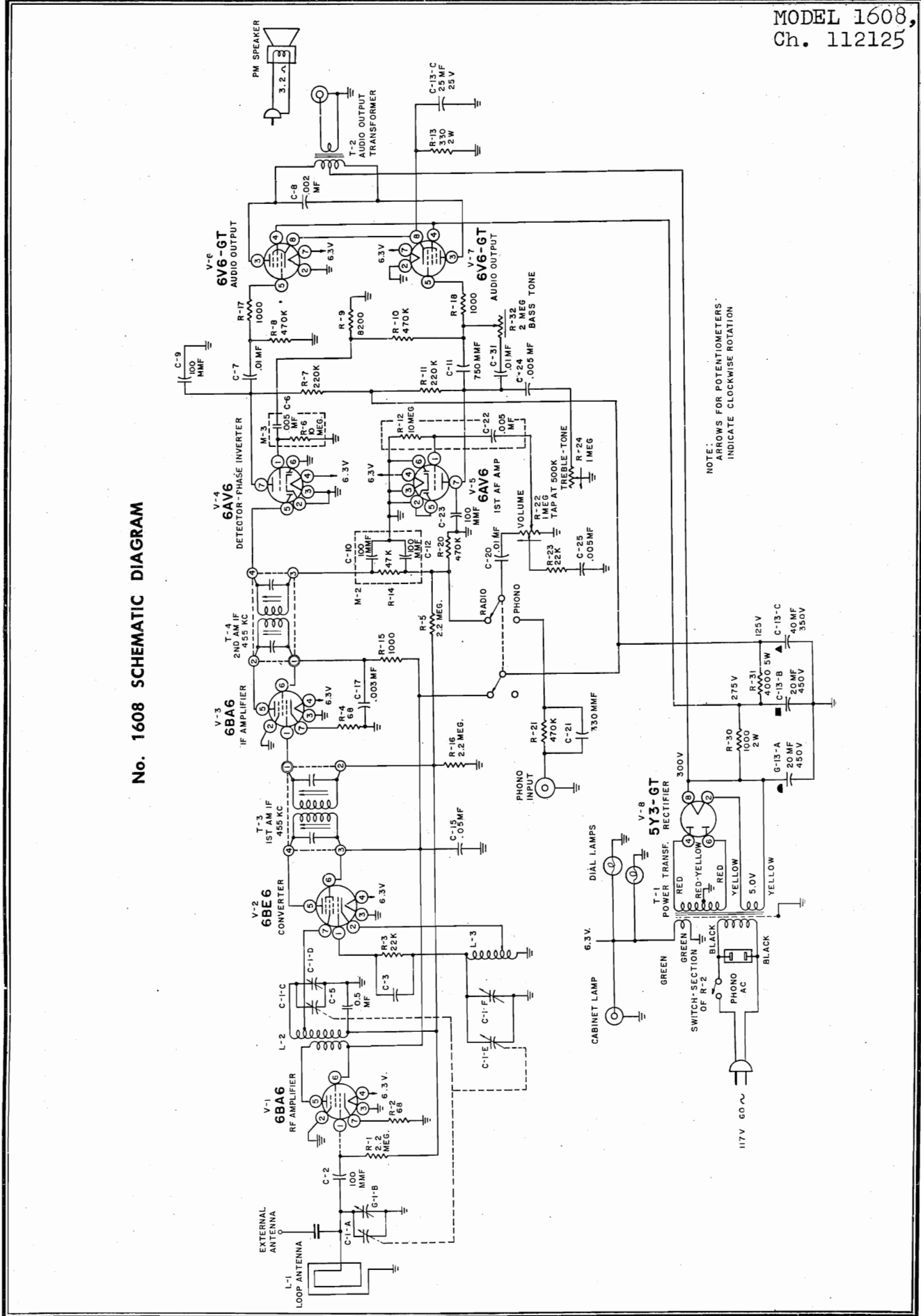


No. 1608 VOLTAGE CHART



VOLTAGES MEASURED TO CHASSIS GROUND WITH VTVM TYPE METER.
DOTS ON I.F. TRANSFORMERS INDICATE THE POSITION OF COLOR CODED TERMINAL.

No. 1608 SCHEMATIC DIAGRAM



MODEL 1608,
Ch. 112125

No. 1608 PARTS LISTS

CAPACITORS

| Circuit Symbol | S-C Part No. | Capacity | Type | Voltage |
|----------------|--------------|----------|------------|---------|
| C-1 | 110051 | 3 Gang | Variable | |
| C-2 | 110694 | 100 MMF | Ceramic GP | |
| C-3 | 110695 | 47 MMF | Ceramic GP | |
| C-5 | 110801 | .05 MF | Paper | 400 |
| *C-6 | See M-3 | .005 MF | Paper | 400 |
| C-7 | 110806 | .01 MF | Paper | 600 |
| C-8 | 110804 | .002 MF | Paper | 600 |
| C-9 | 110694 | 100 MMF | Ceramic GP | |
| *C-10 | See M-2 | 100 MMF | Ceramic GP | |
| C-11 | 110676 | 750 MMF | Ceramic GP | 350 |
| *C-12 | See M-2 | 100 MMF | Ceramic GP | |
| C-13 | 111090 | | Electrolyt | |
| C-15 | 110801 | .05 MF | Paper | 400 |
| C-17 | 110698 | .003 MF | Paper | 400 |
| C-20 | 110687 | .01 MF | Paper | 400 |
| C-21 | 110463 | 330 MMF | Ceramic GP | 350 |
| *C-22 | See M-1 | .005 MF | Paper | 400 |
| C-23 | 110694 | 100 MMF | Ceramic GP | 500 |
| C-24 | 110688 | .005 MF | Paper | 400 |
| C-25 | 110688 | .005 MF | Paper | 400 |
| C-31 | 110806 | .01 MF | Paper | 600 |

RESISTORS

| Circuit Symbol | S-C Part No. | Resistance. | Watt | Tol. |
|----------------|--------------|-----------------------------|------|------|
| R-1 | 149121 | 2.2 Meg. | 1/2 | 20% |
| R-2 | 149094 | 68 ohms | 1/2 | 20% |
| R-3 | 149109 | 22K ohms | 1/2 | 20% |
| R-4 | 149094 | 68 ohms | 1/2 | 20% |
| R-5 | 149121 | 2.2 Meg. | 1/2 | 20% |
| *R-6 | See M-3 | 10 Meg. | 1/2 | 20% |
| R-7 | 149117 | 470K ohms | 1/2 | 20% |
| R-8 | 149117 | 470K ohms | 1/2 | 10% |
| R-9 | 28169 | 8200 ohms | 1/2 | 10% |
| R-10 | 149115 | 220K ohms | 1/2 | 20% |
| R-11 | 149115 | 220K ohms | 1/2 | 20% |
| *R-12 | See M-1 | 10 Meg. | 1/2 | 20% |
| R-13 | 149020 | 330 ohms | 2 W | 10% |
| *R-14 | See M-2 | 47K ohms | 1/2 | 10% |
| R-15 | 149101 | 1000 ohms | 1/2 | 20% |
| R-16 | 149121 | 2.2 Meg. | 1/2 | 20% |
| R-17 | 149101 | 1000 ohms | 1/2 | 20% |
| R-18 | 149101 | 1000 ohms | 1/2 | 20% |
| R-20 | 149117 | 470K ohms | 1/2 | 20% |
| R-21 | 149117 | 470K ohms | 1/2 | 20% |
| R-22 | 145135 | 1 Meg., Pot. Volume Control | | |
| R-23 | 149109 | 22K ohms | 1/2 | 20% |
| R-24 | 145137 | 1 Meg., Pot. Treble Control | | |
| R-30 | 149076 | 1000 ohms | 2 W | 20% |
| R-31 | 149330 | 4000 ohms | 5 W | |
| R-32 | 145136 | 2 Meg., Pot. Bass Control | | |

TUBES

| Circuit Symbol | S-C Part No. | Description |
|----------------|--------------|----------------------------|
| V-1 | 162012 | 6BA6 — RF AMPLIFIER |
| V-2 | 162013 | 6BE6 — CONVERTER |
| V-3 | 162012 | 6BA6 — IF AMPLIFIER |
| V-4 | 162066 | 6AV6 — DET & PHASE INVERT. |
| V-5 | 162066 | 6AV6 — 1st AF AMP. |
| V-6 | 162136 | 6V6-GT — AUDIO OUTPUT |
| V-7 | 162136 | 6V6-GT — AUDIO OUTPUT |
| V-8 | 162108 | 5Y3-GT — RECTIFIER |

COILS

| Circuit Symbol | S-C Part No. | Type |
|----------------|--------------|--------------|
| L-1 | 139051 | LOOP ANTENNA |
| L-2 | 114405 | RF COIL |
| L-3 | 114096 | OSC. COIL |

TRANSFORMERS

| Circuit Symbol | S-C Part No. | Description |
|----------------|--------------|---------------------|
| T-1 | 161032 | POWER TRANSFORMER |
| T-2 | 161261 | AUDIO OUTPUT |
| T-3 | 114364 | 1st AM IF (455 Kc.) |
| T-4 | 114364 | 2nd AM IF (455 Kc.) |

MISCELLANEOUS

| Circuit Symbol | S-C Part No. | Description |
|----------------|--------------|-----------------|
| M-1 | 128201 | CIRCUIT NETWORK |
| M-2 | 110478 | DIODE FILTER |
| M-3 | 128201 | CIRCUIT NETWORK |

Note:

For substitution of networks with separate components, use the following:

| | |
|------------------|------------------|
| R-6 S-C #149125 | C-6 S-C #110688 |
| R-12 S-C #149125 | C-10 S-C #110694 |
| R-14 S-C # 28177 | C-12 S-C #110694 |
| | C-22 S-C #110688 |

GENERAL ASSEMBLY

| Description | SC Part No. |
|----------------------------|-------------|
| Pilot Lamp | 29956 |
| Back Panel | 101191 |
| Cabinet Assembly | 108216 |
| Chassis Assembly | 112125 |
| Escutcheon | 125061 |
| Phono-Slide | 132160 |
| Knob-off-on-volume | 134171 |
| Knob-Bass-Tone | 134171 |
| Knob-Treble-Tone | 134171 |
| Knob-Tuning | 134171 |
| Knob-Phono-Radio | 134172 |
| Phono-Assembly | 148050 |
| Pilot Lamp Socket and Plug | 152050 |
| Speaker Assembly | 155199 |
| Grille Cloth | 130166 |
| Bullet Catch | 132016 |
| Door Pull | 132188 |
| Hinge, R-H | 132186 |
| Hinge, L-H | 132187 |
| Door Set | 81789 |

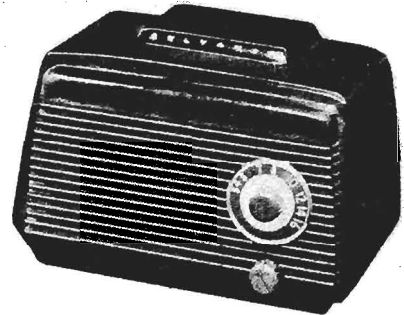
CHASSIS PARTS

| Description | SC Part No. |
|----------------------------|-------------|
| Tuning Shaft C-Washer | 27668 |
| Dial Lamp | 29956 |
| Speaker Socket | 31539 |
| Phono Socket | 34421 |
| Bracket — R. H. Dial | 105337 |
| Bracket — L. H. Dial | 105338 |
| Bracket — Antenna | 105341 |
| IF Transformer Clip | 113030 |
| Antenna Loop Assm. | 139051 |
| Dial Plate | 142172 |
| Pointer Assembly | 144023 |
| Idler Pulley | 147029 |
| Dial Light Shield | 151001 |
| Tube Shield Base | 151077 |
| Tube Shield | 151094 |
| Socket-octal | 152014 |
| Socket — AC outlet | 152038 |
| Socket — 7 pt min. | 152098 |
| Socket — Dial Light Assem. | 152109 |
| Dial Cable Spring | 156042 |
| Dial Cable | 81791 |

MODELS 1-250, 1-251,
1-252, Ch. 1-215

GENERAL DESCRIPTION

Models 1-250, 1-251 and 1-252 are compact, 5 tube AC-DC type broadcast receivers. The models are the same except for cabinet color. Model 1-250 is a black molded plastic. Model 1-251 is walnut finish and Model 1-252 is finished in ivory. The receiver has a built-in loop antenna and once the station is tuned in, the receiver should be rotated and left in the position where the signal is received with maximum volume. There is no provision for an external antenna connection. The circuit is of the isolated chassis type. Controls are provided for tuning and on-off and volume.



SPECIFICATIONS

POWER SUPPLY 117 Volts DC,
60 cycle AC, 30 Watts

FREQUENCY RANGE 535-1620 Kc.

INTERMEDIATE FREQUENCY 455 Kc.

POWER OUTPUT
Undistorted 1.0 Watt
Maximum 1.5 Watts

SPEAKER 5" P.M., 4.7 oz. magnet

SYLVANIA TUBE COMPLEMENT

| Function | Type |
|-------------------------------|-------|
| Converter | 12BE6 |
| I. F. Amplifier | 12BA6 |
| 2nd Det. - A. V. C. 1st A. F. | 12AT6 |
| Audio Output | 50C5 |
| Rectifier | 35W4 |

ALIGNMENT PROCEDURE

PRELIMINARY ADJUSTMENTS

Set volume control to maximum position.

Allow chassis and signal generator to warm up for several minutes.

No output meter need be used.

I. F. ALIGNMENT

1. Tune receiver to approximately 1000 Kc.; where no audible reception is heard.
2. Tune signal generator to 455 Kc. with 400 cycle modulation and connect output between receiver B- and control grid (pin 7) of 12BE6 converter tube through a 0.1 mfd. capacitor.
3. Align I. F. transformers T1 & T2 by aligning first the cores accessible from under

the chassis and then the top cores.

4. Keep the output from the generator at its lowest possible value to prevent the AVC from interfering with accurate alignment.

R. F. ALIGNMENT

1. Connect a Hazeltine Loop to the output of the signal generator to radiate the signal into the receiver.
2. Set receiver variable capacitor to minimum capacity.
3. Tune the signal generator to 1650 Kc. with 400 cycle modulation and adjust the oscillator trimmer C4 for maximum output.
4. Tune the receiver to a frequency between 1420 Kc. and 1500 Kc.; where no audible reception is heard.
5. Adjust antenna trimmer C2 for maximum output.

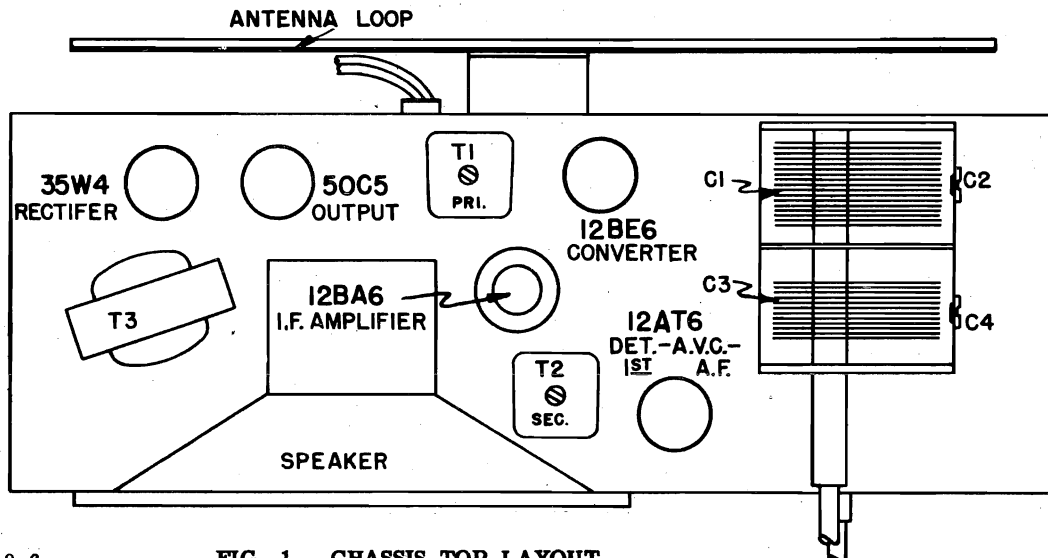


FIG. 1 - CHASSIS TOP LAYOUT

4-10-50 9-6

MODELS 1-250, 1-251, 1-252, 510B, 510H, 510W, Ch. 1-215

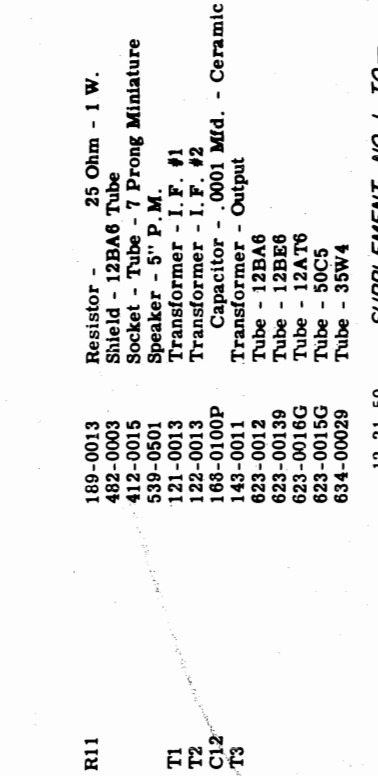


FIG. 2 - CHASSIS BOTTOM LAYOUT

- 189-0013 Resistor - 25 Ohm - 1 W.
- 482-0003 Shield - 12BA6 Tube
- 412-0015 Socket - Tube - 7 Prong Miniature
- 539-0501 Speaker - 5" P.M.
- 121-0013 Transformer - I. F. #1
- 122-0013 Transformer - I. F. #2
- 168-0100P Capacitor - .0001 Mfd. - Ceramic
- 143-0011 Transformer - Output
- 623-0012 Tube - 12BA6
- 623-00139 Tube - 12BE6
- 623-0016G Tube - 12AT6
- 623-0015G Tube - 50C5
- 634-00029 Tube - 35W4

12-21-50 SUPPLEMENT NO. 1 TO - 9-6
 ADDITION TO SERVICE INFORMATION FOR CHASSIS 1-215

REPAIR PARTS LIST

Repair Parts for the I. F. Transformers in the Repair Parts List should read as follows:

| SCHEMATIC LOCATION | PART NUMBER | DESCRIPTION |
|--------------------|-------------|----------------------------------------------|
| C13 | 170-0002 | Capacitor - 2 Gang Variable |
| C1, C3 | 487-0004 | Clip - I. F. Transformer Mtg. |
| L1 | 113-0015 | Coil - Oscillator |
| R4 | 152-0004 | Control - On-Off & Volume |
| | 195-0002 | Cord - A. C. Line |
| | 722-0010 | Dial - Station - Plastic |
| | 740-0005 | Knob (For Black Cabinet) |
| | 740-0007 | Knob (For Walnut Cabinet) |
| | 740-0008 | Knob (For Ivory Cabinet) |
| | 582-0002 | Loop - Antenna |
| R9 | 181-0151 | Resistor - 150 Ohm - 1/2 W. |
| R10 | 182-0122 | Resistor - 1,200 Ohm - 1 W. |
| R1 | 181-0223 | Resistor - 22,000 Ohm - 1/2 W. |
| R3, R6 | 181-0473 | Resistor - 47,000 Ohm - 1/2 W. |
| R7, R8 | 181-0474 | Resistor - 470,000 Ohm - 1/2 W. |
| R2 | 181-0225 | Resistor - 2.2 Megohm - 1/2 W. |
| R5 | 181-0106 | Resistor - 10 Megohm - 1/2 W. |
| C15 | 162-0625 | Capacitor - Paper - .005 Mfd. - 600 V. |
| C5 | 162-0411M | Capacitor - Paper - .01 Mfd. - 400 V. |
| C16 | 162-0612 | Capacitor - Paper - .02 Mfd. - 600 V. |
| C7, C14, C19 | 162-0615 | Capacitor - Paper - .05 Mfd. - 500 V. |
| C6 | 166-0100P | Capacitor - Ceramic - .0001 Mfd. - 500 V. |
| C17 | 161-2002 | Capacitor - Electrolytic - 40 Mfd. - 150 V. |
| C18 | 170-0002 | Capacitor - 2 Gang Variable |
| C1, C3 | 487-0004 | Clip - I. F. Transformer Mtg. |
| L1 | 113-0015 | Coil - Oscillator |
| R4 | 152-0004 | Control - On-Off & Volume |
| | 195-0002 | Cord - A. C. Line |
| | 722-0010 | Dial - Station - Plastic |
| | 740-0005 | Knob (For Black Cabinet) |
| | 740-0007 | Knob (For Walnut Cabinet) |
| | 740-0008 | Knob (For Ivory Cabinet) |
| | 582-0002 | Loop - Antenna |
| R9 | 181-0151 | Resistor - 150 Ohm - 1/2 W. |
| R10 | 182-0122 | Resistor - 1,200 Ohm - 1 W. |
| R1 | 181-0223 | Resistor - 22,000 Ohm - 1/2 W. |
| R3, R6 | 181-0473 | Resistor - 47,000 Ohm - 1/2 W. |
| R7, R8 | 181-0474 | Resistor - 470,000 Ohm - 1/2 W. |
| R2 | 181-0225 | Resistor - 2.2 Megohm - 1/2 W. |
| R5 | 181-0106 | Resistor - 10 Megohm - 1/2 W. |
| T1 | 121-0013 | Transformer - I. F. #1 (R69301) matched pair |
| T2 | 122-0013 | Transformer - I. F. #2 (R69302) matched pair |
| T1 | 121-0016 | Transformer - I. F. #1 (R69303) matched pair |
| T2 | 122-0016 | Transformer - I. F. #2 (R69304) matched pair |

These two sets of I. F. transformers are matched pairs and must be matched for replacement. The "R" number above is stamped on the shield in each case. Replacement must be made only with a transformer having the same "R" number stamped on the shield as the old part.

CODE CHANGES FOR CHASSIS 1-215

- C01 - certain changes to meet Underwriter's requirements
- C02 - factory information only, does not affect service

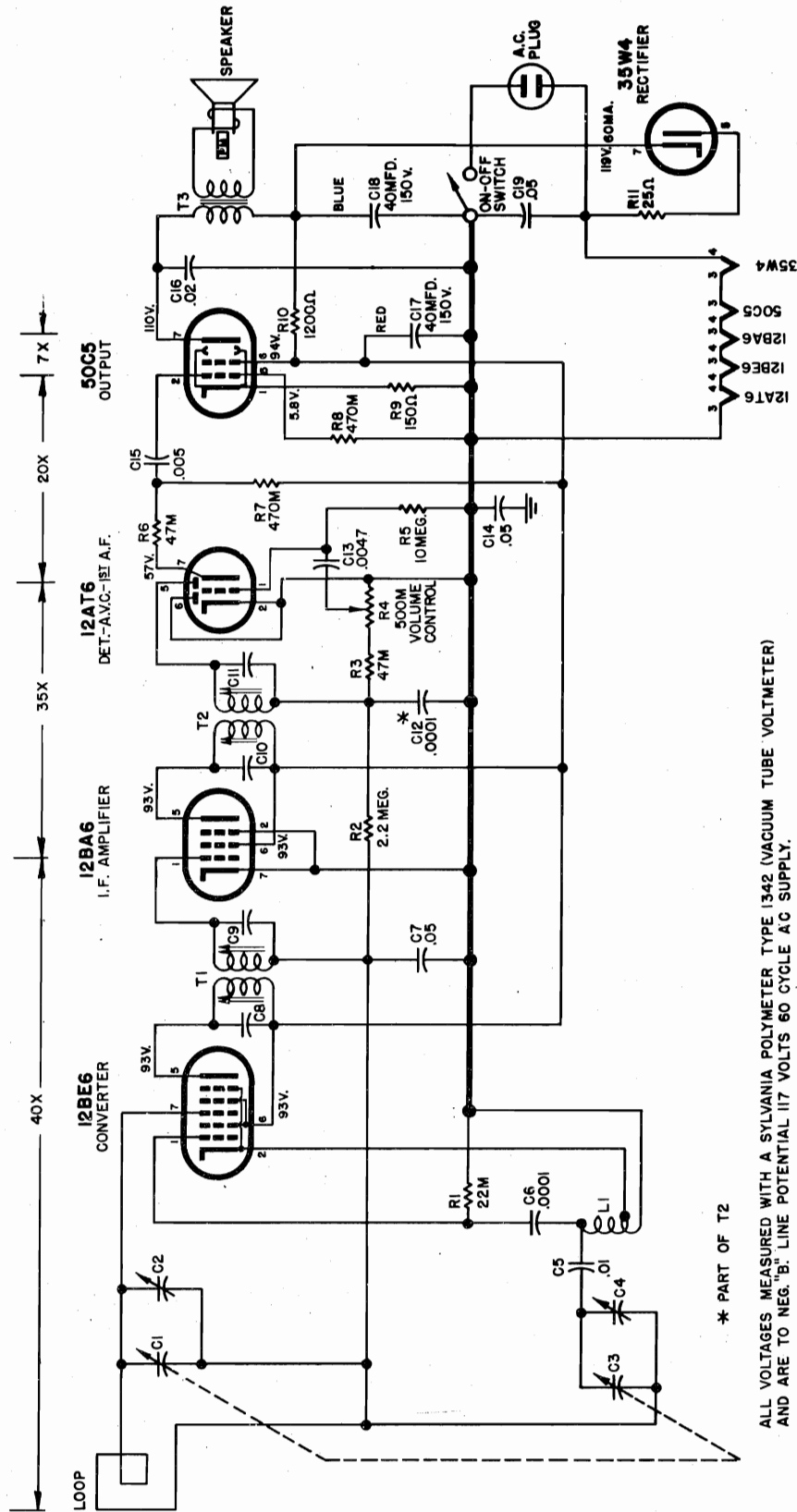
ADDITION OF NEW MODELS

Models 510B, 510H, 510W are compact 5 tube AC-DC type broadcast receivers which supersede models 1-250, 1-251 and 1-252 in later production. Model 510B is finished in black, model 510H in ivory, and 510W in walnut.

Reference for all service data and repair parts should be made to Bulletin 9-6.

MODELS 1-250, 1-251,
1-252, Ch. 1-215

SCHEMATIC DIAGRAM FOR 1-215



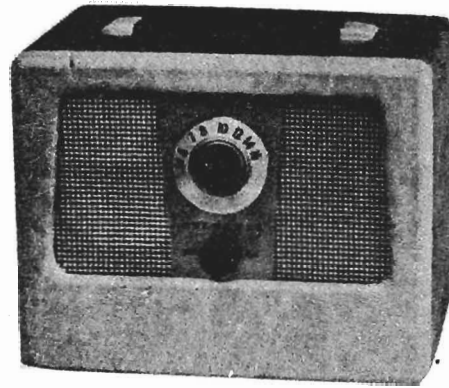
ALL VOLTAGES MEASURED WITH A SYLVANIA POLYMER TYPE 1342 (VACUUM TUBE VOLTMETER) AND ARE TO NEG. "B" LINE POTENTIAL I17 VOLTS 60 CYCLE AC SUPPLY. THE GAIN PER STAGE VALUES AS NOTED ABOVE ARE APPROXIMATE VALUES FOR AN AVERAGE STAGE, RATHER THAN AN ABSOLUTE VALUES.

FIG. 3 - SCHEMATIC DIAGRAM OF 1-215 CHASSIS

MODEL 430L,
Ch. 1-254

GENERAL DESCRIPTION

Model 430-L is a compact 4 tube AC-DC-Battery 3 way portable type broadcast receiver. The receiver has a built-in loop antenna and once the station is tuned in, the receiver should be rotated and left in the position where the signal is received with maximum volume. There is no provision for an external antenna. Battery operation is obtained by inserting the line cord plug in the socket at the rear of the chassis. Controls are provided for tuning and on-off and volume.



SPECIFICATIONS

POWER SUPPLY

AC-DC Operation, 117 Volts DC, 60 cycle AC
Battery Operation

"A" Battery, 7 1/2 Volt Eveready 717
"B" Battery, 90 Volt Eveready 490

FREQUENCY RANGE 540 - 1650 KC.

INTERMEDIATE FREQUENCY 455 KC.

SPEAKER 4" P. M. , 0.68 oz. magnet

SYLVANIA TUBE COMPLEMENT

| <u>Function</u> | <u>Type</u> |
|-------------------------|-------------|
| Converter | 1R5 |
| I. F. Amplifier | 1U4 |
| 2nd Det. -AVC-1st A. F. | 1U5 |
| Audio Output | 3V4 |

ALIGNMENT PROCEDURE

PRELIMINARY ADJUSTMENTS

Set volume control to maximum position.

Allow chassis and signal generator to warm up for several minutes.

No output meter need be used.

I. F. ALIGNMENT

1. Tune receiver to 540 Kc. (variable capacitor fully closed).
2. Tune signal generator to 455 Kc. with 400 cycle modulation and connect output between receiver ground and control grid of 1R5 converter tube (pin 6 or antenna trimmer) through a 0.25 capacitor.
3. Align I. F. transformers T1 & T2 by adjusting the top and bottom slugs to give maximum readings.

4. Keep the output from the generator at its lowest possible value to prevent the AVC from interfering with accurate alignment.

R. F. ALIGNMENT

1. Connect a Hazeltine Loop to the output of the signal generator to radiate the signal into the receiver.
2. Set receiver variable capacitor to minimum capacity.
3. Tune the signal generator to 1650 Kc. with 400 cycle modulation and adjust the oscillator trimmer for maximum output.
4. Close the variable capacitor and check for 540 Kc.
5. Set signal generator to 1500 Kc. Rotate variable capacitor until signal is brought in and peak antenna trimmer to give maximum reading.

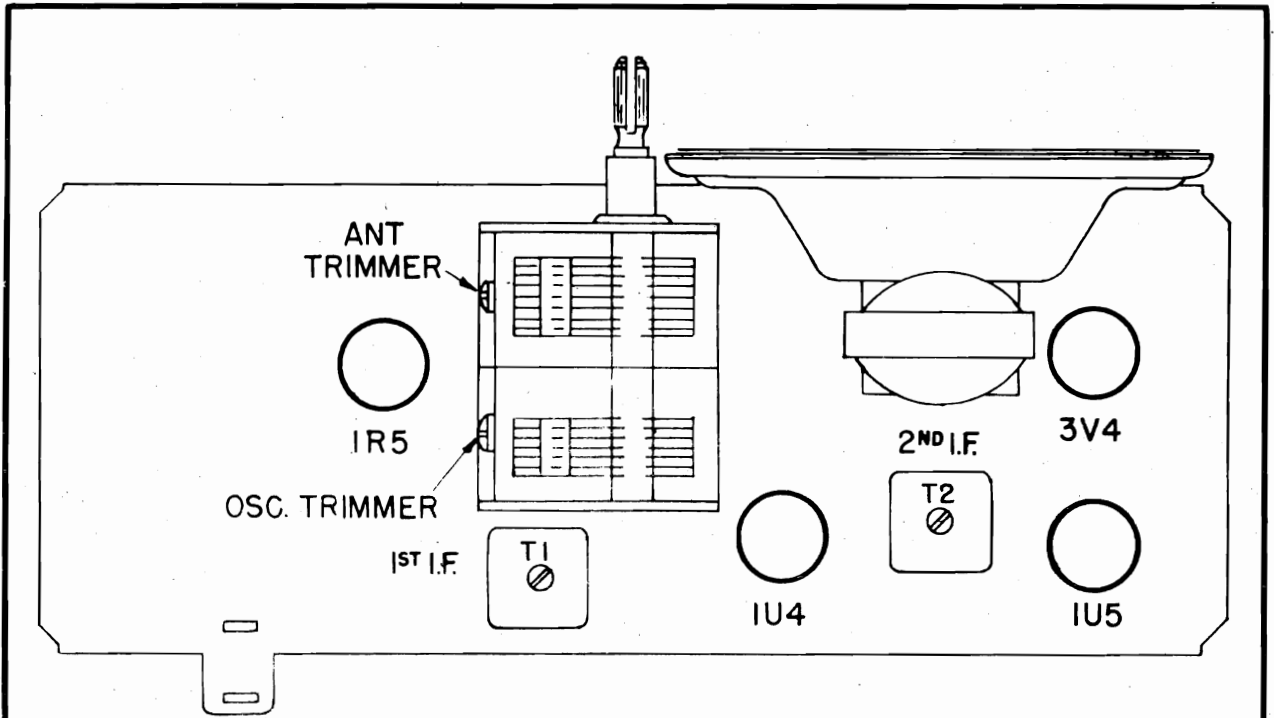


FIG. 1 - CHASSIS TOP LAYOUT

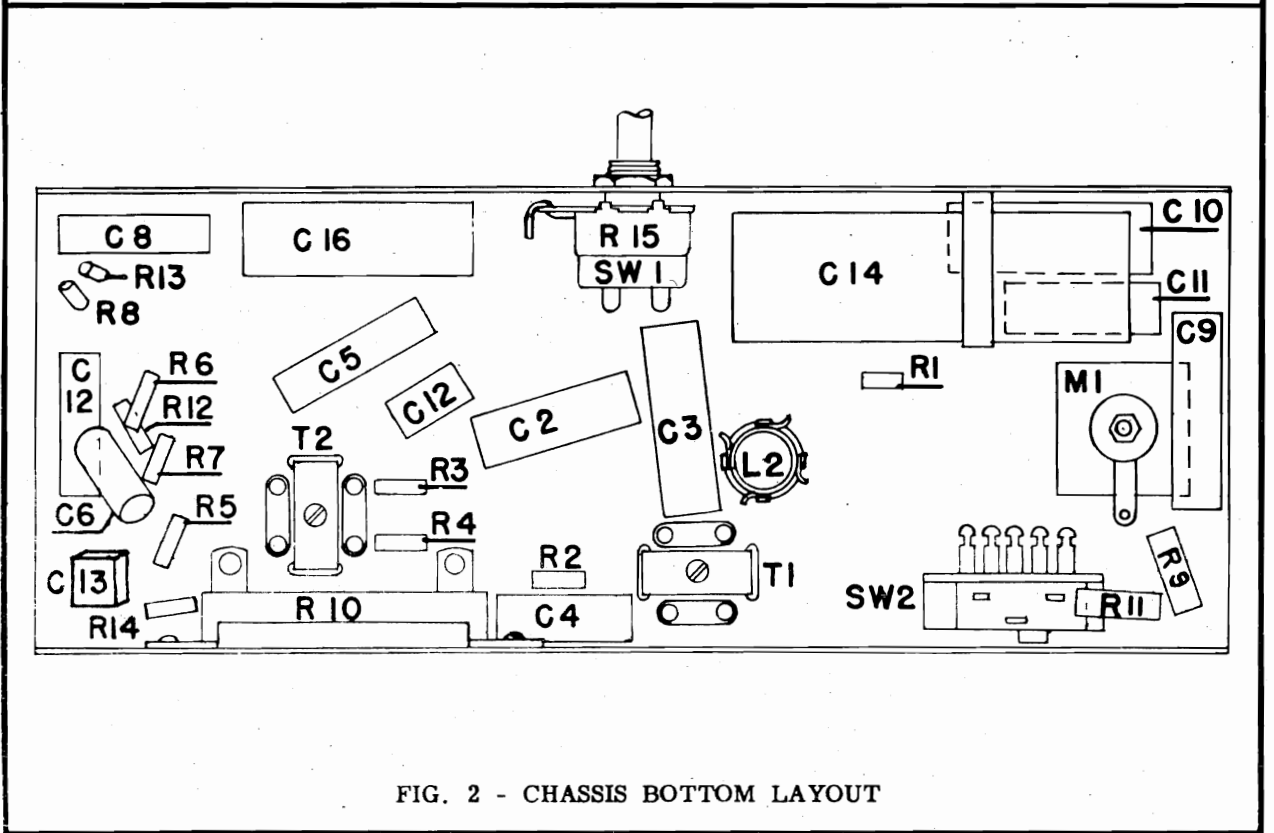
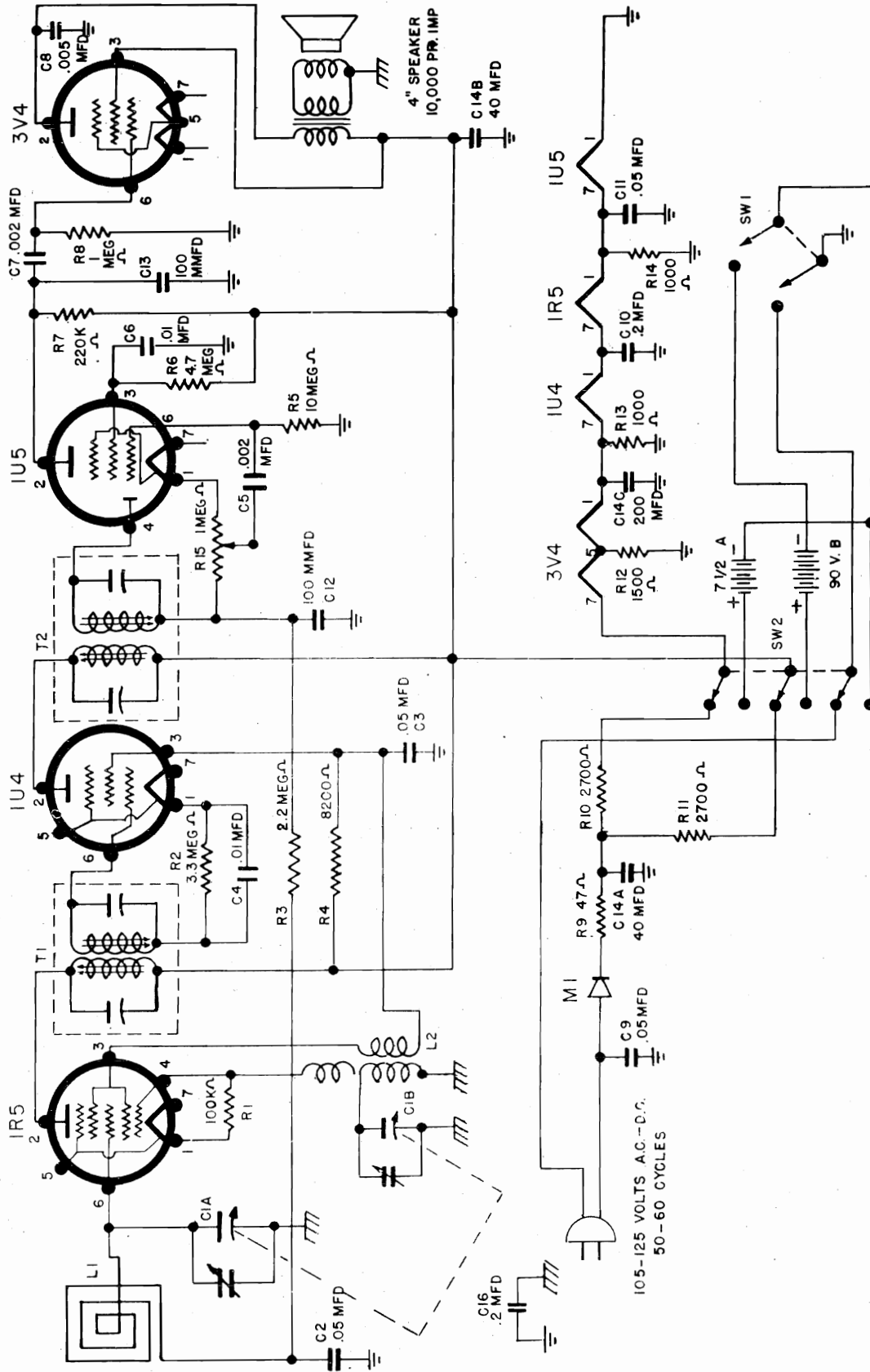


FIG. 2 - CHASSIS BOTTOM LAYOUT

MODEL 430L,
Ch. 1-254



SCHEMATIC DIAGRAM FOR MODEL 430L

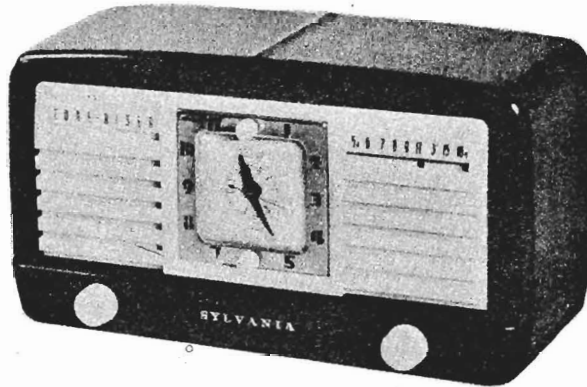
REPAIR PARTS LIST

| <u>SCHEMATIC LOCATION</u> | <u>SERVICE PART NUMBER</u> | <u>DESCRIPTION</u> |
|-------------------------------|--------------------------------|-------------------------------------------------------------------------------------|
| | 814-0001 | Cabinet - Wood |
| C5, C7 | 162-0622 | Capacitor - Paper - .002 Mfd. - 600 V. |
| C8 | 162-0425 | Capacitor - Paper - .005 Mfd. - 400 V. |
| C4, C6 | 162-0411 | Capacitor - Paper - .01 Mfd. - 400 V. |
| C2 | 162-0215 | Capacitor - Paper - .05 Mfd. - 200 V. |
| C3, C9, C11 | 162-0415 | Capacitor - Paper - .05 Mfd. - 400 V. |
| C10, C16 | 162-0402 | Capacitor - Paper - .2 Mfd. - 400 V. |
| C12, C13 | 163-0100 | Capacitor - Mica - .0001 Mfd. - 500 V. |
| | 170-0003 | Capacitor - 2 Gang - Variable |
| C14 | 161-3009 | Capacitor - Electrolytic - 40 Mfd. - 150 V. 40 Mfd. - 150 V. 200 Mfd. - 15 V. |
| L2 | 113-0017 | Coil - Oscillator |
| R15 | 152-0009 | Control - On-Off & Volume |
| | 195-0002 | Cord - Line |
| | 722-0016 | Dial |
| | 776-0001 | Front Plate & Baffle Board Assy. (with Metal Trim Plate) |
| | 740-0009 | Knob - Dial |
| | 740-0010 | Knob - On-Off & Volume |
| L1 | 581-0001 | Loop - Antenna (without back cover) |
| | 196-0008 | Plug - Lead Assy. - "A" Battery |
| | 196-0009 | Plug - Lead Assy. - "B" Battery |
| M1 | 517-0002 | Rectifier - Selenium |
| R9 | 182-0470 | Resistor - 47 Ohm - 1 W. |
| R13, R14 | 181-0102 | Resistor - 1,000 Ohm - 1/2 W. |
| R12 | 181-0152 | Resistor - 1,500 Ohm - 1/2 W. |
| R10 | 189-0022 | Resistor - 2,700 Ohm - W. W. |
| R11 | 182-0272 | Resistor - 2,700 Ohm - 1 W. |
| R4 | 181-0822 | Resistor - 8,200 Ohm - 1/2 W. |
| R1 | 182-0104 | Resistor - 100,000 Ohm - 1 W. |
| R7 | 181-0224 | Resistor - 220,000 Ohm - 1/2 W. |
| R8 | 181-0105 | Resistor - 1 Megohm - 1/2 W. |
| R3 | 181-0225 | Resistor - 2.2 Megohm - 1/2 W. |
| R2 | 181-0335 | Resistor - 3.3 Megohm - 1/2 W. |
| R6 | 181-0475 | Resistor - 4.7 Megohm - 1/2 W. |
| R5 | 181-0106 | Resistor - 10 Megohm - 1/2 W. |
| | 412-0013 | Socket - Tube |
| | 539-0400 | Speaker |
| SW2 | 573-0002 | Switch - 3 P.D. T. (AC -DC-Bat.) |
| | 143-0015 | Transformer - Output |
| | 623-0018G | Tube - 1R5 |
| | 623-0019G | Tube - 1U4 |
| | 623-0020G | Tube - 1U5 |
| | 623-0021G | Tube - 3V4 |

MODELS 540B, 540H,
540M, Ch. 1-253

GENERAL DESCRIPTION

Models 540B (Black), 540H (Ivory), and 540M (Mahogany) are plastic-cased 5 tube clock radios which tune the standard broadcast band. The receivers have built-in loop antennas and once a station is tuned in, the receiver should be rotated and left in position where the signal is received with maximum volume. If desired, an external antenna may be connected to the terminal provided for that purpose on the back cover.



The clock may be used to:

- (A) Provide correct time.
- (B) Turn on radio program for awakening.
- (C) Turn the buzzer alarm on 10 minutes after the radio starts playing.
- (D) Turn on the buzzer alarm for awakening with the radio silenced.

Front panel controls are provided for tuning and volume. On the clock face are the alarm set and operating selector controls.

SPECIFICATIONS

POWER SUPPLY
105-125 Volts, 60 cycle AC, 30 Watts

FREQUENCY RANGE..... 540-1650 Kc.

INTERMEDIATE FREQUENCY..... 455 Kc.

SPEAKER.....4" P.M., 1.0 oz. Magnet

SYLVANIA TUBE COMPLEMENT

| <u>Function</u> | <u>Type</u> |
|----------------------------|-------------|
| Oscillator-Converter | 12BE6 |
| I.F. Amplifier | 12BA6 |
| Detector - AVC - 1st Audio | 12AT6 |
| Audio Output | 50C5 |
| Rectifier | 35W4 |

ALIGNMENT PROCEDURE

PRELIMINARY INSTRUCTIONS

Set volume control to maximum position.

Allow chassis and signal generator to warm up for several minutes.

Connect an A.C. voltmeter across voice coil terminals.

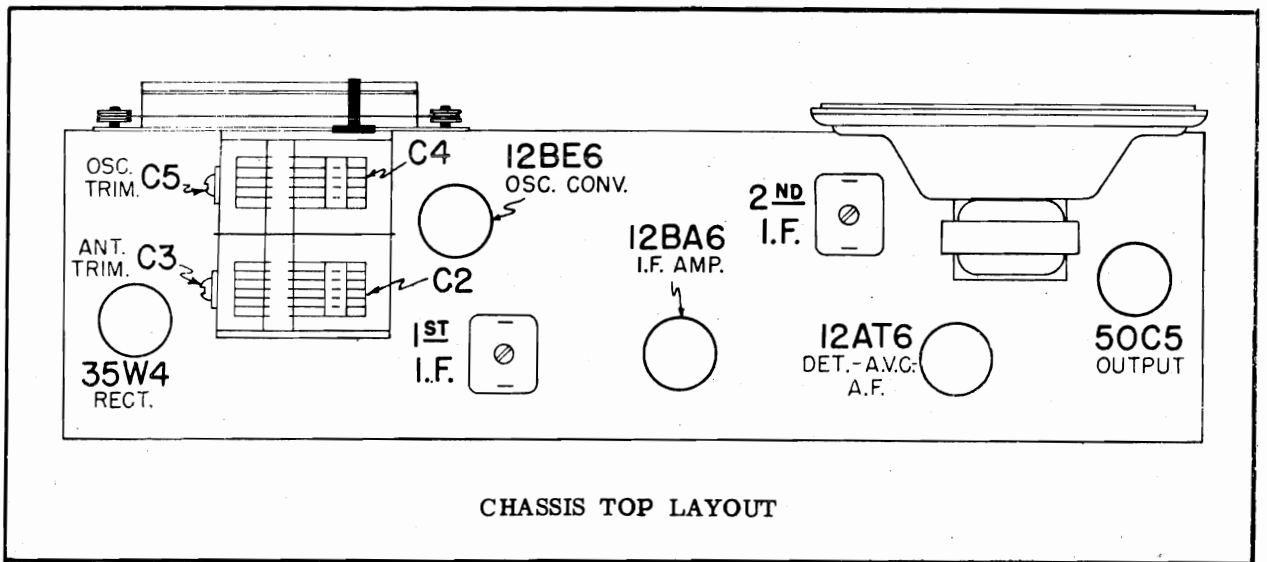
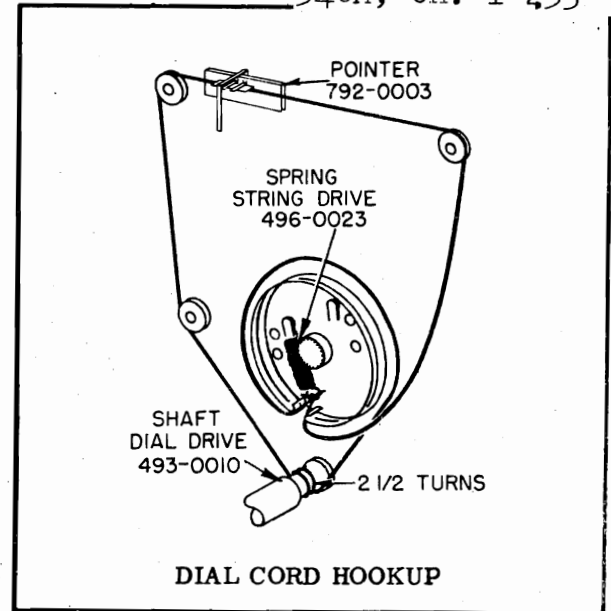
I.F. ALIGNMENT

1. Set the variable tuning capacitor to fully open position (capacitor plates out of mesh).
2. Tune signal generator to 455 Kc. with 400 cycle modulation and connect output between receiver B- and control grid (pin 7) of 12BE6 converter tube through a 0.1 mfd. capacitor.
3. Align I.F. transformers T1 and T2 by aligning first the cores accessible from under the chassis and then the top cores.
4. Keep the output from the generator at its lowest possible value to prevent the AVC from interfering with accurate alignment.

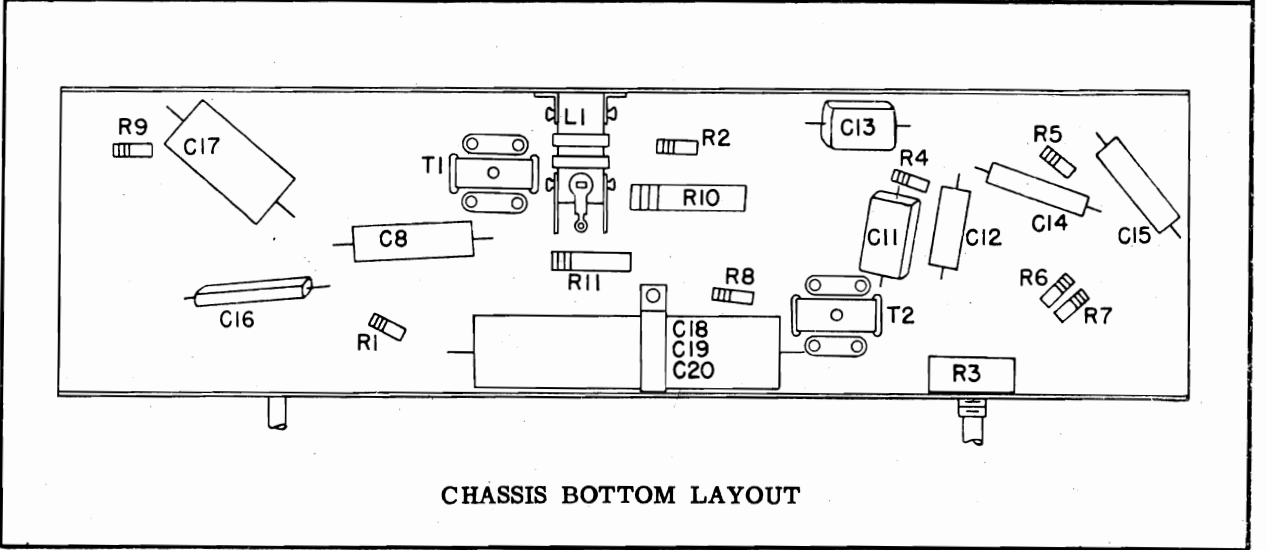
MODELS 540B, 540H,
540M, Ch. 1-253

R.F. ALIGNMENT

1. With the variable tuning capacitor fully open and the signal generator connected between receiver B- and control grid (pin 7) of 12BE6 converter tube through a 0.1 mfd. capacitor, tune signal generator to 1650 Kc.
2. Adjust the oscillator trimmer C5 (on front section of variable capacitor) for maximum output.
3. Tune the receiver to 1500 Kc.
4. Connect a Hazeltine Loop to the output of the signal generator to radiate a 1500 Kc. signal into the receiver.
5. Adjust antenna trimmer C3 (on rear section of variable capacitor) for maximum output.

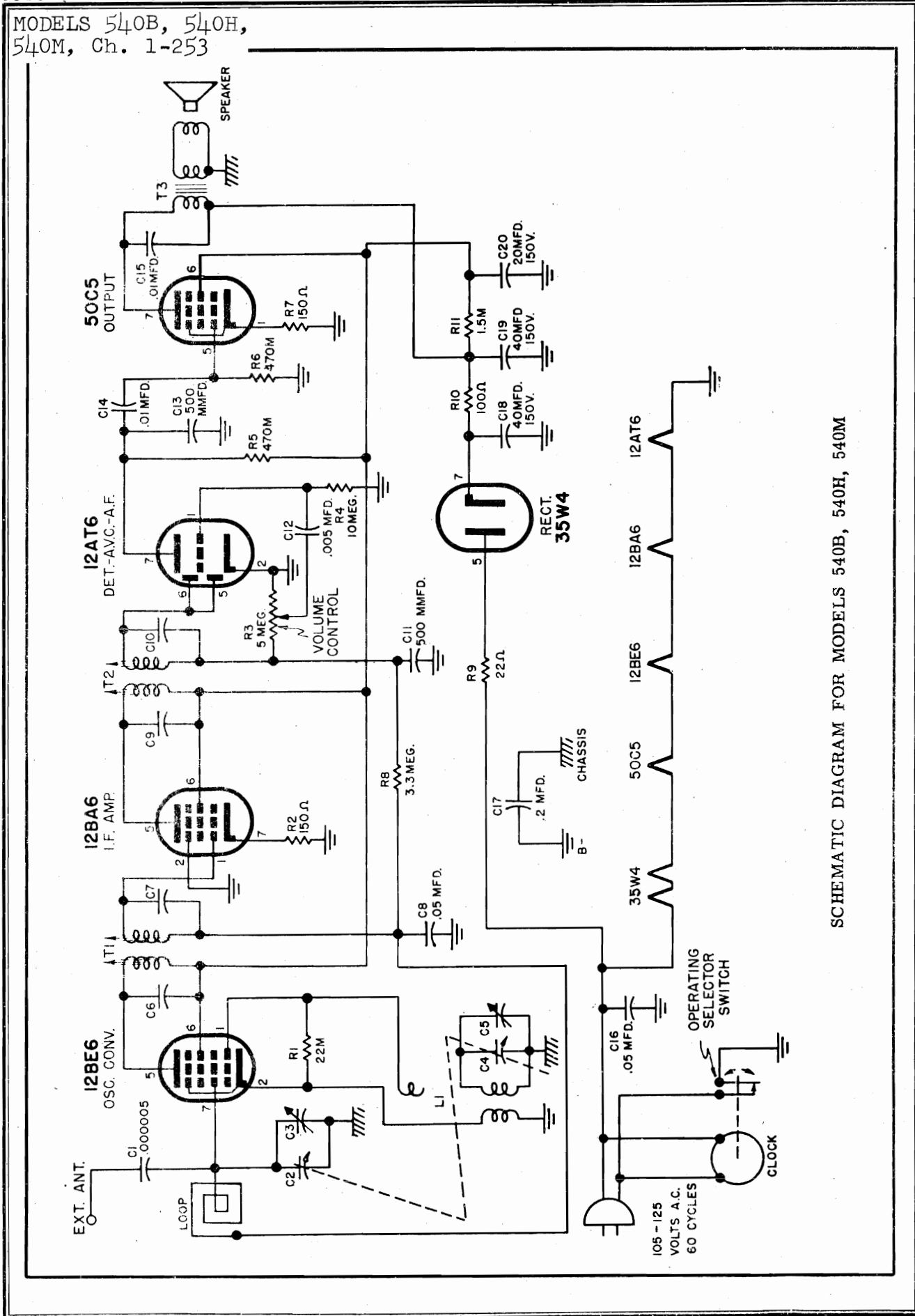


CHASSIS TOP LAYOUT



CHASSIS BOTTOM LAYOUT

MODELS 540B, 540H,
540M, Ch. 1-253



SCHEMATIC DIAGRAM FOR MODELS 540B, 540H, 540M

**SCHEMATIC PART
LOCATION NUMBER**

DESCRIPTION

| | | |
|---------|-----------|-----------------------------------------------------------|
| | 813-0004 | Cabinet - Plastic - Mahogany (Grille Insert not included) |
| | 813-0005 | Cabinet - Plastic - Black (Grille Insert not included) |
| | 813-0006 | Cabinet - Plastic - Ivory (Grille Insert not included) |
| C2,C4 | 172-0004 | Capacitor - Variable |
| C18 | 161-3010 | Capacitor - Electrolytic - 40 Mfd. - 150 V. |
| C19 | | 40 Mfd. - 150 V. |
| C20 | | 20 Mfd. - 150 V. |
| C12 | 162-0625 | Capacitor - Paper - .005 Mfd. - 600 V. |
| C14,C15 | 162-0411 | Capacitor - Paper - .01 Mfd. - 400 V. |
| C8 | 162-0415 | Capacitor - Paper - .05 Mfd. - 400 V. |
| C16 | 160-0415 | Capacitor - Phenolic - .05 Mfd. - 400 V. |
| C17 | 162-0402 | Capacitor - Paper - .2 Mfd. - 400 V. |
| C11,C13 | 163-0500 | Capacitor - Mica - .0005 Mfd. - 500 V. |
| L1 | 113-0018 | Coil - Oscillator |
| R3 | 153-0012 | Control - Volume - 500,000 Ohm |
| | 195-0002 | Cord - Line |
| | 717-0001 | Glass (Clock Crystal) |
| | 776-0002 | Insert - Plastic (Grille - Dial - Cloth Insert) |
| | 740-0015 | Knob - Alarm Set |
| | 743-0005 | Knob - Operating Selector |
| | 740-0008 | Knob - Volume and Tuning Controls |
| | 582-0004 | Loop & Back Cover Assembly |
| C1 | | Capacitor - .000005 Mfd. |
| | 714-0002 | Metal Bezel (Clock Numerals) |
| | 792-0003 | Pointer - Dial |
| R9 | 181-0220 | Resistor - 22 Ohm - 1/2 W. |
| R10 | 183-0101 | Resistor - 100 Ohm - 2 W. |
| R2,R7 | 181-0151 | Resistor - 150 Ohm - 1/2 W. |
| R11 | 182-0152 | Resistor - 1,500 Ohm - 1 W. |
| R1 | 181-0223 | Resistor - 22,000 Ohm - 1/2 W. |
| R5,R6 | 181-0474 | Resistor - 470,000 Ohm - 1/2 W. |
| R8 | 181-0335 | Resistor - 3.3 Megohm - 1/2 W. |
| R4 | 181-0106 | Resistor - 10 Megohm - 1/2 W. |
| | 493-0010 | Shaft - Dial Drive |
| | 412-0013 | Socket - Tube |
| | 539-0401 | Speaker (includes Output Transformer) |
| | 496-0023 | Spring - String Drive |
| T1,T2 | 121-0101 | Transformer - I.F. - Input & Output |
| T3 | 143-0016 | Transformer - Output |
| | 623-0016G | Tube - 12AT6 |
| | 623-0012G | Tube - 12BA6 |
| | 623-0013G | Tube - 12BE6 |
| | 634-0002G | Tube - 35W4 |
| | 623-0015G | Tube - 50C5 |

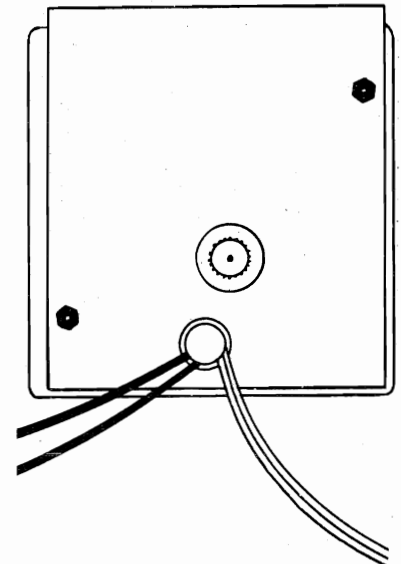


FIGURE A

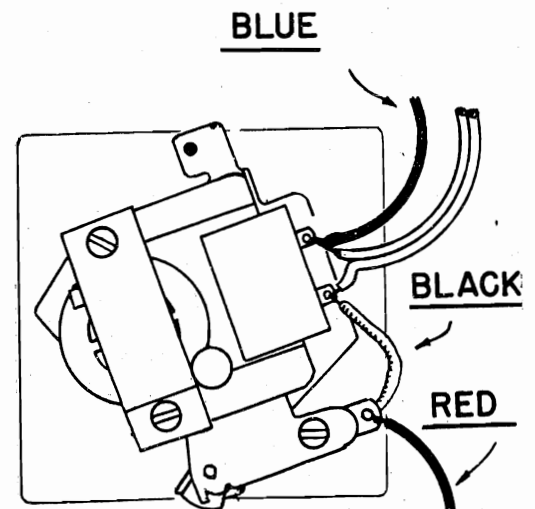


FIGURE B

To take clock movement out of cabinet proceed as follows:

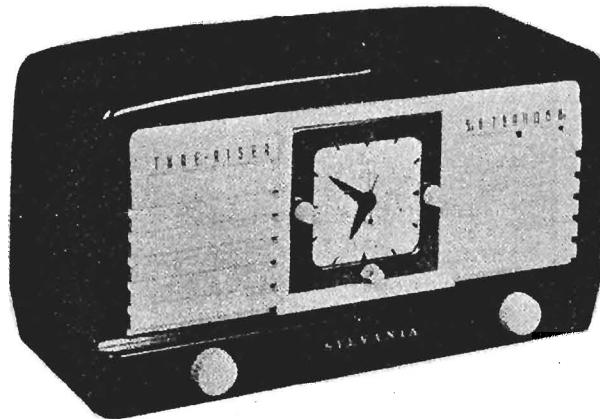
Remove the following:

- A - Line cord from power line
- B - Tuning knob, volume control knob, and chassis from cabinet.
- C - 2 nuts holding clock clamping shield shown in Figure A.
- D - As this shield is sufficiently pulled back, unsolder red and blue wires and power cord shown in Figure B
- E - The movement may then be withdrawn through the opening in the front of the cabinet.
- F - In shipping a movement to a service station, be certain that it is suitably packed to withstand transportation. Care should be taken with the glass crystal so that it is not subject to strain during shipment.

MODELS 540BA, 540HA,
540MA, Ch. 1-253

GENERAL DESCRIPTION

Models 540BA (Black), 540HA (Ivory), and 540MA (Mahogany) are plastic cabinet 5 tube clock radios which tune the standard broadcast band. Each receiver has a built-in loop antenna, and once a station is tuned in, the radio should be rotated and left in position where the signal is received with maximum volume. If desired, an external antenna may be connected to the terminal provided for that purpose on the back cover.



The clock may be used to:

- (A) Provide accurate sweep second time.
- (B) Turn off radio or appliance up to 60 minute period or less.
- (C) Turn on radio program for awakening.
- (D) Turn on buzzer alarm 10 minutes after radio starts playing.
- (E) Turn on buzzer alarm for awakening with radio and appliance turned off.

- (F) Turn radio off automatically after retiring.
- (G) Turn radio off automatically and awaken to music with appliance operating.
- (H) Turn appliance on and off with radio off.

Front panel controls are provided for tuning and volume. On the clock face are the alarm set, operating selector, and rock-a-bye controls.

SPECIFICATIONS

POWER SUPPLY

105-125 Volts, 60 Cycle AC, 30 Watts

APPLIANCE OUTLET

Maximum Load 1100 Watts

FREQUENCY RANGE..... 540-1650 Kc.

INTERMEDIATE FREQUENCY..... 455 Kc.

LOUD SPEAKER..... 4" P.M., 1.0 oz. Magnet

SYLVANIA TUBE COMPLEMENT

| Function | Type |
|----------------------------|-------|
| Oscillator-Converter | 12BE6 |
| I.F. Amplifier | 12BA6 |
| Detector - AVC - 1st Audio | 12AT6 |
| Audio Output | 50C5 |
| Rectifier | 35W4 |

ALIGNMENT PROCEDURE

PRELIMINARY INSTRUCTIONS

Set volume control to maximum position.

Allow chassis and signal generator to warm up for several minutes.

Connect an A.C. voltmeter across voice coil terminals.

I.F. ALIGNMENT

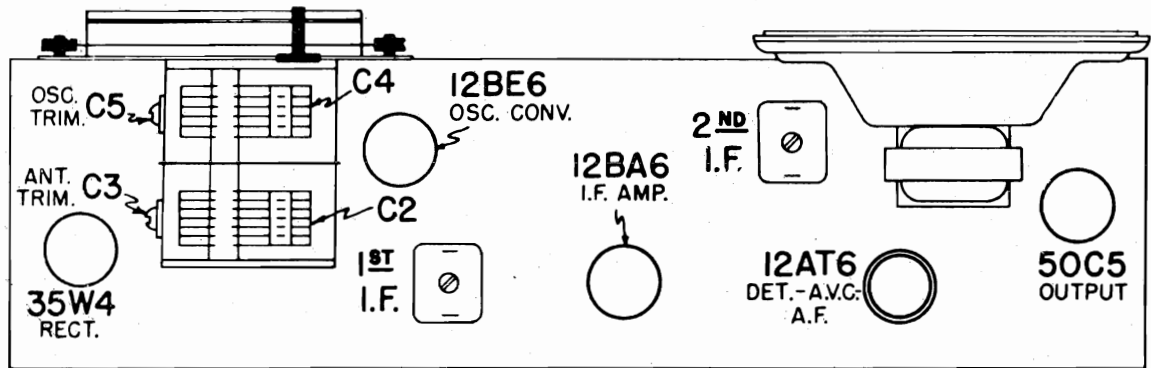
1. Set the variable tuning capacitor to minimum capacity position (plates fully out of mesh).
2. Tune signal generator to 455 Kc. with 400 cycle modulation and connect output between receiver B- and control grid (pin 7) of 12BE6 converter tube through a 0.1 mfd. capacitor.
3. Align I.F. transformers T1 and T2 by aligning first the cores accessible from under the chassis and then the top cores.

4. Keep the output from the generator at its lowest possible value to prevent the AVC from interfering with accurate alignment.

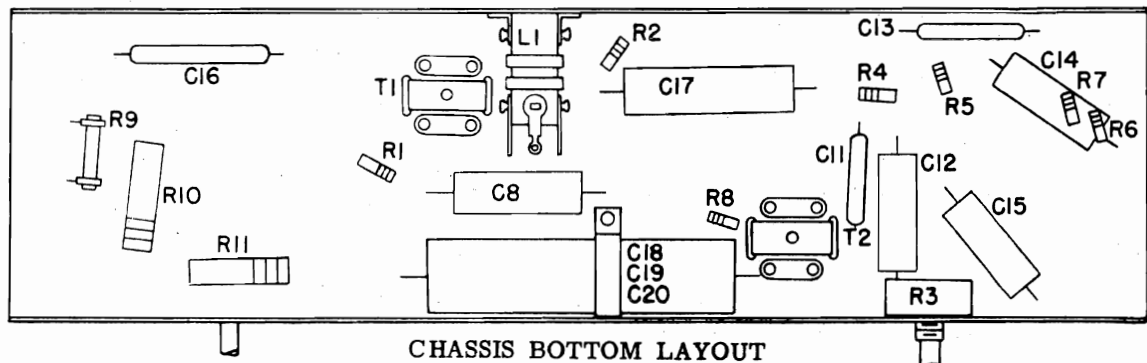
R.F. ALIGNMENT

1. With the variable tuning capacitor fully open and the signal generator connected between receiver B- and control grid (pin 7) of 12BE6 converter tube through a 0.1 mfd. capacitor, tune signal generator to 1650 Kc.
2. Adjust the oscillator trimmer C5 (on front section of variable capacitor) for maximum output.
3. Tune the receiver to 1500 Kc.
4. Connect a Hazeltine Loop to the output of the signal generator to radiate a 1500 Kc. signal into the receiver.
5. Adjust antenna trimmer C3 (on rear section of variable capacitor) for maximum output.

MODELS 540BA, 540HA,
540MA, Ch. 1-253

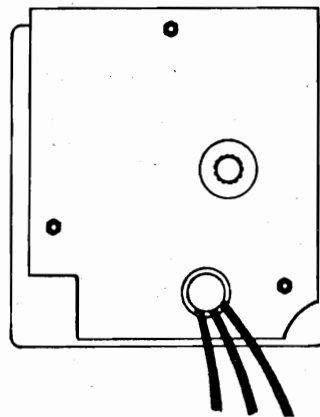


CHASSIS TOP LAYOUT



CHASSIS BOTTOM LAYOUT

FIGURE A



To take clock movement out of cabinet proceed as follows:

Remove the following:

- A - Line cord from power line.
- B - Tuning knob, volume control knob, and chassis from cabinet.
- C - Three nuts holding clock clamping shield shown in Figure A above.
- D - As this shield is sufficiently pulled back, unsolder red, blue, and green wires shown in Figure B above.
- E - Before movement can be withdrawn from the cabinet, it is necessary to have the rock-a-bye control in the full 60 minute position.
- F - In shipping a movement to a service station, be certain that it is suitably packed to withstand transportation. Care should be taken to insure that the glass crystal is not subject to strain during shipment.

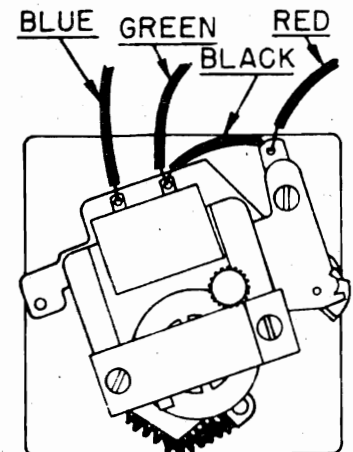
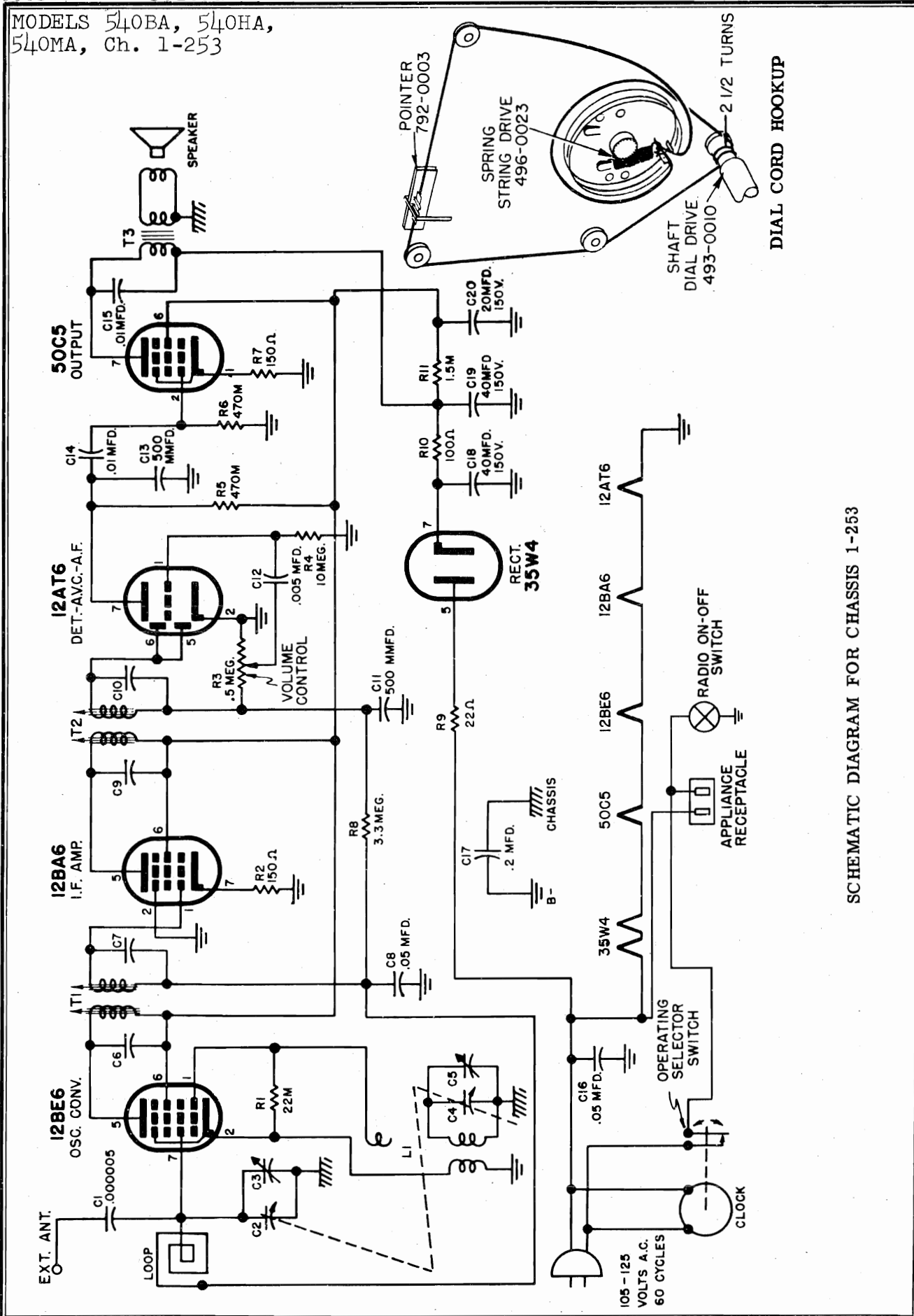


FIGURE B

MODELS 540BA, 540HA,
540MA, Ch. 1-253



SCHEMATIC DIAGRAM FOR CHASSIS 1-253

MODELS 540BA, 540HA,
540MA, Ch. 1-253

REPAIR PARTS LIST

| <u>SCHEMATIC LOCATION</u> | <u>PART NUMBER</u> | <u>DESCRIPTION</u> |
|---------------------------|--------------------|-----------------------------------------------------------|
| | 813-0004 | Cabinet - Plastic - Mahogany (Grille Insert not included) |
| | 813-0005 | Cabinet - Plastic - Black (Grille Insert not included) |
| | 813-0006 | Cabinet - Plastic - Ivory (Grille Insert not included) |
| C2,C4 | 172-0004 | Capacitor - Variable |
| C18 | 161-3010 | Capacitor - Electrolytic - 40 Mfd. - 150 V. |
| C19 | | 40 Mfd. - 150 V. |
| C20 | | 20 Mfd. - 150 V. |
| ©12 | 162-0625 | Capacitor - Paper - .005 Mfd. - 600 V. |
| C14,C15 | 162-0411 | Capacitor - Paper - .01 Mfd. - 400 V. |
| C8 | 162-0415 | Capacitor - Paper - .05 Mfd. - 400 V. |
| C16 | 160-0415 | Capacitor - Phenolic - .05 Mfd. - 400 V. |
| C17 | 162-0402 | Capacitor - Paper - .2 Mfd. - 400 V. |
| C11,C13 | 163-0500 | Capacitor - Mica .0005 Mfd. - 500 V. |
| L1 | 113-0018 | Coil - Oscillator |
| R3 | 153-0012 | Control - Volume - 500,000 Ohm |
| | 195-0005 | Cord - Line |
| | 717-0001 | Glass (Clock Crystal) |
| | 776-0002 | Insert - Plastic (Grille - Dial - Cloth Insert) |
| | 740-0015 | Knob - Alarm Set |
| | 743-0005 | Knob - Operating Selector & Rock-A-Bye Switch |
| | 740-0008 | Knob - Volume and Tuning Controls |
| | 582-0007 | Loop & Back Cover Assembly |
| C1 | 714-0004 | Capacitor - .000005 Mfd. |
| | 792-0003 | Metal Bezel (Clock Numerals) |
| R9 | 181-0220 | Pointer - Dial |
| R10 | 183-0101 | Resistor - 22 Ohm - 1/2 W. |
| R2,R7 | 181-0151 | Resistor - 100 Ohm - 2 W. |
| R11 | 182-0152 | Resistor - 150 Ohm - 1/2 W. |
| R1 | 181-0223 | Resistor - 1,500 Ohm - 1 W. |
| R5,R6 | 181-0474 | Resistor - 22,000 Ohm - 1/2 W. |
| R8 | 181-0335 | Resistor - 470,000 Ohm - 1/2 W. |
| R4 | 181-0106 | Resistor - 3.3 Megohm - 1/2 W. |
| | 493-0010 | Resistor - 10 Megohm - 1/2 W. |
| | 482-0006 | Shaft - Dial Drive |
| | 417-0013 | Shield - Miniature Tube |
| | 412-0013 | Socket - Appliance |
| | 539-0401 | Socket - Tube |
| | 496-0023 | Speaker (includes Output Transformer) |
| | 571-0006 | Spring - String Drive |
| | 121-0101 | Switch - Radio |
| T1,T2 | 143-0016 | Transformer - I.F. - Input & Output |
| T3 | 623-0016G | Transformer - Output |
| | 623-0012G | Tube - 12AT6 |
| | 623-0013G | Tube - 12BA6 |
| | 634-0002G | Tube - 12BE6 |
| | 623-0015G | Tube - 35W4 |
| | | Tube - 50C5 |

Some cases have been reported where the chassis hold-down bolts plus their washers were longer than the plastic legs. To remedy, remove washers, as required.

MODEL CH749,
Hudson #225908

TECHNICAL SERVICE BULLETIN

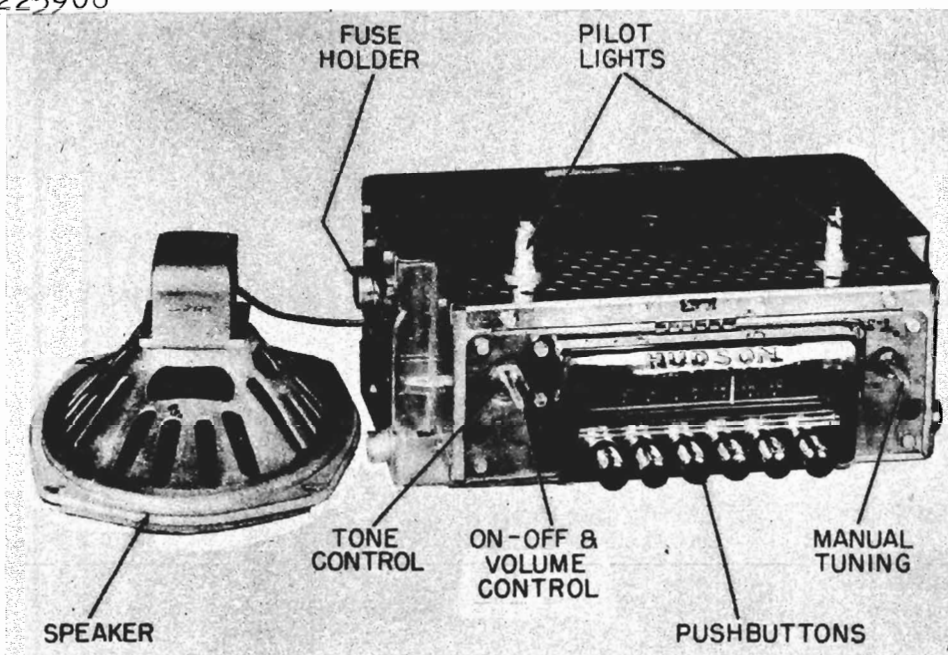


FIG. 1 MODEL 225908

GENERAL

The Hudson model 225908 receiver is a six tube, twin unit, superheterodyne receiver. The antenna, RF, and oscillator circuits are inductively tuned (manually and push button) by iron cores over a frequency range of 540 to 1600 kilocycles.

The speaker is mounted above the receiver and both units are mounted behind the instrument panel. The on-off, volume and tone controls are on concentric shafts at the left of the receiver. The manual tuning control and trim knob are at the right.

A special compensating capacitor in the oscillator circuit minimizes frequency drift due to normal variations in temperature and car battery voltage.

ALIGNMENT

Maximum performance depends on accurate alignment of the receiver; therefore, follow these instructions carefully.

CAUTION: Make all alignment adjustments to the receiver with the "A" lead connected to a 6.6 volt negative source and ground the chassis to the positive side of this source. Rotate the volume and tone controls

Sylvania built CH749 Hudson receiver serial numbers start at CH1001 and up.

TUBE COMPLEMENT

| | |
|--------|------------------------------|
| 6SK7GT | R. F. Amplifier |
| 6SA7GT | Converter |
| 6SK7GT | I. F. Amplifier |
| 6SQ7GT | Detector, AVC & AF Amplifier |
| 5V6GT | Output |
| 6X5GT | Full Wave Rectifier |

POWER SUPPLY

The power supply uses a 6X5GT full wave rectifier tube in conjunction with a four prong, full wave primary type vibrator.

to their maximum clockwise positions. Keep the output from the signal generator at its lowest possible value to prevent the AVC of the receiver from interfering with accurate alignment. Use an insulated screw driver, or the prescribed tool, for making all alignment adjustments.

MODEL CH749,
Hudson #225908

IF ALIGNMENT PROCEDURE

1. IF ALIGNMENT AT 265 KILOCYCLES

- (a) Remove top and bottom covers from the receiver.
- (b) Set the signal generator at 265 kilocycles.
- (c) Connect the signal lead of the signal generator through a 0.1 Mfd. capacitor to the 6SA7GT converter grid (pin #8 on the socket). Connect output indicator across speaker voice coil.
- (d) Connect the ground lead of the signal generator to the chassis or case.
- (e) Position the dial pointer at the high frequency end of the dial.
- (f) With core alignment tool 898-0003 adjust the IF cores "A," "B," "C," and "D" in order named for maximum output. (See Parts Layout - Bottom of Chassis, page 5).

Repeat this adjustment until maximum output reading does not change.

2. RF AND OSCILLATOR ALIGNMENT

- (a) Connect the signal lead of the signal generator through the dummy antenna, illustrated in Fig. 2 to the antenna connector on the receiver.
- (b) Adjust the signal generator to 535 kilocycles.
- (c) Rotate the manual tuning control to tune the receiver at 535 kilocycles.
- (d) Adjust the oscillator trimmer C9 for maximum response (See Parts Layout - Bottom of Chassis, Page 5).
- (e) Adjust the signal generator to 1400 kilocycles.
- (f) Rotate the manual tuning control to tune the receiver at 1400 kilocycles.

- (g) Adjust the converter trimmer C6 and the antenna trimmer C1 for maximum output (See Parts Layout - Top and Bottom of Chassis, Pages 4 and 5).
- (h) If dial calibration is off after making the above adjustments, corrections can be made by turning the eccentric screw at the fulcrum of the dial pointer (See Parts Layout - Top of Chassis, Page 4).

SENSITIVITY CONTROL

Sensitivity control R9 is factory set and should not be changed. If it is necessary for this control to be readjusted, it should be set to 2 volts DC positive on the cathode of the 6SK7GT IF Amplifier tube.

ALIGNMENT AFTER CORE REPLACEMENT

WARNING: The following adjustments are to be made **ONLY** if a core has been replaced.

- (a) Adjust the signal generator to 1675 kilocycles.
- (b) Connect the signal lead of the signal generator through the dummy antenna, see Fig. 2, to the antenna connector of the receiver.
- (c) Rotate the manual tuning control to stop at 1600 kilocycles (maximum high frequency end of the dial).
- (d) Screw the cores completely out of the antenna coil, the converter coil, and the oscillator coil.
- (e) Adjust the oscillator trimmer C9 at 1675 kilocycles (see Parts Layout - Bottom of Chassis, Page 5).
- (f) Adjust the converter trimmer C6, and the antenna trimmer C1 for maximum output (see Parts Layout - Top of Chassis and Bottom of Chassis).
- (g) Replace cores to approximately their

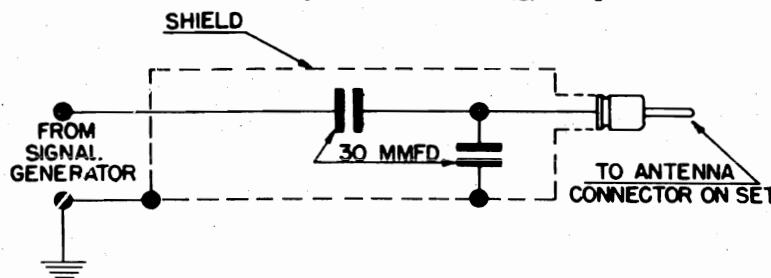


FIG. 2 DUMMY ANTENNA

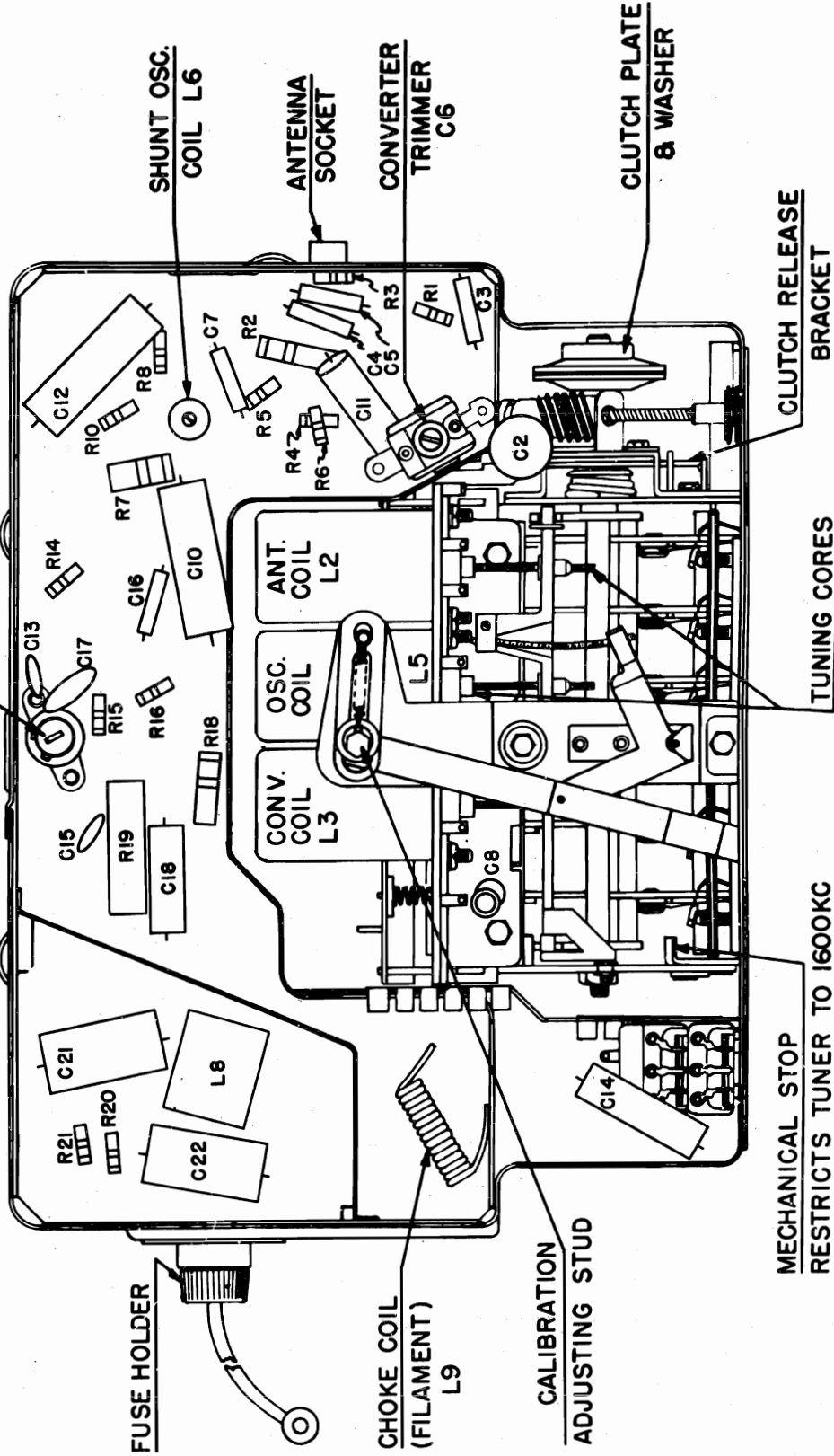
MODEL CH749,
Hudson #225908

- (m) "Rock in" shunt oscillator coil L6 for maximum output. This should be done only as a last resort. This is the same as rocking in the padder capacitor on a capacitor tuned receiver.
- (n) Check the receiver for calibration and gain. If the receiver is off scale or weak, repeat operations (j), (k) and (1).

- (k) Adjust the antenna core L2 and converter coil L3 for maximum output (see Parts Layout - Top of Chassis, Page 4).
- (1) Adjust the signal generator to 600 kilocycles.

- (h) Adjust the signal generator to 1400 kilocycles.
- (i) Rotate the manual tuning control to position dial pointer at 1400 kilocycles.
- (j) Adjust the oscillator core L5 to scale at 1400 kilocycles (see Parts Layout - Top of Chassis, Page 4).

FIG. 3 PARTS LAYOUT - TOP OF CHASSIS



(o) After alignment is complete, the maximum high frequency tuning range should be checked. If the range is higher or lower than 1605 kilocycles,

the lug stop on the tuner unit near the volume control should be bent to limit the frequency coverage to 1605 kilocycles.

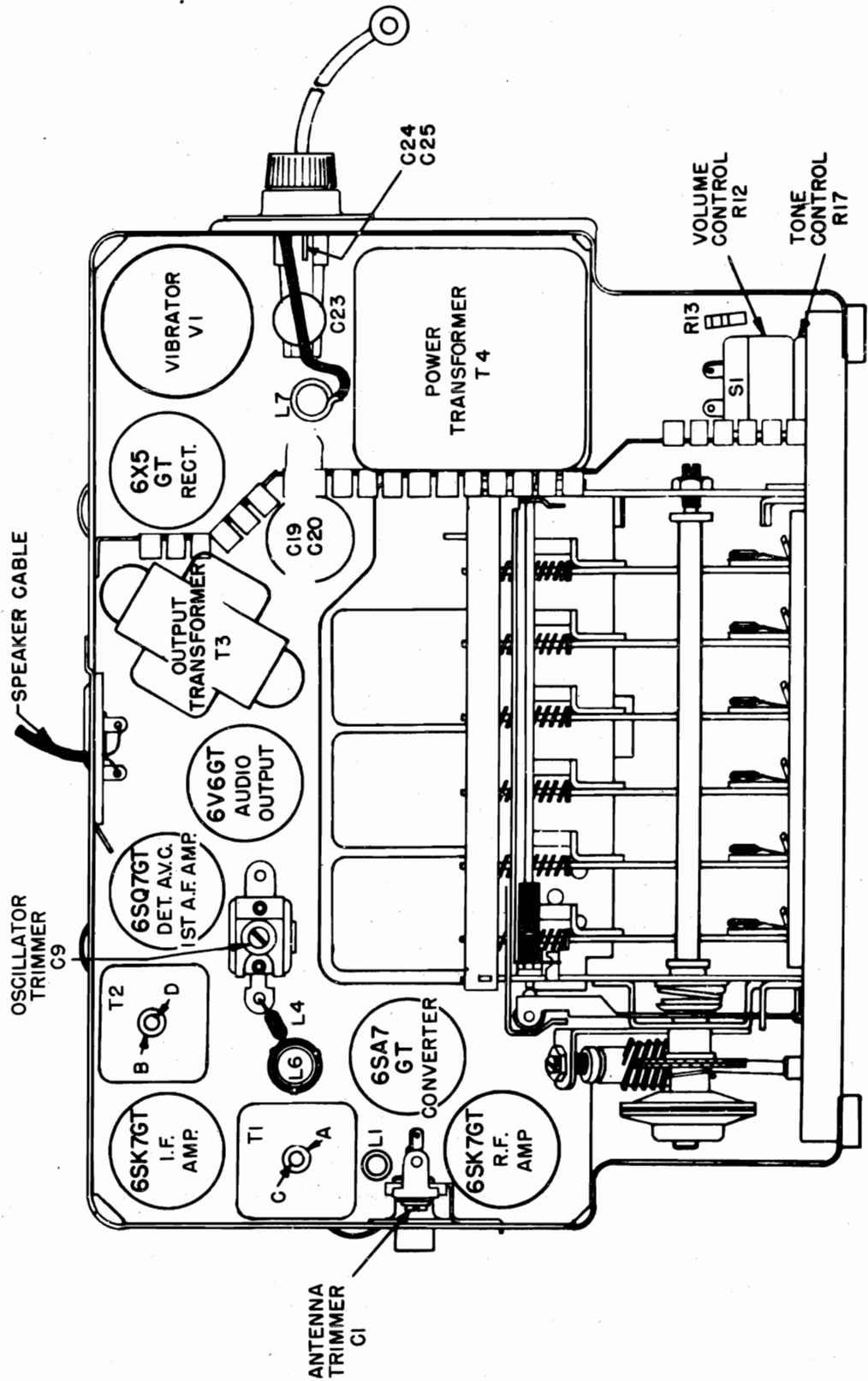


FIG. 4 PARTS LAYOUT - BOTTOM OF CHASSIS

MODEL CH749,
Hudson #225908

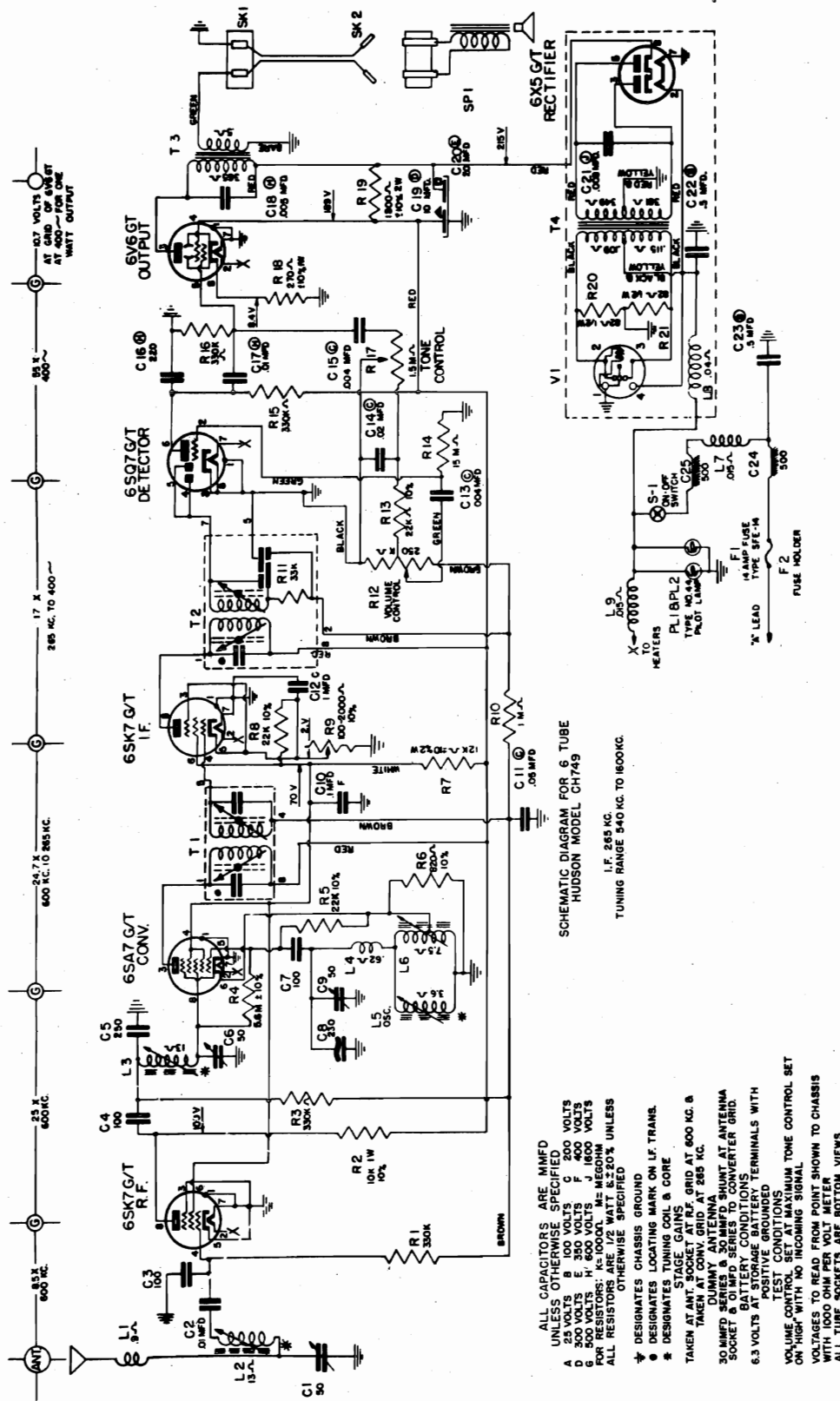


FIG. 5 SCHEMATIC DIAGRAM - MODEL 225908

PARTS LIST

MODEL CH749,
Hudson #225908

COILS AND CHOKES

| <u>SCHEMATIC LOCATION</u> | <u>PRODUCTION PART NO.</u> | <u>SERVICE PART NO.</u> | <u>DESCRIPTION</u> |
|---------------------------|----------------------------|-------------------------|-------------------------------|
| L9 | 71630 | 148-0007 | Choke - Filament |
| L8 | 71628 | 147-0007 | Choke - Main Hash |
| L7 | 71629 | 147-0001 | Choke - Motor Noise |
| L1 | 71642 | 148-0001 | Choke - Motor Noise - Antenna |
| L5 | 71517 | 113-0016 | Coil - Oscillator |
| L4 | 71949 | 146-0010 | Coil - Oscillator Series |
| L6 | 71631 | 116-0002 | Coil - Oscillator Shunt |
| L2, L3 | 71515 | 112-0007 | Coil - RF |
| L2, L3, L5 | 75060 | 117-0011 | Coil Assembly - Tuner Unit |

CAPACITORS

| | | | |
|----------|-------|-----------|---------------------------------------------------------------|
| C13, C15 | 71915 | 166-4000D | Capacitor - Ceramic - .004 Mfd. - 500 V. |
| C2, C17 | 71632 | 168-0002D | Capacitor - Ceramic - .01 Mfd. - 500 V. |
| C4, C7 | 14140 | 163-0100 | Capacitor - Mica - .0001 Mfd. - 500 V. |
| C3 | 13228 | 163-0100 | Capacitor - Mica - .0001 Mfd. - 500 V. |
| C16 | 71660 | 163-0220 | Capacitor - Mica - .00022 Mfd. - 500 V. |
| C5 | 11691 | 163-0250 | Capacitor - Mica - .00025 Mfd. - 500 V. |
| C8 | 71920 | 165-0230 | Capacitor - Compensating - .000230 Mfd. |
| C21 | 71662 | 160-16282 | Capacitor - Molded Paper - .0082 Mfd. - 1600 V. |
| C18 | 71950 | 162-0625 | Capacitor - Paper - .005 Mfd. - 600 V. |
| C14 | 20987 | 162-0212 | Capacitor - Paper - .02 Mfd. - 200 V. |
| C11 | 71955 | 162-0215 | Capacitor - Paper - .05 Mfd. - 200 V. |
| C12 | 71954 | 162-0401 | Capacitor - Paper - .1 Mfd. - 200 V. |
| C10 | 71953 | 162-0401 | Capacitor - Paper - .1 Mfd. - 400 V. |
| C22, C23 | 71763 | 169-0001 | Capacitor - Paper - .5 Mfd. - 100 V. |
| C19, C20 | 71916 | 161-2000 | Capacitor - Electrolytic 10 Mfd. - 300 V. 20 Mfd. - 350 V. |
| C1 | 71917 | 172-0027 | Capacitor - Trimmer - Antenna |
| C6 | 71918 | 172-0028 | Capacitor - Trimmer - Converter |
| C9 | 71919 | 172-0029 | Capacitor - Trimmer - Oscillator |

RESISTORS

| | | | |
|--------------|---------|----------|---------------------------------------------|
| R20, R21 | BY38201 | 181-0820 | Resistor - insulated - 82 Ohm - 1/2 W. |
| R6 | BY38211 | 181-0821 | Resistor - insulated - 820 Ohm - 1/2 W. |
| R5, R8, R13 | BY32231 | 181-0223 | Resistor - insulated - 22,000 Ohm - 1/2 W. |
| R11 | BY33331 | 181-0333 | Resistor - insulated - 33,000 Ohm - 1/2 W. |
| R1, R3, R15, | BY33342 | 181-0334 | Resistor - insulated - 330,000 Ohm - 1/2 W. |
| R16 | | | |
| R10 | BY31052 | 181-0105 | Resistor - insulated - 1 Megohm - 1/2 W. |
| R4 | BY35651 | 181-0565 | Resistor - insulated - 5.6 Megohm - 1/2 W. |
| R14 | BY31562 | 181-0156 | Resistor - insulated - 15 Megohm - 1/2 W. |
| R18 | ZY32711 | 182-0271 | Resistor - insulated - 270 Ohm - 1 W. |
| R2 | ZY31031 | 182-0103 | Resistor - insulated - 10,000 Ohm - 1 W. |
| R19 | VY31821 | 183-0182 | Resistor - insulated - 1,800 Ohm - 2 W. |
| R7 | VY31231 | 183-0123 | Resistor - insulated - 12,000 Ohm - 2 W. |

MISCELLANEOUS

| | | | |
|--------------|-------|----------|-----------------------------------|
| SP1 | 71964 | 539-0006 | Speaker - 6" x 9" PM |
| SK2 | 71926 | 193-0008 | Cable - Speaker |
| | 71640 | 562-0006 | Cable - Battery - Fuse |
| R12, R17, S1 | 75752 | 157-0013 | Control - Volume, Tone and On-Off |
| R9 | 71645 | 159-0004 | Control - Sensitivity |
| | 71503 | 192-0002 | Core - Perm. Tuner |
| | 71699 | 416-0002 | Socket - Antenna Connector |
| | 71696 | 412-0016 | Socket - Octal - Tube |
| | 71697 | 413-0003 | Socket - Vibrator |

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| | | | |
|----|---------|----------|-------------------------|
| T1 | 71702 | 121-0015 | Transformer - 1st I. F. |
| T2 | 71703 | 122-0015 | Transformer - 2nd I. F. |
| T3 | 71938 | 143-0004 | Transformer - Output |
| T4 | 71941 | 141-0012 | Transformer - Power |
| V1 | 71942-1 | 511-0001 | Vibrator |

INSTALLATION & SUPPRESSION

| | | |
|-------|----------|------------------------------------------------------------------------------------------------------------|
| 75744 | 569-0014 | Installation Kit Assembly (complete) includes mounting brackets, hardware and volume and tuning knob |
| 75759 | 561-0008 | Cable - Battery - Fuse to Circuit Breaker |
| 71961 | 569-0004 | Capacitor - Generator and Ignition Coil |
| 75152 | 191-0002 | Fuse - 14 Amp. - Type SFE - 14 |
| 71962 | 744-0009 | Knob - Tone Control |
| 71963 | 744-0010 | Knob - Trim |
| 75133 | 749-0012 | Knob - Volume and Tuning |
| 75756 | 496-0050 | Spring - Knob Tension |
| 71899 | 563-0004 | Suppressor - Distributor |

TUNER ASSEMBLY

| | | |
|-------|----------|------------------------------------------|
| 71819 | 333-0008 | Clutch Plate & Washer Assembly |
| 71818 | 333-0007 | Clutch Release Bracket & Roller Assembly |
| 71823 | 333-0006 | Gear & Bushing Assembly |
| 71587 | 331-0003 | Lock - Cam |
| 71979 | 752-0021 | Plunger Screw & Knob Assembly |
| 71991 | 493-0009 | Shaft - Drive |
| 71835 | 496-0045 | Spring - Release Bar |
| 71990 | 313-0015 | Unit - Tuner Assembly |
| 71847 | 554-0015 | Washer - "C" |
| 44638 | 553-0010 | Washer - Fiber |
| 71846 | 553-2008 | Washer - Tuning Shaft |
| 71815 | 484-0005 | Worm Gear & Bracket Assembly |

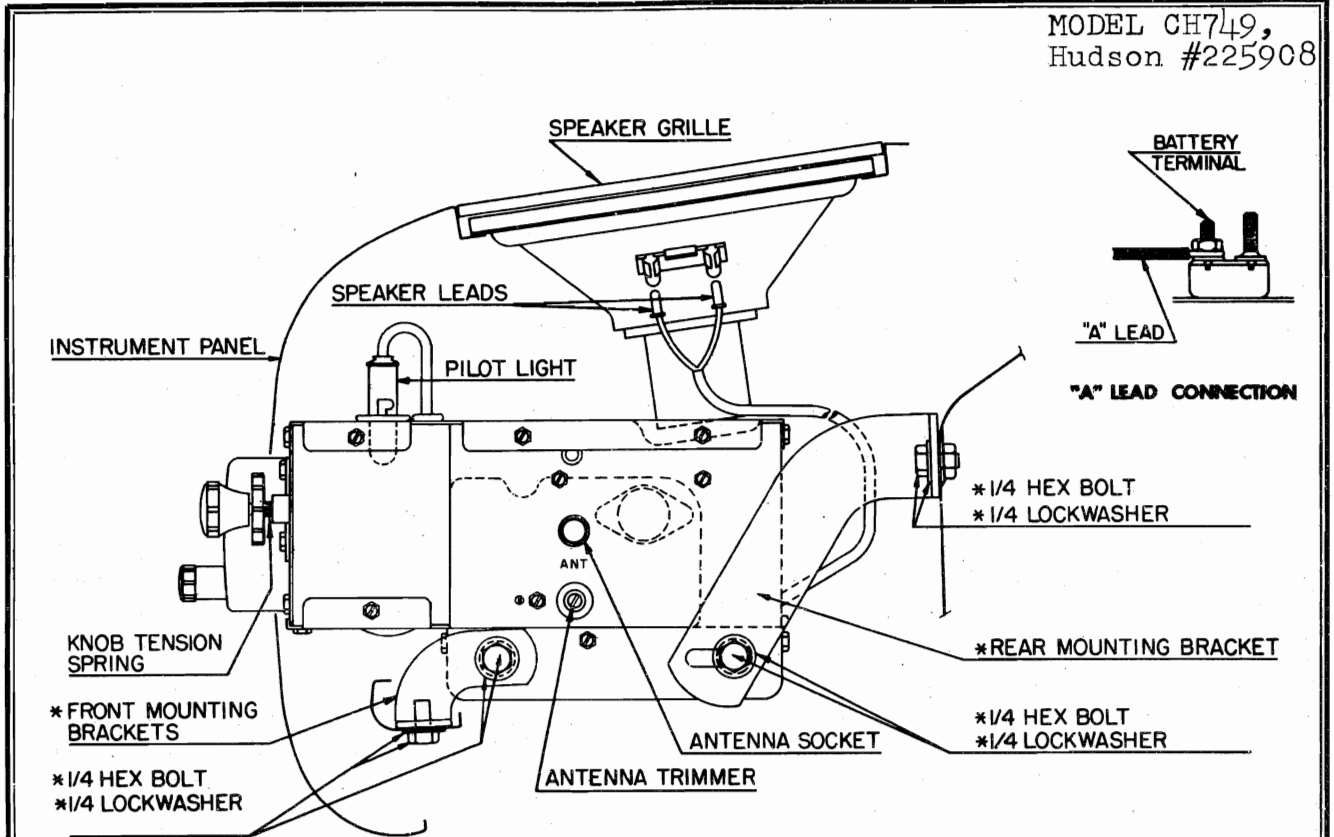
DIAL ASSEMBLY

| | | | |
|----------|-------|----------|-------------------------------------|
| PL1, PL2 | 71907 | 711-0020 | Escutcheon Assembly (complete) |
| | 14914 | 611-0044 | Light - Dial (Mazda #44) |
| | 75007 | 472-0003 | Link - Pointer Drag & Stud Assembly |
| | 71929 | 477-0003 | Escutcheon Window Retaining |
| | 75057 | 791-0013 | Pointer & Bracket Assembly |
| | 75063 | 722-0014 | Scale - Dial |
| | 71948 | 411-0011 | Socket - Dial Light & Lead Assembly |
| | 75036 | 496-0048 | Spring - Pointer Tension |
| | 75039 | 553-2009 | Washer - Pointer Tension Spring |
| | 71940 | 489-0012 | Window - Escutcheon |

TUBE COMPLEMENT

| | | |
|--------|-----------|------------------------------------------|
| 45238G | 622-0001G | 6SK7GT - R. F. Amplifier |
| 41332G | 622-0002G | 6SA7GT - Converter |
| 45238G | 622-0001G | 6SK7GT - I. F. Amplifier |
| 45239G | 622-0003G | 6SQ7GT - Detector, AVC & A. F. Amplifier |
| 71226G | 622-0004G | 6V6GT - Audio Output |
| 71227G | 633-0001G | 6X5GT - Rectifier |

MODEL CH749,
Hudson #225908



* INDICATES PARTS FURNISHED BY HUDSON MOTOR CAR CO.

FIG. 6 RECEIVER INSTALLATION

INSTALLATION

Figure 6 illustrating the installed receiver and its related parts is given here to facilitate removal and reinstallation of the receiver when service or repairs are necessary.

1. Loosen set screws and remove volume control knob, tone control knob, tuning knob, trim knob, and knob tension spring.
2. Remove speaker leads, antenna lead and

"A" lead.

3. Remove four speaker mounting screws and speaker grille.
4. Lift speaker out of recess in dash panel.
5. Remove four 1/4" hex bolts and slide receiver to the rear, down and remove.

OPERATING INSTRUCTIONS

VOLUME CONTROL

To turn the receiver on, turn the volume control knob to the right until it clicks and the dial is illuminated. Allow the receiver to reach the operating stage and adjust the volume control knob for the desired volume. To turn the receiver off, rotate the volume control knob to the left until the control clicks.

MANUAL TUNING

To tune the receiver manually it is only necessary to rotate the manual tuning knob (smaller of the two right hand knobs). Tune the receiver to the exact frequency for the best tonal quality. Manual tuning can be done at any time and will not disturb the setting of the push buttons.

MODEL CH749,
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TONE CONTROL

The tone control knob is located directly behind the volume control knob. Rotating this control to the right or left will change the tone

of the receiver. Right hand rotation will emphasize the high notes, left hand rotation emphasizes the bass notes. Turn in either direction for most pleasing tone.

AUTOMATIC TUNING

There are six automatic tuning positions, each of which may be adjusted to a desired station. In order to simplify station identification, it is advisable to set the automatic tuning mechanism in sequence according to frequencies of the stations, beginning with the station broadcasting on the lowest frequency, and progressing to the station broadcasting on the higher frequency. If these positions have not been previously adjusted, proceed as follows:

1. Loosen the first push button (left side of receiver) by turning it counterclockwise with your fingers, not more than two turns.
2. Turn the manual tuning control knob to tune in the desired station. (Carefully tune to the middle of the signal for clearest reception).
3. Push this push button in to its extreme bottom position and then release. Tighten the push button by turning it clockwise (with fingers only). This completes the operation of setting this push button.
4. Repeat the above procedure for each of the five remaining push buttons.

INTERFERENCE SUPPRESSION

There should be no motor noise or interference from the ignition system if the receiver has been installed in the car according to the instructions furnished with it. The interference suppression equipment may be further checked for proper installation by referring to the following instructions and illustration.

IMPORTANT: Use the utmost care in the following operations to insure freedom from motor noise. Be sure that good ground contacts are made between the interference capacitors and the car body. If necessary, clean away paint and dirt with emery paper. Tighten all nuts and bolts securely.

The voltage regulator capacitor 569-0004 should be installed as shown in Fig. 7. Make certain the contacts are clean and the capacitor is attached to the terminal marked A.

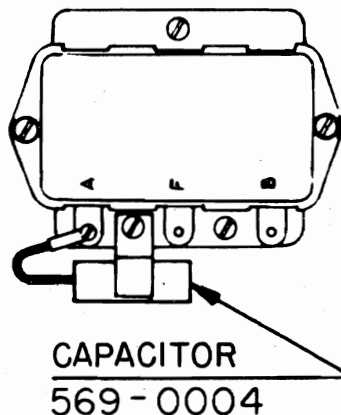


FIG. 7 VOLTAGE REGULATOR

MODEL CH749,
Hudson #225908

The ignition coil capacitor should be installed as shown in Fig. 8. To install, remove the bolt on the left side of the ignition coil and mount the capacitor 569-0004 under this bolt. Connect the capacitor lead to the coil negative terminal marked thus (-).

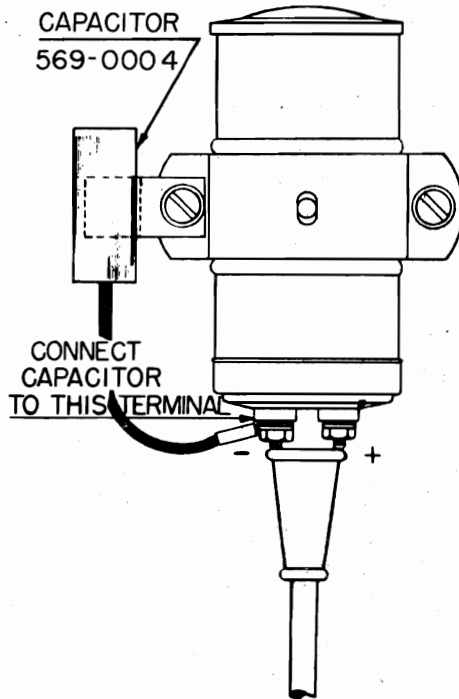


FIG. 8 IGNITION COIL CAPACITOR

The distributor suppressor 563-0004 should be installed as shown in Fig. 9. To insert the distributor suppressor into the high tension line between the ignition coil and the distributor, cut off the high tension wire approximately 1 1/2" above the distributor cap. Cut off an additional one inch from this line and insert the suppressor. Secure the suppressor by screwing the wires into each end. Make certain the capped wire is securely seated in the distributor.

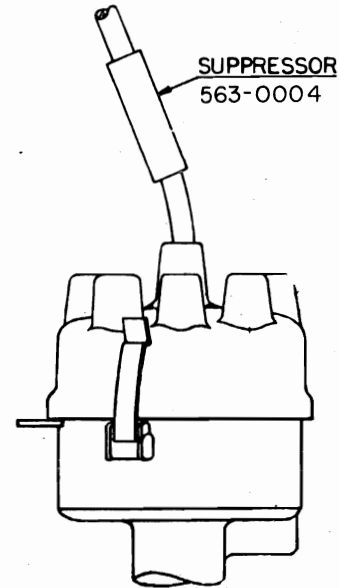


FIG 9 DISTRIBUTOR SUPPRESSOR

11-10-50 2-17

*Supplement No. 1
to
Technical Service Bulletin*

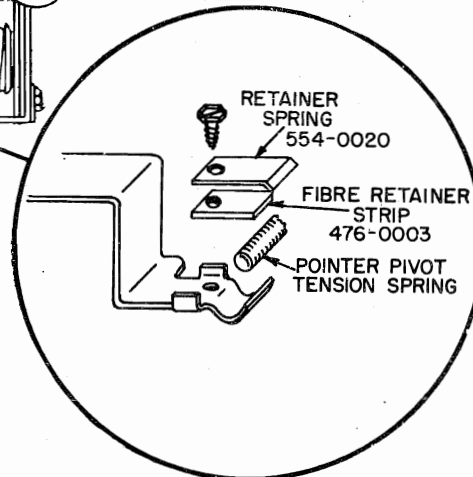
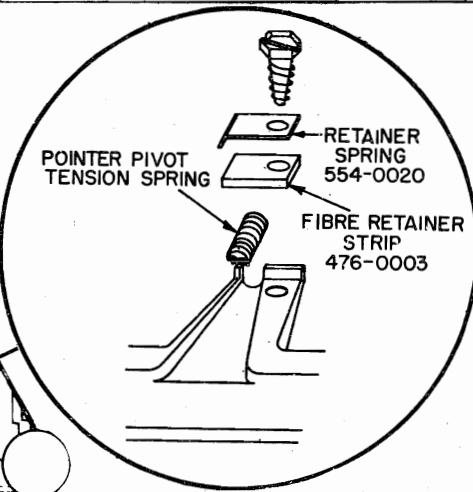
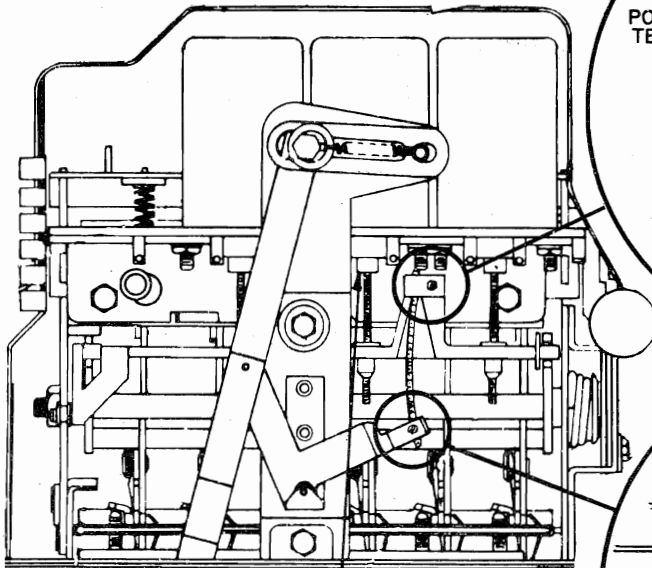
Subject: Pointer Slippage and Binding

In order to prevent pointer slippage and binding due to warping of the two red fibre retainer strips which hold the pointer pivot tension spring in place, metal guard springs have been incorporated in the production of sets with serial numbers CH 17075 (approx.) and up. The guard springs are inserted between the screws which secure the retainer strips, and the retainer strips themselves. These guard springs prevent warping of the retainer strips and consequent pointer slippage. Both the retainer strips and the metal guard springs are available through local Sylvania Parts Distributors.

| <u>SCHEMATIC LOCATION</u> | <u>PRODUCTION PART NUMBER</u> | <u>SERVICE PART NUMBER</u> | <u>DESCRIPTION</u> |
|---------------------------|-------------------------------|----------------------------|------------------------|
| | 75866 | 554-0020 | Spring - Metal Guard |
| | 71529 | 476-0003 | Strip - Fibre Retainer |

MODEL CH749,
Hudson #225908

BOTTOM VIEW OF TUNER SHOWING RETAINER STRIP



4-16-51 2-17

*Supplement No. 2
to
Technical Service Bulletin*

Item 1. Interference suppression.

All 6 cylinder Hudson cars have a suppressor built into the distributor cap; thus the information given on page 12, for installation of Suppressor 563-0004 applies only to eight cylinder models. *

Item 2. The following revisions should be made to the Repair Parts List:

| <u>SCHEMATIC LOCATION</u> | <u>PRODUCTION PART NUMBER</u> | <u>SERVICE PART NUMBER</u> | <u>DESCRIPTION</u> |
|---------------------------|-------------------------------|----------------------------|----------------------------------------------------------------------------------------------------------------------------|
| | | Delete | |
| L1 | 71640 | 562-0006 | Cable - Battery - Fuse |
| | 71642 | 148-0001 | Choke - Motor Noise - Antenna |
| | 71907 | 711-0020 | Escutcheon Assembly (complete) |
| | 71929 | 477-0003 | Escutcheon Window Retaining |
| | 75063 | 722-0014 | Scale - Dial |
| | 71991 | 493-0009 | Shaft - Drive |
| | 71990 | 313-0015 | Unit - Tuner Assembly |
| | 71815 | 484-0005 | Worm Gear and Bracket Assembly |
| | | Add | |
| L1 | 75955 | 148-0001 | Choke - Motor Noise - Antenna |
| | 75725 | 722-0018 | Dial |
| | 75741 | 711-0024 | Escutcheon |
| | 71640 | 562-0006 | Holder - Fuse |
| | 71929 | 477-0003 | Plate - Escutcheon Window Retaining |
| | 75757 | 493-0014 | Shaft Assembly - Drive |
| | 75730 | 313-0019 | Tuner Unit Assembly - mechanical portion only - includes push buttons, driven clutch disc, worm gear, tuning control shaft |
| | | | |
| | 75523 | 484-0005 | Worm Gear and Bracket assembly |

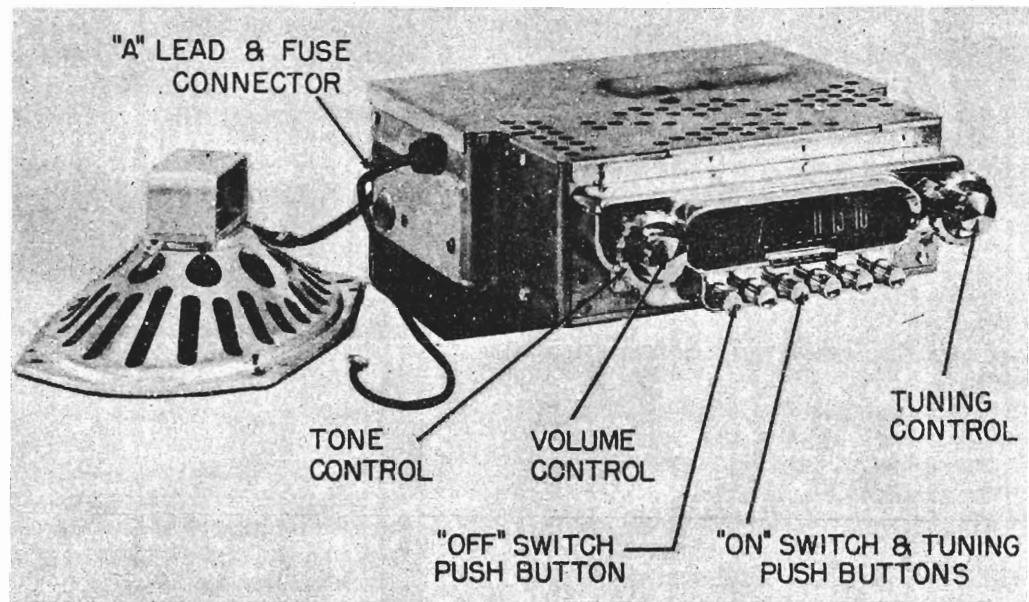


FIG.1 OCF751-1

GENERAL

The Ford model 1A-18805-D receiver is designed for use in the 1951 Ford Station Wagons and cars. If Adapter Kit 1C-18819-A is used, this receiver may be installed in all 1951 Ford Trucks except parcel delivery trucks. The Sylvania serial numbers of the model covered in this bulletin are OCF40,001 and up.

This receiver is a twin unit, 8 tube super-heterodyne with a vibrator power supply and a push pull output stage employing 6V6GT tubes. The antenna, radio frequency and oscillator circuits in this receiver are tuned by means of iron cores both manually and with push buttons, over a range from 540 to 1600 kilocycles.

TUBE COMPLEMENT

| | |
|--------|--------------------------------|
| 6SK7GT | R. F. Amplifier |
| 6SA7GT | Converter |
| 6SK7GT | I. F. Amplifier |
| 6SQ7GT | Det., AVC & 1st A.F. Amplifier |
| 6J5GT | Inverter |
| 6V6GT | Output - Push Pull (2) |
| 6X5GT | Rectifier |

POWER SUPPLY

The power supply uses a 4 prong, full wave, non-synchronous vibrator in conjunction with a 6X5GT full wave rectifier tube. The wiring for the power transformer and vibrator, the main hash choke and its by-pass, and the buffer capacitor are mounted in a shielded compartment on the chassis to reduce interference.

ALIGNMENT

Optimum performance depends on accurate alignment of the receiver; therefore, follow these instructions carefully.

PRELIMINARY INSTRUCTIONS

Make all alignment adjustments to the receiver with the "A" lead connected to a 7.2 volt negative source and ground the chassis to the positive

side of this source. Rotate the volume control to its maximum clockwise position. Rotate the tone control fully clockwise. Connect the output meter across the speaker voice coil. Keep the output from the signal generator at its lowest possible value to prevent the AVC of the receiver from interfering with accurate alignment. Use an insulated screw driver and special alignment tool 898-0003 for making adjustments.

MODEL OCF751-I,
Ford #1A-18805-D

SENSITIVITY CONTROL

The sensitivity control R6 is factory preset and should not be readjusted unless it has been tampered with. If it is definitely determined that readjustment is necessary, set the control to obtain 3.5 volts at the cathode of the I.F. Amplifier (pin #5 of the second 6SK7GT tube).

I F ALIGNMENT

1. Remove the top and bottom covers of the receiver.
2. Set the signal generator to 265 Kc.
3. Connect the signal lead of the signal generator through a .1 Mfd. capacitor to the converter grid (pin #8, 6SA7GT).
4. Adjust the primary and secondary IF cores "A," "B," "C" and "D" in order named for maximum output. Both the primary and secondary of each transformer are adjusted from the top of the transformer using special alignment tool. (See Parts Layout - Bottom of Chassis, Page 3).

Repeat this operation until no further increase in output is obtained.

R F AND OSCILLATOR ALIGNMENT

1. Connect the signal generator leads through a dummy antenna which consists of two, 30 Mmfd. capacitors in a grounded shield, wired so that one is between the antenna lead-in socket of receiver and the signal generator, and the other is shunted from antenna lead to ground.
2. Turn the manual control until the high frequency stop is reached.
3. Set the signal generator to 1625 Kc.
4. Adjust the oscillator trimmer C7, the converter trimmer C6, and the antenna trimmer C1, respectively for maximum response.
5. If dial calibration is off after making above adjustments, corrections can be made by turning eccentric stud of fulcrum of dial pointer.

IRON CORE AND ADJUSTING SPRING

ADJUSTMENT OR REPLACEMENT

1. Remove the top cover from the receiver.
2. Remove the escutcheon assembly.
3. Break cement seal and screw the core in or out to the desired position.

4. If the cores are replaced or have been tampered with, the adjustments under coil and core replacement must be made.
5. After all adjustments have been made re-cement core springs.

CORE ALIGNMENT

CAUTION: The following adjustments are to be made only after a core or coil has been replaced or tampered with.

1. Set signal generator to 1625 Kc.
2. Connect signal generator through a dummy antenna which consists of two 30 Mmfd. capacitors inside a grounded shield so that one is connected directly from antenna socket on receiver to ground while the other capacitor is connected from signal generator to receiver antenna socket.
3. Rotate the manual tuning control to set dial pointer at 1610 Kc. (Maximum high frequency end of dial).
4. Screw the cores completely out of the antenna coil, the converter coil, and the oscillator coil.
5. Adjust the oscillator trimmer C7 at 1625 Kc.
6. Adjust the converter trimmer C6 and the antenna trimmer C1 for maximum output reading.
7. Set the signal generator and the receiver dial to 1410 Kc.
8. Replace the cores to their original position (approximately 11/16" from the end of the coil form.)
9. Adjust the oscillator core L6 to scale at 1410 Kc.
10. Adjust the antenna core L2 and RF core L5 for maximum output reading.
11. Repeat steps 9 and 10 to insure that tracking and calibration are correct.
12. After alignment is complete, the maximum high frequency tuning range should be checked. If the range is greater or less than 1610 Kc., the lug stop near the volume control should be bent to limit the frequency coverage to 1610 Kc.

IMPORTANT: After installing the receiver in the car, allow it to operate for approximately 15 minutes to reach normal operating temperature. Extend antenna to maximum height. Check the antenna trimmer alignment on a weak station at approximately 1410 Kc.

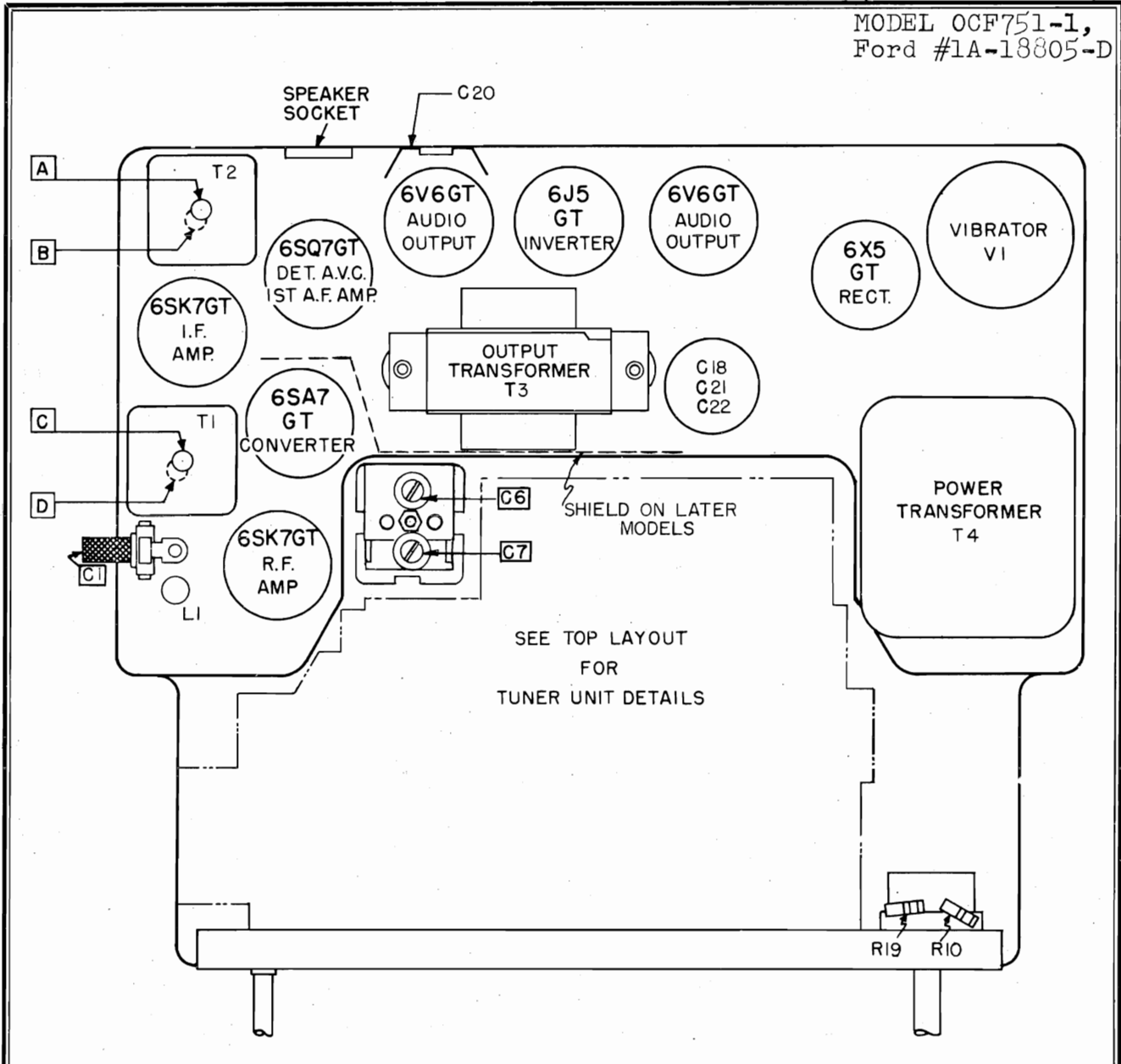


FIG. 2 PARTS LAYOUT - BOTTOM OF CHASSIS

REPAIR PARTS LIST

TUNER UNIT AND PARTS

| <u>SCHEMATIC LOCATION</u> | <u>PRODUCTION PART NUMBER</u> | <u>SERVICE PART NUMBER</u> | <u>DESCRIPTION</u> |
|---------------------------|-------------------------------|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| | 75900 | 313-0016 | Tuner Unit Assembly - Mechanical portion only (includes clutch plate, push buttons, On-Off switch, worm gear and bracket, tuning control shaft) |
| | 60493 | 481-0011 | Ball - bearing - .125" |
| | 71818 | 333-0007 | Bracket - Clutch release and Roller Assembly |

MODEL OCF751-1,
Ford #1A-18805-D

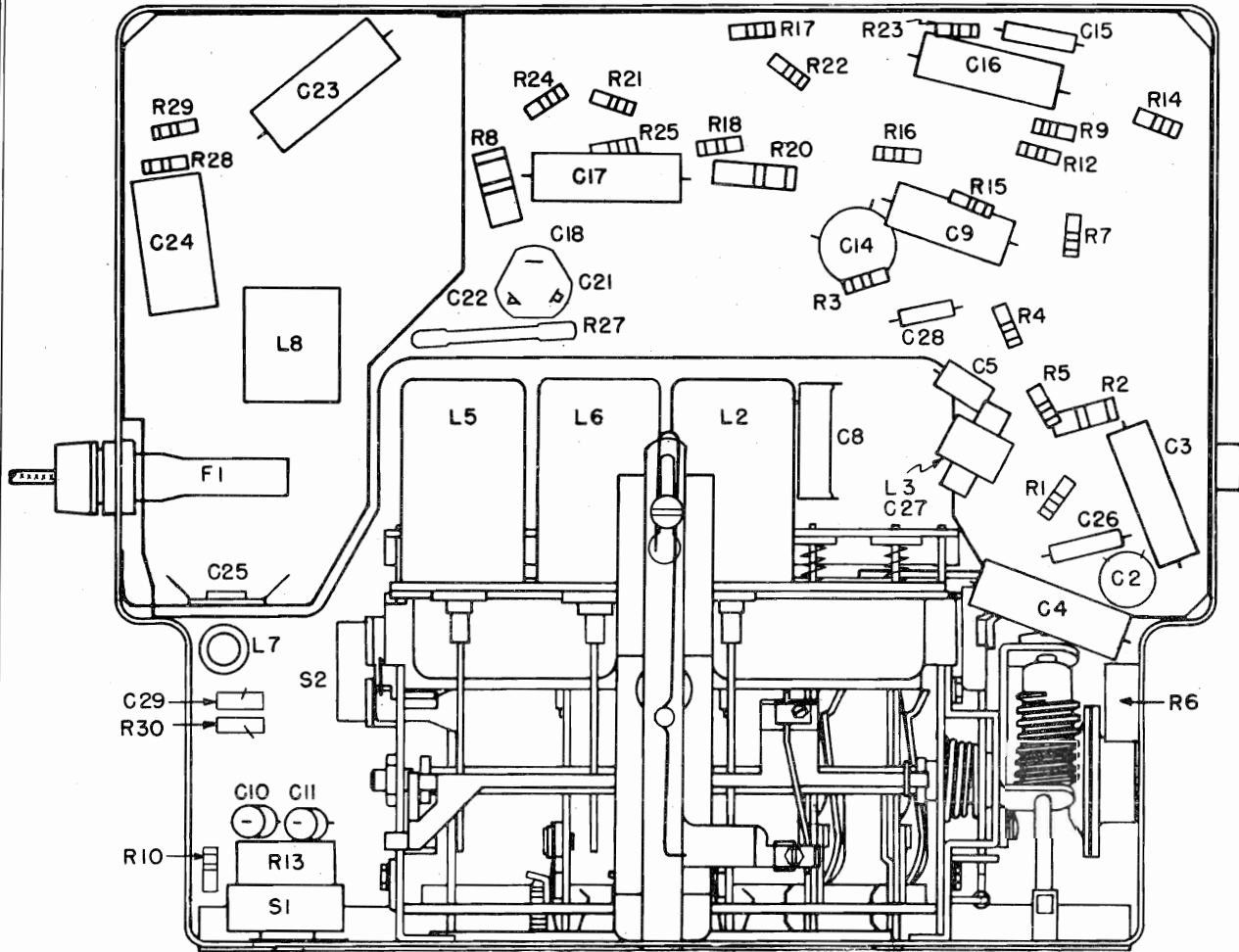


FIG. 3 PARTS LAYOUT - TOP OF CHASSIS

| | | |
|-------|----------|------------------------------------------------------------|
| 75842 | 492-0027 | Bracket - Pointer Support Assembly |
| 71626 | 481-0006 | Bushing - Tuning Shaft |
| 71627 | 481-0007 | Bushing - Volume Control Shaft |
| 75082 | 752-0022 | Button - Push and Screw Assembly |
| 71650 | 487-0010 | Clip - Dial Window Retaining (L. H.) |
| 71649 | 487-0009 | Clip - Dial Window Retaining (R. H.) |
| 65966 | 333-0005 | Clutch and Disc Assembly - Driven |
| 71503 | 192-0002 | Core & Adjusting Spring Assembly |
| 75094 | 722-0013 | Drum - Tone Shaft and Gear Assembly |
| 71651 | 711-0019 | Escutcheon |
| 75106 | 485-0002 | Filter - Dial Scale |
| 75530 | 333-0006 | Gear - Drive and Bushing Assembly |
| 75009 | 484-0004 | Gear - Tone Assembly |
| 75531 | 484-0006 | Gear - Worm |
| 71723 | 489-0011 | Glass - Dial Window |
| 71652 | 744-0008 | Knob - Control - Tone |
| 71653 | 741-0004 | Knob - Control - Tuning - includes Spring - Knob retaining |
| 71654 | 742-0002 | Knob - Control - Volume - includes Spring - Knob retaining |
| 75797 | 472-0007 | Link - Pointer Drag & Stud Assembly |
| 71587 | 331-0003 | Lock - Cam |

MODEL OCF751-1,
Ford #1A-18805-D

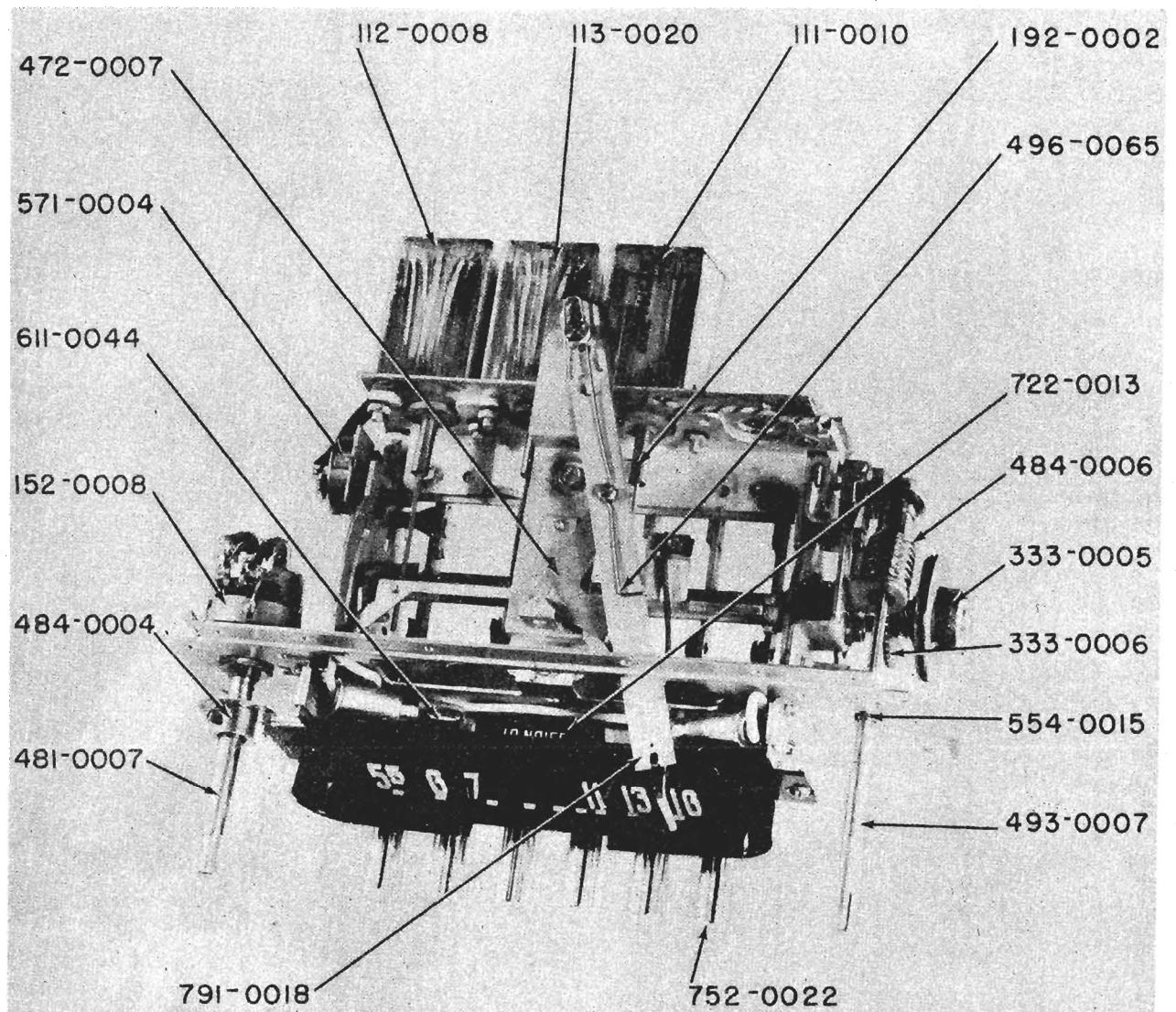


FIG. 4 OCF751 - 1 TUNER

| | | |
|----------|----------|---------------------------------------------------------|
| 75031 | 552-0023 | Nut - 3/8 - 32 Hex |
| 71847 | 791-0018 | Pointer Assembly |
| 75103 | 554-0015 | Ring - Retaining - Tuning Shaft |
| 65975 | 722-0011 | Scale - Dial |
| 71838 | 551-0017 | Screw - Adjusting |
| 75873 | 551-0017 | Screw - Pivot |
| 71701 | 493-0007 | Shaft Assembly - Manual Drive |
| 71700 | 497-0007 | Sleeve - Tuning Shaft |
| 75102 | 497-0006 | Sleeve - Volume Control Shaft |
| 71827 | 411-0009 | Socket - Dial Light |
| 71831 | 496-0043 | Spring - Clutch Release |
| 75037 | 496-0046 | Spring - Clutch Release Bracket |
| 75793 | 496-0065 | Spring - Cross Arm Tension |
| 71529 | 496-0066 | Spring - Pointer Tension |
| S2 71865 | 476-0003 | Strip - Fibre Retainer (Pointer Pivot Tension Spring) |
| 71837 | 571-0004 | Switch - On-Off |
| 71180 | 553-3000 | Washer - Felt |
| 71853 | 553-4009 | Washer - Shim |
| | 553-5005 | Washer - Tension |

MODEL OCF751-1,
Ford #1A-18805-D

TUBE COMPLEMENT

| <u>SCHEMATIC LOCATION</u> | <u>PRODUCTION PART NUMBER</u> | <u>SERVICE PART NUMBER</u> | <u>DESCRIPTION</u> |
|---------------------------|-------------------------------|----------------------------|-----------------------------------------------|
| | 45238H | 622-0001H | 6SK7GT - R.F. Amplifier |
| | 41332H | 622-0002H | 6SA7GT - Converter |
| | 45238H | 622-0001H | 6SK7GT - I.F. Amplifier |
| | 45239H | 622-0003H | 6SQ7GT - Detector - AVC - 1st A. F. Amplifier |
| | 44547H | 622-0010H | 6J5GT - Inverter |
| | 71226H | 622-0004H | 6V6GT - Audio Output |
| | 71226H | 622-0004H | 6V6GT - Audio Output |
| | 71227H | 633-0001H | 6X5GT - Rectifier |

CAPACITORS

| | | | |
|----------|----------------|-----------|----------------------------------------------------------------------------------------|
| C8 | 75961 | 165-0230 | Capacitor - Ceramic - Temp. Comp. - .00023 Mfd. |
| C2 | 71632 | 168-0002D | Capacitor - Ceramic - .01 Mfd. - 200 V. |
| | 75825 or 71633 | 161-3005 | Capacitor - Electrolytic |
| C18 | | | 20 Mfd. - 25 V. |
| C21, C22 | | | 20 Mfd. - 350 V. |
| C5 | 71472 | 163-0033 | Capacitor - Mica - .000033 Mfd. - 500 V. |
| C15 | 71660 | 163-0220 | Capacitor - Mica - .00022 Mfd. - 500 V. |
| C29 | 20548 | 163-0250 | Capacitor - Mica - .00025 Mfd. - 500 V. |
| C28 | 71399 | 164-0010 | Capacitor - Silver Mica - .00001 Mfd. - 500 V. |
| C26 | 71661 | 164-0150 | Capacitor - Silver Mica - .00015 Mfd. - 500 V. |
| C10 | 75064 | 160-04215 | Capacitor - Molded Paper - .0015 Mfd. - 400 V. |
| C11, C14 | 75098 | 160-02256 | Capacitor - Molded Paper - .0056 Mfd. - 200 V. |
| C23 | 71662 | 160-16282 | Capacitor - Molded Paper - .0082 Mfd. - 1600 V. |
| C3 | 71666 | 160-02122 | Capacitor - Molded Paper - .022 Mfd. - 200 V. |
| C16, C17 | 71664 | 160-06122 | Capacitor - Molded Paper - .022 Mfd. - 600 V. |
| C9 | 71663 | 160-0201 | Capacitor - Molded Paper - .1 Mfd. - 200 V. |
| C4 | 71665 | 160-0401 | Capacitor - Molded Paper - .1 Mfd. - 400 V. |
| C24 | HT71763 | 169-0001 | Capacitor - Paper - .5 Mfd. - 100 V. |
| C1 | 71636 | 172-0026 | Capacitor - Trimmer - Antenna |
| C6, C7 | 75824 | 173-0002 | Capacitor - Trimmer and Fixed |
| C20, C25 | | 167-0008 | Capacitor - Spark Plate Kit |
| | | | Consists of Silvered mica washer, Shouldered washer, flatwasher, screw, lockwasher-nut |

MISCELLANEOUS CHASSIS PARTS

| | | | |
|-----|-------|----------|-------------------------------------------------|
| | 71639 | 561-0003 | Cable - Battery (Fuse to Ammeter) |
| F2 | 75786 | 562-0007 | Holder - Fuse |
| | 71699 | 416-0002 | Socket - Antenna Connector |
| SK1 | 71698 | 414-0001 | Socket - Speaker |
| | 71693 | 412-0016 | Socket - Tube - 8 Prong Octal - Molded Bakelite |
| | 66423 | 413-0005 | Socket - Vibrator |

MISCELLANEOUS ELECTRICAL PARTS

| | | | |
|----------|-------|----------|----------------------------------------|
| PL1, PL2 | 14914 | 611-0044 | Bulb - Dial Light (Mazda #44) |
| L1 | 75955 | 148-0001 | Choke - Antenna |
| L8 | 71628 | 147-0007 | Choke - Hash - Main |
| L7 | 75850 | 145-0005 | Choke - Heater |
| | 75796 | 117-0012 | Coils - Permeability Tuning (includes) |
| L2 | | 111-0010 | Antenna Coil |
| L5 | | 112-0008 | R. F. Coil |
| L6 | | 113-0020 | Oscillator Coil |
| L3, C27 | 75918 | 118-0008 | I. F. Trap Coil |

MISCELLANEOUS ELECTRICAL PARTS (continued)

| <u>SCHEMATIC LOCATION</u> | <u>PRODUCTION PART NUMBER</u> | <u>SERVICE PART NUMBER</u> | <u>DESCRIPTION</u> |
|---------------------------|-------------------------------|----------------------------|----------------------------------|
| R6 | 71645 | 159-0004 | Control - Sensitivity |
| R13, S1 | 71893 | 152-0008 | Control - Volume and Tone Switch |
| F1 | 17392 | 191-0002 | Fuse - 14 Amp |
| SP1 | 75674-2 | 539-0001 | Speaker - 6' x 9" PM |
| T1 | 71702 | 121-0015 | Transformer - 1st I.F. |
| T2 | 71703 | 122-0015 | Transformer - 2nd I.F. |
| T3 | 75931 | 143-0012 | Transformer - Output |
| T4 | 75787 | 141-0010 | Transformer - Power |
| V1 | 71712 | 511-0001 | Vibrator |

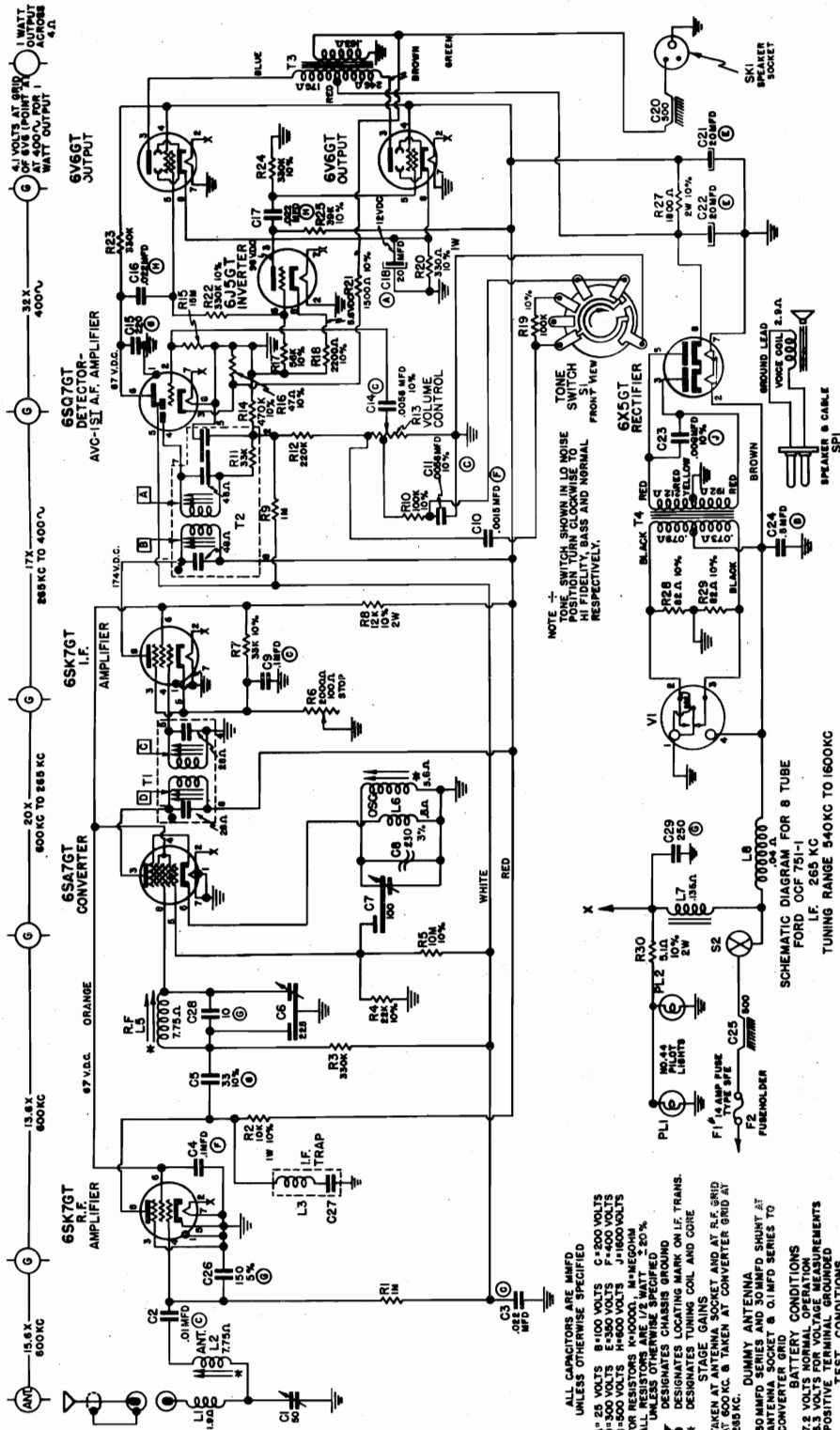
INSTALLATION PARTS

| | | |
|--------|----------|---------------------------------------------|
| 75938 | 569-0015 | Installation and Suppression Kit (includes) |
| 71617 | 492-0014 | Bracket - Installation |
| 75162 | 567-0005 | Capacitor - Fuel Gauge |
| 71456 | 564-0002 | Capacitor - Generator |
| 71604 | 569-0012 | Capacitor - Oil Gauge |
| 75156 | 569-0004 | Capacitor - Voltage Regulator |
| 71460 | 568-0003 | Collector - Wheel Static |
| 71610 | 552-0006 | Nut - Hex - 1/4-20 |
| 75663 | 552-0001 | Nut - Wing - 8-32 |
| 75935 | 563-0006 | Suppressor Lead - Distributor |
| 71615 | 553-2006 | Washer - Flat |
| 400-14 | 553-0003 | Washer - Lock - 1/4 Split |
| 71669 | 552-0020 | Nut - Hex - 1/2 - 28 |
| 71414 | 563-0004 | Suppressor-Distributor |
| 71491 | 553-1250 | Washer - Lock - 1/2 - Int. Tooth |

RESISTORS

| | | | |
|-------------------|---------|----------|---------------------------------------------|
| R16 | BY34701 | 181-0470 | Resistor - 47 Ohm - 1/2 W. - insulated |
| R28, R29 | BY38201 | 181-0820 | Resistor - 82 Ohm - 1/2 W. - insulated |
| R21 | BY31521 | 181-0152 | Resistor - 1,500 Ohm - 1/2 W. - insulated |
| R18 | BY32221 | 181-0222 | Resistor - 2,200 Ohm - 1/2 W. - insulated |
| R4 | BY32231 | 181-0223 | Resistor - 22,000 Ohm - 1/2 W. - insulated |
| R7, R11 | BY33331 | 181-0333 | Resistor - 33,000 Ohm - 1/2 W. - insulated |
| R25 | BY33931 | 181-0393 | Resistor - 39,000 Ohm - 1/2 W. - insulated |
| R17 | BY35631 | 181-0563 | Resistor - 56,000 Ohm - 1/2 W. - insulated |
| R10, R19 | BY31041 | 181-0104 | Resistor - 100,000 Ohm - 1/2 W. - insulated |
| R12 | BY32241 | 181-0224 | Resistor - 220,000 Ohm - 1/2 W. - insulated |
| R3, R22, R23, R24 | BY33341 | 181-0334 | Resistor - 330,000 Ohm - 1/2 W. - insulated |
| R14 | BY34741 | 181-0474 | Resistor - 470,000 Ohm - 1/2 W. - insulated |
| R1, R9 | BY31051 | 181-0105 | Resistor - 1.0 Megohm - 1/2 W. - insulated |
| R5 | BY31061 | 181-0106 | Resistor - 10 Megohm - 1/2 W. - insulated |
| R15 | BY31561 | 181-0156 | Resistor - 15 Megohm - 1/2 W. - insulated |
| R20 | ZY33311 | 182-0331 | Resistor - 330 Ohm - 1 W. - insulated |
| R2 | ZY31031 | 182-0103 | Resistor - 10,000 Ohm - 1 W. - insulated |
| R30 | 71676 | 189-0014 | Resistor - 5.1 Ohm - 2 W. - W. W. |
| R27 | VY31821 | 183-0182 | Resistor - 1,800 Ohm - 2 W. - insulated |
| R8 | VY31231 | 183-0123 | Resistor - 12,000 Ohm - 2 W. - insulated |

MODEL OCF751-1,
Ford #1A-18805-D



ALL CAPACITORS ARE AMFED UNLESS OTHERWISE SPECIFIED
 A* 25 VOLTS B*100 VOLTS C*200 VOLTS
 D*500 VOLTS E*350 VOLTS F*400 VOLTS
 G*500 VOLTS H*600 VOLTS J*1000 VOLTS
 ALL RESISTORS ARE 1/2 WATT UNLESS OTHERWISE SPECIFIED
 * DESIGNATES CHASSIS GROUND
 † DESIGNATES TUNING COIL AND CORE
 ‡ DESIGNATES TUNING COIL AND CORE
 § STAGE GAINS
 ¶ TAKEN AT ANTENNA SOCKET AND AT R.F. GRID AT 600 KC & TAKEN AT CONVERTER GRID AT 800 KC. DUMMY ANTENNA
 ** 30MFD SERIES AND 30MFD SHUNT AT ANTENNA SOCKET & 0.1MFD SERIES TO BATTERY
 †† 7.5 VOLTS NORMAL OPERATION POSITIVE MEASUREMENTS
 ††† TEST CONDITIONS
 †††† VOLUME CONTROL SET AT MAXIMUM TONE CONTROL SET ON HIGH FIDELITY WITH NO TONE CONTROL. TONE CONTROL SET ON POINT SHOWN TO CHASSIS WITH 1000 OHM PER VOLT METER. ALL TUBE SOCKETS ARE BOTTOM VIEWS

NOTE - TONE SWITCH SHOWN IN LO NOISE POSITION. HI FIDELITY, BASS AND NORMAL RESPECTIVELY.

SCHEMATIC DIAGRAM FOR 8 TUBE FORD OCF 751-1
 L.F. 265 KC
 TUNING RANGE 540KC TO 1600KC

FIG. 5 SCHEMATIC DIAGRAM MODEL OCF751-1

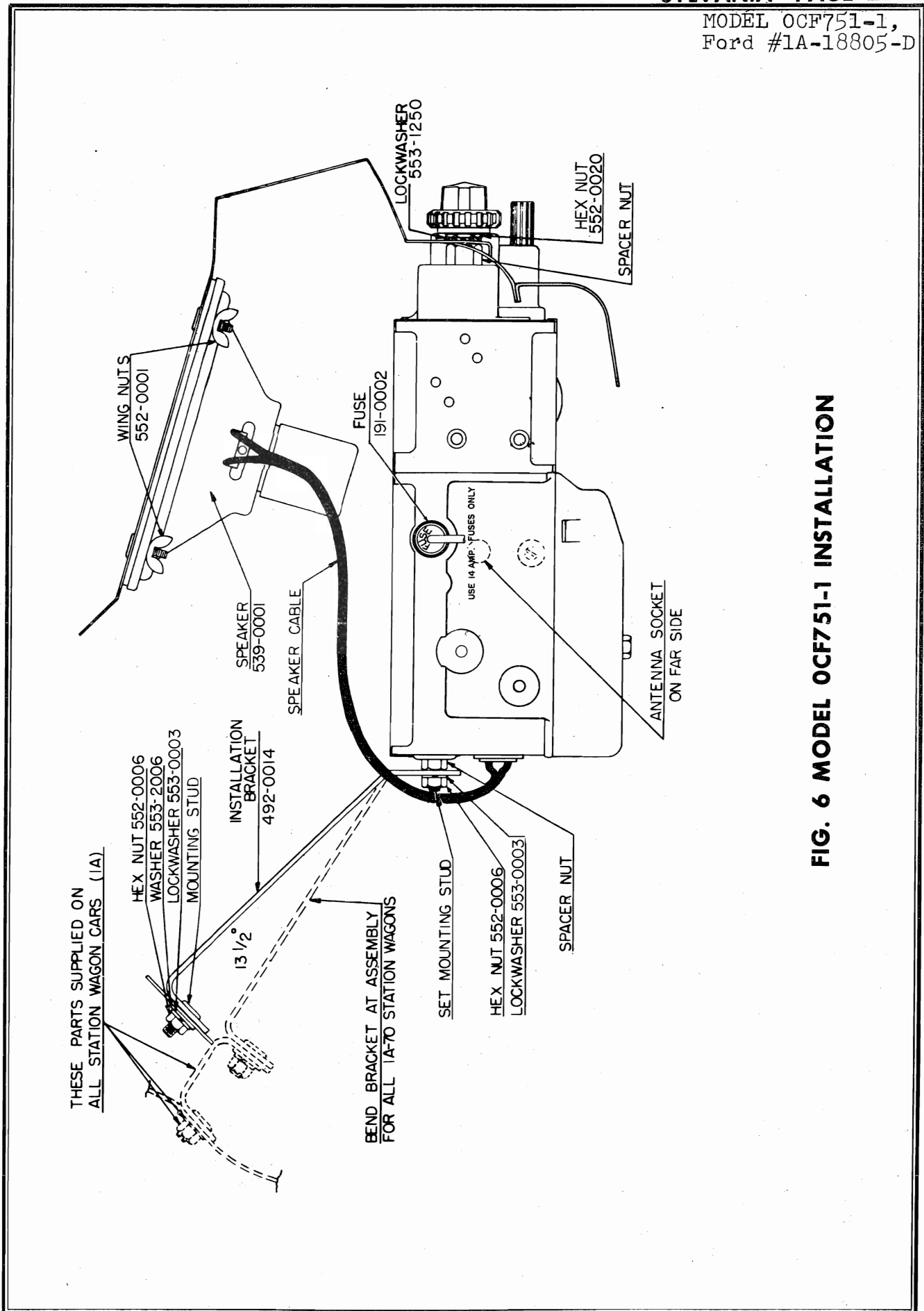


FIG. 6 MODEL OCF751-1 INSTALLATION

MODEL OCF751-1,
Ford #1A-18805-D

RECEIVER INSTALLATION

Figure 6 illustrates the installed receiver to facilitate removal and reinstallation of the receiver when service is necessary.

TO REMOVE THE RECEIVER FROM THE CAR:

1. Disconnect the "A" lead at the receiver. Remove the speaker plug from the receiver.
2. Remove control knobs, front mounting nuts and lockwashers from the radio control shafts. (See Fig. 6)
3. Disconnect the bottom of the set rear mounting bracket by removing the hex nut and lockwasher from the set rear mounting stud. (See Fig. 6)
4. Remove set by pushing it back and down behind instrument panel.
5. To take the speaker from the Ford car, remove the four wing nuts that hold the speaker to the rear of the instrument panel.

OPERATING INSTRUCTIONS

TO TURN RADIO ON

The radio is connected to the accessory terminal of the ignition switch, therefore, it is necessary to turn the ignition key to the left, if the engine is not running, before turning the radio on. Press any one of the five automatic push-buttons. Allow approximately 20 seconds for the receiver to reach operating temperature.

To turn the receiver off, press the "Off" push-button. (See Fig. 1)

MANUAL TUNING

To operate the manual tuning control simply turn the tuning knob (see Fig. 1). When tuning

in a station, be sure to tune to the exact frequency for the best tone quality.

VOLUME CONTROL

Turn the volume control knob for the desired volume.

TONE CONTROL

The tone control knob is located directly behind the volume control knob. Turning this control to the right or left will change the tone of the receiver. This control has four positions and the position to which the control is set is indicated in the window in the center of the dial scale.

AUTOMATIC TUNING

Automatic push button tuning is provided by means of 5 push buttons located directly under the dial scale and to the right of the "Off" push button (see Fig. 1). These five buttons permit the selection of five favorite local stations. When the push buttons have been set to the desired stations it is only necessary to press a push button to turn the set "On" and to receive the station for which the adjustment was made. The dial pointer will automatically indicate the frequency of the selected station.

SETTING THE PUSH BUTTON TUNER

The five push buttons may be adjusted to any of the desired stations. In order to simplify the identification of these stations, it is ad-

visible to set the push buttons in sequence according to their frequencies, beginning with the station broadcasting on the lowest frequency and progressing to the station broadcasting on the highest frequency.

The push buttons should be set up during the daytime because at night, distant stations will be heard with the same volume as local stations, making it difficult to identify local stations.

Allow the receiver to operate for at least fifteen minutes before adjusting the push buttons. This will allow each part in the receiver to reach normal operating temperature.

MODEL OCF751-1,
Ford #1A-18805-D

- a. Collapse the antenna.
- b. Select a station at the low end of the broadcast band and manually tune it in so its signal is heard without distortion.
- c. Loosen the second push button from the left side by turning it, with your fingers, counterclockwise one turn.
- d. Press the loosened push button in firmly to its extreme position and release. Tighten the push buttons as much as possible by turning clockwise with your fingers.
- e. The push button is now set for this sta-

tion selection. Follow the above procedure for setting each of the four remaining push buttons.

- f. Check that the push button setting corresponds to the best manually tuned signal for each station and repeat steps "b" through "e" where necessary.

When the five push buttons have been set to the desired stations, return the antenna to the lowest position necessary for good reception. It is only necessary to press a push button to receive the station for which the adjustment was made. The dial pointer will automatically indicate the frequency of the selected station.

INTERFERENCE ELIMINATION

There should be no motor noise or interference from the ignition system if the receiver has been installed in the car according to the instructions furnished with the receiver. The interference suppression equipment may be checked for proper installation by referring to the following instruction and illustrations.

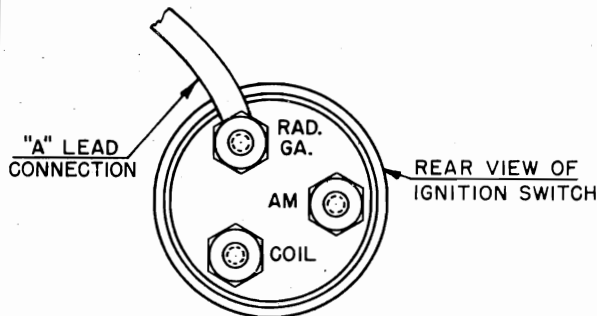


FIG. 7 "A" LEAD CONNECTION

The "A" lead to the receiver should be installed in each car as illustrated in Fig. 7.

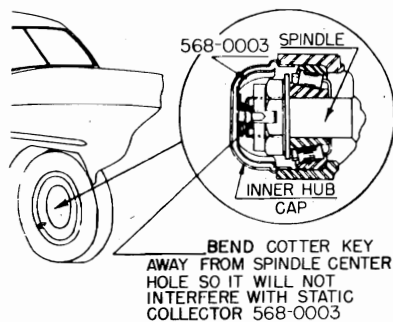


FIG. 8 WHEEL STATIC COLLECTOR

Remove both the outer and the inner hub caps from both front wheels. Clean the inner caps

and spindles. Snap static collector springs 568-0003 in inner hub caps.

IMPORTANT: Bend cotter key away from center hole so it will not interfere with static collector. Replace hub caps.

Two types of distributor suppressors are used with the Ford model OCF751-1 receiver. Suppressor 563-0004 was used for receivers with serial numbers up to OCF-51,341-751-1. Suppressor 563-0006 is used for all receivers with serial numbers above this number. Suppressor 563-0004 may be replaced with suppressor lead 563-0006.

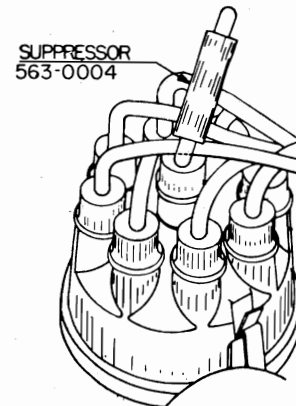


FIG. 9 DISTRIBUTOR SUPPRESSOR 563-0004

To install Suppressor 563-0004 shown in Fig. 9, cut the high tension wire running from the ignition coil to the center hole of the distributor cap, one and one half inches from the coil. Cut one inch from the coil end of the wire. Screw the cut ends of the wire into both ends of Suppressor 563-0004. Replace the wire in the coil.

MODEL OCF751-1,
Ford #1A-18805-D
SUPPRESSOR LEAD
563-0006

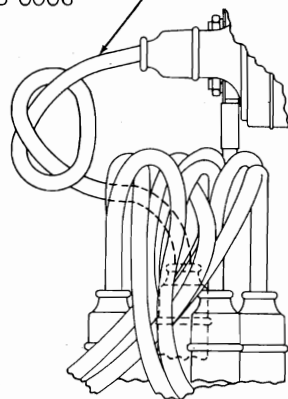


FIG. 10 DISTRIBUTOR SUPPRESSOR LEAD 563-0006

To install Suppressor lead 563-0006, remove the high tension wire that runs between the ignition coil and the center hole of the distributor cap. Thoroughly clean the contacts on the coil and distributor. Make an overhand loop in Suppressor lead 563-0006 as shown in Fig. 10 and insert the lead in place of the high tension wire.

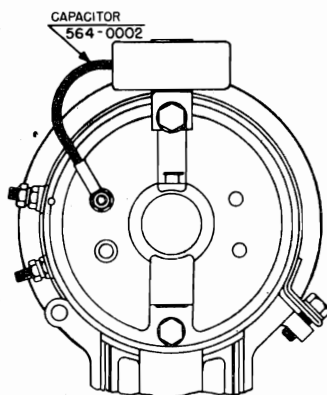


FIG. 11 GENERATOR CAPACITOR

The generator capacitor 564-0002 is installed by loosening (do not remove) the top assembly bolt from the rear end plate of the generator. Mount the capacitor under this bolt and connect the lead to the armature terminal of the generator.

Supplement No. 1

3-20-51 2-19

*to
Technical Service Bulletin*

Suppressor Lead 563-0006 was available for production earlier than originally anticipated. As a result, the serial numbers given under "Interference Elimination" in Bulletin 2-19 are changed. Distributor Suppressor 563-0004 is used with receivers having serial numbers up to and including OCF 49,260 751-1. Receivers with serial numbers above OCF 49,260 751-1 use Suppressor Lead 563-0006.

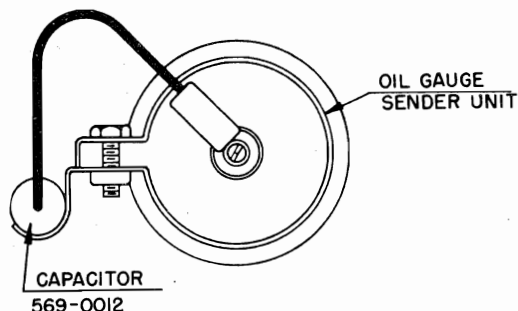


FIG. 12 OIL GAUGE CAPACITOR

Connect capacitor 569-0012 to the oil gauge sender unit as shown.

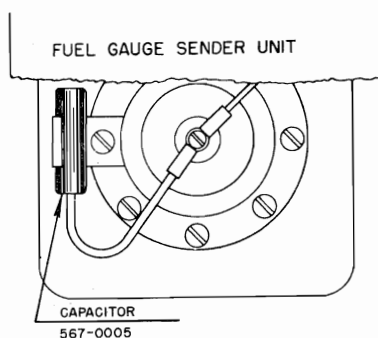


FIG. 13 FUEL GAUGE CAPACITOR

Connect capacitor 567-0005 to the fuel gauge sender unit as shown in Fig. 13 and seal tightly with compound.

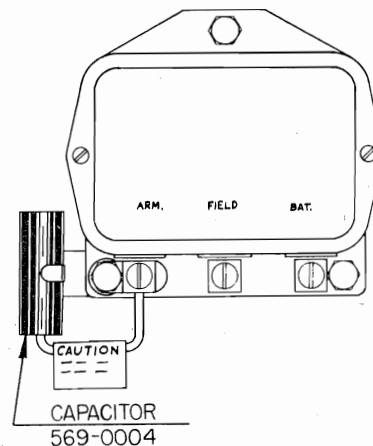


FIG. 14 VOLT. REG. CAPACITOR

Mount capacitor 569-0004 between voltage regulator and dash panel. Connect lead to "ARM" terminal on regulator as shown.

MODELS 1CF743, Ford #1A-18805-B; 1CM747, Mercury #1M-18805; 1CH748, Lincoln #1H-18805

GENERAL

The Ford model 1A-18805-B, Mercury model 1M-18805, and Lincoln model 1H-18805 radio receivers are designed for use in the 1951 Ford, Mercury, and Lincoln cars respectively. The serial numbers covered by this bulletin are: Ford 1CF 1001 and up; Mercury 1CM 1001 and up; and Lincoln 1CH 1001 and up. These receivers are all similar electrically, but differ mechanically, in the appearance of the control knobs, escutcheon and dial assemblies, and method of mounting the receivers and speakers in the cars.

These radios are eight tube, two unit, super-hetrodyne receivers with vibrator power supply and full wave rectifier. The antenna, RF, and oscillator circuits are inductively tuned (push button and manual) over a frequency range of 540 to 1600 kilocycles by means of iron cores. A special compensating capacitor in the oscillator circuit minimizes frequency drift due to normal variations in temperature and battery voltage.

TUBE COMPLEMENT

| | |
|--------|------------------------------|
| 6SK7GT | R. F. Amplifier |
| 6SA7GT | Converter |
| 6SK7GT | I. F. Amplifier |
| 6SQ7GT | Det., AVC, & A. F. Amplifier |
| 6J5GT | Phase Inverter |
| 6V6GT | Output - Push Pull (2) |
| 6X5GT | Rectifier |

ALIGNMENT

Maximum performance depends on accurate alignment of the receiver; therefore, follow these instructions carefully.

PRELIMINARY INSTRUCTIONS

Make all alignment adjustments to the receiver with the "A" lead connected to a 7.2 volt negative source and ground the chassis to the positive side of this source. Rotate the volume control to its maximum clockwise position. Rotate the tone control to the treble position. Connect the output meter across the speaker voice coil. Keep the output from the signal generator at its lowest possible value to prevent the AVC of the receiver from interfering with accurate alignment. Use an insulated screw driver and special alignment tool 898-0003 for making adjustments.

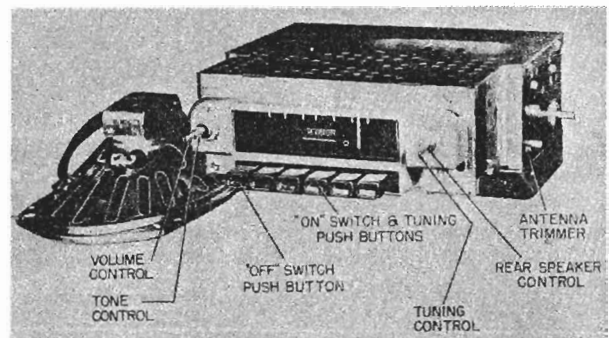
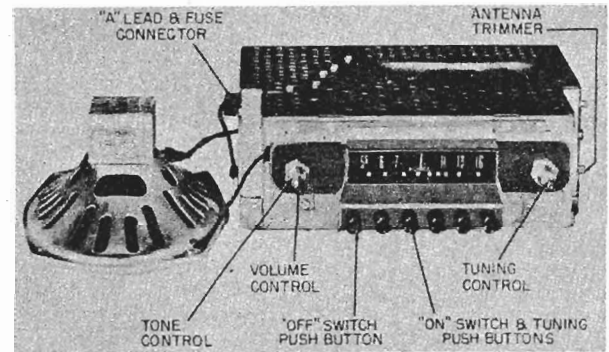


FIG. 2 1CM747 & 1CH748

POWER SUPPLY

The power supply uses a 6X5GT full wave rectifier tube in conjunction with a four prong, full wave, non-synchronous vibrator.

SENSITIVITY CONTROL

The sensitivity control R8 is factory preset and should not be readjusted unless the control has been tampered with. If it is definitely determined that readjustment is necessary, set the control to obtain 3.5 volts at the cathode of the IF Amplifier (pin #5 of the second 6SK7GT tube).

I F ALIGNMENT

1. Remove the top and bottom cover of the receiver.
2. Set the signal generator to 265 Kc.
3. Connect the signal lead of the signal generator through a .01 Mfd. capacitor to the converter grid (pin #8, 6SA7GT).
4. Adjust the primary and secondary IF cores "A," "B," "C" and "D" in order named

MODELS 1CF743, Ford #1A-18805-B; 1CM747, Mercury #1M-18805; 1CH748, Lincoln #1H-18805

for maximum output. Both the primary and secondary of each transformer are adjusted from the top of the transformer using special alignment tool. (See Parts Layout - Top of Chassis & Bottom of Chassis,

Repeat this operation until no further increase in output is obtained.

RF AND OSCILLATOR ALIGNMENT

1. Connect the signal generator leads through the dummy antenna illustrated in Fig. 3, to antenna lead-in socket on receiver.
2. Set signal generator to 535 Kc.
3. Rotate the manual tuning control to stop at 535 Kc.
4. Adjust oscillator trimmer C8 for maximum response.
5. Set signal generator to 1300 Kc.
6. Rotate the manual tuning control to stop at 1300 Kc.
7. Adjust the converter trimmer C5 and antenna trimmer C2 for maximum response.
8. If dial calibration is off after making above adjustments, corrections can be made by turning eccentric stud of fulcrum of dial pointer.
4. Screw the cores completely out of the antenna coil, the converter coil, and the oscillator coil.
5. Adjust the oscillator trimmer C8 at 1675 Kc.
6. Adjust the converter trimmer C5 and the antenna trimmer C2 for maximum output reading.
7. Set the signal generator and the receiver dial to 1300 Kc.
8. Replace the cores to their original position (approximately 11/16" from the end of the coil form.
9. Adjust the oscillator core L4 to scale at 1300 Kc.
10. Adjust the antenna core L2 and RF core L3 for maximum output reading.
11. Set the signal generator to 600 Kc.
12. "Rock in" the shunt oscillator core L6 for maximum output reading. Note: This is the same as rocking in the padder capacitor in a four gang capacitor receiver.
13. Check receiver at 1300 Kc. for calibration and gain. If the receiver is off scale or weak, repeat operations 9, 10 and 11.
14. After alignment is complete, the maximum high frequency tuning range should be checked. If the range is greater or less than 1605 Kc., the lug stop near the volume control should be bent to limit the frequency coverage to 1605 Kc.

IRON CORE AND ADJUSTING SPRING ADJUSTMENT OR REPLACEMENT

1. Remove the top cover from the receiver.
2. Remove the escutcheon assembly.
3. Break cement seal and screw the core in or out to the desired position.
4. If the cores are replaced or have been tampered with, the adjustments under coil and core replacement must be made.
5. After all adjustments have been made re-cement core springs.

CORE ALIGNMENT

CAUTION: The following adjustments are to be made only after a core or coil has been replaced or tampered with.

1. Set signal generator to 1675 Kc.
2. Connect signal generator leads through dummy antenna illustrated in Fig. 3, to antenna lead in socket of receiver.
3. Rotate the manual tuning control to set dial pointer at 1600 Kc. (Maximum high frequency end of dial).

IF TRAP ADJUSTMENT

1. Set the signal generator to 265 Kc.
2. Connect the signal generator leads through the dummy antenna as illustrated in Fig. 3, to antenna lead-in socket on receiver.
3. Rotate the manual tuning control to tune the set to approximately 900 Kc.
4. Connect the output meter across the speaker voice coil and tune the IF trap core T1 with alignment tool 898-0003 for minimum output.

Note: In certain localities it may be necessary to shift the IF trap adjustment slightly in order to reject the interfering signal from a local station whose broadcasting frequency, or range frequency, is a few kilocycles higher or lower than 265 Kc.

IMPORTANT: After installing the receiver in the car, allow it to operate for approximately 15 minutes to reach normal operating temperature. Extend antenna to maximum. Check the antenna trimmer alignment on a weak station at approximately 1300 Kc.

MODELS 1CF743, Ford #1A-18805-B; 1CM747, Mercury #1M-18805; 1CH748, Lincoln #1H-18805

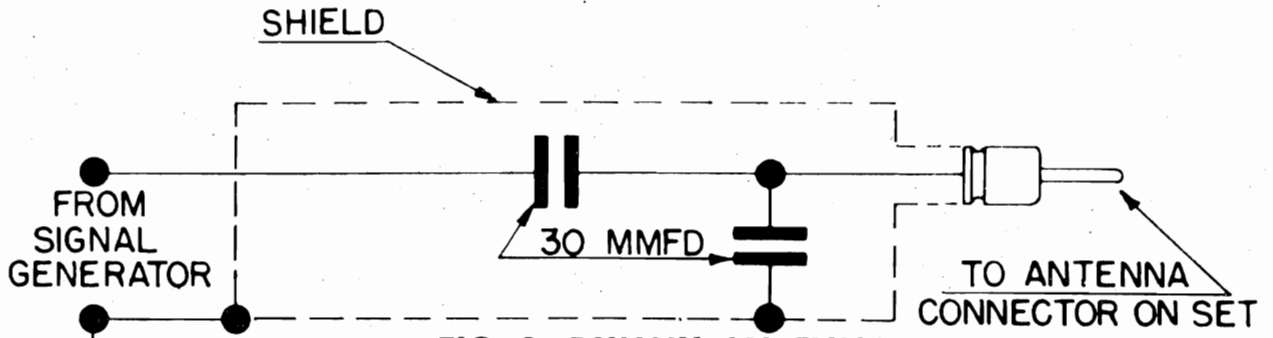


FIG. 3 DUMMY ANTENNA

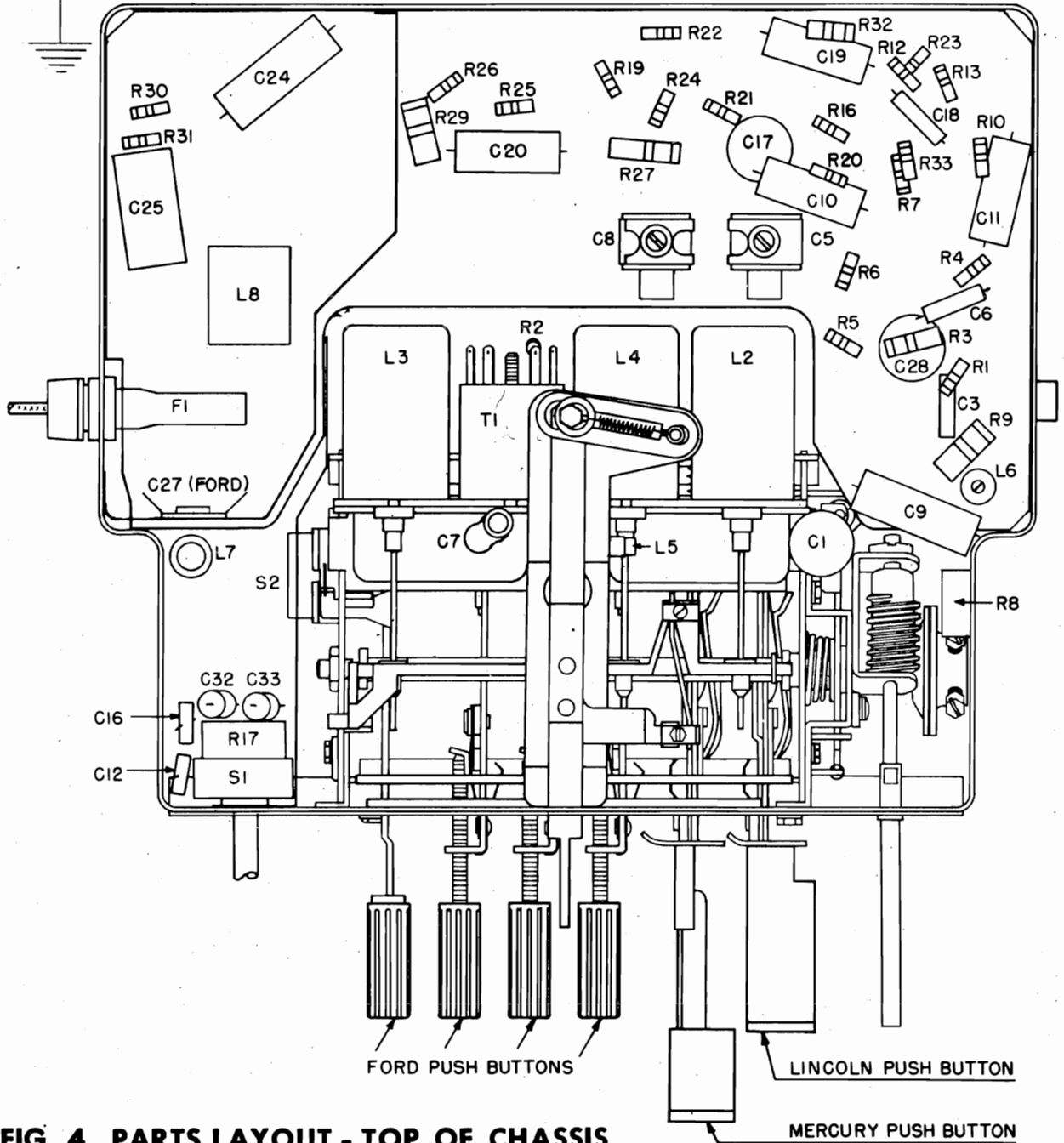


FIG. 4 PARTS LAYOUT - TOP OF CHASSIS

MODELS 1CF743, Ford;
 1CM747, Mercury;
 1CH748, Lincoln

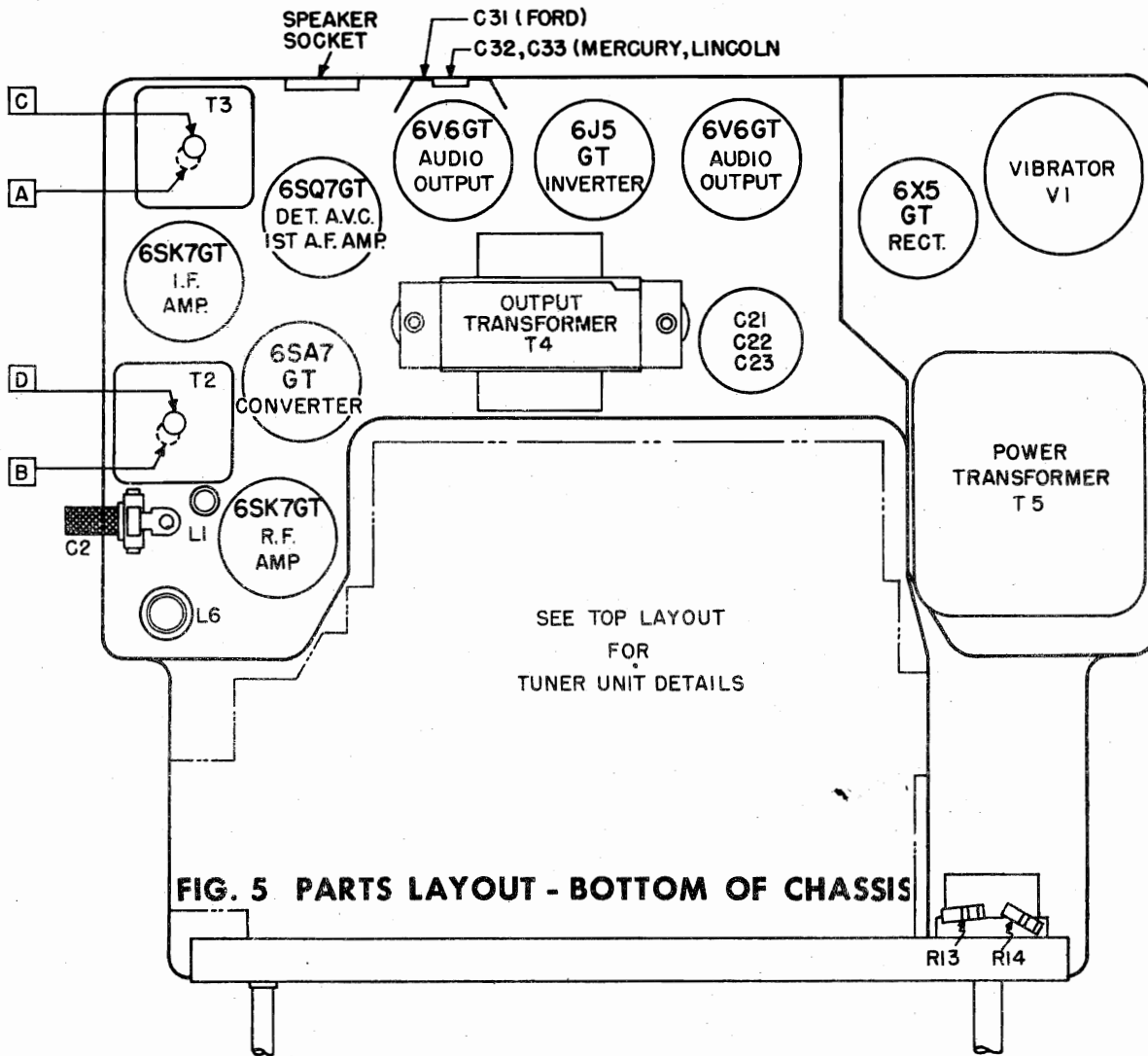


FIG. 5 PARTS LAYOUT - BOTTOM OF CHASSIS

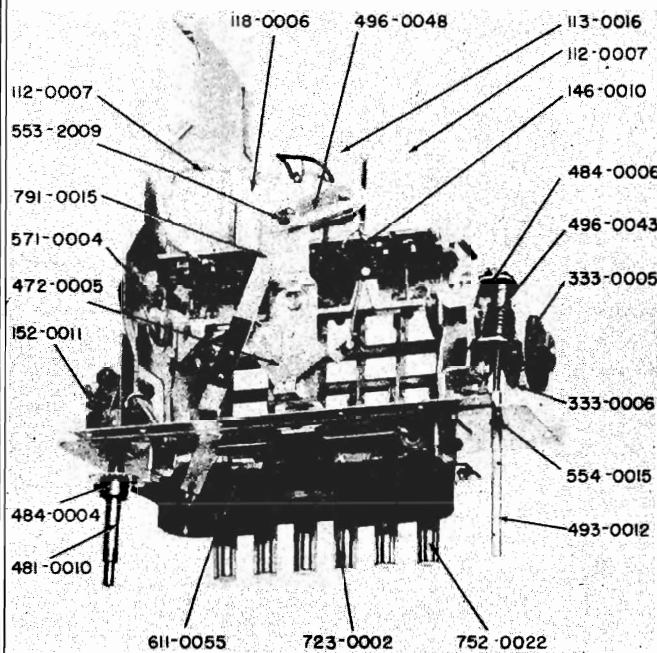


FIG. 6 1CF743 TUNER

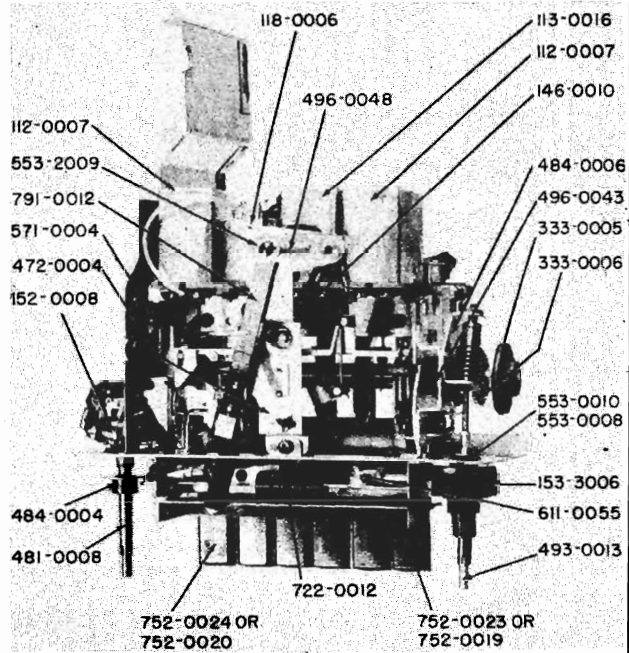


FIG. 7 1CM747 & 1CH748 TUNER

MODELS 1CF743, Ford;
1CM747, Mercury;
1CH748, Lincoln

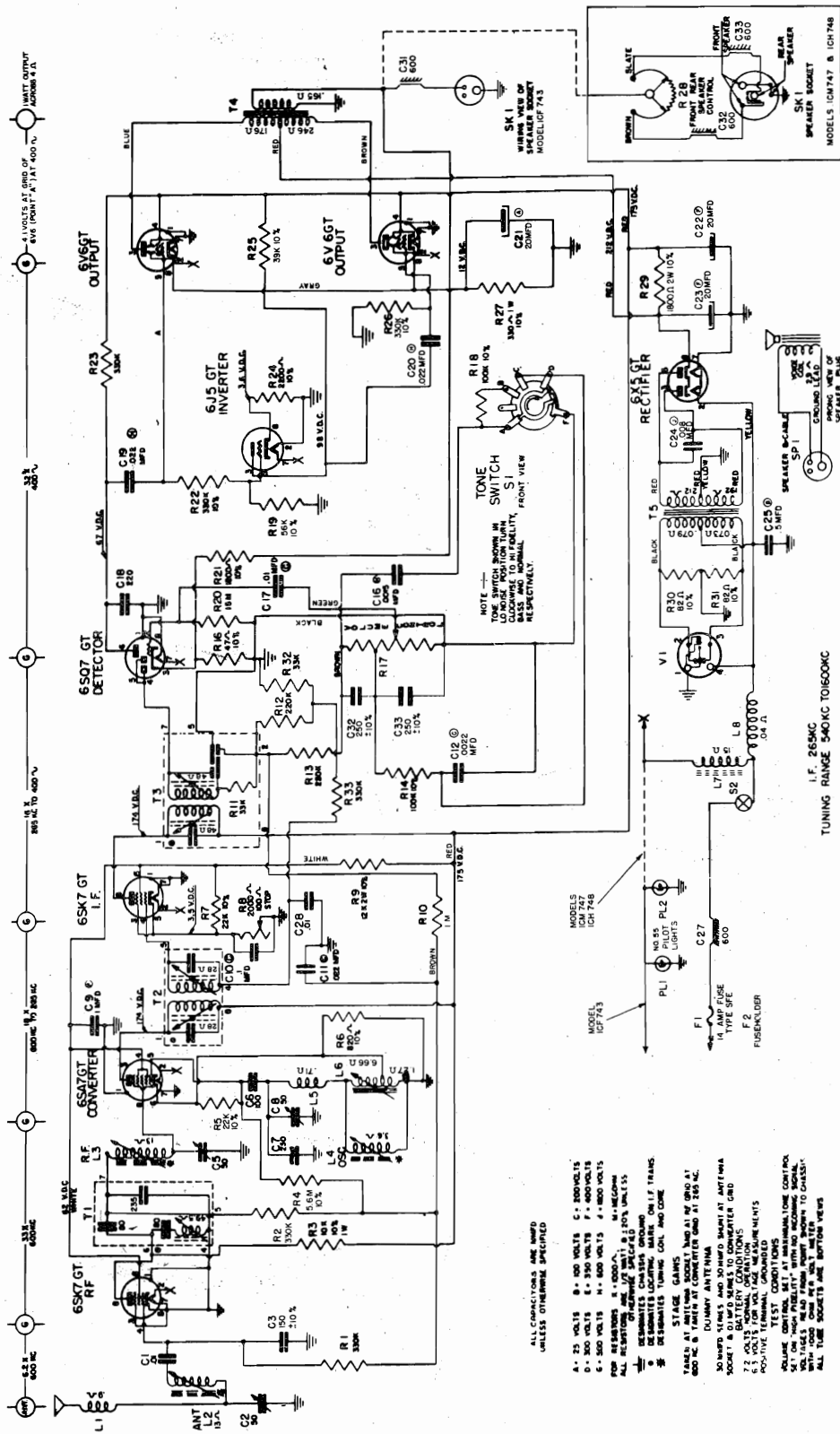


FIG. 8 SCHEMATIC DIAGRAM - MODELS 1CF743 1CM747 & 1CH748

MODELS ICF743,
1CM747, 1CH748

REPAIR PARTS LIST

| TUNER UNIT AND PARTS | | | TUNER UNIT AND PARTS (continued) | | | | |
|----------------------|---------------------|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|---------------------|------------------|-------------------------------------------|
| SCHMATIC LOCATION | PRODUCTION PART NO. | SERVICE PART NO. | DESCRIPTION | SCHMATIC LOCATION | PRODUCTION PART NO. | SERVICE PART NO. | DESCRIPTION |
| | 75600 | 313-0016 | Tuner Unit Assembly - ICF743 - mechanical portion only - includes push buttons, driven clutch disc, on-off switch, worm gear, tuning control shaft | | 75037 | 496-0065 | Spring - Cross Arm Tension |
| | 75720 | 313-0017 | Tuner Unit Assembly - ICM747 - mechanical portion only - includes push buttons, driven clutch disc, on-off switch, worm gear, tuning control shaft | | 75038 | 496-0048 | Spring - Cross Arm |
| | 75680 | 313-0018 | Tuner Unit Assembly - ICH748 - mechanical portion only - includes push buttons, driven clutch disc, on-off switch, worm gear, tuning control shaft | | 75039 | 571-0004 | Switch - On-Off |
| | 60493 | 481-0011 | Ball - Bearing 125 | | 71837 | 553-3000 | Washer - Feit |
| | 75912 | 492-0025 | Bracket Assembly - Dial Background & Socket (ICF743) | | 71852 | 553-2011 | Washer - Shim |
| | 75687 | 411-0010 | Bracket Assembly - Dial Background & Socket (ICM747 & ICH748) | | 75039 | 553-2009 | Washer - Special - Pointer Tension Spring |
| | 75004 | 492-0024 | Bracket & Pointer Assembly | | 71853 | 553-5005 | Washer - Special |
| | 71818 | 333-0007 | Bracket & Roller Assembly - Clutch Release | | | | |
| | 75672 | 481-0009 | Bushing - Tuning Shaft (ICF743) | | | | |
| | 71752 | 481-0005 | Bushing - Tuning Shaft (ICM747, ICH748) | | | | |
| | 75671 | 481-0010 | Bushing - Volume Shaft (ICF743) | | | | |
| | 75082 | 752-0022 | Button - Push - and Screw Assembly (ICF743) | | | | |
| | 71880 | 752-0023 | Button - Push (ICM747) | | | | |
| | 71892 | 752-0024 | Button - Push - Off (ICM747) | | | | |
| | 71597 | 752-0019 | Button - Push (ICM748) | | | | |
| | 71598 | 752-0020 | Button - Push - Off (ICM748) | | | | |
| | 75675 | 182-0009 | Cable - Speaker control (ICM747, ICH748) | | | | |
| | 65966 | 333-0005 | Clutch Disc Assembly | | | | |
| | 71503 | 182-0002 | Core - Iron tuning and adjusting spring | | | | |
| | 75604 | 723-0002 | Drum - Tone - Shaft and Gear Assembly | | | | |
| | 75000 | 722-0012 | Drum - Tone - Shaft and Gear Assembly | | | | |
| | 75911 | 711-0023 | Escutcheon & Dial Assembly (ICF743) | | | | |
| | 71758 | 711-0021 | Escutcheon (ICM747) | | | | |
| | 75157 | 711-0018 | Escutcheon (ICM748) | | | | |
| | 75530 | 333-0006 | Gear - Drive - and Bushing Assembly | | | | |
| | 484-0004 | 472-0006 | Gear - Tone | | | | |
| | 75042 | 472-0005 | Link - Pointer End | | | | |
| | 75593 | 472-0005 | Link & Stud Assembly - Pointer Drag (ICF743) | | | | |
| | 75003 | 472-0004 | Link & Stud Assembly - Pointer Drag (ICM747, ICH748) | | | | |
| | 75531 | 484-0006 | Gear - Worm | | | | |
| | 71501 | 552-0027 | Nut - Core adjusting | | | | |
| | 75031 | 552-0023 | Nut - 3/8-32 - Speaker Control Mounting (ICM747, ICH748) | | | | |
| | 71753 | 552-0008 | Nut - 1/2-28 - Special | | | | |
| | 71889 | 753-0002 | Plunger Insert - Off Button (ICM747) | | | | |
| | 71891 | 753-0003 | Plunger Insert - Push Button (ICM748) | | | | |
| | 75605 | 791-0015 | Pointer & Bracket Assembly (ICM743) | | | | |
| | 75005 | 791-0012 | Pointer & Bracket Assembly (ICM747, ICH748) | | | | |
| | 71847 | 554-0015 | Ring - Drive Shaft Retaining | | | | |
| | 75034 | 727-0003 | Scale - Dial (ICM747) | | | | |
| | 75049 | 727-0002 | Scale - Dial (ICM748) | | | | |
| | 65975 | 551-0017 | Screw - Adjusting | | | | |
| | 71838 | 551-0017 | Screw - Pivot | | | | |
| | 364-6 | 551-6300 | Screw - Set #8-32 x 3/16 Headless | | | | |
| | 75602 | 493-0012 | Shaft - Manual Tuning Assembly (ICF743) | | | | |
| | 75678 | 493-0013 | Shaft - Manual Tuning Assembly (ICM747, ICH748) | | | | |
| | 75056 | 497-0008 | Sleeve - Tuning Shaft (ICM747, ICH748) | | | | |
| | 75044 | 497-0009 | Sleeve - Volume Control Shaft (ICM747, ICH748) | | | | |
| | 71827 | 496-0043 | Spring - Clutch Release | | | | |
| | 71831 | 496-0046 | Spring - Clutch Release Bracket | | | | |
| | 71833 | 496-0047 | Spring - Switch Plunger Return | | | | |

MODELS 1CF743,
1CM747, 1CH748

| SCHEMATIC LOCATION | PRODUCTION PART NO. | SERVICE PART NO. | DESCRIPTION | SCHEMATIC LOCATION | PRODUCTION PART NO. | SERVICE PART NO. | DESCRIPTION |
|------------------------------------------------|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|---------------------|------------------|-------------|
| <u>MISCELLANEOUS ELECTRICAL PARTS</u> | | | | | | | |
| PL1, PL2 | 15362 75398 | 611-0055 117-0010 112-0007 112-0007 113-0016 116-0006 118-0009 116-0002 172-0026 172-0024 172-0025 147-0001 147-0007 75850 71630 71642 71883 71882 75614 17392 75674 71733 71702 71705 75787 71712 | Bulb - Dial Light (Mazda #55) Coils - Permeability Tuning (includes) Antenna Coil R. F. Coil Oscillator Coil Oscillator Series Coil I. F. Trap Coil Oscillator Shunt Coil Antenna Trimmer Oscillator Trimmer R. F. Trimmer Choke - Hash - Main Choke & Core Assembly - Heater Choke - Motor Noise Choke - Motor Noise - Antenna Control - Dual - Speaker (ICM747, ICH748) Control - Sensitivity Control - Volume and Tone Switch (ICM747, ICH748) Control - Volume and Tone Switch (ICF743) Fuse - 14 Amp. Speaker - PM - 6" x 9" (ICF743) Speaker - PM - 6" x 9" (ICM747, ICH748) Transformer - 1st I. F. Transformer - 2nd I. F. Transformer - Output Transformer - Power Vibrator | | | | |
| <u>INSTALLATION PARTS - ICF743</u> | | | | | | | |
| L1 | 75661 | 711-0022 | Bezel - Control | | | | |
| L2 | 71456 | 564-0002 | Capacitor - Generator | | | | |
| L3 | 71604 | 569-0012 | Capacitor - Oil Gauge | | | | |
| L4 | 75156 | 569-0004 | Capacitor - Voltage Regulator | | | | |
| L5 | 75162 | 567-0005 | Capacitor - Fuel Gauge | | | | |
| L6 | 75655 | 741-0005 | Knob - Tuning (complete) | | | | |
| L7 | 75656 | 742-0003 | Knob - Volume Control (complete) | | | | |
| L8 | 75662 | 744-0012 | Knob - Tone Control | | | | |
| L9 | 71610 | 552-0006 | Nut - 1/4-20 Hex | | | | |
| <u>INSTALLATION PARTS - ICF747 (continued)</u> | | | | | | | |
| T1 | 71669 | 552-0020 | Nut - 1/2-28 Special | | | | |
| T2 | 75663 | 552-0001 | Nut - #8-32 Wing | | | | |
| T3 | 75643 | 492-0022 | Bracket - Mounting - Receiver - R. H. | | | | |
| T4 | 75648 | 492-0023 | Bracket - Mounting - Receiver - L. H. | | | | |
| T5 | 71414 | 563-0004 | Suppressor - Distributor | | | | |
| T6 | 71741 | 553-2007 | Washer - Serrated | | | | |
| T7 | 75873 | 553-1014 | Washer - Lock - 1/4 - Split | | | | |
| T8 | 71460 | 568-0003 | Spring - Wheel Static Grounding | | | | |
| T9 | 75657 | 776-0003 | Baffle and Gasket Assembly - Speaker | | | | |
| <u>INSTALLATION PARTS - ICM747</u> | | | | | | | |
| R17, S1 | 71731 | 492-0017 | Bracket - Speaker Mounting | | | | |
| R18 | 71737 | 492-0015 | Bracket - Receiver Mounting - L. H. | | | | |
| R19 | 71730 | 492-0016 | Bracket - Receiver Mounting - R. H. | | | | |
| <u>INSTALLATION PARTS - ICH748</u> | | | | | | | |
| F1 | 71744 | 492-0019 | Bracket - Receiver Mounting | | | | |
| T2 | 71745 | 492-0018 | Bracket - Receiver Mounting | | | | |
| T3 | 71456 | 564-0002 | Capacitor - Generator | | | | |
| T4 | 71457 | 569-0004A | Capacitor - Ignition Coil | | | | |
| T5 | 71604 | 569-0012 | Capacitor - Oil Gauge | | | | |
| T6 | 75162 | 567-0005 | Capacitor - Fuel Gauge | | | | |
| T7 | 71751 | 744-0017 | Knob - Tone Switch & Speaker Control | | | | |
| T8 | 71751 | 740-0017 | Knob - Volume and Tuning | | | | |
| T9 | 71610 | 552-0006 | Nut - 1/4-20 Hex | | | | |
| T10 | 75663 | 552-0001 | Nut - #8-32 Wing | | | | |
| T11 | 71747 | 559-0003 | Screw - #8-1/2 Binder Head Self-Tapping | | | | |
| T12 | 71748 | 551-0007 | Screw - 1/4-20 x 1/2 - Hex Head | | | | |
| T13 | 71746 | 193-0007 | Spring - Hood Bonding | | | | |
| T14 | 71414 | 563-0004 | Suppressor - Distributor | | | | |
| T15 | 71741 | 553-2007 | Washer - Serrated | | | | |
| T16 | 75613 | 553-1014 | Washer - Lock - 1/4 - Split | | | | |
| T17 | 71460 | 568-0003 | Spring - Wheel Static Grounding | | | | |
| <u>RESISTORS</u> | | | | | | | |
| R16 | BY34701 | 181-0470 | Resistor - insulated - 47 Ohm - 1/2 W. | | | | |
| R17 | BY38201 | 181-0820 | Resistor - insulated - 82 Ohm - 1/2 W. | | | | |
| R18 | BY38211 | 181-0821 | Resistor - insulated - 82 Ohm - 1/2 W. | | | | |
| R19 | BY31521 | 181-0152 | Resistor - insulated - 1,500 Ohm - 1/2 W. | | | | |
| R20 | BY32221 | 181-0222 | Resistor - insulated - 2,200 Ohm - 1/2 W. | | | | |
| R21 | BY32231 | 181-0223 | Resistor - insulated - 2,200 Ohm - 1/2 W. | | | | |
| R22 | BY33331 | 181-0333 | Resistor - insulated - 33,000 Ohm - 1/2 W. | | | | |
| R23 | BY33391 | 181-0393 | Resistor - insulated - 39,000 Ohm - 1/2 W. | | | | |
| R24 | BY35631 | 181-0563 | Resistor - insulated - 56,000 Ohm - 1/2 W. | | | | |
| R25 | BY31041 | 181-0104 | Resistor - insulated - 100,000 Ohm - 1/2 W. | | | | |
| R26 | BY32241 | 181-0224 | Resistor - insulated - 220,000 Ohm - 1/2 W. | | | | |
| R27 | BY33341 | 181-0334 | Resistor - insulated - 330,000 Ohm - 1/2 W. | | | | |
| R28 | BY31051 | 181-0105 | Resistor - insulated - 1 Megohm - 1/2 W. | | | | |
| R29 | BY35651 | 181-0565 | Resistor - insulated - 5.6 Megohm - 1/2 W. | | | | |
| R30 | ZY31561 | 181-0156 | Resistor - insulated - 10,000 Ohm - 1 W. | | | | |
| R31 | ZY31031 | 182-0103 | Resistor - insulated - 330 Ohm - 2 W. | | | | |
| R32 | YV33311 | 183-0331 | Resistor - insulated - 1,800 Ohm - 2 W. | | | | |
| R33 | YV31821 | 181-0182 | Resistor - insulated - 12,000 Ohm - 2 W. | | | | |

MODELS 1CF743, Ford;
1CM747, Mercury;
1CH748, Lincoln

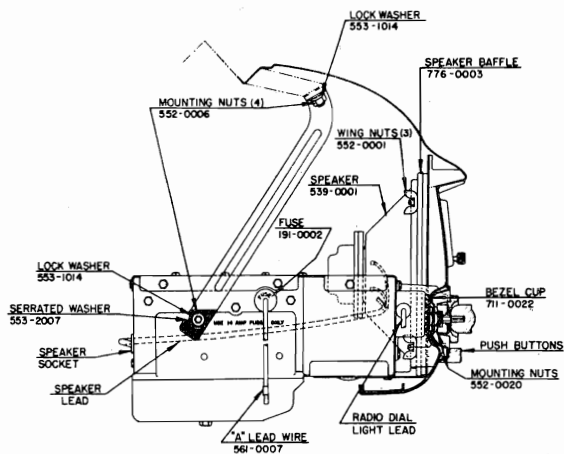


FIG. 9 1CF743 INSTALLATION

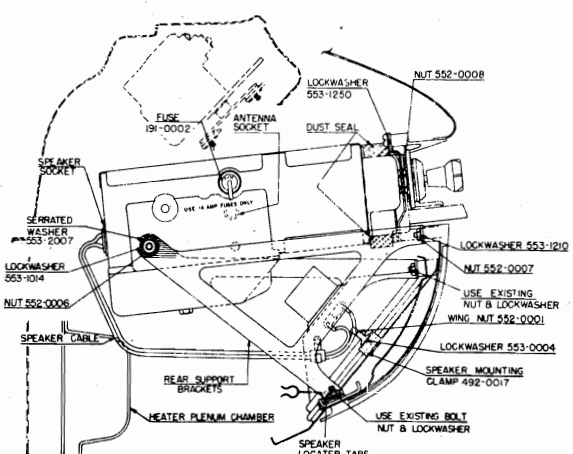


FIG. 10 1CM747 INSTALLATION

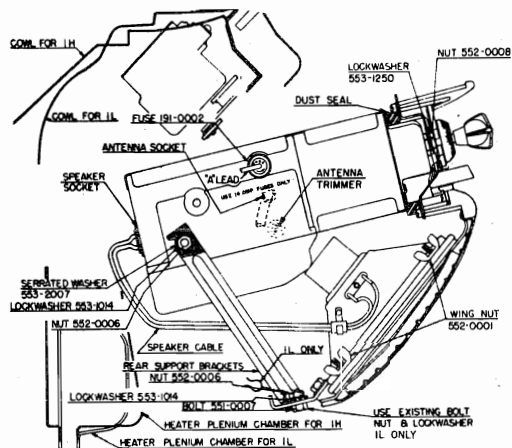


FIG. 11 1CH748 INSTALLATION
RECEIVER INSTALLATION

Figures 9, 10, and 11 illustrate the installed receivers to facilitate removal and reinstallation when service is necessary.

TO REMOVE THE FORD RECEIVER

1. Disconnect the speaker plug, dial light lead, antenna lead, and "A" lead.
2. Remove control knobs, front mounting nuts, and lockwashers from the radio control shafts.
3. Disconnect the receiver from the receiver mounting brackets by removing the hex nut and lockwasher from the receiver mounting stud.
4. Remove receiver by sliding it back and down behind the instrument panel.
5. To remove the speaker, remove the four wing nuts holding the speaker to the instrument panel.

TO REMOVE THE MERCURY RECEIVER

1. Remove the car heater plenum chamber.
2. Disconnect speaker plug, antenna lead, and

- "A" lead.
3. Loosen the two speaker mounting clamps and remove the speaker.
 4. Remove control knobs, front mounting nuts and lockwashers from the radio control shafts.
 5. Loosen the nuts holding the receiver to the mounting brackets.
 6. Remove receiver by sliding it back and down behind the instrument panel.

TO REMOVE THE LINCOLN RECEIVER

1. Remove the car heater plenum chamber.
2. Disconnect the speaker plug, antenna lead, and "A" lead.
3. Remove control knobs, front mounting nuts and lockwashers from the radio control shafts.
4. Loosen the hex nuts holding the receiver to the mounting brackets.
5. Remove receiver by sliding it back and down behind the instrument panel.
6. To remove the speaker, remove the four wing nuts holding it to the instrument panel.

OPERATING INSTRUCTIONS

TO TURN RADIO ON

The radio is connected to the accessory terminal of the ignition switch, therefore, it is necessary to turn the ignition key to the left, if the engine is not running, before turning the radio on. Press any one of the five automatic push buttons. Allow approximately 20 seconds for the receiver to reach operating temperature.

To turn the receiver off, press the "Off" push-button.

MODELS ICF743, Ford;
 ICM747, Mercury;
 ICH748, Lincoln

MANUAL TUNING

To operate the manual tuning control simply turn the tuning knob (see Fig. 1). When tuning in a station, be sure to tune to the exact frequency for the best tone quality.

VOLUME CONTROL

Turn the volume control knob for the desired volume.

tone CONTROL

The tone control knob is located directly behind the volume control knob. Turning this control to the right or left will change the tone of the receiver. This control has four positions and the position to which the control is set is

AUTOMATIC TUNING

Automatic push button tuning is provided by means of push buttons located directly under the dial scale and to the right of the "Off" push button (see Fig. 1). These five buttons permit the selection of five favorite local stations. When the push buttons have been set to the desired station it is only necessary to press a push button to turn the set "on" and to receive the station for which the adjustment was made. The dial pointer will automatically indicate the frequency of the selected station.

SETTING THE PUSH BUTTON TUNER

The five push buttons may be adjusted to any of the desired stations. In order to simplify the identification of these stations, it is advisable to set the push buttons in sequence according to their frequencies, beginning with the station broadcasting on the lowest frequency and progressing to the station broadcasting on the highest frequency.

The push buttons should be set up during the day since at night distant stations will be heard with the same volume as local stations, making it difficult to identify local stations.

Allow the receiver to operate for at least fifteen minutes before adjusting the push buttons. This will allow each part in the receiver to reach normal operating temperature.

TO SET THE PUSH BUTTONS

1. ICF743 RECEIVER

- a. Collapse the antenna.
- b. Select a station at the low end of the broadcast band and manually tune it in so its signal is heard without distortion.
- c. Loosen the second push button from the left side by turning it counter-

indicated in the window in the center of the dial scale.

REAR SPEAKER CONTROL

The rear speaker control disc, located behind the tuning control knob on the Mercury and Lincoln receivers, is provided to control an auxiliary rear shelf speaker (available from Mercury-Lincoln dealer).

The speaker socket located on the rear of the receiver case will accommodate both the front speaker and rear speaker. When the rear speaker is plugged into the socket, a switch in the socket connects the rear speaker control into the circuit.

clockwise one turn with your fingers.

- d. Press the loosened push button in firmly to its extreme position and release. Tighten the push button as much as possible by turning clockwise with your fingers.
- e. The push button is now set for this station selection. Follow the above procedure for setting each of the four remaining push buttons.
- f. Check that the push button setting corresponds to the best manual tuned signal for each station and repeat steps "b" through "e" where necessary.

2. ICM747 & ICH748 RECEIVERS

- a. Collapse the antenna.
- b. Select a station at the low end of the broadcast band and manually tune it in so its signal is heard without distortion.
- c. Unlock the second push button from the left by pushing the button to the left and pulling it out.
- d. Press the unlocked push button in firmly to its extreme position and release.
- e. The push button is now set for this station selection. Follow the above procedure for setting each of the four remaining push buttons.
- f. Check that the push button setting corresponds to the best manual tuned signal for each station and repeat steps "b" through "e" where necessary.

When the five push buttons have been set to the desired stations, return the antenna to the lowest position necessary for good reception. It is only necessary to press a push button to receive the station for which the adjustment was made. The dial pointer will automatically indicate the frequency of the selected station.

MODELS 1CF743, Ford;
 1CM747, Mercury;
 1CH748, Lincoln

INTERFERENCE ELIMINATION

There should be no motor noise or interference from the ignition system if the receiver has been installed in the car according to the instructions furnished with the receiver. The interference suppression equipment may be checked for proper installation by referring to the following instructions and illustrations.

The "A" lead to the receiver should be installed in each car as illustrated in Fig. 12.

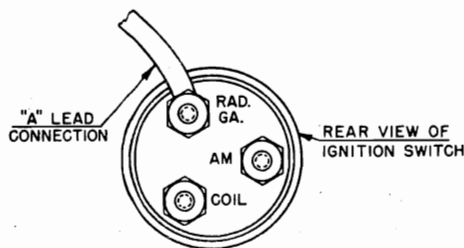


FIG. 12 "A" LEAD CONNECTION

Cut the high tension wire running from the ignition coil to the center hole of the distributor cap, one and one half inches from the coil for the Ford "8", two and one half inches from the coil for the Ford "6", and one and one half inches from the cap for the Mercury and Lincoln. Cut one inch from the coil end of the wire. Screw the cut ends of the wire into both ends of suppressor, 563-0004. Replace the wire in the coil.

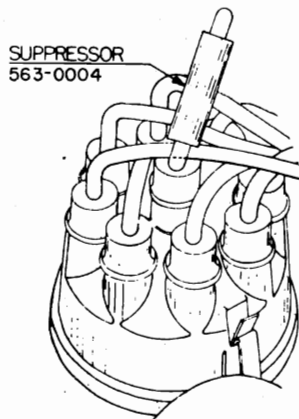


FIG. 13 DISTRIBUTOR SUPPRESSOR

The generator capacitor 564-0002 is installed by loosening (do not remove) the top assembly bolt from the rear end plate of the generator. Mount the capacitor under this bolt and connect the lead to the armature terminal of the generator.

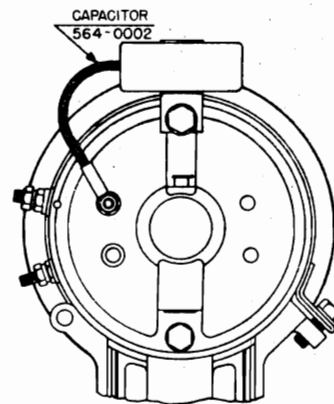


FIG. 14 GENERATOR CAPACITOR

Connect capacitor 569-0012 to the oil pressure gauge unit as shown.

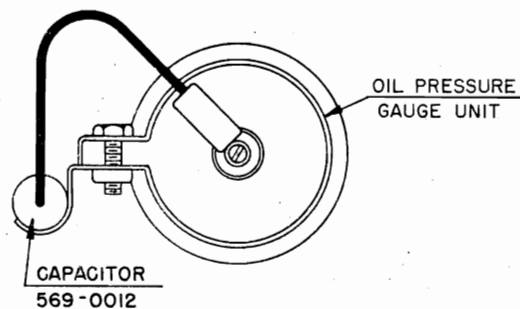


FIG. 15 OIL GAUGE CAPACITOR

Connect capacitor 567-0005 to the fuel gauge unit as shown.

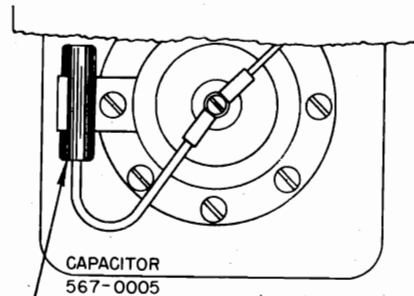


FIG. 16 FUEL GAUGE CAPACITOR

MODELS 1CF743, Ford;
1CM747, Mercury;
1CH748, Lincoln

Remove both outer and inner hub caps from both front wheels. Clean inner caps and spindles. Snap static collector springs 568-0003 in inner hub caps.

IMPORTANT: Bend cotter key away from center hole so it will not interfere with static collector. Replace hub caps.

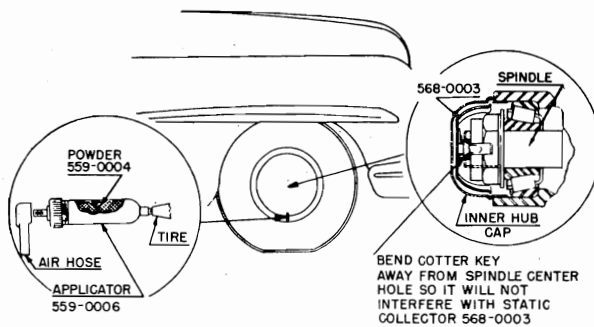


FIG. 17 WHEEL STATIC EQUIPMENT

Install wheel static powder as needed. Available at your Ford, Lincoln or Mercury dealer. Place one package of anti-static powder 559-0004 in applicator 559-0006. Deflate tire to about 10 pounds. Attach applicator to tire as shown. Reinflate tire to normal pressure. Tap applicator gently while reinflating tire to allow all of the powder to be blown into the tube. Inject powder into all five tubes. One injection is good for the life of the tube.

Remove the screw from the hood pad on the cowl and install the hood bonding spring 193-0007.



FIG. 18 LINCOLN HOOD BOND

Mount capacitor 569-0004 between voltage regulator and dash panel. Connect lead to "ARM" terminal on regulator as shown.

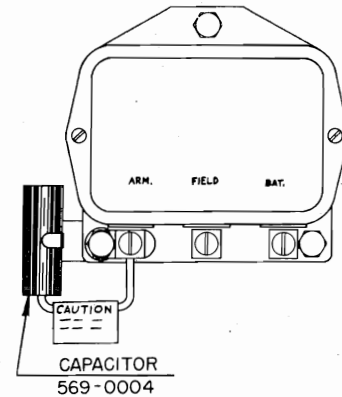


FIG. 19 VOLT. REG. CAPACITOR

Mount capacitor 569-0004A as shown for the 1H or 1L Lincoln. Be sure to connect the lead to the battery terminal of the coil. If the lead is connected to the Distributor terminal the performance of the car engine will be impaired.

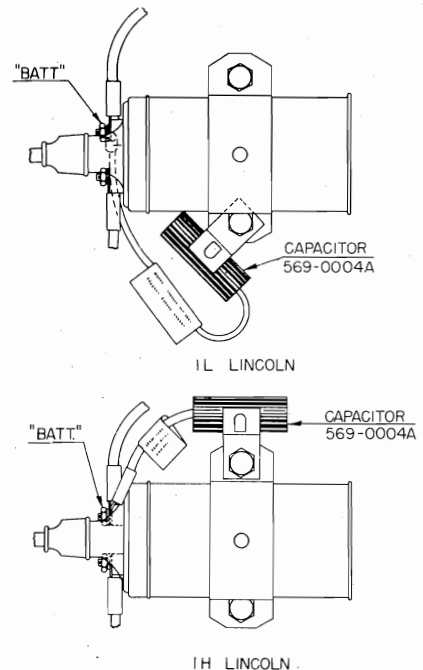


FIG. 20 IGNITION COIL CAPACITOR - LINCOLN

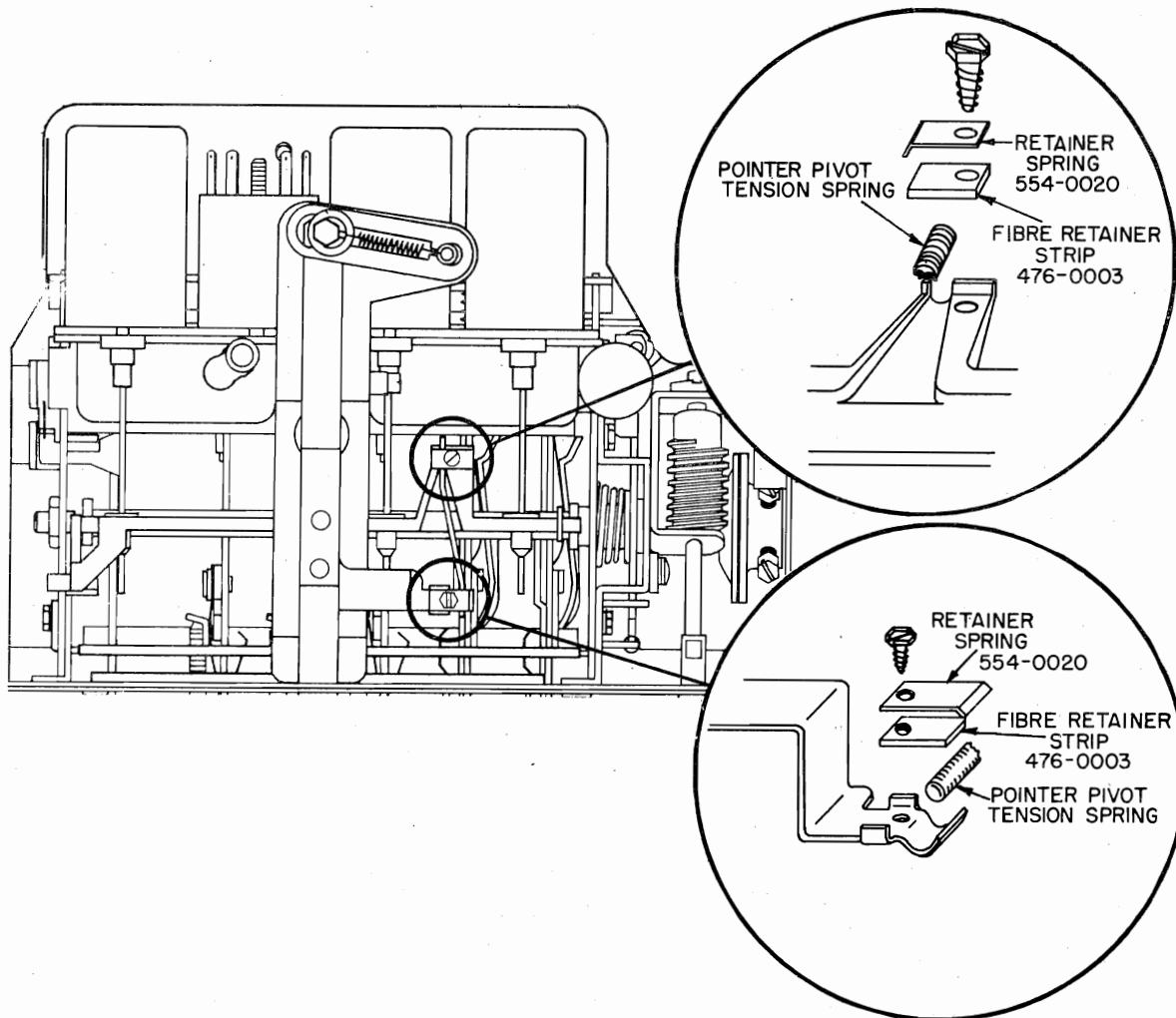
MODELS 1CF743, Ford;
 1CM747, Mercury;
 1CH748, Lincoln

Supplement No. 1
 to
Technical Service Bulletin

2-16
 11-10-50

Subject: Pointer Slippage and Binding

In order to prevent pointer slippage and binding due to warping of the two red fibre re-
 tainer strips which hold the pointer pivot tension spring in place, metal guard springs
 have been incorporated in the production of sets with the serial numbers which are
 listed below. The guard springs are inserted between the screws which secure the
 retainer strips, and the retainer strips themselves. These guard springs prevent warp-
 ing of the retainer strips and consequent pointer slippage. Both the retainer strips and
 the metal guard springs are available through local Sylvania Parts Distributors.



Ford 1CF743
 Mercury 1CM747
 Lincoln 1CH748

Serial 1CF10982 (approx.) and up
 Serial 1CM29771 (approx.) and up
 Serial 1CH5837 (approx.) and up

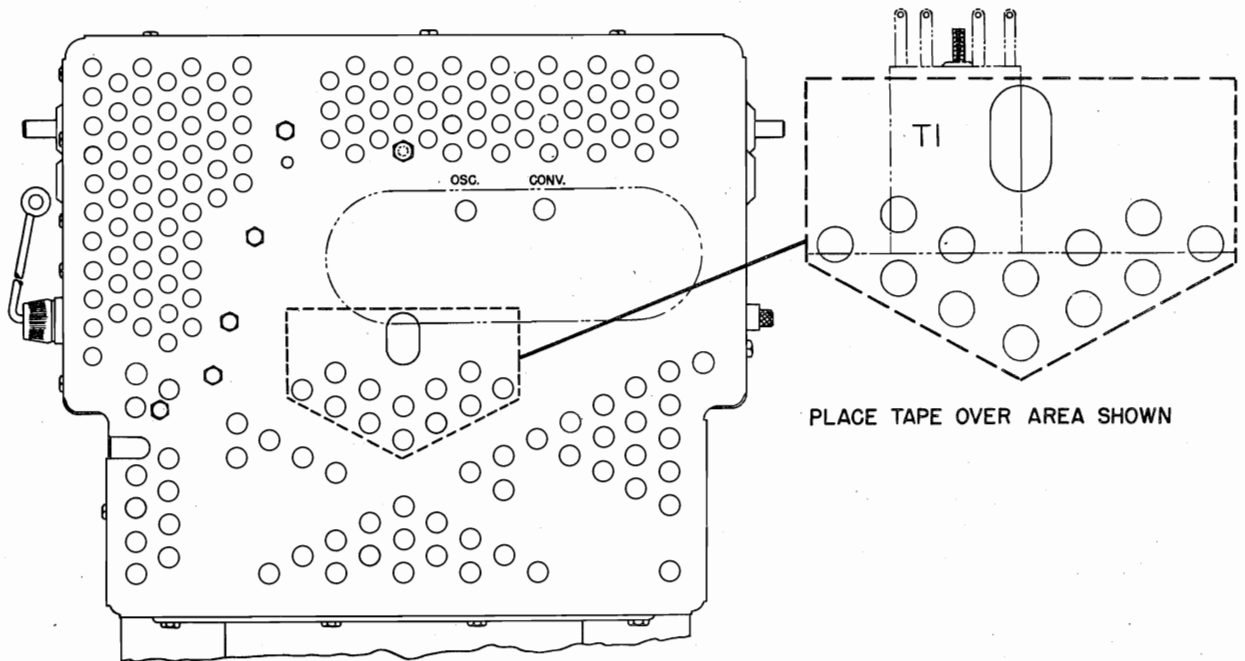
| <u>SCHEMATIC LOCATION</u> | <u>PRODUCTION PART NUMBER</u> | <u>SERVICE PART NUMBER</u> | <u>DESCRIPTION</u> |
|---------------------------|-------------------------------|----------------------------|------------------------|
| | 75866 | 554-0020 | Spring - Metal Guard |
| | 71529 | 476-0003 | Strip - Fibre Retainer |

MODELS 1CF743, Ford;
 1CM747, Mercury;
 1CH748, Lincoln

Supplement No. 2
 to
Technical Service Bulletin
 2-16
 4-16-51

Subject: Water Seepage into Mercury and Lincoln Receivers

In order to prevent seepage of water into Mercury 1CM747 and Lincoln 1CH748 receivers, with consequent damage to the I.F. Trap Coil (T1), a piece of waterproof cellulose tape may be placed over the ventilating holes in the top cover of the receiver directly above the I.F. Trap Coil, as shown in the figure below. In later production of Lincoln and Mercury cars this seepage has been eliminated. A new design replacement I.F. Trap Coil will shortly be available through your local Sylvania Parts Distributor. If the I.F. Trap Coil is replaced by one of the new design, the tape may be removed from the ventilating holes in the receiver top cover.



TOP VIEW OF RECEIVER SHOWING I. F. TRAP COIL

| <u>SCHEMATIC LOCATION</u> | <u>PRODUCTION PART NUMBER</u> | <u>SERVICE PART NUMBER</u> | <u>DESCRIPTION</u> |
|---------------------------|-------------------------------|----------------------------|--------------------|
| T1 | 76094 | 118-0009 | I. F. Trap Coil |

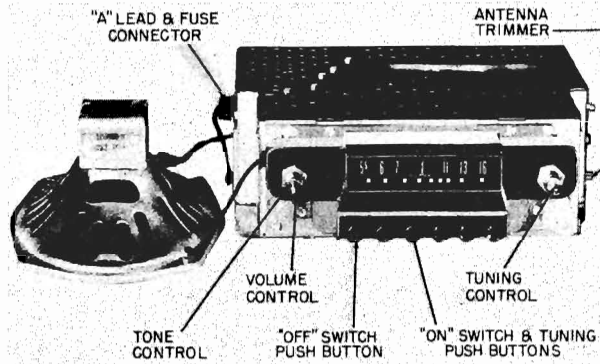
MODELS 1CF743-1, Ford
1A-18805-B; 1CM747-1,
Mercury 1M-18805;
1CH748-1, Lincoln 1H-
18805

TECHNICAL SERVICE BULLETIN

1-24-51

2-18

FIG. 1 1CF743-1



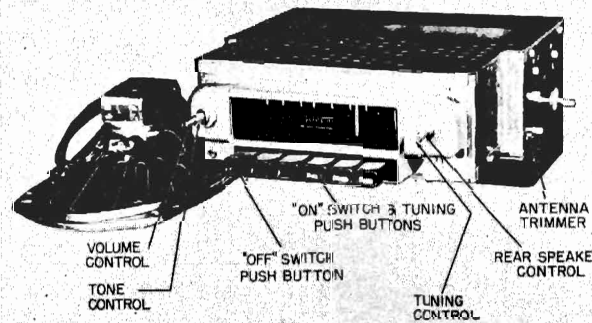
GENERAL DESCRIPTION

The Ford model 1A-18805-B, Mercury model 1M-18805, and Lincoln model 1H-18805 radio receivers are designed for use in the 1951 Ford, Mercury and Lincoln cars respectively. The serial numbers covered by this bulletin are: Ford 1CF 28,001, and up; Mercury 1CM 51,001, and up; and Lincoln 1CH 9,501, and up. These differ mechanically, in the appearance of the control knobs, escutcheon and dial assemblies, and method of mounting the receivers and speakers in the cars.

These radios are eight tube, two unit, super-hetrodyne receivers with vibrator power supply and full wave rectifier. The antenna, RF, and oscillator circuits are inductively tuned (push button and manual) over a frequency range of 540 to 1610 kilocycles by means of iron cores.

A special compensating capacitor in the oscillator circuit minimizes frequency drift due to normal variations in temperature and battery voltage.

FIG. 2 1CM747-1
& 1CH748-1



TUBE COMPLEMENT

POWER SUPPLY

- 6SK7GT R. F. Amplifier
- 6SA7GT Converter
- 6SK7GT I. F. Amplifier
- 6SQ7GT Det. , AVC, & 1st. A.F. Amplifier
- 6J5GT Inverter
- 6V6GT Push Pull (2) - Audio Output
- 6X5GT Rectifier

These receivers employ a four prong, full wave, non-synchronous vibrator in conjunction with a 6X5GT full wave rectifier tube. The wiring for the power transformer and vibrator, the main hash choke and its by-pass, and the buffer capacitor are mounted in a shielded compartment on the chassis to reduce interference.

ALIGNMENT

Optimum performance depends on accurate alignment of the receiver; therefore, follow these instructions carefully.

PRELIMINARY INSTRUCTIONS

Make all alignment adjustments to the receiver with the "A" lead connected to a 7.2 volt negative source and ground the chassis to the positive side of this source. Rotate the volume

control to its maximum clockwise position. Rotate the tone control to the treble position. Connect the output meter across the speaker voice coil. Keep the output from the signal generator at its lowest possible value to prevent the AVC of the receiver from interfering with accurate alignment. Use an insulated screw driver and special alignment tool 898-0003 for making adjustments.

MODELS 1CF743-1, Ford 1A-18805-B; 1CM747-1, Mercury 1M-18805; 1CH748-1, Lincoln 1H-18805

SENSITIVITY CONTROL

The sensitivity control R6 is factory preset and should not be readjusted unless it has been tampered with. If it is definitely determined that readjustment is necessary, set the control to obtain 3.5 volts at the cathode of the I. F. Amplifier (pin #5 of the second 6SK7GT tube).

I F ALIGNMENT

1. Remove the top and bottom covers of the receiver.
2. Set the signal generator to 265 Kc.
3. Connect the signal lead of the signal generator through a .1 Mfd. capacitor to the converter grid (pin #8, 6SA7GT).
4. Adjust the primary and secondary IF cores "A," "B," "C" and "D" in order named for maximum output. Both the primary and secondary of each transformer are adjusted from the top of the transformer using special alignment tool. (See Parts Layout - Bottom of Chassis, Page 3).

Repeat this operation until no further increase in output is obtained.

R F AND OSCILLATOR ALIGNMENT

1. Connect the signal generator leads through a dummy antenna which consists of two, 30 Mmfd. capacitors in a grounded shield, wired so that one is between the antenna lead-in socket of receiver and the signal generator, and the other is shunted from antenna lead to ground.
2. Turn the manual control until the high frequency stop is reached.
3. Set the signal generator to 1625 Kc.
4. Adjust the oscillator trimmer C7, the converter trimmer C6 and the antenna trimmer C1, respectively for maximum response.
5. If dial calibration is off after making above adjustments, corrections can be made by turning eccentric stud of fulcrum of dial pointer.

IRON CORE AND ADJUSTING SPRING ADJUSTMENT OR REPLACEMENT

1. Remove the top cover from the receiver.
2. Remove the escutcheon assembly.
3. Break cement seal and screw the core in or out to the desired position.
4. If the cores are replaced or have been tampered with, the adjustments under coil and core replacement must be made.
5. After all adjustments have been made recement core springs.

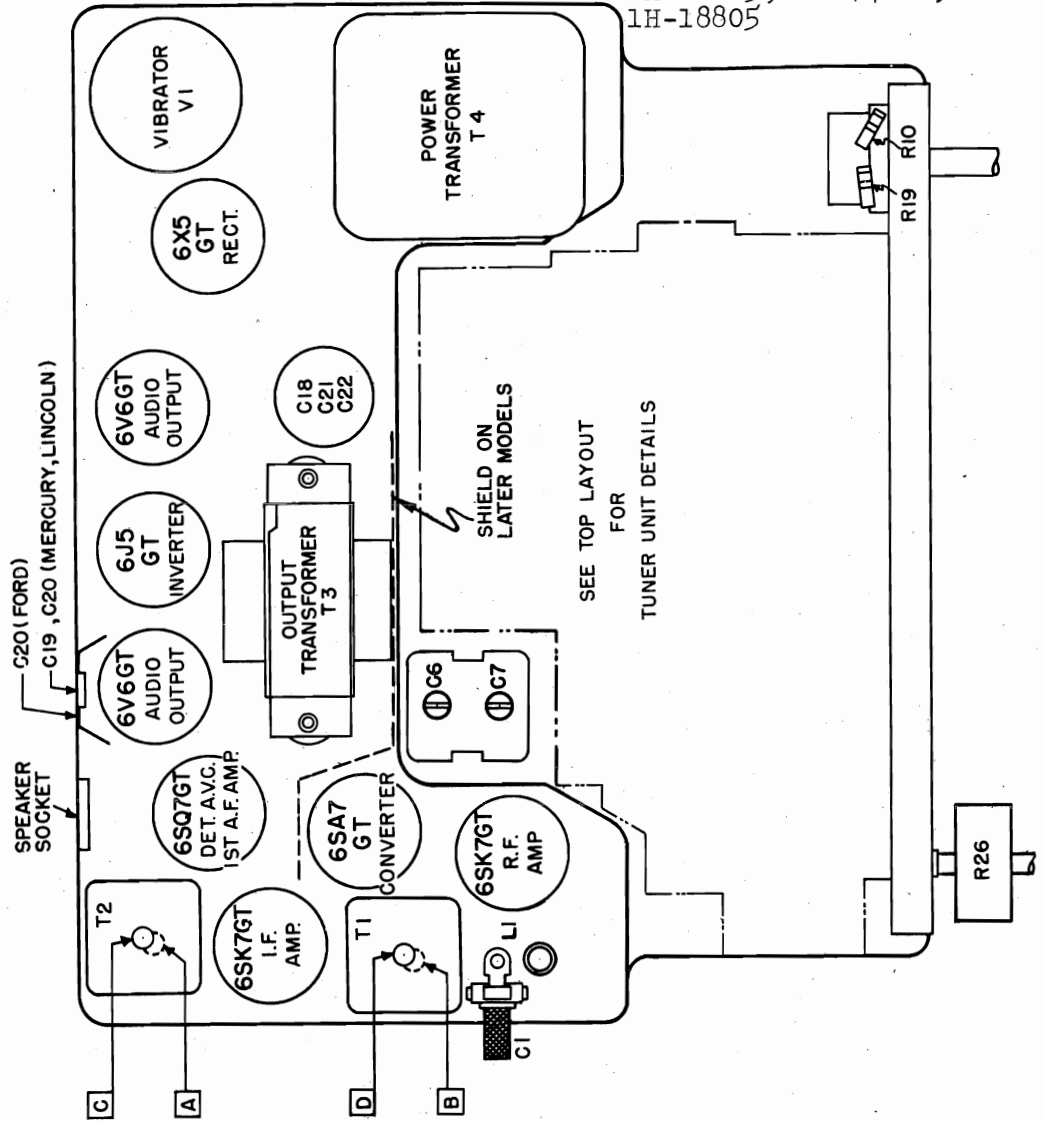


FIG. 3 PARTS LAYOUT - BOTTOM OF CHASSIS

MODELS 1CF743-1,
1CM747-1, 1CH748-1

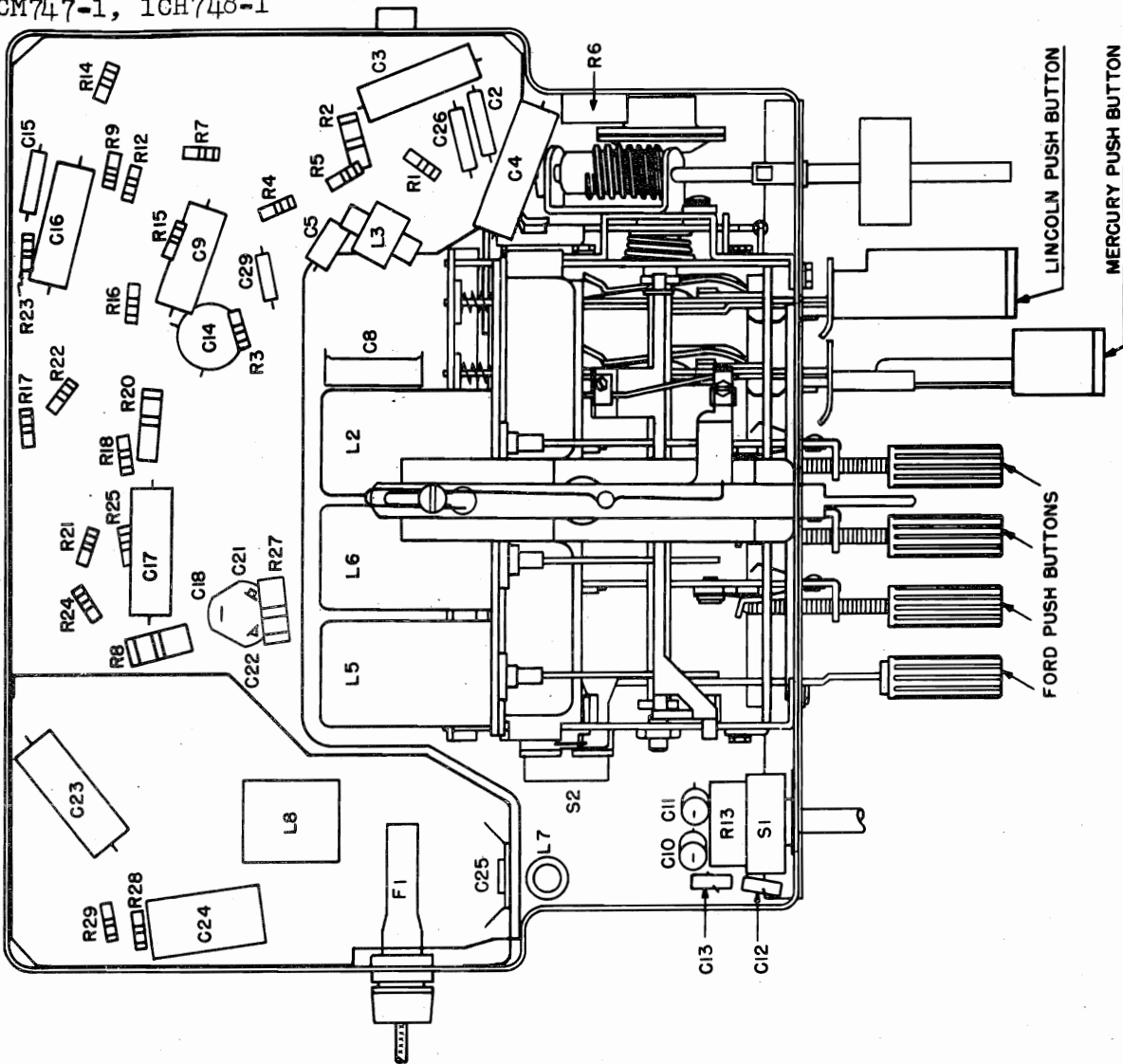


FIG. 4 PARTS LAYOUT - TOP OF CHASSIS

CORE ALIGNMENT

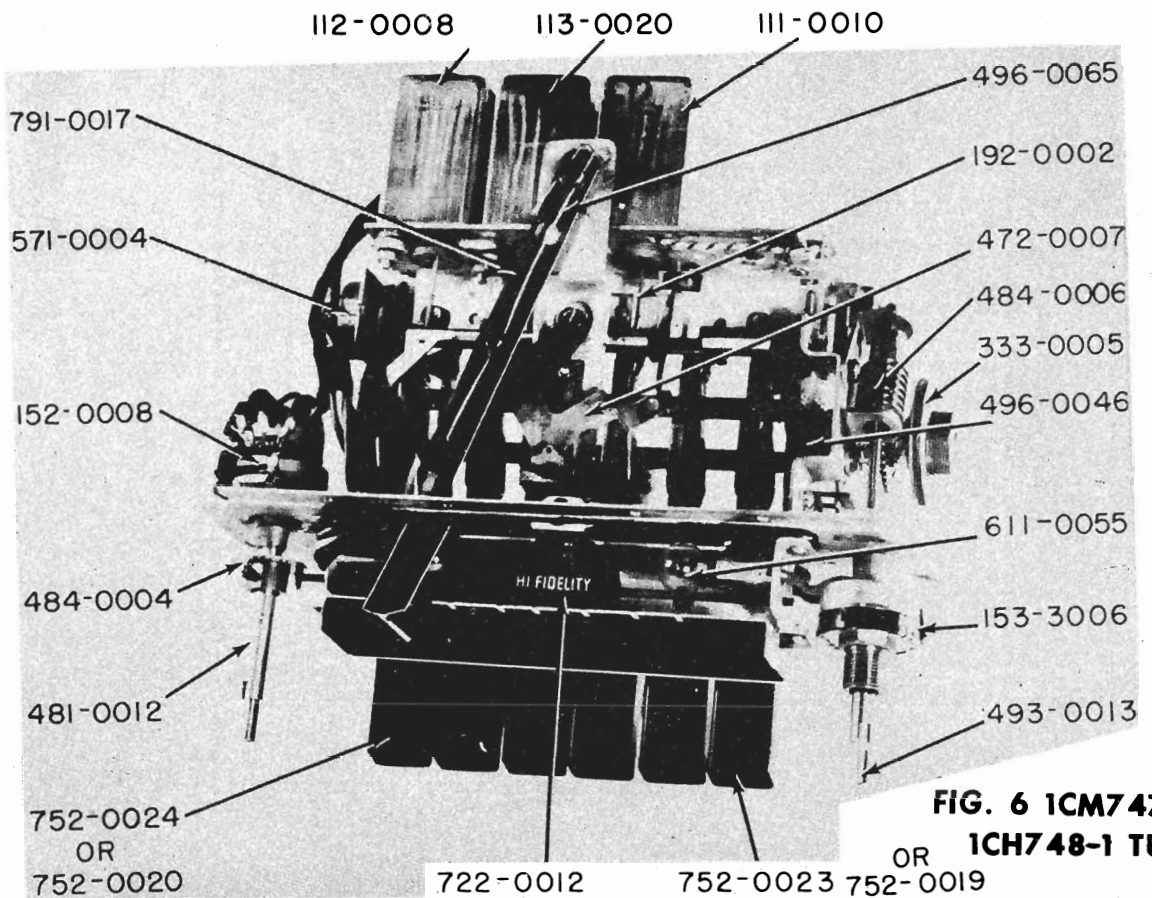
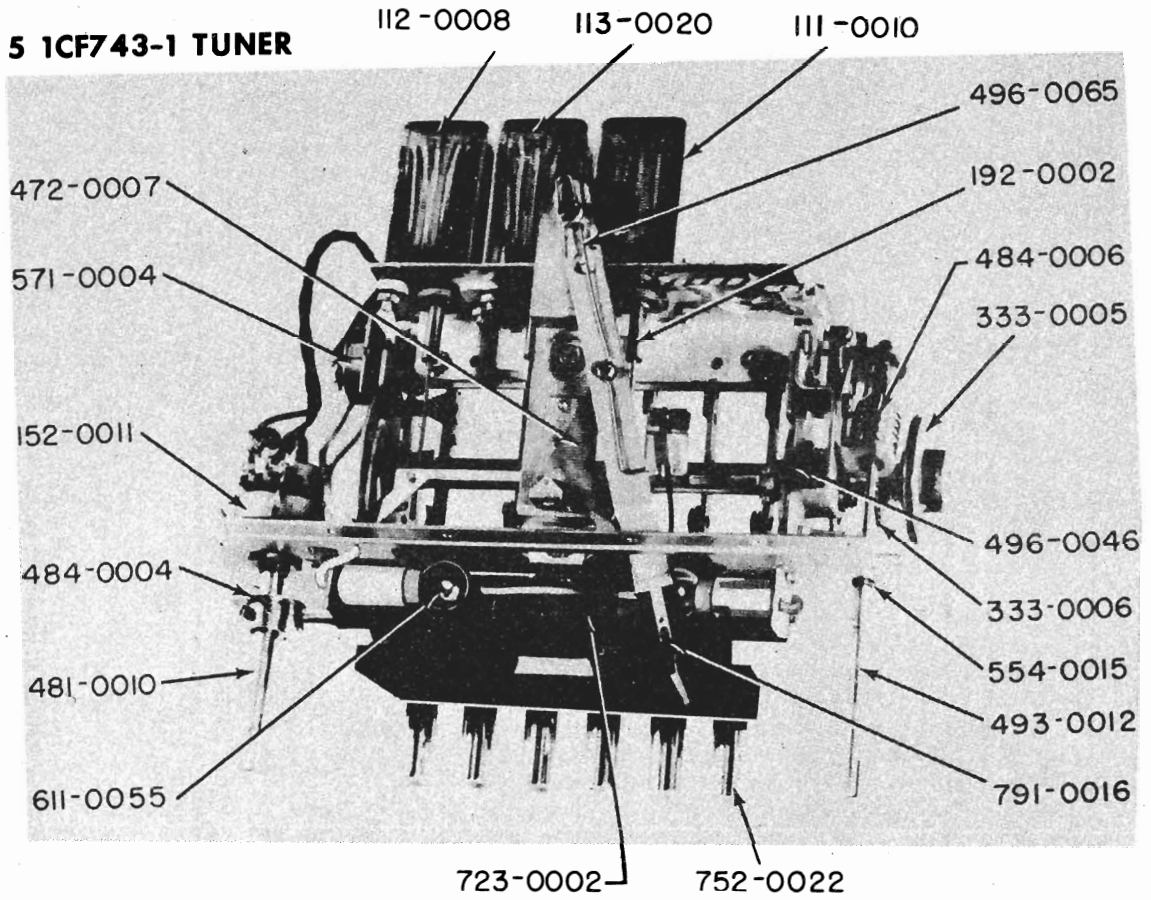
CAUTION: The following adjustments are to be made only if a core or coil has been replaced or tampered with.

1. Set signal generator to 1625 Kc.
2. Connect signal generator to receiver lead-in socket through dummy antenna described above.
3. Rotate the manual tuning control to set dial pointer at 1610 Kc. (Maximum high frequency end of dial).
4. Screw the cores completely out of the antenna coil, the converter coil, and the oscillator coil.
5. Adjust the oscillator trimmer C7 at 1625 Kc.
6. Adjust the converter trimmer C6 and the antenna trimmer C1 for maximum output reading.
7. Set the signal generator and the receiver dial to 1410 Kc.
8. Replace the cores to their original position (approximately 11/16" from the end of the coil form).
9. Adjust the oscillator core L6 to scale at 1410 Kc.
10. Adjust the antenna core L2 and RF core L5 for maximum output reading.
11. Repeat steps 10 and 11 to insure that tracking and calibration are correct.
12. After alignment is complete, the maximum high frequency tuning range should be checked. If the range is greater or less than 1610 Kc., the lug stop near the volume control should be bent to limit the frequency coverage to 1610 Kc.

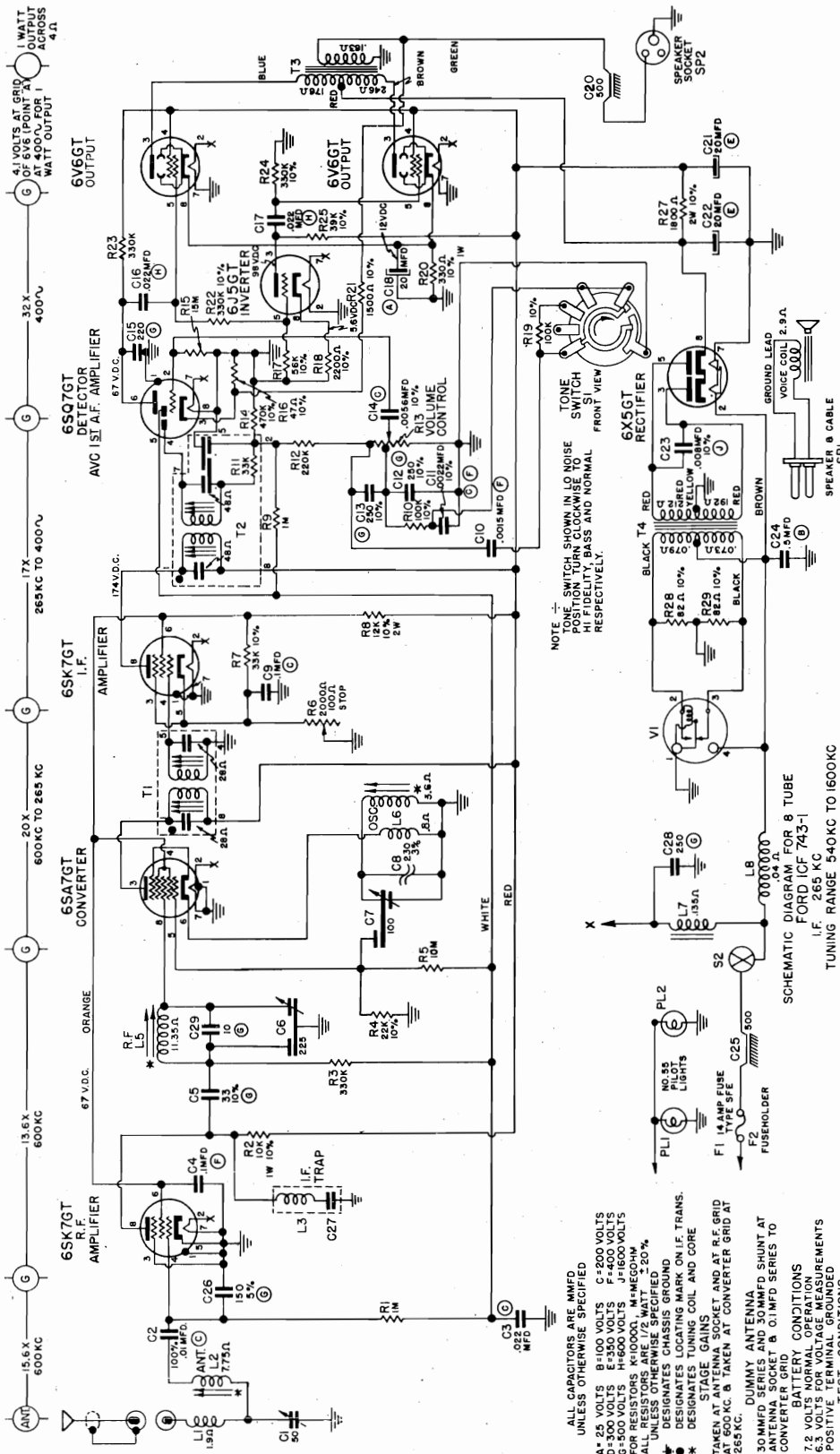
IMPORTANT: After installing the receiver in the car, allow it to operate for approximately 15 minutes to reach normal operating temperature. Extend antenna to maximum height. Check the antenna trimmer alignment on a weak station at approximately 1410 Kc.

MODELS 1CF743-1,
1CM747-1, 1CH748-1

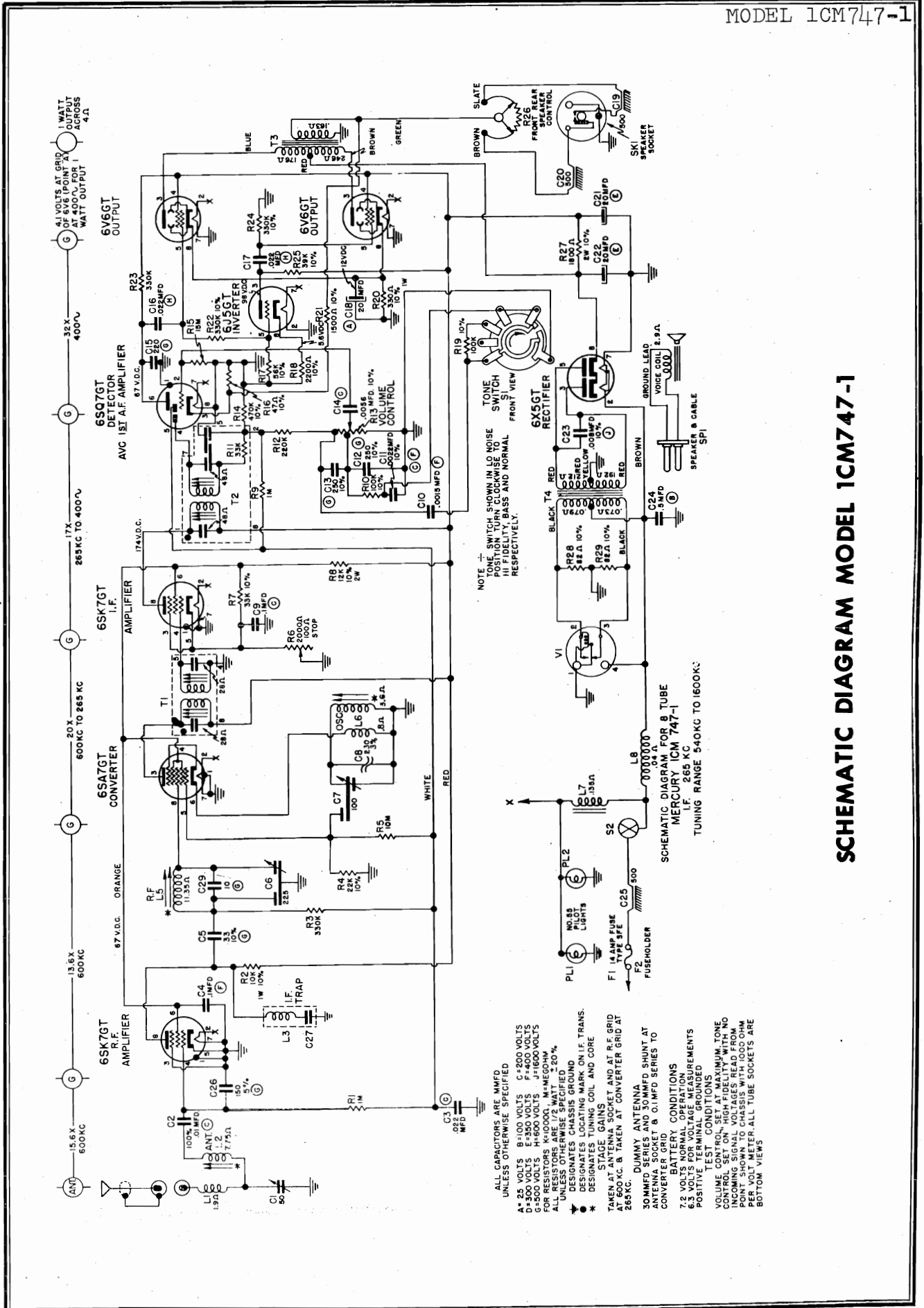
FIG. 5 1CF743-1 TUNER



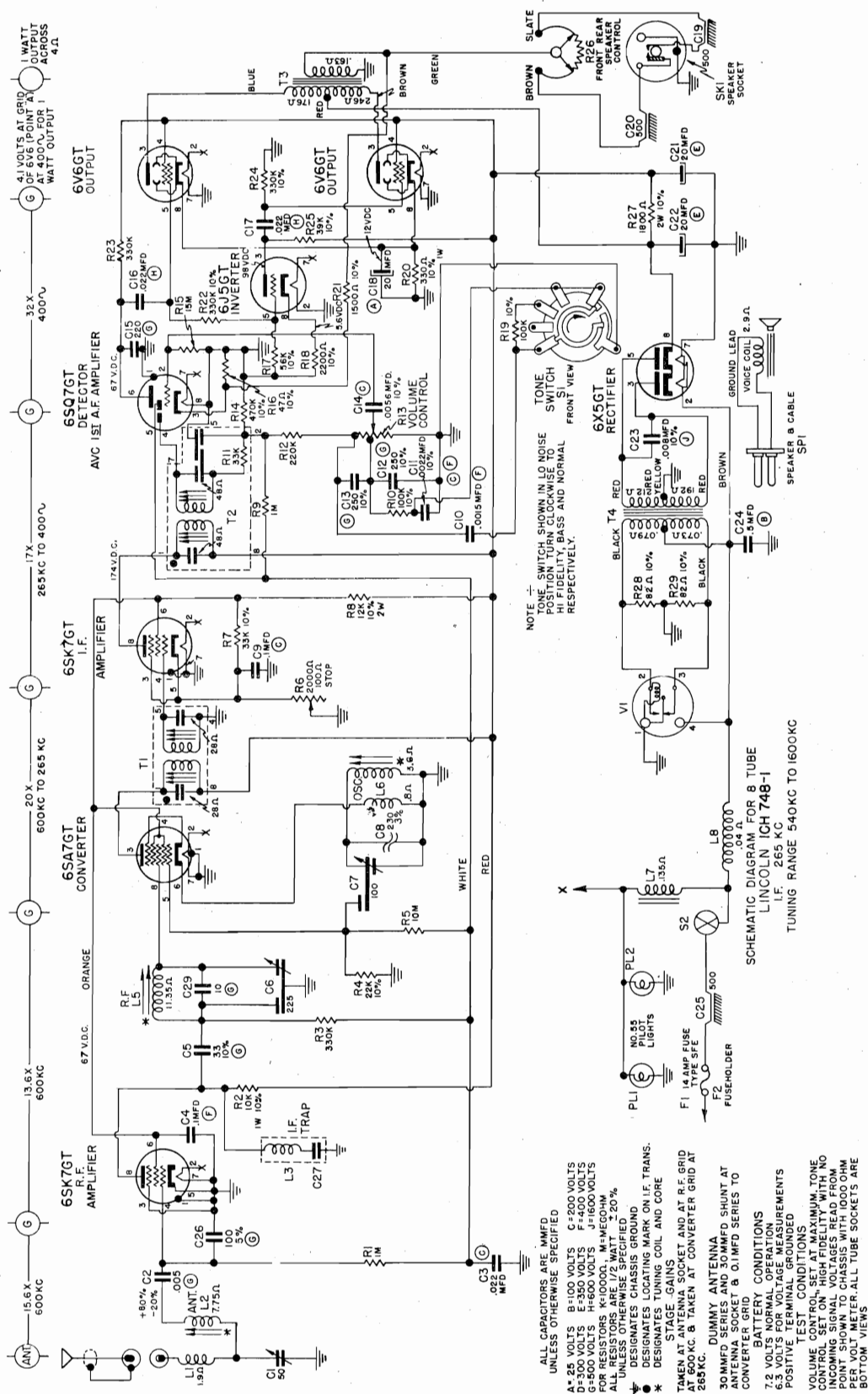
**FIG. 6 1CM747-1 &
1CH748-1 TUNER**



SCHEMATIC DIAGRAM MODEL ICF743-1



SCHEMATIC DIAGRAM MODEL 1CM747-1



SCHEMATIC DIAGRAM MODEL 1CH748-1

MODELS 1CF743-1,
1CM747-1, 1CH748-1

REPAIR PARTS LIST

| PRODUCTION PART NUMBER | TUNER UNIT AND PARTS SERVICE PART NUMBER | DESCRIPTION | SCHEMATIC LOCATION | PRODUCTION PART NUMBER | SERVICE PART NUMBER | DESCRIPTION |
|------------------------|------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|------------------------|---------------------|--------------------------------------------------|
| 75590 | 313-0016 | Tuner Unit Assembly - 1CF743-1 - mechanical portion only - includes push buttons, driven clutch disc, on-off switch, worm gear, tuning control shaft | | 71847 | 554-0015 | Ring - Drive Shaft Retaining |
| 75585 | 313-0017 | Tuner Unit Assembly - 1CM747-1 - mechanical portion only - includes push buttons, driven clutch disc, on-off switch, worm gear, tuning control shaft | | 75034 | 727-0002 | Scale - Dial (1CM747-1) |
| 75699 | 313-0018 | Tuner Unit Assembly - 1CH748-1 - mechanical portion only - includes push buttons, driven clutch disc, on-off switch, worm gear, tuning control shaft | | 65975 | 551-0017 | Scale - Dial (1CH748-1) |
| 60493 | 481-0011 | Ball - bearing - .125" | S2 | 71838 | 551-0017 | Screw - Adjusting |
| 75912 | 492-0025 | Bracket Assembly - Dial Background & Socket (1CF743-1) | | 364-6 | 551-6300 | Screw - Set #8-32 x 3/16 Headless |
| 75687 | 411-0010 | Bracket Assembly - Dial Background & Socket (1CF743-1) | | 75602 | 493-0012 | Shaft - Manual Tuning Assembly (1CF743-1) |
| 75798 | 492-0026 | Bracket Assembly - Pointer Support (1CF743-1) | | 493-0013 | 493-0013 | Shaft - Manual Tuning Assy. (1CM747-1, 1CH748-1) |
| 75842 | 492-0027 | Bracket Assembly - Pointer Support (1CM747-1, 1CH748-1) | | 497-0008 | 497-0008 | Sleeve - Tuning Shaft (1CM747-1, 1CH748-1) |
| 71818 | 333-0007 | Bracket & Roller Assembly - Clutch Release | | 496-0043 | 496-0043 | Spring - Clutch Release |
| 75672 | 481-0009 | Bushing - Tuning Shaft (1CF743-1) | | 496-0046 | 496-0046 | Spring - Clutch Release Bracket |
| 75817 | 481-0012 | Bushing - Volume Control Shaft (1CM747-1, 1CH748-1) | | 554-0020 | 554-0020 | Spring - Retainer |
| 75671 | 481-0010 | Eushing - Volume Control Shaft (1CF743-1) | | 496-0047 | 496-0047 | Spring - Switch Plunger Return |
| 75082 | 752-0022 | Button - Push - and Screw Assembly (1CF743-1) | | 496-0065 | 496-0065 | Spring - Cross Arm Tension |
| 71890 | 752-0023 | Button - Push - Off (1CM747-1) | | 496-0066 | 496-0066 | Spring - Pointer Tension |
| 71892 | 752-0024 | Button - Push - Off (1CM747-1) | | 476-0003 | 476-0003 | Strip - Fibre Retainer |
| 71597 | 752-0019 | Button - Push - Off (1CH748-1) | | 571-0004 | 571-0004 | Switch - On-Off |
| 65966 | 333-0005 | Clutch Disc Assembly | | 553-3000 | 553-3000 | Washer - Felt |
| 71503 | 192-0002 | Core - Iron tuning, and adjusting spring | | 553-4009 | 553-4009 | Washer - Shlm |
| 75635 | 722-0017 | Drum - Tone - Shaft & Gear Assembly (1CF743-1) | | 553-5005 | 553-5005 | Washer - Tension |
| 75604 | 723-0002 | Drum - Tone - Shaft & Gear Assembly (1CF743-1) | | | | |
| 75000 | 722-0012 | Drum - Tone - Shaft & Gear Assembly (1CF743-1) | | | | |
| 75911 | 711-0018 | Escutcheon & Dial Assembly (1CF747-1) | | | | |
| 71749 | 711-0018 | Escutcheon (1CH748-1) | | | | |
| 71758 | 711-0018 | Escutcheon (1CH748-1) | | | | |
| 75009 | 333-0006 | Gear - Drive & Bushing Assembly | | | | |
| 71891 | 484-0004 | Gear - Tone | | | | |
| 71889 | 753-0003 | Insert - Push Button - Plain (1CM747-1) | | | | |
| 75797 | 753-0003 | Insert - Push Button - On - Off (1CM747-1) | | | | |
| 75531 | 472-0007 | Link & Stud Assembly - Pointer Drag (1CF743-1, C16, C17, 1CM747-1, 1CH748-1) | | | | |
| 71587 | 484-0006 | Gear - Worm | | | | |
| 75031 | 331-0003 | Lock - Cam (1CF743-1) | | | | |
| 71753 | 552-0028 | Nut - 3/8-32 - Control mounting | | | | |
| 75784 | 552-0028 | Nut - 1/2-28 - Mounting | | | | |
| | 791-0016 | Pointer (1CF743-1) | | | | |
| | 791-0017 | Pointer (1CM747-1, 1CH748-1) | | | | |
| 75803 | | | | | | |

TUBE COMPLEMENT

| | |
|-----------|-----------------------------------------------|
| 622-0001H | 6SK7GT - R.F. Amplifier |
| 622-0002H | 6SA7GT - Converter |
| 622-0003H | 6SK7GT - I.F. Amplifier |
| 622-0004H | 6SQ7GT - Detector - AVC - 1st A. F. Amplifier |
| 622-0010H | 6J5GT - Inverter |
| 622-0004H | 6V6GT - Push Pull - Audio Output |
| 622-0004H | 6V6GT - Push Pull - Audio Output |
| 633-0001H | 6X5GT - Rectifier |

CAPACITORS

| | |
|-----------|---------------------------------------------------------------------|
| 166-5000D | Capacitor - Ceramic - .005 Mfd. - 450 V. |
| 168-0002D | Capacitor - Ceramic - .01 Mfd. - 500 V. |
| 161-3005 | Capacitor - Electrolytic 20 Mfd. - 350 V. |
| 163-0250 | Capacitor - Mica - .00025 Mfd. - 500 V. |
| 163-0250 | Capacitor - Mica - .00025 Mfd. - 500 V. (1CF743-1) |
| 163-0220 | Capacitor - Mica - .00022 Mfd. - 500 V. |
| 163-0023 | Capacitor - Mica - .000033 Mfd. - 500 V. |
| 164-0150 | Capacitor - Silver Mica - .00015 Mfd. - 500 V. (1CF743-1, 1CM747-1) |
| 164-0100 | Capacitor - Silver Mica - .0001 Mfd. - 500 V. (1CH748-1) |
| 164-0010 | Capacitor - Silver Mica - .00001 Mfd. - 500 V. |
| 160-0401 | Capacitor - Molded Paper - .1 Mfd. - 400 V. |
| 160-0201 | Capacitor - Molded Paper - .1 Mfd. - 200 V. |
| 160-06122 | Capacitor - Molded Paper - .022 Mfd. - 600 V. |
| 160-04222 | Capacitor - Molded Paper - .022 Mfd. - 200 V. |
| 160-04215 | Capacitor - Molded Paper - .0022 Mfd. - 400 V. |
| 160-02256 | Capacitor - Molded Paper - .0025 Mfd. - 200 V. |
| 160-16282 | Capacitor - Molded Paper - .0056 Mfd. - 1600 V. |
| 169-0001 | Capacitor - Paper - .5 Mfd. - 100 V. |

MODELS 1CF743-1,
1CM747-1, 1CH748-1

| SCHEMATIC LOCATION | | CAPACITORS (continued) | | | |
|------------------------|---------------------|-----------------------------------------------------|------------------------|---------------------|--------------------------------------|
| PRODUCTION PART NUMBER | SERVICE PART NUMBER | DESCRIPTION | PRODUCTION PART NUMBER | SERVICE PART NUMBER | DESCRIPTION |
| C8 | 75961 | Capacitor - Temp. Compensating - .00023 Mfd. | 75643 | 492-0022 | Support - Mounting - Receiver - R.H. |
| C19, C20, C25 | 71636 | Capacitor - Kit - Spark Plate | 71414 | 563-0004 | Suppressor - Distributor |
| C1 | 75824 | Capacitor - Trimmer - Antenna | 75935 | 563-0006 | Suppressor Lead - Distributor |
| C6, C7 | 75824 | Capacitor - Trimmer & Fixed Capacitor | 75673 | 553-1014 | Washer - Lock - 1/4 Split |
| F2 | 75786 | Holder - Fuse | 71741 | 553-2007 | Washer - Serrated |
| SP2 | 75642 | Lead - "A" (1CF743-1) | | | |
| SK1 | 71639 | Lead - "A" (1CM747-1, 1CH748-1) | | | |
| | 71693 | Socket - Antenna Connector | | | |
| | 71693 | Socket - Tube - 8 Prong Octal | | | |
| | 71698 | Socket - Speaker (1CF743-1) | | | |
| | 71754 | Socket - Speaker (1CM747-1, 1CH748-1) | | | |
| | 66423 | Socket - Vibrator | | | |
| | | MISCELLANEOUS CHASSIS PARTS | | | |
| | | MISCELLANEOUS ELECTRICAL PARTS | | | |
| PL1, PL2 | 15362 | Bulb - Dial Light (Mazda #55) | 71737 | 492-0015 | Bracket - Mounting - Receiver - L.H. |
| L2 | 75796 | Coils - Permeability tuning (includes) | 71730 | 492-0016 | Bracket - Mounting - Receiver - R.H. |
| L5 | | Antenna Coil | 75162 | 567-0005 | Capacitor - Fuel Gauge |
| L6 | | R. F. Coil | 71456 | 564-0002 | Capacitor - Generator |
| L1 | | Oscillator Coil | 71604 | 569-0012 | Capacitor - Oil Gauge |
| L8 | 75955 | Choke - Antenna | 75156 | 569-0004 | Capacitor - Voltage Regulator |
| L8 | 71628 | Choke - Hash | 71731 | 492-0017 | Clamp - Speaker Mounting |
| L7 | 75850 | Choke & Core Assembly - Heater | 71460 | 568-0003 | Collector - Wheel Static |
| R26 | 71883 | Control - Dual - Speaker (1CM747-1, 1CH748-1) | 71751 | 744-0007 | Knob - Tone Switch & Speaker Control |
| R6 | 71645 | Control - Sensitivity | 75707 | 740-0016 | Knob - Volume and Tuning |
| R13, S1 | 75804 | Control - Volume & Tone Switch (1CM747-1, 1CH748-1) | 411-10 | 552-0007 | Nut - #10-32 Hex |
| R13, S1 | 75791 | Control - Volume & Tone Switch (1CF743-1) | 71610 | 552-0006 | Nut - 1/4-20 Hex |
| F1 | 17392 | Fuse - 14 Amp | 75663 | 552-0001 | Nut - #8-32 Wing |
| SP1 | 75674 | Speaker - PM - 6"x9" (1CF743-1) | 71753 | 552-0008 | Nut - 1/2-28 - Special |
| SP1 | 71733 | Speaker - PM - 6"x9" (1CM747-1, 1CH748-1) | 71414 | 563-0004 | Suppressor - Distributor |
| T1 | 71702 | Transformer - 1st I. F. | 75935 | 563-0006 | Suppressor Lead - Distributor |
| T2 | 121-0015 | Transformer - 2nd I. F. | 402-8 | 553-1208 | Washer - Lock - #8 - Int. Tooth |
| T3 | 75931 | Transformer - Output | 553-1210 | 553-1210 | Washer - Lock #10 - Int. Tooth |
| T4 | 75787 | Transformer - Power | 71741 | 553-2007 | Washer - Serrated |
| L3, C27 | 75918 | Trap Coil - I. F. | 75673 | 553-1014 | Washer - Lock - 1/4 - Split |
| V1 | 71712 | Vibrator | 71491 | 553-1250 | Washer - Lock - 1/2 - Int. Tooth |
| | | MISCELLANEOUS CHASSIS PARTS | | | |
| | | MISCELLANEOUS ELECTRICAL PARTS | | | |
| | 75657 | Baffle and Gasket Assembly - Speaker | | | |
| | 75162 | Capacitor - Fuel Gauge | | | |
| | 71456 | Capacitor - Generator | | | |
| | 71604 | Capacitor - Oil Gauge | | | |
| | 75156 | Capacitor - Voltage Regulator | | | |
| | 71460 | Collector - Wheel Static | | | |
| | 75661 | Cup - Bezel | | | |
| | 75662 | Knob - Tone Control | | | |
| | 75655 | Knob - Tuning (Complete) | | | |
| | 75656 | Knob - Volume Control (Complete) | | | |
| | 71610 | Nut - 1/4 - 20 Hex. | | | |
| | 71669 | Nut - 1/2 - 28 - Mounting | | | |
| | 75663 | Nut - #8-32 - Wing | | | |
| | 75648 | Support - Mounting - Receiver - L.H. | | | |
| | | INSTALLATION PARTS 1CF743-1 | | | |
| | | INSTALLATION PARTS 1CM747-1 | | | |
| | | INSTALLATION PARTS 1CH748-1 | | | |
| | 71744 | Bracket - Mounting - Receiver - L.H. | | | |
| | 71745 | Bracket - Mounting - Receiver - R.H. | | | |
| | 75162 | Capacitor - Fuel Gauge | | | |
| | 71456 | Capacitor - Generator | | | |
| | 71457 | Capacitor - Ignition Coil | | | |
| | 71604 | Capacitor - Oil Gauge | | | |
| | 71460 | Collector - Wheel Static | | | |
| | 71751 | Knob - Tone Switch & Speaker Control | | | |
| | 75711 | Knob - Volume & Tuning | | | |
| | 71610 | Nut - 1/4-20 Hex | | | |
| | 75663 | Nut - #8-32 Wing | | | |
| | 71753 | Nut - 1/2-28 Hex | | | |
| | 71747 | Nut - 1/4-20 x 1/2 - Hex Head | | | |
| | 71748 | Spring - Hood Bonding | | | |
| | 71746 | Spring - Hood Bonding | | | |
| | 71414 | Suppressor - Distributor | | | |
| | 75935 | Suppressor Lead - Distributor | | | |
| | 71741 | Washer - Serrated | | | |
| | 75673 | Washer - Lock - 1/4 - Split | | | |
| | 71491 | Washer - Lock - 1/2 - Int. Tooth | | | |

MODELS 1CF743-1,
1CM747-1, 1CH748-1

| <u>SCHEMATIC LOCATION</u> | <u>PRODUCTION PART NUMBER</u> | <u>SERVICE PART NUMBER</u> | <u>DESCRIPTION</u> |
|---------------------------|-------------------------------|----------------------------|-------------------------------------------------|
| RESISTORS | | | |
| R16 | BY34701 | 181-0470 | Resistor - insulated - 47 Ohm - 1/2 W. |
| R28, R29 | BY38201 | 181-0820 | Resistor - insulated - 82 Ohm - 1/2 W. |
| R21 | BY31521 | 181-0152 | Resistor - insulated - 1,500 Ohm - 1/2 W. |
| R18 | BY32221 | 181-0222 | Resistor - insulated - 2,200 Ohm - 1/2 W. |
| R4 | BY32231 | 181-0223 | Resistor - insulated - 22,000 Ohm - 1/2 W. |
| R7, R11 | BY33331 | 181-0333 | Resistor - insulated - 33,000 Ohm - 1/2 W. |
| R25 | BY33931 | 181-0393 | Resistor - insulated - 39,000 Ohm - 1/2 W. |
| R17 | BY35631 | 181-0563 | Resistor - insulated - 56,000 Ohm - 1/2 W. |
| R10, R19 | BY31041 | 181-0104 | Resistor - insulated - 100,000 Ohm - 1/2 W. |
| R12 | BY32242 | 181-0224 | Resistor - insulated - 220,000 Ohm - 1/2 W. |
| R3, R23 | BY33342 | 181-0334 | Resistor - insulated - 330,000 Ohm - 1/2 W. |
| R22, R24 | BY33341 | 181-0334 | Resistor - insulated - 330,000 Ohm - 1/2 W. |
| R14 | BY34741 | 181-0474 | Resistor - insulated - 470,000 Ohm - 1/2 W. |
| R1, R9 | BY31052 | 181-0105 | Resistor - insulated - 1.0 Megohm - 1/2 W. |
| R5 | BY31061 | 181-0106 | Resistor - insulated - 10 Megohm - 1/2 W. |
| R15 | BY31562 | 181-0156 | Resistor - insulated - 15 Megohm - 1/2 W. |
| R20 | ZY33311 | 182-0331 | Resistor - insulated - 330 Ohm - 1 W. |
| | or | or | |
| | 66041 | 189-0011 | Resistor - insulated - 330 Ohm - 1 W. (W. W.) |
| R2 | ZY31031 | 182-0103 | Resistor - insulated - 10,000 Ohm - 1 W. |
| R27 | VY31821 | 183-0182 | Resistor - insulated - 1,800 Ohm - 2 W. |
| | or | or | |
| | 71677 | 189-0002 | Resistor - insulated - 1,800 Ohm - 2 W. (W. W.) |
| R8 | VY31231 | 183-0123 | Resistor - insulated - 12,000 Ohm - 2 W. |

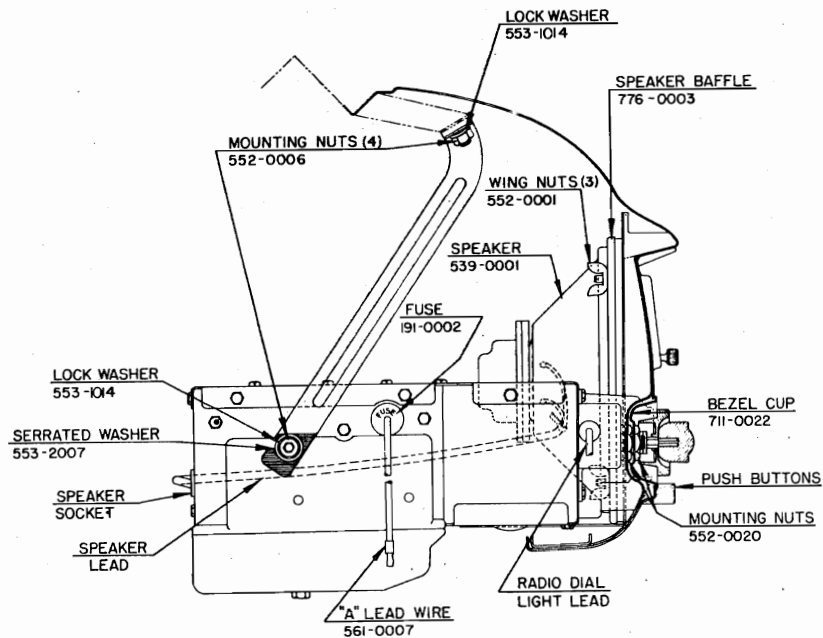


FIG. 7 ICF743-1 INSTALLATION

MODELS 1CF743-1,
1CM747-1, 1CH748-1

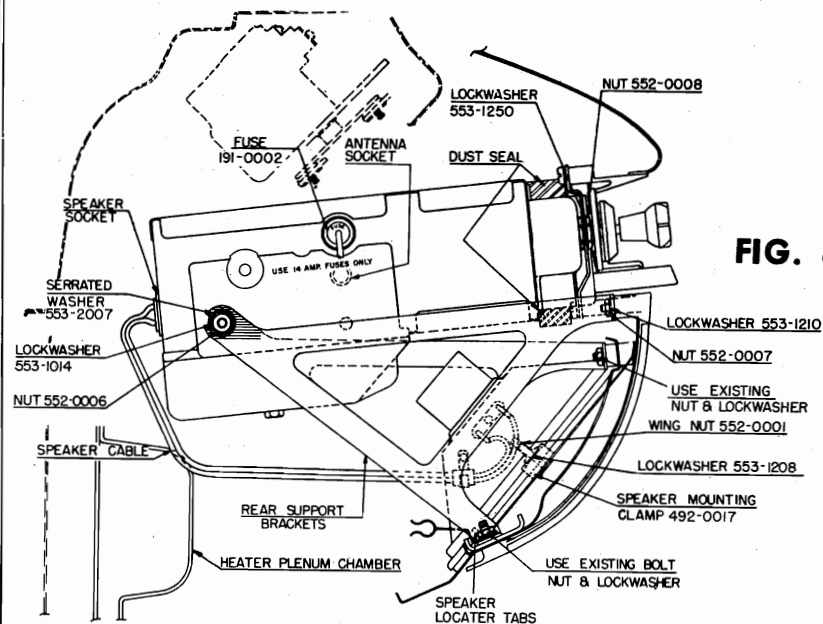


FIG. 8 1CF747-1 INSTALLATION

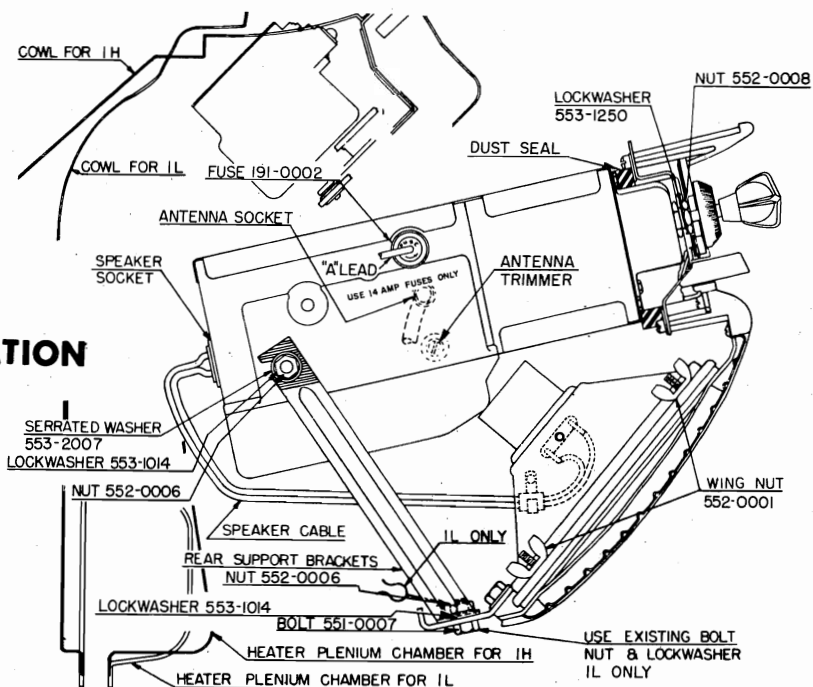


FIG. 9 1CH748-1 INSTALLATION

RECEIVER INSTALLATION

Figures 7, 8 and 9 illustrate the installed receivers to facilitate removal and reinstallation when service is necessary.

TO REMOVE THE FORD RECEIVER

1. Disconnect the speaker plug, dial light lead, antenna lead, and "A" lead.
2. Remove control knobs, front mounting nuts, and lockwashers from the radio control shafts.
3. Disconnect the receiver from the receiver mounting brackets by removing the hex

nut and lockwasher from the receiver mounting stud.

4. Remove receiver by sliding it back and down behind the instrument panel.
5. To remove the speaker, remove the four wing nuts holding the speaker to the instrument panel.

TO REMOVE THE MERCURY RECEIVER

1. Remove the car heater plenum chamber.
2. Disconnect speaker plug, antenna lead, and "A" lead.

MODELS 1CF743-1,
1CM747-1, 1CH748-1

- | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ol style="list-style-type: none"> 3. Loosen the two speaker mounting clamps and remove the speaker. 4. Remove control knobs, front mounting nuts and lockwashers from the radio control shafts. 5. Loosen the nuts holding the receiver to the mounting brackets. 6. Remove receiver by sliding it back and down behind the instrument panel. | <ol style="list-style-type: none"> 2. Disconnect the speaker plug, antenna lead, and "A" lead. 3. Remove control knobs, front mounting nuts and lockwashers from the radio control shafts. 4. Loosen the hex nuts holding the receiver to the mounting brackets. 5. Remove receiver by sliding it back and down behind the instrument panel. 6. To remove the speaker, remove the four wing nuts holding it to the instrument panel. |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

TO REMOVE THE LINCOLN RECEIVER

1. Remove the car heater plenum chamber.

OPERATING INSTRUCTIONS

TO TURN RADIO ON

The radio is connected to the accessory terminal of the ignition switch, therefore, it is necessary to turn the ignition key to the left, if the engine is not running, before turning the radio on. Press any one of the five automatic push buttons. Allow approximately 20 seconds for the receiver to reach operating temperature.

To turn the receiver off, press the "Off" push-button.

MANUAL TUNING

To operate the manual tuning control simply turn the tuning knob. When tuning in a station, be sure to tune to the exact frequency for the best tone quality.

VOLUME CONTROL

Turn the volume control knob for the desired volume.

TONE CONTROL

The tone control knob is located directly behind the volume control knob. Turning this control to the right or left will change the tone of the receiver. This control has four positions and the position to which the control is set is indicated in the window in the center of the dial scale.

REAR SPEAKER CONTROL

The rear speaker control disc, located behind the tuning control knob on the Mercury and Lincoln receivers, is provided to control an auxiliary rear shelf speaker (available from Mercury-Lincoln dealer).

The speaker socket located on the rear of the receiver case will accommodate both the front speaker and rear speaker. When the rear speaker is plugged into the socket, a switch in the socket connects the rear speaker control into the circuit.

AUTOMATIC TUNING

Automatic push button tuning is provided by means of push buttons located directly under the dial scale and to the right of the "Off" push button (see Fig. 1). These five buttons permit the selection of five favorite local stations. When the push buttons have been set to the desired station it is only necessary to press a push button to turn the set "on" and to receive the station for which the adjustment was made. The dial pointer will automatically indicate the frequency of the selected station.

SETTING THE PUSH BUTTON TUNER

The five push buttons may be adjusted to any of the desired stations. In order to simplify

the identification of these stations, it is advisable to set the push buttons in sequence according to their frequencies, beginning with the station broadcasting on the lowest frequency and progressing to the station broadcasting on the highest frequency.

The push buttons should be set up during the day since at night distant stations will be heard with the same volume as local stations, making it difficult to identify local stations.

Allow the receiver to operate for at least fifteen minutes before adjusting the push buttons. This will allow each part in the receiver to reach normal operating temperature.

MODELS 1CF743-1,
1CM747-1, 1CH748-1

TO SET THE PUSH BUTTONS

1. 1CF743 RECEIVER

- a. Collapse the antenna.
- b. Select a station at the low end of the broadcast band and manually tune it in so its signal is heard without distortion.
- c. Loosen the second push button from the left side by turning it counter-clockwise one turn with your fingers.
- d. Press the loosened push button in firmly to its extreme position and release. Tighten the push button as much as possible by turning clockwise with your fingers.
- e. The push button is now set for this station selection. Follow the above procedure for setting each of the four remaining push buttons.
- f. Check that the push button setting corresponds to the best manual tuned signal for each station and repeat steps "b" through "e" where necessary.

2. 1CM747 & 1CH748 RECEIVERS

- a. Collapse the antenna.

- b. Select a station at the low end of the broadcast band and manually tune it in so its signal is heard without distortion.
- c. Unlock the second push button from the left by pushing the button to the left and pulling it out.
- d. Press the unlocked push button in firmly to its extreme position and release.
- e. The push button is now set for this station selection. Follow the above procedure for setting each of the four remaining push buttons.
- f. Check that the push button setting corresponds to the best manual tuned signal for each station and repeat steps "b" through "e" where necessary.

When the five push buttons have been set to the desired stations, return the antenna to the lowest position necessary for good reception. It is only necessary to press a push button to receive the station for which the adjustment was made. The dial pointer will automatically indicate the frequency of the selected station.

INTERFERENCE ELIMINATION

There should be no motor noise or interference from the ignition system if the receiver has been installed in the car according to the instructions furnished with the receiver. The interference suppression equipment may be checked for proper installation by referring to the following instructions and illustrations.

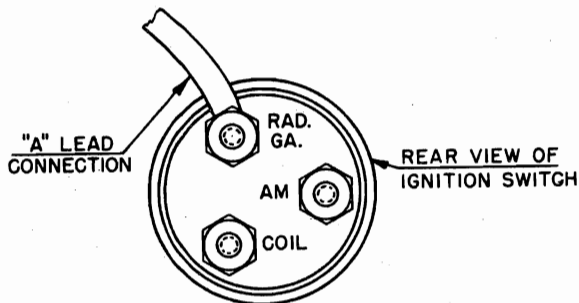


FIG. 10 "A" LEAD CONNECTION

The "A" lead to the receiver should be installed in each car as illustrated in Fig. 10.

Two types of distributor suppressors are used with the Ford (743-1), Mercury (747-1) and Lincoln (748-1) receivers. Suppressor 563-0004 was used for Ford receivers with serial numbers up to 1CF 60757 743-1 (approx.), Mercury receivers with serial numbers up to 1CM 103,500 747-1 (approx.) and Lincoln receivers with serial numbers up to 1CH 15,500 748-1 (approx.). All Ford, Lincoln and Mercury receivers with serial numbers above those listed use suppressor lead 563-0006.

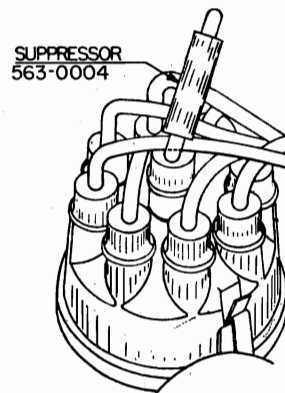


FIG. 11 DISTRIBUTOR SUPPRESSOR 563-0004

To install suppressor 563-0004 shown in Fig. 11, cut the high tension wire running from the ignition coil to the center hole of the distributor cap one and one half inches from the coil for the Ford "8", two and one half inches from the cap for the Mercury and Lincoln. Cut one inch from the coil end of the wire. Screw the cut ends of the wire into both ends of suppressor 563-0004. Replace the wire in the coil.

MODELS 1GF743-1,
1GM747-1, 1CH748-1

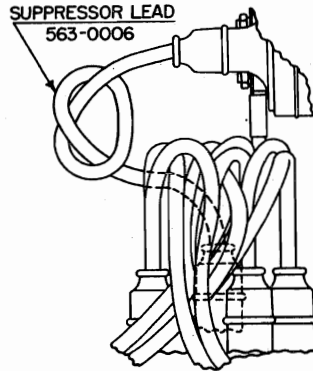


FIG. 12 DISTRIBUTOR SUPPRESSOR LEAD 563-0006

To install suppressor lead 563-0006, remove the high tension wire that runs between the ignition coil and the center hole of the distributor cap on the Ford, Lincoln and Mercury cars. Thoroughly clean the contacts on the coil and distributor. Make an overhand loop in suppressor lead 563-0006 as shown in Fig. 12 and insert the lead in place of the high tension wire.

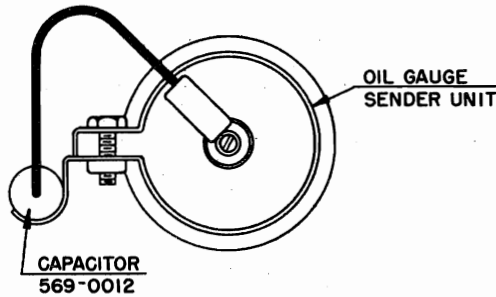


FIG. 13 OIL GAUGE CAPACITOR

Connect capacitor 569-0012 to the oil gauge sender unit as shown.

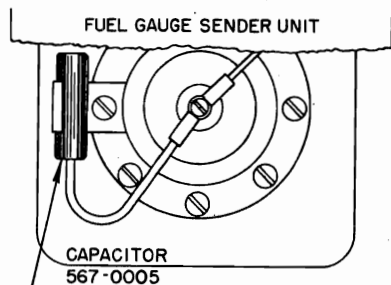


FIG. 14 FUEL GAUGE CAPACITOR

Connect capacitor 567-0005 to the fuel gauge sender unit as shown in Fig. 14 and seal tightly with compound.

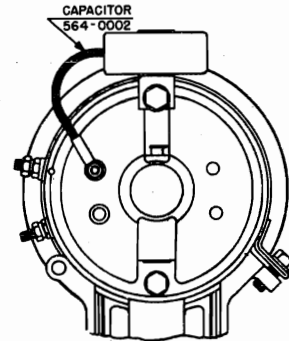


FIG. 15 GENERATOR CAPACITOR

The generator capacitor 564-0002 is installed by loosening (do not remove) the top assembly bolt from the rear end plate of the generator. Mount the capacitor under this bolt and connect the lead to the armature terminal of the generator.

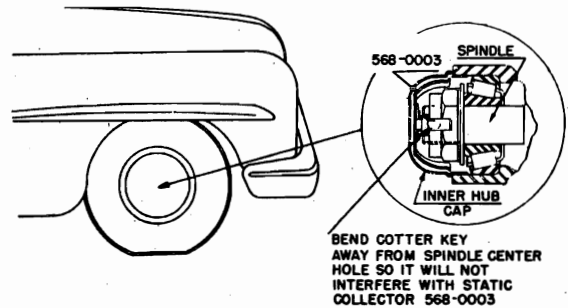


FIG. 16 WHEEL STATIC COLLECTOR

Remove both outer and inner hub caps from both front wheels. Clean inner caps and spindles. Snap static collector springs 568-0003 in inner hub caps.

IMPORTANT: Bend cotter key away from center hole so it will not interfere with static collector. Replace hub caps.

REMOVE SCREW FROM HOOD PAD ON COWL AT LOCATION SHOWN AND INSTALL HOOD BONDING SPRING 193-0007 WITH SCREW 559-0003

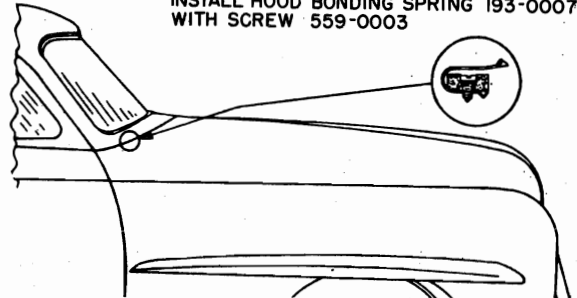
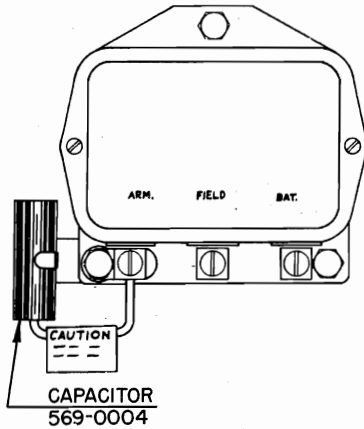


FIG. 17 LINCOLN HOOD BOND

MODELS 1CF743-1,
1CM747-1, 1CH748-1

Remove the screw from the hood pad on the cowl and install the hood bonding spring 193-0007.



Mount capacitor 569-0004 between voltage regulator and dash panel. Connect lead to "ARM" terminal on regulator as shown.

Mount capacitor 569-0004A as shown for the 1H or 1L Lincoln. Be sure to connect the lead to the battery terminal of the coil. If the lead is connected to the Distributor terminal the performance of the car engine will be impaired.

FIG. 18 VOLT. REG. CAPACITOR

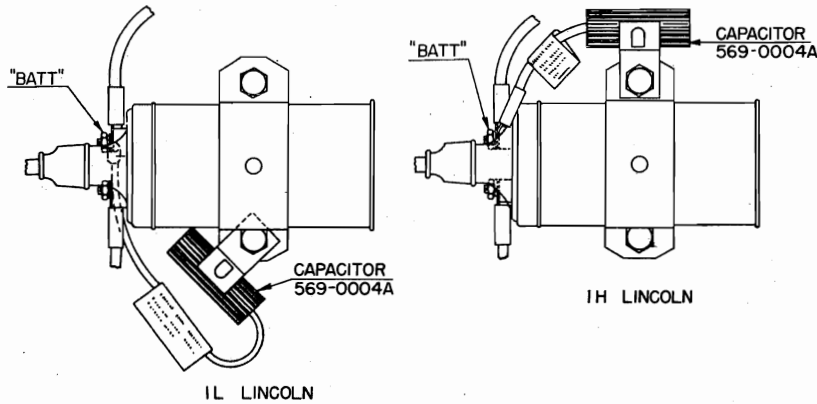


FIG. 19 IGNITION COIL CAPACITOR - LINCOLN

Supplement No. 1
to
Technical Service Bulletin

Suppressor Lead 563-0006 was available for production earlier than originally anticipated. As a result, the serial numbers given under "Interference Elimination" in Bulletin 2-18 are changed. Distributor Suppressor 563-0004 is used with receivers having the following serial numbers:

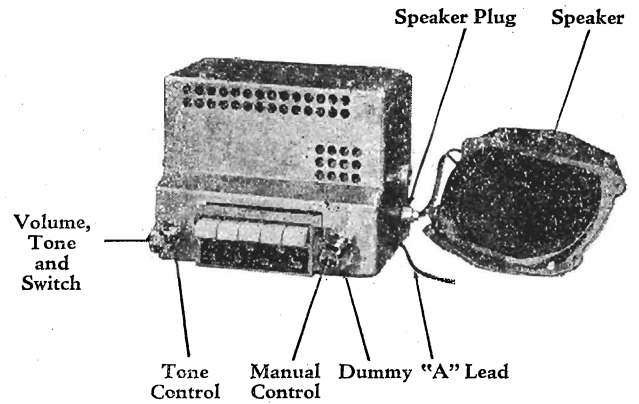
- Ford (743-1) receivers with serial numbers up to and including 1CF 49, 221 743-1
- Mercury (747-1) receivers with serial numbers up to and including 1CM 86, 501 747-1
- Lincoln (748-1) receivers with serial numbers up to and including 1CH 17, 865 748-1

Receivers with serial numbers higher than those listed above use Suppressor Lead 563-0006.

MODEL 100170, 1951
Kaiser-Frazer

GENERAL

- MOUNTING—All 1951 Kaiser Cars.
- TUBES—Seven, Plus Rectifier.
- SPEAKER—6" x 9" Elliptical, Permanent Magnet.
- TUNING—Manual and 5 Push Button Mechanical.
- ANTENNA TRIMMER COMPENSATION — For Antennas Between 0.000060 - 0.000095 Mfd.
- TUNING RANGE—550-1600 KC.



MODEL 100170

PUSHBUTTON SET-UP

Pull button to the left and out. Tune in desired station manually. Push button in as far as it will go.

ALIGNMENT PROCEDURE

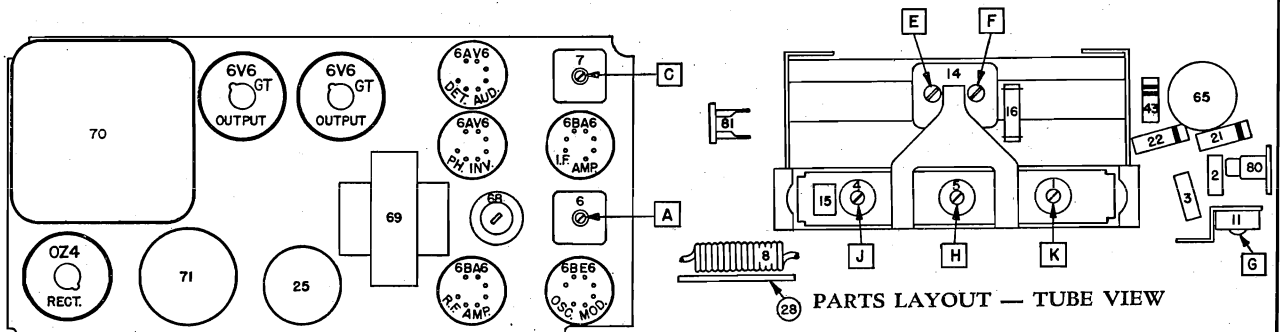
- Output Meter Connections Across Voice Coil
- Generator Ground Receiver Chassis
- Dummy Antenna In Series With Generator
- Volume Control Position Maximum Volume
- Tone Control Position Treble
- Generator Output Minimum for Readable Indication

| Steps | Series Condenser or Dummy Antenna | Connect to | Signal Generator Frequency | Tune Receiver To | Adjust in Sequence for Max. Output |
|-------|-----------------------------------|--------------------|----------------------------|--------------------|------------------------------------|
| 1 | 0.1 Mfd. | 6BE6 Grid (Pin #7) | 260 KC | High Freq. Stop | A, B, C, D |
| 2 | 0.000068 Mfd. | Antenna Connector | 1615 KC | High Freq. Stop | *E, F, G |
| 3 | 0.000068 Mfd. | Antenna Connector | 1000 KC | Signal Gen. Signal | J, K |
| 4 | 0.000068 Mfd. | Antenna Connector | 1615 KC | High Freq. Stop | F, G |
| 5 | 0.000068 Mfd. | Antenna Connector | 1000 KC | Signal Gen. Signal | L** |

*Before making this adjustment check the mechanical setting of the oscillator core "H." The slotted end of the core should be 1 25/32" from the mounting end of the coil form. (This measurement is readily made by inserting a suitable plug in the mounting end of the coil form). If adjustment is necessary be sure to first dissolve the glyptal seal on the core studs. Core adjustments are made from the mounting end of the coil form with an insulated screwdriver, and core studs should be resealed with glyptal or household cement after alignment.

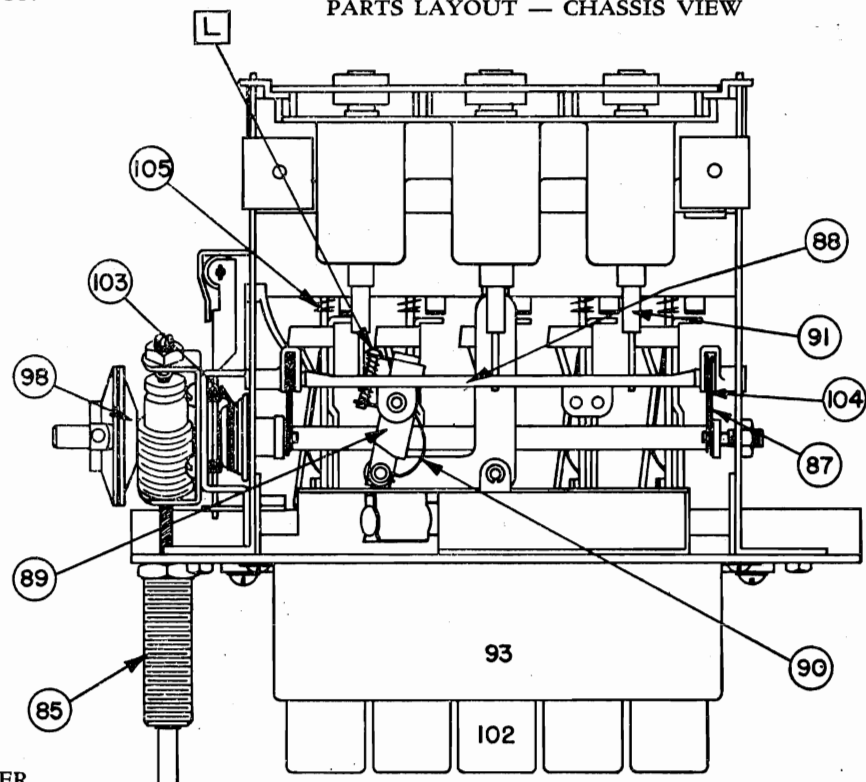
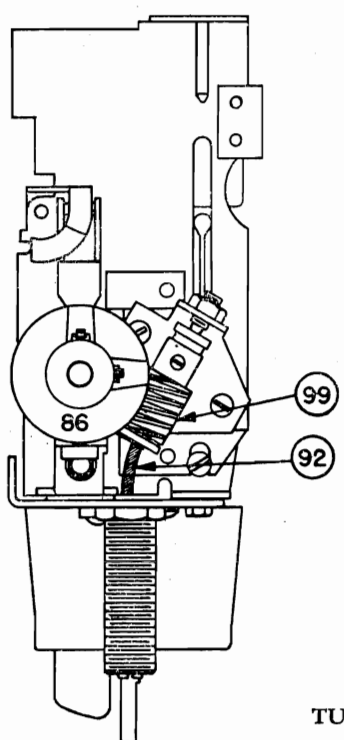
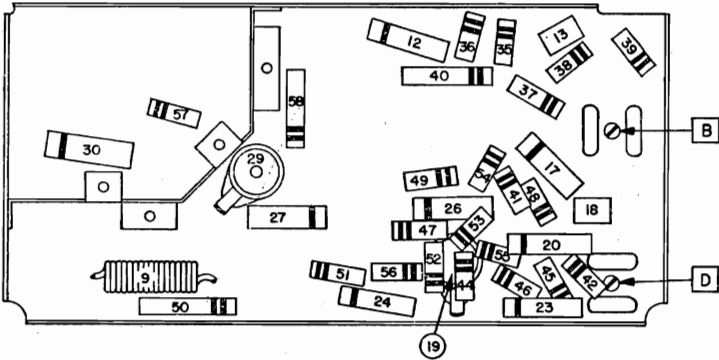
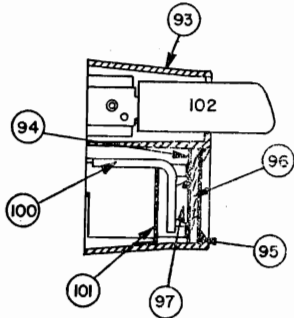
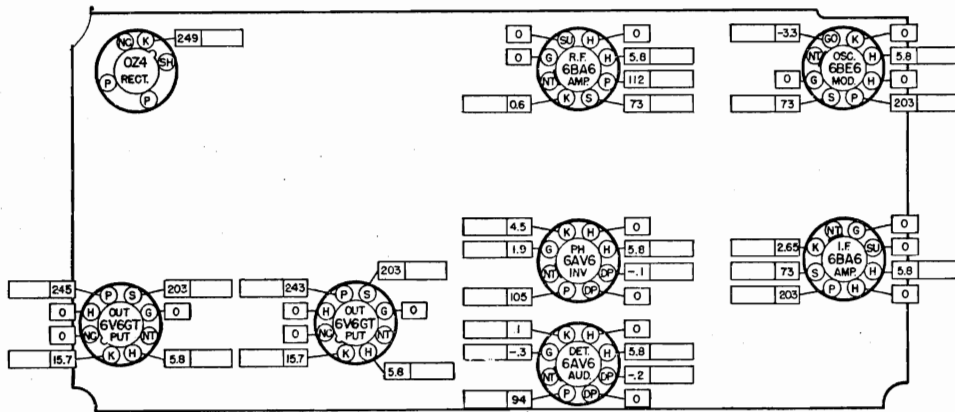
**"L" is the pointer adjustment screw on the pointer connecting link (see tuner drawing). Adjust so pointer reads 1000 KC.

With the radio installed and the car antenna plugged in adjust antenna trimmer "G" (see sticker on case) for maximum volume with the radio tuned to a weak station from 600 to 1000 KC.

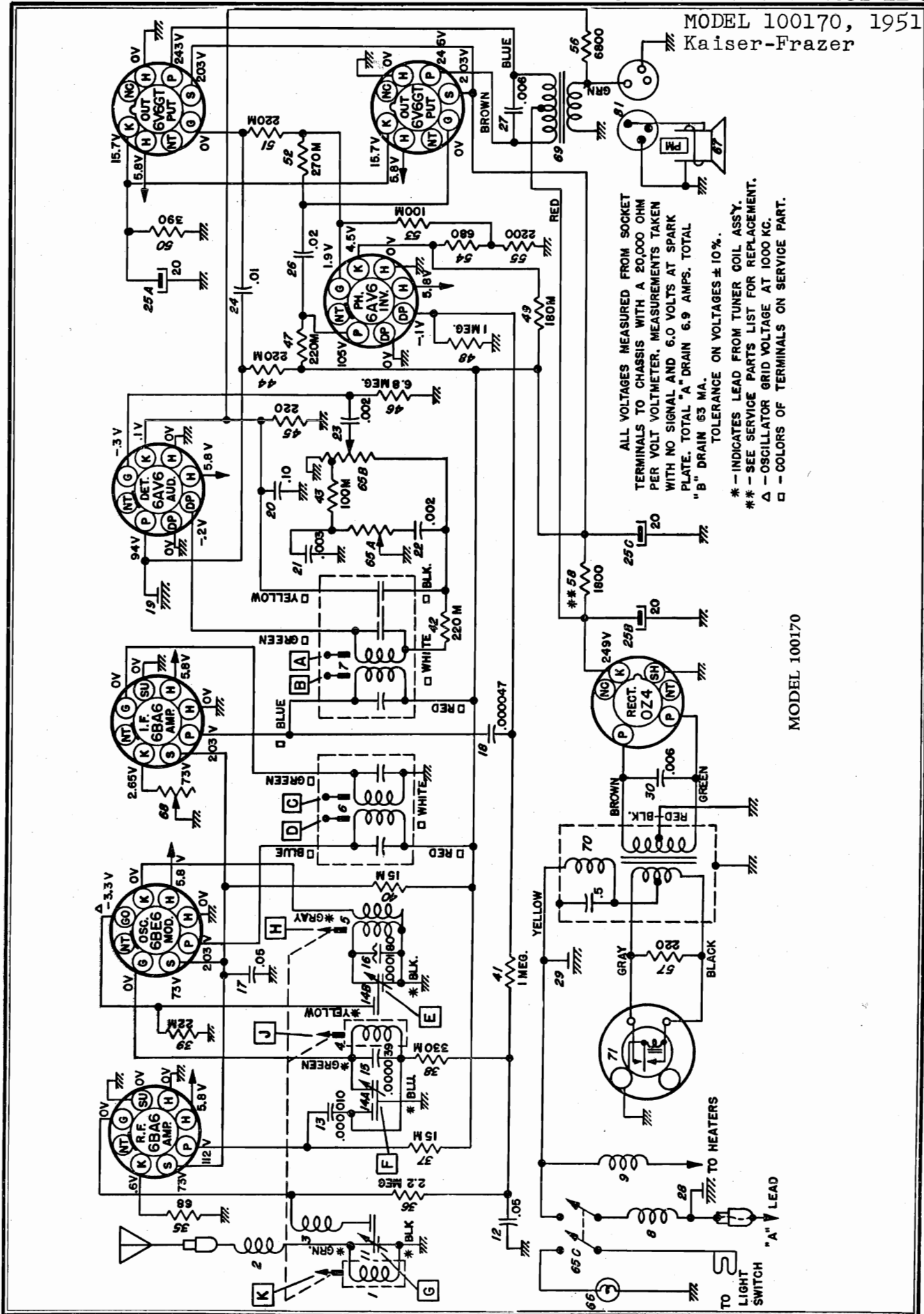


MODEL 100170,
1951 Kaiser-
Frazer

TUBE SOCKET VOLTAGE CHART



MODEL 100170, 1951
Kaiser-Frazer



ALL VOLTAGES MEASURED FROM SOCKET
TERMINALS TO CHASSIS WITH A 20,000 OHM
PER VOLT VOLTMETER. MEASUREMENTS TAKEN
WITH NO SIGNAL AND 6.0 VOLTS AT SPARK
PLATE. TOTAL "A" DRAIN 6.9 AMPS. TOTAL
"B" DRAIN 63 MA.
TOLERANCE ON VOLTAGES ± 10%.

* - INDICATES LEAD FROM TUNER COIL ASS'Y.
** - SEE SERVICE PARTS LIST FOR REPLACEMENT.
△ - OSCILLATOR GRID VOLTAGE AT 1000 KC.
□ - COLORS OF TERMINALS ON SERVICE PART.

MODEL 100170

MODEL 100170, 1951
Kaiser-Frazer

SERVICE PARTS LIST

| Illus. No. | Production Part No. | Service Part No. | Description |
|-------------------------|---------------------|------------------|---------------------------------------------------------------------------------|
| ELECTRICAL PARTS | | | |
| Coils | | | |
| 1 | 7258914 | 7258914 | Antenna |
| 2 | 7255738 | 7255738 | Antenna Series Choke |
| 3 | 7240251 | 7240251 | Antenna Spark Choke |
| 4 | 7258914 | 7258914 | R.F. |
| 5 | 7258911 | 7258911 | Oscillator |
| 6 | 7258188 | 1218725 | 1st I.F. |
| 7 | 7258198 | 1218726 | 2nd I.F. |
| 8 | 7260510 | 1217846 | "A" Spark Choke |
| 9 | 7260511 | 1217846 | Hash Choke |
| Condensers | | | |
| 11 | 7259597 | 7259597 | Antenna Trimmer |
| 12 | 7236842 | E 503 | .05 mfd 200 V Tubular |
| 13 | 1219293 | G 100 | .000010 mfd Molded |
| 14 | 7242454 | 7242454 | Dual Trimmer |
| 15 | 7258223 | G 390 | .000039 mfd Molded |
| 16 | 7257424 | 7257424 | .000180 mfd Compensating |
| 17 | 7258125 | E-503 | .05 mfd 400 V Tubular |
| 18 | 7258602 | G 470 | .000047 mfd Molded |
| 19 | 1217848 | 1217848 | Chassis Plate Condenser |
| 20 | 7238789 | E 104 | .1 mfd 400 V Tubular |
| 21 | 7257699 | E 302 | .003 mfd 600 V Tubular |
| 22 | 7237836 | E 202 | .002 mfd 600 V Tubular |
| 23 | 7237836 | E 202 | .002 mfd 600 V Tubular |
| 24 | 1209309 | E 103 | .01 mfd 400 V Tubular |
| 25 | 7240724 | M 908 | Electrolytic |
| 25A | | | 20 mfd 25 V |
| 25B | | | 20 mfd 400 V |
| 25C | | | 20 mfd 400 V |
| 26 | 7258124 | E 203 | .02 mfd 400 V Tubular |
| 27 | 1219084 | H 602 | .006 mfd 800 V Tubular |
| 28 | 1219822 | 1219822 | Spark Plate |
| 29 | 1217848 | 1217848 | Chassis Plate |
| 30 | 7240906 | H 602 | .006 mfd 1600 V Tubular |
| Resistors | | | |
| 35 | 1215558 | 1215558 | 68 Ohms 1/2W Insulated |
| 36 | 12111147 | A 225 | 2.2 Megohms 1/2W Insulated |
| 37 | 7237595 | B 153 | 15,000 ohms 1W Insulated |
| 38 | 7240732 | A 334 | 330,000 ohms 1/2W Insulated |
| 39 | 1211192 | A223 | 22,000 ohms 1/2W Insulated |
| 40 | 7233653 | C 153 | 15,000 ohms 2W Insulated |
| 41 | 7238873 | A 105 | 1 Megohm 1/2W Insulated |
| 42 | 1214555 | A 224 | 220,000 ohms 1/2W Insulated |
| 43 | 1213270 | A 104 | 100,000 ohms 1/2W Insulated |
| 44 | 1214555 | A 224 | 220,000 ohms 1/2W Insulated |
| 45 | 7237835 | A 221 | 220 ohms 1/2W Insulated |
| 46 | 7241937 | A 685 | 6.8 Megohms 1/2W Insulated |
| 47 | 1214555 | A 224 | 220,000 ohms 1/2W Insulated |
| 48 | 7238873 | A 105 | 1 Megohm 1/2W Insulated |
| 49 | 1215560 | 1215560 | 180,000 ohms 1/2W Insulated |
| 50 | 1219690 | 1219690 | 390 ohms 2W Wire Wound |
| 51 | 1214555 | A 224 | 220,000 ohms 1/2W Insulated |
| 52 | 1214556 | A 274 | 270,000 ohms 1/2W Insulated |
| 53 | 1213270 | A 104 | 100,000 ohms 1/2W Insulated |
| 54 | 1214543 | A 681 | 680 ohms 1/2W Insulated |
| 55 | 1214545 | A 222 | 2200 ohms 1/2W Insulated |
| 56 | 1213483 | 1213483 | 6800 ohms 1/2W Insulated |
| 57 | 1219738 | B 221 | 220 ohms 1W Insulated |
| 58 | 1214573 | { B 562 C 272 | 1800 ohms 2W Wire Wound (Replace with 5600 ohm 1W and 2700 ohm 2W in parallel). |

MODEL 100170, 1951
Kaiser-Frazer

SERVICE PARTS LIST

| Illus. No. | Production Part No. | Service Part No. | Description |
|------------|---------------------|------------------|-----------------------------------|
| | | | Tubes |
| | 1217690 | 5252 | 6BA6 |
| | 1217691 | 5253 | 6BE6 |
| | 1218506 | 5262 | 6AV6 |
| | 1211924 | 5003 | 0Z4 |
| | 1213793 | 5241 | 6V6GT |
| | | | Miscellaneous Electrical |
| | 7260564 | 7260328 | "A" Lead and Fuse Holder (Male) |
| 65 | 7260674 | 7260674 | Control - Volume, Tone and Switch |
| 65A | | | Tone Control |
| 65B | | | Volume Control |
| 65C | | | Switch |
| 66 | 187189 | 44 | Dial Light |
| 67 | 7260563 | 7260563 | Speaker, PM |
| 68 | 7260545 | 7260545 | Sensitivity Control |
| 69 | 7260531 | 7260531 | Transformer - Output |
| 70 | 7259614 | 6060 | Transformer - Power |
| 71 | 7239124 | 8542 | Vibrator |
| | | | MECHANICAL PARTS |
| | | | Chassis |
| | 1219760 | 1219760 | Plug - Speaker |
| 80 | 7256742 | 7256742 | Socket - Antenna |
| | 7260565 | 1219758 | Socket - Dial Light |
| | 7258073 | 7258073 | Socket - 7-Pin Miniature Tube |
| | 7236279 | 7236279 | Socket - Octal Tube |
| 81 | 7258498 | 7258498 | Socket - Speaker |
| | 7239125 | 7239125 | Socket - Vibrator |
| | | | Tuner |
| | 147481 | 147481 | Ball Bearings (10) |
| 85 | 7260507 | 7260507 | Bushing - Manual Drive |
| 86 | 7258072 | 7258072 | Clutch Disc - Driven |
| 87 | 7258203 | 7258203 | Connecting Link - Core Bar |
| 88 | 7258211 | 7258211 | Core Guide Bar Assembly |
| 89 | 7256271 | 7256271 | Connecting Link - Pointer |
| 90 | 7255992 | 7255992 | Spring - Pointer Connecting Link |
| 91 | 7258468 | 7258468 | Core - Iron Tuning |
| 92 | 7260560 | 7260560 | Drive Shaft - Manual |
| 93 | 7260579 | 7260579 | Escutcheon Assy. |
| 94 | 7260509 | 7260509 | Dial Backplate |
| 95 | 7260514 | 7260514 | Dial Gasket |
| 96 | 7260524 | 7260524 | Dial Glass |
| 97 | 7257718 | 7257718 | Dial Retainer |
| 98 | 7256495 | 7256495 | Gear and Bushing - Clutch |
| 99 | 7256705 | 7256705 | Gear and Bracket - Worm |
| 100 | 7260558 | 7260558 | Pointer Assembly |
| | 1219759 | 1219759 | Pointer Tip Package |
| 101 | 7260517 | 7260517 | Pointer Backplate |
| 102 | 1219757 | 1219757 | Push Button and Slide Assy. |
| 103 | 7258756 | 7258756 | Spring - Clutch |
| 104 | 7257415 | 7257415 | Spring - Core Bar Connecting Link |
| 105 | 7255984 | 7255984 | Spring - Slide Return |
| | | | INSTALLATION PARTS |
| | 7260585 | 7260585 | "A" Lead and Fuse Holder |
| | 7260781 | 7260781 | Condenser - Ammeter |
| | 1911095 | 6030 | Condenser - Generator |
| | 1912900 | 6030 | Condenser - Ignition Coil |
| | 1912900 | 6030 | Condenser - Voltage Regulator |
| | 7260586 | 7260586 | Hood Ground Clip |
| | 7260559 | 7260559 | Knob - Control |
| | 7260535 | 7260535 | Knob - Dummy |
| | 7260537 | 7260537 | Knob - Tone Control |
| | 7260534 | 7260534 | Mounting Bracket - Left Hand |
| | 7260533 | 7260533 | Mounting Bracket - Right Hand |
| | 7260512 | 7260512 | Mounting Bracket - Front |
| | 7260835 | 7260835 | Suppressor - Distributor |
| | 7260659 | 7260659 | Trim Plate |

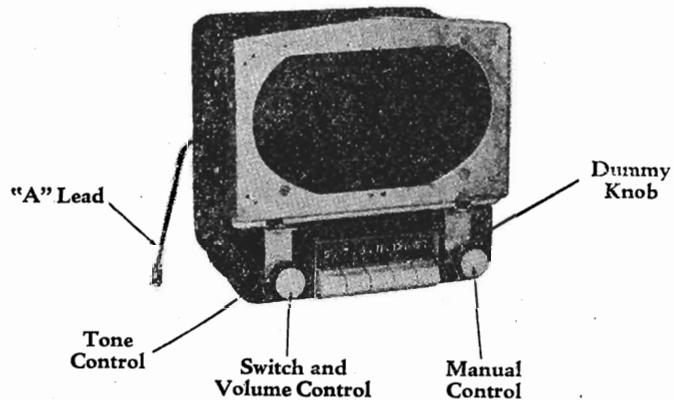
MODEL 100205,
1951 Henry J

GENERAL

- MOUNTING—All 1951 Henry J cars.
- TUBES—Five, plus rectifier.
- SPEAKER—6" x 9" Elliptical, Permanent Magnet.
- TUNING—Manual and 5 P. B. Mechanical.
- ANTENNA TRIMMER COMPENSATION—For Antennas Between 0.000058 - 0.000090 Mfd.
- TUNING RANGE—550-1600 KC.

PUSH BUTTON SET-UP PROCEDURE

Pull Push Button right and out. Tune in desired station manually. Push button all the way in.



MODEL 100205

ALIGNMENT PROCEDURE

- Output Meter Connections Across Voice Coil
- Generator Return To Receiver Chassis
- Dummy Antenna In Series With Generator
- Volume Control Position Maximum Volume
- Tone Control Position Treble
- Generator Output Minimum for Readable Indication

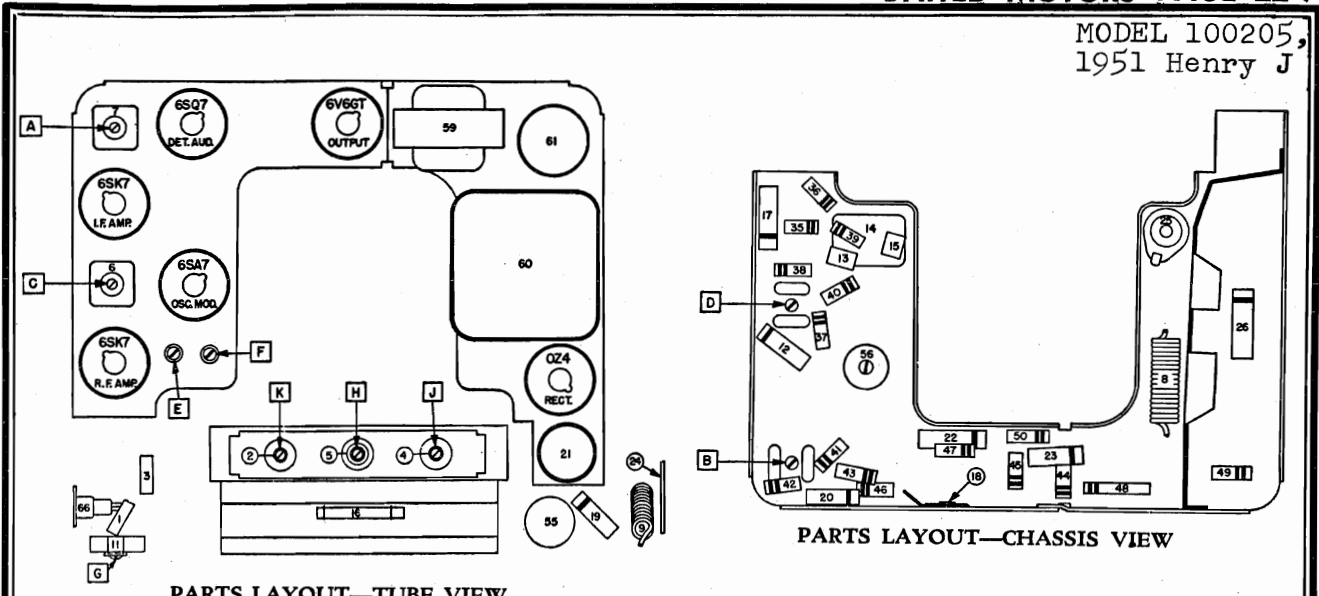
| Steps | Series Condenser or Dummy Antenna | Connect Signal Generator to | Signal Generator Frequency | Tune Receiver to | Adjust in Sequence for Max. Output |
|-------|-----------------------------------|-----------------------------|----------------------------|-------------------------|------------------------------------|
| 1 | 0.1 Mfd. | 6SA7 Grid (Pin #8) | 260 KC | High Frequency Stop | A, B, C, D |
| 2 | 0.000068 Mfd. | Antenna Connector | 1615 KC | High Frequency Stop | *E, F, G |
| 3 | 0.000068 Mfd. | Antenna Connector | 1000 KC | Signal Generator Signal | J, K |
| 4 | 0.000068 Mfd. | Antenna Connector | 1615 KC | High Frequency Stop | F, G |
| 5 | 0.000068 Mfd. | Antenna Connector | 1100 KC | Signal Generator Signal | L** |

*Before making this adjustment check mechanical setting of oscillator core "H." The rear of the core should be 1 1/8" from the mounting end of the coil form. (This measurement is readily made by inserting a suitable plug in the mounting end of the coil form.) If adjustment is necessary, first dissolve the glyptal seal on the core studs. Core adjustments should be made with an insulated screw driver, and core studs should be cemented in place with glyptal or household cement after alignment.

**L is the pointer adjustment screw which is on the connecting link, between the pointer assembly and core guide bar (See tuner Dwg.) It should be adjusted so that when looking directly at the dial the pointer is on the 1100 KC mark. This setting is to give the correct relationship between the pointer and the dial when the radio is installed in a car.

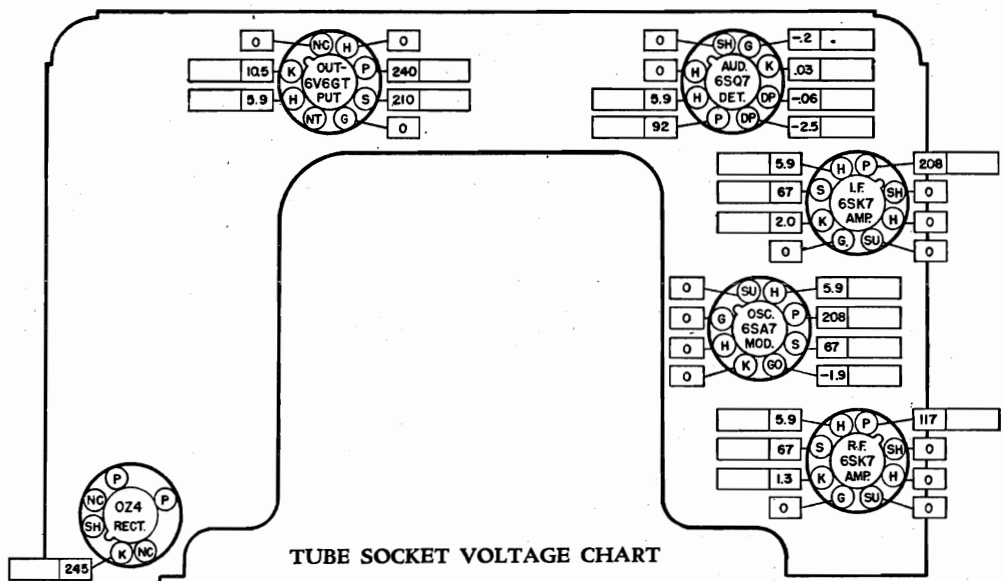
With the radio installed and the car antenna plugged in adjust the antenna trimmer "G" for maximum volume with the radio tuned to a weak station between 600 and 1000 KC (see sticker on case).

MODEL 100205,
1951 Henry J



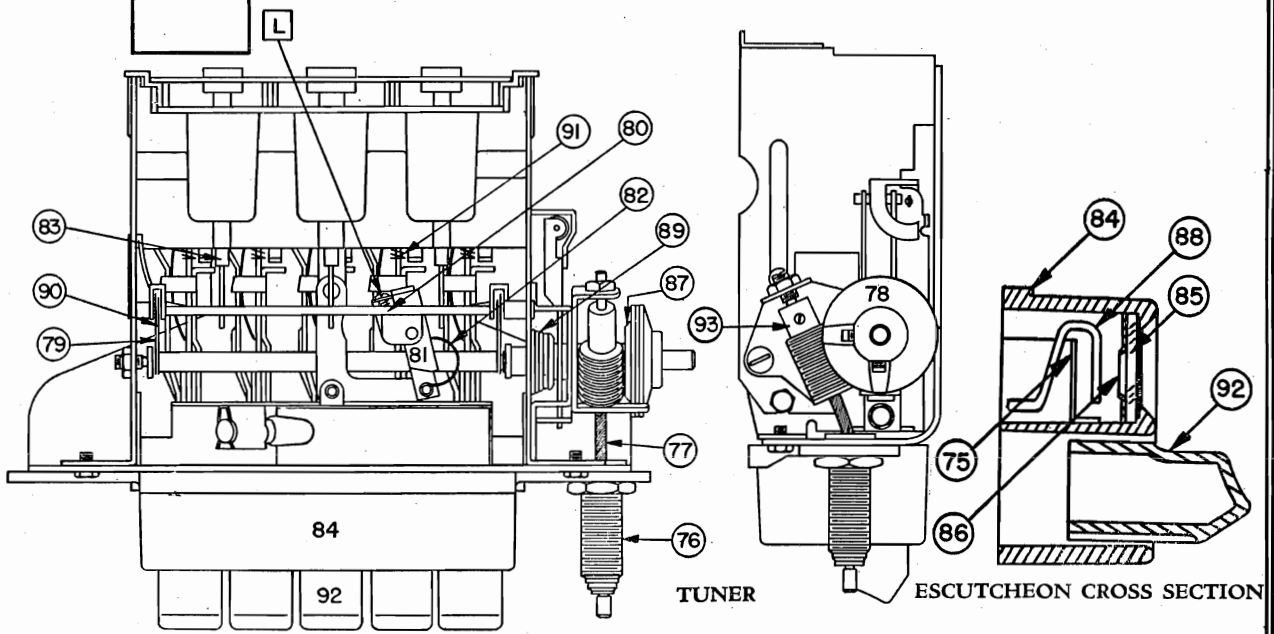
PARTS LAYOUT—TUBE VIEW

PARTS LAYOUT—CHASSIS VIEW



TUBE SOCKET VOLTAGE CHART

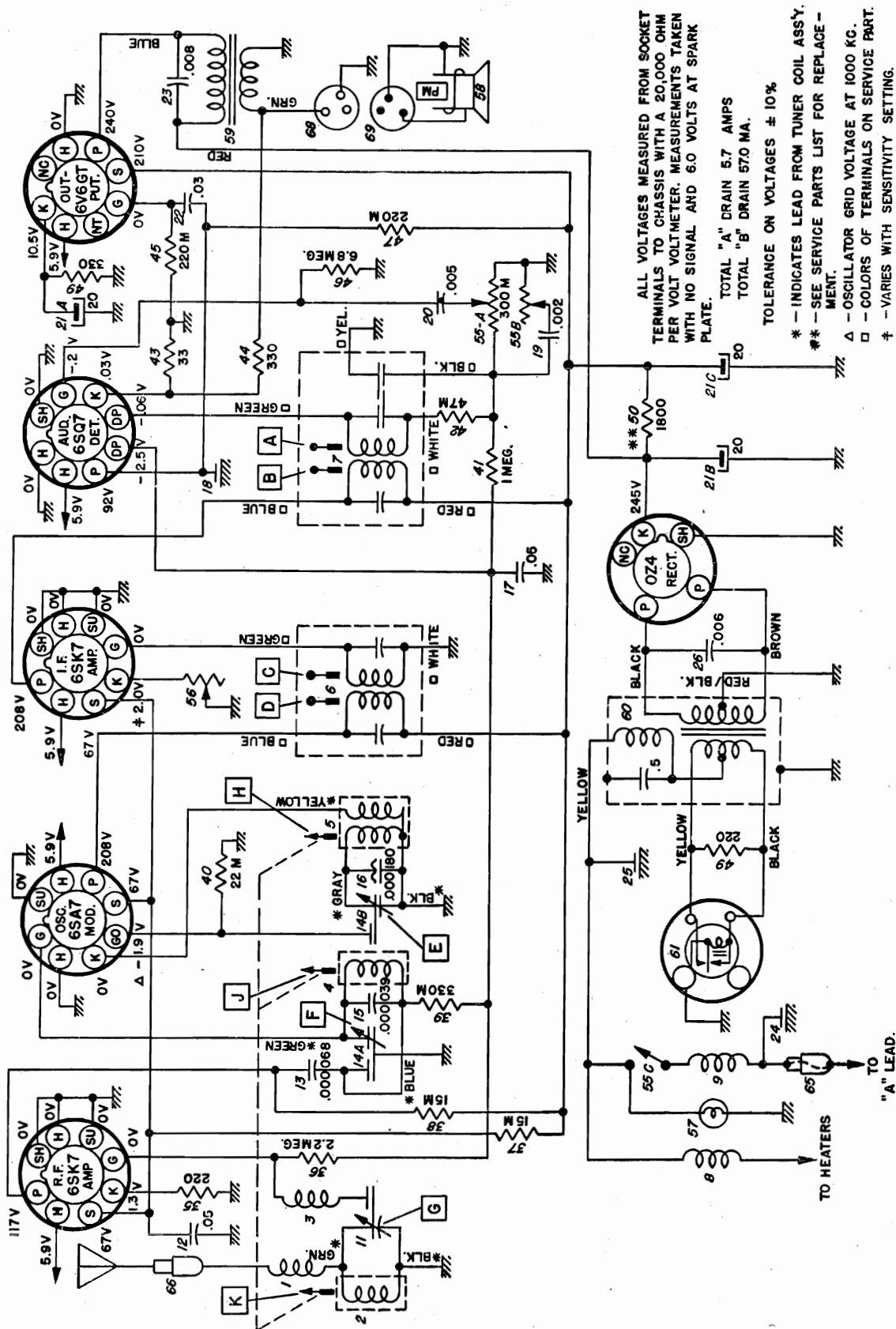
Voltage measured from socket terminals to chassis and are positive unless marked otherwise.



TUNER

ESCUTCHEON CROSS SECTION

MODEL 100205,
1951 Henry J



ALL VOLTAGES MEASURED FROM SOCKET TERMINALS TO CHASSIS WITH A 20,000 OHM PER VOLT VOLTMETER. MEASUREMENTS TAKEN WITH NO SIGNAL AND 6.0 VOLTS AT SPARK PLATE.

TOTAL "A" DRAIN 5.7 AMPS
TOTAL "B" DRAIN 570 MA.

TOLERANCE ON VOLTAGES ± 10%

* — INDICATES LEAD FROM TUNER COIL ASS'Y.
** — SEE SERVICE PARTS LIST FOR REPLACEMENT.
△ — OSCILLATOR GRID VOLTAGE AT 1000 KC.
□ — COLORS OF TERMINALS ON SERVICE PART.
† — VARIES WITH SENSITIVITY SETTING.

KAISER-FRAZER 100205

SERVICE PARTS LIST

| Illus. No. | Production Part No. | Service Part No. | Description |
|-------------------------|---------------------|------------------|-----------------------------------------------------------------------------------|
| ELECTRICAL PARTS | | | |
| Coils | | | |
| 1 | 7255738 | 7255738 | Ant. Series Choke |
| 2 | 7258914 | 7258914 | Antenna |
| 3 | 7240251 | 7240251 | Ant. Spark Choke |
| 4 | 7258914 | 7258914 | R. F. |
| 5 | 7259687 | 7259687 | Oscillator |
| 6 | 7258188 | 1218725 | 1st I.F. |
| 7 | 7258198 | 1218726 | 2nd I.F. |
| 8 | 7255912 | 7241708 | Hash Choke |
| 9 | 7241118 | 1217846 | "A" Spark Choke |
| Condensers | | | |
| 11 | 7257959 | 7257959 | Antenna Trimmer |
| 12 | 7258125 | E 503 | .05 Mfd. 400 V. Tubular |
| 13 | 1219550 | G 680 | .000068 mfd. Mica |
| 14 | 7242454 | 7242454 | Dual Trimmer |
| 14A | | | R.F. Section |
| 14B | | | Oscillator Section |
| 15 | 7258221 | G 390 | .000039 mfd. Mica |
| 16 | 7257424 | 7257424 | .000180 mfd. Compensating |
| 17 | 7236842 | E 503 | .05 mfd. 200 V Tubular |
| 18 | 1217848 | 1217848 | Chassis Plate Condenser |
| 19 | 1219632 | E 202 | .002 mfd. 600V Tubular |
| 20 | 7230767 | E 502 | .005 mfd. 600V Tubular |
| 21 | 7240724 | M 908 | Electrolytic |
| 21A | | | 20 mfd. 25V |
| 21B | | | 20 mfd. 400V |
| 21C | | | 20 mfd. 400V |
| 22 | 7242448 | E 303 | .03 mfd. 400V Tubular |
| 23 | 1219594 | H 802 | .008 mfd. 800V Tubular |
| 24 | 1219825 | 1219825 | Spark Plate Condenser |
| 25 | 1217848 | 1217848 | Chassis Plate Condenser |
| 26 | 7240906 | H 602 | .006 mfd. 1600 V Tubular |
| Resistors | | | |
| 35 | 7237835 | A 221 | 220 ohms 1/2W Insulated |
| 36 | 1211147 | A 225 | 2.2 megohms 1/2W Insulated |
| 37 | 1219678 | C 153 | 15,000 ohms 2W Insulated |
| 38 | 1211091 | B 153 | 15,000 ohms 1W Insulated |
| 39 | 7240732 | A 334 | 330,000 ohms 1/2W Insulated |
| 40 | 1211192 | A 223 | 22,000 ohms 1/2W Insulated |
| 41 | 7238873 | A 105 | 1 megohm 1/2W Insulated |
| 42 | 7240731 | A 473 | 47,000 ohms 1/2W Insulated |
| 43 | 1214538 | A 330 | 33 ohms 1/2W Insulated |
| 44 | 1213224 | A 331 | 330 ohms 1/2W Insulated |
| 45 | 1213479 | A 224 | 220,000 ohms 1/2W Insulated |
| 46 | 7241937 | A 685 | 6.8 megohms 1/2W Insulated |
| 47 | 1213479 | A 224 | 220,000 ohms 1/2W Insulated |
| 48 | 7233773 | C 331 | 330 ohms 1W Wire Wound |
| 49 | 1219738 | B 221 | 220 ohms 1W Insulated |
| 50 | 1214573 | { C 272 B 562 | 1800 ohms 2W Wire Wound (Replace with 2700 ohm, 2W and 5600 ohm, 1W in parallel.) |
| Tubes | | | |
| | 7237751 | 5229 | 6SK7 |
| | 7237752 | 5222 | 6SA7 |
| | 1214293 | 5232 | 6SQ7GT |
| | 1213793 | 5241 | 6V6GT |
| | 1211924 | 5003 | 0Z4 |

MODEL 100205,
1951 Henry J

SERVICE PARTS LIST

| Illus. No. | Production Part No. | Service Part No. | Description |
|---------------------------------------|---------------------|------------------|-------------------------------------|
| MISCELLANEOUS ELECTRICAL PARTS | | | |
| 55 | 7260651 | 7260651 | Control - Volume, Tone & Switch |
| 55A | | | Volume Control |
| 55B | | | Tone Control |
| 55C | | | Switch |
| 56 | 7242204 | 7242204 | Control - Sensitivity |
| 57 | 187189 | 44 | Lamp - Dial Light |
| 58 | 7260819 | 7260819 | Speaker 6 x 9 Elliptical P. M. |
| 59 | 7260712 | 7260712 | Transformer - Output |
| 60 | 7259375 | 7255881 | Transformer - Power |
| 61 | 7239124 | 8542 | Vibrator |
| MECHANICAL PARTS | | | |
| Chassis | | | |
| 65 | 7260133 | 7260328 | "A" Lead & Fuse Holder Assy. (Male) |
| 66 | 7256742 | 7256742 | Connector - Antenna |
| 67 | 1219758 | 1219758 | Socket - Dial Light |
| | 7236279 | 7236279 | Socket - Octal |
| | 7239125 | 7239125 | Socket - Vibrator |
| Tuner | | | |
| 75 | 7257722 | 7257722 | Backplate - Pointer |
| | 147481 | 147481 | Ball Bearing Pkg. (10) |
| 76 | 7260635 | 7260635 | Bushing & Drive Shaft Assembly |
| 77 | 7260636 | 7260636 | Manual Drive Shaft Assembly |
| 78 | 7258072 | 7258072 | Clutch Disc - Driven |
| 79 | 7258203 | 7258203 | Connecting Link - Core Bar |
| 80 | 7258210 | 7258210 | Core Guide Bar - Parallel |
| 81 | 7256271 | 7256271 | Conn. Link - Pointer Adj. |
| 82 | 7255992 | 7255992 | Spring - Conn. Link - Pointer |
| 83 | 7258468 | 7258468 | Core Assy. - Powdered Iron |
| 84 | 7260643 | 7260643 | Escutcheon Assy. |
| 85 | 7260653 | 7260653 | Dial Glass |
| 86 | 7257719 | 7257719 | Mask Plate |
| | 7257718 | 7257718 | Spring - Dial Retainer |
| 87 | 7256495 | 7256495 | Gear & Bushing - Clutch |
| 88 | 7257742 | 7257742 | Pointer Assy. |
| | 1219120 | 1219120 | Pointer Tip Package |
| 89 | 7258756 | 7258756 | Spring - Clutch |
| 90 | 7257415 | 7257415 | Spring - Core Bar Conn. Link |
| 91 | 7255984 | 7255984 | Spring - Slide Return |
| 92 | 1219824 | 1219824 | Tuner Slide and Push Button |
| 93 | 7257711 | 7257711 | Worm Gear and Bracket |
| INSTALLATION PARTS | | | |
| | 7260743 | 7260743 | "A" Lead and Fuse Holder |
| | 7259644 | 7259644 | Condenser - Generator |
| | 7259643 | 7259643 | Condenser - Ignition Coil |
| | 7260814 | 7260814 | Condenser - Ignition Switch |
| | 1912900 | 6030 | Condenser - Voltage Regulator |
| | 7260599 | 7260599 | Eye Bolt |
| | 147685 | 147685 | Fuse - 14 Amp. |
| | 7260667 | 7260667 | Knob - Control |
| | 7260665 | 7260665 | Knob - Dummy |
| | 7260666 | 7260666 | Knob - Tone Control |
| | 7260835 | 7260835 | Suppressor - Distributor |
| | 7260671 | 7260671 | Trim Plate |

MODELS 982697,
982698, Oldsmobile

GENERAL

MOUNTING—982698 - All 1951 - 88 Series Oldsmobile Cars.
982697 - All 1951 - 98 Series Oldsmobile Cars.

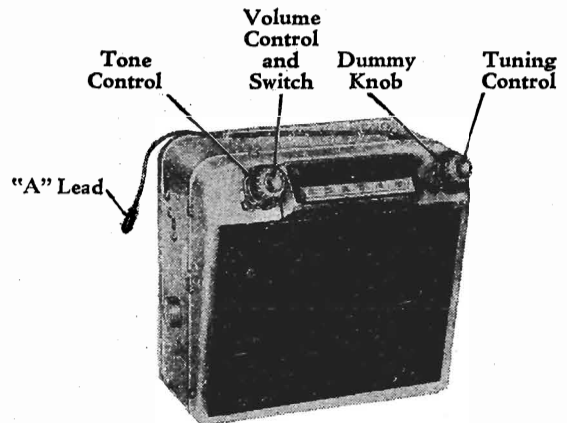
TUBES—Six, Plus Rectifier.

SPEAKER—6" x 9" Elliptical Permanent Magnet.

TUNING—Manual and 5 P. B. Mechanical.

ANTENNA TRIMMER COMPENSATION—For Antennas Between 0.000050 - 0.000070 Mfd.

TUNING RANGE—540 - 1600 KC



MODELS 982697
982698

PUSHBUTTON SET-UP

Pull pushbutton to the left and out. Tune in desired station manually. Push button all the way in.

ALIGNMENT PROCEDURE:

Output Meter Connection Across Voice Coil
 Generator Return To Receiver Chassis
 Dummy Antenna In Series With Generator
 Volume Control Position Maximum Volume
 Tone Control Position Treble
 Generator Output Minimum for Readable Indication

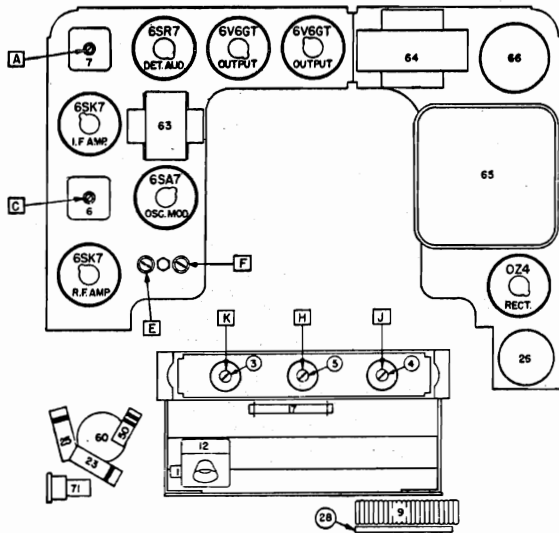
| Steps | Series Condenser or Dummy Antenna | Connect to | Signal Generator Frequency | Tune Receiver to | Adjust in Sequence For Max. Output |
|-------|-----------------------------------|--------------------|----------------------------|-------------------------|------------------------------------|
| 1 | 0.1 Mfd. | 6SA7 Grid (Pin #8) | 260 KC | High Frequency Stop | A, B, C, D |
| 2 | 0.000068 Mfd. | Antenna Connector | 1615 KC | High Frequency Stop | *E, F, G |
| 3 | 0.000068 Mfd. | Antenna Connector | 1400 KC | Signal Generator Signal | J, K |
| 4 | 0.000068 Mfd. | Antenna Connector | 1615 KC | High Frequency Stop | F, G |
| 5 | 0.000068 Mfd. | Antenna Connector | 1000 KC | Signal Generator Signal | **L |

*Before making this adjustment check the mechanical setting of the oscillator core "H." The slotted end of core should be 1 3/8" from the mounting end of the coil form. (This measurement is readily made by inserting a suitable plug in the mounting end of the coil form.) If adjustment is necessary, first dissolve the glyptal seal on the studs. Core adjustments should be made with an insulated screwdriver and core studs should be re-sealed in place with glyptal or household cement after alignment.

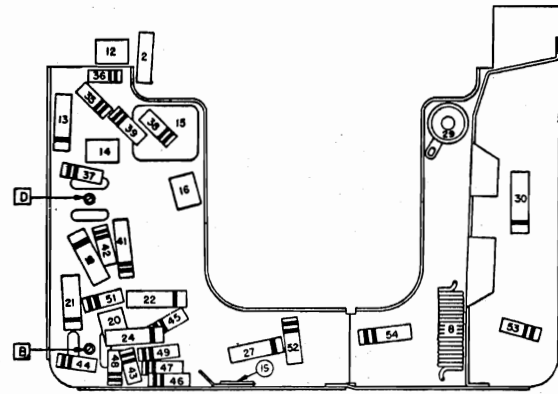
**"L" is the pointer adjustment screw which is on the pointer connecting link (see tuner drawing) and should be adjusted so the pointer reads 1000 KC. (On first "0" of "100.")

With the radio installed and the car antenna plugged in adjust the antenna trimmer "G" for maximum volume with the radio tuned to a weak station between 600 and 1000 KC. (See sticker on case.)

MODELS 982697,
982698, Oldsmobile



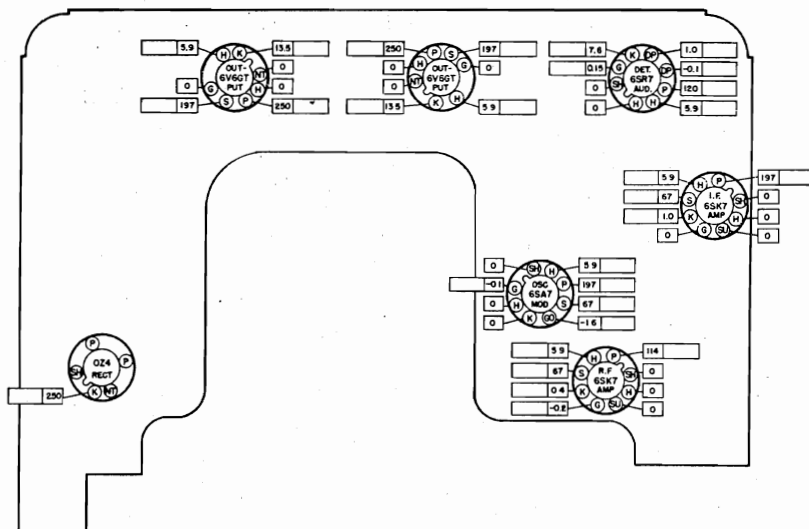
PARTS LAYOUT — TUBE VIEW



PARTS LAYOUT — CHASSIS VIEW

The tube socket voltages as measured at the factory and under the conditions shown on the schematic diagram

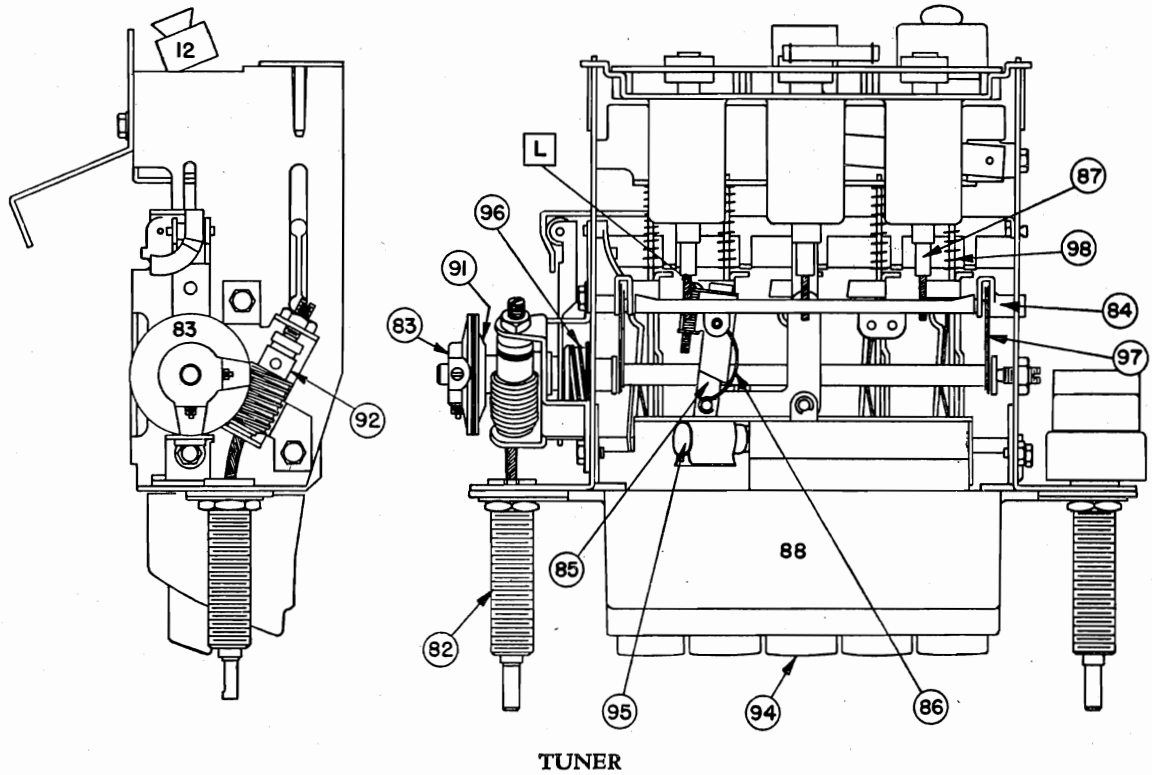
are shown here. The blank spaces are provided so the serviceman may fill in the actual readings as taken with his own equipment. A normal operating radio should be used for these measurements.



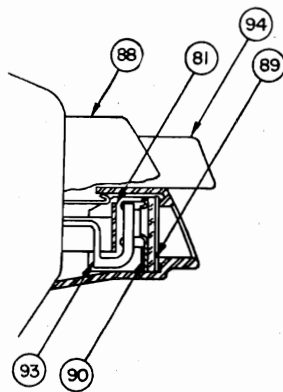
TUBE SOCKET VOLTAGE CHART

VOLTMETER RESISTANCE OHMS PER VOLT. READING TAKEN WITH VOLTS AT SPARK PLATE. THE VOLTAGES ARE MEASURED FROM TUBE SOCKET TERMINALS TO CHASSIS AND ARE POSITIVE UNLESS MARKED OTHERWISE.

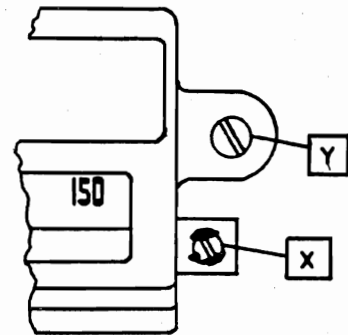
MODELS 982697,
982698, Oldsmobile



TUNER



ESCUTCHEON CROSS SECTION



ESCUTCHEON MOUNTING

SPECIAL INSTRUCTIONS

Unless special precautions are taken in removing the dial escutcheon, there is a possibility that the dial pointer tip will be broken. Therefore, in removal of the escutcheon, the following procedure is recommended:

1. Loosen, but do not remove, the two screws holding the pointer back plate ("X" in Escutcheon Mounting drawing above) and loosen the shellac so that the back plate is free to move.
2. Remove the escutcheon mounting screws "Y" (see Escutcheon Mounting).
3. Carefully lift off the escutcheon (DO NOT FORCE). If the dial backplate is free to move slightly downward the escutcheon will come off easily.

The same caution should be exercised when replacing the escutcheon.

MODELS 982697,
982698, Oldsmobile

SERVICE PARTS LIST

| Ill. No. | Production Part No. | Service Part No. | Description |
|-------------------------|---------------------|------------------|------------------------------------------------------------------------------------|
| ELECTRICAL PARTS | | | |
| Coils | | | |
| 1 | 7255738 | 7255738 | Antenna Series Choke |
| 2 | 7240251 | 7240251 | Antenna Spark Choke |
| 3 | 7258914 | 7258914 | Antenna |
| 4 | 7258914 | 7258914 | R.F. |
| 5 | 7259687 | 7259687 | Oscillator |
| 6 | 7258849 | 1219508 | 1st I.F. |
| 7 | 7258850 | 1219509 | 2nd I.F. |
| 8 | 7237846 | 1217846 | Hash Choke |
| *9 | 7259187 | *7259187 | Spark Choke |
| Condensers | | | |
| *12 | 7260251 | *7260251 | Antenna Trimmer |
| 13 | 7236842 | 6537 | .05 mfd 200V Tubular |
| 14 | 7258221 | G 390 | .000039 mfd Molded |
| 15 | 7242454 | 7242454 | Dual Trimmer |
| 15A | | | R.F. Section |
| 15B | | | Oscillator Section |
| 16 | 7258221 | G 390 | .000039 mfd Molded |
| 17 | 7257424 | 7257424 | .000180 mfd Compensating |
| 18 | 7230892 | 6537 | .05 mfd 400V Tubular |
| 19 | 1217848 | 1217848 | Chassis Plate |
| 20 | 1215189 | G 100 | .000010 mfd Molded |
| 21 | 7237870 | 6533 | .01 mfd 400V Tubular |
| 22 | 1219495 | 6539 | .1 mfd 400V Tubular |
| 23 | 7232956 | 6531 | .005 mfd 600V Tubular |
| 24 | 7238881 | 6533 | .01 mfd 400V Tubular |
| 25 | 7237836 | E 202 | .002 mfd 600V Tubular |
| 26 | 7240724 | M 908 | Electrolytic |
| 26A | | | 20 mfd 25V |
| 26B | | | 20 mfd 400V |
| 26C | | | 20 mfd 400V |
| 27 | 7236134 | 7236134 | .0015 mfd 800V Tubular |
| 28 | 7241259 | 1219768 | Spark Plate |
| 29 | 1217848 | 1217848 | Chassis Plate |
| 30 | 7240906 | H 602 | .006 mfd 1600V Tubular |
| Resistors | | | |
| 35 | 1213217 | A 101 | 100 Ohms 1/2W Insulated |
| 36 | 1211147 | A 225 | 2.2 Megohms 1/2W Insulated |
| 37 | 7237595 | B 153 | 15,000 Ohms 1W Insulated |
| 38 | 7240732 | A 334 | 330,000 Ohms 1/2W Insulated |
| 39 | 1211192 | A 223 | 22,000 Ohms 1/2W Insulated |
| 41 | 7233653 | C 153 | 15,000 Ohms 2W Insulated |
| 42 | 1213220 | A 151 | 150 Ohms 1/2W Insulated |
| 43 | 7238873 | A 105 | 1 Megohm 1/2W Insulated |
| 44 | 7240731 | A 473 | 47,000 Ohms 1/2W Insulated |
| 45 | 7238873 | A 105 | 1 Megohm 1/2W Insulated |
| 46 | 1213235 | A 102 | 1,000 Ohms 1/2W Insulated |
| 47 | 1213235 | A 102 | 1,000 Ohms 1/2W Insulated |
| 48 | 1214561 | 1214561 | 820,000 Ohms 1/2W Insulated |
| 49 | 7238873 | A 105 | 1 Megohm 1/2W Insulated |
| 50 | 1213480 | A 393 | 39,000 Ohms 1/2W Insulated |
| 51 | 7236080 | B 273 | 27,000 Ohms 1W Insulated |
| 52 | 7234563 | 7234563 | 360 Ohms 1W Insulated |
| 53 | 1219738 | B 221 | 220 Ohms 1W Insulated |
| 54 | 1214573 | { C 272 B 562 | 1800 Ohms 2W Wire Wound (Or replace with 2700 Ohm 2W and 5600 Ohm 1W in parallel). |
| Tubes | | | |
| | 7237751 | 6SK7 | R.F. and I.F. Amplifier |
| | 7237752 | 6SA7 | Oscillator Modulator |
| | 1218107 | 6SR7 | Detector - Audio |
| | 1213793 | 6V6GT | Output |
| | 1211924 | 0Z4 | Rectifier |

MODELS 982697,
982698, Oldsmobile

SERVICE PARTS LIST

| Ill. No. | Production Part No. | Service Part No. | Description |
|---------------------------------|---------------------|-------------------------|----------------------------------|
| Miscellaneous Electrical | | | |
| *60 | 7260270 | *7260270 (Model 982697) | Control - Volume, Tone, & Switch |
| *60 | 7260250 | *7260250 (Model 982698) | Control - Volume, Tone, & Switch |
| 60A | | | Volume Control |
| 60B | | | Tone Control |
| 60C | | | Switch |
| 61 | 187189 | 44 | Lamp - Dial Light |
| 62 | 7258146 | 7258146 | Speaker - 6 x 9 P. M. |
| 63 | 7258941 | 7258941 | Transformer - Input |
| 64 | 7259419 | 7259419 | Transformer - Output |
| 65 | 7259375 | 7255881 | Transformer - Power |
| 66 | 7239124 | 8542 | Vibrator - Non-Synchronous |

MECHANICAL PARTS

| Chassis | | | |
|----------------|---------|-------------------------|-----------------------------------|
| *70 | 7260133 | *7260328 | Connector - "A" Lead |
| 71 | 7256742 | 7256742 | Connector - Antenna |
| | 7236279 | 7236279 | Socket - Octal Tube |
| | 7239125 | 7239125 | Socket - Vibrator |
| Tuner | | | |
| *81 | 7260134 | *7260134 (Model 982697) | Backplate-Pointer |
| *81 | 7260247 | *7260247 (Model 982698) | Backplate-Pointer |
| | 147481 | 147481 | Ball Bearings (12) |
| *82 | 7260352 | *7260352 (Model 982697) | Bushing and Manual Drive Shaft |
| *82 | 7260354 | *7260354 (Model 982698) | Bushing and Manual Drive Shaft |
| | 7260351 | *7260351 (Model 982697) | Manual Drive Shaft |
| | 7260238 | *7260238 (Model 982698) | Manual Drive Shaft |
| 83 | 7258072 | 7258072 | Clutch Disc-Driven |
| 84 | 7258211 | 7258211 | Core Guide Bar - Parallel |
| 85 | 7256271 | 7256271 | Pointer Connecting Link |
| 86 | 7255992 | 7255992 | Spring - Pointer Connecting Link |
| 87 | 7258468 | 7258468 | Core - Powdered Iron |
| *88 | 7260371 | *7260371 (Model 982697) | Escutcheon Assy. |
| *88 | 7260367 | *7260367 (Model 982698) | Escutcheon Assy. |
| 89 | 7260245 | *7260245 | Dial |
| 90 | 7259496 | 7259496 | Dial Backplate |
| 91 | 7256495 | 7256495 | Gear and Bushing - Clutch |
| *92 | 7260212 | *7260212 | Gear and Bracket - Worm |
| *93 | 7260360 | *7260360 (Model 982697) | Pointer Assy. |
| *93 | 7260361 | *7260361 (Model 982698) | Pointer Assy. |
| | 1219174 | 1219174 | Pointer Tip Pkg. |
| 94 | 1219173 | 1219173 (Model 982697) | Push Button and Slide Assy. |
| *94 | 1219856 | *1219856 (Model 982698) | Push Button and Slide Assy. |
| 95 | 1219758 | 1219758 | Socket - Dial |
| 96 | 7258756 | 7258756 | Spring - Clutch |
| 97 | 7257415 | 7257415 | Spring - Core Bar Connecting Link |
| 98 | 7255984 | 7255984 | Spring - Slide Return |

INSTALLATION PARTS

| | | |
|---------|----------|-------------------------------|
| 7260632 | *7260632 | "A" Lead and Condenser Assy. |
| 1911095 | 6030 | Condenser - Generator |
| 1912757 | 6030 | Condenser - Ignition Coil |
| 7260190 | 6030 | Condenser - Voltage Regulator |
| 120151 | 120151 | Fuse - 15 Amps |
| 555348 | 555348 | Hood Ground Clip |
| 7259818 | *7259818 | Knob - Control |
| 7260192 | *7260192 | Knob - Tone Control and Dummy |
| 7240138 | 7240138 | Static Collector |
| 7258815 | 7258815 | Trim Plate Model 982697 |
| 7259789 | *7259789 | Trim Plate Model 982698 |

* Parts first used in 1951

MODELS 982699,
982700, Oldsmobile

GENERAL

MOUNTING—982700 - All 1951 88 Series Oldsmobile Cars.
982699 - All 1951 98 Series Oldsmobile Cars.

TUBES—Seven, Plus Rectifier.

SPEAKER—6" x 9" Elliptical Permanent Magnet.

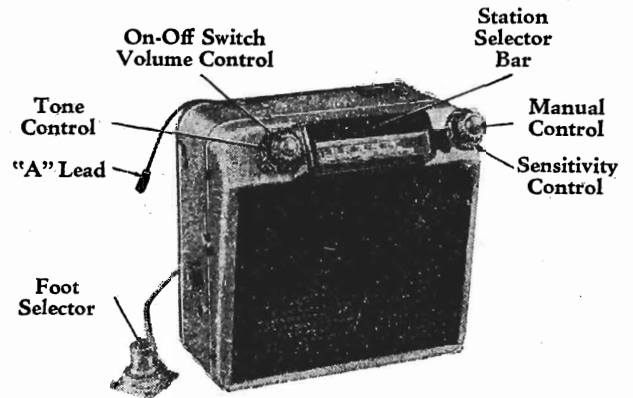
TUNING—Manual and Electronic.

ANTENNA TRIMMER COMPENSATION—For Antennas Between 0.000050 - 0.000070 Mfd.

TUNING RANGE—540 - 1600 KC.

PUSHBUTTON SET-UP

No Pushbutton Set-up is required. However, the number of stations on which the tuner will stop can be regulated by use of the Sensitivity Control.



MODELS 982699
982700

SIGNAL SEEKING TUNER ALIGNMENT PROCEDURE:

NOTE: When aligning the signal seeker tuner type radio, be sure to use a vacuum tube voltmeter as indicated and be sure to follow the alignment sequence given—(Notice that the primary of the 2nd I.F. is aligned first.)

Output Meter Connection VTVM From **2** To Chassis (see Parts layout page 2)
 Generator Return Receiver Chassis
 Dummy Antenna In Series With Generator
 Volume Control Maximum Volume
 Tone Control Treble
 Generator Output Not to Exceed 2 Volts at VTVM

| Step | Dummy Antenna | Connect To | Signal Generator Frequency | Tune Receiver To | Adjust in Sequence For Max. Output |
|------|---------------|-------------------|----------------------------|-------------------------|------------------------------------|
| 1 | 0.1 mfd | 6SA7 Grid (Pin 8) | 260 KC | *High Frequency Stop | A, B, C, D |
| 2 | 0.000068 mfd | Antenna Connector | 1615 KC | High Frequency Stop | **E, F, G |
| 3 | 0.000068 mfd | Antenna Connector | 600 KC | Signal Generator Signal | J, K |
| 4 | 0.000068 mfd | Antenna Connector | 1615 KC | Signal Generator Signal | F, G |
| 5 | 0.000068 mfd | Antenna Connector | 1000 KC | Signal Generator Signal | ***L |

*To tune to high frequency, put a 0.070" feeler gauge (or bare #13 wire) in slot against the high frequency stop. (See tuner pictures). Depress station selector bar and allow the planetary arm to run against the feeler gauge. Turn the radio off and then on.

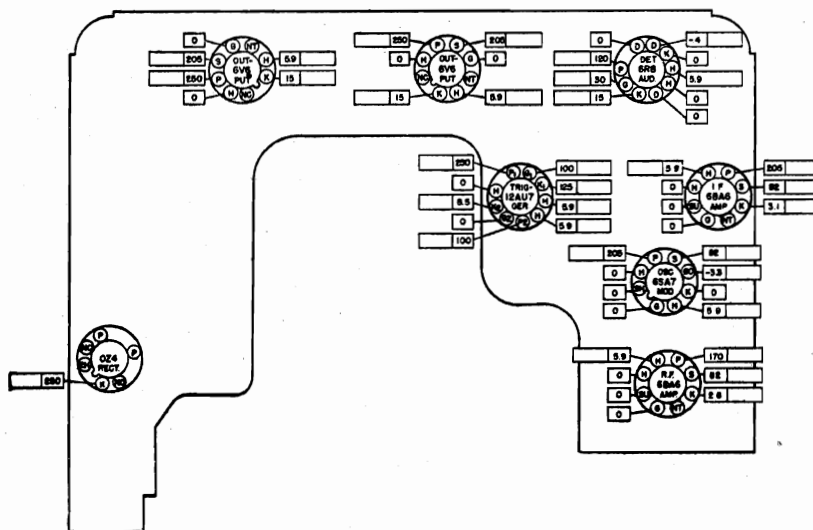
**Before making this adjustment, check the setting of oscillator core "H." The rear of the core should be 1 3/8" from the mounting end of the coil form. This measurement is readily made by inserting a suitable plug in the mounting end of the coil form. The core adjustment is made from the mounting end of the coil form with an insulated screw driver. (It will be necessary to steady the core guide bar by applying a downward pressure at the antenna core end of the bar while making these adjustments.) If this adjustment is necessary, first dissolve the glyptal seal on the core stud and be sure to re-seal after making the adjustment.

***"L" is the pointer adjustment screw on the end of the core guide bar—adjust so pointer reads 1000 KC.

With the radio installed and the antenna plugged in, adjust the antenna trimmer "C" for maximum volume with the radio tuned to a weak station between 600 and 1000 KC (see sticker on case).

MODELS 982699,
982700, Oldsmobile

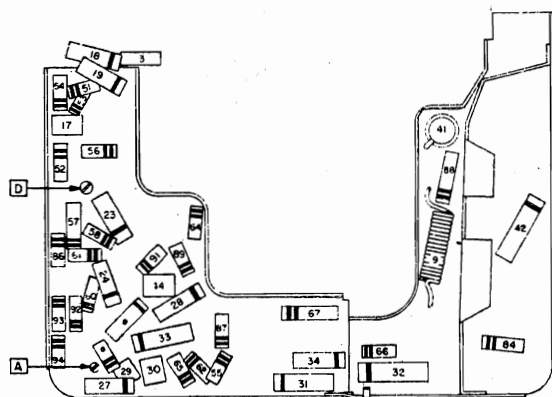
TUBE SOCKET VOLTAGE CHART



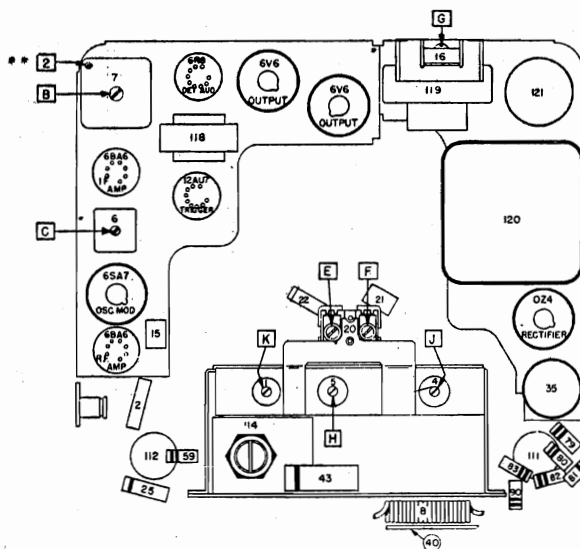
The tube socket voltages, as measured at the factory and under the conditions shown on the schematic diagram, are shown above. The blank spaces are provided so that the serviceman may fill in actual voltage readings as taken with his own equipment. A normal operating radio should be used for these measurements.

Voltmeter resistance..... Ohms Per Volt.
Readings taken with..... Volts at Spark Plate.
All voltages measured from socket terminals to chassis.

NOTE: For Complete Tuner Information See Bulletin 6D-620.



PARTS LAYOUT — CHASSIS VIEW

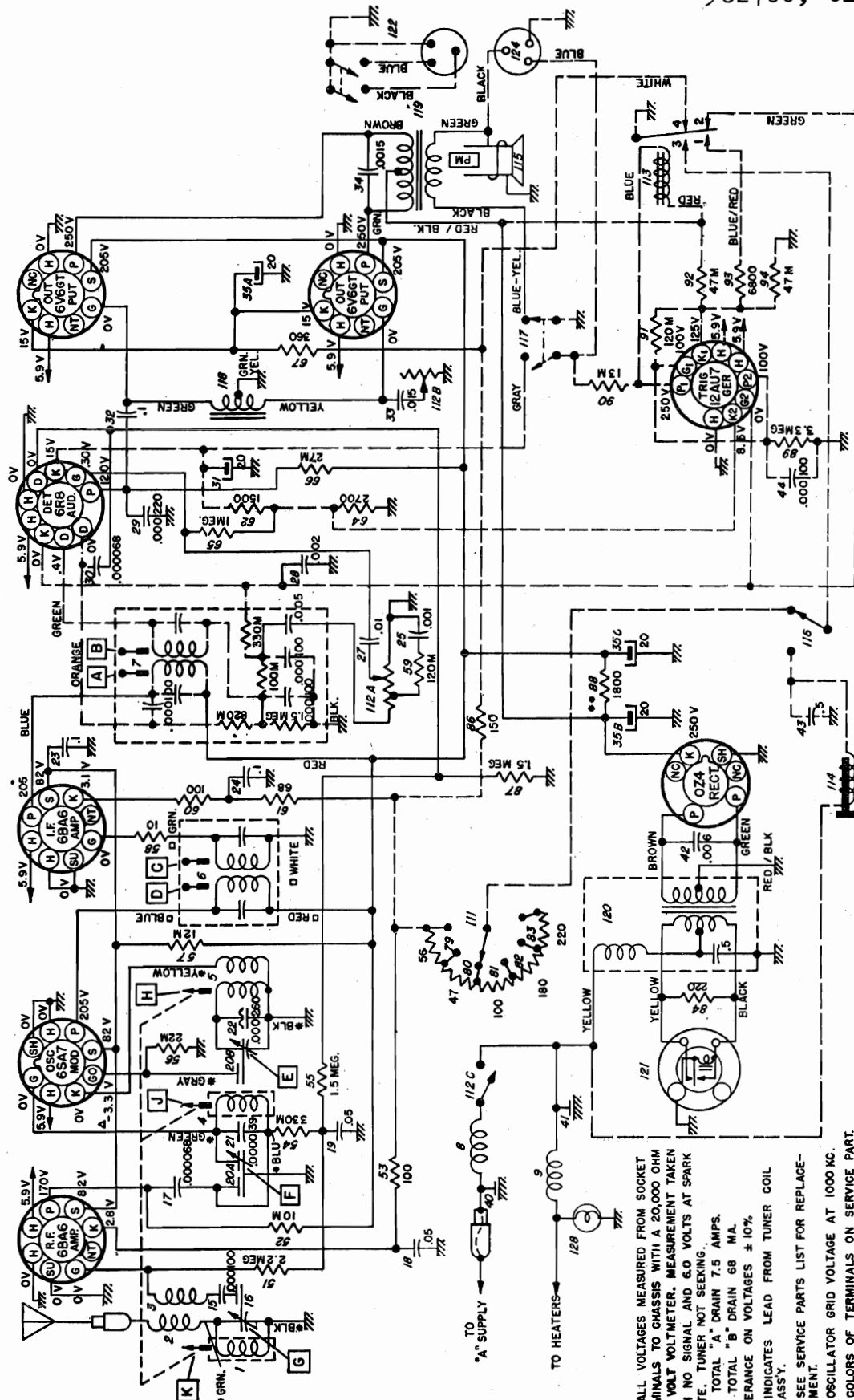


PARTS LAYOUT — TUNER VIEW

*Resistor and condenser are included in the 2nd IF Assy.

**Connect vacuum tube voltmeter between this point and ground during alignment.

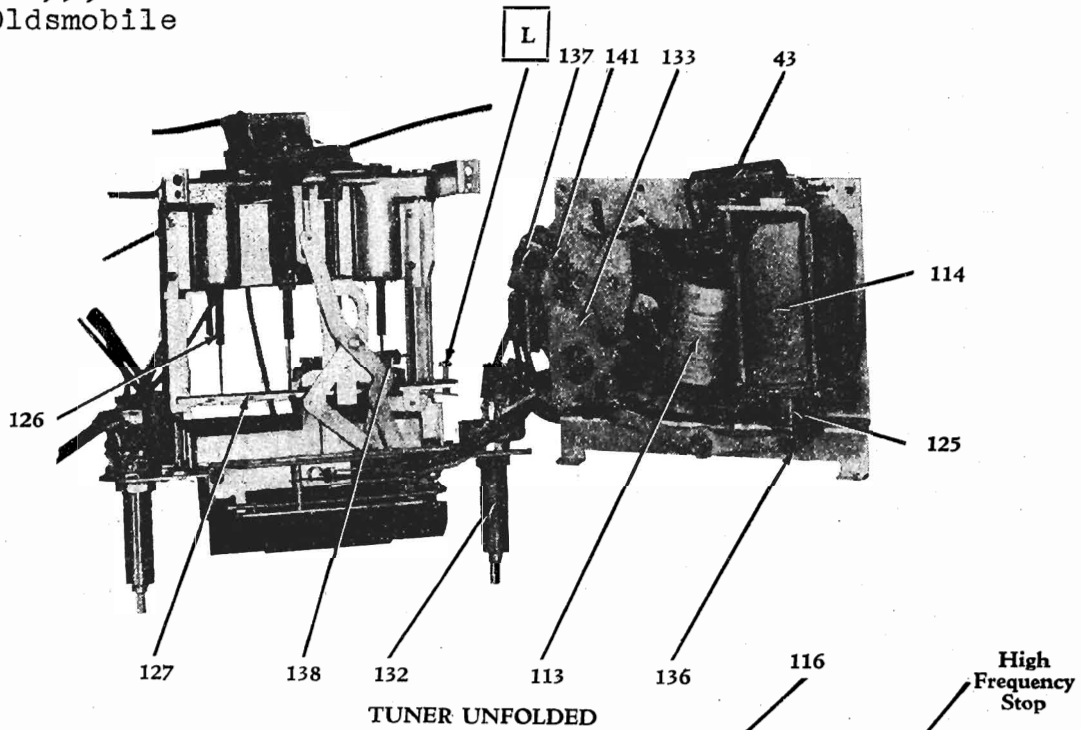
MODELS 982699,
982700, Oldsmobile



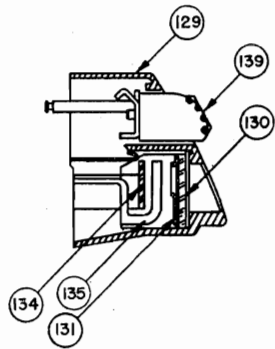
ALL VOLTAGES MEASURED FROM SOCKET
TERMINALS TO CHASSIS WITH A 20,000 OHM
PER VOLT VOLTMETER. MEASUREMENT TAKEN
WITH NO SIGNAL AND 6.0 VOLTS AT SPARK
PLATE. TUNER NOT SEEKING.
TOTAL "A" DRAIN 7.5 AMPS.
TOTAL "B" DRAIN 68 MA.
TOLERANCE ON VOLTAGES ± 10%.
* - INDICATES LEAD FROM TUNER COIL
ASSY.
* - SEE SERVICE PARTS LIST FOR REPLACE-
MENT.
Δ - OSCILLATOR GRID VOLTAGE AT 1000 KC.
□ - COLORS OF TERMINALS ON SERVICE PART.

----- TUNER CIRCUIT COMPONENTS

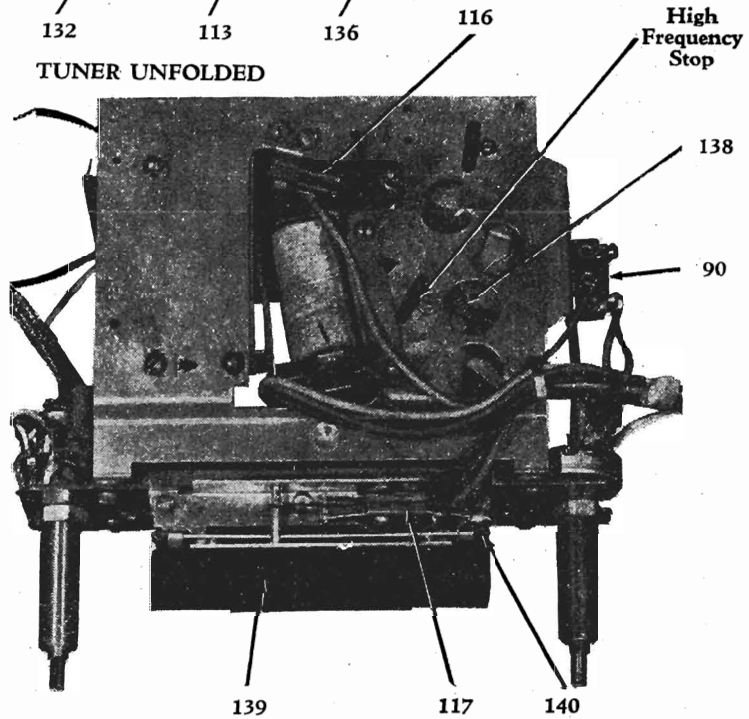
MODELS 982699,
982700, Oldsmobile



TUNER UNFOLDED



ESCUTCHEON
CROSS-SECTION



TUNER

NOTE: For a complete discussion of the Signal Seeking Tuner see Bulletin 6D-620.

SERVICE PARTS LIST

| Illus. No. | Production Part No. | Service Part No. | Description |
|-------------------------|---------------------|------------------|----------------------|
| ELECTRICAL PARTS | | | |
| Coils | | | |
| 1 | 7257979 | 7257979 | Antenna |
| 2 | 725738 | 725738 | Antenna Series Choke |
| 3 | 7240251 | 7240251 | Antenna Spark Choke |
| 4 | 7257979 | 7257979 | R.F. |
| 5 | 7259184 | 7259184 | Oscillator |
| 6 | 1219508 | 1219508 | 1st I.F. Assy. |
| 7 | 1219602 | 1219602 | 2nd I.F. Assy. |
| 8 | 7259190 | 1217846 | "A" Spark Choke |
| 9 | 7259187 | 1217846 | Hash Choke |

SERVICE PARTS LIST

| Illus. No. | Production Part No. | Service Part No. | Description |
|-------------------|---------------------|--------------------|---------------------------------------------------------------------|
| Condensers | | | |
| 15 | 7239184 | G 100 | .000100 mfd molded |
| 16 | 7258160 | 7258160 | Antenna Trimmer |
| 17 | 1219550 | G 680 | .000068 mfd molded |
| 18 | 7236842 | 6537 | .05 mfd 200 V Tubular |
| 19 | 7236842 | 6537 | .05 mfd 200 V Tubular |
| 20 | 7242454 | 7242454 | Dual Trimmer |
| 20A | | | R.F. Section |
| 20B | | | Oscillator Section |
| 21 | 7258221 | G 390 | .000039 mfd molded |
| 22 | 7257567 | 7257567 | .000260 mfd compensating |
| 23 | 7238788 | 6539 | .1 mfd 400 V Tubular |
| 24 | 1209306 | 6539 | .1 mfd 200 V Tubular |
| 25 | 1218883 | 6527 | .001 mfd 600 V Tubular |
| 27 | 7238881 | 6533 | .01 mfd 600 V Tubular |
| 28 | 7237836 | E 202 | .002 mfd 600 V Tubular |
| 29 | 7238792 | G 221 | .000220 mfd molded |
| 30 | 1219550 | G 680 | .000068 mfd molded |
| 31 | 1219660 | 1219660 | 20 mfd 50 V Electrolytic |
| 32 | 7239495 | 6539 | .1 mfd 400 V Tubular |
| 33 | 7237719 | 7237719 | .015 mfd 600 V Tubular |
| 34 | 7246134 | 7236134 | .0015 mfd 800 V Tubular |
| 35 | 7259128 | 7259128 | Electrolytic |
| 35A | | | 20 mfd 100 V |
| 35B | | | 20 mfd 400 V |
| 35C | | | 20 mfd 400 V |
| 40 | 7241259 | 7241259 | Spark Plate Assy. |
| 41 | 1217848 | 1217848 | Chassis Plate |
| 42 | 7240906 | H 602 | .006 mfd 1600 V Tubular |
| 43* | 7259954 | 7259954* | .5 mfd 100 V Tubular |
| 44 | 7239184 | G 101 | .000100 mfd molded |
| Resistors | | | |
| 51 | 1211147 | A 225 | 2.2 Megohms 1/2W Insulated |
| 52 | 1211085 | B 103 | 10,000 Ohms 1W Insulated |
| 53 | 1213217 | A 101 | 100 Ohms 1/2W Insulated |
| 54 | 7240732 | A 334 | 330,000 Ohms 1/2W Insulated |
| 55 | 1211142 | A 155 | 1.5 Megohms 1/2W Insulated |
| 56 | 1211192 | A 223 | 22,000 Ohms 1/2W Insulated |
| 57 | 1212491 | 1212491 | 12,000 Ohms 2W Insulated |
| 58 | 1219755 | A 100 | 10 Ohms 1/2W Insulated |
| 59 | 1213271 | 1213271 | 120,000 Ohms 1/2W Insulated |
| 60 | 1213217 | A 101 | 100 Ohms 1/2W Insulated |
| 61 | 1215558 | 1215558 | 68 Ohms 1/2W Insulated |
| 62 | 1219488 | 1219488 | 1500 Ohms 1/2W Insulated |
| 64* | 1219756 | 1219756* | 2700 Ohms 1/2W Insulated (± 5%) |
| 65 | 7238873 | A 105 | 1 Megohm 1/2W Insulated |
| 66 | 1213342 | B 273 | 27,000 Ohms 1W Insulated |
| 67 | 7234563 | 7234563 | 360 Ohms 1W Wire Wound |
| 79 | 1219766 | 1214540 | 56 Ohms 1/2W Insulated |
| 80 | 1219767 | 1213489 | 47 Ohms 1/2W Insulated |
| 81 | 7257376 | A 101 | 100 Ohms 1/2W Insulated |
| 82 | 1219769 | 1215559 | 180 Ohms 1/2W Insulated |
| 83 | 1219770 | A 221 | 220 Ohms 1/2W Insulated |
| 84 | 1219738 | B 221 | 220 Ohms 1W Insulated |
| 86 | 1213220 | A 151 | 150 Ohms 1/2W Insulated |
| 87 | 1211142 | A 155 | 1.5 Megohms 1/2W Insulated |
| 88 | 1214573 | { C 272 } B 562 | 1800 Ohms 2W Wire Wound. (Replace with C 272 and B 562 in parallel) |
| 89 | 1214564 | A 335 | 3.3 Megohms 1/2W Insulated |
| 90 | 7231539 | 7231539 | 13,000 Ohms 1W Insulated |
| 91 | 1213271 | 1213271 | 120,000 Ohms 1/2W Insulated |
| 92 | 1216157 | B 473 | 47,000 Ohms 1W Insulated |
| 93 | 1216154 | 1216154 | 6800 Ohms 1W Insulated |
| 94 | 1216157 | B 473 | 47,000 Ohms 1W Insulated |
| Tubes | | | |
| | 1217690 | 5252 | 6BA6 |
| | 7237752 | 5222 | 6SA7 |
| | 1219485 | 5328 | 12AU7 |
| | 1219496 | 5541 | 6R8 |
| | 1213793 | 5241 | 6V6GT |
| | 1211924 | 5003 | 0Z4 |

MODELS 982699,
982700, Oldsmobile

SERVICE PARTS LIST

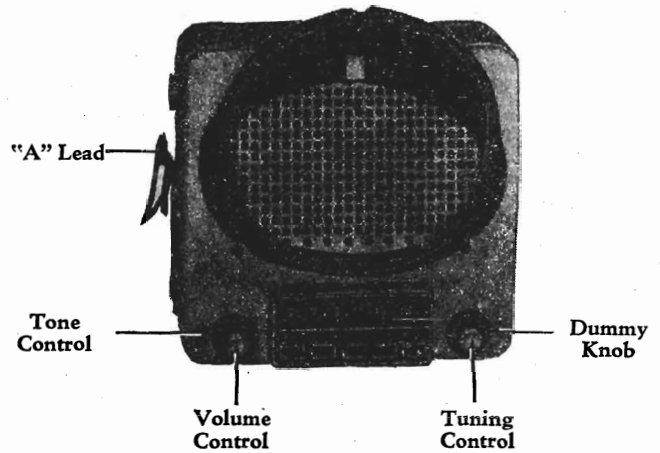
| Illus. No. | Production Part No. | Service Part No. | Description |
|---------------------------------|---------------------|-------------------------|--------------------------------------|
| Miscellaneous Electrical | | | |
| * | 7260133 | 7260328* | "A" Lead and Fuse Holder Assy. |
| 111* | 7260300 | 7260300* (Model 982699) | Control - Sensitivity |
| 111* | 7260285 | 7260285* (Model 982700) | Control - Sensitivity |
| 112* | 7260301 | 7260301* (Model 982699) | Control. Volume - Tone and Switch |
| 112* | 7260294 | 7260294* (Model 982700) | Control - Volume, Tone and Switch |
| 112A | | | Volume |
| 112B | | | Tone |
| 112C | | | Switch |
| 113 | 7259009 | 7259009 | Relay |
| 114 | 7259010 | 1219661 | Solenoid |
| 125 | 7259164 | 7259164 | Solenoid Plunger Assy. |
| 115 | 7258146 | 7258146 | Speaker |
| 116 | 7259011 | 7259011 | Switch - Tuner Return |
| 117 | 7259012 | 7259012 | Switch - Station Selector |
| 122* | 7260813 | 7260813* | Switch - Foot Station Selector |
| 118 | 7258941 | 7258941 | Transformer - Input |
| 119 | 7259324 | 7259324 | Transformer - Output |
| 120 | 7259375 | 7255881 | Transformer - Power |
| 121 | 7239124 | 8542 | Vibrator - Non-Synchronous |
| MECHANICAL PARTS | | | |
| Chassis | | | |
| | 7256742 | 7256742 | Antenna Connector |
| | 1217820 | 1217820 | Socket - Dial Light |
| 124* | 7260840 | 7260840* | Socket - Foot Switch |
| | 7236279 | 7236279 | Socket - Octal |
| | 7259307 | 7259307 | Socket - 9 Pin Miniature |
| | 7258073 | 7258073 | Socket - 7 Pin Miniature |
| | 7239125 | 7239125 | Socket - Vibrator |
| Tuner | | | |
| 126 | 7259201 | 7259201 | Core - Tuning |
| 127 | 7259178 | 7259178 | Core Guide Bar |
| 128 | 187189 | 44 | Dial Light |
| 129* | 7260372 | 7260372* (Model 982699) | Escutcheon |
| 129* | 7260297 | 7260297* (Model 982700) | Escutcheon |
| 130 | 7259344 | 7259344 | Dial |
| 131 | 7259496 | 7259496 | Dial Backplate |
| 132* | 7260374 | 7260374* (Model 982699) | Manual Drive Shaft Assy. |
| 132* | 7260282 | 7260282* (Model 982700) | Manual Drive Shaft Assy. |
| 133 | 1219610 | 1219610 | Motor Gear Train Assy. |
| 134* | 7260134 | 7260134* (Model 982699) | Pointer Backplate |
| 134* | 7260247 | 7260247* (Model 982700) | Pointer Backplate |
| 135 | 1219174 | 1219174 | Pointer Tip Pkg. |
| 136 | 7259100 | 6047 | Spring Clip |
| 137 | 7259207 | 7259207 | Spring - Worm Anti-rattle |
| 138 | 7259055 | 7259055 | Spring - Motor Power |
| | 1219611 | 1219611 (Model 982699) | Station Selector Bar Pkg. |
| | 1219849 | 1219849* (Model 982700) | Station Selector Bar Pkg. |
| * | 7259028 | 7259028 (Model 982699) | Station Selector Bar and Shaft Assy. |
| 139 | 7260289 | 7260289 (Model 982700) | Station Selector Bar and Shaft Assy. |
| 139* | 7259125 | 7259125 | Switch Operating Ring |
| | | | Toggle Plate |
| 140 | 7259111 | 7259111 | Spring (2) |
| | 7256121 | 7256121 | "C" Washer |
| 141 | 7259026 | 7259026 | Worm Gear and Brkt. Assy. |
| INSTALLATION PARTS | | | |
| | 7260632 | 7260632* | "A" Lead and Condenser Assy. |
| | 1911095 | 6030 | Condenser - Generator |
| | 1912757 | 6030 | Condenser - Ignition |
| | 7260190 | 6030 | Condenser - Regulator |
| | 555348 | 555348 | Clip - Hood Grounding |
| | 120151 | 120151 | Fuse - 15 Amp |
| | 7259818 | 7259818* | Knob - Control |
| | 7260191 | 7260191* | Knob - Tone Control |
| | 7260193 | 7260193* | Knob - Sensitivity |
| | 7240138 | 7240138 | Static Collector |
| | 7258815 | 7258815 (Model 982699) | Trim Plate - 98 Series |
| | 7259789 | 7259789* (Model 982700) | Trim Plate - 88 Series |

* Parts first used in 1951

MODEL 984592,
1951 Pontiac

GENERAL

- MOUNTING—All 1951 Pontiac Cars.
- TUBES—Seven, Plus Rectifier.
- SPEAKER—6" x 9" Elliptical, Permanent Magnet.
- TUNING—Manual and 5 Push Button Mechanical.
- ANTENNA TRIMMER COMPENSATION — For Antennas Between 0.000060 - 0.000090 Mfd.
- TUNING RANGE — 550-1600 KC.



MODEL 984592

PUSHBUTTON SET-UP

Pull button to the right and out. Tune in desired station manually. Push button in as far as it will go.

ALIGNMENT PROCEDURE

- Output Meter Connections Across Voice Coil
- Generator Ground Receiver Chassis
- Dummy Antenna In Series With Generator
- Volume Control Position Maximum Volume
- Tone Control Position Treble
- Generator Output Minimum for Readable Indication

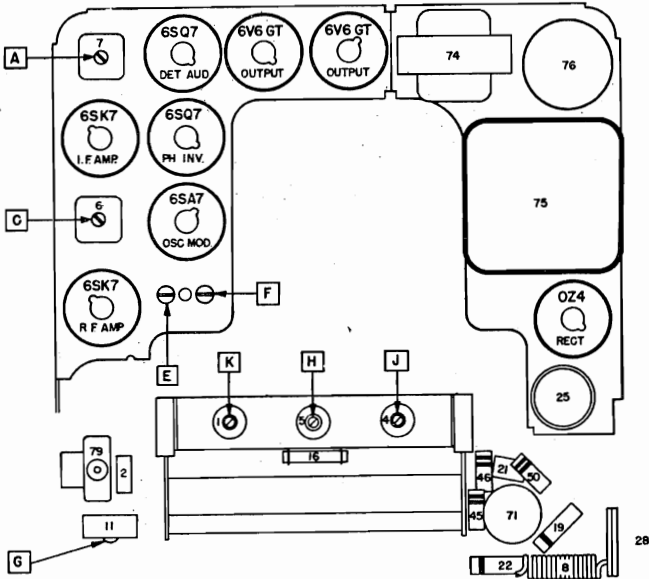
| Steps | Series Condenser or Dummy Antenna | Connect to | Signal Generator Frequency | Tune Receiver To | Adjust in Sequence for Max. Output |
|-------|-----------------------------------|-----------------------------------------|----------------------------|--------------------|------------------------------------|
| 1 | 0.1 Mfd. | 6SA7 Grid (Pin #8) or 7Q7 Grid (Pin #6) | 260 KC | High Freq. Stop | A, B, C, D |
| 2 | 0.000068 Mfd. | Antenna Connector | 1615 KC | High Freq. Stop | *E, F, G |
| 3 | 0.000068 Mfd. | Antenna Connector | 1000 KC | Signal Gen. Signal | J, K |
| 4 | 0.000068 Mfd. | Antenna Connector | 1615 KC | High Freq. Stop | F, G |
| 5 | 0.000068 Mfd. | Antenna Connector | 1100 KC | Signal Gen. Signal | L** |

*Before making this adjustment check the mechanical setting of the oscillator core "H." The slotted end of the core should be 1 25/32" from the mounting end of the coil form. (This measurement is readily made by inserting a suitable plug in the mounting end of the coil form). If adjustment is necessary be sure to first dissolve the glyptal seal on the core studs. Core adjustments are made from the mounting end of the coil form with an insulated screwdriver, and core studs should be resealed with glyptal or household cement after alignment.

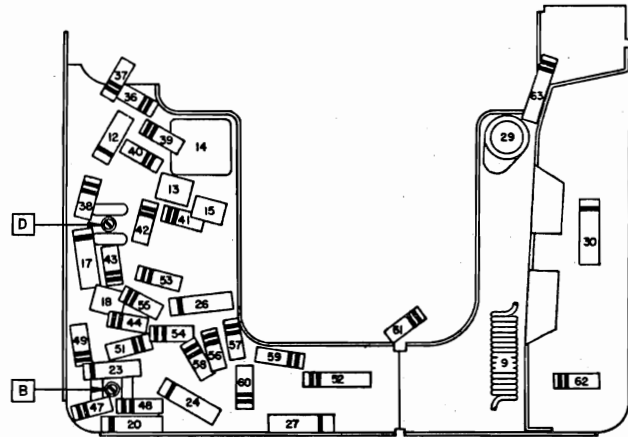
**"L" is the pointer adjustment screw on the pointer connecting link (see tuner drawing). Adjust so pointer reads 1100 KC.

With the radio installed and the car antenna plugged in adjust antenna trimmer "G" (see sticker on case) for maximum volume with the radio tuned to a weak station between 600 and 1000 KC.

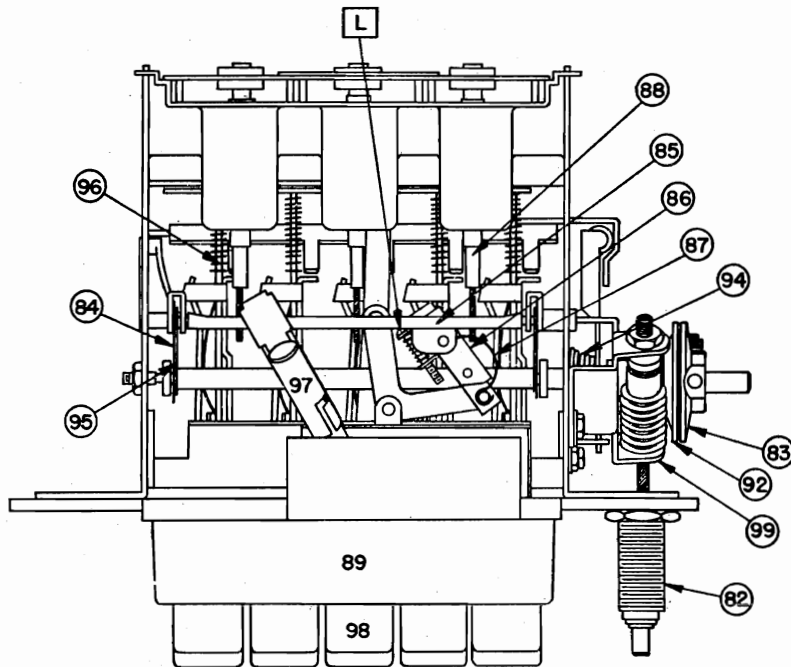
MODEL 984592,
Pontiac 1951



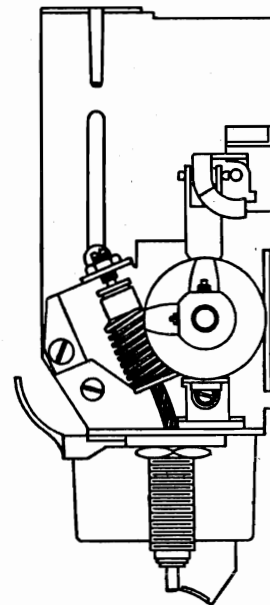
PARTS LAYOUT — TUBE VIEW



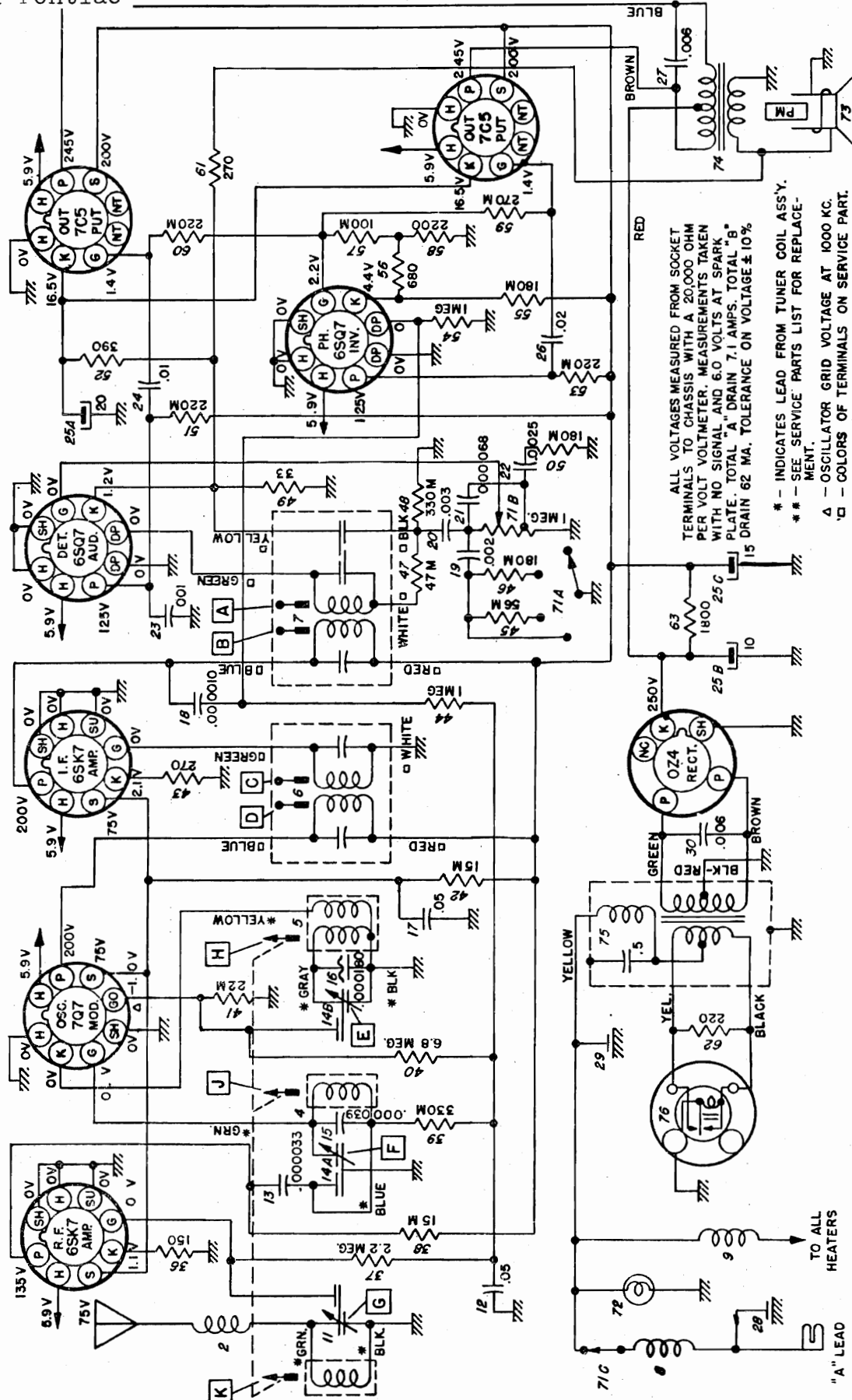
PARTS LAYOUT — CHASSIS VIEW



TUNER



MODEL 984592,
1951 Pontiac



ALL VOLTAGES MEASURED FROM SOCKET TERMINALS TO CHASSIS WITH A 20,000 OHM PER VOLT VOLTMETER. MEASUREMENTS TAKEN WITH NO SIGNAL AND 6.0 VOLTS AT SPARK PLATE. TOTAL "A" DRAIN 7.1 AMPS. TOTAL "B" 1.5 DRAIN 62 MA. TOLERANCE ON VOLTAGE ± 10%.

* - INDICATES LEAD FROM TUNER COIL ASS'Y.
 ** - SEE SERVICE PARTS LIST FOR REPLACEMENT.
 Δ - OSCILLATOR GRID VOLTAGE AT 1000 KC.
 □ - COLORS OF TERMINALS ON SERVICE PART.

MODEL 984592 — ALTERNATE USING 7Q7 AND 7C5 TUBES

SERVICE PARTS LIST

| Illus. No. | Production Part No. | Service Part No. | Description |
|-------------------------|---------------------|--------------------|-------------------------------------------------------------------------------|
| ELECTRICAL PARTS | | | |
| Coils | | | |
| 1 | 7258914 | 7258914 | Antenna |
| 2 | 7255738 | 7255738 | Antenna Series Choke |
| 3 | 7240251 | 7240251 | Antenna Spark Choke |
| 4 | 7258914 | 7258914 | R.F. |
| 5 | 7258911 | 7258911 | Oscillator |
| 6 | 7258849 | 1219508 | 1st I.F. |
| 7 | 7258850 | 1219509 | 2nd I.F. |
| 8 | 1217846 | 1217846 | "A" Spark Choke |
| 9 | 7241708 | 7241708 | Hash Choke |
| Condensers | | | |
| 11 | 7257959 | 7257959 | Antenna Trimmer |
| 12 | 7236842 | 6537 | .05 mfd 200 V Tubular |
| 13 | 1218348 | G 330 | .000033 mfd ceramic |
| 14 | 7242454 | 7242454 | Dual Trimmer |
| 14A | | | R. F. Section |
| 14B | | | Oscillator Sec. |
| 15 | 7258221 | G 390 | .000039 mfd Ceramic |
| 16 | 7257424 | 7257424 | .000180 mfd compensating |
| 17 | 7258125 | 6537 | .05 mfd 400 V Tubular |
| 18 | 1215189 | G 100 | .000010 mfd Mica |
| 19 | 7237954 | E 202 | .002 mfd 600 V Tubular |
| 20 | 7257699 | E 302 | .003 mfd 600 V Tubular |
| 21 | 1219691 | G 680 | .000068 mfd Mica |
| 22 | 7240578 | 7240578 | .0025 mfd 400 V Tubular |
| 23 | 7239188 | 6527 | .001 mfd 600 V Tubular |
| 24 | 1208600 | 6533 | .01 mfd 600 V Tubular |
| 25 | 7238830 | M 908 | Electrolytic |
| 25A | | | 20 mfd 25 V |
| 25B | | | 10 mfd 400 V |
| 25C | | | 15 mfd 400 V |
| 26 | 7258124 | 6534 | .02 mfd 400 V Tubular |
| 27 | 1219692 | H 602 | .006 mfd 1000 V Tubular |
| 28 | 1219768 | 1219768 | Spark Plate |
| 29 | 1217848 | 1217848 | Chassis Plate |
| 30 | 7240906 | H 602 | .006 mfd 1600 V Tubular |
| Resistors | | | |
| 36 | 1213220 | A 151 | 150 ohms 1/2W Insulated |
| 37 | 1211147 | A 225 | 2.2 Megohm 1/2W Insulated |
| 38 | 7237595 | B 153 | 15,000 ohms 1W Insulated |
| 39 | 7240732 | A 334 | 330,000 ohms 1/2W Insulated |
| 40 | 7241937 | A 685 | 6.8 megohms 1/2W Insulated |
| 41 | 1211192 | A 223 | 22,000 ohms 1/2W Insulated |
| 42 | 7233653 | C 153 | 15,000 ohms 2W Insulated |
| 43 | 1214542 | A 271 | 270 ohms 1/2W Insulated |
| 44 | 7238873 | A 105 | 1 megohm 1/2W Insulated |
| 45 | 1213267 | A 563 | 56,000 ohms 1/2W Insulated |
| 46 | 1215560 | 1215560 | 180,000 ohms 1/2W Insulated |
| 47 | 7240731 | A 473 | 47,000 ohms 1/2W Insulated |
| 48 | 1214557 | A 334 | 330,000 ohms 1/2W Insulated |
| 49 | 1214538 | A 330 | 33 ohms 1/2W Insulated |
| 50 | 1215560 | 1215560 | 180,000 ohms 1/2W Insulated |
| 51 | 1214555 | A 224 | 220,000 ohms 1/2W Insulated |
| 52 | 1216149 | B 391 | 390 ohms 1W Insulated |
| 53 | 1214555 | A 224 | 220,000 ohms 1/2W Insulated |
| 54 | 7238873 | A 105 | 1 Megohm 1/2W Insulated |
| 55 | 1215560 | 1215560 | 180,000 ohms 1/2W Insulated |
| 56 | 1214543 | A 681 | 680 ohms 1/2W Insulated |
| 57 | 1213270 | A 104 | 100,000 ohms 1/2W Insulated |
| 58 | 1214545 | A 222 | 2200 ohms 1/2W Insulated |
| 59 | 1214556 | A 274 | 270,000 ohms 1/2W Insulated |
| 60 | 1214555 | A 224 | 220,000 ohms 1/2W Insulated |
| 61 | 1214542 | A 271 | 270 ohms 1/2W Insulated |
| 62 | 1219738 | B 221 | 220 ohms 1W Insulated |
| 63 | 1214573 | { C 272 } B 562 | 1800 ohms 2W Wire Wound (Use 2700 ohm 2W Insulated and 5600 ohm 1W Insulated) |

MODEL 984592,
1951 Pontiac

SERVICE PARTS LIST

| Illus No. | Production Part No. | Service Part No. | Description |
|-----------|---------------------|------------------|-----------------------------------|
| | | | Tubes |
| | 7237751 | 5229 | 6SK7 |
| | 7237753 | 5231 | 6SQ7 |
| | 7237752 | 5222 | 6SA7 |
| | 1213981 | 5301 | 7Q7 (Alternate) |
| | 1213793 | 5241 | 6V6GT |
| | 1213568 | 5295 | 7C5 (Alternate) |
| | 1211924 | 5003 | 0Z4 |
| | | | Miscellaneous Electrical |
| *71 | 7260043 | *7260043 | Control - Volume, Tone and Switch |
| 71A | | | Tone Control |
| 71B | | | Volume Control |
| 71C | | | Switch |
| 72 | 187189 | 44 | Lamp - Dial Light |
| *73 | 7260410 | *7260410 | Speaker 6x9 Elliptical PM |
| 74 | 7259249 | 7240453 | Transformer - Output |
| 75 | 7259375 | 725588I | Transformer - Power |
| 76 | 7239124 | 8542 | Vibrator - Non-Synchronous |
| | | | MECHANICAL PARTS |
| | | | Chassis |
| 79 | 7257746 | 7257746 | Socket - Antenna |
| | 7241356 | 7241356 | Socket - Octal Tube |
| | 7236279 | 7236279 | Socket - Octal Tube |
| | 7239125 | 7239125 | Socket - Vibrator |
| | | | Tuner |
| 81 | 7257722 | 7257722 | Back Plate - Pointer |
| *82 | 7260039 | *7260039 | Bushing & Manual Drive Shaft |
| 83 | 7258072 | 7258072 | Clutch Disc - Driven |
| 84 | 7258203 | 7258203 | Connecting Link - Core Bar |
| 85 | 7258210 | 7258210 | Core Guide Bar - Parallel |
| 86 | 7256271 | 7256271 | Pointer Connecting Link |
| 87 | 7255992 | 7255992 | Spring - Pointer Conn. Link |
| 88 | 7258468 | 7258468 | Core - Tuning |
| 89 | 7257717 | 7257717 | Escutcheon Assy. |
| 90 | 7257721 | 7257721 | Dial |
| 91 | 7257719 | 7257719 | Dial Backplate |
| | 7257718 | 7257718 | Spring - Dial Retainer |
| 92 | 7256495 | 7256495 | Gear and Bushing - Clutch |
| *93 | 7260209 | *7260209 | Pointer Assy. |
| | 1219120 | 1219120 | Pointer Tip Pkg. |
| 94 | 7258756 | 7258756 | Spring - Clutch |
| 95 | 7257415 | 7257415 | Spring - Core Bar Conn. Link |
| 96 | 7255984 | 7255984 | Spring - Slide Return |
| *97 | 1219740 | *1219740 | Socket - Dial Light |
| *98 | 1219739 | *1219739 | Push Button & Slide Assy. |
| *99 | 7260037 | *7260037 | Worm Gear & Bracket Assy. |
| | | | INSTALLATION PARTS |
| | 1911095 | 6030 | Condenser - Generator |
| | 1913140 | 6030 | Condenser - Voltage Regulator |
| | 147685 | 147685 | Fuse 14 Amps. |
| | 514608 | *514608 | Knob - Control |
| | 514782 | *514782 | Knob - Dummy |
| | 514784 | *514784 | Knob - Tone Control |
| | 511836 | *511836 | Trim Plate |
| | 513486 | 513486 | Washer - Anti Rattle |

*Parts first used in 1951

MODEL 984688,
1951 Pontiac

GENERAL

MOUNTING—All 1951 Pontiac Cars.

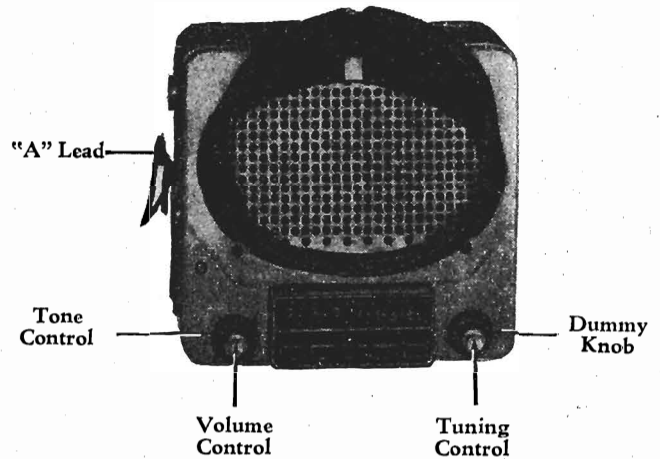
TUBES—Seven, Plus Rectifier.

SPEAKER—6" x 9" Elliptical, Permanent Magnet.

TUNING—Manual and 5 Push Button Mechanical.

ANTENNA TRIMMER COMPENSATION—For Antennas Between 0.000060 - 0.000090 Mfd.

TUNING RANGE—550-1600 KC.



MODEL 984688

PUSHBUTTON SET-UP

Pull button to the right and out. Tune in desired station manually. Push button in as far as it will go.

SERVICE INFORMATION: This model is identical to the 1951 Pontiac Model 984592 radio covered in Bulletin 6D-1035 except for the parts shown below. However, it may use several miniature tubes on an alternate basis and when these are used additional components are altered as shown. For service information reference should be made to Bulletin 6D-1935 except that the schematic diagram using the miniature tubes is included on page 2 of this bulletin.

Parts changed on all 984688 radios

| Illus. No. | Production Part No. | Service Part No. | Description |
|------------|---------------------|------------------|-----------------------------|
| 98 | 1218885 | 1218885 | Push Button and Slide Assy. |
| | 515718 | 515718 | Knob - Control |
| | 511831 | 511831 | Knob - Dummy |
| | 511833 | 511833 | Knob - Tone |

Additional parts changed only when miniature tubes are used

| | | | |
|-----|---------|----------|---------------------------------|
| *13 | 1219862 | *1219862 | *.000005 Mfd. Molded Capacitor |
| 36 | 1213217 | A 101 | 100 Ohms 1/2 W. Insulated Res. |
| 40 | 1215548 | A 106 | 10 Megohms 1/2 W Insulated Res. |
| | 1217690 | 6BA6 | R.F. and I.F. Tube |
| | 1217691 | 6BE6 | Oscillator-Modulator Tube |
| | 1218506 | 6AV6 | Detector-Auto & P.H. Inv. Tube |
| | 7261021 | *7261021 | *Socket - Miniature Tube. |

* Parts first used in 1951.

MODEL 986515,
Chevrolet

CHEVROLET DELUXE PUSH BUTTON RADIO
MODEL 986515

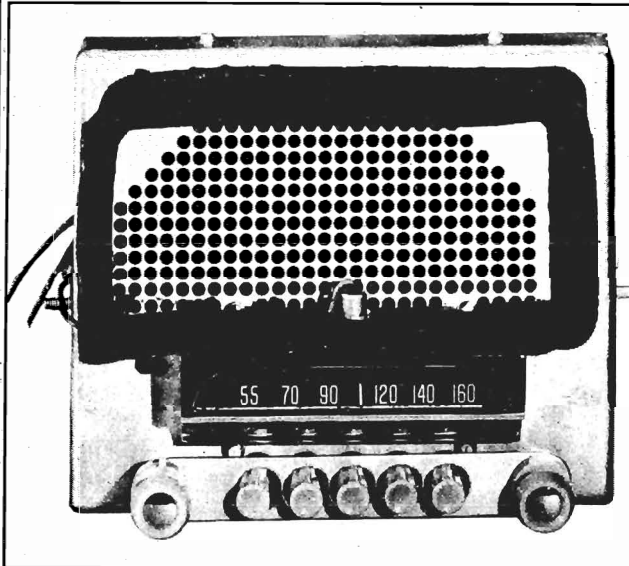


Figure 1

This radio is a five tube (plus rectifier) super-heterodyne automobile receiver designed expressly for 1951 Chevrolet passenger car installation. The receiver is of the single unit design for ease of installation and service. In this type of design the speaker is integral with the receiver and instrument panel by means of a special rubber gasket which, due to location and baffling, permits exceptionally good tone quality.

ELECTRICAL DESCRIPTION

The circuit used in this receiver is the super-heterodyne type and uses no regeneration. The tuning circuits are of the permeability type and are tuned by varying the iron cores in and out of the antenna, radio frequency and oscillator coils like pistons. (See Figure 2.)

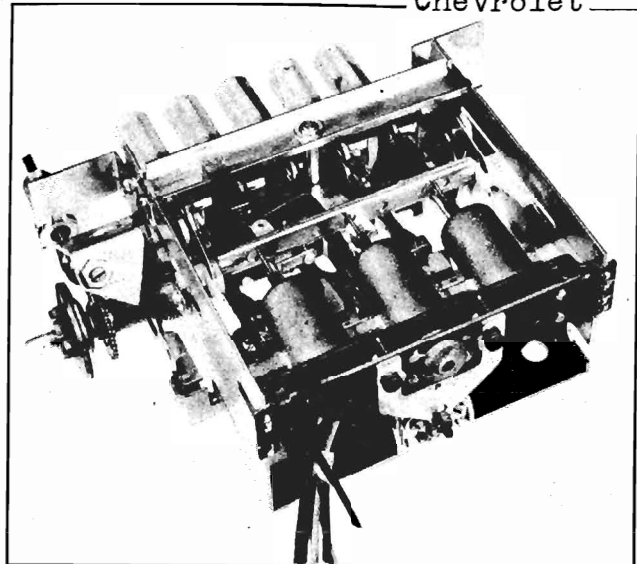


Figure 2

The Intermediate frequency stages are tuned by means of two iron cores being adjusted from the top and bottom sides of the I.F. transformer, both the first (input) and second (output) Intermediate frequency transformers are tuned by this method. (See Figure 3.)

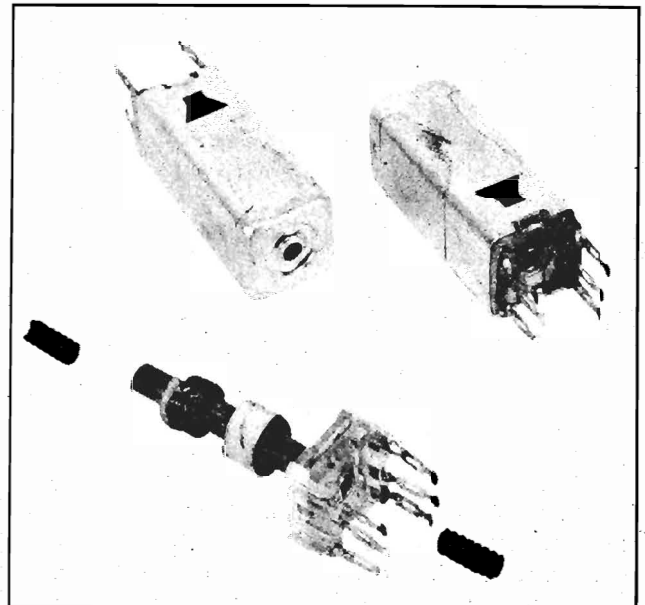


Figure 3

The antenna circuit is capacity coupled to the antenna by means of an antenna trimmer condenser to take care of normal variations in antenna and antenna coil capacity. The antenna condenser is adjustable by means of a small screwdriver, and is located on the bottom of the radio case. The audio stage is transformer coupled to the output tube to take advantage of all the gain and tone quality that the receiver

MODEL 986515,

Chevrolet

is capable of developing. The automatic volume control is of the delayed signal type and is very capable of maintaining a constant level of volume at all times. Very high frequency filter chokes are used in the radio frequency and oscillator grid circuits to discriminate against ignition interference in the receiver, thus eliminating the use of spark plug suppressors. The vibrator is the full wave non-synchronous type using an OZ4 rectifier tube and will operate on either a negative or positive ground.

TUBE COMPLEMENT AND FUNCTION

- 6BA6 Radio frequency amplifier.
- 6BE6 Oscillator - modulator.
- 6BA6 Intermediate frequency amplifier.
- 6AV6 Detector - automatic volume control - and first audio
- 6V6GT Audio output.
- OZ4 Cold cathode rectifier.

GENERAL INFORMATION

- Tuning range 540 - 1615 Kilocycles.
- Intermediate frequency 262 Kilocycles.
- Maximum power output 5 watts.
- Undistorted power output 3 watts.
- Current drain with permanent magnet speaker 6.5 amperes at 6 volts.
- Speaker size 6" x 9" elliptical permanent magnet type.
- Voice coil impedance 4 ohms at 400 cycles.
- Fuse protection 14 amperes 25 volt.

PUSH BUTTON TUNING

An outstanding feature of the 986515 radio is the new simplified method of setting up the push buttons, which can be done easily by anyone, without any tools. With this type of push button tuning which is completely mechanical, no cords or pulleys are used thus assuring trouble-free operation and constant calibration of the radio stations set on the push buttons at all times.

PROCEDURE FOR SETTING PUSH BUTTONS

Turn on the receiver for ten minutes or longer to allow circuits to stabilize.

1. Pull button slightly to the left and out as far as it will go.

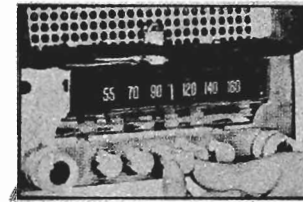


Figure 4

2. Tune in station desired with manual tuning knob to clearest point.

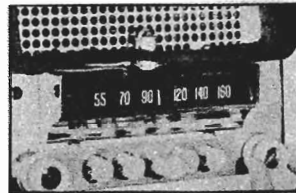


Figure 5

3. Push button in firmly to end of travel. Repeat same procedure for remaining four buttons

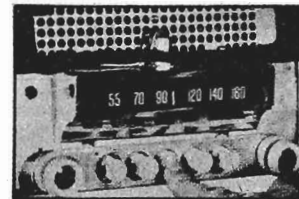


Figure 6

PROCEDURE FOR INSTALLATION OF 986515 RADIO AND ANTENNA

All 1951 Chevrolet passenger cars will use the fender type antenna which will mount on the left front fender.

INSTALLATION PROCEDURE 986257 ANTENNA

After the antenna has been unpacked, proceed as follows:

1. Assemble lead-in cable to antenna mast and tighten securely, place spacer "F" over antenna rod assembly. (See Figure 7.)

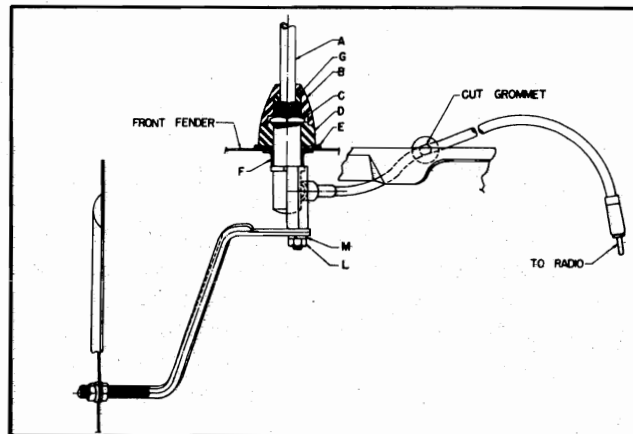


Figure 7

2. Place template on top of left front fender, at front door edge and line up template as indicated. Center punch and drill 13/16 inch hole.
3. Locate two dimples in top of left front fender baffle and drill two 5/16 inch holes for mounting brackets.
4. Place antenna thru 13/16 inch hole from bottom side of fender.
5. Place rubber pad "E," insulator "D" and nut "C" on antenna rod and tighten securely, making sure antenna is in a vertical position. (See Figure 7.)

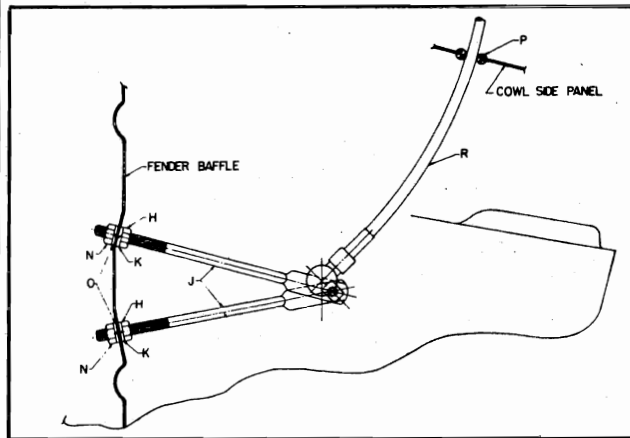


Figure 8

6. Be sure seal "G" is in place, then screw insulator "B" in place. (See Figure 7.)
7. Place nuts "H" and lockwashers "K" on braces "J" and place in 5/16 inch holes in fender baffle. (See Figure 8.)
8. Place braces "J" to stud on antenna mast base with washer "M" and nut "L," place washers "O," nuts "N" and tighten securely. (See Figure 8.)

INSTALLATION OF RECEIVER AND NOISE SUPPRESSION EQUIPMENT

After unpacking and checking radio, place on bench and hook-up radio to 6 volt power unit (or fully charged battery) and allow radio to play while installing suppression equipment. Fill out the warranty label on the cover to show owner's name and date of installation. **RADIOS THAT WILL PLAY FOR 15 MINUTES BEFORE INSTALLATION WILL GIVE MANY MONTHS OF UNINTERRUPTED SERVICE. CHECK ALL RADIOS BEFORE INSTALLATION.**

INSTALLATION NOISE SUPPRESSION EQUIPMENT

1. Mount voltage regulator condenser on voltage regulator. (See Figure 9.)

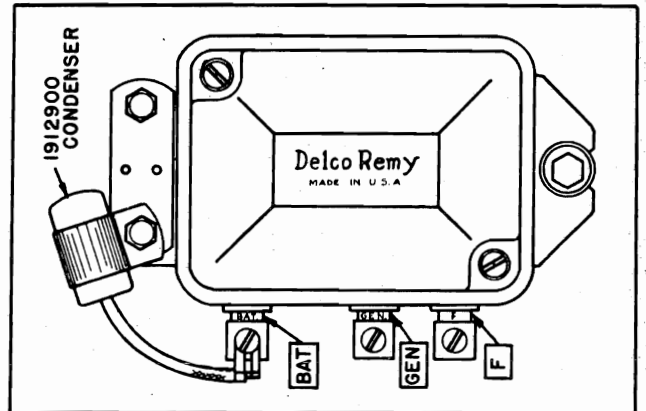


Figure 9

2. Mount generator condenser on generator. (See Figure 10.)

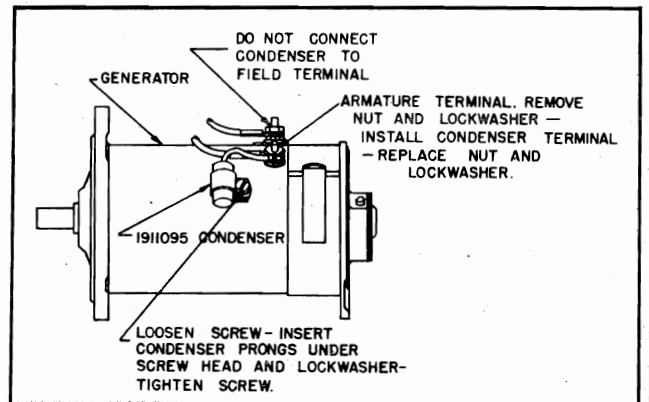


Figure 10

3. Install rubber nipple and distributor suppressor on high tension coil wire. (See Figure 11.)

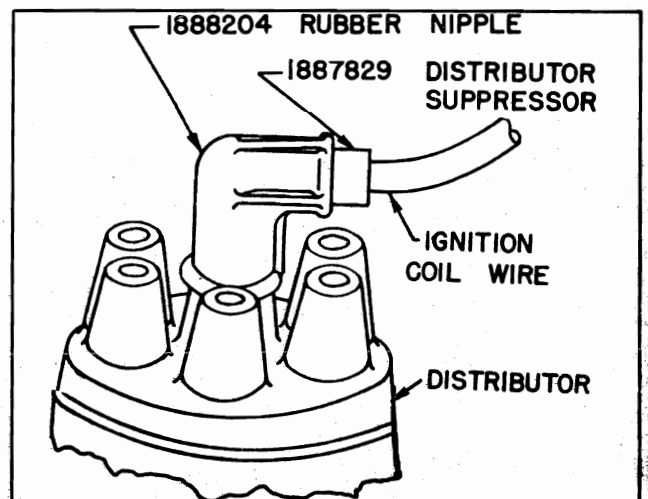


Figure 11

MODEL 986515,
Chevrolet

- Remove front wheel hub and dust caps and install front wheel static collectors. Remove any grease from hole center of spindle to make a good connection, bend cotter pin to clear static collector. (See Figure 12.)

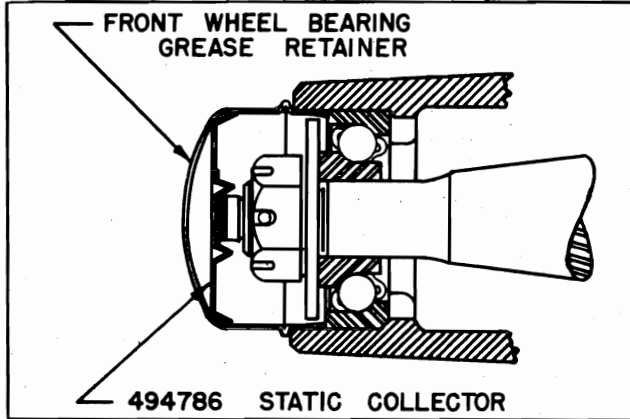


Figure 12

- Drill $1\frac{1}{32}$ inch hole on right hand side of dash and pierce dash mat for radio mounting bracket. (See Figure 14.)

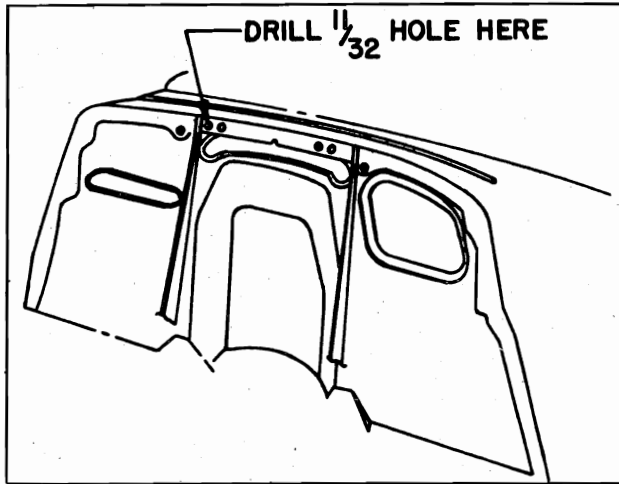


Figure 14

- Mount ignition coil condenser on ignition coil. (See Figure 13.)

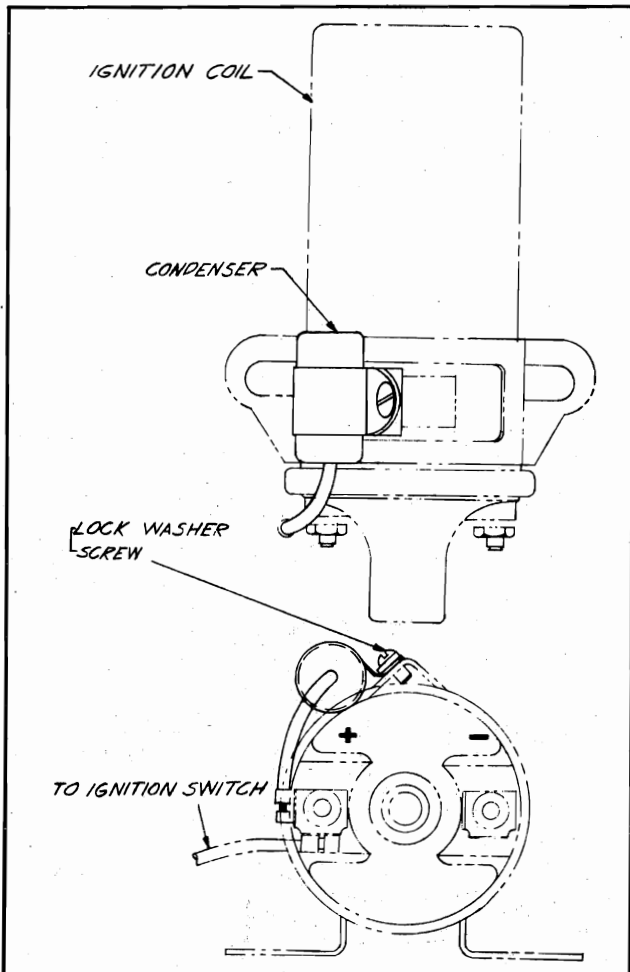


Figure 13

- From inside of car cut dash mat around $1\frac{1}{32}$ inch hole, large enough to insert tubing spacer. (See Figure 16.)

- Remove nut and lockwasher from two studs located on inside of instrument panel on lower portion of radio grille. **DO NOT REMOVE SPECIAL SPACERS.** Save nuts and washer for reassembling. (See Figure 16.)

- Remove cardboard radio grille cover from inside of radio grille and discard. **(THIS IS IMPORTANT.)**

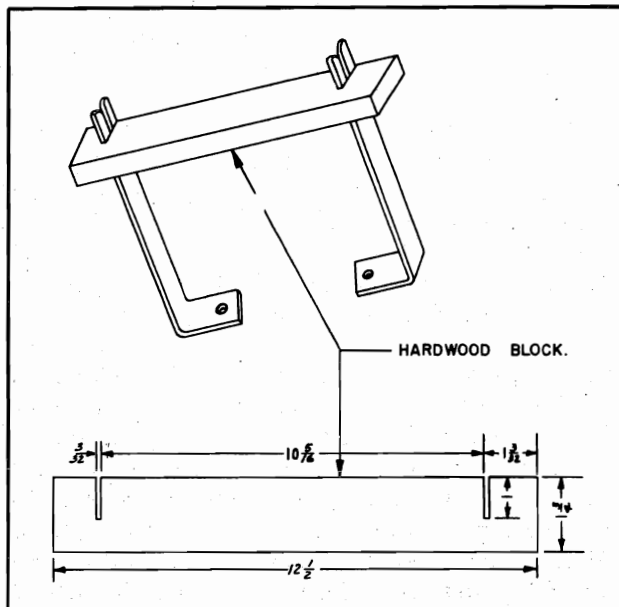


Figure 15

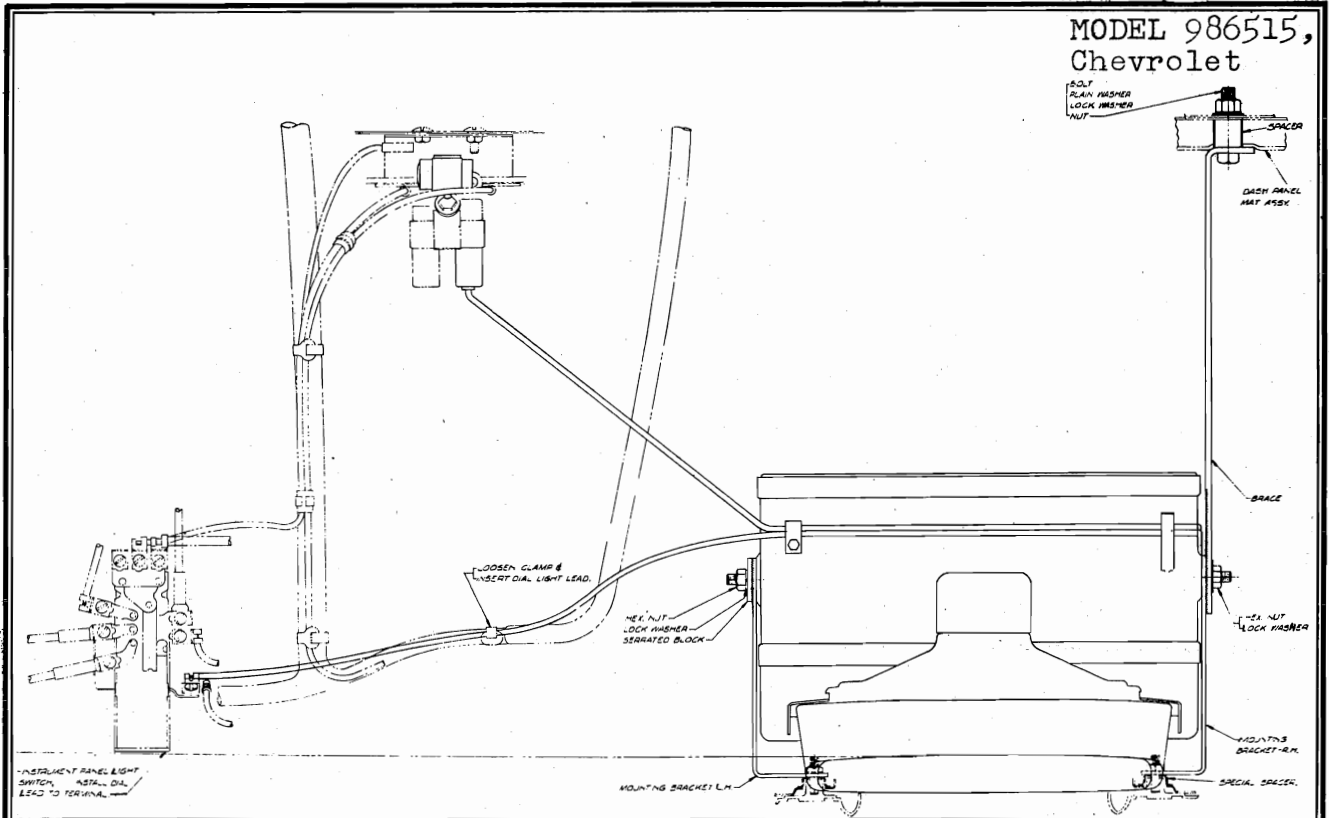


Figure 16

10. Assemble left and right hand brackets to studs (BEING SURE SPACERS ARE IN PLACE) with nuts and washers removed from studs as outlined in paragraph 8. (See Figure 16.) It is important that these brackets be mounted in a vertical position to allow radio receiver to enter into slots of brackets and as these brackets MUST be tightened before the receiver is installed, we suggest that you take a piece of hardwood and make a jig for holding the brackets while tightening. In Figure 15 complete dimensions and procedure for making a jig is outlined.
11. From inside of instrument panel below brackets just mounted, remove two stamped nuts which hold radio control cover plate assembly, remove plate and discard all these parts.
12. Install radio receiving set by inserting radio between mounting brackets being sure that studs on sides of radio are aligned with slots in mounting brackets.
13. Slide the set into place so that the tuning shafts and push buttons are protruding through the instrument panel in the opening provided. If radio escutcheon is too close or against radio grille opening, use thin flat washers provided to shim radio for proper clearance. (See Figures 17 & 20.)
14. Install trim plate and hex nuts on tuning and volume shaft bushings. DO NOT TIGHTEN. (See Figure 17.)
15. Place slotted end of long brace on right hand stud of radio, placing tubing spacer between dash and brace, then insert 5/16 - 18 x 1-1/2 inch bolt through brace, tubing spacer and dash. Place plain washer, lockwasher and hex nut on engine side of dash and tighten securely. (See Figure 16.)
16. Install internal tooth lockwasher and nut on right hand stud, then install serrated block, lockwasher and nut on left hand stud, adjust the radio so that it appears in a level position with regard to dial space around radio grille and tighten the hex nuts on tuning shafts and on the sides of the receiver.
17. Put the dummy knob on left-hand tuning shaft and tone control knob on right-hand shaft, install felt washer and knobs on both shafts. (See Figure 18.)
18. Install dial light lead terminal to the instrument light terminal of light switch. (See Figure 16.)

MODEL 986515,
Chevrolet

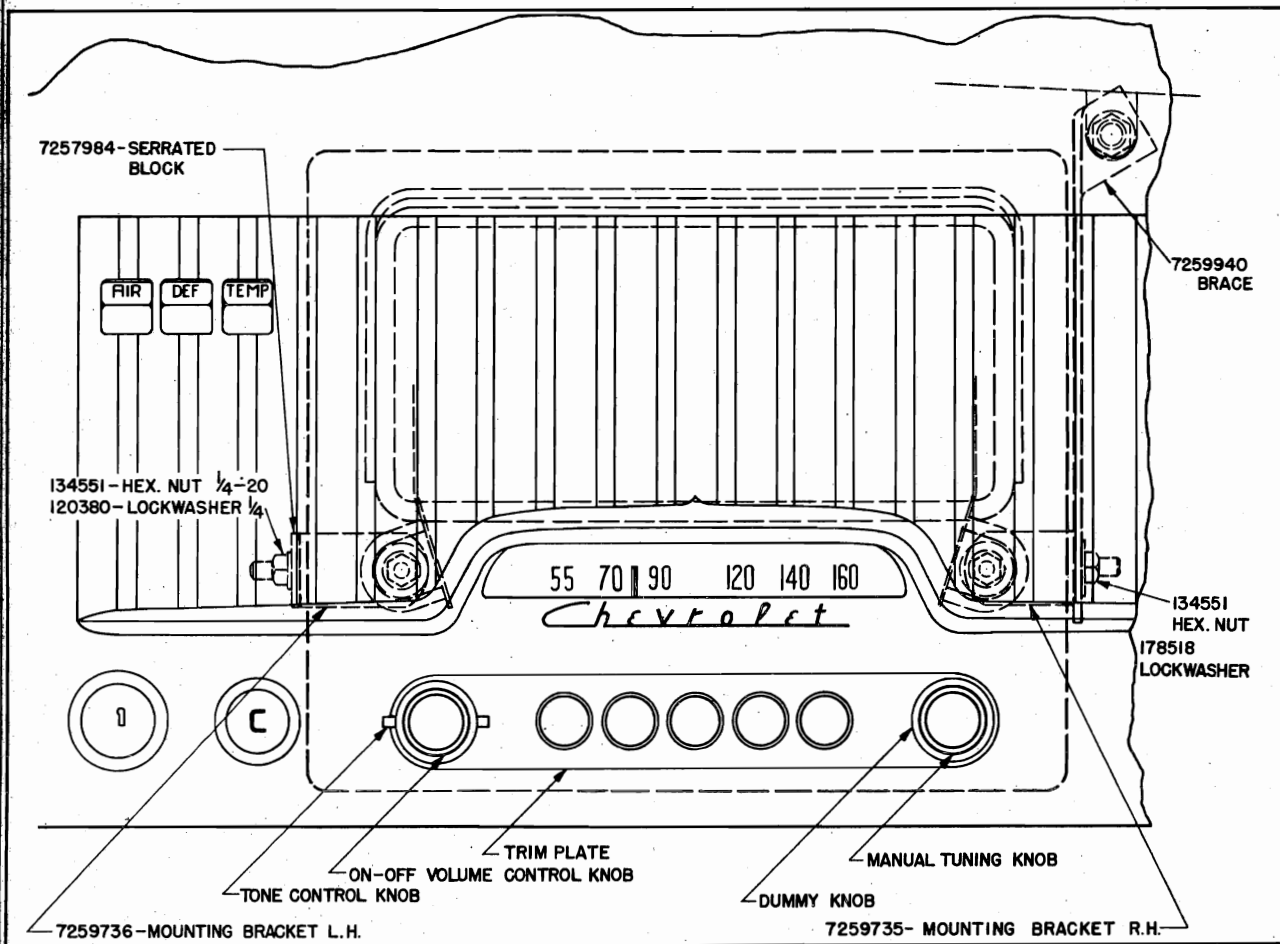


Figure 17

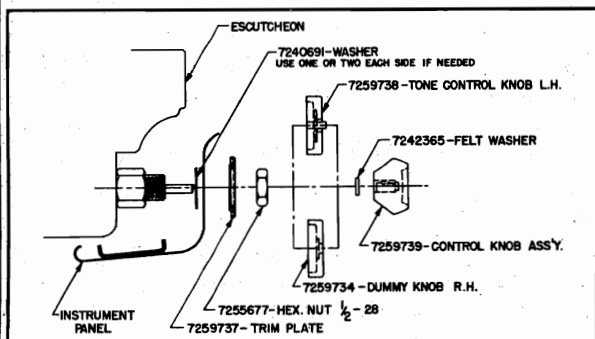


Figure 18

19. Attach male end of fuse holder to accessory junction block in either of optional positions (Figures 16 and 21) and then, insert fuse in male end of fuse holder and screw female end with "A" lead onto male fuse holder. (See Figures 20 and 21.)

20. Plug antenna into antenna socket on side of receiver (Figure 20), turn on receiver and tune in a weak station near 140 on the dial with volume in maximum position and an-

tenna extended to full height. With a small screwdriver adjust antenna trimmer for maximum volume. (See Figure 19).

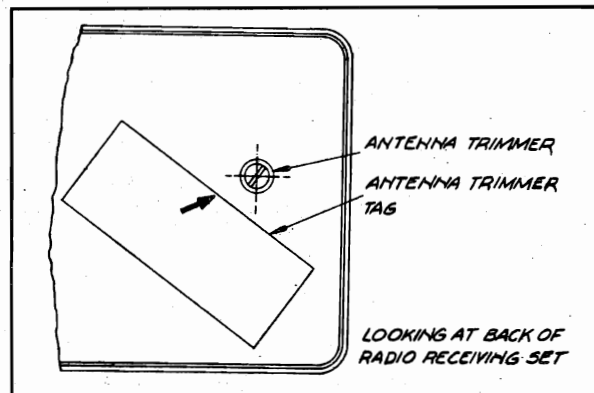


Figure 19

Select five good stations and set push buttons starting with left-hand button and a station near 55 on the dial, set remaining buttons in sequence with stations on dial, refer to page 4 for procedure to set push buttons.

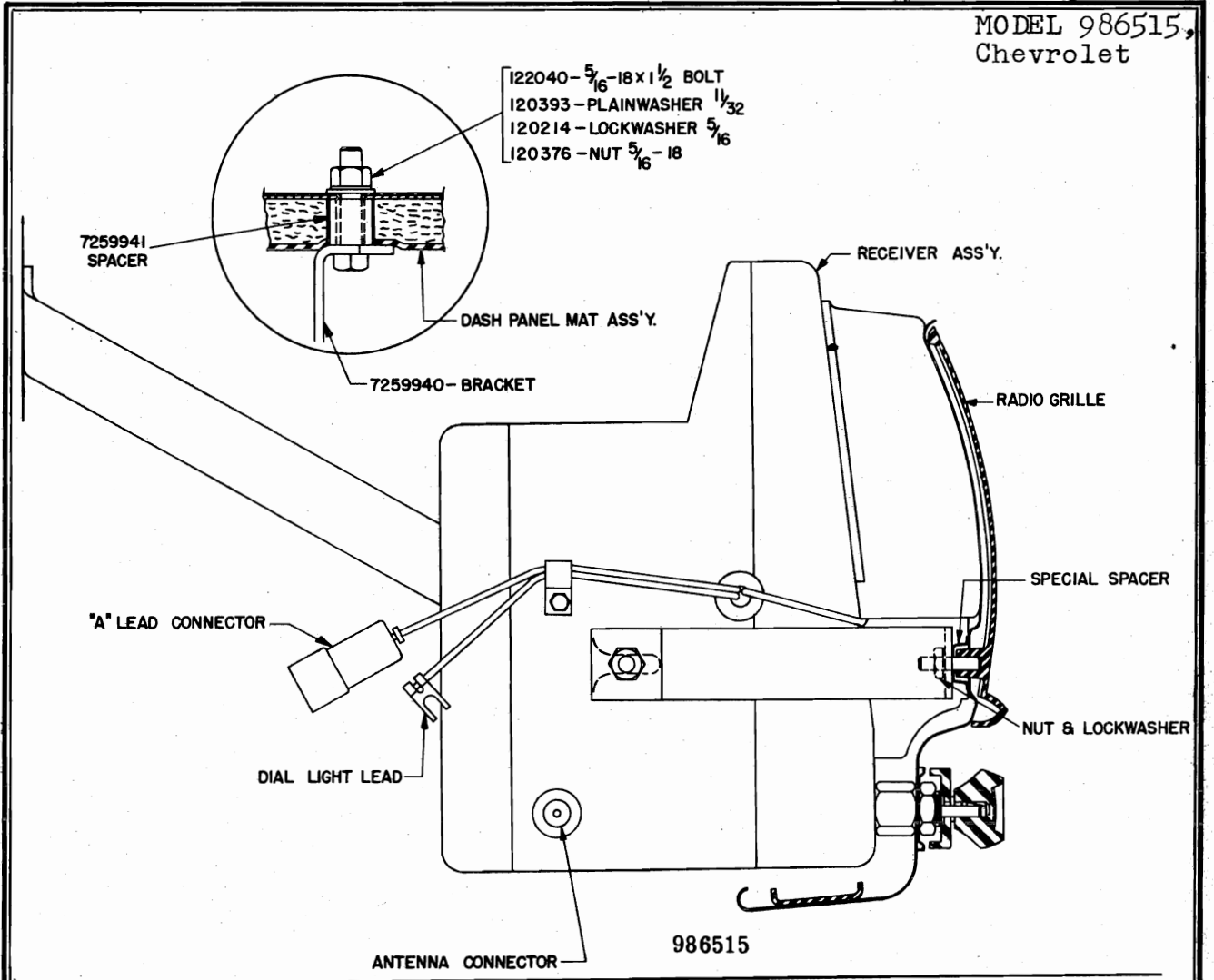


Figure 20

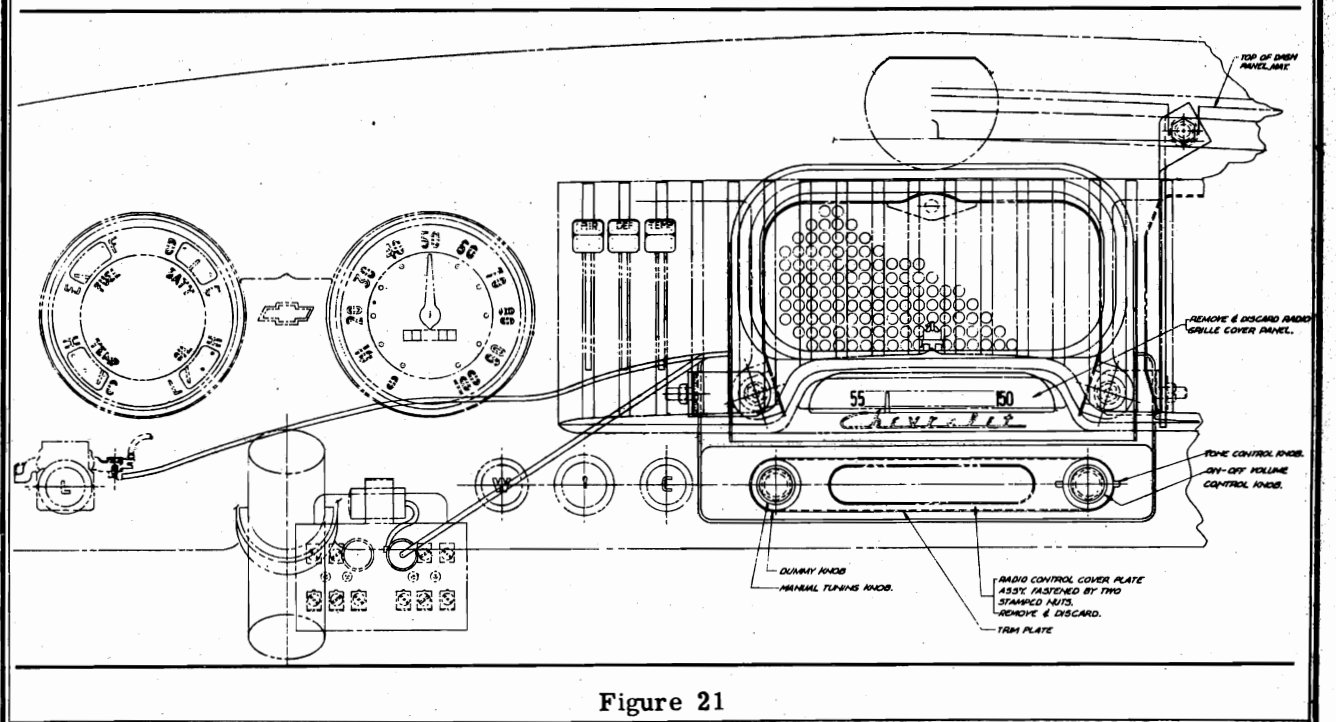


Figure 21

MODEL 986515,
Chevrolet

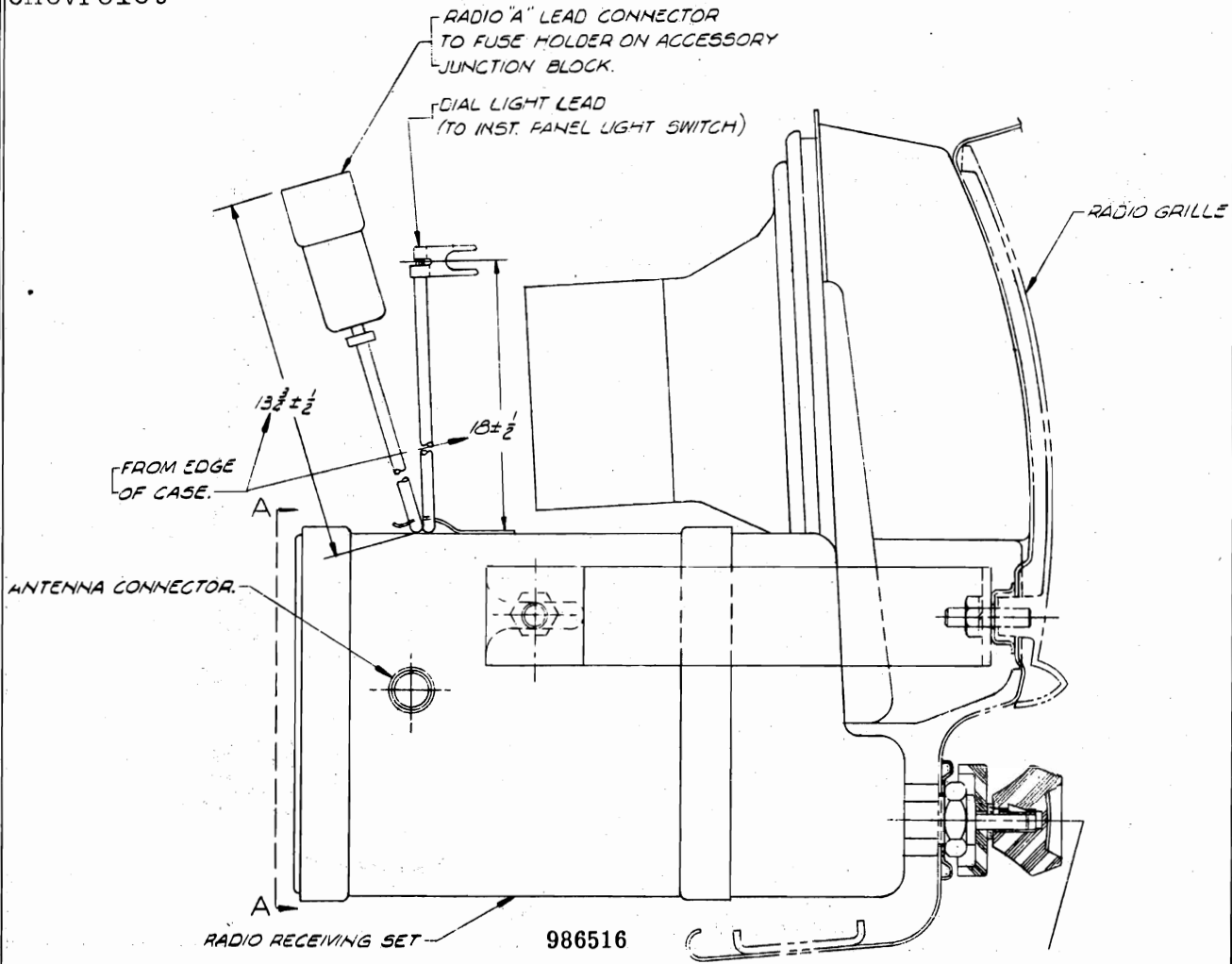


Figure 22

USE SAME INSTRUCTIONS FOR INSTALLING BOTH 986515 AND 986516 RADIOS.

PROCEDURE FOR CHECKING AND SERVICING 986515 RADIO

The most important operation in servicing automobile radios is, to talk with the customer and let him tell you what is wrong with his radio. The customer will save you untold time in locating the trouble and fixing the radio. You will find that complaints will come under one of the four following categories:

1. Fuse blown.
2. Noisy.
3. Weak, no volume.
4. Receiver completely dead.

Blown fuse is caused by one of the following three:

1. Vibrator points sticking or burning. Check vibrator on a vibrator analyzer, or if none is available, remove vibrator from radio

and replace fuse, turn on radio and if the fuse does blow, replace vibrator with new one.

2. Excessive voltage from generator. Check voltage regulator and set to proper voltage, as outlined in Chevrolet shop manual.
3. Short in 6 volt circuit of radio. It will be necessary to remove radio from car and check all 6 volt wires, hash condensers and chokes in radio.

NOISY RADIOS

The noise can be caused by one or more of the following:

1. TIRE STATIC is caused by friction between the tires and pavement, is almost a continuous roar while car is in motion, and does not vary appreciably with car speed.

The intensity of the noise is greater on a dry sunny day and not so noticeable on humid or rainy days. To eliminate this noise be sure that the front wheel static collectors have been installed, being sure that they are free of grease at the spindle and are making good contact to the front wheel spindle. If the static still persists, install tire static powder in all five tires. It is impossible to determine in advance which cars will need tire static powder and for this reason it is recommended that the static powder be installed in all cars and trucks in which a radio is to be installed.

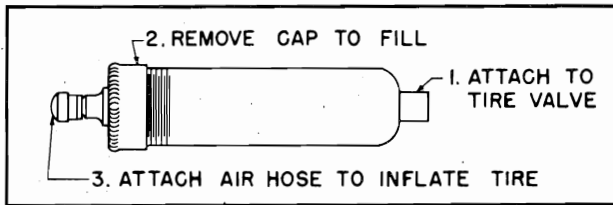


Figure 23

Tire static powder part number 986087 and injector part number 986033 are both available through General Motors Parts Warehouses.

2. **NOISY ANTENNAS** can be located by turning on the radio receiver and tuning in a station, then by tapping the antenna rod with a screwdriver handle, if noisy will crash in the radio each time you tap the antenna rod. The antenna lead-in can also cause noise in the radio if the shield is broken or unsoldered from the ends or if the lead-in wire in cable is loose or broken. Replace antenna rod or lead-in.
3. **MOTOR INTERFERENCE** in Chevrolet radios is usually caused by poor grounds when installing the antenna or receiver, or not using all the suppression material furnished with the receiver. Check to make sure all suppression material has been installed and that all grounds are bright, clean and tight.
4. **GENERATOR INTERFERENCE** is a whining noise similar to a siren and increases or decreases with speed of the engine. Install or replace generator condenser. (If generator brushes and armature are worn, true armature and replace generator brushes.)
5. **NOISY RADIO TUBES** can be located by turning on the radio and tuning in a station, then remove the tube inspection plate and

with a small screwdriver, use the handle end to tap each of the tubes lightly. If noisy, it will cause a crashing noise in the radio as you tap the tube. Replace tube or tubes. If the foregoing does not eliminate the noise, it will be necessary to remove the radio from the car and hook-up radio on service bench, remove covers and check for loose or poorly soldered connections.

6. **WEAK - NO VOLUME** usually is caused by three things, weak tubes or vibrator or antenna being partially grounded.

PROCEDURE FOR CHECKING THE VOLTAGE OF 986515 RADIO

The same procedure is used for operating radio test equipment as outlined on pages 9 through 14 of the 1950 Chevrolet Radio Service and Shop Manual (P&A 15).

It will be necessary to remove the front cover of the radio case to check the voltages. Hook-up the radio on the service bench to a 6 volt power unit, or a fully charged battery. It is important that you have 6 volts at the spark plate of the radio or the voltage readings will be correspondingly lower.

Set the master selector switch of the volt-ohm-meter to the 12 position, set the voltage selector switch to D.C. 1K \sim /v. Place the test leads in jack marked "Test Leads," ground the "-" negative lead to radio chassis for ground, with red lead check all tube pins marked "H" which show a reading on the voltage chart. (See Figure 24.)

If no voltage or incorrect check or replace the following:

1. Check or replace On and Off switch (Item 51C on circuit diagram and 51 on parts layout).
2. Check or replace Condensers. (Items 26A - 26B - 27 on circuit diagram and parts layout.)
3. Check or replace chokes. (Items 8 and 9 on circuit diagram and parts layout.)

Next check will be the A.C. voltage on secondary winding of the power transformer. Set the Master selector switch to the 600 position, set the voltage selector switch to A.C. 1K \sim /v. With red lead check the tube pins marked "P"

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Chevrolet

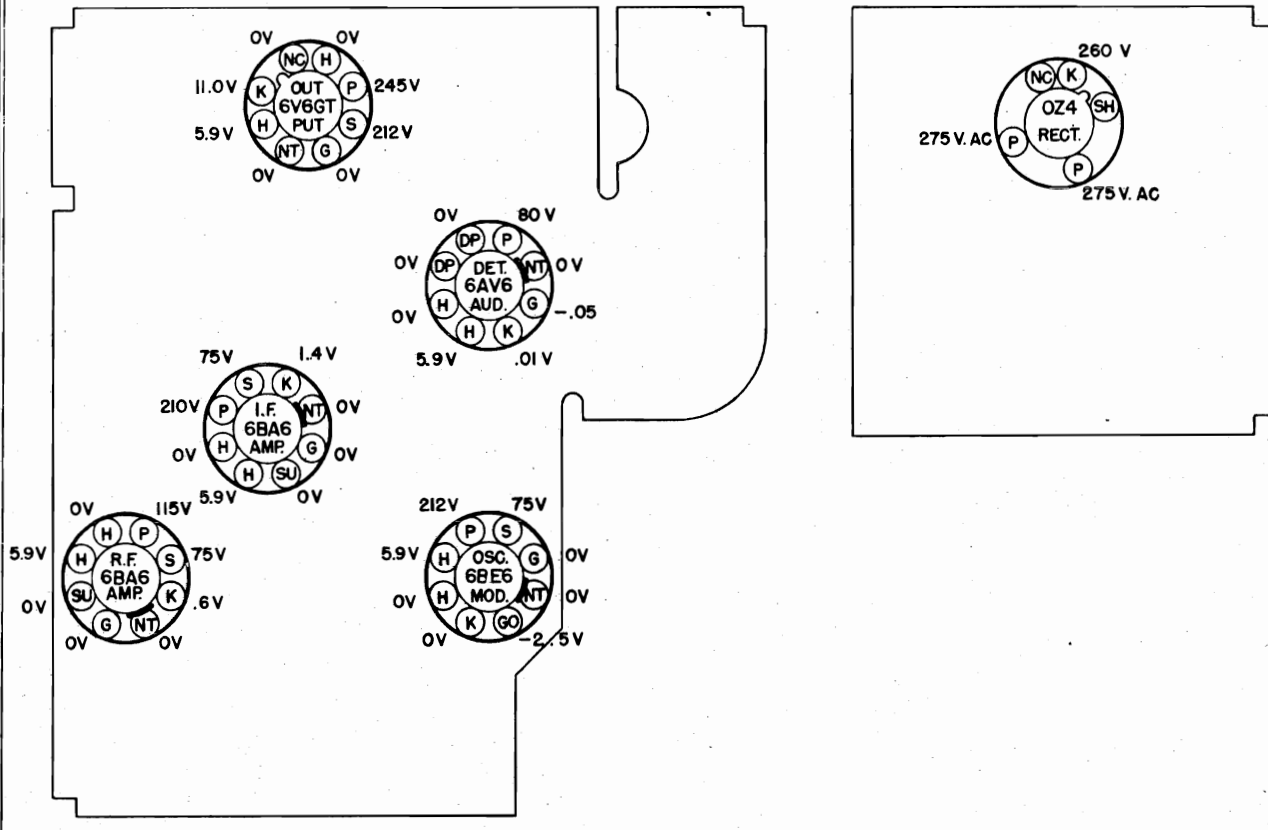


Figure 24

on OZ4 tube. Each terminal should read 270 to 280 volts A.C. If incorrect or no voltage, check or replace the following:

1. Check or replace condenser. (Item 28 on circuit diagram and parts layout.)
2. Check or replace vibrator. (Item 57 on circuit diagram and parts layout.)
3. Check or replace power transformer. (Item 56 on circuit diagram and parts layout.)
4. Check or replace OZ4 socket.

Next change the Master selector switch to the 300 position and the voltage selector switch to D.C. 1K ~/v position. With the black lead to the radio chassis for ground, with the red lead check the tube pin marked "K" on OZ4 tube. It should read 255 to 265 volts, if incorrect or no voltage, check or replace the following:

1. Check or replace the OZ4 tube.
2. Check or replace the OZ4 tube socket.

Next check the tube pin marked "P" on 6V6GT tube, should read 240 to 250 volts. If incor-

rect or no voltage, check or replace the following:

1. Check or replace Electrolytic condenser. (Item 19B on circuit diagram and 19 on parts layout.)
2. Check or replace audio transformer. (Item 55 on circuit diagram and parts layout.)
3. Check or replace condenser. (Item 21 on circuit diagram and parts layout.)

Next check tube pin marked "S" on 6V6GT tube, should read 207 to 217 volts. If incorrect or no voltage, check the following:

1. Check or replace Electrolytic condenser. (Item 19C on circuit diagram and 19 on parts layout.)
2. Check or replace resistor. (Item 48 on circuit diagram and parts layout.)

Next check the tube pin marked "K" on 6V6GT tube, should read 10 to 12 volts. If incorrect or no voltage check or replace the following:

1. Check or replace Electrolytic condenser.

MODEL 986515,
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(Item 19A on circuit diagram and 19 on parts layout.)

2. Check or replace resistor. (Item 43 on circuit diagram and parts layout.)

Next check tube pin marked "P" on 6AV6 tube, should read 75 to 85 volts. If incorrect or no voltage check or replace the following:

1. Check or replace resistor. (Item 40 on circuit diagram and parts layout.)
2. Check or replace condensers. (Item 18 and 20 on circuit diagram and parts layout.)

Next, check tube pin marked "P" on 6BA6 Intermediate frequency amplifier tube, should read 205 to 215 volts. If incorrect or no voltage, check the following:

1. Check or replace Intermediate Frequency Transformer. (Item 7 on circuit diagram and parts layout.)

Next check tube pin marked "S" on 6BA6 I.F. Amplifier tube, should read 70 to 80 volts. If incorrect or no voltage check or replace the following:

1. Check or replace resistor. (Item 33 on circuit diagram and parts layout.)

2. Check or replace condenser. (Item 12 on circuit diagram and parts layout.)

Next check tube pin marked "P" on 6BE6 tube, should read 207 to 217 volts. If incorrect or no voltage, check or replace the following:

1. Check or replace Intermediate Frequency Transformer. (Item 6 on circuit diagram and parts layout.)

Next check tube pin marked "S" on 6BE6 tube, should read 70 to 80 volts. If incorrect or no voltage, check the following:

1. Check or replace resistor. (Item 33 on circuit diagram and parts layout.)
2. Check or replace condenser. (Item 12 on circuit diagram and parts layout.)

Next check tube pin marked "P" on 6BA6 Radio Frequency amplifier tube, should read 110 to 120 volts. If incorrect or no voltage, check or replace the following:

1. Check or replace resistor. (Item 34 on circuit diagram and parts layout.)

Next check tube pin marked "S" on 6BA6 R.F. tube, should read 70 to 80 volts. If incorrect or no voltage, check the following:

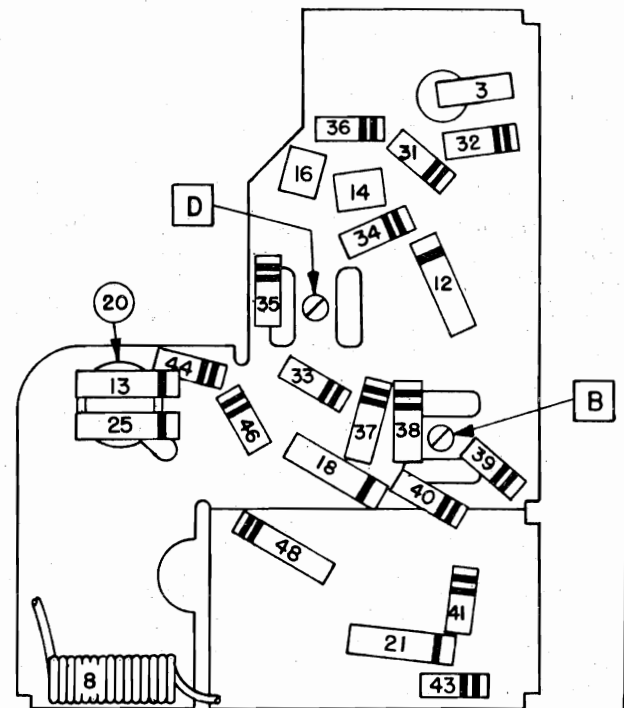
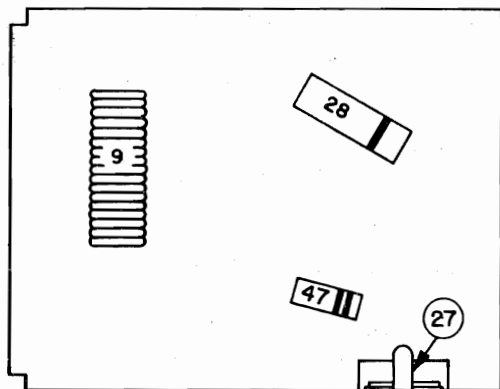


Figure 25

MODEL 986515,
Chevrolet

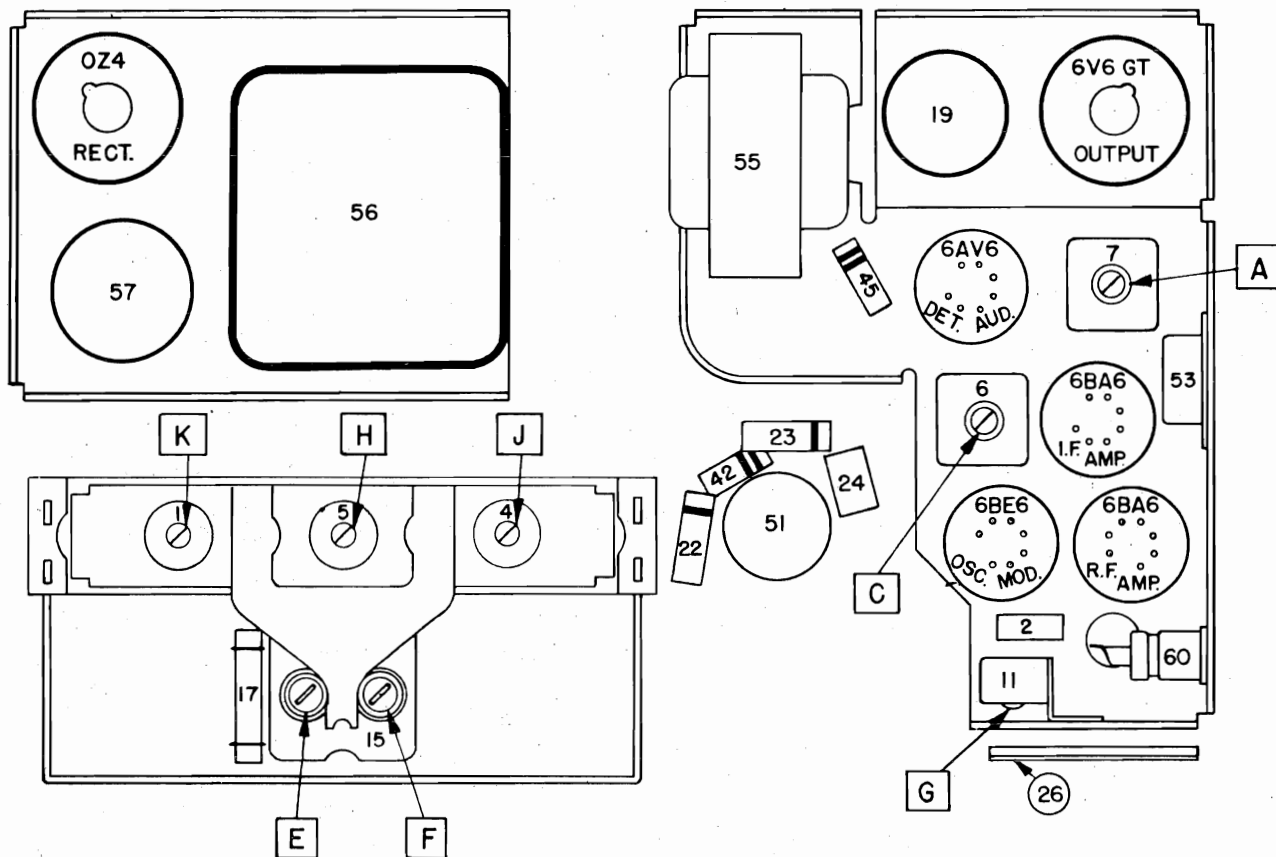


Figure 26

1. Check or replace resistor. (Item 33 on the following: circuit diagram and parts layout.)
2. Check or replace condenser. (Item 12 on circuit diagram and parts layout.)

We have now checked the tubes, vibrator and voltages, with these being correct and the radio still does not play, the trouble will be in the grid circuit of the radio. To continue, it will be necessary to check the grid circuit by means of Signal Tracing.

**PROCEDURE FOR SIGNAL TRACING
986388 RADIO**

Turn on Signal Generator On and Off switch, place the modulation switch in the modulated position, set Signal Generator tone control to .5, place the shielded lead assembly in jack marked "Audio." Ground the black lead of Signal Generator to the radio chassis.

With the red lead touch tube pin marked "P" on 6V6GT tube. If no signal check or replace

1. Check or replace Audio transformer. (Item 55 on circuit diagram and parts layout.)
2. Check or replace speaker. (Item 54 on circuit diagram and parts layout.)

Next touch tube pin marked "G" on 6V6GT tube. If no signal check or replace the following:

1. Check or replace 6V6GT tube.
2. Check or replace 6V6GT tube socket.

Next touch tube pin marked "P" on 6AV6 tube. If no signal check or replace the following:

1. Check or replace condenser. (Item 18 on circuit diagram and parts layout.)
2. Check or replace resistor. (Item 41 on circuit diagram and parts layout.)

Next touch tube pins marked "G" and "DP" on 6AV6 tube. If no signal at either point check

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Chevrolet

or replace the following:

1. Check or replace 6AV6 tube.
2. Check or replace 6AV6 tube socket.
3. Check or replace resistors. (Items 45 and 46 on circuit diagram and parts layout.)

Next remove the shielded lead-in assembly from the audio jack, and move to the jack marked "I.F." Set the band switch to "A" position, turn Signal Generator volume control about a third open, tune Signal Generator to exactly 262 Kilocycles.

With the red lead, touch tube pin marked "P" on 6BA6 Intermediate Frequency Amplifier tube. If no signal, check or replace the following:

1. Check or replace Intermediate Frequency Transformer. (Item 7 on circuit diagram and parts layout.)

2. Check or replace resistors. (Items 38, 39, 42 and 44 on circuit diagram and parts layout.)
3. Check or replace condensers. (Items 22, 23, 24 and 25 on circuit diagram and parts layout.)
4. Check or replace volume and tone control. (Items 51A and 51B on circuit diagram and 51 on parts layout.)

Next touch tube pin marked "G" on 6BA6 I.F. tube. If no signal check or replace the following:

1. Check or replace 6BA6 tube.
2. Check or replace 6BA6 tube socket.
3. Check or replace sensitivity control. (Item 53 on circuit diagram and parts layout.)

Next touch tube pin marked "P" on 6BE6 tube. If no signal check or replace the following:

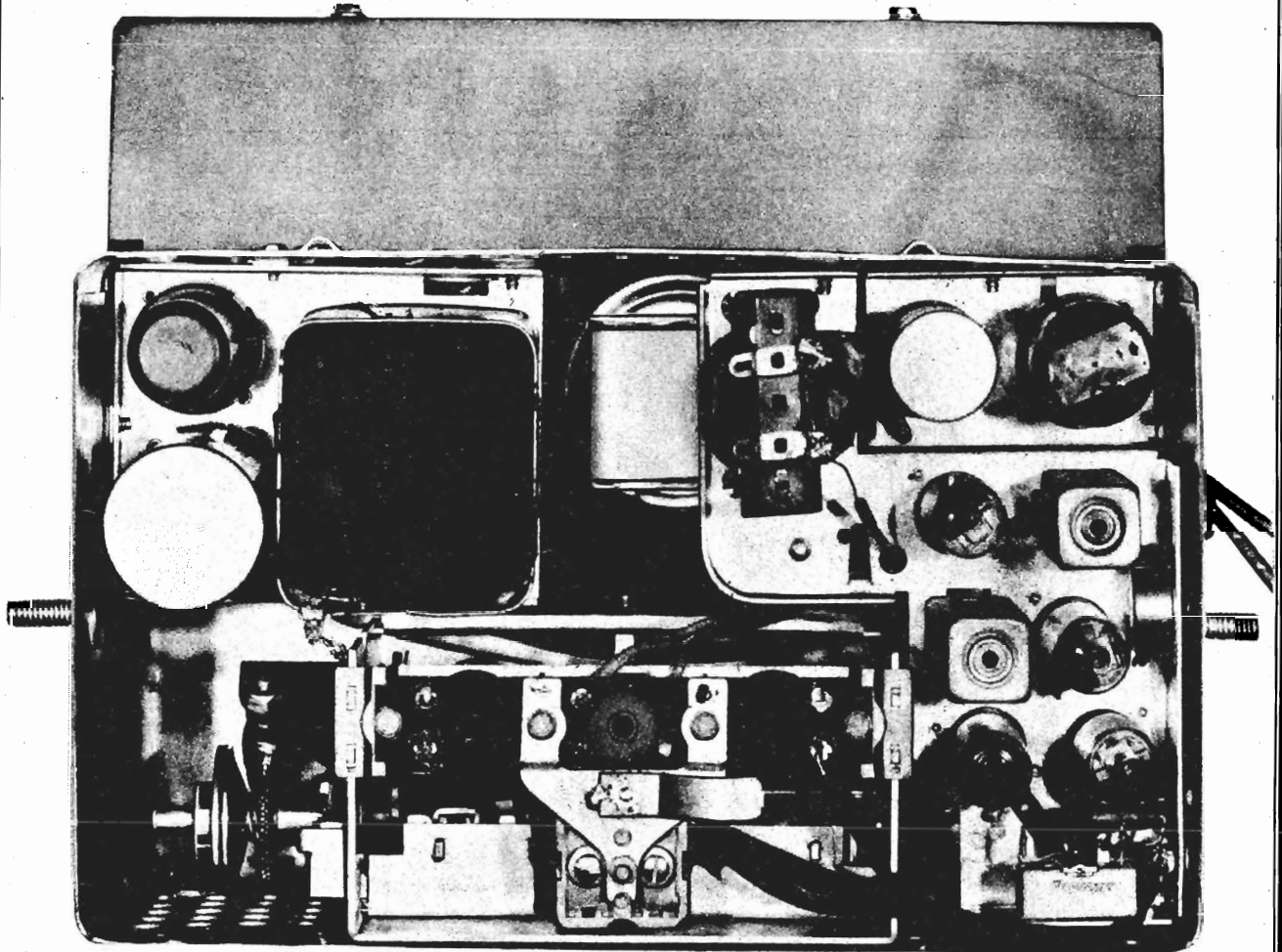


Figure 27

MODEL 986515,
Chevrolet

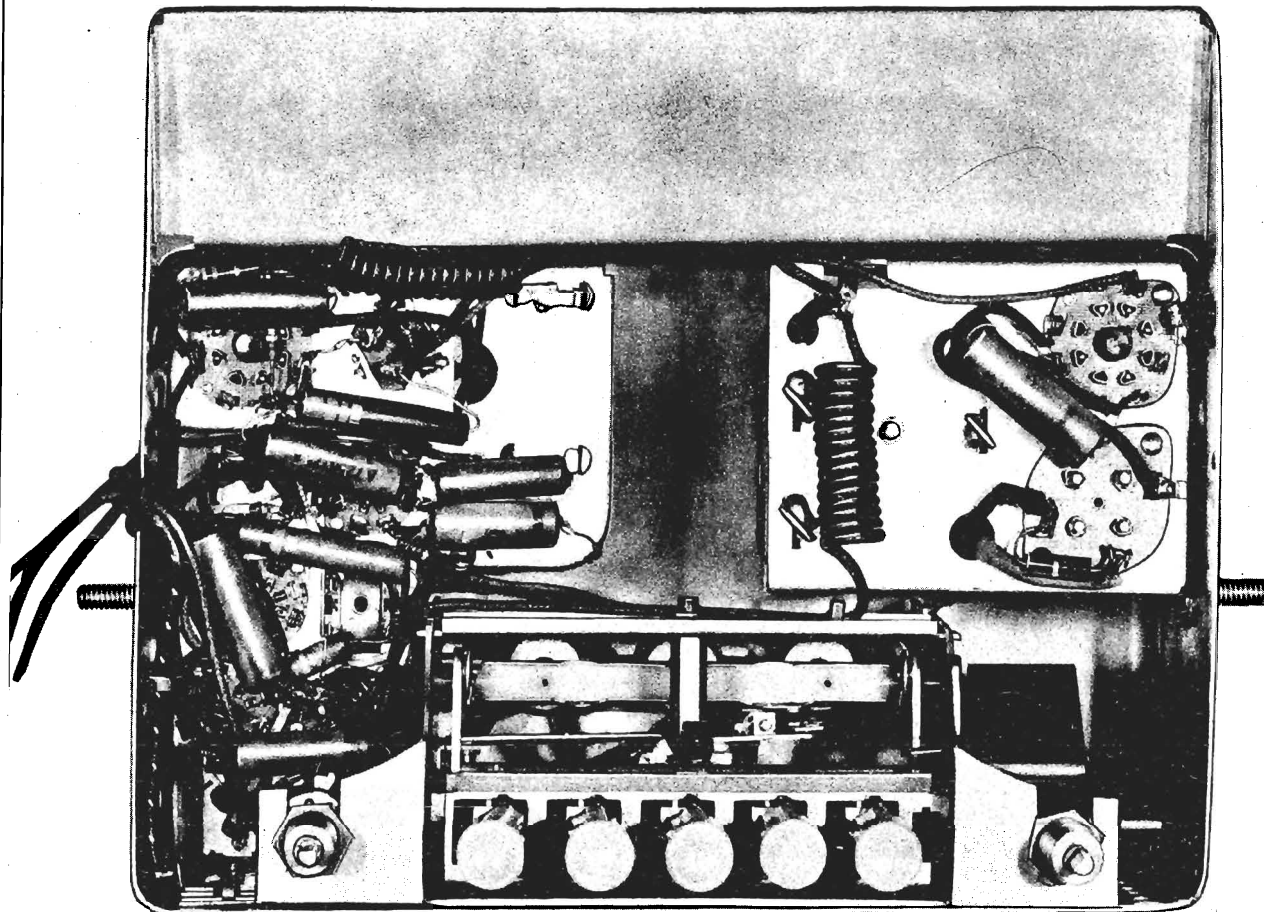


Figure 28

1. Check or replace Intermediate Frequency transformer. (Item 6 on circuit diagram and parts layout.)
2. Check or replace resistor. (Item 37 on circuit diagram and parts layout.)

Next touch tube pin marked "G" on 6BE6 tube. If no signal check or replace the following:

1. Check or replace 6BE6 tube.
2. Check or replace 6BE6 tube socket.

Now change the shielded lead-in assembly from I.F. jack to jack marked "R.F.," tune Radio receiver and Signal Generator to 1000 kilocycles, set band switch to "B" position. Next touch tube pin marked "P" on 6BA6 Radio Frequency Amplifier tube. If no signal check or replace the following:

1. Check or replace Radio Frequency Coil. (Item 4 on circuit diagram and parts layout.)

2. Check or replace Oscillator coil. (Item 5 on circuit diagram and parts layout.)
3. Check or replace condensers. (Items 14, 15A, 15B, 16 and 17 on circuit diagram and parts layout.)

Next touch tube pin marked "G" on 6BA6 R.F. tube. If no signal check or replace the following:

1. Check or replace 6BA6 tube.
2. Check or replace 6BA6 tube socket.
3. Check or replace resistor. (Item 31 on circuit diagram and parts layout.)

Leaving the Signal Generator set as above and radio still tuned to 1000 kilocycles, place a .000075 mfd. condenser on red lead of Signal Generator and plug into antenna socket. If no signal check or replace the following:

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1. Check or replace antenna coil. (Item 1 on circuit diagram and parts layout.)
2. Check or replace chokes. (Items 2 and 3 on circuit diagram and parts layout.)
3. Check or replace condensers. (Items 11 and 13 on circuit diagram and parts layout.)
4. Check or replace resistor. (Item 32 on circuit diagram and parts layout.)

PROCEDURE FOR ALIGNMENT OF 986515 RADIO

All receivers are properly aligned at the factory and should require no further adjustments, unless the adjustments have been tampered with, or new coils, I.F. Transformers or tuning cores have been installed.

To properly align the receiver, it will be necessary to have an output meter and signal generator. If any of the tuning coils or cores have been replaced, see "Capacity and Inductance Alignment Procedure." If only the adjustments have been tampered with or an I.F. transformer has been replaced the receiver is aligned as follows:

Set the Volt-Ohm-Milliammeter Master selector switch in the 30 position, the voltage selector switch in A.C. 1K \sim /V position and place the leads in the jack marked "output meter," place the other end of the black lead to radio chassis for ground. Place the red lead to the terminal of the speaker to which the green lead of the audio output transformer is connected, as outlined in the 1950 Chevrolet Radio Service and Shop Manual. (Speaker is item 54 and audio output transformer item 55 on circuit diagram and parts layout.)

Turn on the Signal Generator On and Off switch and turn on the radio receiver, turn volume control to maximum position. Set modulation switch in the modulated position, turn the band selector to the "A" position and tune the Signal Generator to exactly 262 Kilocycles. Place the Signal Generator shielded lead in jack marked "I.F." and place the black lead to the radio chassis for ground. Place red lead to tube pin marked "G" on the 6BE6 tube.

Adjust the Signal Generator volume control so that the meter reads about 10 on the meter scale. Adjust in sequence trimmers "A, B, C and D" (on circuit diagram and parts layout)

for maximum meter reading. Repeat adjustment to get best alignment. (Keep the Signal Generator volume turned down so that during adjustments, the meter does not read more than 10 on the meter scale.)

Now place Signal Generator shielded lead assembly in the jack marked "R.F.", set the band selector switch in "B" position, tune the Signal Generator to exactly 1615 kilocycles, place a .000075 mfd. condenser on the red lead and connect to the antenna connector. Tune the radio receiver to the stop at the 1600 kilocycle end of the dial. (Keep the Signal Generator volume control adjusted so the meter reads about 10 on the meter scale.)

Now adjust trimmers "E, F and G" (on circuit diagram and parts layout), in sequence for maximum reading on the meter scale. Repeat for best alignment. Tune the Signal Generator and radio receiver to exactly 1000 kilocycles and repeat adjustments of trimmers "F and G" only for maximum meter reading.

After the receiver has been installed in the car, tune in a weak station near 1000 kilocycles, with volume control turned to maximum position and antenna extended to full height. Re-adjust trimmer "G" only for maximum volume.

CAPACITY AND INDUCTANCE ALIGNMENT PROCEDURE

This alignment procedure is to be used only when any of the following parts have been replaced in the radio, antenna coil, radio frequency coil, oscillator coil or any of the tuning cores.

The Intermediate Frequency alignment at 262 kilocycles are the same as outlined in "Alignment procedure" on page 18. After completing the alignment at 262 kilocycles for the intermediate frequency transformers "A, B, C and D" proceed as follows:

Connect Signal Generator red lead to a .000075 mfd. condenser and connect to antenna connector.

Mechanically align iron cores "H, J and K" (on circuit diagram and parts layout) to measure 1-25/32 inches in coil forms from rear mounting edge of coil forms. (See Figure 26.) Now set the Signal Generator to exactly 1615 kilocycles, set band switch to "B" position, tune radio receiver to the stop on the 1600 kilocycle end of the dial. Have output meter

MODEL 986515,
Chevrolet

hooked up as outlined in "Alignment Procedure." Now adjust iron cores "H, J and K" (on circuit diagram and parts layout) in sequence for maximum meter reading.

Now adjust trimmers "E, F and G" (on circuit diagram and parts layout) in sequence for maximum reading on meter scale. Now tune Signal Generator and radio receiver to 1000 kilocycles, and readjust iron cores "J and K" only for maximum reading on meter scale. **DO NOT READJUST IRON CORE "H" ON THIS ADJUSTMENT.** Repeat the adjustment of iron cores "J and K" at 1000 kilocycles for maximum reading on meter scale.

Reset Signal Generator to 1615 kilocycles and tune radio receiver to stop on 1600 kilocycle end of dial, then readjust trimmers "F and G" only until no further increase in the meter reading can be obtained.

After the radio receiver has been installed in the car, tune in a weak station near 1000 kilocycles, with volume control turned to maximum position and antenna extended to full height. Readjust trimmer "G" only for maximum volume.

SERVICE PARTS LIST 986515 RADIO

| | | |
|------------|------------------|-------------|
| Illus. No. | Service Part No. | Description |
|------------|------------------|-------------|

COILS

- | | | |
|---|---------|----------------------|
| 1 | 7258914 | Antenna |
| 2 | 7258502 | Antenna Series Choke |
| 3 | 7240251 | Antenna Spark Choke |
| 4 | 7258914 | Radio Frequency |
| 5 | 7258911 | Oscillator |
| 6 | 1218725 | 1st. I.F. |
| 7 | 1218726 | 2nd I.F. |
| 8 | 7260470 | Hash Choke |
| 9 | 7260090 | Hash Choke |

CONDENSERS

- | | | |
|-----|---------|---------------------------|
| 11 | 7260172 | Antenna Trimmer |
| 12 | 7230592 | .05 mfd. 600V. Tubular |
| 13 | 7230592 | .05 mfd. 600V. Tubular |
| 14 | 1215189 | .000010 mfd. molded |
| 15 | 7242454 | Dual Trimmer |
| 15A | | R.F. Section |
| 15B | | Oscillator Section |
| 16 | 1217736 | .000039 Mfd. Molded |
| 17 | 7257424 | .000180 Mfd. Compensating |
| 18 | 7230592 | .05 mfd. 600V. Tubular |

- | | | |
|-----|---------|--------------------------|
| 19 | 7260065 | Electrolytic |
| 19A | | 20 mfd. 25 V. |
| 19B | | 20 mfd. 400 V. |
| 19C | | 20 mfd. 400 V. |
| 20 | 1217848 | Hash plate (chassis) |
| 21 | 1219693 | .015 mfd. 800V. Tubular |
| 22 | 1218499 | .0015 mfd. 200V. Tubular |
| 23 | 7230767 | .005 mfd. 600V. Tubular |
| 24 | 7232957 | .000330 mfd. molded |
| 25 | 7230767 | .005 mfd. 600V. Tubular |
| 26 | 1219369 | Dual Spark Plate |
| 27 | 1217848 | Hash plate (chassis) |
| 28 | 7240906 | .006 mfd. 1600V. Tubular |

RESISTORS

- | | | |
|----|---------|-------------------------------------------------------------------|
| 31 | 1215558 | 68 ohms 1/2W. Insulated |
| 32 | 1214563 | 2.2 megohms 1/2W. Insulated |
| 33 | 7233653 | 15,000 ohms 2W. Insulated |
| 34 | 7237595 | 15,000 ohms 1W. Insulated |
| 35 | 1214557 | 330,000 ohms 1/2W. Insulated |
| 36 | 1214550 | 22,000 ohms 1/2W. Insulated |
| 37 | 1213282 | 1 megohm 1/2W. Insulated |
| 38 | 1214553 | 47,000 ohms 1/2W. Insulated |
| 39 | 1214557 | 330,000 ohms 1/2W. Insulated |
| 40 | 1214555 | 220,000 ohms 1/2W. Insulated |
| 41 | 1214555 | 220,000 ohms 1/2W. Insulated |
| 42 | 1213270 | 100,000 ohms 1/2W. Insulated |
| 43 | 7233773 | 330 ohms 1W. Insulated |
| 44 | 1215563 | 6.8 megohms 1/2W. Insulated |
| 45 | 1213240 | 2,700 ohms 1/2W. Insulated |
| 46 | 1215559 | 180 ohms 1/2W. Insulated |
| 47 | 7237994 | 220 ohms 1W. Insulated |
| 48 | USE | 7242844 - 2700 ohms 2W. 7240918 - 5600 ohms 1W. in parallel |

TUBES

- | | |
|---------|--------------------------------|
| 1217690 | 6BA6 R.F. and I.F. Amplifier |
| 1217691 | 6BE6 Oscillator-Modulator |
| 1218506 | 6AV6 Detector-A.V.C.-1st Audio |
| 1213793 | 6V6GT Audio Output |
| 1211924 | Rectifier |

MISCELLANEOUS ELECTRICAL PARTS

- | | | |
|-----|---------|-----------------------------------|
| 51 | 7260084 | Control - Volume, Tone and Switch |
| 51A | | Tone Control |
| 51B | | Volume Control |
| 51C | | Switch |
| 52 | 125588 | Lamp - Dial |
| 53 | 7242204 | Sensitivity Control |
| 54 | 7259381 | Speaker - 6" x 9" P.M. |
| 55 | 7260060 | Transformer - Audio Output |

PAGE 22-48 UNITED MOTORS

MODEL 986515,
Chevrolet

- 56 7260100 Transformer - Power
- 57 7239124 Vibrator

MECHANICAL PARTS

- 60 7239475 Socket - Antenna
- 7258073 Socket - 7 Pin Miniature
- 7236279 Socket - Octal Tube
- 7239125 Socket - Vibrator

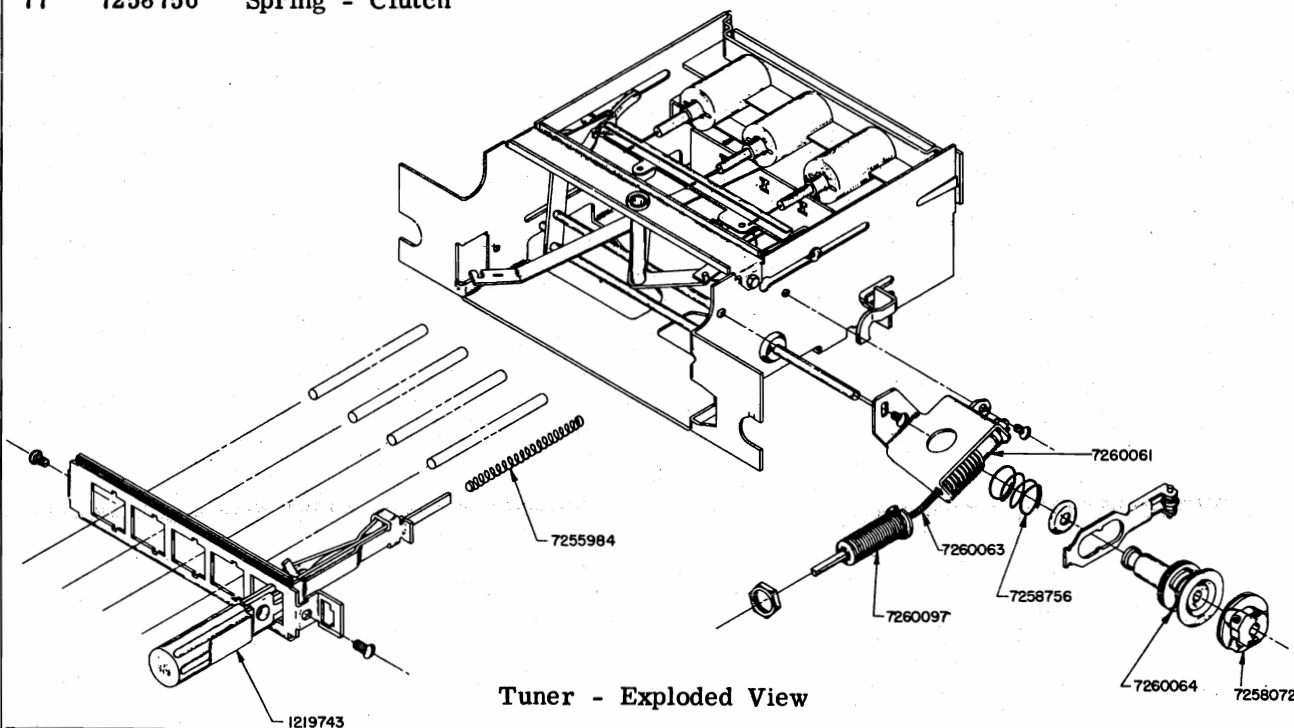
TUNER PARTS

- 62 7260018 Backplate - Pointer
- 147481 Ball bearing (10 to Unit)
- 63 7260097 Bushing & Manual Drive Shaft Assy.
- 64 7260068 Manual Drive Shaft
- 65 7258072 Clutch - Disc, Driven
- 66 7258203 Connecting Link Core Bar
- 67 7258210 Core Guide Bar
- 68 7256271 Pointer Connecting Link
- 69 7255992 Spring Pointer Connecting Link
- 70 7258468 Core Iron Tuning
- 71 7260076 Escutcheon Assembly
- 72 1219744 Dial Package
- 73 7260064 Gear and Bushing - Clutch
- 74 7260074 Pointer Assembly
- 75 7260093 Pointer Tip
- 76 1219742 Push Button and Slide Assembly
- 77 7258756 Spring - Clutch

- 78 7257415 Spring - Core Bar Connecting Link
- 79 7255984 Spring Slide Return
- 80 1219743 Socket - Dial Light
- 81 7260061 Worm Gear and Bracket

INSTALLATION PARTS

- 7259728 Installation Package
Contains the following:
- 1912900 Condenser - Ammeter
- 1910147 Condenser - Generator
- 1910147 Condenser - Ignition Coil
- 1912900 Condenser - Voltage Regulator
- 1887829 Suppressor - Distributor
- 147685 Fuse
- 7257921 Fuse Holder Body - Male
- 7259733 Knob - Control
- 7259734 Knob - Dummy
- 7259738 Knob - Tone Control
- 7259736 Mounting Bracket L.H.
- 7259735 Mounting Bracket R.H.
- 7259940 Brace - Receiver Mounting, Rear
- 1888204 Nipple - Rubber - Distributor
- 7257984 Serrated Pad
- 7259941 Spacer - Mounting
- 494786 Collector - Static



Tuner - Exploded View

Figure 30

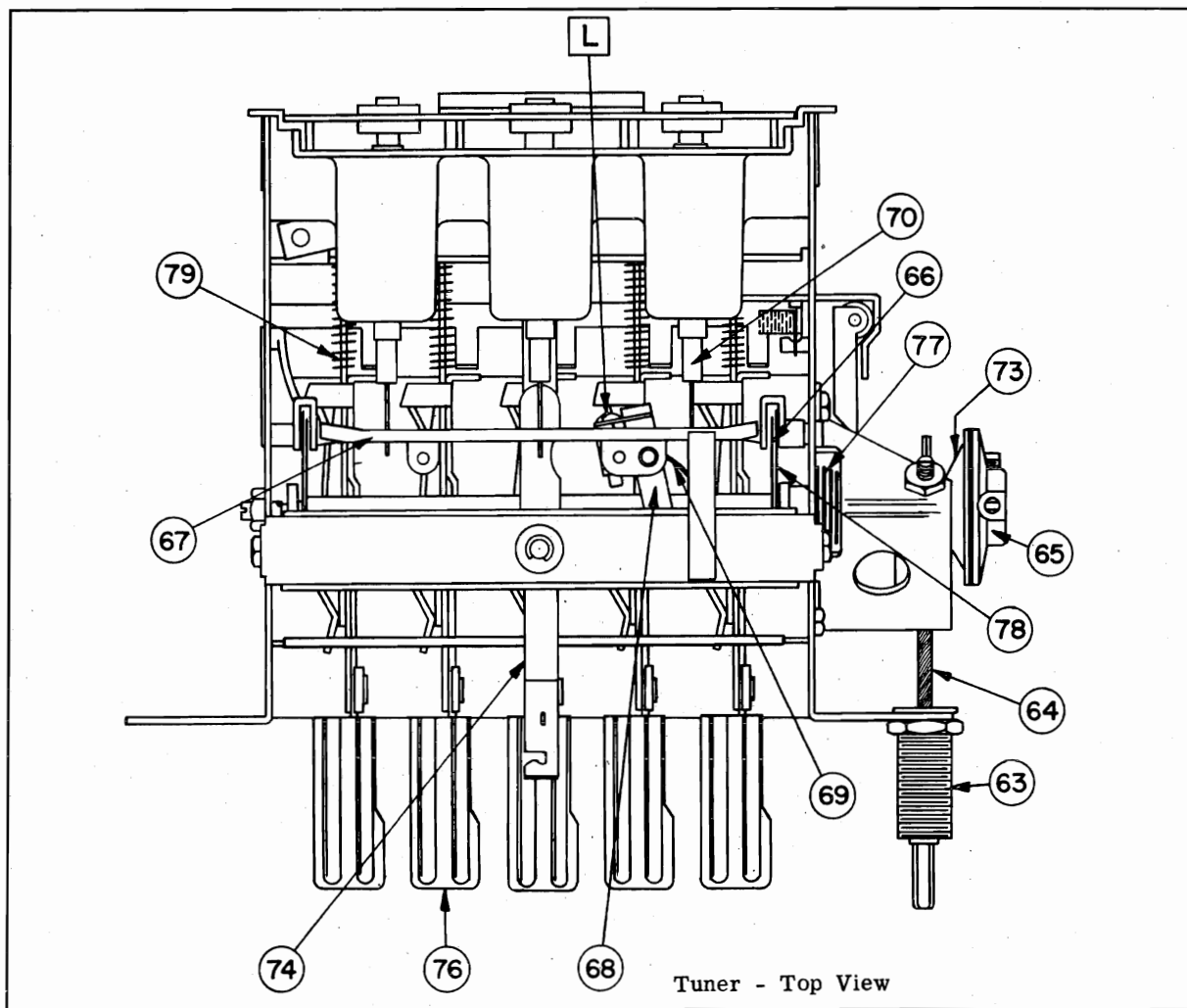


Figure 31

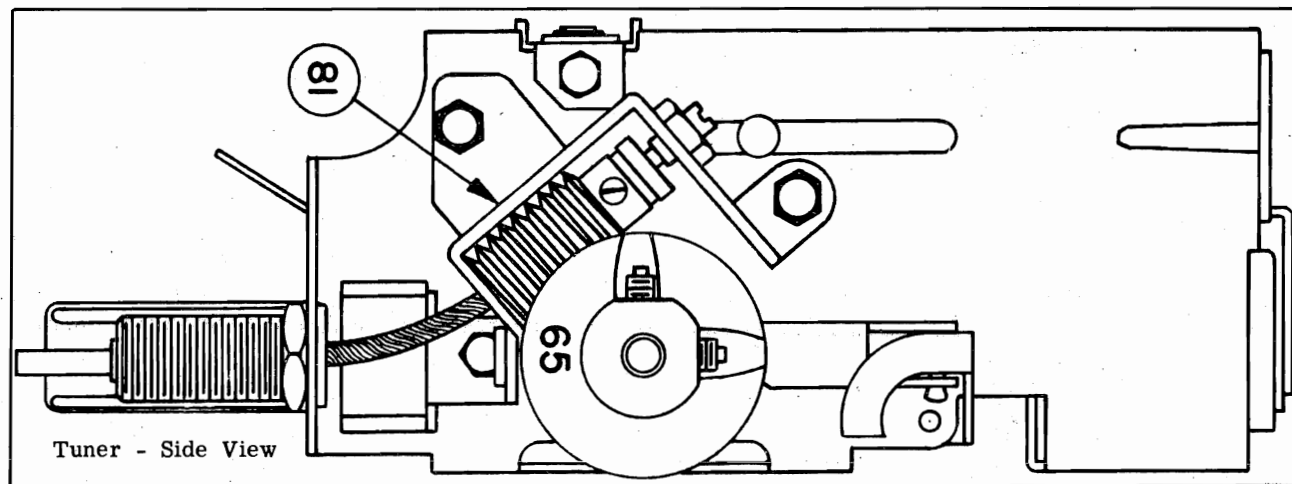


Figure 32

MODEL 986516,
Chevrolet

**CUSTOM DELUXE RADIO
MANUAL TUNING 986516**

This radio is a single unit five tube (plus rectifier) superheterodyne automobile receiver designed expressly for 1951 Chevrolet passenger car installation. In this type of design the speaker is integral with the receiver and instrument panel by means of a special rubber gasket which, due to location and baffling, permits exceptionally good tone quality.

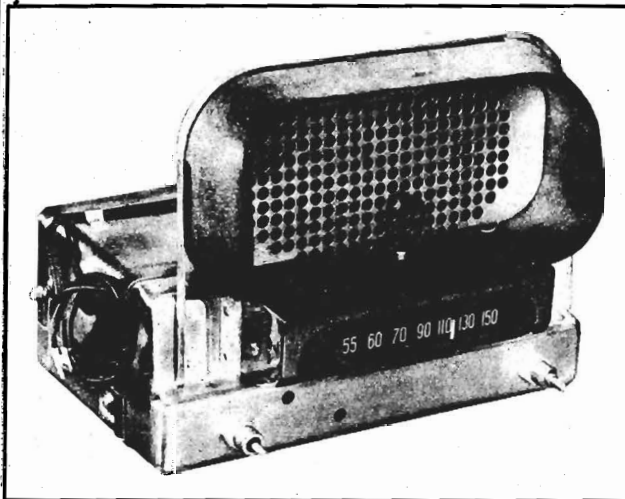


Figure 34

ELECTRICAL DESCRIPTION

The circuit used in this receiver is the superheterodyne type and uses no regeneration. The tuning circuits are of the permeability type and tuned by varying the iron cores in and out of the antenna, radio frequency and oscillator coils like pistons. (See Figure 35.)

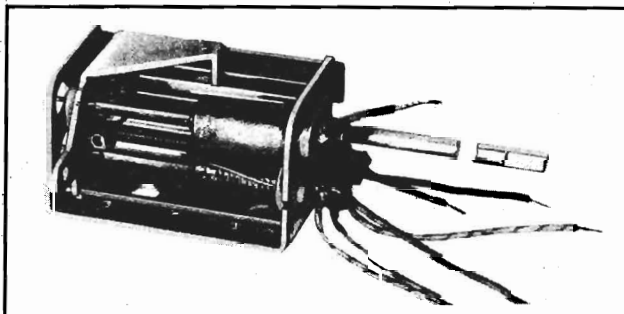


Figure 35

The Intermediate Frequency stages are tuned by means of two iron cores being adjusted the top and bottom sides of the I.F. transformer, both the first (input) and second (output) Intermediate Frequency transformers are tuned by this method. (See Figure 36.)

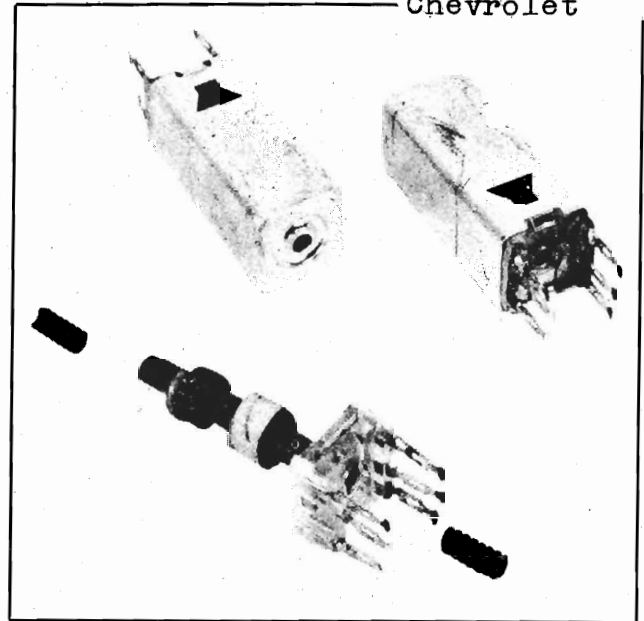


Figure 36

The antenna circuit is capacity coupled to the antenna by means of an antenna trimmer condenser to take care of normal variations in antenna and antenna coil capacity. The antenna condenser is adjustable by means of a small screw driver, and is located at the rear of the radio case. The audio stage is transformer coupled to the output tube to take advantage of all gain and tone quality that the receiver is capable of developing. The automatic volume control is of the delayed signal type and is very capable of maintaining a constant level of volume at all times. Very high frequency filter chokes are used in the radio frequency and oscillator grid circuits to discriminate against ignition interference in the receiver, thus eliminating the use of spark plug suppressors. The vibrator is the full wave non-synchronous type using a 6X5GT rectifier tube and will operate on either a negative or positive ground.

TUBE COMPLEMENT AND FUNCTION

| | |
|-------|-----------------------------------------------------|
| 6BA6 | Radio Frequency Amplifier |
| 6BE6 | Oscillator - Modulator |
| 6BA6 | Intermediate Frequency Amplifier |
| 6AT6 | Detector - Automatic Volume Control and First Audio |
| 6V6GT | Audio Output |
| 6X5GT | Rectifier |

GENERAL INFORMATION

Tuning range 540 - 1610 Kilocycles.

MODEL 986516,
Chevrolet

Intermediate Frequency 257.5 Kilocycles.
Maximum Power Output 3.5 Watts.
Undistorted Power Output 2.5 Watts.
Current Drain Permanent Magnet Speaker 6.5
Amperes at 6 Volts.
Voice Coil Impedance 3.2 ohms at 400 Cycles
Fuse protection 14 Amperes 25 Volt.

**PROCEDURE FOR INSTALLATION
OF 986516 RADIO AND ANTENNA**

The installation procedure for the antenna and receiver are the same as for 986515 receiver.

**PROCEDURE FOR SERVICING
986516 RADIO**

The same procedure for operating radio test equipment as outlined for 986515

**PROCEDURE FOR CHECKING THE
VOLTAGE OF 986516 RADIO**

It will be necessary to remove the front cover with the dial and speaker assembly to check the voltages.

Hookup radio on the service bench to a 6 volt power-unit, or a fully charged battery. It is important that you have at least 5.9 volts at the spark plate of the radio, or the voltage readings will all be low.

First set the Master selector switch of the volt-ohm-milliammeter to the 12 position, set the voltage selector switch to D.C. 1K \sim /V. Place the test leads in jack marked "test leads," ground the "-" negative lead to radio chassis for ground, with the red lead check all tube pins marked "H" which show a reading on the voltage chart. (See Figure 37.) If no voltage or incorrect, check or replace the following:

1. Check or replace On and Off switch. (Item 51C on circuit diagram and 51 on parts layout.)
2. Check or replace condensers. (Items 24, 25 and 26 on circuit diagram and parts layout.)
3. Check or replace choke. (Item 5 on circuit diagram and parts layout.)

Now set the Master selector switch to the 600 position and the voltage selector switch to A.C. 1K \sim /V. position. With the red lead check the two terminals marked "P" on the 6X5GT tube, both terminals should read 270 to 280 volts A.C. If incorrect or no voltage check the following:

1. Check or replace condensers. (Item 26 and 27 circuit diagram and parts layout.)
2. Check or replace choke. (Item 5 on circuit diagram and parts layout.)
3. Check or replace power transformer. (Item 55 on circuit diagram and parts layout.)
4. Check or replace resistors. (Items 43 and 44 on circuit diagram and parts layout.)
5. Check or replace vibrator. (Item 56 on circuit diagram and parts layout.)

Now change the Master selector switch to the 300 position, and the voltage selector switch to D.C. 1K \sim /V. position, leaving the leads in the same jacks and the black lead grounded to the radio chassis. Now with the red lead check the voltage on the 6X5GT tube, pin marked "K." It should read 245 to 255 volts D.C. If incorrect or no voltage check the following:

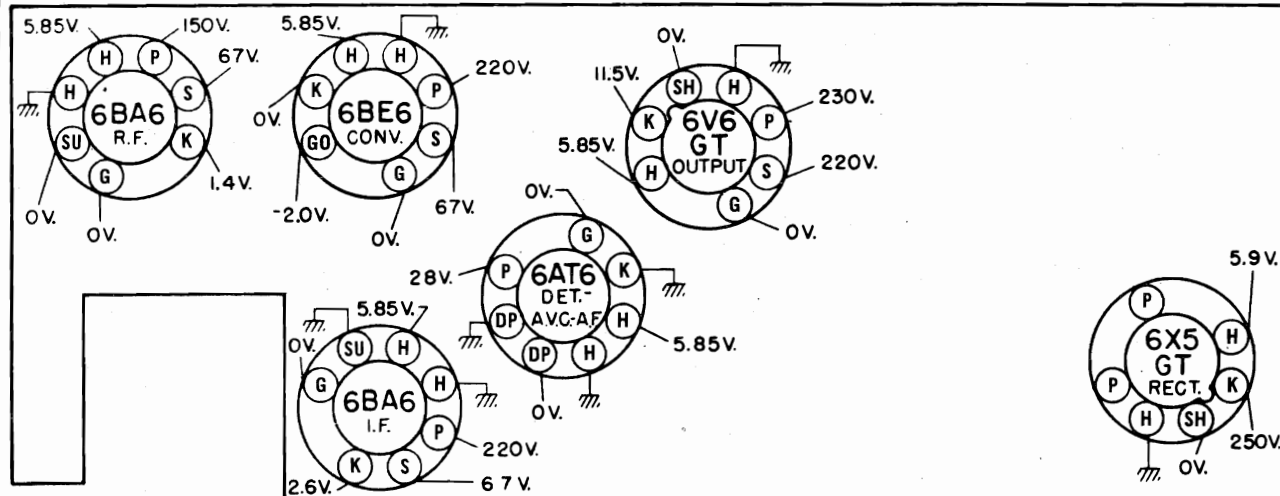
1. Check or replace 6X5GT tube.
2. Check or replace 6X5GT socket.

Next check the voltage on the 6V6GT tube, pin marked "P." It should read 225 to 235 volts D.C. If incorrect or no voltage check the following:

1. Check electrolytic condenser. (Item 21 on parts layout, 21A on circuit diagram.)
2. Check or replace audio transformer. (Item 54 on circuit diagram and parts layout.)
3. Check or replace condenser. (Item 23 on circuit diagram and parts layout.)
4. Check or replace "B" choke. (Item 6 on circuit diagram and parts layout.)

Now check pin marked "S" on 6V6GT tube, should read 215 to 225 volts D.C. If incorrect or no voltage check the following:

1. Check or replace electrolytic condenser.



READINGS TAKEN FROM TUBE SOCKET CONTACTS TO CHASSIS WITH A D.C. VOLT-METER HAVING A RESISTANCE OF 1000 OHMS PER VOLT. "A" SUPPLY AT SPARK PLATE 5.9 VOLTS, "B" SUPPLY DRAIN APPROXIMATELY 50 MA.

Figure 37

- (Item 21B on circuit diagram, 21 on parts layout.)
2. Check or replace resistor. (Item 42 on circuit diagram and parts layout.)
- Next check pin marked "K" on 6V6GT tube, should read 10 to 12 volts D.C. If incorrect or no voltage, check the following:
1. Check or replace electrolytic condenser. (Item 21A on circuit diagram, 20 on parts layout.)
 2. Check or replace resistor. (Item 40 on circuit diagram and parts layout.)
- Now check pin marked "P" on 6AT6 tube, should read 25 to 28 volts D.C. If incorrect or no voltage check the following:
1. Check or replace condensers. (Item 19 and 20 on circuit diagram and parts layout.)
 2. Check or replace resistor. (Item 39 on circuit diagram and parts layout.)
- Next check pin marked "P" on 6BA6 I.F. tube, should read 215 to 225 volts D.C. If incorrect or no voltage check the following:
1. Check or replace Intermediate frequency transformer. (Item 4 on circuit diagram and parts layout.)
- Now check pin marked "S" on 6BA6 I.F. tube,
- should read 62 to 72 volts D.C. If incorrect or no voltage check the following:
1. Check or replace resistor. (Item 35 on circuit diagram and parts layout.)
- Next check pin marked "P" on 6BE6 tube, should read 215 to 225 volts D.C. If incorrect or no voltage check the following:
1. Check or replace Intermediate frequency transformer. (Item 3 on circuit diagram and parts layout.)
- Next check pin marked "S" on 6BE6 tube, should read 62 to 72 volts D.C. If incorrect or no voltage check the following:
1. Check or replace resistor. (Item 35 on circuit diagram and parts layout.)
 2. Check or replace condenser. (Item 11 on circuit diagram and parts layout.)
- Next check pin marked "P" on 6BA6 radio frequency tube, should read 145 to 155 volts D.C. If incorrect or no voltage check or replace the following:
1. Check or replace condensers. (Items 12 and 13 on circuit diagram and parts layout.)

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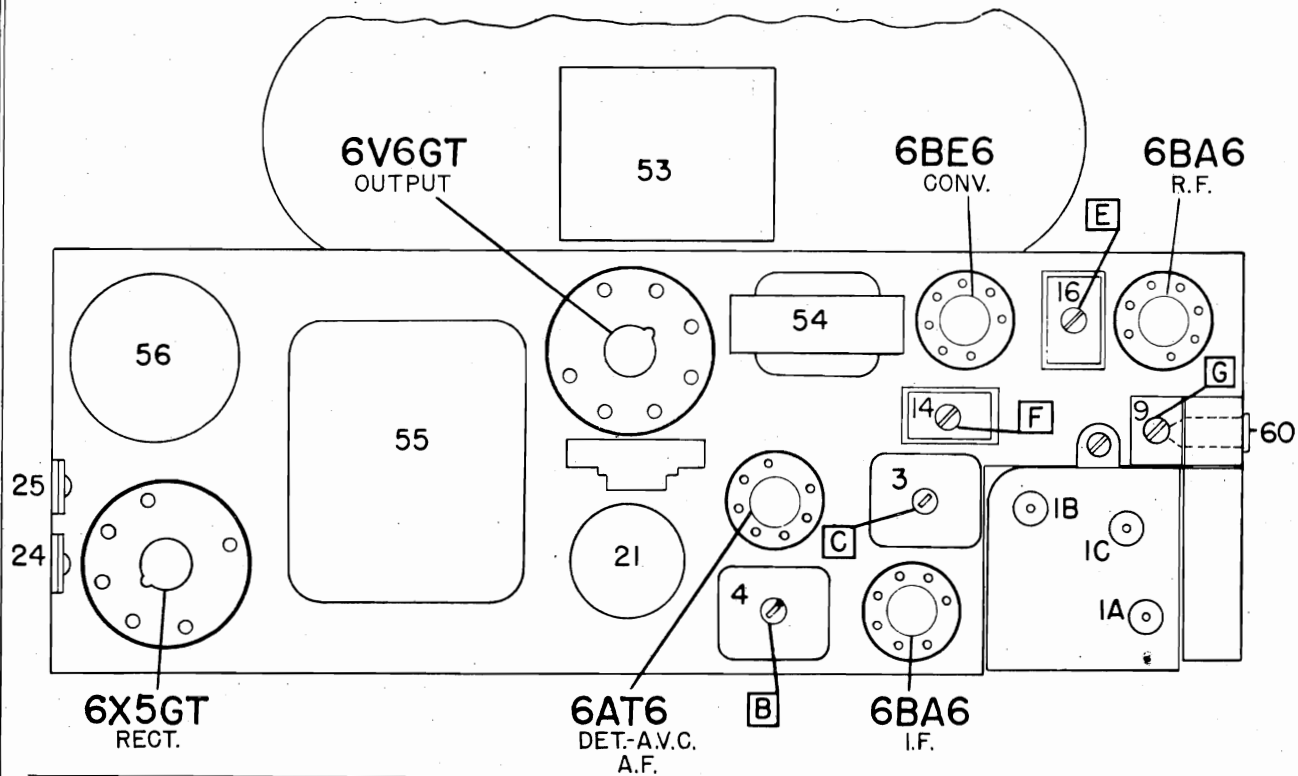


Figure 38

2. Check or replace resistor. (Item 31 on circuit diagram and parts layout.)

2. Check or replace condenser. (Item 11 on circuit diagram and parts layout.)

Next check pin marked "S" on 6BA6 radio frequency tube, should read 62 to 72 volts D.C. If incorrect or no voltage check or replace the following:

We have now checked the tubes, vibrator and voltages, with these being correct and radio does not play, the trouble will be in the grid circuit of the radio. To continue it will be necessary to check the grid circuit by means of Signal Tracing.

1. Check or replace resistor. (Item 35 on circuit diagram and parts layout.)

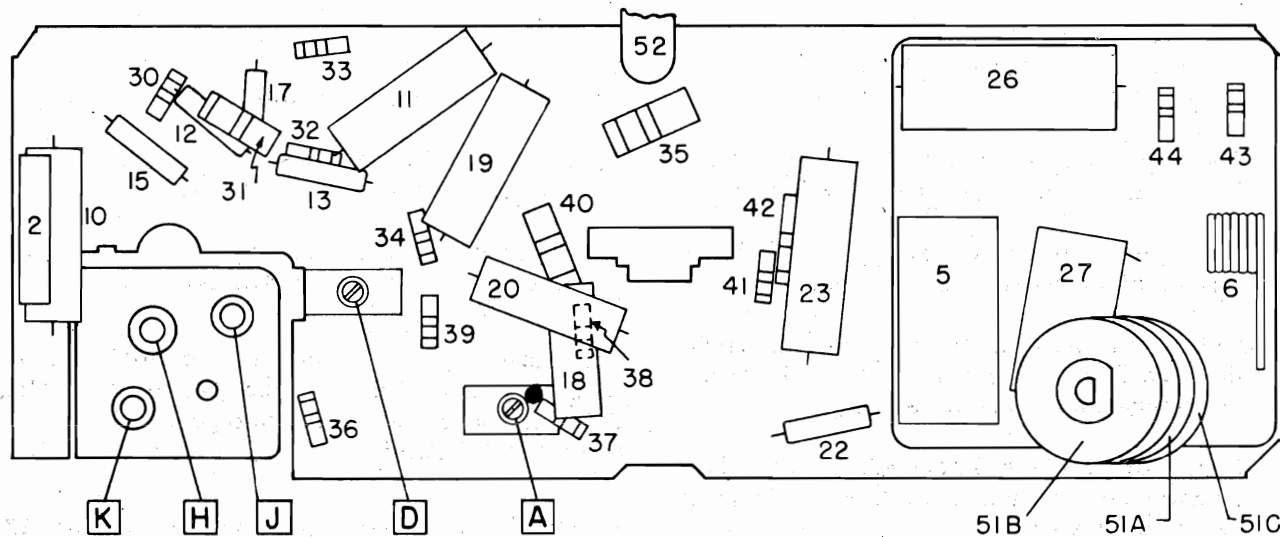


Figure 39

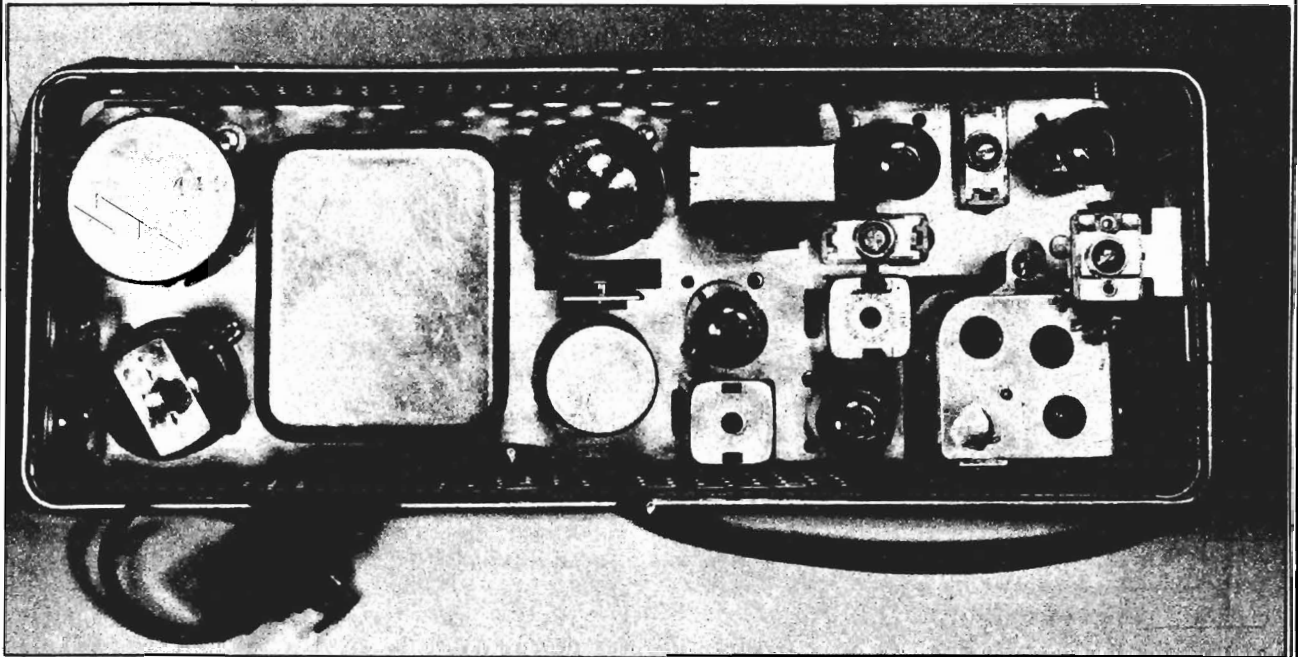


Figure 40

**PROCEDURE FOR SIGNAL TRACING
RADIO 986516**

Turn on Signal Generator On and Off switch, place the modulation switch in the modulated position, set Signal Generator tone control to .5, place shielded lead assembly in jack marked "Audio." Ground the black lead of Signal Generator to the radio chassis.

With red lead touch tube pin marked "P" on 6V6GT tube. If no signal check or replace the following:

1. Check or replace condenser. (Item 23 on circuit diagram and parts layout.)
2. Check or replace audio transformer. (Item 54 on circuit diagram and parts layout.)
3. Check or replace speaker. (Item 53 on circuit diagram and parts layout.)

Next touch tube pin marked "G" on 6V6GT tube. If no signal check or replace the following:

1. Check or replace 6V6GT tube.
2. Check or replace 6V6GT tube socket.

Next touch tube pin marked "P" on 6AT6 tube. If no signal check or replace the following:

1. Check or replace condensers. (Items 19, 20 and 22 on circuit diagram and parts layout.)
2. Check or replace resistor. (Item 41 on circuit diagram and parts layout.)
3. Check or replace tone control. (Item 51B on circuit diagram and 51 on parts layout.)

Next touch tube pin marked "G" on 6AT6 tube. If no signal check or replace the following:

1. Check or replace 6AT6 tube.
2. Check or replace 6AT6 tube socket.

Next touch the ungrounded tube pin marked "DP" on the 6AT6 tube. If no signal check or replace the following:

1. Check or replace 6AT6 tube.
2. Check or replace 6AT6 tube socket.

Now change the shielded lead assembly to the jack marked "I.F." Intermediate Frequency on the Signal Generator, tune the Signal Generator to exactly 257.5 kilocycles, set band switch in "A" position, turn Signal Generator volume control about one third open.

Next touch tube pin marked "P" on 6BA6 I.F. amplifier tube. If no signal check or replace

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Chevrolet

the following:

1. Check or replace intermediate frequency transformer. (Item 4 on circuit diagram and parts layout.)
2. Check or replace resistors. (Items 37 and 38 on circuit diagram and parts layout.)
3. Check or replace condenser. (Item 18 on circuit diagram and parts layout.)
4. Check or replace volume control. (Item 51A on circuit diagram and 51 on parts layout.)

Next touch tube pin marked "G" on 6BA6 I.F. amplifier tube. If no signal check or replace the following:

1. Check or replace 6BA6 tube.
2. Check or replace 6BA6 tube socket.
3. Check or replace resistor. (Item 36 on circuit diagram and parts layout.)

Next touch tube pin marked "P" on 6BE6 tube. If no signal check or replace the following:

1. Check or replace intermediate frequency transformer. (Item 3 on circuit diagram and parts layout.)

Next touch tube pin marked "G" on 6BE6 tube. If no signal check or replace the following:

1. Check or replace 6BE6 tube.
2. Check or replace 6BE6 tube socket.

Now change shielded lead assembly to the "R.F." radio frequency jack on the Signal Generator, set band switch to "B" position, tune Signal Generator to 1000 kilocycles.

Tune radio receiver to 1000 kilocycles. Next touch tube pin marked "P" on 6BA6 radio frequency tube. If no signal check or replace the following:

1. Check or replace coil and core assembly. (Item 1A, 1B and 1C on circuit diagram and 1 on parts layout.)
2. Check or replace condensers. (Items 12, 13, 14, 15, 16 and 17 on circuit diagram and parts layout.)

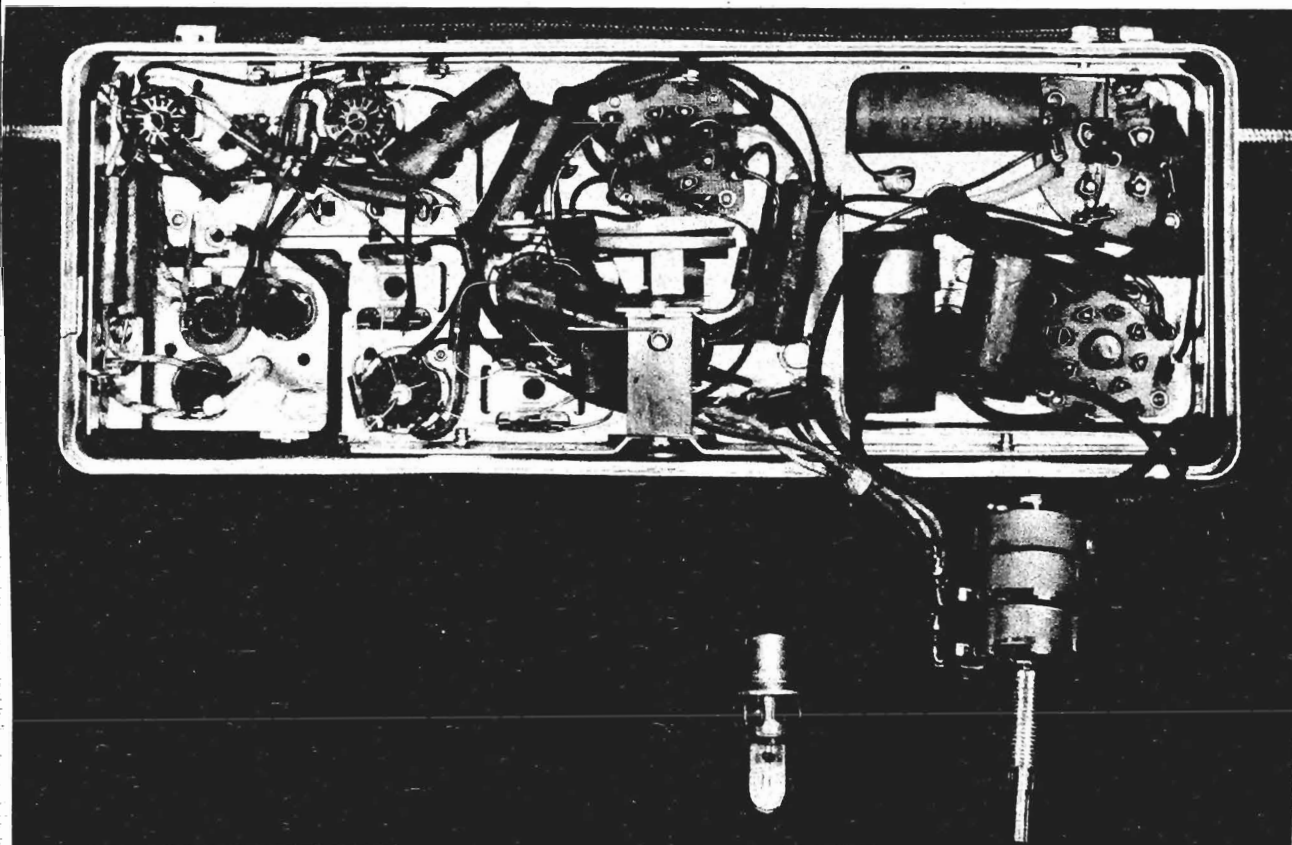
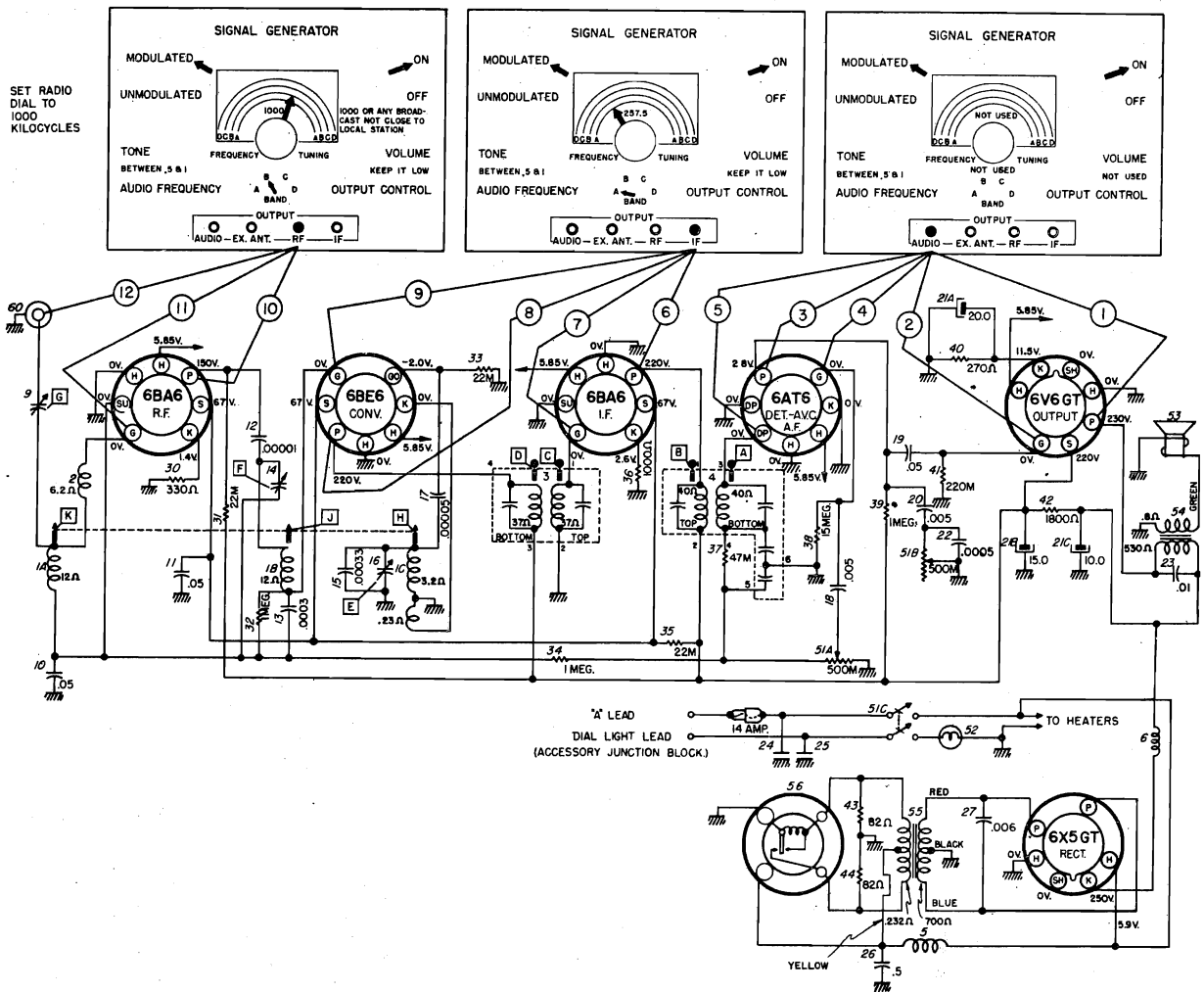


Figure 41



POINT SIGNAL STOPS - CHECK OR REPLACE ITEMS LISTED

| | |
|---------------------------------------------------------------------|--------------------------------------------------------------------------------|
| No signal at point 1 - check or replace - items 23-53-54 | No signal at point 7 - check or replace - item 36 - 6BA6 tube or tube socket |
| No signal at point 2 - check or replace - 6V6GT tube or tube socket | No signal at point 8 - check or replace - item 3 |
| No signal at point 3 - check or replace - items 19-20-22-41-51B | No signal at point 9 - check or replace - 6BE6 tube or tube socket |
| No signal at point 4 - check or replace - 6AT6 tube or tube socket | No signal at point 10 - check or replace - items 1B-1C-12-13-14-15-16-17-32-33 |
| No signal at point 5 - check or replace - 6AT6 tube or socket | No signal at point 11 - check or replace - 6BA6 tube or tube socket |
| No signal at point 6 - check or replace - items 4-18-37-38-51A | No signal at point 12 - check or replace - items 1A-2-9-10 |

Figure 42

Signal Tracing Procedure 986516 Radio

MODEL 986516,
Chevrolet

3. Check or replace resistors. (Items 32 and 34 on circuit diagram and parts layout.)

Next touch tube pin marked "G" on 6BA6 radio frequency tube. If no signal check or replace the following:

1. Check or replace 6BA6 tube.
2. Check or replace 6BA6 tube socket.
3. Check or replace resistor. (Item 30 on circuit diagram and parts layout.)

Next place red lead to antenna socket. If no signal check or replace the following:

1. Check or replace coil assembly. (Items 1A, 1B and 1C on circuit diagram and 1 on parts layout.)
2. Check or replace condensers. (Items 9 and 10 on circuit diagram and parts layout.)
3. Check or replace choke. (Item 2 on circuit diagram and parts layout.)

PROCEDURE FOR ALIGNMENT OF 986516 RADIO

All receivers are aligned at the factory and should require no further adjustment, unless the adjustments have been tampered with, or new coils, I.F. Transformers or tuning cores have been installed.

To properly align the receiver it will be necessary to have an output meter and signal generator. If any of the tuning coils or cores have been replaced, see "Capacity and Inductance Alignment Procedure." If only the adjustments have been tampered with or an I.F. transformer has been replaced, the receiver is aligned as follows: Set the volt-ohm-meter Master selector switch in 30 position, the voltage selector switch in A.C. 1K \sqrt{V} ., place leads in jacks marked "output meter." Place the other end of the black lead to the radio chassis for ground. Place red lead to the terminal of the speaker to which the green wire of the Audio transformer is connected, as outlined in the 1950 Chevrolet Radio Service and Shop Manual. (Speaker is item 53 and audio output transformer item 54 on circuit diagram and parts layout.)

Turn on the On and Off switch of the Signal Generator, turn radio receiver on with volume

control turned to maximum position, set modulation switch in modulated position, turn band selector switch to "A" position, tune Signal Generator to exactly 257.5 kilocycles. Place shielded lead in "I.F." jack, place black lead to radio chassis for ground, red lead to 6BE6 tube pin marked "G."

Adjust Signal Generator volume control so that the meter reads about 10 on the meter scale. Adjust in sequence trimmers "A, B, C and D" (on circuit diagram and parts layout) for maximum reading on the meter scale. (Keep the Signal Generator volume control turned down so that during adjustments the meter does not read more than 10 on the meter scale.)

Now place Signal Generator shielded lead assembly in the jack marked "R.F.", set band selector in "B" position, tune Signal Generator to exactly 1610 kilocycles, place the red lead to a .000075 mfd. condenser and connect to the antenna connector. Tune radio receiver to stop on the 1600 kilocycle end of dial. (Keep Signal Generator volume control adjusted so the meter reads about 10 on the meter scale.)

Now adjust trimmers "E, F and G" (on circuit diagram and parts layout) for maximum reading on meter scale. Repeat for best alignment. After the receiver has been installed in the car tune in a weak station near 1400 kilocycles, with volume control turned to maximum and antenna extended to full height. Re-adjust trimmer "G" only for maximum volume.

CAPACITY AND INDUCTANCE ALIGNMENT

This alignment procedure is to be used only when the tuner unit with the antenna, radio frequency, oscillator coils and tuning cores have been changed.

The intermediate frequency alignment at 257.5 kilocycles is the same as outlined in "Alignment Procedure" on page 18. After completing the alignment at 257.5 kilocycles for the intermediate frequency transformers "A, B, C and D" proceed as follows: Connect Signal Generator red lead to a .000075 mfd. condenser, and connect to antenna connector. Set Signal Generator to exactly 1610 kilocycles, tune radio receiver to stop at 1600 kilocycle end of dial. Have output meter hooked-up as outlined in "Alignment Procedure." Adjust trimmers "E, F and G" for maximum reading on meter scale.

MODEL 986516,
Chevrolet

Next tune Signal Generator to exactly 1400 kilocycles, tune radio receiver to exactly 1400 on the dial and adjust iron cores "H, J and K" for maximum reading on output meter scale. NOTE: The front end of the iron cores are slotted so that these adjustments can be made with a non-metallic screw driver that fits loosely in the coil form.

Repeat alignment procedure at 1610 and 1400 kilocycles until the maximum reading has been attained at 1600 and 1400 kilocycles adjustments.

After the receiver has been installed in the car, tune in a weak station near 1400 kilocycles, with volume control turned to maximum position and antenna extended to full height. Readjust trimmers "G" only for maximum volume.

SERVICE PARTS LIST 986516 RADIO

| Illus. No. | Service Part No. | Description |
|------------|------------------|--------------------------------------|
| 1 | 1219701 | Coil Assembly - Permability Tuning |
| 1A | | Antenna Coil |
| 1B | | R.F. Coil |
| 1C | | Oscillator Coil |
| 2 | 1218639 | Antenna Spark Choke |
| 3 | 1219702 | 1st I.F. Transformer |
| 4 | 1219703 | 2nd I.F. Transformer |
| 5 | 1219704 | Hash Choke |
| 6 | 1219705 | B Choke |
| CONDENSERS | | |
| 9 | 1219706 | Antenna Trimmer |
| 10 | 7230592 | .05 mfd. 600V. Tubular |
| 11 | 7230592 | .05 mfd. 600V. Tubular |
| 12 | 1215189 | .0001 mfd. Molded |
| 13 | 7232957 | .0003 mfd. Molded |
| 14 | 1218636 | R.F. Trimmer |
| 15 | 1219566 | .00033 mfd. Temperature Compensating |
| 16 | 1218635 | Oscillator Trimmer |
| 17 | 1207625 | .00005 mfd. Molded |
| 18 | 7230767 | .005 mfd. 100V. Tubular |
| 19 | 7230592 | .05 mfd. 600V. Tubular |
| 20 | 7230767 | .005 mfd. 400V. Tubular |
| 21 | 1218009 | Electrolytic Condenser |
| 21A | | 20 mfd. 25V. |
| 21B | | 15 mfd. 350V. |
| 21C | | 10 mfd. 350 V. |
| 22 | 1216881 | .0005 mfd. Molded |
| 23 | 1208600 | .01 mfd. 600V. Tubular |
| 24 | 1219707 | Spark Plate |
| 25 | 1219707 | Spark Plate |
| 26 | 1214939 | .5 mfd. 100V. Tubular |
| 27 | 7240906 | .006 mfd. 1600V. Tubular |

RESISTORS

| | | |
|----|---------|----------------------------|
| 30 | 1213224 | 330 ohm 1/2W. Insulated |
| 31 | 1216156 | 22,000 ohm 1W. Insulated |
| 32 | 1213282 | 1 megohm 1/2W. Insulated |
| 33 | 1214550 | 22,000 ohm 1/2W. Insulated |
| 34 | 1213282 | 1 megohm 1/2W. Insulated |
| 35 | 7240590 | 22,000 ohm 2W. Insulated |
| 36 | 1213235 | 1000 ohm 1/2W. Insulated |
| 37 | 1213289 | 15 megohm 1/2W. Insulated |
| 38 | 1213282 | 1 megohm 1/2W. Insulated |
| 39 | 1213846 | 270 ohm 1W. Insulated |
| 40 | 1214555 | 220,000 ohm 1/2W Insulated |
| 41 | 1214573 | 1800 ohm 2W. Insulated |
| 42 | 1214541 | 82 ohm 1/2W. Insulated |
| 43 | 1214541 | 82 ohm 1/2W. Insulated |
| 44 | 1214553 | 47,000 ohm 1/2W. Insulated |

TUBES

| | |
|---------|--------------------------------|
| 1217690 | 6BA6 R.F. Amplifier |
| 1217691 | 6BE6 Oscillator - Modulator |
| 1217690 | 6BA6 I.F. Amplifier |
| 1218105 | 6AT6 Detector A.V.C. 1st Audio |
| 1213793 | 6V6GT Audio Output |
| 1213794 | 6X5GT Rectifier |

MISCELLANEOUS ELECTRICAL PARTS

| | | |
|-----|---------|--------------------------------|
| 51 | 1219708 | Control-Volume, Tone, Switch |
| 51A | | Volume Control |
| 51B | | Tone Control |
| 51C | | On-Off Switch |
| 52 | 125588 | Lamp - Dial (Mazda 44) |
| 53 | 1219709 | Speaker 5"x7" Permanent Magnet |
| 54 | 1219710 | Transformer - Audio Output |
| 55 | 1219711 | Transformer - Power |
| 56 | 7239124 | Vibrator |

MECHANICAL PARTS

| | | |
|----|---------|-------------------------------------------|
| 60 | 1218651 | Socket - Antenna Connector |
| | 7236279 | Socket - Octal Tube |
| | 1219570 | Socket - Miniature Tube |
| | 7239125 | Socket - Vibrator |
| | 1219713 | Socket - Pilot Lamp |
| | 1219714 | Case - Wraparound (includes spark plates) |
| | 1219586 | Clip - I.F. Transformer Mtg. |
| | 1219716 | Cover - Front |
| | 1219717 | Cover - Rear |
| | 1219718 | Spring - Tension, Pointer Return |
| | 1219719 | Link - Pointer |
| | 1219720 | Pointer |
| | 1219722 | Dial |
| | 1219723 | Escutcheon |
| | 1219724 | Nut - Control Mounting |
| | 1219725 | Background - Dial |
| | 1219727 | Clip - Pointer Adjust |
| | 1219728 | Lever - Pointer |
| | 1219731 | Spring - Dial Retaining R.H. |
| | 1219732 | Spring - Dial Retaining L.H. |

MODEL 986516,
Chevrolet

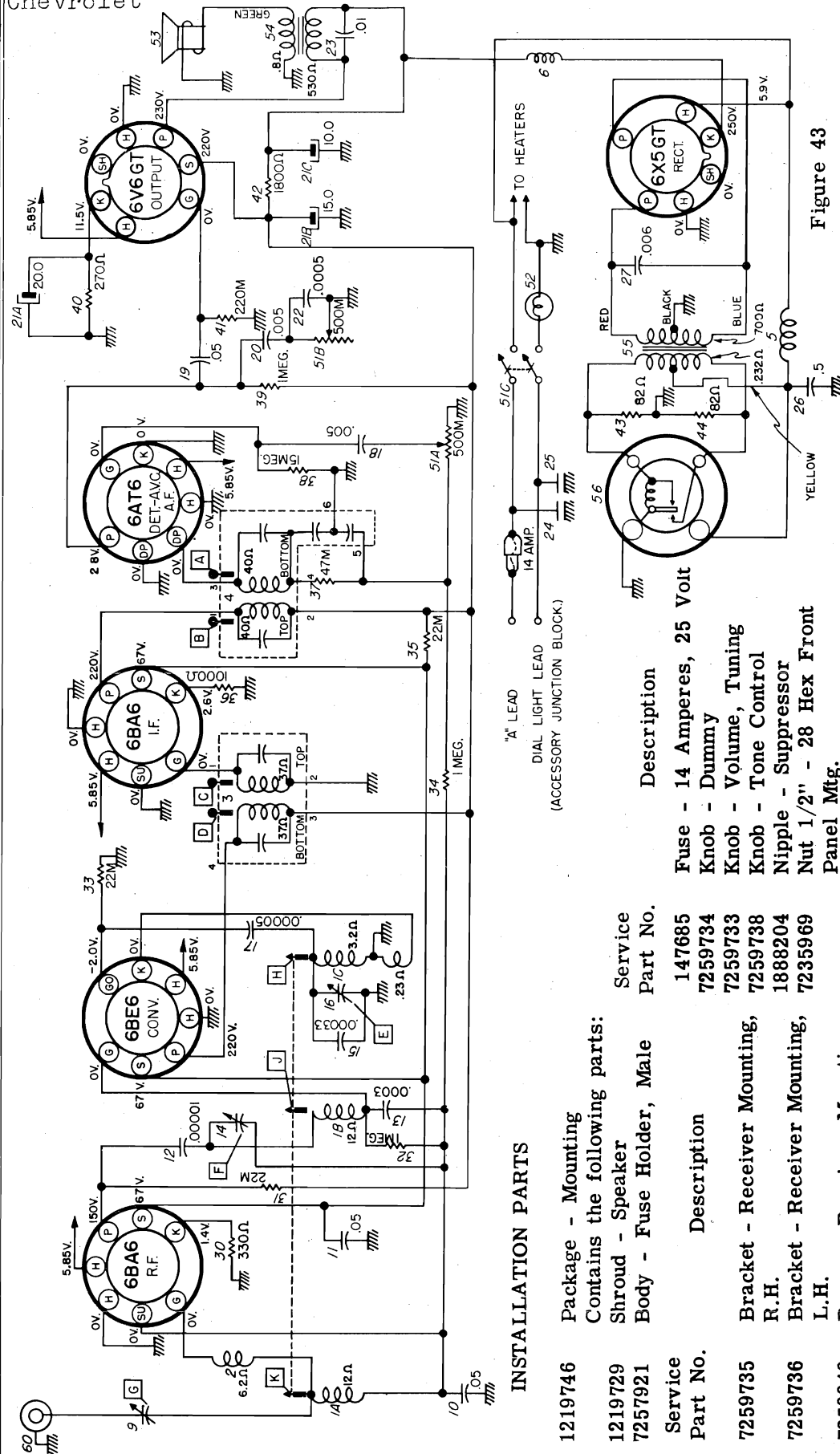


Figure 43
Circuit Diagram - 986516 Radio

INSTALLATION PARTS

| | | |
|---------|-----------------------------------|------------------|
| 1219746 | Package - Mounting | Service Part No. |
| 1219729 | Contains the following parts: | |
| 7257921 | Shroud - Speaker | 147685 |
| | Body - Fuse Holder, Male | 7259734 |
| | | 7259733 |
| | | 7259738 |
| | | 1888204 |
| | | 7235969 |
| | | 1219737 |
| | | 1887829 |
| 7259735 | Bracket - Receiver Mounting, R.H. | |
| 7259736 | Bracket - Receiver Mounting, L.H. | |
| 7259940 | Brace - Receiver Mounting, Rear | |
| 1912900 | Condenser - Generator | |
| 1910147 | Condenser - Ignition Coil | |
| 1912900 | Condenser - Voltage Regulator | |
| 494786 | Static Collector - Front Wheel | |

| | |
|--|------------------------------------|
| | Description |
| | Fuse - 14 Amperes, 25 Volt |
| | Knob - Dummy |
| | Knob - Volume, Tuning |
| | Knob - Tone Control |
| | Nipple - Suppressor |
| | Nut 1/2" - 28 Hex Front Panel Mtg. |
| | Trim Plate |
| | Suppressor - Distributor |

TUBE SOCKETS VIEWED FROM TERMINAL SIDE. VOLTAGES MEASURED FROM SOCKET TERMINALS TO CHASSIS WITH A D.C. VOLTMETER HAVING A RESISTANCE OF 1000 OHMS PER VOLT. ALL VOLTAGES POSITIVE UNLESS OTHERWISE DESIGNATED. READINGS TAKEN WITH 5.9 VOLTS AT SPARK PLATE. TOLERANCE ON VOLTAGES ± 10%
 TOTAL CURRENT DRAIN (PERMANENT MAGNET SPEAKERS) 6.5 AMPS.
 'B' SUPPLY DRAIN 50 MA

MODEL 986443,
Chevrolet Truck

CUSTOM DELUXE TRUCK
PUSH BUTTON RADIO
MODEL 986443

This radio is single unit five tube (plus rectifier) radio designed expressly for 1951 Chevrolet Trucks, and can also be installed on 1947-48-49 and 50 Chevrolet Trucks. The receiver has been designed in conjunction with the truck and when installed, becomes an integral part of the instrument panel, with dial, push buttons and controls extending through the instrument panel. In this type of design, the speaker is integral with the receiver and instrument panel by means of a special rubber gasket which, due to location and baffling, permits exceptionally good tone quality. The receiver incorporates a five station mechanical tuning unit which permits easy instant tuning.

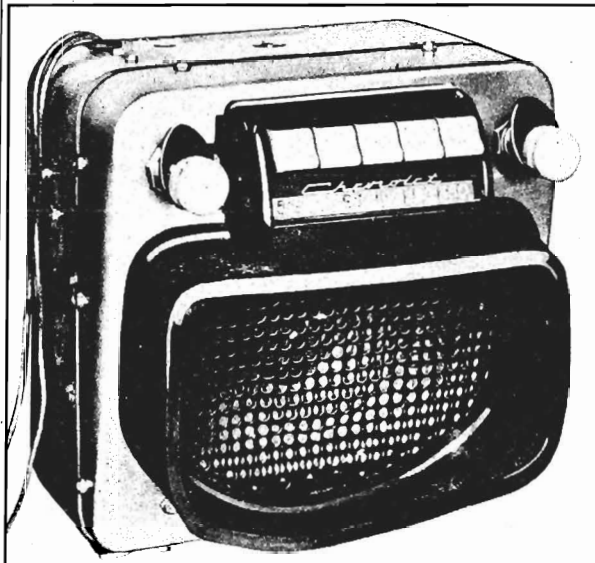


Figure 52

PUSH BUTTON TUNING

An outstanding feature of the 986443 radio is the new simplified method of setting up the push buttons, which can be done easily by anyone, without any tools. With this type of push button tuning which is completely mechanical, (no cords or pulleys are used), assures trouble free operation and constant calibration of the radio stations set on the push buttons at all times.

PROCEDURE FOR SETTING
PUSH BUTTONS

Turn on the receiver for ten minutes or longer to allow circuits to stabilize.

1. Pull button slightly to the left and out as far as it will go.
2. Tune in station desired with manual tuning knob to clearest and loudest point.
3. Push button in firmly to end of travel. Repeat same procedure for remaining four buttons.

ELECTRICAL DESCRIPTION

The circuits used in this receiver are of the super-heterodyne type and use no regeneration. The tuning circuits are of the permeability type and are tuned by varying the iron tuning cores in and out of the antenna, radio frequency and oscillator coils, like pistons. (See Figure 53.)

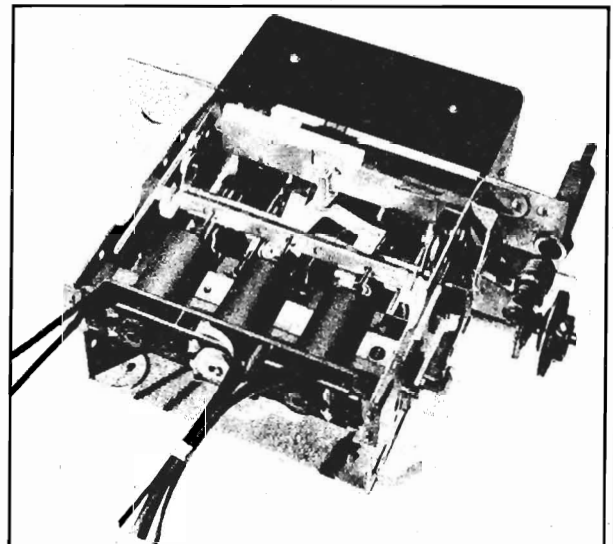


Figure 53

The intermediate frequency stages are tuned by means of two adjustable iron cores, one located on the top side and the other on the bottom side of the transformer. Both the first (input) and second (output) intermediate frequency transformers are tuned by this method. (See Figure 54.)

The antenna circuit is capacity coupled to the antenna by means of an antenna trimmer condenser to take care of normal variations in antenna and antenna coil capacity. The antenna condenser is adjustable by means of a small screw driver, and is located on the bottom side of the radio case. The audio stage is transformer coupled to the output tube to take advantage of all the gain and tone quality that

MODEL 986443,
Chevrolet Truck

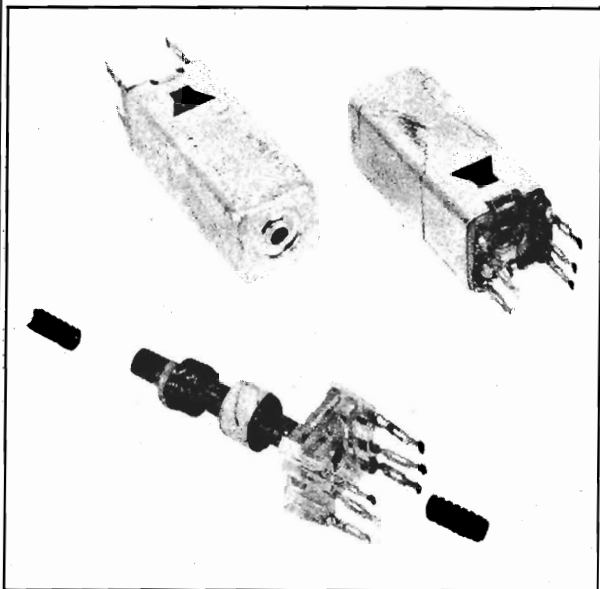


Figure 54

the receiver is capable of developing. The automatic volume control is of the delayed signal type and is very capable of maintaining a constant level of volume at all times. Very high frequency filter chokes are used in the radio frequency and oscillator grid circuits to discriminate against ignition interference in the receiver, thus eliminating the use of spark plug suppressors. The vibrator is the full wave non-synchronous type using an OZ4 rectifier tube and will work on either a negative or positive ground.

TUBE COMPLEMENT AND FUNCTION

| | |
|--------|---------------------------------------------------------|
| 6SK7 | Radio Frequency Amplifier |
| 6SA7 | Oscillator - Modulator |
| 6SK7 | Intermediate Frequency Amplifier |
| 6SQ7GT | Second Detector - Automatic Volume Control, First Audio |
| 6V6GT | Audio Output |
| OZ4 | Cold Cathode Rectifier |

GENERAL DESCRIPTION

Tuning range 540 to 1615 kilocycles.
Intermediate frequency 262 kilocycles.
Maximum power output 4.5 watts.
Undistorted power output 3 watts.
Current drain with permanent magnet speaker 6.1 amperes at 6 volts.
Speaker size 6" x 9" Elliptical type, permanent magnet.
Voice coil impedance 4 ohms at 400 cycles.

Fuse protection 14 amperes 25 volt.

INSTALLATION PROCEDURE TRUCK RADIO AND ANTENNA

All 1951 Chevrolet trucks will use the cowl type antenna, which will mount on the left-hand side of cab cowl. (See Figure 55.)

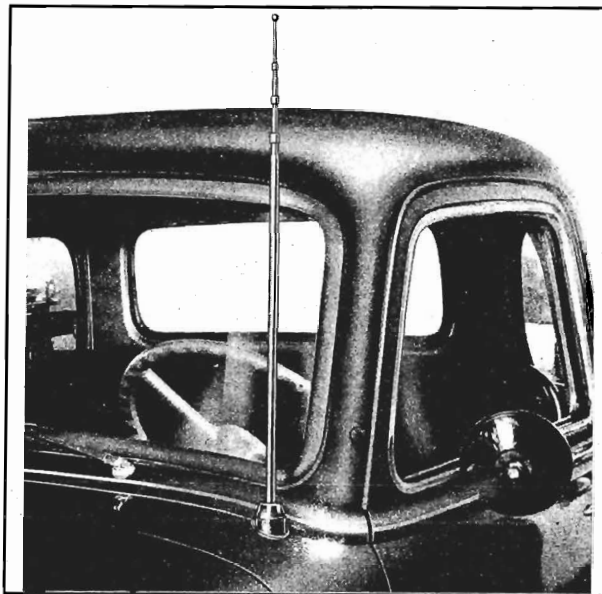


Figure 55

1. Assemble lead-in cable "P" and bracket "N" to antenna mast, then place spacer "F" over rod assembly
2. Place template on outside of cowl, left-hand side, lining up with body contour as indicated and drill 13/16" hole, scrape sound deadening from underside of cowl to insure good ground for antenna.
3. Pass antenna mast from inside cab thru 13/16" hole in cowl and attach bracket "O" to bracket "N" with bolt and nut "J" and "Q," fasten bracket "O" to side panel with self-tapping screws "L" and "M." DO NOT TIGHTEN. (See Figure 56.)
4. Place rubber pad "E," spacer "D" and nut "C" over antenna mast and tighten nut "C," make sure seal "G" is placed, then slip top insulator "B" over antenna and tighten. (See Figure 56.)
5. Tighten self-tapping screws "L" and "M" also bolt and nut "J" and "Q" making sure antenna is perpendicular.

MODEL 986443,
Chevrolet Truck

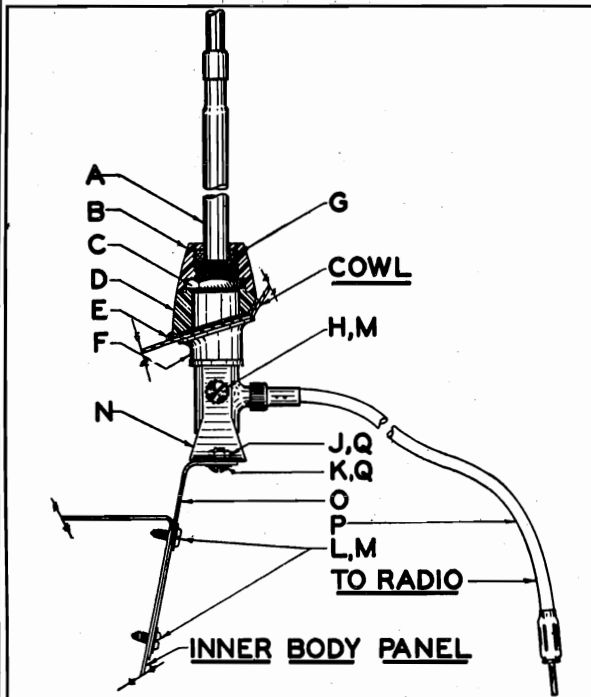


Figure 56

INSTALLATION OF RECEIVER AND NOISE SUPPRESSION EQUIPMENT

After unpacking and checking radio, place on bench and hook-up radio to 6 volt power unit (or fully charged battery) and allow radio to play while installing suppression equipment. Fill out the warranty label on the rear cover to show owner's name and date of installation.

RADIO THAT WILL PLAY FOR 15 MINUTES BEFORE INSTALLATION WILL GIVE MANY MONTHS OF UNINTERRUPTED SERVICE. CHECK ALL RADIOS BEFORE INSTALLATION.

1. Mount generator condenser on generator. (See Figure 57.)

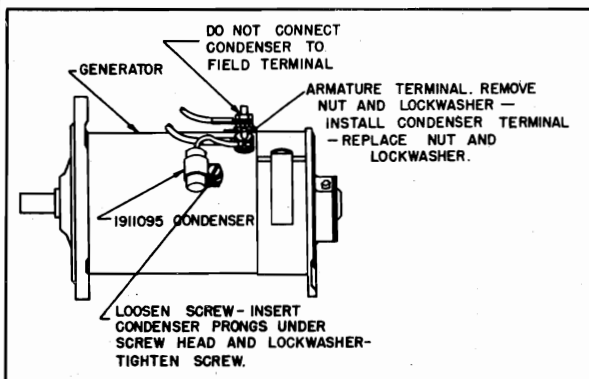


Figure 57

2. Install distributor suppressor and rubber nipple on high tension coil wire. (See Figure 58.)

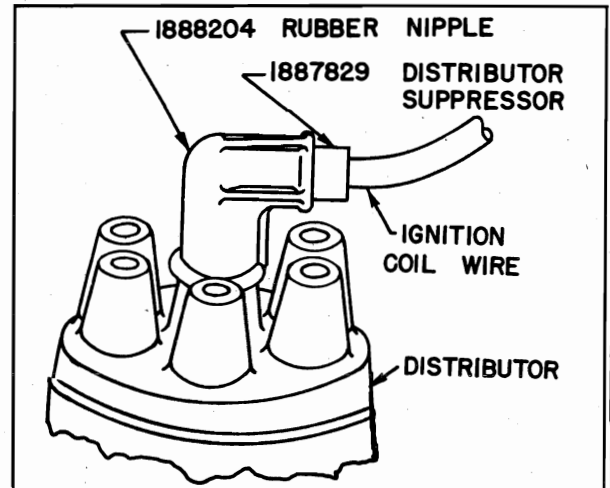


Figure 58

3. Remove front wheel hub and dust caps and install front wheel static collectors. Remove any grease from hole center of spindle to make a good connection, bend cotter pin to clear static collector. (See Figure 59.) These cannot be used on the 1-1/2 and 2 ton models.

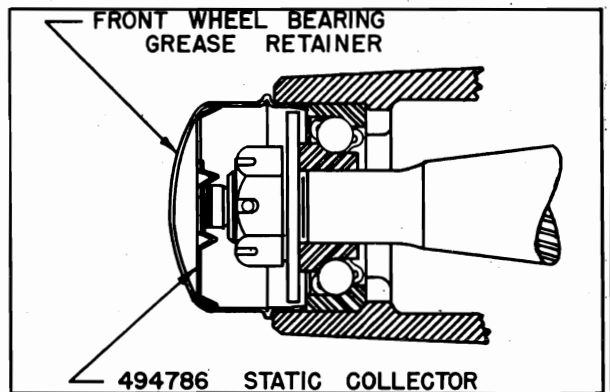


Figure 59

4. Install ignition coil condenser on ignition coil. (See Figure 60.)

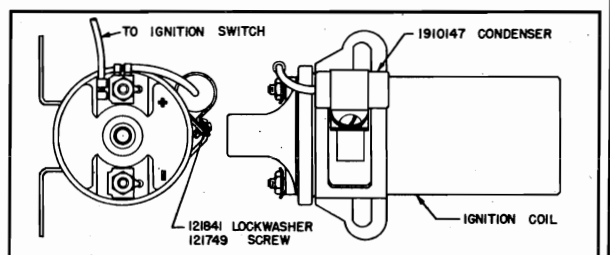


Figure 60

MODEL 986443,
Chevrolet Truck

5. Install voltage regulator condenser on voltage regulator. (See Figure 61.)

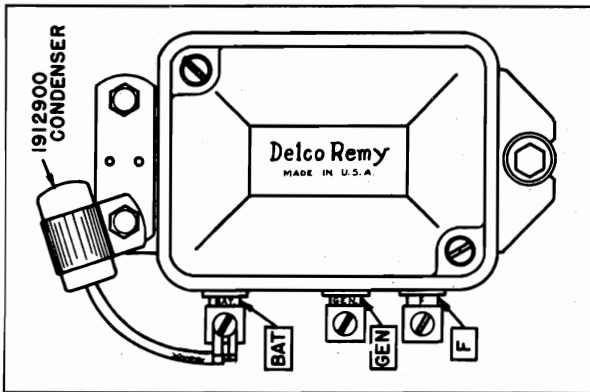


Figure 61

6. Install ammeter condenser and male fuse holder body to ammeter by first placing hex nut on discharge terminal of ammeter about 3/8." Connect one lug of ammeter condenser to same terminal and then assemble male portion of fuse holder to ammeter stud. Connect other end of ammeter condenser to instrument panel for ground. (See Figure 62.)

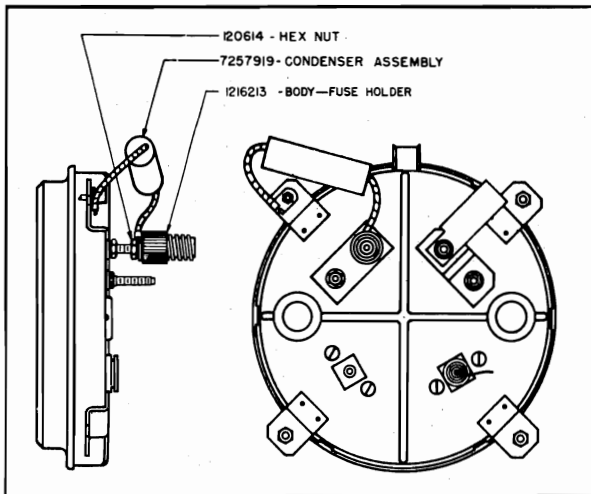


Figure 62

7. Remove the decorative plate, the two buttons from the center of the instrument panel and the black cardboard baffle from the rear side of the radio grille.
8. Assemble the two lower mounting spacers with the bolts, lockwashers and rubber washers, to the proper holes in lower flange of instrument panel, with the bolts just short of sticking through the spacers. (See Figure 63.)

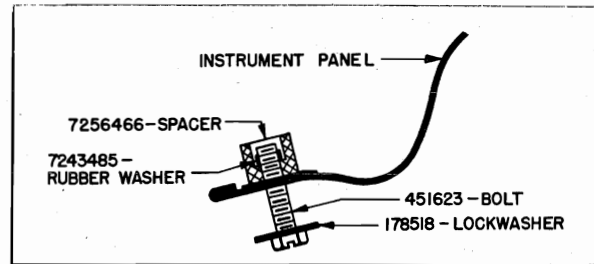


Figure 63

9. Assemble the two upper mounting spacers on the manual tuning control and volume control bushings. (See Figure 64.)

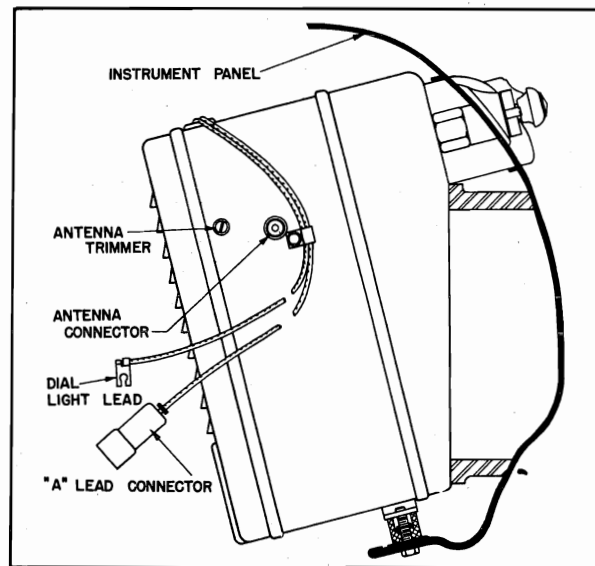


Figure 64

10. Open cowl ventilator. Place the receiver behind the instrument panel and insert the control bushings and dial escutcheon into the proper panel openings. (See Figure 65.)
11. Assemble one control bushing escutcheon and one hex nut on each control bushing. Tighten hex nuts. (See Figure 65.)
12. Assemble the two lower mounting bolts in the weld nuts in bottom of receiver and tighten securely. (See Figure 64.)
13. Install the tone control knob, felt washer and volume control knob on the left-hand shaft. Install the dummy knob, felt washer and manual tuning knob on the right-hand shaft. (See Figure 65.)
14. Insert fuse in male fuse holder on ammeter, connect female fuse holder on receiver

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Chevrolet Truck

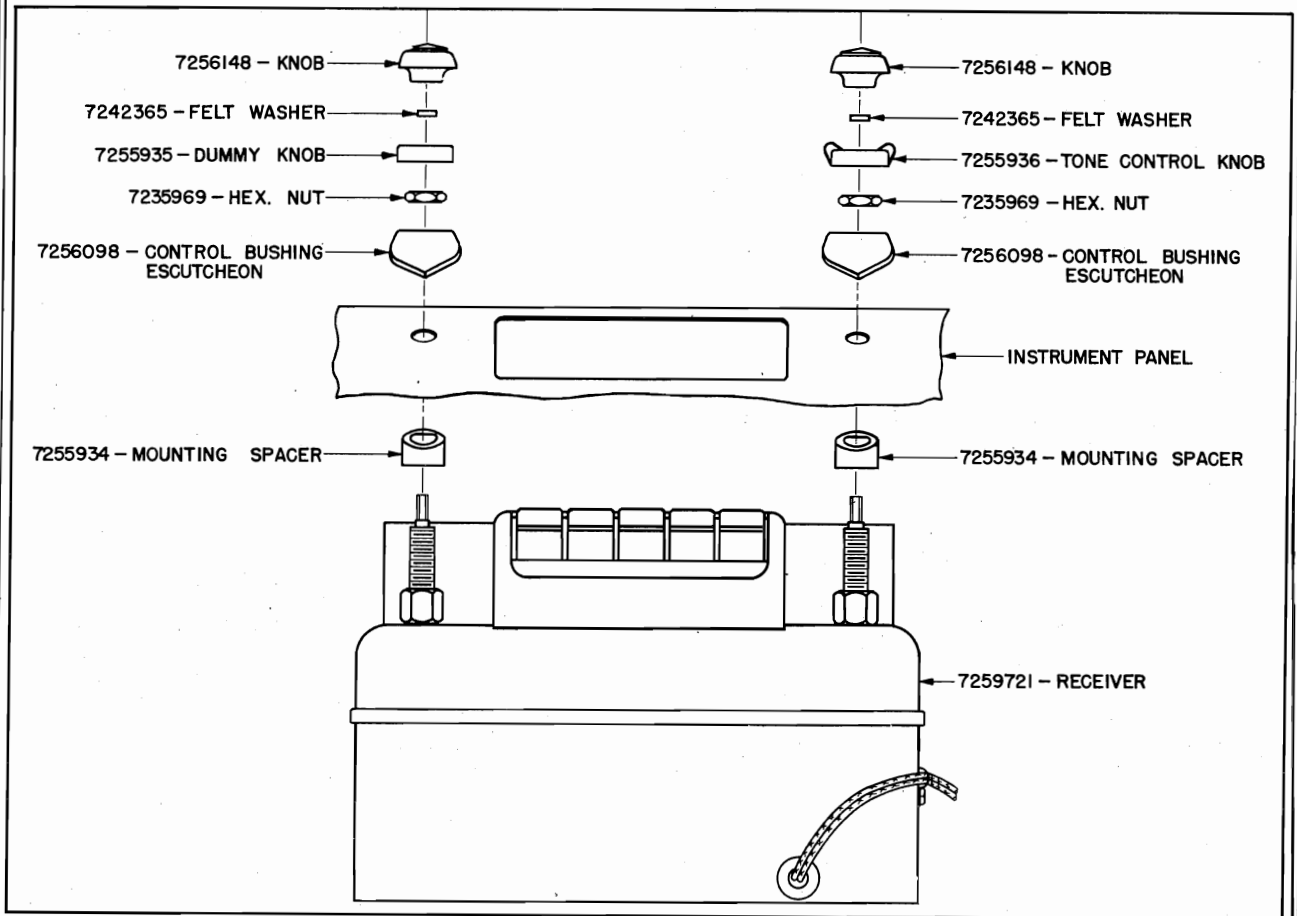


Figure 65

- "A" lead to male fuse holder. (See Figure 64.)
15. Plug the antenna lead into the antenna socket on side of the receiver. (See Figure 64.)
 16. Connect dial light lead to the instrument panel light terminal on the truck lighting switch. (See Figure 66.)

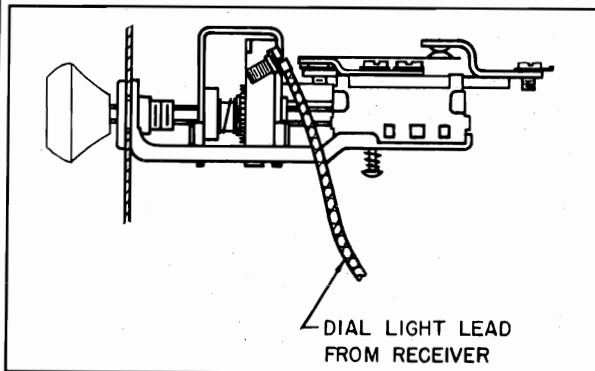


Figure 66

17. Raise antenna to full height and tune in a weak station near 140 on the dial, with volume turned to maximum position. Adjust antenna trimmer for maximum volume.

**PROCEDURE FOR SERVICING
986443 TRUCK RADIO**

The same procedure for operating radio test equipment as outlined for 986515

**PROCEDURE FOR CHECKING VOLTAGES
OF 986443 TRUCK RADIO**

It will be necessary to remove the front cover of the receiver.

Hook-up radio on the service bench to a 6 volt power unit or a fully charged battery.

Now set the Master selector switch of the

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Chevrolet Truck

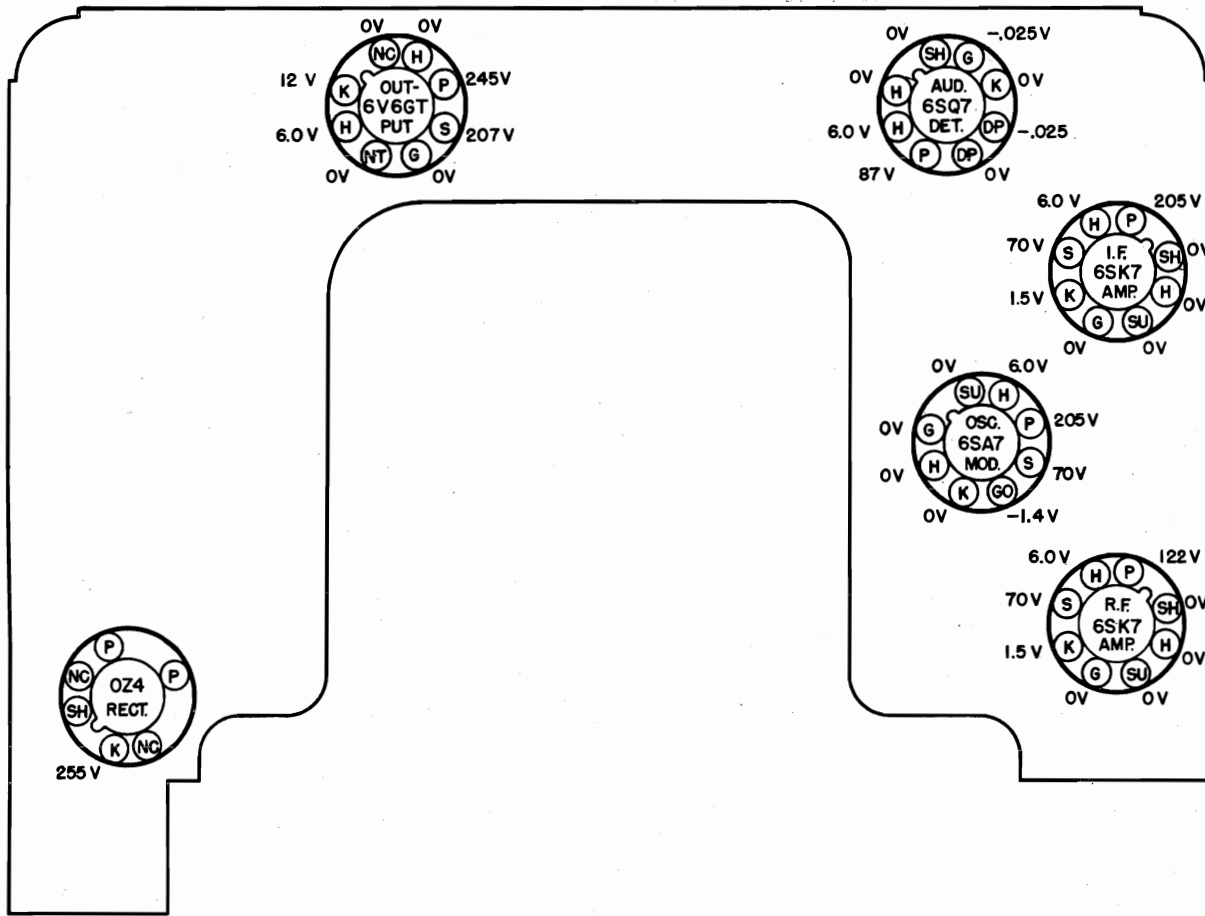


Figure 67

volt-ohm-milliammeter to the 12 position, set the voltage selector switch to D.C. 1K \sim /V. position. Place test leads in jacks marked "Test leads," ground the "-" negative lead to the radio chassis for ground, with the red lead check all tube pins marked "H" which show a reading on the voltage chart. (See Figure 67.)

If no voltage or incorrect check or replace the following:

1. Check or replace On and Off switch. (Item 55C on circuit diagram and 55 on parts layout.)
2. Check or replace condensers. (Items 26A, 26B and 27 on circuit diagram and parts layout.)
3. Check or replace choke. (Item 10 on circuit diagram and parts layout.)
4. Check or replace condensers 26A, 26B and 27 on circuit diagram and parts layout.

5. Check for open or loose connection in the 6 volt circuit.

Now set the Master selector switch to 600 position and the voltage selector switch to A.C. 1K \sim /V. position. With red lead check the OZ4 tube pins marked "P," each should read 270 to 280 volts A.C. If incorrect or no voltage check or replace the following:

1. Check or replace condenser. (Item 28 on circuit diagram and parts layout.)
2. Check or replace resistor. (Item 48 on circuit diagram and parts layout.)
3. Check or replace power transformer. (Item 60 on circuit diagram and parts layout.)
4. Check or replace vibrator. (Item 61 on circuit diagram and parts layout.)
5. Check or replace vibrator socket.

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Chevrolet Truck

Now change the Master selector switch to the 300 position and the voltage selector switch to D.C. 1K ~~/V. position. Now check the voltage on tube pin marked "K" of the OZ4 tube. It should read 250 to 260 volts D.C. If incorrect or no voltage check or replace the following:

1. Check or replace OZ4 tube.
2. Check or replace OZ4 tube socket.

Next check tube pin marked "P" of the 6V6GT tube. It should read 240 to 250 volts D.C. If incorrect or no voltage, check or replace the following:

1. Check or replace electrolytic condenser. (Item 20B on circuit diagram and Item 20 on parts layout.)

2. Check or replace audio output transformer. (Item 59 on circuit diagram and parts layout.)

Next check tube pin marked "S" on 6V6GT tube, should read 202 to 212 volts D.C. If incorrect or no voltage, check or replace the following:

1. Check or replace electrolytic condenser. (Item 20C on circuit diagram and Item 20 on parts layout.)
2. Check or replace resistor. (Item 49 on circuit diagram and parts layout.)

Next check tube pin marked "K" on 6V6GT tube, should read 10 to 14 volts D.C. If incorrect or no voltage, check or replace the following:

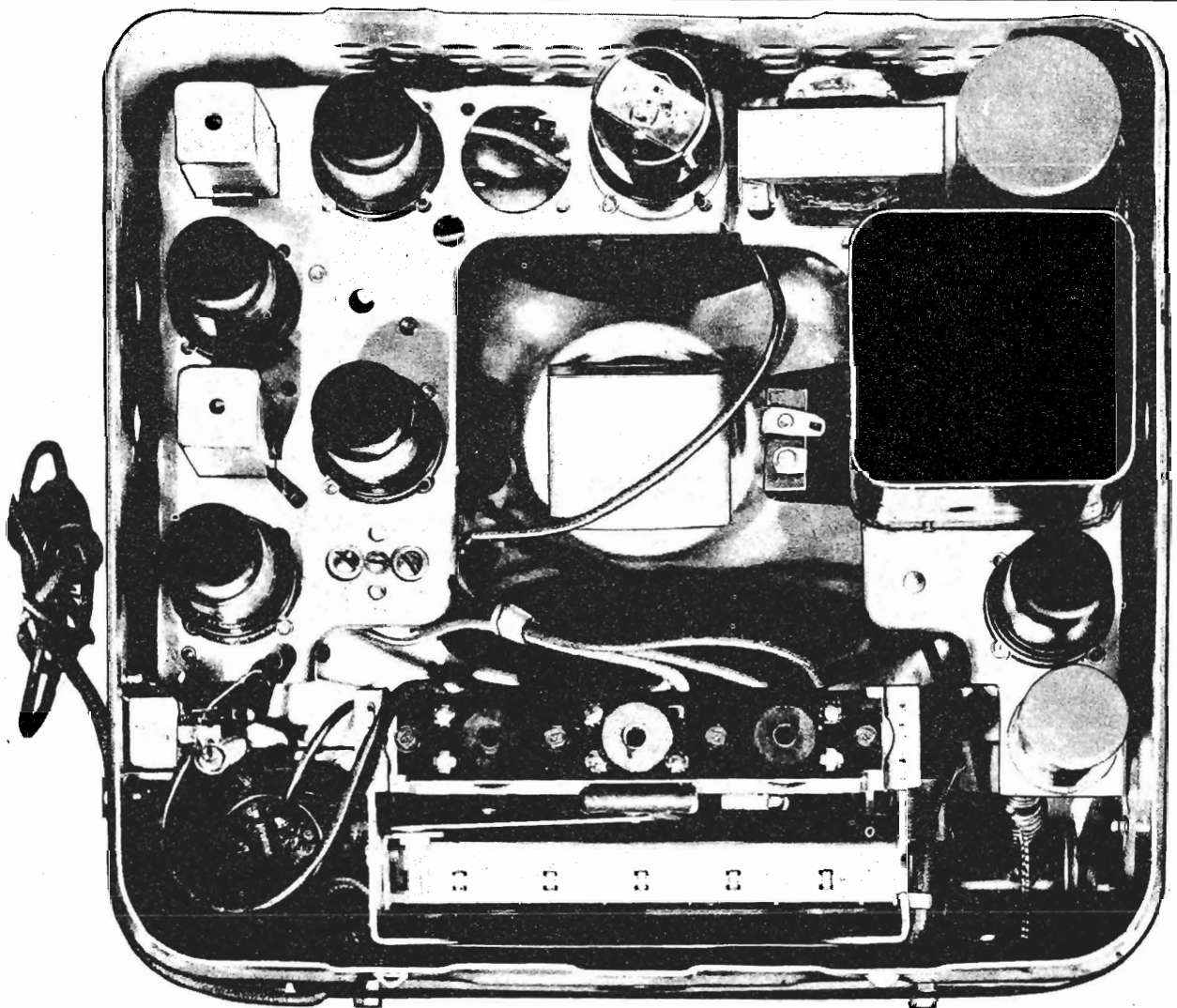


Figure 68

MODEL 986443,
Chevrolet Truck

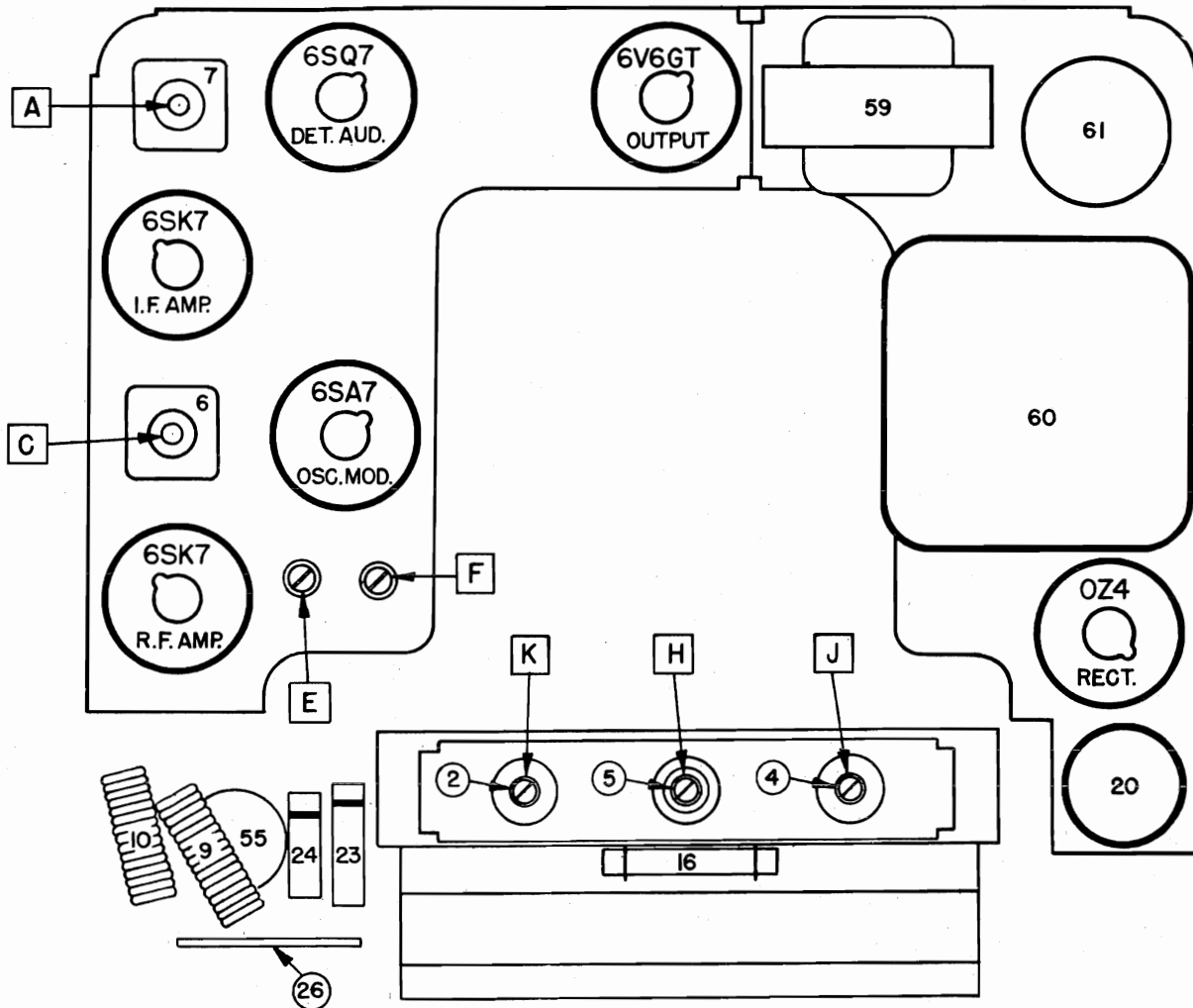


Figure 69

1. Check or replace electrolytic condenser. (Item 20A on circuit diagram and Item 20 of parts layout.)
2. Check or replace resistor. (Item 46 on circuit diagram and parts layout.)

Next check tube pin marked "P" on 6SQ7GT tube, should read 82 to 90 volts D.C. If incorrect or no voltage, check or replace the following:

1. Check or replace condensers. (Items 19, 21, 22, 23 and 24 on circuit diagram and parts layout.)
2. Check or replace resistor. (Item 44 on circuit diagram and parts layout.)

Next check tube pin marked "P" of the 6SK7 intermediate frequency amplifier tube, should

read 200 to 210 volts D.C. If incorrect or no voltage, check or replace the following:

1. Check or replace intermediate frequency transformer. (Item 7 on circuit diagram and parts layout.)

Next check tube pin marked "S" of the 6SK7 I.F. amplifier tube, should read 65 to 75 volts D.C. If incorrect or no voltage check or replace the following:

1. Check or replace resistor. (Item 37 on circuit diagram and parts layout.)
2. Check or replace condenser. (Item 12 on circuit diagram and parts layout.)

Next check tube pin marked "P" of the 6SA7 tube, should read 200 to 210 volts D.C. If incorrect or no voltage check or replace the following:

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1. Check or replace intermediate frequency transformer. (Item 6 on circuit diagram and parts layout.)

Next check tube pin marked "S" on 6SA7 tube, should read 65 to 75 volts D.C. If incorrect or no voltage check or replace the following:

1. Check or replace resistor. (Item 37 on circuit diagram and parts layout.)
2. Check or replace condenser. (Item 12 on circuit diagram and parts layout.)

Next check tube pin marked "P" on 6SK7 radio frequency amplifier tube, should read 117 to 127 volts D.C. If incorrect or no voltage, check or replace the following:

1. Check or replace resistor. (Item 38 on circuit diagram and parts layout.)

2. Check or replace condenser. (Item 13 on circuit diagram and parts layout.)

Next check tube pin marked "S" on 6SK7 R.F. amplifier tube, should read 65 to 75 volts D.C. If incorrect or no voltage, check or replace the following:

1. Check or replace resistor. (Item 37 on circuit diagram and parts layout.)
2. Check or replace condenser. (Item 12 on circuit diagram and parts layout.)

We have now checked the tubes, vibrator and

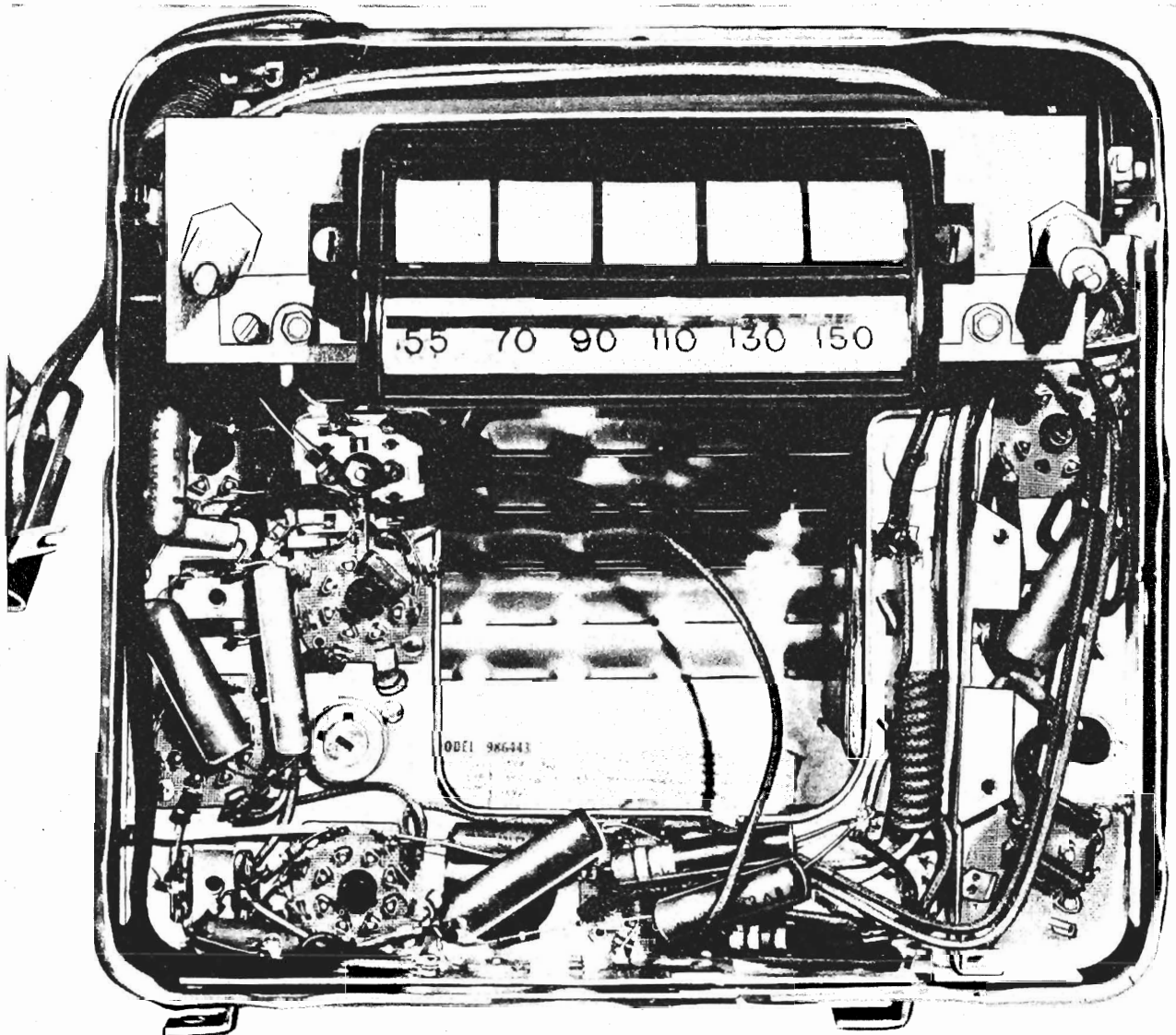


Figure 70

MODEL 986443,
Chevrolet Truck

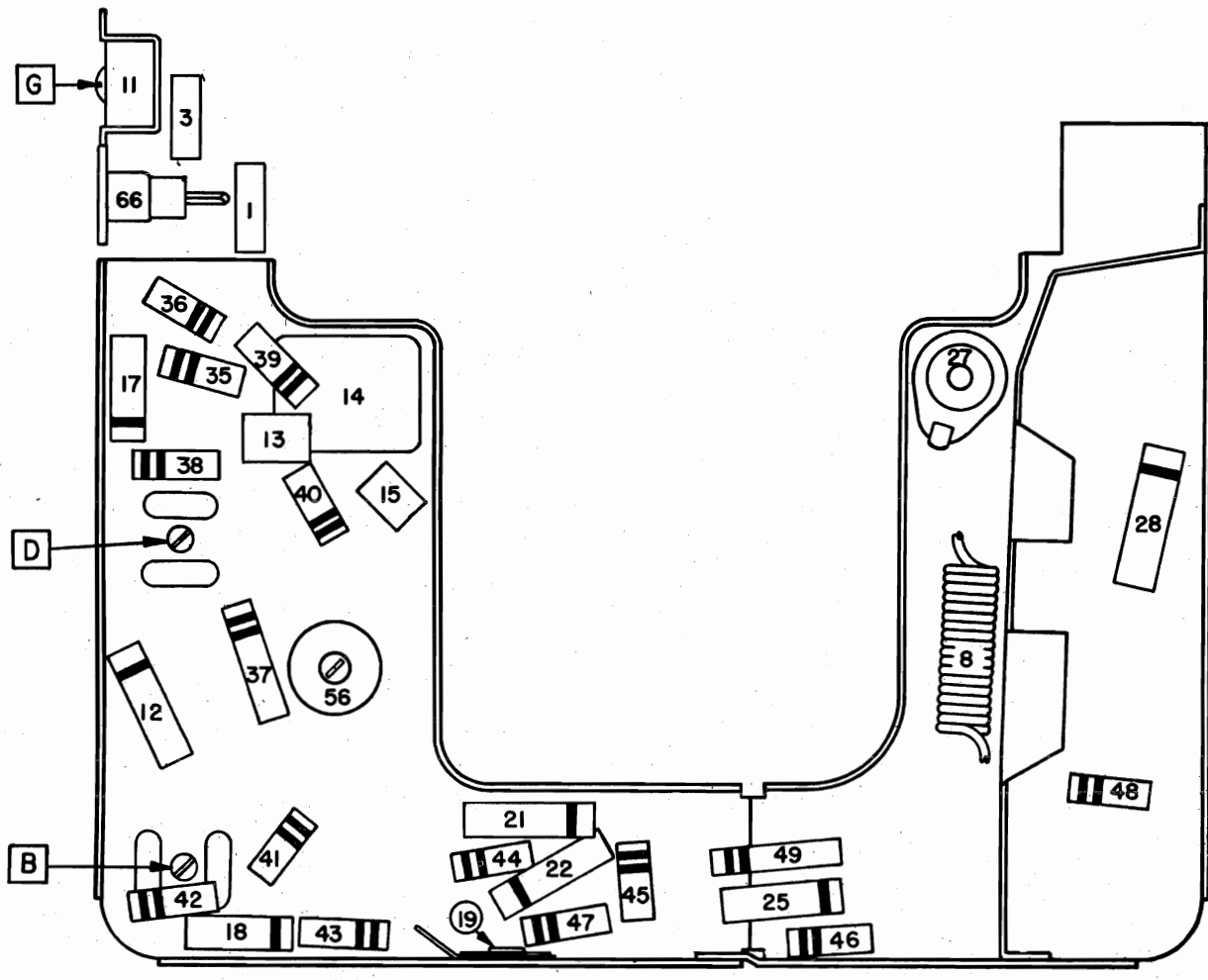


Figure 71

voltages of the receiver, with these being correct and radio does not play, the trouble will be in the grid circuit of the radio. To continue, it will be necessary to check the grid circuit by means of signal tracing.

**PROCEDURE FOR SIGNAL TRACING
RADIO 986443**

Turn on Signal Generator On and Off switch, place the modulation switch in the modulated position, set Signal Generator tone control to .5, place shielded lead assembly in jack marked "Audio." Ground the black lead to radio chassis for ground. Turn on radio receiver with volume to maximum position.

With red lead touch tube pin marked "P" of 6V6GT tube, if no signal, check or replace the following:

1. Check or replace condenser. (Item 25 on circuit diagram and parts layout.)
2. Check or replace audio transformer. (Item 59 on circuit diagram and parts layout.)
3. Check or replace speaker. (Item 58 on circuit diagram and parts layout.)

Next touch tube pin marked "G" of 6V6GT tube, if no signal, check or replace the following:

1. Check or replace 6V6GT tube.
2. Check or replace 6V6GT tube socket.

Next touch tube pin marked "P" of 6SQ7GT tube, if no signal, check or replace the following:

1. Check or replace condensers. (Items 19,

MODEL 986443,
Chevrolet Truck

21, 22, 23 and 24 on circuit diagram and parts layout.)

2. Check or replace tone control. (Item 55B on circuit diagram and 55 on parts layout.)

Next touch tube pin marked "G" of 6SQ7GT tube, if no signal, check or replace the following:

1. Check or replace 6SQ7 tube.
2. Check or replace 6SQ7 tube socket.
3. Check or replace resistor. (Item 45 on circuit diagram and parts layout.)

Now change the Signal Generator shielded lead to the intermediate frequency "I.F." jack, then tune Signal Generator to exactly 262 kilocycles, set band switch on "A" position.

Turn the Signal Generator volume control about 1/3 open. Next touch tube pin marked "P" of 6SK7 intermediate frequency amplifier tube, if no signal, check or replace the following:

1. Check or replace intermediate frequency transformer. (Item 7 on circuit diagram and parts layout.)
2. Check or replace volume control. (Item 55A on circuit diagram and 55 on parts layout.)
3. Check or replace condenser. (Item 18 on circuit diagram and parts layout.)
4. Check or replace resistors. (Items 42 and 43 on circuit diagram and parts layout.)

Next touch tube pin marked "G" of 6SK7 I.F. amplifier tube, if no signal, check or replace the following:

1. Check or replace 6SK7 tube.
2. Check or replace 6SK7 tube socket.
3. Check or replace sensitivity control. (Item 56 on circuit diagram and parts layout.)

Next touch tube pin marked "P" of 6SA7 tube, if no signal, check or replace the following:

1. Check or replace intermediate frequency transformer. (Item 6 on circuit diagram and parts layout.)

Next touch tube pin marked "G" of 6SA7 tube, if no signal, check or replace the following:

1. Check or replace 6SA7 tube.
2. Check or replace 6SA7 tube socket.

Now change the Signal Generator shielded lead to the radio frequency "R.F." jack, tune signal generator to exactly 1000 kilocycles, set band switch to "B" position.

Now tune radio receiver to 1000 kilocycles, then touch tube pin marked "P" of the 6SK7 radio frequency amplifier tube, if no signal, check or replace the following:

1. Check or replace radio frequency coil. (Item 4 on circuit diagram and parts layout.)
2. Check or replace oscillator coil. (Item 5 on circuit diagram and parts layout.)
3. Check or replace condensers. (Items 14A, 14B, 15 and 16 on circuit diagram and parts layout.)
4. Check or replace resistors. (Items 39 and 40 on circuit diagram and parts layout.)

Next touch tube pin marked "G" of 6SK7 radio frequency amplifier tube, if no signal, check or replace the following:

1. Check or replace 6SK7 tube.
2. Check or replace 6SK7 tube socket.
3. Check or replace resistor. (Item 35 on circuit diagram and parts layout.)

Now place a .000075 mfd. condenser on the end of red lead and plug in antenna socket, if no signal, check or replace the following:

1. Check or replace chokes. (Items 1 and 3 on circuit diagram and parts layout.)
2. Check or replace antenna coil. (Item 2 on circuit diagram and parts layout.)
3. Check or replace condenser. (Item 11 on circuit diagram and parts layout.)
4. Check or replace resistor. (Item 36 on circuit diagram and parts layout.)

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Chevrolet Truck

PROCEDURE FOR ALIGNMENT
986443 RADIO

All receivers are aligned at the factory and should require no further adjustments, unless the adjustments have been tampered with, or new coils, I.F. transformers or tuning cores have been installed. To properly align the receiver it will be necessary to have an output meter and Signal Generator. If any of the tuning coils or cores have been replaced, see "Capacity and Inductance Alignment Procedure." If only the adjustments have been tampered with or an I.F. transformer has been replaced, the receiver is aligned as follows:

Set the volt-ohm-milliammeter Master selector switch in the 30 position, the voltage selector switch in A.C. 1K \sim /V. position, and place the leads in the jacks marked "output meter," place the other end for the black lead to radio chassis for ground. Place the red lead to the terminal of the speaker to which the green lead of the audio output transformer is connected, as outlined in the 1950 Chevrolet Radio Service and Shop Manual. (Speaker Item 48, audio output transformer 59 on circuit diagram and parts layout.)

Turn on the Signal Generator On and Off switch and turn on the radio receiver, turn volume control to maximum position. Set modulation switch in the modulated position, turn the band selector to the "A" position and turn the Signal Generator to exactly 262 kilocycles. Place the Signal Generator shielded lead in the jack marked "I.F." and place the black lead to the

radio chassis for ground. Place red lead to tube pin marked "G" on the 6SA7 tube.

Adjust the Signal Generator volume control so that the meter reads about 10 on the meter scale. Adjust in sequence trimmers A, B, C and D (on circuit diagram and parts layout) for maximum meter reading. Repeat adjustment to get best alignment. (Keep the Signal Generator volume turned down so that during adjustments the meter does not read more than 10 on the meter scale.)

Now place Signal Generator shielded lead in the jack marked "R.F.," set the band selector switch in "B" position, tune the Signal Generator to exactly 1615 kilocycles, place a .000075 mfd. condenser on the red lead and connect it to the antenna connector. Tune the radio receiver to the stop at the 1600 kilocycle end of the dial. (Keep the Signal Generator volume control adjusted so the meter reads about 10 on the meter scale.)

Now adjust trimmers "E, F and G" (on circuit diagram and parts layout) in sequence for maximum reading on the meter scale. Repeat for best alignment. Tune the Signal Generator and radio receiver to exactly 1000 kilocycles and repeat adjustments of trimmers "F and G" only for maximum meter reading.

After the receiver has been installed in the truck, tune in a weak station near 1000 kilocycles, with volume control turned to maximum position and antenna extended to full height, readjust trimmer "G" only for maximum volume.

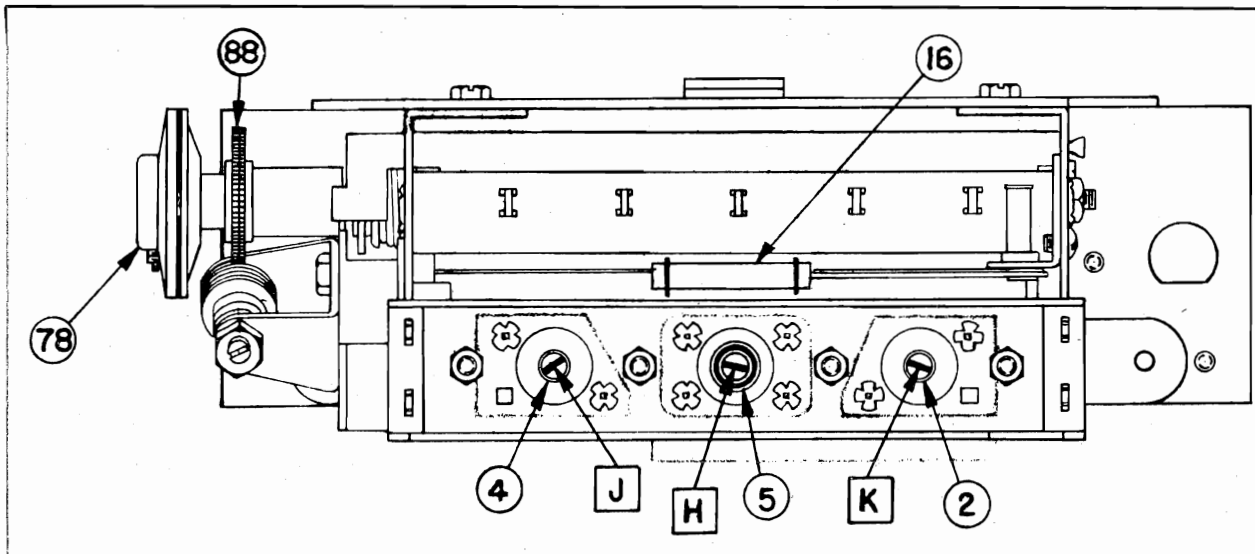


Figure 72

MODEL 986443,
Chevrolet Truck

CAPACITY AND INDUCTANCE
ALIGNMENT PROCEDURE

SERVICE PARTS LIST 986443

This alignment procedure is to be used only when any of the following parts have been replaced in the radio; antenna coil, radio frequency coil, oscillator coil or any of the tuning cores.

The intermediate frequency alignment at 262 kilocycles is the same as outlined in "Alignment Procedure" on page 18. After completing the alignment at 262 kilocycles for the intermediate frequency transformers "A, B, C and D" proceed as follows:

Connect Signal Generator red lead to a .000075 mfd. condenser and connect to antenna connector.

Mechanically align iron cores "H, J and K" (on circuit diagram and parts layout) to measure 1-25/32 inches in coil forms from rear mounting edge of coil forms. (See Figure 72.) Now set Signal Generator to exactly 1615 kilocycles, set band switch to "B" position, tune radio receiver to the stop on the 1600 kilocycle end of the dial. Have output meter hooked up as outlined in "Alignment Procedure." Now adjust iron cores "H, J and K" (on circuit diagram and parts layout) in sequence for maximum meter reading.

Now adjust trimmers "E, F and G" (on circuit diagram and parts layout) in sequence for maximum reading on meter scale. Now tune Signal Generator and radio receiver to 1000 kilocycles, and readjust iron cores "J and K" only for maximum reading on meter scale. **DO NOT READJUST IRON CORE "H" ON THIS ADJUSTMENT.**

Repeat the adjustment of iron cores "J" and "K" only at 1000 kilocycles for maximum reading on meter scale.

Reset Signal Generator to 1615 kilocycles and tune radio receiver to stop on 1600 kilocycle end of dial, then readjust trimmers "F and G" only until no further increase in the meter reading can be obtained. After the radio receiver is installed in the truck, tune in a weak station near 1000 kilocycles, with volume control turned to maximum position and antenna extended to full height, readjust trimmer "G" only for maximum volume.

| Illus. No. | Service Part No. | Description |
|------------|------------------|-------------|
|------------|------------------|-------------|

COILS

| | | |
|----|---------|---------------------|
| 1 | 7255738 | Antenna Choke |
| 2 | 7258914 | Antenna |
| 3 | 7240251 | Antenna Spark Choke |
| 4 | 7258914 | R.F. |
| 5 | 7258911 | Oscillator |
| 6 | 1218725 | 1st I.F. |
| 7 | 1218726 | 2nd I.F. |
| 8 | 7241708 | Hash Choke |
| 9 | 1217846 | "A" Spark Choke |
| 10 | 1217846 | "A" Spark Choke |

CONDENSERS

| | | |
|-----|---------|---------------------------|
| 11 | 7257959 | Antenna Trimmer & Bracket |
| 12 | 7230592 | .05 mfd. 600V. Tubular |
| 13 | 1212359 | .000068 mfd. Mica |
| 14A | 7242454 | Dual Trimmer - R.F. |
| 14B | 7242454 | Dual Trimmer - Oscillator |
| 15 | 1217736 | .000039 mfd. Mica |
| 16 | 7257424 | .000180 mfd. Compensating |
| 17 | 7230592 | .05 mfd. 600 V. Tubular |
| 18 | 7230767 | .004 mfd. 600V. Tubular |
| 19 | 1217848 | Chassis Plate Condenser |
| 20 | 7240724 | Electrolytic |
| 20A | | 20 mfd. 25V. |
| 20B | | 20 mfd. 400V. |
| 20C | | 20 mfd. 400V. |
| 21 | 1217790 | .001 mfd. 600V. Tubular |
| 22 | 7230592 | .04 mfd. 600V. Tubular |
| 23 | 7237836 | .002 mfd. 600V. Tubular |
| 24 | 7230767 | .004 mfd. 600V. Tubular |
| 25 | 7233243 | .004 mfd. 800V. Tubular |
| 26 | 7258332 | Spark Plate Condenser |
| 26A | | Pilot Light Section |
| 26B | | "A" Lead Section |
| 27 | 1217848 | Chassis Plate Condenser |
| 28 | 7240906 | .005 mfd. 1600V. Tubular |

RESISTORS

| | | |
|----|---------|------------------------------|
| 35 | 7237835 | 220 ohms 1/2W. Insulated |
| 36 | 1214563 | 2.2 megohms 1/2W. Insulated |
| 37 | 7233653 | 15,000 ohms 2W. Insulated |
| 38 | 7237595 | 15,000 ohms 1W. Insulated |
| 39 | 1214557 | 330,000 ohms 1/2W. Insulated |
| 40 | 1214550 | 22,000 ohms 1/2W. Insulated |
| 41 | 1213282 | 1 megohm 1/2W. Insulated |
| 42 | 1214553 | 47,000 ohms 1/2W. Insulated |
| 43 | 1215563 | 6.8 megohm 1/2W. Insulated |
| 44 | 1214555 | 220,000 ohms 1/2W. Insulated |

MODEL 986443,
Chevrolet Truck

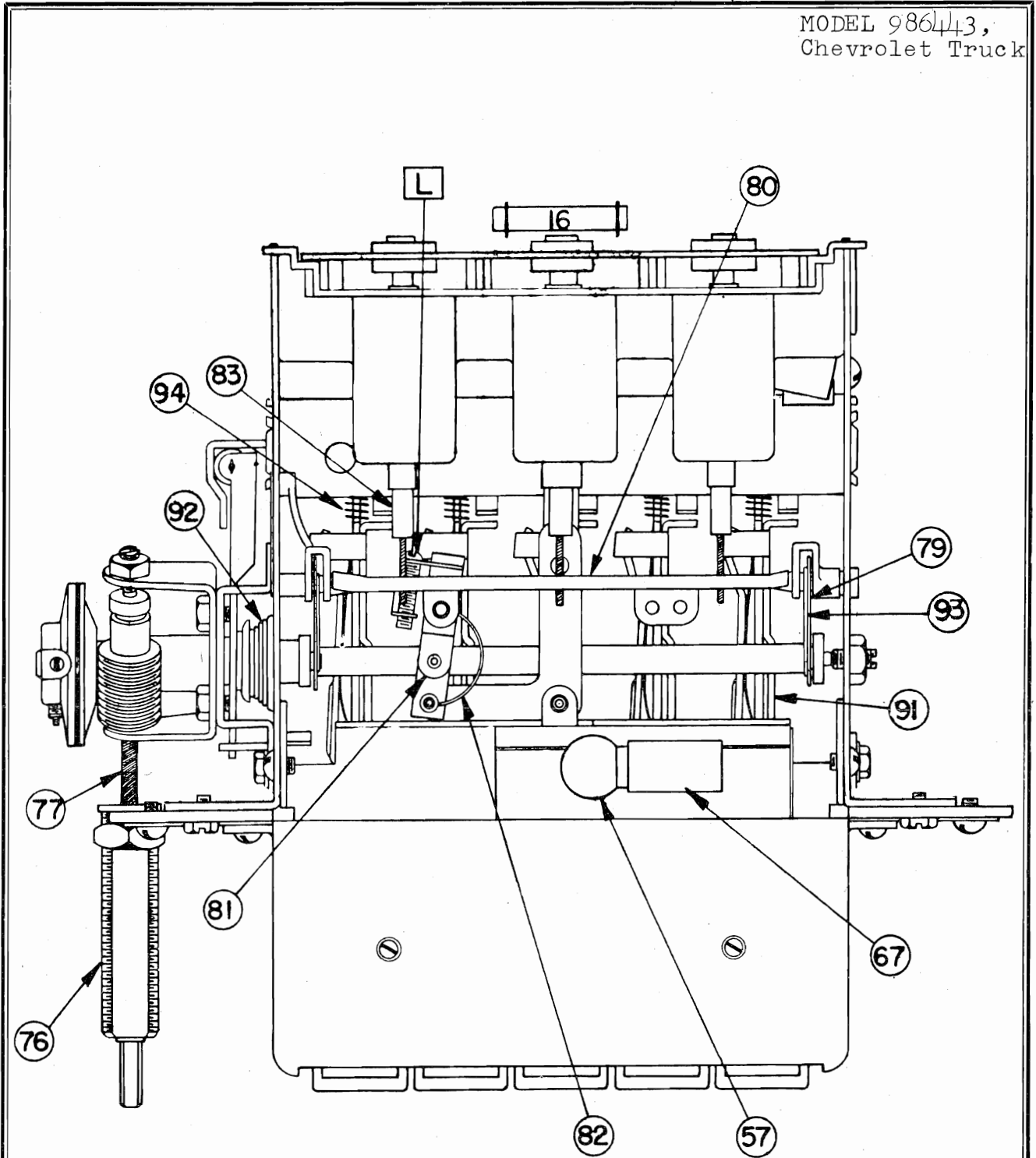


Figure 73

Tuner Unit - Top View

MODEL 986443,
Chevrolet Truck

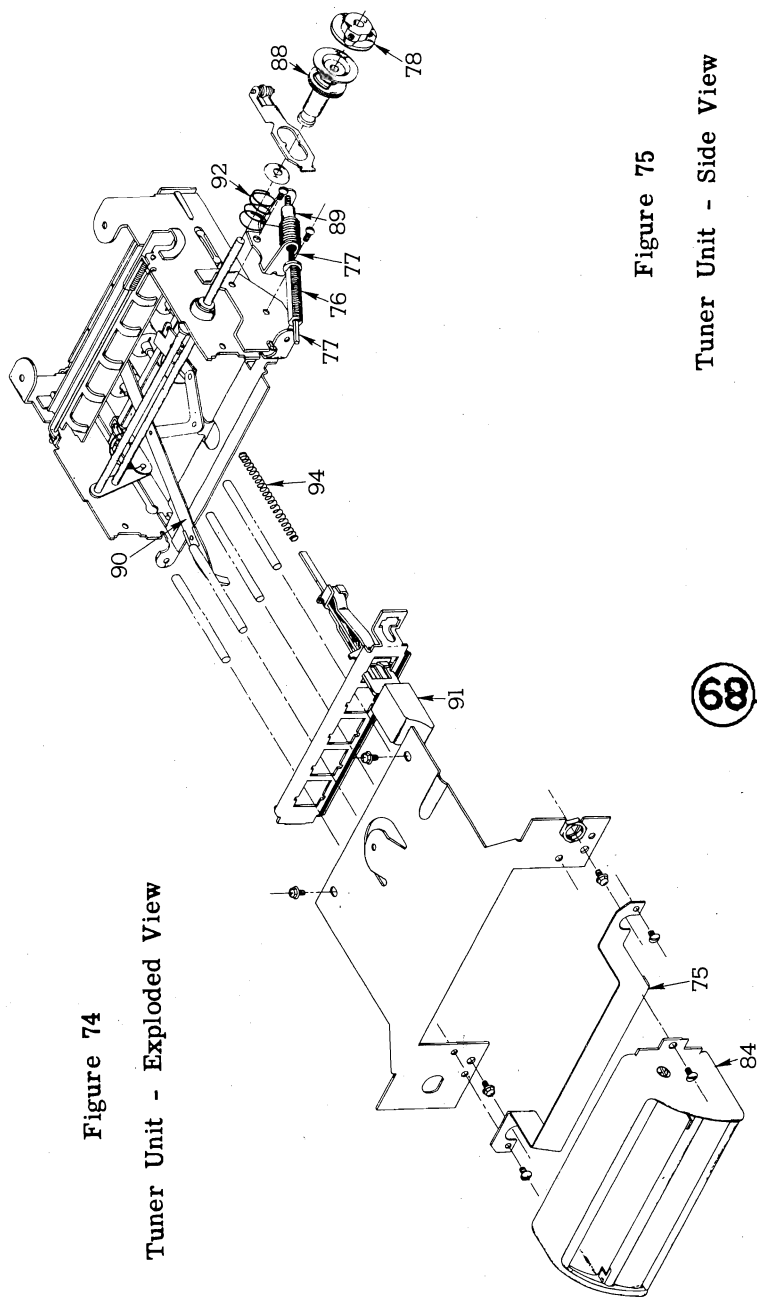
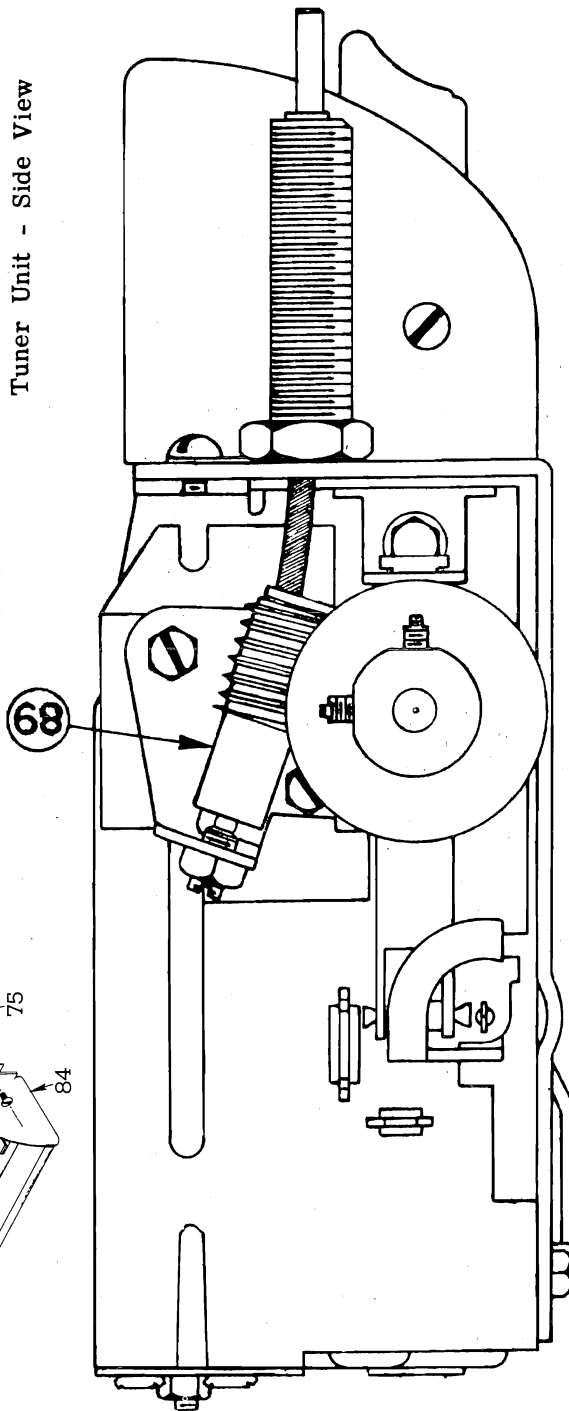
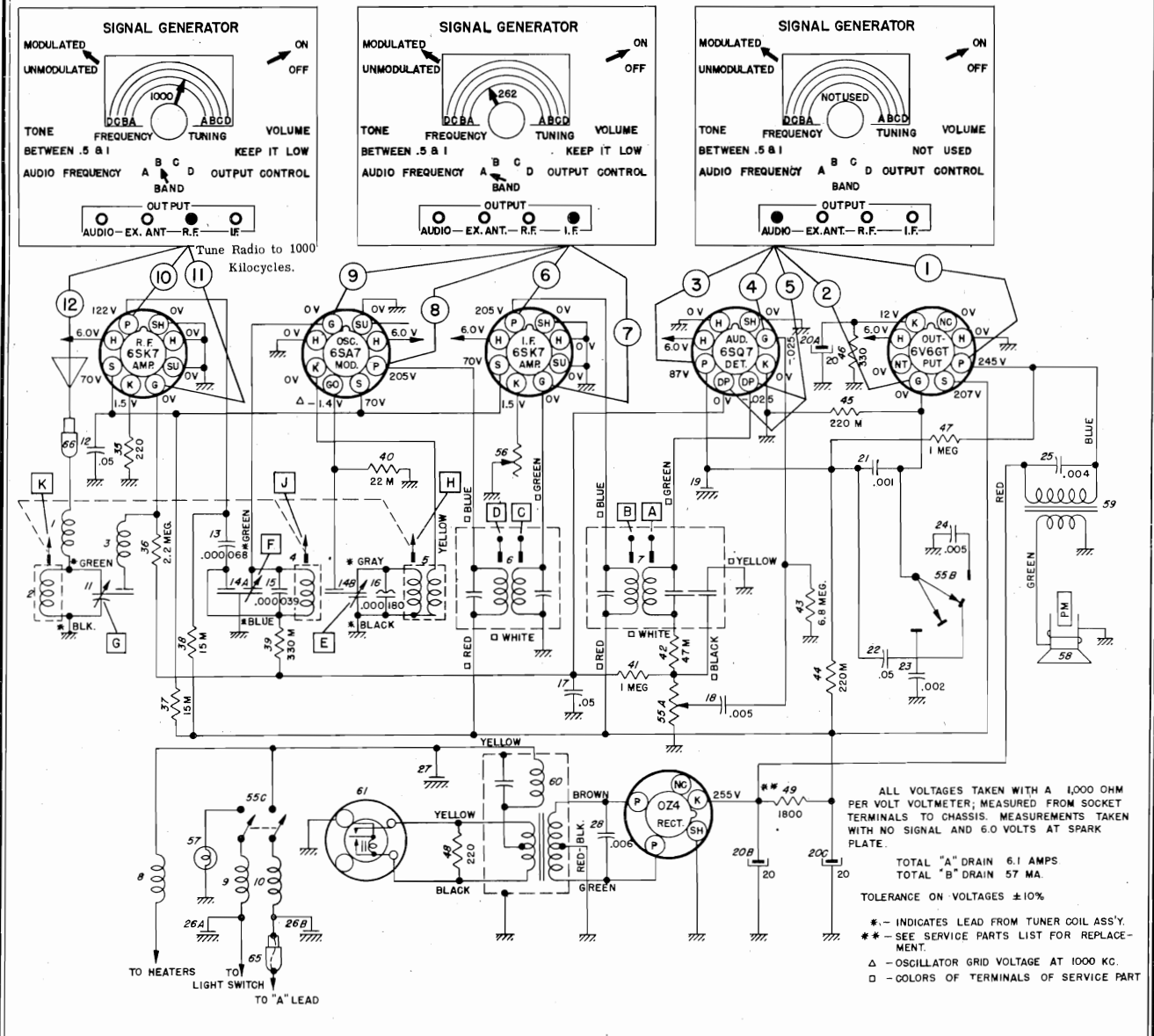


Figure 74
Tuner Unit - Exploded View

Figure 75
Tuner Unit - Side View



MODEL 986443,
Chevrolet Truck



POINT SIGNAL STOPS - CHECK OR REPLACE ITEMS LISTED

| | |
|---------------------------------------------------------------------|---------------------------------------------------------------------------|
| No signal at point 1 - check or replace - items 25-58-59. | No signal at point 7 - check or replace - 6SK7 tube or tube socket. |
| No signal at point 2 - check or replace - 6V6GT tube or tube socket | No signal at point 8 - check or replace - item 6 |
| No signal at point 3 - check or replace - items 21-22-23-24-55B. | No signal at point 9 - check or replace - 6SA7 tube or tube socket. |
| No signal at point 4 - check or replace - 6SQ7 tube or tube socket. | No signal at point 10 - check or replace - items 4-5-13-14A-14B-15-16-39. |
| No signal at point 5 - check or replace - 6SQ7 tube or tube socket. | No signal at point 11 - check or replace - 6SK7 tube or tube socket. |
| No signal at point 6 - check or replace - items 7-18-42-43-55A. | No signal at point 12 - check or replace - items 1-2-3-11-17-36-41 |

Figure 76

Signal Tracing Procedure 986443 Truck Radio

MODEL 986443,
Chevrolet Truck

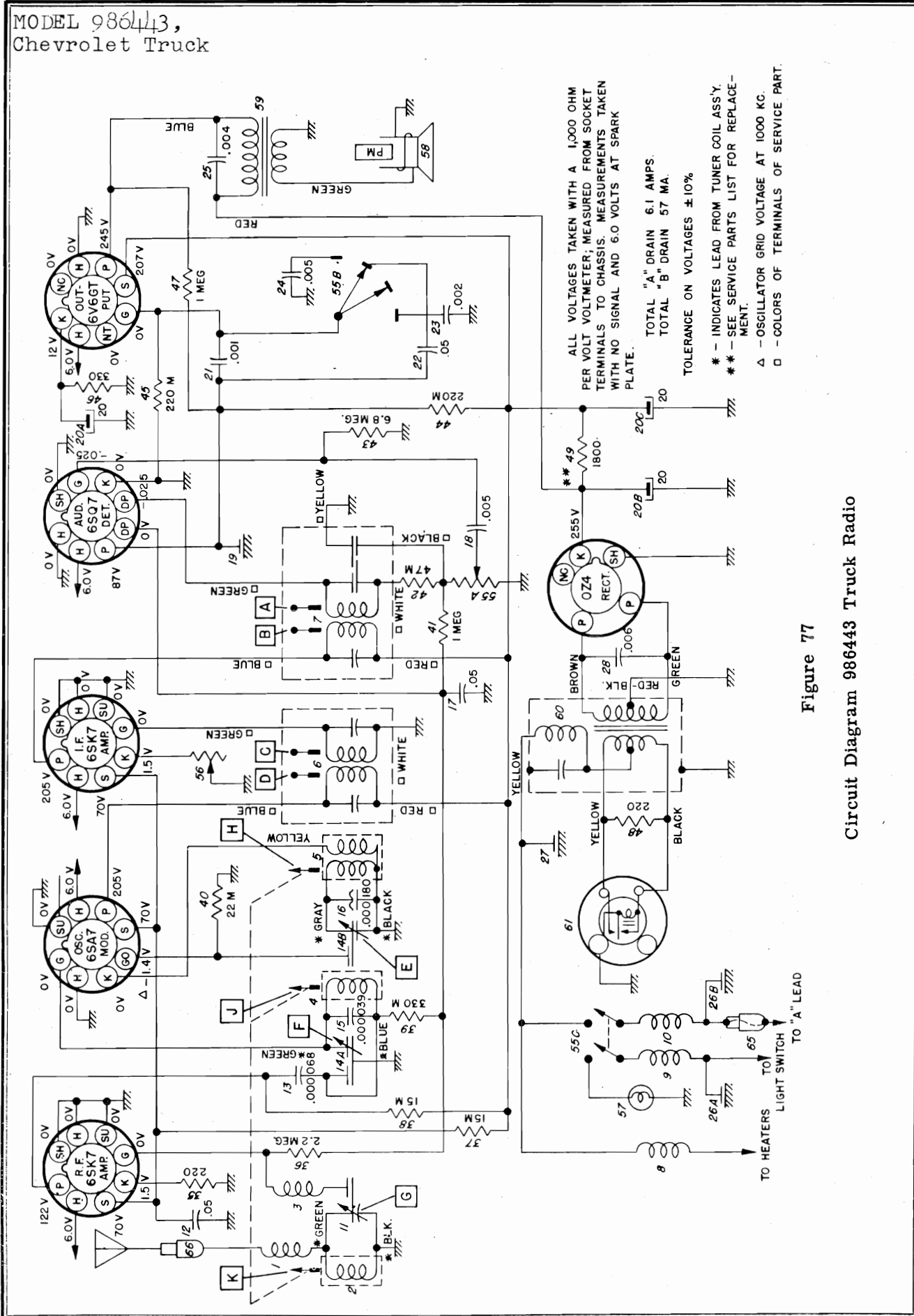


Figure 77

Circuit Diagram 986443 Truck Radio

MODELS 7260405,
7260905, 1951
Cadillac

GENERAL

MOUNTING—Model 7260405 - All 1951 Cadillac Sedans. Model 7260905 - All 1951 Cadillac Convertibles.

TUBES—Seven, plus Rectifier and Trigger.

SPEAKER — 6" x 9" Elliptical, Permanent Magnet.

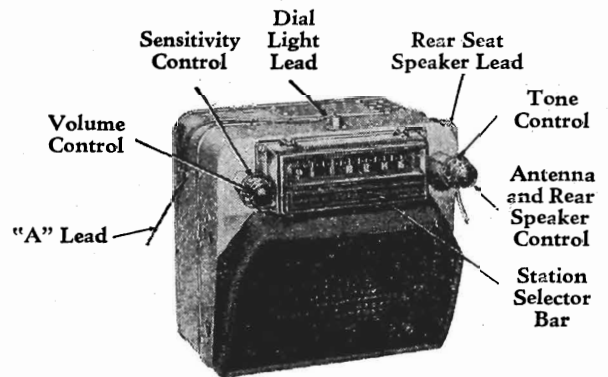
TUNING—Electronic.

ANTENNA TRIMMER COMPENSATION — 0.000060 - 0.000085 Mfd.

TUNING RANGE—540 - 1600 KC.

PUSHBUTTON SET-UP

No pushbutton set-up is necessary. However, the number of stations on which the tuner will stop can be controlled by the use of the Sensitivity Control.



MODEL 7260405

SIGNAL SEEKING TUNER ALIGNMENT PROCEDURE:

NOTE: When aligning the signal seeker tuner type radio, be sure to use a vacuum tube voltmeter as indicated and be sure to follow the alignment sequence given—(Notice that the primary of the 2nd I.F. is aligned first.)

- Output Meter ConnectionVTVM From **2** To Chassis (see parts layout page 2)
- Generator ReturnReceiver Chassis
- Dummy AntennaIn Series With Generator
- Volume ControlMaximum Volume
- Sensitivity ControlMaximum Sensitivity
- Tone ControlTreble
- Generator OutputNot To Exceed 2 Volts at VTVM

| Step | Dummy Antenna | Connect To | Signal Generator Frequency | Tune Receiver To | Adjust in Sequence for Max. Output |
|------|---------------|-------------------|----------------------------|----------------------|------------------------------------|
| 1 | 0.1 mfd | 6SA7 Grid (Pin 8) | 260 KC | *High Frequency Stop | A, B, C, D |
| 2 | 0.000068 mfd | Antenna Connector | 1615 KC | High Frequency Stop | **E, F, G |
| 3 | 0.000068 mfd | Antenna Connector | 600 KC | Signal Gen. Signal | J, K |
| 4 | 0.000068 mfd | Antenna Connector | 1615 KC | Signal Gen. Signal | F, G |
| 5 | 0.000068 mfd | Antenna Connector | 1000 KC | Signal Gen. Signal | ***L |

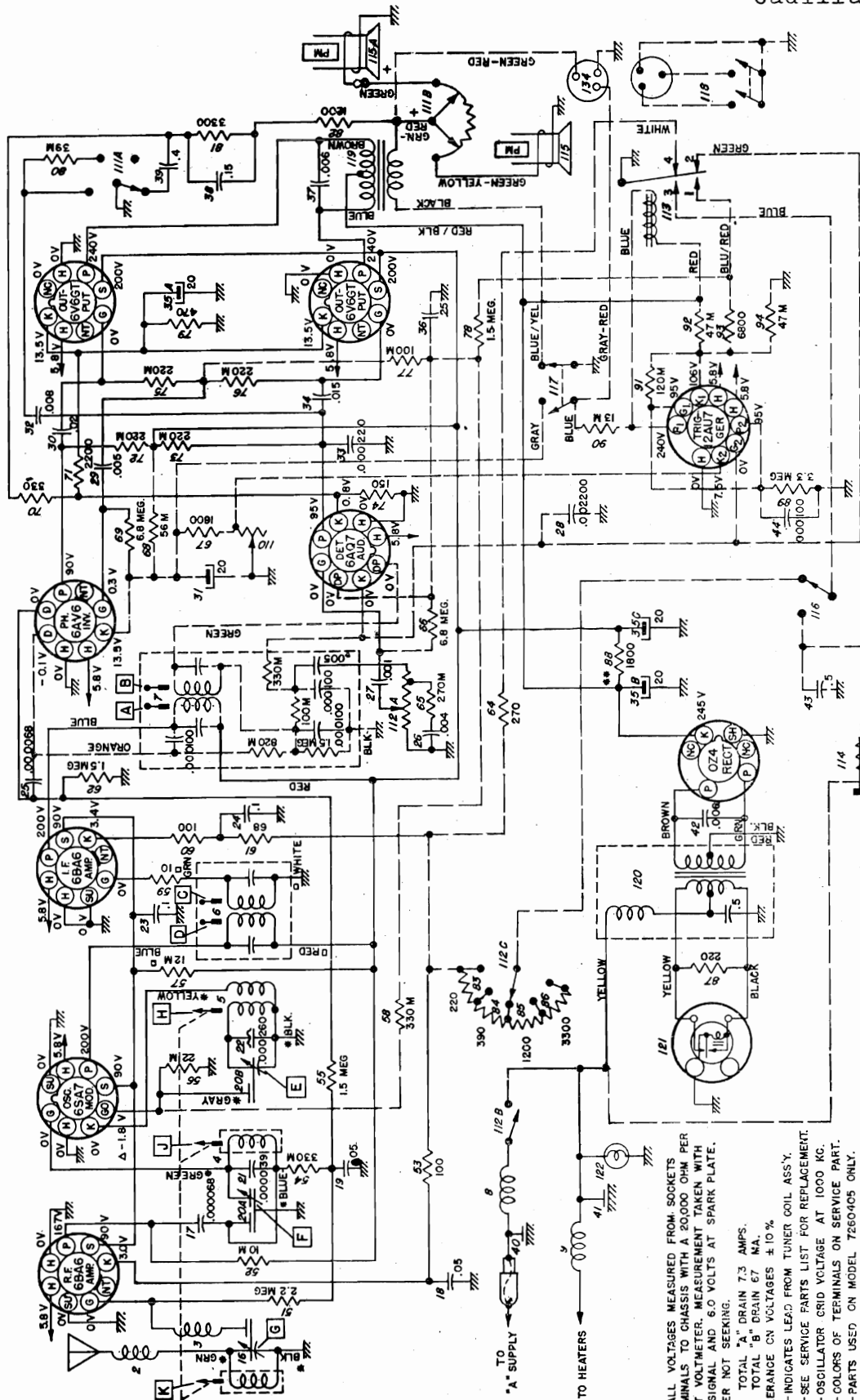
*To tune to high frequency, put a 0.070" feeler gauge (or bare #13 wire) in slot against the high frequency stop. (See tuner picture). Depress station selector bar and allow the planetary arm to run against the feeler gauge. Turn the radio off and then on.

**Before making this adjustment, check the setting of oscillator core "H." The rear of the core should be 1 1/8" from the mounting end of the coil form. This measurement is readily made by inserting a suitable plug in the mounting end of the coil form. The core adjustment is made from the mounting end of the coil form with an insulated screwdriver. (It will be necessary to steady the core guide bar by applying a downward pressure at the antenna core end of the bar while making these adjustments.) If this adjustment is necessary, first dissolve the glyptal seal on the core stud and be sure to re-seal after making the adjustment.

***"L" is the pointer adjustment screw on the end of the core guide bar—adjust so pointer reads 1000 KC.

With the radio installed and the antenna plugged in, adjust antenna trimmer "G" (See sticker on case) for maximum volume with the radio tuned to a weak station between 600 and 1000 KC.

MODELS 7260405,
7260905, 1951
Cadillac



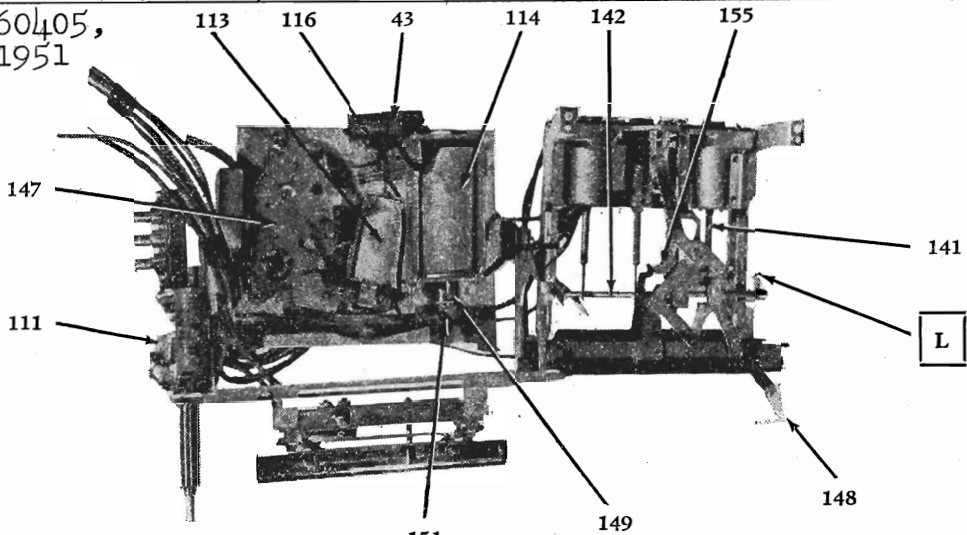
ALL VOLTAGES MEASURED FROM SOCKETS
TERMINALS TO CHASSIS WITH A 20000 OHM PER
VOLT VOLTMETER. MEASUREMENT TAKEN WITH
NO SIGNAL AND 6.0 VOLTS AT SPARK PLATE.
TUNER NOT SEEKING.

TOTAL "A" DRAIN 7.3 AMPS.
TOTAL "B" DRAIN 67 MA.
TOLERANCE ON VOLTAGES ± 10%.

* — INDICATES LEAD FROM TUNER COIL ASS'Y.
** — SEE SERVICE PARTS LIST FOR REPLACEMENT.
Δ — OSCILLATOR GRID VOLTAGE AT 1000 KC.
□ — COLORS OF TERMINALS ON SERVICE PLATE.
+ — PARTS USED ON MODEL 7260405 ONLY.

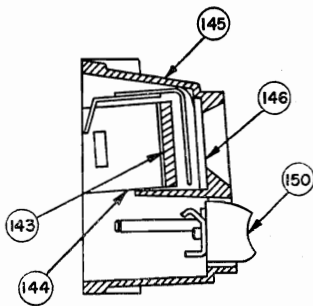
----- TUNER CIRCUIT COMPONENTS

MODELS 7260405,
7260905, 1951
Cadillac

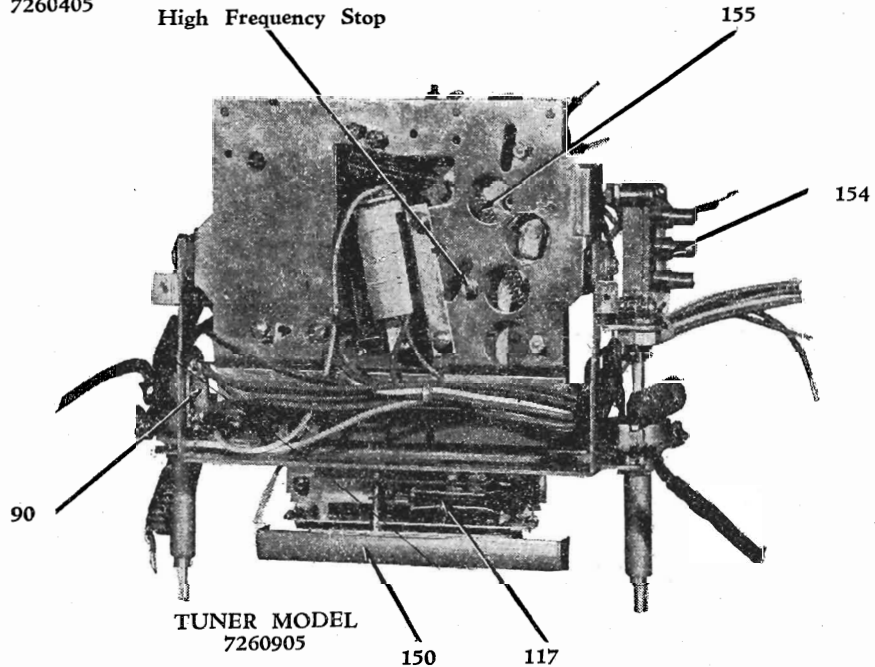


TUNER — OPEN — MODEL 7260405

High Frequency Stop



ESCUTCHEON
CROSS-SECTION



TUNER MODEL
7260905

NOTE: For complete service information on the Signal Seeking Tuner see Bulletin 6D-620

SERVICE PARTS LIST

| Illus. No. | Production Part No. | Service Part No. | Description |
|-------------------------|---------------------|------------------|--------------------------|
| ELECTRICAL PARTS | | | |
| Coils | | | |
| 1 | 7257979 | 7257979 | Antenna |
| 2 | 7255738 | 7255738 | Antenna Series Choke |
| 3 | 7240251 | 7240251 | Antenna Spark Choke |
| 4 | 7257979 | 7257979 | R.F. |
| 5 | 7259184 | 7259184 | Oscillator |
| 6 | 7259790 | 1219508 | 1st I.F. Assy. |
| 7 | 7259290 | 1219602 | 2nd I.F. Assy. |
| 8 | 7241118 | 1217846 | "A" Spark Choke |
| 9 | 7256931 | 1217846 | Hash Choke |
| Condensers | | | |
| *16 | 7259988 | *7259988 | Antenna Trimmer & Brkt. |
| 17 | 1219550 | G 680 | .000068 mfd Molded |
| 18 | 1210697 | 6537 | .05 mfd 200V Tubular |
| 19 | 1210697 | 6537 | .05 mfd 200V Tubular |
| 20 | 7242454 | 7242454 | Dual Trimmer |
| 20A | | | R.F. Section |
| 20B | | | Oscillator Section |
| 21 | 7258221 | G 390 | .000039 mfd Ceramic |
| 22 | 7257567 | 7257567 | .000260 mfd Compensating |
| 23 | 7238788 | 6539 | .1 mfd 400V Tubular |

SERVICE PARTS LIST

MODELS 7260405,
7260905, 1951
Cadillac

| Illus No. | Production Part No. | Service Part No. | Description |
|-------------------------------|---------------------|--------------------|-------------------------------------------------------------------------------|
| Condensers (Continued) | | | |
| 24 | 7238789 | 6539 | .1 mfd 200V Tubular |
| 25 | 1219550 | G 680 | .000068 mfd Molded |
| 26 | 1218969 | E 402 | .004 mfd 600V Tubular |
| 27 | 1218883 | 6527 | .001 mfd 600V Tubular |
| 28 | 1219553 | 1219553 | .0022 mfd 600V Tubular |
| 29 | 7230767 | 6531 | .005 mfd 600V Tubular |
| 30 | 7233770 | 6534 | .02 mfd 600V Tubular |
| 31 | 1219660 | 1219660 | 20 mfd 50V Electrolytic |
| 32 | 1219463 | 1219463 | .008 mfd 600V Tubular |
| 33 | 7238792 | G 221 | .000220 mfd. Molded |
| 34 | 7237719 | 7237719 | .015 mfd 600V Tubular |
| 35 | 7240724 | M 908 | Electrolytic |
| 35A | | | 20 mfd 25V |
| 35B | | | 20 mfd 400V |
| 35C | | | 20 mfd 400V |
| 36 | 1209817 | E 254 | .25 mfd 200V Tubular |
| †37 | †1219084 | †H 602 | †.006 mfd 800V Tubular |
| **37 | **1219594 | **H 802 | ** .008 mfd 800V Tubular |
| 38 | 1218880 | 1218880 | .15 mfd 100V Tubular |
| †39 | †1218882 | †1218882 | †.4 mfd 100V Tubular |
| **39 | **1211202 | **1211202 | ** .25 mfd 200V Tubular |
| 40 | 1219768 | 1219768 | Spark Plate Assy. |
| 41 | 1217848 | 1217848 | Chassis Plate Condenser |
| 42 | 7240906 | H 602 | .006 mfd 1600V Tubular |
| 43 | 7259954 | 7259954 | .5 mfd 100V Tubular |
| 44 | 1219499 | G 101 | .000100 mfd Molded |
| Resistors | | | |
| 51 | 1211147 | A 225 | 2.2 Megohms ½W Insulated |
| 52 | 1211085 | B 103 | 10,000 ohms 1W Insulated |
| 53 | 1213217 | A 101 | 100 ohms ½W Insulated |
| 54 | 7240732 | A 334 | 330,000 ohms ½W Insulated |
| 55 | 1213283 | A 155 | 1.5 Megohms ½W Insulated |
| 56 | 1211192 | A 223 | 22,000 ohms ½W Insulated |
| 57 | 1212491 | 1212491 | 12,000 ohms 2W Insulated |
| 58 | 1214557 | A 334 | 330,000 ohms ½W Insulated |
| 59 | 1219755 | A 100 | 10 ohms ½W Insulated |
| 60 | 1213217 | A 101 | 100 ohms ½W Insulated |
| 61 | 1215558 | 1215558 | 68 ohms ½W Insulated |
| 62 | 1211142 | A 155 | 1.5 Megohms ½W Insulated |
| 63 | 1211118 | A 104 | 100,000 ohms ½W Insulated |
| 64 | 1214542 | A 271 | 270 ohms ½W Insulated |
| 65 | 1214556 | A 274 | 270,000 ohms ½W Insulated |
| 66 | 7241937 | A 685 | 6.8 Megohms ½W Insulated |
| 67 | 1219504 | 1219504 | 1600 ohms ½W Insulated |
| 68 | 1213509 | 1213509 | 56,000 ohms 1W Insulated |
| 69 | 7241937 | A 685 | 6.8 Megohms ½W Insulated |
| 70 | 1213224 | A 331 | 330 ohms ½W Insulated |
| 71 | 1214545 | A 222 | 2200 ohms ½W Insulated |
| 72 | 1214555 | A 224 | 220,000 ohms ½W Insulated |
| 73 | 1214555 | A 224 | 220,000 ohms ½W Insulated |
| 74 | 1213220 | A 151 | 150 ohms ½W Insulated |
| 75 | 1214555 | A 224 | 220,000 ohms ½W Insulated |
| 76 | 1214555 | A 224 | 220,000 ohms ½W Insulated |
| 78 | 1211142 | A 155 | 1.5 Megohms ½W Insulated |
| 79 | 1216150 | B 471 | 470 ohms 1W Insulated |
| 80 | 1213480 | A 393 | 39,000 ohms ½W Insulated |
| 81 | 1213481 | A 332 | 3300 ohms ½W Insulated |
| 82 | 1213236 | 1213236 | 1200 ohms ½W Insulated |
| 83 | 1218969 | A 221 | 220 ohms ½W Insulated |
| 84 | 1219763 | A 391 | 390 ohms ½W Insulated |
| 85 | 1219764 | 1213235 | 1200 ohms ½W Insulated |
| 86 | 1219765 | A 332 | 3300 ohms ½W Insulated |
| 87 | 1219738 | B 221 | 220 ohms 1W Insulated |
| 88 | 1214573 | { C 272 } B 562 | 1800 ohms Wire Wound (Replace with 2700 ohms 2W and 5600 ohms 1W in parallel) |
| 89 | 1211150 | A 335 | 3.3 Megohms ½W Insulated |
| 90 | 7231539 | 7231539 | 13,000 ohms 1W Insulated |
| 91 | 1213271 | 1213271 | 120,000 ohms ½W Insulated |
| 92 | 1216157 | B 473 | 47,000 ohms 1W Insulated |
| 93 | 1216154 | 1216154 | 6800 ohms 1W Insulated |
| 94 | 1216157 | B 473 | 47,000 ohms 1W Insulated |
| Tubes | | | |
| | 1217690 | 5252 | 6BA6 |
| | 7237752 | 5222 | 6SA7 |
| | 1218505 | 5262 | 6AV6 |
| | 1219484 | 5278 | 6AQ7GT |

† Use with 7258488 and 7259675 Speakers
** Use with 7260502 Speaker

MODELS 7260405,
7260905, 1951
Cadillac

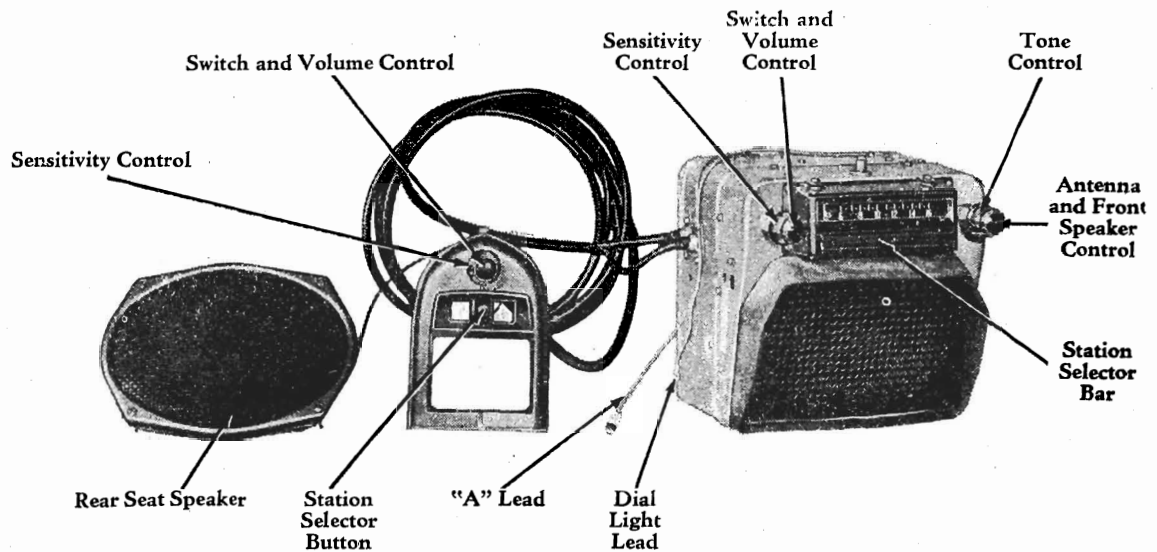
SERVICE PARTS LIST

| | Production Part No. | Service Part No. | Description |
|-------|---------------------|--------------------------------|-----------------------------------------------|
| | | Tubes (Continued) | |
| | 1213793 | 5241 | 6V6GT |
| | 1211924 | 5003 | 0Z4 |
| | 1219485 | 5328 | 12AU7 |
| | | Miscellaneous Electrical Parts | |
| | 7260328 | *7260328 | "A" Lead Assy. and Fuse Connector |
| 110 | 7259408 | 7259408 | Adjuster - Cathode Delay |
| *111 | 7260682 | *7260682 | Control - Tone, Speakers (Model 7260405 only) |
| 111A | | | Tone Control |
| 111B | | | Speakers Control |
| | 7259239 | 7259239 | Control - Tone (Model 7260905 only) |
| 112 | 7259240 | 7259240 | Control - Volume, Sensitivity and Switch |
| 112A | | | Volume Control |
| 112B | | | Switch |
| 112C | | | Sensitivity Control |
| 113 | 7259009 | 7259009 | Relay |
| 114 | 1219661 | 1219661 | Solenoid |
| 115 | 7258488 | 7258488 | Speaker - Front Seat |
| *115 | 7260502 | *7260502 | Speaker - Front Seat (Alternate) |
| *115A | 7260849 | *7260849 | Speaker - Rear Seat (Model 7260405 only) |
| 116 | 7259011 | 7259011 | Switch - Tuner Return |
| 117 | 7259012 | 7259012 | Switch - Station Selector |
| *118 | 7260629 | *7260629 | Switch - Foot Station Selector |
| 119 | 7259336 | 7259336 | Transformer - Output |
| 120 | 7259375 | 7255881 | Transformer - Power |
| 121 | 7239124 | 8542 | Vibrator |
| 122 | 125588 | 55 | Lamp - Dial Light |
| | | MECHANICAL PARTS | |
| | | Chassis | |
| 132 | 7258520 | 7258520 | Antenna Connector |
| | 7236279 | 7236279 | Socket - Octal Tube |
| | 7259307 | 7259307 | Socket - 9 Pin Miniature Tube |
| | 7258073 | 7258073 | Socket - 7 Pin Miniature Tube |
| | 7239125 | 7239125 | Socket - Vibrator |
| 133 | 1219603 | 1219603 | Socket - Dial Light |
| *134 | 7260698 | *7260698 | Socket - Foot Switch |
| | 7260677 | *7260677 | Socket and Wire Assy. - to R. S. Speaker Plug |
| | | Tuner | |
| 141 | 7259201 | 7259201 | Core - Iron Tuning |
| 142 | 7259178 | 7259178 | Core - Guide Bar |
| 143 | 7259319 | 7259319 | Dial Calibrated |
| *144 | 7260806 | *7260806 | Dial Backplate Assy. |
| | 187189 | 44 | Pilot Light |
| *145 | 7260808 | *7260808 | Escutcheon Assy. |
| 146 | 7258236 | 7258236 | Dial Glass |
| | 7258232 | 7258232 | Dial Glass Retainer (2) |
| 147 | 1219610 | 1219610 | Motor Gear Train |
| *148 | 1219847 | *1219847 | Pointer Tip Pkg. |
| 149 | 7259164 | 7259164 | Plunger Solenoid |
| 150 | 1219604 | 1219604 | Station Selector Bar Pkg. |
| | 7259125 | 7259125 | Station Selector Bar |
| | 7259111 | 7259111 | Switch Operating Collar |
| | 7256121 | 7256121 | Toggle Plate |
| 151 | 7259100 | 7259100 | Spring (2) |
| | 7257361 | 7257361 | "C" Washer |
| | 7258239 | 7258239 | Spring Clip |
| *154 | 7260675 | *7260675 | Spring - Vacuum Valve Anti-Rattle |
| | 7258260 | 7258260 | Spring - Calibrated Dial Retainer |
| | 7260676 | *7260676 | Vacuum Valve (Model 7260405 Only) |
| | 7259264 | 7259264 | Vacuum Valve (Model 7260905) |
| 155 | 7259055 | 7259055 | Vacuum Valve Shaft (Model 7260405-Only) |
| | | | Vacuum Valve Shaft (Model 7260905) |
| | | | Spring - Motor Power |
| | | INSTALLATION PARTS | |
| | 7240138 | 6013 | Static Collector |
| | 1911095 | 6030 | Condenser - Generator |
| | 1910147 | 6030 | Condenser - Ignition Coil |
| | 1917580 | 6030 | Condenser - Regulator |
| | 5289849 | 5289849 | Connector - Dial Light Lead |
| | 7259510 | 7259510 | Escutcheon - Sensitivity Control |
| | 7259509 | 7259509 | Escutcheon - Tone Control |
| | 147685 | 147685 | Fuse - 14 Amperes |
| | 1219822 | 1219822 | Fuse Holder Pkg. |
| | 7259369 | 7259369 | Knob - Control |
| | 7259508 | 7259508 | Knob - Sensitivity Control |
| | 7259507 | 7259507 | Knob - Tone Control |
| | 7259514 | 7259514 | Spring - Knob Retainer |

* Parts First Used in 1951

MODELS 7260705,
7261005, Cadillac

This Model Same as Model 7260905, Bulletin 6D-1064, Except as Indicated by This Bulletin



MODELS 7260705 and 7261005

GENERAL

MOUNTING—1951 Cadillac 75 Series Cars.

TUBES—Seven, Plus Rectifier and Trigger.

SPEAKER—6" x 9" Elliptical, Permanent Magnet, Front — 6" x 9" Elliptical, Permanent Magnet, Rear.

TUNING—Electronic.

ANTENNA TRIMMER COMPENSATION—

0.000060 - 0.000085 Mfd.

TUNING RANGE—540 - 1600 KC.

PUSHBUTTON SET-UP—No pushbutton set-up is necessary. However, the number of stations on which the tuner will stop can be controlled by the use of the Sensitivity Controls.

ALIGNMENT PROCEDURE—Alignment procedure same as that of Model 7260905, Bulletin 6D-1064.

FUNCTIONAL OPERATION

The Cadillac remote control signal seeker type radio has all the controls of the Cadillac Syncro-Matic Model 7260905 Radio for front seat operation and in addition has a control head mounted in the left or right rear seat arm rest for rear seat operation. This remote control head has a switch, volume control, and station selector button.

After the rear seat control switch is turned on, only the rear controls operate the radio. The radio cannot be operated from the front seat again until the rear control switch is turned off. Two controls that are always operated at the receiver are the tone control and the antenna control.

This radio operates from the front instrument panel in exactly the same manner as the 7260905 Model except for a front speaker switch on the right hand control knob. This switch is used only when the rear control is in operation, and it gives the front seat occupants the choice of listening at a reduced volume from normal output to the stations selected by the person operating the rear selector button or completely disconnecting the front speaker.

THEORY OF OPERATION

The energizing of relays, illustration numbers 125 and 126, is accomplished by turning the rear control switch (123C) to the "on" position. When this switch is turned on, the "A" voltage is applied across the relays, energizing the relays and closing the contacts to the rear controls. With the relays 125 and 126 energized, the rear seat controls are operative and not the front seat controls.

Once these relays are energized, the "A" supply is connected to the power transformer center-tap through contacts 1-2 and 3-4 of relay 126, regardless of the position of the front switch (112B); therefore the radio cannot be turned off until the relays are de-energized by turning off the rear switch (123C). With the relays in the de-energized position, all controls are operative at the receiver, while all remote controls in the rear arm rest are inoperative.

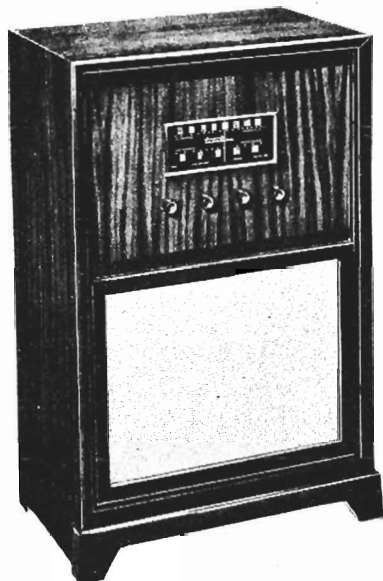
MODELS 7260705,
7261005, Cadillac

CADILLAC REMOTE CONTROL SYNCROMATIC MODEL SERVICE PARTS LIST

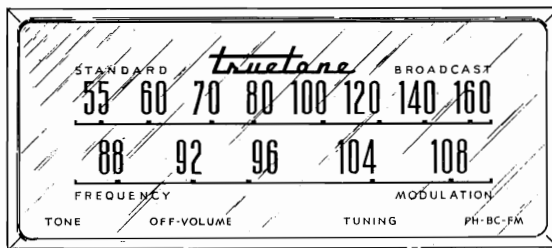
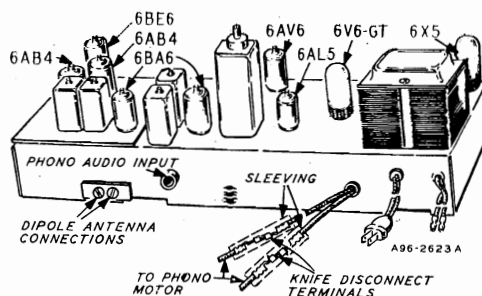
The Service Parts List of the Cadillac Remote Control Syncromatic Radios are identical to the Cadillac Syncromatic Radio, Model 7260905, except for the illustration numbers and parts listed below: Those parts marked with a cross (†) are changed from Model 7260905—the others are added parts.

| Illus. No. | Production Part No. | Service Part No. | Description |
|-------------------------|---------------------|------------------|-------------------------------------------------------|
| ELECTRICAL PARTS | | | |
| Capacitors | | | |
| 45 | 1218969 | E-402 | .004 mfd 600V Tubular |
| 46 | 1219550 | G 680 | .000068 mfd Molded |
| Resistors | | | |
| 95 | 1214556 | A-274 | 270,000 ohms ½W Insulated |
| 96 | 7237835 | A 221 | 220 ohms ½W Insulated |
| 97 | 1213482 | A 391 | 390 ohms ½W Insulated |
| 98 | 1213236 | 1213236 | 1200 ohms ½W Insulated |
| 99 | 1213481 | A 332 | 3300 ohms ½W Insulated |
| Miscellaneous | | | |
| †*111 | 7260703 | *7260703 | Tone and Front Speaker Control |
| 111A | | | Tone Control |
| 111B | | | Front Speaker Switch |
| †118 | 7260629 | 7260629 | Foot Switch Assembly (Omitted) |
| 123 | 7259947 | 7259947 | Control - Volume, Sensitivity, and Switch—Remote Unit |
| 123A | | | Volume |
| 123B | | | Sensitivity |
| 123C | | | Switch |
| 124 | 187189 | 44 | Lamp - Remote Dial Light |
| 125 | 7259951 | 7259951 | Relay - 4 Section |
| 126 | 7259952 | 7259952 | Relay - 3 Section |
| *127 | 7260849 | *7260849 | Speaker 6 x 9 Elliptical P. M. Rear |
| 129 | 7259012 | 7259012 | Switch - Station Selector - Remote Unit |
| MECHANICAL PARTS | | | |
| Chassis | | | |
| †134 | 7260698 | 7260698 | Foot Switch Socket (Omitted) |
| Remote Control | | | |
| | 7259946 | 7259946 | Cable - Rear Seat - Model 7260705 |
| * | 7260870 | *7260870 | Cable - Rear Seat - Model 7261005 |
| 157 | 1219682 | 1219682 | Plug and Shell Pkg. |
| 158 | 1219679 | 1219679 | Plug and Shell Pkg. |
| * | 4599418 | *4599418 | Escutcheon - Arm Rest |
| 159 | 7259510 | 7259510 | Escutcheon - Sensitivity Control |
| 160 | 7259508 | 7259508 | Knob - Sensitivity Control |
| 161 | 7259369 | 7259369 | Knob - Control |
| 163 | 1219686 | 1219686 | Socket Pkg. - Dial Light |
| 164 | 7259944 | 7259944 | Socket - Cable |
| 165 | 7259943 | 7259943 | Socket - Cable |
| 167 | 1219687 | 1219687 | Station Selector Button Pkg. Push Button Assy. |
| | 7259125 | 7259125 | Retaining Ring |
| | 7256121 | 7256121 | Washer Felt Washer "C" Washer |

* Parts First Used in 1951.



GENERAL INFORMATION



TONE CONTROL

Use this knob to adjust the tone of the receiver. When turned clockwise the high notes will predominate and when turned counter-clockwise a deep bass effect will result.



ON-OFF SWITCH AND VOLUME CONTROL

The On-Off switch and Volume control are operated by the same knob. To turn the radio on, turn the knob clockwise until a click is heard. Allow approximately 30 seconds for the tubes to heat. Then continue to turn the knob clockwise to increase the volume.



TUNING KNOB

Use this control to tune in the desired station. Turn the knob until the station is heard. Then slowly rotate it back and forth until the signal is clearest and strongest. If signal is too strong, reduce it by means of the volume control, not by using the tuning knob.

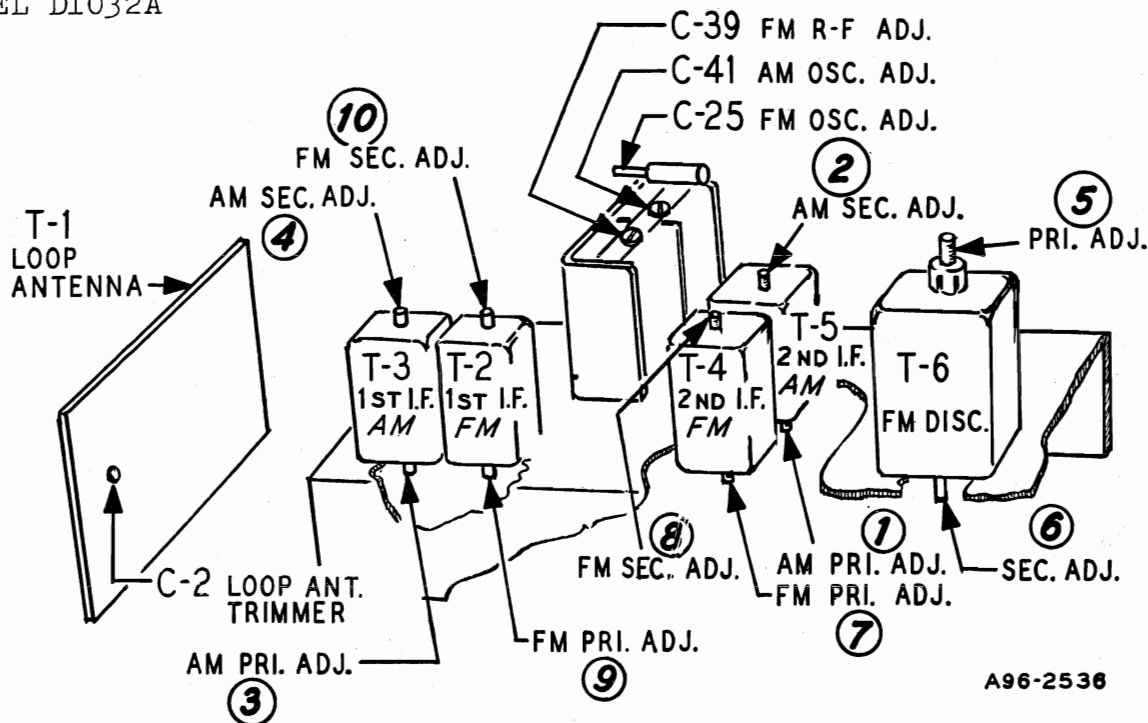


BAND AND PHONO RADIO SWITCH

This control has three positions, FM, Broadcast and Phono. In the Phono position, the electrical circuits are connected for the reproduction of records played on the external record player.

A96-2651

MODEL D1032A



A96-2536

DRIVE CORD REPLACEMENT

Replacement of the drive cord may be accomplished as shown in the illustration. For this purpose use the new drive cord assembly listed in the Replacement Parts List. Turn the gang condenser until the plates are fully meshed. Then install the string as shown, winding three turns counter-clockwise around the tuning shaft with the turns progressing away from the chassis. After the cord is installed, rotate the tuning shaft several times in order to take up any slack in the cord.

When television programs become available in your community, the audio amplifier and speaker of this radio may be used in conjunction with a Television Picture Receiver and sound converter to reproduce the sound portion of the television programs. Simply insert the connector on the cable of the Television Converter into the socket marked PHONO and operate the receiver in the same manner as described in the foregoing paragraph.

Intermediate Frequency—
AM 455 KC — FM 10.7 MC

Selectivity — AM — 45 KC broad at 1000 times signal, measured at 1000 KC

I.F. FM—200 KC broad at 2 times down

I.F. FM—950 KC broad at 200 times down

AM Sensitivity—(For .5 watt output with external antenna)
25 microvolts average

FM Sensitivity—(For .5 watt output)
25 microvolts average

RECORD PLAYER AND TELEVISION SOUND CONNECTIONS

For models not equipped with built-in record player, a socket marked PHONO is provided on the back of the chassis for connection to an external record player or automatic record changer. When it is desired to play records through the radio, insert the connector on the cable of any standard record player into this socket. Turn the band switch to the phono position and use the volume control to adjust the sound level.

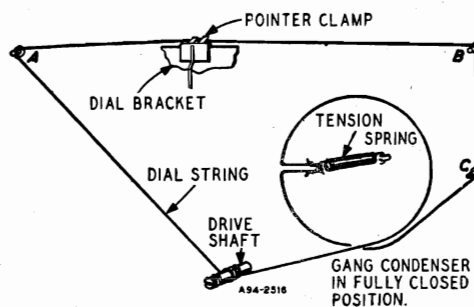
ELECTRICAL SPECIFICATIONS

Power Output—
117 volts AC—40 watts
50-60 cycles

Power Output—
1.9 watts maximum
.8 watts 10% distortion

Speaker—8 inch PM dynamic

Frequency Ranges—
Broadcast 540-1600 KC
Frequency modulation 88-108 MC



ALIGNMENT PROCEDURES

AM STAGES

The following is required for aligning:
 An All Wave Signal Generator Which Will Provide an Accurately Calibrated Signal at the Test Frequencies as Listed.
 Output Indicating Meter, Non-Metallic Screwdriver, Dummy Antennas — .1 mf, and 50mmf.

Volume Control Maximum all Adjustments.
 Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.
 Allow Chassis and Signal Generator to "Heat Up" for Several Minutes.

| SIGNAL GENERATOR | | | | GANG CONDENSER SETTING | ADJUST | ADJUST FOR |
|-------------------|--------------------------------------------|-----------------------|-------------------|--------------------------------------------------------------------|--------------------------------|----------------|
| FREQUENCY SETTING | CONNECT GENERATOR OUTPUT TO | THROUGH DUMMY ANTENNA | CONNECT GROUND TO | | | |
| 455 KC | Control Grid 1st 6BA6 Pin No. 1 | .1 mf | Chassis Base | Rotor Fully Open | 2nd I.F. Pri. (1) and Sec. (2) | Maximum Output |
| 455 KC | Control Grid 6BE6 Pin No. 7 1st Det. | .1 mf | Chassis Base | Rotor Fully Open | 1st I.F. Pri. (3) and Sec. (4) | Maximum Output |
| 455 KC | Control Grid 6BE6 Pin No. 7 | .1 mf | Chassis Base | Rotor Fully Open | 2nd I-F Pri. (1) and Sec. (2) | Maximum Output |
| 1620 KC | Control Grid 6BE6 Pin No. 7 | .1 mf | Chassis Base | Rotor Fully Open | Oscillator C-41 | Maximum Output |
| 1400 KC | External Antenna Terminal | 50 mmf | Chassis Base | Turn Rotor to Max. Output. Set Pointer to 1400 KC See Note A | Antenna C-2 | Maximum Output |

NOTE A—If the pointer is not at 1400 KC on the dial, reset pointer to the 1400 KC mark on the dial scale.

FM STAGES

The following is required for aligning:
 An accurately calibrated signal generator providing unmodulated signals at the test frequencies listed below.
 Non-metallic screwdriver.
 Dummy Antennas and I-F Loading Resistor—2500 mmf, 300 ohms

Zero center scale DC vacuum tube voltmeter having a range of approximately 3 volts.
 (If a zero center scale meter is not available, a standard scale vacuum tube voltmeter may be used by reversing the meter connections for negative readings).
 Allow chassis and signal generator to "Heat Up" for several minutes.

| SIGNAL GENERATOR | | | THROUGH DUMMY ANTENNA | BAND SWITCH SETTING | GANG CONDENSER SETTING | ADJUST | ADJUST FOR |
|------------------|-------------------|-----------------------------------------------------------|-----------------------|---------------------|------------------------|-----------------------------------------------------------------------------------------------------------------|--------------------|
| | FREQUENCY SETTING | CONNECT GENERATOR OUTPUT TO | | | | | |
| Discriminator | 10.7 MC | 6BA6 2nd I-F Pin 1 and Chassis | 2500 mmf | FM | Rotor Fully Open | Disc. Pri. (5) Note A | Maximum Deflection |
| | 10.7 MC | 6BA6 2nd I-F Pin 1 and Chassis | 2500 mmf | FM | Rotor Fully Open | Disc. Sec. (6) Note B | |
| I-F | 10.7 MC Note C | 6BA6 1st I-F Pin 1 and Chassis | 2500 mmf | FM | Rotor Fully Open | 2nd I-F Pri. (7) Sec. (8) Note D | Maximum Deflection |
| Discriminator | 10.7 MC | 6BA6 1st I-F Pin 1 and Chassis | 2500 mmf | FM | Rotor Fully Open | Disc. Pri. (5) Note D | Maximum Deflection |
| I-F | 10.7 MC | Junction C-32A & B (Dual 100 mmf cond.) And chassis | 2500 mmf | FM | Rotor Fully Open | 1st I-F Pri. (9) & Sec. (10) 2nd I-F Pri. (7) & Sec. (8) Disc. Pri. (5) In Order Shown Note D | Maximum Deflection |
| | 10.7 MC | Same as above | 2500 mmf | FM | Rotor Fully Open | Disc. Sec. (6) Note B | |

RECHECK I-F ADJUSTMENTS IN ORDER GIVEN

| | | | | | | | |
|------------|-------|-------------------------------------------------------------------------------------------------------|----------|----|---------------------------------|-----------|--------------------|
| Oscillator | | Disconnect built-in dipole antenna and connect generator to dipole terminals with resistor in series. | 300 ohms | FM | Rotor Fully Open | Osc. C-25 | Deflection Maximum |
| Antenna | 104.5 | Same as above | 300 ohms | FM | Tune rotor for max. AVC voltage | Ant. C-39 | Maximum Deflection |

RECHECK ANTENNA & OSC. ADJUSTMENTS IN ORDER GIVEN

FM ALIGNMENT NOTES

NOTE A—The zero center scale DC vacuum tube voltmeter is to be connected between chassis ground and the AVC line. A signal of .1 volt must be fed into the receiver for this adjustment.
 Note output voltage on the zero center DC vacuum tube voltmeter.

NOTE B—Disconnect zero center DC vacuum tube voltmeter from AVC and connect it at the audio takeoff point at the

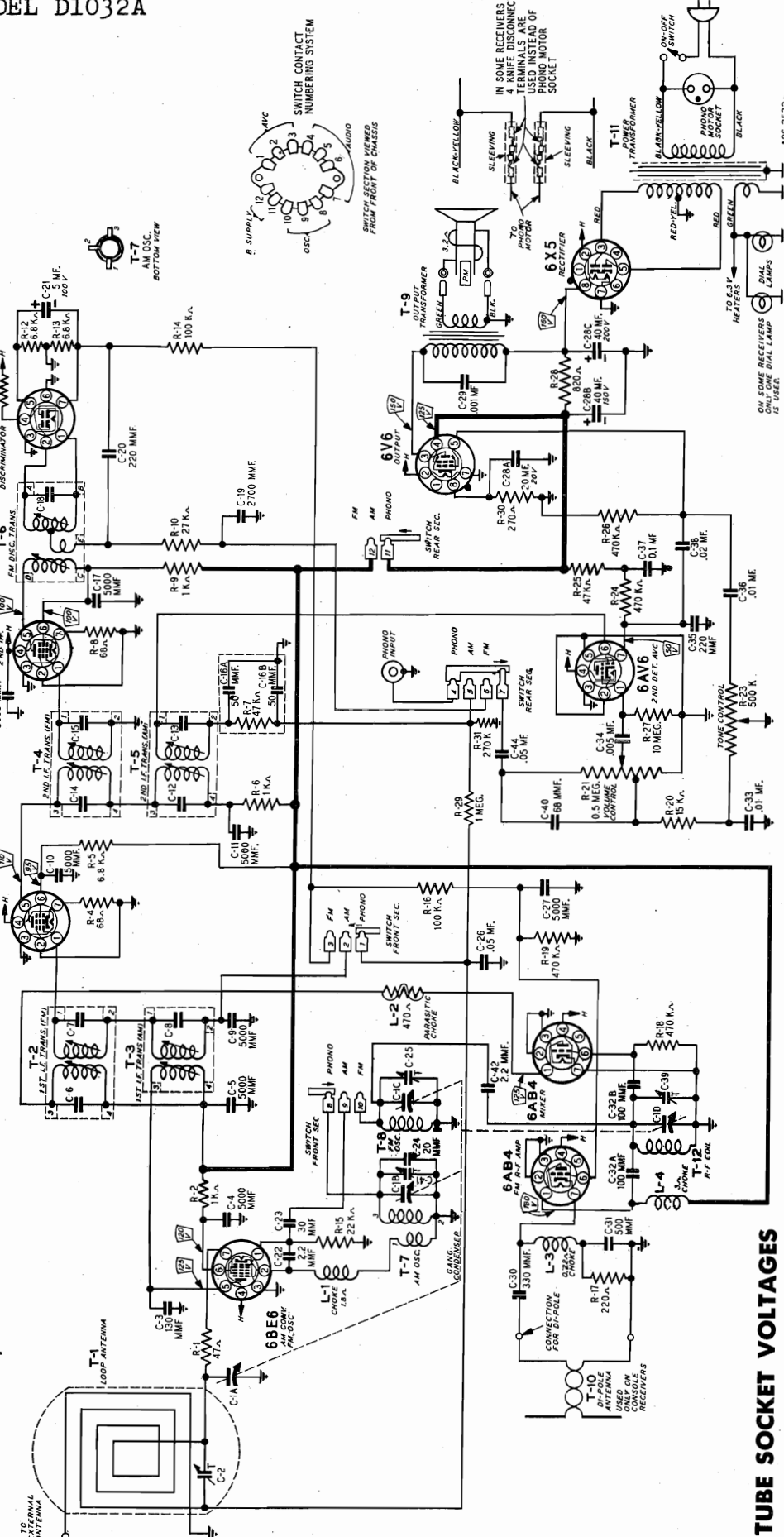
27 K ohm resistor (R-10) and its junction with the terminal strip. Adjust for zero voltage indication.

NOTE C—AM I-F coils must be aligned before attempting to align the FM I-F coils.

NOTE D—Connect zero center DC vacuum tube voltmeter as in Note A. Adjust input to give same output on the zero center DC vacuum tube voltmeter as in Note A.

MODEL D1032A

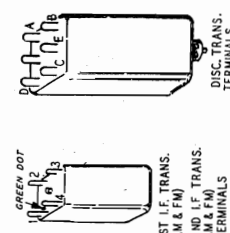
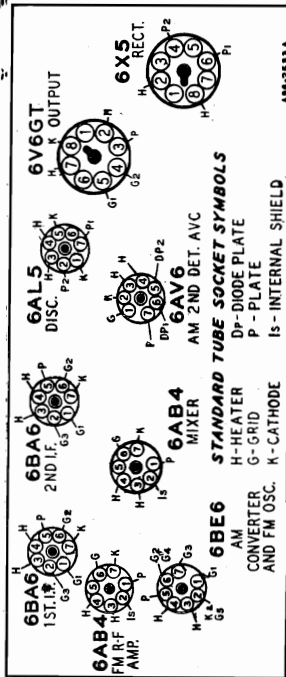
NOTE — In later production C-24 is 10 mmf



TUBE SOCKET VOLTAGES

Socket voltages are shown on the schematic diagram. All voltages are between the socket terminal and chassis ground. Plate, screen and cathode voltages were taken with a 1000 ohm-per-volt meter with a 300 volt scale used for plate and screen voltages. Audio grid voltages were read with a vacuum tube volt-meter. Conditions of measurement are:

- Line voltage 117 Volts AC
- Signal Input
- A Variation of ±10% is usually permissible.



REPLACEMENT PARTS LIST

RESISTORS

| | | Ohms | Watts | |
|------|--------|---------|-------|----------------|
| R-1 | B85470 | 47 | 0.5 | Carbon.. |
| R-2 | B85102 | 1000 | 0.5 | Carbon..... |
| R-6 | | | | |
| R-9 | | | | |
| R-4 | B84680 | 68 | 0.5 | Carbon..... |
| R-8 | | | | |
| R-5 | | | | |
| R-12 | B84682 | 6800 | 0.5 | Carbon..... |
| R-13 | | | | |
| R-7 | | | | |
| R-25 | B85473 | 47 K | 0.5 | Carbon..... |
| R-10 | B85273 | 27 K | 0.5 | Carbon..... |
| R-11 | 43X233 | 3.6 | 0.5 | Wirewound... |
| R-14 | B85104 | 100 K | 0.5 | Carbon..... |
| R-16 | | | | |
| R-15 | | | | |
| R-17 | B85223 | 22 K | 0.5 | Carbon..... |
| R-18 | B84221 | 220 | 0.5 | Carbon..... |
| R-19 | B85474 | 470 K | 0.5 | Carbon..... |
| R-24 | | | | |
| R-26 | | | | |
| R-20 | B85153 | 15 K | 0.5 | Carbon..... |
| R-21 | 36X372 | .5 meg. | | Volumé Control |
| R-23 | 40X310 | .5 meg. | | Tone Control |
| R-27 | B85106 | 10 meg. | 0.5 | Carbon..... |
| R-28 | D84821 | 820 | 2.0 | Carbon..... |
| R-29 | B85105 | 1 meg. | 0.5 | Carbon..... |
| R-30 | B84271 | 270 | 0.5 | Carbon..... |
| R-31 | B84274 | 270 K | 0.5 | Carbon..... |

TRANSFORMERS AND COILS

| | | |
|------|--------|---------------------------------|
| L-1 | 35A5 | Insulated Choke |
| L-2 | 9A2103 | Parasitic Choke |
| L-3 | 35A9 | Insulated Choke |
| L-4 | 35A8 | Insulated Choke |
| T-1 | 9A1972 | "B" Range Loop Antenna |
| T-2 | 9A2060 | 1st I-F Trans. (FM) |
| T-3 | 9A2062 | 1st I-F Trans. (AM) |
| T-4 | 9A2061 | 2nd I-F Trans. (FM) |
| T-5 | 9A2063 | 2nd I-F Trans. (AM) |
| T-6 | 9A2161 | Discriminator Transformer |
| T-7 | 9A2065 | Oscillator Coil (AM) |
| T-8 | 9A2067 | Oscillator Coil (FM) |
| T-9 | 51X134 | Output Transformer |
| T-10 | 9A2005 | Dipole Antenna |
| T-11 | 53X291 | Power Transformer |
| T-12 | 9A2066 | Antenna Coil (FM) |

DIAL AND DRIVE ASSEMBLY

| | |
|---------|-------------------------------------|
| 58X742 | Dial Glass |
| 15X251 | Pointer |
| 19X192 | "C" Washer (Mtg. Drive Shaft) |
| 6X66 | Rubber Grommet |
| 25X1616 | Dial Bracket |
| 28X113 | Drive Cord Tension Spring |
| 7A103 | No. 47 Pilot Light |
| 7A199 | Pilot Light Socket Assembly |
| 10X38 | Drive Cord Assembly |
| 26X486 | Drive Shaft |

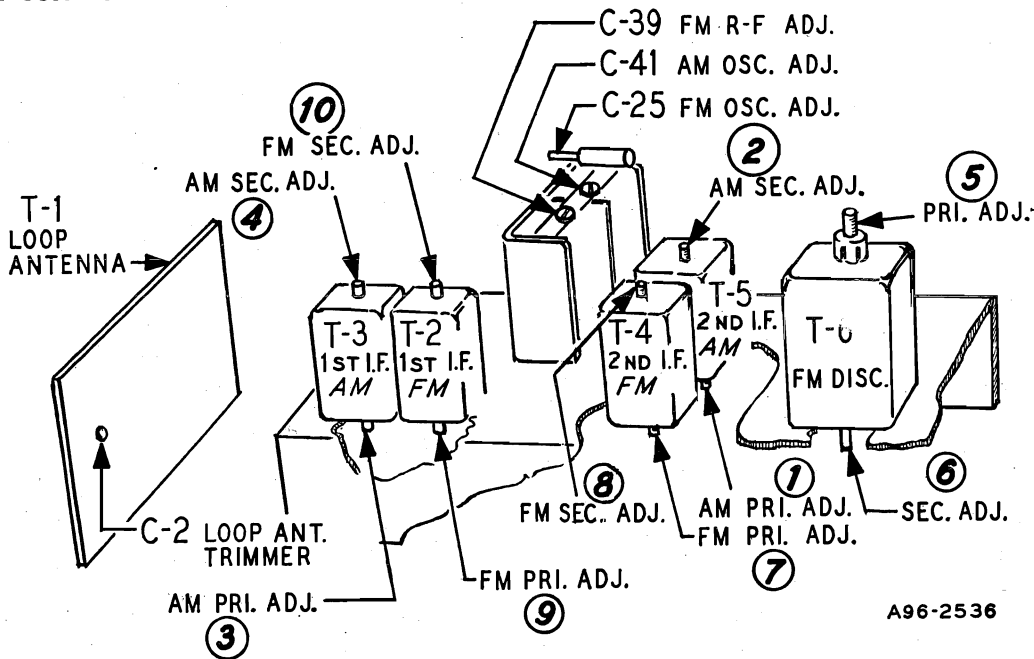
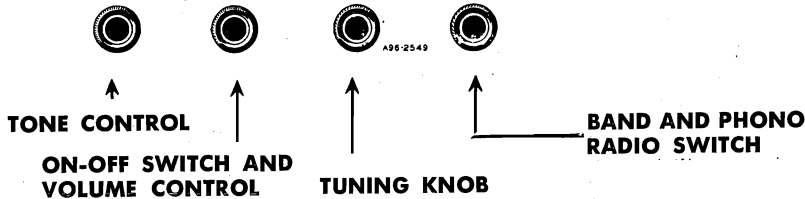
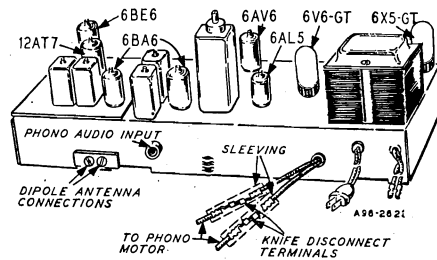
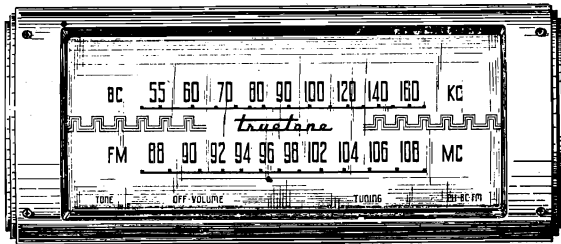
MISCELLANEOUS

| | |
|--------|---------------------------------|
| 12A477 | 8" P.M. Speaker |
| 4X1082 | Escutcheon |
| 10A759 | Knob |
| 13X546 | Line Cord & Plug Assembly |
| 2A393 | Band Change Switch |
| 3A435 | Molded Octal Tube Socket |
| 3A305 | Phono Socket |
| 3A426 | Tube Socket (1st 6BA6) |
| 3A427 | Tube Socket |
| 3A439 | Tube Socket (Miniature) |
| | Cabinet No. 052 |

CAPACITORS

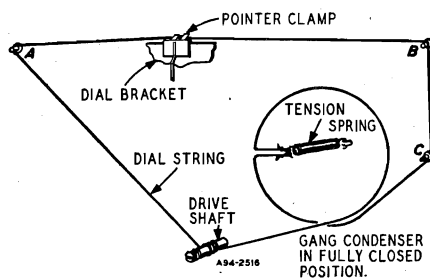
| | | |
|-------|--------|------------------------------------|
| C-1 | 14A209 | Gang Condenser Assembly |
| C-2 | 17A256 | 2-24 mmf Trimmer..... |
| C-3 | 47X559 | 130 mmf Ceramic..... |
| C-4 | | |
| C-5 | | |
| C-9 | | |
| C-10 | | |
| C-11 | 47X507 | 5000 mmf Ceramic..... |
| C-17 | | |
| C-27 | | |
| C-43 | | |
| C-6 | | Part of T-2 (1st I-F Trans. FM) |
| C-7 | | Part of T-3 (1st I-F Trans. AM) |
| C-8 | | Part of T-5 (2nd I-F Trans. AM) |
| C-12 | | Part of T-4 (2nd I-F Trans. FM) |
| C-13 | | |
| C-14 | | |
| C-15 | | |
| C-16A | 47X112 | 50-50 mmf Dual Mica.... |
| C-16B | | |
| C-18 | | Part of T-6 (Discriminator Trans.) |
| C-19 | 47X492 | 2700 mmf Molded Mica.. |
| C-20 | 47X468 | 220 mmf Ceramic..... |
| C-35 | | |
| C-21 | 45X361 | 5 mf 100 V Dry Electrolytic |
| C-22 | 47X557 | 2.2 mmf Ceramic..... |
| C-42 | | |
| C-23 | 47X558 | 30 mmf Ceramic..... |
| C-24 | 47X523 | 10 mmf Ceramic..... |
| C-25 | 17A255 | 1-8 mmf Trimmer..... |
| C-26 | | |
| C-44 | B66503 | .05 mf 200 V Tubular..... |
| C-28A | | 20 mf 20 V |
| C-28B | 45X360 | 40 mf 150 V Dry Electrolytic |
| C-28C | | 40 mf 200 V |
| C-29 | H66102 | .001 mf 800 V Tubular..... |
| C-30 | 47X470 | 330 mmf Molded Mica.. |
| C-31 | 47X508 | 500 mmf Ceramic..... |
| C-32A | | |
| C-32B | 76X4 | 100 mmf Dual Ceramic.. |
| C-33 | | |
| C-36 | B66103 | .01 mf 200 V. Tubular..... |
| C-34 | D66502 | .005 mf 400 V. Tubular..... |
| C-37 | D66104 | .1 mf 400 V Tubular..... |
| C-38 | D66203 | .02 mf 400 V Tubular..... |
| C-39 | | |
| C-41 | | Part of C-1 (Gang Condenser) |
| C-40 | 47X471 | 68 mmf Ceramic..... |

MODEL D1046D



DRIVE CORD REPLACEMENT

Replacement of the drive cord may be accomplished as shown in the illustration. For this purpose use the new drive cord assembly listed in the Replacement Parts List. Turn the gang condenser until the plates are fully meshed. Then install the string as shown, winding three turns counter-clockwise around the tuning shaft with the turns progressing away from the chassis. After the cord is installed, rotate the tuning shaft several times in order to take up any slack in the cord.



ELECTRICAL SPECIFICATIONS

Power Output—
117 volts AC—40 watts
60 watts phono operating

Power Output—
1.9 watts maximum
.8 watts 10% distortion

Speaker—8 inch PM dynamic

Frequency Ranges—
Broadcast 540-1600 KC
Frequency modulation 88-108 MC

Intermediate Frequency—
AM 455 KC — FM 10.7 MC

Selectivity — AM — 45 KC broad
at 1000 times signal, measured
at 1000 KC

I.F. FM—200 KC broad at 2 times
down

I.F. FM—950 KC broad at 200
times down

AM Sensitivity—(For .5 watt output
with external antenna)
25 microvolts average

FM Sensitivity—(For .5 watt output)
25 microvolts average

**ALIGNMENT PROCEDURES
AM STAGES**

The following is required for aligning:
An All Wave Signal Generator Which Will Provide an Accurately Calibrated Signal at the Test Frequencies as Listed.
Output Indicating Meter, Non-Metallic Screwdriver, Dummy Antennas
— .1 mf, and 50mmf.

Volume Control Maximum all Adjustments.
Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.
Allow Chassis and Signal Generator to "Heat Up" for Several Minutes.

| SIGNAL GENERATOR | | | | GANG CONDENSER SETTING | ADJUST | ADJUST FOR |
|-------------------|--------------------------------------------|-----------------------|-------------------|--------------------------------------------------------------------|--------------------------------|----------------|
| FREQUENCY SETTING | CONNECT GENERATOR OUTPUT TO | THROUGH DUMMY ANTENNA | CONNECT GROUND TO | | | |
| 455 KC | Control Grid 1st 6BA6 Pin No. 1 | .1 mf | Chassis Base | Rotor Fully Open | 2nd I.F. Pri. (1) and Sec. (2) | Maximum Output |
| 455 KC | Control Grid 6BE6 Pin No. 7 1st Det. | .1 mf | Chassis Base | Rotor Fully Open | 1st I.F. Pri. (3) and Sec. (4) | Maximum Output |
| 455 KC | Control Grid 6BE6 Pin No. 7 | .1 mf | Chassis Base | Rotor Fully Open | 2nd I-F Pri. (1) and Sec. (2) | Maximum Output |
| 1620 KC | Control Grid 6BE6 Pin No. 7 | .1 mf | Chassis Base | Rotor Fully Open | Oscillator C-41 | Maximum Output |
| 1400 KC | External Antenna Terminal | 50 mmf | Chassis Base | Turn Rotor to Max. Output. Set Pointer to 1400 KC See Note A | Antenna C-2 | Maximum Output |

NOTE A—If the pointer is not at 1400 KC on the dial, reset pointer to the 1400 KC mark on the dial scale.

FM STAGES

The following is required for aligning:
An accurately calibrated signal generator providing unmodulated signals at the test frequencies listed below.
Non-metallic screwdriver.
Dummy Antennas and I-F Loading Resistor—2500 mmf, 300 ohms

Zero center scale DC vacuum tube voltmeter having a range of approximately 3 volts.
(If a zero center scale meter is not available, a standard scale vacuum tube voltmeter may be used by reversing the meter connections for negative readings).
Allow chassis and signal generator to "Heat Up" for several minutes.

| SIGNAL GENERATOR | | | THROUGH DUMMY ANTENNA | BAND SWITCH SETTING | GANG CONDENSER SETTING | ADJUST | ADJUST FOR |
|------------------|-------------------|-----------------------------------------------------------|-----------------------|---------------------|------------------------|-----------------------------------------------------------------------------------------------------------------|--------------------|
| | FREQUENCY SETTING | CONNECT GENERATOR OUTPUT TO | | | | | |
| Discriminator | 10.7 MC | 6BA6 2nd I-F Pin 1 and Chassis | 2500 mmf | FM | Rotor Fully Open | Disc. Pri. (5) Note A | Maximum Deflection |
| | 10.7 MC | 6BA6 2nd I-F Pin 1 and Chassis | 2500 mmf | FM | Rotor Fully Open | Disc. Sec. (6) Note B | |
| I-F | 10.7 MC Note C | 6BA6 1st I-F Pin 1 and Chassis | 2500 mmf | FM | Rotor Fully Open | 2nd I-F Pri. (7) Sec. (8) Note D | Maximum Deflection |
| Discriminator | 10.7 MC | 6BA6 1st I-F Pin 1 and Chassis | 2500 mmf | FM | Rotor Fully Open | Disc. Pri. (5) Note D | Maximum Deflection |
| I-F | 10.7 MC | Junction C-32A & B (Dual 100 mmf cond.) And chassis | 2500 mmf | FM | Rotor Fully Open | 1st I-F Pri. (9) & Sec. (10) 2nd I-F Pri. (7) & Sec. (8) Disc. Pri. (5) In Order Shown Note D | Maximum Deflection |
| | 10.7 MC | Same as above | 2500 mmf | FM | Rotor Fully Open | Disc. Sec. (6) Note B | |

RECHECK I-F ADJUSTMENTS IN ORDER GIVEN

| | | | | | | | |
|------------|-------|-------------------------------------------------------------------------------------------------------|----------|----|---------------------------------|-----------|--------------------|
| Oscillator | 108.5 | Disconnect built-in dipole antenna and connect generator to dipole terminals with resistor in series. | 300 ohms | FM | Rotor Fully Open | Osc. C-25 | Maximum Deflection |
| Antenna | 104.5 | Same as above | 300 ohms | FM | Tune rotor for max. AVC voltage | Ant. C-39 | Maximum Deflection |

RECHECK ANTENNA & OSC. ADJUSTMENTS IN ORDER GIVEN

FM ALIGNMENT NOTES

NOTE A—The zero center scale DC vacuum tube voltmeter is to be connected between chassis ground and the AVC line. A signal of .1 volt must be fed into the receiver for this adjustment.
Note output voltage on the zero center DC vacuum tube voltmeter.

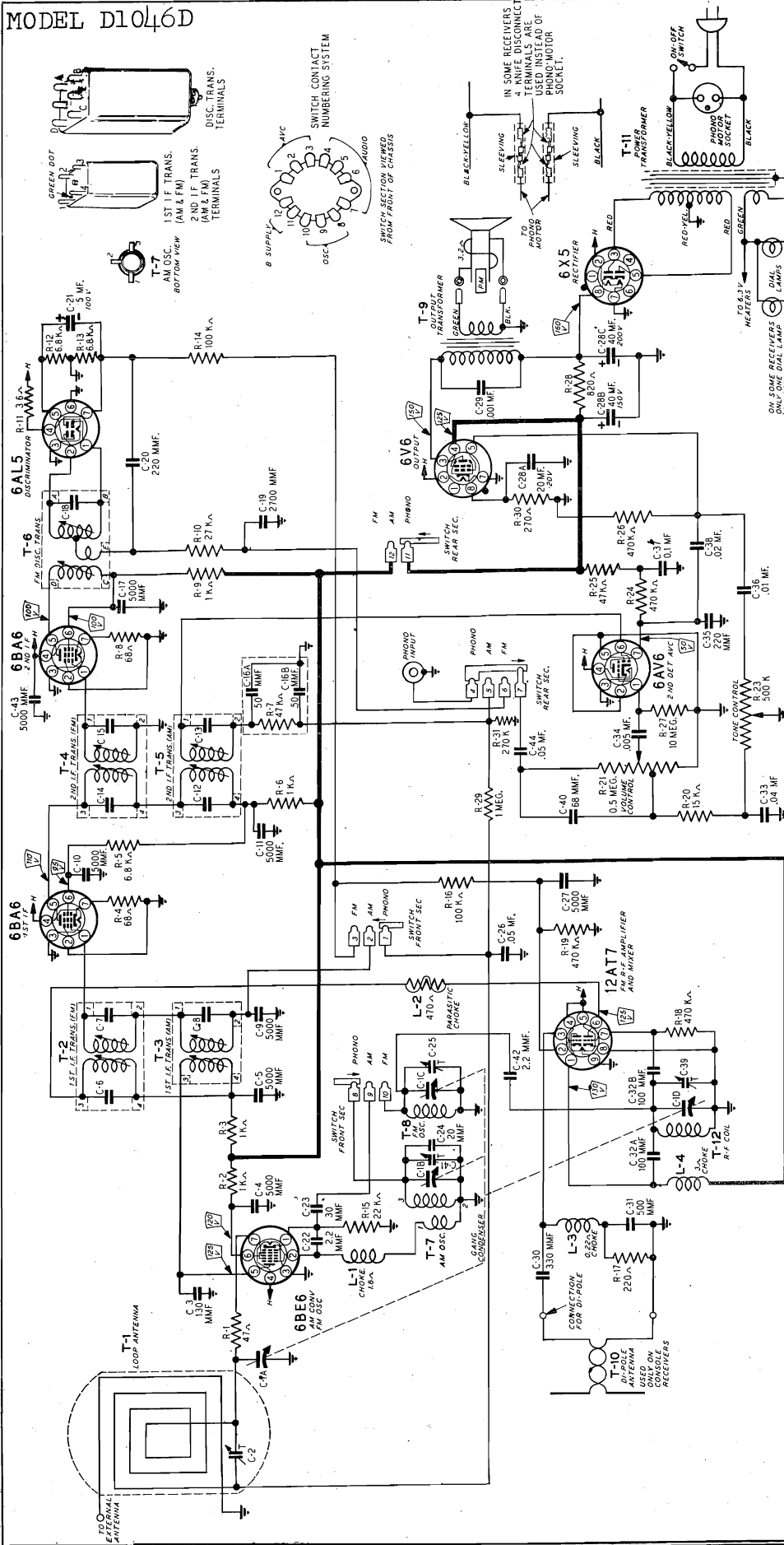
NOTE B—Disconnect zero center DC vacuum tube voltmeter from AVC and connect it at the audio takeoff point at the

27 K ohm resistor (R-10) and its junction with the terminal strip. Adjust for zero voltage indication.

NOTE C—AM I-F coils must be aligned before attempting to align the FM I-F coils.

NOTE D—Connect zero center DC vacuum tube voltmeter as in Note A. Adjust input to give same output on the zero center DC vacuum tube voltmeter as in Note A.

MODEL D1046D

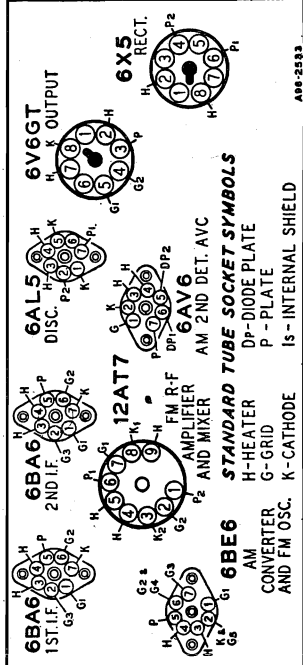


NOTE — In later production C-33 is .01 mf.

TUBE SOCKET VOLTAGES

Socket voltages are shown on the schematic diagram. All voltages are between the socket terminal and chassis ground. Plate, screen and cathode voltages were taken with a 1000 ohm-per-volt meter with a 300 volt scale used for plate and screen voltages. Audio grid voltages were read with a vacuum tube volt-meter. Conditions of measurement are:

- Line voltage 117 Volts AC
- Signal Input None
- A Variation of ±10% is usually permissible.



ABE-2533

PARTS LISTS

NOTICE: There is a model number label on the chassis. This label identifies the receiver as to chassis and issue letter. When ordering parts or writing, give ALL information on this label.

MISCELLANEOUS

| | | |
|--------|---------------------------|-------|
| 12A477 | 8" P.M. Speaker | ..... |
| 4X1073 | Escutcheon | ..... |
| 10A758 | Knob | ..... |
| 13X546 | Line Cord & Plug Assembly | ..... |
| 2A395 | Band Change Switch | ..... |
| 3A435 | Molded Octal Tube Socket | ..... |
| 3A305 | Phono Socket | ..... |
| 3A426 | Tube Socket (1st 6BA6) | ..... |
| 3A443 | Tube Socket (12AT7) | ..... |
| 3A427 | Tube Socket (6BE6) | ..... |
| 3A439 | Tube Socket (Miniature) | ..... |
| | Cabinet No. 952 | ..... |

CAPACITORS

| | | | |
|-------|--------|------------------------------------|------------------------|
| C-1 | 14A209 | Gang Condenser Assembly | ..... |
| C-2 | 17A256 | 2-24 mmf | Trimmer..... |
| C-3 | 47X559 | 130 mmf | Ceramic..... |
| C-4 | | | |
| C-5 | | | |
| C-9 | | | |
| C-10 | | | |
| C-11 | 47X507 | 5000 mmf | Ceramic..... |
| C-17 | | | |
| C-27 | | | |
| C-43 | | | |
| C-6 | | Part of T-2 (1st I-F Trans. FM) | |
| C-7 | | Part of T-3 (1st I-F Trans. AM) | |
| C-8 | | Part of T-5 (2nd I-F Trans. AM) | |
| C-12 | | Part of T-4 (2nd I-F Trans. FM) | |
| C-13 | | | |
| C-14 | | | |
| C-15 | | | |
| C-16A | 47X112 | 50-50 mmf | Dual Mica.... |
| C-16B | | | |
| C-18 | | Part of T-6 (Discriminator Trans.) | |
| C-19 | 47X492 | 2700 mmf | Molded Mica.. |
| C-20 | 47X468 | 220 mmf | Ceramic..... |
| C-35 | | | |
| C-21 | 45X361 | 5 mf | 100 V Dry Electrolytic |
| C-22 | 47X557 | 2.2 mmf | Ceramic..... |
| C-42 | | | |
| C-23 | 47X558 | 30 mmf | Ceramic..... |
| C-24 | 47X516 | 20 mmf | Ceramic..... |
| C-25 | 17A255 | 1-8 mmf | Trimmer..... |
| C-26 | | | |
| C-44 | B66503 | .05 mf | 200 V Tubular..... |
| C-28A | | 20 mf | 20 V |
| C-28B | 45X360 | 40 mf | 150 V Dry Electrolytic |
| C-28C | | 40 mf | 200 V |
| C-29 | H66102 | .001 mf | 800 V Tubular..... |
| C-30 | 47X470 | 330 mmf | Molded Mica.. |
| C-31 | 47X508 | 500 mmf | Ceramic..... |
| C-32A | | | |
| C-32B | 76X4 | 100 mmf | Dual Ceramic.. |
| C-33 | | | |
| C-36 | B66103 | .01 mf | 200 V. Tubular..... |
| C-34 | D66502 | .005 mf | 400 V. Tubular..... |
| C-37 | D66104 | .1 mf | 400 V Tubular..... |
| C-38 | D66203 | .02 mf | 400 V Tubular..... |
| C-39 | | | |
| C-41 | | Part of C-1 (Gang Condenser) | |
| C-40 | 47X471 | 68 mmf | Ceramic..... |

RESISTORS

| | | Ohms | Watts | |
|------|--------|---------|-------|----------------|
| R-1 | B85470 | 47 | 0.5 | Carbon..... |
| R-2 | | | | |
| R-3 | B85102 | 1000 | 0.5 | Carbon..... |
| R-6 | | | | |
| R-9 | | | | |
| R-4 | B84680 | 68 | 0.5 | Carbon..... |
| R-8 | | | | |
| R-5 | | | | |
| R-12 | B84682 | 6800 | 0.5 | Carbon..... |
| R-13 | | | | |
| R-7 | B85473 | 47 K | 0.5 | Carbon..... |
| R-25 | | | | |
| R-10 | B85273 | 27 K | 0.5 | Carbon..... |
| R-11 | 43X233 | 3.6 | 0.5 | Wirewound... |
| R-14 | B85104 | 100 K | 0.5 | Carbon..... |
| R-16 | | | | |
| R-15 | B85223 | 22 K | 0.5 | Carbon..... |
| R-17 | B84221 | 220 | 0.5 | Carbon..... |
| R-18 | | | | |
| R-19 | | | | |
| R-24 | B85474 | 470 K | 0.5 | Carbon..... |
| R-26 | | | | |
| R-20 | B85153 | 15 K | 0.5 | Carbon..... |
| R-21 | 36X381 | .5 meg. | | Volume Control |
| R-23 | 40X311 | .5 meg. | | Tone Control |
| R-27 | B85106 | 10 meg. | 0.5 | Carbon..... |
| R-28 | D84821 | 820 | 2.0 | Carbon..... |
| R-29 | B85105 | 1 meg. | 0.5 | Carbon..... |
| R-30 | B84271 | 270 | 0.5 | Carbon..... |
| R-31 | B84274 | 270 K | 0.5 | Carbon..... |

TRANSFORMERS AND COILS

| | | | |
|------|--------|---------------------------|-------|
| L-1 | 35A5 | Insulated Choke | ..... |
| L-2 | 9A2103 | Parasitic Choke | ..... |
| L-3 | 35A9 | Insulated Choke | ..... |
| L-4 | 35A8 | Insulated Choke | ..... |
| T-1 | 9A1972 | "B" Range Loop Antenna | ..... |
| T-2 | 9A2060 | 1st I-F Trans. (FM) | ..... |
| T-3 | 9A2062 | 1st I-F Trans. (AM) | ..... |
| T-4 | 9A2061 | 2nd I-F Trans. (FM) | ..... |
| T-5 | 9A2063 | 2nd I-F Trans. (AM) | ..... |
| T-6 | 9A2161 | Discriminator Transformer | ..... |
| T-7 | 9A2065 | Oscillator Coil (AM) | ..... |
| T-8 | 9A2067 | Oscillator Coil (FM) | ..... |
| T-9 | 51X134 | Output Transformer | ..... |
| T-10 | 9A2003 | Dipole Antenna | ..... |
| T-11 | 53X291 | Power Transformer | ..... |
| T-12 | 9A2066 | Antenna Coil (FM) | ..... |

DIAL AND DRIVE ASSEMBLY

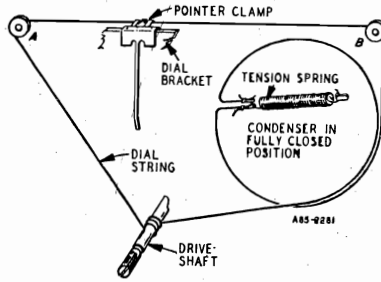
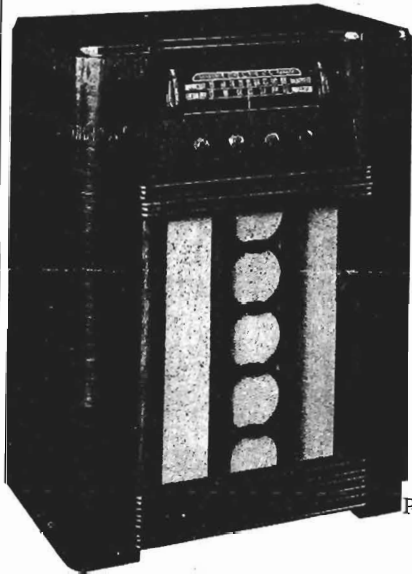
| | | |
|---------|-------------------------------|-------|
| 58X730 | Dial Glass | ..... |
| 15X251 | Pointer | ..... |
| 19X192 | "C" Washer (Mtg. Drive Shaft) | ..... |
| 6X66 | Rubber Grommet | ..... |
| 25X1610 | Dial Bracket | ..... |
| 28X113 | Drive Cord Tension Spring | ..... |
| 7A103 | No. 47. Pilot Light | ..... |
| 7A215 | Pilot Light Socket Assembly | ..... |
| 10X38 | Drive Cord Assembly | ..... |
| 26X510 | Drive Shaft | ..... |

TYPE G.I. - 28A169 RECORD CHANGER PARTS

| | |
|----------------|------------------------------------------------|
| G.I. 69-73657 | Tone Arm |
| G.I. 55-73613 | Plastic Stabilizer |
| G.I. 28A755782 | Idler Wheel Assembly |
| G.I. 56-76507 | Motor, 3 speed, 60 cycles, 105-125 Volts A. C. |
| P-81 | Crystal Cartridge, complete with needle |
| | *Needle only |

*When ordering needles, specify part number and letter stamped on Cartridge.

MODEL D1846



ELECTRICAL SPECIFICATIONS

Power Consumption—
117 volts AC 60 watts normal
85 watts phono operating

Power Output—
4.5 watts maximum
2.5 watts 10% distortion

Speaker—8" PM dynamic

Frequency Ranges—
Broadcast 540-1600 KC
Frequency Modulation 88-108 MC

Intermediate Frequency—
AM 455 KC — FM 10.7 MC

Selectivity — AM — 45 KC broad
at 1000 times signal, measured
at 1000 KC

I.F. FM—200 KC broad at 2 times
down

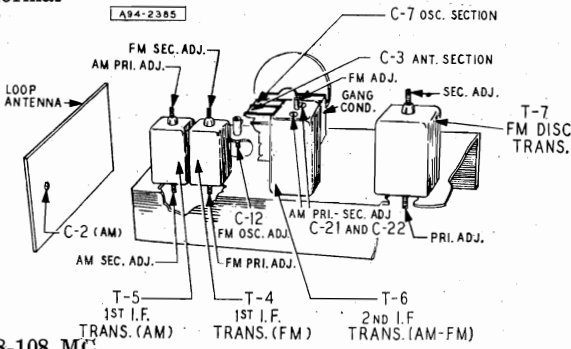
I.F. FM—950 KC broad at 200
times down

AM Sensitivity—(For .5 watt output
with external antenna)
10 microvolts average

FM Sensitivity—(For .5 watt output)
100 microvolts average

DRIVE CORD REPLACEMENT

Replacement of the drive cord may be accomplished as shown in the illustration. For this purpose use the new drive cord assembly listed in the Replacement Parts List. Turn the gang condenser until the plates are fully meshed. Then install the string as shown, winding three turns clockwise around the tuning shaft with the turns progressing away from the chassis. After the cord is installed, rotate the tuning shaft several times in order to take up any slack in the cord.

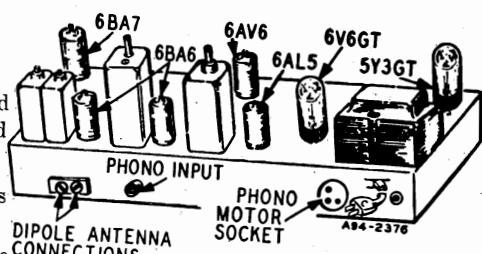
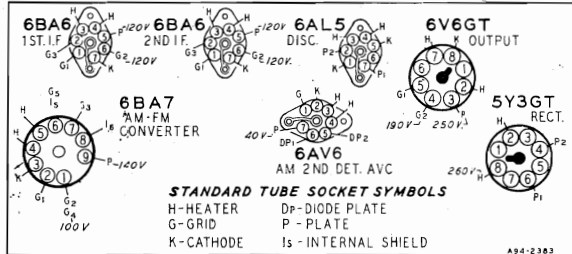


REMOVAL OF CHASSIS FROM CABINET

Before removing the chassis from the cabinet it will be necessary to detach the dial pointer from the dial string. To do this, spread the tabs on the pointer and pull the dial string off the pointer.

The dial lamp socket assembly may be disengaged from the cabinet mounting by squeezing together and pulling away from the cabinet mounting, the spring bracket to which the dial lamp socket is mounted. Take care not to bend or damage the large drive pulley on the gang condenser while doing this.

When replacing the chassis in the cabinet it will be necessary to tune in a station of a known frequency and move the dial pointer until that frequency is indicated on the dial and then attach the pointer to the dial string. Take care not to scuff or cut the dial string or bend the pointer during this operation.



TUBE SOCKET VOLTAGES

Socket voltages are shown on the Bottom Socket diagram at the tube socket terminals. All voltages are between the socket terminal and chassis ground. Plate, screen and cathode voltages were taken with a 1000 ohm-per-volt meter with a 300 volt scale used for plate and screen voltages. Audio grid voltages were read with a vacuum tube volt-meter. Conditions of measurement are:

- Line voltage117 Volts AC
- Signal InputNone
- A Variation of ±10% is usually permissible.

SERVICE DATA

ALIGNMENT PROCEDURES AM STAGES

Volume Control Maximum all Adjustments.

Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.

Allow Chassis and Signal Generator to "Heat Up" for Several Minutes.

The following is required for aligning:

An All Wave Signal Generator Which Will Provide an Accurately Calibrated Signal at the Test Frequencies as Listed.

Output Indicating Meter, Non-Metallic Screwdriver, Dummy Antennas — .1 mf, and 50 mmf.

| FREQUENCY SETTING | SIGNAL GENERATOR CONNECTION AT RADIO | GROUND CONNECTION | DUMMY ANTENNA | GANG CONDENSER SETTING | ADJUST TUNING SLUGS AND TRIMMERS |
|-------------------|--------------------------------------------|-------------------|---------------|-------------------------------------|----------------------------------|
| 455 KC | Control Grid 1st 6BA6 Pin No. 1 | Chassis Base | .1 mf | Turn Rotor to Full Open | 2nd I.F. C-21 & C-22 |
| 455 KC | Control Grid 6BA7 Pin No. 7 1st Det. | Same as above | .1 mf | Turn Rotor to Full Open | 1st I.F. Pri. & Sec. |
| 1620 KC | Control Grid 6BA7 Pin No. 7 | Same as above | .1 mf | Turn Rotor to Full Open | Oscillator C-7 |
| 1400 KC | External Antenna Lead | Same as above | 50 mmf | Turn Dial to 1400 KC. See Note A | Antenna C-2 |

NOTE A—Set pointer at the 1400 KC mark on the dial scale. Attach pointer to drive cord.

FM STAGES

Allow chassis and signal generator to warm up for several minutes. The following equipment is required for aligning:

An accurately calibrated signal generator providing unmodulated signals at the test frequencies listed below.

Non-metallic screwdriver.

Dummy Antennas and I-F Loading Resistor—2500 mmf, 300 ohms and a 3300 ohm .5 watt resistor with short leads.

Zero center scale DC vacuum tube voltmeter having a range of approximately 3 volts.

(If a zero center scale meter is not available, a standard scale vacuum tube voltmeter may be used by reversing the meter connections for negative readings.)

| | FREQUENCY SETTING | SIGNAL GENERATOR CONNECTION AT RADIO | DUMMY ANTENNA | BAND SWITCH SETTING | CONDENSER SETTING | ADJUSTMENT FOR MAX. METER DEFLECTION |
|---------------|-------------------|-----------------------------------------------------------------------------------------------------|---------------|---------------------|-------------------|-----------------------------------------|
| Discriminator | 10.7 MC | 6BA6 2nd I-F Pin 1 & Chassis | 2500 mmf | FM | Rotor Fully Open | Disc. Pri. Note A |
| | 10.7 MC | Same as above | 2500 mmf | FM | Rotor Fully Open | Disc. Sec. Note B |
| | 10.7 MC | Same as above | 2500 mmf | FM | Rotor Fully Open | Disc. Pri. Note A |
| | 10.7 MC | Same as above | 2500 mmf | FM | Rotor Fully Open | Disc. Sec. Note B |
| I-F | 10.7 MC Note E | 6BA6 1st I-F Pin 1 & Chassis | 2500 mmf | FM | Rotor Fully Open | 2nd I-F Note C |
| Discriminator | 10.7 MC | 6BA6 2nd I-F Pin 1 & Chassis | 2500 mmf | FM | Rotor Fully Open | Disc. Pri. Note A |
| I-F | 10.7 MC | Antenna and Chassis | 2500 mmf | FM | Rotor Fully Open | 1st. I-F Pri. and Sec. and Note C |
| | 10.7 MC | Antenna and Chassis Solder a 3300 ohm resistor across terminals 3 and 4 of 1st. I-F trans. | 2500 mmf | FM | Rotor Fully Open | 1st. I-F Pri. Note C |
| | 10.7 MC | Antenna and Chassis Note D | 2500 mmf | FM | Rotor Fully Open | 1st. I-F Sec. Note C |

RECHECK I-F ADJUSTMENTS IN ORDER GIVEN

| | | | | | | |
|------------|-----------------|-------------------------------------------------------------------------------------------------------|----------|----|---------------------------------|-----------|
| Oscillator | 108.4 Note F | Disconnect built-in dipole antenna and connect generator to dipole terminals with resistor in series. | 300 ohms | FM | Rotor Fully Open | Osc. C-12 |
| Antenna | 104.5 | Same as above | 300 ohms | FM | Tune rotor for max. AVC voltage | Ant. C-3 |

RECHECK ANTENNA & OSC. ADJUSTMENTS IN ORDER GIVEN

FM ALIGNMENT NOTES

NOTE A—The zero center scale DC vacuum tube voltmeter is to be connected between chassis ground and the AVC line. A signal of .1 volt must be fed into the receiver for this adjustment.

Note output voltage on the zero center DC vacuum tube voltmeter.

NOTE B—Disconnect zero center DC vacuum tube voltmeter from AVC and connect it to the audio takeoff point at the 27 K ohm resistor (R-11) and its junction with the terminal strip. Adjust for zero voltage indication.

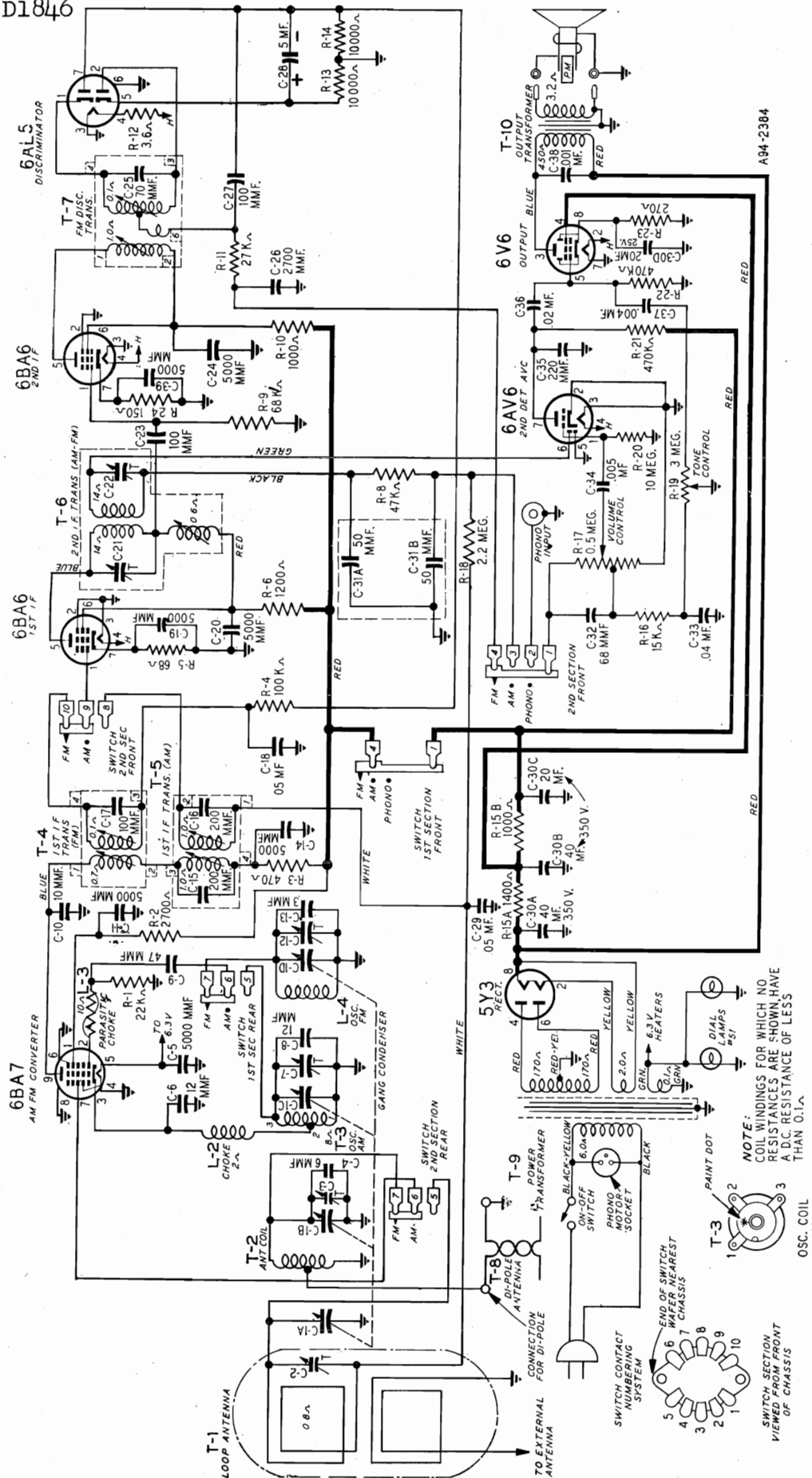
NOTE C—Connect zero center DC vacuum tube voltmeter as in Note A. Adjust input to give same output on the zero center DC vacuum tube voltmeter as in Note A.

NOTE D—Unsolder 3300 ohm resistor from terminals 3 and 4 of 1st I-F transformer and resolder across terminals 1 and 2.

NOTE E—2nd I-F Trimmers (AM) must be aligned before attempting to adjust 2nd I-F (FM) tuning slug.

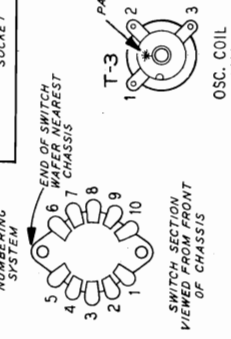
NOTE F—Remove the 3300 ohm load resistor before attempting to check the antenna and oscillator adjustments.

MODEL D1846



A94-2384

NOTE:
COIL WINDINGS FOR WHICH NO
RESISTANCES ARE SHOWN HAVE
A D.C. RESISTANCE OF LESS
THAN 0.1Ω.



REPLACEMENT PARTS LIST

NOTICE: There is a Model Number label on the chassis. This label identifies the radio as to chassis, dial and issue letter. When ordering parts or writing, give ALL information appearing on this label.

MISCELLANEOUS

| | |
|--------|------------------------------------------------------|
| 12A477 | 8" PM Speaker |
| 2A373 | Band Change Switch |
| 3A303 | Molded Octal Tube Socket |
| 3A304 | Phono Motor Jack |
| 3A305 | Phono Input Jack |
| 3A426 | Miniature Tube Socket |
| 3A443 | Miniature Tube Socket (For AM-FM Converter Tube).... |
| 10A691 | Knob (Tuning) |
| 10A692 | Knob (Off-On Volume) |
| 10A693 | Knob (Tone) |
| 10A694 | Knob (AM-FM Phono) |
| 13X546 | Line Cord and Plug |
| 30X547 | Line Cord Clamp |

CAPACITORS

| | |
|---------------------|-------------------------------------------|
| C-1A, C-1B } 14A204 | Gang Condenser Assembly |
| C-1C, C-1D } | Part of T-1 (Loop Antenna Assembly) |
| C-2 } | Part of C-1 (Gang Condenser Assembly) |
| C-3 } | |
| C-7 } | |
| C-4 | 47X521 6 mmf Ceramic..... |
| C-5 | |
| C-11 | |
| C-14 | |
| C-19 | 47X507 5000 mmf Silvered Ceramic.. |
| C-20 | |
| C-24 | |
| C-39 | |
| C-6 } | 47X522 12 mmf Ceramic..... |
| C-8 } | |
| C-9 | 47X517 47 mmf Ceramic..... |
| C-10 | 47X512 10 mmf Ceramic..... |
| C-12 | 17A255 1-8 mmf Trimmer..... |
| C-13 | 47X547 3 mmf Ceramic..... |
| C-15 } | Part of T-5 (1st I.F. Transformer AM) |
| C-16 } | Part of T-4 (1st I.F. Transformer FM) |
| C-17 } | |
| C-18 } | B66503 .05 mf 200 V Tubular..... |
| C-29 } | |
| C-21 } | Part of T-6 (2nd I.F. Transformer AM-FM) |
| C-22 } | |
| C-23 | 47X497 100 mmf Ceramic..... |
| C-25 | Part of T-7 (Discriminator Coil Assembly) |
| C-26 | 47X492 2700 mmf Molded..... |
| C-27 | 47X526 100 mmf Molded..... |
| C-28 | 45X361 5 mf 100 V Dry Electrolytic.... |
| C-30A | 40 mf 350 V |
| C-30B | 40 mf 350 V |
| C-30C | 45X359 20 mf 350 V |
| C-30D | 20 mf 25 V |
| C-31A } | 47X112 50-50 mmf Dual Mica..... |
| C-31B } | |
| C-32 | 47X471 68 mmf Molded..... |
| C-33 | B66403 .04 mf 200 V Tubular..... |
| C-34 | D66502 .005 mf 400 V Tubular..... |
| C-35 | 47X468 220 mmf Ceramic..... |
| C-36 | D66203 .02 mf 400 V Tubular..... |
| C-37 | B66402 .004 mf 200 V Tubular..... |
| C-38 | H66102 .001 mf 800 V Tubular..... |

RESISTORS

| | | Ohms | Watts | |
|-----|--------|-------|-------|-------------|
| R-1 | B84223 | 22 K | .5 | Carbon..... |
| R-2 | B83272 | 2700 | .5 | Carbon..... |
| R-3 | B84471 | 470 | .5 | Carbon..... |
| R-4 | B85104 | 100 K | .5 | Carbon..... |
| R-5 | B83680 | 68 | .5 | Carbon..... |
| R-6 | B84122 | 1200 | .5 | Carbon..... |
| R-8 | B85473 | 47 K | .5 | Carbon..... |

| | | Ohms | Watts | |
|---------|--------|----------|-------|-----------------|
| R-9 | B85683 | 68 K | .5 | Carbon..... |
| R-10 | B84102 | 1000 | .5 | Carbon..... |
| R-11 | B84273 | 27 K | .5 | Carbon..... |
| R-12 | 43X233 | 3.6 | .5 | Wire Wound... |
| R-13 } | | | | |
| R-14 } | B84103 | 10K | .5 | Carbon..... |
| R-15A } | | | | |
| R-15B } | 43X224 | 1000 | 6.0 | Wire Wound.. |
| | | 1400 | 4.0 | |
| R-16 | B84153 | 15 K | .5 | Carbon..... |
| R-17 | 36X371 | .5 meg | | Volume Control |
| R-18 | B85225 | 2.2 meg. | .5 | Carbon..... |
| R-19 | 40X284 | 3 meg. | | Tone Control... |
| R-20 | B85106 | 10 meg. | .5 | Carbon..... |
| R-21 } | | | | |
| R-22 } | B85474 | 470 K | .5 | Carbon..... |
| R-23 | B84271 | 270 | .5 | Carbon..... |
| R-24 | B84151 | 150 | .5 | Carbon..... |

TRANSFORMERS AND COILS

| | | |
|------|--------|---------------------------------------|
| L-2 | 35A1 | Insulated Choke |
| L-3 | 9A1940 | Parasitic Choke Assembly |
| L-4 | 9A2021 | Oscillator Coil Assembly (FM) |
| T-1 | 9A1972 | "B" Range Loop Antenna Assembly |
| T-2 | 9A1956 | Antenna Coil Assembly |
| T-3 | 9A1997 | Oscillator Coil (AM) |
| T-4 | 9A1932 | 1st I.F. Transformer (FM) |
| T-5 | 9A1998 | 1st I.F. Transformer (AM) |
| T-6 | 9A1999 | 2nd I.F. Transformer (AM-FM) |
| T-7 | 9A1970 | Discriminator Coil Assembly |
| T-8 | 9A2003 | Dipole Antenna Assembly |
| T-9 | 53X290 | Power Transformer |
| T-10 | 51X134 | Output Transformer |

DIAL AND DRIVE ASSEMBLY

| | |
|---------|----------------------------------------------|
| 15X229 | Pointer |
| 6X21 | Rubber Grommet |
| 20X260 | Condenser Cushion Stud } Mtg. Gang Condenser |
| 58X717 | Dial |
| 28X113 | Drive Cord Tension Spring |
| 26X507 | Drive Shaft |
| 19X192 | "C" Washer (For drive shaft) |
| 10X66 | Drive Cord Assembly |
| 7A215 | Pilot Light Socket Assembly |
| 7A32 | No. 51 Pilot Light |
| 25X1491 | Pointer Bracket |
| 4X915 | Escutcheon (Right) |
| 4X916 | Escutcheon (Left) |
| 30X517 | Dial Clamp |
| 25X1571 | Idler Bracket |
| 4X931 | Escutcheon Inserts |

TYPE O-28A144 RECORD CHANGER PARTS

| | |
|-----------|-------------------------------------------------|
| O-7102-1 | Phono motor, 60 cycle, 115 volt |
| O-7583 | Idler Pulley Kit { These parts can only be used |
| O-7103 | Turntable { with O-7102-1 Type motor |
| O-7106-1 | Phono Motor, 60 cycle, 115 volt |
| O-7584 | Idler Pulley Kit { These parts can only be used |
| O-7107 | Turntable { with O-7106-1 Type motor |
| O-7101 | Grommet |
| O-4388-3 | Fibre Washer |
| O-7478-4 | Motor on-off Switch |
| O-7477-1 | Switch Cover |
| O-7810 | Changer Blade Assembly |
| O-4279 | Tenite Cap |
| O-4215-37 | Set Screw (Mounting tenite cap) |
| O-6699 | Control Button |
| O-7799 | Tone Arm Assembly Less Cartridge |
| | Cartridge Shure P93 |
| O-4298-3 | Screw (for mtg. cartridge to tone arm) |
| | Needle, Durpoint 15X |
| O-7589 | Needle Set Screw |

MODEL D4142A

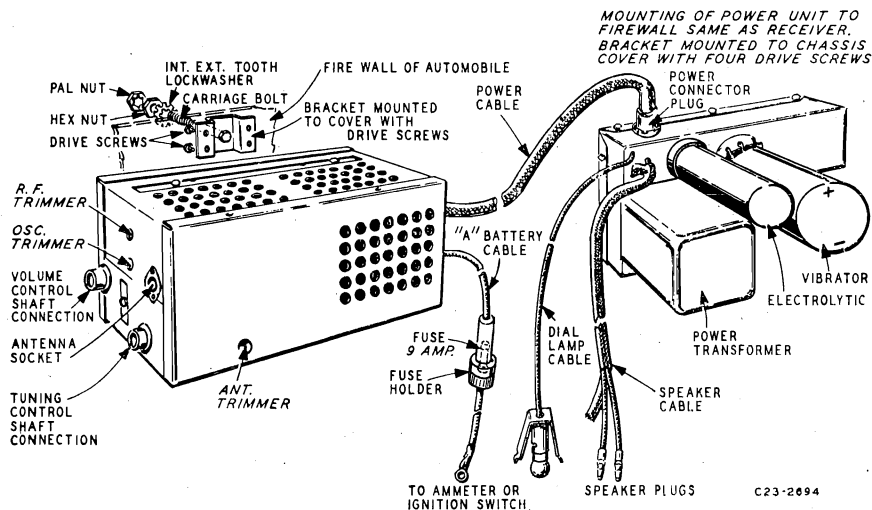


Fig. 1 — Receiver and Power Supply Units

RADIO INFORMATION

This automobile radio consists of three units, the receiver, the power supply and the speaker. The receiver and power supply have been designed to mount on the firewall of the car in an out-of-sight position by means of the mounting hardware provided with each radio. This will mean drilling one or two holes through the firewall to accommodate the mounting studs (in some cases it will be possible to take advantage of holes already drilled by the manufacturer). In some cars the best spot for installing the receiver unit may be found to be near the top of the firewall where the surface is curved, in which case, the following precaution should be observed. Refer to Fig. 2 and note the open space between the outer surface of the receiver unit and the surface of the firewall. This space should be filled in with several layers

of heavy cardboard before tightening the nut on the mounting stud to prevent springing the case of the receiver unit. If the case of this unit is sprung its shielding effect may be lessened resulting in unsatisfactory performance. The tuning head, consisting of the dial plate, dial assembly and flexible shafts are put up in kit form for each make of automobile. The speaker baffle is also supplied in kit form. Instructions for installing these two items are supplied in each kit. Attention is called to the fact that the radio should be installed in a location where the control cables can be fastened to it without making any sharp bends. If this precaution is observed, the radio controls will operate freely and easily.

In some automobiles where it may be impractical to mount the receiver unit with the brackets supplied, it is

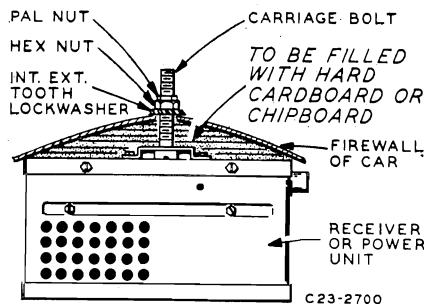


Fig. 2 — Unit Mounting

suggested that the mounting be made with a 1/4-20 bolt attached through one of the ventilator holes on the side of the receiver case.

ANTENNA

A shielded antenna cable (30 mmf. capacity) with bayonet connector plug is required.

The plug on the antenna cable is inserted in the socket at the side of the radio case as shown in Fig. 1. The wire at the other end of the cable is connected to the antenna.

LOW CAPACITY ANTENNA

This radio is designed for a low capacity car antenna. The total capacity of antenna and shielded cable should be 40 to 200 mmf.

Types of Low Capacity Antennas — "Fishpole" type, such as door hinge and cowl; over-the-roof types which are short and are mounted quite a distance from the metal roof of the car.

Mount the antenna on the same side of the car as the radio.

HIGH CAPACITY ANTENNA

If this radio is to be installed with a high capacity car antenna (200 to 500 mmf. total capacity of antenna and shielded cable), a 24 inch shielded adapter extension cable is necessary. The adapter is inserted in the socket at the side of the radio case. Then the antenna cable plug is inserted in the socket at the other end of the adapter.

Types of High Capacity Antennas — Over-the-roof types which are long and are mounted close to the metal roof of the car; ordinary built-in roof antennas (not metal roof). Under-car antennas (these are usually high capacity) are not recommended for this radio.

ANTENNA CABLE

CAUTION—Be careful not to bend the antenna cable too sharply or to

clamp it tightly as the small wire inside the cable may be broken.

Keep the antenna cable as far away from car wiring as possible and ground the pigtail of the antenna cable shield at the antenna end, otherwise ignition noise may be picked up. The length of the pigtail from the grounding point to the end of the antenna cable should be kept as short as possible, preferably not over one inch.

For the "fish pole" and over-the-roof type antennas, the antenna lead must be shielded the entire distance from the radio to the point where the lead goes through the car body to the outside.

When the antenna cable is connected to an antenna lead coming down the pillar post, the shielded cable should be pushed several inches up into the pillar post.

MISCELLANEOUS DATA

Before Mounting Radio

Before mounting the radio to the fire wall, it is advisable in most cases to complete the wiring connections.

Battery Cable and Fuse

The battery connection is made at the ammeter. The end of the battery cable with the connecting lug is secured to one of the posts at the back of the ammeter in the instrument panel. The other end of the cable with the fuse receptacle connects to the battery cable from the radio after the fuse has been inserted. A 9 ampere fuse is used.

Dial Lamp Cable

Insert the dial lamp assembly in the receptacle. The dial lamp used in this unit is a 6-8 volt automobile type lamp (Bulb No. 51).

Inserting Vibrator Unit

IMPORTANT: — The vibrator unit can be inserted in two ways. The proper method of insertion will depend on which terminal of the car battery is grounded. If the POSITIVE (+) terminal of the car battery is grounded, insert the vibrator as shown in figure 1. If the NEGATIVE (—) terminal of the car battery is grounded, insert the vibrator so that the negative sign on the vibrator is towards the back flange of the power supply unit.

Adjusting Antenna Trimmer

After the antenna is connected, tune in a weak signal at approximately 1600 KC with the volume control about three-fourths on. Turn the adjusting screw of the antenna trimmer (C-2) in or out until maximum output is obtained. See Fig. 1 for location of this trimmer.

Calibrating The Radio

The radio must be calibrated before attaching the control cables to the radio. Set the dial pointer to the low end of the scale. Insert a screwdriver into the tuning control shaft connection and turn the tuning assembly all the way to the left (counter-clockwise). This adjustment matches the tuning of the receiver to the low end of the dial scale. Then attach the control cables to the radio.

Replacing Tubes And Vibrator

Remove the top cover of the radio receiver if tube replacement is necessary. The vibrator is located on the power supply unit and may be easily removed by pulling it straight up and out. Replacement vibrators may be purchased at any Western Auto Supply Company Store.

OPERATING THE RADIO

To Turn the Radio On

Turn the volume control knob to the right. A click will be heard and the dial lamp will light. Wait 30 seconds for the tubes to heat.

Tuning in a Station

Turn the volume on full by turning the volume control knob to the right as far as it will go. Next, slowly turn

the tuning knob until a station is heard. Reduce the volume by means of the volume control knob to below the desired intensity.

Now turn the tuning knob very slowly back and forth until the station is clearest and strongest. **IF THE STATION IS NOT CAREFULLY TUNED IN, THE RECEPTION WILL BE NOISY AND DISTORTED.** Then adjust the volume

control until the desired intensity is obtained. Always reduce the volume by means of the volume control knob and never by turning the tuning knob.

To Turn the Radio Off

Turn the volume control knob to the left as far as it will go. A click will be heard and the dial lamp will be off.

SERVICE DATA

ALIGNMENT PROCEDURE

Volume Control—Maximum All Adjustments.
Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.
Allow Chassis and Signal Generator to "Heat Up" for several minutes.

The following equipment is required for aligning:

A Signal Generator which will provide an accurately calibrated signal at the test frequencies as listed.

Output Indicating Meter—Non-Metallic Screwdriver.

Dummy Antenna—.05 mf., See Note A.

| SIGNAL GENERATOR | | DUMMY ANTENNA | IRON CORE SETTING | ADJUST TUNING SLUGS (IF) AND TRIMMERS TO MAXIMUM (See Fig. 4) | |
|-------------------|----------------------------|---------------|------------------------------|---------------------------------------------------------------|--|
| FREQUENCY SETTING | CONNECTION AT RADIO | | | | |
| I.F. | Control Grid (prong No. 7) | .05 mf. | Extreme Position out of Coil | 1st I.F. Pri. (1) & Sec. (2) | |
| 455 KC | 6BE6 Mixer Tube | | | 2nd I.F. Pri. (3) & Sec. (4) | |
| 1605 KC | Antenna Cable See Note A | See Note A | Extreme Position out of Coil | Oscillator (C-7) | |
| 1605 KC | Antenna Cable | See Note A | Extreme Position out of Coil | R.F. (C-5) Ant. (C-2) | |

Reassemble Radio—Install in Car—Connect Car Antenna to Radio.

Car Antenna Readjustment—Tune in weak signal near 1600 KC—Readjust Antenna Trimmer C-2 for maximum output.

SPECIFICATIONS

Power Consumption 5.5 Amperes at 6.6 Volts

Power Output (6.6 Volts) 2.2 Watts Undistorted
4.0 Watts Maximum

Sensitivity.....3 Microvolts at 1 Watt Output

Selectivity45 KC Broad at 1000 Times Signal

Tuning Frequency Range540 to 1605 KC

Intermediate Frequency455 KC

Speaker6" PM Dynamic

Attenuate the signal from the signal generator to prevent the leveling-off action of the AVC.

NOTE A—Insert the antenna cable plug in the antenna socket on the chassis. The total capacity of the antenna cable and dummy antenna should be 60 mmf. If the cable, for example, has a capacity of 30 mmf., use a 30 mmf. condenser for a dummy antenna. Connect the other end of the antenna cable through the dummy antenna capacity to the output of the signal generator.

CALIBRATION—To calibrate the radio see article "Calibrating the Radio" on page 2.

MODEL D4142A

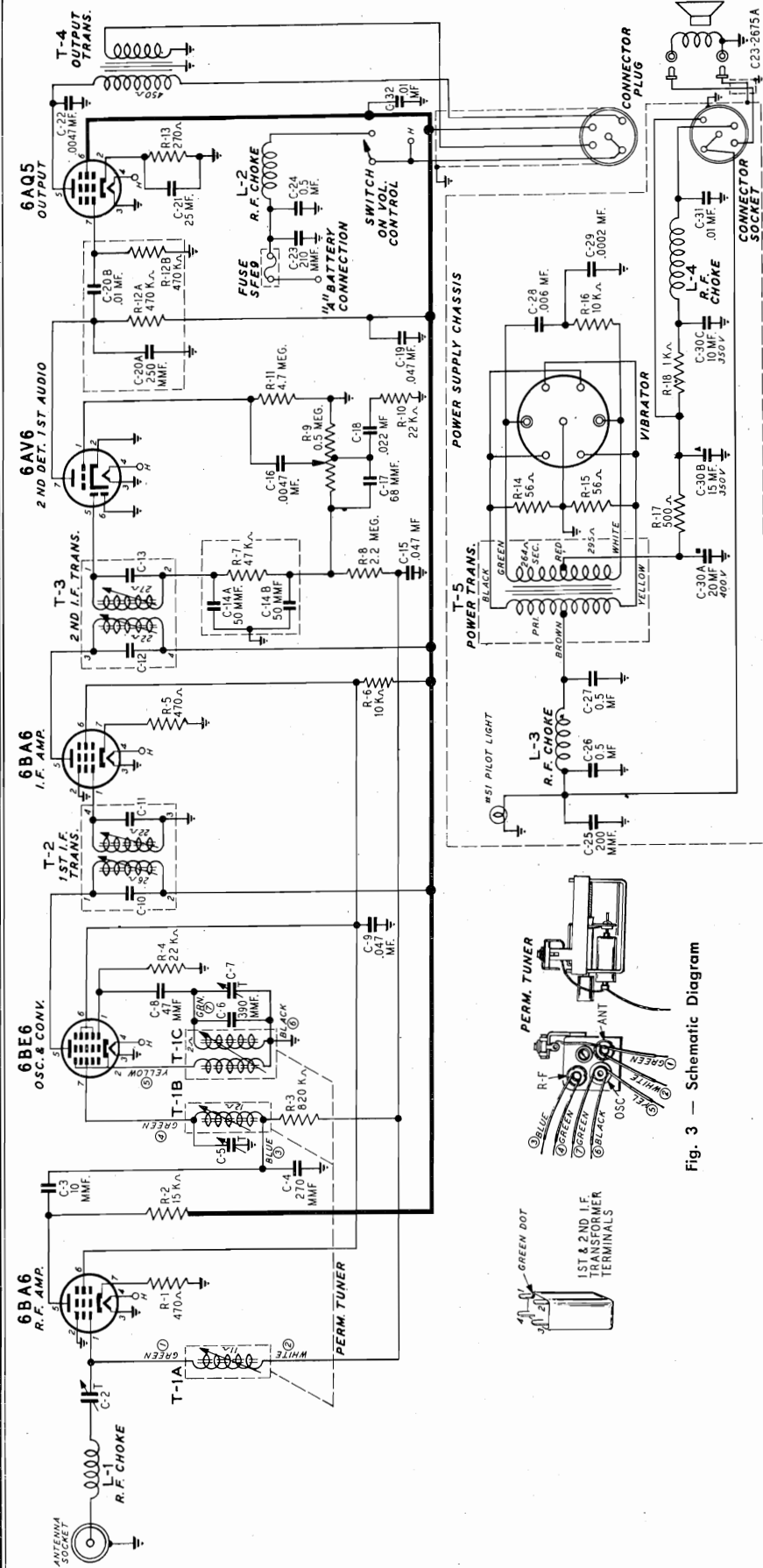
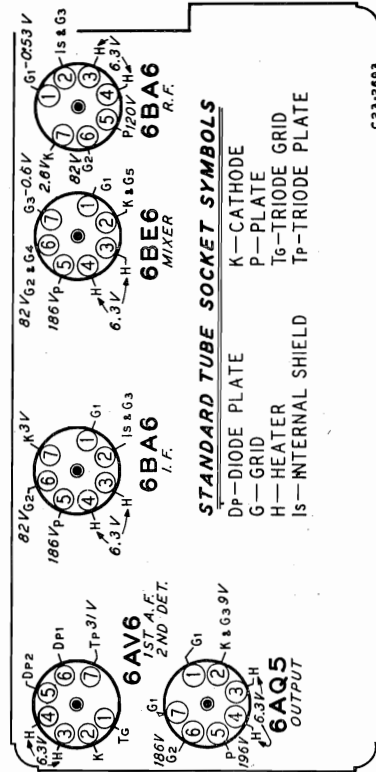


Fig. 3 — Schematic Diagram



TUBE SOCKET VOLTAGES

Voltages were measured between the indicated terminals and chassis ground. Plate, screen and cathode voltages were taken with a 1000 ohm-per-volt meter with a 300 volt scale used for plate and screen voltages, under the following conditions:

- Battery voltage6.6 Volts
- Signal InputNone
- Volume ControlMaximum
- AntennaShorted to Ground

A variation of $\pm 10\%$ is usually permissible.

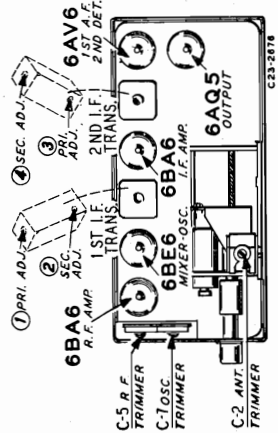


Fig. 4 — Tube Layout

Fig. 5 — Socket Voltages — Bottom View

STANDARD TUBE SOCKET SYMBOLS

| | |
|--------------------|-----------------|
| DP—DIODE PLATE | K—CATHODE |
| G—GRID | P—PLATE |
| H—HEATER | Tp—TRIODE GRID |
| IS—INTERNAL SHIELD | Tp—TRIODE PLATE |

SUPPRESSION OF MOTOR NOISE

The following procedure has been found to be effective in reducing motor noise to a satisfactory level in most cars. Follow the steps in the order given. Additional procedure, which may be required in exceptional cases of motor noise, is not covered here and will be found by referring to current literature on this subject.

GENERATOR CONDENSER — A generator condenser is required in all cases. Connect the condenser lead to the battery terminal of the generator. The case and mounting strap connect the other side of the condenser to ground. This unit must, therefore, be well grounded at its mounting.

CAUTION—In cars with automatic regulators, it is important not to connect the condenser across the field terminal. Most manufacturers at the present time have a recommendation for the proper post at which to connect the condenser.

DISTRIBUTOR SUPPRESSOR—A distributor suppressor will be required in most cases. Remove the high tension lead to the distributor. Insert a distributor suppressor and connect the wire to the other end of the suppressor (See Fig. 6). If this is not practical, cut the high tension lead close to the distributor and use a wood screw end type distributor suppressor in this line.

Withdraw Antenna Cable Plug

Turn on the radio and start the motor.

If motor noise is heard, proceed as follows:

BONDING CABLES, STEERING COLUMN, ETC.—Try grounding to the fire wall all cables and tubing which pass through it such as oil lines, gas lines, etc. It is also possible for the steering column, foot pedals, and brake lever to carry interference to the back of the fire wall at which point it may affect the radio. By means of a file, contact can be established between any of these parts and the fire wall or frame in order to determine whether such a ground will reduce the noise. To bond the parts to the fire wall or frame, clean the point of contact, wrap a length of one inch braided shielding around the part, and solder the connection. Then solder the end of the shielding to the fire wall or frame or ground it under a screw head if one is convenient.

Sufficient play should be left in the bonding shielding so that movement of the parts will not loosen this shielding.

Then Re-insert Antenna Cable Plug

If motor noise is heard when the antenna cable is reconnected, proceed as follows until the noise is satisfactorily reduced:

BYPASS CONDENSERS — Try a .5 mfd. bypass condenser from the ammeter to ground and see if interference is reduced. Install this condenser permanently if there is an improvement.

In like manner, try a .5 mfd. condenser from car fuse to ground, switch to ground, tail light and stop light connections to ground, windshield wiper and various other 6 volt connections to ground, noting what effect these condensers have on the noise pickup.

Try a .5 mfd. condenser between the point at which the dome light lead leaves the pillar post and ground.

Try a .5 mfd. condenser from the "Hot" side of the coil primary to ground.

The electric gauges used for oil, water, and gas are often a source of interference and bypass condensers should be tried. The condenser should usually be connected to the end of the line nearest the measuring device rather than at the instrument panel.

HIGH AND LOW TENSION LEADS—In some cases, the high and low tension leads between the coil and distributor are run close together. In some cars, they are in the same conduit. If this is the case, remove the low tension lead from this conduit. In any event, keep the high and low tension leads as far apart from each other as possible. If separating the two leads is not sufficient, shield and ground the shield of the low tension lead.

GROUNDING MOTOR AND OTHER PARTS—The motor must, in every case, be well grounded to the frame of the car. If it is not, use a very heavy braided lead for this purpose, similar to a storage battery ground lead. In like manner, it may be necessary to check the grounding of the metal fire wall, instrument panel, transmission, radiator, hood, and muffler to the frame of the automobile. To obtain a good electrical connection, scrape off the paint, if necessary, at the point where ground contact is made.

PEENING ROTOR ARM — In extreme cases of motor noise, it is advisable topeen the distributor rotor arm, that is, increase the length of the arm by using a small machinist's hammer. This will lessen the gap between the rotor arm and the stationary contacts thus reducing the spark. Be sure, after peening the arm, that it does not strike the stationary contacts.

SPARK PLUG SUPPRESSORS—If motor noise persists, spark plug suppressors must be installed. One suppressor is put on each plug. These are not regularly supplied with the radio and must be purchased extra. Ninety-five percent of all cars will not require spark plug suppressors. Care should be taken that a good mechanical and electrical connection is made between the spark plugs, suppressors, and plug wires.

WHEEL OR BRAKE STATIC—To determine if noise is being caused from this source, set the car in motion; then with the motor shut off and the clutch disengaged, apply the brakes. If the noise stops, the source of the static is in the wheels. The use of a front or rear wheel static eliminator will generally end the trouble.

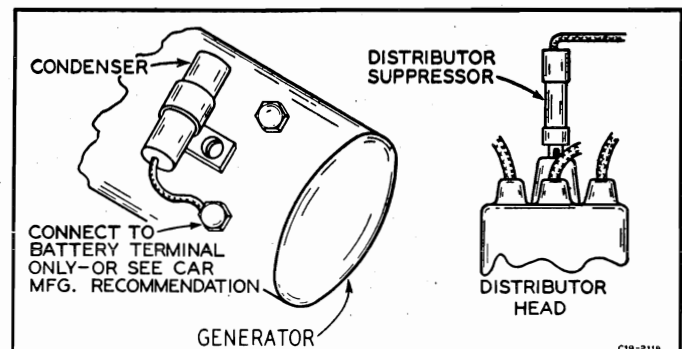


Fig. 6 — Generator Condenser and Distributor Suppressor

MODEL D4142A

REPLACEMENT PARTS LIST

NOTICE: There is a model number label on the radio. This label identifies the radio as to chassis, dial and issue letter. When ordering parts or writing, give ALL information appearing on this label.

CAPACITORS (Con't.)

MISCELLANEOUS

| | |
|---------|------------------------------------------------------------------------------------------------------------------------------------------------|
| 12A503 | 6" P.M. Speaker |
| 76X1 | Diode Filter Assembly |
| 76X5 | Audio Couplate Assembly |
| 3A426 | Tube Socket |
| 3A437 | Antenna Connector |
| 3A467 | Connector Socket (Power Supply) |
| 3A440 | Vibrator Socket |
| 19A42 | Vibrator |
| 34X555 | Top Cover for Receiver Case |
| 34X557 | Bottom Cover for Receiver Case |
| 34X554 | Bottom Cover for Power Supply Case |
| 20A101 | Iron Core Tuning Assembly Complete with Coils, Trimmers, etc. |
| 7A232 | Pilot Light Socket Assembly |
| 7A32 | Pilot Light Bulb No. 51 |
| 16X26 | Fuse (SFE9) |
| 16X150 | Fuse Holder Assembly |
| 16X149 | Fuse Retainer Knob Assembly |
| 13X798 | Shielded Cable & Plug Assembly |
| 26A513 | Nut & Bolt Kit Assembly |
| 26A512 | Universal Mtg. Hardware Assembly (Complete) Includes Bracket, Screws, Bolts, Lockwashers, Distributor Suppressor, Generator Condenser, etc. .. |
| 25X1772 | Mtg. Bracket (for Power Supply & Receiver) |
| 21A6 | Distributor Suppressor |
| 48X27 | Generator Condenser |

| | | | |
|-------------------------------|--------|-------------------------|------------------------------------------|
| C-8 | 47X495 | 47 mmf | Ceramic..... |
| C-9 } C-19 } | 46X397 | .047 mf | 400 V Molded Tubular |
| C-10 } C-11 } | | | Part of T-2 (1st I.F. Transformer) |
| C-12 } C-13 } | | | Part of T-3 (2nd I.F. Transformer) |
| C-14A } C-14B } | | | Part of 76X1 (See Miscellaneous) |
| C-15 | 46X398 | .047 mf | 200 V Molded Tubular |
| C-16 | 46X400 | .0047 mf | 200 V Molded Tubular |
| C-17 | 47X471 | 68 mmf | Molded Mica.. |
| C-18 | 46X413 | .022 mf | 200-V Molded Tubular |
| C-20A } C-20B } | | | Part of 76X5 (See Miscellaneous) |
| C-21 | 45X388 | 25 mf | 25 V Electrolytic.... |
| C-22 | 46X412 | .0047 mf | 1000 V Molded Tubular |
| C-23 | 47X602 | 210 mmf | Mica..... |
| C-24 } C-26 } C-27 } | 46X425 | .5 mf | 100 V Paper Tubular. |
| C-25 | 47X129 | 200 mmf | Mica..... |
| C-28 | 46X424 | .006 mf | 1600 V Buffer..... |
| C-29 | 47X520 | .0002 mf | Ceramic..... |
| C-30A } C-30B } C-30C } | 45X387 | 20 mf 15 mf 10 mf | 400 V 350 V 350 V Electrolytic.... |
| C-31 } C-32 } | 47X595 | .01 mf | Ceramic..... |

TRANSFORMERS & COILS

| | |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| L-1 | 35A10 R-F Choke |
| L-2 | 9A2222 R-F Choke |
| L-3 | 9A1958 R-F Choke |
| L-4 | 9A2219 R-F Choke |
| T-1A } T-1B } T-1C } | Antenna, R-F, Oscillator Coils and Iron Cores are part of 20A101 Tuning Assembly. Entire Assembly must be ordered. (See Miscellaneous.) |
| T-2 | 9A2203 1st I.F. Transformer & Can Assembly |
| T-3 | 9A2204 2nd I.F. Transformer & Can Assembly |
| T-4 | 51X153 Output Transformer |
| T-5 | 53X321 Power Transformer |

CAPACITORS

| | | | |
|----------------|-----------------------------------|------------|-------------------|
| C-2 | Part of Tuner (See Miscellaneous) | | |
| C-3 | 47X523 | 10 mmf | Ceramic..... |
| C-4 | RCM20D271K | 270 mmf | Silver Mica.... |
| C-5 } C-7 } | 17A263 | 25-100 mmf | Trimmer Condenser |
| C-6 | 47X475 | 390 mmf | Mica..... |

RESISTORS

| | | Ohms | Watts | |
|--------------------|----------------------------------|----------|-------------------------|--------------|
| R-1 } R-5 } | B83471 | 470 | 0.5 | Carbon..... |
| R-2 | C84153 | 15 K | 1.0 | Carbon..... |
| R-3 | B85824 | 820 K | 0.5 | Carbon..... |
| R-4 } R-10 } | B85223 | 22 K | 0.5 | Carbon..... |
| R-6 | D84103 | 10 K | 2.0 | Carbon..... |
| R-7 | Part of 76X1 (See Miscellaneous) | | | |
| R-8 | B85225 | 2.2 meg. | 0.5 | Carbon..... |
| R-9 | 36X387 | .5 meg. | Volume Control & Switch | |
| R-11 | B85475 | 4.7 meg. | 0.5 | Carbon..... |
| R-12A } R-12B } | Part of 76X5 (See Miscellaneous) | | | |
| R-13 | C84271 | 270 | 1.0 | Carbon..... |
| R-14 } R-15 } | C84560 | 56 | 1.0 | Carbon..... |
| R-16 | C84103 | 10 K | 1.0 | Carbon..... |
| R-17 | 43X257 | 500 | 5.0 | Wirewound... |
| R-18 | D84102 | 1 K | 2.0 | Carbon..... |

MODEL H-327T6U,
Ch. V-2157-3U



SPECIFICATIONS

FREQUENCY RANGE: 540 to 1615 kc.
 INTERMEDIATE FREQUENCY: 455 kc.
 TUBE COMPLEMENT:
 1 12BA6 R-F Amp.
 1 12BE6 Converter
 1 12BA6 I-F Amp.
 1 12AV6 Det., AVC, and 1st A-F Amp.
 1 35C5 Output Amp.
 1 35W4 Rectifier
 POWER OUTPUT:
 Undistorted 0.9 watt
 Maximum 1.5 watts
 LOUDSPEAKER: 4" PM
 OPERATING VOLTAGE: 105 to 120 volts, 50-60 cycles A-C or D-C
 POWER CONSUMPTION: 35 watts

ALIGNMENT

It is recommended that the chassis be isolated from the power line by means of an isolation transformer.

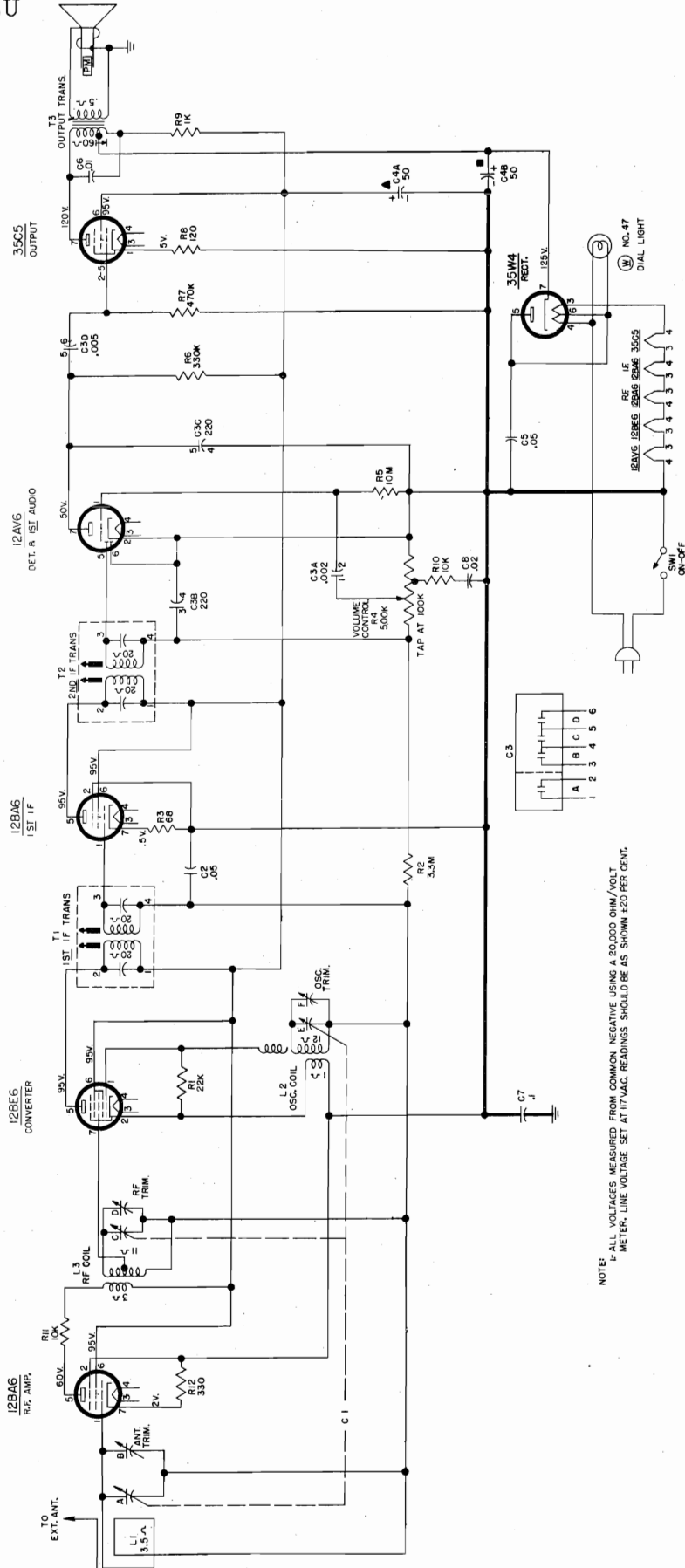
Make certain that the dial pointer is correctly positioned.

While making the following adjustments, keep the volume control set for maximum output and the signal generator output attenuated to avoid AVC action.

| Step | Connect Signal Generator to - | Signal Generator Frequency | Radio Dial | Adjust for Maximum Output - |
|------|-----------------------------------------------------------------|----------------------------|------------------|---------------------------------------------------|
| 1. | pin #7 of the 12BE6 through a 200 mmf capacitor | 455 kc. | minimum capacity | top and bottom slugs of T2 and T1 in order given* |
| 2. | stator of ant. tuning capacitor (A) through a 200 mmf capacitor | 1615 kc. | minimum capacity | oscillator trimmer (F) |
| 3. | same as step 2 | 1400 kc. | 1400 kc. | R-F trimmer (D) |
| 4. | radiated signal | 1400 kc. | 1400 kc. | antenna trimmer (B) |

* It is recommended that a fiber aligning tool that snugly fits the slot in the powdered iron core be used to prevent chipping of the slot.

MODEL H-327T6U,
Ch. V-2157-3U



NOTE: ALL VOLTAGES MEASURED FROM COMMON NEGATIVE USING A 20,000 OHM/VOLT METER. LINE VOLTAGE SET AT 117V AC. READINGS SHOULD BE AS SHOWN E20 PER CENT.

FIG. 1 - SCHEMATIC DIAGRAM OF V-2157-3U CHASSIS

PARTS LIST FOR MODEL H-327T6U

When ordering parts, specify model number of set in addition to part number and description of part.

CABINET AND MISCELLANEOUS

| Part No. | Description |
|-----------|-------------------------------------------------|
| V-6120-3 | Background, dial |
| V-10017-4 | Baffle and grille cloth assembly |
| V-1220-4 | Cabinet (without baffle and grille cloth) |
| V-3219S-1 | Cord, dial drive |
| V-10013-4 | Grille |
| V-10009-2 | Knob, volume, on-off and tuning |
| No. 47 | Light, dial |
| V-10181-1 | Pointer |
| V-9996-2 | Shaft, tuning |
| V-9888-2 | Socket, wafer (12BE6, 35W4, 35C5) |
| V-9888-3 | Socket, wafer (12BA6, 12AV6) |
| V-9122-2 | Socket, dial light |
| V-10079-2 | Speaker, 4" PM (includes T3) |
| V-10076-1 | Spring, dial drive |

V-2157-3U CHASSIS

| Ref. No. | Part No. | Description |
|----------|-------------|------------------------------------------------|
| C1 | V-10189-1 | Capacitor, variable |
| C2 | RCP10W2503M | Capacitor, .05 mfd 200 v. |
| C3 | V-9634-1 | Capacitor, multiple |
| C4 | V-10190 | Capacitor, electrolytic, 50-50 mfd 150 v. |
| C5 | RCP10W4503M | Capacitor, .05 mfd 400 v. |
| C6 | RCP10W4103M | Capacitor, .01 mfd 400 v. |
| C7 | RCP10W4104M | Capacitor, .1 mfd 400 v. |
| C8 | RCP10W2203M | Capacitor, .02 mfd 200 v. |
| L1 | V-10197-1 | Loop, antenna |
| L2 | V-10192 | Coil, oscillator |
| L3 | V-10191 | Coil, RF |
| R1 | RC20AE223M | Resistor, 22,000 ohms 1/2 w. |
| R2 | RC20AE335M | Resistor, 3.3 megohms 1/2 w. |
| R3 | RC20AE680M | Resistor, 68 ohms 1/2 w. |
| R4 | V-9993-2 | Control, volume, 500,000 ohms |
| R5 | RC20AE106M | Resistor, 10 megohms 1/2 w. |
| R6 | RC20AE334M | Resistor, 330,000 ohms 1/2 w. |
| R7 | RC20AE474M | Resistor, 470,000 ohms 1/2 w. |
| R8 | RC20AE121M | Resistor, 120 ohms 1/2 w. |
| R9 | RC30AE102M | Resistor, 1000 ohms 1 w. |
| R10 | RC20AE103M | Resistor, 10,000 ohms 1/2 w. |
| R11 | RC20AE103M | Resistor, 10,000 ohms 1/2 w. |
| R12 | RC20AE331K | Resistor, 330 ohms 1/2 w. |
| T1 | V-9735-1 | Transformer, IF |
| T2 | V-9735-1 | Transformer, IF |
| T3 | V-10079-2 | Transformer, audio (includes speaker) |

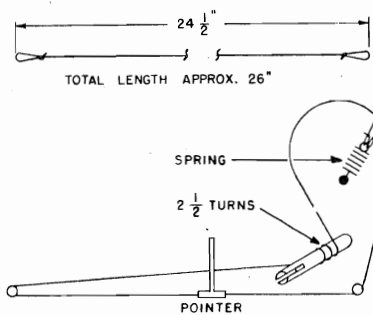


FIG. 2 - DIAL DRIVE

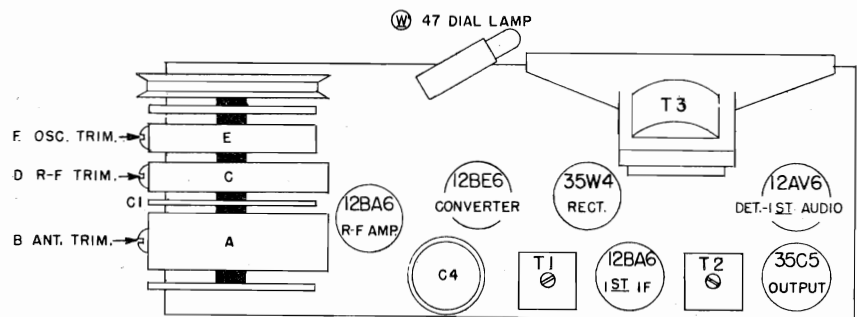


FIG. 3 - CHASSIS LAYOUT

MODEL H-328C7,
Ch. V-2136-4

SPECIFICATIONS

FREQUENCY RANGES:

Amplitude Modulation 540 to 1615 kc.
Frequency Modulation 88 to 108 mc.

INTERMEDIATE FREQUENCIES:

Amplitude Modulation 455 kc.
Frequency Modulation 10.7 mc.

TUBE COMPLEMENT:

- 1 12AT7 R-F Amp. and Mixer (FM)
- 1 12BE6 FM Osc. and AM Converter
- 1 12BA6 I-F Amp.
- 1 6BJ6 I-F Driver (FM)

- 1 12AL5 Ratio Det. (FM)
- 1 12AV6 ... Det. and AVC (AM) and A-F Amp.
- 1 50L6GT Output Amp.

POWER OUTPUT:

Undistorted 2.5 watts
Maximum 3.0 watts

LOUDSPEAKER: 10" PM

OPERATING VOLTAGE:

..... 105 to 120 volts, 60 cycles AC

POWER CONSUMPTION: 70 watts

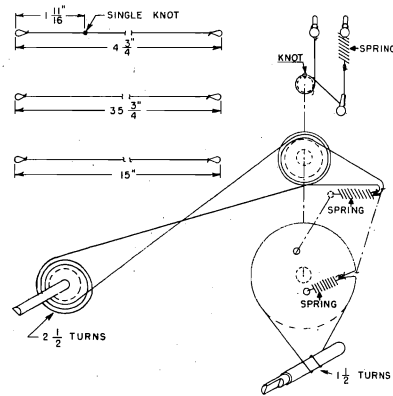


FIG. 3 - DIAL DRIVE

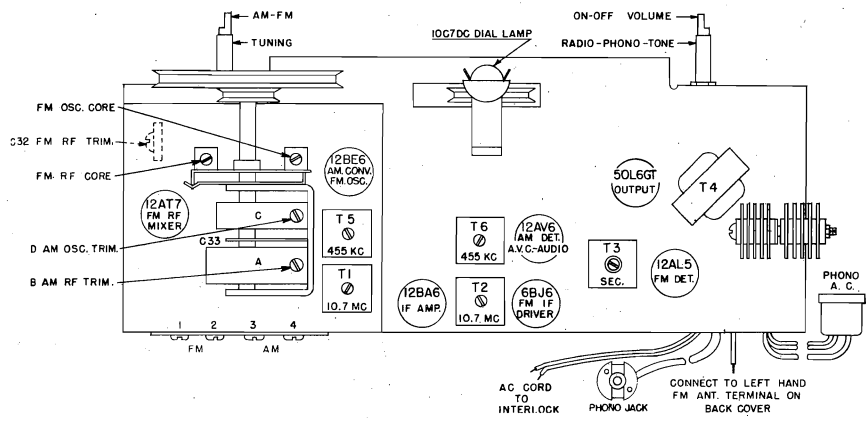
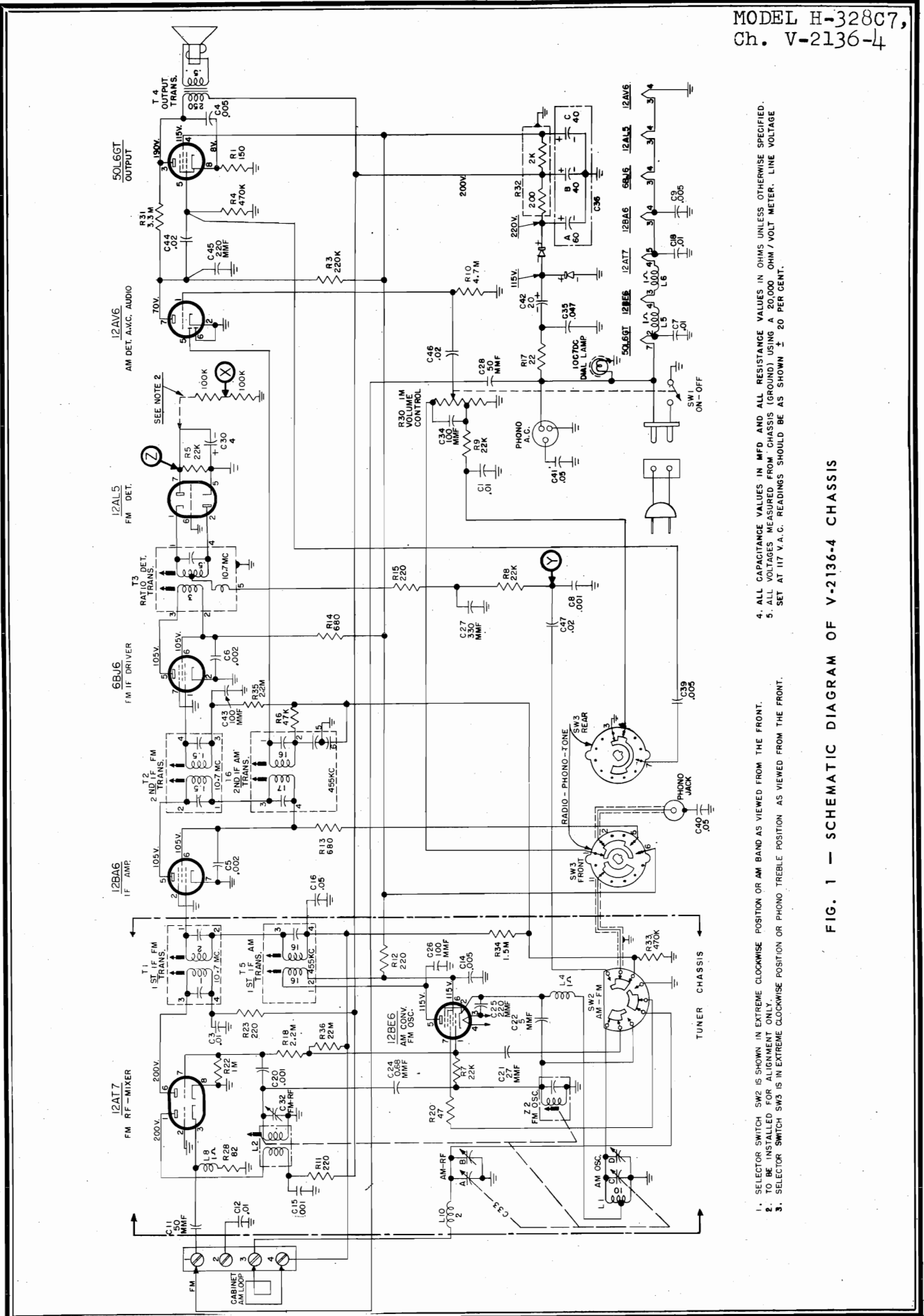


FIG. 2 - TOP VIEW OF CHASSIS



4. ALL CAPACITANCE VALUES IN MFD AND ALL RESISTANCE VALUES IN OHMS UNLESS OTHERWISE SPECIFIED.
5. ALL VOLTAGES MEASURED FROM CHASSIS (GROUND) USING A 20,000 OHM / VOLT METER. LINE VOLTAGE SET AT 117 V.A.C. READINGS SHOULD BE AS SHOWN ± 20 PER CENT.

1. SELECTOR SWITCH SW2 IS SHOWN IN EXTREME CLOCKWISE POSITION OR AM BAND AS VIEWED FROM THE FRONT.
2. TO BE INSTALLED FOR ALIGNMENT ONLY.
3. SELECTOR SWITCH SW3 IS IN EXTREME CLOCKWISE POSITION OR PHONO TREBLE POSITION AS VIEWED FROM THE FRONT.

FIG. 1 — SCHEMATIC DIAGRAM OF V-2136-4 CHASSIS

MODEL H-328C7,
Ch. V-2136-4

**ALIGNMENT
BROADCAST BAND**

Connect an output meter across the speaker voice coil.

While making the following adjustments, keep the volume control set for maximum output and the signal generator output attenuated to avoid AVC action.

| | Connect Signal Generator to — | Signal Generator Frequency | Radio Dial Setting | Adjust |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|----------------------------|--------------------|-----------------------------------------------------------|
| 1 | Set the band switch to AM and the radio-phonotone control to RADIO | | | |
| 2 | Stator of tuning capacitor (A) through a 0.1 mfd capacitor | 455 kc. | minimum capacity | Pri. and sec. of T6 and T5 for max. output in order given |
| <p><i>NOTE: If the I-F transformers are badly mis-aligned, it may be impossible to obtain sufficient output using the above system. In this event, it will be necessary to align each transformer separately. Start with the last I-F transformer and work forward, connecting the signal generator to the control grid of the tube preceding the transformer under alignment.</i></p> | | | | |
| 3 | Radiated signal (no actual connection) | 1615 kc. | Minimum capacity | AM osc. trimmer (D) for max. output |
| 4 | Radiated signal (no actual connection) | 1400 kc. | tune to signal | AM R-F trimmer (B) for max. output (rock-in adjustment) |

FM BAND

Do not align the FM circuits until all AM adjustments have been completed.

| Step | Connect Signal Generator to — | Signal Generator Frequency | Radio Dial Setting | Adjust |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|--------------------|----------------------------------------------------|
| 1 | Set the band switch to FM | | | |
| 2 | Connect two 100,000 ohm resistors (the resistances must be equal within 5 per cent) between pin No. 7 of the 12AL5 tube and ground as shown on the schematic diagram. | | | |
| 3 | Connect a V.T.V.M. between points "X" and "Y" (see schematic diagram). | | | |
| 4 | Pin No. 7 of 12AT7 through a 0.1 mfd mica capacitor | 10.7 mc. | minimum capacity | Sec. of T3 for zero (use medium strength signal) |
| 5 | Connect the V.T.V.M. between point "Z" and ground | | | |
| 6 | Same as step 4 | 10.7 mc. | minimum capacity | Pri. of T3 and pri. and sec. of T1 and T2 for max. |
| 7 | Reconnect the V.T.V.M. between points "X" and "Y" and increase the signal strength 10 times | | | |
| 8 | Same as step 4 | 10.7 mc. | minimum capacity | Recheck sec. of T3 for zero voltage |
| 9 | Reconnect the V.T.V.M. between point "Z" and ground | | | |
| 10 | Same as step 4 | 10.7 mc. | minimum capacity | Pri. of T3 for maximum voltage |
| 11 | Remove the two 100,000 ohm resistors that were inserted in step 2 | | | |
| 12 | FM ant. terminal through a 300 ohm non-inductive resistor | 98 mc. | 98 mc. | FM osc. core for maximum voltage |
| 13 | Same as step 12 | 98 mc. | 98 mc. | FM R-F trimmer (C32) for maximum voltage |
| 14 | Same as step 12 | 105 mc. | tune to signal | FM R-F core for maximum voltage |
| 15 | Same as step 12 | 90 mc. | tune to signal | FM R-F trimmer (C32) for maximum voltage (rock-in) |
| 16 | Recheck steps 14 and 15 for tracking | | | |

WARNING: The chassis of this receiver is connected directly to one side of the power line. When making repairs or adjustments, it is recommended that the chassis be isolated from the line by means of an isolation transformer. Otherwise, serious shock may result if the radio chassis and ground are contacted at the same time.

It should be noted that the interlock plug, which must be released from the cabinet to allow removal of the chassis, is incorporated for customer protection. Additional protection is provided by soldering the speaker cord to the terminal board on the output transformer and using closed-end lugs on the wires that extend from the back cover to the FM antenna terminals. These protective measures are in accordance with Underwriters Laboratories requirements and should not be altered in any way.

PARTS LIST FOR MODEL H-328C7

When ordering parts, specify model number of set in addition to part number and description of part.

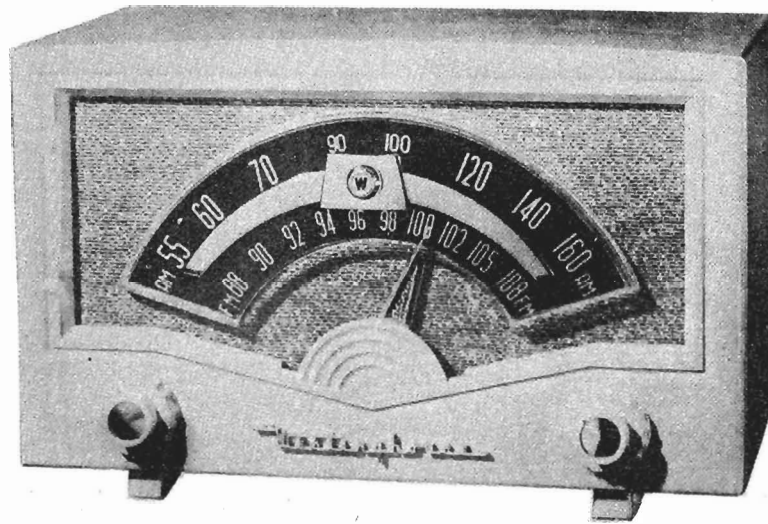
CABINET AND MISCELLANEOUS

| Part No. | Description | Part No. | Description |
|-----------|----------------------------------------|-----------|----------------------------------------------------|
| V-5982-6 | Antenna assembly (A.M. loop) | V-9104-9 | Knob, tuning (rear) |
| V-10307-1 | Baffle and grille cloth assembly | 10C7DC | Lamp, pilot |
| V-1230-1 | Cabinet, complete | V-3990-2 | Medallion |
| V-9833-1 | Cable assembly, phono A-C (male) .. | V-10318-2 | Nameplate, Westinghouse |
| V-6415-4 | Cable, phono | V-10310-1 | Pointer |
| V-4898-1 | Catch, bullet | V-10342-2 | Pulley and shaft assembly, pointer .. |
| V-3254S | Connector, phono (female) | V-10357-1 | Pulley, tuning gang |
| V-3219S-1 | Cord, dial drive (spool 100') | V-4967 | Pull, door |
| V-9845-1 | Cover, back (record changer) | V-10472-1 | Shield, pilot lamp |
| V-10311-1 | Cover assembly, back (radio) | V-9770-2 | Speaker, 10 " PM |
| V-10308-1 | Dial | V-3248S | Spring, dial drive - 1 3/32" long overall |
| V-8576 | Doors, matched pair (less hardware) | V-6795-3 | Spring, dial drive - 3/4" long overall |
| V-8577 | Drawer, record changer | V-9680-1 | Sleeve, tuning drive |
| V-10309-1 | Escutcheon | V-10366-1 | Socket, pilot lamp |
| V-9091-1 | Hinge (L.H.) | V-5556-1 | Socket (12AT7) |
| V-9091-2 | Hinge (R.H.) | V-4292S-2 | Socket (12BE6) |
| V-10338-1 | Hub, pointer | V-4292-1 | Socket (12BA6, 6BJ6, 12AL5, 12AV6) |
| V-10347-1 | Interlock bracket assembly | V-3246S | Socket (50L6GT) |
| V-10408-2 | Knob, off-on volume | | |
| V-10408-1 | Knob, A.M. - F.M. selector | | |
| V-9861-2 | Knob, radio - phono (rear) | | |

V-2136-4 CHASSIS

| | | | | | |
|-----|---------------|----------------------------------------|----------|---------------------------|------------------------------------------------------------------------|
| C1 | RCP10W2103M | Capacitor, .01 mfd 200 v. | R1 | RC30AE151K | Resistor, 150 ohms 1 w. |
| C3 | RCP10W4103M | Capacitor, .01 mfd 400 v. | R3 | RC20AE224M | Resistor, 220,000 ohms 1/2 w |
| C4 | RCP10W4502M | Capacitor, .005 mfd 400 v. | R4 | RC20AE474M | Resistor, 470,000 ohms 1/2 w |
| C5 | RCP10W6202M | Capacitor, .002 mfd 600 v. | R5 | RC20AE223K | Resistor, 22,000 ohms 1/2 w. |
| C6 | RCP10W6202M | Capacitor, .002 mfd 600 v. | R6 | RC20AE473M | Resistor, 47,000 ohms 1/2 w. |
| C7 | RCP10W4103M | Capacitor, .01 mfd 400 v. .. | R7 | RC20AE223M | Resistor, 22,000 ohms 1/2 w. |
| C8 | RCP10W6102M | Capacitor, .001 mfd 600 v. | R8 | RC20AE223M | Resistor, 22,000 ohms 1/2 w. |
| C9 | V-5596 | Capacitor, .005 mfd | R9 | RC20AE223M | Resistor, 22,000 ohms 1/2 w. |
| C11 | V-5658-10 | Capacitor, 50 mmf | R10 | RC20AE475M | Resistor, 4.7 megohms 1/2 w. |
| C12 | RCP10W2103M | Capacitor, .01 mfd 200 v. .. | R11 | RC20AE221M | Resistor, 220 ohms 1/2 w. |
| C14 | V-5596 | Capacitor, .005 mfd | R12 | RC20AE221M | Resistor, 220 ohms 1/2 w. |
| C15 | V-9863-1 | Capacitor, .001 mfd | R13 | RC20AE681M | Resistor, 680 ohms 1/2 w. |
| C16 | RCP10W2503M | Capacitor, .05 mfd 200 v. .. | R14 | RC20AE681M | Resistor, 680 ohms 1/2 w. |
| C18 | RCP10W4103M | Capacitor, .01 mfd 400 v. .. | R15 | RC20AE221M | Resistor, 220 ohms 1/2 w. |
| C20 | V-9863-1 | Capacitor, .001 mfd | R17 | V-6067-7 | Resistor, 22 ohms 3 w. ... |
| C21 | R2CC30UK270K | Capacitor, 27 mmf | R18 | RC20AE225M | Resistor, 2.2 meg. 1/2 w. .. |
| C22 | R2CC30UK050D | Capacitor, 5 mmf | R20 | RC20AE470M | Resistor, 47 ohms 1/2 w. .. |
| C24 | V-5658-4 | Capacitor, .68 mmf | R22 | RC20AE105M | Resistor, 1 meg. 1/2 w. |
| C25 | R5CC20ZY221M | Capacitor, 220 mmf | R23 | RC20AE221M | Resistor, 220 ohms 1/2 w. |
| C26 | RCM20D101J | Capacitor, 100 mmf | R28 | RC20AE820K | Resistor, 82 ohms 1/2 w. .. |
| C27 | RCM20A331M | Capacitor, 330 mmf | *R30 | V-10359-1 | Control, volume (includes radio-phon-tone switch and SW 1) |
| C28 | V-5658-10 | Capacitor, 50 mmf | R31 | RC20AE335M | Resistor, 3.3 meg. 1/2 w. |
| C30 | V-4637 | Capacitor, 4 mfd, 50 v. | R32 | V-10054-1 | Resistor, 200 ohms and 2,000 ohms |
| C32 | V-9670 | Capacitor, trimmer (FM-RF) | R33 | RC20AE474M | Resistor, 470,000 ohms 1/2 w. |
| C33 | V-9671-2 | Capacitor, tuning | R34 | RC20AE155M | Resistor, 1.5 meg. 1/2 w. |
| C34 | RCM20A101M | Capacitor, 100 mmf | R35 | RC20AE225M | Resistor, 2.2 meg. 1/2 w. |
| C35 | V-10157-4473M | Capacitor, .047 mfd 400 v. | R36 | RC20AE226M | Resistor, 22 meg. 1/2 w. |
| C36 | V-9919 | Capacitor, 60-40-40 mfd 250 v. | V-9640 | Rectifier, selenium | |
| C39 | RCP10W4502M | Capacitor, .005 mfd 400 v. | *SW1 | V-10359-1 | Switch, on-off (includes R30, SW3) |
| C40 | RCP10W2503M | Capacitor, .02 mfd 200 v. | SW2 | V-9681-1 | Switch, A.M. - F.M. selector |
| C41 | RCP10W2503M | Capacitor, .02 mfd 200 v. | *SW3 | V-10359-1 | Switch, radio-phon-tone (includes R30 and SW1) |
| C42 | V-9823 | Capacitor, Elec. 20 mfd 200 v. | T1 | V-9688 | Transformer, 1st F.M. IF |
| C43 | RCM20A101M | Capacitor, 100 mmf | T2 | V-9642 | Transformer, 2nd F.M. IF |
| C44 | RCP10W2203M | Capacitor, .02 mfd 200 v. | T3 | V-9828 | Transformer, ratio detector |
| C45 | RCM20A221M | Capacitor, 220 mmf | *T4 | V-9770-2 | Transformer, output (includes speaker) |
| C46 | RCP10W2203M | Capacitor, .02 mfd 200 v. | T5 | V-9649-1 | Transformer, 1st A.M. IF |
| C47 | RCP10W2203M | Capacitor, .02 mfd 200 v. | T6 | V-10350-1 | Transformer, 2nd A.M. IF |
| L1 | V-9672 | Coil, A.M. osc. | Z2 | V-9675 | Coil |
| L2 | V-9674 | Coil, F.M. RF | V-9676-1 | Core, F.M. tuning | |
| L4 | V-9099-1 | Reactor, RF (1.1 microhenries) | | | |
| L5 | V-9099-1 | Reactor, RF (1.1 microhenries) | | | |
| L6 | V-9099-1 | Reactor, RF (1.1 microhenries) | | | |
| L8 | V-9099-1 | Reactor, RF (1.1 microhenries) | | | |
| L10 | V-6157-1 | Coil, antenna loading | | | |

MODELS H-334T7U, H-335T7U, Ch. V-2136-5U



SPECIFICATIONS

FREQUENCY RANGES:

Amplitude Modulation 540 to 1615 kc.
 Frequency Modulation 88 to 108 mc.

INTERMEDIATE FREQUENCIES:

Amplitude Modulation 455 kc.
 Frequency Modulation 10.7 mc.

TUBE COMPLEMENT:

- 1 12AT7 R-F Amp. and Mixer (FM)
- 1 12BE6 FM Osc. and AM Converter
- 1 12BA6 I-F Amp.
- 1 6BJ6 I-F Driver (FM)

- 1 12AL5 Ratio Det. (FM)
- 1 12AV6 .. Det. and AVC (AM) and A-F Amp.
- 1 50C5 Output Amp.

POWER OUTPUT:

Undistorted 1.0 watts
 Maximum 1.9 watts

LOUDSPEAKER: 5" PM

OPERATING VOLTAGE:

..... 105 to 120 volts, DC or 60 cycles AC

POWER CONSUMPTION: 35 watts

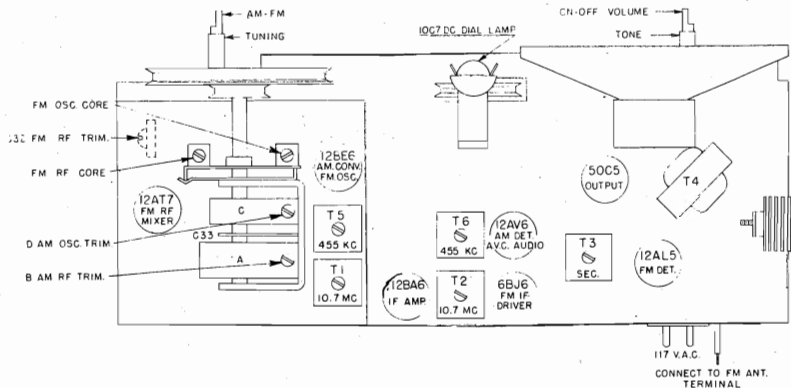


FIG. 3 - TOP VIEW OF CHASSIS

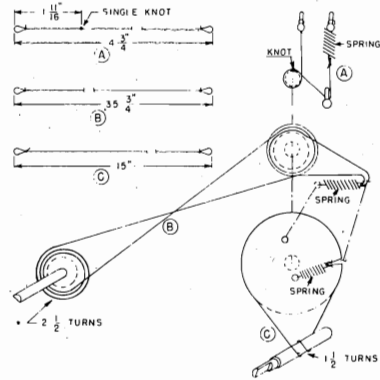


FIG. 4 - DRIVE MECHANISM

MODELS H-334T7U, H-335T7U, Ch. V-2136-5U

ALIGNMENT
BROADCAST BAND

Connect an output meter across the speaker voice coil.

While making the following adjustments, keep the volume control set for maximum output and the signal generator output attenuated to avoid AVC action.

Check the dial pointer position by meshing the tuning capacitor plates completely and seeing that the dial pointer is set on the end mark of the dial scale.

| Step | Connect Signal Generator to — | Signal Generator Frequency | Radio Dial Setting | Adjust |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|----------------------------|--------------------|-----------------------------------------------------------|
| 1 | Set the band switch to AM | | | |
| 2 | Stator of tuning capacitor (A) through a 0.1 mfd capacitor | 455 kc. | minimum capacity | Pri. and sec. of T6 and T5 for max. output in order given |
| <i>NOTE: If the I-F transformers are badly mis-aligned, it may be impossible to obtain sufficient output using the above system. In this event, it will be necessary to align each transformer separately. Start with the last I-F transformer and work forward, connecting the signal generator to the control grid of the tube preceding the transformer under alignment.</i> | | | | |
| 3 | Radiated signal (no actual connection) | 1615 kc. | minimum capacity | AM osc. trimmer (D) for max. output |
| 4 | Radiated signal (no actual connection) | 1400 kc. | tune to signal | AM R-F trimmer (B) for max. output (rock-in) adjustment |

FM BAND

Do not align the FM circuits until all AM adjustments have been completed.

| Step | Connect Signal Generator to — | Signal Generator Frequency | Radio Dial Setting | Adjust |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|--------------------|---------------------------------------------------------------|
| 1 | Set the band switch to FM | | | |
| 2 | Connect two 100,000 ohm resistors (the resistances must be equal within 5 per cent) between pin No. 7 of the 12AL5 tube and ground as shown on the schematic diagram. | | | |
| 3 | Connect a V.T.V.M. between points "X" and "Y" (see schematic diagram). | | | |
| 4 | Pin No. 7 of 12AT7 through a .01 mfd mica capacitor | 10.7 mc. | minimum capacity | Sec. of T3 for zero (use medium strength signal) |
| 5 | Connect the V.T.V.M. between point "Z" and ground. | | | |
| 6 | Same as step 4 | 10.7 mc. | minimum capacity | Pri. of T3 and pri. and sec. of T1 and T2 for maximum voltage |
| 7 | Reconnect the V.T.V.M. between points "X" and "Y" and increase the signal strength 10 times. | | | |
| 8 | Same as step 4 | 10.7 mc. | minimum capacity | Recheck sec. of T3 for zero voltage |
| 9 | Reconnect the V.T.V.M. between point "Z" and ground. | | | |
| 10 | Same as step 4 | 10.7 mc. | min. cap. | Pri. of T3 for maximum voltage |
| 11 | Remove the two 100,000 ohm resistors that were inserted in step 2. | | | |
| 12 | FM ant. terminal through a 300 ohm non-inductive resistor | 98 mc. | 98 mc. | FM osc. core for maximum voltage |
| 13 | Same as step 12 | 98 mc. | 98 mc. | FM R-F trimmer (C32) for maximum voltage |
| 14 | Same as step 12 | 105 mc. | tune to signal | FM R-F core for maximum voltage |
| 15 | Same as step 12 | 90 mc. | tune to signal | FM R-F trimmer (C32) for maximum voltage (rock-in) |
| 16 | Recheck steps 14 and 15 for tracking. | | | |

ANTENNA INFORMATION

An external AM antenna can be coupled to the set by taping the lead-in wire to the outside of the rear cover as shown in Fig. 2. The wire should be dressed in the position shown and can be held in place with adhesive tape or other similar material.

The blue wire emerging from the hole in the rear cover is a "line" antenna for FM reception. It should be connected to the left antenna terminal as shown in Fig. 2. If an external FM antenna is to be used, disconnect the blue wire and connect the transmission line to the two terminals.

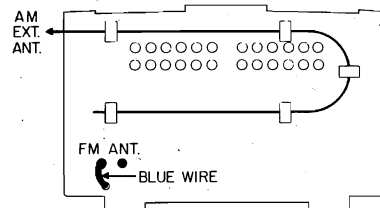
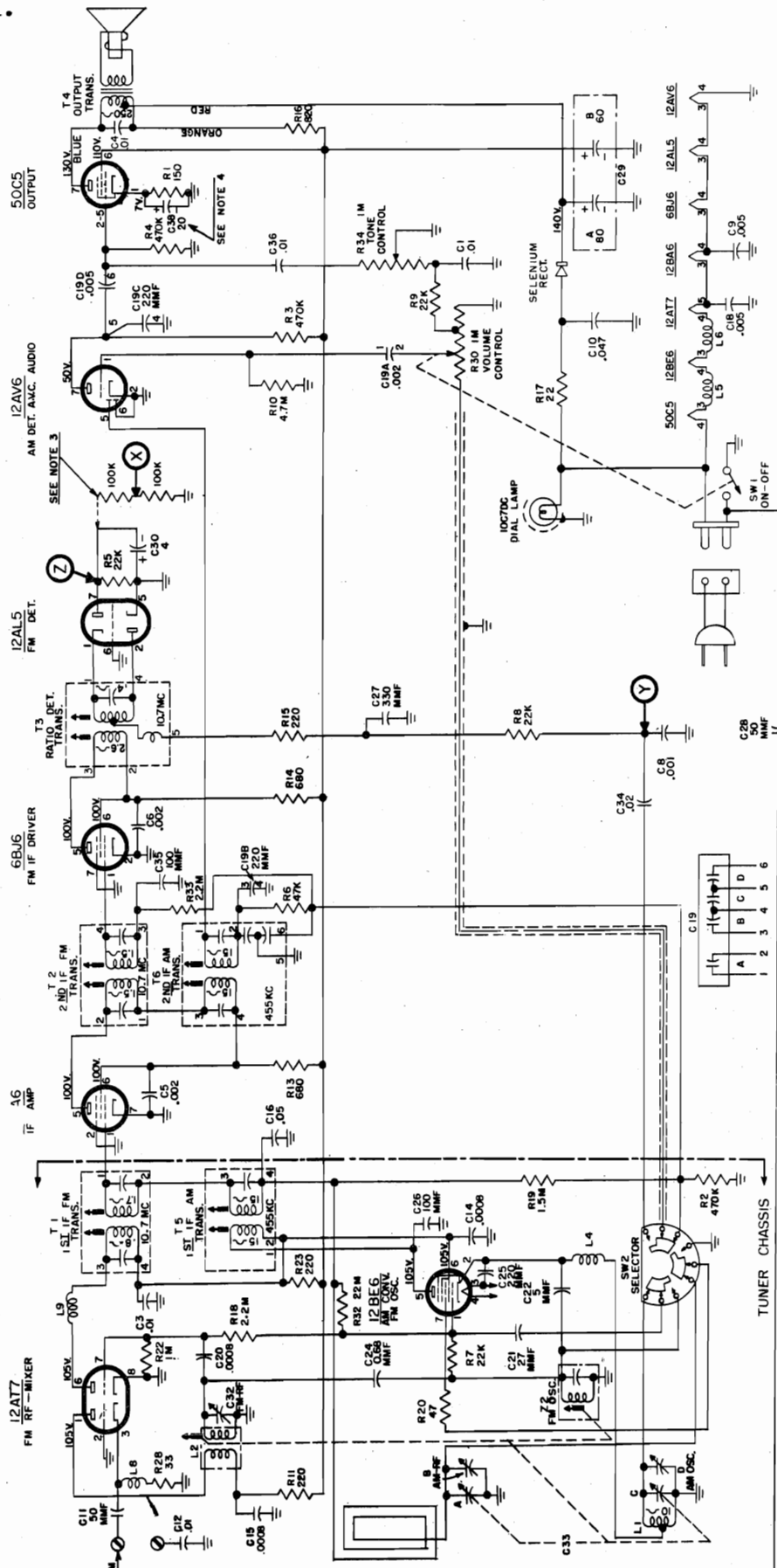


FIG. 2 — ANTENNA COUPLING

MODELS H-334T7U, H-335T7U, Ch. V-2136-5U

WARNING
When making repairs or adjustments, it is recommended that the chassis be isolated from the line by means of an isolation transformer. Otherwise, serious shock may result if the radio chassis and ground are contacted at the same time.

The chassis is connected directly to one side of the power line.



- NOTES:
1. SELECTOR SWITCH SW2 IS SHOWN IN EXTREME CLOCKWISE POSITION OR AM BAND. EXTREME COUNTER CLOCKWISE POSITION IS SHOWN IN AM BAND.
 2. ALL VOLTAGES MEASURED FROM CHASSIS (GROUND) USING A 20,000 OHM/VOLT METER. LINE VOLTAGE SET AT 117V.A.C. VOLTAGES SHOULD BE AS SHOWN ± 20 PER CENT.
 3. TO BE INSTALLED FOR ALIGNMENT ONLY.
 4. C38 MAY OR MAY NOT BE PART OF C29.
 5. ALL CAPACITANCE VALUES IN MFD AND ALL RESISTANCE VALUES IN OHMS UNLESS OTHERWISE SPECIFIED.

FIG. 1 — SCHEMATIC DIAGRAM OF V-2136-5U CHASSIS

MODELS H-334T7U, H-335T7U, Ch. V-2136-5U

PARTS LIST

When ordering parts, specify model number of set in addition to part number and description of part.

CABINET AND MISCELLANEOUS

| <i>Part No.</i> | <i>Description</i> | <i>Part No.</i> | <i>Description</i> |
|-----------------|-------------------------------------|-----------------|---------------------------------------------------------------|
| V-10364-2 | Baffle and Grille Cloth Assy. | V-9653 | Loop, antenna |
| V-1233-1 | Cabinet (brown) | V-3990-2 | Medallion |
| V-1233-2 | Cabinet (ivory) | V-10318-2 | Nameplate, Westinghouse |
| V-5426 | Clip, I-F mounting | V-9661 | Plug, AC power (male) |
| V-3219S-1 | Cord, dial drive (100' spool) | V-10310-1 | Pointer |
| V-9636-3 | Cover Assy., back | V-10357-1 | Pulley Assy., gang |
| V-9651-2 | Cover, back | V-10342-1 | Pulley and Shaft Assy., pointer ... |
| V-10308-1 | Dial | V-9655 | Shell, interlock |
| V-10309-1 | Escutcheon | V-10472-1 | Shield, lamp |
| V-9637-1 | Foot, mounting | V-9706-2 | Shield, miniature tube, spring |
| V-10408-1 | Knob, band (brown) | V-9654 | Socket, interlock |
| V-10408-3 | Knob, band (ivory) | V-5556-1 | Socket, miniature wafer (12AT7) .. |
| V-10408-2 | Knob, off-on-volume (brown) | V-4292S-2 | Socket, miniature molded (12BE6) |
| V-10408-4 | Knob, off-on-volume (ivory) | V-4292-1 | Socket, miniature molded (12BA6, 6BJ6, 12AL5, 12AV6) |
| V-9104-9 | Knob, tuning, rear (brown) | V-6878-2 | Socket, miniature wafer (50C5) |
| V-9104-11 | Knob, tuning, rear (ivory) | V-10366-1 | Socket, pilot lamp |
| V-9104-10 | Knob, tone, rear (brown) | V-10466-1 | Speaker, 5" PM |
| V-9104-12 | Knob, tone, rear (ivory) | V-3248S | Spring, dial drive |
| 10C7DC | Lamp, pilot | V-6795-3 | Spring, FM tuner & gang drive |

V-2136-5U CHASSIS

| <i>Ref. No.</i> | <i>Part No.</i> | <i>Description</i> | <i>Ref. No.</i> | <i>Part No.</i> | <i>Description</i> |
|-----------------|-----------------|--------------------------------------------------------------------|-----------------|-----------------|---------------------------------------------------------------|
| C1 | RCP10W4103M | Capacitor, .01 mfd 400 v. | L9 | V-4886-12 | Choke, RF |
| C3 | RCP10W4103M | Capacitor, .01 mfd 400 v. | | V-9640 | Rectifier, selenium |
| C4 | RCP10W4103M | Capacitor, .01 mfd 400 v. | R1 | RC30AE151K | Resistor, 150 ohms 1 w. |
| C5 | RCP10W6202M | Capacitor, .002 mfd 600 v. | R2 | RC20AE474M | Resistor, 470,000 ohms 1/2 w. |
| C6 | RCP10W6202M | Capacitor, .002 mfd 600 v. | R3 | RC20AE474M | Resistor, 470,000 ohms 1/2 w. |
| C8 | RCP10W6102M | Capacitor, .001 mfd 600 v. | R4 | RC20AE474M | Resistor, 470,000 ohms 1/2 w. |
| C9 | V-5596 | Capacitor, .005 mfd | R5 | RC20AE223K | Resistor, 22,000 ohms 1/2 w. |
| C10 | V-10157-4473M | Capacitor, .047 mfd 400 v. | R6 | RC20AE473M | Resistor, 47,000 ohms 1/2 w. |
| C11 | V-5658-10 | Capacitor, 50 mmf | R7 | RC20AE223M | Resistor, 22,000 ohms 1/2 w. |
| C12 | RCP10W2103M | Capacitor, .01 mfd 200 v. | R8 | RC20AE223M | Resistor, 22,000 ohms 1/2 w. |
| C14 | V-9863-1 | Capacitor, .0008 mfd | R9 | RC20AE223M | Resistor, 22,000 ohms 1/2 w. |
| C15 | V-9863-1 | Capacitor, .0008 mfd | R10 | RC20AE475M | Resistor, 4.7 megohms 1/2 w. |
| C16 | RCP10W2503M | Capacitor, .05 mfd 200 v. | R11 | RC20AE221M | Resistor, 220 ohms 1/2 w. |
| C18 | V-5596 | Capacitor, .005 mfd | R13 | RC20AE681M | Resistor, 680 ohms 1/2 w. |
| C19 | V-9634-1 | Capacitor, multiple ceramic, .002 mfd, 220 mmf, 220 mmf, .005 mfd. | R14 | RC20AE681M | Resistor, 680 ohms 1/2 w. |
| C20 | V-9863-1 | Capacitor, .0008 mfd | R15 | RC20AE221M | Resistor, 220 ohms 1/2 w. |
| C21 | R2CC30UK270K | Capacitor, 27 mmf | R16 | V-6984-10 | Resistor, 820 ohms 5 w. |
| C22 | R2CC30UK050D | Capacitor, 5 mmf | R17 | RC30AE220K | Resistor, 22 ohms 1 w. |
| C24 | V-5658-4 | Capacitor, .68 mmf | R18 | RC20AE225M | Resistor, 2.2 megohms 1/2 w. |
| C25 | R5CC20ZY221M | Capacitor, 220 mmf | R19 | RC20AE155M | Resistor, 1.5 megohms 1/2 w. |
| C26 | RCM20D101J | Capacitor, 100 mmf | R20 | RC20AE470M | Resistor, 47 ohms 1/2 w. |
| C27 | RCM20A331M | Capacitor, 330 mmf | R22 | RC20AE105M | Resistor, 1 megohm 1/2 w. |
| C28 | V-5658-10 | Capacitor, 50 mmf | R23 | RC20AE221M | Resistor, 220 ohms 1/2 w. |
| C29 | V-9920 | Capacitor, electrolytic, 80 mfd 150 v., 60 mfd 150 v. | R28 | RC20AE330M | Resistor, 33 ohms 1/2 w. |
| C30 | V-4637 | Capacitor, electrolytic, 4 mfd 50 v. | *R30 | V-10330-1 | Control, volume, 1 megohm (assy consists of R30, R34 and SW1) |
| C32 | V-9670 | Capacitor, trimmer (FM RF) | R32 | RC20AE226M | Resistor, 22 megohms 1/2 w. |
| C33 | V-9671-2 | Capacitor, variable tuning (consists of A,B,C, and D) | R33 | RC20AE225M | Resistor, 2.2 megohms 1/2 w. |
| C34 | RCP10W2203M | Capacitor, .02 mfd 200 v. | *R34 | V-10330-1 | Control, tone, 1 megohm (assy consists of R30, R34 and SW1) |
| C35 | RCM20A101M | Capacitor, 100 mmf | *SW1 | V-10330-1 | Switch, on-off (assy consists of R30, R34 and SW1) |
| C36 | RCP10W4103M | Capacitor, .01 mfd 400 v. | SW2 | V-9681-1 | Switch, selector |
| C38 | V-3236 | Capacitor, 20 mfd 25 v. | T1 | V-9688 | Transformer, 1st FM IF |
| L1 | V-9672 | Coil AM osc. | T2 | V-9642 | Transformer, 2nd FM IF |
| L2 | V-9674 | Coil, FM RF | T3 | V-9828 | Transformer, ratio detector |
| | V-9676-1 | Core, FM RF and osc. tuning | T4 | V-9665 | Transformer, output |
| L4 | V-9099-1 | Choke, 1.1 microhenries | T5 | V-9649-1 | Transformer, 1st AM IF |
| L5 | V-9099-1 | Choke, 1.1 microhenries | T6 | V-10350-1 | Transformer, 2nd AM IF |
| L6 | V-9099-1 | Choke, 1.1 microhenries | Z2 | V-9675 | Coil and Capacitor Assy., FM osc. |
| L8 | V-9099-1 | Choke, antenna input | | | |

MODELS H-334T7U, H-335T7U,
Ch. V-2136-5U; H-334T7UR,
Ch. V-2136-5R

SUPPLEMENTARY INFORMATION

MODELS H-334T7U AND H-335T7U — CHASSIS V-2136-5U

MODEL H-334T7UR — CHASSIS V-2136-5R

PRODUCTION CHANGES IN V-2136-5U CHASSIS

1. Later production chassis contain a 6 watt pilot lamp (type 6S6DC) rather than the 10 watt lamp indicated in the service notes. The purpose of the change is to eliminate pilot lamp noise and reduce heating inside the cabinet.

2. In some chassis, excessive HF oscillator voltage injection tends to reduce the sensitivity at the high frequency end of the AM band. This effect is eliminated by adding a 680 ohm 1/2 watt resistor (R35) between the tap on the AM oscillator coil (L1) and chassis ground. Some chassis do not require R35 for correct oscillator injection.

3. Excessive hum and a thumping effect as the receiver is tuned across an FM signal can be caused by abnormally low heater to cathode resistance in the 12AL5 tube. To eliminate this effect, some chassis contain a 470 ohm 1/2 watt resistor (R36) connected between pins #3 and #4 (heater) of the 12AL5.

4. Later production chassis contain a .005 mfd capacitor (C39) connected across the ratio detector electrolytic capacitor (C30). This serves as an RF bypass and eliminates an oscillation that may otherwise appear on the FM band.

5. In some chassis, the 455 kc. 2nd I-F transformer (T6) is part number V-6130-1 rather than the specified V-10350-1. The V-6130-1 transformer does not contain the two diode filter capacitors shown on the schematic diagram. Therefore, when the V-6130-1 transformer is used, an external 150 mmf capacitor (C40) is added between the bottom of R6 and ground to serve in place of the missing filter output capacitor. Since C19B, which is shown in parallel with the built-in filter input capacitor, provides sufficient capacitance without the built-in capacitor, an additional capacitor is not required at the filter input.

In accordance with the preceding information, the following parts should be added to the H-334T7U and H-335T7U parts list:

| Ref. No. | Part No. | Description |
|----------|------------|-----------------------------------------------|
| | 6S6DC | Lamp, pilot |
| C39 | V-5596 | Capacitor, .005 mfd |
| C40 | RCM20A151M | Capacitor, 150 mmf (used when T6 is V-6130-1) |
| R35 | RC20AE681M | Resistor, 680 ohms 1/2 w. |
| R36 | RC20AE471M | Resistor, 470 ohms 1/2 w. |

MODEL H-334T7UR — CHASSIS V-2136-5R

The V-2136-5R chassis used in Model H-334T7UR is similar to the V-2136-5U. However, there are enough differences to warrant the inclusion in this supplement of a schematic diagram covering the V-2136-5R chassis and a ----- parts list for Model H-334T7UR. For alignment and other service information, refer to the original H-334T7U and H-335T7U service notes.

PARTS LIST FOR MODEL H-334T7UR

When ordering parts, specify model number of set in addition to part number and description of part.

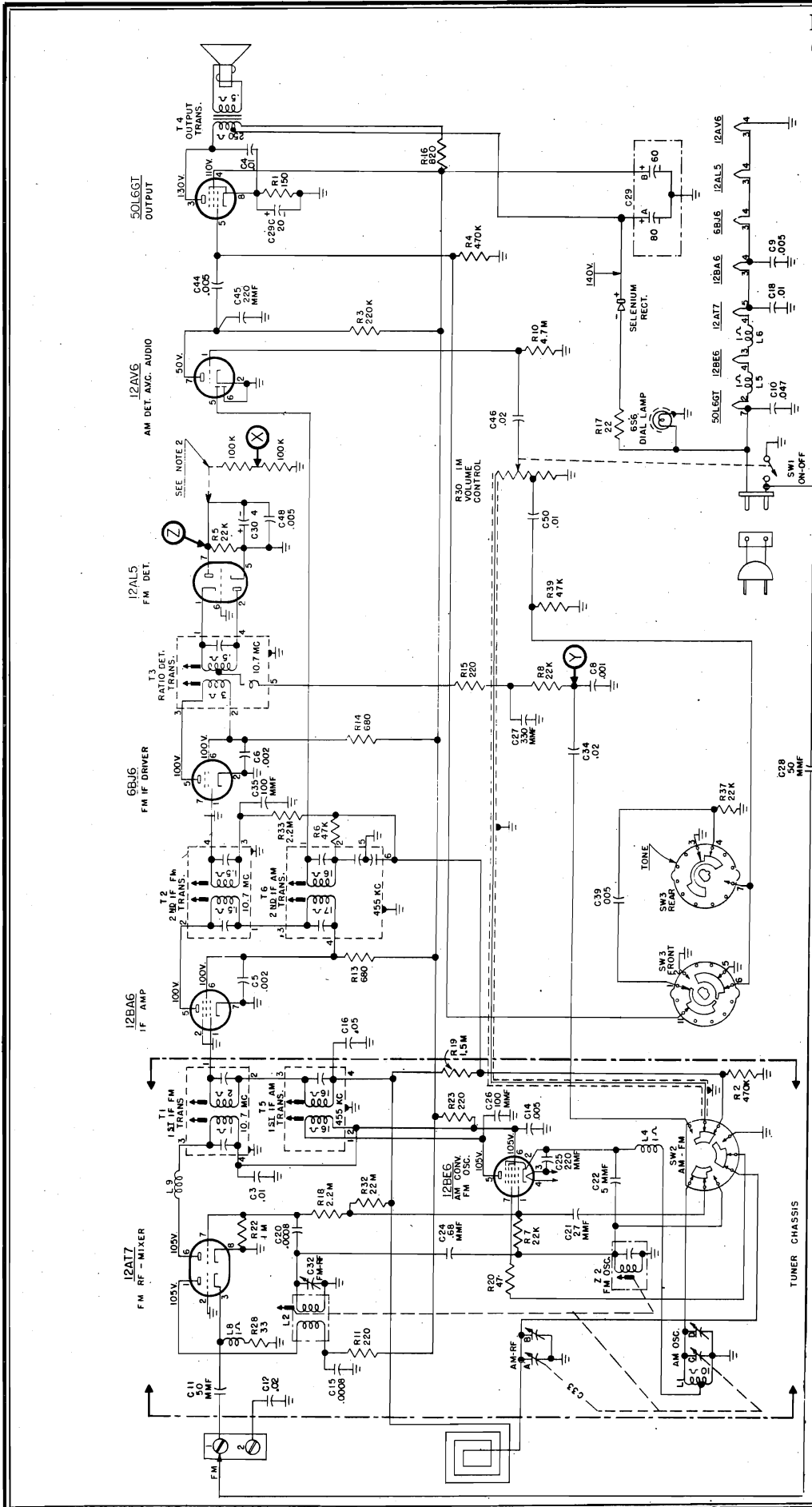
CABINET AND MISCELLANEOUS

| Part No. | Description |
|----------|----------------------------------|
| V-3246S | Socket, octal wafer (50L6) |

*Sold only as a complete assembly.

| Ref. No. | Part No. | Description |
|----------|-------------|---------------------------------------------------------------------|
| C12 | RCP10W2203M | Capacitor, .02 mfd 200 v. |
| C14 | V-5596 | Capacitor, .005 mfd |
| C18 | RCP10W4103M | Capacitor, .01 mfd 400 v. |
| C29 | V-10415-1 | Capacitor, electrolytic, 80 mfd 150 v., 60 mfd 150 v., 20 mfd 25 v. |
| C39 | RCP10W4502M | Capacitor, .005 mfd 400 v. |
| C44 | RCP10W4502M | Capacitor, .005 mfd 400 v. |
| C45 | RCM20A221M | Capacitor, 220 mmf |
| C46 | RCP10W2203M | Capacitor, .02 mfd 200 v. |
| C48 | V-5596 | Capacitor, .005 mfd |
| C50 | RCP10W4103M | Capacitor, .01 mfd 400 v. |
| R3 | RC20AE224M | Resistor, 220,000 ohms 1/2 w. |
| *R30 | V-9824-1 | Control, volume, 1 megohms (assy consists of R30, SW1 and SW3) |
| R37 | RC20AE223M | Resistor, 22,000 ohms 1/2 w. |
| R39 | RC20AE473M | Resistor, 47,000 ohms 1/2 w. |
| *SW1 | V-9824-1 | Switch, on-off (assy consists of R30, SW1 and SW3) |
| *SW3 | V-9824-1 | Switch, tone (assy consists of R30, SW1 and SW3) |
| T4 | V-10660 | Transformer, output |

MODEL H-334T7UR,
Ch. V-2136-5R

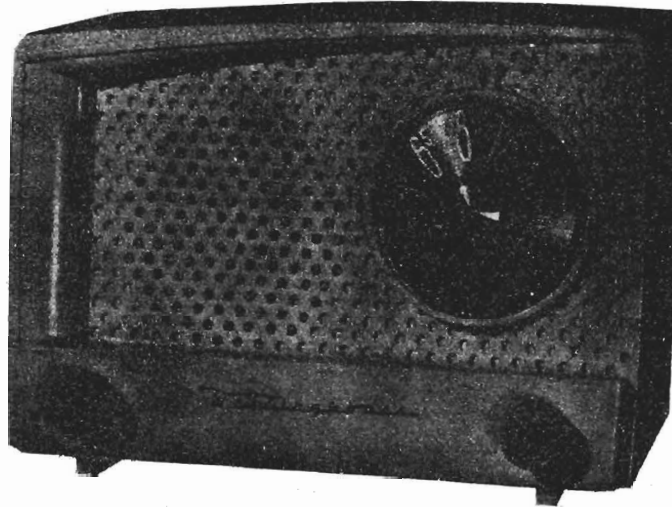


4. ALL CAPACITANCE VALUES IN MFD AND ALL RESISTANCE VALUES IN OHMS UNLESS OTHERWISE SPECIFIED.
5. ALL VOLTAGES MEASURED FROM CHASSIS GROUND USING 500 OHM-POLY METER. LINE VOLTAGE SET AT 117 V. A. C. READINGS SHOULD BE AS SHOWN ± 20 PER CENT.

1. SELECTOR SWITCH SW2 IS SHOWN IN EXTREME CLOCKWISE POSITION OR AM BAND AS VIEWED FROM THE FRONT.
2. TO BE INSTALLED FOR ALIGNMENT ONLY.
3. SELECTOR SWITCH SW3 IS IN EXTREME COUNTER CLOCKWISE POSITION AS VIEWED FROM THE FRONT.

SCHEMATIC DIAGRAM OF V-2136-5R CHASSIS

MODELS H-336T5U, H-337T5U, Ch. V-2157U



SPECIFICATIONS

FREQUENCY RANGE: 540 to 1615 kc.

INTERMEDIATE FREQUENCY: 455 kc.

TUBE COMPLEMENT:

- 1 12BE6 Converter
- 1 12BA6 I-F Amp.
- * 1 12AV6 Det., AVC, and 1st A-F Amp.
- 1 50C5 Output Amp.
- 1 35W4 Rectifier

POWER OUTPUT:

- Undistorted 0.9 watt
- Maximum 1.5 watts

LOUDSPEAKER: 4" P.M.

OPERATING VOLTAGE: 105 to 120 volts, 50-60 cycles A-C or D-C

POWER CONSUMPTION: 35 watts

* See schematic diagram for substitute tubes.

ALIGNMENT

It is recommended that the chassis be isolated from the power line by means of an isolation transformer.

While making the following adjustments, keep the volume control set for maximum output and the signal generator output attenuated to avoid AVC action.

| Step | Connect Signal Generator to — | Signal Generator Frequency | Radio Dial | Adjust for Maximum Output — |
|------|-----------------------------------------------------------------|----------------------------|------------------|------------------------------------------------------------------|
| 1. | Stator of R-F tuning capacitor (A) through a 0.1 mfd capacitor. | 455 kc. | Minimum Capacity | Top and bottom slugs in 2nd and 1st I-F trans. in order given. * |
| 2. | Same as step 1 | 1615 kc. | Minimum Capacity | Osc. trimmer (D) |
| 3. | Radiated Signal | 1400 kc. | 1400 kc. | Ant. trimmer (B) |

*It is recommended that a fiber aligning tool that snugly fits the slot in the powdered iron core be used to prevent chipping of the slot.

PARTS LIST

When ordering parts, specify model number of set in addition to part number and description of part.

CABINET AND MISCELLANEOUS PARTS

| Part No. | Description |
|-----------|------------------------------------------------|
| V-10012-3 | Background, dial |
| V-9746-1 | Baffle and grille cloth assy. (H-337T5U) |
| V-1219-2 | Cabinet (H-336T5U) |
| V-1219-4 | Cabinet (H-337T5U) |
| V-3219S-1 | Cord, dial drive (100' spool) |
| V-10008-3 | Dial (H-337T5U) |
| V-10008-4 | Dial (H-336T5U) |
| V-10009-7 | Knob (H-337T5U) |
| V-10009-6 | Knob (H-336T5U) |
| V-9996-2 | Shaft, tuning |
| V-9727-1 | Speaker, 4" PM (includes T3) |
| V-10076-1 | Spring, dial drive |
| V-9888-2 | Socket, wafer (12BE6, 50C5 and 35W4) |
| V-9888-3 | Socket, wafer (12BA6 and 12AV6) |

CHASSIS PARTS

| Ref. No. | Part No. | Description |
|----------|--------------|----------------------------------------------------------------------|
| C1 | V-10047 | Capacitor, variable (consists of A, B, C, and D) |
| C2 | RCP 10W2503M | Capacitor, .05 mfd 200 v. |
| C3 | V-9634-1 | Capacitor, multiple ceramic (consists of A, B, C and D) |
| C4 | V-9991 | Capacitor, electrolytic 50-50 mfd 150 v. (consists of A and B) |
| C5 | RCP 10W4503M | Capacitor, .05 mfd 400 v. |
| C6 | RCP 10W4103M | Capacitor, .01 mfd 400 v. |
| C7 | RCP 10W4104M | Capacitor, .1 mfd 400 v. |
| L1 | V-9994 | Loop, antenna |
| L2 | V-9992 | Coil, osc. |
| R1 | RC20AE223M | Resistor, 22,000 ohms 1/2 w. |
| R2 | RC20AE335M | Resistor, 3.3 meg. 1/2 w. |
| R3 | RC20AE680M | Resistor, 68 ohms 1/2 w. |
| *R4 | V-9993-1 | Control, volume 500,000 ohms (assy consists of R4 and SW1) |
| R5 | RC20AE106M | Resistor, 10 megohms 1/2 w. |
| R6 | RC20AE334M | Resistor, 330,000 ohms 1/2 w. |
| R7 | RC20AE474M | Resistor, 470,000 ohms 1/2 w. |
| R8 | RC20AE121M | Resistor, 120 ohms 1/2 w. |
| R9 | RC30AE102M | Resistor, 1000 ohms 1 w. |
| *SW1 | V-9993-1 | Switch, on-off (assy consists of SW1 and R4) |
| T1 | V-9735-1 | Transformer, 1st I-F |
| T2 | V-9735-1 | Transformer, 2nd I-F |
| T3 | V-9727-1 | Transformer, audio (includes T3 and speaker) |

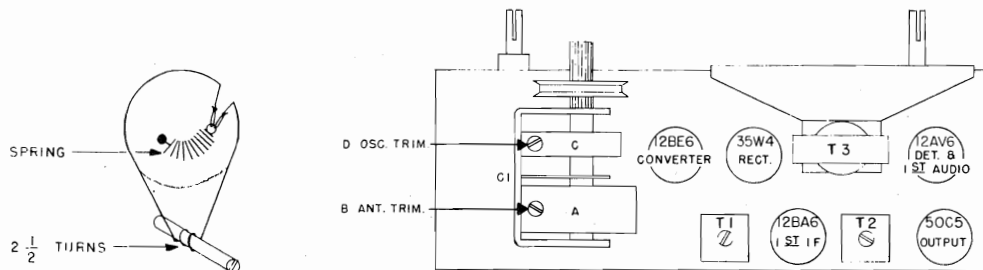
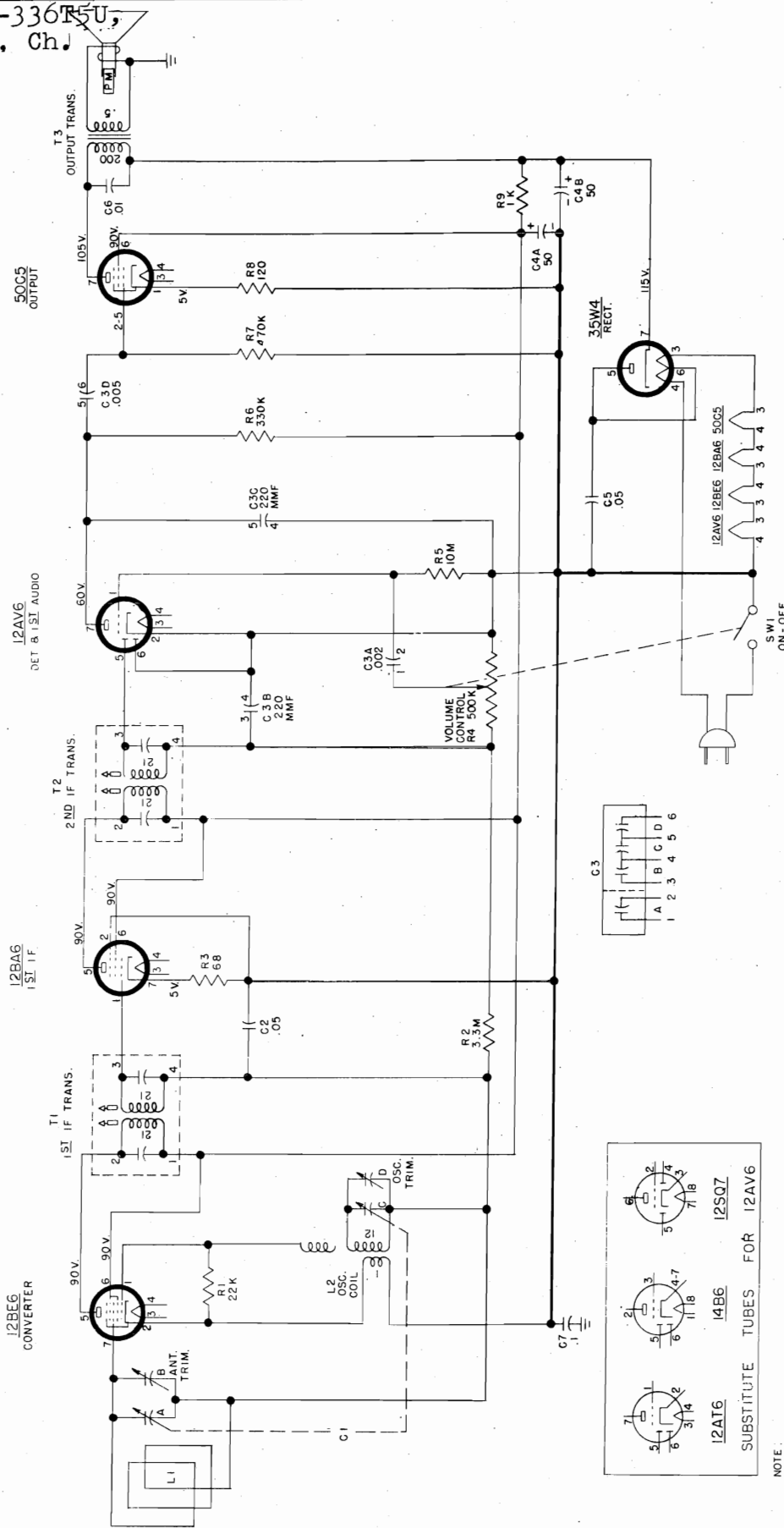


FIG. 1 - DIAL DRIVE AND CHASSIS LAYOUT

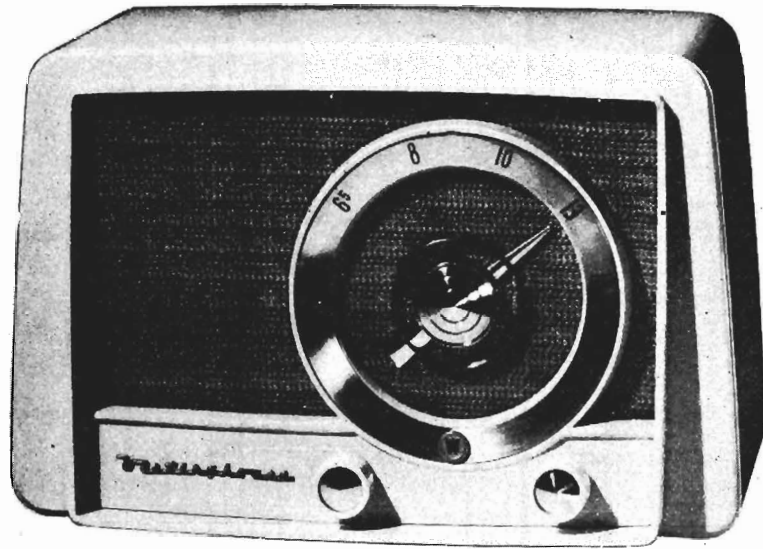
MODELS H-336T5U,
H-337T5U, Ch.
V-2157U.



NOTE:
1. ALL VOLTAGES MEASURED FROM COMMON NEGATIVE USING A 20,000 OHM/VOLT METER. LINE VOLTAGE SET AT 117 V.A.C. READINGS SHOULD BE AS SHOWN \pm 20 PER CENT.
2. ALL CAPACITANCE VALUES IN MFD. AND ALL RESISTANCE VALUES IN OHMS UNLESS OTHERWISE SPECIFIED.

FIG. 2 — SCHEMATIC DIAGRAM OF V-2157U CHASSIS

MODELS H-338T5U, H-341T5U,
H-345T5, H-346T5, Ch.
V-2157-4U



SPECIFICATIONS

FREQUENCY RANGE: 540 to 1615 kc.

INTERMEDIATE FREQUENCY: 455 kc.

TUBE COMPLEMENT:

- 1 12BE6 Converter
- 1 12BA6 I-F Amp.
- 1 12AV6 Det., AVC, and 1st A-F Amp.
- 1 50C5 Output Amp.
- 1 35W4 Rectifier

POWER OUTPUT:

- Undistorted 0.9 watt
- Maximum 1.5 watts

LOUDSPEAKER: 4" P.M.

OPERATING VOLTAGE: 105 to 120 volts, 50-60 cycles A-C or D-C

POWER CONSUMPTION: 35 watts

ALIGNMENT

It is recommended that the chassis be isolated from the power line by means of an isolation transformer.

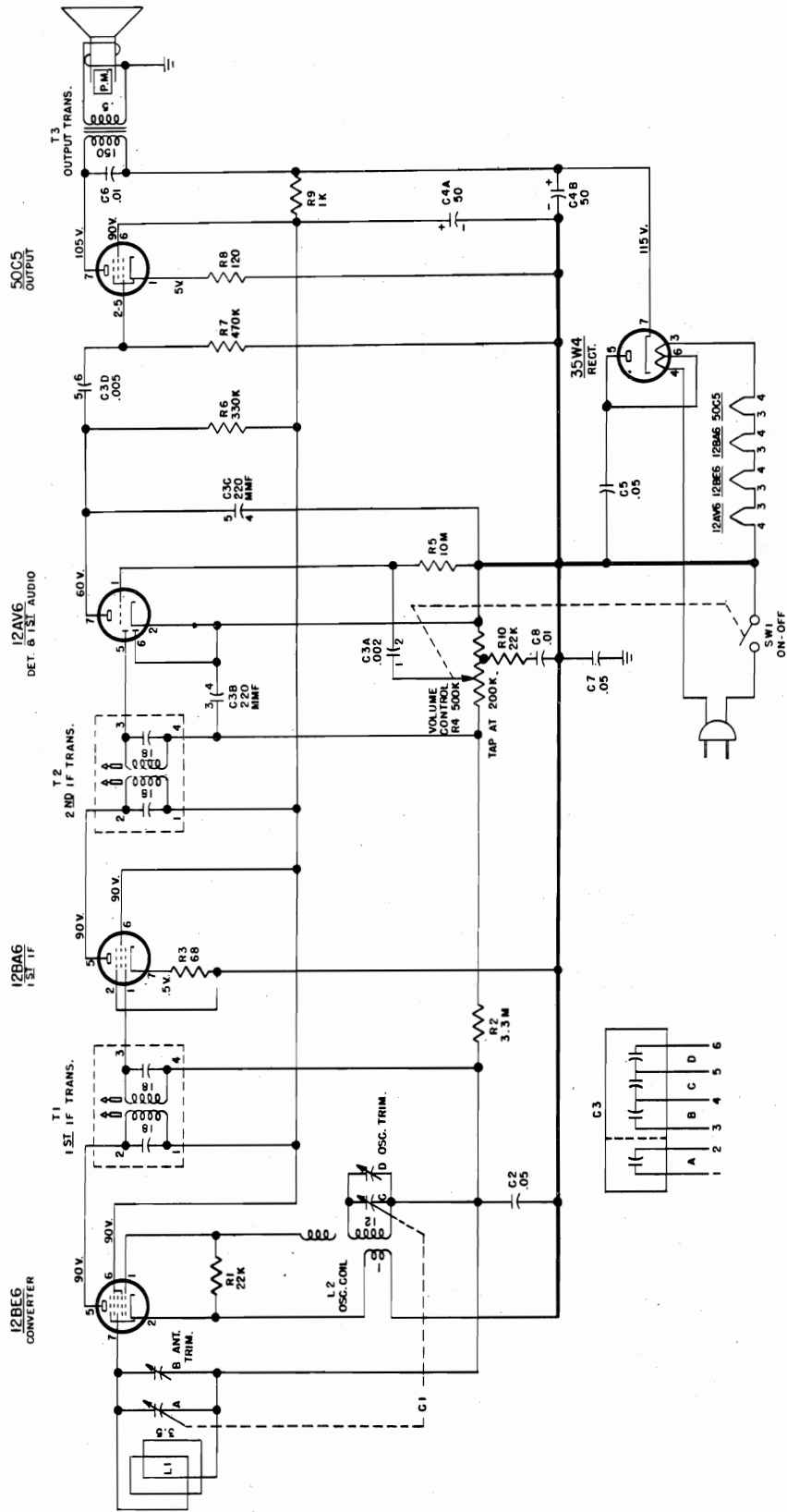
Make certain that the dial pointer is correctly positioned.

While making the following adjustments, keep the volume control set for maximum output and the signal generator output attenuated to avoid AVC action.

| Step | Connect Signal Generator to — | Signal Generator Frequency | Radio Dial | Adjust for Maximum Output — |
|------|-----------------------------------------------------------------|----------------------------|------------------|---------------------------------------------------|
| 1. | Stator of ant. tuning capacitor (A) through a 200 mmf capacitor | 455 kc. | Minimum capacity | Top and bottom slugs of T2 and T1 in order given* |
| 2. | Same as step 1 | 1615 kc. | Minimum capacity | Oscillator trimmer (D) |
| 3. | Radiated signal | 1400 kc. | 1400 kc. | Antenna trimmer (B) |

* It is recommended that a fiber aligning tool that snugly fits the slot in the powdered iron core be used to prevent chipping of the slot.

MODELS H-338T5U, H-341T5U, H-345T5, H-346T5, Ch. V-2157-4U



NOTES:
 1. ALL VOLTAGES MEASURED FROM COMMON NEGATIVE USING A 20,000 OHM/VOLT METER. LINE VOLTAGE SET AT 117 V.A.C. READINGS SHOULD BE AS SHOWN ± 20 PER CENT.
 2. ALL CAPACITANCE VALUES IN MFD AND ALL RESISTANCE VALUES IN OHMS UNLESS OTHERWISE SPECIFIED.

FIG. 1 — SCHEMATIC DIAGRAM OF V-2157-4U CHASSIS

MODELS H-338T5U, H-341T5U, H-345T5, H-346T5, Ch. V-2157-4U

PARTS LIST FOR MODELS H-338T5U AND H-341T5U

When ordering parts, specify model number of set in addition to part number and description of part.

CABINET AND MISCELLANEOUS PARTS

| Part No. | Description |
|-----------|-------------------------------------------------------------------------|
| V-10333-1 | Baffle and grille cloth assembly |
| V-1220-4 | Cabinet, H-338T5U (less front grille and baffle and grille cloth) |
| V-1220-3 | Cabinet, H-341T5U (less front grille and baffle and grille cloth) |
| V-5426 | Clip, I-F mounting |
| V-3219S-1 | Cord, dial drive (spool) |
| V-10335-1 | Dial |
| V-10336-1 | Grille, front (H-338T5U) |
| V-10336-2 | Grille, front (H-341T5U) |
| V-10009-8 | Knob (H-338T5U) |
| V-10009-9 | Knob (H-341T5U) |
| V-10332-1 | Pointer |
| V-3891 | Nut, speed (front grille to cabinet) |
| V-3926 | Nut, speed (baffle to front grille) |
| V-9996-2 | Shaft, tuning |
| V-10052 | Shield, bottom chassis |
| V-9727-2 | Speaker, 4" PM (includes T3) |
| V-5786 | Spring, pointer |
| V-10076-1 | Spring, dial drive |
| V-9888-3 | Socket (12AV6, 12BA6) |
| V-9888-2 | Socket (12BE6, 50C5, 35W4) |

CABINET AND MISCELLANEOUS PARTS FOR MODELS H-345T5 AND H-346T5

V-2157-4U CHASSIS PARTS

| Ref. No. | Part No. | Description | Part No. | Description |
|----------|-------------|-------------------------------------------------|------------|--------------------------------------------------------------------------|
| C1 | V-10360-1 | Capacitor, variable | V-10009-11 | Knob (H-345T5) |
| C2 | RCP10W2503M | Capacitor, .05 mfd. 200 v | V-10009-9 | Knob (H-346T5) |
| C3 | V-9634-1 | Capacitor, multiple | V-3891 | Nut, speed (front grille to cabinet) |
| C4 | V-9991 | Capacitor, electrolytic, 50-50 mfd. 150 v | V-3926 | Nut, speed (baffle to front grille) |
| C5 | RCP10W4503M | Capacitor, .05 mfd. 400 v | V-10332-1 | Pointer |
| C6 | RCP10W4103M | Capacitor, .01 mfd. 400 v | V-9996-2 | Shaft, tuning |
| C7 | RCP10W4503M | Capacitor, .05 mfd. 400 v | V-10052 | Shield, bottom chassis |
| C8 | RCP10W4103M | Capacitor, .01 mfd. 400 v | V-9727-2 | Speaker, 4" PM (includes T3) |
| L1 | V-10450-1 | Loop, antenna | V-5786 | Spring, pointer |
| L2 | V-9992 | Coil, oscillator | V-10076-1 | Spring, dial drive |
| R1 | RC20AE223M | Resistor 22,000 ohms 1/2 w | V-9888-3 | Socket (12AV6, 12BA6) |
| R2 | RC20AE335M | Resistor 3.3 meg. 1/2 w | V-9888-2 | Socket (12BE6, 50C5, 35W4) |
| R3 | RC20AE680M | Resistor 68 ohms 1/2 w | V-10333-3 | Baffle and grille cloth assembly (H-345T5) |
| R4 | V-9993-4 | Control, volume 500,000 ohms | V-10333-4 | Baffle and grille cloth assembly (H-346T5) |
| R5 | RC20AE106M | Resistor 10 meg. 1/2 w | V-1220-2 | Cabinet, H-345T5 (less front grille & baffle & grille cloth assy.) |
| R6 | RC20AE334M | Resistor 330,000 ohms 1/2 w | V-1220-3 | Cabinet, H-346T5 (less front grille & baffle & grille cloth assy.) |
| R7 | RC20AE474M | Resistor 470,000 ohms 1/2 w | V-5426 | Clip, I-F mounting |
| R8 | RC20AE121M | Resistor 120 ohms 1/2 w | V-3219S-1 | Cord, dial drive (100' spool) |
| R9 | RC30AE102M | Resistor 1000 ohms 1/2 w | V-10335-1 | Dial |
| R10 | RC20AE223M | Resistor 22,000 ohms 1/2 w | V-10336-2 | Grille, front |
| T1 | V-9735-1 | Transformer, I-F | | |
| T2 | V-9735-1 | Transformer, I-F | | |
| T3 | V-9727-2 | Transformer, audio (includes speaker) | | |

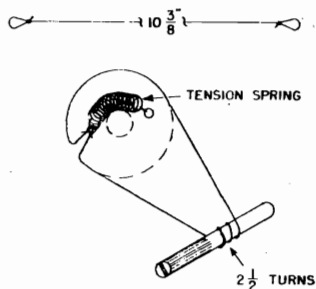


FIG. 2 - DIAL DRIVE

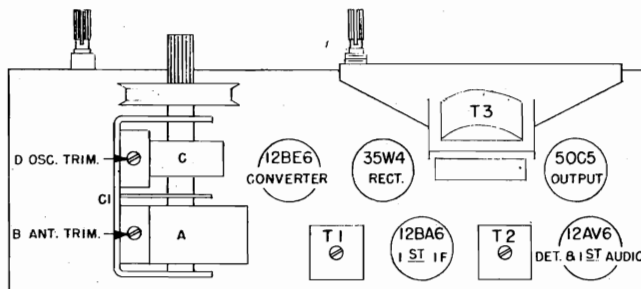
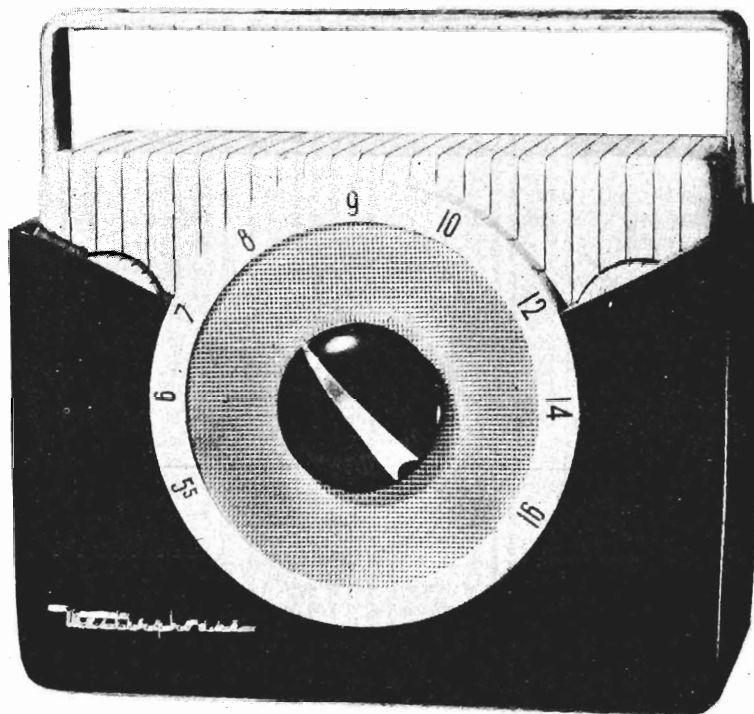


FIG. 3 - CHASSIS LAYOUT

PAGE 22-20 WESTINGHOUSE

MODELS H-342P5U, H-343P5U,
H-348P5, H-349P5, Ch. V-
2156-1U



SPECIFICATIONS

FREQUENCY RANGE 540 to 1615 kc.

INTERMEDIATE FREQUENCY 455 kc.

TUBE COMPLEMENT:

- 1 1U4 R-F Amplifier
- 1 1R5 Converter
- 1 1U4 I-F Amplifier
- 1 1U5 Det., AVC, and 1st A-F Amp.
- 1 3V4 Output Amplifier

POWER OUTPUT:

- Maximum 0.38 watt
- Undistorted 0.18 watt

LOUDSPEAKER 5" PM

POWER SUPPLY:

Battery Operation— "AB" Battery Pack (9 v. "A" and 90 v. "B")— Eveready 756W, Burgess T6Z60, or Ray-O-Vac AB601

Line Operation 105 to 120 volts, D-C
or 50 to 60 cycles A-C

CURRENT CONSUMPTION (Battery Operation)

"A" section of "AB" battery05 amp.
"B" section of "AB" battery016 amp.

POWER CONSUMPTION (Line Operation)

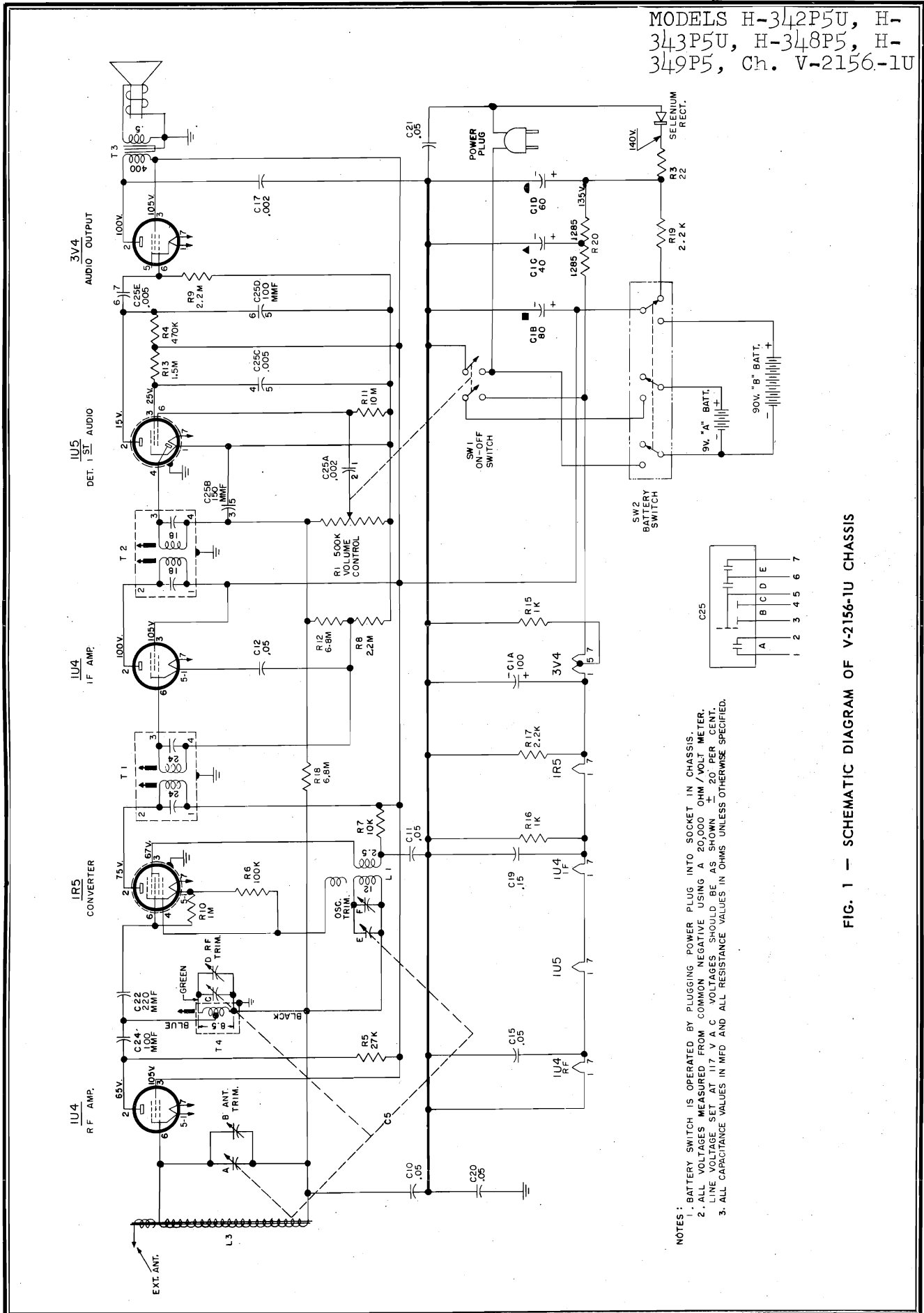
..... 15 watts

BATTERY INSTALLATION

One of the following "A-B" battery packs should be used with this radio: Eveready 756W, Burgess T6Z60, or Ray-O-Vac AB601.

Best performance is obtained by installing the battery with the plug toward the front of the cabinet as shown in Fig. 4. However, if the battery is oversize it may be necessary to install it with the plug toward the back of the radio to allow complete closing of the back cover.

MODELS H-342P5U, H-343P5U, H-348P5, H-349P5, Ch. V-2156-1U



NOTES:
 1. BATTERY SWITCH IS OPERATED BY PLUGGING POWER PLUG INTO SOCKET IN CHASSIS.
 2. ALL VOLTAGES MEASURED FROM COMMON NEGATIVE USING A 20,000 OHM / VOLT METER. LINE VOLTAGE SET AT 117 V. A.C. VOLTAGES SHOULD BE SHOWN ± 2% PER CENT.
 3. ALL CAPACITANCE VALUES IN MFD AND ALL RESISTANCE VALUES IN OHMS UNLESS OTHERWISE SPECIFIED.

FIG. 1 — SCHEMATIC DIAGRAM OF V-2156-1U CHASSIS

MODELS H-342P5U, H-343P5U, H-348P5, H-349P5, Ch. V-2156-1U

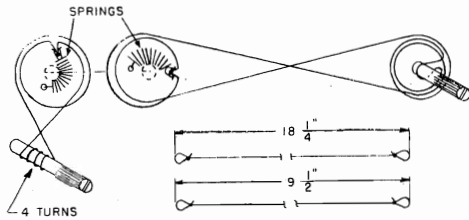


FIG. 2 - DRIVE MECHANISM

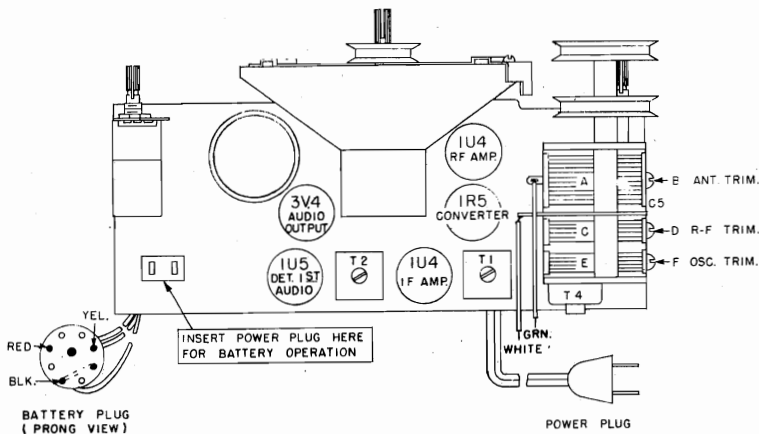


FIG. 3 - CHASSIS LAYOUT

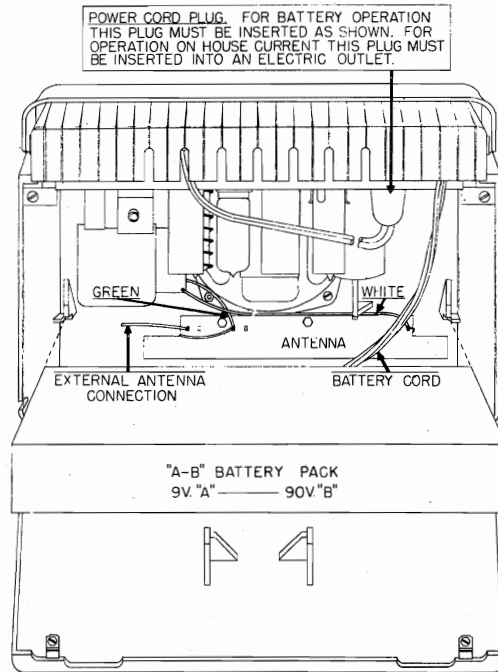


FIG. 4 - REAR VIEW

ALIGNMENT

It is recommended that the chassis be isolated from the power line by means of an isolation transformer.

While making the following adjustments, keep the volume control set for maximum output and the signal generator output attenuated to avoid AVC action.

| Step | Connect Signal Generator to — | Signal Generator Frequency | Radio Dial Setting | Adjust for Maximum Output — |
|------|--------------------------------------------------------------------------|----------------------------|--------------------|---------------------------------------------------|
| 1 | Pin No. 6 of the 1R5 converter through a 200 mmf capacitor | 455 kc. | Minimum capacity | Top and bottom slugs of T2 and T1 in order given* |
| 2 | Stator of antenna tuning section of gang (E) through a 200 mmf capacitor | 1615 kc. | Minimum capacity | Osc. trimmer (F) |
| 3 | Same as step 2 | 1400 kc. | 1400 kc. | R-F trimmer (D) |
| 4 | Same as step 2 | 600 kc. | 600 kc. | Slug of R-F trans. (T4)** |
| 5 | Recheck steps 3 and 4 | | | |
| 6 | Radiated signal | 1400 kc. | 1400 kc. | Antenna trimmer (B) |

* It is recommended that a fiber aligning tool that snugly fits the slot in the powdered iron core be used to prevent chipping of the slot.

** A 10/32" Allen wrench can be used to adjust the slug in T4.

MODELS H-342P5U, H-343P5U, H-348P5, H-349P5, Ch. V-2156-1U

PARTS LIST FOR

When ordering parts, specify model number of set in addition to part number and description of part.

CABINET AND MISCELLANEOUS

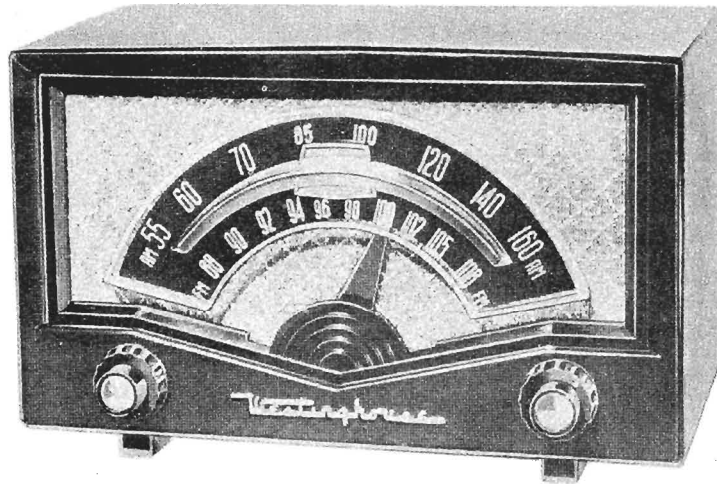
MODELS H-348P5 AND H-349P5

| Part No. | Description | Part No. | Description |
|-----------|---------------------------------------------------------|-----------|--------------------------------------------------------|
| V-10391-1 | Antenna, iron core | V-10391-1 | Antenna, iron core |
| V-4169-1 | Base, miniature tube (1U5) | V-4169-1 | Base, miniature tube |
| V-1235-1 | Cabinet, H-342P5U (less handle) | V-1235-3 | Cabinet, H-348P5 (less handle) .. |
| V-1235-2 | Cabinet, H-343P5U (less handle) | V-1235-4 | Cabinet, H-349P5 (less handle) .. |
| V-6554-2 | Cable assembly, battery | V-6554-2 | Cable assembly, battery |
| V-5426 | Clip, I-F mounting | V-5426 | Clip, I-F mounting |
| V-10386-1 | Clip, back cover catch | V-10386-1 | Clip, back cover catch |
| V-3219S-1 | Cord, dial drive (100' spool) | V-3219S-1 | Cord, dial drive (100' spool) |
| V-10383-1 | Handle | V-10383-1 | Handle |
| V-10388-1 | Knob, H-342P5U | V-10388-3 | Knob, H-348P5 |
| V-10388-2 | Knob, H-343P5U | V-10388-2 | Knob, H-349P5 |
| V-10363-2 | Nameplate, Westinghouse | V-10363-2 | Nameplate, Westinghouse |
| V-3873 | Plug, battery | V-3873 | Plug, battery |
| V-10389-1 | Pointer, H-342P5U | V-10389-3 | Pointer, H-348P5 |
| V-10389-2 | Pointer, H-343P5U | V-10389-4 | Pointer, H-349P5 |
| V-9704-4 | Shaft, tuning | V-9704-4 | Shaft, tuning |
| V-4169-2 | Shield, miniature tube (1U5) | V-4169-2 | Shield, miniature tube (1U5) |
| V-9706-1 | Shield, spring, miniature tube (1R5) | V-9706-1 | Shield, spring, miniature tube (1R5) |
| V-4292S-3 | Socket, miniature molded (3V4, 1U4, 1R5, and 1U5) | V-4292S-3 | Socket, miniature molded (3V4, 1U4, 1R5 and 1U5) |
| V-9705 | Speaker, 5" PM | V-9705 | Speaker, 5" PM |
| V-5687 | Spring, back cover hinge | V-5687 | Spring, back cover hinge |
| V-3448 | Spring, dial cord | V-3448 | Spring, dial cord |

V-2156-1U CHASSIS

| Ref. No. | Part No. | Description |
|----------|-------------|--------------------------------------------------------------------------------------------------------|
| C1 | V-6552-2 | Capacitor, electrolytic (consists of A, B, C and D - 100 mfd 25 v. and 80, 60, 40 mfd at 150 v.) |
| C5 | V-10372-1 | Capacitor, variable tuning (consists of A, B, C, D, E and F) |
| C10 | RCP10W2503M | Capacitor, .05 mfd 200 v. |
| C11 | RCP10W2503M | Capacitor, .05 mfd 200 v. |
| C12 | RCP10W2503M | Capacitor, .05 mfd 200 v. |
| C14 | RCP10W2503M | Capacitor, .05 mfd 200 v. |
| C15 | RCP10W2503M | Capacitor, .05 mfd 200 v. |
| C17 | RCP10W6202M | Capacitor, .002 mfd 600 v. |
| C19 | RCP10W2154M | Capacitor, .15 mfd 200 v. |
| C20 | RCP10W2503M | Capacitor, .05 mfd 200 v. |
| C21 | RCP10W4503M | Capacitor, .05 mfd 400 v. |
| C22 | RCM20A221M | Capacitor, 220 mmf |
| C24 | RCM20A101M | Capacitor, 100 mmf |
| C25 | V-9703-1 | Capacitor, multiple (consists of A, B, C and D) |
| L1 | V-5661 | Coil, oscillator |
| L3 | V-10391-1 | Antenna, iron core |
| *R1 | V-10373-1 | Control, volume, 500,000 ohms (assy consists of R1 and SW1) |
| | V-9446-2 | Rectifier, selenium |
| R3 | RC30AE220M | Resistor, 22 ohms 1 w. |
| R4 | RC20AE474M | Resistor, 470,000 ohms 1/2 w. |
| R5 | RC20AE273M | Resistor, 270,000 ohms 1/2 w. |
| R6 | RC20AE104M | Resistor, 100,000 ohms 1/2 w. |
| R7 | RC20AE103M | Resistor, 10,000 ohms 1/2 w. |
| R8 | RC20AE225M | Resistor, 2.2 megohms 1/2 w. |
| R9 | RC20AE225M | Resistor, 2.2 megohms 1/2 w. |
| R10 | RC20AE105M | Resistor, 1 megohm 1/2 w. |
| R11 | RC20AE106M | Resistor, 10 megohms 1/2 w. |
| R12 | RC20AE685M | Resistor, 6.8 megohms 1/2 w. |
| R13 | RC20AE155M | Resistor, 1.5 megohms 1/2 w. |
| R15 | RC20AE102K | Resistor, 1000 ohms 1/2 w. |
| R16 | RC20AE102K | Resistor, 1000 ohms 1/2 w. |
| R17 | RC20AE222K | Resistor, 2200 ohms 1/2 w. |
| R18 | RC20AE685M | Resistor, 6.8 megohms 1/2 w. |
| R19 | RC30AE222K | Resistor, 2200 ohms 1 w. |
| R20 | V-5659-4 | Resistor, ballast, 2570 ohms |
| *SW1 | V-10373-1 | Switch, on-off (assy consists of R1 and SW1) |
| SW2 | V-6565 | Switch, line-battery |
| T1 | V-6972-5 | Transformer, 1st I-F |
| T2 | V-6972-6 | Transformer, 2nd I-F .. |
| T3 | V-6567-2 | Transformer, audio |
| T4 | V-6561-2 | Transformer, RF |

MODELS H-350T7,
H-351T7, Ch. V-2180-1



MODELS H-350T7 AND H-351T7

(BROWN)

(IVORY)

CHASSIS V-2180-1

SERVICE NOTES

SPECIFICATIONS

FREQUENCY RANGES:

Amplitude Modulation 540 to 1615 kc.
Frequency Modulation 88 to 108 mc.

INTERMEDIATE FREQUENCIES:

Amplitude Modulation 455 kc.
Frequency Modulation 10.7 mc.

TUBE COMPLEMENT:

- 1 6BJ6 RF Amplifier (FM)
- 1 12AT7 Mixer-osc.
- 2 12BA6 I-F Amp.
- 1 12AL5 Ratio Det. (FM)

- 1 12AV6 .. Det. and AVC (AM) and A-F Amp.
- 1 50C5 Output Amp.

POWER OUTPUT:

Undistorted 1.0 watts
Maximum 1.9 watts

LOUDSPEAKER: 5/4" PM

OPERATING VOLTAGE:

..... 105 to 120 volts, DC or 60 cycles AC

POWER CONSUMPTION: 35 watts

WARNING

The chassis is connected directly to one side of the power line. When making repairs or adjustments, it is recommended that the chassis be isolated from the line by means of an isolation transformer. Otherwise, serious shock may result if the radio chassis and ground are contacted at the same time.

MODELS H-350T7, H-351T7, Ch. V-2180-1

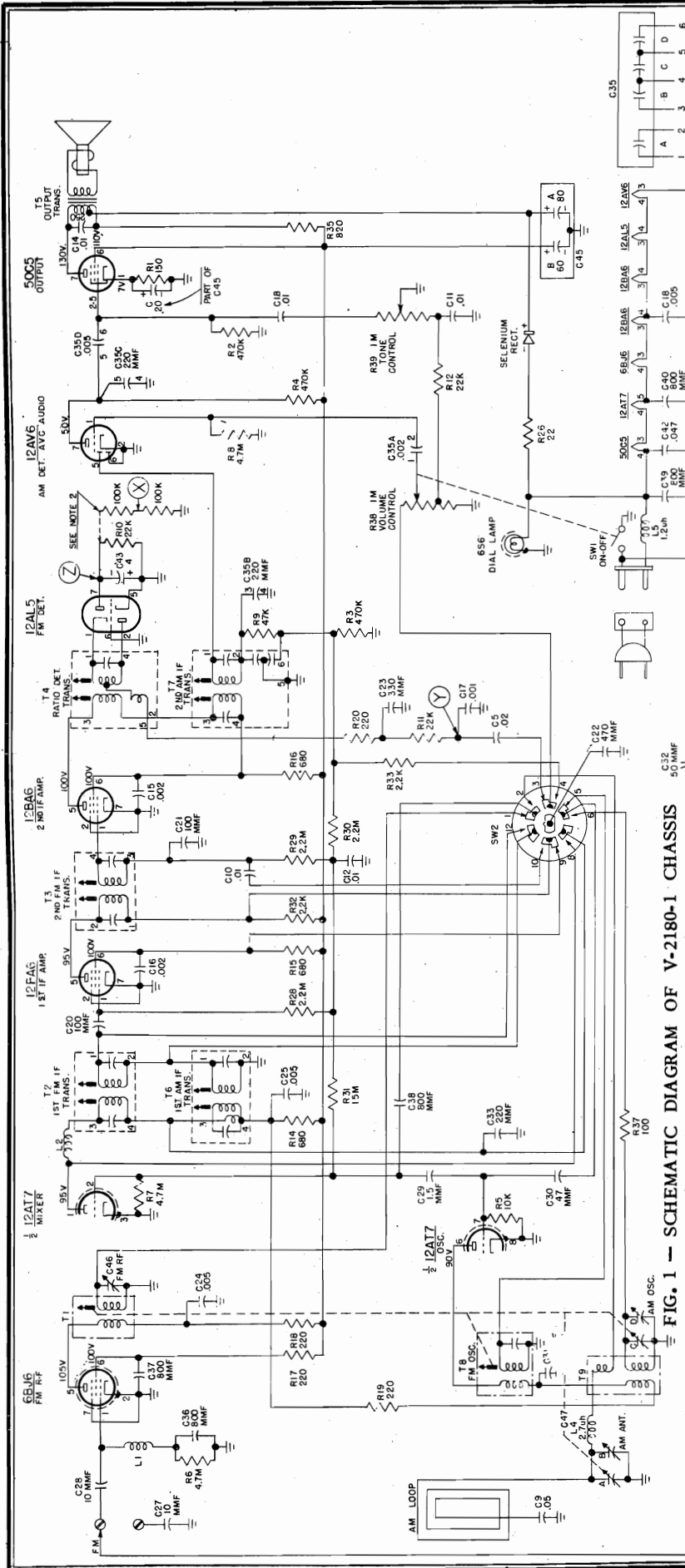


FIG. 1 - SCHEMATIC DIAGRAM OF V-2180-1 CHASSIS

NOTES:
 1-SELECTOR SWITCH SW2 IS SHOWN IN EXTREME COUNTERCLOCKWISE POSITION OR FM BAND. EXTREME CLOCKWISE POSITION IS AM BAND.
 2- SWITCH SHOWN AS VIEWED FROM FRONT OF SET.
 3- TO BE INSTALLED FOR ALIGNMENT ONLY.
 4- ALL CAPACITANCE VALUES IN MFD. AND ALL RESISTANCE VALUES IN OHMS UNLESS OTHERWISE SPECIFIED.
 5- ALL VOLTAGES MEASURED FROM CHASSIS (GND.) USING A 20,000 OHM/VOLT METER. LINE VOLTAGE 117 V.A.C.
 6- VOLTAGES SHOULD BE AS SHOWN ± 20 PER CENT.

ANTENNA INFORMATION

An external AM antenna can be coupled to the set by taping the lead-in wire to the outside of the rear cover as shown in Fig. 2. The wire should be dressed in the position shown and can be held in place with adhesive tape or other similar material.

The blue wire emerging from the hole in rear cover is a "line" antenna for FM reception. It should be connected to the left antenna terminal as shown in Fig. 2. If an external FM antenna is to be used, disconnect the blue wire and connect the transmission line to the two terminals.

CHASSIS NO. V-2180-1

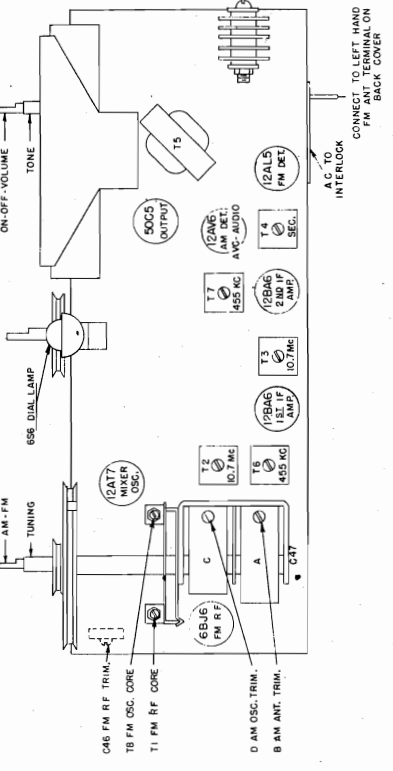
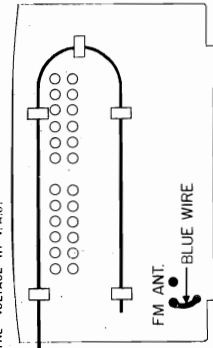


FIG. 3 - TOP VIEW OF CHASSIS



MODELS H-350T7, H-351T7, Ch. V-2180-1

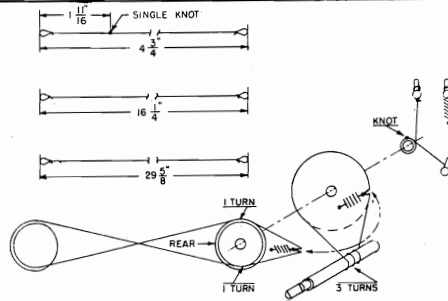


FIG. 4 — DRIVE MECHANISM
ALIGNMENT
BROADCAST BAND

Connect an output meter across the speaker voice coil.

While making the following adjustments, keep the volume control set for maximum output and the signal generator output attenuated to avoid AVC action.

Check the dial pointer position by meshing the tuning capacitor plates completely and seeing that the dial pointer is set on the end mark of the dial scale.

| Step | Connect Signal Generator to — | Signal Generator Frequency | Radio Dial Setting | Adjust |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|----------------------------|--------------------|-----------------------------------------------------------|
| 1 | Set the band switch to AM | | | |
| 2 | Stator of tuning capacitor (A) through a 0.1 mfd capacitor | 455 kc. | minimum capacity | Pri. and sec. of T7 and T6 for max. output in order given |
| NOTE: If the I-F transformers are badly mis-aligned, it may be impossible to obtain sufficient output using the above system. In this event, it will be necessary to align each transformer separately. Start with the last I-F transformer and work forward, connecting the signal generator to the control grid of the tube preceding the transformer under alignment. | | | | |
| 3 | Radiated signal (no actual connection) | 1615 kc. | minimum capacity | AM osc. trimmer (D) for max. output |
| 4 | Radiated signal (no actual connection) | 1400 kc. | tune to signal | AM ant. trimmer (B) for max. output (rock-in) adjustment) |

FM BAND

Do not align the FM circuits until all AM adjustments have been completed.

| Step | Connect Signal Generator to — | Signal Generator Frequency | Radio Dial Setting | Adjust |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|--------------------|---------------------------------------------------------------|
| 1 | Set the band switch to FM | | | |
| 2 | Connect two 100,000 ohm resistors (the resistances must be equal within 5 per cent) between pin No. 7 of the 12AL5 tube and ground as shown on the schematic diagram. | | | |
| 3 | Connect a V.T.V.M. between points "X" and "Y" (see schematic diagram). | | | |
| 4 | Pin No. 2 of 12AT7 through a 0.1 mfd mica capacitor | 10.7 mc. | minimum capacity | Sec. of T4 for zero (use medium strength signal) |
| 5 | Connect the V.T.V.M. between point "Z" and ground. | | | |
| 6 | Same as step 4 | 10.7 mc. | minimum capacity | Pri. of T4 and pri. and sec. of T3 and T2 for maximum voltage |
| 7 | Reconnect the V.T.V.M. between points "X" and "Y" and increase the signal strength 10 times. | | | |
| 8 | Same as step 4 | 10.7 mc. | minimum capacity | Recheck sec. of T4 for zero voltage |
| 9 | Reconnect the V.T.V.M. between point "Z" and ground. | | | |
| 10 | Same as step 4 | 10.7 mc. | min. cap. | Pri. of T4 for maximum voltage |
| 11 | Remove the two 100,000 ohm resistors that were inserted in step 2. | | | |
| 12 | FM ant. terminal through a 300 ohm non-inductive resistor | 98 mc. | 98 mc. | FM osc. core for maximum voltage |
| 13 | Same as step 12 | 98 mc. | 98 mc. | FM R-F trimmer (C46) for maximum voltage |
| 14 | Same as step 12 | 105 mc. | tune to signal | FM R-F core for maximum voltage |
| 15 | Same as step 12 | 90 mc. | tune to signal | FM R-F trimmer (C46) for maximum voltage (rock-in) |
| 16 | Recheck steps 14 and 15 for tracking. | | | |

PARTS LIST FOR MODELS H-350T7 AND H-351T7

When ordering parts, specify model number of set in addition to part number and description of part.

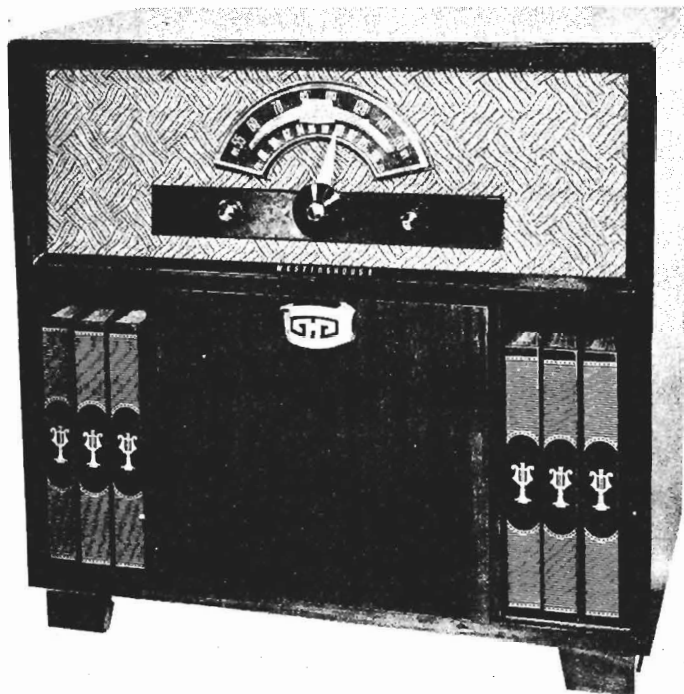
CABINET AND MISCELLANEOUS

| Part No. | Description | Part No. | Description |
|-----------|--------------------------------------------|-----------|-----------------------------------------------------|
| V-10364-3 | Baffle and grille cloth assembly (H-350T7) | 6S6DC | Lamp, pilot |
| V-10364-4 | Baffle and grille cloth assembly (H-351T7) | V-9653 | Loop, AM antenna |
| V-1233-3 | Cabinet (brown) | V-10318-2 | Nameplate, Westinghouse |
| V-1233-4 | Cabinet (ivory) | V-9661 | Plug, AC power (male) |
| V-5426 | Clip, I-F mounting | V-10310-1 | Pointer |
| V-3219S-1 | Cord, dial drive (100' spool) | V-10357-1 | Pulley assembly, gang |
| V-9636-4 | Cover assembly, back | V-10647-1 | Pulley and shaft assembly, pointer |
| V-10308-1 | Dial | V-9655 | Shell, interlock |
| V-10604-1 | Escutcheon | V-10472-1 | Shield, lamp |
| V-9104-9 | Knob, tuning, rear (brown) | V-10038-1 | Shield, miniature tube (6BJ6) |
| V-9104-10 | Knob, tone, rear (brown) | V-10649-1 | Shield, miniature tube (12AT7) |
| V-9104-11 | Knob, tuning, rear (ivory) | V-9654 | Socket, interlock |
| V-9104-12 | Knob, tone, rear (ivory) | V-6878-2 | Socket, miniature wafer (50C5) |
| V-10408-1 | Knob, band (brown) | V-9888-3 | Socket, miniature wafer (6BJ6, 12BA6, 12AL5, 12AV6) |
| V-10408-2 | Knob, off-on-volume (brown) | V-10133-2 | Socket, miniature wafer (12AT7) |
| V-10408-3 | Knob, band (ivory) | V-10650-1 | Socket, pilot lamp |
| V-10408-4 | Knob, off-on-volume (ivory) | V-9641-2 | Speaker, 5 1/4" PM |
| | | V-6795-3 | Spring, FM tuner and gang drive |

V-2180-1 CHASSIS

| Ref. No. | Part No. | Description | Ref. No. | Part No. | Description |
|----------|---------------|--------------------------------------------------------------------|----------|------------|-------------------------------------------------------------|
| C5 | RCP10W2203M | Capacitor, .02 mfd 200 v. | R1 | V-9640 | Rectifier, selenium |
| C9 | RCP10W2503M | Capacitor, .05 mfd 200 v. | R2 | RC30AE151K | Resistor, 150 ohms 1 w. |
| C10 | RCP10W4103M | Capacitor, .01 mfd 400 v. | R3 | RC20AE474M | Resistor, 470,000 ohms 1/2 w. |
| C11 | RCP10W4103M | Capacitor, .01 mfd 400 v. | R4 | RC20AE474M | Resistor, 470,000 ohms 1/2 w. |
| C12 | RCP10W4103M | Capacitor, .01 mfd 400 v. | R5 | RC20AE103M | Resistor, 10,000 ohms 1/2 w. |
| C13 | RCP10W4103M | Capacitor, .01 mfd 400 v. | R6 | RC20AE475M | Resistor, 4.7 megohms 1/2 w. |
| C14 | RCP10W4103M | Capacitor, .01 mfd 400 v. | R7 | RC20AE475M | Resistor, 4.7 megohms 1/2 w. |
| C15 | RCP10W6202M | Capacitor, .002 mfd 600 v. | R8 | RC20AE475M | Resistor, 4.7 megohms 1/2 w. |
| C16 | RCP10W6202M | Capacitor, .002 mfd 600 v. | R9 | RC20AE473M | Resistor, 47,000 ohms 1/2 w. |
| C17 | RCP10W6102M | Capacitor, .001 mfd 600 v. | R10 | RC20AE223K | Resistor, 22,000 ohms 1/2 w. |
| C18 | V-5596 | Capacitor, .005 mfd | R11 | RC20AE223M | Resistor, 22,000 ohms 1/2 w. |
| C20 | R4CC21YY101M | Capacitor, 100 mmf | R12 | RC20AE223M | Resistor, 22,000 ohms 1/2 w. |
| C21 | R4CC21YY101M | Capacitor, 100 mmf | R14 | RC20AE681M | Resistor, 680 ohms 1/2 w. |
| C22 | R5CC21ZY471M | Capacitor, 470 mmf | R15 | RC20AE681M | Resistor, 680 ohms 1/2 w. |
| C23 | RCM20A331M | Capacitor, 330 mmf | R16 | RC20AE681M | Resistor, 680 ohms 1/2 w. |
| C24 | V-5596 | Capacitor, .005 mfd | R17 | RC20AE221M | Resistor, 220 ohms 1/2 w. |
| C25 | V-5596 | Capacitor, .005 mfd | R18 | RC20AE221M | Resistor, 220 ohms 1/2 w. |
| C27 | V-5658-7 | Capacitor, 10 mmf | R19 | RC20AE221M | Resistor, 220 ohms 1/2 w. |
| C28 | V-5658-7 | Capacitor, 10 mmf | R20 | RC20AE221M | Resistor, 220 ohms 1/2 w. |
| C29 | V-5658-9 | Capacitor, 1.5 mmf | R26 | RC30AE220K | Resistor, 22 ohms 1 w. |
| C30 | V-10710-1 | Capacitor, 47 mmf | R28 | RC20AE225M | Resistor, 2.2 megohms 1/2 w. |
| C31 | V-10710-1 | Capacitor, 47 mmf | R29 | RC20AE225M | Resistor, 2.2 megohms 1/2 w. |
| C32 | V-5658-10 | Capacitor, 50 mmf | R30 | RC20AE225M | Resistor, 2.2 megohms 1/2 w. |
| C33 | V-10710-2 | Capacitor, 220 mmf | R31 | RC20AE156M | Resistor, 15 megohms 1/2 w. |
| C35 | V-9634-1 | Capacitor, multiple ceramic (.002 mfd, 220 mmf, 220 mmf, .005 mfd) | R32 | RC20AE222M | Resistor, 2200 ohms 1/2 w. |
| C36 | V-9863-1 | Capacitor, 800 mmf | R33 | RC20AE222M | Resistor, 2200 ohms 1/2 w. |
| C37 | V-9863-1 | Capacitor, 800 mmf | R35 | V-6984-10 | Resistor, 820 ohms 5 w. |
| C38 | V-9863-1 | Capacitor, 800 mmf | R37 | RC20AE101M | Resistor, 100 ohms 1/2 w. |
| C39 | V-9863-1 | Capacitor, 800 mmf | *R38 | V-10330-2 | Control, volume, 1 megohm (assy consists of R38, R39 & SW1) |
| C40 | V-9863-1 | Capacitor, 800 mmf | *R39 | V-10330-2 | Control, tone, 1 megohm (assy consists of R38, R39 & SW1) |
| C42 | V-10157-4473M | Capacitor, .047 mfd 400 v. | *SW1 | V-10330-2 | Switch, on-off (assy consists of R38, R39 and SW1) |
| C43 | V-4637 | Capacitor, 4 mfd 50 v. | SW2 | V-10651-1 | Switch, AM-FM selector |
| C45 | V-10415-2 | Capacitor, electrolytic (80-60 mfd 250 v. and 20 mfd 20 v.) | T1 | V-10642-1 | Transformer, FM RF |
| C46 | V-10640-1 | Capacitor, FM RF trimmer | T2 | V-9688 | Transformer, 1st FM IF |
| C47 | V-10662-2 | Capacitor, variable (consists of A, B, C and D) | T3 | V-9642 | Transformer, 2nd FM IF |
| | V-9676-1 | Core, FM tuning | T4 | V-9828 | Transformer, ratio detector |
| L1 | V-10644-1 | Reactor, RF | T5 | V-10660 | Transformer, audio |
| L2 | V-4886-13 | Reactor, RF | T6 | V-10619 | Transformer, 1st AM IF |
| L4 | V-9099-5 | Reactor, 2.7 microhenries | T7 | V-10350-1 | Transformer, 2nd AM IF |
| L5 | V-9099-1 | Reactor, 1.2 microhenries | T8 | V-10643-1 | Transformer, FM oscillator |
| | | | T9 | V-10641-1 | Transformer, AM oscillator |

MODEL H-354C7,
Ch. V-2180-2



MODEL H-354C7

CHASSIS V-2180-2

SERVICE NOTES

For Record Changer Information, Refer to the V-9481 Automatic Record
Changer Service Notes

SPECIFICATIONS

FREQUENCY RANGES:

Amplitude Modulation 540 to 1615 kc.
Frequency Modulation 88 to 108 mc.

INTERMEDIATE FREQUENCIES:

Amplitude Modulation 455 kc.
Frequency Modulation 10.7 mc.

TUBE COMPLEMENT:

- 1 6BJ6 RF Amplifier (FM)
- 1 12AT7 Mixer-osc.
- 2 12BA6 I-F Amp.
- 1 12AL5 Ratio Det. (FM)

- 1 12AV6 .. Det. and AVC (AM) and A-F Amp.
- 1 50L6GT Output Amp.

POWER OUTPUT:

Undistorted 2.5 watts
Maximum 3.0 watts

LOUDSPEAKER: 8" PM

OPERATING VOLTAGE:

..... 105 to 120 volts, 60 cycles AC

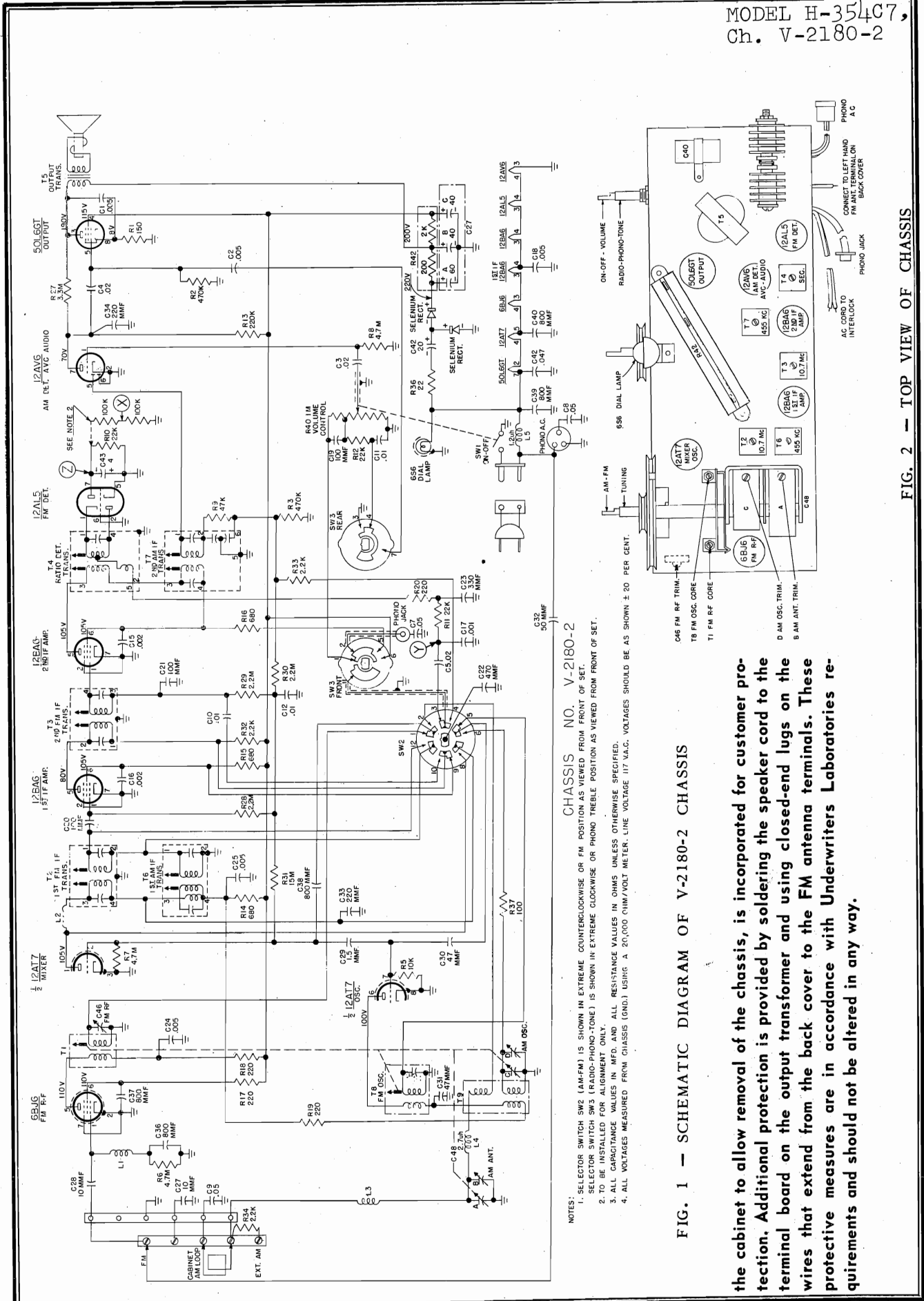
POWER CONSUMPTION: 70 watts

WARNING: The chassis of this receiver is connected directly to one side of the power line. When making repairs or adjustments, it is recommended that the chassis be isolated from the line by means of an isolation transformer. Otherwise, serious shock may result if the radio chassis and ground are contacted at the same time.

It should be noted that the interlock plug, which must be released from

Form RM3240
6-51

MODEL H-354C7,
Ch. V-2180-2



CHASSIS NO. V-2180-2

- NOTES:
1. SELECTOR SWITCH SW2 (AM-FM) IS SHOWN IN EXTREME COUNTERCLOCKWISE OR FM POSITION AS VIEWED FROM FRONT OF SET.
 2. TO BE INSTALLED FOR ALIGNMENT ONLY.
 3. ALL CAPACITANCE VALUES IN MFD. AND ALL RESISTANCE VALUES IN OHMS UNLESS OTHERWISE SPECIFIED.
 4. ALL VOLTAGES MEASURED FROM CHASSIS (GND.) USING A 20,000 OHM/VOLT METER. LINE VOLTAGE 117 V.A.C. VOLTAGES SHOULD BE AS SHOWN ± 20 PER CENT.

FIG. 1 - SCHEMATIC DIAGRAM OF V-2180-2 CHASSIS

FIG. 2 - TOP VIEW OF CHASSIS

the cabinet to allow removal of the chassis, is incorporated for customer protection. Additional protection is provided by soldering the speaker cord to the terminal board on the output transformer and using closed-end lugs on the wires that extend from the back cover to the FM antenna terminals. These protective measures are in accordance with Underwriters Laboratories requirements and should not be altered in any way.

MODEL H-354C7,
Ch. V-2180-2

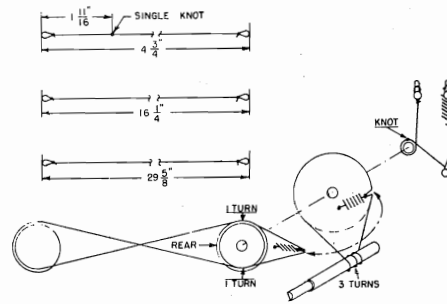


FIG. 3 - DIAL DRIVE
ALIGNMENT
BROADCAST BAND

Connect an output meter across the speaker voice coil.

While making the following adjustments, keep the volume control set for maximum output and the signal generator output attenuated to avoid AVC action.

| Step | Connect Signal Generator to - | Signal Generator Frequency | Radio Dial Setting | Adjust |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|----------------------------|--------------------|-----------------------------------------------------------|
| 1 | Set the band switch to AM and the radio-phono-tone control to RADIO | | | |
| 2 | Stator of tuning capacitor (A) through 0.1 mfd capacitor | 455 kc. | minimum capacity | Pri. and sec. of T7 and T6 for max. output in order given |
| NOTE: If the I-F transformers are badly mis-aligned, it may be impossible to obtain sufficient output using the above system. In this event, it will be necessary to align each transformer separately. Start with the last I-F transformer and work forward, connecting the signal generator to the control grid of the tube preceding the transformer under alignment. | | | | |
| 3 | Radiated signal (no actual connection) | 1615 kc. | minimum capacity | AM osc. trimmer (D) for max. output |
| 4 | Radiated signal (no actual connection) | 1400 kc. | tune to signal | AM ant. trimmer (B) for max. output (rock-in adjustment) |

FM BAND

Do not align the FM circuits until all AM adjustments have been completed.

| Step | Connect Signal Generator to - | Signal Generator Frequency | Radio Dial Setting | Adjust |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|--------------------|----------------------------------------------------|
| 1 | Set the band switch to FM | | | |
| 2 | Connect two 100,000 ohm resistors (the resistances must be equal within 5 per cent) between pin No. 7 of the 12AL5 tube and ground as shown on the schematic diagram. | | | |
| 3 | Connect a V.T.V.M. between points "X" and "Y" (see schematic diagram). | | | |
| 4 | Pin No. 2 of 12AT7 through a 0.1 mfd mica capacitor | 10.7 mc. | minimum capacity | Sec. of T4 for zero (use medium strength signal) |
| 5 | Connect the V.T.V.M. between point "Z" and ground | | | |
| 6 | Same as step 4 | 10.7 mc. | minimum capacity | Pri. of T4 and pri. and sec. of T3 and T2 for max. |
| 7 | Reconnect the V.T.V.M. between points "X" and "Y" and increase the signal strength 10 times. | | | |
| 8 | Same as step 4 | 10.7 mc. | minimum capacity | Recheck sec. of T4 for zero voltage |
| 9 | Reconnect the V.T.V.M. between point "Z" and ground | | | |
| 10 | Same as step 4 | 10.7 mc. | minimum capacity | Pri. of T4 for maximum voltage |
| 11 | Remove the two 100,000 ohm resistors that were inserted in step 2 | | | |
| 12 | FM ant. terminal through a 300 ohm non-inductive resistor | 98 mc. | 98 mc. | FM osc. core for maximum voltage |
| 13 | Same as step 12 | 98 mc. | 98 mc. | FM R-F trimmer (C46) for maximum voltage |
| 14 | Same as step 12 | 105 mc. | tune to signal | FM R-F core for maximum voltage |
| 15 | Same as step 12 | 90 mc. | tune to signal | FM R-F trimmer (C46) for maximum voltage (rock-in) |
| 16 | Recheck steps 14 and 15 for tracking | | | |

MODEL H-354C7,
Ch. V-2180-2

PARTS LIST FOR MODEL H-354C7

When ordering parts, specify model number of set in addition to part number and description of part.

CABINET AND MISCELLANEOUS

| Part No. | Description |
|-----------|-------------------------------------------------------|
| V-1245-1 | Cabinet |
| V-6415-5 | Cable, phono pickup |
| V-9822-1 | Cable assembly, phono AC power (female) |
| V-9833-1 | Cable assembly, phono AC power (male) |
| V-5426 | Clip, I-F mounting |
| V-3254S | Connector, phono |
| V-10444-2 | Connector assembly, phono |
| V-3219S-1 | Cord, dial drive (100' spool) |
| V-9845-1 | Cover, back (record changer) |
| V-10682-1 | Cover assembly, back (radio) |
| V-10308-1 | Dial |
| V-8585 | Drawer, record changer (complete less hardware) |
| V-10604-1 | Escutcheon, dial |
| V-10261-4 | Grille cloth |
| V-10338-1 | Hub, pointer |
| V-9104-9 | Knob, tuning (rear) |
| V-9861-2 | Knob, radio-phono-tone (rear) |
| V-10408-1 | Knob, band |

| Part No. | Description |
|-----------|-----------------------------------------------------------|
| V-10408-2 | Knob, on-off-volume |
| 6S6DC | Lamp, pilot |
| V-8586 | Panel, background for knobs |
| V-9661 | Plug, AC |
| V-10310-1 | Pointer, dial |
| V-10591-3 | Pull, record changer drawer |
| V-10357-1 | Pulley assembly, gang |
| V-10647-2 | Pulley and shaft assembly, pointer |
| V-9655 | Shell, interlock |
| V-10472-1 | Shield, lamp |
| V-10038-1 | Shield, miniature tube (6BJ6) |
| V-10649-1 | Shield, miniature tube (12AT7) |
| V-9654 | Socket, interlock |
| V-9888-3 | Socket, miniature wafer (6BJ6, 12BA6, 12AL5, 12AV6) |
| V-10133-2 | Socket, miniature wafer (12AT7) |
| V-3246S | Socket, octal wafer (50L6GT) |
| V-10650-1 | Socket, pilot lamp |
| V-10675-1 | Speaker, 8" PM |
| V-6795-3 | Spring, dial drive |
| V-10673-1 | Terminal strip, antenna |

V-2180-2 CHASSIS

| Ref. No. | Part No. | Description |
|----------|---------------|-------------------------------------------------------|
| C1 | RCP10W4502M | Capacitor, .005 mfd 400 v. |
| C2 | RCP10W4502M | Capacitor, .005 mfd 400 v. |
| C3 | RCP10W2203M | Capacitor, .02 mfd 200 v. |
| C4 | RCP10W2203M | Capacitor, .02 mfd 200 v. |
| C5 | RCP10W2203M | Capacitor, .02 mfd 200 v. |
| C7 | RCP10W2503M | Capacitor, .05 mfd 200 v. |
| C8 | RCP10W2503M | Capacitor, .05 mfd 200 v. |
| C9 | RCP10W2503M | Capacitor, .05 mfd 200 v. |
| C10 | RCP10W4103M | Capacitor, .01 mfd 400 v. |
| C11 | RCP10W4103M | Capacitor, .01 mfd 400 v. |
| C12 | RCP10W4103M | Capacitor, .01 mfd 400 v. |
| C15 | RCP10W6202M | Capacitor, .002 mfd 600 v. |
| C16 | RCP10W6202M | Capacitor, .002 mfd 600 v. |
| C17 | RCP10W6102M | Capacitor, .001 mfd 600 v. |
| C18 | V-5596 | Capacitor, .005 mfd |
| C19 | R4CC21YY101M | Capacitor, 100 mmf |
| C20 | R4CC21YY101M | Capacitor, 100 mmf |
| C21 | R4CC21YY101M | Capacitor, 100 mmf |
| C22 | R5CC21ZY471M | Capacitor, 470 mmf |
| C23 | RCM20A331M | Capacitor, 330 mmf |
| C24 | V-5596 | Capacitor, .005 mfd |
| C25 | V-5596 | Capacitor, .005 mfd |
| C27 | V-5658-7 | Capacitor, 10 mmf |
| C28 | V-5658-7 | Capacitor, 10 mmf |
| C29 | V-5658-9 | Capacitor, 1.5 mmf |
| C30 | V-10710-1 | Capacitor, 47 mmf |
| C31 | V-10710-1 | Capacitor, 47 mmf |
| C32 | V-5658-10 | Capacitor, 50 mmf |
| C33 | V-10710-2 | Capacitor, 220 mmf |
| C34 | V-10710-2 | Capacitor, 220 mmf |
| C36 | V-9863-1 | Capacitor, 800 mmf |
| C37 | V-9863-1 | Capacitor, 800 mmf |
| C38 | V-9863-1 | Capacitor, 800 mmf |
| C39 | V-9863-1 | Capacitor, 800 mmf |
| C40 | V-9863-1 | Capacitor, 800 mmf |
| C42 | V-10157-4473M | Capacitor, .047 400 v. |
| C43 | V-4637 | Cap., electrolytic, 4 mfd 50 v. |
| C44 | V-9919-2 | Capacitor, electrolytic, 60-40-40 mfd 250 v. |
| C46 | V-10640-1 | Capacitor, FM RF trimmer |
| C48 | V-10662-1 | Capacitor, variable (consists of A, B, C and D) |
| C49 | V-9823-2 | Capacitor, electrolytic, 20 mfd 200 v. |
| L1 | V-10644-1 | Reactor, RF |
| L2 | V-4886-13 | Reactor, RF |
| L3 | V-6157-1 | Coil, antenna loading |
| L4 | V-9099-5 | Reactor, 2.7 microhenries |

| Ref. No. | Part No. | Description |
|----------|------------|--------------------------------------------------------------|
| L5 | V-9099-1 | Reactor, 1.2 microhenries |
| | V-9640 | Rectifier, selenium |
| R1 | RC30AE151K | Resistor, 150 ohms 1 w. |
| R2 | RC20AE474M | Resistor, 470,000 ohms 1/2 w. |
| R3 | RC20AE474M | Resistor, 470,000 ohms 1/2 w. |
| R5 | RC20AE103M | Resistor, 10,000 ohms 1/2 w. |
| R6 | RC20AE475M | Resistor, 4.7 megohms 1/2 w. |
| R7 | RC20AE475M | Resistor, 4.7 megohms 1/2 w. |
| R8 | RC20AE475M | Resistor, 4.7 megohms 1/2 w. |
| R9 | RC20AE473M | Resistor, 47,000 ohms 1/2 w. |
| R10 | RC20AE222K | Resistor, 2200 ohms 1/2 w. |
| R11 | RC20AE223M | Resistor, 22,000 ohms 1/2 w. |
| R12 | RC20AE223M | Resistor, 22,000 ohms 1/2 w. |
| R13 | RC20AE224M | Resistor, 220,000 ohms 1/2 w. |
| R14 | RC20AE681M | Resistor, 680 ohms 1/2 w. |
| R15 | RC20AE681M | Resistor, 680 ohms 1/2 w. |
| R16 | RC20AE681M | Resistor, 680 ohms 1/2 w. |
| R17 | RC20AE221M | Resistor, 220 ohms 1/2 w. |
| R18 | RC20AE221M | Resistor, 220 ohms 1/2 w. |
| R19 | RC20AE221M | Resistor, 220 ohms 1/2 w. |
| R20 | RC20AE221M | Resistor, 220 ohms 1/2 w. |
| R27 | RC20AE335M | Resistor, 3.3 megohms 1/2 w. |
| R28 | RC20AE225M | Resistor, 2.2 megohms 1/2 w. |
| R29 | RC20AE225M | Resistor, 2.2 megohms 1/2 w. |
| R30 | RC20AE225M | Resistor, 2.2 megohms 1/2 w. |
| R31 | RC20AE156M | Resistor, 15 megohms 1/2 w. |
| R32 | RC20AE222M | Resistor, 2200 ohms 1/2 w. |
| R33 | RC20AE222M | Resistor, 2200 ohms 1/2 w. |
| R34 | RC20AE222M | Resistor, 2200 ohms 1/2 w. |
| R36 | V-6067-7 | Resistor, 22 ohms 3 w. |
| R37 | RC20AE101M | Resistor, 100 ohms 1/2 w. |
| *R40 | V-10359-2 | Control, volume, 1 megohm (assy. consists of R40, SW1 & SW3) |
| R42 | V-10054-1 | Resistor, ballast, 2000 ohms 6 w. and 200 ohms 3 w. |
| *SW1 | V-10359-2 | Switch, on-off (assy. consists of R40, SW1 and SW3) |
| SW2 | V-10651-1 | Sw., selector (AM-FM-PHONO) |
| *SW3 | V-10359-2 | Switch, tone (assy. consists of R40, SW1 and SW3) |
| T1 | V-10642-1 | Transformer, FM RF |
| T2 | V-9688 | Transformer, 1st FM I-F |
| T3 | V-9642 | Transformer, 2nd FM I-F |
| T4 | V-9828 | Transformer, ratio detector .. |
| T5 | V-9827 | Transformer, audio |
| T6 | V-10619 | Transformer, 1st AM I-F |
| T7 | V-10350-1 | Transformer, 2nd AM I-F |
| T8 | V-10643-1 | Transformer, FM oscillator.. |
| T9 | V-10641-1 | Transformer, AM oscillator.. |

TUBES: The Tubes used, and their functions, are as follows:

- 12AT7 R-F Amplifier and Mixer (F-M)
- 6BE6 A-M Converter and F-M Oscillator
- 6BA6 1st I-F Amplifier (A-M & F-M)
- 6BA6 2nd I-F Amplifier (F-M)
- 6AL5 F-M Detector
- 6AV6 A-M Detector, A.V.C. and Audio Amp.
- 6V6GT Beam Power Amplifier
- 5Y3GT Rectifier

LINE VOLTAGE: This receiver is designed for operation on 105-125 Volts; 60 Cycles, Alternating Current (AC) only.

POWER CONSUMPTION INCLUDING RECORD CHANGER: 115 Watts.

TUNING RANGE:

- Broadcast Band: 540 to 1650 Kilocycles
(182 to 555 Meters)
- F-M Band: 87.5 to 108.5 Megacycles
(2.7 to 3.4 Meters)

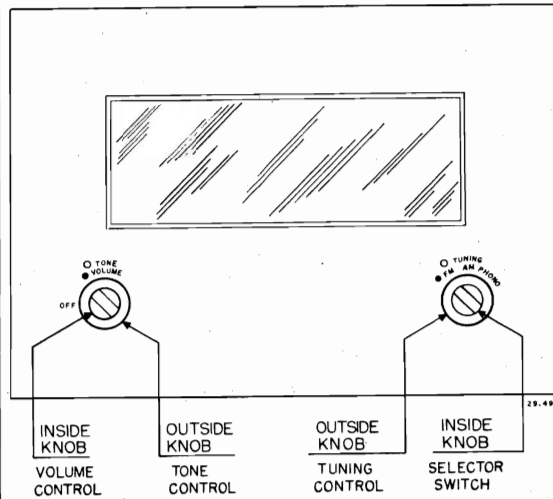
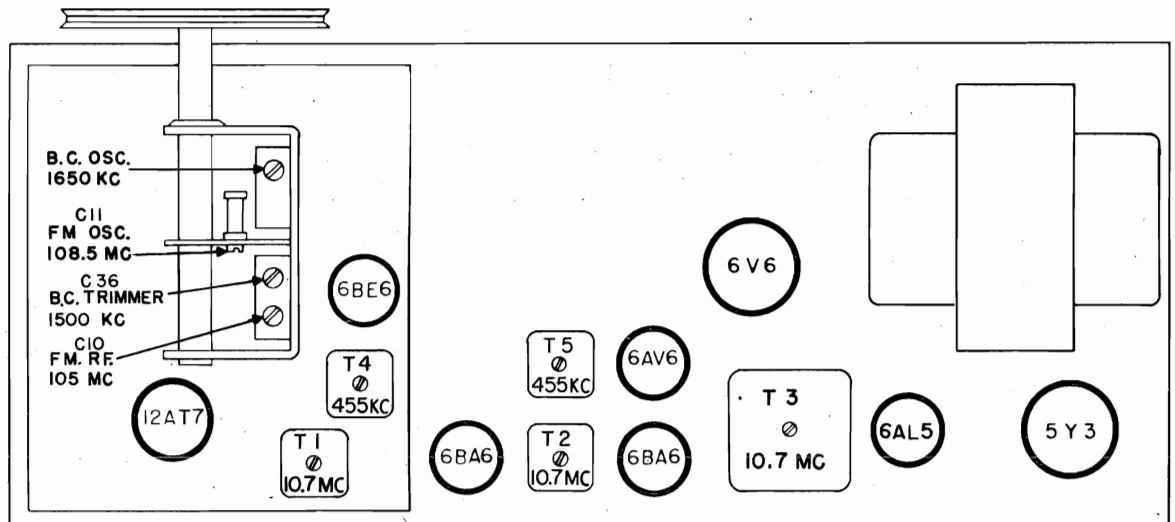
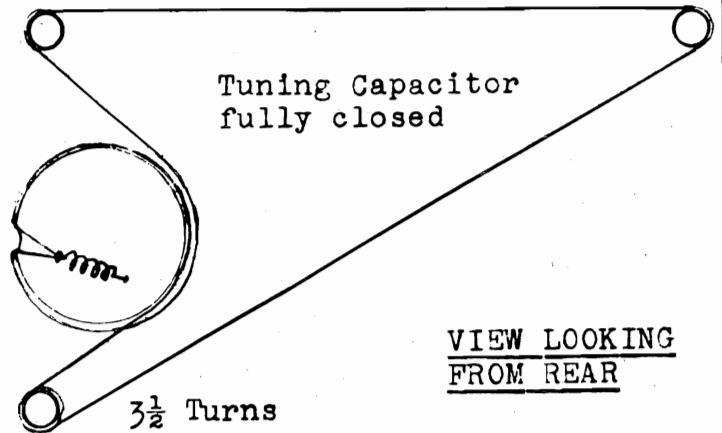


FIG. 1—FRONT PANEL CONTROLS



29.463

FIG. 2—TUBE AND ADJUSTMENT LOCATION DIAGRAM

MODEL 2761

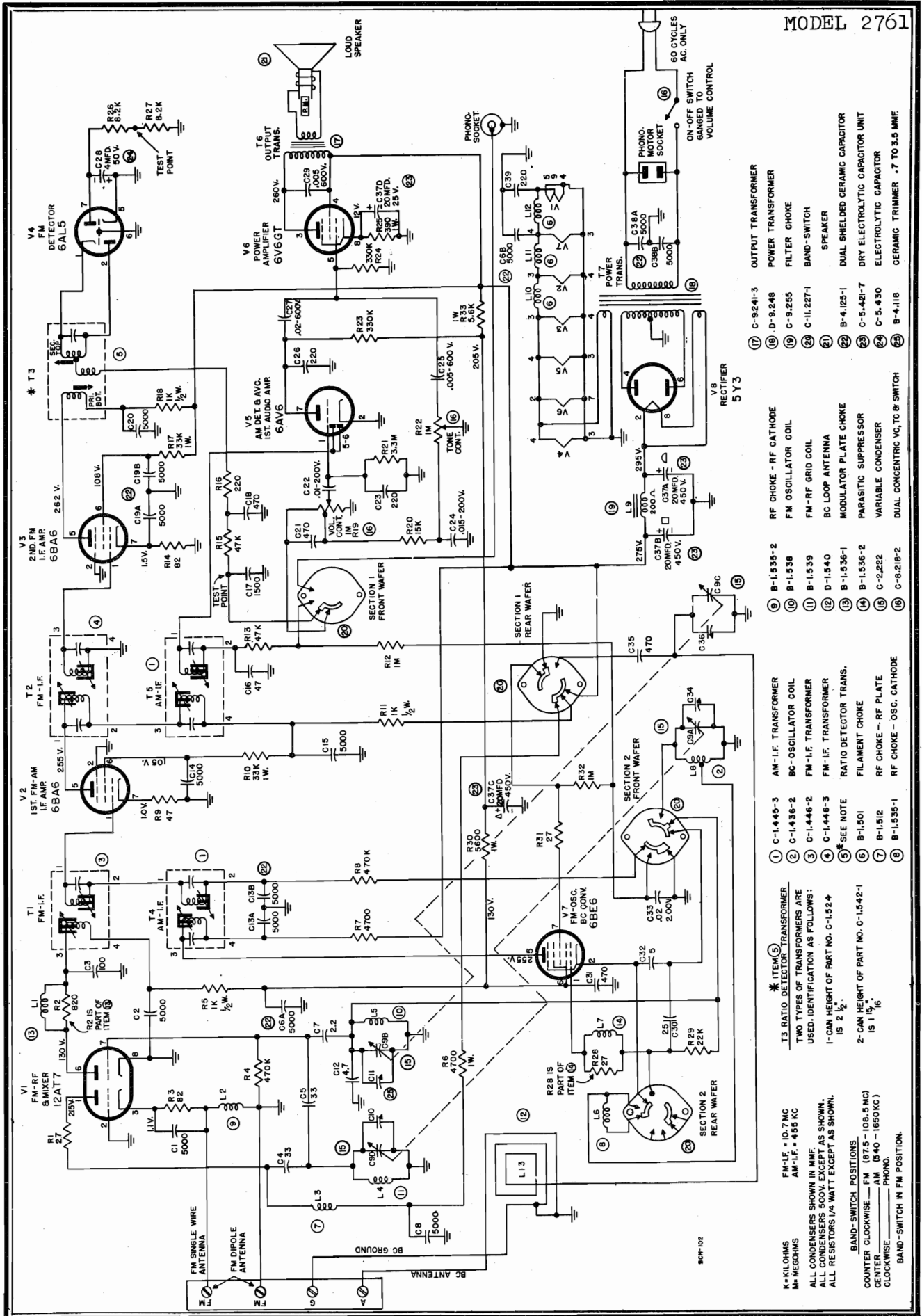
ALIGNMENT CHART

| STEP | CIRCUIT ALIGNED | RECEIVER DIAL AT | SIGNAL GENERATOR | | METER | | ADJUST | METER INDICATION | |
|--------------------------|-----------------|-------------------------|------------------|-----------------------|-----------------------------------------------------------------------------------------|------------------|-------------------|------------------------------------------------------------------------|------------------------------------------------|
| | | | TYPE | FREQ. | CONNECTIONS | TYPE | | | CONNECTIONS |
| 1 | B.C. I.F. | B.C. BAND MAX. FREQ. | A.M. | 455 KC 30% MOD. | REAR B.C. SECTION OF VARIABLE CONDENSER | OUTPUT | ACROSS VOICE COIL | TOP & BOT. OF T4 & T5 | MAX. OUTPUT |
| PREFERRED METHOD 2 | F.M. | F.M. BAND MAX. FREQ. | F.M. | 10.7 MC. 30% MOD. | HIGH SIDE THROUGH .005 MF. (APPROX.) CAP TO PIN 7 OF 12A7 | OUTPUT | ACROSS VOICE COIL | TOP & BOT. OF T1 & T2; BOT. OF T3 | MAX. OUTPUT |
| ALTERNATE METHOD 2 | I.F. | | R.F. OR A.M. | 10.7 MC. UNMOD. | | D.C. V.T.V.M. | | NEGATIVE TO PIN 7 OF 6A5; POSITIVE TO GROUND | MAX. DEFLECTION |
| PREFERRED METHOD 3 | F.M. | F.M. BAND MAX. FREQ. | F.M. | 10.7 MC. 30% MOD. | EACH SIDE OF GEN. OUTPUT THROUGH 150 OHM RESISTOR TO F.M. ANT. TERMINALS | OUTPUT | ACROSS VOICE COIL | TOP | MAX. OUTPUT |
| ALTERNATE METHOD 3 | DET. | | R.F. OR A.M. | 10.7 MC. UNMOD. | | D.C. V.T.V.M. | | NEG. TO JUNCTION OF 82K'S AT 6A5; POS. TO JUNCTION OF R15 & C17. | ZERO BETWEEN TWO OPPOSITE POLARITY PEAKS |
| PREFERRED METHOD 4 | F.M. | F.M. BAND MAX. FREQ. | F.M. | 108.5 MC. 30% MOD. | EACH SIDE OF GEN. OUTPUT THROUGH 150 OHM RESISTOR TO F.M. ANT. TERMINALS | OUTPUT | ACROSS VOICE COIL | TRIMMER ON TOP CENTER OF VAR. COND. (C11) | MAX. OUTPUT |
| ALTERNATE METHOD 4 | O.S.C. | | R.F. OR A.M. | 108.5 MC. UNMOD. | | D.C. V.T.V.M. | | NEGATIVE TO PIN 7 OF 6A5; POSITIVE TO GROUND | MAX. DEFLECTION |
| PREFERRED METHOD 5 | F.M. | F.M. BAND 105 MC | F.M. | 105 MC. 30% MOD. | REAR B.C. SECTION OF VARIABLE CONDENSER | OUTPUT | ACROSS VOICE COIL | TRIMMER AT REAR OF VAR. COND. (C10) | MAX. OUTPUT |
| ALTERNATE METHOD 5 | R.F. | | R.F. OR A.M. | 105 MC. UNMOD. | | D.C. V.T.V.M. | | NEGATIVE TO PIN 7 OF 6A5; POSITIVE TO GROUND | MAX. DEFLECTION |
| 6 | B.C. O.S.C. | B.C. BAND MAX. FREQ. | A.M. | 1650 KC 30% MOD. | EACH SIDE OF GEN. OUTPUT TO 2 OR 3-TURN LOOP (1 FOOT DIA.) SEVERAL FEET FROM ANT. | OUTPUT | ACROSS VOICE COIL | TRIMMER AT FRONT OF VAR. COND. (C34). | MAX. OUTPUT |
| 7 | B.C. R.F. | B.C. BAND 1500 KC | A.M. | 1500 KC 30% MOD. | | | OUTPUT | ACROSS VOICE COIL | B.C. TRIM. AT REAR OF VAR. COND. (C36). | MAX. OUTPUT |

29-498

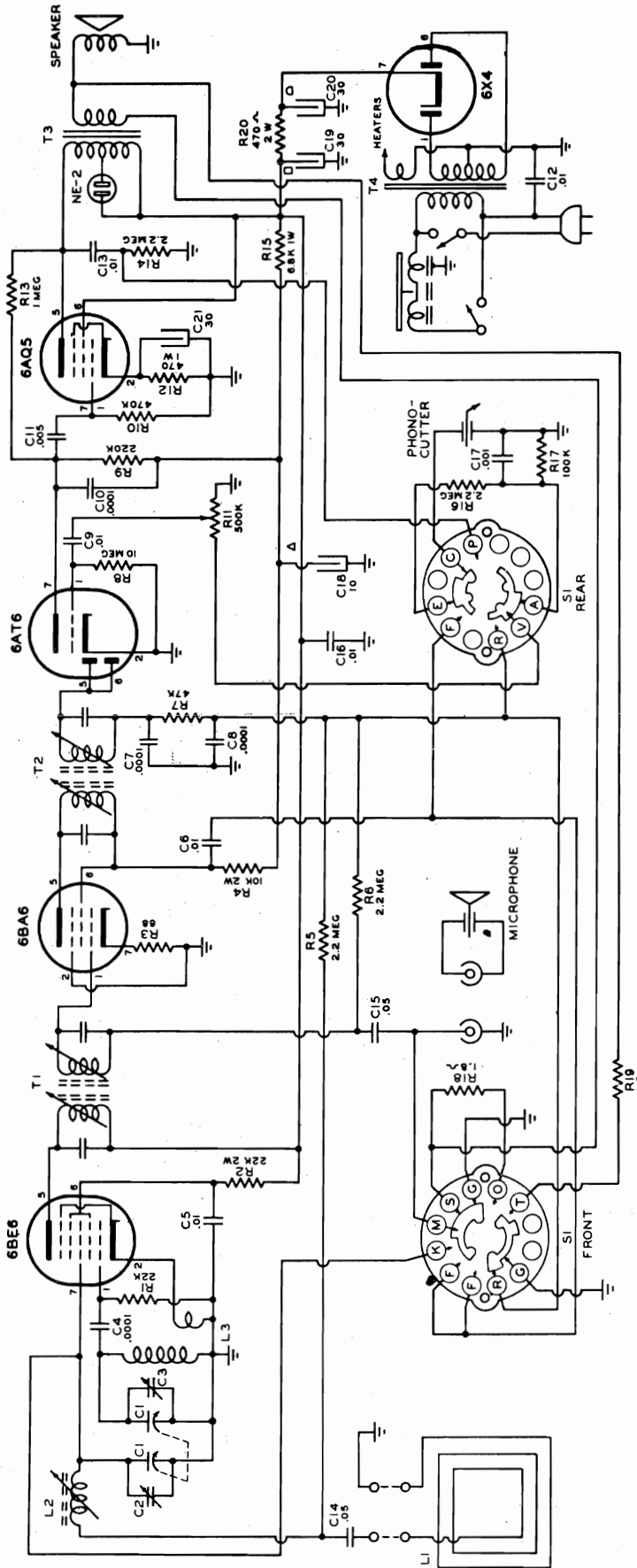
NOTES:

- 1-TURN VOLUME CONTROL FULLY CLOCKWISE.
- 2-MAINTAIN SIGNAL INPUT LOW ENOUGH TO HAVE LESS THAN 2 VOLTS ACROSS METERS.
- 3-UNLESS OTHERWISE NOTED, CONNECT LOW SIDE OF SIGNAL GENERATOR TO CHASSIS.
- 4-UNLESS OTHERWISE NOTED, SET VARIABLE CONDENSER TO MINIMUM CAPACITY (MAX. FREQ.)
- 5-USE PROPER TOOL FOR SMALL I.F. TRANS. ADJUSTMENTS— I.E., .150 DIA. BAKELITE WITH BLADE .075 THICK.
- 6-MAINTAIN 60 CYCLE LINE VOLTAGE AT APPROX. 117 VOLTS.



- * ITEM 5
- T3 RATIO DETECTOR TRANSFORMER
- T2 2ND FM I.F. AMP. 6BA6 262 V.
- T1 FM-I.F.
- T4 AM-I.F.
- T5 AM-I.F.
- V1 FM-RF MIXER 12A17
- V2 1ST FM-AM I.F. AMP. 6BA6 285 V.
- V3 2ND FM I.F. AMP. 6BA6 262 V.
- V4 FM DETECTOR 6AL5
- V5 AM DET. & AVC. 1ST AUDIO AMP. 6AV6
- V6 POWER AMPLIFIER 6V6GT
- V7 FM-OSC. BC CONV. 6B6G
- V8 RECTIFIER 5Y3
- 1 C-1,449-3 AM-I.F. TRANSFORMER
- 2 C-1,436-2 BC-OSCILLATOR COIL
- 3 C-1,446-2 FM-I.F. TRANSFORMER
- 4 C-1,446-3 FM-I.F. TRANSFORMER
- 5 SEE NOTE
- 6 B-1,501 FILAMENT SUPPRESSOR
- 7 B-1,512 RF CHOKE - RF PLATE
- 8 B-1,535-1 RF CHOKE - OSC. CATHODE
- 9 B-1,535-2 RF CHOKE - RF CATHODE
- 10 B-1,538 FM OSCILLATOR COIL
- 11 B-1,539 FM-RF GRID COIL
- 12 B-1,540 BC LOOP ANTENNA
- 13 B-1,536-1 MODULATOR PLATE CHOKE
- 14 B-1,536-2 PARASITIC SUPPRESSOR
- 15 C-2,222 VARIABLE CONDENSER
- 16 C-6,218-2 DUAL CONCENTRIC V6, T6 & SWITCH
- 17 C-9,641-3 OUTPUT TRANSFORMER
- 18 D-9,248 POWER TRANSFORMER
- 19 C-9,255 FILTER CHOKE
- 20 C-11,227-1 BAND-SWITCH
- 21 B-4,125-1 DUAL SHIELDED CERAMIC CAPACITOR
- 22 C-5,421-7 DRY ELECTROLYTIC CAPACITOR UNIT
- 23 C-5,430 ELECTROLYTIC CAPACITOR
- 24 B-4,118 CERAMIC TRIMMER .7 TO 5.5 MMF

Schematic Diagram



NOTE - ALL CAPACITIES MFD. ALL RESISTORS 1/2 WATT UNLESS OTHERWISE SPECIFIED

TYPICAL VOLTAGE CHART

| TUBE | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|------|------|-----|------|------|------|-------|-----|
| 6BE6 | -67V | GND | 6.3V | 250V | 95V | | |
| 6BA6 | | | GND | 6.3V | 78V | 78V | 7 |
| 6AT6 | -3 | | GND | 6.3V | -3V | -3 | 70V |
| 6AQ5 | 14.5 | | GND | 6.3V | 235V | 250V | |
| 6X4 | 290V | | GND | 6.3V | 290V | 1270V | |

MEASURED WITH 20000-Ω PER VOLT METER. SCALES USED 10-50-250-1000 *A.C. VOLTAGE

FUNCTION SWITCH CONTACTS CLOSED
 PHONOGRAPH R-G M-S-G E-C A-V
 RADIO G-F M-S-G-O V-R
 RECORD RADIO G-F M-G-O-T C-P V-R
 RECORD MICROPHONE G-R-K O-T V-F

WISE) SWITCH IN PHONO POSITION-(COUNTERCLOCK- WISE)-VIEWED FROM SHAFT END.

| OPERATION | CONNECT OSCILLATOR TO ANTENNA | DUMMY TO ANTENNA | INPUT SIG. FREQUENCY | BAND | SET DIAL TO | TRIMMERS | PURPOSE |
|-----------|-----------------------------------------|------------------|----------------------|------|-------------|---------------|-------------------------|
| 1 | Converter Grid | .1 Mfd | 455 Kc. | BC | 600 Kc. | L3, 4, 5 & 6 | I.F. Alignment |
| 2 | Two turns loosely coupled to Wavemagnet | | 1600 Kc. | BC | 1600 Kc. | Osc. Trim. C3 | Set Oscillator to scale |
| 3 | Two turns loosely coupled to Wavemagnet | | 1400 Kc. | BC | 1400 Kc. | Ant. Trim. C2 | Align Wavemagnet |

Dial Assembly

| | | | | | | | |
|---------|-----------------------------------------------------|--------|--|--|--|--|--|
| 46-915 | Tuning & Vol. Control Knob (2 used) | 19-223 | | | | | |
| 46-929 | Tuning & Vol. Control Knob (2 used on G Model only) | 24-568 | | | | | |
| 59-228 | Dial Pointer | 24-571 | | | | | |
| 59-259 | Dial Pointer (G Model only) | 43-199 | | | | | |
| 54-263 | Speed Nut | 43-205 | | | | | |
| 80-209 | Plate Cover Tension Spring | 49-706 | | | | | |
| 93-1085 | Felt Washer (2 used on Kenob) | | | | | | |
| 188-132 | Retaining Ring (2 used on Kenob) | 49-710 | | | | | |
| S-17844 | Pointing Ring (used on S-17845) | 54-30 | | | | | |
| S-17845 | Pulley Shaft & Pulley Assembly | 54-139 | | | | | |
| S-17846 | Pulley Mfg. Strip & Bushing Assembly | 54-267 | | | | | |
| S-17847 | Dial Cord & Eyelet Assembly | | | | | | |

Miscellaneous (Cont'd.)

| | | | | | | | |
|---------|------------------------|---------|--|--|--|--|--|
| 95-1132 | 1st. I. F. Transformer | 54-282 | | | | | |
| 95-1133 | 2nd. I. F. Transformer | 57-1613 | | | | | |
| S-17933 | Osc. Coil Assembly | 57-1739 | | | | | |
| | | 57-1751 | | | | | |
| | | 78-274 | | | | | |
| | | 78-782 | | | | | |
| | | 78-806 | | | | | |
| | | 78-807 | | | | | |
| | | 80-611 | | | | | |
| | | 82-29 | | | | | |
| | | 82-30 | | | | | |
| | | 83-1888 | | | | | |
| | | 85-511 | | | | | |
| | | 93-125 | | | | | |
| | | 93-126 | | | | | |
| | | 94-295 | | | | | |
| | | 94-680 | | | | | |
| | | 112-164 | | | | | |
| | | 114-157 | | | | | |
| | | 114-248 | | | | | |
| | | 114-297 | | | | | |
| | | 114-311 | | | | | |
| | | 125-81 | | | | | |
| | | 138-47 | | | | | |
| | | 138-48 | | | | | |
| | | 149-109 | | | | | |
| | | 166-44 | | | | | |
| | | 178-175 | | | | | |
| | | 199-153 | | | | | |
| | | 202-879 | | | | | |
| | | 212-10 | | | | | |
| | | 212-10 | | | | | |
| | | S-17843 | | | | | |
| | | S-17858 | | | | | |
| | | S-17887 | | | | | |
| | | S-17960 | | | | | |
| | | S-17971 | | | | | |

Collis & Chokes

| | | |
|---------|----------------------------------|------|
| 22-3 | .01 Mid. Ceramic (Disc) (4 used) | 500V |
| 22-4 | .004 Mid. Ceramic (Disc) | 500V |
| 22-5 | 110 Mmld. (or 22-1669) | 500V |
| 22-182 | 220 Mmld. Mica (Molded) | 500V |
| 22-326 | .003 Mid. | 400V |
| 22-827 | .05 Mid. | 200V |
| 22-829 | .05 Mid. | 200V |
| 22-1386 | .02 Mid. | 200V |
| 22-1741 | C13,14,15,16 Four Section Elect. | 200V |
| 22-2287 | C1 Two Section Gang | |

Resistors

| | | | |
|-------|-----------------------|----------|------|
| R15 | 27 ohm | 1/2W 10% | Ins. |
| R3 | 270 ohm | 1/2W 10% | Ins. |
| R4 | 470 ohm | 1/2W 10% | Ins. |
| R7 | 680 ohm | 1/2W 10% | Ins. |
| R6 | 22K ohm | 1/2W 10% | Ins. |
| R1 | 100K ohm | 1/2W 20% | Ins. |
| R12 | 1 megohm | 1/2W 20% | Ins. |
| R14 | 3.3 megohm | 1/2W 20% | Ins. |
| R13 | 4.7 megohm | 1/2W 20% | Ins. |
| R2 | 10 megohm | 1/2W 20% | Ins. |
| R11 | 15 megohm | 1/2W 20% | Ins. |
| R8 | 140 ohm Zipohm | 3W 10% | Ins. |
| R9,10 | Two Section Candohm | | |
| R5 | Vol. Control & Switch | | |

Miscellaneous

| | |
|---------|------------------------------------------------|
| 11-104 | Line Cord & Plug |
| 14-1310 | Plastic Cabinet for H401 - Portable Model |
| 14-1316 | Plastic Cabinet for H401G - Portable Model |
| 15-51 | Cable Socket Cap & Insulator (used on S-17887) |
| 16-690 | Packing Carton |
| 19-210 | Connector Clip (used on S-17843) |

The 4H40 chassis is an AC, DC or battery operated super-heterodyne. The chassis is isolated from the DC circuit, and all measurements must be made from a common negative point. The most convenient place to reach this negative point is the negative side or container of the electrolytic. When the change-over Switch S1 is in AC position, the DC resistance from chassis to any circuit must be almost infinite. If any circuit becomes grounded a hum will result. Microphonic tubes will cause audio howl. Check the 1R5 and 1S5.

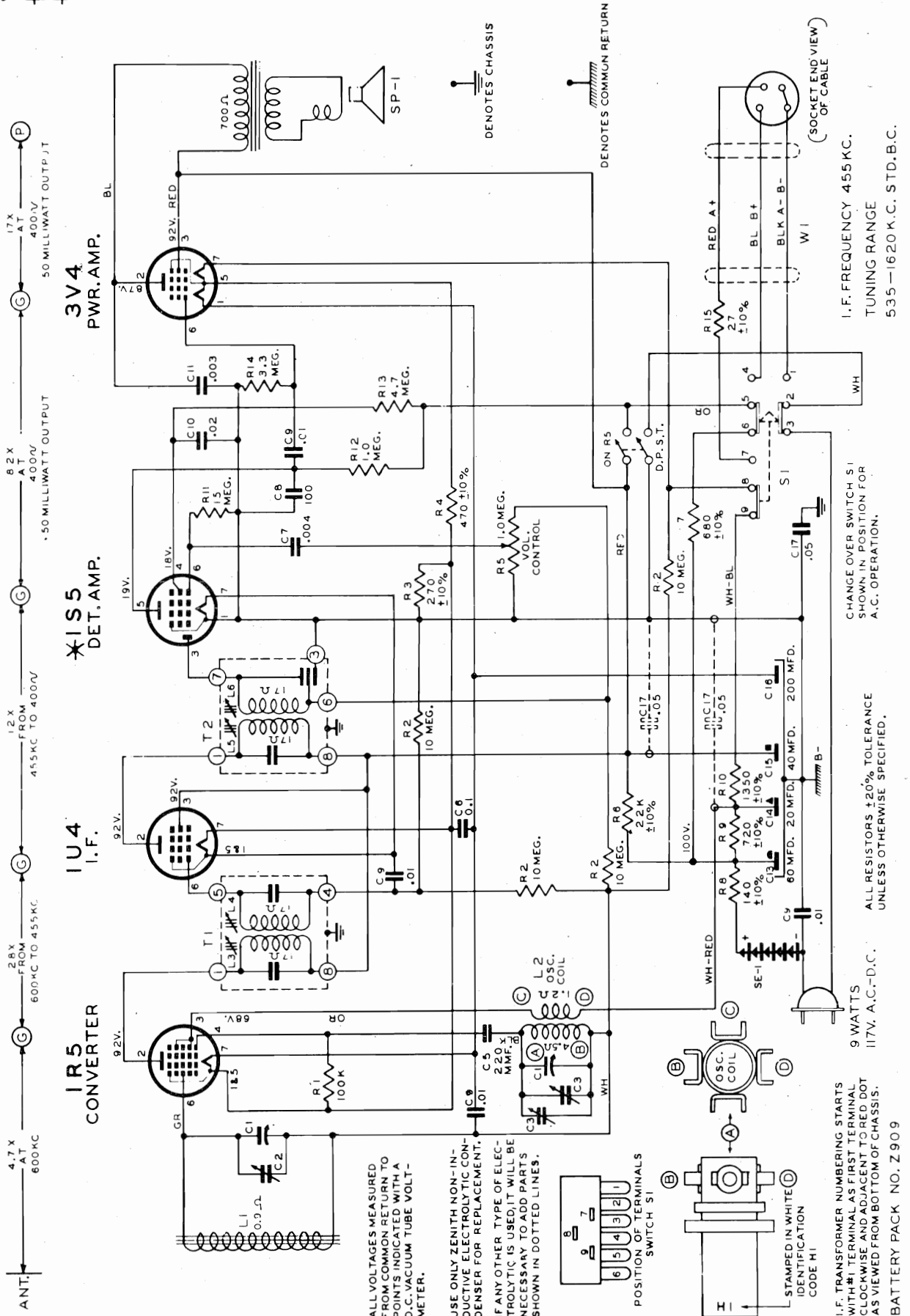
If the R.F. becomes weak or dead, check the DC resistance of the wavemagnet. This DC resistance should be approximately .9 ohm. If it is open check the wavemagnet.

IF Alignment: Remove the chassis from the cabinet and arrange the units so that the wavemagnet can be connected. All the connections and adjustments can be made from the top of the chassis. Connect a signal generator, through a .1 mfd. dummy antenna, to the converter grid and B-(common return). Connect an output meter across the voice coil of the speaker (two lugs provided). Set the signal generator to 455 Kc. and adjust L3, L4, L5 and L6 for the maximum indication on the output meter. Always keep the signal output from the generator just high enough to get an indication, otherwise excessive loading may result.

RF Alignment: Connect a two turn loop across the leads of the signal generator, loosely couple this loop to the wavemagnet. Set the signal generator and the dial pointer of the receiver to 1600 Kc. and adjust C3 oscillator trimmer to resonance. Set the signal generator and dial pointer to 1400 and adjust C2 antenna trimmer to resonance. These trimmers are on the top of gang condenser. Check operation and re-install set in cabinet. Tune in a weak station near 1400 Kc. or use background noise and readjust antenna trimmer for maximum sensitivity.

The I.F. transformer's incorporated in this receiver are of the new permeability tuned type. The advantage of an I.F. transformer of this type is its extreme stability under various humidity and temperature conditions. The upper coil is the secondary and the lower the primary. When adjusting these I.F. transformers the tuning wrench 68-19 can be inserted into the top slug, rotated until maximum output is obtained and then dropped down to the lower slug and the same operation repeated. The tuning wrench is so designed that turning one slug does not affect the adjustment of the other.

MODEL H401,
Ch. 4H40



3V4
PWR. AMP.

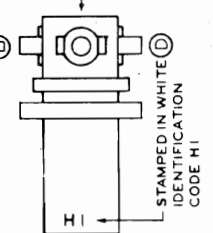
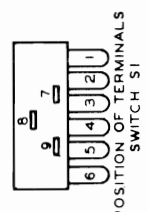
IS5
DET. AMP.

IU4
I.F.

IR5
CONVERTER

ALL VOLTAGES MEASURED FROM COMMON RETURN TO POINTS INDICATED WITH A D.C. VACUUM TUBE VOLT-METER.

USE ONLY ZENITH NON-INDUCTIVE ELECTROLYTIC CONDENSER FOR REPLACEMENT. IF ANY OTHER TYPE OF ELECTROLYTIC IS USED, IT WILL BE NECESSARY TO ADD PARTS SHOWN IN DOTTED LINES.



I.F. TRANSFORMER NUMBERING STARTS WITH #1 TERMINAL AS FIRST TERMINAL CLOCKWISE AND ADJACENT TO RED DOT AS VIEWED FROM BOTTOM OF CHASSIS. BATTERY PACK NO. Z909

ALL RESISTORS ±20% TOLERANCE UNLESS OTHERWISE SPECIFIED.

CHANGE OVER SWITCH S1 SHOWN IN POSITION FOR A.C. OPERATION.

I.F. FREQUENCY 455 KC.
TUNING RANGE
535—1620 K.C. STD. B.C.

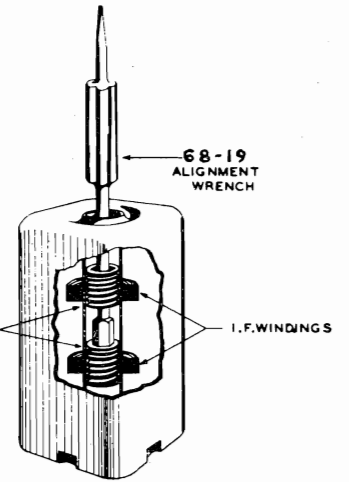
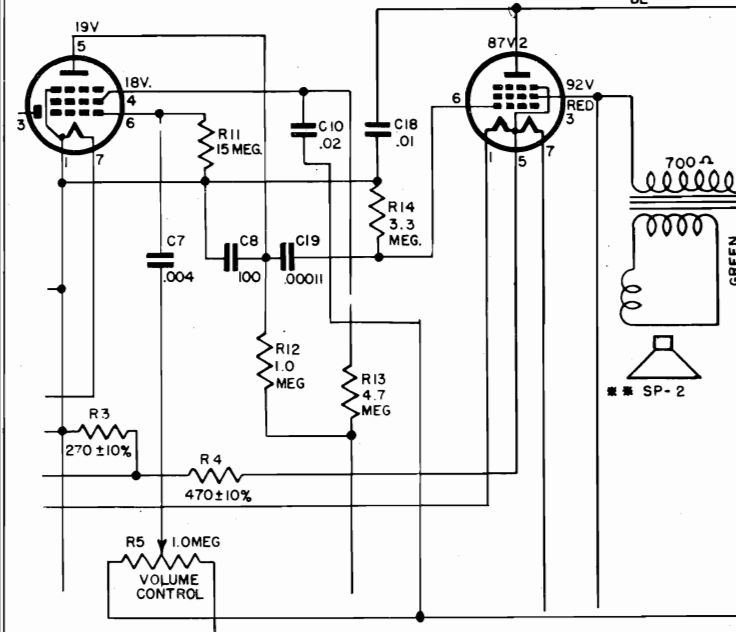
MODEL H401,
Ch. 4H40

ALTERNATE AUDIO CIRCUIT
USED ON LATER RELEASES.

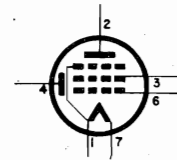
DETAILED VIEW OF I. F. TRANSFORMERS.

*1S5
DET. AMP.

3V4
PWR. AMP.



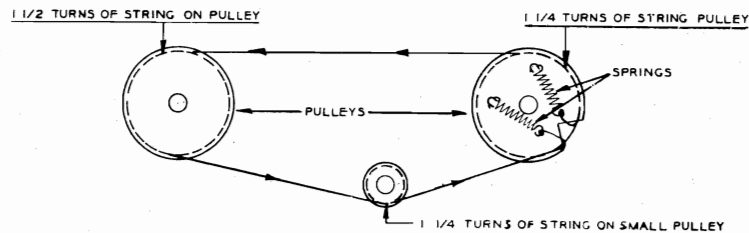
* IU5



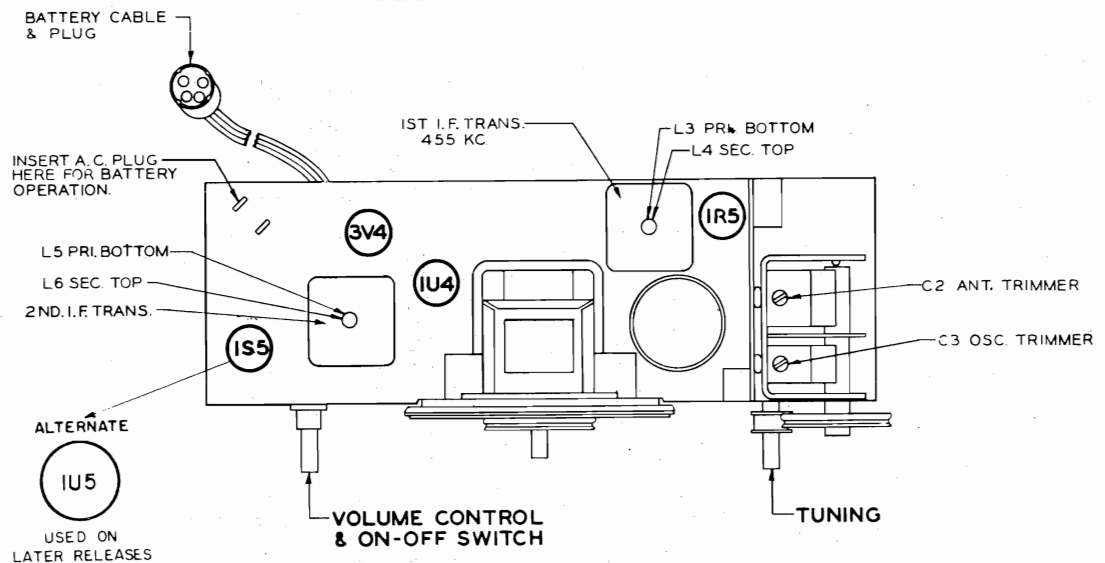
USED ON
LATER RELEASES

** WHEN SP-2 IS USED, C-18 AND
C-19 MUST ALSO BE USED.

DIAL CABLE DRAWING



TUBE AND TRIMMER LOCATION



MODEL H500,
Ch. 5H40

ALIGNMENT PROCEDURE

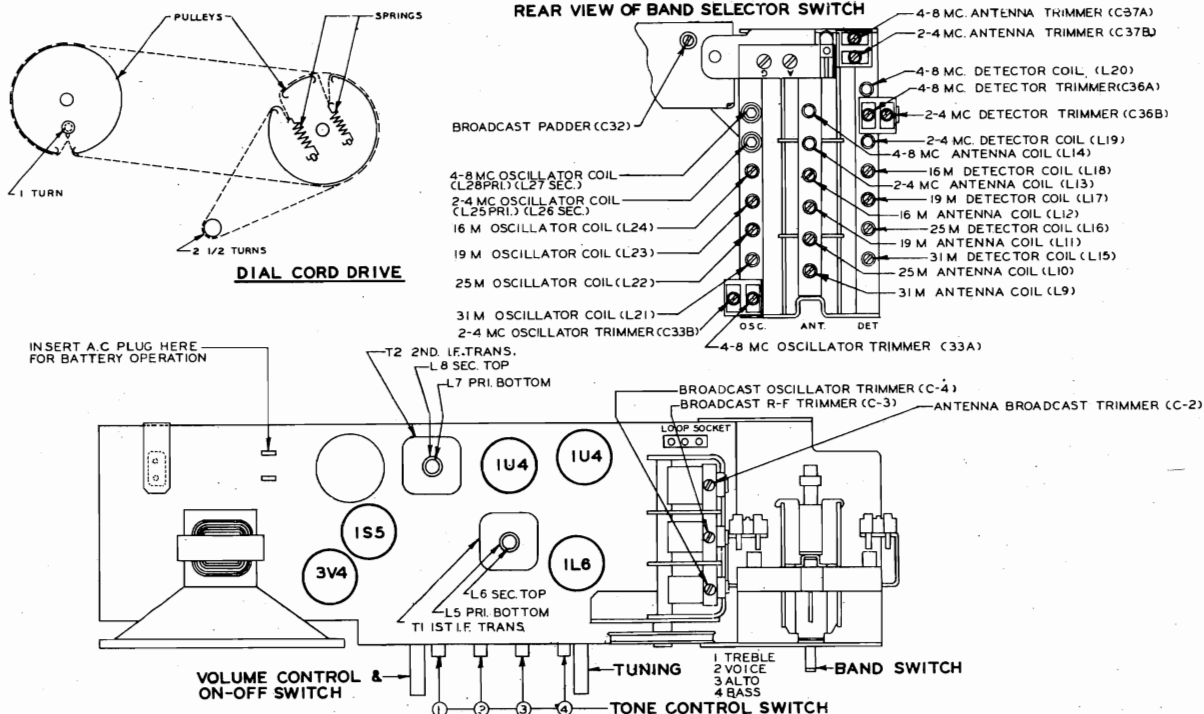
| OPER. | CONNECT OSCILLATOR TO DUMMY ANTENNA | INPUT SIGNAL FREQ. | BAND | SET DIAL AT | TRIMMERS | PURPOSE |
|-------|-----------------------------------------------------------------------------------------------------------------------------------|--------------------|------|----------------|-------------|---------------------------|
| 1 | Positive lead of signal generator to converter grid through a .1 Mfd. condenser & negative lead to negative filament of 1L6 tube. | 455 Kc | BC | 600 Kc | L5, 6, 7, 8 | Align I. F. |
| 2 | One turn loop coupled loosely to broadcast wavemagnet | 1600 Kc | BC | 1600 Kc | C4 | Set oscillator to scale |
| 3 | | 1400 Kc | BC | 1400 Kc | C3 | Alignment of detector |
| 4 | | 1400 Kc | BC | 1400 Kc | C2 | Alignment of BC antenna |
| 5* | | 600 Kc | BC | Rock at 600 Kc | C32 | Alignment of BC at 600 Kc |

*Note: Rock Tuning Condenser When Making Alignment Under Operations 5, 7, 10, 12, 13, 14 & 15.

NOTE: If Trimmers C2, C3, C4 are adjusted after procedures #2 through #15 are completed, it will be necessary to repeat alignment procedures #2 through #15.

| OPERATION | CONNECT OSCILLATOR TO DUMMY ANTENNA | INPUT SIGNAL FREQ. | BAND | SET DIAL AT | TRIMMERS | PURPOSE | |
|-----------|-------------------------------------------------------------|-------------------------|-----------|----------------|------------------|----------------------------------------------------|--|
| 6 | 3 feet of wire approximately 1 foot from extended wave rod. | 7.8 Mc | 4-8 Mc | 7.8 Mc | C33A, C36A, C37A | Alignment of S. W. Oscillator Detector and Antenna | |
| 7* | | 4.2 Mc | 4-8 Mc | Rock at 4.2 Mc | 4-8 Mc Osc. slug | | |
| 8 | | Repeat Operations 6 & 7 | | | | | |
| 9 | | 3.9 Mc | 2-4 Mc | 3.9 Mc | C33B, C36B, C37B | | |
| 10* | | 2.1 Mc | 2-4 Mc | Rock at 2.1 Mc | 2-4 Mc Osc. slug | | |
| 11 | | Repeat Operation 9 & 10 | | | | | |
| 12* | | 17.8 Mc | 16 Meters | 17.8 Mc | L24, L18, L12 | | |
| 13* | | 15.2 Mc | 19 Meters | 15.2 Mc | L23, L17, L11 | | |
| 14* | | 11.8 Mc | 25 Meters | 11.8 Mc | L22, L16, L10 | | |
| 15* | | 9.6 Mc | 31 Meters | 9.6, Mc | L21, L15 L9 | | |

TUBE, TRIMMER LOCATION AND DIAL CABLE DRAWING



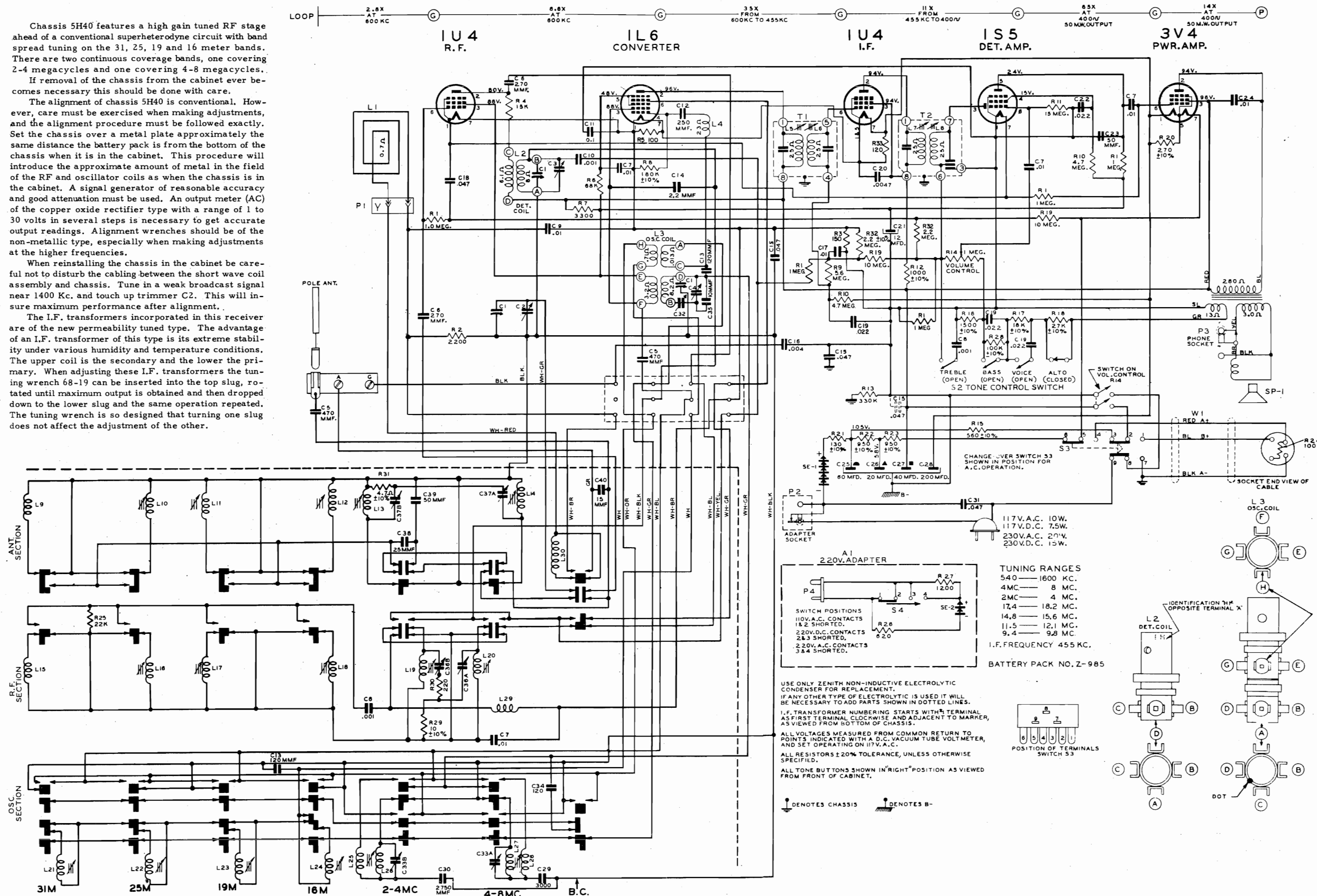
Chassis 5H40 features a high gain tuned RF stage ahead of a conventional superheterodyne circuit with band spread tuning on the 31, 25, 19 and 16 meter bands. There are two continuous coverage bands, one covering 2-4 megacycles and one covering 4-8 megacycles.

If removal of the chassis from the cabinet ever becomes necessary this should be done with care.

The alignment of chassis 5H40 is conventional. However, care must be exercised when making adjustments, and the alignment procedure must be followed exactly. Set the chassis over a metal plate approximately the same distance the battery pack is from the bottom of the chassis when it is in the cabinet. This procedure will introduce the approximate amount of metal in the field of the RF and oscillator coils as when the chassis is in the cabinet. A signal generator of reasonable accuracy and good attenuation must be used. An output meter (AC) of the copper oxide rectifier type with a range of 1 to 30 volts in several steps is necessary to get accurate output readings. Alignment wrenches should be of the non-metallic type, especially when making adjustments at the higher frequencies.

When reinstalling the chassis in the cabinet be careful not to disturb the cabling between the short wave coil assembly and chassis. Tune in a weak broadcast signal near 1400 Kc. and touch up trimmer C2. This will insure maximum performance after alignment.

The I.F. transformers incorporated in this receiver are of the new permeability tuned type. The advantage of an I.F. transformer of this type is its extreme stability under various humidity and temperature conditions. The upper coil is the secondary and the lower the primary. When adjusting these I.F. transformers the tuning wrench 68-19 can be inserted into the top slug, rotated until maximum output is obtained and then dropped down to the lower slug and the same operation repeated. The tuning wrench is so designed that turning one slug does not affect the adjustment of the other.

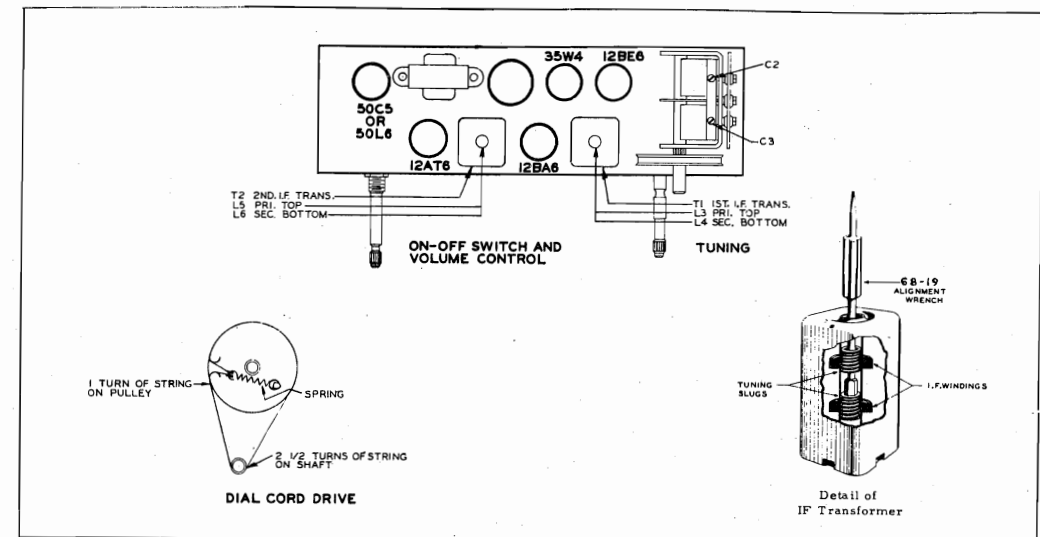


MODEL H500,
Ch. 5H40

Table with columns: PART NO., DIAG. NO., DESCRIPTION, and part numbers. Includes sections for DIAL ASSEMBLY, COILS & CHOKES, CONDENSERS, RESISTORS, and MISCELLANEOUS.

Table with columns: PART NO., DIAG. NO., DESCRIPTION, and part numbers. Includes sections for SPEAKER BUFFLE, CABINET PARTS, FREQUENCY BAND SWITCH ASSEMBLY, and VOLTAGE ADAPTER.

MODELS H511, H511Y,
H511W, Ch. 5H01



TUBE, TRIMMER LOCATION, DIAL CABLE DRAWING AND DETAILED VIEW OF I.F. TRANSFORMERS.

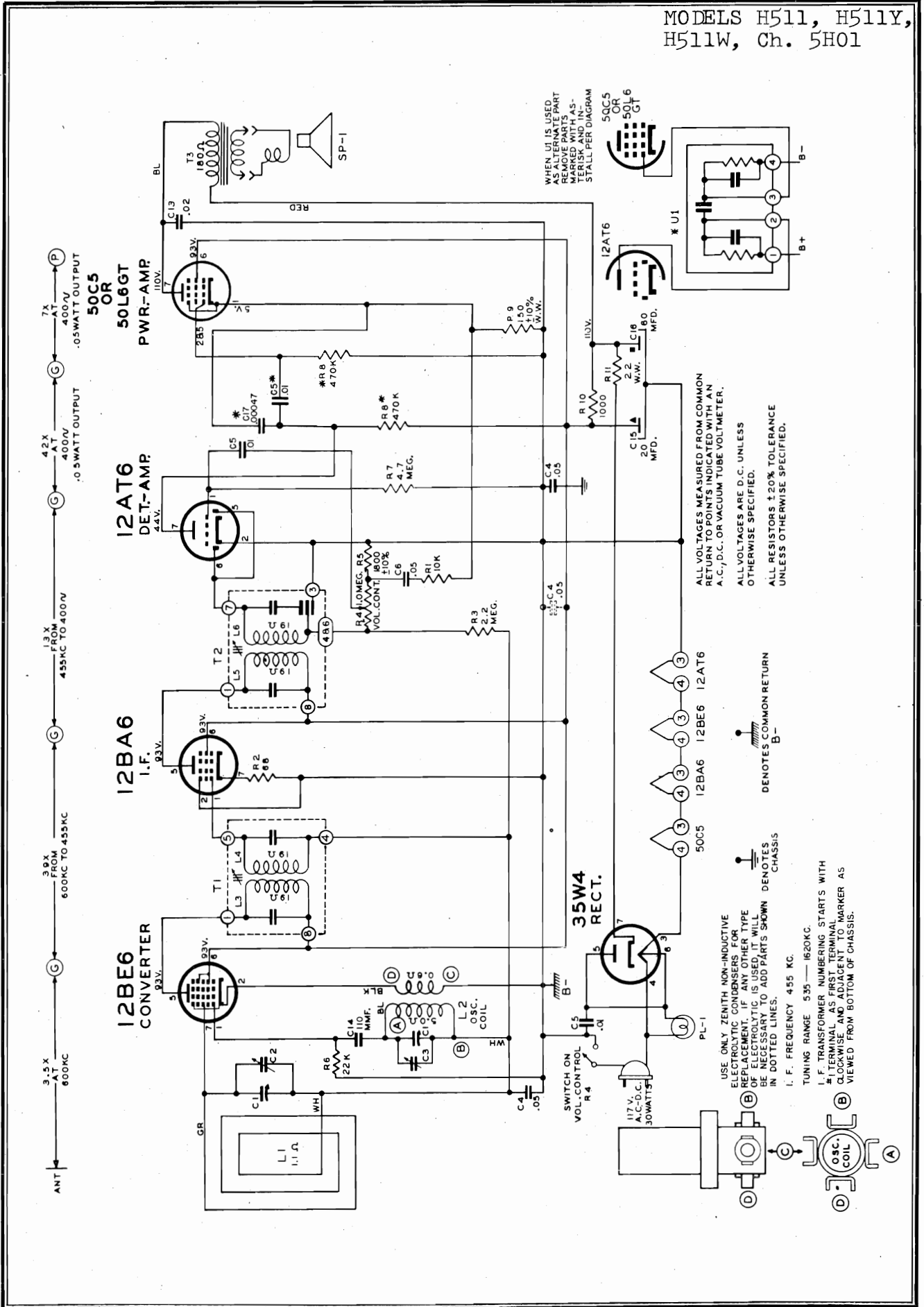
The I.F. transformers incorporated in this receiver are of the new permeability tuned type. The advantage of an I.F. transformer of this type is its extreme stability under various humidity and temperature conditions. The upper coil is the secondary and the lower the primary. When adjusting these I.F. transformers the tuning wrench 68-19 can be inserted into the top slug, rotated until maximum output is obtained and then dropped down to the lower slug and the same operation repeated. The tuning wrench is so designed that turning one slug does not affect the adjustment of the other.

ALIGNMENT PROCEDURE

Table with columns: OPERATION, CONNECT OSCILLATOR TO, DUMMY ANTENNA, INPUT SIG. FREQUENCY, SET DIAL AT, TRIMMERS, and PURPOSE. Contains 3 rows of alignment steps.

Table with columns: PART NO., DESCRIPTION, and part numbers. Includes sections for PARTS LIST, DIAL ASSEMBLY, COILS & CHOKES, CONDENSERS, and MISCELLANEOUS.

MODELS H511, H511Y, H511W, Ch. 5H01



WHEN U1 IS USED AS ALTERNATE PART REMOVE PARTS MARKED WITH AS- AND REPLACE WITH STALLER DIAGRAM

ALL VOLTAGES MEASURED FROM COMMON RETURN TO POINTS INDICATED WITH AN A.C./D.C. OR VACUUM TUBE VOLTMETER. ALL VOLTAGES ARE D.C. UNLESS OTHERWISE SPECIFIED. ALL RESISTORS ±20% TOLERANCE UNLESS OTHERWISE SPECIFIED.

USE ONLY ZENITH NON-INDUCTIVE ELECTROLYTIC CONDENSERS FOR REPLACEMENT. IF ANY OTHER TYPE OF ELECTROLYTIC IS USED, IT WILL BE NECESSARY TO ADD PARTS SHOWN IN DOTTED LINES. I. F. FREQUENCY 455 KC. TUNING RANGE 535 — 1620KC. I. F. TRANSFORMER NUMBERING STARTS WITH #1 TERMINAL AS FIRST TERMINAL CLOCKWISE AND ADJACENT TO MARKER AS VIEWED FROM BOTTOM OF CHASSIS.

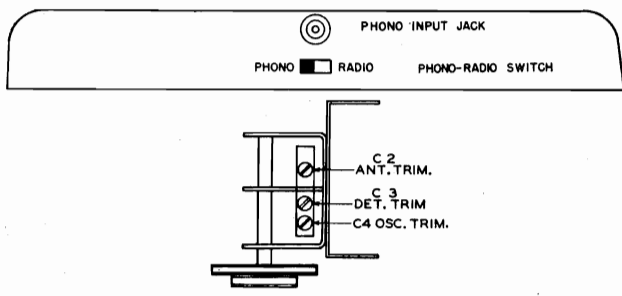
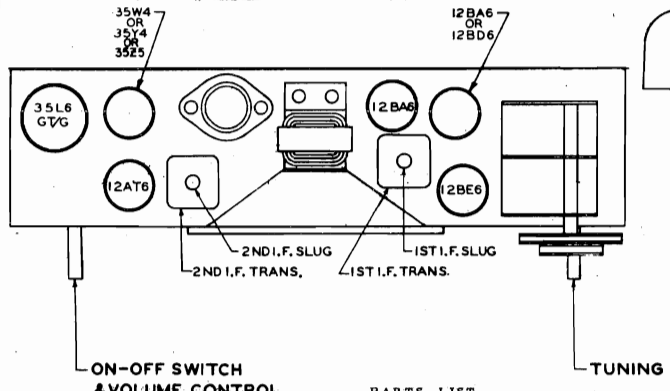
CHASSIS DENOTES COMMON RETURN B-

MODEL H615Z,
Ch. 6G05

The I.F. transformers incorporated in this receiver are of the new permeability tuned type. The advantage of an I. F. transformer of this type is its extreme stability under various humidity and temperature conditions. The upper coil is the secondary and the lower the primary. When adjusting these I. F. transformers the tuning wrench 68-19 can be inserted into the top slug, rotated until maximum output is obtained and then dropped down to the lower slug and the same operation repeated. The tuning wrench is so designed that turning one slug does not affect the adjustment of the other.

ALIGNMENT PROCEDURE

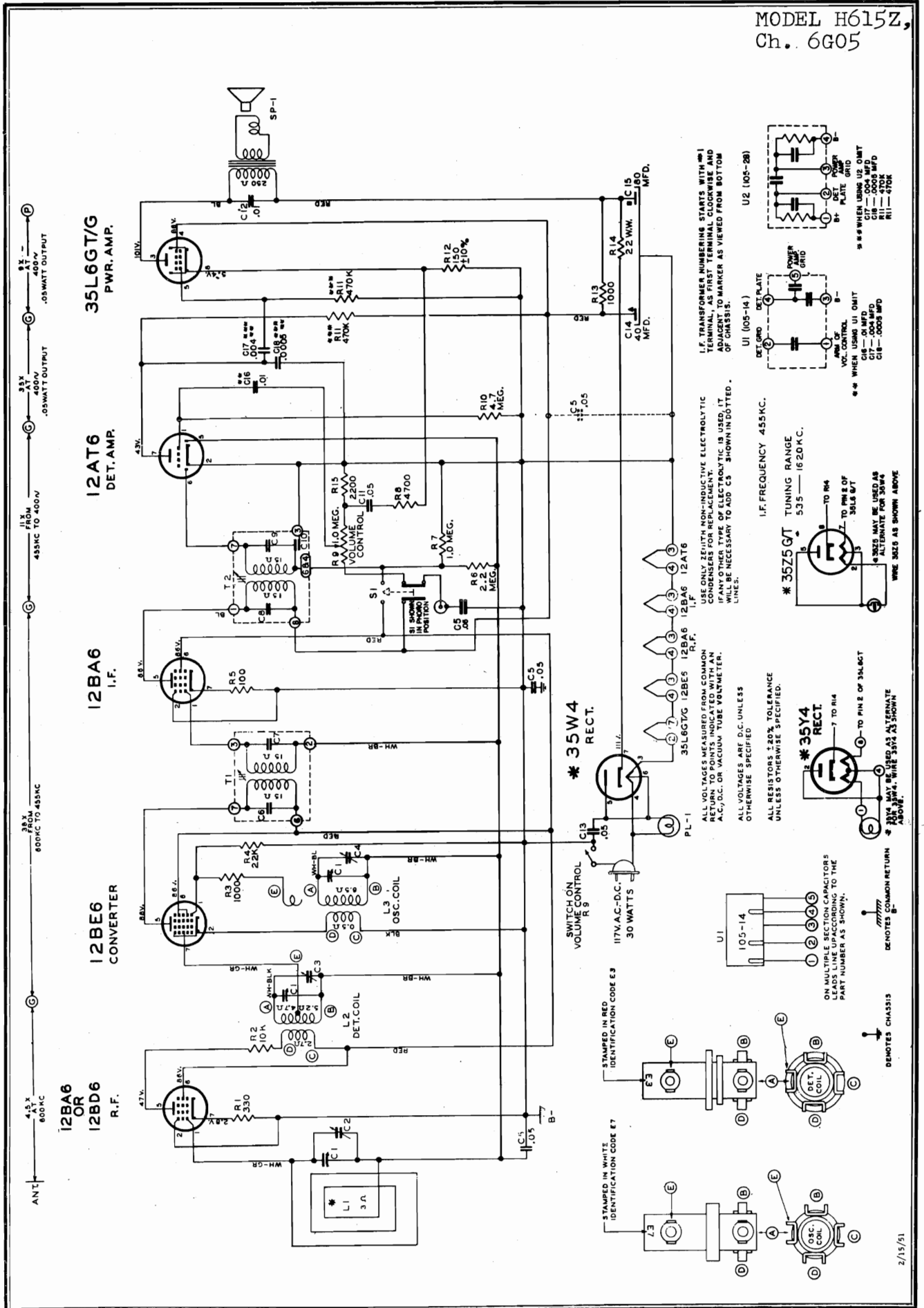
| OPERATION | CONNECT OSCILLATOR TO | DUMMY ANTENNA | INPUT SIG. FREQUENCY | SET DIAL AT | TRIMMERS | PURPOSE |
|-----------|--------------------------------------------|---------------|----------------------|-------------|----------------------------------|-------------------------------|
| 1 | Convertor Grid | .5 Mfd | 455 Kc. | 600 Kc. | Adjust Primary & Secondary Slugs | For I.F. Alignment |
| 2 | Single Turn Loosely Coupled to Wave Magnet | -- | 1600 Kc. | 1600 Kc. | C-4 | Set Oscillator to Dial Scale. |
| 3 | | -- | 1400 Kc. | 1400 Kc. | C-3 | Detector Alignment |
| 4 | | -- | 1400 Kc. | 1400 Kc. | C-2 | Antenna Alignment |



PARTS LIST

| PART NO. | DIAG. NO. | DESCRIPTION | QTY | RES. |
|---------------------------|-----------|------------------------------------------|------|-----------|
| DIAL ASSEMBLY | | | | |
| 26-452 | | Dial Scale | | |
| 59-252 | | Dial Pointer | | |
| 59-253 | | Dial Pointer (Used on W & Y models only) | | |
| 76-519 | | Tuning Shaft | | |
| 78-882 | | Dial Light Socket & Wire | | |
| 80-69 | | Dial Cord Tension Spring | | |
| 80-209 | | Dial Cord Tension Spring | | |
| 100-67 | PL1 | Dial Light Bulb | | |
| 171-12 | | Pilot Light Lens | | |
| 188-32 | | Retaining Ring (Used on 76-519) | | |
| 188-54 | | Clamping Ring (Used on Dial Pointer) | | |
| 188-60 | | Retaining Ring (Used on S-14867) | | |
| S-14834 | | Dial Cord & Eyelet Assem. (Short) | | |
| S-14867 | | Painter Pulley & Bushing Assem. | | |
| S-14868 | | Bkrt. & Stud Assem. | | |
| S-16593 | | Dial Cord & Eyelet Assem. (Long) | | |
| Coils & Chokes | | | | |
| 95-1101 | T1 | 1st. I.F. Transformer | | |
| 95-1102 | T2 | 2nd I.F. Transformer | | |
| S-14832 | L2 | Detector Coil Assem. | | |
| S-14833 | L3 | Oscillator Coil Assem. | | |
| Condensers | | | | |
| 22-3 | C16 | .01 Mfd. | 500V | |
| 22-178 | C11 | .05 Mfd. | 200V | |
| 22-448 | C17 | .004 Mfd. | 600V | |
| 22-829 | C5 | .05 Mfd. | 200V | |
| 22-854 | C18 | .0005 Mfd. | 600V | |
| 22-1017 | C13 | .05 Mfd. | 400V | |
| 22-1182 | C12 | .01 Mfd. | 400V | |
| 22-1808 | C14,C15 | Elec. Cond. 80-40 Mfd. | 150V | |
| 22-2158 | C1 | Three Section Gang Cond. | | |
| 105-14 | U1 | Multiple Capacitor Unit (or 105-28) | | |
| Resistors | | | | |
| 63-1219 | R14 | 22 Ohm W.W. 1/2W 20% | | Ins. Res. |
| 63-1574 | R13 | 1000 Ohm 1 W 20% | | |
| 63-1664 | R9 | Volume Control & Switch | | |
| 63-1744 | R5 | 100 Ohm 1/2W 20% | | Ins. Res. |
| 63-1765 | R1 | 330 Ohm 1/2W 20% | | |
| 63-1786 | R3 | 1000 Ohm 1/2W 20% | | |
| 63-1800 | R15 | 2200 Ohm 1/2W 20% | | |
| 63-1814 | R8 | 4700 Ohm 1/2W 20% | | |
| 63-1828 | R2 | 10K Ohm 1/2W 20% | | |

| | | | | | | |
|-----------------------------------|-----|---------------------------------------------------------|------|-----|--|--------------------|
| 63-1842 | R4 | 22K Ohm | 1/2W | 20% | | |
| 63-1898 | R11 | 470K Ohm | 1/2W | 20% | | |
| (2 used) | | | | | | |
| 63-1912 | R7 | 1 Megohm | 1/2W | 20% | | |
| 63-1926 | R6 | 2.2 Megohm | 1/2W | 20% | | |
| 63-1940 | R10 | 4.7 Megohm | 1/2W | 20% | | |
| 63-1977 | R12 | 150 Ohm | 1 W | 10% | | |
| Miscellaneous | | | | | | |
| 11-85 | | Line Cord & Plug | | | | |
| 14-1320 | | Plastic Cabinet for H615Z | | | | |
| 14-1321 | | Plastic Cabinet for H615WZ | | | | |
| 14-1322 | | Plastic Cabinet for H615YZ | | | | |
| 16-660 | | Packing Carton | | | | |
| 44-25 | | Phono Jack | | | | |
| 46-745 | | Tuning & Vol. Control Knob (2 used) | | | | |
| 46-745Y | | Tuning & Vol. Control Knob (2 used) | | | | (W & Y Model only) |
| 49-643 | SP1 | 5-1/4" PM Speaker | | | | |
| TS-2035 Output Transformer | | | | | | |
| 54-129 | | ZC-5091 Cone & Voice Coil | | | | |
| 54-139 | | Speed Nut (10 used on mtg. dial scale & gasket) | | | | |
| 54-267 | | #3/8-32 x 9/16" Palmnut Type N Cad. (used on 63-1664) | | | | |
| 54-267 | | #6-32 x 5/16" Palmnut (1 ea. used on 95-1101 & 95-1102) | | | | |
| 57-1688 | | Cabinet Front Plate | | | | |
| 78-275 | | Elect. Cond. Socket | | | | |
| 78-596 | | Loktal Tube Socket (used only when 35Y4 is used) | | | | |
| 78-611 | | Octal Tube Socket | | | | |
| 78-801 | | Octal Tube Socket (used only when 35Z5GT is used) | | | | |
| 78-807 | | Miniature Tube Socket (4 used) | | | | |
| 78-810 | | Miniature Tube Socket (used only when 35W4 is used) | | | | |
| 83-1833 | | Rubber Strip (used with Dial Scale) | | | | |
| 85-495 | | Phono-Radio Switch | | | | |
| 94-334 | | Gang Cond. Mtg. Bushing (3 used) | | | | |
| 110-155 | | Grill Cloth | | | | |
| 110-156 | | Grill Cloth (used on W&Y Model only) | | | | |
| 114-192 | | #6 x 7/16" Hex. Hd. S.T. (2 used on Chassis Mtg.) | | | | |
| 139-92 | | Baffle Board | | | | |
| 139-95 | | Speaker Baffle (Rubber) | | | | |
| 159-69 | | Trimount Stud-St.Br. (4 used on Wavemagnet) | | | | |
| 166-41 | | Rubber Bumper (or 166-44) (used on Gang Cond) | | | | |
| 188-136 | | Trim Ring | | | | |
| 196-154 | | Grill Cloth Support Gasket | | | | |
| 202-886 | | Instruction Book | | | | |
| 5-18134 | | Wavemagnet Assem. | | | | |

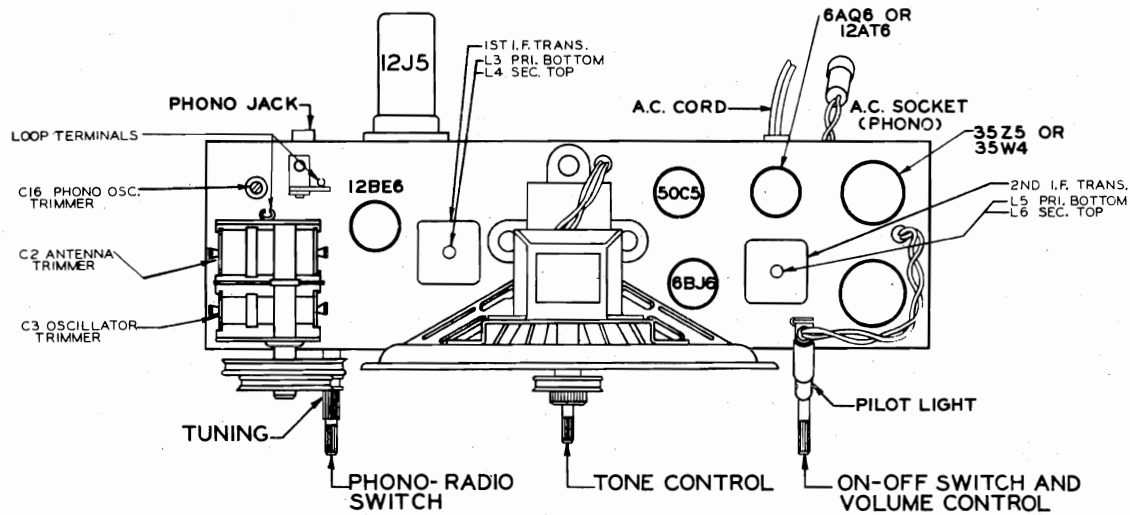


MODEL H664,
Ch. 6H02

The I.F. transformers incorporated in this receiver are of the new permeability tuned type. The advantage of an I.F. transformer of this type is its extreme stability under various humidity and temperature conditions. The upper coil is the secondary and the lower the primary. When adjusting these I.F. transformers the tuning wrench 68-19 can be inserted into the top slug, rotated until maximum output is obtained and

then dropped down to the lower slug and the same operation repeated. The tuning wrench is so designed that turning one slug does not affect the adjustment of the other. In the event the receiver oscillates during phono operation, adjust C16 4-80 mmf. capacitor to a point at which the oscillation ceases.

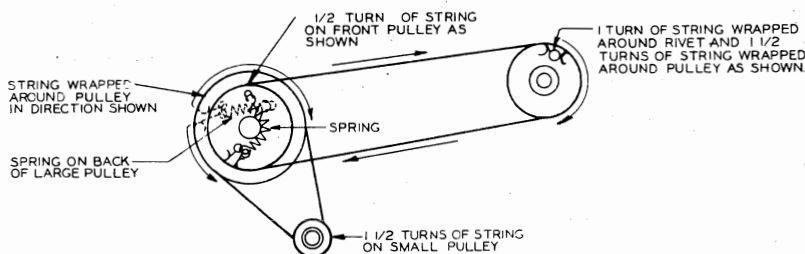
This position of no oscillation will sometimes vary with different cartridges, and in this case readjustment of C16 must be made.



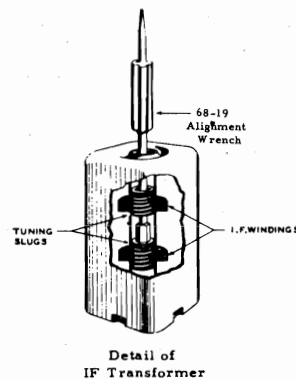
TUBE AND TRIMMER LOCATION

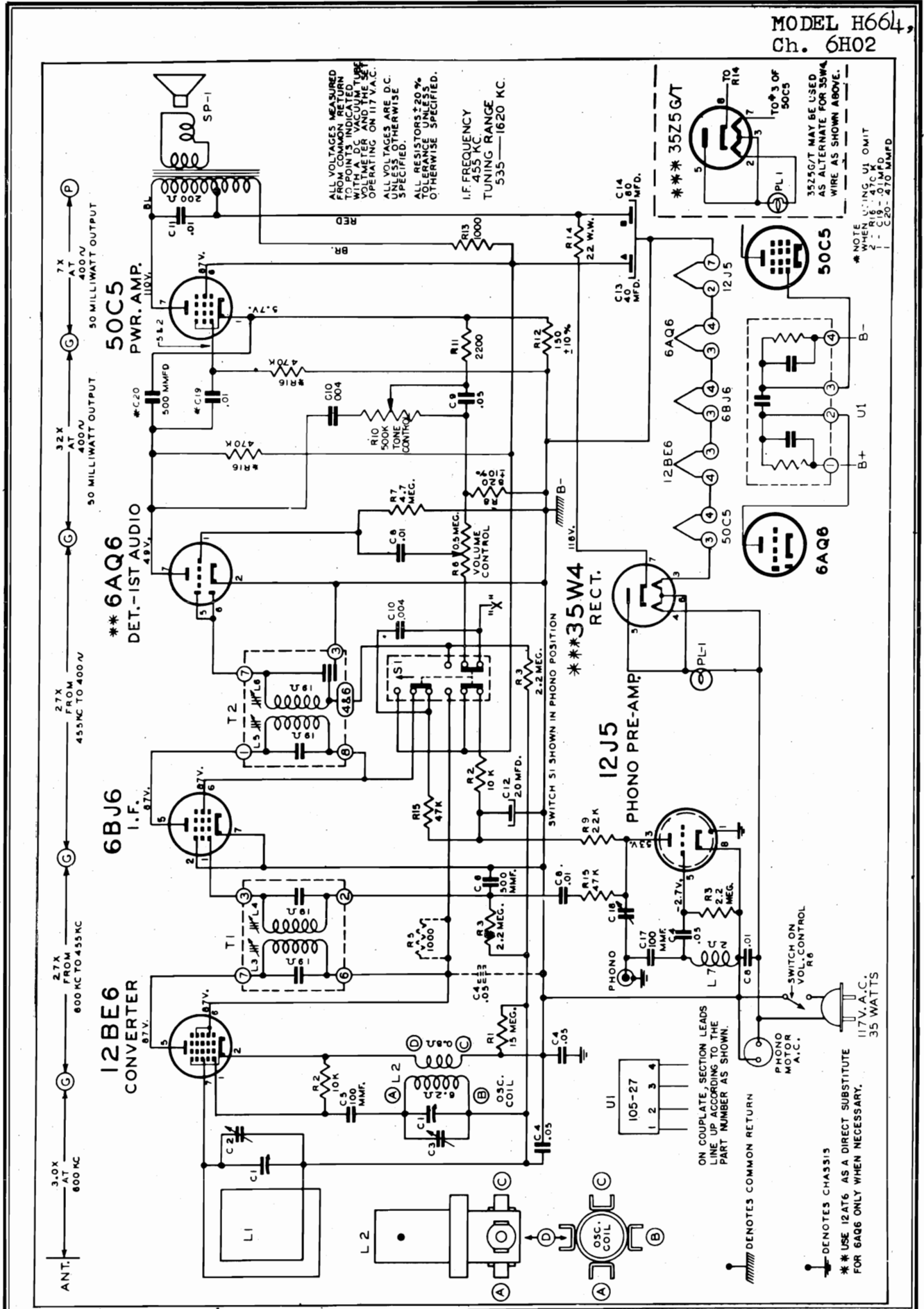
ALIGNMENT PROCEDURE

| OPERATION | CONNECT OSCILLATOR TO | DUMMY ANTENNA | INPUT SIG. FREQUENCY | SET DIAL AT | TRIMMERS | PURPOSE |
|-----------|----------------------------------------------|---------------|----------------------|-------------|-------------|-------------------------------|
| 1 | Converter Grid | .5 Mfd. | 455 Kc. | 600 Kc. | L3, 4, 5, 6 | For I. F. Alignment |
| 2 | One Turn Loop Coupled Loosely to Wave Magnet | -- | 1600 Kc. | 1600 Kc. | C-3 | Set Oscillator to Dial Scale. |
| 3 | | -- | 1400 Kc. | 1400 Kc. | C-2 | Align Antenna Stage |



**DIAL CABLE DRAWING AND
DETAIL OF I. F. TRANSFORMER**





ALL VOLTAGES MEASURED FROM COMMON RETURN WITH A D.C. VACUUM TUBE VOLTMETER AND THE SET OPERATING ON 117 V.A.C. ALL VOLTAGES ARE D.C. UNLESS OTHERWISE SPECIFIED. ALL RESISTORS ±20% TOLERANCE UNLESS OTHERWISE SPECIFIED.

I.F. FREQUENCY 455 KC. TUNING RANGE 535—1620 KC.

*** 35Z5GT
TO *'S OF 50C5
PL I

50C5
10'S OF 50C5
WIRE AS SHOWN ABOVE.

* NOTE WHEN USING U1 OMIT
C19 - 0.1 MF.
C20 - 470 MF.

ON COUPLER, SECTION LEADS LINE UP ACCORDING TO THE PART NUMBER AS SHOWN.

⊖ DENOTES COMMON RETURN

⊖ DENOTES CHASSIS

*** USE 12AT6 AS A DIRECT SUBSTITUTE FOR 6AQ6 ONLY WHEN NECESSARY. 117V. A.C. 35 WATTS

MODEL H664,
Ch. 6H02

USE ONLY ZENITH NON-INDUCTIVE
ELECTROLYTIC CONDENSER FOR
REPLACEMENT.
IF ANY OTHER TYPE OF ELECTROLYTIC
IS USED IT WILL BE NECESSARY TO ADD
PARTS SHOWN IN DOTTED LINES.

I.F. TRANSFORMER NUMBERING STARTS
WITH #1 TERMINAL AS FIRST TERMINAL
CLOCKWISE AND ADJACENT TO MARKER
AS VIEWED FROM BOTTOM OF CHASSIS.
"X" TEST POINT

PARTS LIST
MODEL H664 CHASSIS 6H02

| PART NO. | DIAG. NO. | DESCRIPTION | PART NO. | DIAG. NO. | DESCRIPTION |
|----------------|-----------|----------------------------------------------------------------|---------------|-----------|--------------------------------------------------------------------------------------|
| Dial Assembly | | | Miscellaneous | | |
| 26-456 | | Dial Scale & Escutcheon | 11-85 | | Line Cord & Plug - 6 ft. long |
| 46-718 | | Phono Radio Knob | 12-1812 | | Pilot Light Socket Mtg. Brkt. |
| 46-855 | | Tone Control Knob | 14-1293 | | Plastic Cabinet for H664 (Top Section) |
| 46-924 | | Tuning Control Knob | 12-1294 | | Plastic Cabinet for H664 (Bottom Section) |
| 59-255 | | Dial Pointer | 16-786 | | Packing Carton |
| 78-911 | | Pilot Light Socket & Wire | 17-116 | | Wavemagnet Retaining Clamp |
| 80-69 | | Dial Cord Tension Spring | 19-169 | | Record Changer Mtg. Clip (3 used) |
| 80-209 | | Dial Cord Tension Spring | 24-566 | | Chassis Cover |
| 83-1868 | | Pilot Light Indicator Strip | 40-93 | | Cabinet Cover Hinge (2 used) |
| 100-67 | PL1 | Dial Light Bulb | 40-94 | | Cover Support Hinge |
| 188-60 | | Retaining Ring (used on S-17857) | 44-25 | | Phono Jack |
| 188-102 | | Knob Retaining Ring (46-924) | 49-697 | SP1 | 7½" PM Speaker |
| S-17638 | | Dial Cord Assembly (Short) | 52-588 | | ZC7512B Cone & Voice Coil |
| S-17639 | | Dial Cord Assembly (Long) | 54-129 | | Two Prong Receptacle & Cable |
| S-17640 | | Pulley & Bushing Assembly | 54-139 | | Speed Nut (7 used on Dial Scale Mtg. & 2 used Wavemagnet Mtg.) |
| S-17857 | | Tuning Shaft & Pulley Assembly | 54-140 | | 3/8-32x9/16" Palnut Cad. (1 ea. used on 85-499 & 63-2270) |
| S-17923 | | Volume Control Knob Assembly | 54-271 | | 3/8-32x9/16"x3/32 Hex Nut-Steel N.P.(used on 63-2269) |
| Coils & Chokes | | | 57-1713 | | 6-32x1/4" Palnut Cad. (1 ea. used on 95-1101 & 95-1102) |
| 95-1101 | T1 | 1st. I.F. Transformer | 78-709 | | Record Changer Trim Plate |
| 95-1102 | T2 | 2nd. I.F. Transformer | 78-801 | | Octal Tube Socket |
| S-12603 | L7 | Phono Oscillator Coil Assembly | 78-806 | | Octal Tube Socket (used only when 35Z5GT is used) |
| S-13799 | L2 | Oscillator Coil Assembly | 78-807 | | Miniature Tube Socket (2 used) |
| Condensers | | | 78-810 | | Miniature Tube Socket |
| 22-3 | C8 | .01 Mfd. Ceramic (Disc) (3 used) 500V | 78-910 | | Elect. Cond. Socket |
| 22-4 | C10 | .004 Mfd. Ceramic (Disc) (2 used) 500V | 80-830 | | Record Changer Mtg. Spring (4 used) |
| 22-5 | C5 | 110 Mmfd. Ceramic (Disc)(or 22-162)500V | 83-1908 | | Felt Strip |
| 22-178 | C9 | .05 Mfd. 200V | 85-499 | S1 | Phono-Radio Switch (or 85-512) |
| 22-829 | C4 | .05 Mfd. (3 used) 200V | 94-295 | | Gang & Spkr. Mtg. Bushing (4 used) |
| 22-854 | C6 | .0005 Mfd. 600V | 94-753 | | Bushing (4 used on 57-1713) |
| 22-1182 | C11 | .01 Mfd. 400V | 112-773 | | #6x3/8 Phill. B.H.S.T. St. Br. (2 ea. used on S-17651 & 24-566 & 4 used on 40-94) |
| 22-2242 | C16 | Trimmer Cond. | 112-820 | | #8x½" Phill. Flt. Hd. S.T. (4 used on each 40-93) |
| 22-2272 | C12,13,14 | Elect. Cond. 20 Mfd.-150V x 40 Mfd. - 150V x 80 Mfd. - 150V | 112-827 | | 6-32x3/8 Phill. Flt. Hd. S.T. Br. (3 used on Dial Scale Mtg.) |
| 22-2273 | C1 | Two Gang Variable Cond. | 112-828 | | 6-20x7/8 Phill. Flt. Hd. S.T. (4 used on 57-1713) |
| 22-2311 | C17 | 100 Mmfd. Ceramic 500V | 114-39 | | #8x1/4" Hex Hd. S.T. (used on 12-1812) |
| 105-27 | U1 | Couplate Unit (or 1 ea. 22-3 & 22-854 & 2 ea. 63-1898) | 114-42 | | #10-32x1-1/4" Hex Washer Hd. Cad. (4 used chassis Mtg) |
| Resistors | | | 125-81 | | Strain Relief Grommet |
| 63-1219 | R14 | 22 ohm W.W. 1/2W 20% Ins. Res. | 125-82 | | Strain Relief Grommet |
| 63-1574 | R13 | 1000 ohm 1W 20% Ins. Res. | 126-674 | | Dial Light Shield |
| 63-1782 | R8 | 820 ohm 1/2W 10% Ins. Res. | 138-45 | | Cabinet Grill |
| 63-1786 | R5 | 1000 ohm 1/2W Ins. Res. | 188-34 | | Retaining Ring (used on 63-2269) |
| 63-1800 | R11 | 2200 ohm 1/2W 20% Ins. Res. | 196-172 | | Speaker Gasket |
| 63-1828 | R2 | 10K ohm(2 used) 1/2W 20% Ins. Res. | 202-858 | | Instruction Book (Radio-Phono) |
| 63-1842 | R9 | 22K ohm 1/2W 20% Ins. Res. | S-14041 | | Cobra-Matic Record Changer |
| 63-1856 | R15 | 47K ohm(2 used) 1/2W 20% Ins. Res. | S-15780 | | Cobra Cartridge Assembly |
| 63-1926 | R3 | 2.2 Megohm(3 used) 1/2W 20% Ins. Res. | S-16419 | | Record Adapter Plug & Envelope Assembly |
| 63-1940 | R7 | 4.7 Megohm 1/2W 20% Ins. Res. | S-17651 | L1 | Wavemagnet Assembly |
| 63-1961 | R1 | 15 Megohm 1/2W 20% Ins. Res. | | | |
| 63-1977 | R12 | 150 ohm 1W 10% Ins. Res. | | | |
| 63-2269 | R10 | Tone Control | | | |
| 63-2270 | R6 | Volume Control & Switch | | | |

zero reading. A center zero indicating meter is recommended for this adjustment, but is not absolutely necessary. Reversing the leads of a non-zero center meter, or observing closely when the meter starts to go to the left (negative) of zero will give the same results.

Alignment of this chassis will, in most cases, be unnecessary unless an IF or RF transformer is replaced or the adjustments have been tampered with.

Note: If a 12AT7 is replaced with a 12AU7 or vice versa, the RF portion of this receiver must be realigned.

Correct alignment can only be made if the following procedure is followed:

A vacuum tube voltmeter with isolation resistor of 2,000,000 ohms in series with the hot lead will serve for FM adjustments. This lead should be shielded.

An AC output meter connected across the primary or secondary of the output transformer will be satisfactory for all AM adjustments.

The signal generator output should be kept just high enough to get an indication on the meter.

(a) Vacuum Tube Voltmeter Lug 7 on discriminator transformer to chassis (half discriminator load).

(b) Vacuum Tube Voltmeter Lug 5 on discriminator transformer to chassis (full discriminator load).

(c) Vacuum Tube Voltmeter from Limiter Grid to Chassis.

(d) Loosen Slugs by applying a hot iron to the cement.

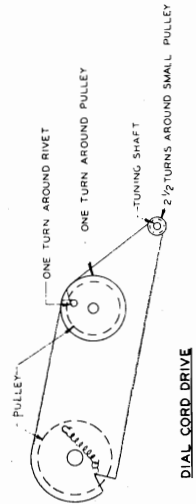
The 7H04Z chassis incorporates a superheterodyne circuit with two stages of IF, on the FM Band, and two stages on the AM Band. There is one stage of RF amplification on the FM Band.

When adjustments are made on the 7H04Z or any AC-DC chassis, a line isolation transformer (110-V input to 110-V output) is recommended in order to avoid a "hot" chassis. If an isolation transformer is not available, check the AC voltage between chassis and bench ground, and if there is any indication of voltage, reverse the plug before handling the set.

The IF transformers and the discriminator transformer are the new permeability tuned type. The advantage of an IF transformer of this type is its extreme stability under various humidity and temperature conditions. The upper coil is the secondary and the lower the primary. When adjusting these IF and discriminator transformers, tuning wrench 68-19 can be inserted into the top slug, rotated until maximum output is obtained and then dropped down to the lower slug and the same operation repeated. The tuning wrench is so designed that turning one slug does not affect the adjustment of the others.

FM IF Alignment: Because of the wide band pass, it is desirable to use a FM signal generator and a cathode ray oscilloscope when aligning the FM IF channel. The instruction book for the Zenith Model 800 Signal Generator (Form Z8001) covers complete FM alignment procedure. If visual alignment equipment is unavailable, reasonably accurate alignment can be made by following the procedure outlined in this service note.

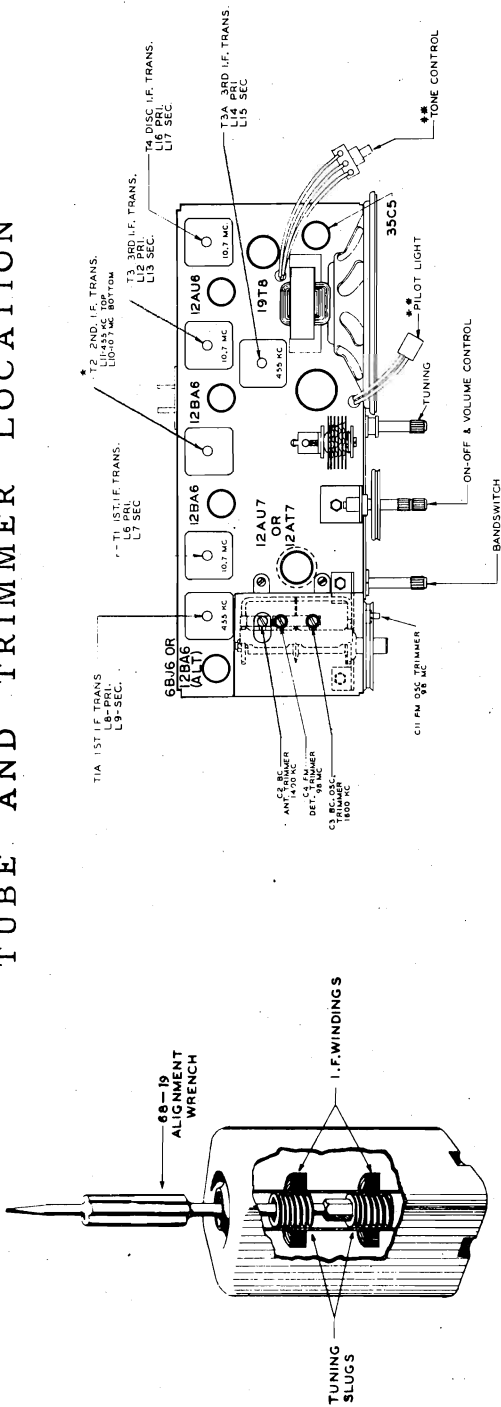
FM Discriminator Alignment: When the secondary of the discriminator is aligned (operation 5) use sufficient signal input to get a good positive and negative indication before setting the slug for



DIAL CORD DRIVE

MODEL H723Z,
Ch. 7H04Z

TUBE AND TRIMMER LOCATION



Detail of
IF Transformer

NOTE: IF TRANSFORMER CORE ADJUSTMENTS ARE MADE BY TURNING TRIMMER C11. PRIMARY ADJUSTMENT, SECONDARY ADJ. TOP.

NOTE: TUNING SLUGS ARE LOCATED ON TUNING CONTROL AND PILOT LIGHT.

ALIGNMENT PROCEDURE

| Operation | Connect Oscillator to Converter | Dummy Antenna | Input Signal Frequency | Band | Set Dial To | Adj. Trimmers | Purpose |
|------------|-------------------------------------------------------|---------------|-------------------------|------|-------------|----------------------------------------------------|-----------------------------------------------------|
| 1 | Pin 2-12AT7 or 12AU7 Converter | .05 Mfd. | 455 Kc. Modulated | BC | 600 Kc. | L8, 9, 11, 14; 15 | Align I. F. channel for maximum output. |
| 2 | 2 turns loosely cpld. to wavemagnet | | 1600 Kc. Modulated | BC | 1600 Kc. | C3 | Set oscillator to dial scale. |
| 3 | 2 turns loosely cpld. to wavemagnet | | 1400 Kc. Modulated | BC | 1400 Kc. | C2 | Align antenna stage. |
| 4 (a) | Pin 1 (grid) on 12AU6 limiter. | .05 Mfd. | 10.7 Mc. Unmodulated | FM | | L16 coil slug Primary discr. | Align primary of discriminator for maximum reading. |
| 5 (b) | Pin 1 (grid) on 12AU6 limiter. | .05 Mfd. | 10.7 Mc. Unmodulated | FM | | L17 coil slug sec. of discr. | Adjust secondary of discriminator for zero reading. |
| 6 (c) | Pin 1 (grid) on 12BA6 2nd IF. | .05 Mfd. | 10.7 Mc. Unmodulated | FM | | L12 and 13 Prim. and Sec. of 3rd IF trans. | Align 3rd IF transformer for maximum reading. |
| 7 (c) | Pin 1 (grid) on 12BA6 1st IF. | .05 Mfd. | 10.7 Mc. Unmodulated | FM | | L10 Prim. of 2nd IF transformer. | Align 2nd IF transformer for maximum reading. |
| 8 (c) | Pin 2 (grid) on 12AT7 or 12AU7 converter tube socket. | .05 Mfd. | 10.7 Mc. Unmodulated | FM | | L6 and L7 Prim. and Sec. of 1st IF transformer. | Align 1st IF transformer for maximum reading. |
| 9 (c) | Antenna Post FM (Re-move line ant.) | 270 ohms | 98 Mc. Unmodulated | FM | 98 Mc. | C11 Osc. Coil. | Set Oscillator to dial scale. |
| 10 (c) (d) | | 270 ohms | 98 Mc. Unmodulated | FM | 98 Mc. | C4 Det. Coil. | Align det. stage to maximum reading. |

MODEL H723Z,
Ch. 7H04Z

PARTS LIST

| PART NO. | DIAG. NO. | DESCRIPTION | PART NO. | DIAG. NO. | DESCRIPTION | PART NO. | DIAG. NO. | DESCRIPTION |
|-----------------------|-----------|-------------------------------------------------|----------|-----------|-----------------------------------------------|----------|-----------|-----------------------------------------------------------------|
| DIAL ASSEMBLY | | | | | | | | |
| 46-859 | | Band Switch Knob | 22-1775 | C24 | .047 Mfd. | 16-656 | | Packing Carton |
| 46-860 | | Tuning Control Knob | 22-1852 | C5 | 7.5 Mmfd. Ceramic | 19-175 | | Coil Mtg. Clip (Used on S-17340) |
| 46-900 | | Volume Control Knob | 22-2253 | C11 | Trimmer Cond. (Slug Tuned) | 24-535 | | Line Cord Plug Cover |
| 59-251 | | Dial Pointer | 22-2255 | C1 | Variable Gang Two Sect. B.C. Two Section F.M. | 49-689 | SP1 | 5-1/4" PM Speaker ZC5091 Cone & Voice Coil |
| 80-69 | | Dial Cord Tension Spring | 22-2256 | C10 | 65 Mmfd. Ceramic | 54-129 | | Speed Nut (9 used to mt. Grille & Baffle) |
| 188-129 | | Retaining Ring | 22-2257 | C12 | 16 Mmfd. Ceramic | 54-271 | | 6-32 X 1/4" Palmut Steel |
| S-17334 | | Tuning Shaft & Pulley Assem. | 22-2258 | C9 | 85 Mmfd. Ceramic | 57-1686 | | (1 used on ea. I.F.) |
| S-17336 | | Tuning Shaft Brkt. & Ins. | 22-2276 | C28 | Dual Ceramic - .01 Mfd. | 57-1690 | | Emblem Plate |
| S-17350 | | Strip Assem. | 22-2278 | C29 | 12 Mmfd. Ceramic | 57-1717 | | Emblem Mtg. Plate |
| S-17467 | | Dial Cord & Eyelet Assem. Brkt. & Pulley Assem. | | | | 58-188 | | Chassis Bottom Plate |
| COILS & CHOKES | | | | | | | | |
| 20-328 | L5 | F.M. Osc. Coil | 63-686 | R18 | 150 Ohm W.W. 1/2W 10% Ins. Res. | 78-806 | | Two Prong Plug |
| 20-331 | L4 | F.M. Mixer " | 63-1450 | R13 | 22 Ohm W.W. 1W 20% Ins. Res. | 78-869 | | Two Contact Socket (Cab. Back) |
| 20-333 | L18 | R.F. Choke " | 63-1527 | R12 | 1000 Ohm W.W. 3W 20% Ins. Res. | 78-871 | | Miniature Tube Socket |
| 20-335 | L2 | R.F. Choke " | 63-1744 | R2 | 100 Ohm 1/2W 20% Ins. Res. | 78-903 | | Miniature Tube Socket |
| 20-336 | L1 | R.F. Plate Load Coil | 63-1758 | R5 | 220 Ohm 1/2W 20% Ins. Res. (5 Used) | 83-1056 | | Miniature Tube Socket |
| 95-1102 | T3A | F.M. Antenna Coil | 63-1782 | R11 | 820 Ohm 1/2W 10% Ins. Res. | 83-1829 | | Wavemagnet Mtg. Strip |
| 95-1150 | T3 | 3rd. I.F. Trans. 455KC (2 Used) | 63-1800 | R14 | 2200 Ohm 1/2W 20% Ins. Res. | 85-501 | | Insulator Strip |
| 95-1153 | T4 | Disc. Trans. 10.7 MC | 63-1828 | R4 | 10K Ohm 1/2W 20% Ins. Res. | 85-501 | | Band Switch |
| 95-1250 | T1A | 1st. I.F. Trans. 455KC | 63-1835 | R15 | 15K Ohm 1/2W 20% Ins. Res. | 97-293 | | Chassis Mtg. Stud (2 Used) |
| 95-1251 | T2 | 2nd. I.F. Trans. 10.7 MC & 455 KC | 63-1856 | R19 | 47K Ohm 1/2W 20% Ins. Res. | 110-152 | | Grill Cloth |
| S-17340 | L3 | B.C. Osc. Coil Assem. | 63-1870 | R8 | 100K Ohm 1/2W 20% Ins. Res. (3 Used) | 112-281 | | #10 X 3/4" Truss Hd. S.T. Stat. Br. Screw (2 Used Chassis Mtg.) |
| CONDENSERS | | | | | | | | |
| 22-3 | C6 | .01 Mfd. Ceramic Disc. (9 Used) | 63-1876 | R16 | 150K Ohm 1/2W 10% Ins. Res. (2 Used) | 114-297 | | #6 X 1/4" Hex Hd. S.T. (4 Used on S-17679 & 6 Used 57-1717) |
| 22-5 | C26 | 110 Mmfd. " " | 63-1898 | R17 | 470K Ohm 1/2W 20% Ins. Res. (2 Used) | 114-356 | | #6-32 X 1-1/4" Hex Hd. S.T. Screw (Used on 212-7) |
| 22-6 | C22 | 470 Mmfd. Ceramic (or 22-1669) | 63-1912 | R9 | 1 Megohm 1/2W 20% Ins. Res. | 126-618 | | Tube Shield |
| 22-229 | C21 | .005 Mfd. | 63-1926 | R7 | 2.2 Megohm 1/2W 20% Ins. Res. (2 Used) | 138-42 | | Cabinet Grill |
| 22-448 | C13 | .02 " | 63-1940 | R3 | 4.7 Megohm 1/2W 20% Ins. Res. (2 Used) | 139-91 | | Speaker Baffle |
| 22-830 | C15 | .02 " | 63-1961 | R6 | 15 Megohm 1/2W 20% Ins. Res. | 149-89 | | Iron Core |
| 22-1126 | C23 | .01 " | 63-2143 | R10 | Volume Control & Switch | 159-69 | | Plug Button |
| 22-1158 | C16 | .05 " | 63-2424 | R21 | 39 Ohm W.W. 1W 10% Ins. Res. | 196-153 | | Speaker Gasket |
| 22-1220 | C14 | .002 " | | | | 202-697 | | F.M. Instruction Book |
| 22-1507 | C19 | 25 Mmfd. Ceramic | 11-85 | | Line Cord & Plug (6 ft.) | 202-860 | | Instruction Book |
| 22-1669 | C7 | 100 " | 12-1070 | | Wavemagnet Mtg. Brkt. | 212-7 | SE1 | Selenium Rectifier |
| 22-1675 | C8 | 150 " | 14-1272 | | Plastic Table Cabinet for H723UZ | S-17366 | | Cab. Back Assem. |
| 22-1676 | C20 | .001 Mfd. " (2 Used) | | | | S-17679 | | Gang Cond. Shield & Terminal Strip Assem. |
| 22-1757 | C18, C17 | Elect. Cond. 40 Mfd. - 150V - 80 Mfd. 150V | | | | S-17696 | L19 | Wavemagnet Assem. |
| | | | | | | S-17855 | L21 | Choke Coil Assem. |
| | | | | | | S-17856 | L20 | Loop Loading Coil Assem. |
| MISCELLANEOUS Cont'd. | | | | | | | | |
| | | | | | | | | Packing Carton |
| | | | | | | | | Coil Mtg. Clip (Used on S-17340) |
| | | | | | | | | Line Cord Plug Cover |
| | | | | | | | | 5-1/4" PM Speaker ZC5091 Cone & Voice Coil |
| | | | | | | | | Speed Nut (9 used to mt. Grille & Baffle) |
| | | | | | | | | 6-32 X 1/4" Palmut Steel |
| | | | | | | | | (1 used on ea. I.F.) |
| | | | | | | | | Emblem Plate |
| | | | | | | | | Emblem Mtg. Plate |
| | | | | | | | | Chassis Bottom Plate |
| | | | | | | | | Two Prong Plug |
| | | | | | | | | Two Contact Socket (Cab. Back) |
| | | | | | | | | Miniature Tube Socket |
| | | | | | | | | Miniature Tube Socket |
| | | | | | | | | Miniature Tube Socket (3 Used) |
| | | | | | | | | Miniature Tube Socket |
| | | | | | | | | Miniature Tube Socket |
| | | | | | | | | Wavemagnet Mtg. Strip |
| | | | | | | | | Insulator Strip |
| | | | | | | | | Band Switch |
| | | | | | | | | Chassis Mtg. Stud (2 Used) |
| | | | | | | | | Grill Cloth |
| | | | | | | | | #10 X 3/4" Truss Hd. S.T. Stat. Br. Screw (2 Used Chassis Mtg.) |
| | | | | | | | | #6 X 1/4" Hex Hd. S.T. (4 Used on S-17679 & 6 Used 57-1717) |
| | | | | | | | | #6-32 X 1-1/4" Hex Hd. S.T. Screw (Used on 212-7) |
| | | | | | | | | Tube Shield |
| | | | | | | | | Cabinet Grill |
| | | | | | | | | Speaker Baffle |
| | | | | | | | | Iron Core |
| | | | | | | | | Plug Button |
| | | | | | | | | Speaker Gasket |
| | | | | | | | | F.M. Instruction Book |
| | | | | | | | | Instruction Book |
| | | | | | | | | Selenium Rectifier |
| | | | | | | | | Cab. Back Assem. |
| | | | | | | | | Gang Cond. Shield & Terminal Strip Assem. |
| | | | | | | | | Wavemagnet Assem. |
| | | | | | | | | Choke Coil Assem. |
| | | | | | | | | Loop Loading Coil Assem. |

MODEL H724Z,
Ch. 7H02Z

The 7H02Z chassis incorporates a superheterodyne circuit with two stages of IF, on the FM Band, and two stages on the AM Band. There is one stage of RF amplification on the FM Band.

When adjustments are made on the 7H02Z or any AC-DC chassis, a line isolation transformer (110-V input to 110-V output) is recommended in order to avoid a "hot" chassis. If an isolation transformer is not available, check the AC voltage between chassis and bench ground, and if there is any indication of voltage, reverse the plug before handling the set.

The I.F. transformers and the discriminator transformer are the new permeability tuned type. The advantage of an IF transformer of this type is its extreme stability under various humidity and temperature conditions. The upper coil is the secondary and the lower the primary. When adjusting these IF and discriminator transformers, tuning wrench 68-19 can be inserted into the top slug, rotated until maximum output is obtained and then dropped down to the lower slug and the same operation repeated. The tuning wrench is so designed that turning one slug does not affect the adjustment of the other.

FM IF Alignment: Because of the wide band pass, it is desirable to use a FM signal generator and a cathode ray oscilloscope when aligning the FM IF channel. The instruction book for the Zenith Model 800 Signal Generator (Form Z8001) covers complete FM alignment procedure. If visual alignment equipment is unavailable, reasonably accurate alignment can be made by following the procedure outlined in this service note.

FM Discriminator Alignment: When the secondary of the discriminator is aligned (operation 5) use sufficient signal input to get a good positive and negative indication before setting the slug for

zero reading. A center zero indicating meter is recommended for this adjustment, but is not absolutely necessary. Reversing the leads of a non-zero center meter, or observing closely when the meter starts to go to the left (negative) of zero will give the same results.

Alignment of this chassis will, in most cases, be unnecessary unless an IF or RF transformer is replaced or the adjustments have been tampered with.

Correct alignment can only be made if the following procedure is followed:

A vacuum tube voltmeter with an isolation resistor of 2,000,000 ohms in series with the hot lead will serve for FM adjustments. This lead should be shielded.

An AC output meter connected across the primary or secondary of the output transformer will be satisfactory for all AM adjustments.

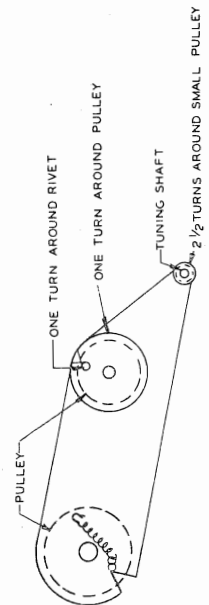
The signal generator output should be kept just high enough to get an indication on the meter.

(a) Vacuum Tube Voltmeter Lug 7 on discriminator transformer to chassis (half discriminator load).

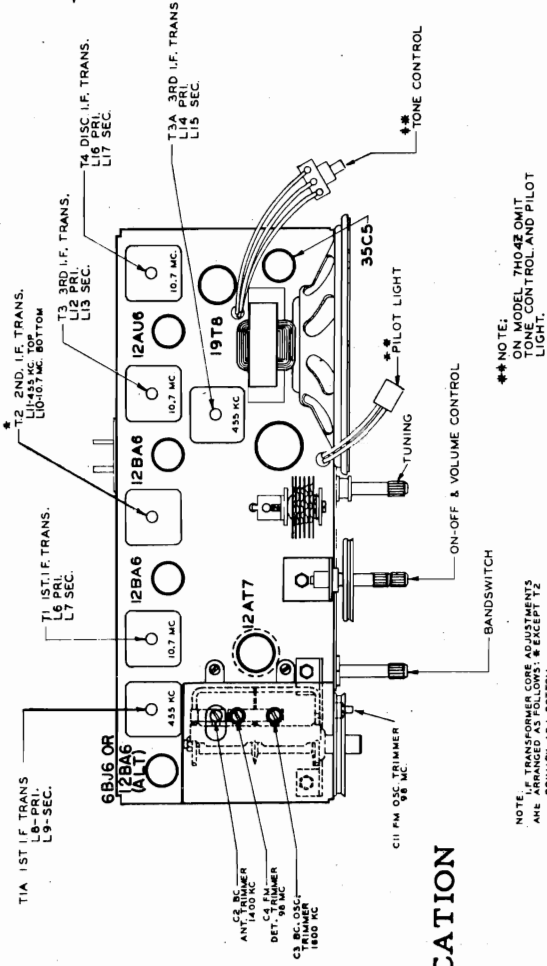
(b) Vacuum Tube Voltmeter Lug 5 on discriminator transformer to chassis (full discriminator load).

(c) Vacuum Tube Voltmeter from Limiter Grid to Chassis.

(d) Loosen Slugs by applying a hot iron to the cement.



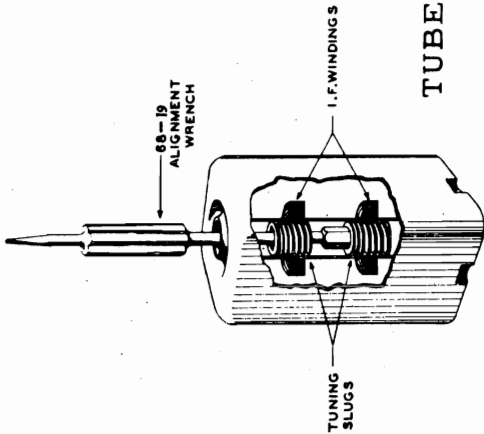
MODEL H724Z,
Ch. 7H02Z



TUBE AND TRIMMER LOCATION

NOTE: IF TRANSFORMER CORE ADJUSTMENTS ARE ARRANGED AS FOLLOWS: EXCEPT T2 SECONDARY ADJ. TO TOP SECONDARY ADJ. TO BOTTOM

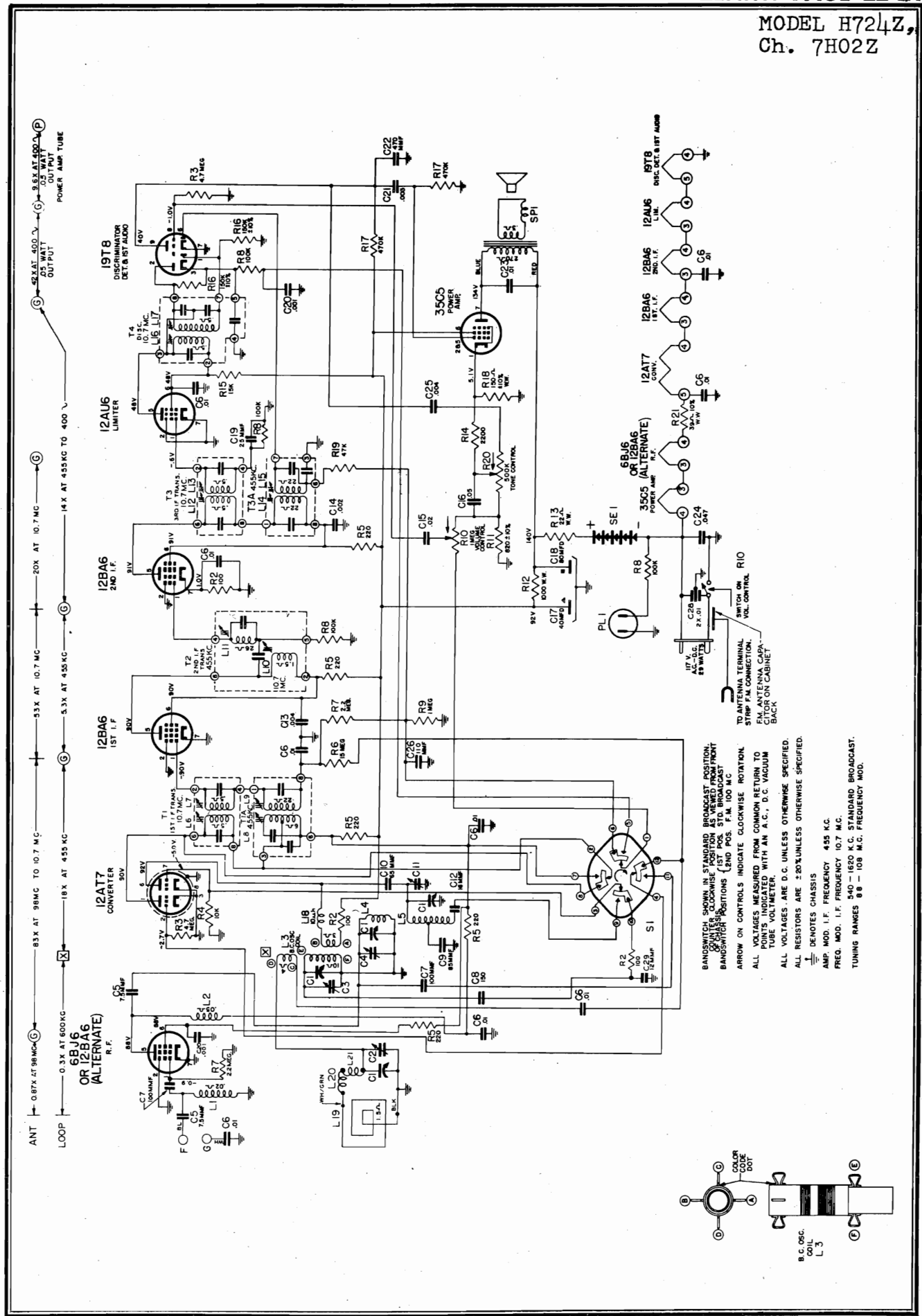
***NOTE: MODEL 7H04E OMIT ON-TONE CONTROL AND PILOT LIGHT.



Detail of IF Transformer

ALIGNMENT PROCEDURE

| Operation | Connect Oscillator to | Dummy Antenna | Input Signal Frequency | Band | Set Dial To | Adj. Trimmers | Purpose |
|------------|----------------------------------------------|---------------|-----------------------------|------|-------------|-------------------------------------------------|-----------------------------------------------------|
| 1 | Pin 2 12AT7 Converter | .05 Mfd. | 455 Kc. Modulated | BC | 600 Kc. | L8, 9, 11, 14, 15 | Align I. F. channel for maximum output. |
| 2 | 2 turns loosely cpd. to wavemagnet | | 1600 Kc. Modulated | BC | 1600 Kc. | C 3 | Set oscillator to dial scale. |
| 3 | 2 turns loosely cpd. to wavemagnet | | 1400 Kc. Modulated | BC | 1400 Kc. | C 2 | Align antenna stage. |
| 4 (a) | Pin 1 (grid) on 12AU6 limiter. | .05 Mfd. | Unmodulated 10.7 Mc. | FM | 100 | L16 coil slug Primary discr. | Align primary of discriminator for maximum reading. |
| 5 (b) | Pin 1 (grid) on 12AU6 limiter. | .05 Mfd. | Unmodulated 10.7 Mc. | FM | 100 | L17 coil slug sec. of discr. | Adjust secondary of discriminator for zero reading. |
| 6 (c) | Pin 1 (grid) on 12BA6 2nd IF. | .05 Mfd. | Unmodulated 10.7 Mc. | FM | 100 | L12 and L13 Prim. and Sec. of 3rd IF trans. | Align 3rd IF transformer for maximum reading. |
| 7 (c) | Pin 1 (grid) on 12BA6 1st IF. | .05 Mfd. | 10.7 Mc. Unmodulated | FM | 100 | L10 Prim. of 2nd IF transformer | Align 2nd IF transformer for maximum reading. |
| 8 (c) | Pin 2 (grid) on 12AT7 converter tube socket. | .05 Mfd. | 10.7 Mc. Unmodulated 98 Mc. | FM | 100 | L6 and L7 Prim. and Sec. of 1st IF transformer. | Align 1st IF transformer for maximum reading. |
| 9 (c) | Antenna Post FM (Remove line ant.) | 270 ohms | Unmodulated 98 Mc. | FM | 98 Mc. | C11 Osc. Coil Slug | Set Oscillator to dial scale. |
| 10 (c) (d) | | 270 ohms | Unmodulated 98 Mc. | FM | 98 Mc. | C4 Det. Coil Slug | Align det. stage to maximum reading. |



MODEL H724Z,
Ch. 7H02Z

PARTS LIST

| DIAG. PART NO. | DIAG. NO. | DESCRIPTION | DIAG. PART NO. | DIAG. NO. | DESCRIPTION | DIAG. PART NO. | DIAG. NO. | DESCRIPTION |
|---------------------------|-----------|--------------------------------------------|----------------|-----------|---------------------------------------------------|----------------|-----------|---------------------------------------------------------------|
| DIAL ASSEMBLY | | | | | | | | |
| 26-451 | | Dial Scale | 22-1757 | C17, C18 | Elect. Cond. 40 Mfd. - 150V X 80 Mfd. | 49-689 | SPI | MISCELLANEOUS Cont. 5-1/4" PM Speaker |
| 46-859 | | Band Switch Knob | 22-1775 | C-24 | .047 Mfd. | 54-129 | | ZC5091 Cone & Voice Coil |
| 46-860 | | Tuning Control Knob | 22-1852 | C5 | 7.5 Mmfd. Ceramic (2 Used) | 54-271 | | Speed Nut (9 used to mt. Grill & Baffle) |
| 46-900 | | Vol. Control Knob | 22-2253 | C11 | Trimmer Cond. (Slug Tuned) | 54-305 | | 6-32 X 1/4" Palmut (1 used on ea. I.F.) |
| 46-901 | | Tone Control Knob | 22-2255 | C1 | Variable Gang Two Section B.C. & Two Section F.M. | | | Palmut Steel Stat. Br. (Used on Chassis Mtg.) |
| 59-251 | | Dial Pointer | 22-2256 | C10 | 65 Mmfd. Ceramic | 57-1686 | | Emblem Plate |
| 78-904 | | Dial Light Socket & Wire | 22-2257 | C12 | 16 Mmfd. Ceramic | 57-1690 | | Emblem Mfg. Plate |
| 80-69 | | Dial Cord Tension Spring | 22-2258 | C9 | 85 Mmfd. Ceramic | 57-1717 | | Chassis Bottom Plate |
| 100-105 | PL1 | Neon Indicator Bulb | 22-2276 | C28 | Dual Ceramic .01 Mfd. - .01 Mfd. | 58-188 | | Two Prong Plug (AC) |
| 188-129 | | Retaining Ring (Used on S-17334 & S-17467) | 22-2278 | C29 | 12 Mmfd. Ceramic | 78-787 | | Two Contact Socket (Cabt. Back) |
| S-17334 | | Tuning Shaft & Pulley Assem. | | | | 78-806 | | Miniature Tube Socket |
| S-17336 | | Tuning Shaft Brkt. & Ins. Strip Assem. | | | | 78-869 | | Miniature Tube Socket |
| S-17350 | | Dial Cord & Eyelet Assem. | | | | 78-870 | | Miniature Tube Socket (3 Used) |
| S-17467 | | Brkt. & Pulley Assem. | | | | 78-871 | | Miniature Tube Socket |
| COILS & CHOKES | | | | | | | | |
| 20-328 | L5 | F.M. Osc. Coil Assem. | 63-686 | R18 | 150 Ohm W.W. 1/2W 10% Ins. Res. | 83-1056 | | Wavemagnet Mtg. Strip |
| 20-331 | L4 | F.M. Mixer Coil | 63-1450 | R13 | 22 Ohm W.W. 1W 20% Ins. Res. | 83-1789 | | Handle Strip (Rubber) |
| 20-333 | L18 | R.F. Choke Coil | 63-1527 | R12 | 1000 Ohm W.W. 3W 20% Ins. Res. | 83-1829 | | Insulator Strip |
| 20-335 | L2 | R.F. Plate Load Coil | 63-1744 | R2 | 100 Ohm 1/2W 20% Ins. Res. (3 Used) | 85-501 | | Band Switch |
| 20-336 | L1 | F.M. Ant. Coil | 63-1758 | R5 | 220 Ohm 1/2W 20% Ins. Res. (5 Used) | 93-487 | | 1/16 X .144 X 3/8 Washer Steel (2 Used on 43-165) |
| 95-1102 | T3A | 3rd. I.F. Trans. 455KC | 63-1782 | R11 | 820 Ohm 1/2W 10% Ins. Res. | 97-293 | | Grill Cloth |
| 95-1150 | T3 | 1st. & 3rd. I.F. Trans. 10.7MC (2 Used) | 63-1800 | R14 | 2200 Ohm 1/2W 20% Ins. Res. | 110-152 | | #10 X 3/4" Truss Hd. S.T. Screw St. Br. (2 Used Chassis Mtg.) |
| 95-1153 | T4 | Disc. Trans. 10.7MC | 63-1828 | R4 | 10K Ohm 1/2W 20% Ins. Res. | 112-281 | | #6-32 X 1-1/4" Hex Hd. S.T. Screw (Used on 212-7) |
| 95-1250 | T1A | 1st. I.F. Trans. 455KC | 63-1835 | R15 | 15K Ohm 1/2W 20% Ins. Res. | 114-356 | | #6 X 3/8 Hex Hd. S.T. Screw (2 Used on 43-165) |
| 95-1251 | T2 | 2nd. I.F. Trans. 10.7MC & 455KC | 63-1856 | R19 | 47K Ohm 1/2W 20% Ins. Res. | 126-618 | | Tube Shield |
| S-17340 | L3 | B.C. Osc. Coil Assem. | 63-1870 | R8 | 100K Ohm 1/2W 20% Ins. Res. (4 Used) | 138-42 | | Cabinet Grille |
| CONDENSERS | | | | | | | | |
| 22-4 | C25 | .004 Mfd. Ceramic | 63-1876 | R16 | 150K Ohm 1/2W 10% Ins. Res. (2 Used) | 139-91 | | Speaker Baffle |
| 22-5 | C26 | 110 Mmfd. Ceramic (Disc) | 63-1898 | R17 | 470K Ohm 1/2W 20% Ins. Res. (2 Used) | 149-89 | | Iron Core (Used on S-17340) |
| 22-6 | C22 | 470 Mmfd. Ceramic | 63-1912 | R9 | 1 Megohm 1/2W 20% Ins. Res. | 159-69 | | Pilot Light Jewel |
| 22-229 | C21 | .005 Mfd. | 63-1926 | R7 | 2.2 Megohm 1/2W 20% Ins. Res. (2 Used) | 171-11 | | Speaker Gasket |
| 22-448 | C13 | .004 Mfd. | 63-1940 | R3 | 4.7 Megohm 1/2W 20% Ins. Res. (2 Used) | 196-153 | | Flexible Handle Sleeve |
| 22-830 | C15 | .02 Mfd. | 63-1961 | R6 | 15 Megohm 1/2W 20% Ins. Res. | 199-103 | | F.M. Inst. Book |
| 22-1126 | C23 | .01 Mfd. | 63-2143 | R10 | Vol. Control & Switch | 202-697 | | Inst. Book |
| 22-1158 | C16 | .05 Mfd. | 63-2144 | R20 | Tone Control | 202-859 | | Selenium Rectifier |
| 22-1220 | C14 | .002 Mfd. | 63-2424 | R21 | 39 Ohm W.W. 1W 10% Ins. Res. | 212-7 | | Selenium Rectifier |
| 22-1507 | C19 | 25 Mmfd. Ceramic | | | | S-13210 | | Strap & Rivet Assem. |
| 22-1669 | C7 | 100 Mmfd. Ceramic (2 Used) | 11-85 | | Line Cord & Plug (6 ft.) | S-17679 | L19 | Gang Cond. Shield & Terminal Assem. |
| 22-1675 | C8 | 150 Mmfd. Ceramic | 12-1070 | | Wavemagnet Mtg. Brkt. | S-17696 | L21 | Wavemagnet Assem. |
| 22-1676 | C20 | .001 Mfd. Ceramic (2 Used) | 14-1273 | | Plastic Cabinet for H724UZ | S-17841 | L20 | Cabt. Back Assem. (Comp.) |
| | | | 16-657 | | Packing Carton | S-17855 | | Choke Coil Assem. |
| | | | 19-175 | | Coil Mtg. Clip | S-17856 | | Loop Loading Coil Assem. |
| | | | 24-535 | | Line Cord Plug Cover | | | |
| | | | 43-165 | | Handle Housing | | | |

The 7G01Z chassis incorporates a superheterodyne circuit with two stages of IF, and one stage of RF amplification on all bands.

When adjustments are made on the 7G01Z or any AC-DC chassis, a line isolation transformer (110 V input to 110 V output) is recommended in order to avoid a "hot" chassis. If an isolation transformer is not available, check the AC voltage between chassis and bench ground, and if there is any indication of voltage, reverse the plug before handling the set.

AM Alignment: The alignment of this chassis on the standard broadcast band is conventional. The alignment slugs in the IF transformers are threaded and screw into the coil forms. The slugs are slotted for a small size fiber screw driver. Do not press hard on the aligning tool or the threads in the coil forms will strip and adjustments will be impossible.

FM RF Alignment: The tuning slugs are attached to threaded shafts and the slugs are varied in the field of the coils by turning the shafts clockwise or counter-clockwise. After adjustment the shafts must be secured with a drop of speaker cement.

FM IF Alignment: The same type of tuning slugs for aligning the AM IF Amplifier are used for the FM I.F.'s. Observe the same precautions when making adjustments.

FM Discriminator Alignment: When the secondary of the discriminator is aligned (operation 5) use sufficient signal input to get a good positive and negative indication before setting the slug for zero reading. A center zero indicating meter is recommended for this adjustment, but is not absolutely necessary. Reversing the leads of a non-zero center meter, or observing closely when the meter starts to go to the left (negative) of zero will give the same results.

Alignment of this chassis will in most cases be unnecessary unless an IF or RF transformer is replaced or the adjustments have been tampered with.

Correct alignment can only be made if the following procedure is followed:

A vacuum tube voltmeter with an isolation resistor of 2,000,000 ohms in series with the hot lead will serve for FM adjustments. This lead should be shielded.

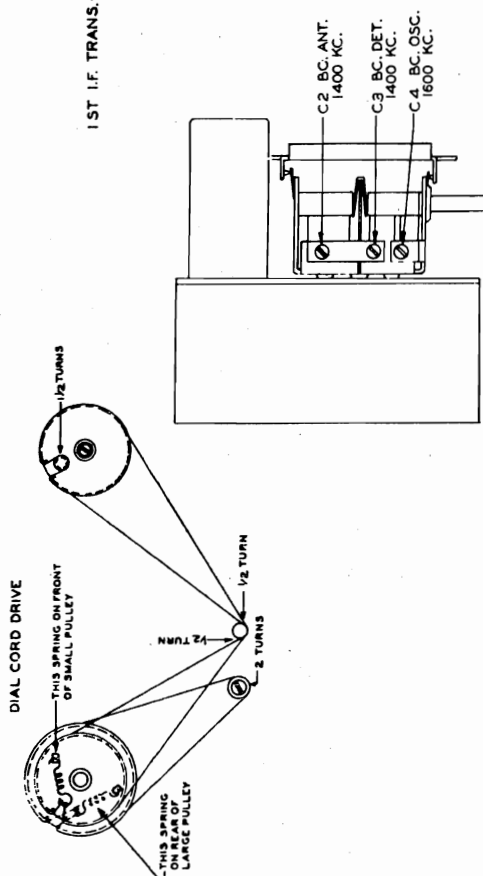
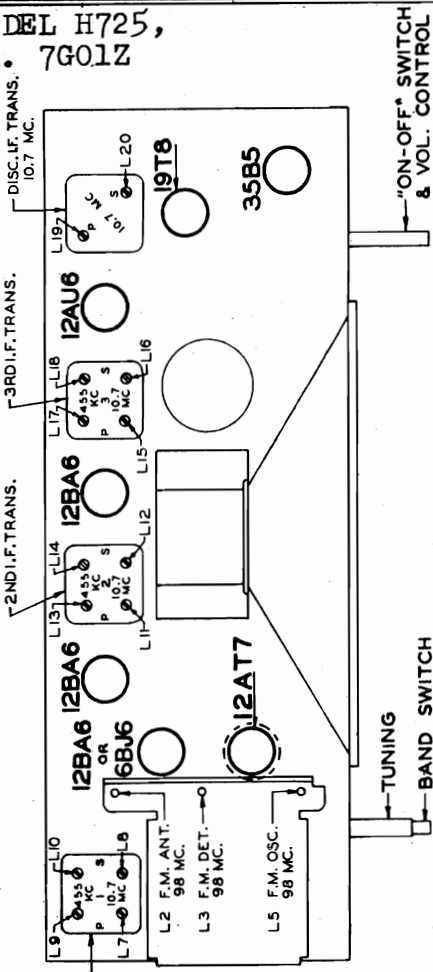
An AC output meter connected across the primary or secondary of the output transformer will be satisfactory for all AM adjustments.

The signal generator output should be kept just high enough to get an indication on the meter.

- (a) Vacuum Tube Voltmeter Lug 6 on discriminator transformer to chassis (half discriminator load).
- (b) Vacuum Tube Voltmeter Lug 3 on discriminator transformer to chassis (full discriminator load).
- (c) Vacuum Tube Voltmeter from Limiter Grid to Chassis.
- (d) Loosen Slugs by applying a hot iron to the cement.

MODEL H725,
Ch. 7G01Z

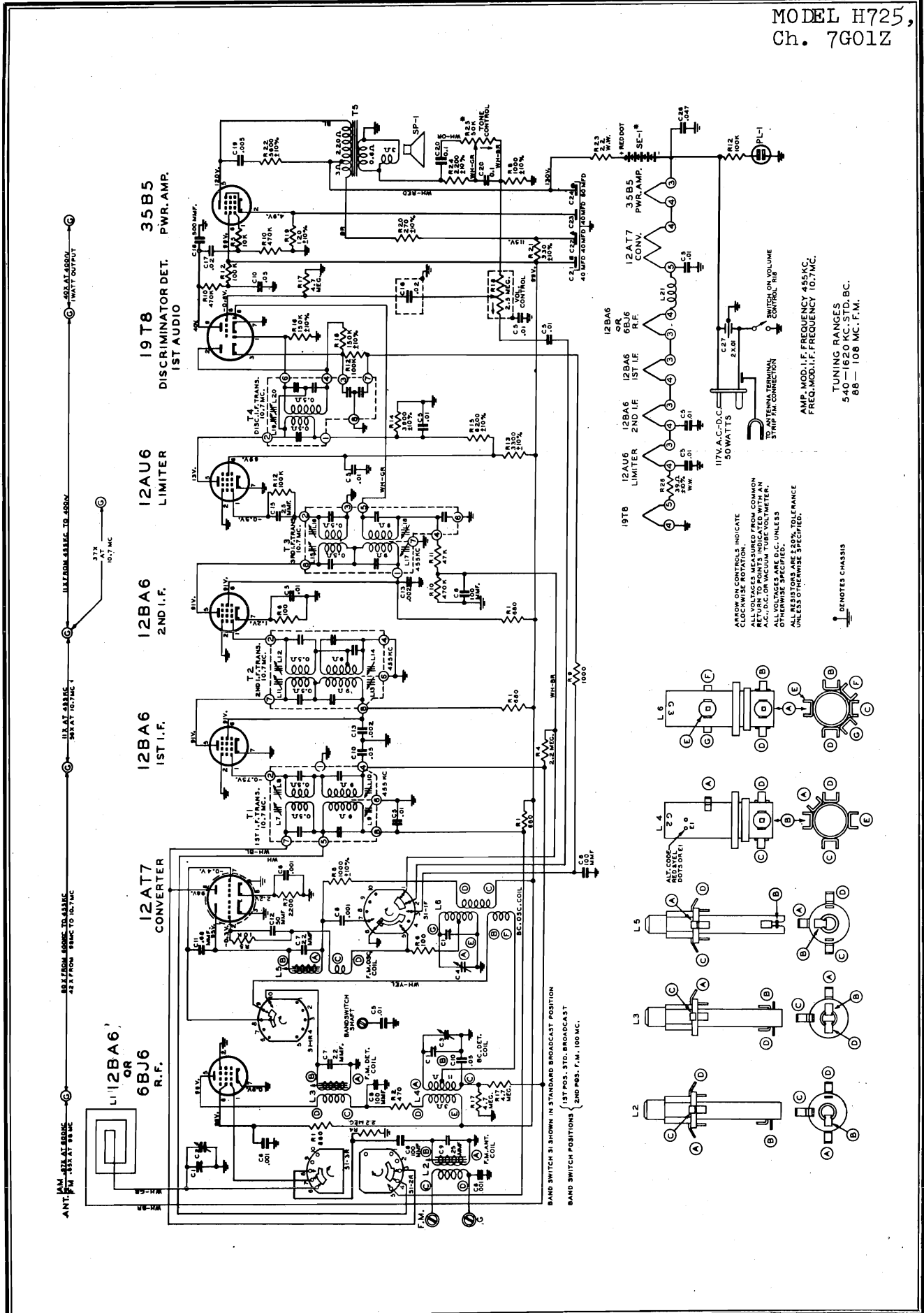
TUBE AND TRIMMER LOCATION



ALIGNMENT PROCEDURE

| Operation | Connect Oscillator To | Dummy Antenna | Input Signal Frequency | Band | Set Dial To | Adj. Trimmers | Purpose |
|------------|------------------------------------------------------------|---------------|------------------------|------|-------------|--------------------------------------------------|----------------------------------------------------|
| 1 | Pin 7 12AT7 Converter 2 turns loosely cpl'd. to wavemagnet | .05 Mfd. | 455 KC Modulated | BC | 600 Kc | L-9, 10, 13, 14, 17 and 18 | Align I.F. channel for maximum output. |
| 2 | 2 turns loosely cpl'd. to wavemagnet | | 1600 Kc Modulated | BC | 1600 Kc | C4 | Set oscillator to dial scale |
| 3 | 2 turns loosely cpl'd. to wavemagnet | | 1400 Kc Modulated | BC | 1400 Kc | C3 and C2 | Align det. and ant. stages |
| 4 (a) | Pin 1 (grid) on 12AU6 limiter | .05 Mfd. | 10.7 Mc Unmodulated | FM | | L19 coil slug Primary discr. | Align primary of discriminator for maximum reading |
| 5 (b) | Pin 1 (grid) on 12AU6 limiter | .05 Mfd. | 10.7 Mc Unmodulated | FM | | L20 coil slug sec. of discr. | Adjust secondary of discriminator for zero reading |
| 6 (c) | Pin 1 (grid) on 12BA6 2nd. IF. | .05 Mfd. | 10.7 Mc. Unmodulated | FM | | L15 and L16 Prim. and Sec. of 3rd IF transformer | Align 3rd, IF transformer for maximum reading |
| 7 (c) | Pin 1 (grid) on 12BA6 1st, IF. | .05 Mfd. | 10.7 Mc. Unmodulated | FM | | L11 and L12 Prim. IF transformer | Align 2nd, IF transformer for maximum reading |
| 8 (c) | Pin 7 (grid) on 12AT7 converter tube socket | .05 Mfd. | 10.7 Mc Unmodulated | FM | | L7 and L8 Prim. and Sec. of 1st IF transformer | Align 1st, IF Transformer for maximum reading |
| 9 (c) (d) | | 270 ohms | 98 Mc Unmodulated | FM | 98 Mc. | L5 Osc. Coil Slug | Set Oscillator to dial scale |
| 10 (c) (d) | Antenna Post F (Re-move line ant.) | 270 ohms | 98 Mc. Unmodulated | FM | 98 Mc. | L3 and L2 Det. and RF coil Slugs | Align det. and ant. stages to maximum reading |

MODEL H725,
Ch. 7G01Z



ANT. IN AT 80 MC. 117V AC-DC 50 WATTS
 42.7 FROM 98 MC TO 10.7 MC
 117V AC-DC 50 WATTS
 37X AT 10.7 MC
 117V AC-DC 50 WATTS
 117V AC-DC 50 WATTS
 117V AC-DC 50 WATTS
 117V AC-DC 50 WATTS
 117V AC-DC 50 WATTS

12BA6
 1ST I.F.

12BA6
 2ND I.F.

12AU6
 LIMITER

19T8
 DISCRIMINATOR DET.
 1ST AUDIO

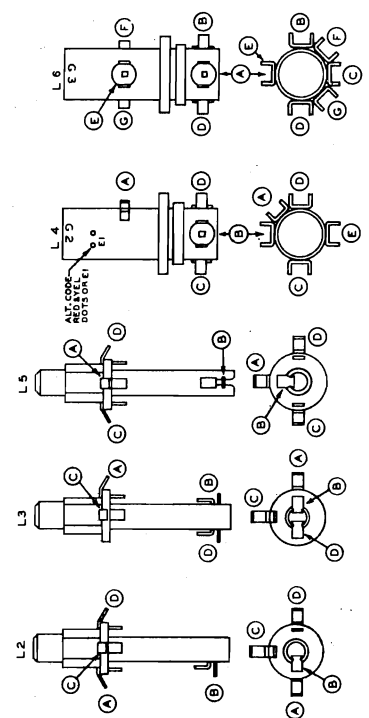
12BA5
 35B5
 PWR. AMP.

12AT7
 CONV.

12BA6
 6BJ6
 R.F.

ARROW ON CONTROLS INDICATE
 CLOCKWISE ROTATION
 ALL VOLTAGES MEASURED FROM COMMON
 A.C. OR D.C. ON VOLUME CONTROL WITH AN
 OTHERWISE SPECIFIED.
 UNLESS OTHERWISE SPECIFIED.

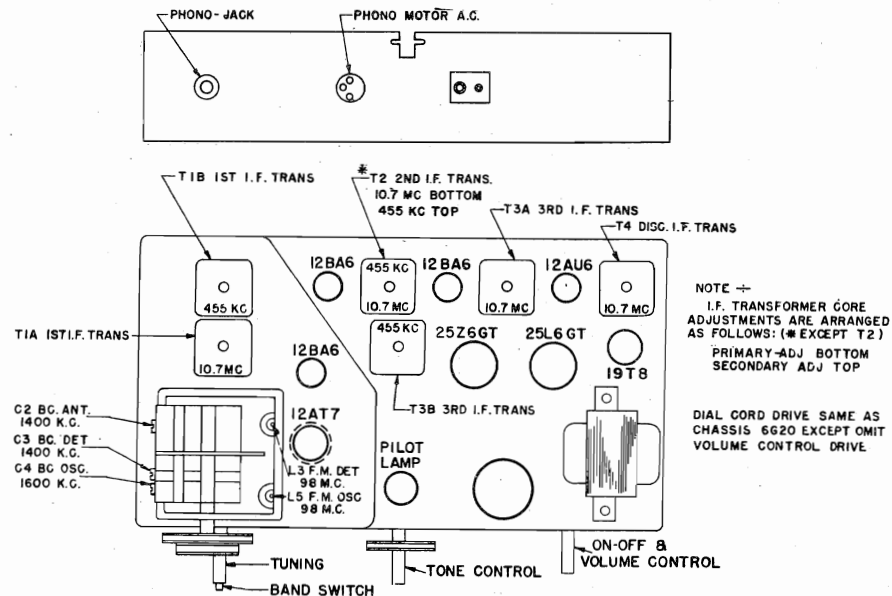
⊥ DENOTES CHASSIS



BAND SWITCH S1 SHOWN IN STANDARD BROADCAST POSITION
 BAND SWITCH POSITIONS { 1ST POS. 370. STANDARD BROADCAST
 2ND POS. F.M. 100 MC.

MODELS H880,
H880R, Ch. 8H20Z

TUBE AND TRIMMER LOCATION



The 8H20Z chassis incorporates a superheterodyne circuit with two stages of IF, on the FM Band, and one stage on the AM Band. There is one stage of RF amplification on all Bands.

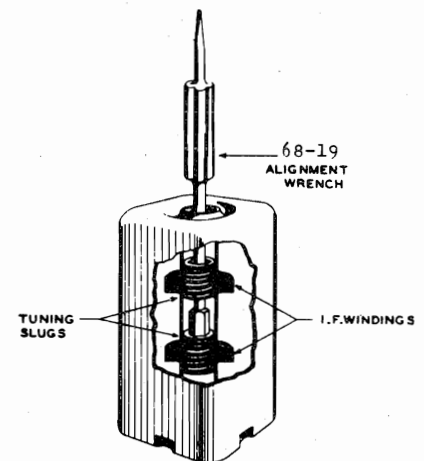
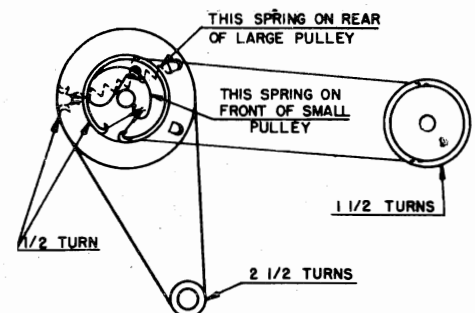
When adjustments are made on the 8H20Z chassis, a line isolation transformer (110 V input to 110V output) is recommended in order to avoid a "hot" chassis. If an isolation transformer is not available, check the AC voltage between chassis and bench ground and if there is any indication of voltage, reverse the plug before handling the set.

FM RF Alignment: The tuning slugs are attached to threaded shafts and the slugs are varied in the field of the coils by turning the shafts clockwise or counter-clockwise. After adjustment the shafts must be secured with a drop of speaker cement.

AM and FM IF Alignment: The AM and FM IF transformers in this receiver are of the new permeability tuned type. The advantage of an IF transformer of this type is its extreme stability under various humidity and temperature conditions. The upper coil is the secondary and the lower the primary. When adjusting these IF transformers the tuning wrench 68-19 can be inserted into the top slug, rotated until maximum output is obtained and then dropped down to the lower slug and the same operation repeated. The tuning wrench is so designed that turning one slug does not affect the adjustment of the other.

FM IF Alignment: Because of the wide band pass, it is desirable to use a FM signal generator and a cathode ray oscilloscope when aligning the FM IF channel. The instruction book for the Zenith Model 800 Signal Generator (Form Z8001) covers complete FM alignment procedure. If visual alignment equipment is unavailable, reasonably accurate alignment can be made by following the procedure outlined below.

FM Discriminator Alignment: When the secondary of the discriminator is aligned (operation 5) use sufficient signal input to get a good positive and negative indication before setting the slug for zero reading. A center zero indicating meter is recommended for this adjustment, but is not absolutely necessary. Reversing the leads of a non-zero center meter, or observing closely when the meter starts to go to the left (negative) of zero will give the same results.

Detail of
IF Transformer

DIAL CORD DRIVE

MODELS H880,
H880R, Ch. 8H20Z

ALIGNMENT PROCEDURE

| Operation | Connect Oscillator To | Dummy Antenna | Input Signal Frequency | Band | Set Dial To | Adj. Trimmers | Purpose |
|------------|----------------------------------------------------------------|---------------|-------------------------|------|-------------|--------------------------------------------------------|-----------------------------------------------------|
| 1 | Pin 2 12AT7 Converter 2 turns loosely cpd. to wavemagnet | .05 Mfd. | 455 Kc. Modulated | BC | 600 Kc. | L9, 10, 12 15 & 16 | Align I. F. channel for maximum output. |
| 2 | 2 turns loosely cpd. to wavemagnet | | 1600 Kc. Modulated | BC | 1600 Kc. | C4 | Set oscillator to dial scale. |
| 3 | 2 turns loosely cpd. to wavemagnet | | 1400 Kc. Modulated | BC | 1400 Kc. | C3, C2 | Align detector and antenna stage. |
| 4 (a) | Pin 1 (grid) on 12AU6 limiter. | .05 Mfd. | 10.7 Mc. Unmodulated | FM | | L17 coil slug Primary discr. | Align primary of discriminator for maximum reading. |
| 5 (b) | Pin 1 (grid) on 12AU6 limiter. | .05 Mfd. | 10.7 Mc. Unmodulated | FM | | L18 coil slug sec. of discr. | Adjust secondary of discriminator for zero reading. |
| 6 (c) | Pin 1 (grid) on 12BA6 2nd. I.F. | .05 Mfd. | 10.7 Mc. Unmodulated | FM | | L13 and L14 Pri. & Sec. of 3rd. IF trans. | Align 3rd. IF transformer for maximum reading. |
| 7 (c) | Pin 1 (grid) on 12BA6 1st. IF. | .05 Mfd. | 10.7 Mc. Unmodulated | FM | | Adjust L11 for maximum reading. | Align 2nd IF transformer for maximum reading. |
| 8 (c) | Pin 2 (grid) on 12AT7 converter tube socket. | .05 Mfd. | 10.7 Mc. Unmodulated | FM | | L7 and L8 Prim. and Sec. of 1st. IF transformer. | Align 1st. IF transformer for maximum reading. |
| 9 (c) | Antenna Post FM (Re- move line ant.) | 270 ohms | 98 Mc. Unmodulated | FM | 98 Mc. | L5 Osc. Coil Slug. | Set Oscillator to dial scale. |
| 10 (c) (d) | | 270 ohms | 98 Mc. Unmodulated | FM | 98 Mc. | L3 Det. Coil Slug | Align det. stage to maximum reading. |

IMPORTANT

Alignment of this chassis will in most cases be unnecessary unless an IF or RF transformer is replaced or the adjustments have been tampered with.

Correct alignment can only be made if the following procedure is followed:

A vacuum tube voltmeter with an isolation resistor of 2,000,000 ohms in series with the hot lead will serve for FM adjustments. This lead should be shielded.

An AC output meter connected across the primary or secondary of the output transformer will be satisfactory for all AM adjustments.

The signal generator output should be kept just high enough to get an indication on the meter.

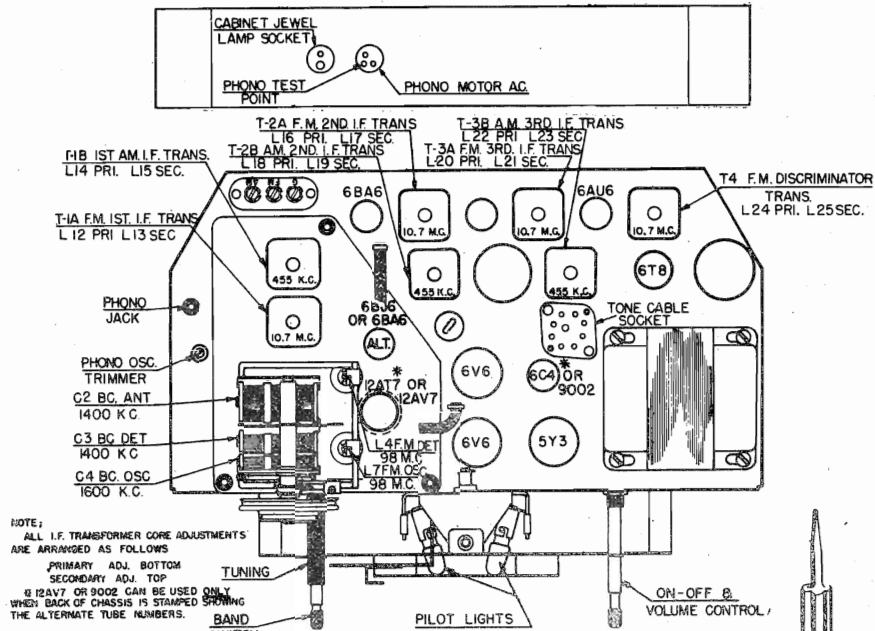
- (a) Vacuum Tube Voltmeter Lug 7 on discriminator transformer to chassis (half discriminator load).
- (b) Vacuum Tube Voltmeter Lug 5 on discriminator transformer to chassis (full discriminator load).
- (c) Vacuum Tube Voltmeter from Limiter Grid to Chassis.
- (d) Loosen Slugs by applying a hot iron to the cement.

MODELS H880,
H880R, Ch. 8H20Z

PARTS LIST

| Dial Assembly | | | | Resistors (Cont'd.) | | | |
|---------------|-----------|-------------------------------------------------------|-----------|---------------------|-----------|---------------------------------------------------------------------------------------------------|-----------|
| Part No. | Diag. No. | Description | | Part No. | Diag. No. | Description | |
| 78-895 | | Dial Light Socket & Wire | | 63-1940 | R32 | 4.7 Megohm 1/2W 20% | Ins. Res. |
| 80-69 | | Dial Cord Spring | | 63-1947 | R3 | 6.8 Megohm 1/2W 20% (2 used) | Ins. Res. |
| 80-746 | | Pulley Retaining Spring | | 63-1954 | R13 | 10 Megohm 1/2W 20% | Ins. Res. |
| 80-747 | | Dial Cord Spring | | 63-1981 | R26 | 120 Ohm 1W 10% | Ins. Res. |
| 100-97 | PL-1 | Pilot Light Bulb | | 63-2068 | R18,R19 | Two Section Candohm | |
| 114-262 | | 8-32x7/16"x1/4" A.F. Hex Hd. S.T. (2 used on S-17149) | | 63-2091 | R15 | 820 Ohm W.W. 1/2W 20% | Ins. Res. |
| 114-297 | | 6-32x1/4" lg. x 1/4" A.F. Hex Hd. (2 used on S-17165) | | 63-2131 | R22 | Volume Control & Switch | |
| 148-122 | | Tuner Arm | | 63-2132 | R11 | Tone Control | |
| 188-30 | | Retaining Ring (used on S-17155) | | 63-2428 | R27 | 82 Ohm W.W. 2W 10% | Ins. Res. |
| S-17149 | | Dial Scale & Brkt. Assem. | | | | <u>Miscellaneous</u> | |
| S-17155 | | Tuning Shaft & Pulley Assem. | | 44-25 | | Phono Jack | |
| S-17157 | | Pointer & Pulley Assem. | | 54-139 | | 3/8-32x9/16 Palnut (1 ea. used on 63-2131 & 63-2132) | |
| S-17158 | | Dial Cord & Eyelet Assem. (Long) | | 54-271 | | 6-32x1/4" Palnut Steel Cad. (1 ea. used on 95-1102-1150-1251-1153 & 2 ea. used on 95-1201 & 1248) | |
| S-17159 | | Dial Cord & Eyelet Assem. (Short) | | | | Two Prong Plug | |
| S-17165 | | Brkt. & Pulley Bushing Assem. | | 58-128 | | Octal Tube Socket (2 used) | |
| | | <u>Coils & Chokes</u> | | 78-755 | | Miniature Tube Socket | |
| 20-337 | L22 | R. F. Choke Coil (6 used) | | 78-869 | | Miniature Tube Socket (3 used) | |
| 95-1102 | T3B | 2nd I. F. Transformer | | 78-870 | | Miniature Tube Socket | |
| 95-1150 | T3B | 2nd I. F. Transformer | | 78-871 | | Three Contact Socket | |
| 95-1153 | T4 | Discriminator Transformer | | 78-896 | | Miniature Tube Socket (9 contact) | |
| 95-1201 | T1A | 1st I. F. Transformer | | 78-903 | | Iron Core Tension Spring (3 used) | |
| 95-1248 | T1B | 1st I. F. Transformer | | 80-780 | | Tuner Arm Tension Spring | |
| 95-1251 | T2 | 2nd I. F. Transformer | | 80-781 | | Ground Spring (2 used) | |
| S-12603 | L20 | Phono Oscillator Coil Assem. | | 80-865 | | Ground Spring (2 used) | |
| S-13997 | L21 | Filament Choke Coil Assem. | | 80-868 | | S.F.D.T. Switch (ant.) | |
| S-15691 | L5 | F. M. Oscillator | | 85-505 | S-2 | Band Switch | |
| S-15743 | L3 | F. M. Detector Coil Assem. | | 85-506 | S-1 | Gang Mtg. Cup Washer (2 used) | |
| S-16344 | L4 | Broadcast Detector Coil Assem. | | 91-1039 | | Auto Trans. | |
| S-16345 | L6 | Broadcast Osc. Coil Assem. | | 95-1188 | T6 | Speaker Output Trans. | |
| S-16408 | L2 | Antenna Choke Coil Assem. | | 95-1272 | T5 | Miniature Tube Shield | |
| | | <u>Condensers</u> | | 126-618 | | Iron Core & Spring | |
| 22-3 | C7 | .01 Mfd. Ceramic (11 used) | 500V | 149-95 | | Speaker Cable & Eyelet Assem. | |
| 22-4 | C21 | .004 Mfd. Ceramic | 500V | | | <u>Cabinet Parts</u> | |
| 22-5 | C8 | 110 Mmfd. Ceramic (or 22-1669) (3 used) | 500V | 2-196 | | Cabinet Back (Phono Section) | |
| 22-177 | C19 | .2 Mfd. | 400V | 11-106 | | Line Cord & Plug (9 ft. long) | |
| 22-669 | C22 | .01 Mfd. | 600V | 14-1254R | | Cabinet for H880R Console Comb. Model | |
| 22-827 | C15 | .1 Mfd. | 200V | 14-1254 | | Cabinet for H880 Console Combination Model | |
| 22-829 | C5 | .05 Mfd. (2 used) | 200V | 16-632 | | Packing Carton | |
| 22-854 | C24 | .0005 Mfd. | 600V | 19-169 | | Record Changer Mounting Clip | |
| 22-1220 | C14 | .002 Mfd. (2 used) | 600V | 46-872 | | Dummy Knob | |
| 22-1367 | C13 | 50 Mmfd. Ceramic (2 used) | 500V | 46-873 | | Tone Control Knob | |
| 22-1506 | C10 | 22 Mmfd. Ceramic (2 used) | 500V | 46-876 | | Tuning Knob | |
| 22-1507 | C28 | 25 Mmfd. Ceramic | 500V | 46-877 | | Volume Control Knob | |
| 22-1676 | C11 | .001 Mfd. Ceramic (4 used) | 500V | 46-899 | | Band Switch Knob | |
| 22-1717 | C20 | .001 Mfd. | 200V | 49-702 | SP-1 | 10" P.M. Speaker | |
| 22-1762 | C12 | 1 Mmfd. Ceramic | 500V | | | ZC-1061 Cone | |
| 22-1775 | C18 | .047 Mfd. (Molded) | 400V | 57-1481 | | Esc. Clamping Ring (4 used) | |
| 22-1863 | C23 | 10 Mmfd. Ceramic | 500V | 57-1658 | | Escutcheon | |
| 22-2104 | C1 | Three Section Variable | | 57-1731 | | Chassis Bottom Plate | |
| 22-2105 | C26,C27 | Elect. 80-40 | 250V | 70-86 | | #6 x 5/8 Washer Hd. Wood Screw Steel Stat. Br. (12 used to Mt. Backs) | |
| 22-2140 | C6 | 15 Mmfd. Ceramic (2 used) | 500V | 78-847 | | Two Contact Socket | |
| 22-2154 | C25 | Elect. 10 Mfd. | 250V | 80-604 | | Hinge Spring (2 used) | |
| 22-2240 | C16 | Trimmer Cond. | | 93-1059 | | Felt Washer (used on 46-873) | |
| 22-2276 | C29 | Dual Ceramic .01 Mfd. - .01 Mfd. (3 used) | 500V | 97-293 | | Chassis Mtg. Ins. Stud (3 used) | |
| | | <u>Resistors</u> | | 112-809 | | Record Changer Mtg. Screw (3 used) | |
| 63-1726 | R33 | 39 Ohm 1/2W 10% | Ins. Res. | 114-128 | | #10 x 1/16" Hex Washer Hd. S.T. (3 used Chassis Mtg.) | |
| 63-1744 | R14 | 100 Ohm 1/2W 20% | Ins. Res. | 114-350 | | #8 x 7/16" Hex Hd. Sl. S.T. (4 used on 57-1658) | |
| 63-1758 | R1 | 220 Ohm 1/2W 20% (5 used) | Ins. Res. | 125-56 | | Rubber Grommet (4 used Speaker Mtg.) | |
| 63-1768 | R4 | 390 Ohm 1/2W 10% | Ins. Res. | 156-35 | | Bullet Catch | |
| 63-1772 | R6 | 470 Ohm 1/2W 20% | Ins. Res. | 159-50 | | Cinch Plug Button (4 used on 192-138) | |
| 63-1782 | R21 | 820 Ohm 1/2W 10% | Ins. Res. | 165-9 | | Glides (2 used) | |
| 63-1806 | R25 | 3300 Ohm 1/2W 10% | Ins. Res. | 165-14 | | Glides (2 used) | |
| 63-1814 | R17 | 4700 Ohm 1/2W 20% | Ins. Res. | 188-54 | | Knob Clamping Ring (46-876) | |
| 63-1827 | R5 | 10K Ohm 1/2W 10% | Ins. Res. | 192-138 | | Dial Glass | |
| 63-1828 | R29 | 10K Ohm 1/2W 20% | Ins. Res. | 202-697 | | F.M. Instruction Book | |
| 63-1834 | R28 | 15K Ohm 1/2W 10% | Ins. Res. | 202-878 | | Radio & Phono Instruction Book | |
| 63-1845 | R24 | 27K Ohm 1/2W 10% | Ins. Res. | S-14029 | | Record Changer Variable Speed | |
| 63-1856 | R10 | 47K Ohm 1/2W 20% (3 used) | Ins. Res. | S-15536 | | Record Changer Compt. Hinge Brkt. & Link Assembly (2 used) | |
| 63-1859 | R34 | 56K Ohm 1/2W 10% | Ins. Res. | S-15780 | | Cobra Tone Arm Cartridge Assembly | |
| 63-1869 | R31 | 100K Ohm 1/2W 10% | Ins. Res. | S-17005 | | Record Changer Mtg. Frame & Arm Assembly | |
| 63-1870 | R20 | 100K Ohm 1/2W 20% (2 used) | Ins. Res. | | | Package of 6 - 45 RPM Center Hole Adaptors | |
| 63-1876 | R30 | 150K Ohm 1/2W 10% (2 used) | Ins. Res. | S-16419 | | Low Impedance Loop & Clip Assembly | |
| 63-1884 | R8 | 220K Ohm 1/2W 20% (2 used) | Ins. Res. | S-16841 | L1 | Volume Control Knob Assembly | |
| 63-1898 | R9 | 470K Ohm 1/2W 20% (2 used) | Ins. Res. | S-17167 | | Cabinet Back Assembly (Radio Section) | |
| 63-1912 | R12 | 1 Megohm 1/2W 20% (3 used) | Ins. Res. | S-17871 | | Loop Loading Coil Assembly | |
| 63-1926 | R7 | 2.2 Megohm 1/2W 20% (2 used) | Ins. Res. | S-17328 | L19 | | |

MODELS H1083E, H1084E,
H1086R, H1087R, Ch. 10H20Z



TUBE AND TRIMMER LOCATION

The 10H20Z chassis incorporates a superheterodyne circuit with two stages of IF, on the FM Band, and two stages on the AM Band. There is one stage of RF amplification on all Bands.

FM RF Alignment: The tuning slugs are attached to threaded shafts and the slugs are varied in the field of the coils by turning the shafts clockwise or counter-clockwise. After adjustment the shafts must be secured with a drop of speaker cement.

AM and FM Alignment: The AM and FM IF transformers in this receiver are of the new permeability tuned type. The advantage of an IF transformer of this type is its extreme stability under various humidity and temperature conditions. The upper coil is the secondary and the lower the primary. When adjusting these IF transformers the tuning wrench 68-19 can be inserted into the top slug, rotated until maximum output is obtained and then dropped down to the lower slug and the same operation repeated. The tuning wrench is so designed that turning one slug does not affect the adjustment of the other.

FM IF Alignment: Because of the wide band pass, it is desirable to use a FM signal generator and a cathode ray oscilloscope when aligning the FM IF channel. The instruction book for the Zenith Model 800 Signal Generator (Form Z8001) covers complete FM alignment procedure. If visual alignment equipment is unavailable, reasonably accurate alignment can be made by following the procedure outlined below.

FM Discriminator Alignment: When the secondary of the discriminator is aligned (operation 5) use sufficient signal input to get a good positive and negative indication before setting the slug for zero reading. A center zero indicating meter is recommended for this adjustment, but is not absolutely necessary. Reversing the leads of a non-zero center meter, or observing closely when the meter starts to go to the left (negative) of zero will give the same results.

IMPORTANT

Alignment of this chassis will in most cases be unnecessary unless an IF or RF transformer is replaced or the adjustments have been tampered with.

NOTE: If 12AT7 is replaced by a 12AV7 or vice versa the RF portion of this receiver must be realigned.

Correct alignment can only be made if the following procedure is followed:

A vacuum tube voltmeter with an isolation resistor of 2,000-000 ohms in series with the hot lead will serve for FM adjustments. This lead should be shielded.

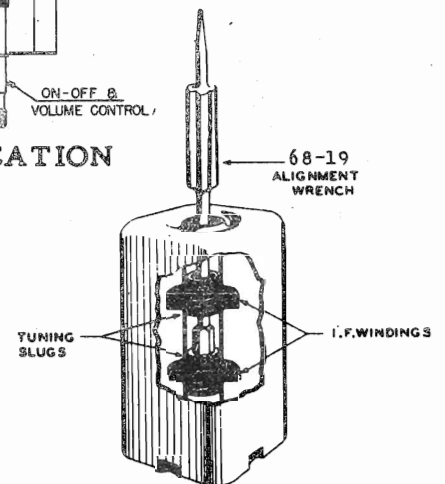
An AC output meter connected across the primary or secondary of the output transformer will be satisfactory for all AM adjustments.

The signal generator output should be kept just high enough to get an indication on the meter.

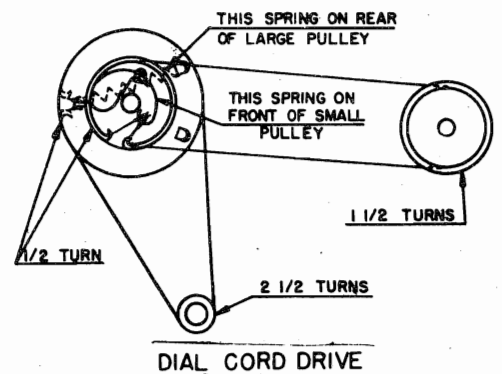
In the event the receiver oscillates during phono operation, adjust C16 4-80 mmf. capacitor to a point at which the oscillation ceases.

This position of no oscillation will sometimes vary with different cartridges, and in this case readjustment of C16 must be made.

- Vacuum Tube Voltmeter Lug 7 on discriminator transformer to chassis (Half discriminator load).
- Vacuum Tube Voltmeter Lug 5 on discriminator transformer to chassis (Full discriminator load).
- Vacuum Tube Voltmeter from Limiter Grid to Chassis.
- Loosen Slugs by applying a hot iron to the cement.



Detail of
IF Transformer



MODELS H1083E, H1084E,
H1086R, H1087R, Ch.
10H20Z

ALIGNMENT PROCEDURE

| Operation | Connect Oscillator To | Dummy Antenna | Input Signal Frequency | Band Set Dial To | Adj. Trimmers | Purpose |
|------------|------------------------------------------------------|---------------|------------------------|------------------|------------------------------------|-----------------------------------------------------|
| 1 | Pin 2 12AV7 or 12AV7 Converter | .05 Mfd. | 455 Kc. Modulated | BC 600 Kc. | Adj. Pri. and Sec. T1B, T2B, T3B | Align I. F. channel for maximum output. |
| 2 | 2 turns loosely cpld. to wavemagnet | | 1600 Kc. Modulated | BC 1600 Kc. | C4 | Set oscillator to dial scale. |
| 3 | 2 turns loosely cpld. to wavemagnet | | 1400 Kc. Modulated | BC 1400 Kc. | C3, C2 | Align detector and antenna stage. |
| 4 (a) | Pin 1 (grid) on 6AU6 limiter. | .05 Mfd. | 10.7 Mc. Unmodulated | FM 100 | Adj. Primary of Discriminator T4 | Align primary of discriminator for maximum reading. |
| 5 (b) | Pin 1 (grid) on 6AU6 limiter. | .05 Mfd. | 10.7 Mc. Unmodulated | FM 100 | Adj. Secondary of Discriminator T4 | Adjust secondary of discriminator for zero reading. |
| 6 (c) | Pin 1 (grid) on 6BA6 2nd. I.F. | .05 Mfd. | 10.7 Mc. Unmodulated | FM 100 | Adj. Pri. and Sec. T3A | Align 3rd. IF transformer for maximum reading. |
| 7 (c) | Pin 1 (grid) on 6B16 1st. IF. | .05 Mfd. | 10.7 Mc. Unmodulated | FM 100 | Adj. Pri. and Sec. T2A | Align 2nd IF transformer for maximum reading. |
| 8 (c) | Pin 2 (grid) on 12AV7 or 12AV7 converter tube socket | .05 Mfd. | 10.7 Mc. Unmodulated | FM 100 | Adj. Pri. and Sec. T1A | Align 1st. IF transformer for maximum reading. |
| 9 (c) | Antenna Post FM (Remove line ant.) | 270 ohms | 98 Mc. Unmodulated | 98 Mc. | L7 Osc. Coil Slug. | Set Oscillator to dial scale. |
| 10 (c) (d) | | 270 ohms | 98 Mc. Unmodulated | 98 Mc. | L4 Det. Coil Slug | Align det. stage to maximum reading. |

PARTS LIST

| Part No. | Diag. No. | Description | Quantity | Part No. | Quantity | Part No. | Quantity |
|----------|-----------|-----------------------------------|----------|----------|----------|----------|----------------------------|
| 78-898 | | Dial Assembly | | 500V | 63-966 | R12 | 4700 ohm 2w 20% |
| 80-69 | | Dial Light Socket & Wire | | 600V | 63-1193 | | 5600 ohm 2w 10% |
| 80-746 | | Dial Cord Spring | | 200V | 63-1452 | R26 | 270 ohm w.w. 2w 10% |
| 80-747 | | Pulley Retaining Spring | | 500V | 63-1716 | | 22 ohm 1/2w 20% |
| 100-67 | PL-1 | Dial Cord Spring | | 200V | 63-1722 | R16 | 33 ohm 1/2w 10% |
| 188-30 | | Retaining Ring (used on S-17155) | | 600V | 63-1723 | R2 | 33 ohm 1/2w 20% |
| S-17155 | | Pointer & Pulley Assem. | | 600V | 63-1744 | R17 | 100 ohm 1/2w 20% |
| S-17157 | | Tuning Shaft & Pulley Assem. | | 600V | 63-1758 | R3 | 220 ohm 1/2w 20% |
| S-17158 | | Dial Cord & Eyelet Assem. (Long) | | 500V | 63-1764 | R24 | 330 ohm 1/2w 10% |
| S-17258 | | Dial Cord & Eyelet Assem. (Short) | | 500V | 63-1771 | R8 | 470 ohm 1/2w 10% |
| S-17261 | | Dial Scale & Brkt. Assem. | | 200V | 63-1772 | R7 | 470 ohm 1/2w 20% |
| 20-337 | | Brkt. & Pulley Pushing Assem. | | 450V | 63-1786 | R9 | 1000 ohm 1/2w 20% |
| 95-1150 | T3A | R. F. Choke Coil (10 used) | | 500V | 63-1793 | R14 | 1500 ohm 1/2w 20% |
| 95-1153 | T4 | 2nd & 3rd I.F. Trans. (F.M.) | | 500V | 63-1799 | R32 | 2200 ohm 1/2w 10% |
| 95-1201 | T1A | Discriminator Trans. | | 500V | 63-1820 | R36 | 6800 ohm 1/2w 10% |
| 95-1248 | T1B | 1st. I.F. Trans. (F.M.) | | 500V | 63-1827 | R6 | 10K ohm 1/2w 10% |
| 95-1249 | T2B | 2nd. I.F. Trans. (B.C.) | | 500V | 63-1842 | R22 | 22K ohm 1/2w -20% (2 used) |
| 95-1254 | T3B | 3rd. I.F. Trans. (B.C.) | | 600V | 63-1845 | R23 | 27K ohm 1/2w 10% |
| S-12603 | L6 | Phone Oscillator Coil Assem. | | 1600V | 63-1848 | R30 | 33K ohm 1/2w 10% |
| S-13997 | L9 | Tone Choke Assem. | | 500V | 63-1849 | R33 | 33K ohm 1/2w 20% |
| S-15691 | L7 | Filament Choke Coil Assem. | | 500V | 63-1856 | R10 | 47K ohm 1/2w 20% |
| S-15743 | L4 | F.M. Det. Coil Assem. | | 500V | 63-1869 | R29 | 100K ohm 1/2w 10% |
| S-16344 | L5 | Broadcast Det. Coil Assem. | | 450V | 63-1870 | R21 | 150K ohm 1/2w 20% |
| | | | | | 63-1876 | R11 | 150K ohm 1/2w 10% |
| | | | | | 63-1884 | R11 | 220K ohm 1/2w 20% |
| | | | | | 63-1890 | R25 | 330K ohm 1/2w 10% |

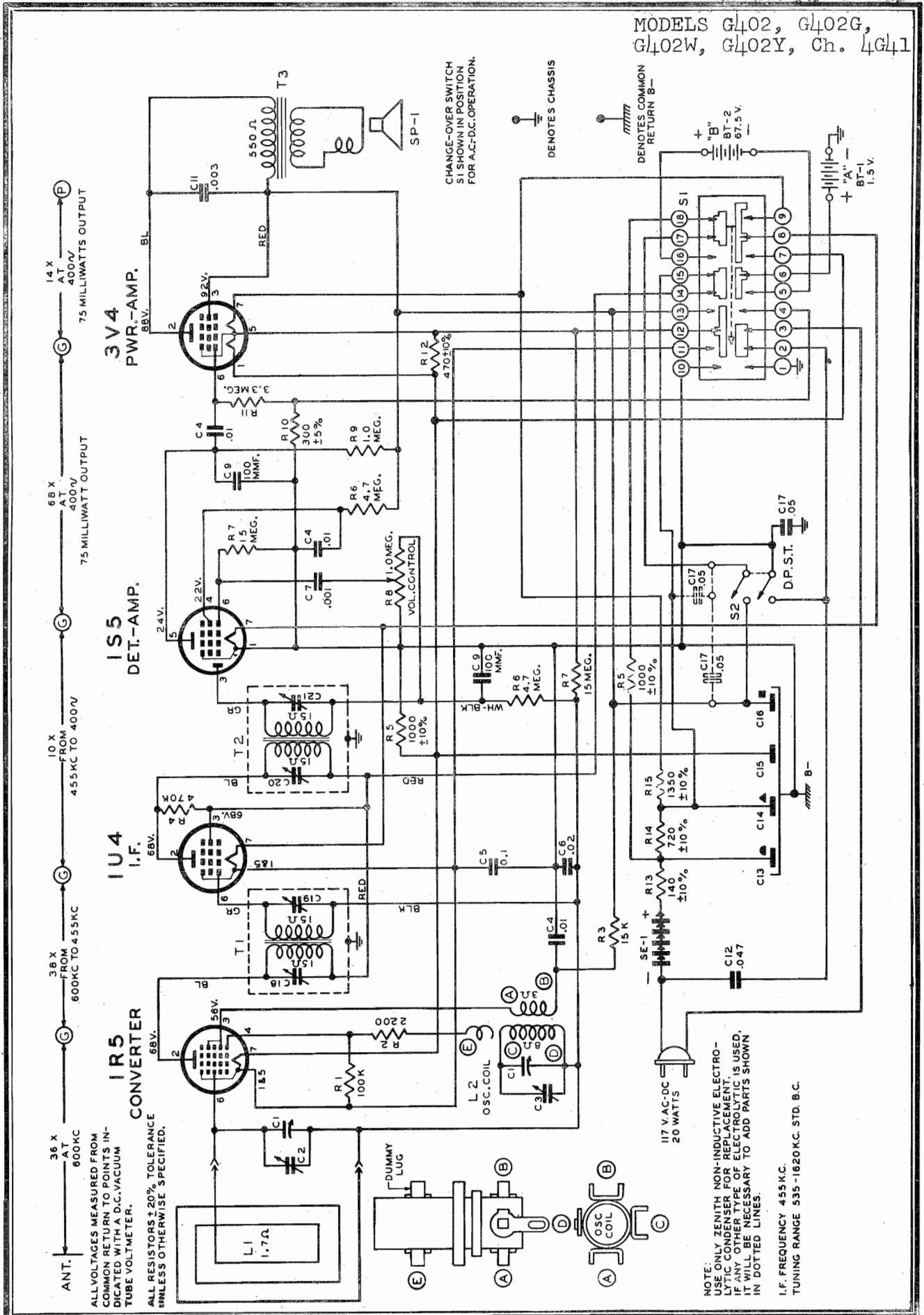
RESISTORS

| Part No. | Diag. No. | Description | Quantity | Part No. | Quantity | Part No. | Quantity |
|----------|-----------|----------------------------------------|----------|----------|----------|----------|----------------------------|
| S-16345 | L6 | Broadcast Osc. Coil Assem. | | 500V | 63-966 | R12 | 4700 ohm 2w 20% |
| S-16408 | L3 | Ant. Choke Coil Assem. | | 600V | 63-1193 | | 5600 ohm 2w 10% |
| 22-2 | C13 | .01 Mfd. Ceramic (9 used) | | 200V | 63-1452 | R26 | 270 ohm w.w. 2w 10% |
| 22-5 | C22 | 110 Mmfd. Ceramic (or 22-1669)(4 used) | | 500V | 63-1716 | | 22 ohm 1/2w 20% |
| 22-171 | C10 | .05 Mfd. | | 200V | 63-1722 | R16 | 33 ohm 1/2w 10% |
| 22-178 | C33 | .05 Mfd. | | 600V | 63-1723 | R2 | 33 ohm 1/2w 20% |
| 22-348 | C32 | .002 Mfd. (Molded) | | 600V | 63-1744 | R17 | 100 ohm 1/2w 20% |
| 22-492 | C14 | .002 Mfd. | | 600V | 63-1758 | R3 | 220 ohm 1/2w 20% |
| 22-829 | C5 | .02 Mfd. | | 500V | 63-1764 | R24 | 330 ohm 1/2w 10% |
| 22-830 | C23 | .02 Mfd. | | 500V | 63-1771 | R8 | 470 ohm 1/2w 10% |
| 22-1203 | C28 | .001 Mfd. | | 200V | 63-1772 | R7 | 470 ohm 1/2w 20% |
| 22-1220 | C17 | .002 Mfd. | | 450V | 63-1786 | R9 | 1000 ohm 1/2w 20% |
| 22-1256 | C27 | 75 Mmfd. (Molded) | | 500V | 63-1793 | R14 | 1500 ohm 1/2w 20% |
| 22-1367 | C12 | 50 Mmfd. Ceramic | | 500V | 63-1799 | R32 | 2200 ohm 1/2w 10% |
| 22-1506 | C9 | 22 Mmfd. Ceramic (2 used) | | 500V | 63-1820 | R36 | 6800 ohm 1/2w 10% |
| 22-1531 | C24 | .2 Mfd. | | 500V | 63-1827 | R6 | 10K ohm 1/2w 10% |
| 22-1612 | C29AB | C29AB-Elect. 40 Mfd. 40 Mfd. | | 500V | 63-1842 | R22 | 22K ohm 1/2w -20% (2 used) |
| 22-1645 | C25 | 330 Mmfd. (Molded) | | 600V | 63-1845 | R23 | 27K ohm 1/2w 10% |
| 22-1668 | C21 | 200 Mmfd. Ceramic | | 1600V | 63-1848 | R30 | 33K ohm 1/2w 10% |
| 22-1676 | C7 | .001 Mfd. Ceramic (4 used) | | 500V | 63-1849 | R33 | 33K ohm 1/2w 20% |
| 22-1761 | C31 | 50 Mmfd. Ceramic | | 500V | 63-1856 | R10 | 47K ohm 1/2w 20% |
| 22-1762 | C11 | 1 Mmfd. Ceramic | | 500V | 63-1869 | R29 | 100K ohm 1/2w 10% |
| 22-1782 | C19 | .0047 Mfd. (Molded) | | 500V | 63-1870 | R21 | 150K ohm 1/2w 20% |
| 22-1802 | C26 | .002 Mfd. | | 450V | 63-1876 | R11 | 150K ohm 1/2w 10% |
| 22-1883 | C15 | 10 Mmfd. Ceramic | | 500V | 63-1884 | R11 | 220K ohm 1/2w 20% |
| 22-1887 | C20 | 25 Mmfd. Ceramic | | 500V | 63-1890 | R25 | 330K ohm 1/2w 10% |
| 22-2104 | C1 | Three Section Variable | | | | | |
| 22-2140 | C6 | 15 Mmfd. Ceramic (2 used) | | | | | |
| 22-2243 | C30AB | C30AB-Elect. 20 Mfd.-350V x 40 Mfd. | | | | | |
| 22-2251 | C16 | Trimer Cond. | | | | | |
| 22-2276 | C34 | Dual Ceramic .01 Mfd.-.01 Mfd. | | | | | |

**MODELS H1083E, H1084E,
H1086R, H1087R, Ch.
10H20Z**

| | | | | | | |
|----------|-------------|--------------------------------------------------------------------|--------------|-----------|---------|------------------------------------------------------------|
| 63-1897 | R33 | 470K ohm 1/2w | 10% | Ins. Res. | 90-367 | Pilot Light Tube |
| 63-1898 | R34 | 470K ohm 1/2w | 20% | Ins. Res. | 93-168 | Rubber Shoulder Washer (4 used) |
| 63-1912 | R1 | 1 Megohm 1/2w | 20% | Ins. Res. | 100-36 | Pilot Light Bulb |
| 63-1926 | R5 | 2.2 Megohm 1/2w | 20% (4 used) | Ins. Res. | 112-808 | #6 x 5/16 Phillips Rd. Hd. S.T. (4 used on Esc. Mtg.) |
| 63-1940 | R28 | 4.7 Megohm 1/2w | 20% | Ins. Res. | 112-809 | Record Changer Mtg. Screw (3 used) |
| 63-2091 | R18 | 820 ohm ww 1/2w | 20% | Ins. Res. | 114-350 | #8 x 7/16 Hex Hd. Sl S.T. (4 used on Esc. Mtg.) |
| 63-2138 | R37AB-R37BB | Candohm | | | 114-354 | Chassis Mtg. Screw (4 used) |
| 63-2139 | R31 | Volume Control & Switch | | | 156-35 | Bullet Catch (3 used) |
| 63-2141 | R15 | 22K ohm 2w | 20% | Ins. Res. | 159-50 | Plug Button Black Oxide (2 used) |
| 63-2142 | R35 | 130 ohm 5w | 10% Zipohm | | 165-9 | Metal Glide (2 used) |
| | | <u>Miscellaneous</u> | | | 165-14 | Metal Glide (2 used) |
| 11-85 | | Line Cord & Plug (6 ft. lg.) | | | 166-55 | Tack Bumper (3 used) |
| 19-212 | | Trans. Mtg. Clip (2 used on 95-1252) | | | 171-7 | Pilot Light Lens |
| 54-306 | | Speed Nut (used on S-13800) | | | 188-54 | Knob Clamping Ring (46-876) |
| 57-1736 | | Chassis Bottom Plate | | | 192-138 | Dial Glass |
| 78-580 | | Nine Contact Socket | | | 202-697 | F. M. Instruction Book |
| 78-644 | | Phono Connector Socket | | | 202-882 | Radio-Phono Instruction Book |
| 78-755 | | Octal Tube Socket (3 used) | | | S-14029 | Variable Speed Record Changer |
| 78-807 | | Miniature Tube Socket | | | S-15528 | Low Impedance Loop Assembly |
| 78-869 | | Miniature Tube Socket | | | S-15536 | Record Changer Compt. Hinge Brkt. & Link Assembly (2 used) |
| 78-870 | | Miniature Tube Socket (3 used) | | | S-15780 | Cobra Tone Arm Cartridge |
| 78-871 | | Miniature Tube Socket | | | S-16419 | Record Adapter Plug & Envelope Assembly |
| 78-896 | | Three Contact Socket | | | S-17005 | Record Changer Mtg. Fram Assembly |
| 78-897 | | Two Contact Socket | | | S-17167 | Volume Control Knob Assembly |
| 78-903 | | Miniature Tube Socket (9 contact) | | | S-17255 | Radiorgan Cable Assembly |
| 80-780 | | Iron Core Tension Spring (3 used) | | | S-17328 | Loop Loading Coil Assembly |
| 80-781 | | Tuner Arm Tension Spring | | | | |
| 80-865 | | Ground Spring | | | | |
| 80-868 | | Grounding Spring | | | | |
| 85-505 | S2 | S.P.D.T. Switch (ant) | | | | |
| 85-508 | S1 | Band Switch | | | | |
| 93-965 | | Rubber Washer (used on S-13800) | | | | |
| 93-1039 | | Gang. Cond. Mtg. Cup Washer (2 used) | | | | |
| 95-1252 | T5 | Speaker Output Trans. | | | | |
| 95-1253 | T6 | Power Trans. | | | | |
| 113-43 | | 6-32x5/16 Hex Hd. S. T. (used on S-17258) | | | | |
| 114-39 | | 8-32x1/4" 1gx 1/4" Hex Hd. (2 used on S-17258 & 4 used on 57-1736) | | | | |
| 126-618 | | Miniature Tube Shield | | | | |
| 148-122 | | Tuner Arm | | | | |
| 149-95 | | Iron Core & Spring (2 used) | | | | |
| S-17257 | | Speaker Cable & Eyelet Assem. | | | | |
| | | <u>Radiorgan Esc. Parts Used on H1087R-H1086R</u> | | | | |
| 76-444 | | Radiorgan Knob Shaft (2 used) | | | | |
| 114-297 | | #6 x 1/4 Hex Hd. Sl. S.T. (2 used on S-17252 & S-17253) | | | | |
| S-14255 | | Radiorgan Mtg. Brkt. Assembly (2 used) | | | | |
| S-17246 | | Radiorgan Knob & Eyelet Assembly (Treble) | | | | |
| S-17247 | | Radiorgan Knob & Eyelet Assembly (Voice) | | | | |
| S-17248 | | Radiorgan Knob & Eyelet Assembly (Alto) | | | | |
| S-17249 | | Radiorgan Knob & Eyelet Assembly (Bass) | | | | |
| S-17250 | | Radiorgan Knob & Eyelet Assembly (Lo-Bass) | | | | |
| S-17251 | | Radiorgan Knob & Eyelet Assembly (Normal) | | | | |
| S-17252 | | Radiorgan Esc. & Knob Assembly (R.H.) | | | | |
| S-17253 | | Radiorgan Esc. & Knob Assembly (L.H.) | | | | |
| | | <u>S-17255 Radiorgan Cable Assembly</u> | | | | |
| 15-79 | | Plug Cap & Insulator | | | | |
| 22-1745 | | 250 Mmfd. Ceramic | 500V | | | |
| 58-195 | | 9 Prong Plug | | | | |
| 63-1722 | R16 | 33 ohm 1/2W 10% | Ins. Res. | | | |
| 63-1778 | R20 | 680 ohm 1/2W 10% | Ins. Res. | | | |
| 63-1813 | R19 | 4700 ohm 1/2W 10% | Ins. Res. | | | |
| 63-1862 | R38 | 68K ohm 1/2W 10% | Ins. Res. | | | |
| 63-1912 | R1 | 1 Megohm 1/2W 20% | Ins. Res. | | | |
| S-14261 | | Radiorgan Strip & Contact Assembly (2 used) | | | | |
| S-17255 | | Radiorgan Cable Assembly | | | | |
| | | <u>Cabinet Parts H1087R</u> | | | | |
| 2-214 | | Cabinet Back (Phono Section) | | | | |
| 14-1279R | | Cabinet for H1087R Console Combination Model | | | | |
| 16-662 | | Packing Carton | | | | |
| 19-9 | | Cable Clip | | | | |
| 19-169 | | Record Changer Mtg. Clip (2 used) | | | | |
| 19-210 | | Loop Connector Clip (2 Used) | | | | |
| 46-872 | | Volume Control Knob | | | | |
| 46-876 | | Tuning Control Knob | | | | |
| 46-877 | | Dummy Knob | | | | |
| 46-899 | | Band Switch Knob | | | | |
| 49-693 | SP-1 | 12" PM Speaker | | | | |
| | | ZC12161 Cone & Voice Coil | | | | |
| 57-1284 | | Strike Plate (3 used) | | | | |
| 57-1481 | | Escutcheon Clamping Plate (4 used) | | | | |
| 57-1666 | | Radio Dial Escutcheon | | | | |
| 70-3 | | #5 x 1/2 R.H.W.S. Steel N.P. (1 used 19-9 & 2 used 83-1220) | | | | |
| 70-86 | | #6 x 5/8 Washer Hd. Wood Screw St. Br. (8 used to Mt. 2-214) | | | | |
| 78-891 | | Pilot Light Socket & Wire | | | | |
| 80-604 | | Hinge Spring (2 used) | | | | |
| 80-830 | | Record Changer Mtg. Spring (4 used) | | | | |
| 83-1220 | | Pilot Light Socket Mtg. Strip | | | | |
| | | <u>Cabinet Parts H1083E</u> | | | | |
| 76-444 | | Radiorgan Knob Shaft (2 used) | | | | |
| 114-297 | | #6 x 1/4 Hex Hd. Sl. S. T. (2 used on S-17252 & S-17253) | | | | |
| S-14255 | | Radiorgan Mtg. Brkt. Assembly (2 used) | | | | |
| S-17246 | | Radiorgan Knob & Eyelet Assembly (Treble) | | | | |
| S-17247 | | Radiorgan Knob & Eyelet Assembly (Voice) | | | | |
| S-17248 | | Radiorgan Knob & Eyelet Assembly (Alto) | | | | |
| S-17249 | | Radiorgan Knob & Eyelet Assembly (Bass) | | | | |
| S-17250 | | Radiorgan Knob & Eyelet Assembly (Lo-Bass) | | | | |
| S-17251 | | Radiorgan Knob & Eyelet Assembly (Normal) | | | | |
| S-17252 | | Radiorgan Esc. & Knob Assembly (R.H.) | | | | |
| S-17253 | | Radiorgan Esc. & Knob Assembly (L.H.) | | | | |

MODELS G402, G402G,
G402W, G402Y, Ch. 4G41



MODELS G402, G402G,
G402W, G402Y, Ch. 4G41

PARTS LIST

DESCRIPTION

DIAL ASSEMBLY

| | |
|---------|----------------------------------------|
| 12-1374 | Volume Control Mtg. Brkt. |
| 46-683 | Front Cover Latch Knob |
| 46-684 | Tuning Control Knob |
| 46-684Y | Tuning Control Knob (W & Y Model only) |
| 46-736 | "On-Off" Switch Knob |
| 46-736Y | "On-Off" Switch Knob (Y Model only) |
| 46-736W | "On-Off" Switch Knob (W Model only) |
| 46-737 | Volume Control Knob |
| 46-737Y | Volume Control Knob (W & Y Model only) |
| 59-200 | Dial Pointer |

COILS & CHOKES

| | | |
|---------|----------------------|----|
| 95-1243 | 1st I.F. Transformer | T1 |
| 95-1244 | 2nd I.F. Transformer | T2 |
| S-13774 | Osc. Coil Assembly | L2 |

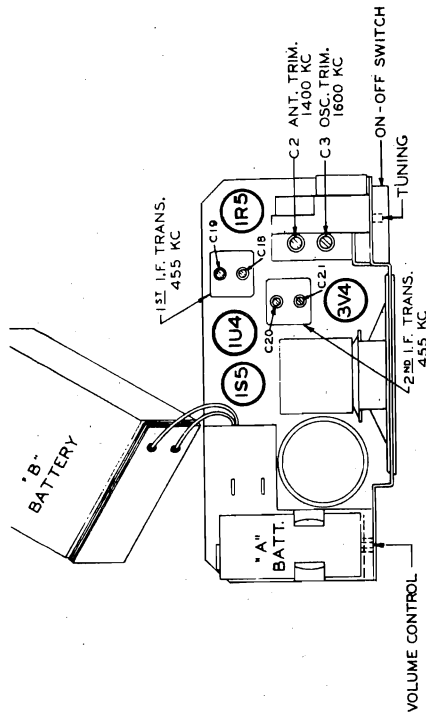
CONDENSERS

| | | | |
|---------|-----------------------------------|--------|------|
| 22-3 | .01 Mfd. Ceramic (Disc) | C4 | 500V |
| 22-326 | .003 Mfd. | C11 | 400V |
| 22-827 | .1 Mfd. | C5 | 200V |
| 22-829 | .05 Mfd. | C17 | 200V |
| 22-1386 | .02 Mfd. | C6 | 200V |
| 22-1457 | Two Section Variable Cond. | C1 | |
| 22-1669 | 100 Mmfd. Ceramic | C9 | 500V |
| 22-1676 | .001 Mfd. (Molded) (or 22-1343) | C7 | 500V |
| 22-1775 | .047 Mfd. (Molded) (or 22-1756) | C12 | 400V |
| 22-2036 | (or 22-1914) | C13,14 | |
| | Four Section Elect. 40-40-20 Mfd. | C15,16 | |
| | 150V - 200 Mfd. 10V | | |

RESISTORS

| | | |
|---------|-------------------------------|-----|
| 63-1651 | Volume Control | R8 |
| 63-1762 | 300 Ohm 1/2W 5% Ins. Res. | R10 |
| 63-1771 | 470 Ohm 1/2W 10% Ins. Res. | R12 |
| 63-1785 | 1000 Ohm 1/2W 10% Ins. Res. | R5 |
| 63-1800 | 2200 Ohm 1/2W 20% Ins. Res. | R2 |
| 63-1835 | 15K Ohm 1/2W 20% Ins. Res. | R3 |
| 63-1870 | 100K Ohm 1/2W 20% Ins. Res. | R1 |
| 63-1898 | 470K Ohm 1/2W 20% Ins. Res. | R4 |
| 63-1912 | 1 Megohm 1/2W 20% Ins. Res. | R9 |
| 63-1933 | 3.3 Megohm 1/2W 20% Ins. Res. | R11 |

TUBE AND TRIMMER LOCATION



Final alignment of the 4G41 chassis should be made with the chassis installed in the cabinet. Tune in a weak station in the vicinity of 1400 KC and adjust the antenna trimmer for maximum.

ALIGNMENT PROCEDURE

| Operation | Connect Oscillator To | Dummy Antenna | Input Sig. Frequency | Set Dial At | Trimmers | Purpose |
|-----------|----------------------------------------|---------------|----------------------|-------------|--------------------|----------------------------|
| 1 | Converter Grid | 1 MFD | 455 Kc. | 600 Kc. | C18, C19, C20, C21 | Align I.F. |
| 2 | One Turn Loosely Coupled to Wavemagnet | | 1600 Kc. | 1600 Kc. | C3 | Set Oscillator To Scale -- |
| 3 | | | 1400 Kc. | 1400 Kc. | C2 | Adjust for Maximum. |

MODEL H503,
Ch. 5H41

The 5H41 chassis is an AC, DC or battery operated super-heterodyne. The chassis is isolated from the DC circuit, and all measurements must be made from a common negative point. The most convenient place to reach this negative point is the negative side or container of the electrolytic. When the change-over Switch S1 is in AC position, the DC resistance from chassis to any circuit must be almost infinite. If any circuit becomes grounded a hum will result. Microphonic tubes will cause audio howl. Check the 1L6 and 1S5.

If the R.F. becomes weak or dead, check the D.C. resistance of the wavemagnet. This D.C. resistance should be approximately .9 ohm. If it is open check the wavemagnet.

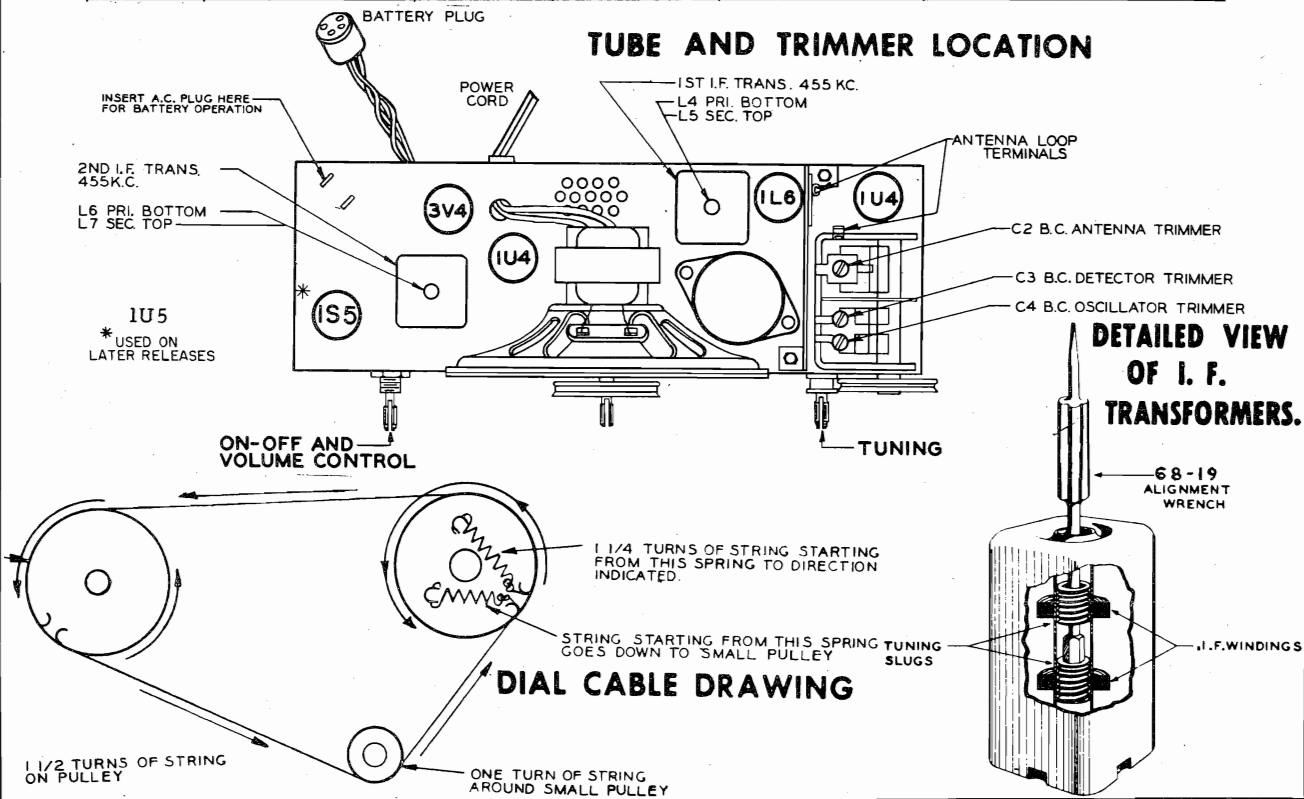
IF Alignment: Remove the chassis from the cabinet and arrange the units so that the wavemagnet can be connected. All the connections and adjustments can be made from the top of the chassis. Connect a signal generator, through a .1 mfd. dummy antenna, to the converter grid and B - (common return). Connect an output meter across the voice coil of the speaker (two lugs provided). Set the signal generator to 455 Kc. and adjust L4, L5, L6 and L7 for the maximum indication on the output meter. Always keep the signal output

from the generator just high enough to get an indication, otherwise excessive loading may result.

RF Alignment: Connect a two turn loop across the leads of the signal generator, loosely couple this loop to the wavemagnet. Set the signal generator and the dial pointer of the receiver to 1600 Kc. and adjust C4 oscillator trimmer to resonance. Set the signal generator and dial pointer to 1400 and adjust C2 and C3 antenna detector trimmers to resonance. These trimmers are on the top of gang condenser. Check operation and re-install set in cabinet. Tune in a weak station near 1400 Kc. or use background noise and re-adjust antenna trimmer for maximum sensitivity.

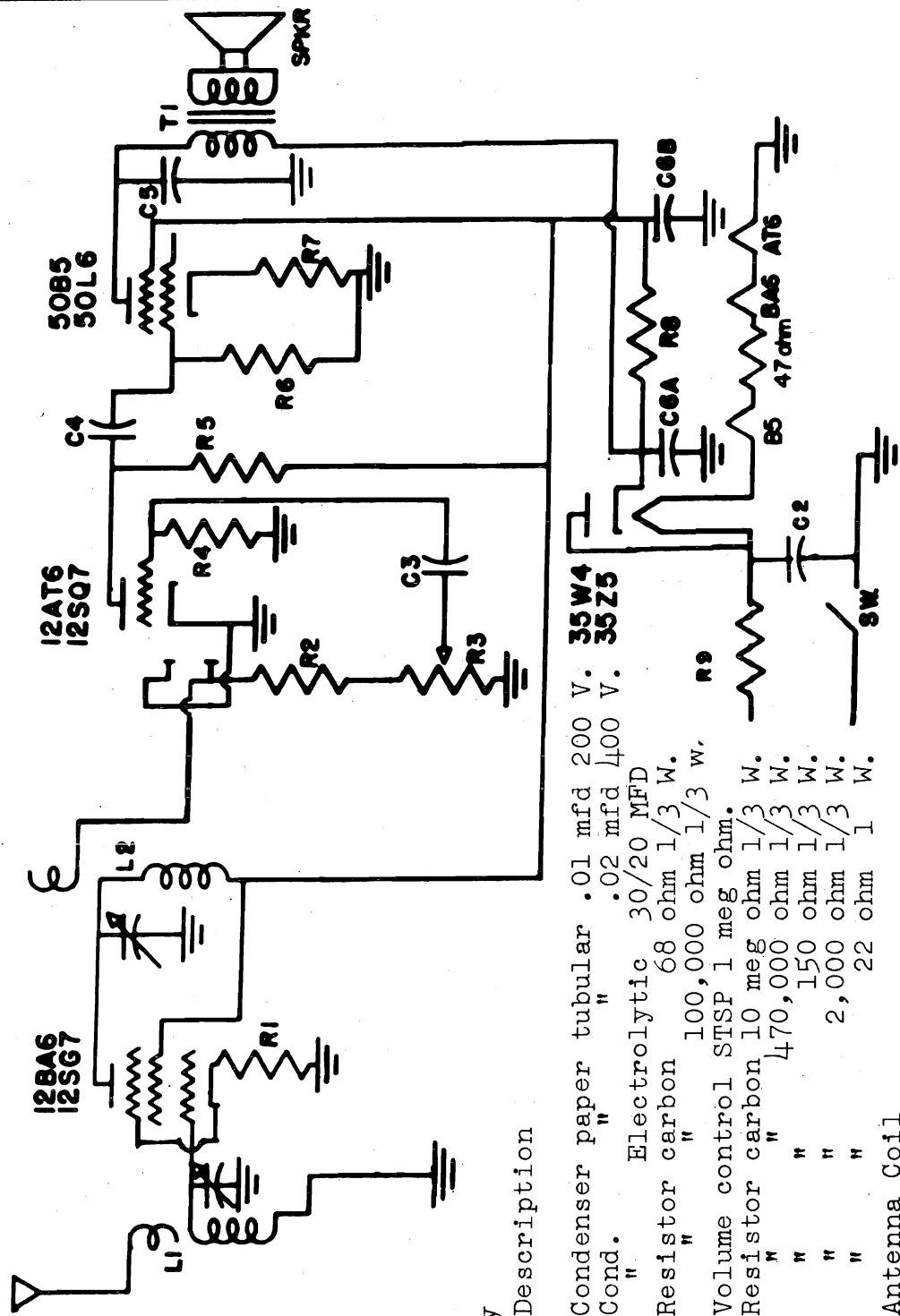
The I.F. transformers incorporated in this receiver are of the new permeability tuned type. The advantage of an I.F. transformer of this type is its extreme stability under various humidity and temperature conditions. The upper coil is the secondary and the lower the primary. When adjusting these I.F. transformers the tuning wrench 68-19 can be inserted into the top slug, rotated until maximum output is obtained and then dropped down to the lower slug and the same operation repeated. The tuning wrench is so designed that turning one slug does not affect the adjustment of the other.

| OPERATION | CONNECT OSCILLATOR TO | DUMMY ANTENNA | INPUT SIG. FREQUENCY | BAND | SET DIAL TO | TRIMMERS | PURPOSE |
|-----------|-----------------------------------------|---------------|----------------------|------|-------------|----------------------------|-------------------------|
| 1 | Converter Grid | .1 Mfd | 455 Kc. | BC | 600 Kc. | L4, 5, 6 & 7 | I.F. Alignment |
| 2 | Two turns loosely coupled to Wavemagnet | | 1600 Kc. | BC | 1600 Kc. | Osc. Trim. C4 | Set Oscillator to scale |
| 3 | Two turns loosely coupled to Wavemagnet | | 1400 Kc. | BC | 1400 Kc. | Ant. & Det. Trims. C2 & C3 | Align Wavemagnet |



MODEL H503,
Ch. 5H41

| Part No. | Diag. No. | Description | Part No. | Diag. No. | Description |
|----------|-----------|------------------------------------------------|----------|-----------|--------------------------------------------------------------------------|
| 46-933 | | Dial Assembly | 43-206 | | Handle Housing (2 used) |
| 59-261 | | Tuning & Vol. Control Knob (2 used) | 49-709 | SP1 | 5 1/4" PM Speaker |
| 80-209 | | Dial Pointer | | | ZC529G Cone & Voice Coil |
| 188-32 | | Retaining Ring (2 used on Pointer Shaft Assy.) | | | 206CZ709 Output Transformer |
| S-18101 | | Pointer Shaft & Pulley Assy. | 49-711 | SP2 | 5 1/4" PM Speaker |
| S-18102 | | Pulley Shaft & Pulley Assy. (used S-17845) | | | ZC529G Cone & Voice Coil |
| S-18103 | | Pulling Mtg. Strip & Bushing Assy. | 54-31 | | 206CZ711 Output Transformer |
| S-18104 | | Dial Cord & Eyelet Assy. | 54-34 | | 10-32 x 3/8" x 1/8" Hex Nut Steel (used on 112-835) |
| S-18186 | | Esc. & Dial Scale Assy. (Complete) | 57-1721 | | #6-32 x 1/4" x 3/32" Hex Nut Steel (used on 212-10) |
| | | Coils & Chokes | 70-162 | | Emblem Plate |
| 95-1132 | T1 | 1st. I.F. Transformer | 70-172 | | #6 x 5/8 Phill R.H. Wood Screw (4 used to Mt. Esc.) |
| 95-1133 | T2 | 2nd. I.F. Transformer | | | #4 x 1/4 Phill R.H. Wood Screw (2 used to Mt. Wave-magnet) |
| S-15811 | L2 | Detector Coil Assembly | 70-173 | | #6 x 3/8 Phill R.H. Wood Screw (4 used to Mt. Esc.) |
| S-15812 | L3 | Osc. Coil Assembly | 70-174 | | #2 x 5/16 Phill R.H. Wood Screw St. Br. (6 used to Mt. 24-576) |
| 22-3 | C6 | Condensers | | | |
| 22-182 | C5 | .01 Mfd. Ceramic (Disc) (5 used) | 78-274 | | Elect. Cond. Socket |
| 22-319 | C8 | .005 Mfd. Mica | 78-543 | | Battery Cable Socket (4 contact) |
| *22-827 | C9 | .1 Mfd. | 78-782 | | Miniature Tube Socket (2 used) |
| 22-829 | C19 | .05 Mfd. (2 used) | 78-807 | | Miniature Tube Socket (2 used) |
| 22-1182 | C20 | .01 Mfd. (2 used) | 78-912 | | Miniature Tube Socket |
| 22-1186 | C11 | .02 Mfd. | 80-461 | | Contact Spring |
| 22-1669 | C12 | 100 Mmfd. Ceramic | 82-33 | | Handle Strap |
| 22-1741 | C15,16 | | 85-511 | S1 | Power Change-over Switch (or 85-515) |
| | 17, 18 | Four Section Elect. Cond. | 93-125 | | #6 Int. Shakeproof Lockwasher (used on 212-10) |
| 22-1782 | C13 | .0047 Mfd. (Molded) | 93-369 | | #10 Int. Shakeproof Lockwasher #1210 (1 used on each 112-835) |
| 22-2323 | C1 | Three Section Gang Cond. Resistors | | | .031 x 13/64 x 5/8 Steel Washer Cad. & Tin Plate (1 used on ea. 112-835) |
| 63-1362 | R18,19 | Two Section Candohm | 93-1081. | | Gang Cond. Mtg. Bushing (3 used) |
| 63-1744 | R21 | 100 ohm 1/2W 20% | 94-334 | | Handle Mtg. Screw (2 used) |
| 63-1757 | R10 | 220 ohm 1/2W 10% | 112-835 | | 4-40 x 1/4" Phill R.H.S.P. screw (2 used on Mtg. Wavemagnet) |
| 63-1758 | R4 | 220 ohm 1/2W 20% | | | 10-32 x 5/8" Hex Sl. Washer Hd. M.S. Steel (2 used on chassis Mtg.) |
| 63-1775 | R20 | 560 ohm 1/2W 10% | 114-251 | | 6-32 x 1" Lg. x 1/4" A.F. Hex Hd. M.S. (used on 212-10) |
| 63-1778 | R12 | 680 ohm 1/2W 10% | | | Strain Relief Grommet - Male |
| 63-1786 | R5 | 1000 ohm 1/2W 20% | | | Strain Relief Grommet - Female |
| 63-1834 | R1 | 15K ohm 1/2W 10% | | | Strike Fastener (2 used) |
| 63-1848 | R7 | 33K ohm 1/2W 10% | | | Strike Fastener (2 used) (or 156-19) |
| 63-1880 | R3 | 180K ohm 1/2W 10% | | | Snap Fastener Stud |
| 63-1912 | R2 | 1 Megohm 1/2W 20% | | | Rubber Bumper |
| 63-1926 | R13 | 2.2 Megohm 1/2W 20% | | | Rubber Feet (4 used) |
| 63-1933 | R14 | 3.3 Megohm 1/2W 20% | | | Speaker Gasket |
| 63-1933 | R14 | 3.3 Megohm 1/2W 20% | | | Instruction Book |
| 63-1940 | R15 | 4.7 Megohm 1/2W 20% | | | Selenium Rectifier |
| 63-1943 | R6 | 4.7 Megohm 1/2W 20% | | | Btry. Cable & Socket Assy. |
| 63-1954 | R9 | 5.6 Megohm 1/2W 10% | | | Wavemagnet Assy. |
| 63-2018 | R16 | 10 Megohm 1/2W 20% | | | Cover Latch & Brkt. Assy. |
| 63-2371 | R11 | 130 ohm 3W WW 10% | | | Cover Latch & Brkt. Assy. (Y Model only) |
| | | Volume Control & Switch | | | Front Cover Hinge & Wire Assy. (R.H.) |
| | | Miscellaneous | | | Front Cover Hinge & Wire Assy. (L.H.) |
| 11-104 | | Line Cord & Plug | 202-889 | | |
| 14-1337 | | Cabinet for H503 - Portable Model | 212-10 | SE1 | |
| 14-1338 | | Cabinet for H503Y - Portable Model | S-18111 | W1 | |
| 15-51 | | Cable Socket Cap & Insulator (part of S-18111) | S-18190 | L1 | |
| 16-721 | | Packing Carton | S-18193 | | |
| 24-576 | | Wavemagnet Cover | S-18194 | | |
| 40-113 | | Cabinet Back Cover Hinge (2 used) | S-18205 | | |



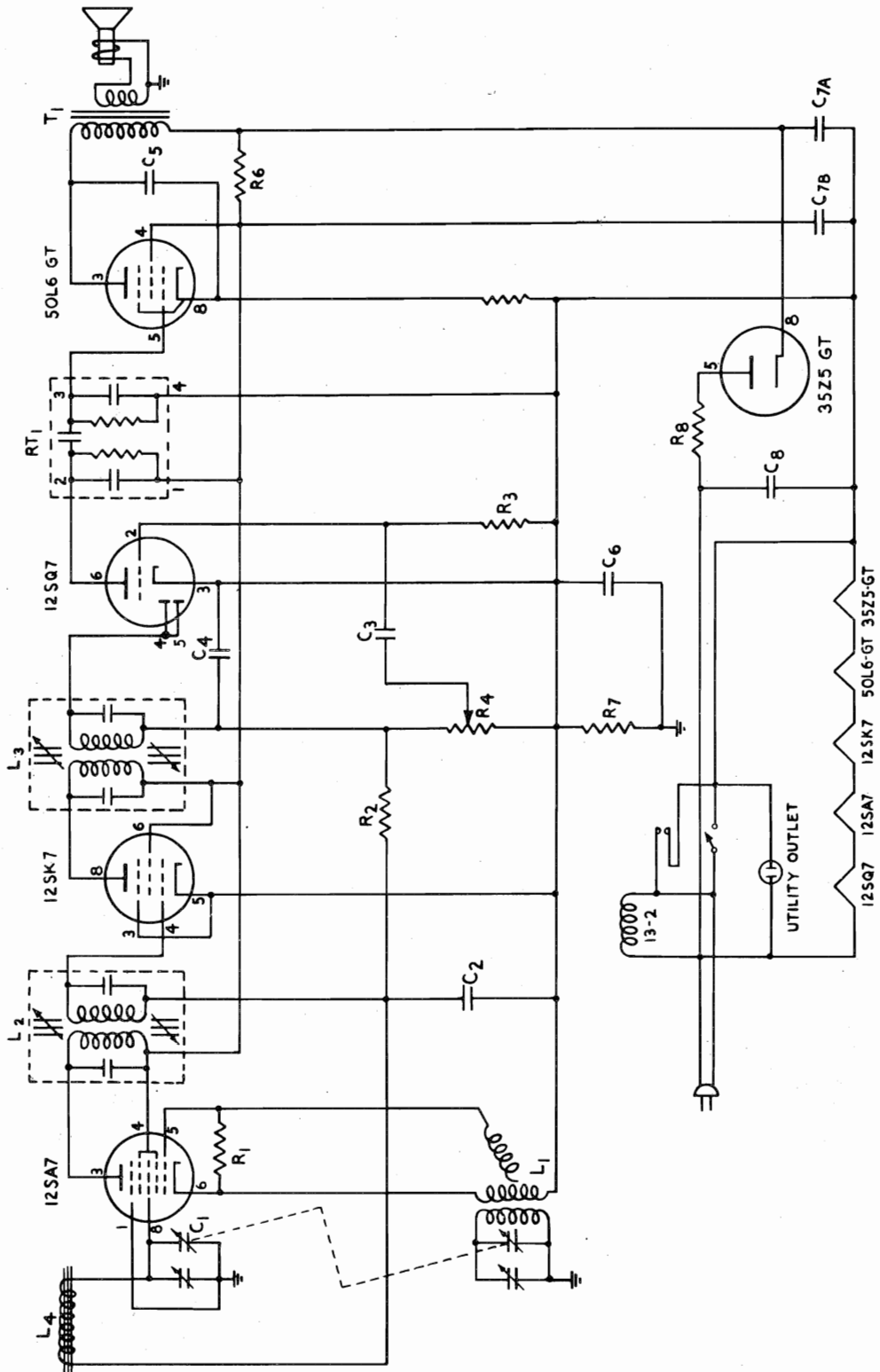
For CW-500 Assembly

Ck Sym. Part No. Description

| | | |
|----------|-------------|----------------------------------------|
| C5 | CP-12103 | Condenser paper tubular .01 mfd 200 V. |
| C2 | CP-14203 | Cond. " .02 mfd 400 V. |
| C6A, C6B | CL-10017 | Electrolytic 30/20 MFD |
| R1 | RC-10680 | Resistor carbon 68 ohm 1/3 W. |
| R2 | RC-11003 | " 100,000 ohm 1/3 W. |
| R3 | VC-12106 | Volume control STSP 1 meg ohm. |
| R4 | RC-11005 | Resistor carbon 10 meg ohm 1/3 W. |
| R5, 6 | RC-14703 | " 470,000 ohm 1/3 W. |
| R7 | RC-11500 | " 150 ohm 1/3 W. |
| R8 | RC-32001 | " 2,000 ohm 1/3 W. |
| R9 | RC-40220 | " 22 ohm 1 W. |
| L1 | TRF-10047-A | Antenna Coil |
| L2 | TRF-10011-B | Interstage coil 15 uuf capacity turn |
| T1 | TO-10000 | Output Transformer |
| SPKR. | SR-10005 | Round 3" speaker |
| C4 | CP-12502 | Condenser paper tubular .005 mfd 200V. |
| C3 | CP-12202 | " .002 mfd 200V. |

MISC. PAGE 22-2 PHHARMONIC

MODELS 51C3,
51CU4



- R1=22000 OHM 1/4 W
- R2=2.2 MEGOHM 1/4 W
- R3=10 MEGOHM 1/4 W
- R4 =.5 MEGOHM VOLUME CONTROL
- R5=150 OHM 1/4 W
- R6=1500 OHM 1W
- R7 =150000 OHM 1/4W
- R8=22 OHM 1/4 W
- C1=VARIABLE 290/105 MMFD.
- C2=.05 MFD. 200V
- C3=.005 MFD. 600 V
- C4=100 MMFD.
- C5=.02 MFD. 400 V
- C6 =2 MFD. 200V
- C7A C7B= 40 MFD. 150 V
- C8=.05 MFD. 400V
- RT1= COUPLING NETWORK-YA-400-001A
- L1 = OSC. COIL
- L2 L3 =455 KC. I.F.
- L4 = ANT.
- T1 = OUTPUT TRANSFORMER

DATE: - 4-27-51

Admiral 6C71-71A, Ch. 10A1; 7C62-62A, Ch. 6M1; 7C63-63A, Ch. 7C1

Model 6C71-71A is a console combination using radio chassis 10A1 and record changer RC200. Model 7C62A-62A, Ch. 6M1, and Model 7C63A-63A, Ch. 7C1, are console combinations and use either record changer RC170 or RC170A.

Admiral 6P32, Ch. 6E1; 7P35, Ch. 6H1

Model 6P32 uses chassis 6E1 and Model 7P35 uses chassis 5H1. These models are leatherette portables using an a-c—d-c battery.

Admiral 6RT41, 6RT42, 6RT43, Ch. 5B1-PH

Models 6RT41, 6RT42, and 6RT43 use radio chassis 5B1-PH. The 6RT41 is a plastic table combination using record changer RC160 or RC160A. The 6RT42 and the 6RT43 are wood table combinations using radio chassis 5B1-PH and record changers RC160 or RC160A. In addition to the RC160 and RC160A, the 6RT42 may use an RC150 record changer.

Admiral 6RT41A, 6RT42A, 6RT43A Ch. 5B1A

Model 6RT41A is a plastic table combination using radio chassis 5B1A and record changers RC160 or RC160A. Models 6RT42A and 6RT43A are wood table combinations using radio chassis 5B1A and record changer RC160 or RC160A.

Admiral 6T01, 6T05, Ch. 6A1

Model 6T01 is a plastic table model using chassis 6A1. Model 6T05 is a wood table model using chassis 6A1.

Admiral 6T02, 6T04, Ch. 5B1

Models 6T02 and 6T04 are table models using chassis 5B1. Model 6T02 has a plastic cabinet, while Model 6T04 has a wood cabinet.

Admiral 6T06, 6T07, Ch. 4A1

Models 6T06 and 6T07, Ch. 4A1, are wood table models using a *Jarn* battery.

Arvin 540T, Ch. RE-278

Model 540T is the same as model 440T, chassis RE-278, except for the part numbers listed below.

| Ref. No. | Part No. | Description |
|----------|-----------|-------------------------------------------|
| R3 | C23068 | Resistor, Volume Control, 2 meg. |
| C2A, C2B | C2BA20375 | Condenser, I. F. Trans. Trimmers |
| T2 | C22878-1 | Output Transformer |
| T1 | C22863-1 | I. F. Transformer* |
| L1 | C22864-1 | Antenna Coil |
| L2 | C22865-1 | Oscillator Coil |
| — | E24328-1 | Cabinet with grille cloth, Ivory |
| — | C24096-1 | Ivory cabinet, rear cover |
| — | E24328-1 | Cabinet with grille cloth, citron |
| — | C24096-8 | Citron cabinet, rear cover |
| — | E24328-7 | Cabinet with grille cloth, flame |
| — | C24096-7 | Flame cabinet, rear cover |
| — | E24328-9 | Cabinet with grille cloth, cherry |
| — | C24096-9 | Cherry cabinet, rear cover |
| — | E24328-10 | Cabinet with grille cloth, Avocado, green |
| — | C24096-10 | Cabinet rear cover, Avocado, green |
| — | E24328-11 | Cabinet with grille cloth, Pebble |
| — | C24096-11 | Cabinet, rear cover, Pebble |
| — | A24372-1 | Arvin Name—on cabinet |
| — | A24084 | Couplate |
| — | A24330-1 | Knob, volume |
| — | C24331-1 | Knob, dial |
| — | A18136 | Antenna hank |

Capehart-Farnsworth P-777

The rubber belt may run off the 78-rpm drive, due to the motor mounting frame being bent slightly, causing misalignment of the shafts. This should not be difficult to check and if bent, to correct. If, for some reason,

it proves impossible to effect permanent correction, then the only solution would obviously be replacement of the motor assembly.

Also check for excessive friction in the 45-rpm bearing. This pulley may be removed, and, if there is any tendency to excess friction, ream it out slightly, apply lubricant, wipe off the excess lubricant and replace. This may also be the correction for one of those hard to locate sources of "wow" or speed variation, noticeable especially on 33- and 45-rpm records.

Farnsworth P71, P72, P73; Capehart-Farnsworth P77, P777

The failure of the changer to shut off after playing the last record may be caused by dust or foreign particles collecting between the inner tube (No. 11379) and the outer tube (No. 55334) or by corrosion on the two parts, making their movement sluggish. This may be checked easily. The weight of a 10" record on the single speed changer and a 7" record on the dual and triple speed-changed should hold the spindle down. When the record is dropped to the turntable, the unloaded spindle should raise up approximately 1/16". If the spindle does not raise freely, it should be disassembled and cleaned. If corrosion is discovered after disassembly of the spindle, it may be removed from the compression rod (part of No. 13674) and from the outer surface of No. 11379 by polishing with crocus cloth. The best way to remove corrosion from the inner wall of part No. 11379 is to use a pipe cleaner, rouge and a rust solvent. After cleaning thoroughly in this manner, an unused pipe cleaner should be inserted in order to remove any remaining rouge and rust solvent before re-assembly of the parts. *Do not use any lubricant.* The same will apply to the inner wall of the outer tube No. 55334. When re-assembling, be sure that the small washer, No. 55345, between the spring collets and the rubber is installed cup side down. If installed with the cup side up, two or more records will drop. As a final note on this point, spindle corrosion has nothing whatsoever to do with failure to drop records properly, unless, of course, the spindle parts are completely "frozen."

Failure of the changer to drop records properly may be caused by a spring collet, or by improper adjustments. In checking for proper adjustment, there are three dimensions which must be observed closely. Adjusting nut No. 37344 on the bottom of No. 13674 spindle must be set so that rubber washer, part No. 62152, when fully compressed does not exceed 0.337 inches in diameter. Original engineering specifications on this part were 0.312 to 0.325. In order to operate more satisfactorily on older records, this was later increased to 0.335 to 0.337, although the original specifications should be entirely satisfactory on new records which are in good condition. If necessary to change adjusting nut No. 37344, be sure locknut No. 2015-002 is tightened securely.

Chevrolet 986067

Model 986067 is designed expressly for 1947, '48, '49, and '50 Chevrolet trucks. In checking voltages of the 986067, it will be necessary to remove the rear cover of receiver and remove radio chassis from the case. Hook up radio on the service bench to a 6-volt power unit or a fully charged battery. The master selector switch of the volt-ohm-milliammeter should be set to the 12 position and the voltage selector switch to D.C. 1K/v position. Place test leads in jacks marked

"test leads," ground the negative lead to the radio chassis for ground, with the red lead check all tube pins marked "H" which show a reading on voltage chart. Now set the Master selector switch to the 600 position and the voltage selector switch to A.C. 1K/v position. With red lead check the two terminals marked "P" on the OZ4 tube, both should read 270 to 280 volts a.c. each. If incorrect or no voltage check the following:

1. Check or replace capacitors (Illus. Nos. 31 and 32).
2. Check or replace resistor (Illus. No. 47).
3. Check or replace power transformer.
4. Check or replace vibrator.
5. Check or replace OZ4 tube socket.

Now change the Master selector switch to the 300 position and the voltage selector switch to D.C. 1K/v position. Pin "K" on OZ4 should read 245 to 255 volts d.c. If incorrect or no voltage, check or replace OZ4 tube.

Pin "P" on the 6V6GT tube should read 235 to 245 volts d.c. If incorrect or no voltage, check the following:

1. Check or replace electrolytic capacitor (Illus. No. 24B).
2. Check or replace resistors (Illus. Nos. 200 to 210 volts d.c. If incorrect or no voltage, check the following:

1. Check or replace electrolytic capacitor (Illus. No. 24C).
2. Check or replace resistors (Illus. Nos. 48 and 49).

Pin "K" on the 6V6GT tube should read 10 to 14 volts. If incorrect or no voltage check the following:

1. Check or replace electrolytic capacitor (Illus. No. 25A).
2. Check or replace resistor (Illus. No. 45).

Pin "P" on 6SQ7 tube should read 65 to 75 volts d.c. If incorrect or no voltage check the following:

1. Check or replace capacitors (Illus. Nos. 25, 26, and 32).
2. Check or replace resistor (Illus. No. 43).

Pin "P" on 6SK7 intermediate frequency amplifier tube should read 200 to 210 volts d.c. If incorrect or no voltage, check or replace the intermediate frequency transformer

Pin "S" on 6SK7 i-f amplifier tube should read 60 to 70 volts d.c. If incorrect or no voltage, check the following:

1. Check or replace resistor (Illus. No. 38).
2. Check or replace capacitor (Illus. No. 17).

Pin "P" on the 6SA7 tube should read 200 to 210 volts d.c. If incorrect or no voltage, check or replace intermediate frequency transformer.

Pin "S" on the 6SA7 tube, should read 60 to 70 volts d.c. If incorrect or no voltage check the following:

1. Check or replace capacitor (Illus. No. 17).
2. Check or replace resistor (Illus. No. 38).

Pin "P" on the radio frequency amplifier 6SK7 tube should read 155 to 165 volts d.c. If incorrect or no voltage check the following:

1. Check or replace capacitor (Illus. No. 18).
2. Check or replace resistor (Illus. No. 39).

Pin "S" on r-f amplifier 6SK7 tube should read 60 to 70 volts d.c. If incorrect or no voltage check the following:

1. Check or replace capacitor (Illus. No. 18).
2. Check or replace resistor (Illus. No. 39).

Pin "S" on r-f amplifier 6SK7 tube should read 60 to 70 volts d.c. If incorrect or no voltage check the following:

1. Check or replace capacitor (Illus. No. 18).
2. Check or replace resistor (Illus. No. 39).

1. Check or replace resistor (Illus. No. 38).
2. Check or replace capacitor (Illus. No. 17).

If the tubes, vibrator, and voltages are correct and radio does not play the trouble will be in the grid circuit of the radio. To continue, it will be necessary to check the grid circuit by means of signal tracing.

Turn on signal generator on and/off switch, place the modulation switch in the modulated position set signal generator tone control to 0.5 and place shielded lead assembly in jack marked "audio." Ground the black lead to the radio chassis. Turn on radio receiver with volume to maximum position.

With red lead touch pin marked "P" on the 6V6GT tube. If you have no signal, check the following:

1. Check or replace speaker.
 2. Check or replace audio transformer.
- Touch pin "G" on 6V6GT tube. If no signal check or replace 6V6GT tube.
- Touch pin "P" on the 6SQ7 tube. If no signal check the following:

1. Check or replace capacitors (Illus. Nos. 25, 26, 27, and 28).
 2. Check or replace tone control.
- Touch pin "G" on 6SQ7 tube. If no signal, check or replace 6SQ7 tube.
- Touch the two pins marked "DP" on 6SQ7 tube. A signal should be heard on each one. If no signal check or replace 6SQ7 tube.

Change the signal generator shielded lead to the intermediate frequency "I.F." jack. Tune signal generator to exactly 262 and set band switch in "A" position. Turn the signal generator volume control about one-third open and touch pin "P" on intermediate frequency 6SK7 amplifier tube. If no signal, check the following:

1. Check or replace intermediate frequency transformer.
2. Check or replace volume control.
3. Check or replace capacitor (Illus. No. 23).
4. Check or replace resistor (Illus. No. 44).

Touch pin "G" on i-f 6SK7 amplifier tube. If no signal check or replace 6SK7 tube.

Touch pin "P" on 6SA7 tube. If no signal check the following:

1. Check or replace intermediate frequency transformer.
 2. Check or replace sensitivity control.
- Touch pin marked, "G" on 6SA7 tube. If no signal check or replace 6SA7 tube.

Change the signal-generator shielded lead to the radio frequency "R.F." jack, tune signal generator to exactly 1000 kc and set band switch to "B" position. Tune radio to 1000 kc. Touch pin "P" on 6SK7 amplifier tube. If no signal check the following:

1. Check or replace radio frequency coil (Illus. No. 3).
2. Check or replace oscillator coil (Illus. No. 4).
3. Check or replace capacitors (Illus. Nos. 18, 19A, 19B, 20 and 21).

Touch pin "G" on r-f 6SK7 tube. If no signal check or replace 6SK7 tube.

Place a 0.000075- μ f capacitor on the end of red lead and plug in antenna socket. If no signal check the following:

1. Check or replace antenna coil (Illus. No. 1).
2. Check or replace choke coils (Illus. No. 2).
3. Check or replace antenna trimmer (Illus. No. 16).
4. Check or replace resistors (Illus. Nos. 37 and 42).

Crosley 11-100U, 11-101U, 11-102U, 11-103U, 11-104U, 11-105U, Ch. 330

Chassis 330 is similar to Chassis 301, which is also used with the above models, except that the 330 uses a 12SQ7GT (V3) in the detector—avc 1st a-f amplifier stage, whereas the 301 uses a 12AV6. The 12SQ7GT is connected in the following way: pin 1 goes to the shield; pin 2 goes to the junction of R5 and C8B; pin 3 goes to the junction of ground, pin 4, and C8A; pin 5 goes to tap 2 of the 2nd i-f transformer T2, pin 6 goes to the junction of R8, C8C, and C8D; pin 7 goes to pin 3 of V1, and pin 8 is grounded. The voltage readings are as follows: pins 1, 3, 4, and 8 are 0 volts; pin 2 is -0.8 volt; pin 5 is -0.6 volt; pin 6 is 52 volts; pin 7 is 12 volts a.c.

The following part should be added to the parts list: TS2, Part No. W-46447-1, Shield, tube (V3).

The following procedure should be used when installing an idler spring (part no. 151085) on the drive shaft:

1. Remove cotter from end of shaft under chassis.
2. Pull drive shaft straight out from chassis being careful to keep drive cord on shaft and pulley.
3. Remove spring washer from shaft.
4. Place idler spring on shaft and then hook one end of the spring under the chassis. The other end of the spring hooks around the portion of drive cord that is between the drive shaft and the tuning capacitor pulley.
5. Place spring washer on the drive shaft, insert drive shaft in chassis, and insert cotter on end of shaft.

Emerson 559, Ch. 120059A

The schematic diagram for Chassis 120059A shows two resistors marked R15. The one going to pin 6 of the 117Z3 should be marked R10.

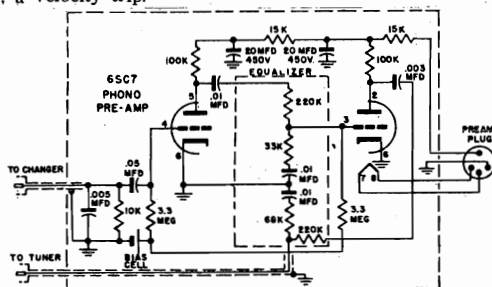
Emerson 672B, Ch. 120097-B

The 672B is similar to Model 634B in that both models use a 120097-B chassis. The service data and Parts List for 672B, Ch. 120097-B, are the same as those for the 634B except for the cabinet parts listed below:

| Part No. | Description |
|----------|--------------------------|
| 140396 | Cabinet |
| 470092 | Lid support |
| 620145 | Chassis mounting board |
| 580138 | Shielded lead wire (25") |
| 450099S | Knob |
| 450099 | Knob |
| 587011 | Spring insert |
| 700053 | Loop antenna |
| 410807-1 | Dial back plate |
| 530002 | Drive cord (37") |
| 525022-1 | Pointer. |

Farnsworth P-63

Record changer P-63 is basically the same as the P-62 record changer—the difference lies in the type of trip mechanism. The P-62 changer employs a fixed position trip; the P-63, a velocity trip.



Farnsworth 36P10, Capehart

Model 36P10 employs the Farnsworth P-10 a-m-f-m radio chassis and the Farnsworth P-73 intermix record changer in a mahogany chairside cabinet with a 12-inch high-fidelity p-m speaker. For information on the radio chassis and record changer used in this instrument see Farnsworth Chassis P7, P9, and P-10 and the Farnsworth P-72 and P-73 Record Changers.

Following is a list of parts which pertain to the Model 36P10 only. Parts for the integral parts of the chassis and record changer are included under their respective chassis.

| Part No. | Description |
|-----------|--------------------------------|
| H-328 | Cabinet (36P10) |
| 750000A | Dial escutcheon |
| 59373 | Knob (2) |
| 59316 | Knob (2) |
| 650011A-1 | Speaker and output transformer |
| 13908 | Loop antenna assy. |
| 750004A-1 | A-m dial glass |
| 750004A-2 | F-m dial glass. |

Farnsworth P-860

The alignment procedure and table, the chassis component layout, suggested batteries, and dial-cord stringing diagram for Model P-860 are the same as those for Farnsworth Model GP-350.

Farnsworth "N" Series, Capehart

In order to permit the use of the "Magnetic True Timbre" pickup in the N series instruments, a modification kit has been prepared, No. 41141.

A separate phono preamplifier (2-stage) using a 6SC7 twin triode tube, and mounted on a separate chassis, is used in place of the 6J7 preamplifier stage included on the tuner chassis. The schematic diagram for this stage is shown in Fig. 1. The 6J7 tube has been removed and the power cable to the preamp chassis is brought through the unused socket and connections made on the underside of the socket. The 6J7 stage is not used, so a shielded lead is connected directly from the phono input socket to the phono lug on the auxiliary bandswitch.

The noise eliminator, which is furnished with the record changer modification kit, is also included in these modified N series instruments. The circuit diagram of the noise eliminator is the same as that in the P4 series.

The voltage and resistance readings for the 6SC7 are given below:

| Pin | Voltage (volts) | Resistance (ohms) |
|-----|-----------------|-------------------|
| 1 | 0 | 0 |
| 2 | 150 | 200 K |
| 3 | -0.3 | inf |
| 4 | -0.3 | inf |
| 5 | 135 | 200 K |
| 6 | 0 | 0 |
| 7 | 0 | 0 |
| 8 | 5.4ac | 2.5 |

Fig. 1. Schematic for the 6SC7 phono-preamplifier stage used in the Farnsworth "N" Series, Capehart.

Farnsworth 1000-M, Capehart, Ch. P8

Model 1000-M is similar to Models 1002-F, 1003-M, and 1004-B, and uses a m-f-m radio chassis P-8.

Gamble-Skogmo 43-7661, 43-7852

Model 43-7661 is the same as Model 43-7660 except that the 7661 uses a blond cabinet. Model 43-7852 is the same as Model 43-7851 except that it uses a blond cabinet.

Gamble-Skogmo 43-8101, 165, 197, 197U

Model 165 is the same as Model 94RA31-43-8115A. Model 197 is the same as Model 94RA31-43-8115B. Model 197U is the same as Model 94RA31-43-8116A. Model 43-8101 is electrically the same as Models 94RA31-43-8115A, -8115B, and -8116A.

Gamble-Skogmo 43-9841A

Model 43-9841A is the same as Model 94RA31-43-9841A.

Gamble-Skogmo 94RA4-43-8129A, 94RA4-43-8130A, 94RA4-43-8130B, 94RA4-43-8131A, 94RA4-43-8131B, 94RA4-43-8132A

Model 94RA4-43-8129A is the same as Model 43-8129A. Models 94RA4-43-8130A and 94RA4-43-8130B are the same as Models 43-8130A and 43-8130B, respectively. Model 94RA4-43-8131A is the same as Model 43-8131A. Model 94RA4-43-8131B is the same as Model 43-8131B. Model 94RA4-43-8132A is the same as Model 94RA4-43-8131A except that it employs a maroon cabinet.

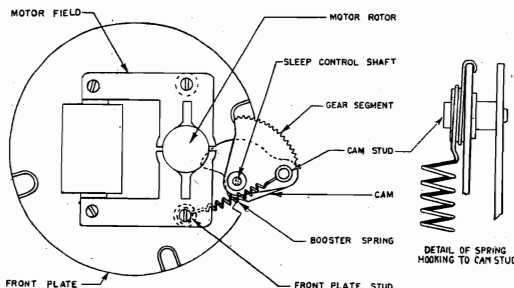
Gamble-Skogmo 94RA33-43-8135

The 94RA33-43-8135 is the same as Models 94RA33-43-8130C and 94RA33-43-8131C except for the differences mentioned below. The physical difference is the cabinet, larger drum on the tuning gang, speaker bracket, dial glass, dial bracket and power-cord strain relief. The parts list for Model 94RA33-43-8135 is the same as that for the 8130C and 8131C except for the following parts.

| Part No. | Description |
|-----------|-----------------|
| E81650-2 | Tuning gang |
| E81645-82 | Speaker |
| M1607-2 | Dial bracket |
| P1602-2 | Dial glass |
| SR-2P | Strain relief |
| P1601A-2 | Cabinet, walnut |
| M1605-2 | Chassis |

General Electric P15

To further clarify the identity of the three spindles for the record speeds for which they are to be used, the following descriptions have been added to the Parts List for record changer P15: RMU-060 Spindle, offset spindle for 7 inch, 33-1/3 rpm records; RMX-162 Spindle, for 10 or 12 inch, 33-1/3 or 78 rpm records; RMX-163 Spindle, for 7 inch, 45 rpm records.

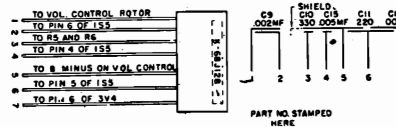


General Electric 145

In late productions, resistors R13 and R14 have been combined into one tapped resistor, R25A and R25B. This new resistor is mounted in place of R14. The catalogue number for R25 is RRW-047. R25A is 1,000 ohms and should be wired in place of R14. R25B is 1,300 ohms and should be wired in place of R13.

Late production Models 145 have an automatic shutoff when the cabinet front is closed. New parts for these models are interchangeable and will be carried in replacement stock in place of the original early production items as shown below:

| Part No. | Description |
|----------|---------------------------------------------------------------------|
| RDE-049 | Escutcheon replaces RDE-034 |
| RDK-166 | Knob and knob clip replaces RDK-149 |
| RAC-067 | Cabinet front cover replaces RAC-055 |
| RMC-036 | Nameplate and catch, with 2 stud mount for maroon or white cabinets |
| RMC-038 | Nameplate and catch, with 3 stud mount for maroon or white cabinets |
| RMC-039 | Nameplate and catch, with 3 stud mount for brown cabinet. |



Lead identification for ceramic capacitor RCW-3015.

The accompanying illustration of the four-section ceramic capacitor, catalogue number RCW-3015, is added to aid in capacitor-terminal identification of C9, C10, C11 and C12.

General Electric 64, 65

Late production receivers incorporate a helical spring in the clock mechanism which provides a more positive trip action to the switch contact assembly when operating the sleep control. Failure of switch contacts to open may be due to the incomplete travel of the sleep control gear segment and cam assembly after its release by the segment gear's drive pinion. Normally, the spring action of the switch contacts through the sleep control switch lever should be sufficient to allow sleep control cam and gear segment to spring outward completely after it becomes disengaged from its pinion drive gear. However, if binding or position of control parts results in failure of segment gear and cam to swing completely outward properly releasing switch control lever and contacts, the addition of the booster spring (catalogue no. RMS-203) will provide the additional tension to correct segment gear and cam operation.

To install the booster spring, remove the case and draw the clock mechanism forward from the front of the radio cabinet, just far enough to permit installation of the booster spring. The accompanying illustration shows the position of the booster spring as viewed from the rear of the clock mechanism. One end of the spring is fastened to the cam stud, the other end to the brass front plate stud.

Rear view of clock mechanism in General Electric Models 64 and 65, showing position of booster spring.

General Electric 60, 62, 64, 65, 66, 67

The stock item RAB-054, Cabinet back and loop, is no longer available and Stock No. RAB-097, Cabinet back and loop, is substituted in its place. For those receivers produced, employing RAB-054 with connections made to the primary antenna winding, the black wire to chassis ground is removed when RAB-097 is substituted for replacement.

General Electric 123, 124, 125

A self-tapping screw, #4 x 1/4 inch, Cat. No. RHS-044, Shakerproof type 25, has been added to the Parts List for the above models. Cabinets of later production receivers were tapped for these screws to mount the loud-speaker in lieu of the Tinnerman clip, RHM-061, used in earlier speaker mountings.

General Electric 140

The rectifier assembly, REX-004, is no longer stocked riveted to a mounting bracket. The new rectifier may be screw mounted to the original rectifier bracket as follows: remove wires at the connecting lugs of the old rectifier; using screwdriver blade between plates of rectifier to be removed, pry plates off from rectifier mounting bracket; assemble new rectifier to bracket, using a #6-32 x 1 inch long screw through rectifier and bracket hole and fasten using lock washer and nut; replace wire connections to new rectifier.

General Electric 143

In late production receivers, C5 was changed to 0.25 µf, 200 volts, Cat. No. UCC-050. This change was made to reduce regeneration which resulted in unstable operation.

General Electric 165

A tube shield has been added in late production receivers to the I55 tube, improving its stability. This item is carried in parts replacement stock at RHS-010.

General Electric 218, 218H

A 15,000-ohm, 1/2-watt resistor R33 has been added between the high side of the volume control and the arm of the band switch S1D. This improves receiver stability. The following changes should be made in the Parts Lists for these models:

Delete Stock No. RLI-084; Add RLI-088, Choke, f-m antenna (L2), used in 218 only; Add URD-077, Resistor, 15,000 ohms, 1/2 w. carbon.

Stock No. RLI-088 has been deleted from the Parts List and Stock No. RLI-084, Coil, f-m antenna choke, L2, added in its place.

General Electric 402

R2, shown connected to B+, should cross over the vertical B+ lead to pin 6 of V2, and a dot connection should be drawn at the vertical B- lead to pin 2.

General Electric 505, 506, 507, 508

Catalogue items RWL-009 and RWL-016 should be deleted from the Parts List and replaced by the following items: RWL-025, Cord, power cord and plug (brown, heavy duty type) for Models 505, 507, 508; RWL-026, Cord, power cord and plug (ivory, heavy duty type) for Model 506.

General Electric 505, 506, 507, 508, 509, 530

Change Step 1 (column 2) of the Alignment Chart to read "12BA6 grid pin (1)," and Step 2 (column 2) to read "12SA7 grid pin (8)." Change the tube type numbers of the I-F Stage Gains to read: 12SA7 grid to 12BA6 grid—50 at 455 kc; 12BA6 grid to 12SQ7 diode plate—50 at 455 kc.

General Electric 509, 530

Catalogue items RWL-009 and RWL-106 should be deleted from the Parts List and replaced by the following items: RWL-025, Cord, power cord and plug (brown, heavy duty type) for Model 530; RWL-024, Cord, power cord and plug (white, heavy duty type) for Model 509.

General Electric 515, 516, 517, 518

Catalogue items RWL-009 and RWL-016 should be deleted from the Parts List and replaced by the following items: RWL-025, Cord, power cord and plug (brown, heavy duty type) for Models 515, 517, 518; RWL-026, Cord, power cord and plug (ivory, heavy duty type) for Model 516.

General Electric 521, 522

Delete items RDK-217, RDS-090 and RWL-009 from the Parts List, and add the following items: RDK-237, Knob, tuning dial wheel with scale embossed; RWL-025, Cord, power cord and plug (brown, heavy duty, type).

General Electric 600, 601, 603, 604

The description "maroon for Models 600 and 601" should be added to Stock items RAB-096, RAU-308, RHY-010, and RHB-006. The following additional replacement parts have been added to the Parts List for Models 600, 601, 603, and 604.

| Part No. | Description |
|----------|----------------------------------------------------------------------|
| RAB-125 | Back, cabinet back, tan, less hinges (603) |
| RAB-126 | Back, cabinet back, green, less hinges (604) |
| RAU-327 | Cabinet, cabinet body, tan (less back, handle and hardware) (603) |
| RAU-328 | Cabinet, cabinet body, green (less back, handle and hardware) (604) |
| RDK-204 | Knob, volume or tuning, green (604) |
| RDK-205 | Knob, volume or tuning, tan (603) |
| RHB-014 | Button, plug button, tan, in cabinet over alignment trimmers (603) |
| RHB-015 | Button, plug button, green, in cabinet over alignment trimmers (604) |
| RHM-052 | Clip, for rim-mounting speaker |
| RHM-062 | Clip, for hole-mounting speakers |
| RHW-024 | Cup washer, retaining washer for item RMS-217, handle shock spring |
| RHY-016 | Handle, cabinet handle, tan (603) |
| RHY-017 | Handle, cabinet handle, green (604) |
| RJP-028 | Plug, battery connecting plug P1 |
| RMS-216 | Guide spring, used with item RMC-040 |
| RMS-217 | Spring, shock spring for cabinet handle |
| UCG-022 | Capacitor, 56 μ f, mica, C15. |

General Electric 752

A 47- μ f, silver mica capacitor, C3, was added to the circuit of later receivers to prevent parasitic oscillation. C3 has been added from ground to the junction of R6 and the i-m terminal of S1E. In the Visual Alignment Chart, Step 5 of FM-IF Alignment, change adjustment "Core of T4" to read "Core of T9."

Hallicrafters S-41G, S-41W

In the Alignment Data Table for these models, under the column headed Adjust Trimmers, add C-4A to Step 1, C-4B to Step 2, and C-4C to Step 3. In some models the two capacitors marked C2 have been replaced by variable iron core T6.

Jewel 349, 949

Model 349 is the same as Model 949. The Alignment Procedure for these models is the same as that for Models 921, 935 and 936, except that "Reduce input as needed to keep output near 1.28 volts (0.5 watt)" should read "to keep output near 0.4 volt (0.5 watt)," and in the third column, 12BE6 grid (mentioned twice) should read 1R5 grid. The Parts List for Models 349 and 949 is given below:

| Ref. No. | Part No. | Description |
|-----------|----------|------------------------------------------------|
| C1 | 30-17A | Variable capacitor, 2 gang, 420 & 162 μ f |
| C2, 3, 11 | 32-4 | Tubular paper capacitor, 0.05 μ f, 200 v |
| C4, 6 | 32-29 | Tubular paper capacitor, 0.01 μ f, 200 v |
| C5, 7 | 32-17 | Tubular paper capacitor, 0.002 μ f, 200 v |
| C8 | 32-20 | Tubular paper capacitor, 0.005 μ f, 200 v |
| C9 | 32-5 | Tubular paper capacitor, 0.05 μ f, 400 v |
| C10 | 32-32 | Tubular paper capacitor, 0.2 μ f, 200 v |
| C12, 13 | 35-4 | Mica capacitor, 100 μ f, 500 v |
| C14 | 31-16A | Electrolytic capacitor, 50 x 30 μ f, 150 v |
| C15 | 31-17 | Electrolytic capacitor, 200 μ f, 15 v |
| R1 | 20-49 | 100K, 1/2 w, 20% |
| R2 | 20-46 | 3.3M, 1/2 w, 20% |
| R3 | 20-6 | 2.2M, 1/2 w, 20% |
| R4 | 20-42 | 8.2K, 1/2 w, 20% |
| R5 | 20-57 | 10M, 1/2 w, 20% |
| R6 | 20-73 | 4.7M, 1/2 w, 20% |
| R7 | 20-74 | 220K, 1/2 w, 20% |
| R8 | 20-14 | 1M, 1/2 w, 20% |
| R9 | 20-31 | 47 ohms, 1 w, 10% |
| R10 | 20-143 | 2.5K, 8 w, 5% ww |
| R11 | 20-134 | 2.7K, 1 w, 10% |
| R12 | 20-109 | 1.5K, 1/2 w, 10% |
| R13, 14 | 20-67 | 1K, 1/2 w, 10% |
| R15 | 50-17 | Volume control, 1 megohm, DPST switch (S2) |
| T1 | 61-12 | Input i-f transformer |
| L1 | 61-13 | Output i-f transformer |
| L2 | 62-16 | Loop |
| L3 | 60-10 | Oscillator coil |
| S1 | 65-4 | Manual slide switch, DPDT |
| | 73-3 | Selenium rectifier, 65 ma |
| | 80-15 | 4" p.m. speaker with output transformer |
| | 120-28 | Leatherette cabinet |
| | 120-29 | Front panel and baffle board |
| | W122-24 | Volume knob |
| | W122-19 | Selector knob |
| | 123-9 | Plastic dial. |

Jewel 920A

The Alignment Procedure and Parts List for Model 920A is the same as that for Models 921, 935, 936.

Jewel 964

In later Model 964 receivers, pin 5 of the 12AT6 is connected to the junction of the i-f transformer and pin 6, instead of to the junction of the antenna coil and the 4.7-megohm resistor (going to the i-f transformer). The Alignment Procedure is the same as that given for Models 921, 935, and 936, except that 1500 kc, under Coupling Capacitor, should read 50 μ f; under Connections to Receiver should be Antenna (Disconnect antenna hank by unsoldering), and under Ground Connection should be B—. The seven markings on the dial represent 550 kc, 650 kc, 750 kc, 900 kc, 1100 kc, 1400 kc, and 1600 kc, respectively.

Jewel 955

The Alignment Procedure for Model 955 is the same as that given for Model 964. Model 955 also uses 12SA7, 12SQ7, 50L6, and 35Z5. The Parts List is as follows:

| Ref. No. | Part No. | Description |
|---------------|----------|-----------------------------------------------|
| C1 | 32-17 | Tubular paper capacitor, 0.002 μ f, 200 v |
| C2 | 32-4 | Tubular paper capacitor, 0.05 μ f, 200 v |
| C4 | 32-29 | Tubular paper capacitor, 0.01 μ f, 200 v |
| C6 | 32-5 | Tubular paper capacitor, 0.05 μ f, 400 v |
| C7 | 35-4 | Mica capacitor, 100 μ f, 500 v |
| C8 | 31-20 | Electrolytic capacitor 50 x 30 μ f, 150 v |
| C9 | 30-18 | Variable capacitor, 420 & 162 μ f |
| R1 | 20-3 | 22K, 1/2 w, 20% |
| R2 | 20-7 | 4.7M, 1/2 w, 20% |
| R3 | 20-8 | 10M, 1/2 w, 20% |
| R4 | 20-19 | 470K, 1/2 w, 20% |
| R5 | 20-14 | 330K, 1/2 w, 20% |
| R6 | 20-73 | 1.5K, 1 w, 20% |
| R7 | 20-93 | 22 ohms, 1/2 w, 20% |
| R8 | 20-96 | 22 ohms, 1 w, 20% |
| R9 | 50-11B | Volume control, 2 megohms, SPST switch |
| 61-5 or 61-14 | 60-12 | Oscillator coil, with spring clip |
| 62-17 | 61-14 | I-f transformer, with solder tabs |
| 47-3 | 62-17 | Antenna coil |
| 80-17 | 47-3 | Antenna hank, 15' |
| 120-30A | 80-17 | 4" p.m. speaker with output transformer |
| 122-15 | 120-30A | Cabinet (specify color) |
| | 122-15 | Knob (2) (specify color) |

Midwest KC-16

The mixer coil plate should be grounded to the front apron of the chassis with tinned copper braid to reduce f-m—r-f regeneration.

Montgomery Ward 94GSE-3011B

Model 94GSE-3011B differs from Model 84GSE-3011A only in type of cabinet covering and cabinet hardware as listed below:

| Part Number | Description |
|-------------|---------------------------------------------------|
| MW7E179-3 | Cabinet |
| MW20E449-2 | Rear door with hinges, antenna post and line cord |
| MW20E461 | Handle with mounting brackets. |

Motorola BKOA, CT8A, GM9TA, GMOT, HNO, ILOT, KR9A, OEO, PCO, PC9A, SR9A, CL 10A

The above models all use Chassis 10A. Model BKOA is used in 1950 Buick Special, Super and Roadmaster cars. It will also accommodate 1949 Buick Super and Roadmaster; also the 50-70 Series 1948, '47, '46, and '42 Buick cars. Model CT8A is used in 1948 Chevrolet. It will also accommodate 1947, '46, '42, and '41 Chevrolet cars. Model GM9TA is used in 1949 and 1948 GMC and Chevrolet trucks. Model GMOT is used in 1950, '49, and '48 GMC and Chevrolet trucks. Model HNO is used in 1950 Hudson (Pacemaker, Super, and Commodore). Model ILOT is used in International L-Line trucks. Model KR9A is used in 1949 Kaiser and Frazer. Model OEO is used in 1950 Series 76 and 88, all 1949 and 1948 Futuramic Oldsmobile cars. Model PCO is used in 1950 and 1949 Pontiac cars. Model PC9A is used in 1949 Pontiac cars. Model SR9A is used in 1949 Studebaker cars.

Philco 50-621

This model completed production without change and appears as Run #1 only. The following corrections and additions have been made to the Parts List:

| Part No. | Description |
|-----------|---------------------------------|
| 34-8003-1 | Selenium rectifier, 100 ma, CR1 |
| 10761-3 | Cabinet, brown |
| 10761-4 | Cabinet, beige |
| 10761-5 | Cabinet, green |
| 54-4712-3 | Back, brown |
| 54-4712-4 | Back, beige |
| 54-4712-5 | Back, green |
| Delete | Front |
| Delete | Shield base. |

National HRO-7

To eliminate oscillator drift occurring during stand-by periods, the following changes have been made. These changes allow the h-f oscillator, bfo oscillator and output tubes to remain on all the time whether the B+ switch is turned on or off.

1. Move the B+ end of R24 from the B+ tie-point to pin 6 of V9, 6J7.
2. Connect pin 6 of V9 to pin 5 of S1 using 8 $\frac{3}{4}$ inches of red wire.
3. Move red lead supplying pin 4 of S1 from the cold terminal of bsw to the hot terminal.
4. Move red lead running to tie-point located on chassis between C31 and C37 from pin 4 of S1 to the cold terminal of bsw.
5. Change the value of R21 to 3500 ohms, 5 watts.

National 686S, 686SB, SPU686S, 1286S

The 686SB power unit is the same as the 686S except that it is equipped with mounting brackets. The SPU686S is the same as the 686S except that it is designed for rack mounting. The 1286S is similar to the 686S except that it is designed to operate from 12 volts d.c. The voltages available at the output socket are 12 volts d.c. and 165 volts at 45 milliamperes d.c.

The following capacitors have been added to the 686S and 1286S power units:

1. C203, 0.01 μ f, 300 vdcw, added from the junction of fuse F101 and switch S101 to ground.
2. C204, 0.0043 μ f, 500 vdcw, from the B+ terminal to ground.
3. C205, 0.0001 μ f, 500 vdcw, across output socket, from L201 to A+.

RCA A-82, Ch. RC-1094; A-91, Ch. RC-1095; A-108, Ch. RC-1096; 45-W-9; Ch. RC-1095A

The original carriage in all of the above models used a pull-out handle on the top front, the carriage now in use has a handle under the lower front edge. The same plastic frame may be used for all models. A plug button (supplied with each plastic frame) is used to cover a center hole which is unused on all models except A-108.

Frame—Stock No. 76161 is used as a replacement for frame Stock No. 75549 or 75571 (maroon).

Frame—Stock No. 76162 is used as a replacement for frame Stock No. 75683 or 75684 (light brown).

The new type of pull-out handle (lower front) is available as Stock No. 76125. If the original pull-out handle (top front) is desired it will be necessary to drill two holes in the frame. The holes are .203" diameter and are located .625" each side of the center line and .13/64" down from the top.

In Models A-91 and A-108 the color of wire used in the connecting cable has been changed. A black-white wire has been used as a substitute for the black wire (pin 1 to speaker) and a brown-white wire has been used as a substitute for the brown wire (pin 8 to speaker). A brown wire goes from pin 2 to the jewel lamp and a black wire goes from pin 3 to the jewel lamp.

In Model A-82 a substitute speaker (stamped 92569-9B) has been used in some instruments. It requires a different speaker cone than the one listed in the A-82 Parts List. Speaker 92569-9B uses Stock No. 75875 cone. Speaker 92569-9W uses Stock No. 74901 cone.

RCA Q10-3, Q10 Series, Ch. RC-549C

Model Q10-3 is identical to other sets of the Q10 series with the exception of the cabinet which is black and uses ivory color knobs.

The output transformer mounting has been revised to minimize the possibility of breakdown, especially in tropical areas. The transformer in later production sets is mounted on insulation board which is, in turn, mounted on the dial back plate support.

RCA BX55, Ch. RC-1088; BX57, Ch. RC-1088A

Capacitor C11, 0.047 μ f, must be dressed away from the metal chassis and in such position that inserting the chassis into the case will not change its position. The side of C11 which may short to chassis is the side which connects directly to the selenium rectifier. If this side contacts the chassis it will place the chassis at power line potential.

The 2600-ohm, 6-watt resistor R13 now being used in Model BX57 is of improved design. The original resistor was a ceramic type and the type now being used is a flat armored type. When the new type is used to replace the original type, it is necessary to drill a .120" diameter hole in the front apron of the chassis to accommodate a self-tapping screw for mounting purposes.

RCA Ch. RC-1065C, RC-1065D

The value of capacitor C3 in these chassis is 9.1-113.8 μ f. C3 is located across oscillator coil L2.

RCA Record Changers RP-176A, RP-176B

The record changers are the same as the RP-176 except for the following differences. The pickup and arm assembly for the RP-176A is: Stock No. 72716, Arm, Pickup arm complete, less pivot arm, crystal and cable. The motorboard sub-assemblies, complete with all welded and riveted parts, less detachable operating parts, are designated as stock numbers 72717 and 70844, for RP-178A and RP-178B, respectively.

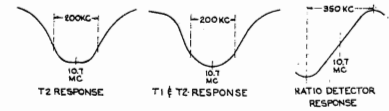
RCA X551, Ch. RC-1089B; X552, Ch. RC-1089C

R4, the 3.3-megohm avc filter resistor previously connected to the junction of R12, 47,000 ohms, and the phono jack J1, is now connected to the junction of R12 and terminal 2 of the 2nd i-f transformer T2.

RCA 8V90, Ch. RC-618, RC-618A; 8V91, Ch. RC-616A, RC-616H

Under Alignment Procedure, Critical Lead Dress, the following additions should be made: 17. The f-m oscillator coil should be cemented to its support. Amphenol No. 912 cement is recommended for this purpose. If it is necessary to loosen the coil, use Amphenol No. 916 solvent.

18. Capacitor C41 should be waxed or cemented to the chassis apron. The f-m response curves are shown in the accompanying diagram.



F-m response curves for Models 8V90 and 8V91.

In Chassis RC-618 the value of R35 is 560 ohms; and R31, the 1-megohm resistor across C4, is used only on early chassis.

Chassis RC-618A is the same as Chassis RC-618 except for the following changes which have been made. A filament choke coil L6 has been added from pin 2 of V8 to pin 2 of the 6AV6 a-f amplifier V5. A 0.005- μ f ceramic capacitor has been added from pin 3 of the 6AU6 driver V3 to ground. A 0.005- μ f ceramic capacitor has been added from pin 5 of V7 to ground. A 100-ohm, 1/2-watt, fixed composition resistor R36 has been added from pin 4 of V8 to pin 4 of V6. Capacitor C11, 5 μ f, has been added in parallel with C12, and C13 across taps D and B of the oscillator coil L4

RCA 8R71, 8R74, 8R75, Ch. RC-1060; 8R72, 8R76, Ch. RC-1060A

A 15,000-ohm 1/2-watt resistor, R1, is sometimes used between pin 7 of S1 Rear and the phono outlet. R33, 1000 ohms, 1/2 watt, has been added from F to G of the a-m oscillator coil. A 0.005- μ f capacitor, C10, has been added from pin 3 of the 6AU6 driver, V3, to ground. Filament choke coil L6 has been added from pin 3 of V5 to pin 2 of V6. A 5- μ f capacitor, C11, has been added in parallel across C12 and C13. A 0.005- μ f capacitor, C44, has been added from pin 5 of tube V5 to ground.

RCA 8X541, Ch. RC-1065L; 8X542, 8X547, Ch. RC-1065M

These instruments are almost identical to the previous production of these instruments which used Chassis RC-1065J and RC-1065K.

RCA 9EY3, Ch. RS13Z

To aid in hum reduction in Record Changer 9EY3, resistor R8 and capacitor C4 have been changed in value. R8 has been changed from 470,000 ohms to 270,000 ohms. C4 has been changed from 0.002 μ f to 0.0047 μ f, 600 volts, tubular.

Regal 7151

Model 7151 is electrically the same as Model 205.

Sparton 130, 132, 135, 139, Ch. 5A10

Inability to procure type 12AV6 tubes in production quantities for the above models using radio chassis type 5A10 made it necessary to make the following production substitution. In the future, these models will use a 12AT6 tube in the 2nd detector and avc circuit in place of the original 12AV6 as shown in the schematic diagram. As these tubes are interchangeable, a change in other components of the circuit is not necessary.

Sears 220, Ch. 528.173

A quantity of model 220 portable radios was shipped on which a corner boss in the cabinet body became broken. Breakage of either or both bosses released the spring (Littlefuse) clip preventing the secure latching of the back in the closed position. When this condition is found a new case (cabinet-less back) should be used. Follow instructions below to prevent repetition of the same trouble.

Remove the handle from the case. Save all parts. Discard the case with the broken bosses, the support brackets and the screws that held the Littlefuse clips in place. Retain the Littlefuse clips and screws, flat washers and grommets that secured the brackets at the bottom to the rear apron of the chassis.

Replace the items that were discarded with the following new items. Order from source number 528.

| Part No. | Description | Amount Required |
|----------|---------------------------------------|-----------------|
| T42-467 | Case | 1 |
| T97-147 | Screw - No. 4-24 x 1/8 thread cutting | 2 |
| T11-420 | Bracket - chassis support | 2 |
| T47-118 | Grommet - 5/16 pure gum rubber | 2 |
| T86-74 | Washer - flat 3/8" O.D. | 2 |

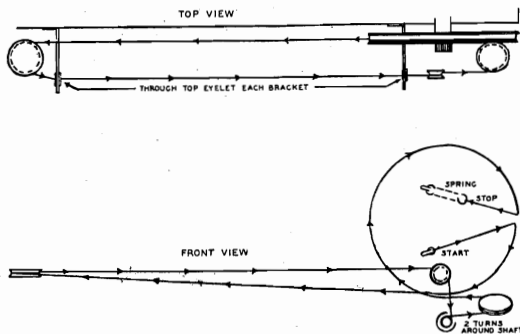
The new support bracket has a larger diameter hole at the top for the new grommet. The mounting screw is longer and a flat washer has been added.

Sears 8260, Ch. 101.823 series

The loop antenna lead wires in the front cover of the above portable have continued to break despite careful assembly and inspection at the source. An analysis of a large number of these radios on life test showed that variations in the spring tension which takes up the slack in the leads is the greatest contributing factor in these failures.

It is recommended that this spring be disconnected on every model 8260 in store stock prior to sale and delivery to the customer. The only purpose of the spring is to hold the wires taut for better appearance. The slightly different appearance of slack wires is more desirable than the potential complaint due to broken leads.

Open the back cover and find the lug in the outer case (in line with the loop leads) to which the small spring is attached. With a small screwdriver or knife bend the lug out enough to slip off the spring loop. Use a paper clip bent to form a hook, if necessary. It is not essential to remove the spring, but merely to disconnect one end as described. When this spring is disconnected the possibility of broken loop leads is reduced to a minimum.



Dial stringing for Sparton Chassis 8W10.

Sparton 1080A, 1081A, Ch. 8L10

Model 1080A in mahogany and Model 1081A in blond are radio-phonograph combinations using radio chassis type 8L10. All of the information on Chassis 8L10 is contained in the service notes for this chassis.

Sparton 141XX, 142XX, 1040XX, 1041XX, 1085, 1086, 1090, 1091, Ch. 8W10

Chassis 8W10 is similar to Chassis 8M10, and the service notes for the 8M10 apply also to the 8W10. The schematic diagram for the 8W10 is the same as that for the 8M10 except that a 68-ohm resistor, R38, has been added from the junction of C1B and C2B to pin 7 (a.m.) of switch S1-R. Models 141XX in mahogany and 142XX in blond are straight table model radio receivers. A new dial, front panel, and control knobs distinguish these models from Models 141X and 142X. Models 141XX and 142XX are equipped with a 6" x 9" p-m oval speaker.

Models 1040XX in mahogany and 1041XX in blond are radio-phonograph combinations. The models also have new dials, front panels, and control knobs and are equipped with a three-speed record changer. The cabinet styling is the same as Models 1040X and 1041X. The receiver chassis is mounted to the tilting front panel in the right-hand cabinet compartment. A 10-inch p-m speaker is standard equipment.

Models 1085 in mahogany and 1086 in blond are radio-phonograph combinations. The receiver chassis is mounted in the top center compartment with the record changer directly below. A compartment either side of the units has been reserved for record album storage. The record changer is stationary mounted. These models employ a 10-inch p-m speaker.

The accompanying illustration shows the dial stringing for these models.

The Chassis Parts List for these models is the same as the Parts List for the 8M10 Chassis. The following parts apply to Chassis 8W10 and the models which use this chassis:

| Part No. | Description |
|------------|---------------------------------------------------|
| PA5654 | Knob, maroon, 4 req'd (1085 only) |
| PA5625-1 | Knob, black, 4 req'd (1086 only) |
| PA5654-1 | Knob, volume (all other models) |
| PA5654-2 | Knob, tone, on-off |
| PA5654-3 | Knob, f-m, a-m, ph. |
| PA5654-4 | Knob, tuning |
| PB30017 | Dial scale |
| PB40150 | Escutcheon, black (1086 only) |
| PB40150-1 | Escutcheon, maroon (1085 only) |
| PD93012-1 | Escutcheon, maroon and gold (141XX, 1040XX, 1090) |
| PD93012-2 | Escutcheon, gold (142XX, 1041XX, 1091) |
| PC63000-12 | Speaker, 10" round p-m (all consoles) |
| PC63000-19 | Speaker, 6" x 9" oval p-m (table models) |

Stromberg-Carlson 1121, 1135

When f-m drift is encountered the following steps can be taken to assure better grounding and better receiver performance.

1. On the variable tuning capacitor, connect short lengths of wire braid from the shaft wiping contacts to the r-f tube shelf. Also at the four points, where the tie-bar of the variable capacitor is connected to the r-f tube shelf, use wire braid (heavy) and solder with a heavy duty soldering iron to insure a well soldered connection.

2. At the converter end of the r-f tube shelf, where it is mounted to the chassis mounting bracket, use a heavy duty iron and sweat in solder along the butting junction.

3. The f-m trimmers on the r-f shelf may be loose, permitting heat, vibration, etc., to cause them to change slightly. If they can be turned easily, unsolder the lock-nut, run it down a fourth or half turn, as necessary to get a smooth but secure hold on trimmer screw, and resolder. Pay particular attention to the oscillator section.

4. At the oscillator end of the range switch, check the contact of the metal spacers to the tie rods between wafer sections. If they are floating or only grounding intermittently, crimp them down tightly against the tie rods and tighten the tie bolts.

5. Substitute wire braid in grounding connections from r-f shelf to main chassis and solder well.

6. Check alignment of the f-m-i-f and discriminator and get proper bandwidth. At the same time be sure that the iron core slugs fit snug so that they will hold alignment. A Vistac compound can be obtained that acts as a non-hardening filler. Particular emphasis should be given on the discriminator transformer secondary where a slight movement gives the same effect as oscillator drift.

United Motors 980899, Buick

The value of the 7259128 (Illustration No. 35) electrolytic capacitor has been changed so that all sections are now 20 µf. Thus, the cathode bypass capacitance on the output tubes has been raised from 10 µf to 20, and the schematic should be altered to comply with this change.

The 470-ohm resistor (Illustration No. 63) in the cathode string of the 6R8 bucking diode circuit has been eliminated after Serial No. 94295.

United Motors 980980, Buick

The 1951 Buick Model 980980 is identical to the 1950 Model 980899 except that the antenna trimmer compensation is for antennas between 0.000061 and 0.000088 µf. The parts list is identical to that for the 980899 except for the following service parts. The service part numbers are the same as the production part numbers except where the service part number is shown in parenthesis.

| Illus. No. | Production Part No. | Description |
|------------|---------------------|-----------------------------------------|
| :63 | 1219487 | 470 ohms, 1/2 w, insulated (removed) |
| 85 | 1211118 (A104) | 100,000 ohms, 1/2w, insulated (removed) |
| 119 | 7260856 | Transformer, output |
| 128 | 7260454 | Escutcheon Assy |
| 129 | 7260455 | Dial |
| 130 | 7260422 | Dial backplate |
| 133 | 7260456 | Pointer backplate |
| 134 | 1219847 | Pointer tip pkg. |
| | 1219846 | Station selector bar pkg. |
| 139 | 7260709 | Station selector bar. |

United Motors 980979, Buick

Model 980979 is used in all 1951 Buick cars, and is identical to the 1950 Model 980869 Buick except for the parts listed below. The antenna trimmer compensation is for antennas between 0.000061 and 0.000088 μf . In the Parts List given below, the service part number is identical to the production part number except where the service part number is given in parenthesis.

| Illus. No. | Production No. | Description |
|------------|----------------|-----------------------------------------|
| 4 | 7260499 | Oscillator coil |
| 13 | 7258221 (C390) | Capacitor 0.000039 μf molded |
| 49 | 7214663 | Resistor 360 ohms, 1w, ww |
| 62 | 7259502 | Speaker, 8" round p.m. |
| 64 | 7260855 | Transformer, output |
| 81 | 7260421 | Backplate pointer |
| 90 | 7260420 | Pointer assembly |
| | 1219845 | Pointer tip pkg. |
| 92 | 7260416 | Escutcheon Assy. |
| 93 | 7260423 | Dial |
| 94 | 7260422 | Dial backplate |
| 98 | 1219840 | Push button and slide assy "B" |
| 99 | 1219841 | Push button and slide assy "U" |
| 101 | 1219842 | Push button and slide assy "T" |
| 102 | 1219843 | Push button and slide assy "C" |
| 103 | 1219844 | Push button and slide assy "K" |
| 104 | 7260414 | Worm gear and bracket, assy. |

United Motors 982421, Oldsmobile

Capacitance drift of the 0.0012- μf mica capacitor used in the oscillator tank circuit (Illustration No. 20) sometimes occurs. This appears as intermittent oscillator frequency drift which seems to be the result of high temperature which may be caused by high input voltage or other extreme conditions. It may be necessary to cover the set or run at a high input voltage when bench testing in order to have the intermittent condition reappear. Since a fixed mica capacitor is usually considered a very stable unit, this condition is not a common occurrence. However, when oscillator frequency drift is encountered this capacitor should be considered as a possible source.

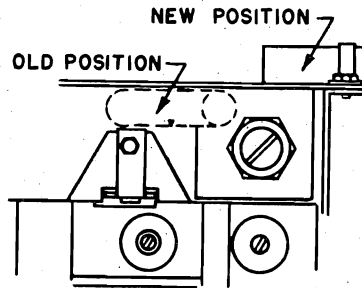
United Motors 982582, 982583, Oldsmobile

The tuner solenoid capacitor (Illustration No. 43) has been moved to a new position and is now secured by a circular mounting bracket. The new location is directly above the solenoid on the top of the tuner frame, as shown in the accompanying diagram, and eliminates any tendency for the rear cover to bind on this capacitor when located on the rear of the tuner.

The clamp fastens around the capacitor approximately $\frac{1}{2}$ -inch from the ground end and this lead is soldered to the clamp for grounding. A self-tapping screw secures the clamp to the liner frame. The hot lead to the capacitor is insulated by a heavy sleeving to the tuner return switch.

The value of the 7259128 electrolytic capacitor (Illustration No. 35) has been changed so that all sections are now 20 μf . Thus, the cathode bypass capacitance on the output tubes has been raised from 10 μf to 20 μf and the schematic should be altered to comply with this increase.

The oscillator coil is now the same as that which is used on both the Cadillac and Buick signal seeking tuner type radios. The part number for this coil is now 7259184.



New position of tuner solenoid capacitor on United Motors Models 982582, 982583.

United Motors 984570, Pontiac

A 7Q7 may be used as the oscillator modulator tube in place of the 6SA7. 7C5's may be used as output tubes in place of 6V6GT's. These substitutions do not require any circuit changes.

Westinghouse H-210, H-211, Ch. V-2144, V-2144-1

For convenience in later production, capacitor C11 that is connected between the common negative line and the chassis is changed to 0.15 μf , 200 volts, part no. V-6066*2154M.

Westinghouse H-305C8, H-306C8, Ch. V-2137-4

The first two items in the parts list for these models should be changed to read as follows

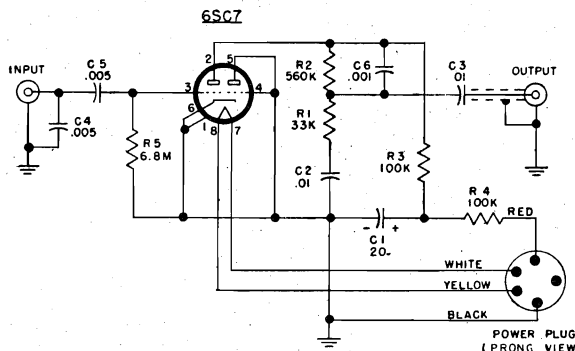
| Part No. | Description |
|----------|-----------------------------|
| V-5982-2 | Antenna assembly, a-m loop |
| V-598604 | Antenna assembly, f-m loop. |

Westinghouse H-312P4, H-312P4U, H-313P4, H-313P4U, H-314P4, H-314P4U, H-315P4, H-315P4U, Ch. V-2153-1

The following part should be added to the parts list for these models: R13 (Part No. RC30AE332K), 3300 ohms, 1 watt.

Westinghouse H-166C

The main chassis used in Model H-166C is the same as that used in Model H-166. A dual-speed record changer is used in Model H-166C. The changer employs a crystal pickup cartridge which has a higher output level than the variable reluctance cartridge used in the other models. For this reason, the phonograph pre-amplifier V-2138-1 in Model H-166C (see accompanying diagram) differs from those used in the other models. It functions mainly as a tone compensating device rather than an amplifier. Replacement parts for the V-2138-1 pre-amplifier are as follows:



Phonograph pre-amplifier used in Model H-166C.

| Part No. | Description |
|-------------|------------------------------------------------------------|
| V-4930 | Cable, power |
| V-4931 | Cable, output |
| V-5765 | Capacitor, dry electrolytic, 20 μf , 300 v (C1) |
| RCP10W4103A | Capacitor, 0.01 μf , 400 v (C2, C3) |
| RCP10W6502A | Capacitor, 0.0005 μf , 600 v (C4, C5) |
| RCP10W6102A | Capacitor, 0.0001 μf , 600 v (C6) |
| V-32548 | Connector, phono |
| V-33458-5 | Grommet, power cord |
| V-33458-10 | Grommet, socket mtg |
| RC10AE333M | Resistor, 33,000 ohms (R1) |
| RC20AE564K | Resistor, 560,000 ohms (R2) |
| RC10AE104M | Resistor, 100,000 ohms (R3, R4) |
| RC20AE685M | Resistor, 6.8 megohms (R5) |
| V-4933 | Socket, molded octal. |

Westinghouse H-316C7, H-317C7, H-326C7, Ch. V-2136-1, V-2136-1A

Model H-317C7 is the same as Models H-316C7 and H-326C7 except that an additional by-pass capacitor of 0.003 μf , 0.004 μf , or 0.007 μf , is connected across the output section of the filter capacitor C36 in some chassis. This additional capacitor is used in cases where the output section of C36 has excessively high impedance at radio frequencies. The chassis parts are listed in the H-316C7 service data. The cabinet and miscellaneous parts are the same as those for Model H-316C7 except for the parts listed below:

| Part No. | Description |
|-----------|-------------------------------------------------|
| V-5982-4 | Antenna assembly, a-m loop |
| V-6120 | Background, dial |
| V-1223-2 | Cabinet (blond) |
| V-9075-2 | Clip, spring (ball head strike) |
| V-8568 | Doors (matched pairs) |
| V-8569 | Drawer, record changer (complete less hardware) |
| V-9832-2 | Grille assembly, panel |
| V-9091-3 | Hinge, L.H. |
| V-9091-4 | Hinge, R.H. |
| V-10122-1 | Pull, door |
| V-3246 | Socket, octal wafer |
| V-9076-2 | Strike, ball head. |

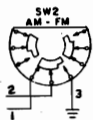
In later production of the V-2136-1 chassis, the following changes were incorporated:

1. The oscillator injection capacitor (C24), which is connected between the top of the f-m oscillator coil and the top of the f-m-r-f coil, is changed in value to 0.68 μf (Part No. V-5658-4). This change improves the mixer efficiency and increases the sensitivity.

2. A 0.05- μf , 200-volt capacitor C44 (Part No. RCP10W2503M) is inserted in the line that extends between point "Y" on the schematic diagram and the selector switch SW2. In addition, R34 (Part No. RC20AE224M), a 220,000-ohm $\frac{1}{2}$ -watt resistor, is inserted between the selector switch side of C44 and ground. These changes improve the tuning characteristics of the f-m band.

Some chassis used in later production of the subject models are designated V-2136-1A. These chassis are the same as the V-2136-1 except for the differences mentioned in the following paragraphs. These chassis use a 19T8 tube in place of the 12AL5 and 12AV6 tubes used in the V-2136-1 chassis. Tap 1 of ratio detector transformer T3, that was connected to pin 1 of the 12AL5, is now connected to pin 3 of the 19T8; and tap 4 of T3 is connected to pin 1 of the 19T8. A 33,000-ohm resistor R35 (R5, 22,000 ohms which was in this position has been removed), is connected from pin 2 to pin 7 of the i-f detector 19T8. C30 is connected across R35, and the two 100,000-ohm resistors used for alignment purposes only are still connected to the junction of C30 and R35. R24, the 220,000-ohm resistor that was connected to C30 and the junction of R25 (4.7 megohms) and R2 (470,000 ohms), and the lead from R24 to SW2 have been deleted. Pin 6 of the 19T8 is connected to tap 1 of T6, the 2nd i-f-a-m transformer. Pin 7 is grounded; pin 9 goes to the junction of R31 and C19C and D; and pin 8 goes to the junction of R10 and C19A. R25, that was connected from R3 to the junction pin 6 of the 12AV6 and R24 and R2, has been deleted. R2, 470,000 ohms, is now connected from ground to the junction of R19 (the 2.2-megohm resistor going to tap 4 of 1st i-f-a-m transformer) and R6 (the 47,000-ohm resistor going to tap 2 of T6). C13, the 0.05- μ f capacitor that went from terminal lug 4 of the antenna terminal board, is now located from tap 4 of T5 to ground, in place of C16, the 0.01- μ f capacitor which has been removed. The positions of C31 and C19B have been reversed. Capacitor C31, 150- μ f, is now located from ground to tap 2 of T6, and capacitor C19B, 220 μ f, is now located from ground to the junction of R2, R6, and R19. A 470,000-ohm resistor R33 (Part No. RC20-AE484K) and a 100- μ f capacitor C43 (Part No. RCM20B101K) have been added in parallel from tap 3 of T2 to ground.

The accompanying diagram shows switch SW2. Only the middle wafer contains changes that have been made in the V-2136-1A chassis.



Switch SW2 used in Chassis V-2136-1A.

The first and last wafers are wired as shown in the schematic for V-2136-1. (The numbers in the illustration were added for reference only.) Contact 1 goes directly to B and A of C33, and thence to L10. Contact 2 goes directly to R20, 47 ohms, and thence to pin 7 of 12BE6. The 47,000-ohm resistor R26 and the 0.001- μ f capacitor C2 connected to R20 have been deleted from the circuit, and contact 3 is grounded.

In the 50L6/GT output circuit capacitor C4, 0.005 μ f, is connected to pin 8 rather than to pin 4. The 3.3-megohm resistor R27, that is connected from terminal lug 4 to SW2 in the V-2136-1 chassis, has been deleted in the V-2136-1A chassis.

Zenith H615, H615W, H615Y, Ch. 6G05

These models and chassis are the same as Model G615, Chassis 6G05, except for the differences in their cabinets. Model H615 has a plastic cabinet (part number 14-1274). Model H615W has a white plastic cabinet (part number 14-1275); and Model H615Y has a black plastic cabinet (part number 14-1276).

Zenith 6MF780, Ch. 6D80, Ford; 6MF780E, Ch. 6D80E, Ford; 6MM790, Ch. 6D90, Mercury; 6MM790E, Ch. 6D90E, Mercury

Model 6MM790, Mercury, is erroneously listed in the Indexes and in Volume XVIII as Model 6MN790.

Mercury Model 6MM790E is the export model of the 6MM790. Model 6MF780E, Ford, is the export model of the 6MF780. In these export models the circuit breaker capacitor 22-1148 should be installed as shown in Fig. 1.

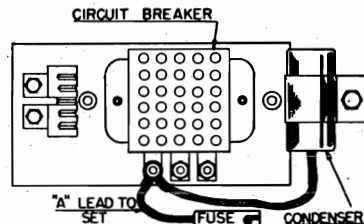


Fig. 1. Circuit breaker used on Mercury Model 6MM790E.

Top and bottom views for Chassis 6D80, 6D80E, 6D90, and 6D90E, are shown in Figs. 2 and 3. The i-f alignment procedure for these chassis is as follows:

1. Remove top and bottom covers from receiver.
2. Set signal generator to 265 kc.
3. Apply signal from generator through a 0.1- μ f dummy to the 7B8 converter grid. (Pin 6 on the socket.)
4. Adjust the i-f trimmers, A, B, C, and D (shown in Fig. 2) in the order named for maximum output. Repeat the operation to assure accurate alignment.

The r-f and oscillator alignment is as follows:

1. Connect signal generator leads through dummy antenna lead in socket on receiver.
2. Set the signal generator to 535 kc.
3. Place set in manual tuning position and set dial to 535 kc.
4. Adjust oscillator trimmer C-9 (shown in Fig. 3) for maximum response.
5. Set signal generator to 1200 kc.
6. Tune set to 1200 kc.
7. Adjust converter trimmer C-7 and antenna trimmer C-2 for maximum response.
8. If dial calibration is off after making above adjustments, a correction can be made by loosening dial scale mounting screws and sliding scale to desired position.

When replacing the core or coil the following adjustments should be made:

1. Replace coil or core.
2. Set signal generator to 1700 kc.
3. Connect signal generator leads through dummy antenna to antenna receptacle on the receiver.
4. Set receiver dial to 1600 kc (maximum high-frequency end of dial).
5. Screw the core completely out of the antenna coil, the converter coil, and the oscillator coil.
6. Adjust oscillator trimmer C-9 at 1700 kc.
7. Adjust converter trimmer C-7, and antenna trimmer C-2 for maximum output reading.
8. Replace cores to their approximate original position.
9. Set signal generator dial and receiver dial to 1200 kc.
10. Adjust oscillator core L-5 to scale at 1200 kc.
11. Adjust the antenna core L-2 and converter core L-3 for maximum output reading.

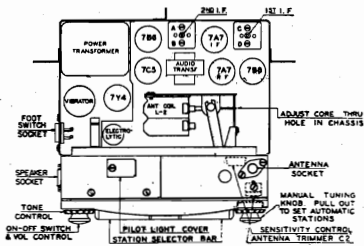


Fig. 2. Top view of Chassis 6D80, 6D80E, 6D90, and 6D90E.

12. Set signal generator to 600 kc.
13. "Rock in" shunt oscillator coil L-6 for maximum output reading. This should be done only as a last resort. This is the same as rocking in the padder capacitor on a ganged capacitor receiver.
14. Check receiver at 1200 kc for calibration and gain. If the receiver is off scale or weak, repeat operations 9, 10, and 11.

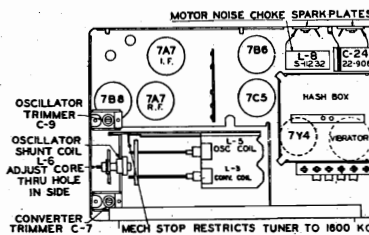
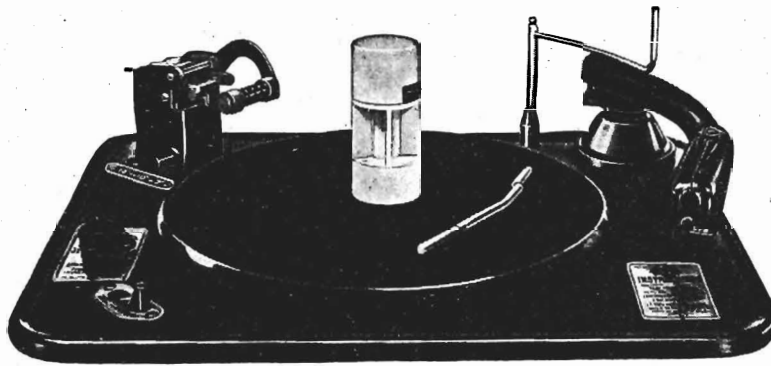


Fig. 2. Bottom view of Chassis 6D80, 6D80E, 6D90, and 6D90E.

15. After alignment is complete, the maximum high-frequency tuning range should be checked. If the range is greater or less than 1605 kc, the mechanical stop for the tuner cross arm should be bent to limit the frequency coverage to 1605 kc. After all adjustments have been made, glue core screws with speaker cement.



The "Garrard" Model R.C.80 Record Changer OPERATING INSTRUCTIONS

The "GARRARD" Model R.C.80 Automatic Record Changer will play any number of records up to 10, of any of the following types (not mixed):—

| | | |
|----------------|---|---------------|
| 10" or 12" | - | 78 r.p.m. |
| 7", 10" or 12" | - | 33.1/3 r.p.m. |
| 7" | - | 45 r.p.m. |

To operate the Record Changer proceed in the following order:—

- 1 See that the correct pick-up is in position for the type of record to be played, i.e., one having a standard .002" to .003" radius needle for 78 r.p.m. records, or .001" radius needle for 33.1/3 and 45 r.p.m. records. The pick-up head is plugged into the arm and a slight pull is all that is necessary to remove it.
- 2 Place the correct record spindle in position, i.e. stepped sloping spindle for 78 or 33.1/3 r.p.m. records, or large spindle for 45 r.p.m. records. (See diagrams 12 and 14).
- 3 Set lever at side of platform to size of record it is desired to play, 7", 10" or 12". Also turn subsidiary platform to forward position if it is desired to play 7" records with small hole. (See diagram 2, 3, 4 and 5.)
- 4 Turn speed control knob to desired speed, 78, 45 or 33.1/3 r.p.m.
- 5 Place any number of records up to 10, (not mixed) on record spindle, lower overarm, and switch on by moving the front left hand knob to "Start"

Note: The overarm is not used when playing 7" records.

To reject a record, move the left hand knob to the "Reject" position.

The changer can be switched off by moving the left hand knob to the "Stop" position. If this is done while a record is playing, when switching on again, that record will be automatically rejected and the next record commenced.

NOTE:

Should the record changer be stopped with the pick-up arm not on its rest, the pick-up should not be handled, but the left hand knob moved to "Start," when the pick-up will automatically lift and return to its rest position and stop if no records are on the record spindle.

The pick-up arm will not move from its rest unless one or more records are placed on the record spindle. This is a safety device designed to prevent the pick-up being damaged should the changer be switched on without being loaded with records.

RECORDS.

To obtain the best results from your records and record changer, care should be taken to see that the records are stored so that they keep reasonably flat and clean. Dust or dirt in the record grooves causes abrasive action and shortens the life of the record, whilst badly warped records will give trouble in dropping, poor reproduction, and even damage the pick-up stylus.

INSTALLATION

Dimensions.

The cabinet space required for fitting is 15½" long, x 13¼" wide, with 5.3/4" clearance above and 3.1/2" clearance below the plate. With a slight alteration to the motor board cut out, the "GARRARD" Model R.C. 80 is a direct replacement for the "GARRARD" Models R.C. 60, 65, 65A, 70 and 70A Record Changers.

FITTING TO CABINET.

First, the motor board should be cut out and drilled as shown on the template enclosed with each changer. If the changer is to replace one of the "GARRARD" Models mentioned above, only the piece marked on the left hand side of the template need be cut out. A small clearance should be left between the edges of the unit plate and the cabinet sides, to allow the record changer to float freely when mounted on its suspension springs.

Having opened the carton, remove the turntable found on the top liner and the box containing the record spindles, then, after disposing of the side liners, carefully lift out the changer by the string loops. A bag containing the fixing screws and spring mountings will be found in one corner of the carton. The spare pick-up head and accessories, if supplied, will be found in a box fixed to the bottom liner. Assemble the spring mountings to the motor board as shown on the template and diagram 1. Next, assemble the long fixing screws to the changer mounting plate, fitting the spring washer under the nut, then assemble a nut on each

screw, leaving 3/8" of thread below.

Before placing the changer in position, the final switch off arm at the rear of the changer, which on unpacking will be found in a downward position, should be turned to a vertical position as shown in the illustrations. To do this, loosen the round headed screw at the top of the auto switch spindle, turn the arm to a vertical position and re-tighten the screw.

The changer can now be placed in position on its suspension springs. Still using the string loops for lifting, the changer should be levelled by first fitting the turntable, then placing a spirit level on a record on the turntable, the changer can be adjusted by raising it and adjusting the lower nuts. When level, the nuts should be assembled under the springs and locked in position with the lock nuts. The string loops may now be removed and the changer connected to the power supply and pick-up to the reproducer.

It is essential to use the spring suspension assemblies on this model changer to prevent extraneous vibration from reaching the unit.

If two record spindles are used, a hole can be drilled in the wooden motor board to take the spindle not in use.

If two "GARRARD" pick-up heads are used, the plastic box in which one of the heads is supplied, can be screwed down into the cabinet to act as a dust free container for the pick-up head not in use.

MODEL R.C. 80

If the plug-in feature is to be used to change pick-ups, the cheese headed screw under the pick-up arm at rear of pick-up should be removed. This screw should be replaced and tightened up for transit purposes only.

TRANSIT SCREWS.

Two plated wood screws are supplied for use in clamping the record changer rigid to the motor board for transit purposes. The small bakelite washers should be fitted under these screws to prevent marking the mounting plate. These screws should be removed before using the record changer. The position of the screws is shown on template and diagram 11.

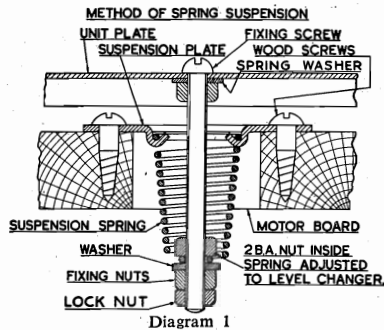


Diagram 1

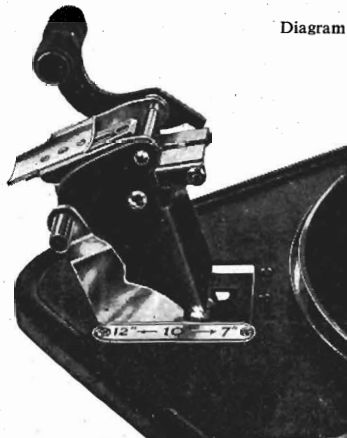


Diagram 2

Record Platform Set for 12" Records

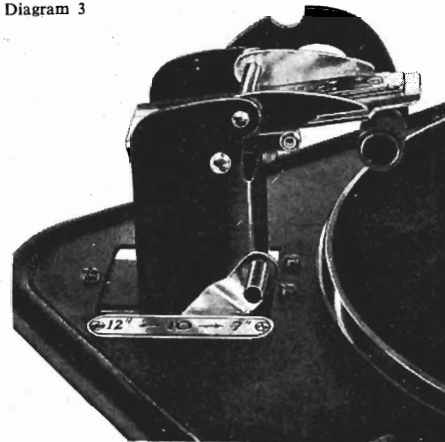


Diagram 3

Record Platform Set for 7" Records

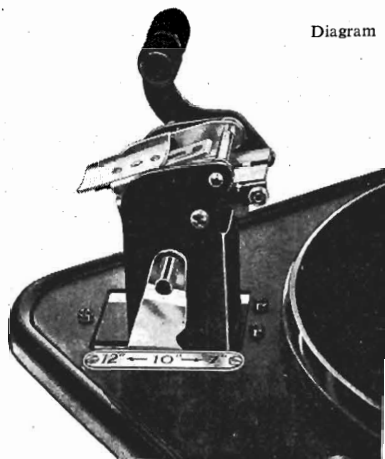


Diagram 4

Record Platform Set for 10" Records



Diagram 5

Record Platform set for 7"—45 r.p.m. Records using the large Record Spindle

MAINTENANCE.

The motor and intermediate wheel bearings, being of the oil retaining type, rarely need lubricating. When the need for oil is apparent, remove both the belts and while holding the intermediate wheel out of the way, lubricate the pulley and motor bearings with a medium grade of machine oil. Carefully remove every trace of surplus oil before replacing the belts.

The rubber rim on the intermediate wheel and the two belts must be kept free from oil.

VOLTAGE AND FREQUENCY.

The "GARRARD" Model R.C. 80/AC. Record Changer is suitable for use on 100/130 and 200/250 volts, at either 40, 50 or 60 cycles according to the motor pulley supplied, and the links on the terminal block should be set to the correct position to correspond with the voltage of the power supply as shown in diagrams 6 and 7.

A motor driving pulley can be supplied for 40, 50 or 60 cycle mains as required. The model.R.C. 80/D.C. Record Changer is suitable for use on 100/130 and 200/250 volts direct current only and the links on the terminal block should be set to the correct position to correspond to the voltage of the power supply as shown in diagrams 8 and 9. The speed of the D.C. motor is governor controlled and information for adjusting the speed will be found under "Service Instructions."

The motor should be earthed by connecting a lead from the earthing tag, (located under one of the motor end cover screws) to a good earth connection.

When adapting an AC./DC. (Universal) Radio Receiver, Amplifier, or one using an AC./DC. Power Pack for the reproduction of gramophone records, a pick-up transformer, or condensers in series with the pick-up leads should be fitted, otherwise the pick-up circuit becomes alive. Also the leads from the radio set or amplifier to the pick-up should be screened and as short as possible.

LINK CONNECTIONS R.C.80/A.C.

This type is for A.C. only and has a brown cover on the terminal block.

CONNECT LINK THUS FOR 200/250 VOLTS. CONNECT LINK THUS FOR 100/130 VOLTS.

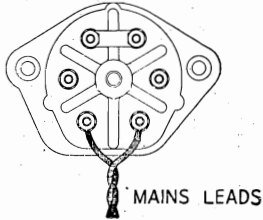


Diagram 6

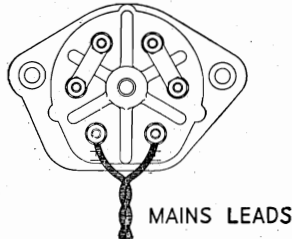


Diagram 7

LINK CONNECTIONS R.C.80/D.C.

This type is for D.C. only and has a blue cover on the terminal block.

CONNECT LINKS THUS FOR 200/250 VOLTS. CONNECT LINKS THUS FOR 100/130 VOLTS.

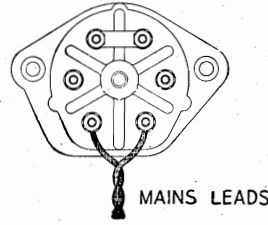


Diagram 8

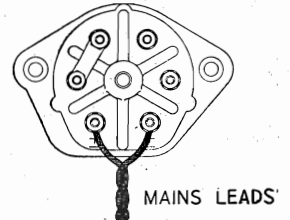
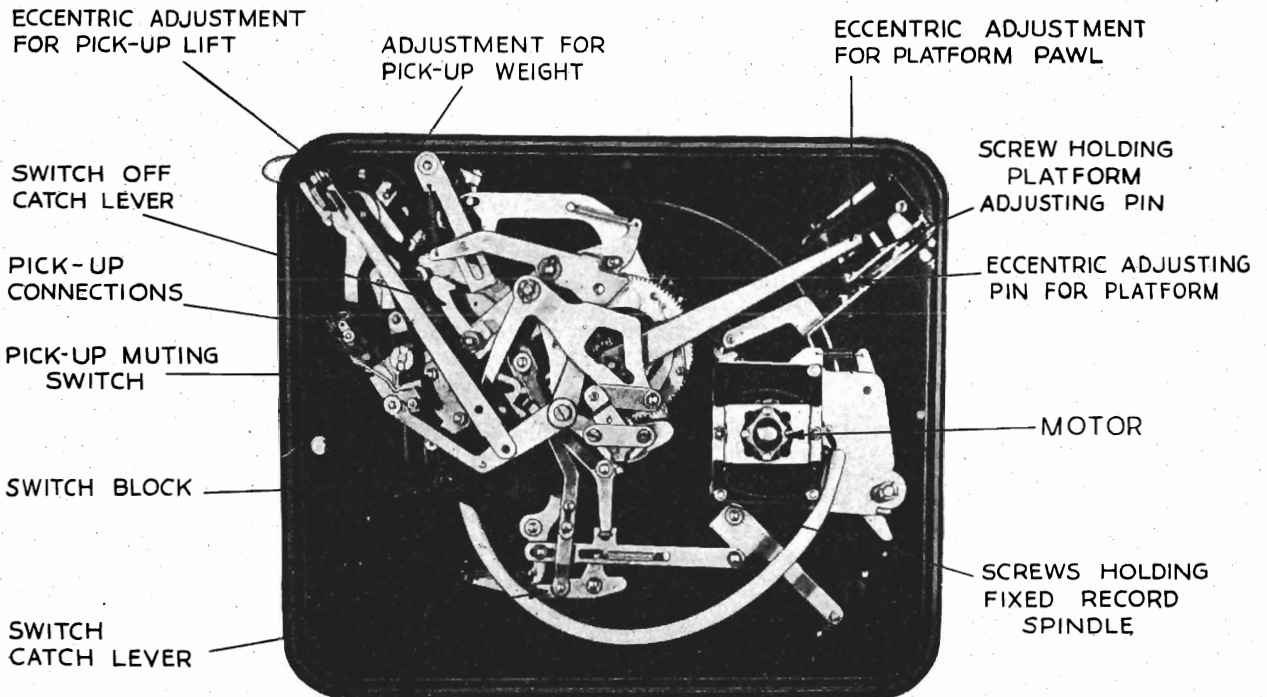


Diagram 9

Low voltage models have a green terminal block cover.



Underneath View

Diagram 10

SERVICE ADJUSTMENTS

SPEED.

The Model R.C. 80/AC. Motor is arranged to give the desired turntable speed within close tolerances. Should the turntable run excessively fast or slow then the motor pulley should be examined to see if it is the correct one to suit the frequency of the mains supply.

The various motor pulleys are colour finished as follows to distinguish the three types:—

- Nickel - 50 cycles.
- Brass - 60 cycles.
- Copper - 40 cycles.

For use on 25 cycles supply, a special motor and pulleys are required.

The speed of the R.C. 80/DC. and low voltage Models, is governor controlled, the governor being located at the lower end of the motor and is screwed on to the armature shaft and held in position by a screw through the governor collar. To adjust the speed, loosen the screw in the governor, and turn the governor a very small amount clockwise to increase the speed, or anti-clockwise to reduce it. Tighten the screw before running the motor to check the speed.

SPEED VARIATION.

It is essential that the driving surfaces of the three brass pulleys, the rubber tyred interwheel, and the belts, should be kept absolutely free from all oil or grease. This is the first point which must be checked if the turntable speed varies and the pulleys, belts and inter-

wheels should be cleaned with a dry cloth if contamination with oil is suspected. Another point to check is that the two belts run centrally on their pulleys; should they tend to run off the pulley, try removing the belt and turning it over. If this does not cure the trouble, a new belt should be fitted. Also see that the main spindle has a small amount of end play. To check this, remove the turntable and grip the main spindle firmly lifting it up and down. If no movement is felt, loosen the two screws (diagram 10) which holds the fixed portion of the main spindle, raise the main spindle a very small amount and re-tighten the screws.

NOISE.

Should the drive become noisy, first see that the screw holding the pulley to the motor shaft is not touching the intermediate wheel as it revolves. If it is, raise the pulley by loosening the screw holding it to the shaft. If the motor pulley is correct, then lubricate the pulleys as described under "Maintenance."

MOTORS.

If the motor fails to start when the control knob is turned to "Start," first check the power supply and ascertain if current is reaching the motor terminals. If correct, switch off the mains supply and examine the terminal block and see that the leads and screws are tight, also examine the switch contacts accessible underneath. Clean and adjust if necessary. On the R.C. 80/DC. and low voltage models, examine the motor brushes and make sure that they are clean and making good contact with the commutator. Also ensure that they are not sticking in the brush tubes.

The "Switch Catch Lever" (diagram 10) should also be checked to see that it is engaging when the knob is

moved to "Start." If it fails to engage, adjustment is provided on the link which operates it to allow it to drop into engagement with the switch lever and hold it in position.

If a thick oil has been used to lubricate the motor bearings, the motor will appear weak or will not start. It will then be necessary to dismantle the motor and clean away all traces of the thick oil. It is, therefore, essential to lubricate the motor bearings with a good quality thin oil.

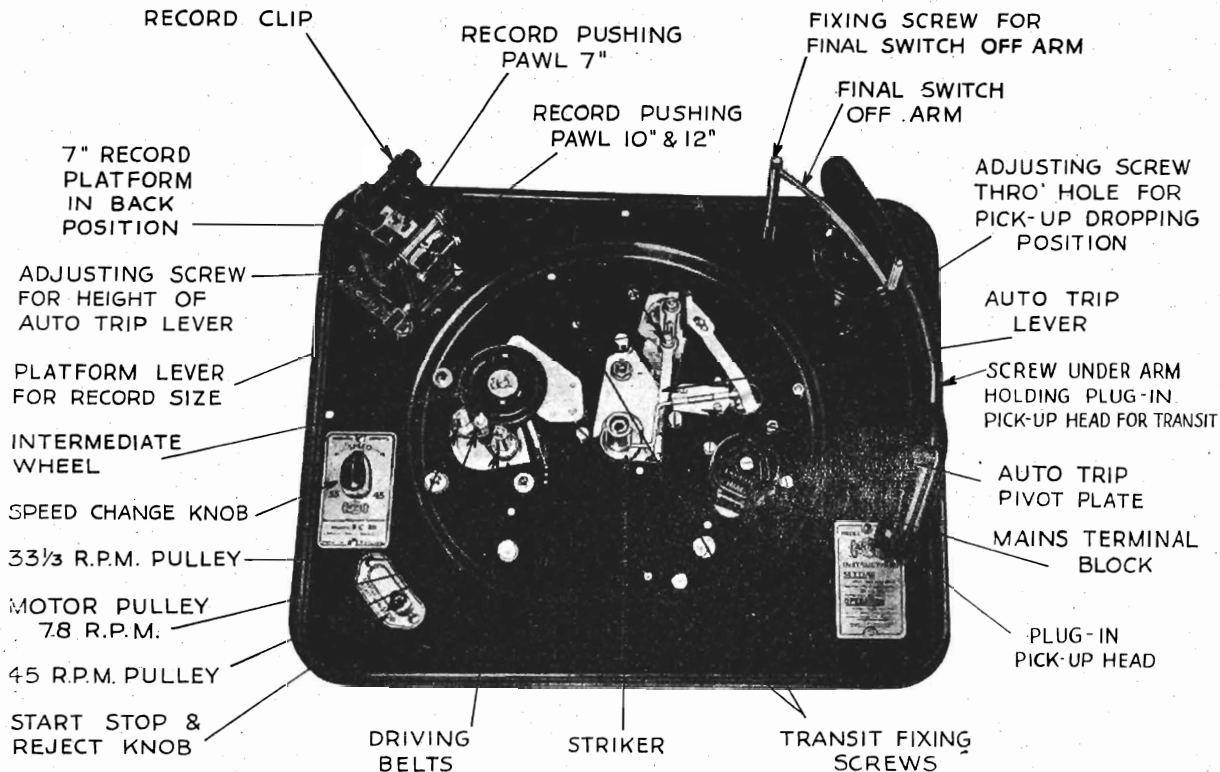
Should the motor get too hot, see that the voltage changeover links are set correctly to correspond with the voltage of the power supply. If correct, check the motor windings by inserting an AC. milli-ammeter in either motor lead.

The maximum current consumption of the R.C. 80/AC. should not exceed 0.26 amps. on 100/130 volts, 50/60 cycles, or 0.13 amps. on 200/250 volts 50/60 cycles. On the R.C. 80/DC. the current should not exceed .26 amps. on 100/130 volts or .23 amps. on 200/250 volts. On the low voltage 12 volt model, the current should not exceed 1.2 amps. or the 6 volt model 2 amps.

If readings in excess of the above figures are obtained, the motor unit should be returned for examination.

To remove the motor, first make sure the electricity supply is disconnected, then remove the insulated plate on the underside of the terminal block and the two terminal block fixing screws will now be accessible, after removal the terminal block will be released and will be attached only to the motor leads. The speed indicator knob should also be removed.

Next, while supporting the motor underneath, unscrew the nuts on the three suspension screws which secure the motor to the unit plate. Before finally



View with Turntable Removed

Diagram 11

removing the motor and its mounting plate away from the unit plate, make a careful note of the sequence of steel and rubber washers on each suspension screw in order to re-assemble correctly when re-fitting the motor.

PICK-UP.

Two types of needle are necessary for playing the different types of record and a needle having a point radius of .0025" is required for the standard 78 r.p.m. records, and one with a point radius of .001" is required for the fine groove 33.1/3 and 45 r.p.m. records. To obviate needle changing either two plug-in pick-up heads or a turnover type of pick-up having two styli can be used. Care should be taken that the correct radius needle is used for the type of record to be played.

Should another type of pick-up be used other than that supplied with the unit, some adjustment for the difference in pick-up weight may be required.

The pick-up weight adjusting screw is located under the unit plate at the rear of the pick-up arm as indicated on Diagram 10 and to adjust the pick-up weight, the screw should be pulled to bring the nut clear of its bracket and the nut turned to give either an increase or decrease in spring tension. The maximum recommended weight for long playing records is 10 grammes.

Should trouble be experienced with the reproduction from the pick-ups, the head should be returned for examination to the manufacturer whose name or trade mark appears on the cartridge.

Crystal cartridges must not be opened or the manufacturers will disclaim all responsibility.

Note: A continuity test cannot be carried out on Crystal Pick-ups with an ohmmeter.

Should there be a tendency for the pick-up to track incorrectly, especially on the first record, check the pick-up weight and adjust as explained above if found lighter than 8 grammes.

If the pick-up does not run into the record grooves after alighting on the record edge, see that the record changer is level by placing a spirit level on a record on the turntable. Also make sure that the flexible wire leading to the pick-up is not twisted or held in such a manner as to prevent the free movement of the pick-up arm; also see that the associated levers are free.

CAUTION.

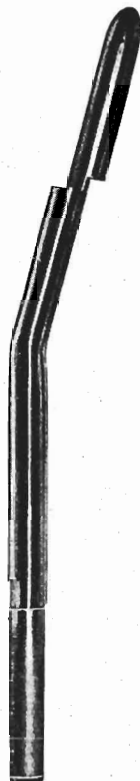
When making any adjustments to the Pick-up Arm it should NEVER on any account be forced into position. If the turntable is turned by hand it should NOT be turned backwards.

PICK-UP DROPPING POSITION.

The pick-up arm dropping position is factory adjusted for optimum accuracy. Should any minor adjustment be required rotate the screw accessible through the top plate as shown in diagram 11. Adjustment must be made only when the pick-up arm is in the rest position.

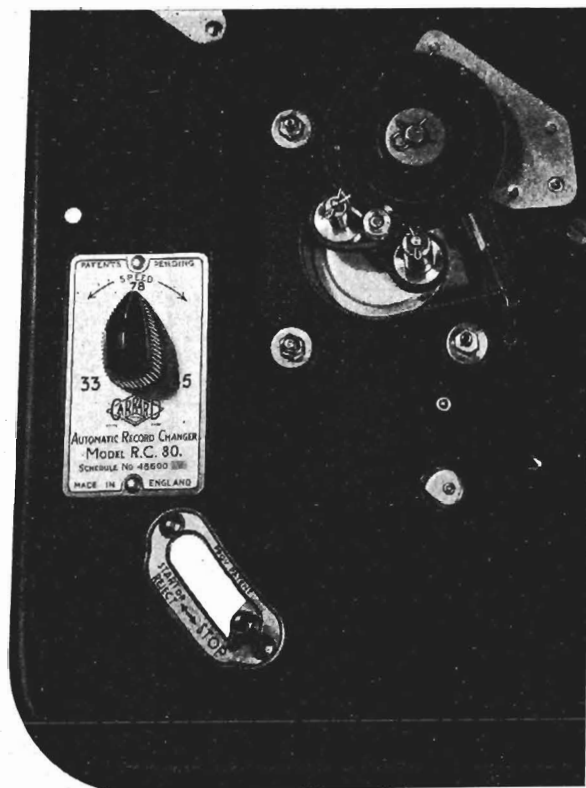
PICK-UP LIFT.

If desired, the amount the pick-up lifts can be adjusted by loosening the nut securing the "Eccentric Adjustment for Pick-up Height" (diagram 10), and adjusting the eccentric pivot with a screw driver in the slot at back. Finally, re-tighten the nut.



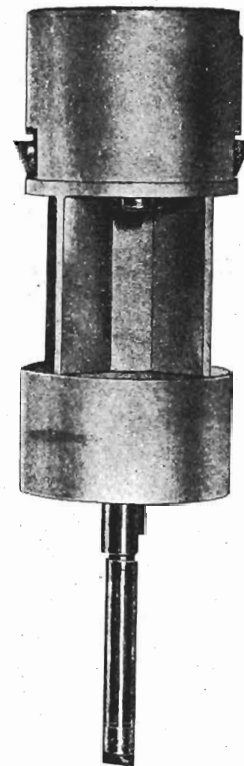
Record Spindle for 78 & 33 1/3 r.p.m. Records

Diagram 12



View of Drive with Turntable Removed

Diagram 13



Record Spindle for 45 r.p.m. Records

Diagram 14

PICK-UP MUTING SWITCH.

A pick-up muting switch is connected across the pick-up to short circuit the pick-up except when the changer is in the playing position. It is important to note that no sound will be obtained from the pick-up by flicking the needle when the pick-up is on its rest. The muting switch contacts should be closed except when the changer is in its playing position. Should this switch fail to operate, clean the contact faces, and ensure that they make and break according to the position of the changer mechanism.

AUTO TRIP MECHANISM.

The auto trip mechanism is the velocity type and is of a special design to be very light and sensitive in operation. It is set to commence operation when the needle reaches a 2.7/8" radius. The trip operates by the auto trip lever being raised by a small cam attached to the main spindle when the pick-up arm runs in on the record run off groove. The auto trip lever, on being lifted, pushes a small cranked rod which engages the clutch.

If the auto trip fails to operate, it may be caused by the auto trip lever being too low and it should be raised by giving the auto trip lever adjusting screw (diagram 11) about half a turn in a clockwise direction).

RECORD PLATFORM ADJUSTMENT.

When despatched from our Works, the record platform is set to accommodate records of average dimensions. Occasionally, however, records may be found outside the normal limits. If necessary, therefore, the platform may be adjusted to take them. To adjust the platform position, loosen the screw in the platform pivot collar (diagram 10) accessible from underneath the changer, rotate the pin by means of the slot in the end, until the platform is in the required position, then re-tighten the screw. The end of this pin is eccentric, and it is this eccentric which adjusts the platform position. Before finally tightening the screw after adjusting this pin, see that a small clearance, about 1/64" is left between the eccentric shoulder and the side of the platform support.

Separate adjustment is provided for the platform pawl, and, to set the platform pawl, first set the platform lever in the 10" position and operate the changer until the pawl is in its forward position. It should then be flush with the edge of the record platform. If it is not, the nut locking the eccentric adjustment for plat-

form (diagram 10) should be loosened and the eccentric adjustment turned until the setting is correct, then re-tighten the locking nut. The pawl position should now be correct for all sizes of record.

RECORD DROPPING.

If the changer fails to drop any records other than the 45 r.p.m. type having a large centre hole, first make sure that the records are not badly warped. If they are reasonably flat, the record platform setting should be checked and adjustments made if necessary. Also check the record spindle to see that it is not bent out of position by laying it on the template (diagram 15).

Should records fail to drop correctly when using the large diameter record spindle, replace this spindle with the sloping one and see that it leans towards the record platform and is exactly in line with it. If this spindle is out of position it should be set correctly by loosening the two screws (diagram 10) holding the fixed part of the main spindle in position, turning the record spindle until it leans towards the centre of the record platform and tightening up the screws. After tightening the screws, see that the main spindle has a small amount of end play by first removing the turntable and gripping the main spindle firmly, lift it up and down. If no end play is felt, adjust as described under "Speed variation" on page 7. On fitting the large spindle the records should then drop correctly.

AUTO SWITCH.

When the last record on the record spindle drops on to the turntable, it allows the final switch off arm to move inwards far enough to switch the changer off. When any records are on the spindle, the arm does not move in far enough to allow this to happen. Should the changer fail to stop automatically, check the following points:—

- 1 That the auto switch arm is in vertical position as shown in the illustrations and that its fixing screw is tight.
- 2 See that the split lever holding the spindle underneath the mounting plate is also tight—it is at this point that a slight adjustment may be made to the position of the knock-off lever should it for any reason be forced out of position.
- 3 The auto switch catch lever (diagram 10) has a friction pivot and if this should become very free it may fail to hold the catch pin when it should engage. If this is so, remove the split pin at the catch lever pivot and stretch the friction spring a small amount, replacing the washer and split pin.

TEMPLATE FOR R.C. 80 RECORD SPINDLE.

Should the sloping record spindle be accidentally bent out of position through being dropped or other reasons, the record dropping will be affected. If trouble is experienced with erratic record dropping, lay the record spindle on the template and check that it conforms to the shape thereof.



Template for Record Spindle

Diagram 15



CONTENTS

| Page | |
|----------|---------------------------------------------|
| 1. | Operating instructions |
| 2. | Pickup service, service adjustments |
| 3. | Trouble shooting chart |
| 4, 5. | Theory of operation. |
| 6, 7, 8. | Assembly instructions, parts identification |
| 9. | Mounting board cutout template |
| 10. | Spring and washer identification |
| 11. | Lubrication instructions, parts list |

SPECIFICATIONS

This single-pickup-arm, single-spindle record changer is designed for three-speed operation ($33\frac{1}{3}$, 45 or 78 revolutions per minute) from a power source of 110 volts at 60 cycles. It will play a single record manually, or a series of twelve 7-inch, twelve 10-inch, ten 12-inch, or ten 10-inch and 12-inch records intermixed.

Indexing of the tone arm for different sizes of records is automatically controlled by two feeler levers, making unnecessary the usual manipulation of the record shelf by the operator.

The pickup arm is designed to use a two-position knob-controlled dual stylus pickup. A special spring coupling system makes it impossible for the changer mechanism to be jammed or damaged by accidentally moving the pickup arm during the change cycle.

45 RPM records are adapted to the single spindle of this changer by inserting a bushing in the large center hole of each record.

Advantages of the spindle-type record shelf include: simplicity of changer mechanism, ease of operation, freedom from chipped records, and ability to change slightly warped records.

The changer shuts itself off after the last record is played.

OPERATING INSTRUCTIONS

LEVELING RECORD CHANGER

It is important to have the record changer absolutely level. Use a torpedo or similar type level on the record changer base plate. Use adequate shims under the radio combination cabinet to achieve perfect level.

LOADING RECORDS ON CHANGER

Pull straight up on the record balance arm until the arm clears the spindle. Swing the arm to the left until the pin in its shaft drops into the locating groove.

Gently lower records over the spindle until they rest on the off-set shelf. While holding the records level, lower the balance arm over the spindle to hold the records in place.

NOTE: Records requiring different speeds cannot be intermixed. When using 45 RPM records, each record must have a record adapter shim pressed into the large hole to permit their use on the small standard-sized spindle.

BEFORE PLAYING RECORDS make certain that the speed control knob is set at the proper speed for the records to be played, and that the small stylus selector knob on the pickup arm points to the same number as indicated on the speed control knob.

REJECTING: To reject a record at any time while the changer is operating, turn the changer control knob to "REJ" and release.

STOPPING: To turn the changer off before automatic shut-off, turn the changer control knob to "OFF." Lift the pickup arm and place on its rest.

UNLOADING: Lift the record balance arm and swing it to the left until the small pin on the shaft drops into the locating groove. Lift the stack of records straight up and off the spindle.

MANUAL OPERATION: To play single records or home recordings, allow the changer to go through its complete shut-off cycle. Lift the record balance arm and move it to the left to its locating groove. Place the record on the spindle and lower it to the spindle shelf. Tilt the record down toward the back end of the pickup arm while gently pulling it toward the record balance arm shaft, releasing the record support and allowing the record to be lowered to the turntable. Turn the changer control knob to the "ON" position *only*. Raise the pickup arm and place the stylus in the 1st groove of the record. To stop, place the pickup arm on its rest and turn the changer control knob to "OFF."

TO REPEAT RECORDS: Swing the record balance arm clear of the spindle, place a record on the turntable and start the changer. The record will be repeated until the control knob is turned off. If a 12-inch record is to be repeated, provide some means such as a rubber band to hold the 12-inch feeler lever against the pickup arm support post, otherwise the pickup will index as for a 10-inch record.

OPERATING PRECAUTIONS

1. Do not, under any circumstances, connect the motor to a source of direct current or to alternating current other than 110 volts at 60 cycles.

2. Do not allow oil or grease to come in contact with the rubber drive wheels (or belts) of the motor assembly.

3. Do not intermix records of different speed requirements.

4. Do not attempt to play records with other than the proper stylus or turntable speed.

5. Do not allow records to remain unplayed on the changer spindle since they will be warped and ruined. Store records flat, in a cool place. Dust on records spoils tone, and leads to short record and stylus life.

6. Take extra care with micro-groove records—a single scratch can cause the stylus to skip across a large portion of the record: a little dust under the stylus can cause groove jumping and poor tone.

7. Keep a small eyebrow brush handy to remove dust from the stylus after every stack of records for best volume and tone.

8. When not in use, leave the speed control knob between the "78" and "45" positions to relieve pressure on the motor wheel.

9. When playing records manually, do not allow the stylus to be dragged across the record, or "ride" against the top or edge of the turntable. The stylus jeweled point may be broken.

10. Do not play fine records with a broken or badly worn stylus. If tone is poor even after the dust has been removed from the stylus, the stylus may be defective. Further use may ruin records.

PICKUP CARTRIDGE

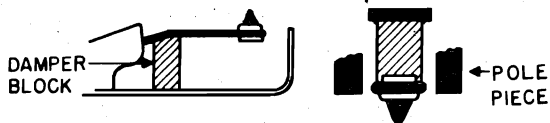
The Model P16 record changer is equipped with a dual stylus variable reluctance cartridge (G.E. Cat. No. RPX-050). A small knob control permits instant selection of either a .003" or .001" stylus for use on standard or micro-groove records. To change styli, first depress the control knob, and then rotate half a turn in either direction, until the pointer points to the number on the pickup arm corresponding to the speed of the records to be played. When the knob is released, the stylus assembly should spring back into its operating position.

MODEL P16

TO CHECK STYLUS

Dust on and around the stylus may cause easily corrected complaints. A soft bristled brush, such as G.E. Cat. No. RQB-001, should be used to clean these parts. A few of these brushes in the home service kit make friendly gifts, may save a service call, and enhance the customer's record enjoyment.

The small rubber-like damper block may become loose at one end, causing distortion. A tiny drop of thin nail polish may be used to re-cement the damper block. Do not allow the whole block to become coated with the cement.



Stylus should ride equidistant between the pole pieces, with only the stylus tip protruding down below the poles. Low pickup output is sometimes traced to a stylus lever bent down below the field of the poles. Normally, a slight extra pressure on the pickup arm causes the stylus to be forced up between the poles, which then support most of the pressure, protecting the stylus.

The tiny micro-groove stylus may be easily broken, causing distortion, groove-jumping, and *rapid record wear*. Such a defect is almost impossible to see with the naked eye, especially since the sharp outline of a break would be worn round by the time the serviceman was called. A jeweler's eyeglass, known as a loupe, is very useful when inspecting styli and damper blocks.



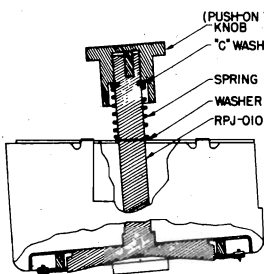
Early stylus wear, though distinguishable by the ear, is almost impossible to determine by sight, unless a high-powered microscope is used. For this reason the listening test for stylus wear is recommended: if a new stylus sounds better, the old one must be defective. Use almost new records with critical high frequency passages for listening tests.

It is suggested that whenever the changer is not in use the larger standard stylus be left in the playing position since the tiny micro-groove stylus is much more easily damaged in case of accidental shock.

TO REPLACE STYLI

To remove the styli assembly for replacement, first pull off the control knob; remove the two cartridge mounting screws; slip off the two wire connectors, and remove the cartridge from the pickup arm. Depress the small spring on the stylus control shaft to remove the "C" washer, followed by the spring and flat washer.

When reassembling, the two wires may be connected to either terminal of the pickup. Note that the knob is keyed to fit on the shaft only one way.



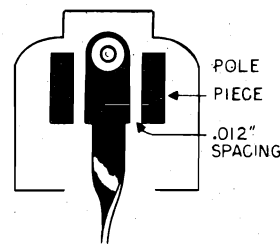
- RKP-009 SERVICE KIT—Contains knob, "C" washer, spring, and flat washer
- RPJ-010 REPLACEABLE STYLI ASSEMBLY—With .003 and .001 inch sapphire styli
- RPJ-011 REPLACEABLE STYLI ASSEMBLY—With .001 and .0025-inch diamond styli

SCRATCH, SURFACE NOISE

Scratch can be reduced by connecting a 15,000 ohm resistor across the pickup leads, either at the amplifier, or under the changer. Lower values of resistors will increase the effect. This procedure reduces the high frequency response of the phonograph, and may be noticed by a lack of "brilliance" in classical music if the resistor value is not carefully chosen to suit the customer.

TO CHECK PICKUP

The pickup coil should measure about 340 ohms. Output measured with a vacuum-tube voltmeter and a Columbia 10003M Standard Test Record should be about .01 volts at 1000 cycles. Distortion originating at the pickup other than by worn or broken styli is usually due to improper spacing of the pole pieces, or bits of dust, especially iron filings, accumulating between the stylus and the pole pieces. Pole pieces should be parallel to each other, and .012 inches from the stylus. Increasing this clearance lowers the voltage output, but tends to lessen distortion and scratch pickup. Though decreasing the clearance increases the output, the stylus becomes more easily clogged with dust, and there is danger that the stylus may actually touch the pole pieces causing unpardonable distortion.



SERVICE ADJUSTMENTS

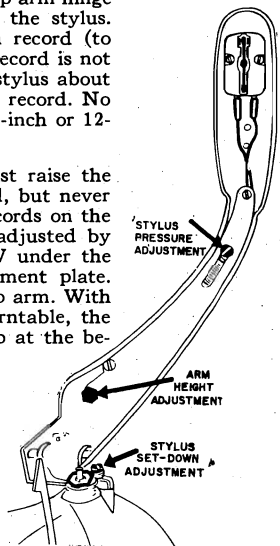
STYLUS SET-DOWN

A small screw on the top of the pickup arm hinge post adjusts the set-down position of the stylus. Make adjustment with a new 10-inch record (to make sure that the center hole in the record is not enlarged). The ideal setting drops the stylus about in the center of the lead-in area of the record. No other adjustment is necessary for the 7-inch or 12-inch records.

PICKUP ARM HEIGHT: The pickup arm must raise the pickup enough to clear the 12th record, but never so high that it strikes the unplayed records on the record spindle. The pickup height is adjusted by turning the hex-headed LIFT SCREW under the pickup arm at the end of the adjustment plate. Screwing it up and in lowers the pickup arm. With a 1 1/8 inch stack of records on the turntable, the pickup should raise 1/4 inch straight up at the beginning of the change cycle.

STYLUS PRESSURE

The stylus pressure should be between 6 and 8 grams. Adjustment may be made by loosening the small round-headed screw which moves in a slot on the adjustment plate under the pickup arm. Moving the screw toward the pickup reduces the stylus pressure. Too little pressure may cause groove-jumping or failure to trip; too much pressure causes excessive record and stylus wear.



NOTE: Before increasing stylus pressure to remedy groove-jumping check:

- For dirt under stylus
- For worn or broken stylus
- Damaged micro-groove records
- That mounting bolts have been removed allowing the changer to float on its mounting springs. This prevents room vibrations from jarring the stylus out of the record groove.
- That the radio and changer are approximately level. Check with a spirit level.

TROUBLESHOOTING

Rather than attempt to itemize the numerous bent levers and stuck bearings and the resulting symptoms that may possibly occur during the life of a record changer, this manual intends to explain the operating principles and purpose of the special parts in the belief that a serviceman who understands *how* it is supposed to work can more easily figure out *why* it does not operate.

The following is a brief review of complaints common to many record changers, with suggested causes and remedies.

Many intermittent complaints are caused by irregular records. Another cause is over-oiling; small levers requiring very light pressures become stiff with oil, and the dust accumulated by the oil, and should never be oiled. Gasoline or kerosene should never be used for cleaning changer parts because of possible damage to rubber parts. Use carbon tetrachloride in a *well-ventilated room*.

| SYMPTOM | CAUSE | REMEDY |
|---------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Too slow, stalls | Dirt or oil on motor pulleys and turntable rim | Clean with carbon tetrachloride |
| | Speed pulley unsnapped from retaining ring | Snap back in place |
| | Large idler wheel mounting bent, idler tire not making firm contact with pulley | Straighten mounting |
| | Voltage too low | Check line voltage, should be at least 105 |
| | Changer too cold | Test changer at room temperature, 70 deg. |
| | New oil or grease too heavy | Use only light oil and grease. MANY POINTS MUST HAVE NO OIL. See page 2 for lubrication instructions |
| Noises: Wow | Oil on pulleys causing slippage | Clean with carbon tetrachloride |
| | Warped records | Use flat records for testing |
| Click | Trip lever friction assembly too stiff | Clean, adjust spring by bending for minimum friction required to move pawl lever |
| Rumble, roar | Changer not floating on mounting springs | Loosen mounting bolts under turntable |
| Thumping | Dent in rubber tire on idler wheel, caused by storing changer in 33-45 RPM position or allowing motor to run when changer is stalled. | May disappear after running the changer a few minutes; otherwise replace the idler wheel. To prevent reoccurrence, leave speed control knob between "78" and "45" when not in use |
| Dead motor or pickup | Open circuit | Both circuits are simple series type and can be easily checked with an ohmmeter. Pickup—340 ohms; Motor—15 ohms (approx.) |
| Poor tone, Jumps grooves | Broken or dirty stylus Stylus pressure too light | See page 2 for stylus and pickup information |
| | Pickup arm bearings stiff | Remove all grease, burrs |
| | Substandard records | Check for scratches, shallow grooves |
| | Changer not level or not floating on springs | Level changer; loosen mounting bolts |
| Doesn't drop records | Spindle mechanism bent or dirty Record holes too small | Repair or replace spindle (see page 8) Check records |
| Drops two records | Record holes too big Record guide in spindle may be stuck | Use other records Record guide must drop freely by gravity |
| Fails to cycle, or cycles too soon | Check trip link, trip lever, pawl lever and trip pawl for easy operation. Check spring friction coupling between trip lever and pawl lever | Straighten bent trip link; wash off main gear levers; DO NOT OIL. |
| Pickup arm indexes O.K. for one size record only | Reset lever or 7 inch feeler lever dirty, or their springs interchanged when reassembled; 12 inch lever bent, or spring missing. | Spring under reset lever is lightest of all; 7 inch feeler spring is same tension as auto. shutoff lever assm. See page 5. |

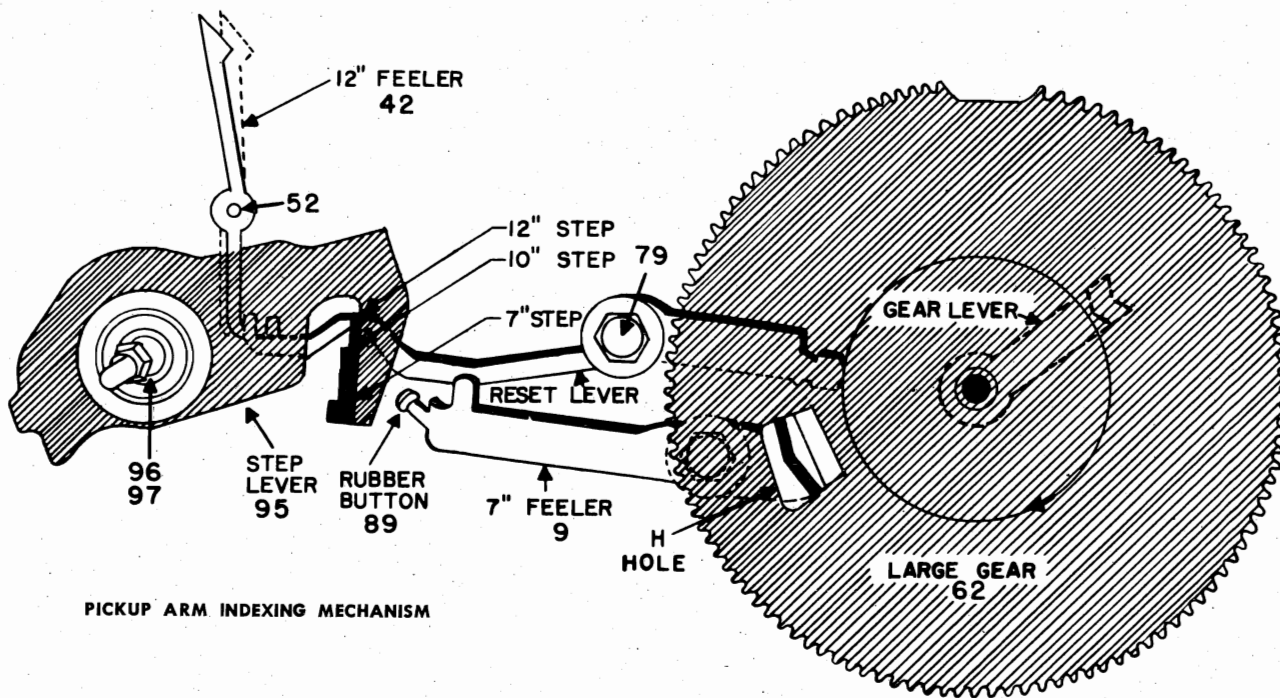
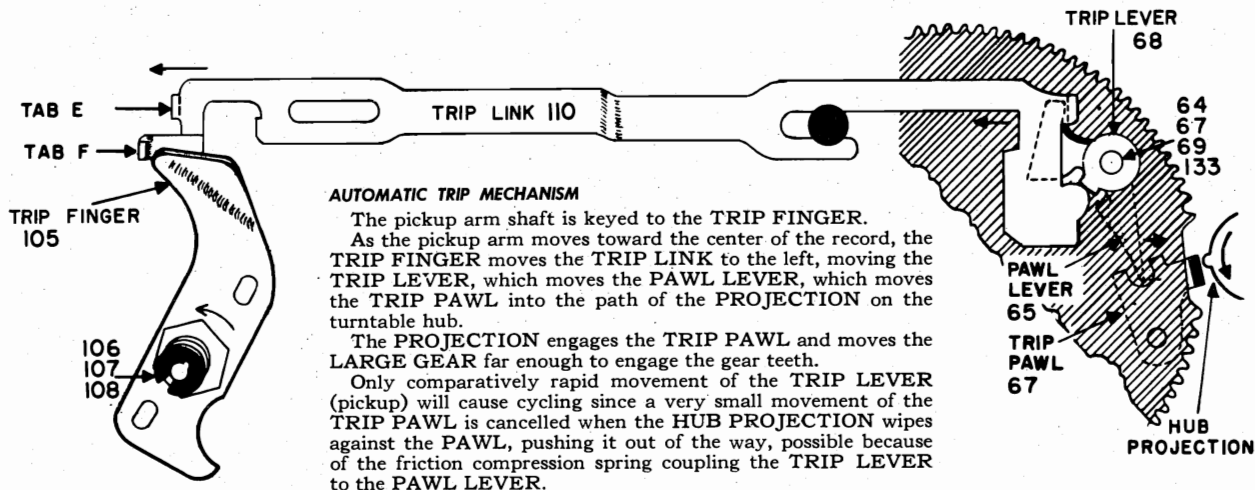
MODEL P16

THEORY OF OPERATION

STARTING CHANGER:

When the control knob is turned to the REJ position, the manual shut-off rod moves the switch operating lever, which engages TAB E of the TRIP LINK.

The TRIP LINK moves the TRIP LEVER, which moves the PAWL LEVER, which moves the TRIP PAWL into the path of the PROJECTION on the turntable hub. The PROJECTION engages the TRIP PAWL and moves the LARGE GEAR far enough to engage the gear teeth with the turntable hub gear.



PICKUP ARM INDEXING SEQUENCE

The RESET LEVER is a limit stop for the STEP LEVER, the position of which determines where the pickup arm sets down after a change cycle.

The GEAR LEVER depresses the RESET LEVER, cancelling all previous indexing information. (This is done mid-cycle, as soon as the pickup arm reaches the extreme right-hand position.)

As each 12-inch record falls it displaces the 12-inch FEELER, which unlatches the RESET LEVER, allowing a spring to move the RESET LEVER to its 12-inch position. The position of the RESET LEVER determines which step the STEP LEVER will stop against.

As LARGE GEAR continues to rotate, the 7-inch FEELER is allowed to drop into HOLE H, forcing the RUBBER BUTTON upward toward a record; if it touches a 10-inch or 12-inch record its movement is limited—and nothing happens. If a 7-inch record is on the turntable, RUBBER BUTTON cannot stop the 7-inch FEELER from depressing the RESET LEVER enough to engage the STEP LEVER at the 7-inch step.

Since neither the 12-inch FEELER nor the 7-inch FEELER operate when a 10-inch record falls to the turntable, the RESET LEVER remains in the neutral 10-inch step position.

PICKUP ARM MOVEMENT

As the forked lever begins to move, the inclined surface on the end near the switch pushes the lift pin upward, raising the pickup arm clear of the record. As soon as the pickup arm is fully raised, the tab on the side of the forked lever contacts the trip finger, swinging the pickup arm clear of the turntable. The tab also contacts the step lever moving it clear of the reset lever.

As the lift pin is pushed upward, the conical spring is compressed, overcoming the pressure of the spring washer separating the step lever and the trip finger, and forcing them together. The detents in the trip finger drop into the matching holes in the step lever locking the two together so that the step lever can control the pickup arm until the stylus is properly placed on the next record.

As soon as the stylus is placed in the lead-in groove of the record, the rapidly decreasing conical spring tension is overcome by the spring washer, which unlocks the trip finger from the step lever, thereby allowing the pickup arm to be guided by the stylus in the record groove.

CHANGING RECORDS

As the LARGE GEAR rotates, the ROLLER moves the FORKED LEVER toward the ON-OFF switch.

Near the end of its travel, the FORKED LEVER engages the EJECTOR LINK, which forces the PUSH ROD up inside of the record support spindle.

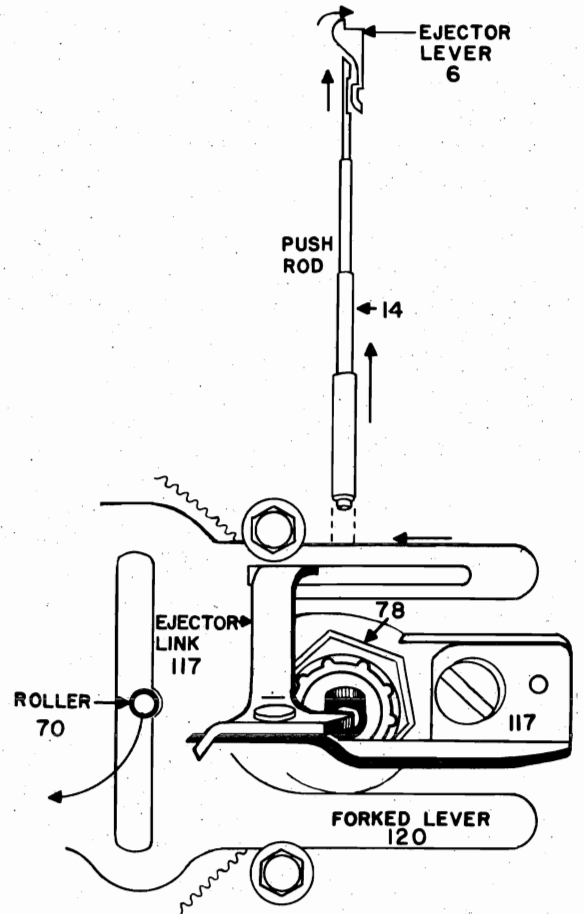
The PUSH ROD forces the record EJECTOR LEVER up and over, forcing the record off the record support ledge of the spindle.

AUTOMATIC SHUTOFF SEQUENCE

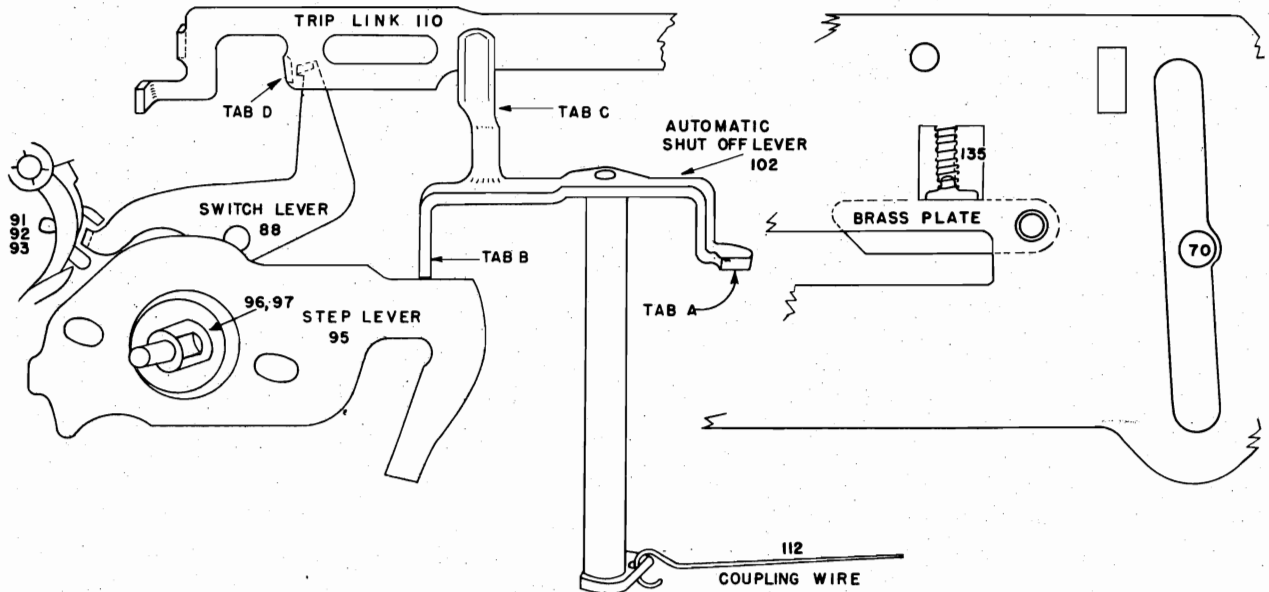
After the last record falls to the turntable, the record balance arm drops, operating a lever which pulls on the COUPLING WIRE which operates the AUTOMATIC SHUTOFF LEVER. At this instant the STEP LEVER and TRIP LINK are in a position to stop the changer . . . but are prevented from doing so by TAB A which strikes the BRASS PLATE, thereby limiting the movement of the AUTOMATIC SHUTOFF LEVER until after the record has been played and the next cycle completed.

On the shutoff cycle TAB B moves up to stop the STEP LEVER, which locates the tone arm in its rest position.

TAB C pushes up on the TRIP LINK allowing TAB D of the TRIP LINK to engage the SWITCH LEVER which operates the ON-OFF switch.



RECORD CHANGING MECHANISM



AUTOMATIC SHUTOFF MECHANISM

MODEL P16

ASSEMBLY INSTRUCTIONS—PARTS IDENTIFICATION

80,104

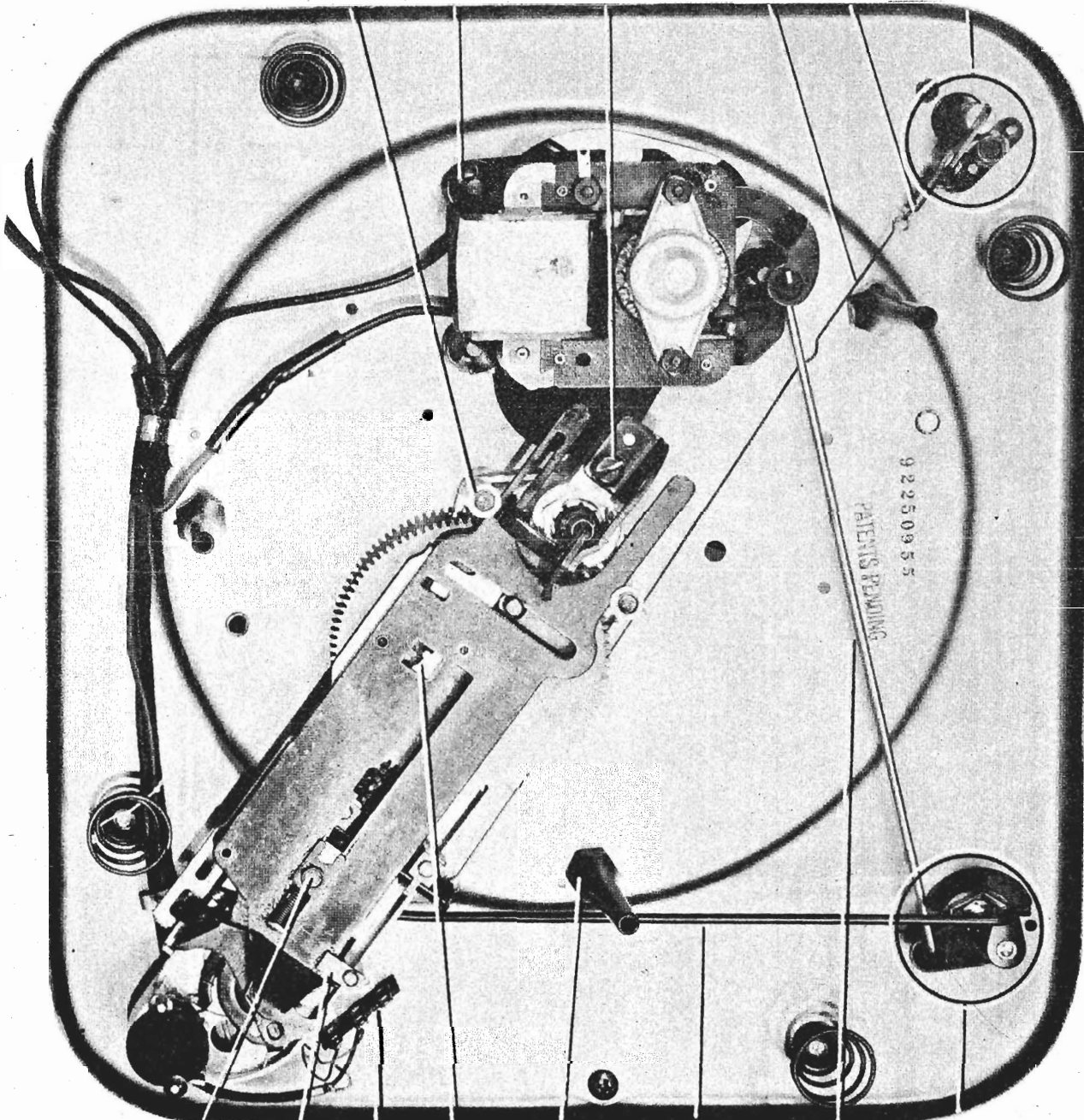
76

44,117

112

115

*1, 132, 61
113, 114



121, 122
129

104
134

79, 86

135

60

53

77

*50, 123, 125,
126, 77, 124,

*Series of
items listed in
order assembled.

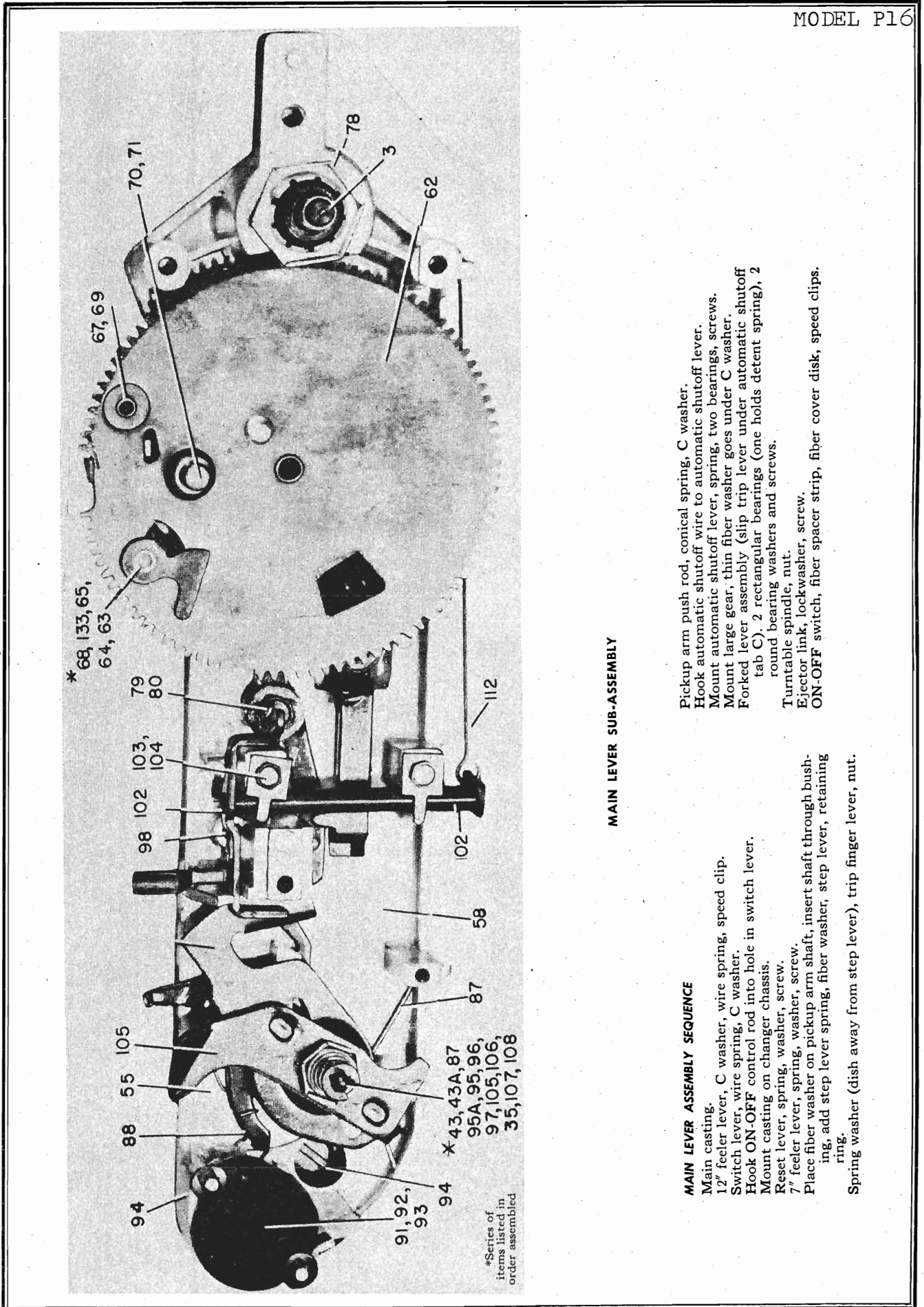
49, 128, 53,
127, 48, 47, 46

UNDER-CHASSIS VIEW COMPLETE

CONTROL KNOB SHAFT ASSEMBLY SEQUENCE

Control knob shaft bearing, PAL nut
Speed control shaft, rubber grommet, speed control rod, spring washer (dish away from bearing). Mount shaft through bearing, add C washer to hold shaft in place

Connect ON-OFF shaft to manual shut-off rod, mount compression spring on shaft, slip ON-OFF shaft thru speed control shaft, mount speed control knob, C washer and ON-OFF knob.



* 68, 133, 65,
64, 63

* 43, 43A, 87
95A, 95, 96,
97, 105, 106,
35, 107, 108

*Series of
items listed in
order assembled

MAIN LEVER SUB-ASSEMBLY

MAIN LEVER ASSEMBLY SEQUENCE

- Main casting.
- 12" feeler lever, C washer, wire spring, speed clip.
- Switch lever, wire spring, C washer.
- Hook ON-OFF control rod into hole in switch lever.
- Mount casting on changer chassis.
- Reset lever, spring, washer, screw.
- 7" feeler lever, spring, washer, screw.
- Place fiber washer on pickup arm shaft, insert shaft through bushing, add step lever spring, fiber washer, step lever, retaining ring.
- Spring washer (dish away from step lever), trip finger lever, nut.

- Pickup arm push rod, conical spring, C washer.
- Hook automatic shutoff wire to automatic shutoff lever.
- Mount automatic shutoff lever, spring, two bearings, screws.
- Mount large gear; thin fiber washer goes under C washer.
- Forked lever assembly (slip trip lever under automatic shutoff tab C). 2 rectangular bearings (one holds detent spring), 2 round bearing washers and screws.
- Turntable spindle, nut.
- Ejector link, lockwasher, screw.
- ON-OFF switch, fiber spacer strip, fiber cover disk, speed clips.

MODEL P16

LUBRICATION

Additional lubrication should not be required for the life of the changer, but in cases of unusual use, high temperature or very dusty conditions the changer should be lubricated as follows:

Old grease and dust should be removed with a small brush and plenty of cleaning fluid. Gasoline or kerosene should not be used because of possible damage to rubber parts.

Grease the following points, using Millicott 70K, Andok "B," or other high grade, light-bodied lubricant:

Head of lift screw under tone arm.
Edges of the 3 slots, other 4 support bearing surfaces, step lever cam, and the pickup arm push rod cam of the forked lever.

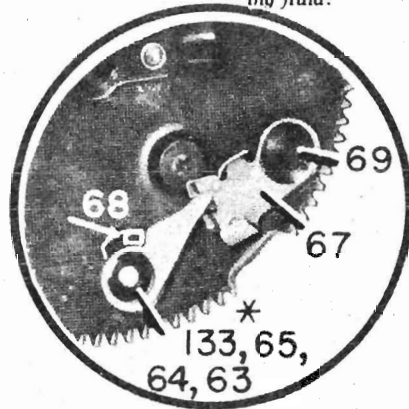
Lower surface of the step lever.
Base of record spindle push rod, turntable ball bearings, bushing and gear.

Apply a small quantity of light mineral oil to:

Tone arm hinge pivots, spindle, push rod.
Step Lever bearing
Ejector link
Large gear shaft, stud roller

Idler wheel and speed-change pulleys. (Remove pulleys to oil their spindles.) Motor can be partly disassembled to washer bearings; allow cleaning fluid to dry before applying a drop of light oil to each bearing.

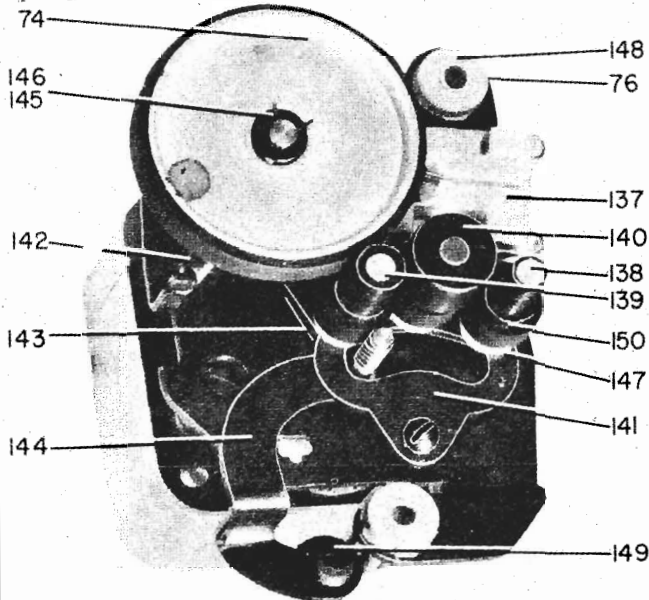
NOTE: Never allow any oil or grease to reach the rubber parts of the drive wheels. The rubber wheels should be cleaned with a cloth moistened with cleaning fluid.



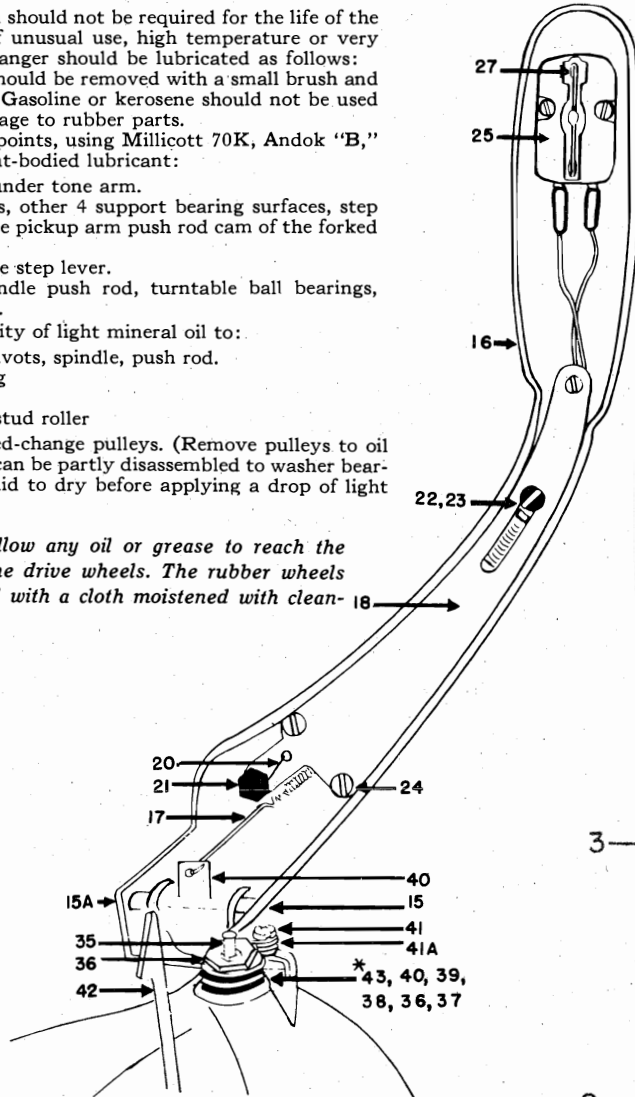
MAIN GEAR LEVERS

PAWL LEVER FRICTION ASSEMBLY SEQUENCE

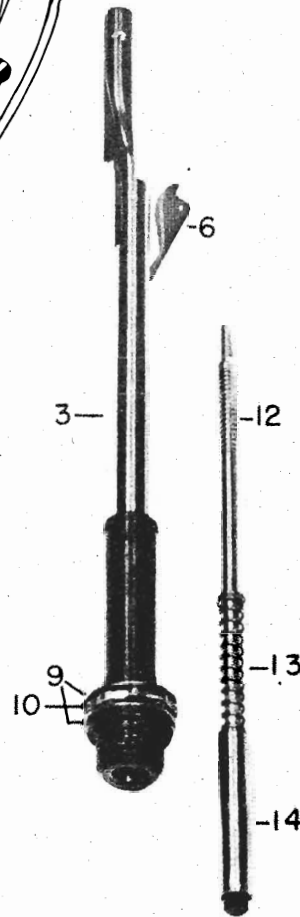
Mount the trip lever on the main gear
Spring, pawl lever
fiber washer, C washer.



MOTOR ASSEMBLY



PICKUP ARM ASSEMBLY



SPINDLE ASSEMBLY

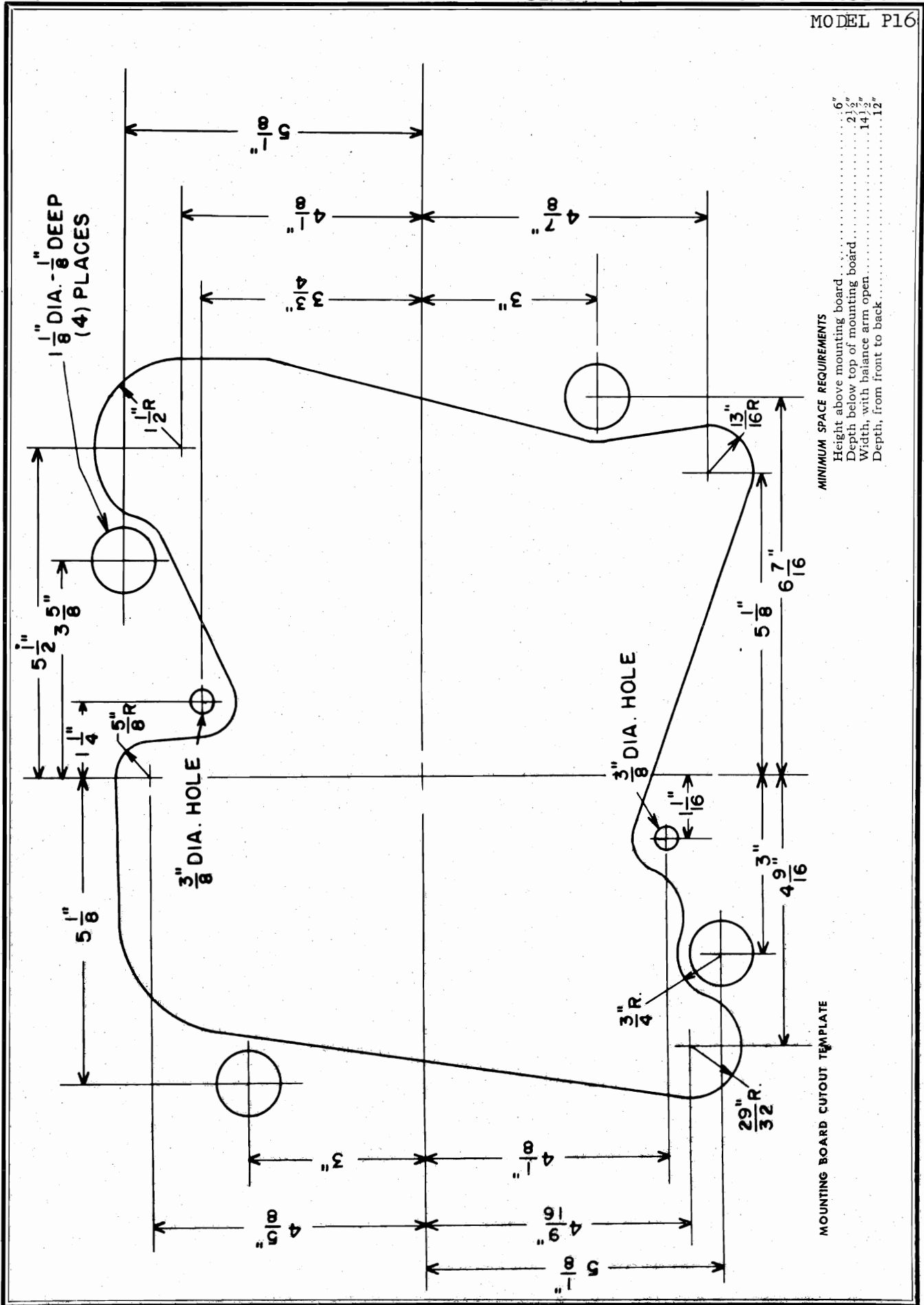
*Series of items listed in order assembled.

TO DISASSEMBLE SPINDLE PUSH-ROD ASSEMBLY

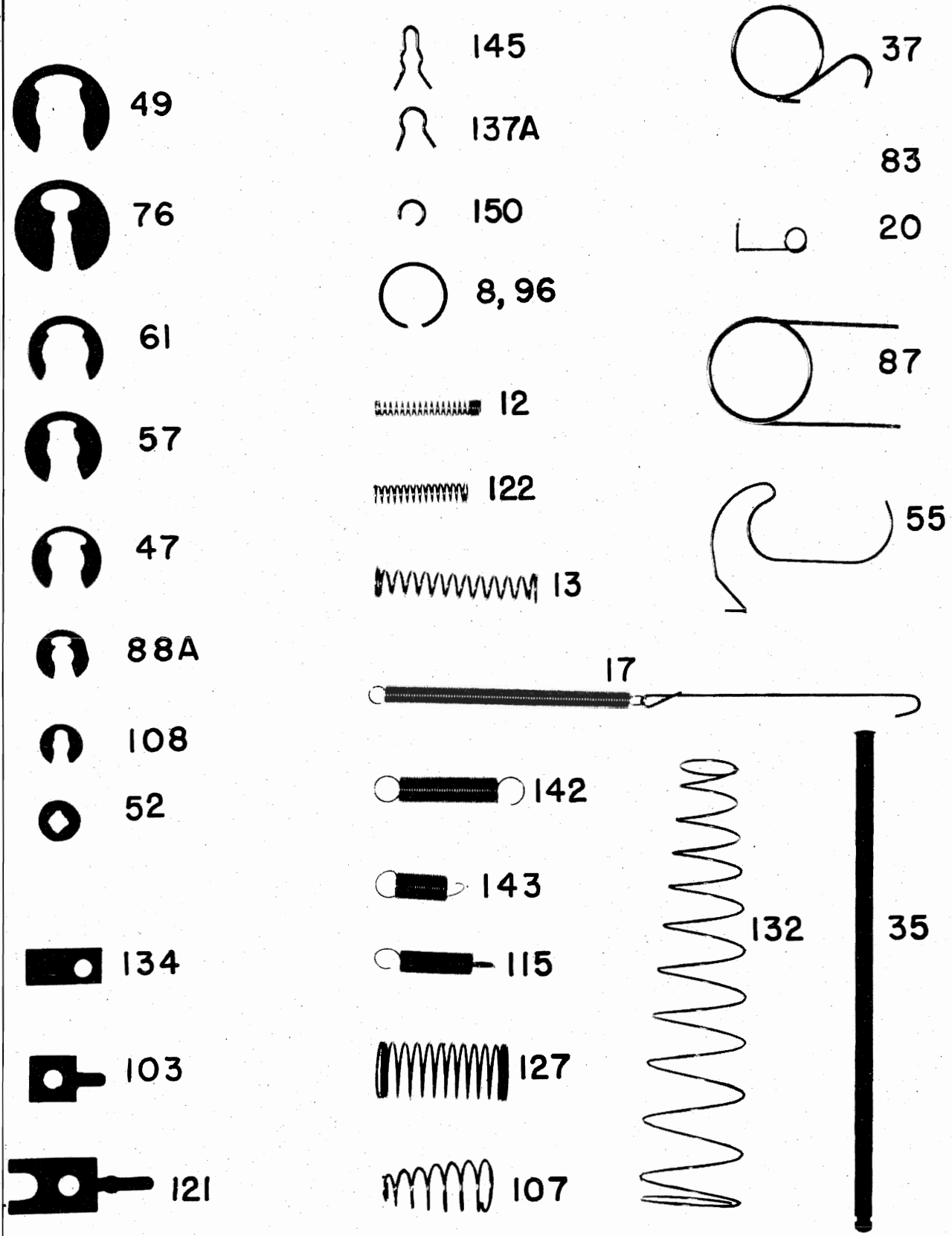
Holding the spindle vertically, press the base of the push rod against the bench until the ejector lever moves up into the spindle body. Press the lever on through with a thumbnail, and at the same time release the downward pressure on the spindle. When the ejector lever pops out, press downward on the spindle again and press the lever downward and out. The push rod and two springs may now be withdrawn from the base of the spindle.

TO ASSEMBLE SPINDLE PUSH-ROD ASSEMBLY

Place both springs on push rod. Insert push rod into spindle with the flattened side of tip facing ejector lever retaining pin. Press spindle downward forcing the push rod in as far as possible. Place ejector lever in the slot resting the end against the top of the spring. Point the lever upward and release the pressure on the spindle, allowing the reject lever to be caught under its retaining pin. Press the spindle downward again pushing the ejector lever into the spindle, snapping it into place.



MODEL P16



The following springs are critical, and their proper installation effects the indexing of the pickup arm. Their length, diameter and number of turns are very similar, making identification difficult. Their most distinguishing feature is their tension, a

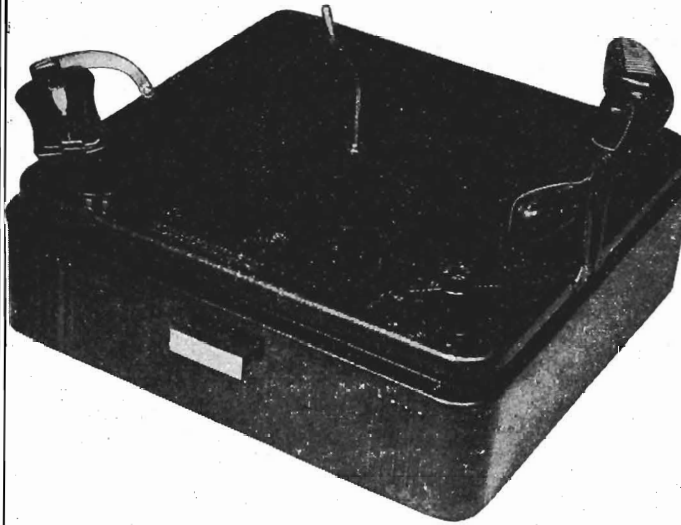
comparison of which is listed below.
 Item 82 for reset lever very light tension RMS-253
 135 escape lever light tension RMS-262
 99 7" feeler lever medium tension RMS-256

SPRING AND WASHER IDENTIFICATION

MODEL P16 RECORD CHANGER
REPLACEMENT PARTS LIST

| Ref. No. | Cat. No. | Description | Ref. No. | Cat. No. | Description | |
|----------|----------|-------------------------------------------------------------------------------------------------------|----------|----------|------------------------------------------------------------------------------------------------------------|--------------------------------|
| 1 | RMX-184 | ARM—Record balance arm assembly, includes: plastic button, record balance arm and support rod | 78 | RHN-022 | NUT—Spindle mounting nut | |
| 2 | RMT-019 | TURNTABLE | 79 | RHS-087 | SCREW—6/32 x 1/4" self tapping screw to mount reset lever, terminal board and forked lever washer bearings | |
| 3 | RMX-185 | SPINDLE—Turntable spindle, less bearings. Includes pusher mechanism inside spindle | 80 | | WASHER—Flat steel washer for mounting reset lever, 7" feeler lever and forked lever, 1/8" I.D. x 3/8" O.D. | |
| 6 | RML-052 | PUSHER—Record push-off lever in spindle | 81 | RML-058 | LEVER—Index reset lever | |
| 8 | RMS-246 | RING—Retaining ring for turntable bearing assembly | 82 | RMS-253 | SPRING—Reset lever spring | |
| 9 | RHW-016 | WASHER—Bearing washer, one needed on each side of turntable ball bearing assembly | 83 | RMS-254 | SPRING—12-inch feeler lever spring | |
| 10 | RMB-020 | BEARING—Ball bearing race | 86 | *UJB-001 | TERMINAL STRIP—3 lug terminal strip | |
| 12 | RMS-247 | SPRING—Small spring inside spindle | 87 | RMS-255 | SPRING—Step lever return spring | |
| 13 | RMS-248 | SPRING—Large spring inside spindle | 88 | RML-059 | LEVER—Switch operating lever | |
| 14 | RMX-186 | SHAFT—Pusher shaft inside spindle | 88-A | RMC-042 | WASHER—"C" washer for mounting switch operating lever | |
| 15 | *RHS-042 | SCREW—Pickup arm hinge pivot adjustment screw | 89 | RMB-026 | RUBBER—Tip of 7-inch feeler lever | |
| 15A | RMB-024 | BEARING—Pickup arm hinge pivot bearing | 90 | RML-060 | LEVER—7-inch feeler lever | |
| 16 | RPA-014 | ARM—Plastic pickup arm only | 91 | RSW-089 | SWITCH—ON-OFF switch | |
| 17 | RMS-249 | SPRING—Pickup arm counterbalance spring | 92 | RRI-063 | INSULATOR—Fiber strip holds ON-OFF switch in place | |
| 18 | RAP-030 | PLATE—Pickup arm adjustment plate (strengthened) | 93 | RRI-064 | INSULATOR—Fiber disk holds ON-OFF switch in place | |
| 20 | RMS-268 | SPRING—Lift screw lock spring | †94 | | NUT—(#720 Tinnerman speed nut) for mounting switch cover | |
| 21 | RHS-090 | SCREW—Hex head lift screw for pickup arm | 95 | RML-061 | LEVER—Step lever, determines pickup arm indexing | |
| †22 | | SCREW—6/32" x 1/2" screw for pickup arm counterbalance adjusting slide | †95A | | WASHER—Fiber washer goes under step lever, 1/4" I.D. x 1/2" O.D. | |
| 23 | RMM-196 | SLIDE—Adjusting slide for pickup arm counterbalance | 96 | RMS-263 | RING—Retaining ring for step lever | |
| †24 | | SCREW—#4 x 1/2" self threading screw for mounting adjustment plate | †97 | RMS-269 | WASHER—Spring washer between trip finger and step lever | |
| 25 | RPX-050 | PICKUP—G. E. reluctance pickup, includes .001" and .003" sapphire styli | 98 | RMS-256 | SPRING—Shut-off lever or 7-inch feeler lever spring | |
| 26 | *RKP-009 | KNOB KIT—Pickup knob kit | 99 | RML-062 | LEVER—Automatic shut-off lever assembly | |
| 27 | *RPJ-010 | STYLI—.001"—.003" sapphire styli assembly | 102 | | | |
| 28 | *RPJ-011 | STYLI—.001"—.003" diamond styli assembly | 103 | *RML-036 | BEARING—Rectangular washer holds automatic shut-off lever | |
| 29 | *RQB-001 | BRUSH—Small brush for cleaning stylus | †104 | | SCREW—4-40 hex-head self tapping screw, for forked lever bearing | |
| 35 | RMU-075 | LIFT PIN—Pickup arm lift pin | 105 | RML-063 | LEVER—Trip finger lever | |
| 36 | RHN-021 | NUT—Holds hinge assembly on pickup arm shaft | 106 | RHN-023 | NUT—PAL nut holds trip finger lever to pickup arm shaft | |
| 37 | RMS-250 | SPRING—Pickup arm safety coupling spring | 107 | RMS-264 | SPRING—Conical lift pin spring | |
| †38 | | WASHER—Lockwasher, 1/4" I.D. x 1/2" O.D. | 108, | *RHC-033 | WASHER—"C" washer for 12-inch feeler lever, pickup arm lift pin and trip link | |
| 39 | RAP-025 | SAFETY PLATE—Washer-like member couples spring #37 to pickup arm shaft #43 | 109 | | LEVER—Trip link lever on forked lever | |
| 40 | RMX-187 | HINGE—Pickup arm hinge and pin | 110 | RML-064 | RHR-014 | RIVET—Trip link mounting rivet |
| 41 | RHS-086 | SCREW—Eccentric setdown adjusting screw on pickup arm hinge | 111 | RML-065 | WIRE—Automatic shut-off lever control link wire | |
| †41A | | NUT—#720 Tinnerman speed nut for mounting eccentric screw | 112 | | | |
| 42 | RML-053 | LEVER—12 inch feeler lever | 113 | RMX-189 | BRACKET—Shut-off bracket | |
| 43 | RMU-076 | SHAFT—Pickup arm pivot shaft | †114 | | SCREW—6 x 5/16" self tapping screw for mounting shut-off bracket | |
| †43A | | WASHER—Fiber washer goes on top of pickup arm pivot sleeve under shaft shoulder 1/4" I.D. x 1/2" O.D. | 115 | RMS-257 | SPRING—Shut-off spring couples shut-off bracket to control wire | |
| †44 | | SCREW—10-24 x 3/8" screw with lockwasher for mounting main casting and ejector link | 117 | RMX-190 | LINK—Ejector link operates spindle mechanism | |
| 45 | RHX-018 | POST—Plastic tone arm rest post | †118 | | WASHER—Lockwasher, holds pickup arm hinge to spindle 1/4" I.D. x 1/2" O.D. | |
| 46 | RDK-255 | KNOB—Brown plastic OFF-ON-REJ. control knob | †119 | | BRACE—Angle iron brace strengthens main frames 1/2" x 3/8" x 8" long | |
| 47 | *RMC-046 | WASHER—"C" washer under OFF-ON-REJ knob | 120 | RAP-027 | FORKED LEVER—(Slide and cam assembly) large forked sliding plate, less trip link | |
| 48 | RDK-256 | KNOB—Brown plastic 33-78-45 speed control knob | 121 | RAP-028 | SLIDE BEARING—Rectangular washer with extension to hold detent spring, supports forked lever | |
| 49 | RHC-050 | WASHER—"C" washer under speed control knob | 122 | RMS-258 | SPRING—Forked lever detent spring | |
| 50 | RMB-027 | BEARING—Control knob shaft bearing | 123 | RHN-024 | NUT—Knob shaft bearing mounting nut | |
| 52 | *RHC-033 | WASHER—"C" washer for 12 inch feeler lever, pickup arm lift pin and trip link | 124 | RHW-031 | WASHER—Spring washer goes under speed knob control shaft | |
| 53 | RML-054 | ROD—Manual shut-off rod | 125 | RMX-191 | SHAFT—33-78-45 knob shaft | |
| 55 | RMS-252 | SPRING—Switch lever spring | 126 | *RHG-027 | GROMMET—Rubber grommet for speed control rod | |
| †56 | | WASHER—Fiber washer, goes under main gear mounting "C" washer, 1/4" I.D. x 1/2" O.D. | 127 | RMS-259 | SPRING—Compression spring between control shafts | |
| 57 | *RHC-027 | WASHER—"C" washer holds main gear in frame | 128 | RMU-077 | SHAFT—OFF-ON-REJ. knob shaft | |
| 58 | RAP-026 | FRAME—Main lever assembly frame | †129 | | SCREW—6/32" x 1/2" screw holds forked lever detent spring "bearing" | |
| 60 | RHF-013 | FOOT—Plastic support foot | †130 | | NUT—(#720 Tinnerman speed nut) for mounting shut-off lever bearings | |
| 61 | *RHC-028 | WASHER—"C" washer holds spring under record balance rod | 132 | RMS-260 | SPRING—Record balance arm holddown spring | |
| 62 | RMX-188 | GEAR—Main gear assembly, complete | 133 | RMS-261 | SPRING—Trip lever friction spring on main gear | |
| 63 | RHC-033 | WASHER—"C" washer for trip lever on main gear | 134 | RAP-029 | BEARING—Rectangular washer supports forked lever | |
| †64 | | WASHER—Fiber washer goes under trip lever "C" washer, 1/4" I.D. x 3/8" O.D. | 135 | RMS-262 | SPRING—Escape lever spring on forked lever | |
| 65 | RML-055 | LEVER—Pawl lever on main gear | 136 | *RJP-003 | PLUG—AC plug for motor | |
| 67 | RMM-186 | PAWL—Trip pawl on main gear | 137 | *RMA-008 | ARM—Motor idler wheel arm | |
| 68 | RML-056 | LEVER—Trip lever on main gear | 137-A | RHC-009 | HAIRPIN CLIP—For idler arm | |
| 69 | RHR-016 | RIVET—Trip pawl mounting rivet | 138 | *RMW-061 | PULLEY—Low speed pulley, 33 1/3 rpm | |
| 70 | RMB-025 | ROLLER—Main gear detent roller | 139 | *RMW-062 | PULLEY—Medium speed pulley, 45 rpm | |
| 71 | RHR-015 | RIVET—Detent roller mounting rivet | 140 | *RMW-063 | PULLEY—High speed pulley, 78 rpm | |
| 74 | *RMW-060 | WHEEL—Motor idler wheel | 141 | *RMA-009 | ARM—Speed pulley mounting arm | |
| 75 | *RBH-014 | MOTOR—General Industries 3-speed turntable motor, complete | 142 | *RMS-205 | SPRING—Idler wheel tension spring | |
| 76 | *RHC-029 | WASHER—"C" washer for mounting motor | 143 | *RMS-211 | SPRING—Pulley arm tension spring | |
| 77 | RML-057 | ROD—Motor speed control rod | 144 | *RMA-010 | ARM—Motor speed control arm | |
| | | | 145 | *RHC-009 | HAIRPIN CLIP—For idler wheel | |
| | | | †146 | | WASHER—Fiber washer for (1/4" I.D. x 1/2" O.D.) idler wheel | |
| | | | †147 | | WASHER—Felt washer for (1/4" I.D. x 1/2" O.D., 1/16") thick speed pulleys | |
| | | | 148 | *RHG-026 | GROMMET—Motor mounting grommet | |
| | | | 149 | *RHG-027 | GROMMET—Speed control arm grommet | |
| | | | 150 | *RMS-218 | RING—Retaining ring for speed pulley | |

*Parts used on previous models. †Common hardware items not stocked by G.E.



TPO-1843

INTRODUCTION

This de luxe record changer is designed to automatically play 78, 45, or 33-1/3 r. p. m. records of 7", 10", or 12" size. The changer will play twelve 7", twelve 10", or ten 12" records at one loading. It operates from a 105-125 volt, 60-cycle a-c supply. If operation is desired on a 50-cycle supply, the 50-60 cycle motor, Part No. 35-1462, must be used, with the springs supplied in the conversion kit, Part No. 40-7848.

The time interval between the last note of one record and the first note of the next one is shortened by the use of a velocity trip. The possibility of damaging the changer by holding the tone arm during a change cycle is prevented by spring-loading all actuating levers.

The controls are conveniently grouped near the front of the changer. All knobs are concentrically mounted in the front right-hand corner. The tone-arm head is immediately behind the control knobs, and the record shelf is in the front left-hand corner.

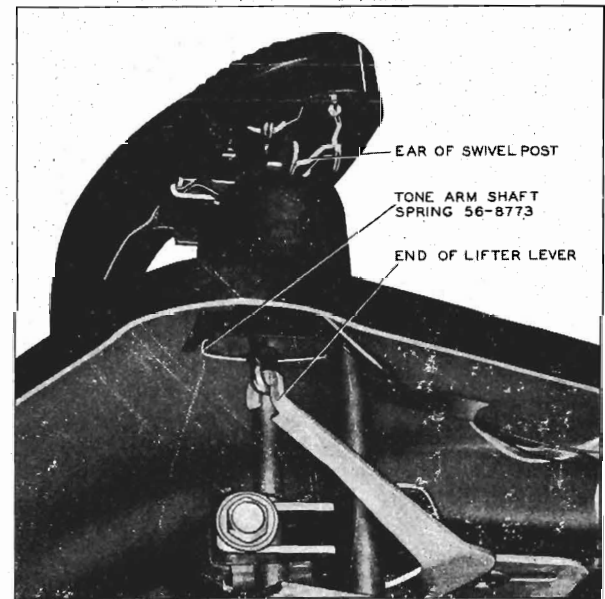
The tone arm set-down indexing is simplified by eliminating feelers and establishing the set-down by means of the record-shelf position. The nodding spindle, rather than a complicated system of levers and blades, accomplishes the record dropping. Most of the working parts are mounted on a bridge sub-assembly, a feature which makes the parts easily accessible for servicing.



DESCRIPTION OF OPERATIONAL CYCLE

At the completion of a record, the changer trips, and allows the dog latch to engage the spur of the turntable hub gear. This rotates the cam gear, allowing the teeth of the cam gear and hub gear to

engage. As the cam rotates, it forces the lifter lever down, raising the tone arm from the record. As the tone arm reaches maximum height, the tone-arm actuator, motivated by the cam gear, contacts the trip-arm stud and swings the tone arm against the rest post. After the tone arm reaches the rest post, the push-off lever rotates, nodding the spindle and dropping the next record onto the turntable. After the record has dropped, the return lever contacts the stud of the trip arm, and starts the tone arm inward. The tone arm is now controlled by the actuator and return levers, in contact with the stud of the trip arm. The return lever continues swinging the tone arm inward until it is stopped by the set-down lever, whose position is dependent upon the setting of the record shelf. This stoppage of the inward travel of the tone arm by the established position of the return lever accomplishes the set-down indexing. The tone arm is thus held above the set-down point. The lifter lever now moves upward, slowly dropping the tone arm to the record surface. As the cam gear continues to rotate, the actuator lever is moved outward and away from the trip-arm stud. The tone-arm return lever then moves away from the trip-arm stud, but the spring portion of the actuator momentarily remains in contact with the stud, eliminating a sudden release of control of the tone arm, and preventing the needle from jumping into the modulated grooves. The trip-



TPO-1831

Figure 1. Tone-Arm Height and Lift Adjustments and Vertical Timing Adjustment

plate supporting finger now engages the dog latch, and the index lever locks the cam gear in a neutral position. The tone arm is now free to play the record.

As the tone-arm advances toward the spindle, the friction-clutch trip finger engages the end of the trip plate. Through the applied pressure of the friction finger (approximately 2 grams) against the trip plate, the trip-plate finger supporting the dog latch begins to move, lessening the engagement of the trip-plate finger and dog latch, preparatory to releasing the latch. This engagement is slowly lessened while the needle is in the playing grooves, giving the reset cam an opportunity (once each revolution of the turn-

MODEL M-22

table) to reset the trip plate into full engagement and slip the friction finger in the friction clutch. As the needle rides in the lead-out or eccentric groove of the record, the velocity of the friction finger is increased. The speed of the disengagement of the trip-plate supporting finger and the dog latch is also increased sufficiently to allow complete disengagement of the dog latch before it has been restored by the reset cam.



ADJUSTMENTS

SPINDLE ADJUSTMENT

The spindle should be checked for perpendicularity (use square on turntable surface) when the changer is out of cycle. To adjust, bend the ear on the push-off-lever assembly; bending the lever toward the spindle spring throws the top of the spindle away from the record shelf. This is shown in figures 3 and 6.

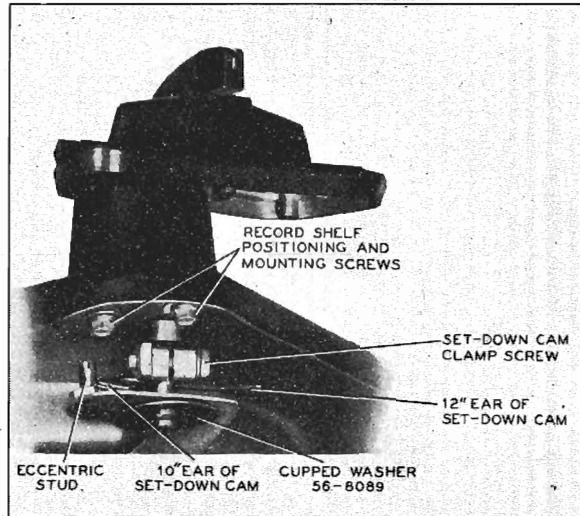


Figure 2. Record-Shelf Adjustment and 10", 12", and Fine Set-down

TPO-1839

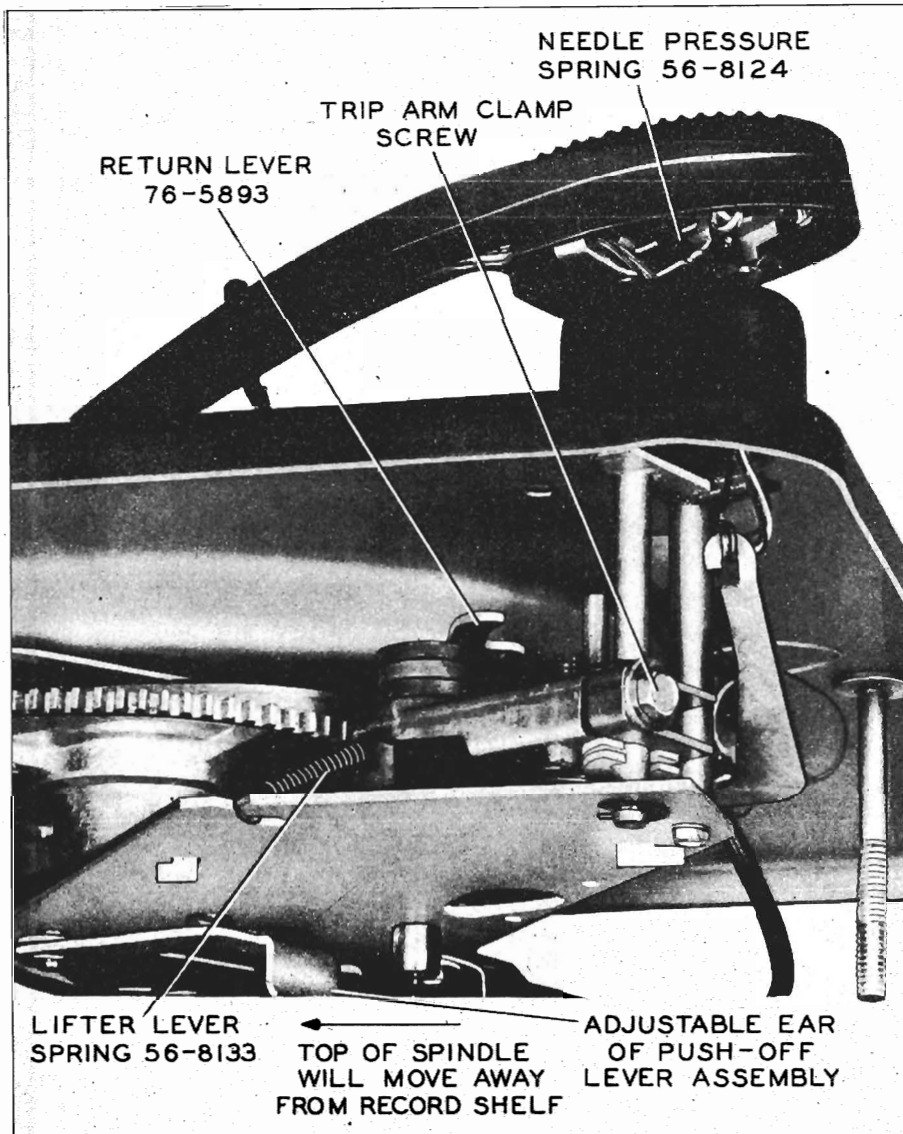
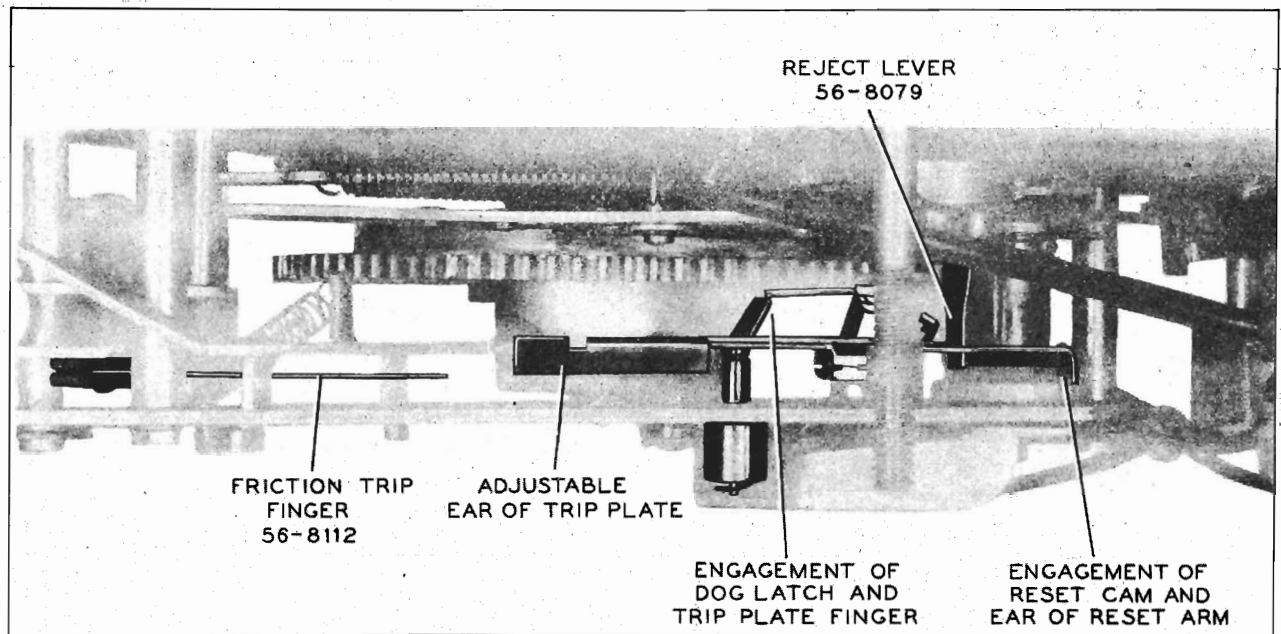


Figure 3. Adjustment of Trip Arm for 7" Set-down

TPO-1845



TPO-1841

Figure 4. Trip Adjustment

RECORD SHELF

CAUTION: This adjustment must be made immediately after a change cycle is completed.

With the changer set for manual operation, place a record-shelf gauge, Part No. 45-6647, on the record shelf. The edge of the gauge should fit snugly against the edge of the raised portion of the shelf, without flexing the spindle.

If the gauge does not fit properly, loosen the two saddle mounting screws holding the record shelf to the base plate (figure 2), and adjust the position of the record shelf. Then tighten the screws.

TONE-ARM HEIGHT AND LIFT

With the changer out of cycle, and the tone arm over the base plate, the needle point should be $1/8'' \pm 1/16''$ above the base plate. To adjust the clearance, bend the protruding ear of the swivel post, at the rear of the tone-arm heel. See figure 1. Bending the ear upward decreases the clearance, downward increases the clearance. Raise the tone arm to its maximum height, and place it against the rest post. There should be approximately $3/32''$ clearance between the lower edge of the tone arm and the top of the rest-post hook. Bend the ear of the swivel to obtain the most satisfactory adjustment of both the rest-post clearance and the base-plate clearance.

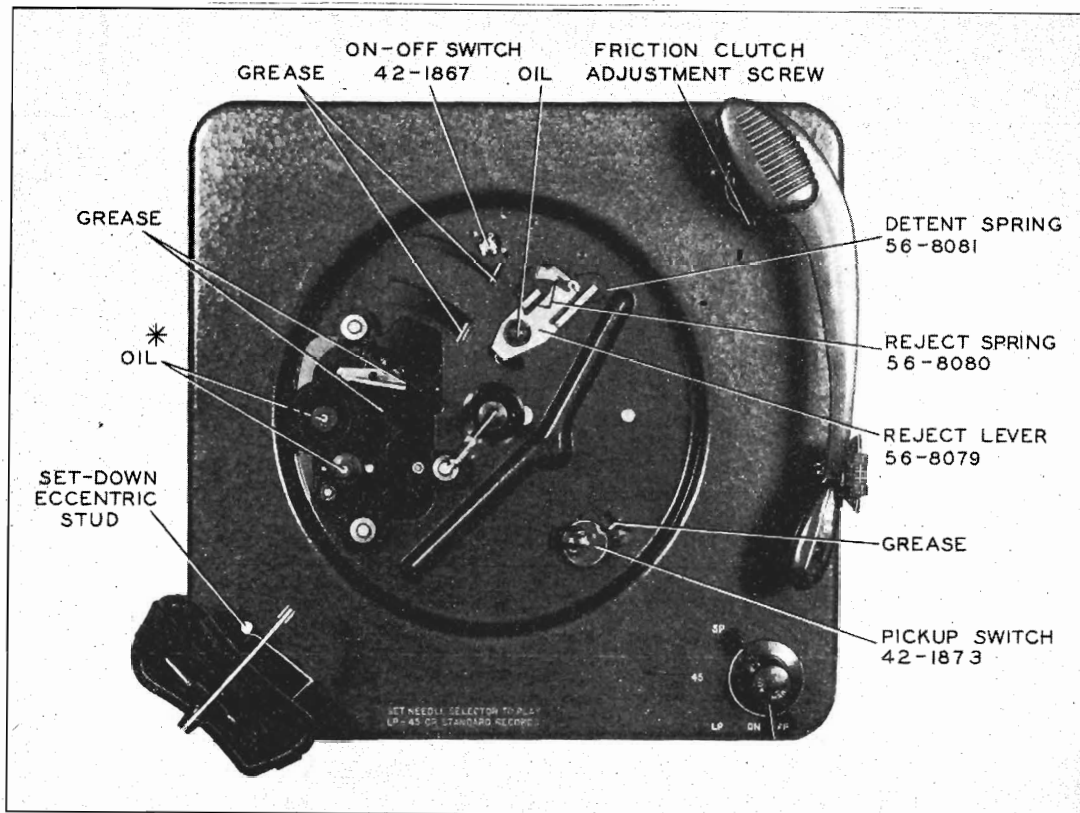
VERTICAL TIMING

Adjust the vertical timing by bending the end of the lifter lever (shown in figure 1), which attaches to the pull-cord, so that there is $1/32''$ to $1/16''$ slack in the pull-cord for all tone-arm positions between the tone-arm rest post and the spindle when the changer is out of cycle. Check by cycling the changer and noting if the lifter lever and pull-cord will raise the tone arm to its maximum height.

SET-DOWN

Set the record shelf to the 12'' position. Set the eccentric stud to its center position toward the corner of the base plate. This stud is accessible through a hole in the base plate near the tone-arm stanchion (see figure 5). Place a 7'' record on the turntable, set the record shelf to the 7'' position, and cycle the changer by hand until the tone arm is just above the record. Loosen the hex-head clamp screw on the trip arm (see figure 3), and swing the tone arm until the needle is $1/8''$ in from the edge of the record. Tighten the clamp screw, and check the adjustment by putting the changer through another cycle. If the set-down point is slightly incorrect, it may be corrected by means of the eccentric stud mentioned above. Recheck the needle set-down. The trip arm should be positioned vertically so that the friction finger is midway between the base plate and the lifter lever. Remove the 7'' record. Set the record shelf to the 10'' position, and place a 10'' record on the turntable. Rotate the turntable until the needle is just above the record. If the needle is not $1/8''$ in from the edge of the record, an adjustment may be made by bending the ear of the set-down cam which is in contact with the eccentric stud. See figure 2. Bending the ear outward moves the set-down point away from the spindle; bending the ear in toward the shelf shaft moves the set-down point toward the spindle. Recheck the needle set-down. Using a 12'' record, with the shelf set to the 12'' position, repeat the adjustment, bending the corresponding ear of the set-down cam (figure 2).

The eccentric stud mentioned above (shown in figures 2 and 5) provides a fine adjustment of the set-down position. This adjustment varies the set-down position of ALL size records over a total range of $3/16''$. Do not use this adjustment unless it is desired to change all three set-down positions by an equal amount.



TPO-1838

Figure 5. Top View, Showing Lubrication Points

TRIP

CAUTION: Do not adjust the friction clutch until the trip-plate engagement is properly set, as explained below.

The proper trip action is greatly dependent upon the proper engagement of the dog latch and the finger of the trip plate supporting it. The correct engagement is $5/64''$ (or approximately one-half the width of the supporting finger of the trip plate) when the ear of the reset arm is contacting the peak point of the reset cam. This is shown in figure 4. The extent of this engagement is adjustable by bending the ear of the trip plate, shown in figure 6. Bending the ear inward decreases the amount of engagement, and bending the ear outward increases the amount of engagement. This adjustable ear is accessible through the large hole in the bridge, and should be bent by using long-nose pliers.

NOTE: Too much engagement will prevent tripping, while too little engagement will cause pre-tripping. If the changer is Run 2, and if it still does not trip after the trip is properly adjusted, remove the tone-arm-shaft spring.

After the trip-latch engagement is set, check the changer for proper trip action. If the trip action is faulty, i.e., if the changer pre-trips or does not trip at all, recheck the trip-latch adjustment. If the changer still does not operate properly, check for tight tone-arm lead dress or excessive friction in the tone-arm-shaft bearing. If this does not clear the

trouble, the friction clutch can be adjusted, although this should *not* normally be necessary. This is a screw adjustment and is accessible, when the tone arm is on the rest post, through a hole in the base plate near the tone-arm stanchion (see figure 5)

Turn the screw counterclockwise until the clutch is just snug (do not tighten), then loosen one turn. Check the adjustment by playing several records. If the changer pre-trips, loosen the screw (turn clockwise) a bit more. This trip arm and clutch assembly is shown in figure 16.



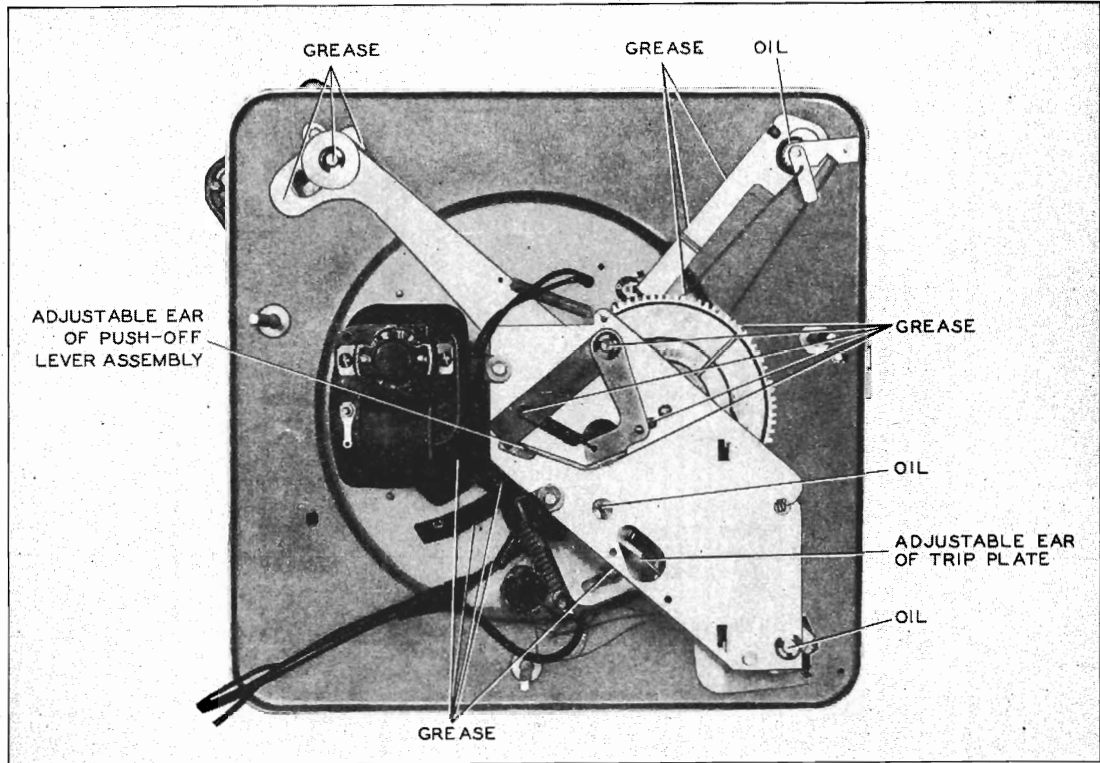
LUBRICATION

LUBRICANTS

Oil: S.A.E. 20.
Grease: Motor cup grease.
Contact lubricant: Dow Corning "DC-4."

PARTS NOT TO BE LUBRICATED

Motor drive shaft.
Motor pulley.
Drive belt.
Idler tire.
Dog latch (on cam gear).

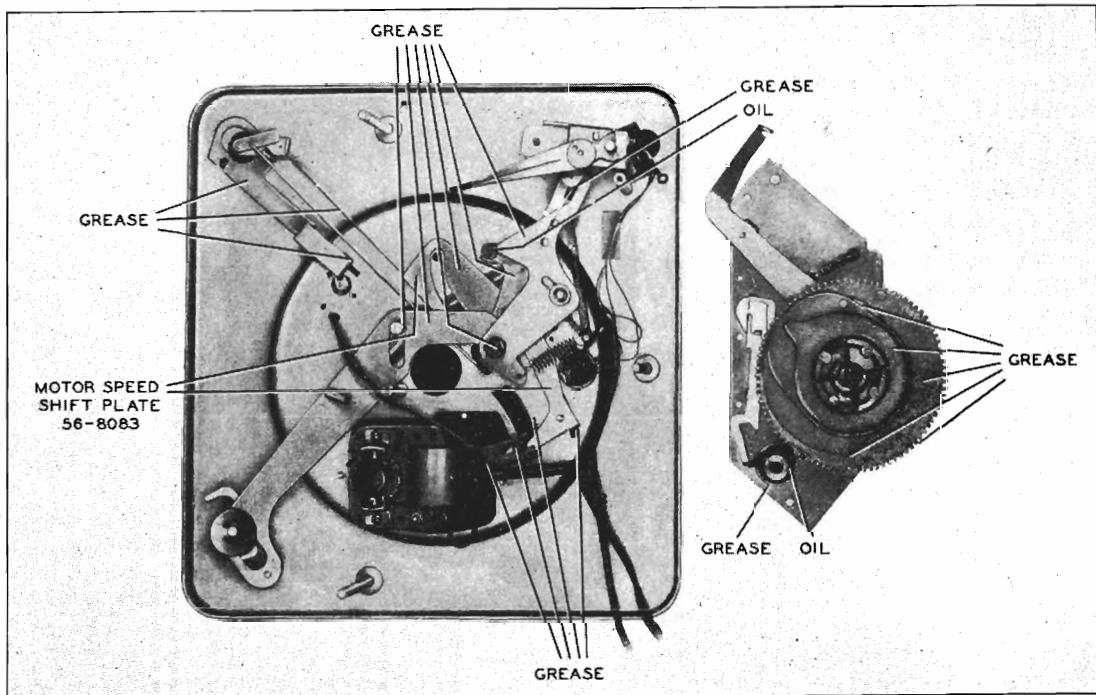


TPO-1836

Figure 6. Bottom View, Showing Lubrication Points

Lifting lever (where dog rides).
 Trip-plate assembly.
 Friction finger.

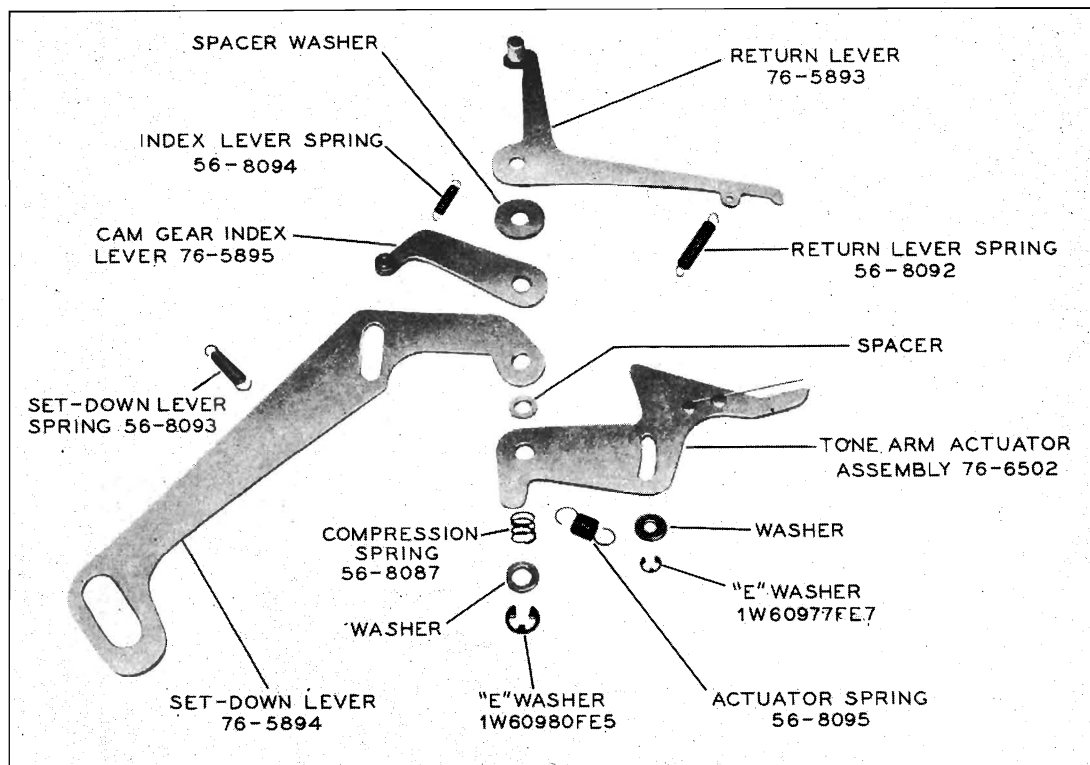
Friction washer.
 Spindle latch (may be lubricated with powdered graphite or talcum powder).



TPO-1837

Figure 7. Bottom View, Bridge Removed, Showing Lubrication Points

MODEL M-22



TPO-1833A

Figure 8. Actuator Assembly

PARTS TO BE GREASED

Actuators

1. Lifting lever, where lever contacts cam gear.
2. Tone-arm-actuator lever where it contacts stud of friction-clutch assembly.

Base Plate

1. Switch lever where it slides on base plate, and slot where ear rides.
2. Motor-speed-shift plate, where it rides in guide slots, and slot that rides on cam-gear spindle; control links where they ride on base plate.

Bridge Assembly

Push-off lever where end slides on bridge, where stud rides in slot of bridge, and at pivot pin.

Cam Gear

All cam surfaces and gear teeth except dog latch.

Friction-Clutch Assembly

Stud of friction-clutch assembly where return lever and tone-arm actuator ride.

Motor

NOTE: When lubricating the motor, use grease or oil very sparingly. Excessive lubrication will cause erratic operation.

1. Cam surfaces of idler-wheel lifter.
2. Detent surfaces.
3. Guide slots of shifter plate.
4. Extension of idler shaft in contact with lower shifter plate.

5. Retaining ear of speed-shift lever.

Record Shelf

1. Record-shelf-shaft bearing.
2. Detents for record shelf.
3. Hold-down pin and detents.
4. Hold-down shaft.
5. Set-down cam, where eccentric stud rides.

PARTS TO BE OILED

1. Cam-gear spindle.
2. Control-knob shafts.
3. Index-lever roller.
4. Motor.
 - a. Idler-assembly pivot shaft.
 - b. Idler-wheel shaft.
 - c. Slider bar, four points.
 - d. Two shift roller pins.
 - e. Pulley shaft (wipe dry and apply only one drop).
 - f. Under pivot bushing of shifter plate.
5. Reject-lever pivot.
6. Tone-arm shaft where it rotates in bridge.
7. Tone-arm-pivot pin where it goes through holes in base plate.
8. Trip-plate-assembly pivot in bushing only.
9. Turntable bearings, top and bottom.
10. Actuator spindle.
11. Bearing surfaces between actuator lever, washer, set-down lever, index lever, washer, and return lever (grease end of return lever where it contacts stud of friction-clutch assembly).

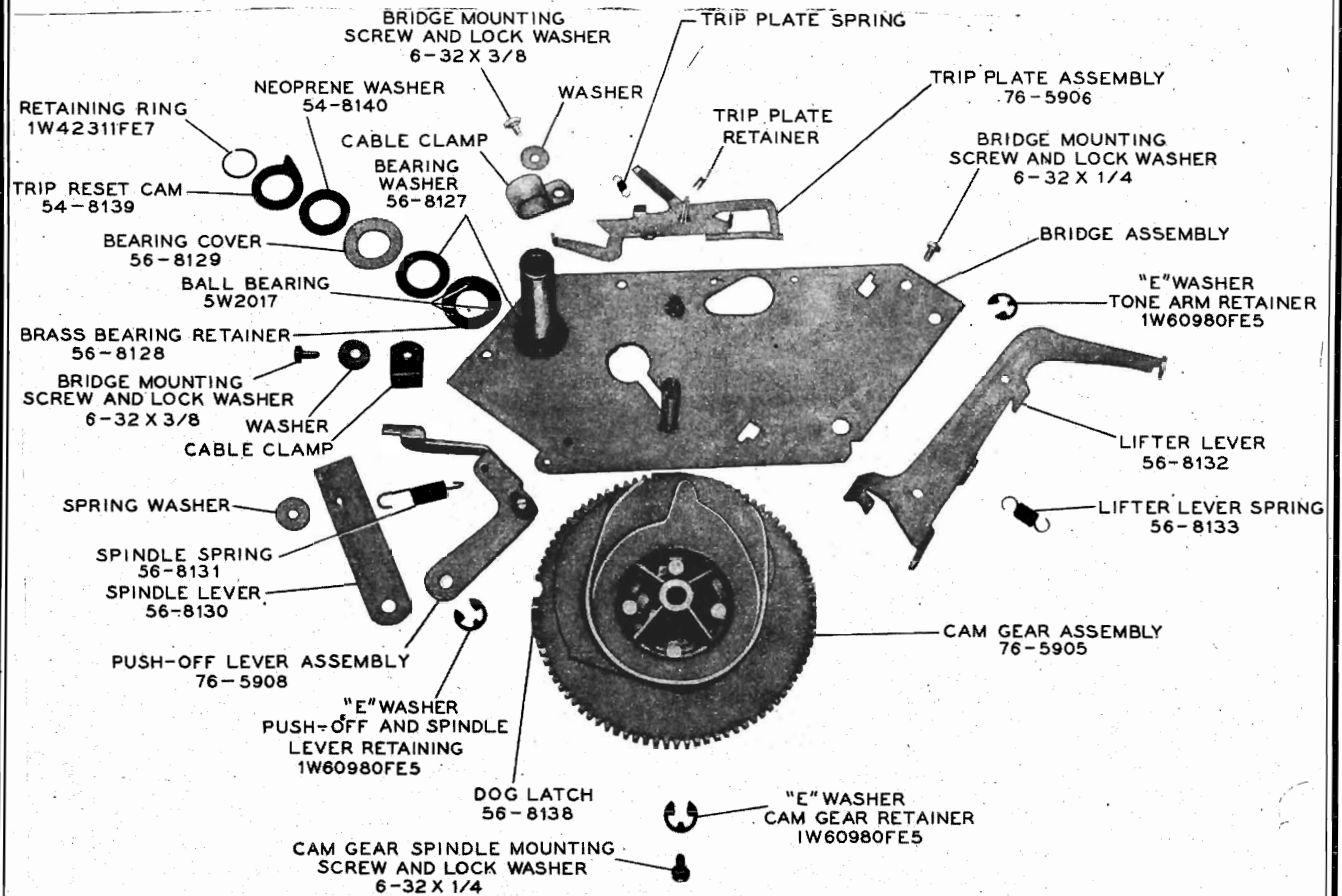


Figure 9. Bridge Assembly

TPO-1844

CAUTION: When lubricating the motor, remove the rubber belt and idler wheel. When lubrication is completed, be sure the motor shaft and pulley are free from oil and grease. Failure to observe this precaution may result in slippage.

CONTACT LUBRICATION

Apply Dow Corning "DC-4" to the contacts of the cartridge contact plate, and to the dimple of the cartridge retaining spring.



UNEVEN TURNTABLE SPEED (WOWS)

Uneven turntable speed may be caused by any of the following conditions:

1. Dirt under and around the idler-wheel assembly.
2. Idler-wheel spring loose or missing.
3. Flat spot on idler-wheel tire or turntable.
4. Loose, worn, or distorted pulley belt.
5. Oil or grease on idler-wheel tire, pulley, pulley belt, or drive shaft.
6. Speed-control knob not in proper position.



REPLACEMENT OF PARTS AND ASSEMBLIES

The following procedures are recommended for the correct removal of parts and assemblies. The parts should be replaced by reversing the order of removal.

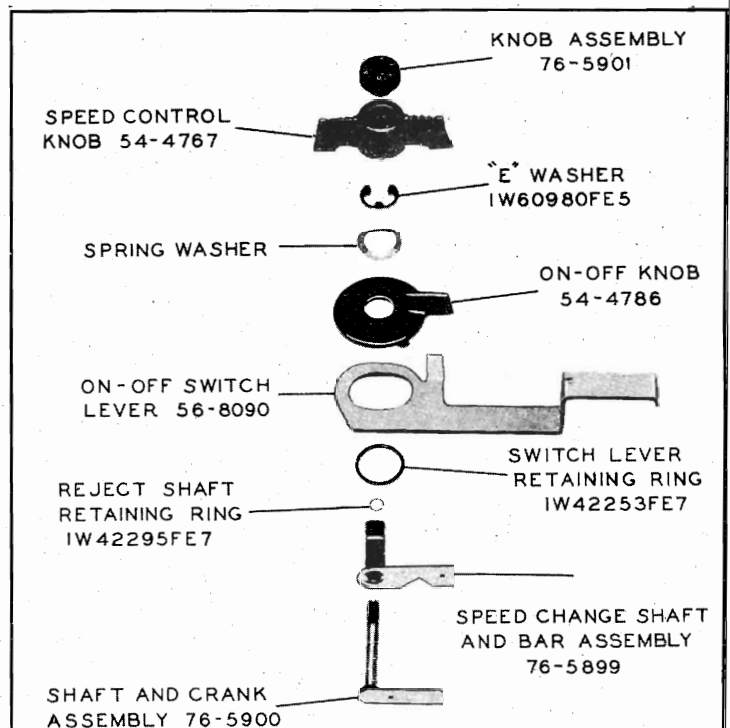


Figure 10. Control Assembly

TPO-1834

MODEL M-22

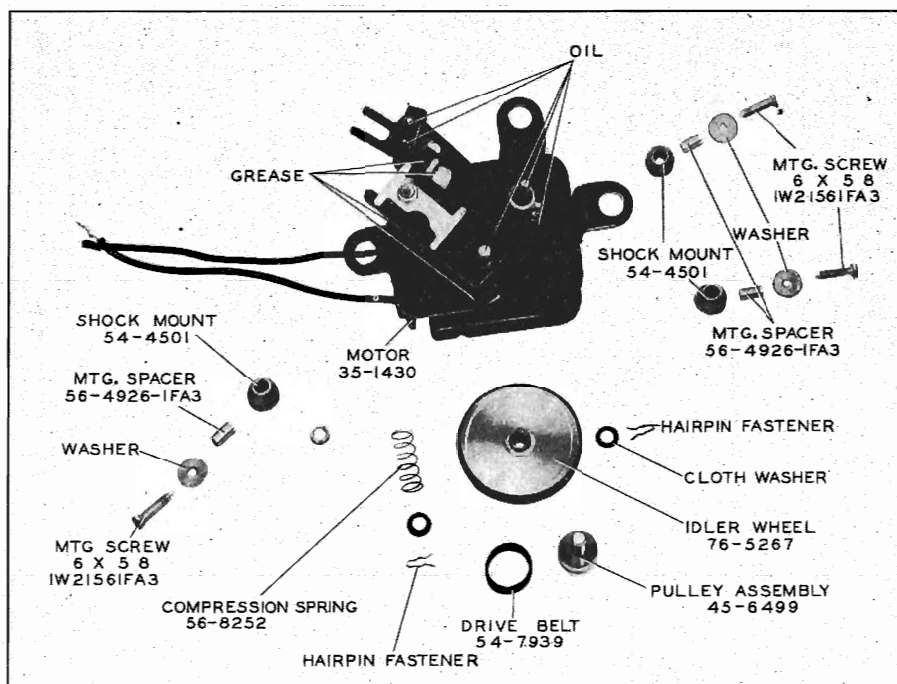


Figure 11. Motor Assembly—Part No. 35-1451

TP9-204

Adjustments should be made according to the directions given in the ADJUSTMENTS section of the manual.

1. Crystal Cartridge

Grasp crystal cartridge with fingernails. With the other hand, hold tone arm and apply slight pressure on switch lever. Pull cartridge down and to the outside. Replace cartridge by holding contacts toward spindle, and pushing upward until firmly seated.

2. Needle

Remove crystal cartridge (see paragraph 1). Lift needle out gently with prying motion, using fingernail or knife point. When replacing needle, align key of needle shaft with keyway in chuck of cartridge, then push needle into cartridge.

3. Turntable

Remove spring retainer and washer from top of spindle bushing. Lift turntable off.

NOTE: When replacing turntable, position speed-control knob midway between LP and 45 or 45 and SP. This holds the idler wheel in a retracted position. Then replace turntable. This method will prevent damage to the idler-wheel tire.

4. Spindle

Disengage spindle spring. Remove spindle. Do not lose spring washer under spindle lever.

5. Bridge (See figure 9)

- Remove set-down-lever spring.
- Remove lifter-lever spring.
- Remove the three hex-head drive screws and the two plastic cable retainers.
- Remove "E" washer from tone-arm spindle.
- Remove hex-head drive screw from cam-gear spindle. This screw is located on the top.
- Remove pull-cord and disconnect tone-arm wires.

- Carefully lift off bridge, cam gear, spindle bushing, trip-plate assembly, lifter lever, spindle lever, and push-off lever.

6. Cam Gear

- Remove bridge (see paragraph 5).
- Remove "E" washer from cam-gear spindle.
- Lift off cam gear.

7. Push-off-Lever Assembly and Spindle Lever

- Remove cam gear (see paragraph 6).
- Remove "E" washer from push-off fulcrum stud.
- Rotate push-off lever so that stud is in large hole, and lift off both push-off lever and spindle lever.

8. Trip-Plate Assembly

- Remove cam gear (see paragraph 6).
- Remove clip from trip stud, and lift assembly from bushing.

9. Trip Reset Cam, Neoprene Washer, and Ball Bearing

- Remove cam gear (see paragraph 6).
- Remove spring retaining ring.
- The trip reset cam, neoprene washer, ball cover, balls, and race may be removed in that order.

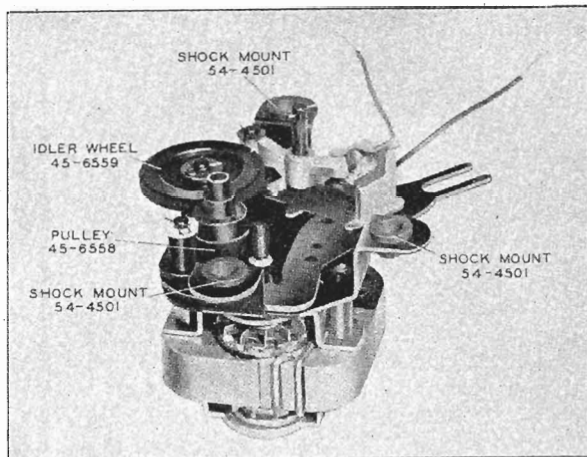
10. Trip-Arm Assembly

- Remove "E" washer from end of tone-arm shaft.
- Disengage pull-cord.
- Loosen trip-arm-clamp screw.
- Raise tone arm sufficiently to clear trip arm.
- Remove trip-arm assembly.
Figure 16 shows trip-arm assembly.

11. Tone Arm

- Place control in MAN. position.
- Unsolder the four tone-arm leads.
- Remove pull-cord from lifter lever.

- d. Remove "E" washer from end of tone-arm stud.
 - e. Loosen trip-arm-clamp screw.
 - f. Remove tone-arm-shaft spring, if present.
 - g. Lift out tone arm.
- Figure 15 shows tone-arm assembly.



TP9-456

Figure 12. Motor Assembly—Part No. 35-1452

12. Motor Assembly

- a. Remove turntable (see paragraph 3).
 - b. Unsolder motor lead from switch on base plate, and free other lead from tape and spaghetti.
 - c. Remove the three hex-head drive screws, washers, and spacers from motor frame.
 - d. Slide jaws of speed-shift lever free of rubber grommet and ear of motor-speed-shift plate.
 - e. Lift motor out.
- Figures 11, 12, and 13 show motor assembly.

13. Control Shafts and Links

- a. Pull off MAN.—AUT.—REJ. button.
- b. Lift off speed-control knob.
- c. Remove "E" washer and spring washer.
- d. Lift off ON-OFF knob.
- e. Remove retaining ring from reject shaft.
- f. From underside, pull out speed-change shaft and bar assembly and MAN.—AUT.—REJ. shaft and crank assembly.
- g. Disengage each of the above from its respective links.

- h. Remove speed-change link.
- i. Remove heavy spring ring from control bushing.
- j. Remove ON-OFF switch lever by lifting over bushing, pulling toward corner of base plate, and lifting ear out of slot.

Figure 10 shows control assembly.

14. Record Shelf

- a. Remove "E" washer from bottom of record-shelf shaft.
- b. Remove cupped washer.
- c. Loosen set-down-clamp screw.
- d. Remove set-down cam, record-shelf spring, and spacer (if used; Run 4 on). When reassembling, add spacer and new spring.
- e. Lift record shelf from saddle.

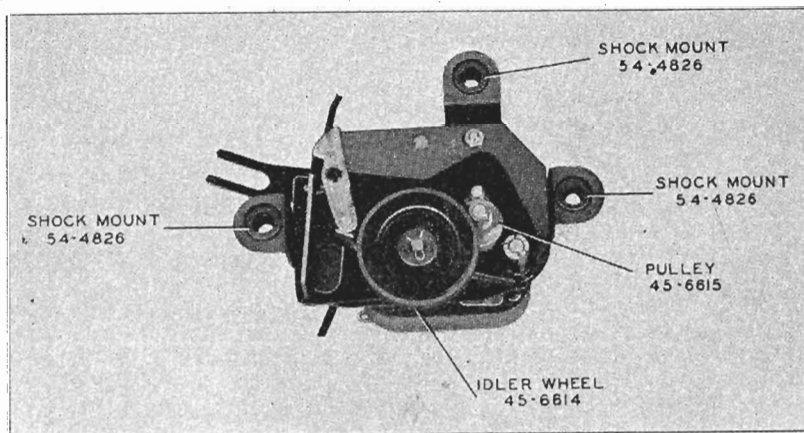
Figure 14 shows record-shelf assembly.

15. Actuator Levers

- a. Remove bridge (see paragraph 5).
- b. Remove spring from tone-arm return lever.
- c. Remove "E" washer, washer, and compression spring from actuator stud.
- d. Remove "E" washer and washer from return-lever support stud.
- e. Remove tone-arm-actuator lever.
- f. Remove spacer washer.
- g. Remove set-down lever.
- h. Remove cam-gear index lever.
- i. Remove motor-speed-shift plate by pulling speed-shift lever toward center of changer, freeing grommet from jaws of lever, and returning lever to an outward position. Lift and turn free end of speed-shift plate toward tone arm; this will free ear in large slot. With free end, carefully twist plate down between return-lever support stud and spring-anchor stud. Ear in small slot will come free.
- j. Remove large washer.
- k. From top of base plate, remove reject and detent springs, "E" washer, and spring washer. Free reject lever of stud, and remove reject link from lever.
- l. Remove tone-arm-return lever.

Figure 8 shows actuator assembly.

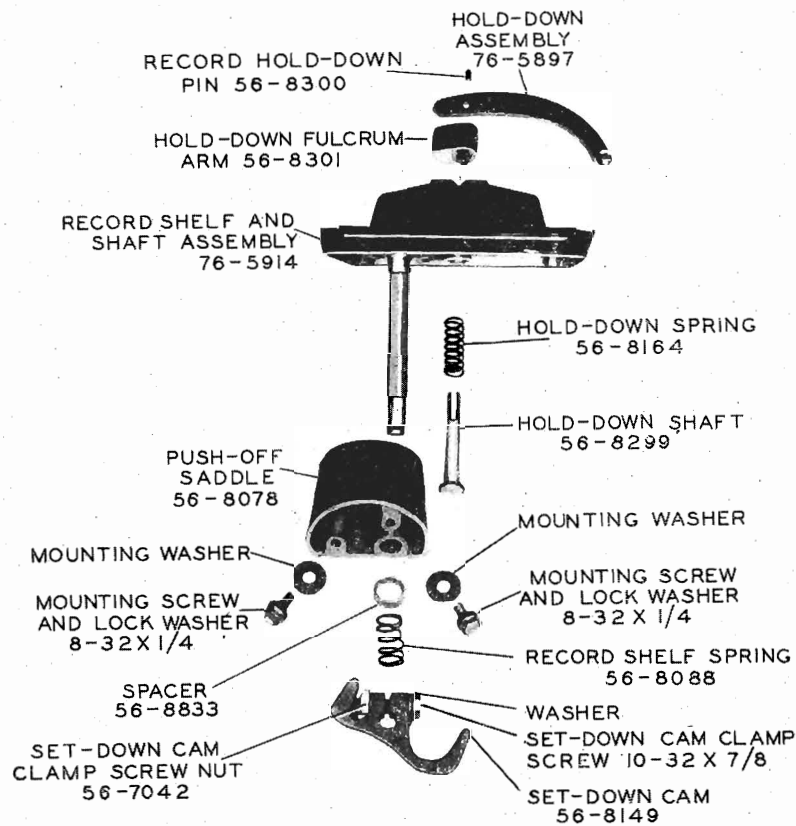
NOTE: When replacing the index-lever spring, the tone-arm-actuator spring, and the return-lever spring, re-cement the ends to the spring mounting stud, using glyptol, as in production. This will prevent the springs from coming loose due to shock.



TPO-1832

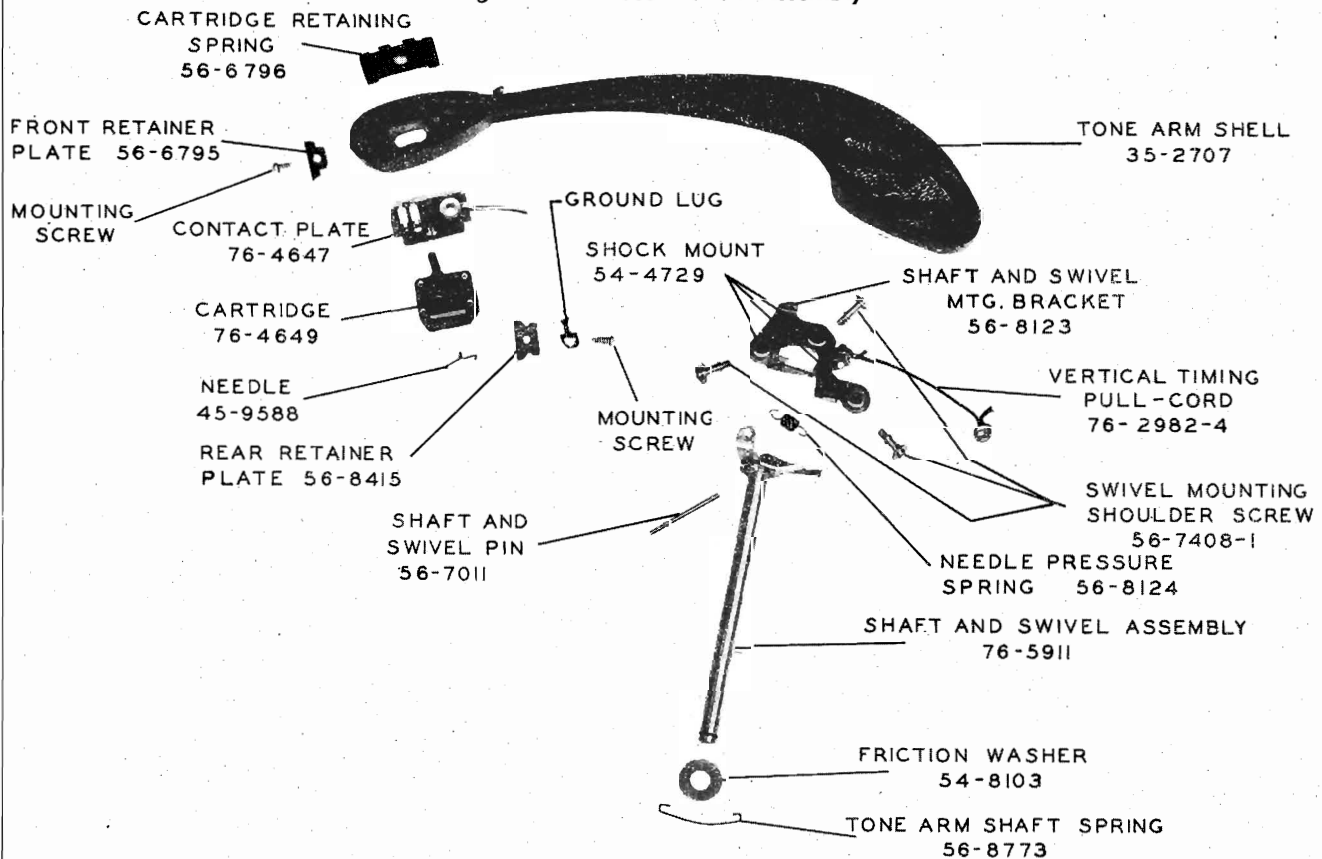
Figure 13. Motor Assembly—Part No. 35-1455

MODEL M-22



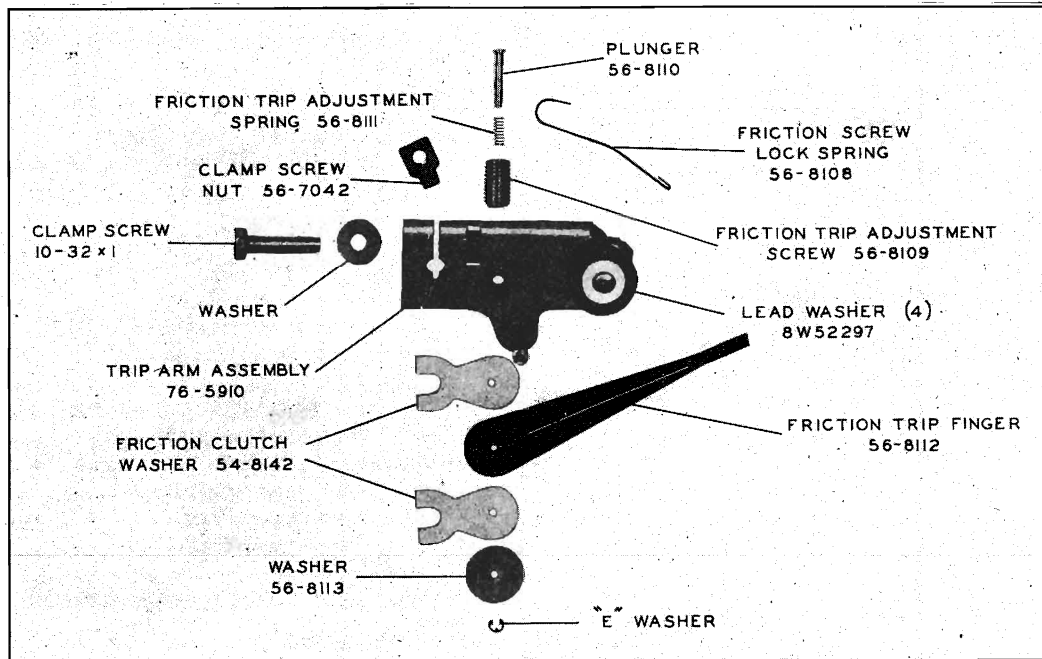
TPO-1835

Figure 14. Record-Shelf Assembly



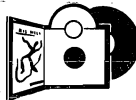
TPO-1840

Figure 15. Tone-Arm Assembly



TPO-1842

Figure 16. Trip-Arm Assembly



PRODUCTION CHANGES

RUN 2

Tone-arm-shaft spring, Part No. 56-8773, was added, to stabilize tone-arm skip.

RUN 3

Tone-arm-shaft spring was removed, to eliminate mistracking. The inside of the tone-arm head was given an aquadage coating, to eliminate hum pick-up.

RUN 4

An extrusion was added to the tone-arm-shaft

bearing of the tone-arm stanchion. Tone-arm-shaft spring, Part No. 56-8773, was added, to stabilize horizontal friction.

RUN 5

Record-shelf spacer, Part No. 56-8833, was added, to prevent jamming of shelf due to mishandling.

RUN 5Z

Changers built prior to Run 5, and converted to include all revisions up to and including Run 5, are identified as Run 5Z.

REPLACEMENT PARTS LIST

| Description | Service Part No. | |
|-------------------------------------|------------------|------------------------------------------------------------------|
| Actuator Assembly (figure 8) | | |
| Cam-gear index lever | 76-5895 | Neoprene washer |
| Spring, index lever | 56-8094 | Push-off-lever assembly |
| Compression spring | 56-8087 | Retaining ring, reset cam and bearing |
| Return lever | 76-5893 | 1W42311FE7 |
| Spring, return lever | 56-8092 | Spindle lever |
| Set-down lever | 76-5894 | Spring, spindle |
| Spring, set-down lever | 56-8093 | 56-8131 |
| Tone-arm-actuator assembly | 76-6502 | Trip-plate assembly |
| Spring, actuator | 56-8095 | 76-5906 |
| | | Trip-reset cam |
| | | 54-8139 |
| Bridge Assembly | | |
| Ball bearing, 1/8" dia. (3) | 5W2017 | Changer base plate, tone-arm rest, and tone-arm stanchion |
| Bearing cover | 56-8129 | 76-5892 |
| Bearing retainer, brass | 56-8128 | Bumper, tone-arm rest, rubber |
| Bearing washer (2) | 56-8127 | 54-8136 |
| Cam-gear assembly | 76-5905 | Switch, motor power |
| Dog latch | 56-8138 | 42-1867 |
| Pin, dog-latch mounting | 56-8139 | Switch, pickup |
| Lifter lever | 56-8132 | 42-1873 |
| Spring, lifter lever | 56-8133 | Changer Mounting Hardware |
| | | Sleeve, rubber (3) |
| | | 54-7798 |
| | | Spring, heavy, top (3) |
| | | 56-7059FA9 |
| | | Spring, light, bottom (3) |
| | | 56-7059-1FCP |
| | | Speed nut (3) |
| | | W-2554FCP |
| | | Control Assembly |
| | | Knob assembly, MAN.—AUT.—REJ. |
| | | 76-5901 |
| | | Knob, ON-OFF |
| | | 54-4786 |

MODEL M-22

| | | | |
|---------------------------------------------|--------------|-------------------------------------------|-----------|
| Knob, speed control | 54-4767 | Reject lever | 56-8079 |
| Lever, ON-OFF switch | 56-8090 | Spring, detent | 56-8081 |
| Link, reject | 56-8084 | Spring, reject | 56-8080 |
| Link, speed change | 56-8091 | Spindle | 76-5909 |
| Retaining ring, reject shaft | 1W42295FE7 | Tone-arm assembly (complete) | 35-2710 |
| Retaining ring, switch lever | 1W42253FE7 | Bracket, mounting for shaft and swivel .. | 56-8123 |
| Shaft-and-bar assembly, speed change | 76-5899 | Cartridge (includes needle) | 76-4649 |
| Shaft-and-crank assembly, reject | 76-5900 | Contact plate | 76-4647 |
| Motor, 117 volts, 60 cycles | 35-1451 | Needle | 45-9588 |
| Drive belt | 54-7939 | Needle, sapphire tips | 45-9589 |
| Grommet, rubber, speed-selector lever | 27-4707 | Pin, shaft and swivel | 56-7011 |
| Idler wheel | 76-5267 | Pull-cord, vertical timing | 76-2982-4 |
| Plate, motor speed shift | 56-8083 | Retainer plate, front | 56-6795 |
| Pulley assembly | 45-6499 | Retainer plate, rear | 56-8415 |
| Screw, motor mounting (3) | 1W21561FA3 | Screw, shoulder, bracket mounting (3) .. | 56-7408-1 |
| Shock mount (3) | 54-4501 | Shaft-and-swivel assembly | 76-5911 |
| Spacer, mounting (3) | 56-4926-1FA3 | Shock-mount, bracket mounting (3) | 54-4729 |
| Spring, idler retractor | 56-8252 | Spring, cartridge retaining | 56-6796 |
| * Motor, 117 volts, 60 cycles | 35-1452 | Spring, needle pressure | 56-8124 |
| Idler wheel | 45-6559 | Spring, tone-arm shaft | 56-8773 |
| Pulley assembly | 45-6558 | Tone-arm shell | 35-2707 |
| * Motor, 117 volts, 60 cycles | 35-1455 | Washer, horizontal friction (plastic) .. | 54-8103 |
| Idler wheel | 45-6614 | Trip-arm assembly | 76-5910 |
| Pulley assembly | 45-6615 | Finger, friction trip | 56-8112 |
| Shock mount (3) | 54-4826 | Nut, clamp screw | 56-7042 |
| Motor, 117 volts, 50-60 cycles | 35-1462 | Plunger | 56-8110 |
| Conversion kit, for 50-cycle operation .. | 40-7848 | Screw, friction-trip adjustment | 56-8109 |
| Record-Shelf Assembly | | Spring, friction screw lock | 56-8108 |
| Hold-down assembly | 76-5897 | Spring, friction-trip adjustment | 56-8111 |
| Hold-down fulcrum arm | 56-8301 | Washer | 56-8113 |
| Hold-down pin | 56-8300 | Washer, friction clutch (plastic) (2) .. | 54-8142 |
| Hold-down shaft | 56-8299 | Washer, lead (4) | 8W52297 |
| Hold-down spring | 56-8164 | Turntable | 35-2711 |
| Push-off saddle | 56-8078 | Retainer, turntable | 56-8097 |
| Record-shelf and shaft assembly | 76-5914 | Washer, turntable | 56-8096 |
| Set-down cam | 56-8149 | | |
| Nut, cam locking | 56-7042 | | |
| Spacer | 56-8833 | | |
| Spring, record shelf | 56-8088 | | |
| Washer, cupped | 56-8089 | | |

* This motor not carried in stock. Order motor Part No. 35-1451. If motor Part No. 35-1455 is replaced by motor Part No. 35-1451, order three shock mounts, Part No. 54-4501.

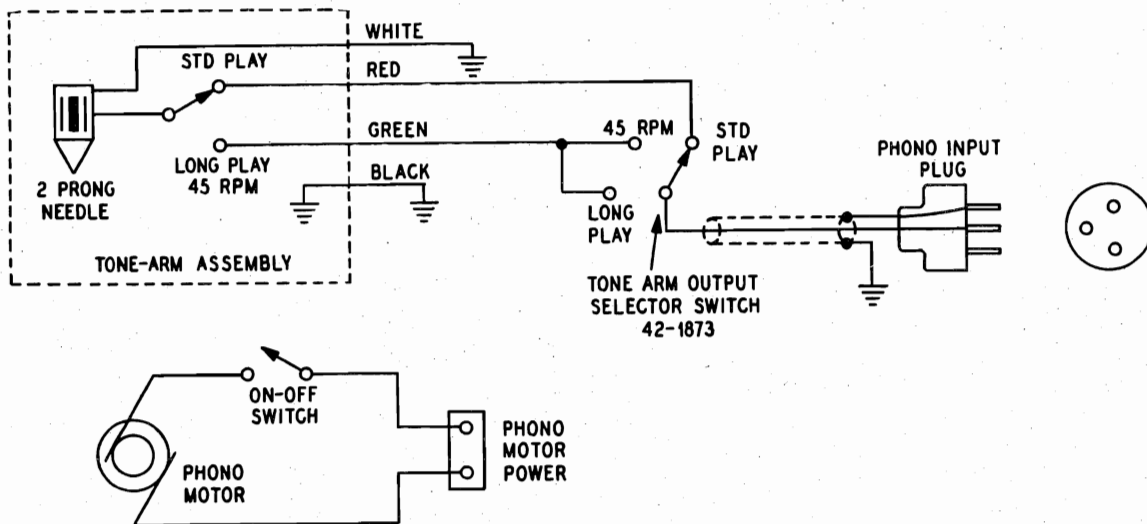
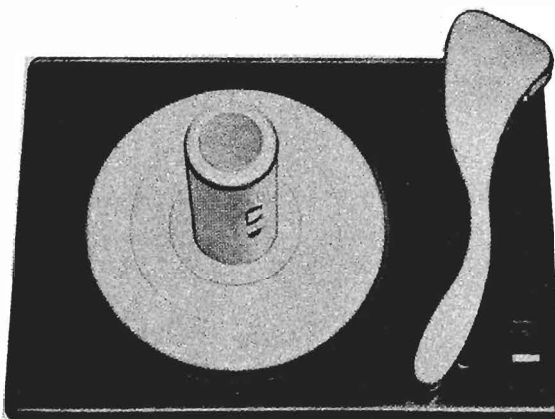


Figure 17. Wiring Diagram of Model M-22

TPO-2313



PH489

The RP193-1 record changer is designed to play and change automatically twelve of the new RCA type seven inch fine groove 45 r.p.m. phonograph records.

SPECIFICATIONS

Turntable speed 45 r.p.m.
 Records used RCA type seven-inch fine groove
 Record capacity 12 records
 Pickup force Approx. 5 grams
 Stylus tip radius001 inch
 Power supply 105-125 volts, 60 cycle, a.c.

CAUTION

1. Avoid handling the pickup arm when the mechanism is in cycle.
2. Do not use force to release a jam.
3. Do not try to remove the records on the turntable if the turntable is stopped in cycle with separator blades exposed.

LUBRICATION

A light machine oil (Singer Sewing Machine Oil) or equivalent, should be used to oil the bearings of the drive motor and the following:

- Idler Carriage.
- Pickup Arm Pivot Bearing.
- Top & Bottom Turntable Shaft Bearings.

Houghton STA-PUT No. 512 or equivalent grease should be used on the following:

- Ball bearing on bottom end of turntable shaft.
- Cycling cam shaft.
- Points of contact on reject slide assembly.
- Cam tracks where the following parts contact.
- Elevating rod, pickup arm lever and inclined edge where pinion gear rides.
- All gear teeth.
- Surfaces where pinion gear drive keys contact shelf and blade assemblies.

Houghton STA-PUT No. 320 can be used on the pinion gear shaft. (However, if available a graphite grease is highly recommended.)

(Do not oil or grease record separator shelves.)

It is important that the drive motor spindle and the rubber tire on the idler wheel be kept clean and free from oil and grease, dirt, or any foreign material at all times. Carbon tetrachloride or naphtha is satisfactory for cleaning those parts.

STA-PUT can be purchased from E. F. Houghton & Company, 303 W. Lehigh Avenue, Philadelphia, Pa.

AUTOMATIC OPERATION

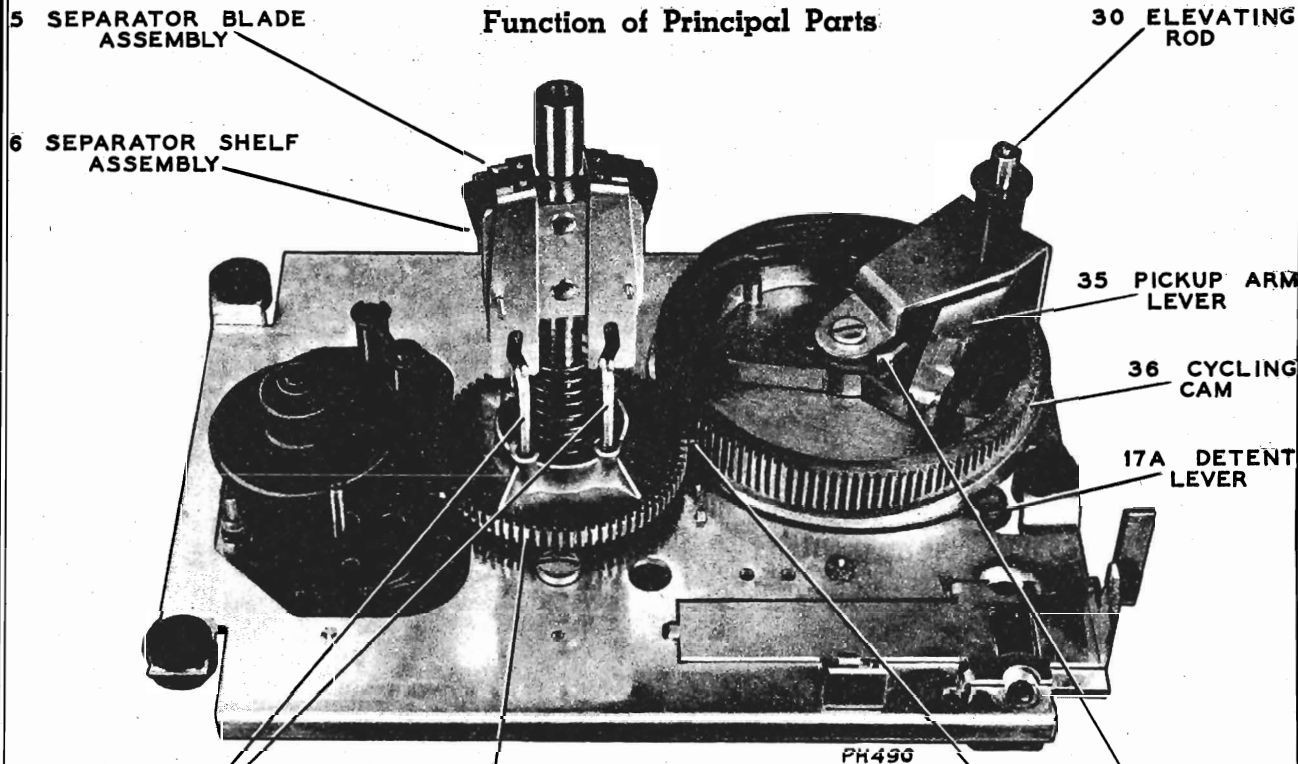
1. Place a stack of records over the center post, with the desired selections upward, the last record to be played on top.
2. Push the "start-reject" knob toward the back of the cabinet and let go. The mechanism will automatically play in sequence one side of each record stacked on the separator shelves.
3. To reject a record being played, push the "start-reject" knob toward the back of the cabinet.
4. At conclusion of playing and as the last record is being repeated, lift the pickup arm and place on its rest. Turn off the power to the drive motor by pulling forward on control knob.
5. Remove the stack of records by lifting them straight up.

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MODEL RP-193-1

Function of Principal Parts



13A PINION GEAR DRIVE KEYS

Pickup Arm Lever (35)

The function of the pickup arm lever is to direct the horizontal movement of the pickup arm during change cycle. This is accomplished as the end of the pickup arm lever rides in the channel molded in the cycling cam. Later, as the mechanism is playing, the pickup arm lever follows the movement of the pickup arm until the pickup arm lever contacts and moves the segment engagement gear, thus tripping the mechanism.

Pinion Gear (13)

The function of the pinion gear is to mount the pinion gear drive keys and transfer the rotating motion of the turntable to the cycling cam during change cycle.

13 PINION GEAR

Pinion Gear Drive Keys (13A)

The function of the drive keys mounted on the pinion gear is to actuate the separator mechanism inside the centerpost as they raise and lower with the pinion gear.

Segment Engagement Gear and Lever Assembly (36A)

The segment engagement gear is mounted on the underside of the cycling cam. During the playing time the segment engagement gear is retracted. As the mechanism is tripped the segment gear is extended, thereby making a momentary contact with

36A SEGMENT ENGAGEMENT GEAR

the rotating pinion gear. This contact provides the movement to start the cycling cam rotating and carry the mechanism through change cycle.

Cycling Cam (36)

The function of the cycling cam and its molded channels is to direct the movement of the pickup arm and the separator mechanism during change cycle.

Detent Lever (17A)

The function of the detent lever is to engage the depression in the side of the cycling cam, and stabilize the cycling cam in the out of cycle position.

ADJUSTMENTS

PICKUP ARM HEIGHT

Loosen the screw marked ("A") on back of the pickup arm and adjust so the pickup will clear a stack of twelve records. Raising the screw in the elongated hole raises the pickup arm, lowering the screw lowers the pickup arm.

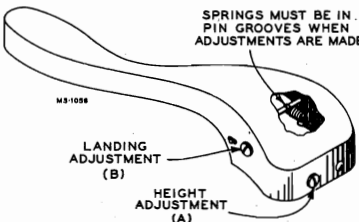
PICKUP-LANDING-ADJUSTMENT

Loosen screw marked ("B") and slide the mounting bracket forward to move the landing point away from the centerpost, and back to move the landing point inward.

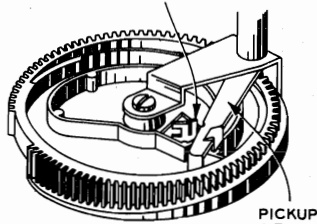
NOTE: Before making the adjustment, make certain the safety springs (26) are in the pin grooves.

TRIPPING ADJUSTMENT

If mechanism fails to trip when the stylus is approximately 1/32" from the side of the centerpost, bend the end of the segment engagement lever (indicated in drawing at right) out for early tripping and in for late tripping.



END OF SEGMENT ENGAGEMENT GEAR BEND OUT TO TRIP EARLY BEND IN TO TRIP LATE



ADJUSTMENT

RP-193

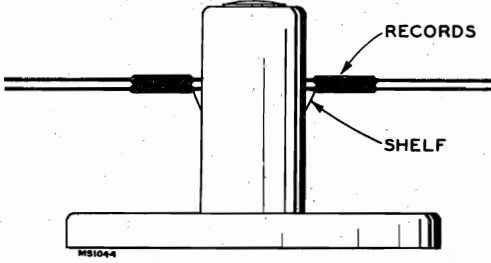
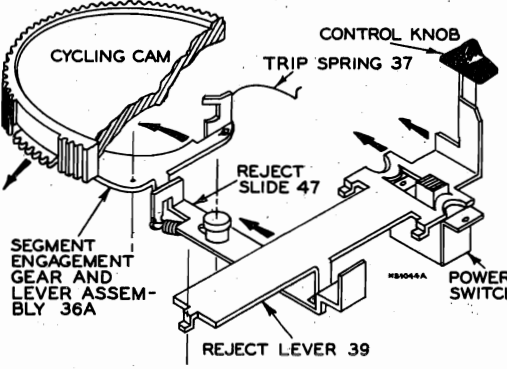
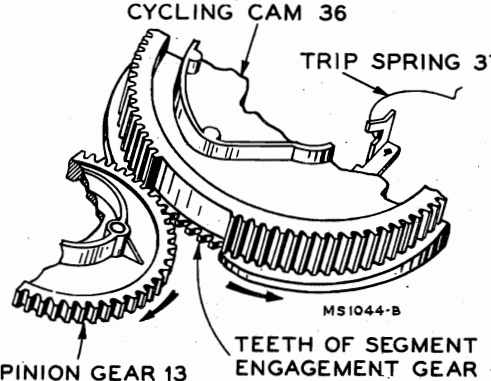
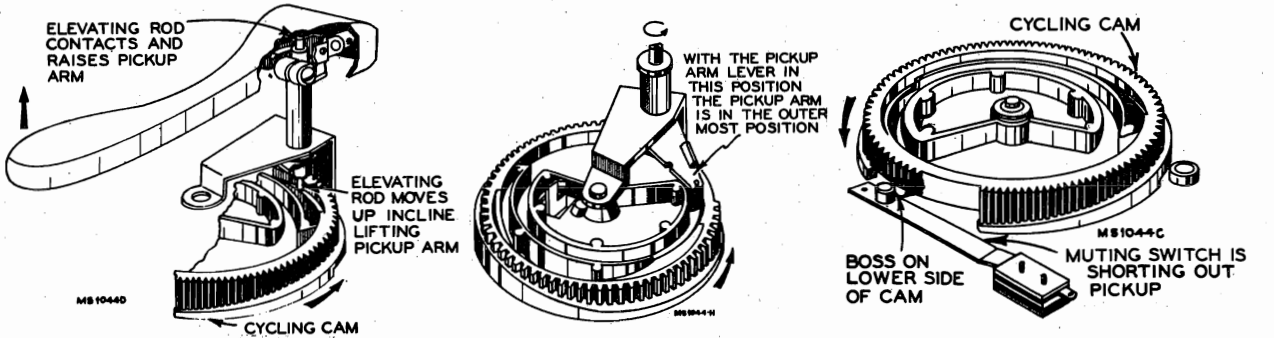
M5-1086

PICKUP LEVER

Note:

If spacing between separator blades and separator shelves do not fall between .040 to .048" bend blades accordingly.

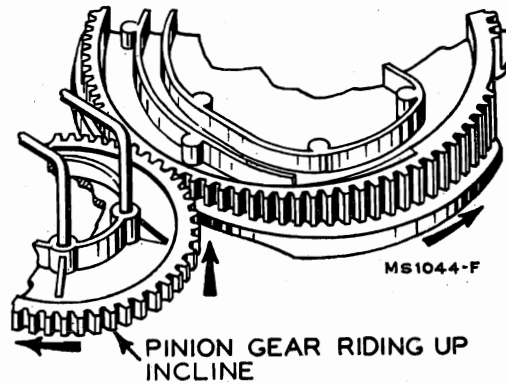
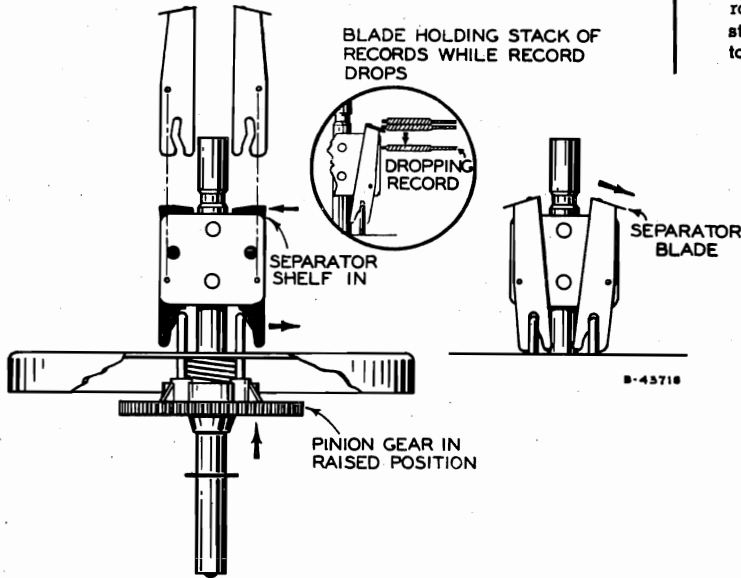
Cycle of Operation

| FUNCTION | EXPLANATION |
|-----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Place a stack of records over the centerpost. | <p>1. Records rest on separator shelves protruding from either side of the centerpost.</p>  |
| Push control knob to reject and release. | <p>1. The control first actuates the power switch applying power to the drive motor. This action starts the turntable rotating.</p> <p>2. Further movement of the control knob causes the reject lever (39) to move the reject slide (47) sufficiently, for engagement with the end of the segment engagement gear and lever assembly (36A). This movement through the train of levers trips the mechanism.</p>  |
| Cycling starts. | <p>1. As the reject slide moves the segment engagement gear slightly, the segment gear snaps outward due to the action of trip spring (37).</p> <p>2. After the segment engagement gear has snapped out, the rotating pinion gear (13) engages the teeth of the segment gear and gives a slight rotary motion to the cycling cam (36). This slight rotary motion causes the teeth of the pinion gear and the teeth of the cycling gear to engage, thus starting change cycle.</p>  |
| Pickup raises from the rest and moves out. | <p>1. As the cycling gear starts rotating the pin on the muting switch moves off the boss on the gear permitting the switch to short out the pickup.</p> <p>2. The elevating rod (30) rides up the incline surface of the track on the cycling cam, causing the pickup to raise from the rest.</p> <p>3. As the cycling cam continues to rotate the turned down end of the pickup arm lever (35) follows the channel moulded in the cycling cam and swings the pickup arm out clear of the records.</p>  |

MODEL RP-193-1

Separator blades separate the lower record from the stack and the lower record drops to the turntable.

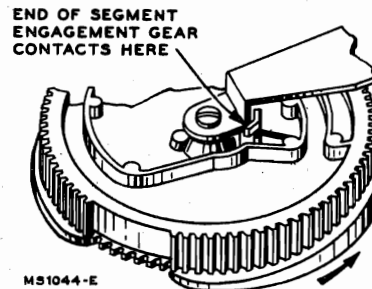
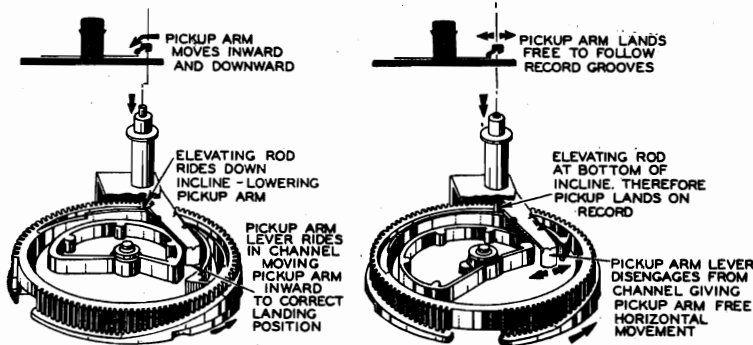
1. An instant after the pickup arm has started to raise the rotating pinion gear (13) starts to raise also. This is due to the lower edge of the gear riding up the spiral incline formed on the edge of the cycling cam.
2. The raising of the pinion gear and key assembly actuates the separating mechanism inside the centerpost. This action causes the support shelves to recede and the separator blades to move out to select the lower record of the stack and to support the remaining records while the bottom record drops to the turntable.



Pickup moves in for landing.

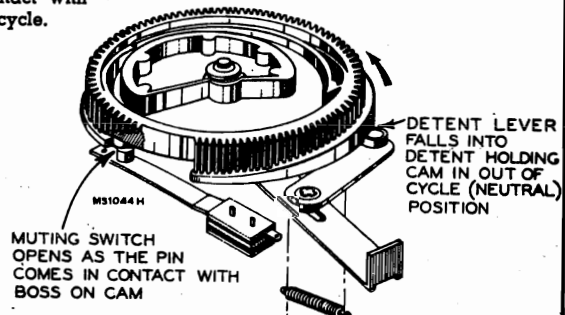
1. As the mechanism nears the end of the change cycle, the end of the segment engagement gear extending from the top of the rotating cycling gear comes against the mounting bracket. This contact resets the segment engagement gear preventing continuous cycling.

2. The end of the pickup arm lever riding in the channel in the cycling gear, moves the pickup arm in for landing.
3. The pickup lands on the start of the record as the elevating rod rides down the incline on the cycling gear.
4. At this very moment the end of the pickup arm lever moves into the open portion of the cycling cam track. This gives free movement to the pickup arm as it moves across the record.



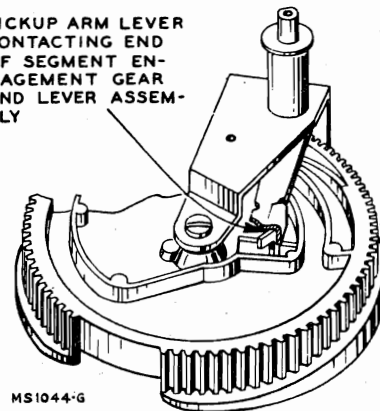
Cycling completed and the record plays.

1. The detent lever (17A) snaps the cycling cam into a neutral position as the muting switch pin comes in contact with the boss on the cam. This completes the change cycle.



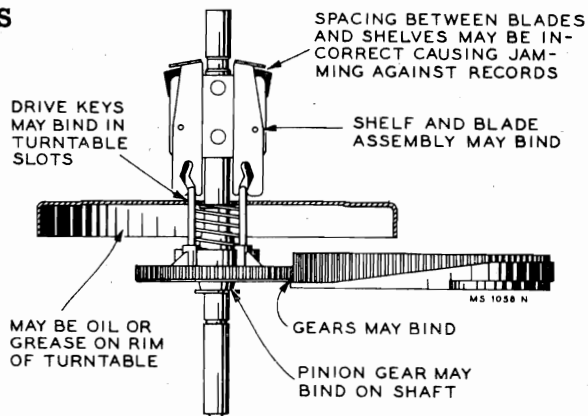
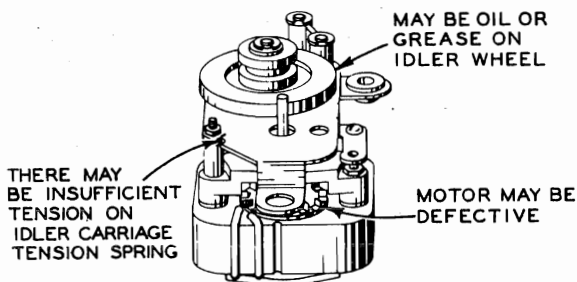
2. As the record plays, the pickup moves inward.
3. When the stylus reaches the end of the selection, the side of the pickup arm lever (35) contacts and trips the segment engagement gear and a new change cycle is started.
4. The mechanism repeats the preceding sequence of operations until the last record of the stack has dropped to the turntable and has been played.
5. The last record will be repeated until the pickup is lifted and placed on the rest.

PICKUP ARM LEVER CONTACTING END OF SEGMENT ENGAGEMENT GEAR AND LEVER ASSEMBLY

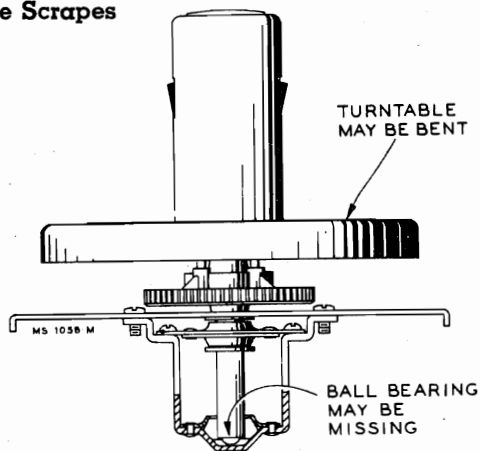


Stalling During Change Cycle

SERVICE HINTS

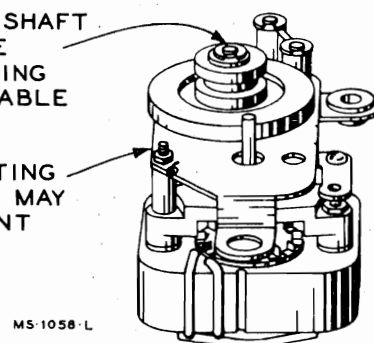


Turntable Scrapes

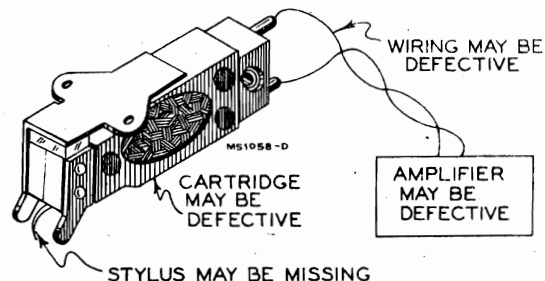
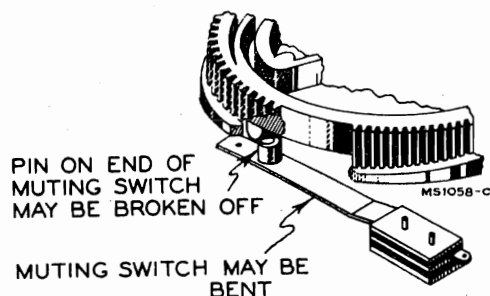


IDLER SHAFT MAY BE TOUCHING TURNTABLE

MOUNTING PLATE MAY BE BENT

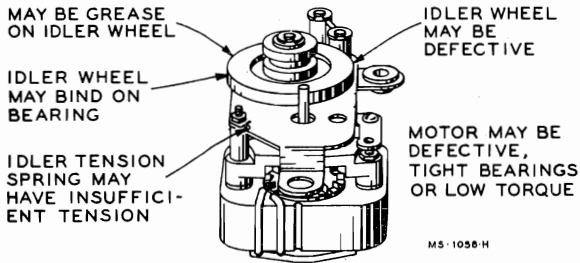
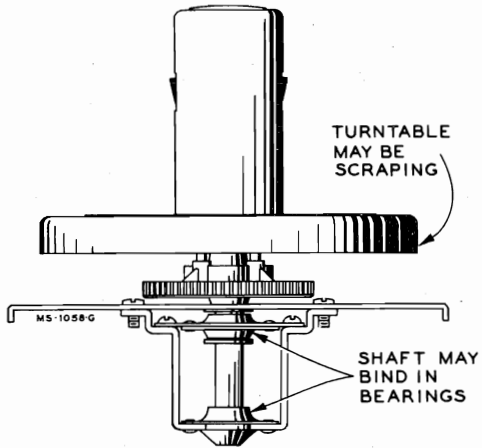


No Output From Instrument

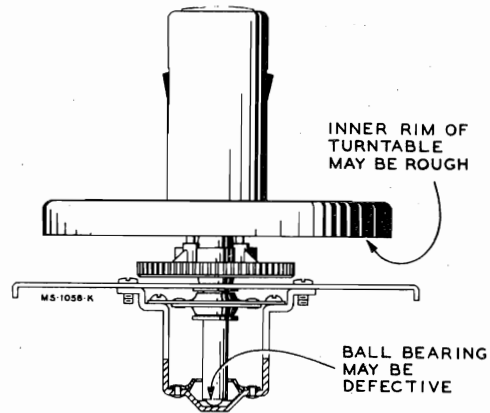
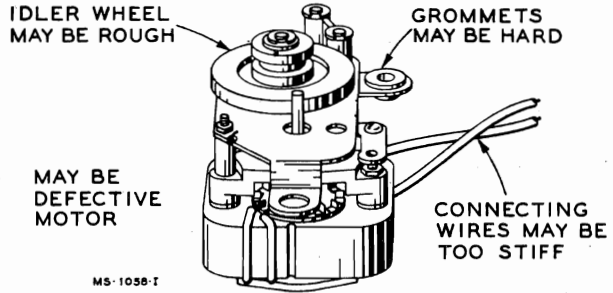


MODEL RP-193-1

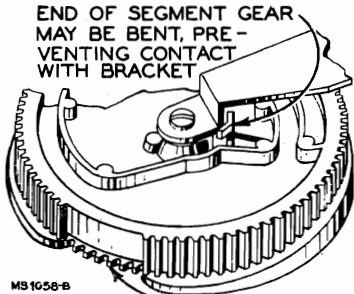
"WOW" OR SPEED VARIATION



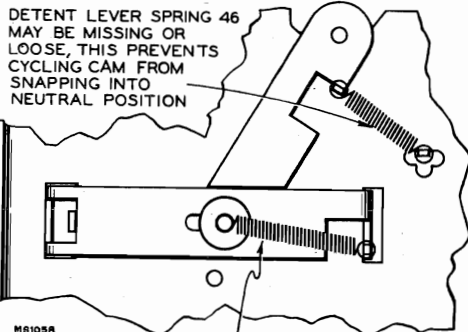
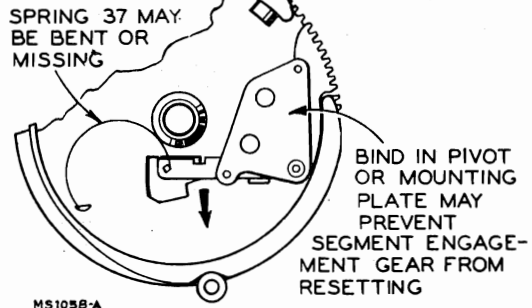
RUMBLE



CONTINUOUS TRIPPING

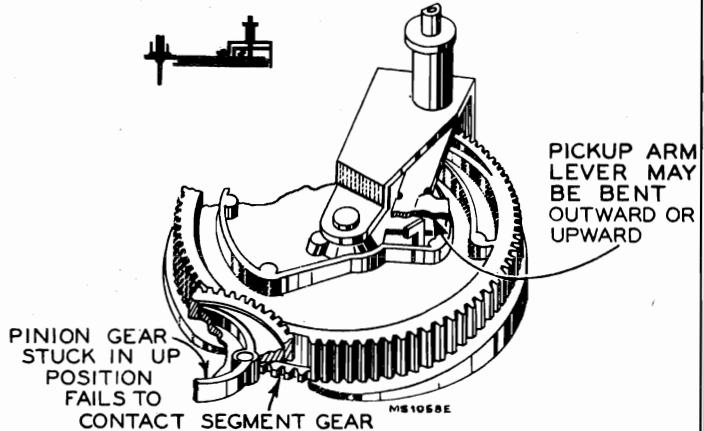


THEREFORE THE SEGMENT ENGAGEMENT GEAR IS NEVER RESET

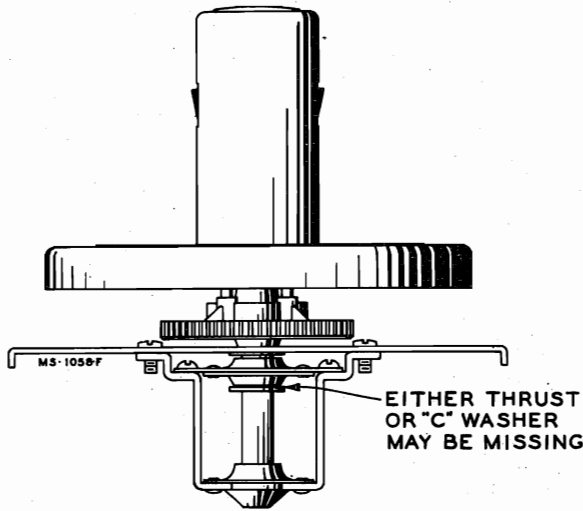


SPRING 49 MAY BE LOOSE OR MISSING, THIS ALLOWS REJECT SLIDE 47 TO REMAIN IN REJECT POSITION.

MECHANISM FAILS TO TRIP

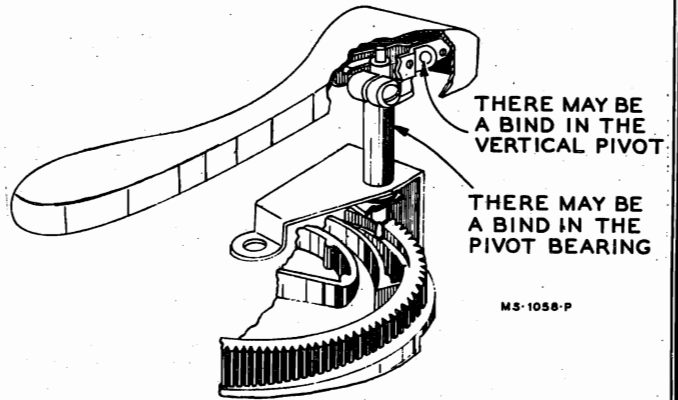


TURNTABLE RAISES DURING CHANGE CYCLE



EITHER THRUST OR "C" WASHER MAY BE MISSING

PICKUP SKIPS GROOVES



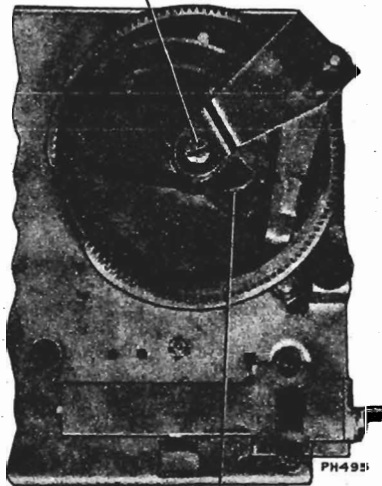
THERE MAY BE A BIND IN THE VERTICAL PIVOT

THERE MAY BE A BIND IN THE PIVOT BEARING

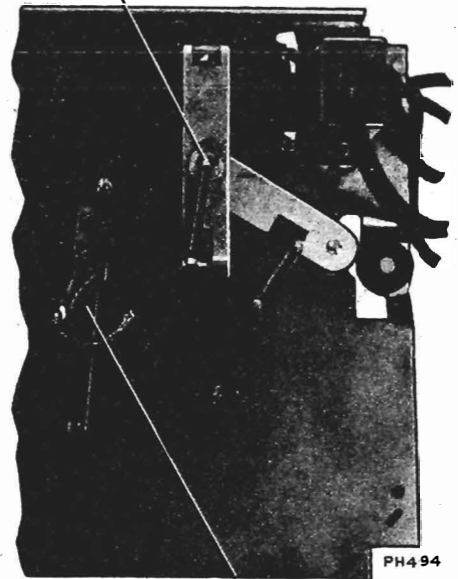
MS-1058-P

IF MOUNTING BRACKET IS NOT SEATED PROPERLY OVER SHOULDER OF SHAFT, MECHANISM MAY FAIL TO TRIP. ALSO MUTING SWITCH MAY NOT FUNCTION PROPERLY.

DO YOU KNOW?



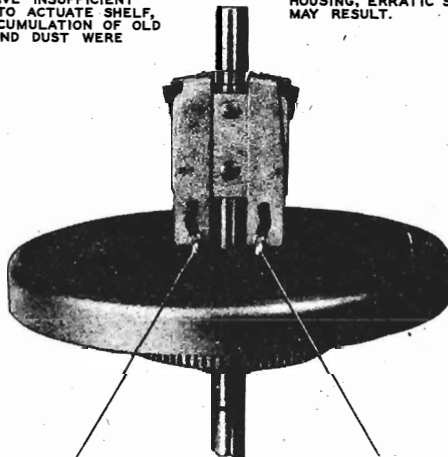
IF REJECT SLIDE BINDS, CONTINUOUS TRIPPING MAY RESULT.



IF THE END OF THE SEGMENT ENGAGEMENT GEAR IS BENT IMPROPERLY, RESETTING THE GEAR WILL NOT BE ACCOMPLISHED AND CONTINUOUS TRIPPING WILL RESULT.

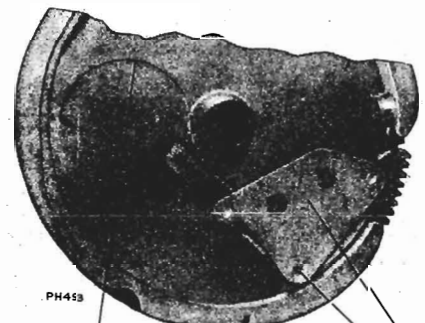
BLADE AND SHELF ASSEMBLY SHOULD NOT BE GREASED. THE SHELF RETURN SPRING WOULD HAVE INSUFFICIENT TENSION TO ACTUATE SHELF, IF AN ACCUMULATION OF OLD GREASE AND DUST WERE PRESENT.

IF BLADE AND SHELF ASSEMBLY IS NOT CENTERED PROPERLY IN SLOTS IN CENTER POST HOUSING, ERRATIC SEPARATION MAY RESULT.



IF KEYS BIND IN SLOTS IN TURNTABLE, MECHANISM WILL NOT SEPARATE RECORDS. ALSO MECHANISM WILL NOT GO INTO CHANGE CYCLE IF THE PINION GEAR REMAINS IN THE UP POSITION.

IF THE MUTING SWITCH IS BENT, MECHANICAL NOISES MAY BE AMPLIFIED DURING CHANGE CYCLE.



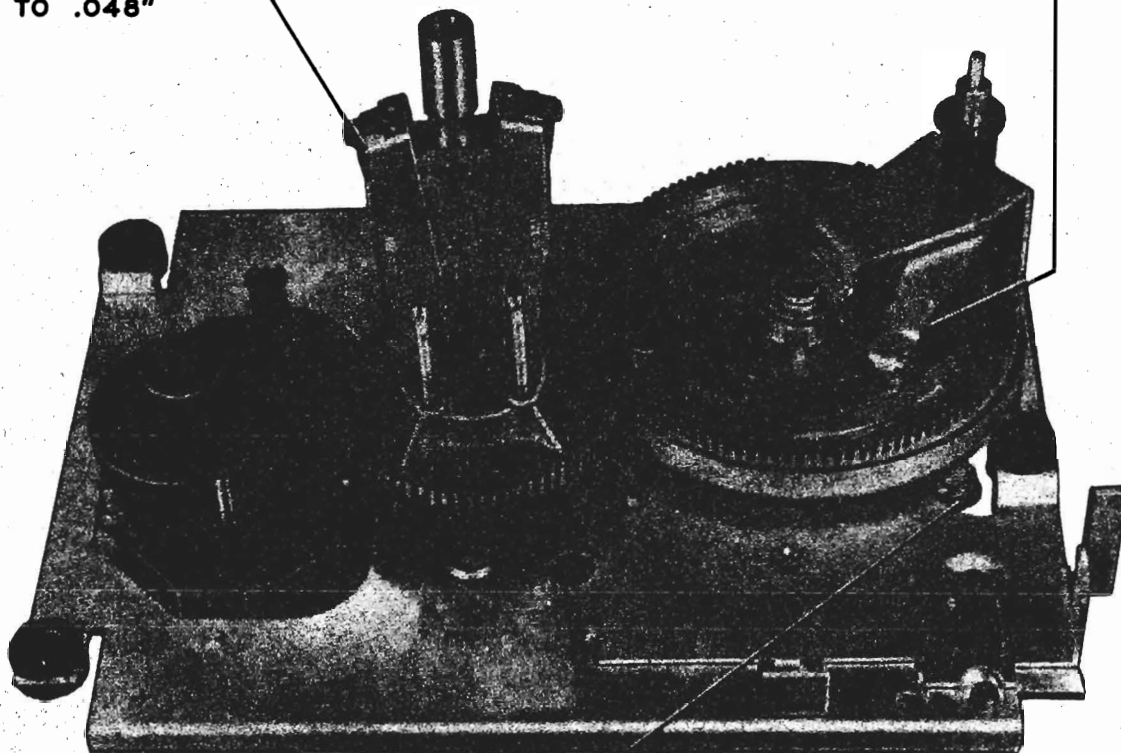
IF THE SPRING IS IMPROPERLY BENT, OR THE END OF THE SEGMENT GEAR BINDS IN THE HOUSING OR BEARING, TRIPPING WILL BE ERRATIC

MODEL RP-193-1

DO YOU KNOW? (Continued)

IF BLADE AND SHELF DO NOT HAVE THE PROPER SEPARATION, MECHANISM MAY NOT SEPARATE RECORDS PROPERLY. SEPARATION SHOULD BE .040" TO .048"

IF END OF PICKUP ARM LEVER IS BENT, MECHANISM MAY NOT TRIP.



PH491

IF DETENT LEVER SPRING IS WEAK OR MISSING, DETENT ROLLER WILL NOT REMAIN IN DETENT. CONTINUOUS TRIPPING WILL RESULT.

DISMANTLING MECHANISM

(Refer to exploded view on opposite page)

REMOVAL OF PICKUP ARM

1. Disconnect pickup wires.
2. Loosen clamp screw 28.
3. Lift pickup arm straight up.

REMOVAL OF PICKUP ARM SWIVEL (BRACKET)

1. Remove landing adjustment screw 22.
2. Push pivot pin 25 away from the slotted side of the pickup arm shell, bend shell slightly to remove pin and entire swivel assembly will slide out.

REMOVAL OF TURNTABLE ASSEMBLY

1. The entire turntable and pinion gear assembly (Nos. 1 to 40 inclusive) can be lifted out by removing the "C" washer 40 located below the upper turntable bearing.

DISMANTLING THE TURNTABLE ASSEMBLY

1. Remove "C" washer 40 located directly below the pinion gear.

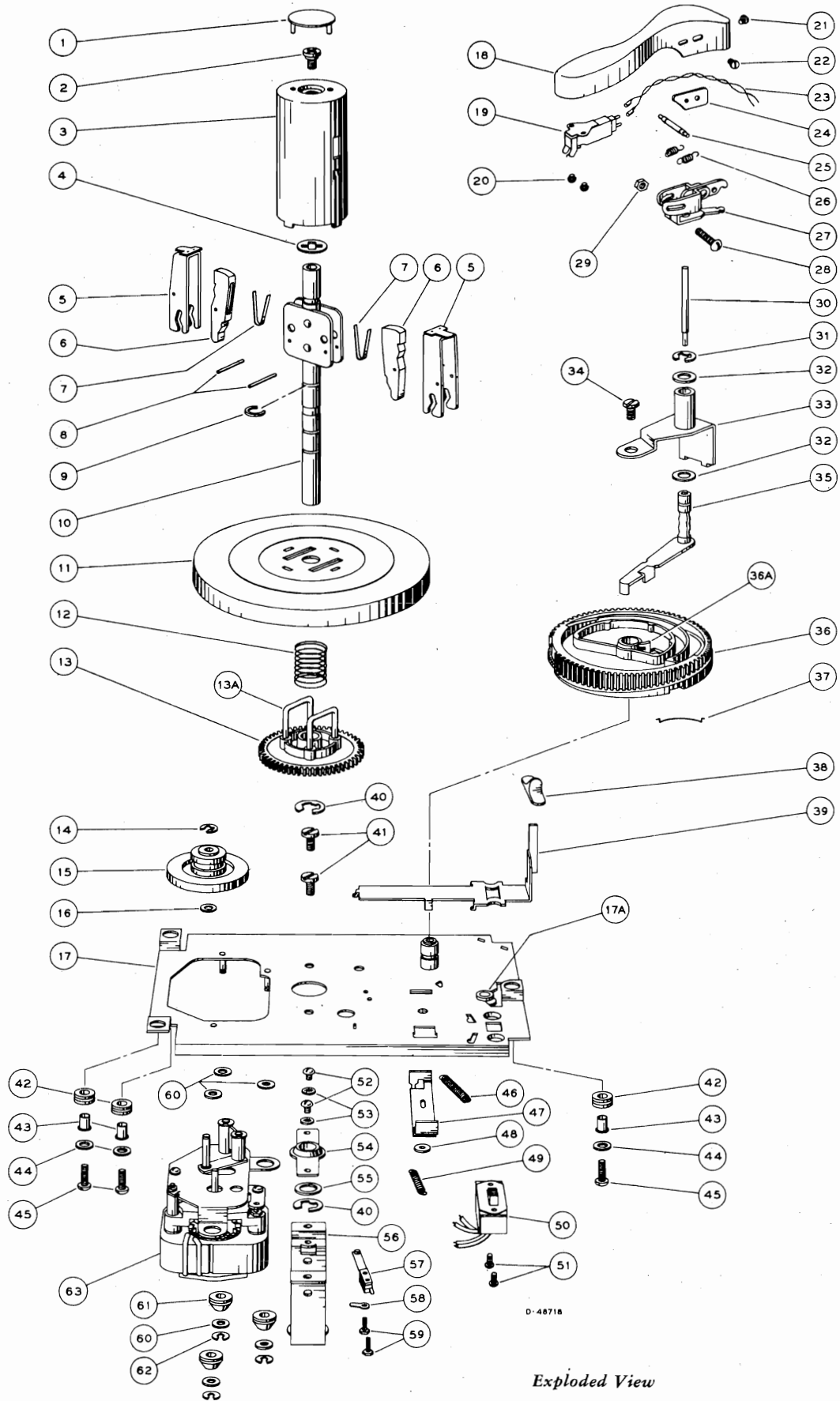
2. Slide the pinion gear 13 and spring 12 off the spindle shaft 10.
3. Remove cap 1.
4. Remove screw 2.
5. Separate spindle cover 3 from the turntable.
6. Push pin 8 out to remove spring 7, shelf 6 and blade assembly 5.

REMOVAL OF TURNTABLE SPINDLE SHAFT

1. Remove "C" washer 9 and lift out spindle shaft 10.

REMOVAL OF CYCLING CAM

1. Remove screw 34.
2. Lift bracket assembly consisting parts Nos. 31 to 35 inclusive.
3. Remove cycling cam.



D-48718

Exploded View

MODEL RP-193-1

REPLACEMENT PARTS

| ILL. NO. | STOCK NO. | DESCRIPTION | ILL. NO. | STOCK NO. | DESCRIPTION |
|----------|-----------|---------------------------------------------------------------------------------|----------|-----------|---------------------------------------------------------------------------------------------------|
| 1 | 76246 | Cap—Turntable centerpost housing cap—red | 34 | 72409 | Screw—#8-32 x 1/4" binder head screw to fasten pickup arm bearing bracket |
| 2 | 76242 | Screw—#8-32 x 3/8" cross-recessed shoulder screw | 35 | 76222 | Lever—Pickup arm shaft and lever |
| 3 | 76241 | Housing—Centerpost housing | 36 | 76217 | Cam—Cycling cam and gear complete with segment engaging gear and trip spring |
| 4 | 76247 | Washer—Spring washer for turntable centerpost and shoulder screw | 36A | — | Gear—Segment engaging gear—part of Ill. #36 |
| 5 | 76237 | Separator—Record separator and knife | 37 | 76218 | Spring—Trip spring |
| 6 | 76238 | Shelf—Record shelf | 38 | 76251 | Knob—Reject knob |
| 7 | 76239 | Spring—Record shelf spring (formed) | 39 | 76223 | Lever—Reject lever |
| 8 | 76240 | Pin—Record shelf and separator pin | 40 | 76221 | Washer—"C" washer to fasten spindle and centerpost |
| 9 | 76245 | Washer—"C" washer for turntable centerpost | 41 | 76227 | Screw—#10-32 x 1/4" binder head machine screw to mount bearing assembly |
| 10 | 76236 | Shaft—Turntable shaft | 42 | 76228 | Grommet—Rubber grommet to mounting sub-base |
| 11 | 76248 | Turntable—Turntable and mat | 43 | 76249 | Spacer—Metal spacer to mount mechanism in plastic cabinet used in (45J3) |
| 12 | 76244 | Spring—Pinion gear return spring (23/32" O.D. 1 1/8"—8 turns) | 44 | 76250 | Washer—Flat metal washer to mount mechanism in plastic cabinet used in (45J3) |
| 13 | 76243 | Gear—Turntable pinion gear complete with two (2) drive keys | 45 | — | Screw—#8-32 x 3/4" binder head machine screw to mount mechanism in plastic cabinet used in (45J3) |
| 13A | — | Key—Drive key for turntable pinion gear—included in Ill. #13 | 46 | 76233 | Spring—Detent lever return spring (9/64" O.D. x 3/4"—34 turns) |
| 14 | 76229 | Washer—"C" washer to fasten idler wheel on Motor #9220-1. | 47 | 76232 | Link—Reject link |
| 15 | 76286 | Wheel—Idler wheel for Motor 9220-1 | 48 | — | Washer—Flat washer for mounting reject slide |
| 16 | 76287 | Washer—Dampening washer for idler wheel for Motor 9220-1 | 49 | 76230 | Spring—Reject slide return spring (9/64" O.D. x 7/8"—42 turns) |
| 17 | 76231 | Base—Sub-base complete with all staked and riveted parts including detent lever | 50 | 32875 | Switch—ON-OFF switch complete with cover |
| 17A | — | Lever—Detent lever—included in Ill. #17 | 51 | — | Screw—#4 x 3/16" cross recessed round head self tapping screw to mount ON-OFF switch |
| 18 | 76215 | Arm—Pickup arm complete with counterweight less crystal and cable | 52, | | |
| 19 | 76257 | Crystal—Crystal cartridge complete with stylus | 53, | | |
| 20 | 76216 | Screw—#2-56 x 1/8" cross recessed fillister head machine screw to mount crystal | 54, | | |
| 21 | 76210 | Screw—#4-40 x 1/8" binder head machine screw for height adjustment | 56 | 76234 | Bearing—Turntable bearing assembly |
| 22 | 76210 | Screw—#4-40 x 1/8" binder head machine screw for landing adjustment | 55 | 76226 | Washer—Bakelite washer for bearing assembly |
| 23 | — | Cable—Twisted pair cable and connectors | 57 | 76224 | Switch—Muting switch |
| 24 | 76211 | Bracket—Landing adjustment bracket | 58 | — | Lug—Solder lug |
| 25 | 76212 | Pin—Pivot pin | 59 | 76225 | Screw—#5-40 x 5/16" hex head tapping screw for mounting muting switch (2 req'd) |
| 26 | 76213 | Spring—Pickup arm safety spring (3/16" O.D. x 35/64"—9 turns) | 60 | 70490 | Washer—Fibre washer for mounting motor |
| 27 | 76214 | Bracket—Pickup arm mounting bracket | 61 | 76288 | Grommet—Rubber grommet for motor mounting plate for Motor 9220-1 |
| 28 | 75726 | Screw—#8-32 x 5/8" round head screw for mounting bracket | 62 | 76229 | Washer—"C" washer to mount motor |
| 29 | 75725 | Nut—#8-32 hex nut to fasten mounting bracket | 63 | 76291 | Motor—115 volt, 60 cycle motor less mounting plate and idler wheel (stamped 9220-1) |
| 30 | 76235 | Rod—Elevating rod | — | 76289 | Plate—Motor mounting plate for Motor 9220-1 |
| 31 | 76220 | Washer—"C" washer to fasten pickup arm lever | — | 76290 | Spring—Idler wheel spring (3/16" O.D. x 5/16") for Motor 9220-1 |
| 32 | 57209 | Washer—Spring washer for pickup arm lever and bearing bracket | | | |
| 33 | 76219 | Bracket—Pickup arm bearing bracket | | | |

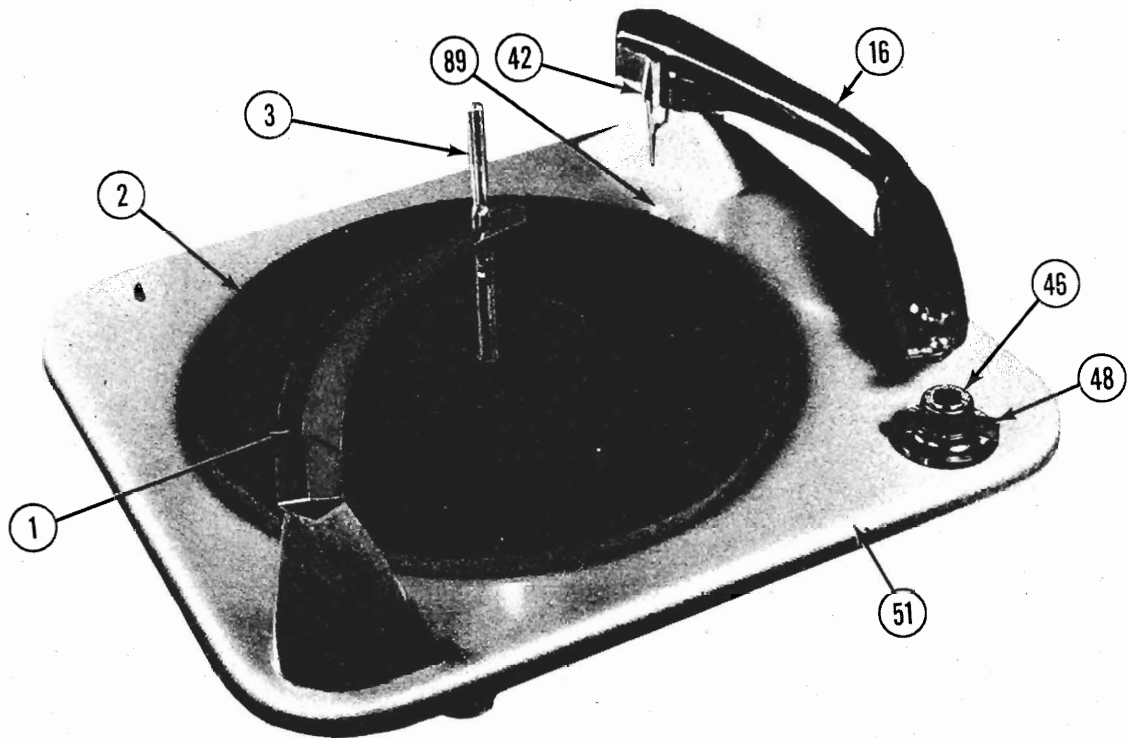


Figure 2

SPECIFICATIONS

The V-M 950 Tri-o-matic Record Changer Intermix Model is designed to play standard 78 RPM, fine-groove 45 RPM, or long-play 33-1/3 RPM records of standard commercial dimensions. Records up to 12 inches in diameter can be played manually.

Features of this changer include playing and automatically changing as many as ten - 12", twelve - 10", or any assortment of 10" and 12" of the same type (78 RPM or 33-1/3 RPM).

A full stack of twelve - 7", 33-1/3 RPM records or a full stack of twelve - 7", 45 RPM records (with the adapter inserted in the record) will also play on this changer.

The changer shuts off after the last record has been played.

Connect this changer only to an outlet supplying 117 volts, 60-cycle ac unless otherwise specified. Power consumption 25 watts.

PREPARING FOR OPERATION

SHIPPING BOLTS: Before placing in operation, the machine must be floated freely on the mounting springs. During shipment, the mechanism is secured by means of two shipping bolts. To float the changer, remove the turntable by lifting it straight up the spindle. Turn the two shipping bolts in a clockwise direction as far as they will go and replace the turntable. Before the turntable can be fully seated, the idler wheel must be gently pushed back out of the way to prevent damage to the rubber tire.

OPERATION

Loading -

1. Pull straight up on record support knob until record support clears spindle. Swing record support to the left until pin in shaft drops into locating groove.

2. Changer will automatically play ten - 12" either standard or long-play records, twelve - 10" either standard or long-play records, any assortment of ten - 12" and 10" records intermixed, or twelve - 7" long-play or fine-groove records.

NOTE: Standard, fine-groove, and long-play records cannot be intermixed. Motor speed control knob must be reset for each type of recording.

3. Place records on spindle and lower to offset shelf. Hold records level and replace record support over spindle.

To Play Standard Recordings -

1. Motor speed control knob must be in the "78" position.

2. To start, turn changer control knob to "Rej." and release. Changer will operate automatically until the last record has been played. Pickup arm returns to rest and the changer control knob to the "Off" position. Changer automatically stops.

LEVELING RECORD CHANGER: It is essential to have the record changer absolutely level. Use a torpedo or similar type level on the record changer baseplate. Use adequate shims to level the record changer pan or radio combination cabinet to achieve perfect level.

MODEL 950

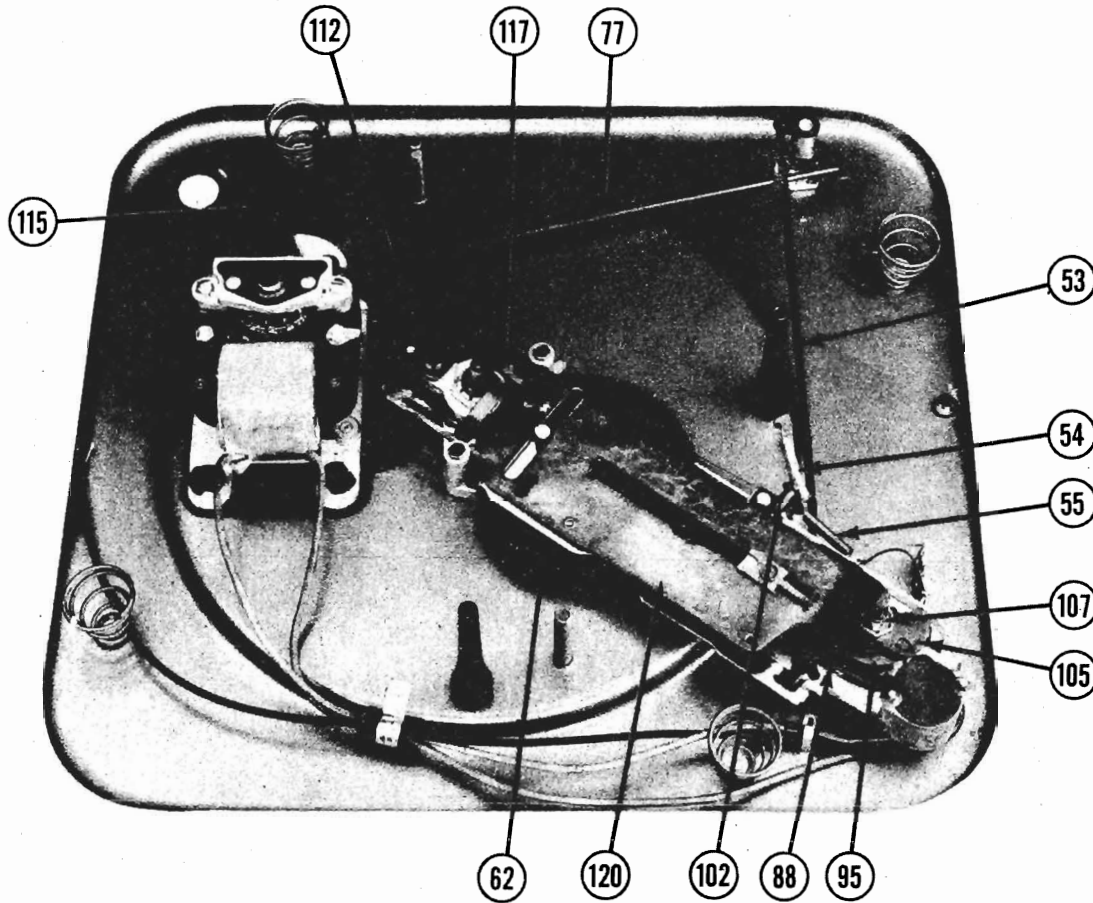


Figure 3

To Play Long-Play (33-1/3 RPM) Records -

1. Motor speed control knob must be in the "33" position.

To Play Fine-Groove (45 RPM) Records -

1. Motor speed control knob must be in the "45" position.

2. These records are manufactured with a 1-1/2" spindle hole. It is essential that a record adapter be inserted into each 45 RPM record to be played. This is necessary to reduce the spindle hole to conventional size.

REJECTING: To reject a record at any time while changer is operating, turn changer control knob to "Rej." and release.

STOPPING: To turn off changer before automatic shut-off, turn changer control knob to "Off." Lift pickup arm and place on rest.

UNLOADING: Lift the record support and swing to the left until pin on shaft drops into locating groove. Lift stack of records straight up and off spindle.

MANUAL OPERATION: To play single records or home recordings, allow the changer to go through its complete shut-off cycle. Lift the record support arm and move it to the left clear of the turntable. Place record on spindle and lower to spindle shelf. Tilt

record down toward the rear of pickup arm and lower record to turntable. Turn changer control knob to "On" position only. Raise pickup arm and place in lead-in groove of record.

REPEATING OF 7", 10", OR 12" RECORDS: To repeat records, swing record support clear of spindle, place record on the turntable, and start changer. Record repeats until control is turned "Off." If a 12" record is repeated, wait for the changer to finish cycling and reposition the pickup arm manually to the 12" position.

SUGGESTIONS: When loading and unloading the changer, use care to prevent bending of the spindle. Records should not be left on the spindle except during operation of changer. Records will warp. When machine is not in use, it is suggested that the speed control knob be left in the "78" position. For best reproduction, keep needle and records clean. Store records flat, in folders or in albums. Do not lay record on record.

CHANGE CYCLE

This changer is provided with what is known as a velocity trip mechanism. The change cycle is started by the faster inward motion of the pickup arm when the needle enters the trip grooves at the end of the record. Only records having fast-finishing grooves before the eccentric cycling groove will operate this velocity trip.

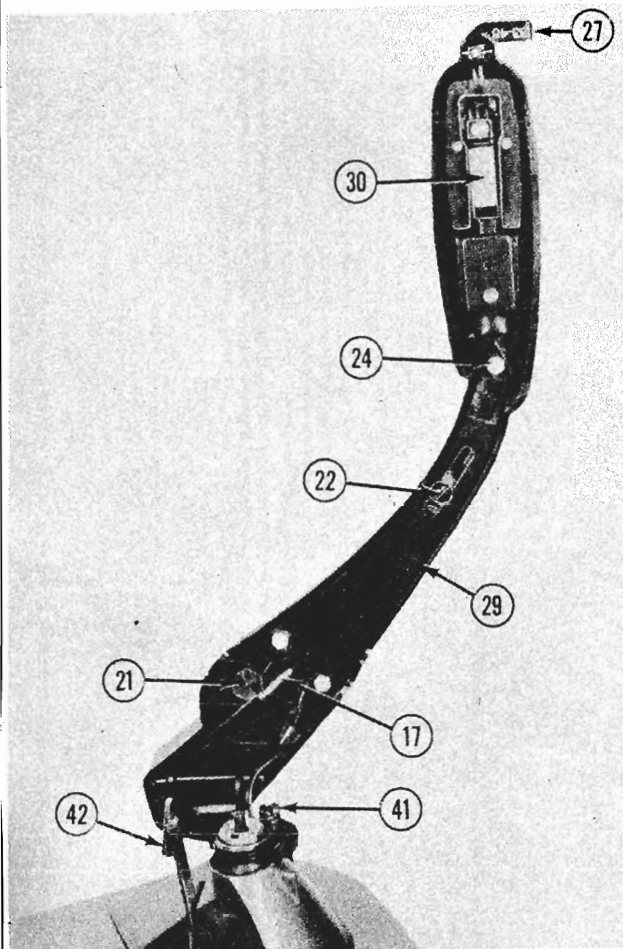


Figure 4

The pickup arm and hinge assembly and trip finger cam (105) are secured at opposite ends of the pickup arm shaft and sleeve (43) so that they move in unison. As the pickup arm nears the end of the record, the trip finger cam (105) pushes the trip link (110), which, in turn, engages the trip lever (68) rotating the pawl lever (65) to move the trip pawl (69) toward the hub on the turntable. While a record is playing, the small motions of the trip pawl (67) are not sufficient to cycle the mechanism because on each revolution of turntable the wiping contact by the hub projection moves the trip pawl (67) back to clear the projection.

In the first revolution of the turntable during which the pickup arm advances rapidly, the trip pawl (67) is moved far enough to definitely engage the projection on the turntable hub. The gear on the turntable hub will now engage the main gear (62) and start its rotation. This, in turn, starts the lateral motion of the slide and cam assembly (120). The slide and cam assembly (120) moves to the rear through the action of an eccentric pin (71) on the main gear (62) moving in the cross slot on the slide and cam assembly (120).

As the slide and cam assembly (120) begins to move, the cam surface at the rear pushes the lift pin (35) upward, raising the pickup arm clear of the record. At the same time, the tab on the rear of the slide and cam assembly (120) contacts the trip finger cam (105) swinging the pickup arm clear of the turntable.

The front edge of the ejector link slot in the slide and cam assembly (120) then contacts the ejector link on the ejector link assembly (117). The ejector link moves the pusher shaft and housing assembly (14) upward actuating the spindle assembly (3), causing the record pusher (6) to move straight up so as to enter the center hole of the record, and then to be pivoted forward, dropping a record to the turntable.

The spindle guide (4) inside the spindle (3) prevents more than one record at a time from being ejected. When records are removed from the turntable, the guide slides straight up allowing free movement up the spindle, then slides back into position by gravity.

Simultaneously, the tab on the rear of the slide and cam assembly (120) contacts the pickup arm return locator (95), moving it clear of the reset lever (81); at the same time, the pickup arm return locator (95) is locked in position with the trip finger cam (105) by means of matching holes in the pickup arm return locator (95) and detents in the trip finger cam (105). This is accomplished by the pressure of the compressed conical lift pin spring (107) overcoming the pressure of the lift pin compression spring washer (97).

At the same time, the cam surface of the bracket on the main gear assembly (62) moves the reset lever (81) to mid-position (10" set-down) where it is held by the 12" record selector (42). The slide and cam assembly (120) continues to the rear and then starts forward. If 7" records are being changed, the rubber bumper (89) of the 7" set-down lever (90) is free to move upward permitting the other end to drop into the hole in the main gear (62) as this gear rotates. This action of the 7" set-down lever (90) raises the reset lever (81) to the upper position (7" set-down).

If 10" records are being changed, the 7" set-down lever (90) will not operate as the rubber bumper (89) will contact the edge of the record and the reset lever (81) will remain in the mid-position (10" set-down) as originally placed by the camming action of the bracket on the main gear (62).

If a 12" record is being changed, the edge of the record strikes the 12" record selector (42) releasing the reset lever (81) which drops to the bottom position (12" set-down).

As the slide and cam assembly (120) continues forward, the tab on the rear of the slide will move clear of the pickup arm return locator (95) and trip finger cam (105), which are still locked together. These rotate under the action of the pickup arm return spring (87) until one of the three set-down steps in the pickup arm return locator (95) strikes the reset lever (81), which has been positioned by the record being changed (see above). This stops the inward movement of the pickup arm return locator (95), trip finger cam (105) and pickup arm. The pickup arm is then lowered to the lead-in grooves of the record at this point as the lift pin (35) rides down the rear cam surface of the slide and cam assembly (120). As the pressure is released from the conical lift pin spring (107), the lift pin compression spring washer (97)

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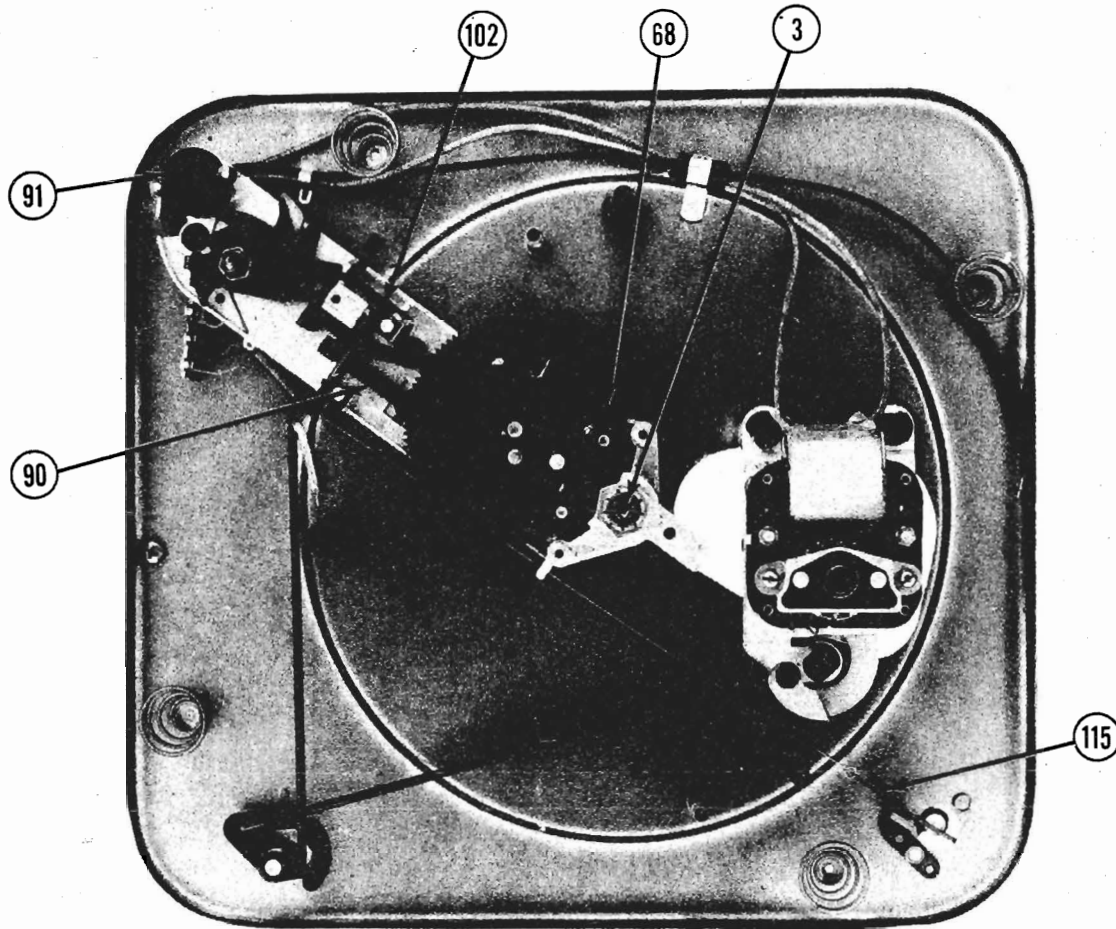


Figure 5

separates the pickup arm return locator (95) and trip finger cam (105), permitting the pickup arm to ride freely across the record.

As soon as the last record has been dropped, the record support assembly (1) drops below the shelf on the spindle assembly (3) and the lower end of the record support post contacts the arm of the shut-off lever on the shut-off lever bracket assembly (117). This pulls the control link (112), which, in turn, rotates the crank of the lever assembly (102). This forces the tab on the lever assembly (102) against the slide and cam assembly (120). At the end of the change cycle, which drops the last record, this tab on the lever assembly (102) drops into the cut-out in the main slot on the slide and cam assembly (120), and the other end of the lever assembly (102) is pushed against the pickup arm return locator (95).

When the last record has been played, the change cycle starts again; however, this time, as the pickup arm return locator (95) is pivoted clear of the reset lever (81) by the tab on the slide and cam assembly (120), the lever assembly (102) rises to the shut-off position. A tab on the lever assembly (102) raises the trip link (110) to the upper position. As the pickup arm return locator (95) starts to return the pickup arm to the record, it is stopped by the lever assembly (102) with the pickup arm positioned over the

pickup arm rest post (45). The main gear continues to rotate pulling the trip link (110) forward to reset it. A tab on the upper surface of the trip link (110) contacts a lever on the control shaft assembly (88) rotating the control shaft assembly to turn off the motor and return the control knob to the "Off" position.

As the slide and cam assembly (120) moves forward, the lift pin (35) rides down the rear cam surface lowering the pickup arm to the pickup arm rest post (45).

LUBRICATION

Additional lubrication should not be required for the life of the changer, but in cases of unusual use or high-operating temperature, the changer should be lubricated as follows:

Apply Andok "B" to:

1. Edges of all slots in slide and cam assembly (120).
2. Outer edges of tines on forked end of slide and cam assembly (120).
3. Lift pin cam surface on slide and cam assembly (120).

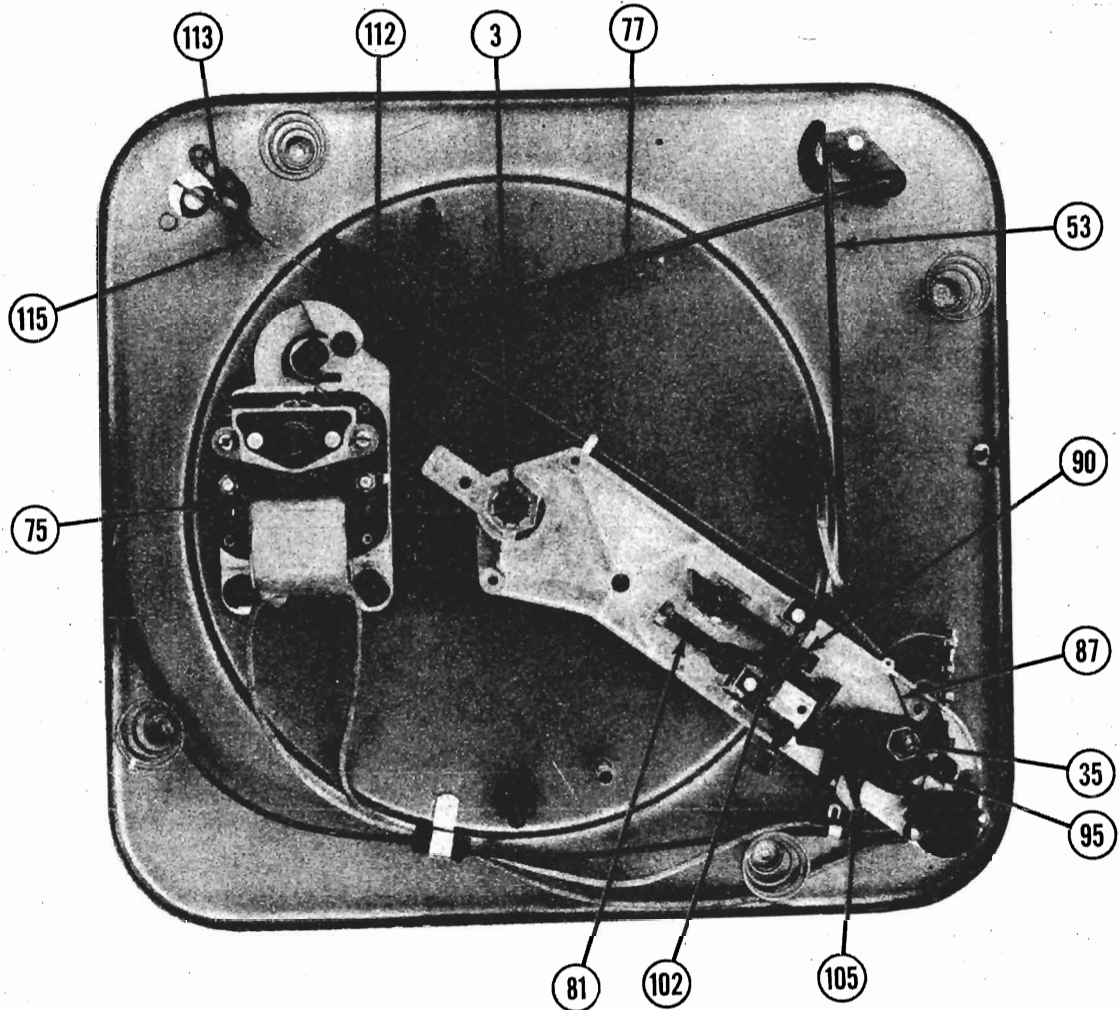


Figure 6

4. Lower surface of pickup arm return locator (95).

5. Inner surface of tab on rear of slide and cam assembly (120).

6. Turntable ball bearing (10).

7. Eccentric pin on main gear assembly (70).

Apply a small quantity of light mineral oil to:

1. Pickup arm shaft and sleeve bearing (43).

2. Turntable and spindle bearing.

ADJUSTMENTS

NEEDLE SET-DOWN (Refer to Figure 4); The set-down position of the needle is adjusted by means of

the set-down adjustment screw (41) mounted on the hinge arm assembly (40). Turn this screw adjusting pickup arm for correct set-down on 10" record. When the correct set-down is obtained for the 10" position, the 12" and the 7" needle set-down will also be correct.

PICKUP ARM HEIGHT (Refer to Figure 4): The pickup arm height is adjusted by the lift screw (21) located at the rear of the strengthener. To raise the height of the pickup arm, turn this screw counter-clockwise. To lower the pickup arm, turn clockwise. The pickup arm height should be adjusted so that with a 1-1/8" stack of records the pickup arm lifts 1/4" straight up as the change cycle starts.

NEEDLE PRESSURE: The needle pressure should be between 10 and 12 grams. Adjustment may be made by loosening the screw (22) on the slide which moves in a slot in the tone arm strengthener (see Figure 4). Move the slide back and forth until the correct needle pressure is obtained.

MODEL 950

TROUBLE CHART

| SYMPTOM | CAUSE | REMEDY |
|---------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Turntable does not revolve when control is turned to "On." | <p>1. No current at motor.</p> <p>2. Motor defective.</p> <p>3. Motor idler wheel (74) not engaging turntable rim.</p> | <p>(a) Check that current is reaching ac leads of changer.</p> <p>(b) Check that switch is closing.</p> <p>(c) Check wiring and soldered terminals in the changer.</p> <p>(a) Remove turntable to allow motor to operate without load. If current is reaching motor and drive spindle does not rotate, the motor is defective. Repair or replace.</p> <p>If drive spindle is turning but turntable is not:</p> <p>(a) Check motor idler assembly to determine if it is free to contact the drive spindle and turntable rim.</p> <p>(b) Wipe off inside rim of the turntable (2) to remove flock, or if oily, clean the turntable rim and rubber tire of the idler wheel (74) with naphtha.</p> |
| Changer does not cycle when the control knob is turned to the "Rej." | 1. The manual reject not actuating the trip. | <p>(a) Turn the control knob (46) to the reject position, hold and see that the control shaft assembly (88) has moved the trip link (110) to the rear. This should actuate the trip pawl (67) on the main gear (62), which will bring the spur on the trip pawl (67) in contact with the hub gear on the turntable hub.</p> <p>(b) Check for binding of the pawl lever (65), the trip lever assembly (68) and the trip pawl (67). If binding occurs, clean out all foreign matter and check for freedom.</p> |
| Control knob cannot be turned to "On" position. | 1. Machine shut off during cycle. | Turn the turntable clockwise, by hand, until the control knob (46) is free. |
| Pickup arm strikes records on spindle when it raises, or pickup arm rest when it moves out. | 1. Pickup arm height not adjusted properly. | (See instructions for adjusting pickup arm height under "Adjustments.") |
| Turntable speed too slow | <p>1. Binding in turntable bearing.</p> <p>2. Motor pulley too small in diameter.</p> <p>3. Line voltage too low.</p> <p>4. Operating temperature too low.</p> | <p>Check the turntable bearing for freedom. Hold the motor idler wheel (74) out of engagement with the turntable and spin the turntable, by hand, to see if it turns readily and coasts for a long time. If binding occurs, remove turntable, clean off foreign matter, and lubricate with light mineral oil.</p> <p>Replace the motor pulley with one having a greater diameter.</p> <p>The line voltage should not be less than 105 volts or the turntable may be too slow.</p> <p>If the machine has been stored in a cold place or operated in surroundings at a temperature of less than 60° F., the turntable speed may be too slow.</p> |
| Turntable speed too fast. | 1. Motor pulley too large in diameter. | Replace the pulley with one having a smaller diameter, or grind one or two thousandths off the pulley. |
| Turntable stalls or slows down during cycle | 1. Motor idler not engaging turntable. | (See "Turntable Does Not Revolve When Control Knob Is Turned to 'On' Position.") |

TROUBLE CHART - Cont.

| SYMPTOM | CAUSE | REMEDY |
|-----------------------------|-------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | 2. Turntable bearing tight. | (See "Turntable Does Not Revolve When Control Knob Is Turned to 'On' Position.") |
| | 3. Operating temperature too low. | The line voltage should not be less than 105 volts. |
| | 4. Binding in drive mechanism. | Hold idler (74) away from turntable, or remove idler wheel. Cycle machine by turning turntable slowly by hand. The main gear should turn freely for the complete revolution without binding at any point: (a) If binding occurs, check for foreign matter in the gear teeth, a bent gear bearing, or bent spindle bushing. Straighten or replace. Clean and lubricate. |
| | 5. Binding between pickup arm lift pin (35) and lift pin cam surface on slide and cam assembly (120). | Lift pin should ride freely on cam surface without binding. |
| | 6. Spindle pusher spring compressing too far. | Cycle the changer and watch the relationship between the bottom of the pusher housing and the lower button of the pusher housing. Just before the slide and cam (120) has completed its backward motion, the pusher housing should stop its upward motion and the lower button should continue up .005 to .047" more, slightly compressing the pusher spring. If the spring compresses too much, the changer may stall on the shut-off cycle. |
| | 7. Motor weak. | When everything checks all right, but the changer still stalls in cycle, the motor may be weak. |
| | 8. Grease on idler wheel. | 1. Wipe off idler wheel rubber tire; inner rim of turntable and rubber belts with naphtha. |
| | 9. Idler wheel bent and not making positive engagement with drive pulley. | 1. Straighten idler, or replace, as necessary. |
| | 10. Turrets unseated from lock ring on turret shaft. | Remove turret and center lock ring. (If lock ring is distorted, replace with new lock ring.) Replace turret and press down to assure turret of being locked to the turret shaft. (Turret will snap into position when properly locked.) |
| | 11. Idler wheel tension spring weak. | Replace spring or bend motor tension spring anchor bracket to give desired tension. |
| Changer continues to cycle. | Reject mechanism binding. | (a) Make certain the trip link (110) is not frozen in the reject position. (b) Make certain the changer control lever (88) is not binding and that it actuates the trip link (110) when the changer control knob (46) is turned to reject. (c) Check for binding of trip pawl (67), trip lever (68) and pawl lever (65); these must be free to turn easily. (d) Check the changer control linkage (23), (53) and (88). |

MODEL 950

TROUBLE CHART - Cont.

| SYMPTOM | CAUSE | REMEDY |
|-------------------------------------------------------------|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Noise during playing of record. | 1. Motor rumble. | If a low-pitched rumbling sound comes from the loud speaker while a record is being played, check motor grommets to be sure the motor is freely suspended on them. The motor lead wires should have slack to allow the motor to float. Motor rumble may also come from an unbalanced motor rotor; in this case, replace the motor. |
| | 2. Defective turntable bearings (10). | Defective turntable bearings can cause rumble. Check for foreign matter in the bearing, defective balls, binding between balls and ball retainer; rough surface on washers. Clean ball bearing, sleeve bearing, and washers; lubricate with Andok "B" and light mineral oil. |
| | 3. Defective motor idler wheel. | A rapid thumping sound while the motor is running may indicate a flat spot on the motor idler wheel (74). If this condition does not clear up after ten minutes of running time, remove the turntable and check the rubber tire on the idler. If the surface of the rubber tire is not smooth and even, replace the idler. Should the bearing of the idler wheel show signs of excessive wear or be extremely wobbly, the idler wheel should be replaced. |
| | 4. Defective record. | Worn or defective records cause needle scratch and distortion of the recorded sound. If the record is warped, it may slip on the other records causing "Wow" (a waver in the recorded sound). An enlarged hole in the record can also cause "Wow." |
| | 5. Turntable scrapes. | If a scraping sound occurs as the turntable revolves, check: (a) Turntable warped, causing outer rim to rise and fall. (b) Motor idler or mounting plate bent. |
| | 6. Squeaks. | Squeaking sound as changer operates indicates lack of oil. Lubricate points indicated under "Lubrication." |
| | 7. Pulleys on motor not properly seated. | Check that pulleys are properly seated. |
| | 8. 7" lever (81) loose. | Check 7" lever washer (100) and screw (101) to see if they are tight. |
| Distortion of Recorded Sound. | 1. Defective record. | (See "Noise During Playing of Record.") |
| | 2. Defective amplifier. | Check phonograph amplifier and speaker. |
| | 3. Bad cartridge. | Replace. (See "Defective Cartridges.") |
| No Sound During Playing. | 1. Defective cartridge. | Replace. (See "Defective Cartridges.") |
| | 2. Defective wiring. | Check pickup leads for a shorted or open lead. |
| | 3. Defective amplifier. | Check phonograph amplifier and speaker. |
| | 4. Loose cartridge terminal clips. | Remove, squeeze together slightly, and replace. |
| Excessive Record Wear | 1. Binding on pickup arm. | (See "Needle Does Not Track Across Record Properly.") |
| Changer does not shut off after last record has been played | 1. Record support binding (1). | The record support must drop below the off-set shoulder of the spindle or the changer will not shut off. (See "Two Records Drop at Once." - 3) |

TROUBLE CHART - Cont.

| SYMPTOM | CAUSE | REMEDY |
|----------------------------------------------------------------|----------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | 2. Lever assembly binding (100). | Clean out dirt and make sure this operates smoothly. |
| | 3. Control link broken (112). | Replace. |
| | 4. Spring (115) loose or broken. | Replace. |
| | 5. Shut-off lever binding. | Check lever and if bent, straighten. |
| Rough pickup arm motion. | 1. Horizontal defects. | (a) Check pickup arm return locator (95) for tightness. (b) Check that pickup arm return spring (87) is not weak and is hooked up properly. (c) Check that fiber washer (95A) is installed under pickup arm return locator. |
| | 2. Vertical defects. | (a) Lift pin (35) binding; clean out dirt and lubricate. (b) Slide and cam (120) binds; check bearing points - - clean and lubricate. (c) Burrs in main slot in slide and cam (120) - - remove with fine file. (d) Ejector lever on ejector bracket assembly (117) binding in slide and cam slot: straighten, remove burrs, and lubricate. (e) Pickup arm shaft and sleeve binding: clean and lubricate. |
| Noise during change cycle. | 1. Tines on the forked end of the slide and cam assembly (120) bent. | Replace. |
| | 2. Control lever bent. | Straighten or replace. Check that "C" washer (95) holds. |
| | 3. Lack of lubrication Grinding noise. | Lubricate ejector lever (117) where it contacts lower end of spindle (3). |
| Control knob does not detent on "33," "45," or "78" positions. | 1. Bent parts. | (a) Insure that forked shaped stamping under idler is not catching in detent notch. Straighten or replace motor. (b) Insure that speed control arm (126) and speed control rod (77) are not bent. |
| Cartridge drags on record. | 1. Needle bent. | Replace. |
| | 2. Cartridge mounting screws loose. | Tighten. |
| Shuts off when last record drops. | 1. Shut-off spring (115 and link (112) too short. | Check length of shut-off spring (115) and shut-off link (112) by comparing with another set - - may be too short. Replace. |
| | 2. Shut-off bracket (113) bent. | Straighten or replace. |
| | 3. Shut-off link (112) bent. | Straighten or replace. |
| | 4. Shut-off lever assembly (102) binding. | (a) Check for burrs: remove with fine file. (b) Check for tight bearings: clean and lubricate. |

MODEL 950

TROUBLE CHART - Cont.

| SYMPTOM | CAUSE | REMEDY |
|-------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Will not play manually. | 1. Trip link (110) bent. | Straighten or replace. |
| | 2. Trip finger cam (105) bent. | Straighten or replace. |
| Impossible to adjust set-down. | 1. Pickup arm shaft and sleeve assembly (43) defective. | Shift the safety plate (39) toward the eccentric set-down adjusting screw (41), and tighten pickup arm shaft and sleeve nut (36). Hold pickup arm against rear stop and push on trip finger cam (105). The safety plate (39) should move away from the set-down adjusting screw (41) and snap back when the trip finger cam (105) is released: if it does not, replace the pickup arm shaft and sleeve assembly (43). Hinge pivot screws may be adjusted favoring one side or the other. |
| Record does not drop when changer cycles. | 1. Spindle pusher shaft and housing assembly (14) broken. | If the pusher shaft (inside the spindle) is broken, the lower end (housing) will drop out of the spindle (7) (see Figure 5). Loosen spindle nut (78) and remove spindle (3). Replace with new spindle unit. |
| | 2. Record pusher (6) in spindle not moving far enough forward to reject a record. | The record pusher should move up inside the spindle body (7), then move forward until it has reached a point flush with, or a maximum of, .010" beyond the spindle body(7). To insure that the record pusher (6) is all the way forward, the lower button on the shaft and housing assembly (14) should be raised high enough by the ejector lever to slightly compress the pusher spring inside the pusher shaft and housing assembly (14). (See "Turntable Stalls During Cycle.") If the spring is compressed and the record pusher (6) does not move far enough forward to eject a record, the spindle (3) should be replaced. If a record is not pushed completely off the ledge, it may hang on the spindle momentarily, then drop on the pickup arm when it moves in over the turntable. |
| | 3. Record pusher (6) raises outside the spindle body (7). | When changer cycles, the record pusher (6) should rise up just inside the spindle body, then move forward inside the center hole in the record. If the record pusher (6) rises outside the spindle body (7), it will raise the record instead of pushing it off the spindle ledge. Remove the spindle (3) and replace with a complete new spindle assembly. |
| Two records drop at once | 1. Hole in record too large. | Check the diameter of the hole in the record. An over-size hole will cause two records to drop at once. |
| | 2. Spindle guide (4) not fully down. | If the spindle guide is not all the way down, more than one record may be dropped at a time. (a) Check the guide to be sure it is free and does not bind at any point. Clean out foreign matter or straighten if necessary. Do not oil. (b) When records are placed on the spindle, be sure the guide is all the way down. The guide will normally raise as a record is being dropped, but it should return to place immediately, by gravity. |
| | 3. Record support (1) binding on spindle, or bent out of square with shaft. | The record support (1) must be able to slide freely, by gravity, down the spindle. If the support does not follow the records down as they are being ejected, two or more records may be ejected at once. If binding occurs: (a) Check the spindle (3) to determine if it is straight. Bend carefully with the fingers, if necessary. |

TROUBLE CHART - Cont.

| SYMPTOM | CAUSE | REMEDY |
|-----------------------------------------------------------|--------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | (b) Straighten the record support (1) if it is not square with the record support shaft. |
| | | (c) When the pin in the record support shaft has just entered the slot in the record support shaft post on the baseplate, the play in the record support (1), as it is swung from side to side, should be equal on both sides of the spindle. To correct bent condition, hold the support shaft and carefully force the record support into proper position. If the support is loose on the shaft, remove the knob and restake with hammer and punch. |
| | 4. Record pusher (6) defective. | The record pusher (6) may be deformed, etc. This may cause two records to drop at once. Replace with new pusher or replace spindle assembly. |
| | 5. Slide play in spindle (3). | Tighten spindle nut (78). If stripped, replace. |
| Record hits pickup arm | 1. Record pusher (6) not moving far enough forward to eject record. | (See "Record Does Not Drop When Changer Cycles" -2.) |
| | 2. Record pusher (6) extending beyond outside diameter of spindle. | Cycle changer, by hand, until pusher shaft and housing assembly (14) is at the top of its travel. Using new record as a gauge, pass it over the spindle to see if it binds at any point. File off high points on record pusher (6), with a fine file, until record will pass freely over spindle. |
| | 3. Pickup arm not adjusted properly. | (See "Adjustments") |
| Needle does not set down on 10" record in proper position | 1. Pickup arm not adjusted properly. | (See "Adjustments") (a) Loose nut (36) on pickup arm shaft and sleeve (43). |
| | 2. Pickup arm shaft and sleeve (43) binding. | File off burrs and rough surfaces. Polish and lubricate shaft. |
| | 3. 7" set-down lever (90) and 12" record selector (42) not operating properly. | Insure that the proper operation and reset of the 7" set-down lever (90) and 12" record selector (42) is not being interfered with. |
| | 4. Needle bent. | Replace with new needle. |
| | 5. Wire spring (83) broken. | 12" record selector (42) does not cock: check for broken 12" record selector spring (83). |
| | 6. Bent pickup arm return locator (95). | Straighten or replace. |
| | 7. Bent trip finger cam (105). | Straighten or replace. |
| Needle does not set down on 12" record in proper position | 1. Diameter of 12" record undersize. | The set-down position of the needle for 12" records is determined by the edge of the record striking the 12" record selector (42). If a 12" record has a diameter of less than the standard size of 11-7/8". plus or minus 1/32", it may fail to depress the 12" record selector far enough. |
| | 2. Enlarged center hole in record. | An enlarged center hole might fail to set the 12" record selector because it could produce the same effect as a small record. |

MODEL 950

TROUBLE CHART - Cont.

| SYMPTOM | CAUSE | REMEDY |
|-----------------------------------------------------|------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | 3. Pickup arm not adjusted properly | (See "Adjustments") (a) Loose nut (36) on the pickup arm shaft and sleeve (43). Tighten. |
| | 4. Binding of pickup arm shaft and sleeve (43). | Clean and polish shaft (43), and lubricate with light oil. |
| | 5. Reset lever spring (82) broken. | Replace spring (82). |
| | 6. 12" record selector spring (83) broken. | Replace spring (83). |
| | 7. 12" record selector (42) binding. | The 12" record selector must be free to operate smoothly. Clean out dirt and straighten if bent, or replace. |
| | 8. Bent pickup arm return locator (95). | Straighten or replace. |
| | 9. Bent trip finger cam (105). | Straighten or replace. |
| Needle does not set down on 7" record properly. | 1. 7" set-down lever spring (99) broken or weak. | Replace. |
| | 2. Pickup arm not adjusted properly. | (See "Adjustments") (a) Loose nut (36) on pickup arm shaft on sleeve: tighten. |
| | 3. 7" set-down lever screw (101) loose. | Tighten. |
| | 4. 7" set-down lever (90) hitting frame or baseplate when it goes through hole in frame. | Straighten, or replace. |
| | 5. Reset lever (81) bent. | Replace. |
| | 6. 7" set-down lever (90) does not fall into opening in main gear. | Replace. |
| | 7. Bent pickup arm return locator (95). | Straighten, or replace. |
| | 8. Bent trip finger cam (105). | Straighten, or replace. |
| Changer does not cycle when record has been played. | 1. No finishing trip groove on record. | Check record for eccentric trip groove in center of record. Some old records and home recordings do not have this eccentric trip groove. |
| | 2. Needle jumps out of grooves in record. | (a) Check trip pressure: the lateral pressure should not exceed 3 grams. (If pressure is excessive, see "Changer Trips Before Needle Reaches End of Record.") (b) The record may be defective: the finishing groove is often too shallow. Check with a record that is known to be good. |

TROUBLE CHART - Cont.

| SYMPTOM | CAUSE | REMEDY |
|----------------------------------------------------|--------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | (c) The needle point may be damaged or affected by an excessive accumulation of dust, lint, etc.: check needle pressure as described under "Adjustments." |
| | | (d) There may be binding in the pickup arm shaft and sleeve assembly (43) or between the pickup arm return locator (95) and the trip finger cam (105): see "Needle Does Not Track Properly Across Record." |
| | 3. Trip pawl (67) binding on gear face. | The trip pawl must be free to move forward and engage the boss on the turntable hub when the trip lever releases it. Check for burrs or foreign matter lodged between the trip pawl (67) and main gear (62). Do not oil as this might collect dirt and gum up the pawl. |
| | 4. Trip finger cam (105) bent. | Straighten, or replace. |
| | 5. Trip link (110) bent. | Straighten, or replace. |
| Changer trips before needle reaches end of record. | 1. Hole in record too large. | If the hole in the record is too large, the groove may turn eccentric with the spindle and cause premature tripping. |
| | 2. Binding of trip link (110). | With the trip link released, check the trip link for freedom of motion. It should be free to move without binding. |
| Needle does not track across record properly. | 1. Needle may be clogged by accumulation of lint, dirt, etc., or worn. | (a) Clean foreign material from around needle (105). (b) Check needle to see if the tip is bent or broken. Replace, if necessary. (Refer to paragraph on "Damaged Needle.") |
| | 2. Trip finger cam (105) does not disengage from the pickup arm return locator (95) when cycle is completed. | There should be a 1/32" gap between the trip finger cam (105) and the pickup arm return locator (95) when the machine is not in cycle. If the gap is small enough to allow the parts to touch and bind as the needle moves across the record, the compression spring washer (97) may be weak or broken. Replace. |
| | 3. Check the bearing in the pickup arm post for binding. | (a) Check pickup arm return locator (76) and trip finger cam (80) for binding. (See 2 above.) |
| | 4. Changer not level. | (See "Leveling Record Changer During Long Play" under "Preparation for Operation.") |
| | 5. Pickup leads too tight. | Give the pickup leads enough slack to allow the tone arm to move freely across a record. |
| CARTRIDGES | | (d) Remove the cartridge mounting screw (28). |
| 1. Damaged Cartridge (Astatic LQD) | To remove the cartridge, proceed as follows: | (e) Disconnect the pickup leads and remove cartridge. |
| | (a) Rotate the cartridge so the cartridge mounting screw (28) is facing downward. | (f) Replace cartridge and connect pickup leads. |
| | (b) Loosen the set screw (26) and remove the cartridge control knob (27). | (g) Secure pickup cartridge to mounting bracket (18). |
| | (c) Carefully pull the cartridge lead up from the rear section of the arm until adequate slack is obtained. | (h) Replace the cartridge control knob (27) and tighten set screw (26). |
| | | (i) Push excess pickup lead into rear section of pickup arm. |

MODEL 950

Damaged Needle (Astatic LQD)

- (a) Rotate cartridge control knob to correspond with needle to be removed.
- (b) The needle may now be removed by pulling it straight out of its mounting.
- (c) In replacing the new needle, make sure that the colored needle is used on the side of the pickup cartridge having the corresponding color spot.

(b) Loosen the knurled thumb nut that secures needle to the cartridge.

(c) Carefully remove needle and replace with a new needle of the same part number.

CAUTION: Make sure that the colored needle is used on the side of the pickup cartridge having the corresponding color spot. The replacement needle will have to be adjusted, before it is tightened in the pickup cartridge, to assure that the needle shank is securely held by the knurled thumb nut. Do not use pliers on knurled thumb nut. Tighten with fingers only.

2. Damaged Cartridge (Shure P-81)

- (a) Disconnect the pickup leads.
- (b) Loosen the two cartridge mounting screws and remove cartridge.
- (c) Replace cartridge and connect leads.

ASTATIC CARTRIDGES

- 2753 Cartridge, Astatic LQD-1M complete
 - 2754 Osmium one mil needle
 - 2755 Osmium three mil needle
- 3137 Cartridge, Astatic LQD-1JM complete
 - 2755 Osmium three mil needle
 - 3135 Sapphire one mil needle
- 3168 Cartridge, Astatic LQD-1J complete
 - 3135 Sapphire one mil needle
 - 3136 Sapphire three mil needle
- 2816 Cartridge, Astatic LQD-1M not grounded complete
 - 2754 Osmium one mil needle
 - 2755 Osmium three mil needle
- 2876 Cartridge, Astatic CQ complete
 - 3521 Sapphire one mil needle
- 2500 Cartridge, Astatic CQ ungrounded complete
 - 3709 Sapphire one and one-half mil needle
- 3560 Cartridge, Astatic GCAG complete
 - 3561 Osmium truncated needle
- 3547 Cartridge, Astatic GCAG complete
 - 3559 Sapphire truncated needle

Damaged Needle (Shure P-81)

- (a) Loosen knurled thumb nut that secures needle to the cartridge.
- (b) Carefully remove needle and replace with a new needle of the same part number.

CAUTION: The replacement needle will have to be adjusted, before it is tightened in the pickup cartridge, to assure that the needle shank is securely held by the knurled thumb nut. Do not use pliers on knurled thumb nut. Tighten with fingers only.

SHURE BROTHERS CARTRIDGES

- 2606 Cartridge, Shure Brothers, P-77 complete
 - 2628 Osmium one mil needle
 - 2629 Osmium three mil needle
- 3063 Cartridge, Shure Bros., 79-V complete
 - 2629 Osmium three mil needle
 - 3120 Sapphire one mil needle
- 3182 Cartridge, Shure Bros., P-76-A complete
 - 3119 Sapphire three mil needle
 - 3120 Sapphire one mil needle
- 3366 Cartridge, Shure Bros., P-71-A complete
 - 3367 Sapphire Unipoint needle
- 3368 Cartridge, Shure Bros., P-37-C complete
 - 3369 Osmium Unipoint Needle
- 3373 Cartridge, Shure Bros., P-81 complete
 - 3374 Osmium Unipoint needle

3. Damaged Cartridge (Shure P-77)

- (a) Rotate the cartridge so the cartridge mounting screws may be loosened.
- (b) Remove the cartridge control knob (27).
- (c) Carefully pull the cartridge lead up from the rear section of the arm until adequate slack is obtained.
- (d) Disconnect the leads and remove the cartridge.
- (e) Replace the cartridge and connect the pickup leads.
- (f) Secure the cartridge to the mounting bracket (strengtheners) (29).
- (g) Push excess pickup lead into rear section of pickup arm and re-install plastic cartridge control lever.

Damaged Needle (Shure P-77)

- (a) Rotate the cartridge control knob to the position corresponding to the type needle to be replaced.

- 3411 Cartridge, Shure Bros., P-81 complete
- 3412 Sapphire Unipoint needle
- 3415 Cartridge, Shure Bros., P-81-C complete
- 3369 Osmium two mil needle
- 3455 Cartridge, Shure Bros., P-76-AF complete
- 3120 Sapphire one mil needle
- 2629 Osmium three mil needle

- 3442 Cartridge, Shure Bros., P-72-V complete
- 2628 Osmium one mil needle
- 2629 Osmium three mil needle
- 3553 Cartridge, Shure Bros., P-37-D complete
- 3567 Osmium Unipoint needle
- 3579 Cartridge, Shure Bros., P-37-A complete
- 3412 Sapphire Unipoint needle

- 3691 Cartridge, Shure Bros., P-76-A complete
- 2628 Osmium one mil needle
- 2629 Osmium three mil needle
- 3719 Cartridge, Shure Bros., P-81-A complete
- 3720 Osmium 2.3 mil needle

WEBSTER CARTRIDGES

- 2197 Cartridge, Webster F-14-2 complete
- 2630 Duo Needle, Osmium tip
- 3239 Cartridge, Webster A-1 complete
- 3292 Sapphire one mil needle
- 3293 Sapphire three mil needle
- 3399 Cartridge, Webster A-1M complete
- 3400 Osmium one mil needle
- 3401 Osmium three mil needle
- 3555 Cartridge, Webster A-1M-Z complete
- 3292 Sapphire one mil needle
- 3401 Osmium three mil needle

PARTS LIST

| Ref. No. | Part No. | Description |
|----------|----------|------------------------------------------------------------|
| 1 | 2908-A | Record Support Assembly - Consists of |
| 1A | | 3286-P Plastic Button |
| 1B | | 2902-J Record Support Arm |
| 1C | | 2530 Record Support Rod |
| 2 | 2528-A | Turntable and Hub Assembly |
| 3 | 2576 | Spindle and Bearing Assembly - Consists of |
| | | 2536 Spindle Assembly less Ball Race and Washers |
| 4 | | 2128 Spindle Guide |
| 5 | | 1535 Pin for Spindle Guide |
| 6 | | 1529 Record Pusher |
| 7 | | 2537 Spindle Body and Base Assembly |
| 8 | | 2078 Retaining Ring |
| 9 | | 2639 Bearing Washer |
| 10 | | 2624 Bearing (Ball Race) |
| 11 | | 2639 Bearing Washer |
| 12 | | 1527 Pusher Spring |
| 13 | | 2552 Pusher Shaft Spring |
| 14 | | 2539 Pusher Shaft and Housing Assembly |
| 15 | 2310 | Hinge Pivot Screw |
| 16 | 2503-B | Plastic Tone Arm |
| 17 | 2508 | Hinge Spring |
| 18 | 2945 | Strengtheners and Bracket Assembly |
| 19 | 2275 | Strengtheners Screw #4 x 1/4" Thread Cutting |
| 20 | 2255 | Lock Spring |
| 21 | 2912 | Lift Screw |
| 22 | 2449 | Screw for Slide 6-32 x 1/8" |
| 23 | 2934 | Adjusting Slide |
| 24 | 2275 | Strengtheners Screw #4 x 1/4" Thread Cutting |
| 25 | 2753 | Cartridge "Astatic LQD" (Also see Cartridge Breakdown) |
| 26 | 2370 | Cartridge Control Knob Screw |
| 27 | 2860-G | Cartridge Control Knob |
| 28 | 2817 | Lockwasher and Screw-Cartridge Mounting |
| 29 | 2509 | Strengtheners and Bracket Assembly |
| 30 | 3691 | Cartridge "Shure P-76V" (Also see Breakdown on Cartridges) |
| 31 | 2542-B | Plastic Tone Arm Assembly Only |
| 32 | 2917 | Strengtheners and Bracket Assembly |
| 33 | 3373 | Cartridge "Shure P-81" (Also see Cartridge Breakdown) |
| 34 | 2904 | Cartridge Mounting Screw |
| 35 | 2220 | Lift Pin |
| 36 | 1975 | Pal Nut |
| 37 | 2247 | Safety Spring |

| Ref. No. | Part No. | Description |
|----------|----------|-------------------------------------------------------|
| 38 | 2937 | Washer 1/4 L.D. x 1/2 O. D. x 1/16" |
| 39 | 2249 | Safety Plate |
| 40 | 2294 | Hinge Assembly |
| | 2933 | Hinge Pin |
| | 2505 | Hinge Bracket Only |
| 41 | 2269 | Eccentric Set-Down Adjustment Screw (Part of Item 40) |
| 41-A | 2926 | Speed Nut |
| 42 | 2957 | 12" Record Selector |
| 43 | 2921 | Tone Arm Shaft and Sleeve |
| 43-A | 2952 | Fiber Washer |
| 44 | 409 | Screw 10-24x5/16" - Casting Hold-down and Lockwasher |
| 45 | 2558-G | Tone-Arm Rest Post |
| 46 | 2907 | Reject Knob |
| 47 | 1651 | "C" Washer - Switch Control |
| 48 | 2906-G | Speed Control Knob |
| 49 | 2594 | "C" Washer - Switch Control |
| 50 | 2593 | Control Shaft Bearing |
| 51 | 2523 | Base Plate |
| 52 | 1588 | "C" Washer - 12" Record Selector |
| 53 | 2600 | Shut-off Rod |
| 54 | 2442 | Trip Spring - Control Link |
| 55 | 1721 | Reject Spring - Shut-off Rod |
| 56 | 2221 | Fiber Washer - Main Gear Assembly |
| 57 | 1719 | "C" Washer - Main Gear Assembly |
| 58 | 2525 | Die-Cast Frame |
| 59 | 2077 | Shipping Bolt |
| 60 | 2918 | Plastic Support Leg |
| 61 | 2110 | "C" Washer - Record Support Assembly |
| 62 | 2575 | Main Gear Assembly - Consists of: |
| | | 2512 Gear Only |
| 63 | | 1588 "C" Washer - Trip Lever Assembly |
| 64 | | 2829 Fiber Washer - Trip Lever Assembly |
| 65 | | 2940 Pawl Lever |
| 66 | | 2516 Spring Washer - Trip Lever Assembly |
| 67 | | 2939 Trip Pawl |
| 68 | | 2569 Trip Lever Assembly |
| 69 | | 2943 Rivet for Pawl Lever |
| 70 | | 2977 Roller |
| 71 | | 2227 Rivet for Roller |
| 72 | 3361 | Hairpin Clip - Idler Wheel |
| 73 | 2583 | Fiber Washer - Idler Wheel |
| 74 | 3353 | Idler Wheel |
| 75 | 2727 | Gen. Ind. 2-belt Motor 110 Volt 60 Cycle |

| Ref. No. | Part No. | Description |
|----------|----------|----------------------------------------------------|
| | 2772 | Idler Wheel |
| | 2773 | Mounting Grommet |
| | 2765 | Lever Grommet |
| | 2797 | Belt |
| | 3088 | Idler Spring |
| | 3089 | Pulley 45 RPM |
| | 3090 | Pulley 33-1/3 RPM |
| | 3294 | Hairpin Clip-Idler |
| | 3295 | Fibre Washer-Idler |
| | 3355 | Felt Washer-Pulley |
| | | Note: Above parts may also be used to service: |
| | 3321 | Motor (110 Volt 50 Cycle) |
| | 3322 | Motor (220 Volt 50 Cycle) |
| | 3129 | General Industries Turret Motor 110 Volt 60 Cycles |
| | 3139 | Pulley 78 RPM |
| | 3140 | Pulley 45 RPM |
| | 3141 | Pulley 33-1/3 RPM |
| | 2772 | Idler Wheel |
| | 2773 | Mounting Grommet |
| | 2765 | Lever Grommet |
| | 3088 | Idler Spring |
| | 3294 | Hairpin Clip-Idler |
| | 3295 | Fibre Washer-Idler |
| | 3355 | Felt Washer-Pulley |
| | | Note: Above parts may also be used to service: |
| | 3395 | Motor (110 Volt 50 Cycle) |
| | 3396 | Motor (220 Volt 50 Cycle) |
| | 3211 | Russel Turret Motor 110 Volt 60 Cycle |
| | 3353 | Idler Wheel |
| | 3354 | Pulley 33-1/3 RPM |
| | 3356 | Pulley 45 RPM |
| | 3357 | Pulley 78 RPM |
| | 3358 | Idler Arm & Pivot Assembly |
| | 3359 | Idler Arm Link |
| | 3360 | Idler Spring |
| | 3361 | Hairpin Clip Idler |
| | 2638 | Mounting Grommet |
| | 3362 | Felt Washer-Pulley |
| | 3363 | Fibre Washer-Idler |
| | 2765 | Lever Grommet |
| | | Note: Above parts may also be used to service: |
| | 3393 | Motor (110 Volt 50 Cycle) |
| | 3394 | Motor (220 Volt 50 Cycle) |
| | 3338 | Alliance Turret Motor 110 Volt 60 Cycle |
| | 3481 | Idler Wheel |
| | 3489 | Mounting Grommet |
| | 3487 | Idler Spring |
| | 3484 | Pulley 78 RPM |
| | 3483 | Pulley 45 RPM |
| | 3482 | Pulley 33-1/3 RPM |
| | 3488 | "C" Washer for Idler Wheel |
| | 3493 | Fibre Washer for Idler Wheel |
| | 3492 | Fibre Washer for Pulleys |
| | 3490 | Felt Washer for Pulley |

| Ref. No. | Part No. | Description |
|----------|----------|------------------------------------------------|
| | 3491 | Felt Washer for Idler Wheel |
| | | Note: Above Parts may also be used to service: |
| | 3478 | Alliance Turret Motor 110 Volt 50 Cycle |
| | 3498 | Alliance Turret Motor 220 Volt 50 Cycle |
| | 76 | 1685 Motor Fastener |
| | 77 | 2942 Motor Speed Control Rod |
| | 78 | 2208 Pal Nut for Spindle |
| | 79 | 2087 Screw 6/32 x 1/4" Reset Lever |
| | 80 | 492 Washer - Flat Steel-Reset Lever |
| | 81 | 2560 Reset Lever |
| | 82 | 2925 Spring - Reset Lever |
| | 83 | 2563 Spring - 12" Record Selector |
| | 83-A | 1720 Speed Nut - Spring - 12" Record Selector |
| | 84 | 409 Screw 1-/24 x 5/16 and Lockwasher |
| | 85 | 2951 Terminal Strip |
| | 86 | 2087 Screw 6/32 x 1/4 |
| | 87 | 2574 Return Spring-Pickup Arm |
| | 88 | 2284 Control Shaft Assembly |
| | 88-A | 1052 "C" Washer for Item 88 |
| | 89 | 2580 Rubber Bumper |
| | 90 | 2581 7" Set-down Lever |
| | 91 | 487 Switch |
| | 92 | 2931 Fiber Insulating Strip |
| | 93 | 2573 Switch Cover |
| | 94 | 1720 Speed Nut - Switch Cover Hold-down |
| | 95 | 2561 Locator Plate - Tone-Arm Return |
| | 95-A | 2266 Fiber Washer |
| | 96 | 2271 Retaining Ring - Locator Plate |
| | 97 | 2953 Spring Washer |
| | 98 | 2585 Spring Shut-Off Lever |
| | 99 | 2579 Spring - 7" Set-down Lever |
| | 100 | 492 Washer - Flat Steel - 7" Set-down Lever |
| | 101 | 2087 Screw 6/32 x 1/4" - 7" Set-down Lever |
| | 102 | 2591 Lever Assembly - Shut-off |
| | 103 | 1587 Lever Assembly Bearing |
| | 104 | 2932 Screw 4/40 Hex Head |
| | 105 | 2520 Trip Finger Cam |
| | 106 | 1975 Pal Nut |
| | 107 | 2262 Conical Lift Pin Spring |
| | 108 | 1588 "C" Washer - Lift Pin Spring |
| | 109 | 1588 "C" Washer - Slide Retainer |
| | 110 | 2958 Trip Link |
| | 111 | 2245 Rivet-Trip Link |
| | 112 | 2935 Control Link |
| | 113 | 2586 Shut-off Bracket Assembly |
| | 114 | 2053 Screw 6 x 5/16 |
| | 115 | 2978 Shut-off Spring |
| | 116 | 409 Screw 10/24 x 5/16 and Lockwasher |
| | 117 | 2571 Ejector Link Assembly |
| | 118 | 2274 Flat Washer |
| | 119 | 2087 Screw 6/32 x 1/4 Slide and Cam Assembly |
| | 120 | 2288 Slide and Cam Assembly |
| | 121 | 2211 Slide Bearing |
| | 122 | 2246 Spring - Slide Bearing |
| | 123 | 2208 Pal Nut |
| | 124 | 2909 Washer |
| | 125 | 2597 Control Shaft Assembly - Motor |
| | 126 | 2765 Rubber Grommet |
| | 127 | 2910 Compression Spring |
| | 128 | 2599 Switch Control Lever Assembly |
| | 129 | 2087 Screw 6/32 x 1/2" |

GENERAL INFORMATION

THE MODEL 950 SERVICE MANUAL (V-M FORM 2544) MAY BE USED IN THE SERVICING OF ALL MODEL 950 TRI-O-MATIC RECORD CHANGERS, EVEN THOSE PRODUCED AFTER OCTOBER 15th, 1950 AT WHICH TIME MANY PRODUCTION CHANGES WENT INTO EFFECT. These changes are outlined in the following paragraphs and should be noted, as it is of the utmost importance when ordering replacement parts.

You will find that most of the new items are interchangeable with those used in earlier models with the exception of the shut-off lever (item 126) V-M part 2591. Should it become necessary to replace this item, the slide and cam assembly (item 120) V-M part 2288 should also be replaced and vice versa with the later design. (Refer to parts list in this supplementary manual).

The last record shut off mechanism has been altered slightly and functions as follows: When the

last record is dropped to the turntable the record support arm also slides downward contacting the shut off bracket assembly. This, in turn, pivots the shut off lever (126) through the media of spring (131) and connecting shut off wire. However, the full pivot of the shut off lever (126) is blocked by the escape lever (130A) of the slide on cam assembly (130), which has moved in under the shut off lever. This prevents the changer from shutting off. As the changer completes the change cycle, the shut off lever (126) slides off the escape lever (130A) and drops into the slot of the cam and slide assembly (130). When the last record has been played, the change cycle starts again, however, this time, as the pickup arm moves outward, the way is clear for the shut off lever (126) to raise to the shut off position, thus causing the mechanism to shut off upon completing the change cycle (see "Change Cycle" in the V-M 950 Manual, Form No. 2544, for complete description of the shut off mech.).

| REF. NO. | PART NO. | REASONS FOR ADDITIONS AND CHANGES To The Record Changer Mechanism | |
|----------|----------|----------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | DESCRIPTION | REASON |
| 115 | 3602 | Hinge Button Bearing | This hinge button bearing replaces the 2310 pivot screw in order to maintain better control over the vertical friction of the tone arm. |
| 116 | 3887 | Jam Nut | This jam nut replaces the 1975 palnut inasmuch as the palnut had tendency to strip the threads of the brass housing in which the tone arm lift pin rides. |
| 117 | 3888 | Lock Washer | This lockwasher replaces the 2937 flat washer inasmuch as a locking device was needed to secure the 2887 jam nut into position. No lockwasher was needed with the 1975 palnut as the palnut was self-locking. |
| 118 | 4088 | Brace for Base Plate | This brace was added to the baseplate in order to straighten the well in which the turntable rides to prevent turntable scraping and also to prevent bending of the baseplate while in transit. |
| 119 | 2546 | Record Support Hold-down Spring | This spring was added shortly after the beginning of the 950 production in order to facilitate the shut off after the last record had been played. |
| 120 | 2110 | "C" Washer for Record Support | This "C" Washer was omitted from the original exploded view of the Model 950 and it was felt necessary to show it on this drawing. |
| 121 | 4172 | Spring for Trip Lever Assembly | This spring replaces the 2516 spring washer in order to maintain a more uniform friction within the trip lever assembly. |
| 122 | 1736 | Motor Mtg. "C" Washer | This "C" Washer was adapted for motor mounting purposes inasmuch as the original snap fastener proved to be unsatisfactory. |
| 123 | 3915 | Slide Support | This support was added to the mechanism to stabilize the slide and cam assembly during the change cycle. |
| 124 | 2932 | 4-40 Hex Hd. Screw | This screw is used to secure the #3915 slide support in position. |
| 125 | 3901 | Reject Spring | This spring replaces the 1721 reject spring and tends to give better return action on the reject rod assembly. |
| 126 | 4013 | Shut Off Lever Assembly | This replaces the 2591 shut off lever assembly which consisted of two separate items and will also serve to simplify and improve upon the last record shut off. |
| 127 | 2579 | Shut Off Lever Spring | This replaces the 2585 shut off lever spring inasmuch as the 2585 spring did not have the proper tension for the new shut off lever. |
| 128 | 3916 | Tinnerman Nut | This tinnerman nut replaces the 2932 self tapping screw on some models due to a change in the die cast subframe. |
| 129 | 2585 | Escape Lever Spring | This spring was necessary to help actuate item 130A which is an escape lever located on the main slide and cam assembly. |
| 130 | 4014 | Slide and Cam Assembly | This replaces the 2288 slide and cam assembly inasmuch as the earlier assembly did not carry the escape lever and spring for the shut off mechanism. |
| 131 | 4016 | Shut off Spring | This spring replaces the 2978 shut off spring inasmuch as the 2978 spring did not have the proper tension when used with the new shut off mechanism. |

Most of the changes which have taken place on the Model 950 Tri-O-Matic record changer were so done to improve upon the product and from time to time we will incorporate more changes either to simplify or improve upon the mechanism.

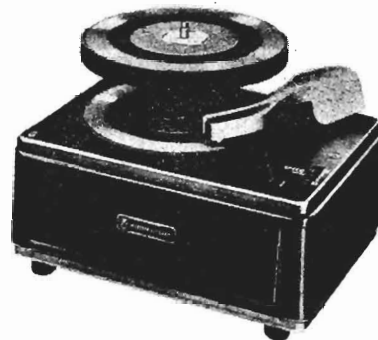
| REF. NO. | PART NO. | DESCRIPTION | REPLACES |
|----------|----------|---------------------------------|------------------------------|
| 115 | 3602 | Hinge Button Bearing | 2310 Pivot Screw |
| 116 | 3887 | Jam Nut | 1975 Palnut |
| 117 | 3888 | Lock Washer | 2937 Flat Washer |
| 118 | 4088 | Brace for Base Plate | Addition to Mech. |
| 119 | 2546 | Record Support Holddown Spring | Addition to Mech. |
| 120 | 2110 | "C" Washer for Record Support | Addition to Mech. |
| 121 | 4172 | Spring for Trip Lever Assembly | 2516 Spring Washer |
| 122 | 1736 | "C" Washer-Motor Mounting | Addition to Mech. |
| 123 | 3915 | Slide Support | Addition to Mech. |
| 124 | 2932 | Screw 4-40 Hex Hd. | Addition to Mech. |
| 125 | 3901 | Reject Spring | 1721 Reject Spring |
| 126 | 4013 | Shut-Off Lever Assembly | 2591 Shut Off Lever Assembly |
| 127 | 2579 | Shut Off Lever Spring | 2585 Shut Off Lever Spring |
| 128 | 3916 | Tinnerman Nut | 2932 Screw |
| 129 | 2585 | Escape Lever Spring | Addition to Mech. |
| 130 | 4014 | Slide and Cam Assembly | 2288 Slide and Cam Assembly |
| 130A | 4005 | Escape Lever (Part of item 130) | Addition to Mech. |
| 131 | 4016 | Shut Off Spring | 2978 Shut Off Spring |

MODELS 77,
755, 760, 762

MODEL 77



MODEL 762



MODEL 755



MODEL 760

DESCRIPTION

The Webster-Chicago Model 77 basic mechanism is a two speed, automatic record changer. Simple in design and operation, it will automatically play up to eight 7" records of either 33 $\frac{1}{3}$ or 45 rpm.

The 1 $\frac{1}{2}$ " center hole records are played on the Model 77 by inserting an RS-46 center hole adapter in the record. An important feature of the RS-46 adapter is its weight. The adapters are metal and the added weight is just enough to prevent the records from slipping.

Model 77 repeats the last record of a stack until the Speed Selector wheel is turned to the center or OFF position. The idler wheel is pulled away from the motor shaft when the control is at OFF, preventing flat spots on the rubber idler which would cause wow and rumble.

Model 77 features the Webster-Chicago Velocity Trip which guarantees fast record change regardless of the position of the trip grooves or the speed with which they move the pickup arm toward the center of the record. The Velocity Trip also eliminates lateral pressure against the deli-

cate sides of the record grooves that would be present if "lead in" springs were used. This lack of lateral pressure is considered to be as important as extra-light vertical pressure or needle weight.

Model 760 is a Model 77 mechanism combined with an amplifier and speaker in a beautiful plastic case to form a complete table model automatic phonograph.

Model 755 is a Model 77 mechanism mounted on an attractive, convenient, metal base. Model 755 is usually connected to the phono input of a radio receiver. A switch is provided to conveniently play either the 10-inch and 12-inch changer in the radio-phono combination or the Model 755.

Model 762 is a Model 77 mounted in an attractive burgundy leatherette carrying case, together with an amplifier and speaker, to make a fine portable phonograph.

These service instructions apply to the changer mechanism of all models. The circuit diagrams for the phonograph models are included in the operating instructions included with each unit.

MODELS 77,
755, 760, 762

PICKUP CARTRIDGE

The pickup cartridge may be of the crystal or ceramic type. Replacement cartridges and needles are available from most radio parts distributors and should be ordered by the manufacturer's name and part number printed on the cartridge. If a substitute cartridge is used, it may be necessary to use a different needle pressure adjusting weight to maintain the correct needle pressure of approximately 5 grams. When ordering the removable weight, specify the cartridge to be used.

A. C. CONNECTIONS

Connect the motor cord to a source of 105-115 volt 60 cycle current only. Do not under any circumstances connect the motor to a Direct Current plug (DC) or alternating current of any other frequency.

To Play Records—See Operating Instructions supplied with the changer or phonograph.

SERVICE NOTES

All units are accurately adjusted, lubricated and tested at the factory. However, service repairs and adjustments sometimes become necessary. This bulletin should be studied carefully before making any adjustments or replacing parts.

Service parts are available from your Webster-Chicago distributor. All parts must be ordered by piece part number and also record changer model and production number, stamped on the under side of the main plate.

The functions and most probable misadjustments of the main assemblies are as follows (reference numbers refer to the photographs on page 7).

THE AUTOMATIC TRIP FAILS TO FUNCTION

Model 77 uses a Velocity trip mechanism in order to reduce "non play" time to a minimum, in other words to secure a fast change cycle.

As indicated in Fig. 1 when the pickup arm (4) moves toward the center of the record the weight (7) and the felt washer (7B) cause the Velocity trip arm (7A) to move with it. The arm in turn pushes the tail end (11A) of pawl (11). Each time the hub "H" of the turntable rotates, the cam shaped lug "S" pushes the pawl (11) to the "restore" position. This prevents the pawl engaging the lug "L" to start the change cycle. Whenever the pawl (11) is pushed quickly, it engages the lug "L" before the cam can push it back and the mechanism goes through its change cycle. The quick push is provided by the pickup arm when it follows the "velocity" grooves in the center of the record.

If the automatic trip fails to function, check for:

1. Bent "pawl tail" (11A) or bent arm (7A).
2. No trip groove on records.
3. Arm (7A) binding and not following the movement of the pickup arm.
4. Pawl may be dirty and sticky. Remove and clean.
5. The Arm (7A) and the weight (7) should be free

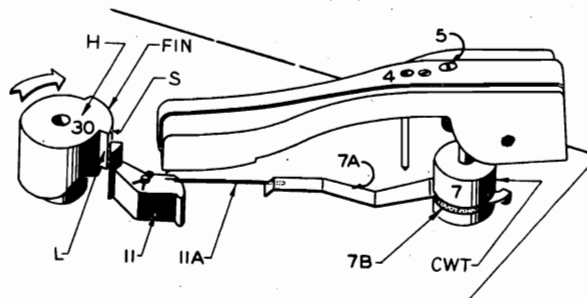


Fig. 1

to move back slightly each time the cam "S" resets the pawl (11), as explained in the discussion of the Velocity Trip above. Clean the felt and arm with Carbon Tetrachloride or similar cleaning agent.

PICKUP ARM LIFT TOO HIGH OR TOO LOW

The vertical movement of the pickup arm is controlled by the motion of the lever (10) Fig. 2 as the cam follower pin "P" follows the up and down contour of the cam in the bottom of the turntable. Adjustment of the vertical lift of the pickup arm can be made by means of the pickup arm post (6A) Fig. 2.

**NEEDLE SET DOWN POINT
INCORRECT**

The pickup arm should set the needle down just inside the "lead in groove" of the record.

The horizontal movement of the pickup arm, like its vertical movement, is controlled by the motion

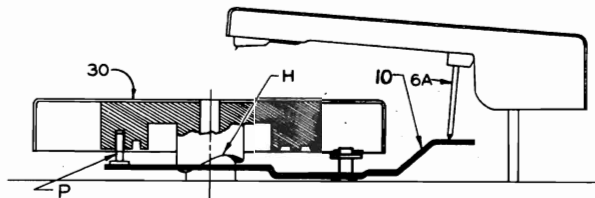


Fig. 2

of the lever (10) Fig. 2. As the cam follower pin "P" follows the eccentric grooves on the under side of the turntable, the pickup arm post (6A) is moved forward and back to permit the next record of the stack to drop.

Any final adjustment of the movement of the arm is made by means of the eccentric screw driver slot "E" Fig. 3.

1. Loosen the pickup arm mounting screw (5) slightly. This screw is the anchor post for the eccentric adjustment lever.
2. Insert a screw driver in the slot "E" and move the arm in or out, slightly, as required.
3. Tighten the mounting screw (5), being careful to not change the set down adjustment setting.

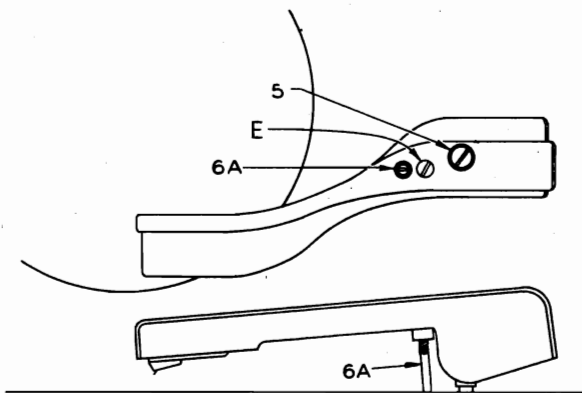
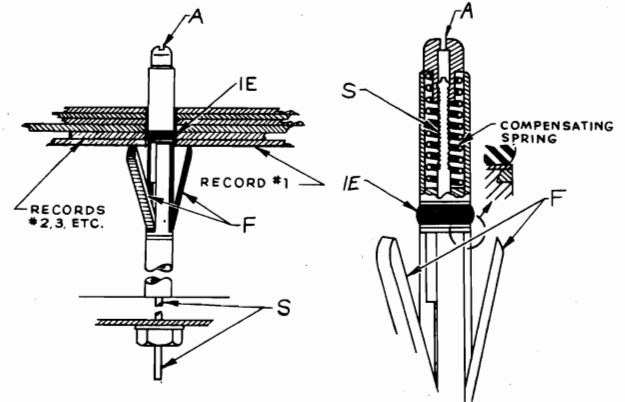


Fig. 3

**MORE THAN ONE RECORD
IS DROPPED DURING A
CHANGE CYCLE**

The three fingers of the center post support the unplayed stack of records and drops them one at a time, onto the turntable.

In operation the sequence of functions consists of the following. Referring to Fig. 4, the actuating wire "S" is pulled downward part way at the start of the change cycle. This expands the rubber



Figs. 4 and 5

collar (IE) which suspends the second and remaining records, while the bottom record No. 1, lowers slightly to provide air separation between Nos. 1 and 2 records, breaking the partial vacuum between the two records. The 3 fingers "F" meanwhile have closed slightly, although remaining in the expanded position. As the change cycle proceeds to the point where the tone arm is swung to one side ready for the dropping of the next record, a further downward pull on wire "S" retracts the fingers "F", permitting the record to drop, as shown in Fig. 6.

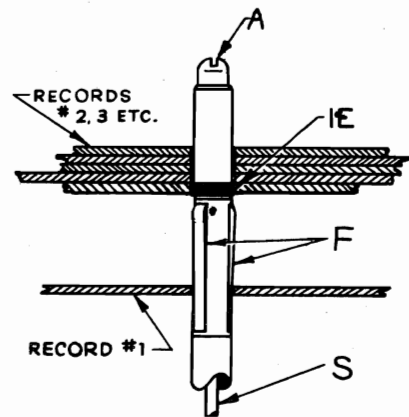


Fig. 6

If the expansion rubber does not hold the stack of records up, adjust the bulge by means of the screwdriver adjustment "A". To do this:

MODELS 77,
755, 760, 762

1. Do not turn the power on.
2. Trip the reject button and turn the turntable clockwise by hand until the three fingers are fully closed.
3. With a screwdriver turn the adjusting screw "A" until the rubber expansion ring (1E) expands sufficiently to support a stack of records.
4. Turn the turntable on through the change cycle and see if the expansion rubber is entirely free when the change mechanism is in the neutral or rest position. It should be possible to move the top of the spindle shaft up and down slightly.
5. Put a stack of records on the spindle and make certain that the expansion rubber is correctly adjusted.

Important Note: Any grease or oil on the expansion rubber will make it slick and the records will not be held up. Remove any grease or oil with Carbon Tetrachloride.

WILL NOT DROP RECORDS

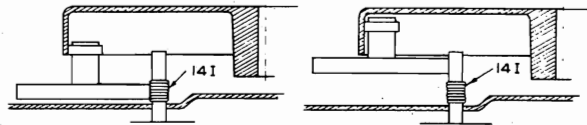
Check for:

1. Foreign matter, dust, etc. inside the spindle to prevent the fingers from closing fully and at the same time.
2. Bent or broken spindle finger.
3. Insufficient pull on wire "S" inside spindle. To adjust, be certain the set screw holding the nut (27), Fig. 14, is tight. Loosen the set screw in nut (28). Trip the mechanism and turn the turntable until the fingers close as much as possible. Back off nut (28) until the fingers are loose, then retighten until the fingers are just closed into the shaft. Notice the position of any one of the flat sides of nut (28) and tighten the nut 3 or more "flats". Tighten the set screw.

If the mechanism stalls in cycle and all other adjustments are correct, loosen the set screw and back off the nut one or two "flats"

STALLS IN CYCLE

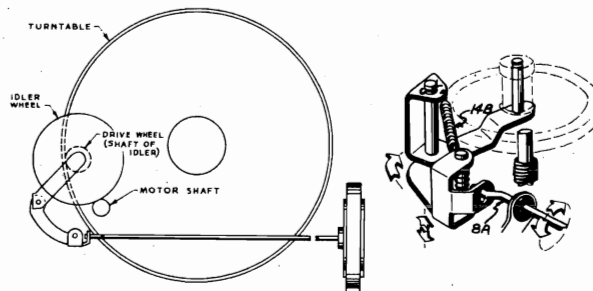
1. Tap the motor to seat the self aligning bearings more perfectly.
2. On early models the sleeve (14I) was placed at the top of the motor shaft, not as Figs. 7 and 8. If the bushing is at the top of the shaft, force it on down to the position indicated. The speed selector wheel will then be calibrated wrong so it would be well to replace it.



Figs. 7 and 8

TURNTABLE TURNS AT 45 R.P.M. AT EITHER SPEED SETTING

The power from the motor is transmitted to the turntable by means of a compound diameter idler as illustrated in Fig. 9. The turntable speed is changed by shifting the idler up or down to contact the motor shaft or the shaft sleeve as shown in Fig. 10.



Figs. 9 and 10

If the motor shaft sleeve (14I) is too high on the shaft, the idler will contact it in either speed control position. Gently force the sleeve down on the shaft until the idler just clears it when in the 45 rpm position.

TO REMOVE TOP COVER FROM MODEL 760

Fig. 12 shows a Model 77 basic mechanism with the top cover removed for easy access to the mechanism. Fig. 12 also shows how the mechanism will look after the Model 760 has been removed from its cabinet. The top cover or the cabinet must be removed in order to make some of the adjustments or repairs mentioned in the Service Notes. To do this:

1. Remove pickup arm mounting screw (5), remove the pickup cord terminal clips from the pickup cartridge, remove the anchor spring (through which the leads are threaded) from the pickup arm, note the routing of the pickup leads as you pull them out of the arm through the hinges.

2. Use a #6 Bristol wrench to loosen the pickup arm mounting assembly screws (6F) and remove the mounting assembly (6). Lift off the Reject button (19) and felt washer.
3. Remove the 6 mounting screws "A" indicated in Fig. 12. (Caution: Remove only these screws — No others at this point.)
Lift the cabinet off the mechanism and amplifier.

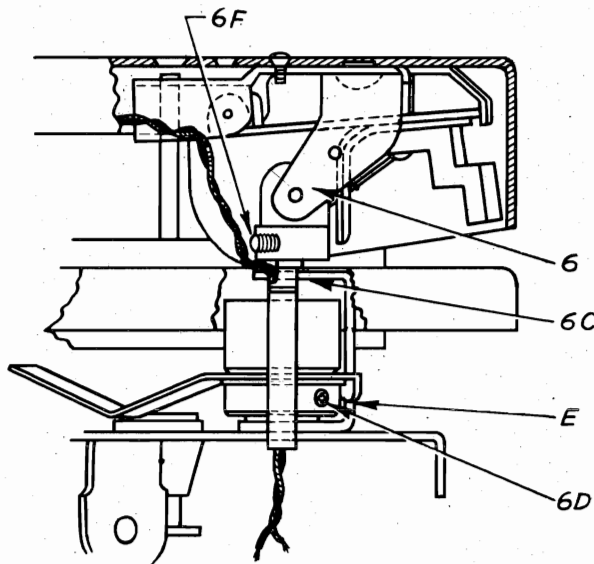


Fig. 11

TO REMOVE THE AMPLIFIER

1. Remove the dial knobs by pulling them straight out, remove the mounting nuts holding the volume and tone controls in place, remove the 4 mounting screws "B" Fig. 12. Save the heavy cardboard spacers.

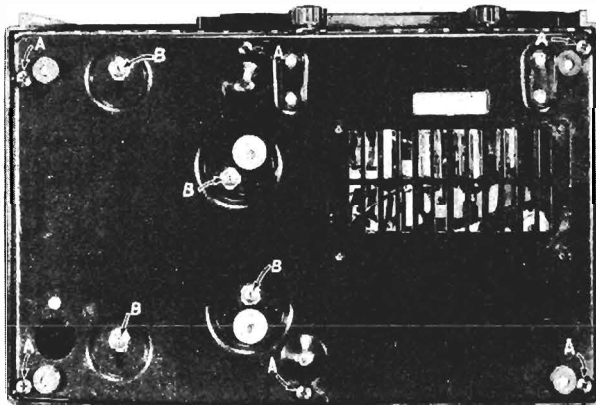


Fig. 12

2. Unplug the leads connecting the amplifier and changer mechanism. Lift the amplifier out of the chassis.

To reassemble Amplifier to Phonograph, put together in reverse order to the above disassembly instructions. Be certain to place the heavy cardboard spacer in position.

TO REASSEMBLE TOP COVER TO MECHANISM AND PICKUP ARM TO MECHANISM

It is imperative that the following steps be followed in the order listed. Failure to do so may result in difficulty in making the necessary final adjustments for needle set down point positioning.

1. Place the cabinet over the mechanism, etc. and fasten in place with the 6 mounting screws. (Fig. 12.)
2. Trip the mechanism and turn the turntable by hand until the pickup arm raising lever (10) is at the extreme limit of its outward movement (the fingers of the spindle will be fully closed into the spindle at this point). Force the mounting post (6C) Fig. 11 to turn until the extended set screw (6D) is firmly against the bracket at point "E". The ear of the velocity trip arm will of course be carried with the set screw.

Hold the mounting post in this position by means of the pickup leads while the pickup arm mounting assembly (6) is placed in position and tightened. **BEFORE TIGHTENING** the set screws, position the mechanism (6) carefully so the pickup arm height adjusting pin (6A) is exactly in the shallow groove on the pickup arm actuating assembly (10). Failure to adjust this properly will result in an incorrect needle set down point on the record. It may be advisable to just lightly tighten the set screw (6F) and check the needle set down adjustment. Tighten them securely if the adjustment is correct.

Be very careful to not tighten the set screws too firmly in the wrong place, forming dents in the mounting post that will prevent a correct adjustment.

3. Attach the pickup arm (4) to the hinge and mounting assembly (6) by means of set screw (5).

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755, 760, 762

4. Make any final needle set down adjustment by means of the screw driver slot (E) as explained on page 3.

If you should get a false needle set down point, remove the mounting screw (5) and the pickup arm, then bend the bottom ear of the bracket holding the pickup arm height adjusting pin (6A) until the point of the pin (6A) fits exactly in the groove of the actuating assembly (10). Be careful not to bend the rest of the pickup arm mounting assembly. Remount the pickup arm and recheck the adjustment of the screw driver adjustment "E".

TO REMOVE TOP COVER FROM MODELS 77, 755 AND 762

1. Remove the mechanism from the cabinet or base pan.
2. Remove pickup arm mounting screw (5), remove the pickup cord terminal clips from the

pickup cartridge, remove the anchor spring (through which the leads are threaded) from the pickup arm, note the routing of the pickup leads as you pull them out of the arm through the hinge.

3. Use a #6 Bristol wrench to loosen the pickup arm mounting assembly screws (6F) and remove the mounting assembly (6) from the mounting post (6C). Lift off the Reject button (19) and felt washer.
4. Remove the 3 nuts from the mounting studs and lift the top cover from the mechanism.

TO REASSEMBLE THE TOP COVER TO THE MODELS 77, 755 AND 762

1. Place the top cover in position and replace the lockwashers and nuts on the 3 mounting studs.
2. Follow steps 2, 3 and 4 for reassembly of Model 760 cover.

MODEL No. 77—REPLACEMENT PARTS LIST

| Figure Number | Part Number | Description | Figure Number | Part Number | Description |
|---------------|-------------|--------------------------------------------|---------------|-------------|-----------------------------|
| 1 | 11X529 | Spindle Cap and Wire Assembly | 14B | 25P429 | Washer — Fibre |
| 2 | 11X528 | Main Spindle Assembly | 14C | 50P034 | Retaining Clip |
| 3 | 25P432 | Fibre Washer | 14D | 50P125 | Retaining Clip |
| 4 | 42P209 | Tone Arm | 14E | 46P130 | Tension Spring |
| 5 | 26P912 | Tone Arm Mounting Screw | 14F | 46P212 | Tension Spring |
| 6 | 21X304 | Tone Arm Mounting Assembly | 14G | 24P043 | Rubber Sleeve Bumper |
| 6A | 41P713 | Height Adjusting Pin | 14H | 25P074 | Rubber Grommet |
| 7 | 11X496 | Automatic Trip Assembly — Complete | 14I | 46P188 | Speed Bushing |
| 7A | 45P871 | Trip Lever | 15 | 26P046 | Nut — Motor Mount |
| 7B | 25P420 | Felt Washer | 16 | 25P211 | Lock Washer — Motor Mount |
| 8 | 11X501 | Speed Control Knob, Lever Bracket Assembly | 17 | 25P367 | Washer — Motor Mount |
| 9 | 45P838 | Switch Slide | 18 | 25P363 | Shock Mount — Motor |
| 10 | 11X498 | Tone Arm Actuating Lever Assembly | 19 | 49P132 | Reject Control |
| 10A | 46P206 | Spring for 11X498 | 20 | 11X493 | Manual Trip Lever Assembly |
| 10B | 25P439 | Retainer for 11X498 | 21 | 46P223 | Tension Spring — Trip Lever |
| 11 | 11X499 | Pawl and Wire Assembly | 22 | 46P196 | Tension Spring |
| 11A | 50P225 | Retainer Pin | 23 | 46P209 | Tension Spring |
| 12 | 46P145 | Tension Spring for Actuating Lever | 24 | 11X495 | Spindle Actuating Assembly |
| 13 | 24P043 | Rubber Sleeve Bumper | 25 | 27P212 | Retaining Pin for 11X495 |
| 14 | 15X103 | Motor | 26 | 45P891 | Pull Down Spring |
| 14A | 11X507 | Idler Wheel | 27 | 41P688 | Hold Down Anchor |
| | | | 28 | 41P687 | Lock Nut |
| | | | 29 | 32P044 | A.C. Switch |
| | | | 30 | 11X489 | Turntable |
| | | | 31 | 49P130 | Tone Arm Res |

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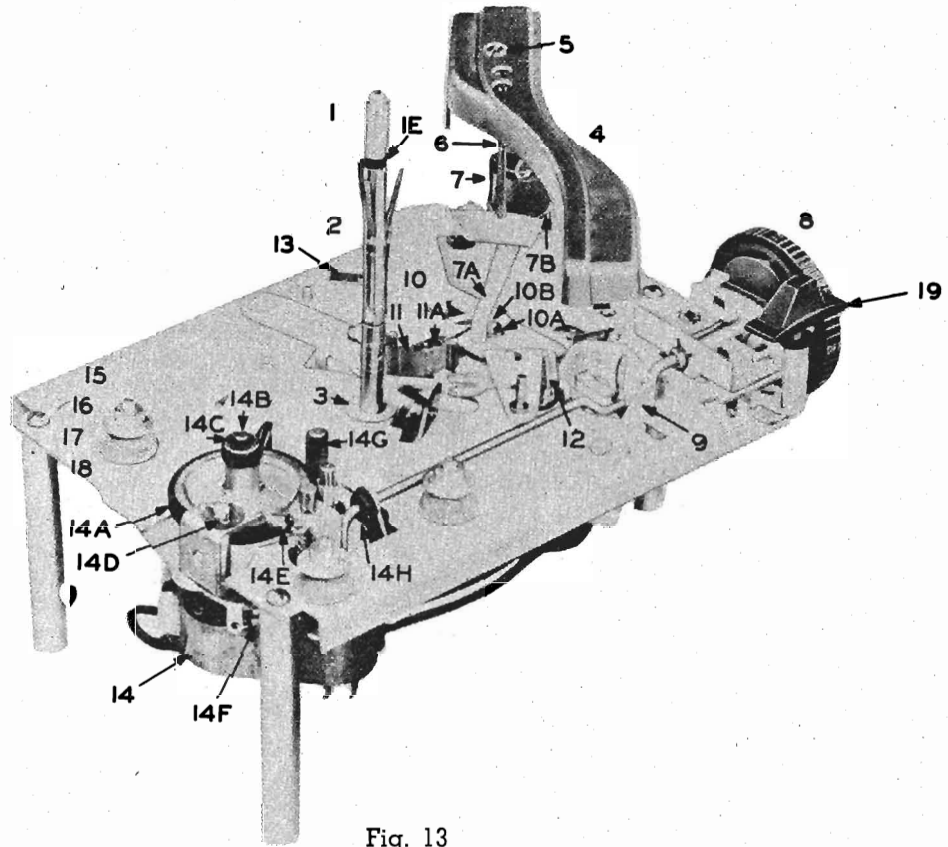


Fig. 13

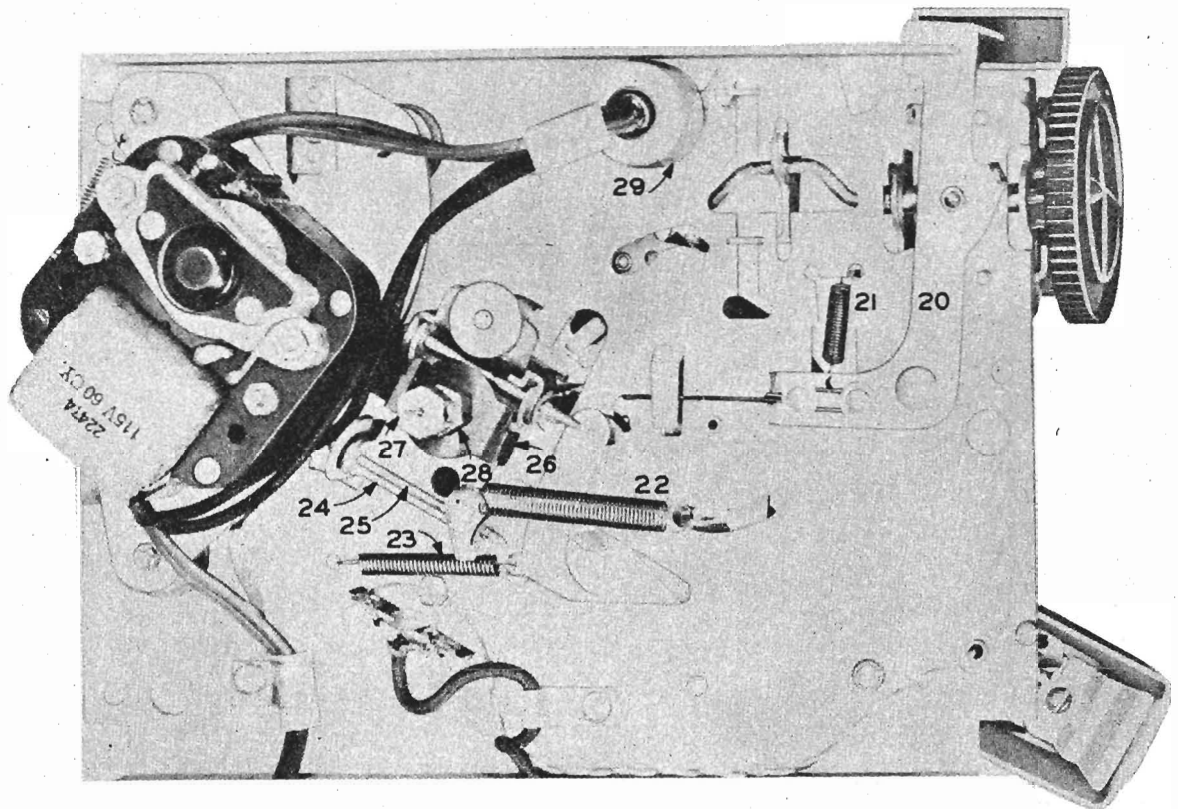
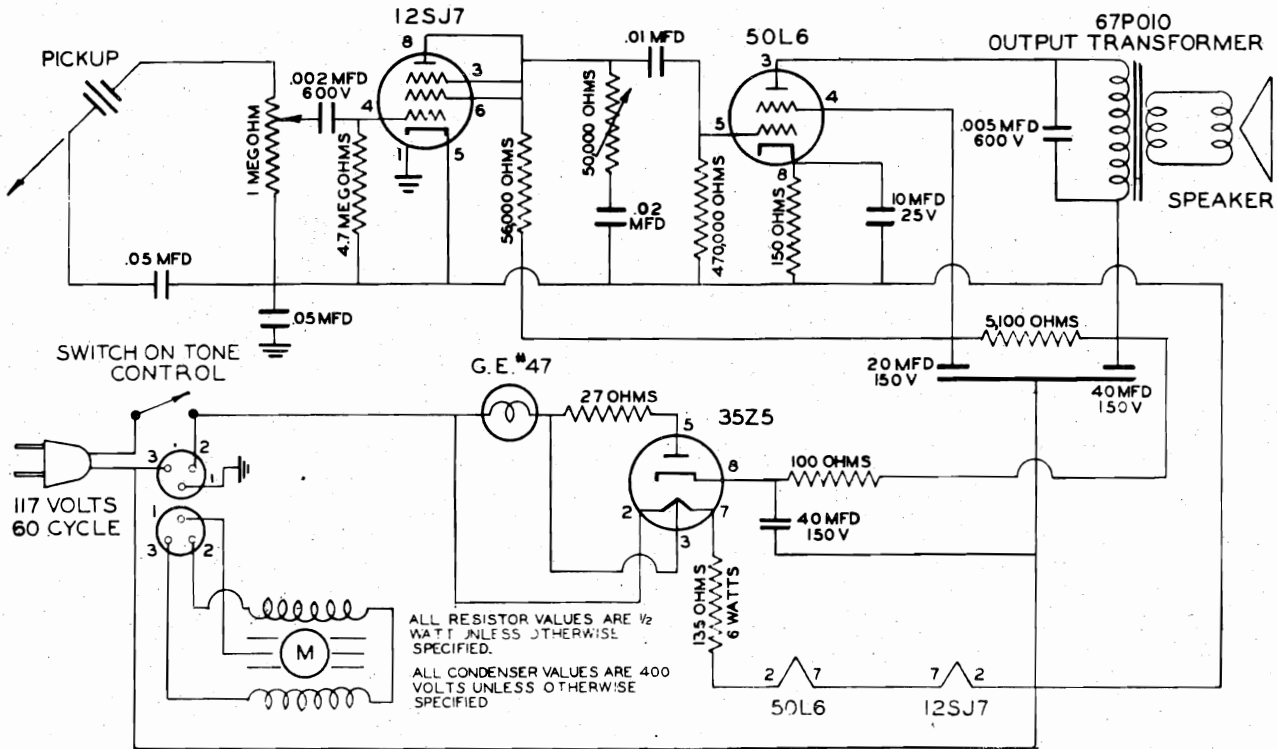


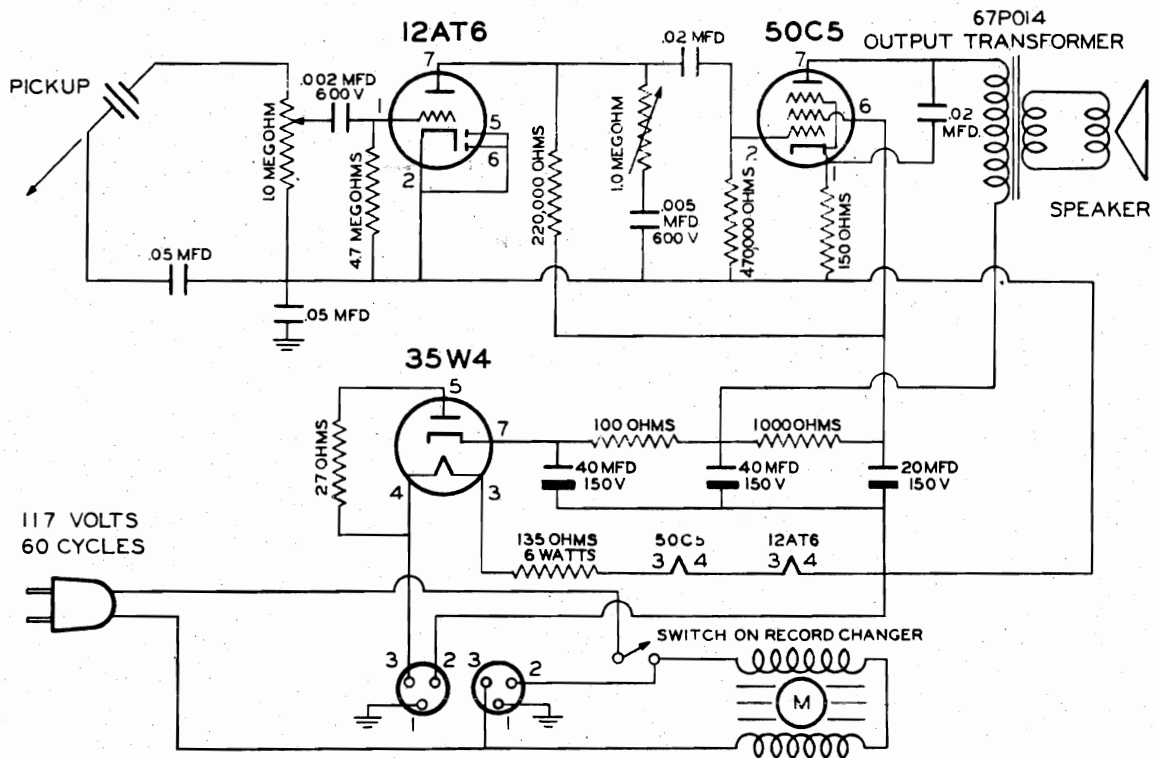
Fig. 14

MODELS 760, 762

MODEL 762



MODEL 760



GENERAL

The Record Changer will automatically play up to twelve 10 inch or ten 12 inch records at one loading. The Record Stack rests on the Spindle and the Record Shelf. The Selector Sprocket drives the Ejector Plate which pushes the records off the Shelf and Spindle allowing them to drop on the Turntable. To load for automatic operation, set the Record Size Selector Knob to 10 or 12, raise the Pressure Bar, place the stack of records on the Spindle, lower the Pressure Bar until it rests on the Record Stack. Set the AUTO-MAN-OFF switch to AUTO and press the Record Change Button. The Changer will play the entire selection of records and will repeat the last record until it is turned off. For manual operation set the AUTO-MAN-OFF switch to MAN and play the records singly as on a non-automatic record player.

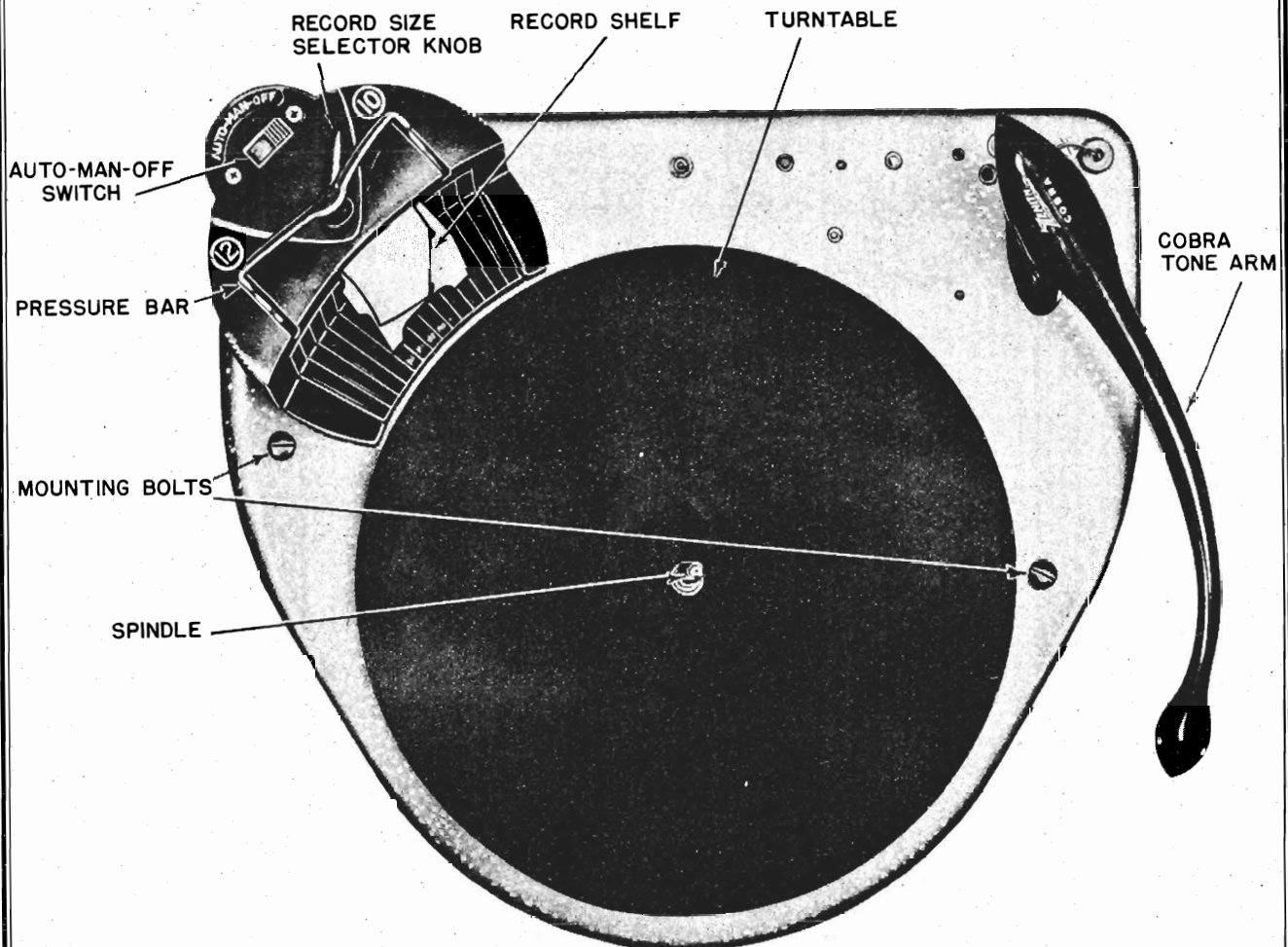


Fig. 1. Top View of Record Changer.

MODEL S-14001

DESCRIPTION OF CYCLING

The phono motor friction drives the idler wheel. The idler wheel rim drives the turntable, and the turntable shaft. To the turntable shaft is attached the segmented clutch drive plate. The pawl on the clutch drive sprocket assembly engages the drive plate causing the sprocket to rotate. The pawl pusher lever on the clutch release arm assembly causes the clutch to engage or disengage.

Closing either the trip switch or the record change switch energizes the solenoid. The magnetic flux of the solenoid attracts the clutch release lever causing the mechanism to trip and move the pawl pusher arm away from the clutch pawl. This action allows the clutch pawl spring to pull the pawl into position for the drive plate segment to engage and start the clutch sprocket rotating. The clutch sprocket is meshed with the chain drive sprocket and the chain drives the selector and timing sprockets.

The timing sprocket completes 7 functions through 360° rotation. These functions are as follows: 1. Applies the tone arm brake. The brake lever is actuated by the brake stud on the timing sprocket. The brake prevents coasting and erratic landing of the needle. 2. The inclined groove pushes the lift pin upward. The lift pin raises and lowers the tone arm. 3. The locating pin laterally swings the tone arm off the record stack. 4. The locating pin or bushing swings the

tone arm over the starting groove of the record. With 12" records, the locating pin swings the tone arm in while the locating bushing swings the tone arm with 10" records. The locating bushing is pushed upward by the record selector lever. 5. The reset stud resets the clutch trip mechanism. Moves the pawl pusher arm in the path of the clutch pawl. 6. The lift pin lowers the tone arm over the starting groove of the record. 7. The brake stud releases the brake. When the clutch pawl hits the pawl pusher arm, the clutch selector disengages.

The selector sprocket actuates the record ejector plate and must be timed with the timing sprocket to drop the records on the turntable when the tone arm is at its greatest outward swing. This occurs immediately after the No. 3 function of the timing sprocket.

As the record is played, the tone arm gradually moves toward the center. The ratchet on the tone arm control lever moves toward pawl on the trip switch lever. As the ratchet comes in contact with the pawl, the oscillating action produced by the eccentric groove on the record causes the trip switch to close, complete the solenoid circuit and repeat the cycle. If the record does not have an eccentric groove, the position trip will close the trip switch and start the next cycle.

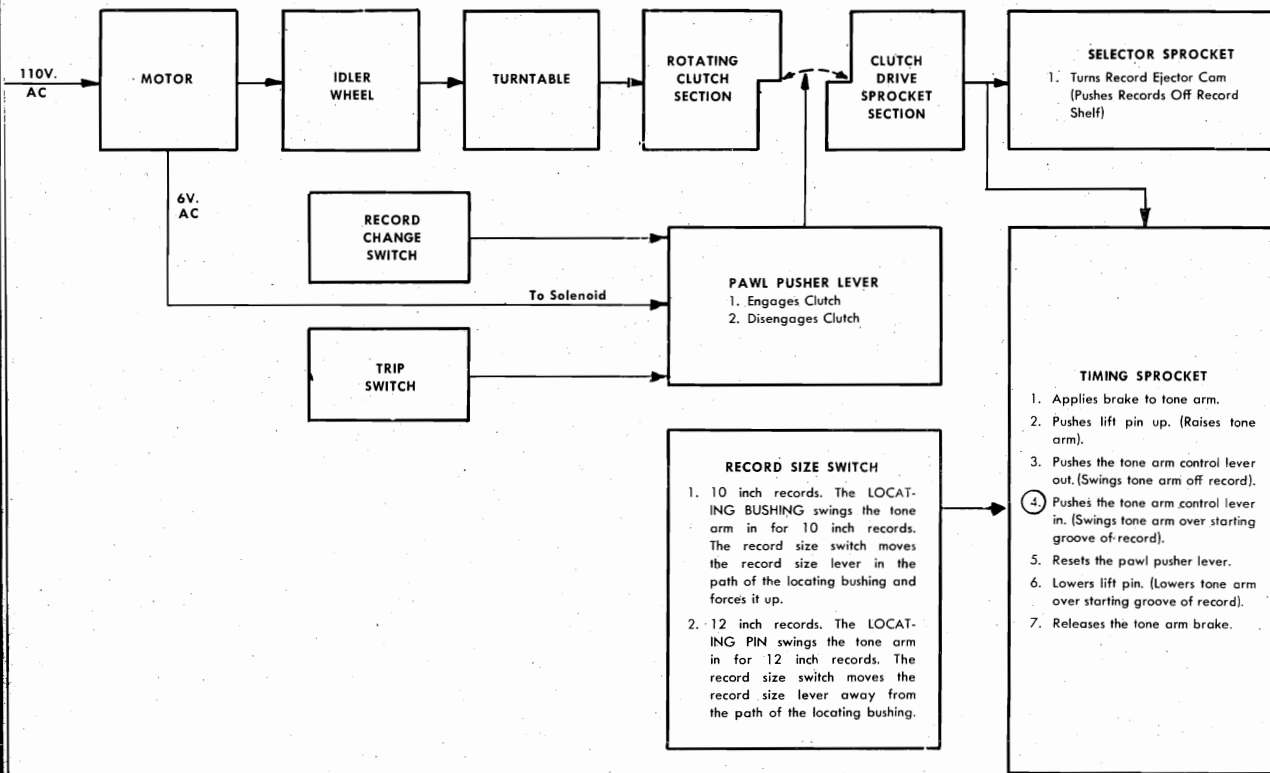


Fig. 2. Sequence of Operation—Zenith Record Changers.

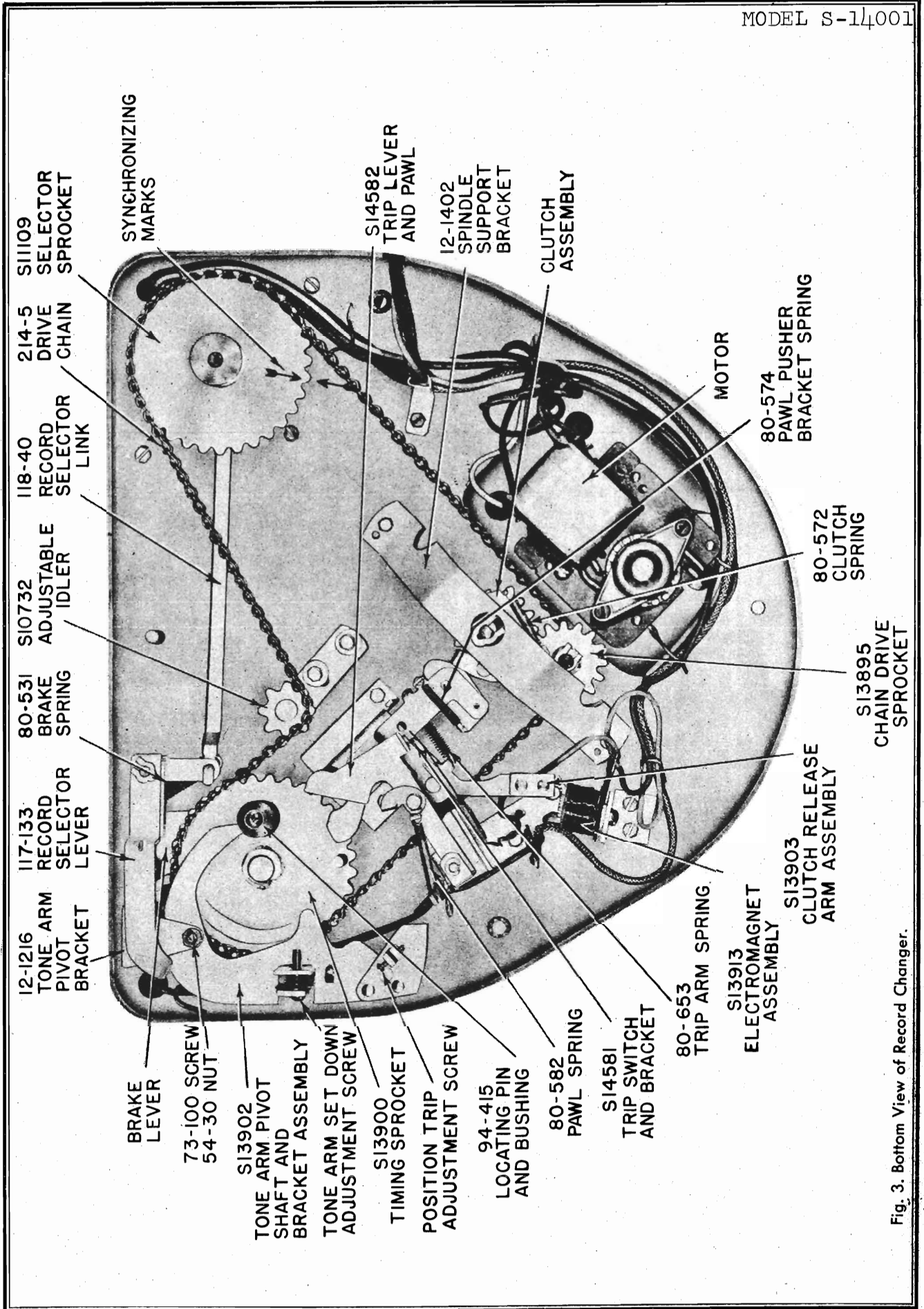


Fig. 3. Bottom View of Record Changer.

MODEL S-14001

**THEORY OF THE COBRA
RADIONIC PICKUP**

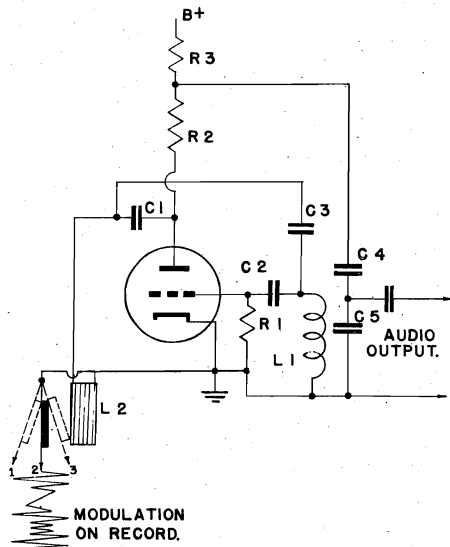


Fig. 4. Simplified Circuit of Oscillator.

The operation of the Cobra pickup is considerably different from Crystal and Dynamic pickups. These pickups generate audio power, while the Cobra controls power generated by a radio frequency oscillator. The triode tube is a modulated oscillator, detector and audio amplifier. The oscillator operates at a frequency of 2.5 Mc. Modulation is accomplished by changing the energy losses in a tuned circuit. These losses may be represented by an equivalent resistance in series with the reactance of the coil. The ratio of the resistance to the reactance determines the efficiency or Q of the coil. The amplitude of the RF voltage developed across this coil by the oscillator will vary with changes in Q.

The grid coil L_1 and other components of the oscillator are mounted in the receiver chassis, while the plate coil L_2 is in the Needle Cartridge with the vane and needle assembly. The coil is fixed and has 40 turns of No. 40 wire (approximate DC resistance $2\frac{1}{2}$ ohms). The stainless steel vane, which is in the field of the coil, is spot welded to the osmium-iridium tipped stylus.

Any movement of the stylus will cause a corresponding movement of the vane. As the stylus and vane follow the modulations in the record, changes in the mutual inductance between the vane and coil occur (see Fig. 4). In position 2 the vane is at rest; and a constant RF voltage appears across the plate coil. As the vane is set in motion and reaches position 1, it is at its greatest outward swing from the coil, resulting in low mutual inductance, low reflected resistance, higher Q, and a higher RF voltage across the coil. In position 3 it is at its greatest inward swing; resulting in a high mutual inductance, high reflected resistance, lower Q and a lower RF voltage. It can be seen that the amplitude of the RF voltage which appears across the coil will vary with changes in Q, satisfying the condition for amplitude modulation. The position of the vane changes both the Q and L of the coil. Changes in L shift the frequency slightly, and a certain amount of frequency modulation is present, but since there is no frequency discrimination it remains undetected.

Since the grid and plate coils are part of a single tuned circuit, any variations of amplitude of the RF voltage brought about by the changes in Q across the plate coil will also appear across the grid Coil L_1 causing a shift in the average plate current through the plate load resistor

across which the audio output voltage is developed. Plate bend detection takes place since only the positive half of the grid swing causes an increase in the average plate current. These changes in the average plate current appear as audio voltage across the plate load resistor.

The 2.5 Mc. RF voltage and the audio voltage both appear at the plate of the oscillator triode. R_2 , C_4 and C_5 filter out the RF voltage allowing only the audio component to the grid of the phono amplifier where it is amplified and reproduced by the loud-speaker.

LUBRICATION

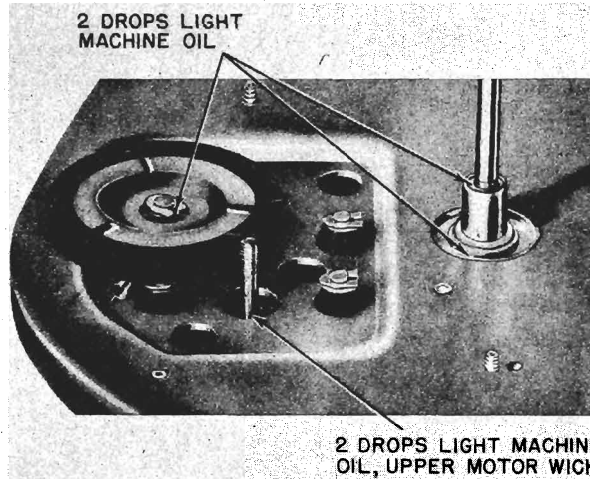


Fig. 5. Lubrication Top of Record Changer.

Sta-Put grease No. 512 (light grease of the vaseline type) and light machine oil of No. 10 consistency are used for lubrication throughout.

Figures 5 and 6 indicate the points to be lubricated and the type of lubricant to use. The Motor has two oil wicks which should be saturated with oil. The Record Spindle Guide Bearing, Idler Wheel Bearing, Lower Drive Shaft Bearing, Drive Shaft Thrust Bearing and the Motor Bearings are of the OILITE type and require very little attention. If squeaks develop, be certain that they are not caused by friction between the Spindle and records on the Turntable. A thin coat of wax on the Spindle will remedy this condition.

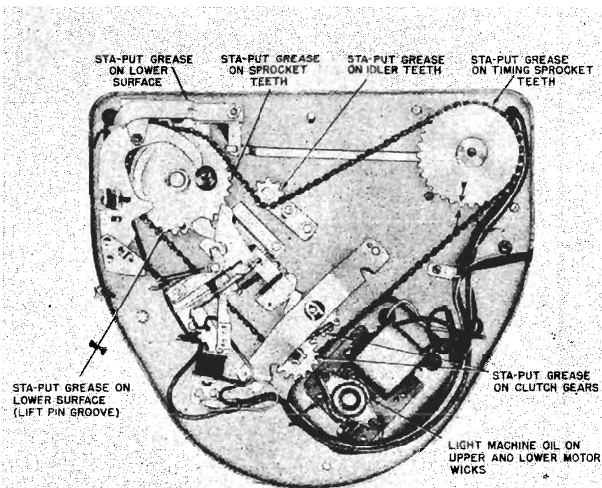


Fig. 6. Lubrication Bottom of Record Changer.

ADJUSTMENTS

1. Tone Arm Set Down Adjustment.

The Tone Arm Set Down Adjustment determines the landing position of the needle on the starting groove of the record. The adjustment screw can be reached with a screwdriver (Fig. 7). The tone arm must be held in the rest position while the adjustment is made. Clockwise rotation of the screw moves the tone arm in, while counter-clockwise rotation moves it out.

2. Position Trip Adjustment.

The Position Trip does not depend on an eccentric groove in the record to start the record change cycle, but will trip the mechanism whenever the needle comes within a pre-determined distance from the Spindle. Older type records that do not have an eccentric groove can in most cases be played automatically by the proper adjustment of the Position Trip. Under normal conditions with the needle approximately $1\frac{7}{8}$ " from the center of the Spindle, adjust the Position Trip Adjustment Screw (Fig. 7) until the trip switch contacts close. This distance is generally satisfactory since no modern record will be cut off before it has completed its play, and none will fail to trip the mechanism at the end. In special cases, screw the Position Trip Adjustment Screw clockwise for earlier tripping and counter-clockwise for later tripping as the individual case may be.

It may be impossible to find an adjustment that will always trip the mechanism and never cut off on all type records, and in these special cases the record must be played manually.

3. Trip Switch Adjustment.

As the record is played, the ratchet on the tone arm pivot shaft engages the trip pawl. The oscillating action developed by the eccentric groove on the record closes the trip switch contacts and allows the solenoid to become energized. The magnetic flux attracts the trip lever which moves the pawl pusher lever from the path of the clutch pawl. This allows the clutch to engage and start the next cycle.

The gap between the trip switch contacts should be approximately $\frac{1}{16}$ inch. If the spacing is incorrect, bend the contact spring. To adjust the contact spring tension, insert a screwdriver between the contact and guide springs and bend the contact spring so that an approximate pressure of one ounce is necessary to move the contact spring from the guide spring. Be certain that the contact spring exerts some pressure on the guide spring after adjustment.

The spacing between the trip magnet solenoid and trip lever should be approximately $\frac{3}{32}$ ". (See Fig. 7.)

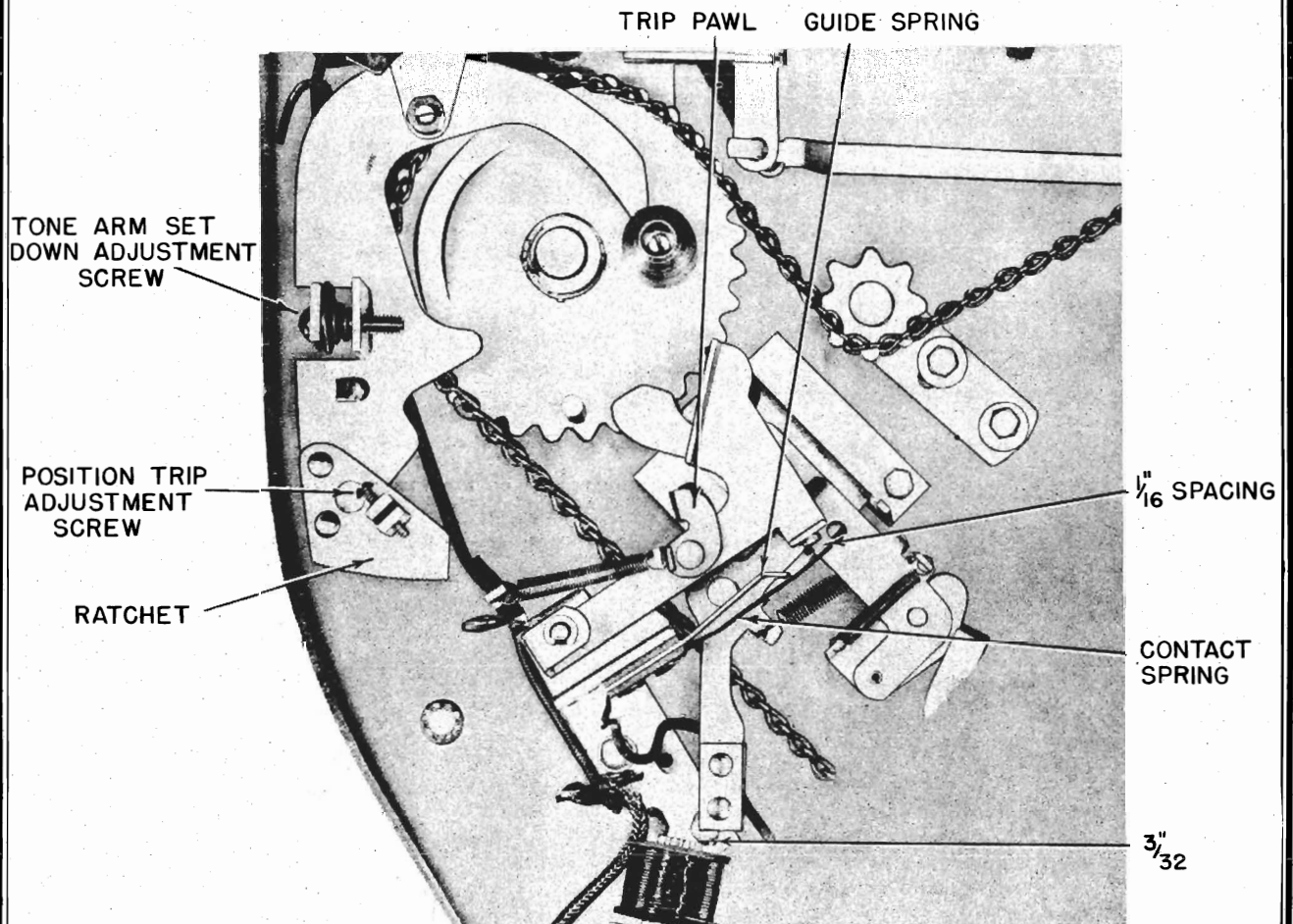


Fig. 7. Tone Arm Set Down, Position Trip and Trip Switch Adjustments.

MODEL S-14001

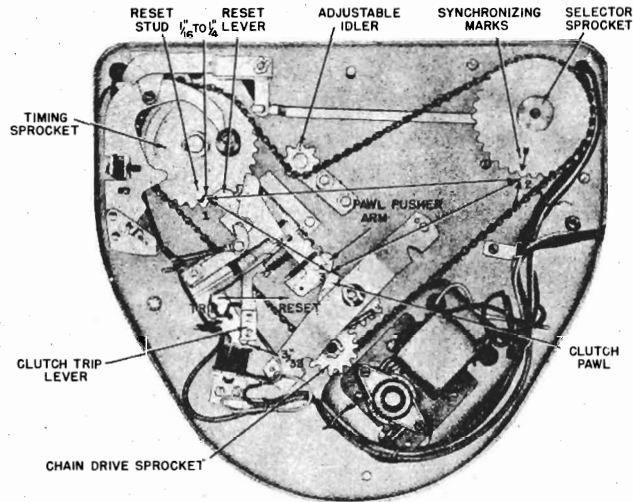


Fig. 8. Synchronization.

4. Synchronization.

A properly timed changer drops records on the turntable when the tone arm is at its greatest outward swing. Improper timing results in the records hitting the tone arm. The record changer is kept in time by the drive chain. If the chain is removed, the changer must be synchronized.

Fig. 8 indicates the correct position of the timing sprocket, selector sprocket and the clutch. To synchronize, study Fig. 8 and proceed as follows:

1. Reset the clutch trip lever.
2. Turn the timing sprocket until the reset stud is approximately $\frac{1}{16}$ " from the reset lever (1). Turn the selector sprocket until the synchronizing mark lines up with the mark on the base plate (2). THESE POSITIONS MUST BE MAINTAINED DURING THE NEXT OPERATION.
3. Thread the chain over the timing sprocket, chain drive sprocket, adjustable idler, selector sprocket and set the adjustable idler for medium tension of the chain. Check the position of the synchronizing marks and the reset stud.
4. Remove the retaining washer and lift the chain drive sprocket until the gears disengage.
5. Turn the clutch until the clutch pawl touches the pawl pusher arm (3).
6. Lower the chain drive sprocket until it engages the clutch gears and reinsert the retaining washer.

5. Tone Arm Height Adjustment.

The Tone Arm vertical rise is governed by the Lift Pin. The Lift Pin is adjustable (see Fig. 9). Too long a Lift Pin will cause the Tone Arm to hit the underside of the records on the Spindle. If the Lift Pin is short the needle will not clear twelve records on the Turntable. To make the proper adjustment, trip the Clutch by hand and rotate the Turntable clockwise until the Tone Arm starts to swing toward the Spindle. Gently push the Tone Arm as close to the Spindle as it will go, place a record over the Spindle and observe the spacing between it and the Tone Arm. The spacing "A" (Fig. 10), should be approximately the thickness of a record. If the spacing is incorrect, lift the Tone Arm, remove the Lift Pin, and adjust the Lift Pin to the proper length.



Fig. 9. Lift Pin.

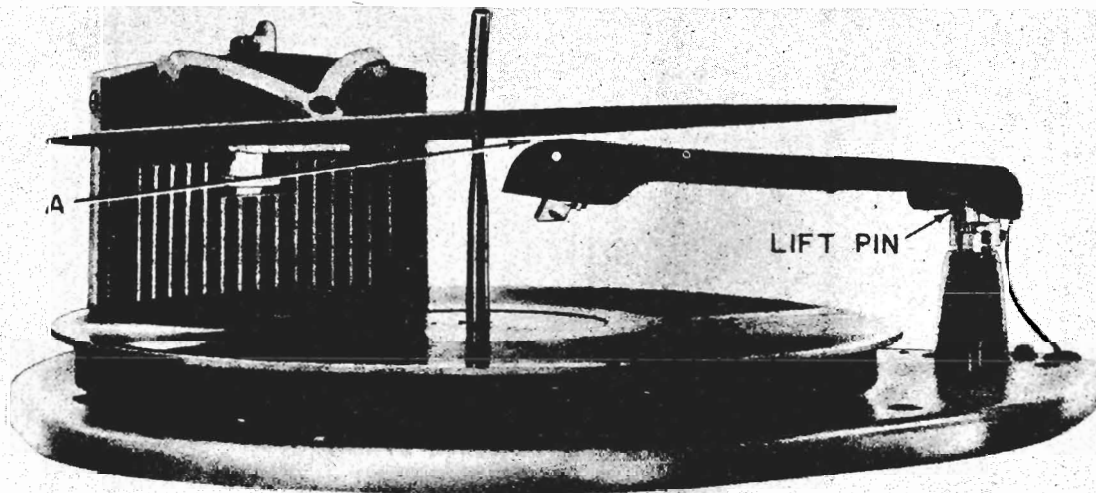


Fig. 10. Tone Arm Height Adjustment.

MODEL S-14001

REMOVING THE TURNTABLE

Hold the clutch by inserting a wide blade screwdriver against the spindle bracket and a segment of the drive plate. Apply a twisting, pulling force to the turntable.

Before seating the turntable, be certain that the idler wheel is pushed inside the turntable rim.

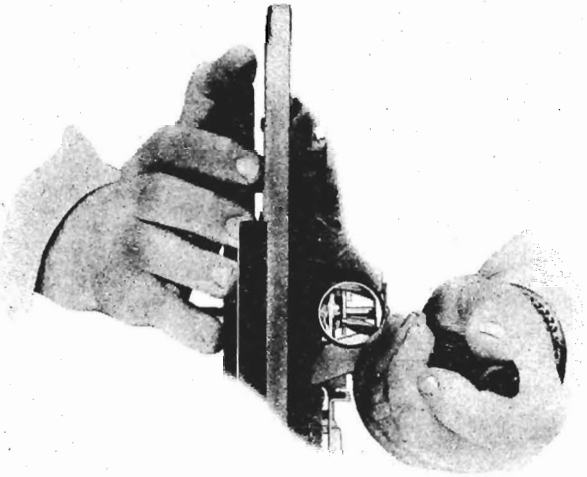


Fig. 11. Removing the Turntable.

REPLACING THE MOTOR

When a replacement Motor is ordered, be certain that the line voltage and frequency of the receiver are given.

To replace the Motor, unsolder the connecting leads, remove the Turntable, the three retaining washers and allow the Motor to drop out. When the Motor is installed do not draw the connecting leads tight as this will prevent the Motor from "floating" on its mounts. Be certain that the retaining washers are crimped and the leads securely soldered and taped.

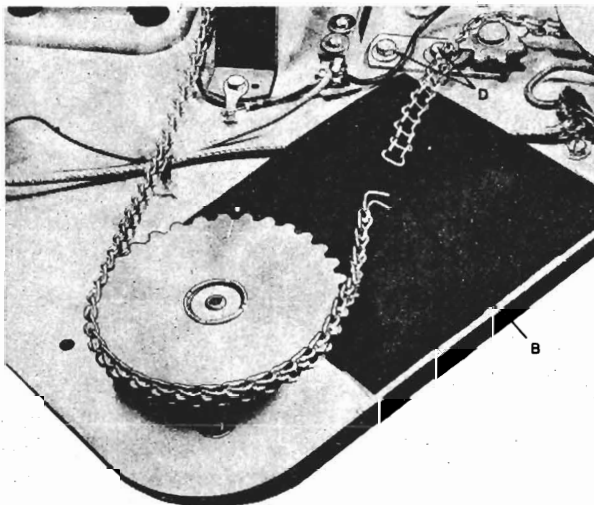
REPLACING THE CHAIN

Fig. 12. Replacing the Chain.

The chain may be removed by loosening the adjustable idler (Screws "D", Fig. 12), and opening one of the links (B) It will be noted that on some models the open ends of the links face inward while on others outward as in Fig. 12. The reason for this is to get the quietest operation. Normally the open ends of the links will face outward with all replacement chains.

After the chain is threaded in place, carefully close the open link and be certain that there is no stiffness in its action. Read the paragraph on Synchronization before the chain is permanently installed.

TROUBLE SHOOTING**SQUEAKS OR NOISES DURING PLAYING OF RECORDS.**

a. Friction between the records on the turntable and the spindle will occasionally cause squeaks. A thin coat of wax applied to the spindle will remedy this condition.

b. Check lubrication.

MECHANISM STARTS SLOWLY AND MOTOR GETS HOT.

a. Check line voltage and frequency.

b. Check lubrication.

c. Motor windings damaged.

d. Room temperature abnormally low.

PRESSING RECORD CHANGE BUTTON ON RECEIVER PANEL DOES NOT START RECORD CHANGE CYCLE.

a. See that the AUTO-MAN-OFF switch is set to AUTO.

b. Check Record Change Switch.

c. Check electrical continuity of solenoid circuit.

d. Check the solenoid energizing voltage.

MOTOR FAILS TO RUN EVEN WHEN IT IS DISCONNECTED FROM CHANGER AND PROPER VOLTAGE AND FREQUENCY APPLIED DIRECTLY TO THE TWO INPUT LEADS OF THE WINDING.

a. Open windings.

b. Damaged or frozen bearings.

c. Lower Bearing Support Bracket bent. Remove and straighten bracket—Re-center armature.

RUMBLE AND MICROPHONICS DURING REPRODUCTION.

a. Changer not "floated" properly. Remove packing strip. Loosen mounting bolts.

b. Motor retaining rings rubbing on the idler wheel.

c. Motor leads pulled too tight preventing motor from "floating" freely.

d. Noisy phono oscillator tube.

e. Impression on Idler Wheel.

NEEDLE SETS DOWN PROPERLY ON RECORD BUT SLIDES OVER THE RECORD GROOVES.

a. Cabinet tilted.

b. Badly worn or broken needle cartridge.

NEEDLE FAILS TO CLEAR MAXIMUM LOAD OF RECORDS ON THE TURNTABLE.

a. Check Tone Arm height adjustment. (Adjustment 5.)

CHANGER CYCLES WITH AUTO-MAN-OFF SWITCH ON MAN.

a. Check AUTO-MAN-OFF switch.

b. Reset stud does not engage clutch reset lever.

MODEL S-14001

TONE ARM FALLS OFF RECORD.

- a. Check Tone Arm set down adjustment. (Adjustment 1.)
- b. Check Tone Arm Pivot Bracket.
- c. Changer not level.

TONE ARM SET-DOWN POSITION VARIES.

- a. Check Tone Arm Brake and Spring.
- b. Loose Tone Arm mounting screw.

RECORD IS NOT HEARD ALTHOUGH CHANGER OPERATES.

- a. See that the Phono Radio switch is on Phono.
- b. Check receiver audio by listening to radio.
- c. Check the phono oscillator tube.
- d. Check Needle Cartridge.
- e. Check Tone Arm Housing for broken leads.

TONE ARM SETS DOWN TOO FAR IN OR OUT ON RECORD.

- a. Check Tone Arm set down adjustment. (Adjustment 1.)

CHANGER CONTINUES TO CYCLE.

- a. Check the trip switch adjustment. (Adjustment 3.)
- b. Check Record Change switch.
- c. Clutch release mechanism sticks.

CHANGER WILL NOT CYCLE UPON COMPLETION OF RECORD.

- a. See that the AUTO-MAN-OFF switch is set to AUTO.
- b. Be certain that the record has an eccentric center groove.
- c. Check the Trip Switch.
- d. Check the solenoid energizing voltage.

SQUEAKS WHEN CHANGER IS IN CYCLE.

- a. Friction between Lift Pin and Timing Sprocket. Apply a thin coat of Sta-Put.

MOTOR RUNS BUT TURNTABLE SLIPS OR STOPS.

- a. Turntable not fully seated. Tap gently.

NUMERICAL PARTS LIST

| | | | |
|---------|----------------------------------------------------------------------------------------|---------|-------------------------------------------------------|
| S-10732 | Idler Assembly | 54-30 | No. 8-32 x 5/16" Hex Nut—Steel N.P. |
| S-11105 | Record Ejector Plate and Pin Assembly | 54-66 | No. 10-32 x 5/16" x 1/8" Hex Nut—Steel N.P. |
| S-11106 | Record Support Plate—Shaft and Pin Assembly | 56-128 | Groove Pin (Sprocket Bushing) |
| S-11107 | Record Support and Ejector Bracket Assembly | 56-226 | Tone Arm Lift Pin—Lower |
| S-11109 | Selector Sprocket and Bushing Assembly | 56-227 | Tone Arm Lift Pin—Upper |
| S-11111 | Turntable Shaft and Bearing Assembly | 57-1323 | Turntable Shaft Plate |
| S-11118 | Idler Wheel Assembly | 58-158 | Five Prong Plug (for S-14172) |
| S-11441 | Record Change Lever and Stud Assembly | 63-1744 | 100 Ohm Carbon Resistor 1/2 W. Insulated |
| S-11473 | Cobra Needle Cartridge | 69-38 | No. 8-32 x 3/4" R.H.M.S.—Steel N.P. |
| S-11657 | Idler Stud and Washer Assembly | 69-43 | No. 8-32 x 3/8" R.H.M.S.—Steel N.P. |
| S-12633 | Needle Cartridge Socket and Cable Assembly | 73-90 | No. 8-32 x 5/16" Hex Head Slotted Set Screw—Conopoint |
| S-13060 | Cobra Tone Arm Hinge Plate and Swivel Bracket Assembly | 73-99 | No. 8-32 x 1/4" Slab Head Set Screw—Steel Conopoint |
| S-13062 | Cobra Tone Arm Hinge Plate, Swivel Bracket, Needle Cartridge Socket and Cable Assembly | 73-102 | No. 8-32 x 7/16" Slab Head Set Screw—Steel—Conopoint |
| S-13466 | Cobra Tone Arm Assembly | 76-409 | Record Ejector Cam Shaft |
| S-13894 | Clutch Pawl Assembly | 80-367 | Toggle Spring (S-11106) |
| S-13895 | Drive Sprocket and Bushing Assembly | 80-368 | Idler Wheel Tension Spring |
| S-13896 | Turntable Drive Shaft Bearing Assembly | 80-448 | Pressure Arm Spring |
| S-13900 | Timing Sprocket Assembly | 80-531 | Brake Spring |
| S-13901 | Trip Switch Assembly | 80-538 | Landing Adjustment Spring (S-13902) |
| S-13902 | Tone Arm Pivot Shaft and Bracket Assembly | 80-572 | Clutch Spring (S-13894) |
| S-13903 | Clutch Release Arm Assembly | 80-574 | Pawl Pusher Bracket Spring (S-13903) |
| S-13913 | Magnet Coil Assembly | 80-582 | Pawl Spring (S-13901) |
| S-13931 | Turntable Assembly | 80-584 | Tone Arm Lift Pin Spring |
| S-13933 | Main Base Plate Assembly | 80-605 | Cobra Cartridge Socket Tension Spring |
| S-14140 | Record Spindle Assembly | 80-653 | Trip Arm Spring (S-13903) |
| S-14172 | Cable Assembly | 83-1349 | Tone Arm Shipping Strip |
| S-14581 | Trip Lever Mounting Bracket Assembly | 83-1453 | Two Lug Terminal Strip |
| S-14582 | Trip Lever and Pawl Assembly | 85-371 | 3 Position Slide Switch |
| 12-1216 | Tone Arm Pivot Bracket | 93-10 | .025 x .260 x 5/8" Steel Washer—Cadmium |
| 12-1390 | Magnet Mounting Bracket | 93-216 | .015 x .255 x 7/16" Steel Washer—Cadmium |
| 12-1402 | Record Spindle Support Bracket | 93-125 | No. 6 Int. Shakeproof Lockwasher No. 1206 |
| 17-81 | Cable Clamp | 93-126 | No. 8 Int. Shakeproof Lockwasher No. 1208 |
| 23-22 | AC Wire Connector | 93-617 | Sprocket Shaft Retaining Washer |
| 24-445 | Record Ejector Housing Cover | 93-673 | Idler Wheel Stud Washer |
| 43-152 | Record Ejector Housing | 93-677 | Idler Wheel Stud Fishpaper Washer (Large) |
| 43-157 | Tone Arm Support Housing | | |
| 46-695 | Record Selector Knob | | |

| | | | |
|---------|----------------------------------------------------------|---------|--------------------------------------------------------------------------|
| 93-678 | Idler Wheel Stud Fishpaper Washer (Small) | 114-88 | No. 8-32 x 1/2" Hex Acorn Hd. M.S.—Steel N.P. |
| 93-679 | Idler Wheel Stud Felt Washer (Large) | 114-201 | No. 8-32 x 5/16" Hex Head Slotted—STAN-TAP—Thread Forming Screw—Cad. Pl. |
| 93-764 | Spring Washer—Shakeproof | 114-248 | No. 6-20 x 5/16" Hex Head Slotted—Self Tapping Screw |
| 93-900 | Fibre Washer (Motor Mtg.) | 117-133 | Record Selector Lever |
| 93-901 | Spring Washer Shakeproof | 118-40 | Record Selector Link |
| 93-903 | Steel Washer—Copper Flash (Motor Mtg.) | 125-45 | Rubber Grommet |
| 93-905 | Spring Washer—Shakeproof No. 3502-16-01 | 125-60 | Pressure Arm Grommet |
| 94-415 | Tone Arm Locating Bushing | 125-61 | Rubber Grommet |
| 112-450 | No. 4-40 x 1/8" Phillips Binding Hd. M.S. Steel Cad. Pl. | 128-20 | Record Ejector Cam |
| 112-451 | No. 8 x 5/16" B.H. Self Tapping Screw—Stan-Tap—Cad. | 128-40 | Record Selector Cam |
| 112-581 | No. 6 x 3/8" R.H. Self Tapping Screw | 141-108 | A.C. Motor—60 Cycles |
| 112-619 | Cobra Tone Arm Housing Mtg. Screws | 148-83 | Cobra Tone Arm Housing |
| 112-687 | Pivot Screw | 148-87 | Record Pressure Arm |
| 112-688 | No. 8 x 3/8" Flat Hd. Screw—Shakeproof Type 25—Cad. Pl. | 166-41 | Rubber Bumper |
| 112-689 | No. 8 x 3/8" R.H. Screw—Shakeproof Type 25—Cad. Pl. | 188-27 | Record Spindle Retaining Washer |
| 112-706 | No. 4-40 x 3/16" Ig. R.H.M.S. (Sems)—Steel N.P. | 188-32 | Retaining Ring |
| 112-719 | No. 6 x 3/8" Flat Head Screw—Self Tapping. | 188-52 | Retaining Ring |
| | | 214-5 | Sprocket Drive Chain |

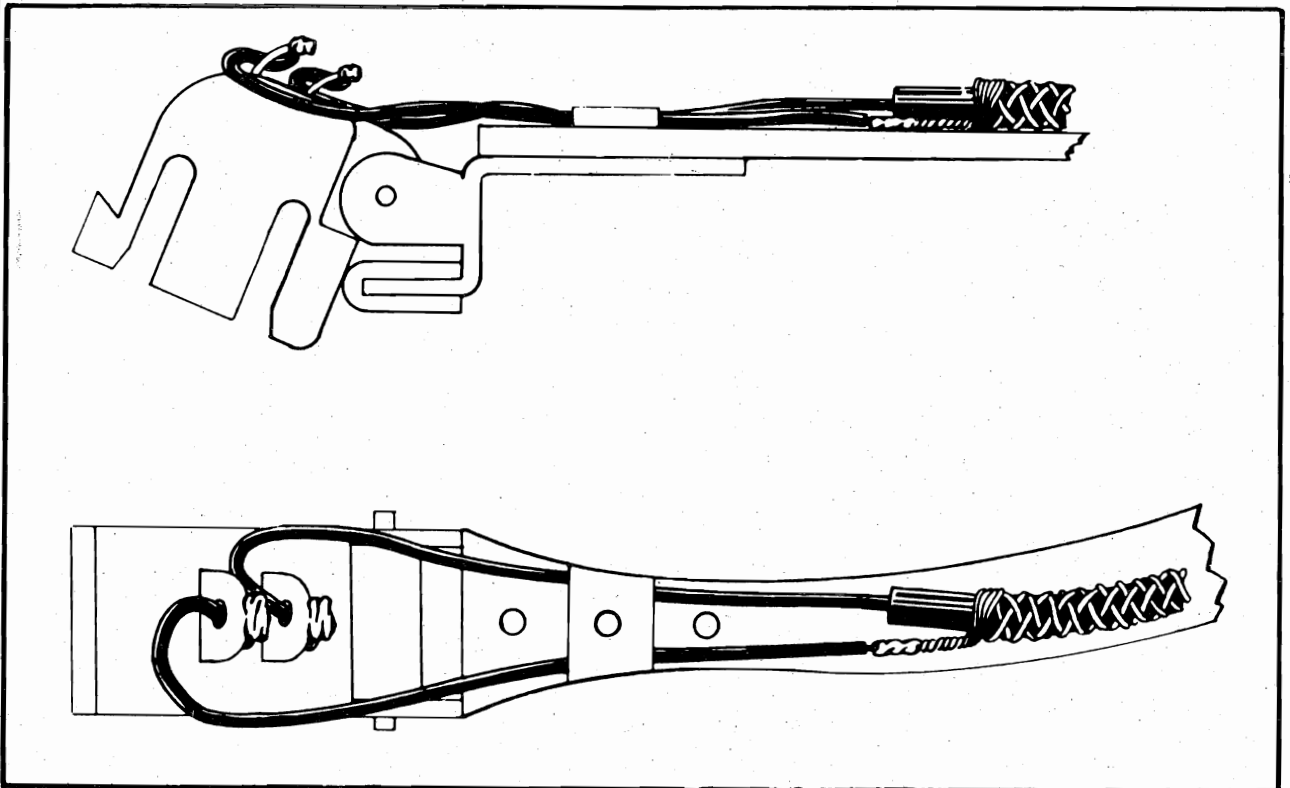


Fig. 13. Needle Cartridge Socket Connections.

Fig. 13 shows how the leads are connected to the Needle Cartridge Socket. The lead and insulation are run through the hole in the contact and the lead is soldered with a light soldering iron. Great care must be exercised, and very little heat applied as the socket is made of lucite and will burn easily. The complete lead, socket and bracket are supplied as S13062.

MODEL S-14001

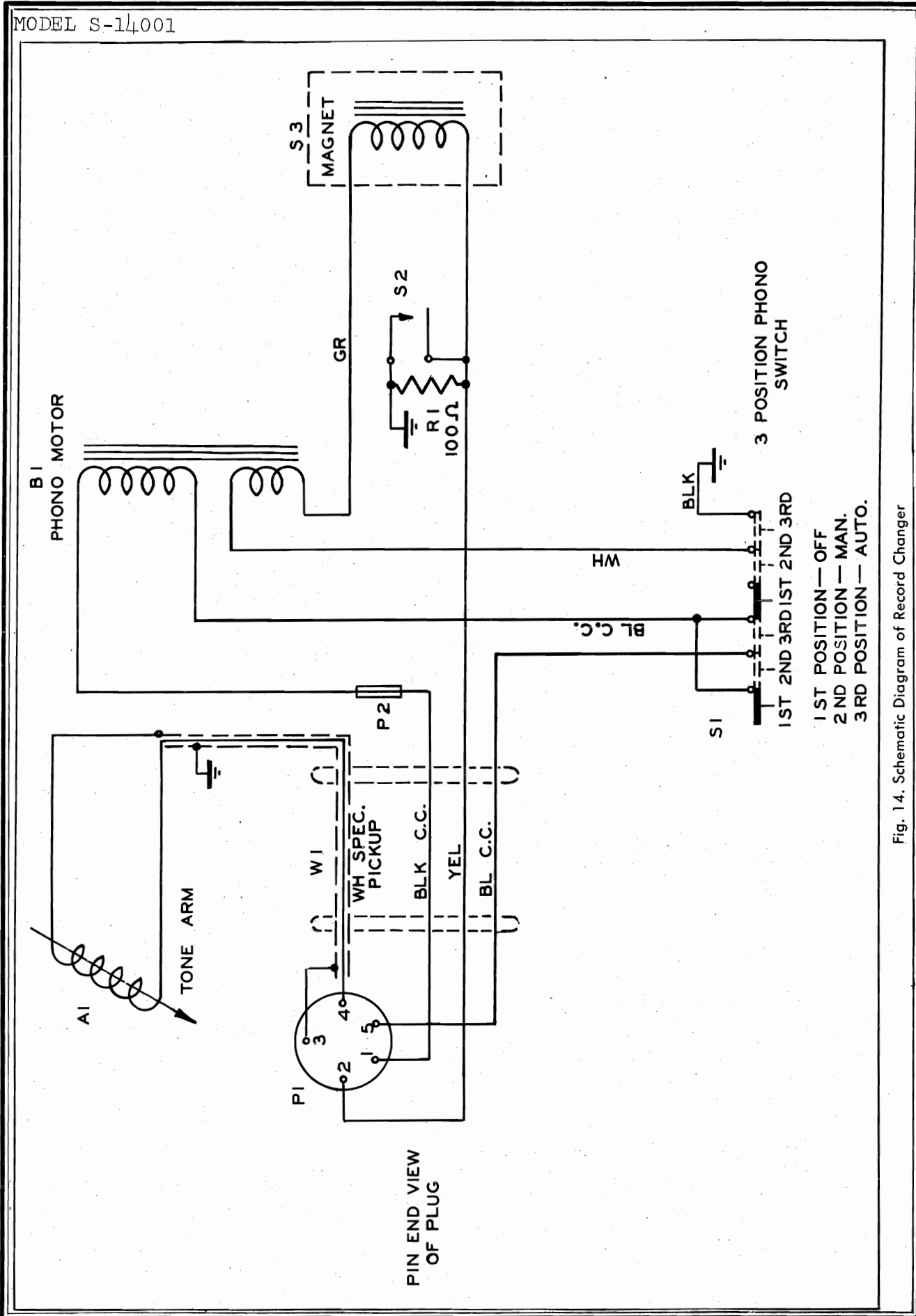


Fig. 14. Schematic Diagram of Record Changer

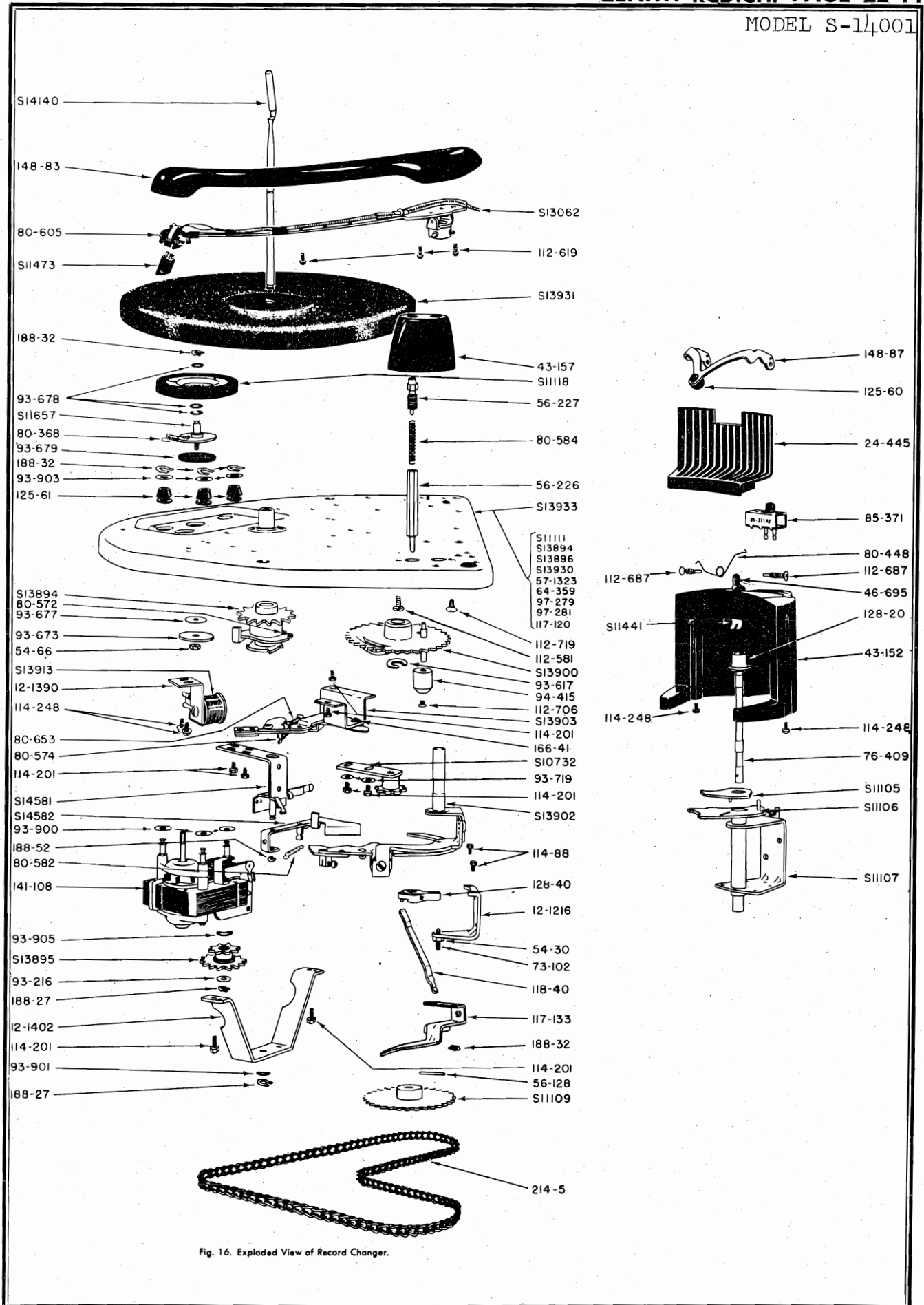


Fig. 16. Exploded View of Record Changer.

MODELS S14012, S14014,
S14019, S14021

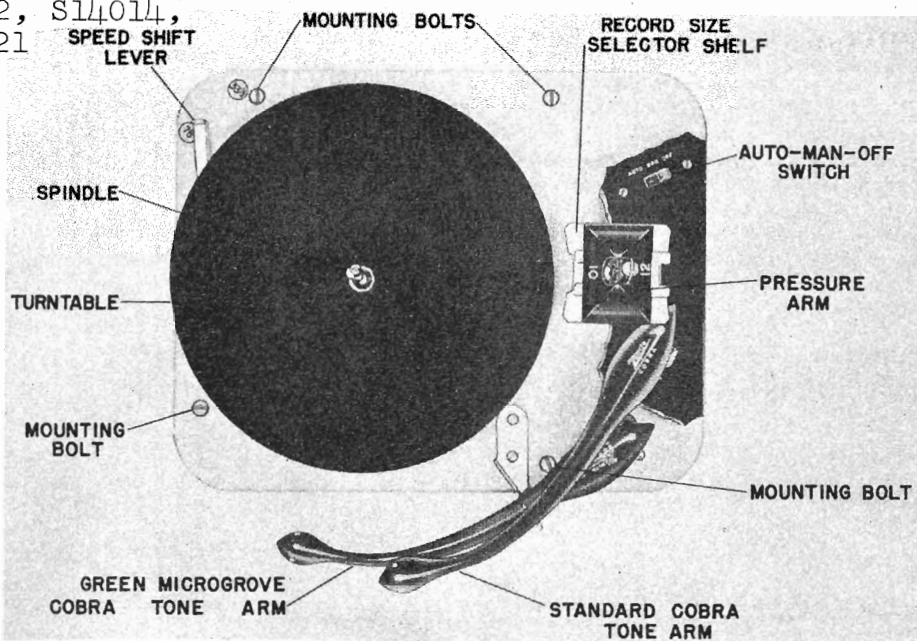


Fig. 1. S14012 and S14014 Record Changers.

GENERAL

The Models S14012 and S14014 record changers are used in Zenith Models 9H995RLP and 6R980LP respectively. These changers are designed to play 12 ten inch or 10 twelve inch 78 RPM records automatically. They will play 33-1/3 RPM records manually. Odd size and warped records must be played manually. Mechanically the changers are alike. There are slight electrical differences. Model S14012 receives the solenoid energizing voltage from the receiver proper while the S14014 supplies its own energizing voltage from a separate winding on the motor. When servicing these changers, check the schematic diagrams for electrical differences. The mechanical operation and adjustments of both changers are identical. To load for automatic 78 RPM operation, set the record size selector shelf to either ten or twelve, depending on the size of the

records to be played. Lift the pressure arm and place a stack of records over the spindle. Lower the pressure arm until it rests on the record stack. Set the AUTO-MAN-OFF switch to AUTO. Move the speed shift lever to 78 RPM and press the record change button on the receiver panel. The record changer will play the complete selection of records, and will repeat the last record until turned off. For manual operation set the AUTO-MAN-OFF switch to MAN, place a record on the turntable and set the needle on the starting groove of the record. For 78 RPM records use the standard tone arm and place the speed shift lever to 78 RPM. For 33-1/3 RPM records use the green tone arm and place the speed shift lever to 33-1/3 RPM. To turn the changer off, set the AUTO-MAN-OFF switch to OFF, and place the tone arm in the rest position.

DESCRIPTION OF CYCLING

The motor drives the turntable thru the media of shafts and idler wheels. Closing the contacts of the trip switch or the record change switch allows current to flow through the solenoid. The magnetic field of the energized solenoid attracts the trip pawl lever which releases the gear pawl tooth and allows it to engage the rotating turntable gear. This action starts the clutch gear to turn. A stud on the clutch gear engages the tone-arm lift lever which engages the tone arm stud and raises the tone arm. The tone arm lift lever also applies the tone arm brake which prevents coasting and erratic landing of the needle. The clutch gear moves the tone arm actuating lever and laterally swings the tone arm off the turntable. During the lateral swing of the tone arm, the record ejector link and arm assembly operates the record push plate and when the tone arm moves to its maximum outward position, the record push plate ejects the record and allows it to drop on the turntable. The clutch gear then moves the tone arm actuating lever which swings the tone arm over the starting groove of the record. The tone arm swings 1 inch nearer the spindle with 10 inch records than it does with

12 inch. This difference in inward swing is controlled by the discriminator lever assembly. When the record size selector shelf is turned to the 10 or 12 inch position, its shaft moves the discriminator cam and sets the discriminator lever assembly for the correct inward swing of the tone arm. After the tone arm swings over the starting groove of the record, the tone arm lift lever lowers it and releases the brake. As the clutch gear completes the revolution, the gear pawl tooth bracket hits the trip pawl and the action removes the gear pawl tooth from the path of the turntable gear, causing the clutch gear to stop thus completing the cycle.

The velocity trip depends on the ratio of oscillations of the trip switch contact to the rate of movement of the tone arm. As the record is played, the tone arm lever moves slowly inward. The oscillating lever comes in contact with the ratchet on the tone arm lever and then moves out before the ratchet can drag the oscillating lever and close the trip switch contacts. When the record is completed and the needle enters the oscillating groove, the inward speed of the tone arm increases. This makes it impossible for the oscillating lever to move out of the ratchet in time and as a result is dragged inward, closing the trip switch contacts and starting the next cycle.

MODELS S14012,
S14014, S14019,
S14021

The S14012 and S14014 record changers use the famous Cobra pickup. On S14012, S14014 and S14019, use only a red cartridge in the red tone arm and only a green cartridge in the green tone arm. On S14021 which has a red tone arm use only a red-green cartridge. Previously published service manuals Z800 and Z801 explain in detail the theory and operation of the Cobra pickup. If these manuals are not available, they may be obtained from your Zenith distributor.

RECORD CHANGER MOUNTING CLIPS

Clamp on pivot clips are used to mount the record changer in the cabinet. The changer is released by applying an upward pressure to the slotted ends of the clips (see Fig. 3) until the clips pivot to a vertical position. When the changer is installed, the clips are pivoted back to the horizontal or holding position.

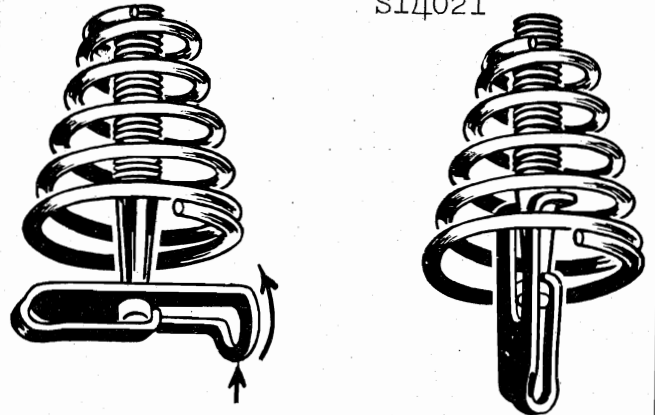


Fig. 3. Record Changer Mounting Clip.

LUBRICATION

Sta-Put grease No. 512 (light grease of the vaseline type) is used for lubrication throughout. Fig. 7 indicates the various lubrication points. Do not apply grease to the top surface or teeth of the clutch gear.

ADJUSTMENTS

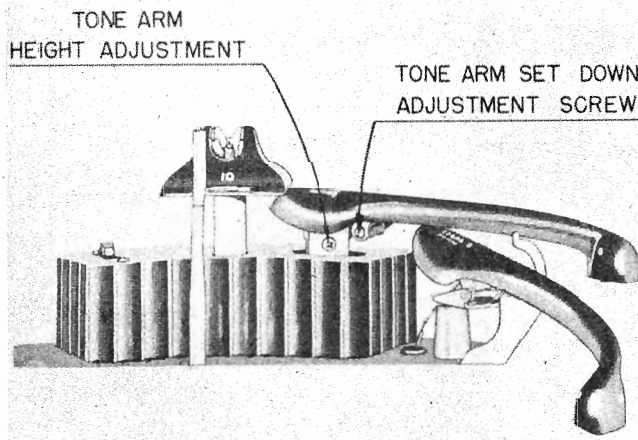


Fig. 2. Tone Arm Set Down and Height Adjustment.

TONE ARM SET DOWN ADJUSTMENT

The landing position of the needle on the record is determined by the setting of the tone arm set down adjustment screw (see Fig. 2). Clockwise rotation of the screw moves the tone arm in, while counter-clockwise rotation moves it out.

TRIP SWITCH ADJUSTMENT

The tone arm lever must be moved so that its ratchet does not engage the oscillating switch lever. With a pair of long nose pliers simultaneously bend the stationary contact and guide spring until the spacing between the trip switch contacts is 1/16 inch to 3/32 inch. The contact spring must always rest against the heavier guide spring after adjustment.

TONE ARM HEIGHT ADJUSTMENT

The tone arm height adjustment determines the vertical rise of the tone arm. If the tone arm does not rise sufficiently, the record changer will not play a full load of 12 ten inch records. If, on the other hand, the tone arm is raised too high, it may hit the records on the record shelf. Set the adjustment screw so that the needle clears 12 unwarped ten inch records on the turntable. The tone arm housing must not hit the underside of the records on the record shelf when the changer is cycled after adjustment.

SLAB HEAD SET SCREWS

For maximum rigidity, the spindle, discriminator cam and tone arm lever are locked in position with slab head screws. A slab head set screw wrench is available as Zenith part No. 68-8

REMOVING THE 78 RPM TONE ARM ASSEMBLY

The complete tone arm assembly can be removed by loosening the two slab head holding screws and pulling the unit out. When the tone arm assembly is installed, the cone points of the slab head screws must enter the indentations previously made. A new assembly does not have these indentations, and must be assembled as follows:

1. See that the changer mechanism is out of cycle.
2. Turn the tone arm set down adjustment screw (see Fig. 2) as far as it will go in the clockwise direction.

MODELS S14012, S14014,
S14019, S14021

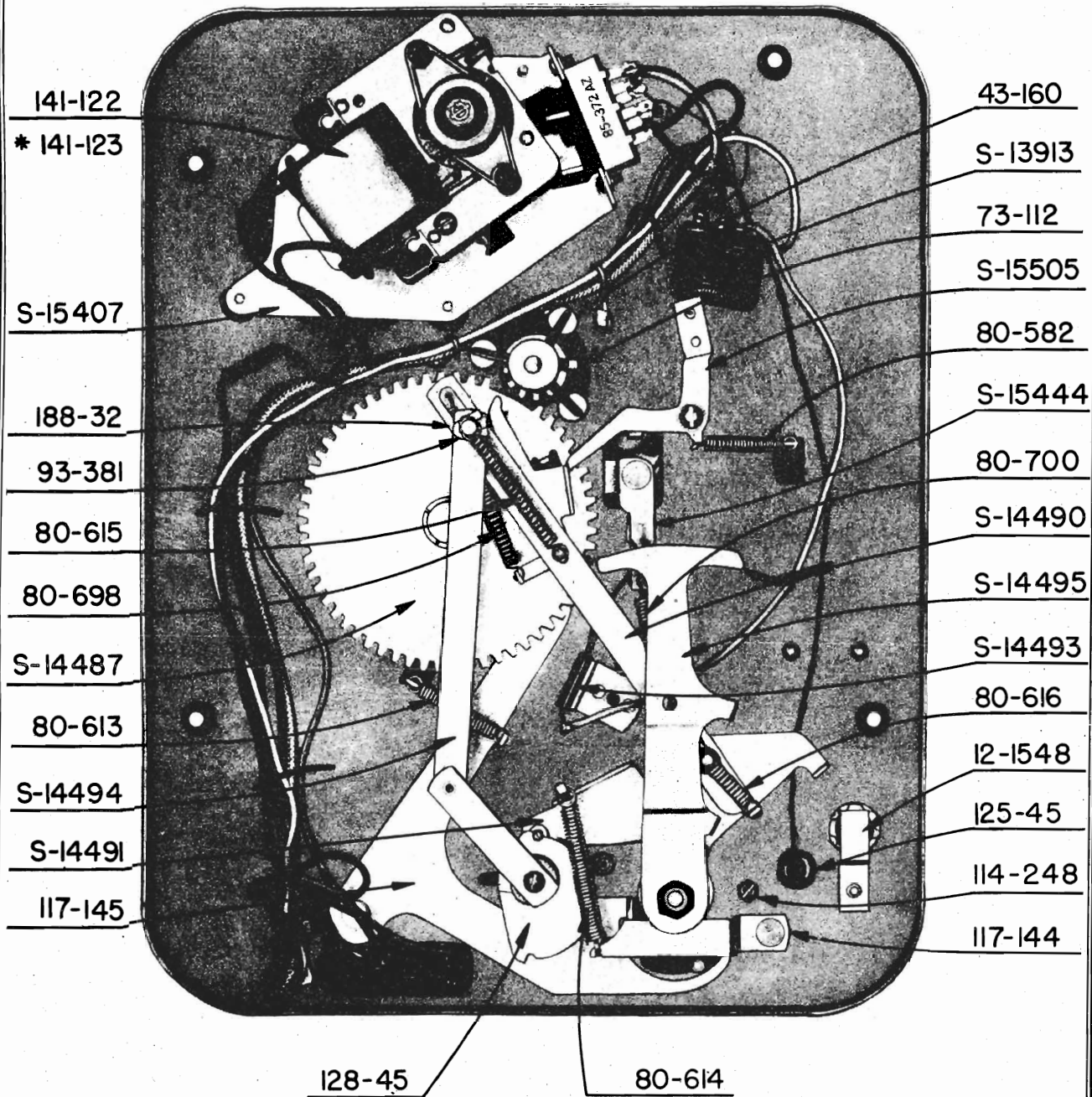


Fig. 4. Bottom View.

3. Insert the tone arm support shaft through its mounting hole.
4. Place a 12 inch record on the turntable and hold the Cobra tone arm housing against the edge of the record. Move the tone arm lever (Part No. S14495) to its maximum outward position. These two positions must be maintained during the next operation.
5. See that the tone arm lever bushing has approximately .005 inch play and tighten the slab head screws.
6. Adjust the tone arm set down adjustment screw (see Fig. 2) for proper landing of the needle.

REMOVING THE RECORD SHELF

The record shelf is removed by unscrewing the slab head screw at the bottom of its shaft and the machine screw which holds the record ejector link. When the unit is assembled, see that the changer is out of cycle and turn the slotted shaft until the record push off plate is retracted into its housing before attaching the record ejector link.

OPERATION OF DUAL SPEED MECHANISM

MODELS S14012,
S14014, S14019,
S14021

Figs. 5. & 6. illustrate the items involved in the two speed drive mechanism.

On 78 RPM operation the motor drive shaft comes in contact with idler wheel S15383 and in turn this idler wheel drives the turntable.

On $33\frac{1}{3}$ operation the motor drive shaft drives the idler wheel S15383. A flange on the lower portion of this idler wheel drives a second idler wheel S15382. This second idler wheel drives the slow speed drive plate on the turntable. See Fig. 6.

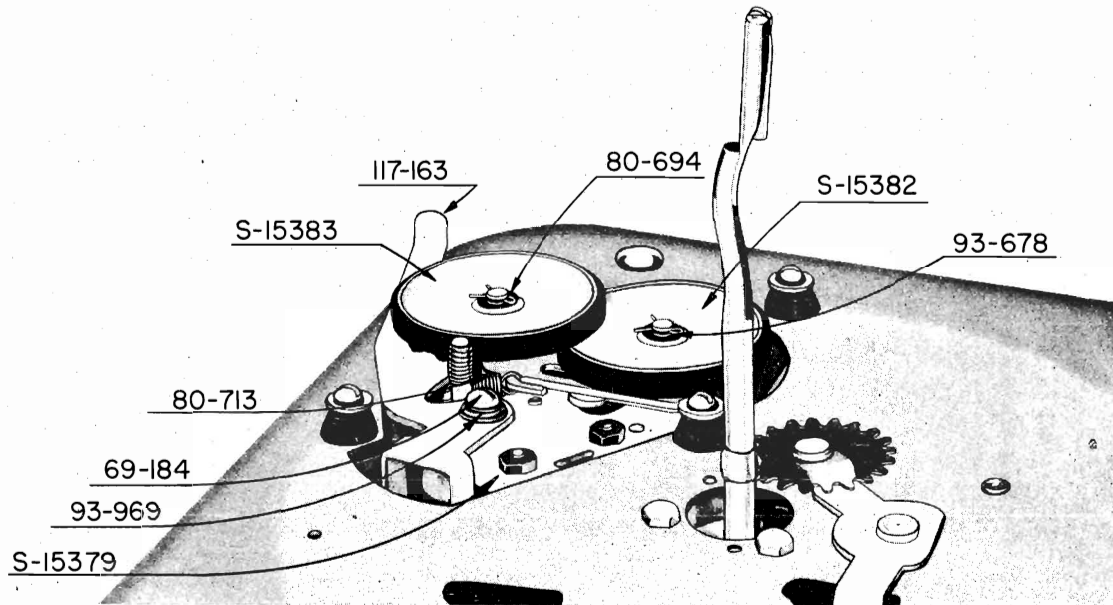


Fig. 5. Speed Changing Mechanism.

DRIVE SURFACE FOR
 $33\frac{1}{3}$ RPM OPERATION

TURNTABLE DRIVE SURFACE
FOR 78 RPM OPERATION

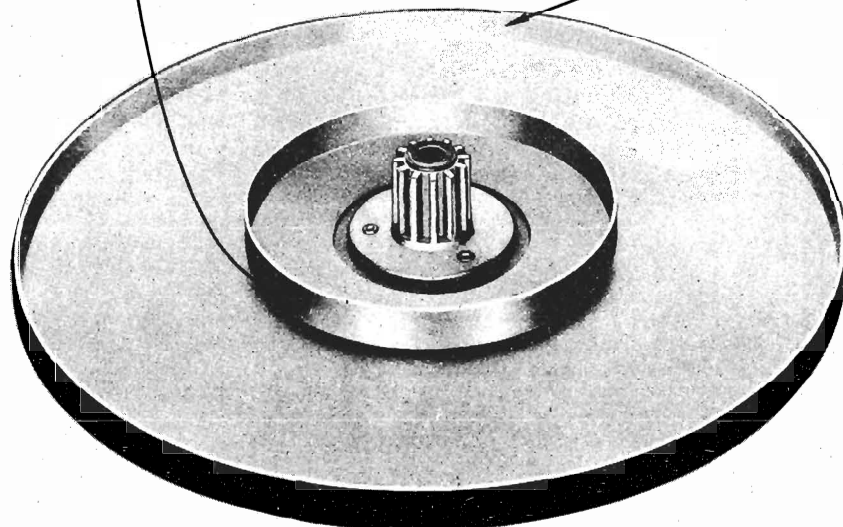


Fig. 6. Turntable Assembly S15411.

MODELS S14012,
S14014, S14019,
S14021

STA-PUT
GREASE

STA-PUT GREASE UNDERNEATH SURFACE
DO NOT APPLY GREASE TO TEETH OR
UPPER SURFACE OF GEAR

STA-PUT
GREASE

STA-PUT GREASE
ON SURFACE OF
CAM

STA-PUT
GREASE

STA-PUT
GREASE

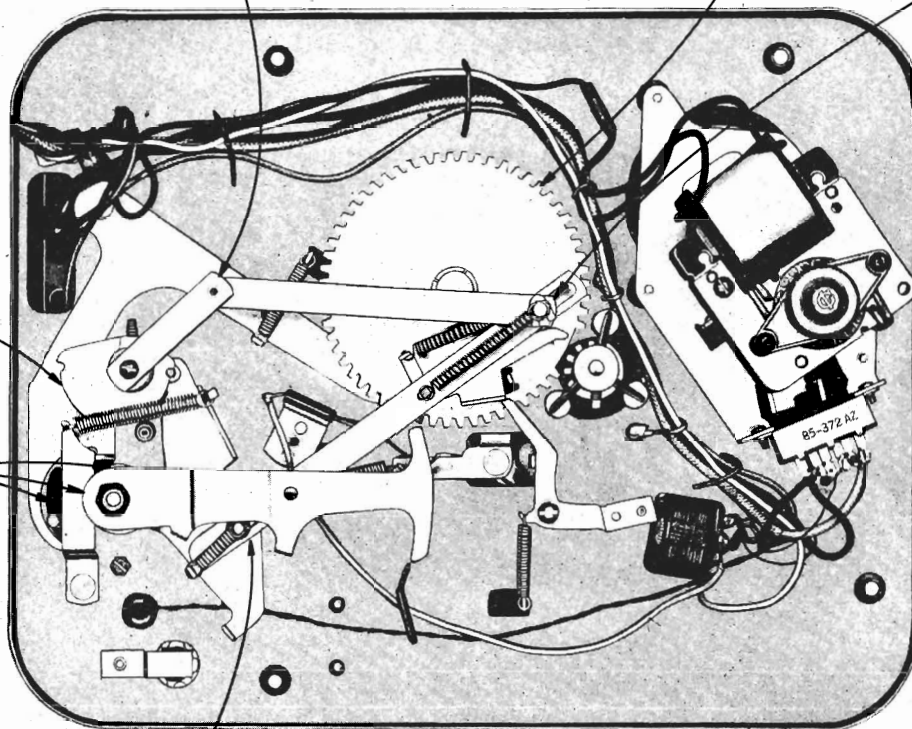


Fig. 7. Lubrication.

TROUBLE SHOOTING

SQUEAKS OR NOISES DURING PLAYING OF RECORDS.

- a. Friction between the records on the turntable and the spindle will occasionally cause squeaks. A thin coat of wax applied to the spindle will remedy this condition.
- b. Check lubrication.

RECORD IS NOT HEARD ALTHOUGH CHANGER OPERATES.

- a. See that the Phono Radio switch is on Phono.
- b. Check receiver audio by listening to radio.
- c. Check the phono oscillator tube.
- d. Check Needle Cartridge.
- e. Check Tone Arm Housing for broken leads.

PRESSING RECORD CHANGE BUTTON ON RECEIVER PANEL DOES NOT START RECORD CHANGE CYCLE.

- a. See that the AUTO-MAN-OFF switch is set to AUTO.
- b. Check Record Change Switch.
- c. Check electrical continuity of solenoid circuit.
- d. Check the solenoid energizing voltage.

RUMBLE AND MICROPHONICS DURING REPRODUCTION.

- a. Changer not "floated" properly. Remove packing strip. Loosen mounting bolts.
- b. Motor retaining rings rubbing on the idler wheel.
- c. Motor leads pulled too tight preventing motor from "floating" freely.
- d. Noisy phono oscillator tube.
- e. Impression on Idler Wheel.

NEEDLE FAILS TO CLEAR MAXIMUM LOAD OF RECORDS ON THE TURNTABLE.

- a. Check Tone Arm height adjustment.

STONE ARM SETS DOWN TOO FAR IN OR OUT ON RECORD.

- a. Check Tone Arm set down adjustment.

STONE ARM SET-DOWN POSITION VARIES.

- a. Check Tone Arm Brake and Spring.
- b. Tone Arm pivots loosely.

CHANGER CONTINUES TO CYCLE.

- a. Check the trip switch adjustment.
- b. Check Record Change switch.
- c. Trip Pawl sticks.

CHANGER WILL NOT CYCLE UPON COMPLETION OF RECORD.

- a. See that the AUTO-MAN-OFF switch is set to AUTO.
- b. Be certain that the record has an eccentric center groove.
- c. Check the Trip Switch.
- d. Check the solenoid energizing voltage.

SOLENOID FAILS TO TRIP MECHANISM.

- a. Check the pawl lever positioning stud. The tip of the pawl must be in approximately the same position in relation to the gear pawl tooth lever as indicated at "A" in Fig. 4. If the position is not the same as indicated, the positioning stud can be bent slightly.
- b. Tension on the trip pawl actuating spring too high.

MECHANISM JAMS.

- a. Burr or sharp point on the gear pawl tooth. Smooth out with a small file.

MODELS S14012,
S14014, S14019,
S14021

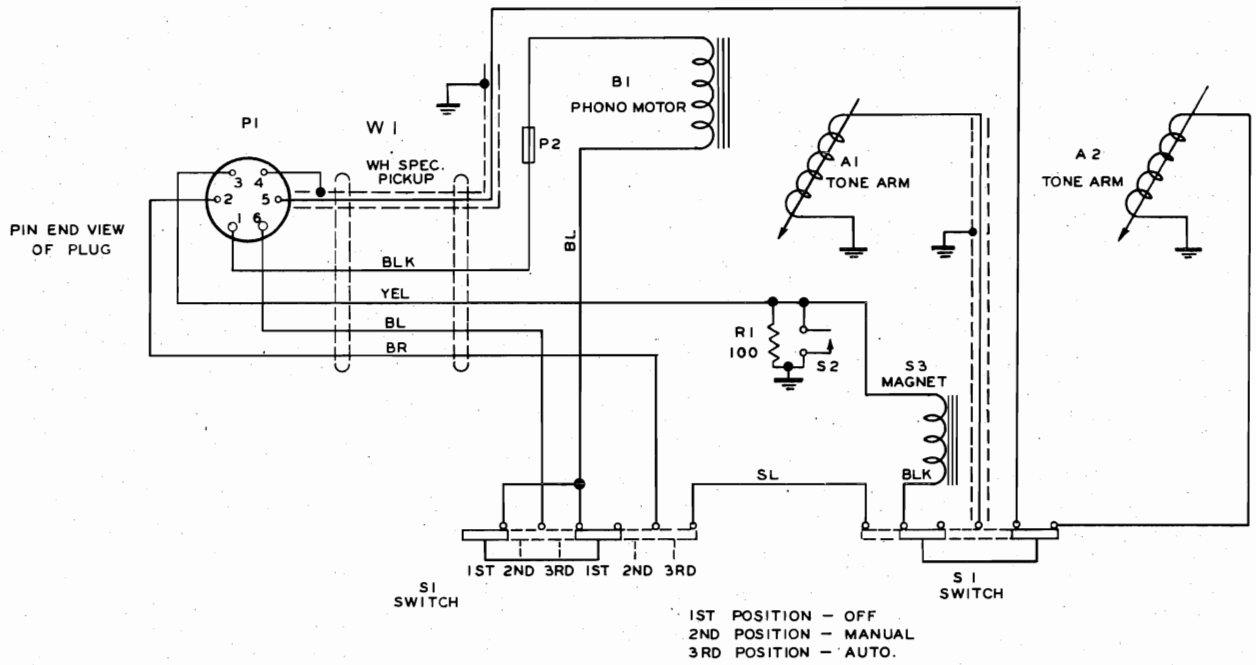


Fig. 8. Schematic Diagram S14012 Record Changer.

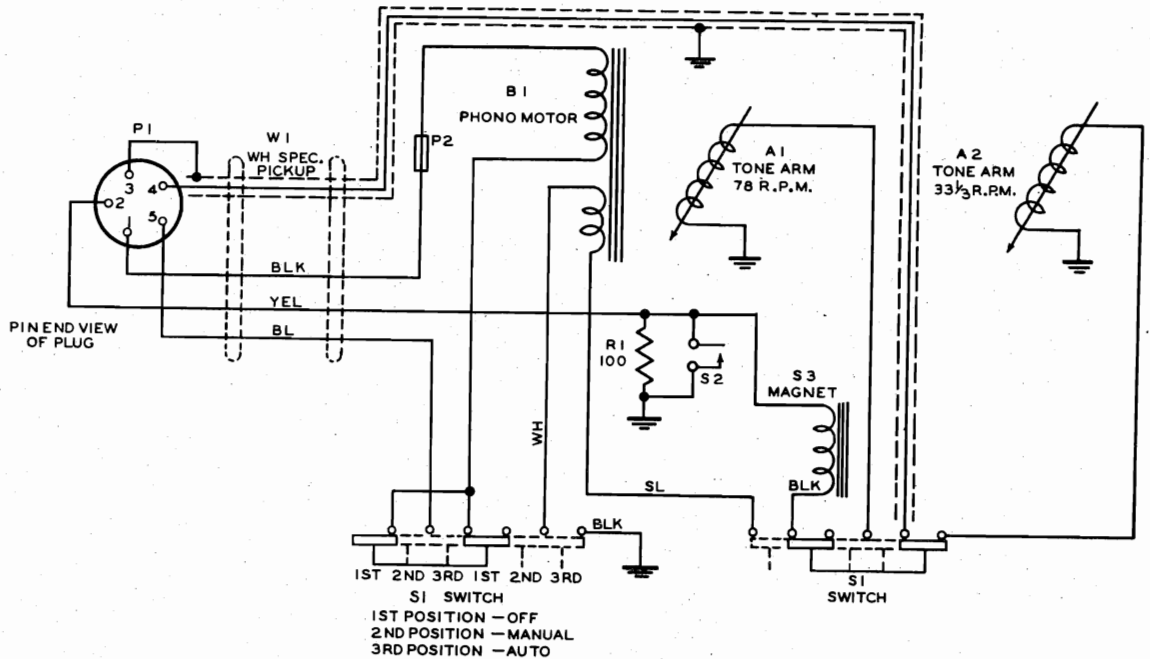


Fig. 9. Schematic Diagram S14014 Record Changer.

MODELS S14012, S14014,
S14019, S14021

PARTS LIST FOR S-14012-14-19 and 21.

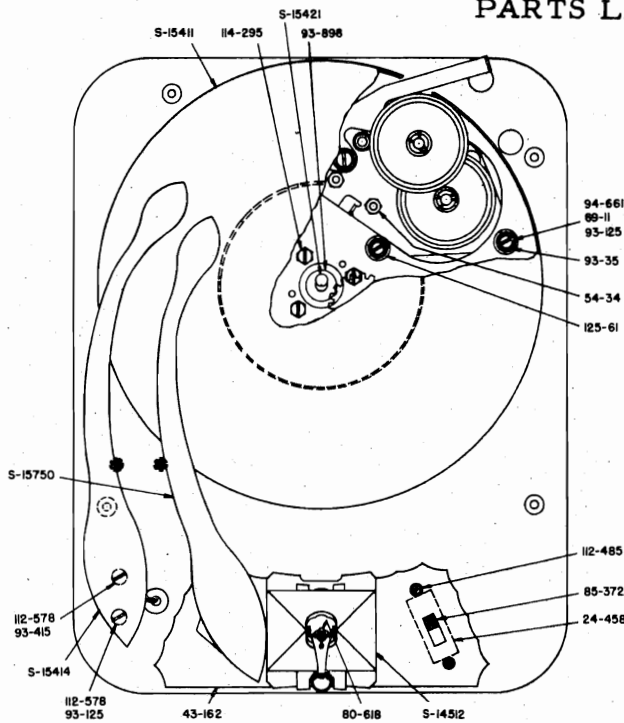


Fig. 10. Parts Identification, Top View.

- 17-81 Cable Clamp
- *17-88 Cable Clamp
- 23-22 A.C. Wire Connector
- 24-458 Switch Cover
- 43-160 Turntable Gear Assembly
- 43-162 Record Ejector Housing
- 56-144 Socket Retaining Pin
- *56-240 Groove Pin (2 used on S-14521)
- 57-1375 Record Push Plate
- 57-1577 Record Post Adj. Plate
- *58-158 Five Prong Plug (Used on S-15466)
- *58-166 Six Prong Plug (Used on S-15443)
- 63-1744 100 Ohm Ins. 1/2W. Res.
- *64-430 Shoulder Rivet (6 used)
- *64-431 Shoulder Rivet (2 used)
- 69-11 #6-32 X 3/4" R.H.M.S. Steel N.P.
- 69-43 #8-32 X 3/8" R.H.M.S. Steel N.P.
- 69-141 #5-40 X 1/4" R.H.M.S. Steel N.P.
- 69-184 #8-32 X 1/4" R.H.M.S. Steel Cad.
- 69-262 #8-32 X 1/2" Phillip R.H.M.S. Steel Stat. Bronze
- 73-99 #8-32 X 1/4" Slab. Hd. Set Screw Cone Pt (2 used)
- 73-112 #8-32 X 1/2" Slab. Hd. Set Screw Cuppoint
- 73-121 Special Set Screw
- x73-123 Allen Hd. Set Screw - cone point
- 76-538 Tone Arm Shaft (33 1/3 R.P.M.)
- 78-561 Cartridge socket
- *78-844 Socket (45 R.P.M. Adaptor)
- 80-582 Pawl Spring
- 80-605 Socket Tension Spring
- 80-609 Landing Adj. Spring
- 80-610 Switch Contact Spring
- 80-613 Lift Pin Lever Spring
- 80-614 Brake Spring
- 80-615 Tone Arm Link Spring (Long)
- 80-616 Tone Arm Link Spring (Short)
- 80-618 Pressure Arm Spring
- 80-619 Tone Arm Swivel Spring
- 80-631 Pawl Spring
- 80-645 Tone Arm Height Adj. Spring
- 80-650 Lever Spring (Fast Speed)
- 80-692 Detent Lever Spring
- 80-694 Idler Wheel Retaining Spring
- *80-698 Pawl Spring
- 80-700 Oscillating Lever Spring
- x80-737 Oscillating Lever Tension Spring
- x80-738 Oscillating Lever Spring
- x80-739 Trip Pawl Spring
- 83-1121 Felt Strip
- 85-372 Three Position Slidé Switch

- 93-35 .032 X .144 X 3/8" Steel Washer N.P. (3 used)
- 93-53 1/32" X 11/64" X 3/8" Steel Washer N.P.
- 93-125 #6 Int. Shakeproof Lockwasher (5 used)
- 93-381 1/32" X 7/32" X 3/8" Steel Washer - Cad.
- 93-415 #6 Ext. Shakeproof Lockwasher
- 93-781 #8 Split Lockwasher Steel N.P.
- 93-876 Fibre Washer
- 93-898 Steel Washer
- 93-899 Steel Washer N.P. .025 X .129 X 5/16"
- 93-969 Spring Washer, Shakeproof
- 93-35 Stop Bushing
- 94-620 Tone Arm Shaft Bushing
- 94-659 Motor Mounting Bushing (3 used)
- 94-661 Trip Pawl Stud
- 125-61 Clutch Gear Retaining Stud
- 97-298 Change Lever Spring Stud
- 97-301 Change Lever Mounting Stud
- 97-329 #4-40 X 1/4" B.H.M.S. Steel Black Zinc Plate (4 used)
- 97-333 #2 X 5/16 R.H.S.T. Screw Cad. Plate Shakeproof Type #25 (3 used)
- 112-485 #6-20 X 5/16" Hex. Hd. Slotted S.T. Screw Steel Cad. (4 used)
- 112-619 #8-32 X 5/16" Hex. Hd. Slotted S.T. Screw Steel Cad. (4 used)
- 114-248 Brake Lever
- 114-295 Tone Arm Lift Lever
- 117-144 Speed Control Lever
- 117-145 Detent Lever
- 117-163 Rubber Grommet (3 used)
- 117-164 Rubber Grommet Pressure Arm
- 125-61 Counterweight
- 125-65 Counterweight
- 135-13 Discriminator Cam
- x135-14 Phono Motor A.C. 110V 60 Cycle
- 128-45 Phono Motor A.C. 110V 60 Cycle
- 141-122 Tone Arm Housing
- *141-123 Record Ejector Arm
- 148-83 Record Pressure Arm
- 148-96 Plastic Tone Arm Only
- 148-97 Magnet Core
- 148-109 Plug Button
- 149-60 Plug Button
- x159-32 Plug Button
- x159-73 Retaining Ring
- x159-74 Tone Arm Sleeve
- 188-32 Magnet Coil Assembly
- 199-85 Clutch Gear Assembly
- S-13913 Tone Arm Actuating Lever Assembly
- S-14487 Discriminator Lever Assembly
- S-14490 Trip Switch Assembly
- S-14491 Record Ejector Link & Arm Assembly
- S-14493 Tone Arm Lever Assembly
- S-14494 Ejector Cam Shaft Assembly
- S-14495 Record Support Plate & Post Assembly
- S-14510 Pressure Arm & Mounting Assembly
- S-14512 Tone Arm Shaft Assembly
- S-14513 Tone Arm Bracket & Lift Pin Assembly
- S-14514 Tone Arm Assembly (78 R.P.M.) or S-15428
- S-14516 Hinge Plate Socket & Stop Assembly
- S-14673 Motor Mounting Plate Assembly
- S-15379 Speed Change Lever & Stud Assembly
- S-15380 Detent Lever & Stud Assembly
- S-15381 Idler Wheel Lever & Stud Assembly (Slow Speed)
- S-15382 Idler Wheel Lever & Stud Assembly (Fast Speed)
- S-15383 Idler Wheel Lever & Swivel Plate Assembly
- S-15384 Dual Speed Mechanism Final Assembly - Complete
- S-15407 Turntable Assembly
- S-15411 Cobra Tone Arm Assembly (33 1/3 R.P.M.)
- S-15414 Spindle Assembly (or S-14496 with 147-157)
- S-15421 Cobra Tone Arm Assembly (78 R.P.M.)
- S-15428 Cable & Plug Assembly
- S-15443 Cable & Plug Assembly
- *S-15466 Oscillating Lever & Gear Assembly
- S-15444 Hinge Plate Assembly - Complete
- S-15451 Hinge Plate & Socket Assembly
- S-15453 Hinge Plate Assembly - Complete
- S-15454 Trip Pawl Assembly
- S-15505 Red-Green Cobra Cartridge Assembly
- xS-15780 Socket Mounting Bracket
- 12-1444 Tone Arm Mounting Bracket (Upper)
- 12-1447 Tone Arm Shaft Pivot Bracket
- 12-1548

* Denotes Parts Used On S-14014 Only
 x Denotes Parts Used On S-14021 Only
 Those that are blank denote parts used on S-14012, S-14014, S-14019 & S-14021

S14019 & S14021

MODELS S14012,
S14014, S14019,
S14021

The S14019 is identical to the S14012 except it uses a 50/60 cycle phono motor #141-124 motor and a 85-445 phono reject switch mounted on the record changer base plate. For 50 cycle operation the 60 cycle spring on the phono motor drive shaft must be replaced with a 50 cycle spring #80-732. See fig. 13 for electrical circuit.

The S14021 is identical to the S14012 except the S14021 has only one Cobra Tone Arm which contains a red-green cartridge. This cartridge allows both 33-1/3 and 78 R.P.M. 10" and 12" records to be played. 10" and 12" records can be played automatically but are not to be intermixed. The electrical circuit is shown in fig. 14.

To adjust the velocity trip switch assembly proceed in the following manner. Adjust trip pawl spring 80-739 so that the end of the spring is in line with an imaginary center line through the center of the shoulder rivet and the coil spring 80-738. (See fig. 12).

Rotate the turntable until the oscillating lever has moved as far to the right as possible. Spring 80-739 should just touch the ratchet on the tone arm lever assembly at a point that is 3/8" from the end of the lever (See fig. 12). The spring should be adjusted by bending it until it will conform to the prescribed limits. Only when the velocity trip switch assembly is adjusted in this manner will the changer trip properly.

When the tone arm fails to track, and jumps grooves, the pivot bearing pressure is too great, this inhibits the movement of the arm. This can be corrected by loosening the lock nut (See fig. 11) and with the use of an Allen wrench adjust the pivot bearing so it will be free enough to allow the tone arm to track properly. Holding the pivot bearing in this position, tighten the lock nut.

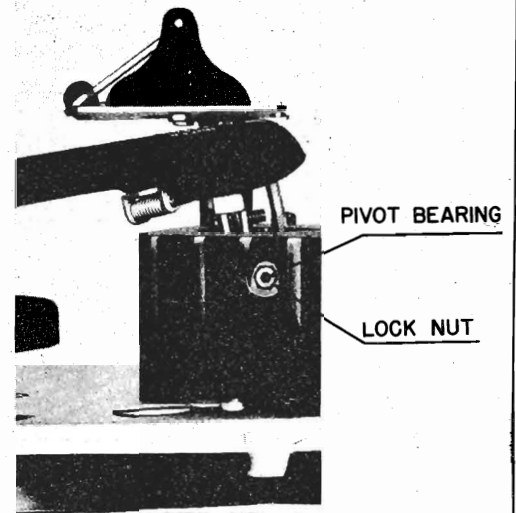


Fig. 11. Pivot Pressure Adjustment.

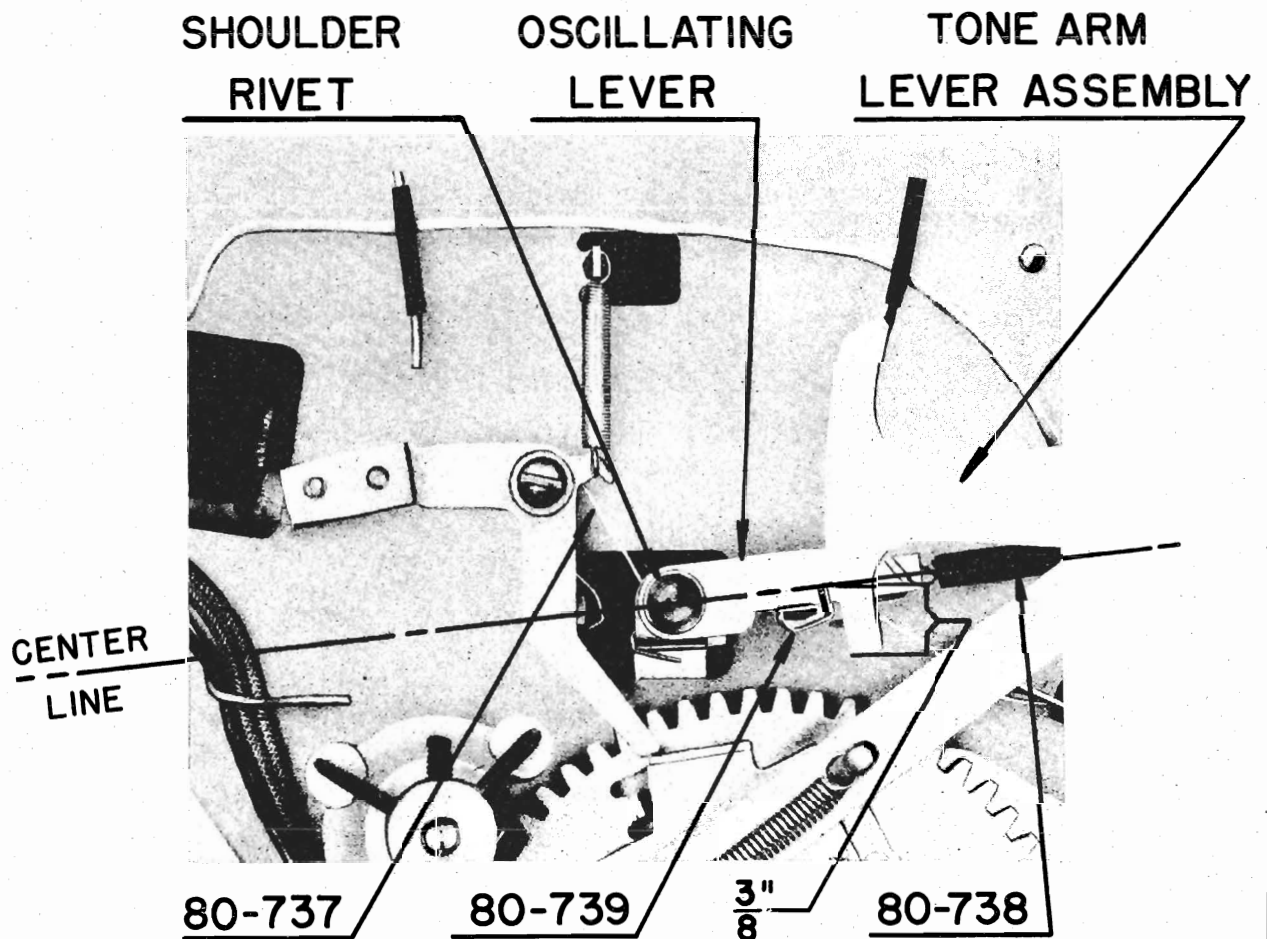


Fig. 12. Velocity Trip Adjustment.

MODELS S14012,
S14014, S14019,
S14021

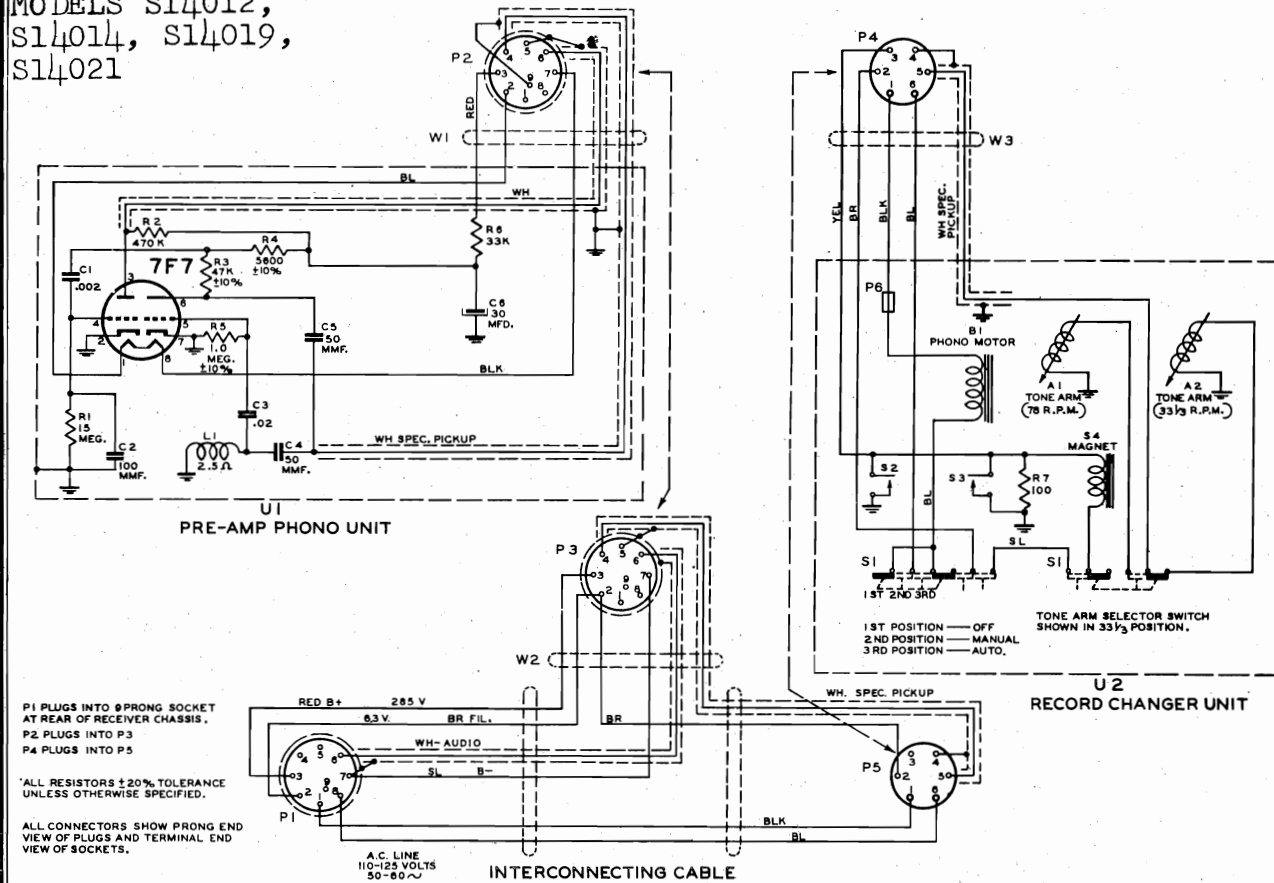


Fig. 13. Schematic For S14019.

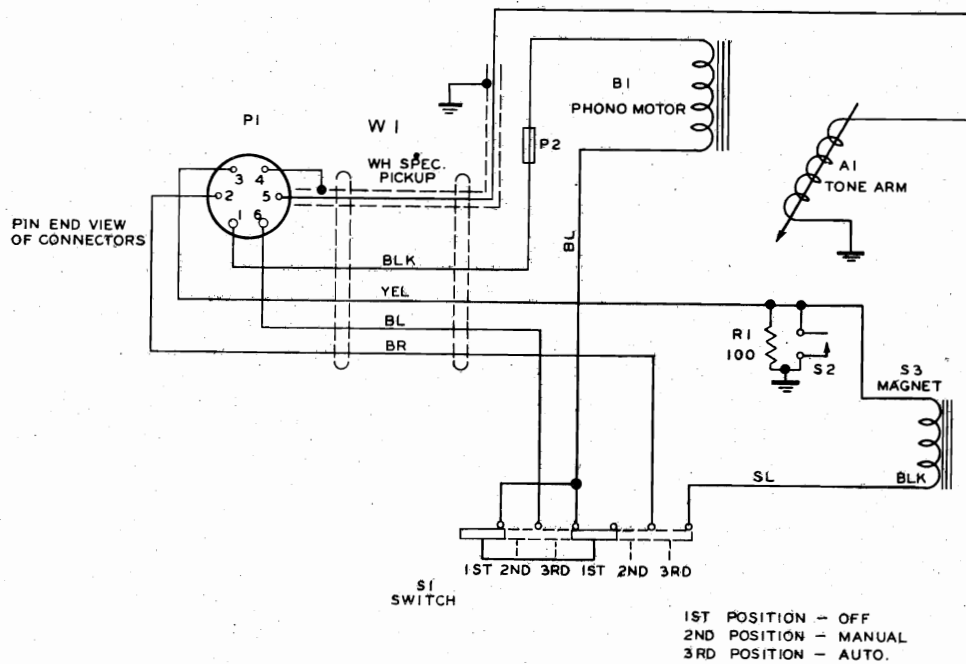
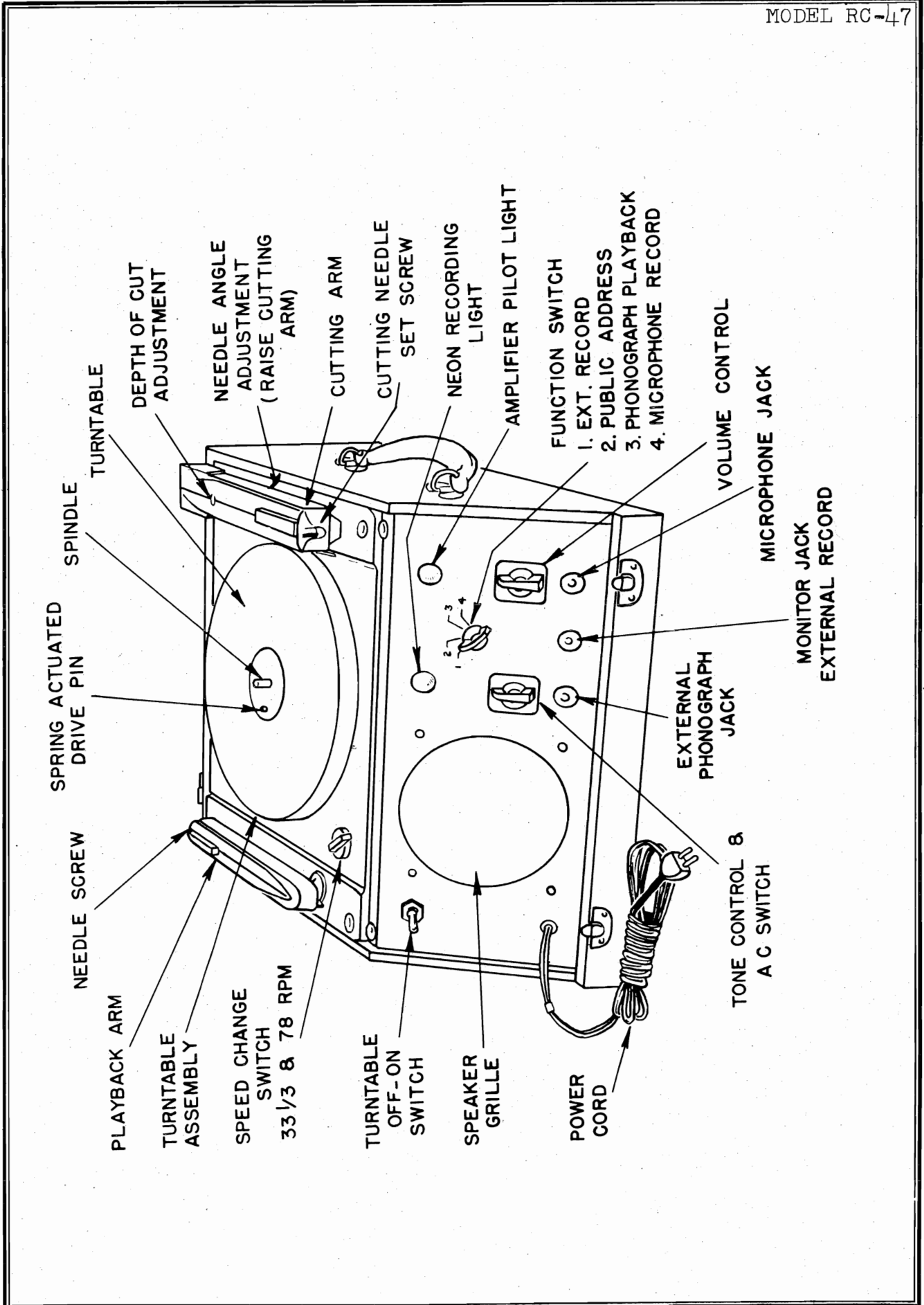


Fig. 14. Schematic For S14021.



MODEL RC-47

General Description - (See Outline Illustration)

The Model RC-47 Bell Re-Cord-O-Fone is a compact, completely portable three-tube disc recorder and playback unit capable of many uses. Complete with crystal microphone and stand; it is ready to record any sound and provide immediate playback. The slanting panel allows easy access to all controls. Phone jacks permit quick and easy connection of additional devices. Adequate tone and volume control provide exceptional, natural reproduction in any recording situation.

Receiving Inspection

Immediately upon receiving your Re-Cord-O-Fone, please check to see that no damage has occurred in shipment. Mount turntable on spindle with idler pulley properly seated. For carrying, place microphone base on post over spindle to prevent turntable coming off.

Connect AC plug to source of power (115V 60 cycles). Turn on phono switch. Turntable should run smoothly on both speeds as selected by rotating green plastic knob on motor board. Microphone should be plugged in and various functions checked. Check cutter by touching needle with fingertip.

If unit fails to operate, remove top and bottom screws holding front panel and chassis. Lift up and outward. See that tubes are plugged in securely. Be sure turntable cable is plugged in tightly to rear of chassis. Reassemble.

SETTING UP RECORDER

Place recorder on solid level surface. An accidental jar during recording might cause the cutting arm to shift, thereby spoiling an otherwise good recording. Set microphone at level of speaker's face, at least 15" away. Do not attempt to make recordings in large hard-walled rooms. Good results will be had in average living room. For best results rehearse material to be recorded so that proper settings and procedure may be ascertained.

NOTE: Be sure to read "Operating Instructions and Auxiliary Information" sections before using this Recorder.

OPERATING INSTRUCTIONS

Recording with Microphone

Turn amplifier on by rotating "tone control" knob clockwise. Set volume control knob at zero. Insert mike plug in "microphone" jack. Set function switch at "microphone re-cord" and place mike in position for pickup. While subject is test performing, adjust "volume control" while watching neon light. Place recording blank on turntable being sure spring-actuated pin fits in one of the off-center holes in blank. Install new cutting needle. Be sure needle screw bears against flat side of needle. Turn on "turntable" switch and select proper speed, 33 1/3 or 78 r.p.m. Lower cutting arm on record and make test cut. Thread should throw toward center of record where rubber finger will cause it to wrap around spindle out of the way. Record may be played back at once.

NOTE: Care must be exercised at all times that this thread never gets under the turntable where it can be caught in the mechanism. This will cause irregular operation or complete stoppage.

External Record - (From Radio or External Amplifier)

Note: - Three methods are possible. Use one most suitable.

METHOD I

To record from an external amplifier or radio, proceed as follows: Secure a two-wire cable to the voice coil of the radio (3-6 ohms impedance) or to low impedance output of amplifier. Connect a phone plug to free end, being sure grounded side of radio is connected through wire to sleeve or plug. Recorder amplifier is not used for this purpose but may be left turned on if desired. Insert plug in "external Re-Cord" jack and set function switch to "external re-cord". Adjust volume and tone controls of radio or amplifier for satisfactory results. Best results will usually be obtained with tone control on radio turned up for maximum "high" response. Re-cord as above.

NOTE:- Radio or amplifier must be capable of supplying 5 to 6 watts undistorted, in order to produce good recording. At this power level, considerable sound is produced by the loudspeaker.

METHOD II
(Preferred)

Connect as in Method I except insert plug in "external phonograph". Set function switch to "external re-cord" with recorder volume off. Adjust radio (or amplifier) volume to slightly above normal listening level and tone control for good treble response. Advance recorder volume control to proper level. Readjust controls if necessary. NOTE:- It may be necessary to reverse one or both AC plugs to secure lowest hum level.

METHOD III

Set up as for "mike record". Place mike 15" to 24" in front of, and to one side of speaker. Re-cord as usual. This method is the simplest to use but care must be used to prevent pickup of room noises.

External Re-cord from external Phone unit

Any record may be copied or re-corded on another blank. Proceed as follows: Insert plug from phono unit in "external phonograph" jack. Set function switch to "external record". Place record to be copied on other turntable and blank on recorder. Place external playback arm on record and adjust volume control on recorder. Start recorder turntable and re-cord as usual.

DUBBING

If desired, vocal comments may be added to (dubbed in) recordings by setting function switch to "mike re-cord" and speaking comments into the microphone. This procedure should be monitored by headphones in order to get good balance. Neither should be much louder than the other if good results are to be obtained. The external phone unit must have a separate volume control for this purpose. Adjust the microphone volume control first, then set the external volume control of phone or radio for proper.

PLAYBACK

Always use new needles on instantaneous recordings to prolong their useful life. Turn "turntable" switch on. Be sure turntable speed is correct for record being played. Turn function switch to "phonograph" position. Lower playback arm to record surface--do not drop. Adjust volume and tone for most pleasing results. Mike cable may be left plugged in. Any record up to 12" may be played back. (See Auxiliary Speaker paragraph)

MODEL RC-47

Public Address Usage

To use as a Public Address System, turn on amplifier by rotating "tone control" knob clockwise. Set function switch at "Public Address" position. Insert mike plug into "microphone" jack. Extend mike cable to full length or use extension cable to allow turning up volume control. In some applications it may be desirable to use external speaker and locate it at one side for better results. Adjust volume and tone controls for proper level. (See speaker on auxiliary speaker)

The speaker will howl if volume control is turned up to high and the microphone is too close to speaker. Separation of the two or turning down volume control is only cure.

External Phonograph

To use an external phono unit such as Bell Sound Models 10T, 10R or "C" with this recorder, proceed as follows: Terminate the shielded cable from the phono unit with a phone plug and insert into the "external" phonograph jack. Turn function switch to "phonograph" position. Adjust volume and tone controls for best results. (See paragraph on auxiliary speaker.)

AUXILIARY INFORMATION

Adjustment of Cutting Arm

There are two adjustments of the cutting arm; one to vary the needle pressure, and another to adjust the needle angle. These are necessary because needle length and blank material and thickness vary. They are interlocking to a slight extent and it may be necessary to recheck one after varying the other. Do not attempt to change these adjustments until the following is thoroughly understood.

Refer to the outline drawing. The needle pressure adjustment is made by turning the screw in the top of the cutting arm. Turning clockwise increases needle pressure and vice versa. The needle pressure should be such that a thread approximately the size of human hair is produced. It should be straight, not curly or fuzzy. The latter condition may also denote a damaged cutting needle.

The other adjustment is found when the cutting arm is raised to a vertical position. The bolt with locknut may be turned so that the end of the cutting arm is raised or lowered. This varies the angle which the needle makes with the vertical to the blank. The cutting surface of the needle should be at a 90° angle to the blank. This may be checked by setting the cutting needle on an uncut blank and raising or lowering the arm until the face of the needle and its reflection form a straight line.

If the needle pressure is too much or the angle wrong, the needle may be forced through the coating with damage to tip. It may also slow down the turntable and cause "wows". If the pressure is too little, the groove will be too shallow to hold the playback arm, causing it to slide across the record.

Recording Level

It is quite important that the recording level be carefully adjusted, otherwise results will be discouraging. Three factors govern the strength of the signal delivered to the recording head:

(1) Setting of volume control; (2) loudness of sound; and (3) distance from microphone. If the voltage to the cutting crystal is too great the crystal

may be damaged and the record groove walls broken down. If this voltage is too small the playback will be weak and noisy. Also, needle scratch and motor rumble may interfere with the recorded sounds.

To help the operator correctly adjust this voltage a neon light is provided. This begins to flash when the volume control is set right. Proper adjustment is made when the lamp flashed on the louder parts and goes out on the softer. Too much volume will light the bulb continuously and even cause it to have a bluish glow.

NOTE:- Riding the level or continuously adjusting the volume during the recording is not recommended. Adjustment should be made so that the loudest passage will be recorded satisfactorily.

An AC voltmeter may be plugged into the monitor jack and the average volume set at approximately 1.5 volts. Loudest sounds should not cause the meter to read more than 2.0 volts.

Crystal headphones may be plugged into this monitor jack and the quality and balance of the recording judged.

Needles

Sapphire cutting needles should be used for best results. Stellite and steel needles may be used with poorer results and shorter useful life. Sapphire, precious metal tipped or steel needles may be used for playback. Personal preference should be guide in selection. Useful life will usually be in proportion to cost. Never use worn or damaged playback needles on instantaneous recordings. Never use thorn, cacti, or fibre needles on acetate recordings.

Cutting Blanks

Best results are had with metal or glass base blanks. Paper base blanks are adequate for test purposes or where not much importance is given the finished product. They are also cheaper while learning. As the operator becomes expert he will find that the more expensive blanks are necessary for best results.

On good blanks, the coating is thick enough that a deep cut will not allow the needle to catch in the base or be dulled or broken. Bubbles, surface irregularities or warping are enough to reject any record.

It may be necessary to adjust both depth of cut and angle on blanks of different manufacturers, even when using the better makes of recording discs. (See section on adjustment of cutting arm.)

Auxiliary Speaker

If desired, an external speaker in suitable housing may be connected in place of the built-in speaker. Terminate cable with phone plug and insert in monitor jack. Better volume and tone as well as a more advantageous speaker location will result. It should have an impedance of 3.4 ohms to properly match output of amplifier.

Speed - 78 or 33 1/3 R.P.M.

Best results will be had when recording music at 78 r.p.m. However, where material to be recorded is long or where highest fidelity is not necessary, the lower speed will allow more recording on a given blank. Recording should not be started too near the outer edge because of irregularity of coating; nor, carried too close to label because of loss of tone quality.

MODEL RC-47

Consult table below for specific data.

| <u>Blank Size</u> | <u>Speed (r.p.m.)</u> | <u>Outer Margin</u> | <u>Recording Time</u> | <u>Width</u> |
|-------------------|-----------------------|---------------------|-----------------------|--------------|
| 10" | 78 | 1/4" | 4 1/2 Min. | 3 |
| 10" | 33 | 1/4" | 11 " | 3 |
| 12" | 78 | 5/8" | 5 1/2 " | 3 1/2 |
| 12" | 33 | 5/8" | 12 1/2 " | 3 1/2 |

Routine Care

While these units are quite sturdy, they should not be subjected to unnecessary rough treatment. Playback and cutting arms should be handled carefully. Neither should be dropped on turntable, nor should the needles be struck against any part. Such treatment may damage either the needle or cartridge or both.

Periodically, the turntable should be raised and any dust and cutting threads removed. Oil motor and idler pulleys with a few drops of light oil, being extremely careful not to apply oil on rubber pulley tire. Microphone cords should be checked for loose connections. Tubes should be checked and doubtful ones replaced.

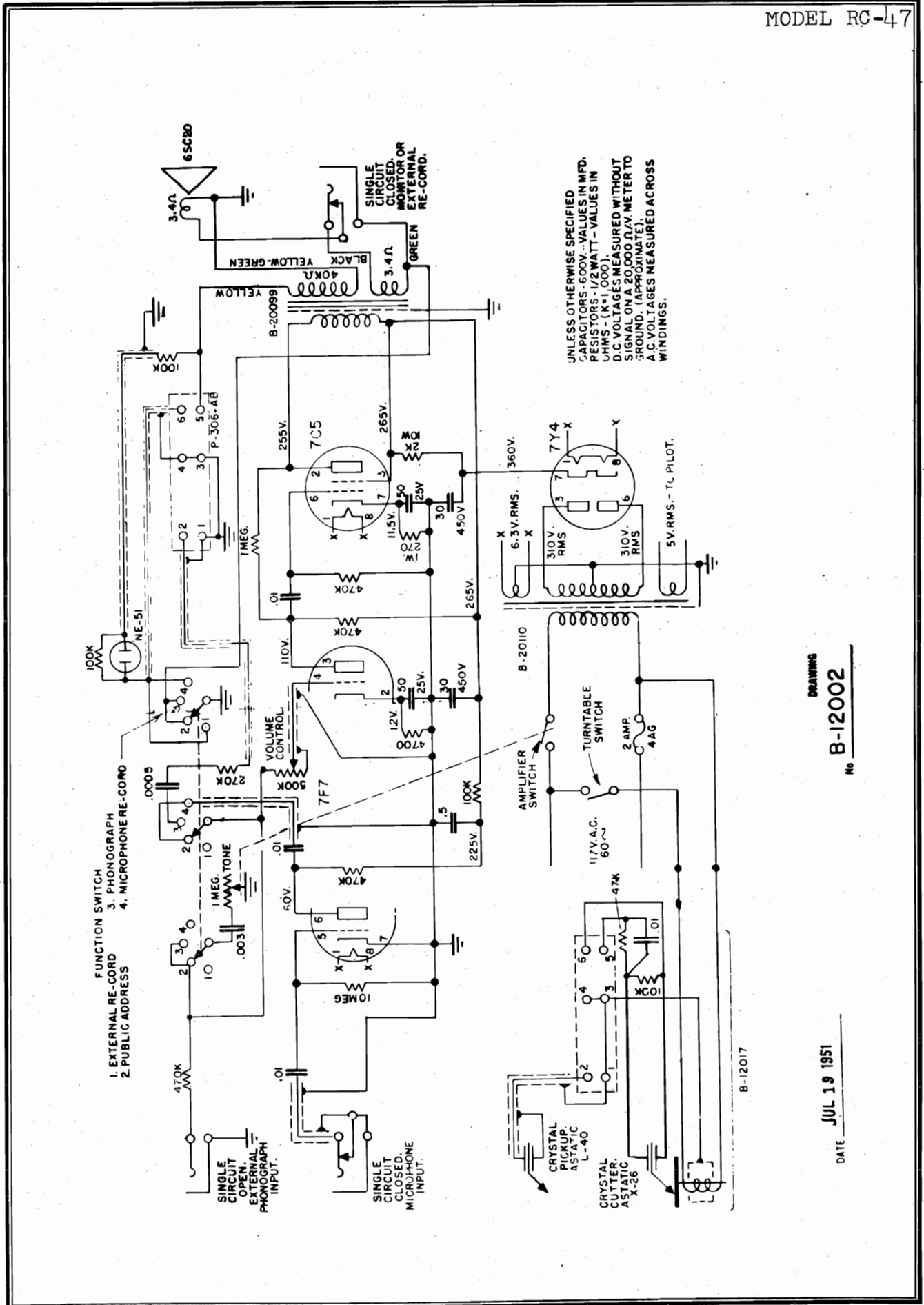
Playback and cutting crystals and the microphone are sensitive to heat and should never be subjected to temperatures greater than 120° F. Continued exposure to direct sunlight should be avoided.

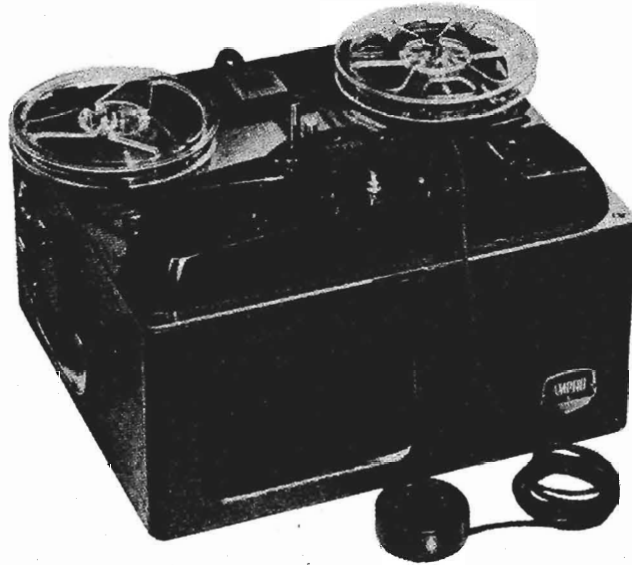
Repair - General

- 1 - Inspect visually.
- 2 - Check tubes - replace bad or doubtful ones.
- 3 - Mike voltage and continuity tests with aid of schematic.
- 4 - Check all electrolytic condensers on reliable bridge. Check coupling condensers, especially to output tube grid. Replace those bad or doubtful.

Phono Unit

- 5 - If phono is suspected, check motor speed using stroboscope disc under neon or fluorescent lights. Speeds should be 78 or 33 1/3 r.p.m. and steady. Motor should run quietly. Remove dirt or threads and oil.
- 6 - To check for defective playback cartridge; While playing record, place finger near end of pickup, press lightly downward and across grooves. If crystal is O.K., volume will change only slightly; if broken, volume will change considerably. If no volume, check input to amplifier. Hum will be heard if finger is touched to ungrounded amplifier lead after disconnecting cartridge. Replace cartridge.
- 7 - To check cutting crystal; If neon light indicates voltage present, cutting needle in the chuck will be felt vibrating. If voltage from amplifier is not available, the leads may be connected to the 115 volt AC supply where again the needle will vibrate. For quality tests, substitute a new cartridge and compare.





INTRODUCTION

Tape Recorders will be delivered to you for servicing for one of three reasons: one, unsatisfactory performance due to operational errors on the part of the user, two, periodic inspection and maintenance, and three, unsatisfactory performance due to wear or failure of components.

Proper operating procedures are described in detail in the operator's instruction book and need not be repeated in this manual. The first section of this manual deals with the routine inspection and protective maintenance of the device. The second section deals with trouble shooting and refers to the applicable material describing the correction of trouble, which constitutes the third section. The fourth section describes the procedures for inspecting and adjusting the device after the repair work has been completed. The final section contains a parts list and information relative to the procurement of parts.

SECTION I

Periodic Inspection and Protective Maintenance

A. CLEANING

Dirt is the cause of many irregularities in performance. Therefore, it is advisable to clean all parts in the path of the tape before attempting to inspect or test the equipment.

1. Remove the control panel using the procedure described in Section III Par. A.
2. Wipe the tape guide stud (95), guides on tape erase lever (98), erase head (67) (surface which contacts the tape), sound head (81), capstan (52), and the pressure roller (74) with a cloth dampened with carbon tetrachloride.

WARNING: DO NOT USE FIRE EXTINGUISHER FLUID OR OTHER SOLVENTS; SUCH MATERIALS MAY EITHER LEAVE A COATING ON THE PARTS, DAMAGE THE PARTS OR LOOSEN ADHESIVES USED IN ASSEMBLING PARTS.

3. Wipe the pressure pads (78) with a cloth dampened with carbon

MODEL 731

tetrachloride. Wipe in the direction of tape travel and be careful not to catch the cloth on the pressure springs or bend the springs.

4. Blow any dust or dirt out of the exposed mechanism. **DO NOT DIRECT A STREAM OF AIR AGAINST THE PRESSURE PADS.**

B. INSPECTION AND TESTING

1. Check the exposed mechanism for loose screws. Tighten any loose screws **EXCEPT DO NOT DISTURB SCREWS ON THE ERASE HEAD ASSEMBLY OR THE SCREW OR NUT WHICH HOLD THE SOUND HEAD IN PLACE.**
2. Thread the recorder with tape and make a test recording using procedure described in the operating instructions.

NOTE: The owner's previously recorded tape may be used to determine what he is complaining about. However, you should make a separate recording in order to make an actual test of the recorder under controlled conditions and assure yourself that his complaint is not traceable to operational errors. Play back the recording which you made and note any irregularities on tape movement, quality of reproduced sound and unusual background noises if present. Also check operation of the controls. If any irregularities in performance are noted, refer to Section II for probable cause and remedy.

C. LUBRICATION

The operator has been instructed not to lubricate this device and has been referred to the service technician for this service which should be on an annual or 500 operating hour basis.

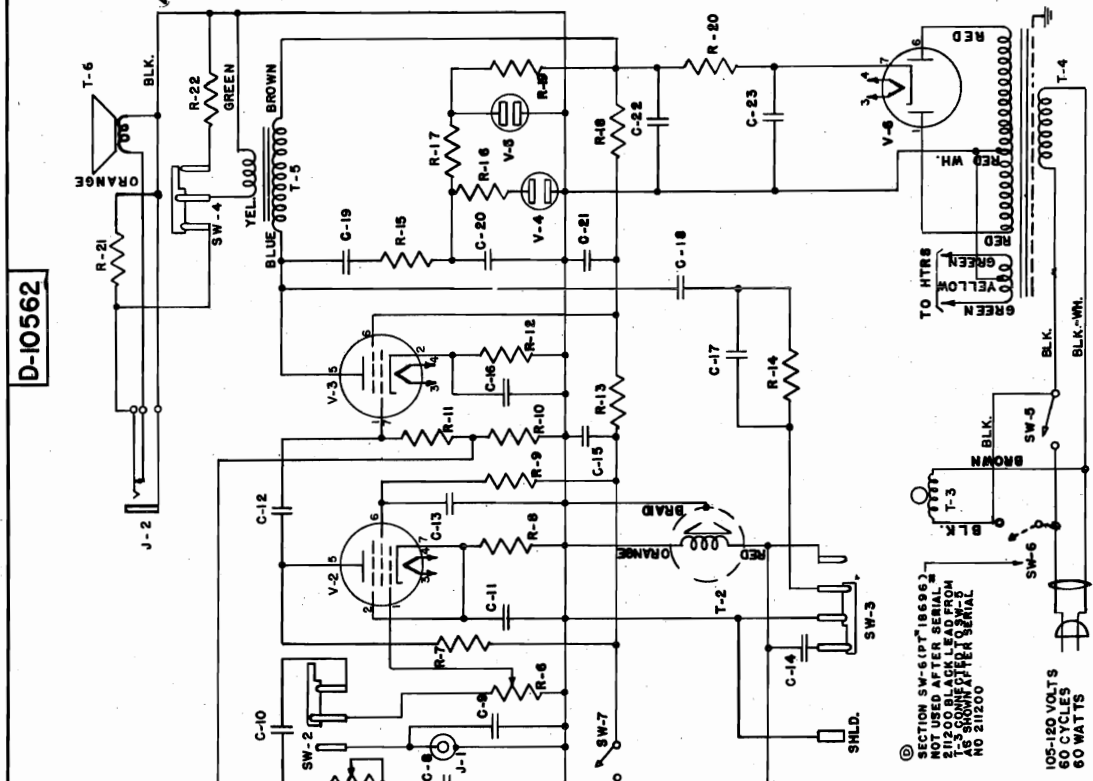
WARNING: Do not use lubricants other than those specified or in excess of the amounts specified. Excessive lubrication will cause slippage in the drive system. **USE A WATCHMAKER'S OIL APPLICATOR OR A BROOMSTRAW - NEVER USE AN OIL CAN.**

1. **CAPSTAN SHAFT (52)** - Apply one drop of Amproil or pure mineral instrument oil to outer end of each bearing. Allow mechanism to run until oil works into the bearing. Then **WIPE EXPOSED PORTIONS OF SHAFT TO REMOVE ANY OIL FROM THEM AND CLEAN FLYWHEEL TIRE AND CAPSTAN WITH CARBON TETRACHLORIDE.**
2. **MOTOR BEARINGS** - Apply two drops of Amproil or pure mineral instrument oil to each motor bearing.

WARNING: The bearings are equipped with wicks, oil the bearings, not the shaft - oil on the shaft will cause slippage. **AFTER OILING, WIPE MOTOR SHAFT AND THE FLYWHEEL TIRE WITH A CLOTH DAMPENED WITH CARBON TETRACHLORIDE.**

3. **TAKEUP SPINDLE (36)** - Apply one drop of Amproil or pure mineral instrument oil to the shaft at the end of the bearing adjacent to the pulley—allow mechanism to run and wipe all oil off of pulley and belt.

| MARK | PART No | DESCRIPTION |
|---------|---------|---------------------------------------|
| C-1 | 18733 | CAPACITOR - .002MFD. 400V. CERAMIC |
| C-2 | 18731 | .02 MFD. 400V. PAPER |
| C-3,4,9 | 18489 | .0005MFD. 500V. CERAMIC |
| C-5,13 | 18732 | .03MFD. 400V. PAPER |
| C-7 | 18739 | .007MFD. 200V. PAPER |
| C-8 | 18782 | .01MFD. 400V. PAPER |
| C-10,12 | 18487 | .01MFD. 400V. CERAMIC |
| C-11,16 | 18716 | .80MFD. 15V. ELECT. BNK. I |
| C-14 | 18091 | .001MFD. 600V. PAPER |
| C-15,21 | 18716 | .4MFD. 350V. ELECT. BNK. I |
| C-17 | 18773 | .0003MFD. 600V. PAPER |
| C-19 | 18488 | .005MFD. 400V. CERAMIC |
| C-20,24 | 18485 | .001MFD. 400V. CERAMIC |
| C-22 | 18715 | .30MFD. 350V. ELECT. BNK. I |
| C-23 | 18715 | .10MFD. 350V. ELECT. BNK. I |
| C-18 | 18492 | .033MFD. 600V. PAPER |
| R-1,17 | 18474 | RESISTOR - 470 K. 1/2 WATT CARBON |
| R-10 | 18471 | 100 K. |
| R-3 | 17854 | 10 MEG. |
| R-14,16 | 17959 | 220K. |
| R-5 | 18777 | CONTROL - TONE 50 K. CARBON |
| R-6 | 18709 | - VOLUME 500K. CARBON |
| R-7 | 18487 | RESISTOR - 560 K. 1/2 WATT CARBON |
| R-8 | 18582 | 2700 OHM " |
| R-9 | 18436 | 18 MEG. |
| R-11,19 | 18729 | 390K. |
| R-12 | 18770 | 22 K. 1/2 WATT CARBON |
| R-13 | 18583 | 2700 OHM 1/2 WATT CARBON |
| R-18 | 18583 | 2700 OHM 1/2 WATT CARBON |
| R-20 | 18772 | 33 OHM 2 WATT CARBON |
| R-21 | 18771 | 33 OHM 1 WATT CARBON |
| R-22 | 18718 | 3 OHM 5WATT WIRE WOUND |
| V-1 | 18497-3 | TUBE - 12AX7 (SELECTED) |
| V-2 | 18699 | TUBE - 6AU6 |
| V-3 | 18701 | TUBE - 6A05 |
| V-4,5 | 18914 | LAMP - INDICATOR NE-51 (SEASONED) |
| V-6 | 18700 | TUBE - 6X4 |
| SW-1 | 18786 | SWITCH, RECORD-LISTEN(PART OF BNK. I) |
| SW-2 | 18786 | " " |
| SW-3 | 18786 | " " |
| SW-4 | 18786 | " " |
| SW-5 | 18696 | SWITCH,AMPLIFIER(PART OF F-6) |
| SW-6 | 18696 | SWITCH, MOTOR |
| SW-7 | 18696 | " " |
| T-1 | 18784 | COIL, OSCILLATOR |
| T-2 | 18737 | HEAD, TAPE RECORDER |
| T-3 | 18787 | MOTOR |
| T-4 | 18728 | TRANSFORMER, POWER |
| T-5 | 18782 | TRANSFORMER, OUTPUT |
| T-6 | 18775 | SPEAKER, TAPE RECORDER |
| J-1 | 18708 | JACK - PHONO - MIC. |
| J-2 | 18769 | JACK - EXT. SPEAKER |



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AVERAGE VOLTAGE TABLE

| TUBE | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|--------|------|------|------|------|------|------|------|------|------|
| 12AX7 | D.C. | D.C. | D.C. | A.C. | A.C. | D.C. | D.C. | D.C. | D.C. |
| PLAY | 94 | -46 | 0 | 3.26 | 3.26 | 197 | 0 | 3.1 | 3.3 |
| RECORD | 0 | 0 | 38 | 3.25 | 3.25 | 109 | -19 | 0 | 3.24 |
| 6AU6 | D.C. | A.C. | A.C. | D.C. | D.C. | D.C. | D.C. | D.C. | D.C. |
| PLAY | 0 | 96 | 3.26 | 3.3 | 63 | 277 | .96 | | |
| RECORD | 0 | 1.01 | 3.25 | 3.25 | 72 | 29.4 | 1.01 | | |
| 6A05 | PLAY | 0 | 11.6 | | | D.C. | D.C. | | |
| RECORD | 0 | 11 | | | | 239 | 228 | 0 | |
| 6X4 | A.C. | 236 | | | | 234 | 240 | 0 | |
| PLAY | 238 | | | | | A.C. | D.C. | | |
| RECORD | 238 | | | | | 236 | 281 | | |
| | | | | | | 238 | 287 | | |

VOLTAGE AT JUNCTION OF R-20 & C-22:
 PLAY: 259
 RECORD: 260

NOTE: LINE VOLTAGE 115 VOLTS 60 CY.
 MEASUREMENT OF ABOVE VOLT-
 AGES MADE WITH 20,000 OHMS PER
 VOLT METER.

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4. **PRESSURE ROLLER SHAFT** (pt. of assem. #74) - Wash with carbon tetrachloride then dry thoroughly and apply one drop of Amproil and rotate roller to work into the bearing. Wipe surplus oil off of roller and bracket.
5. **ACTUATING COLLARS** (16 & 63) - Use a toothpick to apply a thin film of "Lubriplate" or light graphite grease to those surfaces where sliding action occurs.
6. **CONTACT SURFACE BETWEEN PRESSURE PAD BRACKET (78) AND PRESSURE ROLLER BRACKET (74)** - Use a toothpick to apply a thin film of "Lubriplate" or light graphite grease to the working surfaces.

SECTION II

Trouble Shooting

In this recorder, like any other electro-mechanical device, many things could happen which would affect performance. The purpose of the following table is to group the troubles which may be encountered in as few groups as possible and indicate the probable cause and corrective action to be taken.

TROUBLE AND REMEDY TABLE

| Trouble | Probable Cause | Remedy |
|---------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| 1. Low pitch | Tape speed is below 3 3/4" sec. | Check Drive (Sec III C-4) Check pressure pads (Sec III C-3) Check Capstan Follower Check Feed Spindle |
| 2. No high frequencies and distortion | Tape not in contact with sound head. Improper Azimuth adjustment Amplifier trouble Improper Guiding Pressure roller actuator has slipped | Damaged head Worn Pressure pad See Sec. IV A Check Amp. (Sec III C-1) |

| Trouble | Probable Cause | Remedy |
|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>3. Varying pitch (Wows)</p> | <p>Feed reel jerks Worn or loose feed guide</p> <p>Worn Capstan bearings Worn or improperly adjusted pressure pads Bent or worn erase lever Eccentric Capstan or Flywheel Tire</p> <p>Bent motor shaft Sound head loose in shield Dirty or worn takeup mechanism</p> <p>Improper guiding Worn takeup drive belt Rewind lever engaged Worn guide surfaces in soundhead</p> | <p>Check felt feed spindle disc Rotate or replace, or tighten (Sec. III C-4) Replace</p> <p>Replace (Sec. III C-3) Replace or repair</p> <p>Replace or exchange (Sec. III C-4) Replace motor (Sec. III C-4) Tighten</p> <p>Clean or replace (Sec. III C-4) Check tape for weaving Replace (Sec. III C-4) See operating instructions</p> <p>Replace</p> |
| <p>4. Takeup doesn't operate</p> | <p>Dirty or worn friction washer</p> <p>Takeup drive belt off pulleys Takeup drive belt broken or worn out</p> | <p>Clean or replace spindle (Sec. III C-4) Replace</p> <p>Replace</p> |
| <p>5. Can't thread recorder</p> | <p>Loose pressure roller actuator collar</p> <p>Bent pressure pad springs</p> | <p>Adjust or tighten (Sec. III C-3) Adjust</p> |
| <p>6. No sound on playback</p> | <p>Loose erase lever actuator collar</p> <p>Amplifier trouble</p> | <p>Adjust and tighten (Sec. III C-3) Plug in mike, switch to "Record" position, turn on motor switch if feedback occurs, check T-2 and input section of V-1. If no feedback, check SW-4, "B" supply & SW-2.</p> |
| <p>7. Playback OK-won't record</p> | <p>Damaged mike, cable or receptacle Failure of SW-1, 2, 3, or 7</p> <p>Oscillator section of V-1 not functioning C-4, 17 or 18 open V-4 damaged</p> | <p>Repair Repair or replace (Sec. III C-1)</p> <p>Check and repair Check Replace BOTH V-4 and 5 (Matched set)</p> |

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| Trouble | Probable Cause | Remedy |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 8. Excessively noisy recordings | C-18 leaking Worn erase pad Recording level too low Weak oscillator or C-4 off value Loose connections in amplifier Damaged mike or mike receptacles Noisy switches Erase head not properly adjusted | Replace Replace (Sec. III C-3) Check V-4 (Replace V-4 & 5 Matched set) Check Check all connections Check Check switch contacts Adjust (Sec. III C-2) |
| 9. Excessive 120 cycle hum | Open filter capacitor Hum shield not bearing on sound head | Check C-15, 21, 22, 23 Check spring |
| 10. Excessive 60 cycle hum | Damaged tube Hum shield not bearing on sound head | Check tubes for heater to cathode leakage Check springs |
| 11. Low gain and distortion | C-18 leaking Damaged 6AQ5 Damaged coupling or decoupling capacitors Poor contact in switches Incorrect recording bias Open cathode bypass capacitor Damaged output transformer Erase head requires adjustment | Replace Check tubes Check Clean or replace Check recording bias Check capacitors Replace Adjust (Sec. III C-2) |
| 12. Microphonics | Sustained (defective 12AX7 or 6AU6) | Replace with selected tube |
| 13. Oscillation | Damaged 12AX7 C-11 or C-16 open | Replace Replace |

SECTION III

Service Procedures

A. EXPOSURE OF WORKING COMPONENTS

1. Removal of control panel - loosen the setscrews and lift off the four control knobs (9), then take out the three panel retaining screws (11) and lift off the control panel (10).

2. Removal of recorder from case.
 - a. Take out the six screws which hold the tape reel panel (7) in place.
 - b. Take out the six retaining screws (8).
 - c. Lift recorder assembly out of case.
 - d. Remove hex nut, "External Speaker" nameplate, and speaker jack (24).
 - e. Remove the four hex nuts, lockwashers and burr washers and lift out the speaker (2).
3. Removal of Amplifier Cover.
 - a. Take out the seven cover screws (13) and remove the amplifier cover (12).

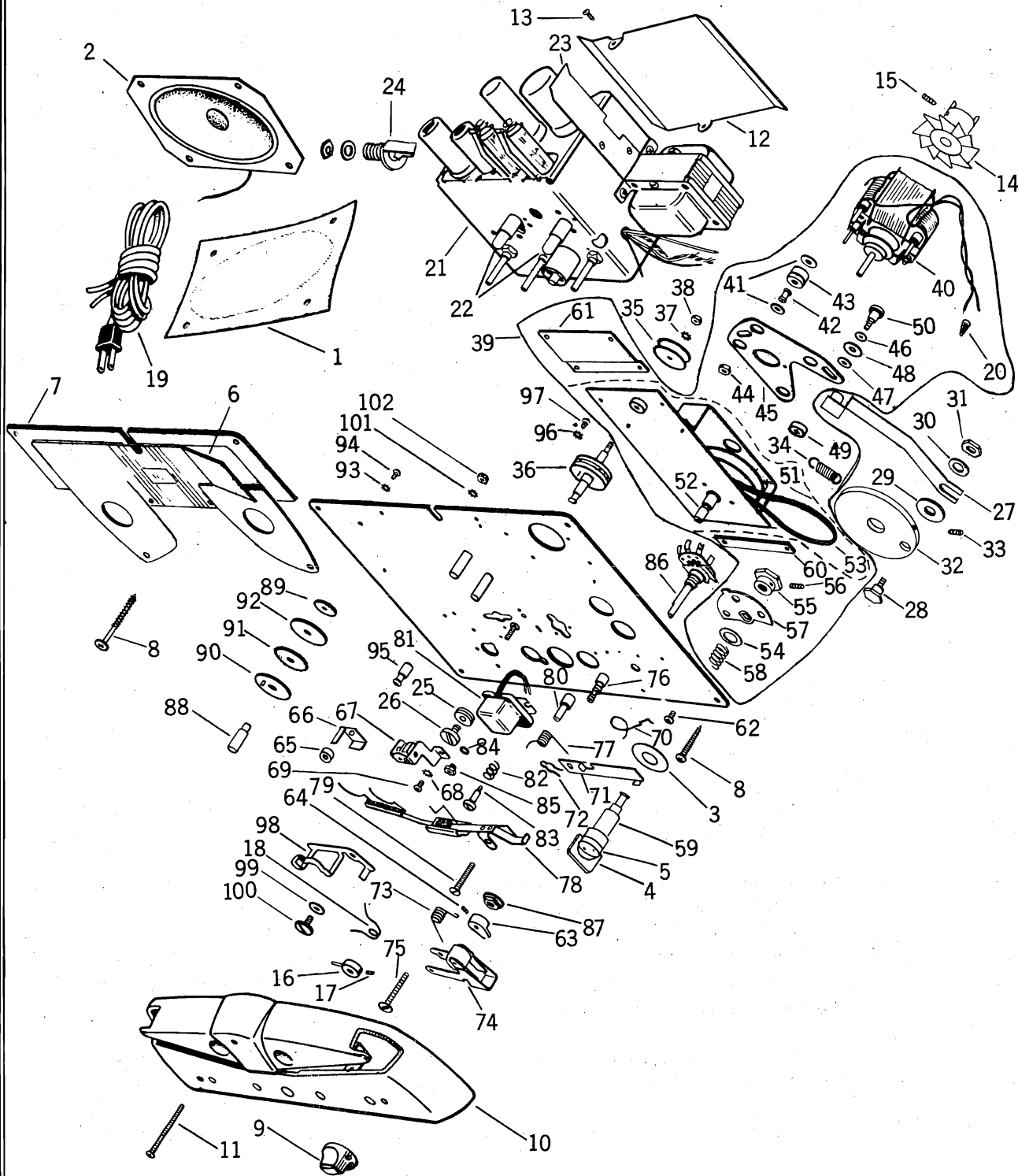
B. REMOVAL OF THE MAJOR UNITS

1. Removal of Amplifier Assembly
 - a. Complete procedure A.
 - b. Loosen setscrew (17) and remove erase lever actuator collar assembly (16) and spring (18).
 - c. Place recorder on its side (controls down).
 - d. Unsolder recording head cable from the two terminals on the "Play - Record" switch. Mark the terminals.
 - e. Remove the three nuts and washers from the amplifier stop screws.
 - f. Remove the four screws (26) and grommets (25) which hold the amplifier to the mechanism plate.
 - g. Pull the amplifier back away from the mechanism plate and disconnect the amplifier leads from the terminals of the motor control switch.
 - h. Disconnect the two motor leads from the amplifier (one was connected to SW-6 in the initial run).
 - i. Disconnect the ground wire from the upper flywheel bracket.

2. REMOVAL OF TAPE RECORDER DRIVE ASSEMBLY

- a. Complete procedures A-1, A-2, and A-3.
- b. Remove the motor lock shaft stud (5), lock key (4) and spring.
- c. Remove hex nut (31) and washer (30) then remove the motor plate actuator assembly (27).

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d. Disconnect the motor leads from the amplifier (one lead was connected to SW-6 in the initial run).

e. Disconnect the ground lead from the upper flywheel bracket.

- f. Remove the three screws (62) which hold the drive assembly (39) to the mechanism plate.
- g. Lift off the drive unit.

C. SERVICING THE MAJOR UNITS

WARNING: NEVER APPLY DIRECT CURRENT TO THE RECORDING HEAD.

1. Servicing the Amplifier and Recording Head.

- a. D.C. Voltage Checks - Check all socket voltages—if voltages vary by more than 10% from those indicated on schematic diagram, check tubes (preferably by substitution) and check associated capacitors and resistors. Bear in mind that a leaking filter capacitor may upset voltages on several stages and that a leaking coupling capacitor will upset voltages on the following stage.
- b. Bias Current Check - Disconnect the grounded lead from the recording head at the "Play - Record" switch, switch to "Record" position. Insert a D.C. microammeter and check for current, if current exceeds 1 microampere, replace C-18. Measure the bias current by inserting a 20 ohm non-inductive (or carbon) resistor between the recording head lead and the switch terminal from which it was disconnected and connect a VT voltmeter across the resistor. The bias current will produce .015 volts \pm 10%. Voltages are also subject to the same tolerance as the specific resistor being used in the test circuit. If the current is not within the limits specified, check the oscillator and associated resistors and capacitors. If component values are correct, then push plate and grid leads of 6AQ5 together to reduce current or separate them to increase current.
- c. Recording Current Check - Disconnect either lead from the oscillator coil, thereby stopping the oscillator. Connect an audio oscillator to the input jack. Place the "Play-Record" switch in the "Mic" position and turn the "Volume-Control" to the maximum clockwise position. Set the audio oscillator for 400 cycles/sec and adjust the output so that V-4 flashes faintly (NOT A SUSTAINED GLOW). A VT voltmeter and a 20 ohm resistor (when connected as described in Par. b.) will indicate .001-.002 volts (plus or minus tolerance on resistor). The wave form (when viewed on an oscilloscope connected across R-22) will be free from distortion. If the current is not correct, change V-4 and V-5 (supplied as a matched and aged set) and recheck. If current is low, increase oscillator level to produce proper current and check wave form. If wave is free from distortion, check all resistors and condensers in the neon lamp circuits. If wave is distorted, in-

indicator lamp circuit can be assumed to be correct and recording head or associated supply network is at fault

- d. Gain and Distortion Check - Restore recording head circuit to normal—leave oscillator circuit open. Load the output of an audio oscillator with a non-inductive resistor of the proper value and connect the ground terminal of the oscillator output to the amplifier chassis. Connect a 20,000 ohm carbon resistor between the "hot" terminal on the oscillator output and the ungrounded lead from the recording head (resistor and connecting lead should be shielded and shield should be grounded). Turn "Volume" control to maximum clockwise position, and "Play-Record" control to "Play" position. Turn "Motor" switch "ON". Adjust oscillator to 400 cycles/sec and .01 volts (measured across oscillator load resistor). An output meter connected across the speaker terminals should read 2. to 3.5 volts and the output wave form should be free from visible distortion. If distortion is present or output is low, first check the tubes (substituting one at a time) then starting at the output stage, check the wave format at each plate and grid in order to locate the stage in which the distortion is occurring. When the bad stage is located, check all associated resistors, condensers, and connections. If switches are a part of the circuit be sure to check them.
- e. Noise Check - Tap each tube with a pencil or other small object and check for microphonics. Any tubes which produce a sustained ringing or crashing noise should be replaced. Operate all switches and check for crashing noises which continue after switch movement has stopped (caused by dirty or worn contacts).

2. Servicing the Erase Mechanism

The erase head consists of a permanent magnet and magnet shield held in place on the mounting bracket by a socket head setscrew and a binder head screw. The proper adjustment of the magnet and shield requires special equipment which is not usually available in a service shop. Therefore, we do not recommend disturbing the two screws referred to. If positioning of the head and erase lever as described here does not produce satisfactory erasure, or if recordings are noisy and distorted and the cause of the trouble is not traceable to other sources, then a fair adjustment can be made by using the procedures described in paragraph c. The factory service department and certain Authorized Service Stations are equipped to make precision adjustments.

- a. Positioning Erase Head - Turn "Play - Record" control to either "Record" or "Mic" position, thereby moving tape erase lever (98) away from the erase pad. Loosen the two screws (69) which hold the erase head to the panel. Rotate the "Motor Control" knob slowly and check to be sure that the erase pad bears evenly on the face of the head. If it does not, rotate the head slightly to correct the condition. Tighten the two screws. Make sure that the tape is pressed firmly against both the magnet and the guard.

- b. Positioning the Erase Lever - Turn the "Play - Record" control to the "Play" position. Loosen the setscrew (17) which holds the erase lever actuator collar assembly (16) to the control shaft. Turn the collar clockwise until a straight-edge placed across the erase lever fingers is $1/8"$ to $3/16"$ in front of the magnet poles. Move the collar up or down as required so that the actuating arm bears fully upon the ear on the erase lever, then tighten the setscrew. Be sure that the erase lever spring (18) is not pinched between the collar and control bushing. Drop the control panel in place and make sure that the ends of the erase lever fingers are covered by the panel when the control is in the "Play" position and the threading track is clear.
- c. Adjusting the Erase Head - The erase head must perform two functions, one, completely remove all previously recorded material, and two, leave the tape in a demagnetized state. Erasure is accomplished by passing the tape thru a strong magnetic field (note that the tape from the supply reel actually is in contact with the leading pole of the permanent magnet). Demagnetization is accomplished by passing the tape through a weaker field of reversed polarity (note that the tape is separated from the trailing pole of the magnet by means of an adjustable non-magnetic guard). If the guard is moved in against the pole of the magnet, the tape passes through a very strong magnetic field which will neutralize the charge placed upon the magnetic coating by the leading pole of the magnet and probably will set up a charge of opposite polarity (this charge will produce excessive tape noise in the recording and also introduce even order harmonic distortion). If the guard is moved as far as possible away from the pole, then the charge placed upon the tape by the erase pole will not be completely neutralized and the remaining charge will again cause excessive tape noise and even order harmonic distortion. Therefore, the placement of the erase guard governs the degree of demagnetization of the tape and proper adjustment will result in the tape leaving the erase head in the desired condition.
1. Adjustment by noise level method (Emergency procedure) - Connect an output meter across the voicecoil of the speaker. Run the recorder and adjust the volume control to produce a low reading on the meter (this will be the system noise for the particular setting of the control). Thread the recorder with a loop of new brown oxide tape which has neither been used for recording or erased. Switch to the "Play" position. Loosen the setscrew (17) and release the erase lever actuator collar (16). Run the recorder and note the output meter reading and listen to the noise.
- Loosen the screw which holds the magnet guard in place and move the guard about $.005"$ in either direction. Note the meter reading and apparent increase or decrease in noise. If the latest reading is less than the previous reading, repeat the process after moving the guard a little farther in the same direction. If the reading is more than

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the previous reading, move the guard in the opposite direction. When the position is found at which the output meter gives the lowest reading and the listening test indicates the lowest level, this will be the best adjustment attainable by this procedure. Due to the changing nature of the noise, a trained ear may note a more definite minimum noise level than is indicated by the output meter.

2. Adjustment by Harmonic Distortion Method (Preferred Procedure) - This procedure requires the following test equipment:

Audio frequency oscillator producing 400 C.P.S. free from second harmonic distortion or equipped with filter to attenuate 800 C.P.S. harmonic by at least 75 D. B.

Matching transformer or network to couple oscillator to input of recorder.

Distortion meter (harmonic)

Check the audio oscillator with the distortion meter to be sure that the 400 C.P.S. tone is free from harmonic distortion. Use a filter if necessary. Match the oscillator to the input of the recorder. Connect the distortion meter to the output of the recorder using the procedure recommended by the manufacturer for connecting to a 3.75 ohm source.

Turn on the recorder, switch to "Phono - Radio" position and adjust the volume control to produce a faint flash from the recording lamp. Check the output of the recorder to be sure that the level being used produces negligible harmonic distortion. If the output is distorted, service the amplifier before attempting to adjust the erase head.

Thread the recorder with brown oxide tape and record about 5' of tape. Rewind the tape, switch to "Play" position and measure the harmonic distortion.

Loosen the screw which holds the magnet guard in place and move the guard about .005" in either direction. Repeat the recording and playback operation and again measure the distortion. If the distortion has decreased, continue moving the guard in the same direction and repeating the test until a position which produces minimum distortion has been located. As the point of minimum distortion is approached, move the guard approximately .001" per step (this can be accomplished by only loosening the retaining screw slightly and tapping the guard with a light tool).

If a considerable number of recorders are to be serviced, the process can be speeded up by placing a second recorder (known to be in good condition) along side of the one being adjusted and using it as a continuous playback unit to monitor a loop of tape upon which a recording is

being made continuously by the unit being adjusted. Slack should be left in the tape as it passes between the two recorders. This produces an additional lag in the record-reproduce process but prevents spurious readings which might be caused if the tape was under abnormal tension in the monitor unit.

Special test equipment can be built for this specific purpose, however, the volume of work to be done will seldom justify the cost of assembling a test device which can only be used for one type of operation.

3. SERVICING THE PRESSURE PADS, PRESSURE ROLLER AND ACTUATING MECHANISM

- a. Pressure Pads - If the pressure pads are worn down to a thickness of less than $1/16$ ", lift the end of the pressure pad spring (77) over the end of the "Motor Control" shaft. Take out the screw (79) which holds the pressure pad bracket assembly (78) in place and lift off the assembly and the pressure pad bracket stud (80). Use Petroleum Naptha (140-210F.) as a solvent to remove the old pad. Use Minnesota Mining & Mfg. Co. Cement #EC-104 to cement the new pad in place (Be sure that the edges of the pads are parallel to the edges of the springs and that the ends of the pads are flush with the ends of the springs). Reassemble and install the pressure pad bracket assembly, place the end of the pressure pad spring below the pressure roller actuator (63) and turn the motor control knob slowly. Check to be sure that the pressure pads enter the slots in the sound and erase heads and bear firmly on the proper surfaces of the heads. Turn the "Motor Control" to the "On" position. Loosen the setscrews (64) which hold the pressure roller actuator (63) in place. Turn the "Motor Control" switch to "Off", then turn the actuator collar in a counter clockwise direction until the sound head pressure pad clears the sound head by at least $1/8$ ". Tighten the setscrews and place a speck of "Lubriplate" on the side of the actuator which comes in contact with the end of the pressure pad bracket.
- b. Pressure Roller Assembly (74) - Rotate the capstan pressure roller and check for binding. If the roller does not revolve freely, immerse it in carbon tetrachloride and rotate the roller until free. Dry the parts and apply 1 drop of Amproil to the edge of the roller and work it into the bearing. Wipe off any surplus oil.

Check the clearance between the heel of the pressure roller bracket and the body of the pressure pad bracket when the "Motor Control" is "ON". If the clearance is less than .005" file the surfaces to increase the clearance.

4. SERVICING THE RECORDER DRIVE ASSEMBLY

- a. Concentricity of Capstan and Flywheel Tire - Use an indicator to check these parts for runout. If the runout exceeds 0.0002" full indicator reading, or the bearings are loose, an

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objectionable wow will be produced. If the runout exceeds 0.0002", remove the motor (40) as per sub-paragraph b of this paragraph and replace the flywheel and capstan (52) and the bearings if required (See sub-paragraph d). Organizations not equipped to work to close tolerances may find it to their advantage to send the drive sub-assembly (51) to the factory for replacement with a factory rebuilt unit.

b. Separation of Motor Unit from the Capstan and Takeup As-

1. Remove drive assembly from mechanism plate as per procedure B-2.
2. Loosen setscrew and remove fan.
3. Unhook motor pressure spring (34).
4. Remove the three motor mounting shoulder screws (50), felt washer (48), plain washers (46 & 47) and spacers (49).
5. Lift off the motor unit.

WARNING! When placing the motor on the bench, do not allow the shaft to strike the bench (this might spring the shaft).

c. Servicing the Motor

1. If the motor does not drive the capstan at the proper speed, take off the three nuts (44), and plain washers (41) and remove the motor from the mounting plate (45). Disassemble the motor and clean and relubricate the bearings. Use 3 speaker cone shims as spacers to center the rotor when re-assembling.
2. Concentricity of motor shaft. Use an indicator to check the part of the motor shaft which drives the flywheel. If the runout exceeds 0.0005" full indicator reading, replace the motor.

d. Servicing Capstan and Takeup Assembly

1. Replacing the takeup drive belt (53).
 - (a) Remove the four screws and lockwashers, the reinforcing strip (60) and plate (61).
 - (b) Pull off the flywheel lower bracket assembly.
 - (c) Install the new belt and reassemble the unit. If the Capstan shaft does not revolve freely, tap the two frame members lightly with a screw driver handle in order to line up the bearings.
2. Repair of Flywheel and Capstan

If the runout of either the capstan or flywheel tire exceeds

the tolerance indicated in paragraph 4 a, the flywheel assembly will require replacement. Disassemble as per sub-paragraph 1 and install a new flywheel and bearings if required. Warning! When removing the rivets which hold the bearing retainers in place, be careful not to distort the aluminum frame members.

3. Servicing the takeup spindle assembly

If takeup jerks or fails to operate, proceed in the following manner:

- (a) Remove drive belt (53) from the takeup pulley (35).
- (b) Remove hex nut (38), lockwasher (37) and spindle pulley (35).
- (c) Remove takeup spindle (36) from the bearing.
- (d) Immerse spindle in carbon tetrachloride and spin reel drive disc to wash dirt out of felt washer.
- (e) Allow carbon tetrachloride to evaporate, then soak the felt washer with Amproil. Gently press the drive disc against the washer to squeeze out the surplus oil. Place the spindle on a blotter and allow it to stand for 20-30 minutes, then wipe excess oil off of shaft and reassemble.

4. Servicing the motor lock - It will seldom be necessary to remove these parts. Should it be necessary to remove them, proceed in the following manner:

- (a) Loosen the setscrew (56) and slide the cam (55) and detent (57) off of the end of the shaft.
- (b) Remove the lock shaft (59), spring (58), and washer (54).
- (c) When reassembling the parts, make the final timing adjustment after the motor assembly and the drive are installed in the recorder. Turn on the motor switch and turn the lock to "Run". Loosen the setscrew (56) and rotate the cam so that the motor shaft is in contact with the flywheel tire and the working side of the cam is not bearing against the motor mounting plate. Tighten the setscrew and turn to "Lock" and check to be sure that the motor shaft is lifted off of the flywheel tire.

SECTION IV

Final Adjustments and Testing

A. MECHANICAL

1. Check operation of felt pressure pads and be sure that they are clean.
2. Check operation of the erase lever and actuating mechanism.
3. Check the feed tension.—Tension should be just great enough to cause tape to follow groove in tape guide at start of 7" reel. If excessive tension is noted, clean or replace friction disc.

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4. Check takeup tension—Tension should be great enough to wind tape evenly on the takeup reel, (Watch out for warped reels.) but not great enough to pull tape through the capstan.
5. Check rewind time—5" reel of tape should rewind in 3 minutes.
6. Check tape velocity—Unwind about 10' of tape from start of reel, place a mark on the light or glossy side of the tape, then measure 36 3/4" and place another mark on the tape. Measure an additional 1 1/2" and place a third mark on the tape. Thread the tape in the recorder. Hold a watch (type with sweep second hand preferred) near the tape guide with the face of the watch vertical. Start the recorder and note the position of the second hand on the watch, when the first mark passes over the guide. If the second mark on the tape reaches the guide within 10 seconds and the third mark does not pass the guide, the speed of the recorder is acceptable. If the speed is low the drive is slipping, pressure on pressure pads is too great, or feed tension is too high. If the speed is high, the flywheel tire is worn.
7. Check the tape passage—Look for weaving of the tape or creeping on the capstan (caused by worn or misaligned pads, tape not guiding properly in head, drive unit loose on mechanism plate, or worn pressure roller).
8. Azimuth adjustment—Thread the recorder with Azimuth adjustment tape, connect an output meter across the speaker voice coil and rotate the hex nut (85) until maximum output is obtained. Two peaks may be encountered. Adjust for the stronger one.

B. AMPLIFIER

1. Gain Test - Disconnect bias oscillator, connect an audio oscillator to the input jack and adjust the oscillator output to .06 volts at 400 cycles/sec. Connect an output meter and oscilloscope across the speaker voice coil. Place the "Play - Record" control in the "Record" position and advance the "Volume" control to a point just below where the wave appears to distort. The output voltage should be at least 2 volts. Restore bias oscillator circuit.

C. FREQUENCY RESPONSE

1. Connections - Connect an audio oscillator to the input jack of the recorder. Connect a VT Voltmeter across the oscillator output. Connect a 3 ohm 5 watt resistor in place of the speaker and connect an output meter across the resistor. Turn tone control to "Treble" position.
2. Tests - Set oscillator to 1000 C.P.S. and set recorder volume control at normal recording position. Adjust oscillator output so that recording indicator flashes very faintly. Record about 10' of tape. Change oscillator frequency to 200 C.P.S. and adjust oscillator output to the same level used at 1000 C.P.S. Record about 10' of tape. Change oscillator frequency to 3000 C.P.S. and adjust oscillator output to 1000 cycle level. Record about 10' of tape. Switch recorder to "Play" position and rewind tape. Start the recorder and adjust volume control to suitable level (not in excess of 2 volts). The output at 200 C.P.S. will usually be within 3DB of the level (maximum permissible variation 7DB), the 3000 cycle will normally be within 3DB of the 1000 cycle level (maximum permissible variation 8 1/2 DB).

SECTION V
Assembly Parts List
Ampro Magnetic Tape Recorder
Model 731

NOMENCLATURE

| Item | Part Number | Quantity Required | 1 2 3 4 5 6 7 8 9 |
|------|-------------|-------------------|-------------------------------------------------------------------------------------------|
| | 16929 | 1 | Carton, Recorder Shipping |
| | A-731 | 1 | Book, Instruction |
| | 20444 | 1 | Recorder Assembly, Magnetic Tape |
| | 111 | 1 | Reel, Tape Recorder |
| | 14112 | 1 | Nut, Wing #10-24 |
| | 102 | 1 | Microphone Assembly |
| | 106 | 1 | Cable Assembly, Radio Speaker |
| 1 | 18779 | 1 | Grille, Speaker |
| 2 | 18775 | 1 | Speaker, Tape Recorder (T-6) |
| | 1462 | 4 | Washer, Burr |
| | 1679 | 4 | Washer, Lock #8 Ext. |
| | 14975 | 4 | Screw, Rosette Hd. #8-32 x 1" Stl. F-110 |
| | 1453 | 4 | Nut, Hex #8-32 Stl. N. P. |
| | 18785 | 1 | Button, Plug |
| | 18698 | 1 | Nameplate, Recorder Case |
| | 14140 | 2 | Screwnail, #15 x 3/8 |
| | 18788 | 1 | Nameplate, External Speaker |
| | 18778 | 1 | Case Assembly, Tape Recorder |
| 8 | 14102 | 6 | Screw, Wood Phillips Oval Hd. #6 x 1-1/4 |
| 3 | 18842 | 1 | Nameplate, Motor Lock |
| | 13465 | 1 | Spring, Motor Lock Key |
| 4 | 13464 | 1 | Key, Motor Lock |
| 5 | 12888 | 1 | Stud, Motor Lock Shaft |
| 6 | 16952 | 1 | Cover, Compartment |
| | 13876 | 1 | Spring, Compartment Cover Retaining |
| | 14141 | 2 | Nut, Speed |
| | 18776 | 1 | Nameplate, Tape Recorder (available only upon certification of loss and serial # of unit) |
| | 14106 | 2 | Rivet, Tub. Oval Hd. .051 x 9/64 |
| 7 | 16951 | 1 | Panel, Tape Reel |
| 8 | 14102 | 2 | Screw, Wood Phillips Oval Hd. #6 x 1-1/4 |
| | 14109 | 1 | Washer, Plain |
| | 14991 | 4 | Screw, Phillips Bd. Hd. #6-32 x 1/4 |
| | 13462 | 1 | Bracket, Tape Reel Panel |
| | 14199 | 1 | Screw, Wood Phillips Rd. Hd. #6 x 3/8 |
| 9 | 16926 | 4 | Knob, Control |
| 10 | 16950 | 1 | Panel, Control |
| | 14107 | 1 | Screw, Phillips Oval Hd. #6-32 x 1-1/2 |
| 11 | 14136 | 2 | Screw, Phillips Oval Hd. #6-32 x 1-3/8 |
| 12 | 13839 | 1 | Cover, Recorder Amplifier |
| 13 | 14996 | 6 | Screw, Sheet Metal Phillips Bd. Hd. #4 x 1/4 Type Z |
| 14 | 20446 | 1 | Fan Assembly, Recorder |
| 15 | 14780 | 1 | Screw, Hd. Socket Set #6-32 x 1/8 Cup Pt. |

NOMENCLATURE

| Item | Part Number | Quantity Required | | | | | | | | | | |
|-------|-------------|--------------------------------------------------------|----------------------------------------------|-----------------------------------------------------|---|---|---|---|---|---|---|--|
| | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | |
| 16 | 20414 | 1 | Collar Assembly Erase Lever Actuator | | | | | | | | | |
| 17 | 14999 | 1 | Screw, Hdlss. Socket Set #4-40 x 3/16 | | | | | | | | | |
| 18 | 15032 | 1 | Spring, Tape Erase Lever | | | | | | | | | |
| 19 | 18774 | 1 | Cord, Recorder Line, 8 Ft. long | | | | | | | | | |
| 20 | 18671 | 2 | Connector, Wire | | | | | | | | | |
| | 18697 | 1 | Shield, Motor Switch | | | | | | | | | |
| 21 | 20445 | 1 | Amplifier Assembly, Tape Recorder | | | | | | | | | |
| 22 | 16915-1 | 2 | Lamp, Neon (seasoned) (V-4,5) | | | | | | | | | |
| | 18714 | 1 | Shield, Tube Cover | | | | | | | | | |
| | 18497-S | 1 | Tube, 12AX7 (selected) (V-1) | | | | | | | | | |
| | 18699 | 1 | Tube, 6AU6 (V-2) | | | | | | | | | |
| | 18700 | 1 | Tube, 6X4 (V-6) | | | | | | | | | |
| | 18701 | 1 | Tube, 6AQ5 (V-3) | | | | | | | | | |
| | 23 | 13873 | 1 | Shield, Motor | | | | | | | | |
| | | 14658 | 1 | Screw, Sheet Metal Phillips Rd. Hd. #8 x 3/8 Type Z | | | | | | | | |
| | | 16984 | 1 | Clamp, Cable | | | | | | | | |
| | | 14972 | 1 | Washer, Lock #6 Ext. | | | | | | | | |
| | | 14100 | 1 | Screw, Phillips Bd. Hd. #6-32 x 5/16 | | | | | | | | |
| | | 1452 | 1 | Nut, Hex #6-32 | | | | | | | | |
| | | 17782 | 1 | Capacitor, .01 mfd. 400 V Paper (C-8) | | | | | | | | |
| | | 18091 | 1 | Capacitor, .001 mfd. 600 V Paper (C-14) | | | | | | | | |
| | | 18485 | 2 | Capacitor, .001 mfd. 400 V Ceramic (C-20, 24) | | | | | | | | |
| 18487 | | 2 | Capacitor, .01 mfd. 400 V Ceramic (C-10, 12) | | | | | | | | | |
| 18488 | 1 | Capacitor, .005 mfd. 400 V Ceramic (C-19) | | | | | | | | | | |
| 18489 | 3 | Capacitor, .0005 mfd. 500 V Ceramic (C-3, 4, 9) | | | | | | | | | | |
| 18492 | 1 | Capacitor, .003 mfd. 600 V Paper (C-18) | | | | | | | | | | |
| 18715 | 1 | Capacitor, 10-30 mfd. Elect. (C-22, 23) | | | | | | | | | | |
| 18716 | 1 | Capacitor, 4-4-80-80 mfd. Elect. (C-15, 21, 11, 16) | | | | | | | | | | |
| 18731 | 1 | Capacitor, .02 mfd. 400 V Paper (C-2) | | | | | | | | | | |
| 18732 | 2 | Capacitor, .03 mfd. 400 V Paper (C-5, 13) | | | | | | | | | | |
| 18733 | 1 | Capacitor, .0027 mfd. 400 V Ceramic (C-1) | | | | | | | | | | |
| 18739 | 1 | Capacitor, .007 mfd. 200 V Paper (C-7) | | | | | | | | | | |
| 18773 | 1 | Capacitor, .0003 mfd. 600 V Paper (C-17) | | | | | | | | | | |
| 17554 | 1 | Resistor, 10 megohms, 1/2 watt carbon (R-3) | | | | | | | | | | |
| 17959 | 4 | Resistor, 220 K ohms, 1/2 watt carbon (R-4, 14, 16, 2) | | | | | | | | | | |
| 18436 | 1 | Resistor, 1.8 megohms, 1/2 watt carbon (R-9) | | | | | | | | | | |
| 18467 | 1 | Resistor, 560 K ohms, 1/2 watt carbon (R-7) | | | | | | | | | | |
| 18471 | 2 | Resistor, 100 K ohms, 1/2 watt carbon (R-10, 15) | | | | | | | | | | |
| 18474 | 2 | Resistor, 470 K ohms, 1/2 watt carbon (R-1, 17) | | | | | | | | | | |

| Item | Part Number | Quantity Required | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|------|-------------|-------------------|---|---|---|---|---|---|---|---|-----------------------------------------------------|
| | 18582 | 1 | | | | | | | | | Resistor, 2700 ohms, 1/2 watt carbon (R-8) |
| | 18583 | 1 | | | | | | | | | Resistor, 22 K ohms, 1/2 watt carbon (R-13) |
| | 18653 | 1 | | | | | | | | | Resistor, 2700 ohms, 1 watt carbon (R-18) |
| | 18718 | 1 | | | | | | | | | Resistor, 3 ohms, 5 watt wire wound (R-22) |
| | 18729 | 2 | | | | | | | | | Resistor, 390 K ohms, 1/2 watt carbon (R-11, 19) |
| | 18770 | 1 | | | | | | | | | Resistor, 270 ohm, 1 watt carbon (R-12) |
| | 18771 | 1 | | | | | | | | | Resistor, 33 ohm, 2 watt carbon (R-21) |
| | 18772 | 1 | | | | | | | | | Resistor, 390 ohm, 2 watt carbon (R-20) |
| 24 | 18769 | 1 | | | | | | | | | Jack - External Speaker (J-2) |
| | 18707 | 1 | | | | | | | | | Board, Terminal |
| | 18773 | 2 | | | | | | | | | Screw, Sheet Metal Phillips Bd. Hd. #6 x 1/4 Type Z |
| | 18722 | 1 | | | | | | | | | Socket, Miniature Tube (9-pin) |
| | 18706 | 1 | | | | | | | | | Base, Miniature Socket Shield |
| | 1466 | 2 | | | | | | | | | Rivet, Tub. Oval Hd. .085 x 7/32 |
| | 18525 | 1 | | | | | | | | | Clamp, Tube |
| | 18721 | 1 | | | | | | | | | Socket, Miniature Tube (7-pin) |
| | 14871 | 1 | | | | | | | | | Rivet, Tub. Oval Hd. .085 x 3/16 |
| | 14908 | 1 | | | | | | | | | Rivet, Tub. Oval Hd. .088 x 1/4 |
| | 18720 | 2 | | | | | | | | | Socket, Miniature Tube (7-pin) |
| | 18524 | 2 | | | | | | | | | Clamp, Tube |
| | 14871 | 2 | | | | | | | | | Rivet, Tub. Oval Hd. .085 x 3/16 |
| | 14908 | 2 | | | | | | | | | Rivet, Tub. Oval Hd. .088 x 1/4 |
| | 13845 | 2 | | | | | | | | | Bracket, Resistor Board Mtg. |
| | 14773 | 2 | | | | | | | | | Screw, Sheet Metal Ph. Bd. Hd. #6 x 1/4 Type Z |
| | 18702 | 1 | | | | | | | | | Terminal, Locking #4 Double |
| | 1474 | 1 | | | | | | | | | Rivet, Tub. Oval Hd. 1/8 x 1/8 |
| | 13840 | 1 | | | | | | | | | Platform, Recorder Amplifier Tube |
| | 12540 | 3 | | | | | | | | | Spacer (Tube Platform) |
| | 14729 | 3 | | | | | | | | | Washer, Plain |
| | 14992 | 3 | | | | | | | | | Screw, Phillips Bd. Hd. #4-40 x 3/8 |
| | 18708 | 1 | | | | | | | | | Connector, Female (J-1) |
| | 12832 | 1 | | | | | | | | | Base, Microphone Jack |
| | 14993 | 2 | | | | | | | | | Screw, Phillips Fil. Hd. #4-40 x 1-1/8 |
| | 18728 | 1 | | | | | | | | | Transformer, Power (T-4) |
| | 14994 | 4 | | | | | | | | | Screw, Phillips Bd. Hd. #8-32 x 1/4 (Sems Unit) |
| | 18782 | 1 | | | | | | | | | Transformer, Output (T-5) |
| | 14117 | 2 | | | | | | | | | Nut, Speed #6-32 Type U |
| | 14991 | 2 | | | | | | | | | Screw, Phillips Bd. Hd. #6-32 1/4 |
| | 18784 | 1 | | | | | | | | | Coil, Oscillator (self-fastening) (T-1) |
| | 18709 | 1 | | | | | | | | | Control, Volume (R-6) |
| | 14854 | 1 | | | | | | | | | Nut, Hex. 3/8-32 Washer Type |
| | 18777 | 1 | | | | | | | | | Control, Tone (R-5) |
| | 16523 | 1 | | | | | | | | | Washer, Lock 3/8 Int. |
| | 14854 | 1 | | | | | | | | | Nut, Hex. 3/8-32 Washer Type |
| | 18786 | 1 | | | | | | | | | Switch, Record-Listen (SW-1, 2, 3, 4) |
| | 14773 | 2 | | | | | | | | | Screw, Sheet Metal Phillips Bd. Hd. #6 x 1/4 Type Z |
| | 17593 | 3 | | | | | | | | | Grommet, Rubber |
| | 16910 | 2 | | | | | | | | | Socket, Neon Lamp |
| | 1474 | 4 | | | | | | | | | Rivet, Tub. Oval Hd. 1/8 x 1/8 |
| | 12886 | 3 | | | | | | | | | Spacer, Amp. Shock Control |
| | 1698 | 3 | | | | | | | | | Washer, Plain |

MODEL 731

| Item | Part Number | Quantity Required | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|------|-------------|-------------------|---|---|---|---|---|---|---|---|------------------------------------------------------|
| | 14972 | 3 | | | | | | | | | Washer, Lock #6 Ext. |
| | 14153 | 3 | | | | | | | | | Screw, Phillips Bd. Hd. #6-32 x 1/2 |
| | 18702 | 1 | | | | | | | | | Terminal Locking, #4 Double |
| | 1474 | 1 | | | | | | | | | Rivet, Tub. Oval Hd. 1/8 x 1/8 |
| | 1767 | 1 | | | | | | | | | Eyelet, Brass |
| | 16824 | 1 | | | | | | | | | Eyelet, Brass |
| | 1475 | 11 | | | | | | | | | Rivet, Tub. Truss Hd. .085 x 1/8 |
| 25 | 18794 | 2 | | | | | | | | | Shock-Mount, Rubber (orange) |
| | 18795 | 2 | | | | | | | | | Shock-Mount, Rubber (blue) |
| 26 | 12783 | 4 | | | | | | | | | Screw, Shoulder, Amplifier Mtg. |
| | 13825 | 3 | | | | | | | | | Washer, Plain |
| | 14972 | 3 | | | | | | | | | Washer, Lock #6 Ext. |
| | 1452 | 3 | | | | | | | | | Nut, Hex #6-32 |
| 27 | 20436 | 1 | | | | | | | | | Actuator Assembly, Motor Plate |
| 28 | 12859 | 1 | | | | | | | | | Screw, Shoulder, Motor Plate Actuator |
| 29 | 1693 | 1 | | | | | | | | | Washer, Plain |
| 30 | 13020 | 1 | | | | | | | | | Washer, Plain |
| 31 | 14916 | 1 | | | | | | | | | Nut, Hex #6-32 |
| 32 | 12858 | 1 | | | | | | | | | Collar, Motor Plate Actuator |
| 33 | 14135 | 1 | | | | | | | | | Screw, Hd. S. Socket Set #8-32 x 7/16 Cup Pt. |
| | 14171 | 1 | | | | | | | | | Screw, Hd. S. Set Hex Socket #8-32 x 3/8 Cone Pt. |
| 34 | 15036 | 1 | | | | | | | | | Spring, Motor Pressure |
| 35 | 12824 | 1 | | | | | | | | | Pulley, Takeup |
| 36 | 20409 | 1 | | | | | | | | | Spindle Assembly, Takeup |
| | 13827 | 1 | | | | | | | | | Lever, Tape Rewind |
| | 14130 | 1 | | | | | | | | | Washer, Plain |
| 37 | 14972 | 1 | | | | | | | | | Washer, Lock #6 Ext. |
| 38 | 1452 | 1 | | | | | | | | | Nut, Hex. #6-32 |
| 39 | 20447-1 | 1 | | | | | | | | | Drive Assembly, Tape Recorder |
| 40 | 18787 | 1 | | | | | | | | | Motor Assembly, Tape Recorder (T-3) |
| 41 | 14131 | 5 | | | | | | | | | Washer, Plain |
| | 1693 | 1 | | | | | | | | | Washer, Plain |
| 42 | 12834 | 3 | | | | | | | | | Sleeve, Motor Mtg. |
| 43 | 16904 | 3 | | | | | | | | | Grommet, Rubber |
| 44 | 14916 | 3 | | | | | | | | | Nut, Hex #6-32 Brass, N. P. |
| 45 | 13872 | 1 | | | | | | | | | Plate, Motor Mtg. |
| 46 | 1313-10 | 3 | | | | | | | | | Washer, Plain |
| 47 | 13940 | 3 | | | | | | | | | Washer, Plain |
| 48 | 16923 | 3 | | | | | | | | | Washer, Felt |
| 49 | 12838 | 3 | | | | | | | | | Washer, Motor Mtg. Spacing |
| 50 | 12837 | 3 | | | | | | | | | Screw, Shoulder, Motor Mtg. |
| 51 | 6002 | 1 | | | | | | | | | Drive Sub Assembly, Tape Recorder |
| | 20406-1 | 1 | | | | | | | | | Bracket Assembly, Flywheel Upper |
| | 16905-1 | 1 | | | | | | | | | Bearing, Flywheel |
| | 16906 | 1 | | | | | | | | | Washer, Felt, Flywheel Brg. Oil |
| | 13846 | 1 | | | | | | | | | Retainer, Flywheel Bearing |
| | 14105 | 3 | | | | | | | | | Rivet, Tub. Truss Hd. .098 x 7/64 |
| | 20416-1 | 1 | | | | | | | | | Bracket Sub Assembly, Flywheel Upper |
| 52 | 20434 | 1 | | | | | | | | | Shaft & Flywheel Assembly Recorder |
| 53 | 16912 | 1 | | | | | | | | | Belt, Takeup Drive |
| | 20407 | 1 | | | | | | | | | Bracket Assembly, Flywheel Lower |
| | 16905-1 | 1 | | | | | | | | | Bearing, Flywheel |
| | 16906 | 1 | | | | | | | | | Washer, Felt, Flywheel Brg. Oil |
| | 13846 | 1 | | | | | | | | | Retainer, Flywheel Bearing |
| | 14108 | 3 | | | | | | | | | Rivet, Tub. Truss Hd. .098 x 9/64 |
| | 18593 | 1 | | | | | | | | | Lug, Solder |
| | 14972 | 3 | | | | | | | | | Washer, Lock #6 Ext. |
| | 14100 | 4 | | | | | | | | | Screw, Phillips Bd. Hd. #6-32 x 5/16 |

| Item | Part Number | Quantity Required | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|------|-------------|-------------------|---|---|---|---|---|---|---|---|------------------------------------------------------------|
| 54 | 14104 | 2 | | | | | | | | | Washer, Plain |
| 55 | 12887 | 1 | | | | | | | | | Cam, Motor Lock |
| 56 | 14935 | 2 | | | | | | | | | Screw, Hdlss Set Hex Socket #8-32 x 1/4 Cup Pt. |
| 57 | 13463 | 1 | | | | | | | | | Detent, Motor Lock |
| | 14838 | 1 | | | | | | | | | Washer, Plain |
| 58 | 15097 | 1 | | | | | | | | | Spring, Motor Lock Shaft |
| 59 | 12889 | 1 | | | | | | | | | Shaft, Motor Lock |
| 60 | 13897 | 1 | | | | | | | | | Strip, Drive Assembly Reinforcing |
| 61 | 13898 | 1 | | | | | | | | | Plate, Drive Assembly Reinforcing |
| | 14972 | 3 | | | | | | | | | Washer, Lock #6 Ext. |
| 62 | 14153 | 3 | | | | | | | | | Screw, Phillips Bd. Hd. #6-32 x 1/2. |
| 63 | 12847 | 1 | | | | | | | | | Actuator, Pressure Roller |
| 64 | 14780 | 2 | | | | | | | | | Screw, Hdlss. Socket Set #6-32 x 1/8 |
| 65 | 16871 | 1 | | | | | | | | | Damper, Tape Erase Pressure Spring |
| 66 | 13891 | 1 | | | | | | | | | Stop, Tape Erase Lever |
| 67 | 20401 | 1 | | | | | | | | | Magnet Assembly, Tape Erase (adjust after installation) |
| 68 | 14972 | 2 | | | | | | | | | Washer, Lock #6 Ext. |
| 69 | 14991 | 2 | | | | | | | | | Screw, Phillips Bd. Hd. #6-32 x 1/4 |
| 70 | 15068 | 1 | | | | | | | | | Spring, Foot Control Lever |
| 71 | 13877 | 1 | | | | | | | | | Lever, Pressure Roller Retractor |
| 72 | 15043 | 1 | | | | | | | | | Retainer, Pressure Roller Retractor |
| 73 | 15034 | 1 | | | | | | | | | Spring, Pressure Roller |
| 74 | 20404 | 1 | | | | | | | | | Bracket Assembly, Pressure Roller |
| 75 | 14101 | 1 | | | | | | | | | Screw, Phillips Truss Hd. #6-32 x 1" |
| 76 | 12830 | 1 | | | | | | | | | Stud, Pressure Roller Bracket |
| 77 | 15033 | 1 | | | | | | | | | Spring, Pressure Pad Assembly |
| 78 | 20439 | 1 | | | | | | | | | Bracket Assembly Pressure Pad |
| | 16903 | 1 | | | | | | | | | Pad, Sound Head Pressure |
| | 16920 | 1 | | | | | | | | | Pad, Tape Erase Pressure |
| 79 | 14101 | 1 | | | | | | | | | Screw, Phillips Truss Hd. #6-32 x 1" |
| 80 | 12823 | 1 | | | | | | | | | Stud, Pressure Pad Bracket |
| 81 | 20424 | 1 | | | | | | | | | Head Assembly, Tape Recorder |
| 82 | 15035 | 1 | | | | | | | | | Spring, Recording Head Adjustment |
| 83 | 12842 | 1 | | | | | | | | | Screw, Shoulder, Recording Head |
| 84 | 13208 | 1 | | | | | | | | | Washer, Plain |
| 85 | 14103 | 1 | | | | | | | | | Nut, Lock #6-40 |
| | 14109 | 1 | | | | | | | | | Washer, Plain |
| 86 | 18696 | 1 | | | | | | | | | Switch, Rotary (SW-6, 7) |
| 87 | 14854 | 1 | | | | | | | | | Nut, Hex 3/8-32 Washer Type |
| 88 | 12820 | 1 | | | | | | | | | Stud, Feed Reel |
| 89 | 13822 | 1 | | | | | | | | | Spacer, Feed Reel |
| 90 | 13821 | 1 | | | | | | | | | Disc, Reel Drive |
| 91 | 16909 | 1 | | | | | | | | | Washer, Felt, Reel Spindle |
| 92 | 13820 | 1 | | | | | | | | | Disc, Tape Feed Reel Friction |
| 93 | 14972 | 1 | | | | | | | | | Washer, Lock #7 Ext. |
| 94 | 14991 | 1 | | | | | | | | | Screw, Phillips Bd. Hd. #6-32 x 1/4 |
| 95 | 12821 | 1 | | | | | | | | | Stud, Tape Guide |
| 96 | 14972 | 1 | | | | | | | | | Washer, Lock #6 Ext. |
| 97 | 14100 | 1 | | | | | | | | | Screw, Phillips Bd. Hd. #6-32 x 5/16 |
| 98 | 13823 | 1 | | | | | | | | | Lever, Tape Erase |
| 99 | 13825 | 1 | | | | | | | | | Washer, Plain |
| 100 | 12822 | 1 | | | | | | | | | Screw, Shoulder, Tape Erase Lever |
| 101 | 14972 | 1 | | | | | | | | | Washer, Lock #6 Ext. |
| 102 | 1452 | 1 | | | | | | | | | Nut, Hex #6-32 |
| | 14313 | 1 | | | | | | | | | Pin, Grooved, 3/32 x 5/16 |
| | 12851 | 2 | | | | | | | | | Stud, Tape Rewind Guide |
| | 12836 | 1 | | | | | | | | | Stud, Recording Head Adjustment |
| | 13871 | 1 | | | | | | | | | Plate, Tape Recorder Mechanism |

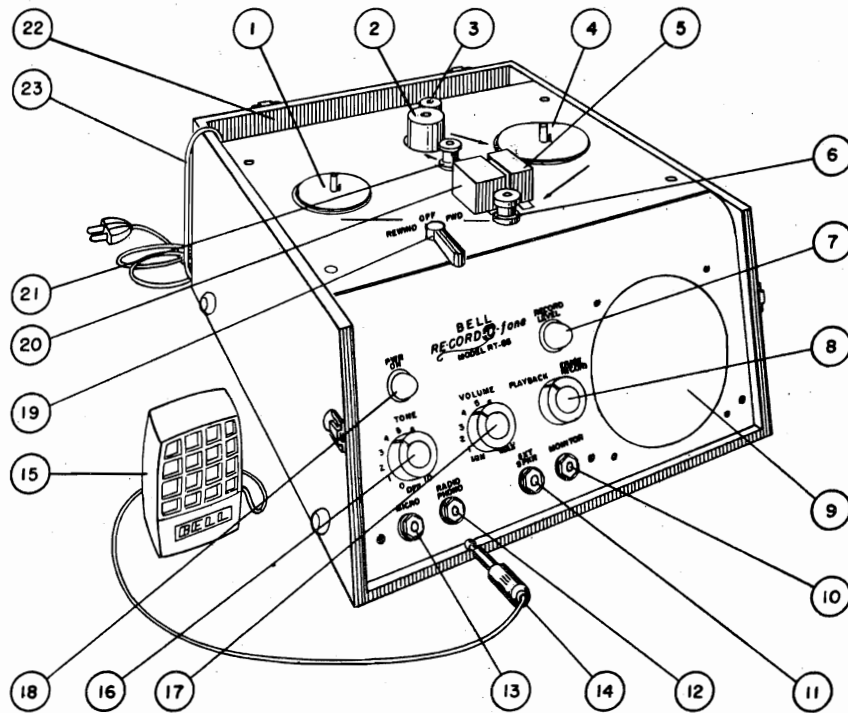


DIAGRAM SHOWING NAME AND LOCATION OF PARTS.

- | | |
|----------------------------------|-----------------------------------------------------------------|
| 1. Supply Reel Platform | 13. Microphone Jack |
| 2. Capstan | 14. Microphone Plug |
| 3. Pressure Roller | 15. Microphone |
| 4. Take-up Reel Platform | 16. Tone Control & Master Power Switch |
| 5. Pressure Pads | 17. Volume Control |
| 6. Idler Roller & Tape Guide | 18. Pilot Light |
| 7. Recording Level Indicator | 19. Direction Control - 3 Position Rewind-Off-Forward |
| 8. Erase Record-Playback Control | 20. Erase-Record-Playback Head |
| 9. Speaker | 21. Tape Guide Post |
| 10. Headphone Monitoring Jack | 22. Storage Compartment for Power Cord, Reels and Microphone |
| 11. External Speaker Jack | 23. Power Cord |
| 12. Radio or Phono Jack | |

SPECIFICATIONS

- | | |
|------------------------|-----------------------------|
| POWER SUPPLY: | 115 Volts 60 Cycles A. C. |
| POWER COMSUMPTION: | 90 Watts maximum - 1.1 Amp. |
| TAPE SPEED: | 7 1/2 inches per second |
| RECORDING TRACK WIDTH: | 3/32 inch - dual track |

TAPE REC. PAGE 22-2 BELL

MODEL RT-65

RECORDING MEDIUM: Plastic or Paper tape - Red or black oxide, (Plastic red oxide preferred.)

RECORDING TIME: 5 inch reel; 15 minutes each track, 30 minutes total.
7 inch reel; 30 minutes each track, one hour total.

FREQUENCY RESPONSE: 70 to 8,000 c.p.s.

REWIND SPEED: 6 to 1 ratio, 5" reel 2 1/2 minutes; 7" reel 4 minutes

TYPE OF ERASE AND BIAS: High Frequency A. C. 48 K.C.

RECORDING LEVEL INDICATOR: Neon Lamp NE-51

POWER OUTPUT: 3.5 Watts - 6V6GT output tube.

AMPLIFIER: 4 stages with inverse feedback - volume and tone controls - high and low frequency compensation in record and playback.

SPEAKER: 6 inch heavy duty, 8 watt capacity

INPUTS: Microphone 75 db gain - Phono or Radio 40 db gain.
Play back gain 85 db.

OUTPUTS: External speaker 3.2 ohm - Monitor for headphones or meter 500 ohm source with voltage divider.

NOTE: (1) Internal speaker disconnects when external speaker jack is used.
(2) 500 ohm output is available by shorting out 10,000 ohm resistor inside amplifier.
(3) A power amplifier may be driven from either external speaker or monitor jack. If external speaker jack is used a 3 ohm 5 watt resistor should be shunted across the connecting plug or amplifier input, to provide load on recorder amplifier.

FUSE: 2 Amp solder-in type GJV located underneath chassis.

HOW TO REMOVE TOP PLATE MECHANICAL ASSEMBLY FROM CABINET

This is necessary to gain access to tubes, controls, etc.

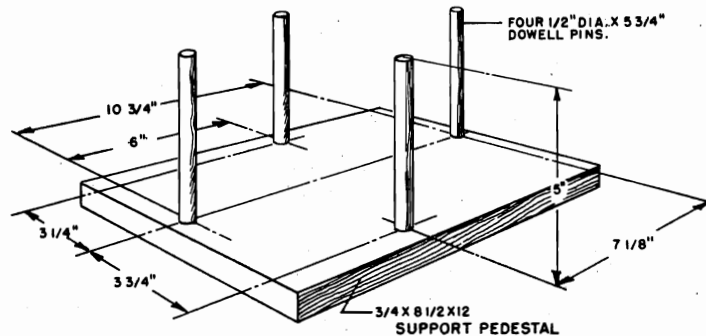
CAUTION - - USE EXTREME CARE IN REMOVING THIS ASSEMBLY TO PREVENT DAMAGE TO FAN.

1. Remove four 10-32 large truss head screws along right and left edges of panel.
2. Lift plate up at right side by grasping take-up reel with left hand. Now, grasp right front corner of plate with right hand and left rear corner with left hand. Pull plate to the right enough for the casting to clear brackets on left side of cabinet and lift up. Top plate is now free except for head wires and 5 prong plug.
3. Push plate to extreme rear of cabinet and rest back of plate on vent grille. Prop front up with piece of wood or cardboard box while unsoldering four head leads. Remove 5 prong plug and mechanical assembly is now free.

NOTE: A. In some earlier models of recorders using a shorter motor, lift top plate up at front and pull forward until casting clears cabinet bracket on right side. Now move plate to right to clear left hand cabinet bracket, lift up and assembly is free except for head wires and plugs. See paragraph 3 above.
B. If in some models there is difficulty in removing top plate without striking fan, remove chassis and front panel by taking out 3 Phillips oval head screws from bottom of case and 2 on each side (7 total).

CAUTION: DO NOT SET THIS ASSEMBLY DOWN ON FAN BLADE.

4. See sketch below for details of a pedestal for supporting top plate assembly while making examination or repairs.



HOW TO REMOVE AMPLIFIER FROM CABINET

1. First it is advisable to remove top plate assembly (see above).
2. Remove 3 Phillips oval head screws and finish washers from bottom of case, remove 4 same type screws and washers from cabinet sides.
3. Push chassis toward front of cabinet while supporting front panel.
4. Unwind power cord if coiled up and push under cabinet vent partition. Remove cable clamp.
5. Unsolder 4 head connections located on slide switch, if not already detached, remove 5 prong plug. Amplifier is now free.

REMOVING TOP PLATE FROM MECHANICAL ASSEMBLY

1. If possible, rest unit on pedestal as described earlier - if this is not available remove fan blade and rest unit on motor shaft.
2. Remove pointer knob from control shaft. Remove four Phillips oval head 10-32 machine screws recessed in panel.
3. Top panel will now lift off of mechanical assembly. It is best to disconnect two wires to blade switch otherwise top panel must be placed to one side while working on either mechanical unit or top plate mechanism.

TOP PLATE MECHANICAL INSPECTION

(See Drawing Fig. 2)

1. With top plate removed from mechanical assembly check the parts located on underneath side of top plate as follows:

Push bell crank (14) toward front edge of top plate, as far as possible, release slowly and note sliding parts. These should not bind or stick in any position. If they do, remove and check for burrs or rough places. Parts should be well lubricated with Sta-Put #18-H grease. See paragraph describing lubrication of recorder. To check roller slide assembly (10) alone, push bell crank forward and while holding against spring, move roller slide assembly and check for sticking friction. To check pressure pad slide assembly (7) alone, push roller slide assembly (10) toward rear of top plate and move bell crank in both directions. Check bell crank (14) to see that it works free and does not strike rubber grommet (17). Bend away slightly if necessary.

2. Install top plate to mechanical assembly and check the following:

Rotate control knob to forward position. The pressure pad slide assembly (7) must be against its full travel stops when control is in the forward position and indexed. Check as follows:

- (a) If pad slide assembly moves still further (is not against the stop) when control knob is pushed beyond the index point, the bell crank flange should be bent toward the cam which actuates the bell crank.
- (b) If pad slide assembly hits its stops before the control is forward in the index position it is necessary to bend the bell crank flange slightly away from the cam.

3. Check the blade switch (18), which is operated by the cam and bell crank (14), and make sure that it is closed in the forward position only. If the switch closes in off or rewind position, bend the angle bracket which mounts switch, by lessening the 90 degree angle.

MODEL R T-65

MECHANICAL ASSEMBLY INSPECTION AND TESTS

(See Drawing Fig. 3)

1. Driving Surfaces:

All driving surfaces and surfaces which touch the tape must be free of oil or grease.

These includes:

- (a) Motor Shaft (53).
- (b) Idler wheel, rubber surface (34).
- (c) Supply or rewind drum, tapered driven surface (44).
- (d) Capstan drum, driven surface (8).
- (e) Take-up drum, driven surface (1D).
- (f) Belt (13).
- (g) Capstan rubber drive (8).
- (h) Capstan pressure roller (10C-Fig. 2)
- (i) Tape guide rollers (2) (12-Fig. 2)
- (j) Recording head surface (2- Fig. 2)
- (k) Felt pressure pads (2) (7D - Fig. 2)
- (l) Motor pulley groove (28 - Fig. 3)
- (m) Belt pulley groove (17)

Wipe off any oil or grease with a clean dry cloth. Carbon tetrachloride may be used but must be wiped off any rubber surface immediately or unit will not have good drive for several hours after application. Use sparingly.

2. Drive Tests:

With motor power off:

(a) With control knob in forward position, manually turn capstan clockwise. The idler should cause motor shaft to rotate, which will in turn rotate take-up drum. Oil or grease on idler, motor shaft, belt, belt pulleys, or take-up drum driven surface will cause a failure of this test. In off position, clearance between idler rubber surface and motor shaft should not be more than .031 inches. This clearance can be reduced by taking up clearance in 4 motor mounting bolts and 3 motor mounting plate screws, in the direction toward the idler. The idler cam part #2043 can cause too much clearance also. Replace cam or bend small stop (1/16" high) toward center hole.

(b) 1. AFTER MACHINE HAS BEEN RUNNING IN THE CABINET FOR FIVE MINUTES OR MORE AND CLUTCHES HAVE BEEN SLIPPING (Normal forward operation), CHECK AS FOLLOWS:

Place a full 5" plastic reel of tape on the take-up drum - hook a gram or ounce scale to end of tape and throw control to forward position. The pull should be 1-1/2 to 2 ounces (40-55 grams). Wipe oil off clutch if above this amount. Add a few drops of STA-PUT #360 if below this amount.

2. Place a full 5" plastic reel of tape on the rewind drum and hook scale to tape end as before. Motor control should be in off position. Measure pull necessary to unwind tape from reel, this should be 1/2 to 3/4 ounce (15 to 20 grams). Remove or apply lubricant as described in preceeding paragraph. NOTE: - Addition of oil increases tension and pull of either clutch.

Clearances:

- (a) Idler roller to motor shaft 1/32" maximum, 1/64" minimum, control in "off" position.
- (b) Brake (24 Fig. 3) to take-up drum (1D) 1/32" minimum, control "rewind" position.
- (c) Idler roller edge to motor frame 1/32" minimum, control "off" position. "Forward" position same, 1/32" minimum. There must be a minimum of end play in idler shaft, idler lever assembly and idler pulley, so that idler does not rub motor, idler lever or motor pulley.
- (d) Belt to take-up drum, control "off" position, 1/32" minimum with motor running.
- (e) End play - take-up, capstan and rewind drums must have some end play but not to exceed 3/64". Motor shaft should also have slight end play.

4. Timing Tests:

- (a) Motor running, turn control knob slowly toward "forward" position. Capstan should start to rotate before take-up drum.
- (b) Motor running, turn control knob slowly from "rewind" to "off" At same time spin take-up drum manually. Brake should stop take-up drum before rewind drum stops rotating.
- (c) The speed of the tape thru the recorder can be checked with Minnesota Mining #43 Leader and Timing Tape. An 18.75 foot length of tape should run 30 seconds plus or minus .5 second. Unit should be tested after it has warmed up.

5. Miscellaneous Tests:

- (a) Motor running, control in off position, check belt position in large pulley groove. The belt should not climb or rotate about the center of a cross section. To remedy change pulley #2081 or take up all excess play in lever assembly #2080. Replace belt.

INSTRUCTIONS FOR LUBRICATION

DO NOT LUBRICATE THIS INSTRUMENT UNTIL YOU READ THESE INSTRUCTIONS AND OBTAIN THE CORRECT LUBRICANTS.

- (1) All the wiping surfaces of mechanical linkages should be free of dirt and foreign material and be lubricated lightly with STA-PUT #18-H grease. This lubricant should be at point of friction only and wiped clean from other surfaces.
- (2) The felt clutch washers on TAKE-UP AND REWIND drums should be lubricated ONLY after tests indicate the necessity. Use a small amount of STA-PUT oil #360 and make tension tests as outlined under "Mechanical Assembly Inspection and Tests." Wipe off excess oil from all surfaces including felts.

NOTE: IF tension tests cannot be met with addition of small amount of oil, the felts are worn and should be replaced.

- (3) For all other bearings and shafts, use a light spindle oil such as Kensington #9. Clean surface to be lubricated first, then apply only two to three drops.

NOTE: The above lubricants can be obtained from the E.F.Houghton & Co. Pipe cleaners are excellent for applying either oil or grease.

AMPLIFIER TESTS AND REPAIRS

See paragraph on "How To Remove Amplifier From Cabinet."

1. See schematic wiring diagram (Fig.4) for all voltages.
2. Check all tubes, inspect wiring and slide switch for poor or open connections.
3. If indicated, test volume control for open or poor connections.
4. Always check head surface for dirt and clean thoroughly. Test for continuity if suspected of being open. Erase winding 11 ohms playback-record winding 170 ohms. Demagnetize head by operating in record position for short time.
5. Test jacks for open or shorted circuits. Microphone jack must be insulated from front panel.
6. Test bias oscillator as follows; Throw switch to record position. Connect A.C. vacuum tube voltmeter capable of measuring 50 K.C. across erase winding at slide switch. Close blade switch (18, Fig. 2) on top panel by hand. Voltage should be 40 volts or more. Check frequency with signal generator and scope. This should be 48 K.C. plus or minus 3 K.C.
7. Hum test in record position - this can be measured across monitor jack. Turn volume and tone control full on, insert dummy shielded open-circuited plug in microphone jack. Amplifier must have bottom shield plate in place and line cord in proper polarity. Voltage should be less than 3 volts. Be sure bias is off. For playback test it will be necessary to listen to the hum in the speaker as the minimum audible hum and minimum voltage reading are not the same.

The power transformer is mounted so that it can be rotated on its axis to cancel hum picked up by the head. THIS HAS BEEN ADJUSTED AT THE FACTORY FOR MINIMUM HUM AND SHOULD NOT HAVE TO BE READJUSTED UNLESS MAJOR REPAIRS ARE MADE SUCH AS REPLACEMENT OF POWER TRANSFORMER, ETC.

To do this it is necessary to remove both the top plate and chassis from the cabinet. The chassis must rest on a sheet of metal similar to the bottom plate in cabinet to be shielded properly. The top plate must be placed in exactly the same position as when installed in cabinet, i. e., the top plate must be level with top of front panel of chassis. It must also have about 1/8" space between flange of top plate and flange of front panel. It may be rested on cardboard boxes or pieces of wood. Loosen four transformer mounting screws, rotate transformer for minimum audible hum (volume control turned on full). Tighten screws. NOTE: There are two null points 180 degrees apart. One will have much lower audible hum than the other. Do not rotate transformer too far or leads may be broken underneath chassis.

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INSPECTION AND TEST OF COMPLETE RECORDER

The testing of the complete recorder can be accomplished by making recordings with microphone, record player, radio, etc., but if instruments are available a more accurate test can be made.

(1) VISUAL TESTS

First, visually inspect the recorder for mechanical defects which can be detected by eye. Check for dirt pile up on record-playback and erase poles of head, clean with cloth slightly dampened in carbon tetrachloride. Check tape guide rollers for easy turning, the outside surfaces should be free of oil and dirt. Check capstan and pressure roller surfaces, clean if necessary with carbon tetrachloride but wipe off immediately so that roller will not soften.

Turn control to rewind and forward positions. Control should index in both positions smoothly. In forward position, both felts should be against head, and roller against capstan.

In off position roller should move away from capstan and allow enough room for feeding tape between roller and capstan. This should be a gap of 1/16" or more. Also, felt pads should move away from head to allow threading of tape between pads and head. The gap should be 1/8" or more. CAUTION: Do not bend springs to meet this dimension. See (2) below.

Check controls on front panel, tone control and power switch and Erase-Record-Playback Switch. These should operate smoothly without binding. If Erase-Record-Playback knob does not operate properly, remove top plate and check slide switch mechanism and shaft rear bearing. Be sure slide switch throws to full extent each position. It may be necessary to position rear bearing on a slight angle to cause this action. Check the position of the shaft arm located on the bearing shaft. To change position of this shaft arm it will be necessary to remove amplifier unit and loosen set screw with screwdriver inserted from underneath chassis thru hole provided. NOTE: - When checking switch, chassis must either be bolted in cabinet or on flat surface.

(2) HEAD TESTS AND ADJUSTMENT

To properly check head alignment it is necessary to have a roll of pre-recorded head alignment tape of one mil wave length, or 7500 cycles (3M head alignment tape #119). Play this back through recorder with A.C. vacuum tube voltmeter connected to monitor jack. Volume control full on. CAUTION: Be sure switch is in PLAYBACK position so as not to erase tape. The meter should read 15 volts or higher. Three things can cause low meter readings, (provided amplifier and tubes are okay). (1) wrong head alignment angle, (2) dirty head or (3) improper pressure of felts. Remove right hand cover which protects the felts and springs. Check head and be sure there is no dirt on poles or bakelite. Dirt holds the tape away from the poles and lowers output. If dirty, clean with carbon tetrachloride and allow to dry. Start the recorder and turn volume full on. With one finger push the felt (farthest from front) toward head. This will increase pressure and indicate whether there was sufficient pressure. If the voltage increases more than one or two db (2 or 3 volts) check the pressure of the felts with a gram or ounce scale gauge. This may be two ounces (55 grams) but NO MORE.

To do this, turn off power switch but throw control to forward. Connect the gauge to the top of the felt and spring. Pull at right angles enough to just lift the felt off the head. Read gauge. If pressure is under 2 ounces, the springs can be bent forward by carefully applying pressure at bottom or by tightening set screws. The set screw adjustment is very critical, so caution must be used if screws are tightened.

NOTE: - Too much pressure will wear the head unnecessarily, cause dirt to accumulate too fast, cause tape to slow down and possibly cause wow. It may also cause tape to squeak and vibrate as it enters head.

(3) HEAD ALIGNMENT

If head is clean and felts have proper tension check the tightening of screws on both sides of head cover. If both are tight, loosen first one slightly, then tighten and loosen other slightly while watching meter. If meter reading goes up when either screw is loosened, make sure other screw is tight and adjust this one for a maximum of voltage, using 7500 cycle head alignment tape.

(4) FREQUENCY TESTS

To make overall frequency response and gain test, proceed as follows:

Connect a signal generator to phono input and adjust and hold the input voltage to .03 volts. Install a reel of 3M plastic tape (red oxide) and record the following frequencies: 70, 125, 250, 500, 1000, 2000, 4000 and 8000. Rewind and playback measuring the voltage

in the monitor jack with a 3.2 ohm (5 to 10 watt) load plugged in the external speaker jack. The output voltage should be approximately 5-7 volts at 1000 cycles. The various frequencies should be within a total of plus or minus 3 to 4 db. Use a good A.C. V.T.V.M. for all voltage readings at all frequencies.

If the unit does not record and play back within these limits it will be necessary to check the complete amplifier unit and make tests as outlined under "Head Tests." NOTE: Before condemning either amplifier or head adjustments be sure tests were made exactly as outlined above. Be sure V.T.V.M. has flat frequency response.

(5) ELECTRICAL TESTS

Amplifier Unit only:

- (a) Distortion Test - Connect signal generator to phono input and load resistor of exactly 3.2 ohms (5 watts or more) to external speaker output. At 1000 cycles it should be possible to obtain at least 3.35 volts at less than 8% distortion across load as measured on a "total distortion" type analyzer. This is 3.5 watts of power.
- (b) Gain Test - The voltage at the phono input should be within 2 db. of .145 volt to obtain 3.5 watts output at 1000 c.p.s. as outlined in (a).
- (c) Frequency Response - Connect signal generator to phono input and use 50, 100, 1000 and 10,000 cycles for test. Use .03 R.M.S. volts input (hold constant). Using 1000 c.p.s. reference 100 cycles should be plus 7 db when measured at monitor jack with 3.2 ohm plugged in internal speaker jack. 50 c.p.s. up 4.25 db, 10,000 c.p.s. up 5 db. These should be within plus or minus 1 db.
- (d) Tone control should drop response 27 db plus or minus 2 db at 10,000 c.p.s. when turned to minimum position and 10 db plus or minus 1 db at 1000 c.p.s.
- (e) See schematic wiring diagram (Fig. 4) for voltages of various parts of circuit both A.C. and D.C.

SOME COMMON FAILURES AND THEIR REMEDIES

The most common causes of failure are dirt on head (which should be cleaned regularly), defective tubes and oil on driving surfaces (see "Mechanical Assembly Inspection and Tests").

- | | |
|---------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Will Not Record: (Neon Lamp Flickers) | A. Open record-playback head winding or leads. B. Output transformer open or shorted 500 ohm winding. C. Open 150 K resistor (R-19) in series with head. D. Open or short section of slide switch. |
| 2. Will Not Play Back: | A. Amplifier inoperative. See "Amplifier Tests and Repairs." B. Open or short section of slide switch. C. Open or shorted speaker coil or external speaker jack. |
| 3. Tubes Will Not Light Up: (Inoperative) | A. Fuse open. Replace with 2 Amp Littelfuse Type GJV. B. Defect in line cord or attachment cap. C. Open power transformer winding. D. Open A.C. switch on volume control. |
| 4. Will Not Erase: | A. Open erase winding in head. Replace head. B. Open or short in slide switch. C. Bias Oscillator not working properly. See "Amp tests and repairs." |
| 5. Does Not Record or Play Back Properly: (Distorts) | A. Dirt covering either or both poles of head. Clean head. B. Bias oscillator weak or wrong frequency. C. Amplifier defective. See "Amplifier Tests and Repair." D. Check contact closure of bias switch under control lever in forward position. |
| 6. Piano and Sustained Notes Have Flutter or Wow. | A. Wow or waver. Check idler, capstan, belt, take-up drum and felt pressure disc for wow. These parts should not have flat spots or be oily or greasy with the exception of the felt disc. To find which part is at fault make a mark with chalk or crayon which can be seen while unit is running. Record a constant note of 400 to 1000 c.p.s. Play |

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back the recording and listen to wow while watching mark as it rotates. Correlate the rate of any severe fluctuation with the rotating speed of the mark. If the wow and mark are exactly synchronized, replace the part which is marked. NOTE: Slight fluctuations may be found on any recorder but these will not interfere with music as the constant note test is a severe one.

- B. Flutter. The cause of flutter, which is a very rapid wow, is more difficult to locate. (1) If the roller nearest front panel is bakelite, replace with an aluminum type, available from the factory, for a trial recording. (2) Check pressure pad tension against the tape. This must not exceed 55 grams (2 ounces) to start pulling pad away from tape. (3) Check motor for undue amount of vibration. Check for slightly bent shaft. Check shock mounts of motor mounting plate, these should be free vertically but must be firm against rubber sideways. Check spacing of idler wheel, check belt for abnormal vibration due to unevenness. Check fan blades and straighten if necessary.

AMPLIFIER PARTS LIST

Major Items

Resistors

| | | | |
|-----|---------|---------------------|-----|
| R3 | 470,000 | ½W | 10% |
| R4 | 270,000 | " | " |
| R13 | " | " | " |
| R14 | " | " | " |
| R23 | " | " | " |
| R6 | 3300 | " | " |
| R7 | 130,000 | " | 5% |
| R12 | " | " | " |
| R8 | 22,000 | " | " |
| R9 | 2700 | " | 10% |
| R10 | 100,000 | " | " |
| R16 | " | " | " |
| R26 | " | " | " |
| R35 | " | " | " |
| R11 | 39,000 | " | " |
| R15 | 360 | 1W | 5% |
| R17 | 10,000 | ½W | 10% |
| R18 | " | " | " |
| R19 | 150,000 | " | " |
| R20 | 6800 | 1W | " |
| R21 | 4700 | 1W | " |
| R24 | 3 | 5W | " |
| R25 | 27,000 | ½W | " |
| R28 | 500,000 | Control Audio Taper | |
| R29 | 500,000 | " w/sw. Audio Taper | |
| R31 | 150 | ½W. 10% | |
| R32 | " | " | " |
| R33 | 10 | Meg. | " |
| R34 | 10,000 | 2W | " |
| R35 | 100,000 | ½W | " |
| R36 | 82,000 | ½W | " |

Capacitors

| | | | | | |
|-----|----------|-------|------------|------|--------------|
| C1 | .02 | mfd. | 600 | Volt | Tubular |
| C2 | .01 | " | 450 | " | Ceramic |
| C4 | " | " | " | " | " |
| C3 | .05 | " | 200 | " | Tubular |
| C5 | .05 | " | 600 | " | " |
| C10 | " | " | " | " | " |
| C11 | " | " | " | " | " |
| C21 | " | " | " | " | " |
| C6 | 200mmfd. | 500 | " | " | Mica 5% |
| C7 | .01 | mfd. | 300 | " | " |
| C8 | " | " | " | " | " |
| C9 | .015 | " | 600 | " | Tubular 5% |
| C12 | .005 | " | 500 | " | Mica 5% |
| C13 | .001 | " | 600 | " | Tubular |
| C14 | .002 | " | " | " | " |
| C16 | 200 | mfd. | 500 | " | Mica |
| C17 | 20-20-20 | mfd. | 450-450-25 | Volt | Electrolytic |
| C18 | 20-20-20 | mfd. | 450-450-25 | Volt | Electrolytic |
| C19 | 40 | mfd. | 450 | Volt | Electrolytic |
| C20 | 470 | mmfd. | 500 | Volt | Mica |

Miscellaneous

Bell Part No.

| | |
|-----------------------------------------------|------------|
| Power Transformer | B-20203 |
| Output Transformer | B-20204 |
| Oscillator Transformer | B-13793 |
| (High frequency erase and bias) | |
| Slide Switch | B-13053P4 |
| Blade Switch (on top panel) | A-13055 |
| Fuse - 2 Amp. Solder in Type GJV - Littelfuse | |
| Pilot Lamp Socket | B-20045P18 |
| Level Indicator Socket | B-20045P19 |
| Loudspeaker - 6" P.M. | B-20111P17 |
| Recording-Erase-Playback Head-Shure TR-5 | B-13828 |

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| | | | |
|-----|----------|---|------------------------------|
| 49 | | | 8-32 BHMS - STL. |
| 48 | A-13804 | 1 | CONTROL SHAFT |
| 47 | 2073 | 1 | SPRING RETAINER |
| 46 | 2011 | 1 | BAKELITE WASHER |
| 45 | 2070 | 1 | FELT WASHER |
| 44A | 2060 | 1 | FELT WASHER |
| 44 | 2082 | 1 | REWIND DRUM ASSEMBLY. |
| 43 | 2043 | 1 | IDLER CAM |
| 42 | 2039 | 1 | IDLER CAM SPRING |
| 41 | 2071 | 1 | SPRING RETAINER |
| 40 | 2031 | 1 | RETAINING WASHER |
| 39 | 2038 | 1 | IDLER LEVER SPRING |
| 38 | 2042 | 1 | IDLER LEVER SPRING CLIP |
| 37 | 2089 | 1 | IDLER LEVER ASSEMBLY |
| 36 | 2044 | 1 | BAKELITE WASHER |
| 35 | 2065 | 1 | FISHPAPER WASHER |
| 34 | 2003 | 1 | IDLER WHEEL |
| 33 | 2065 | 1 | FISHPAPER WASHER |
| 32 | 2044 | 1 | BAKELITE WASHER |
| 31 | 2030 | 1 | FELT WASHER |
| 30 | 2073 | 1 | SPRING RETAINER |
| 29 | | 2 | 6-32 ALLEN SET SCREW |
| 28 | 2033 | 1 | MOTOR BELT PULLEY |
| 27 | 2091 | 1 | CONTROL LINK ASSEMBLY |
| 26 | 2021 | 1 | RIVET |
| 25 | 2021 | 1 | RIVET |
| 24 | 2094 | 1 | BRAKE ASSEMBLY |
| 23 | BRO151P4 | 1 | BRAKE SPRING |
| 22 | 2012 | 1 | FELT WASHER |
| 21 | WAS-496 | 1 | BAKELITE WASHER |
| 20 | 2073 | 1 | SPRING RETAINER |
| 19 | 2080 | 1 | BELT PULLEY LEVER ASSEM. |
| 18 | WAS-496 | 1 | BAKELITE WASHER |
| 17 | 2081 | 1 | BELT PULLEY ASSEMBLY |
| 16 | 2012 | 1 | FELT WASHER |
| 15 | WAS-496 | 1 | BAKELITE WASHER |
| 14 | 2072 | 1 | SPRING RETAINER |
| 13 | 2002 | 1 | "O" RING BELT |
| 12 | 2073 | 1 | SPRING RETAINER |
| 11 | 2011 | 1 | BAKELITE WASHER |
| 10 | 2070 | 1 | FELT WASHER |
| 9 | 2011 | 1 | BAKELITE WASHER |
| 8 | 2083 | 1 | CAPSTAN ASSEMBLY |
| 7 | A-13832 | 1 | CAPSTAN TOP PLATE |
| 6 | | 1 | 4-40 BHMS-STL-NP |
| 5 | 2073 | 1 | SPRING RETAINER |
| 4 | 2011 | 1 | BAKELITE WASHER |
| 3 | 2070 | 1 | FELT WASHER |
| 2 | 2011 | 1 | BAKELITE WASHER |
| 1D | 2087 | 1 | TAKE-UP DRUM ASSEMBLY |
| 1C | 2061 | 1 | FELT WASHER |
| 1B | 2079 | 1 | TAPE DISC ASSEMBLY |
| 1A | | 1 | 4-40 PH.BHMS-STL-NP-ASSEMBLY |

| SYMB | DWG. NO | QTY. | DESCRIPTION. |
|------|---------|------|-------------------------|
| 66 | M-51 | 1 | PLUG W/ SHELL |
| 65 | | 1 | 16" FLEX. WIRE |
| | | 1 | 16" FLEX. WIRE |
| 64 | | 1 | 13" FLEX. WIRE - WHITE |
| | | 1 | 13" FLEX. WIRE - BLACK |
| | | 1 | 11" FLEX. WIRE |
| 63 | | 4 | 10-32 STAN. HEX. NUT. |
| 62 | 2090 | 1 | BASE & BUSHING ASSEMBLY |
| 61 | 2073 | 1 | SPRING RETAINER |
| 60 | 2095 | 1 | FAN |
| 59 | | 3 | 10-32 RHMS - STL. |
| 58 | | 3 | NO. 10 SPLIT LOCKWASHER |
| 57 | LUG-175 | 1 | LUG |
| 56 | 2069 | 3 | SPECIAL WASHER |
| 55 | 2001 | 3 | GROMMET |
| 54 | 2006 | 3 | BUSHING |
| 53 | 2000 | 1 | MOTOR |
| 52 | 2068 | 1 | MOTOR MTG. PLATE |
| 51 | 2073 | 1 | SPRING RETAINER |

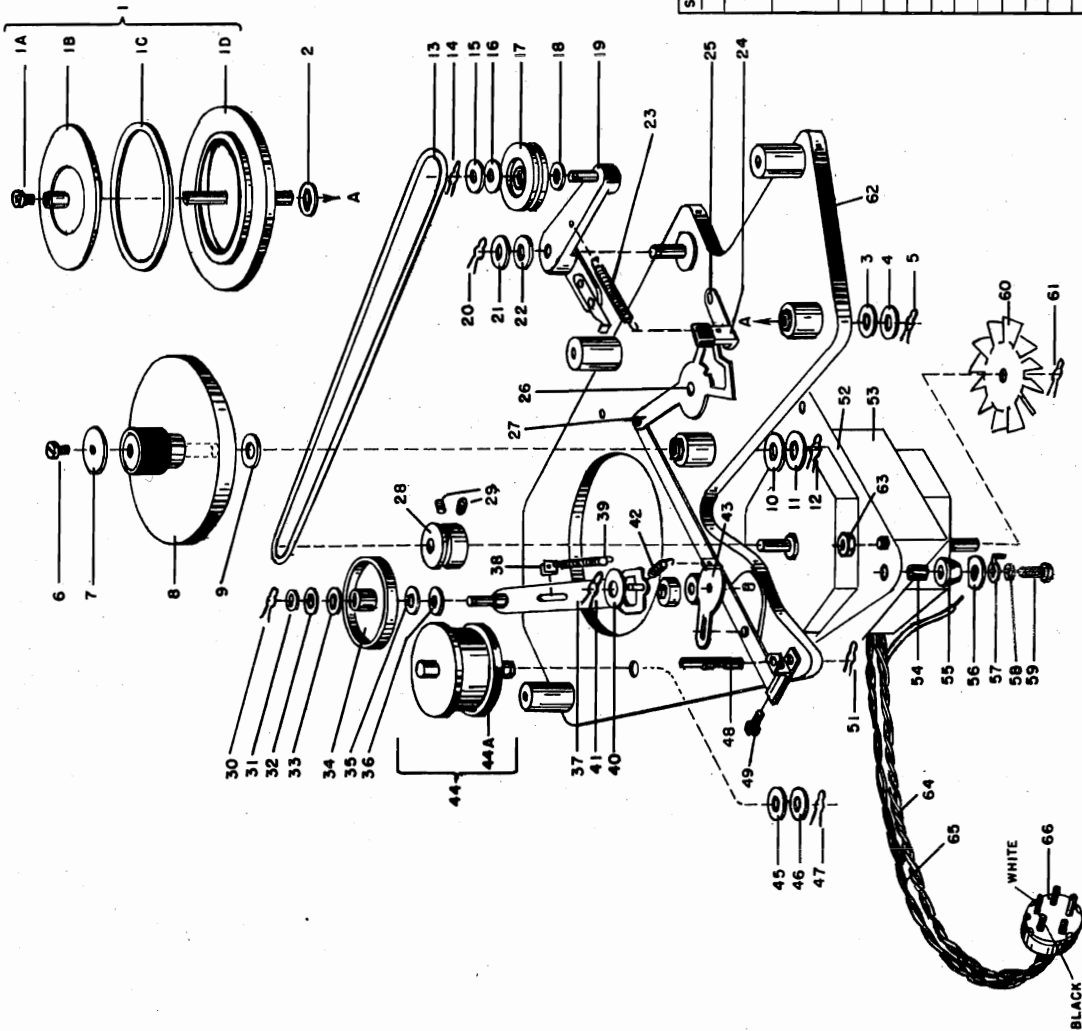
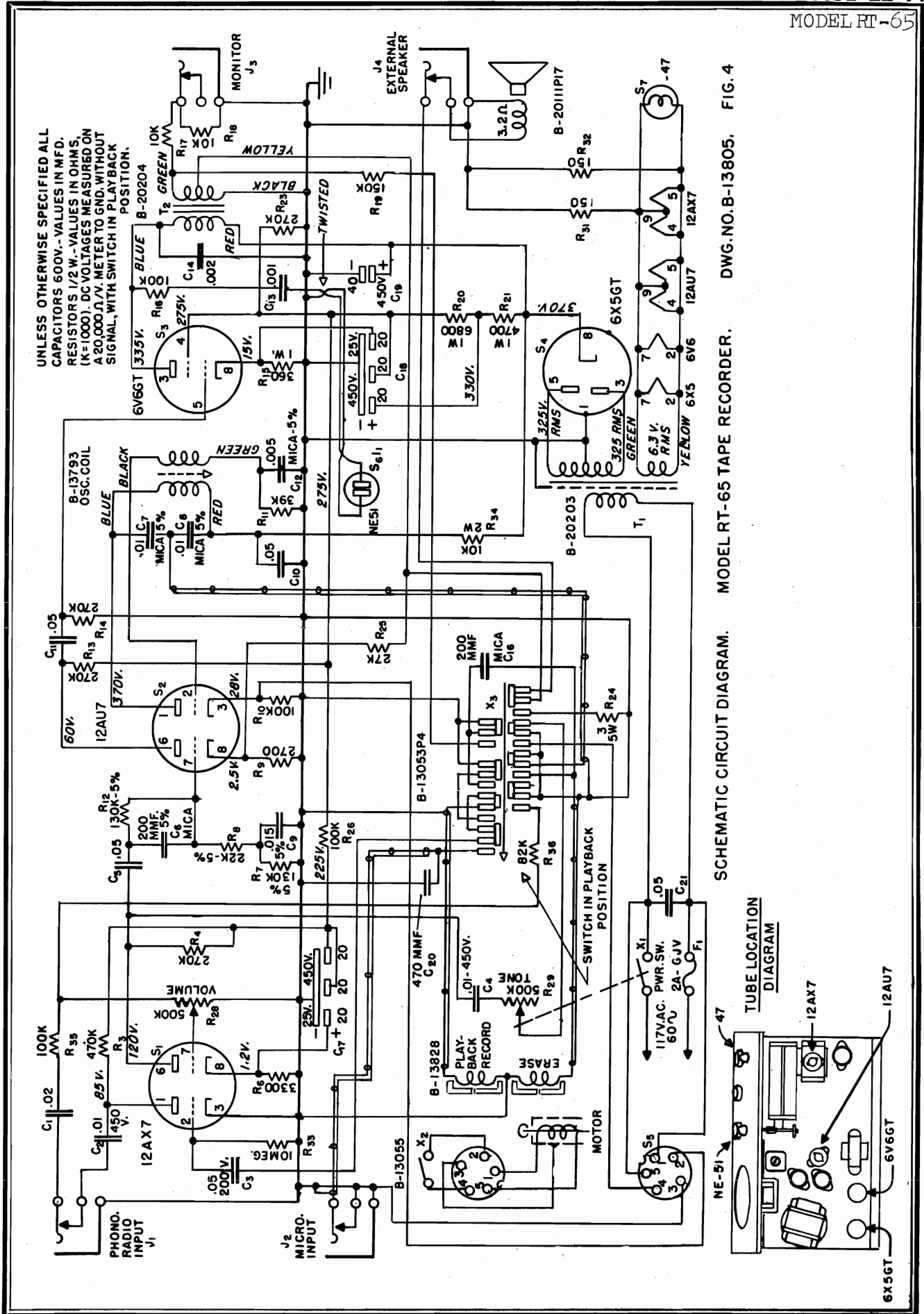
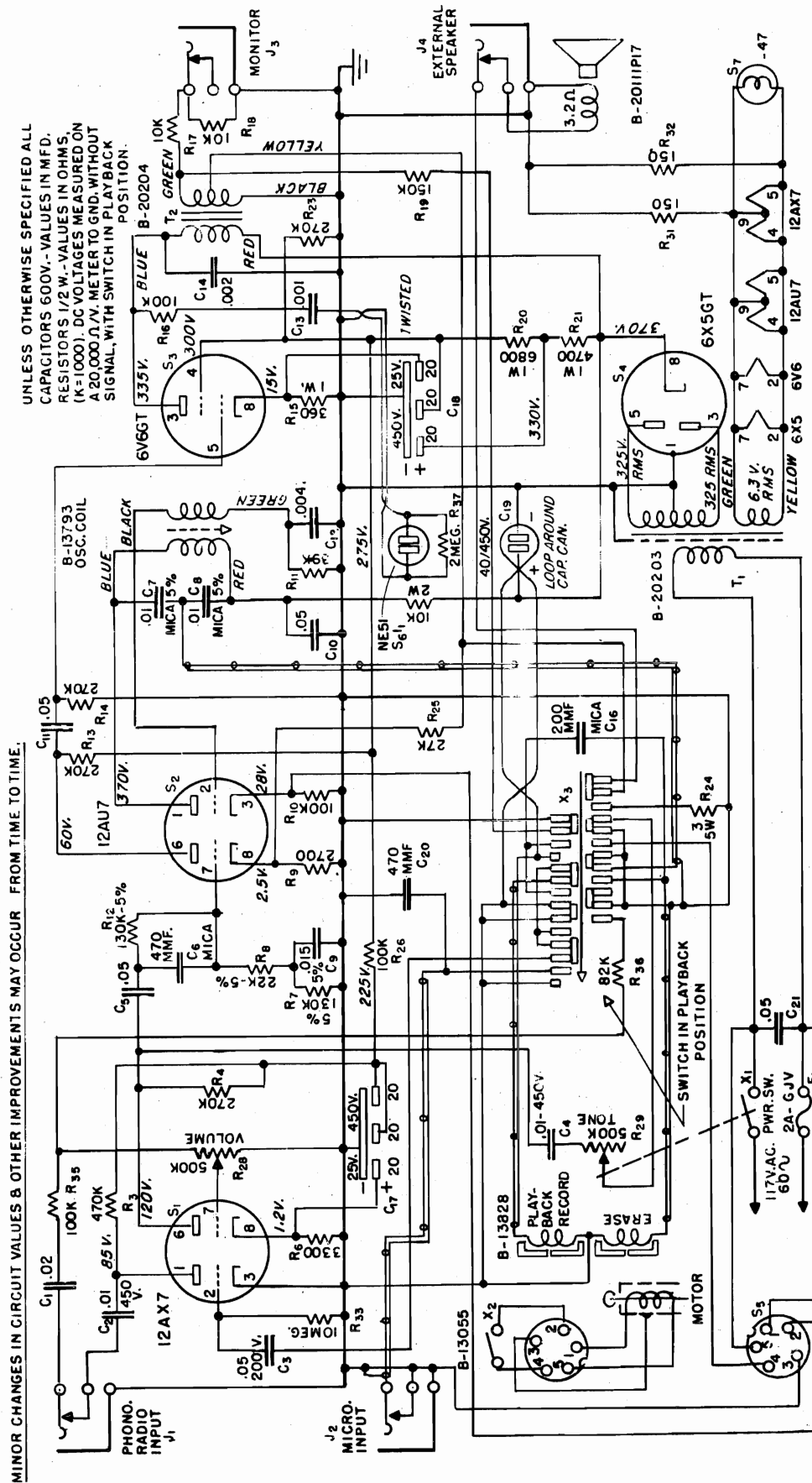


FIG. 3. MECHANICAL ASSEMBLY.

MODEL RT-65 TAPE RECORDER



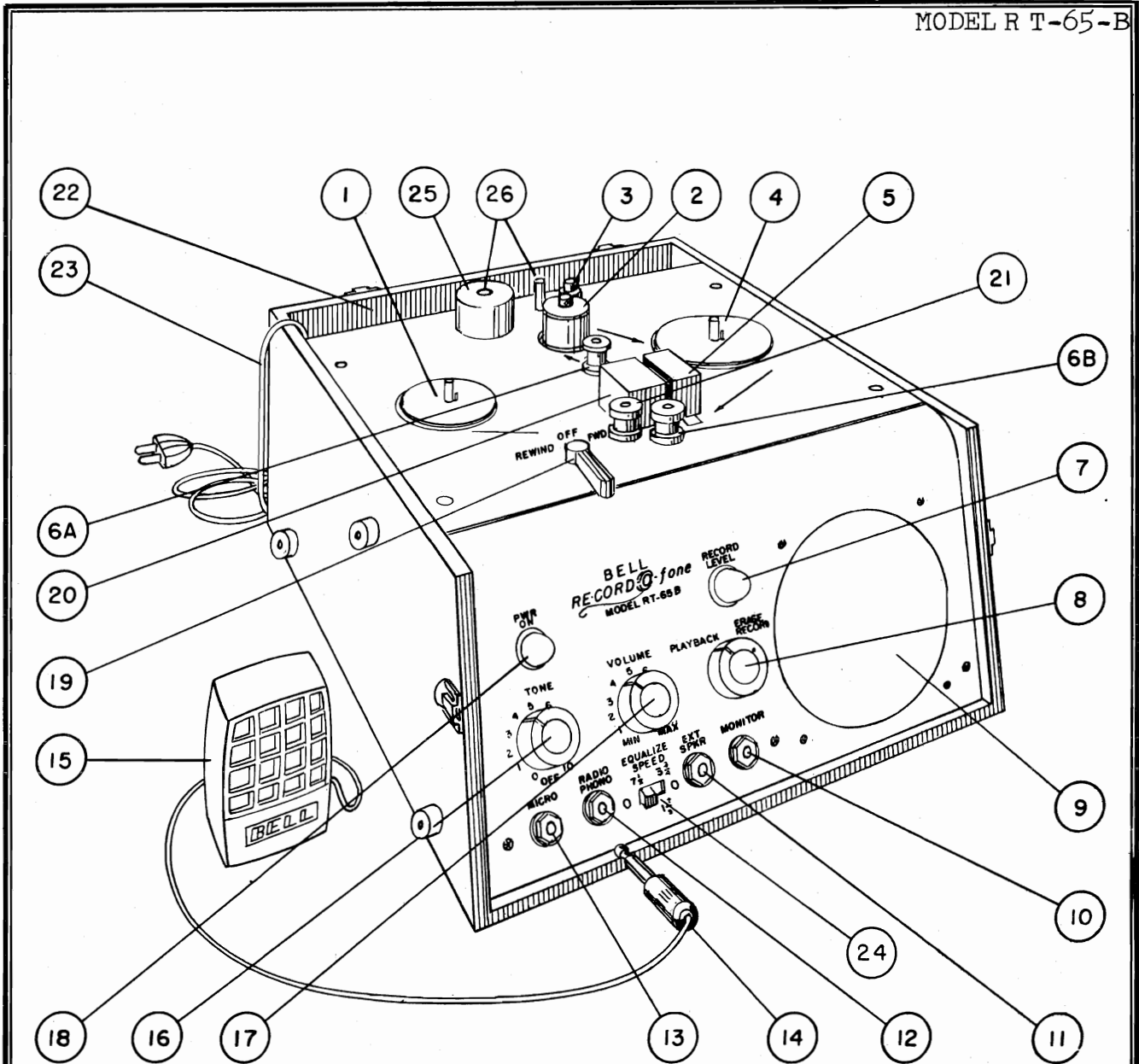
SCHEMATIC CIRCUIT DIAGRAM. MODEL RT-65 TAPE RECORDER. DWG. NO. B-13805. FIG. 4



MINOR CHANGES IN CIRCUIT VALUES & OTHER IMPROVEMENTS MAY OCCUR FROM TIME TO TIME.

UNLESS OTHERWISE SPECIFIED ALL CAPACITORS 600V.- VALUES IN MFD. RESISTORS 1/2 W.- VALUES IN OHMS. (K=1000) DC VOLTAGES MEASURED ON A 20,000Ω/V. METER TO GND. WITHOUT SIGNAL, WITH SWITCH IN PLAYBACK POSITION.

SCHEMATIC CIRCUIT DIAGRAM. MODEL RT-65 TAPE RECORDER. DWG. NO. B-13805-C.



- | | |
|----------------------------------------------------------|-----------------------------------------------------------------|
| 1. Supply Reel Platform | 15. Microphone |
| 2. Capstan | 16. Tone Control & Master Power Switch |
| 3. Pressure Roller | 17. Volume Control |
| 4. Take-Up Reel Platform | 18. Pilot Light |
| 5. Pressure Pads | 19. Direction Control - 3 Position Rewind - Off - Forward |
| 6. A Rear Tape Guide Roller B Front Tape Guide Roller | 20. Erase-Record-Playback Head |
| 7. Recording Level Indicator | 21. Tape Idler Roller |
| 8. Erase Record-Playback Control | 22. Storage Compartment for Power Cord, Reels and Microphone |
| 9. Speaker | 23. Power Cord |
| 10. Headphone Monitoring Jack | 24. Switch to Equalize Tape Speeds |
| 11. External Speaker Jack | 25. Spare Pressure Roller for 1-7/8" Speed |
| 12. Radio or Phono Jack | 26. Spare Pressure Roller Posts for Storing Rollers |
| 13. Microphone Jack | |
| 14. Microphone Plug | |

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TAPE REC. PAGE 22-14 BELL

MODEL RT-65-B

THREE SPEED DUAL TRACK TAPE RECORDER

7-1/2", 3-3/4" and 1-7/8" per second

INTRODUCTION

This recorder is precision built and with reasonable care it will provide many hours of dependable service and enjoyment. At 7-1/2" tape speed it will give good quality reproduction to 8000 cycles and higher. At 1-7/8" tape speed it will provide two hours recording on a single track, or a total of four hours on a 7" reel. The 1-7/8" speed is recommended for voice and music where the quality of music need not be as good as at 7-1/2". The intermediate speed of 3-3/4" provides twice the recording time of 7-1/2" with some reduction in high frequency response.

These three speeds enable the user to choose between the response he wants versus playing time, all in one recorder. The 7-1/2" speed should be used to obtain the best quality recordings.

When unpacking the recorder carefully examine it for visible damage. If unit is damaged, notify your dealer at once so that claim may be filed with the transportation agency.

NOTE - RECORDERS ARE SHIPPED WITH CAPSTAN AND PRESSURE ROLLERS IN 7-1/2" SPEED POSITION.

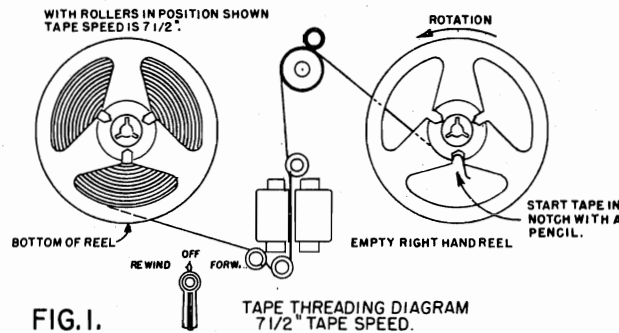


FIG. 1.

OPERATING INSTRUCTIONS

Place the recorder on a flat surface close to a convenient 110 volt AC outlet. Next, remove the cover and take out power cord and after first checking to see that direction control (#19) is in "Off" position, plug into outlet. Now turn on unit by rotating tone control (#16) to the right until you hear a click and the pilot light is illuminated. Place a full reel of Type "A" tape on supply reel platform (#1). Rotate reel until small pin near center post engages one of the small notches in reel. Grasp end of tape and unwind about two feet, notice that the tape has a dull coating on side nearest center of reel. Recordings are made on this (coated) side. Place empty reel on tape take-up reel platform (#4). Thread tape around idler pulleys (#21) and (#6B), then in slot between Erase-Record-Playback head (#20) and the pressure pads (#5); next, past tape guide roller (#6A) around capstan (#2) and between pressure roller (#3) to empty take-up reel. Now thread free end of tape up into empty reel. Push the tape into one of the notches with a pencil. Holding the tape in the notch, rotate the reel for a few turns in a counter-clockwise direction. Be sure small drive pin is engaged and take up all excess slack in tape. See Figure #1.

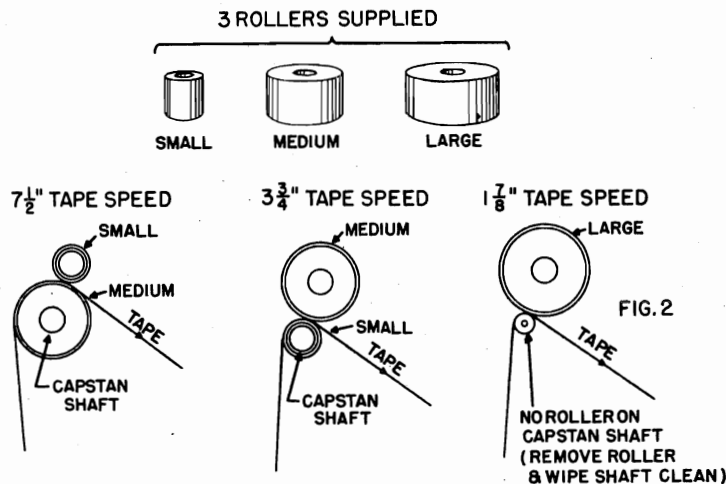


FIG. 2

Method of Changing Tape Speed - The speed at which the tape runs through the recorder depends on the size of the capstan, therefore, to change speed it is necessary to change the diameter of the capstan and the pressure roller. See Fig. 2.

For 7-1/2" per second tape speed, use the medium and the small rollers, as shown.

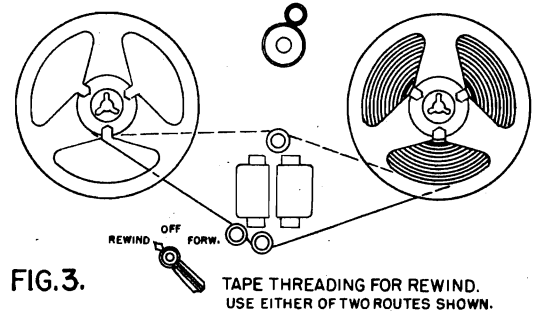
For 3-3/4" per second tape speed, interchange the small and medium size rollers. (Just reverse of 7-1/2").

For 1-7/8" per second tape speed, remove roller and screws from the capstan shaft, wipe off any oil on the shaft and use the large size roller only. Do not use washer or thumb nut on capstan shaft.

NOTE - When changing capstans and rollers, turn power switch (located on tone control) #16 to 'Off' position. Turn direction control #19 to 'Forward'. This prevents the rollers from turning while loosening and tightening thumb screws. Store spare rollers, washer and thumb nut on posts #26.

Equalize Tape Speed Switch - When using 7-1/2" speed, the equalize switch #24 should be in 7-1/2 position for correct response. For 3-3/4" or 1-7/8" speed the switch should be in the 3-3/4-1-7/8 position. This position has extra high boost with some bass droop.

Keep your tape recorder in good condition. The erase head and capstan of the recorder should be cleaned periodically with a soft cloth and carbon tetrachloride to insure maximum performance. Wipe dry before using again. For best results use plastic tape, Type "A" wind.



Recording

Microphone: Insert microphone plug (#14) into microphone jack (#13). Turn Erase-Record Playback control (#8) to Erase-Record position. Now turn volume control (#17) to position #5 and speak into the microphone, holding the microphone about ten inches from your lips. The Record-level indicator (#7) should flicker. If it does not, turn up the volume control until the lamp just flickers occasionally when you speak. Remember, this lamp indicates the instantaneous peaks of volume, it should, therefore, flash only when a loud sound is made. If it flashes too much or lights continuously, it means that the peaks are too loud and serious distortion will result. Excellent recordings can be made with volume reduced just below the flash point where lamp does not flash at all. Use the same method of adjustment when using microphone to record music or any type of pickup.

To set the tape in motion, turn Direction control (#19) to "Forward" position. The recorder is now recording all sounds entering the microphone. Watch the recording level indicator (#7) during recording to avoid overloads but do not continually adjust the volume as this destroys the naturalness of the recording. Keep a uniform distance from microphone for best results.

Stop the tape by turning direction control (#19) to "OFF".

Rewinding

To rewind a full reel or a major portion thereof, turn Record-Playback switch (#8) to playback position. Next, remove tape from around capstan (#2) and from the recording slot (this is the slot between #20 and #5) and run tape straight across from reel to reel. See Fig. 3 above. Now turn Direction Control (#19) to "Rewind" position. For rewinding a small portion of the tape, while desirable, it is not necessary to remove tape from capstan and recording slot. First, turn Record-Playback switch to Playback, then CARE MUST BE EXERCISED TO TURN CONTROL VERY SLOWLY TO REWIND TO PREVENT BREAKING TAPE.

If tape is rewound past head, the volume control (#17) should be turned down to avoid unpleasant high-pitched chatter. However, with a little practice this chatter may be recognized and various sections of recorded speech or music identified during rewind.

The numbered lines to be seen under the left hand or supply reel indicate approximate time elapsed during recording or playback. Each line is approximately three minutes playing time, at 7-1/2" speed, six minutes at 3-3/4" speed and 12 minutes at 1-7/8" speed.

Playback

Thread the recorded tape into the machine the same as for recording and simply turn Direction Control (#19) to forward position, making certain that the Record-Playback Control (#8) is in playback position. To playback a partially recorded tape it is first necessary to rewind your tape to where your recording began. After the tape has been rewound, proceed as described above. Adjust the volume and tone controls for best listening.

CAUTION: Be certain that the Record-Playback Control (#8) is in playback position before starting the tape in motion, at all times, except when recordings are actually being made. This will prevent accidentally erasing a tape when PLAYBACK was intended.

MODEL RT-65-B

Erasing

Any previously recorded tape may be erased by running the tape through the machine in the manner as described for "recording" except that the volume control (#17) is turned to zero so that no signal will be recorded. The erase feature is automatic, since when a recording is being made, the tape is erased just ahead of the recording. In this way, any previously recorded material is always removed before the new material is recorded on the tape.

How To Obtain Dual Track

This recorder will record two "tracks" on a single tape, in other words, only one half of the width of the tape is recorded at a time. After recording through an entire reel in one direction, the full reel is inverted and placed on the Supply Reel Platform (#1), the empty reel on the Take-Up Reel Platform (#4), and the entire tape length may be recorded again on the other half of the tape. To facilitate reel change-over, stop tape motion just before the tape unthreads, leaving five or ten turns on the reel. This avoids need for re-threading. With a little practice, change-over can be done in less than fifteen seconds.

Recording Direct from External Radio, Phonograph or Record Player

To record direct from an external radio or phonograph, a single conductor microphone type cord should be equipped with a shielded plug similar to the one on the microphone cable, and plugged into the radio or phono jack (#12). Shield should be connected to sleeve of plug. The other end of this cable should be connected directly to the speaker voice coil terminals of the radio or phono making certain that the shielding connects to the grounded side of the circuit. (Determine by trial and error test.) A radio service man may be called in to make this simple connection and to supply the cable and plug. You may, of course record radio or phonograph programs by simply placing your microphone approximately one to two feet in front of the loudspeaker and following the procedure as outlined under microphone recording. You may also connect a crystal pickup direct to the recorder by connecting the pickup leads to the phono input. Observe polarity as described above.

Use With Radio Tuner

By connecting the output of one of the commercially available FM, or combination AM-FM tuners, direct into the recorder, a complete high quality radio is obtained with both listening and recording features. One word of caution, in recording direct from a radio or phonograph having "Bass boost" type of tone control, it is recommended that no bass boost be used during recording since bass distortion may result when played back.

CAUTION: Recorder will not playback with plug in radio-phono jack. Also microphone cannot be used to record with plug in radio-phono jack.

Use of Monitoring Headphones

For those who desire to make the best recordings of singers, speakers, musical groups, plays, weddings and similar types requiring varied microphone pick-up, investment in a pair of crystal headphones for monitoring purposes is recommended. The headphones should be equipped with a shielded plug and are inserted into the headphone monitoring jack (#10). You will then be able to hear the sounds just as they are being recorded and keep a constant check on the quality of the recorded material.

500 Ohm Output

The output transformer has a 500 Ohm winding and is connected to the monitor jack through a 10,000 Ohm resistor. To obtain 500 Ohm output, short circuit this series resistor. Connect to monitor jack. Observe ground polarity.

Use of an External Speaker for Better Playback Listening

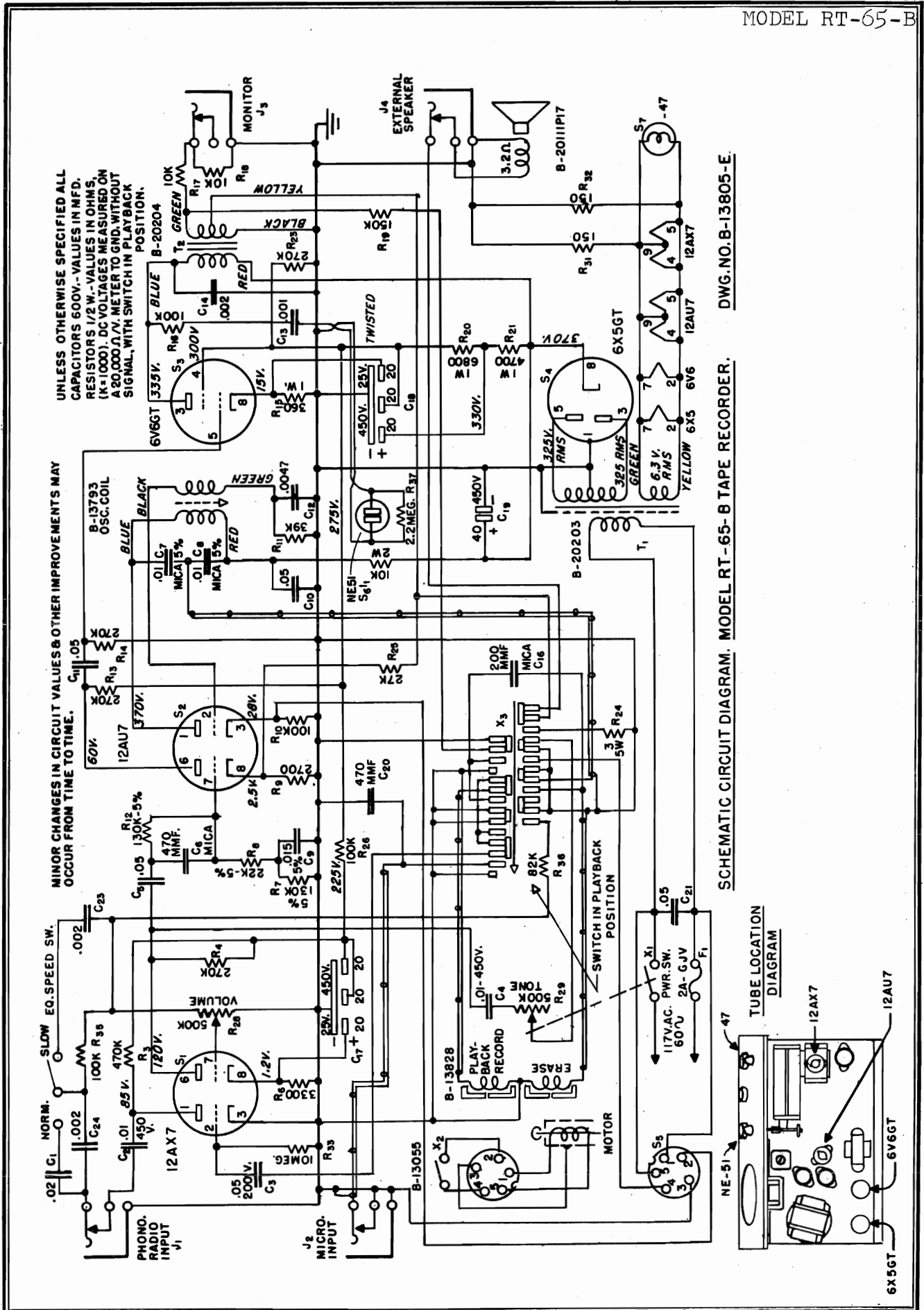
Although the built-in speaker is especially designed to give the best possible sound quality for portable use; it is sometimes desirable to playback to a large audience through a larger, separate loudspeaker, or to use a separate high-fidelity speaker in the home. Leads from the external speaker should be connected to a shielded plug and inserted into the external speaker jack (#11). This output jack has an impedance of 4-6 ohms. Also, when a speaker is plugged into this jack, it automatically disconnects the internal speaker in the unit.

Use of Recorder with an External Amplifier for Recording or Playback

Playback - The output from this recorder may be fed directly into any high impedance phono input of a sound system or amplifier. This is accomplished by connecting the headphone monitoring jack (#10) to the phono input of the amplifier. Connect sleeve of plug to ground connection of amplifier. This permits use of the internal speaker of the recorder to monitor programs being fed to the external amplifier.

You may also feed an external amplifier by connecting the external speaker jack (#11) of the recorder to the phono input of an amplifier. If this is done, it is necessary to add a 3 ohm 5 watt load resistor across your cable between the recorder and amplifier. By this method, the internal speaker of the recorder is silenced and you may monitor your out-going program by use of headphones.

Recording - The output of any sound system or amplifier, if properly terminated by a loudspeaker or equivalent load resistor, may be connected into the Radio-Phono input of the recorder and recordings made. Insert a phone plug into the phono jack of the recorder. Connect the two leads to the speaker or proper resistor load of the amplifier. Observe ground polarity, ground side of amplifier to sleeve of plug.



UNLESS OTHERWISE SPECIFIED ALL CAPACITORS 600V.-VALUES IN MFD. RESISTORS 1/2 W.-VALUES IN OHMS. (K=1000). DC VOLTAGES MEASURED ON A 20,000 Ω/V. METER TO GND. WITHOUT SIGNAL, WITH SWITCH IN PLAYBACK POSITION.

MINOR CHANGES IN CIRCUIT VALUES & OTHER IMPROVEMENTS MAY OCCUR FROM TIME TO TIME.

SCHEMATIC CIRCUIT DIAGRAM, MODEL RT-65-B TAPE RECORDER. DWG. NO. B-13805-E.

EQUIPMENT DATA FOR MODELS BK-411 and BK-414 SOUNDMIRROR

1. WEIGHT — BK-411 — 32 lbs.
40 lbs. packed BK-414 — 38 lbs.
48 lbs. packed
2. DIMENSIONS — BK-411 — unpacked, 17½" wide x 12½" deep x 11¼" high (less feet), feet made of cork ¾" x 1¼" diameter.
BK-414 — (unpacked in operating position, lid closed) 17" wide x 20½" deep x 10" high (less feet and catches).
3. POWER REQUIREMENTS — 105-120 volts, 60 cycles, A. C., single phase.
4. WATTS CONSUMED — 85 total.
5. RECORDING MEDIUM — "Magic Ribbon" (magnetically coated paper ribbon).
6. RECORDING TIME — Approximately 30 minutes per 7" reel.
7. CONSTANT RECORDING SPEED — 7.5 inches per second, nominal.
8. DYNAMIC RANGE — Approximately 40 db.
9. FREQUENCY RESPONSE (overall) — Essentially flat from 100 to 5000 cycles. (See Fig. 29)

10. INPUT CONNECTIONS

| Input | Impedance | Source | Voltage Limits |
|------------|-----------|--------------------|-------------------|
| Microphone | 1 megohm | Crystal microphone | .003 to .2 volts. |
| Radio | 1 megohm | any | 0.2 to 100 volts |

11. OUTPUT CONNECTIONS

| Output Circuit | Impedance | Power Output | Output Voltage |
|--------------------------------------------------------------------------------------------------|---------------------------------------------------|--------------------------------------------------------|----------------|
| Internal Speaker | 3.2 ohms | 1 watt undistorted | 1.8 |
| External Speaker (terminal strip E-3 on BK-411 and output jack J-7 on BK-414 permits its use) | 3.2 ohms (secondary of output transformer T-2) | 1 watt undistorted (when terminated with 3.2 ohm load) | 1.8 |

12. TUBE COMPLEMENT

| | |
|--------------------|---------------------|
| V-1 — 6J7 or 1620† | V-5 — 6SN7 or 6SL7* |
| V-2 — 6SJ7 | V-6 — 6SN7 |
| V-3 — 6E5 | V-7 — 5Y3 |
| V-4 — 6J5 | |

† recommended in cases of extreme microphonics.

* recommended for higher output.

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BK-414

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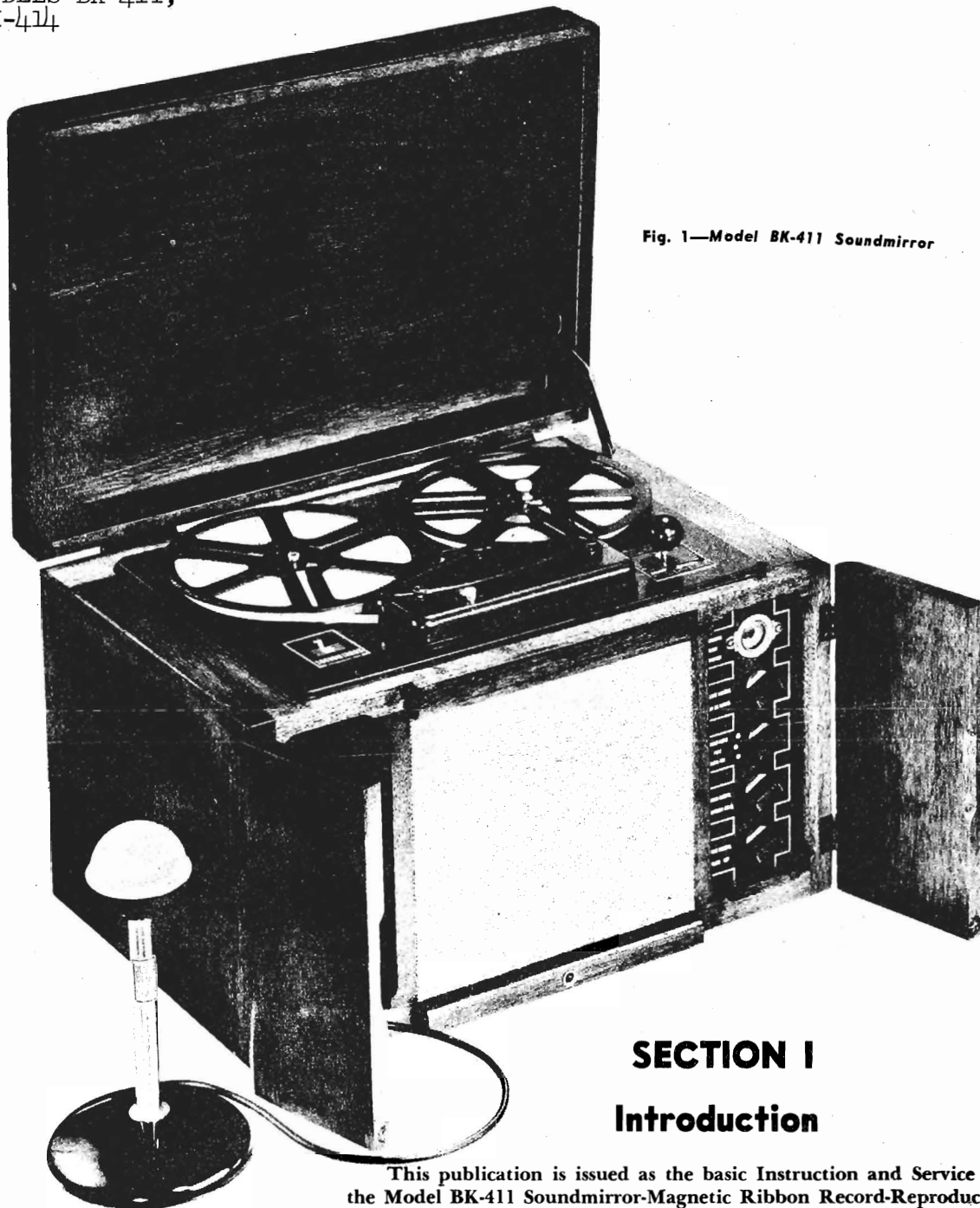


Fig. 1—Model BK-411 Soundmirror

SECTION I

Introduction

This publication is issued as the basic Instruction and Service Manual for the Model BK-411 Soundmirror-Magnetic Ribbon Record-Reproducer, and contains the necessary descriptive data, pictures and necessary drawings, coded and identified for its operation, maintenance, and overhaul.

The Model BK-411 Soundmirror (Fig. 1) is a complete unit designed to record and reproduce audio signals magnetically. The recording medium is a ferromagnetic powder coated paper ribbon, *"Magic Ribbon," wound on reels of appropriate size to supply approximately thirty minutes each of recording or playing time.

The Model BK-411 is a compact unit comparable in size to the average table model combination radio and weighs approximately thirty pounds.

The accessories included with the Model BK-411 Soundmirror are as follows: Microphone complete with cord and phono plug, connected, through a hole in the microphone compartment, to the recorder-amplifier; a removable microphone base to which the microphone may be attached for stationary operation or detached for hand operation; one empty reel and one full reel of *"Magic Ribbon" packed separately alongside the cabinet in the packing carton.

The Model BK-411 Soundmirror operates from a power source of 105 to 120 volts, 60 cycles A. C. and consumes approximately 85 watts.

SECTION II

Detailed Description

POWER REQUIREMENT

The power requirement for the Model BK-411 Soundmirror is 85 watts at 105 to 120 volts 60 cycles, single phase, alternating current. Caution: **DO NOT CONNECT TO DIRECT CURRENT.**

If direct current is the only source of power available, an inverter must be used to supply 85 watts at 105 to 120 volts 60 cycles A. C. to the Model BK-411 Soundmirror.

Note: When used with other than power source specified above, the inverter, generator, or power source must be well grounded and filtered to eliminate line noise or hum.

REELS AND RIBBON

Two reels 7" in diameter x $\frac{7}{16}$ " thick are furnished with the BK-411 Soundmirror; one empty and one filled with "Magic Ribbon" (approximately 1225') to supply approximately thirty minutes of recording or playing time. (See Fig. 2).

The reels are made of light weight material and are subject to shape distortion if care is not exercised in handling.

When extra reels of "Magic Ribbon" are not in use they should be stored by standing them on edge (in the carton) in a dry place. If reels are stored in stacked manner they are apt to become bent.

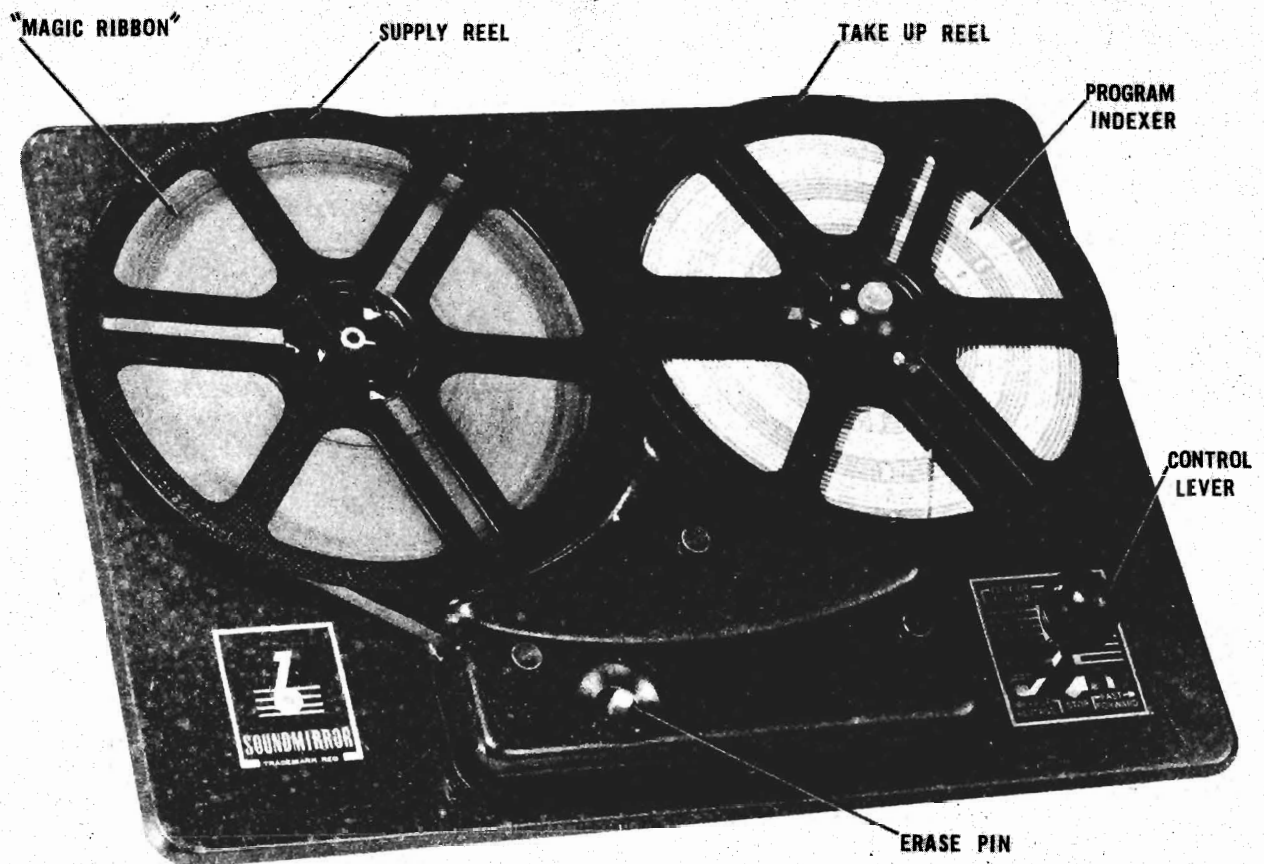


Fig. 2—Top Panel

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The "Magic Ribbon" furnished with the Model BK-411 is a paper ribbon coated with a magnetic material (black iron-oxide) and has a breaking load of 6 lbs. With proper care in handling, "Magic Ribbon" should last indefinitely.

CABINET

The cabinet for the Model BK-411 Soundmirror is made of solid Mahogany and Mahogany veneer.

With the doors and lid closed, the cabinet measures 17½ inches wide, 12½ inches deep, and 11¼ inches high, less feet. The feet are made of cork ⅜" high and 1¼" in diameter.

To preserve the finish of the cabinet, a suitable furniture wax such as Simonize or Johnsons Wax may be used. After applying wax, rub the finish with a polishing cloth to return luster finish.

Scratches may be removed (before waxing) by applying a thin coat of Mahogany stain to the scratch, allowing it to set a moment, then wiping with a polishing cloth.

PILOT LIGHT JEWEL

The pilot light jewel located at the bottom, center-front of the cabinet is an amber translucent rod made of Lucite material. Light is transmitted through the rod from the pilot lamp located inside the cabinet. Alignment of the pilot lamp with the rear end of the rod determines the brilliancy of the light at the front of cabinet.

MICROPHONE

Furnished with the Model BK-411 is a crystal type microphone.

When not in use the microphone is stored in the compartment provided for this purpose. (See Fig. 3). It mounts on one surface of the compartment by a spring clip (H16) which grips the handle of the microphone. During shipment, a rubber band is wrapped around the handle of the Microphone and around the clip to prevent it from dropping and becoming damaged during shipment.

A base (A-3) is furnished with the Microphone for the purpose of using the microphone for stand operation. The base is also mounted in the compartment during shipment and storage, and when used is assembled to the microphone handle as follows: insert lower end of stand into the hole of the base, fitting the key pin of the stand into the key slot of the base and turn the stand clockwise until it locks. Fig. 1 shows the microphone stand

and base assembled. To disassemble, turn the stand counter-clockwise until key pin lines up with the key slot, then pull apart.

The microphone head can also be removed from the stand (by unscrewing it counter-clockwise) for the purpose of replacement.

The microphone plugs into a pin jack (J-1, Fig. 16) connected to the amplifier and may be detached for the purpose of servicing the unit.

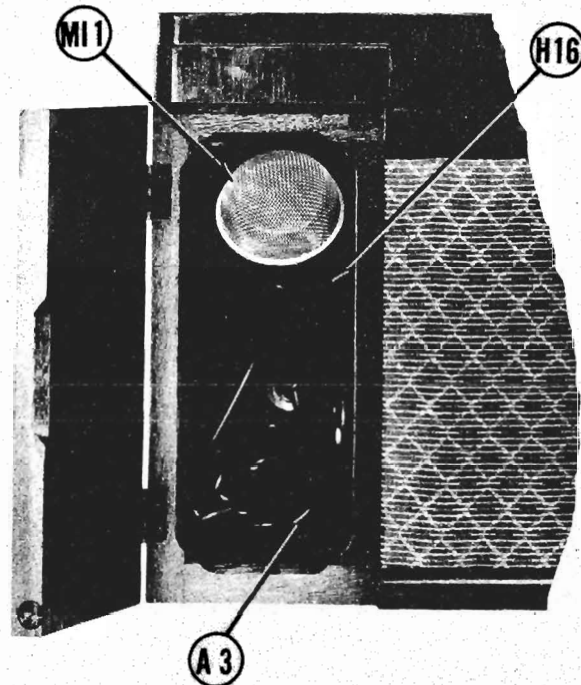


Fig. 3—Microphone and Compartment

TRIM COVERS

Three trim covers are used to give a final "dress" finish to the mechanical section of the BK-411 Soundmirror. These covers may be removed for access to various components located on the mechanism chassis. Fig. 4 shows two covers removed from the chassis. Trim cover (A-14) covers the top mechanism chassis. Trim cover (A-10) covers the record-reproduce head and the erase-head, and trim cover (A-12) covers the pressure wheel and the bracket assembly.

When these trim covers are removed for any reason, they should be replaced so they will not interfere with the operation of the erase head bracket or the pressure wheel link at points "A" and "B" respectively of Fig. 4.

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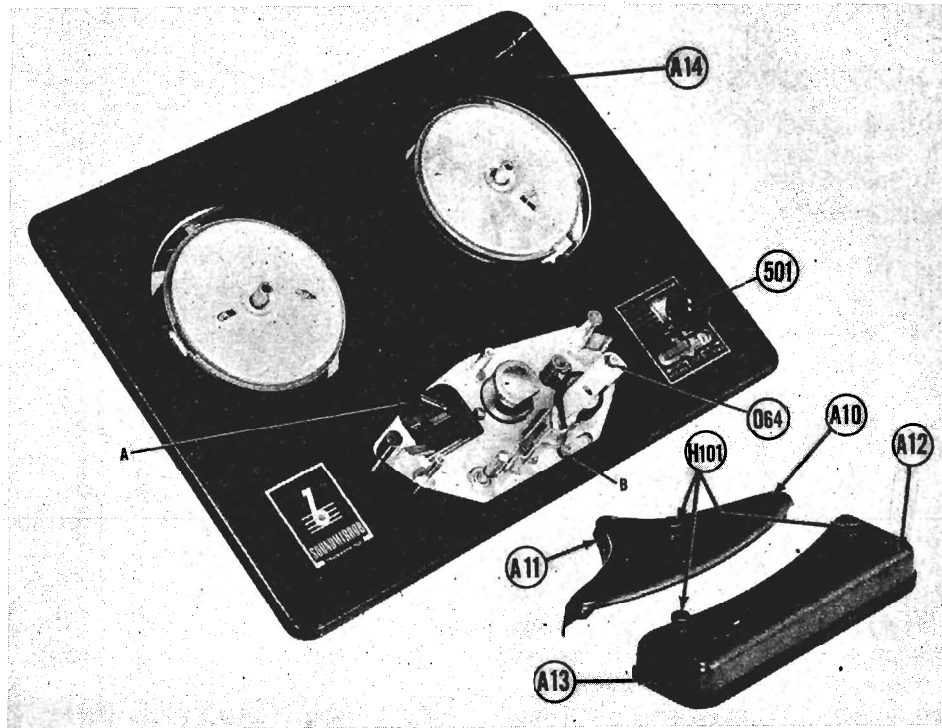


Fig. 4—Top Panel Trim Covers

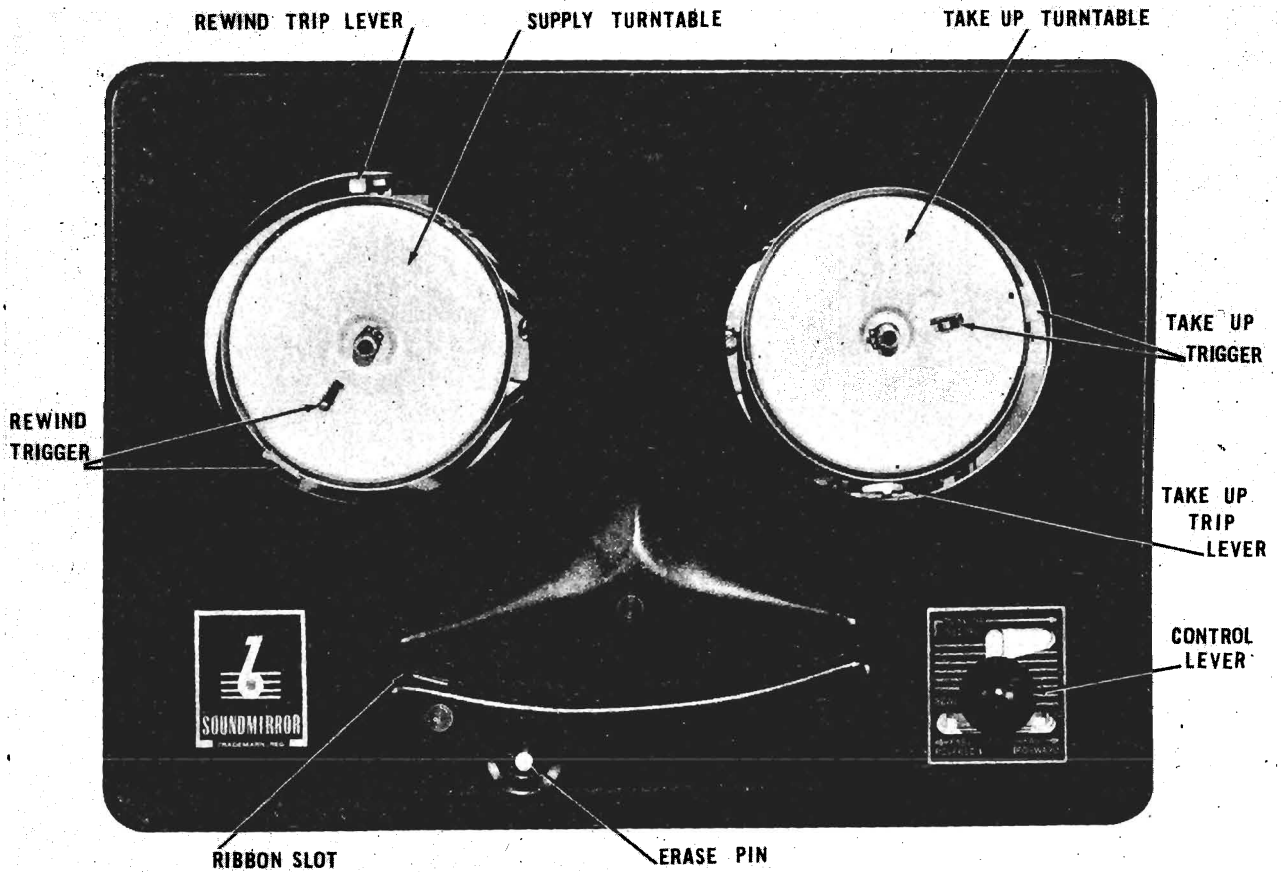


Fig. 5—Top Panel Controls

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BK-414

CONTROLS

Located on the top panel are two manual controls; (See Fig. 5) one control lever for the purpose of shifting the mechanism to its proper position for the following operations: (a) "Play or Record", (b) "Rewind", (c) "Stop", (d) "Fast-Forward", and (e) "Fast-Reverse"; and the "Erase Pin", which, when pressed while shifting the "Control Lever" to the "Record" position, locks the erase head in position against the "Magic Ribbon". The latter control is used only during the recording operation or to erase any previous recording from the ribbon.

Two automatic controls, namely; the Rewind Trip Lever and the Take-Up Trip Lever, are located on the Top Panel; one adjacent to the Rewind clutch and one adjacent to the Take-Up clutch. The Rewind Trip Lever, when triggered, causes the ribbon to rewind from the Take-Up reel onto the Supply reel. The Take-Up Trip Lever, when triggered, causes the reels to stop at the end of the automatic rewind operation.

The amplifier controls are located on the front panel which is concealed by a door on the right front side of the cabinet (See Fig. 6). The controls are as follows, from top to bottom; (a) "Volume Control Play or Record"—This controls the level of

sound being recorded on the ribbon during the recording process (viewed by the "Record-Volume Indicator" (VI) immediately above this control). It also controls the play-back volume to the speaker. (b) A Selector Switch—which connects the various sections of the amplifier for the following operations; "Record-Radio," "Play", and "Record-Mic." (c) "Speaker Volume (Recording Only)"—This controls the speaker (monitor) volume while recording from the radio input circuit. To prevent acoustic feedback the Monitor signal is muted while recording from the Microphone input circuit. (d) "Tone Control" "Power Off"—This control is for turning the power on and off as well as controlling the tone of the playback and monitoring signal. It does not effect the signal being recorded on the "Magic Ribbon".

MECHANICAL FUNCTION

Drive Mechanism

The Drive Mechanism includes the following:

1. A single motor (B-1 Fig. 7) which drives both the capstan and the reeling mechanism. It is an induction type motor and is resiliently mounted on a bracket which can be shifted in its position for the purpose of adjusting the tension of the rubber drive belts. A fan is attached to the drive motor shaft to cool the motor.

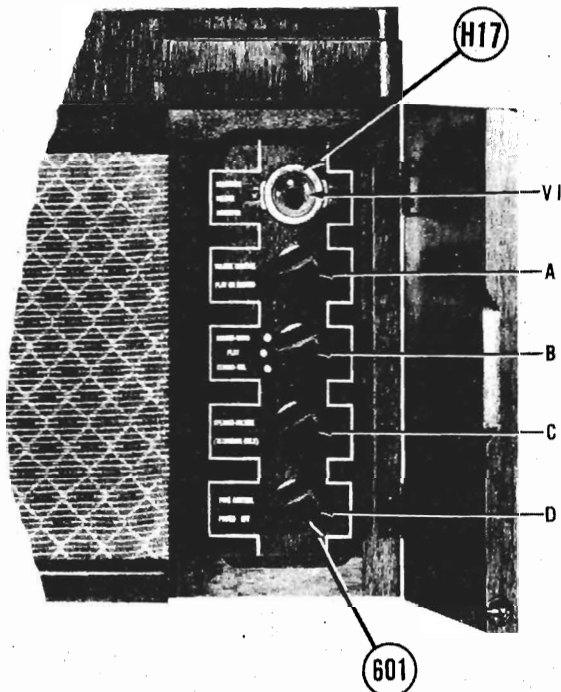


Fig. 6—Front Panel Controls

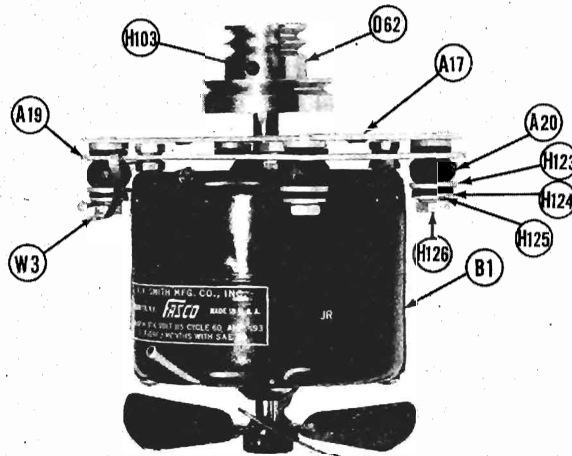


Fig. 7—Drive Motor

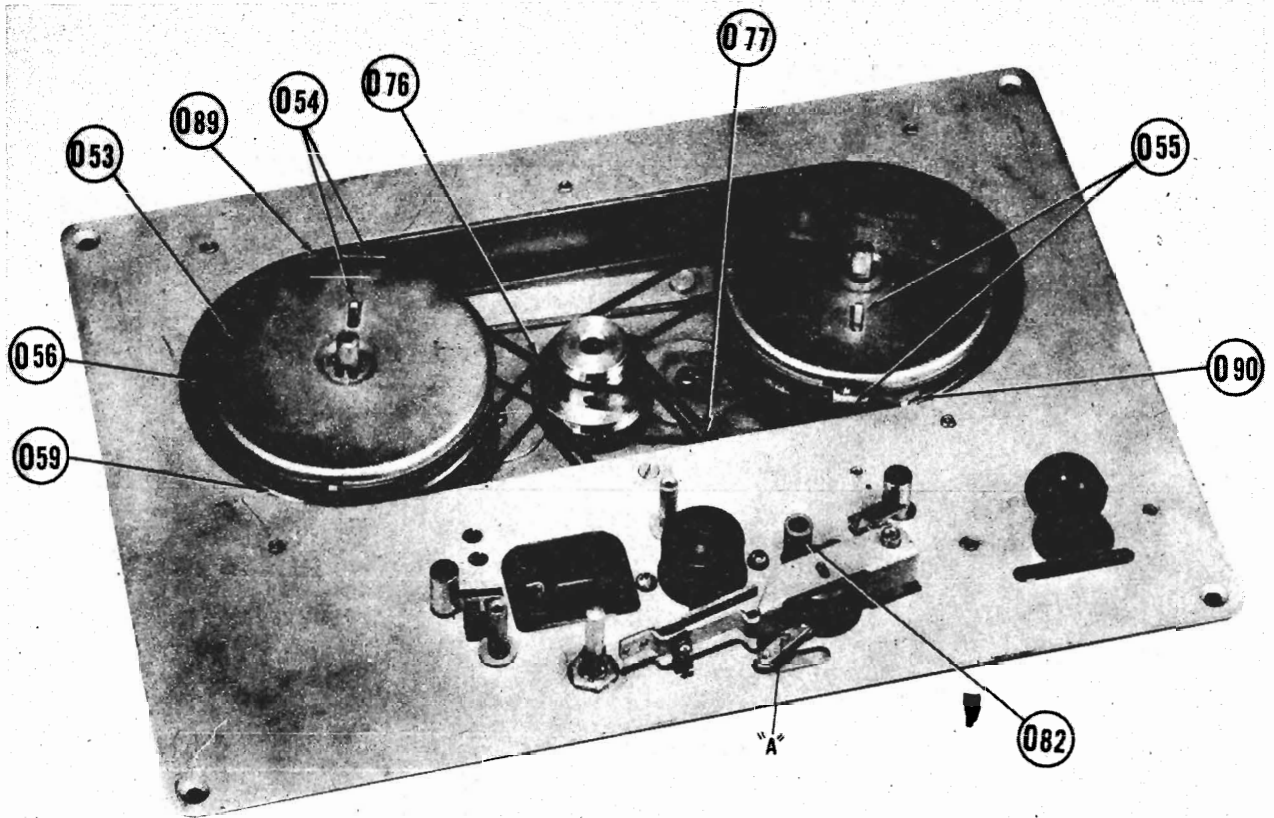


Fig. 8—Reeling Mechanism—Reels Displaced

2. Rubber belts (O-76 & O-77 Fig. 8) couple the drive pulley to the capstan assembly and the reeling mechanism. The smaller belt (O-77) drives the capstan and the larger belt (O-76) drives the reels.

3. A small diameter capstan (O-82 Fig. 8) attached to a pulley and a balanced flywheel provide a constant drive speed for the "Magic Ribbon". The capstan revolves in two bearings which are of the "Oilite" type and require very little additional lubrication. The bottom bearing is of the self-aligning type.

4. A pressure wheel (O-84 Fig. 9) and a pressure pad (MS-2) are assembled on a bracket (A-16) (Also see Fig. 10) which is engaged by the control lever (501) to press the ribbon against the capstan (O-82) and the record-play head (E-1) respectively during the record or play operation. The rubber tire pressure wheel has an "Oilite" bearing requiring very little additional lubrication.

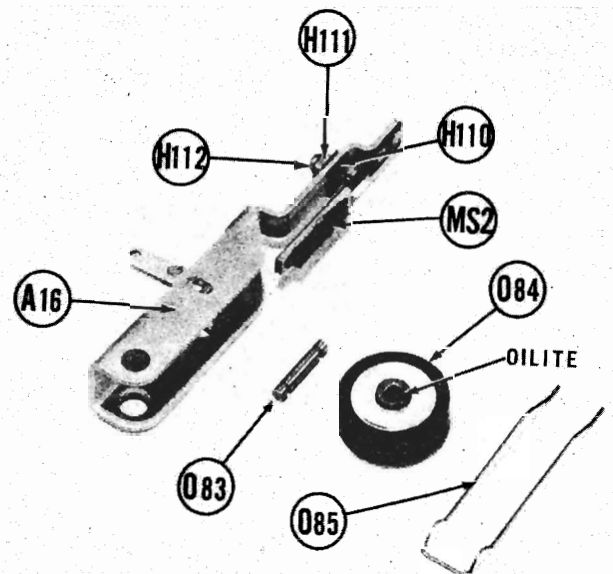


Fig. 9—Pressure Wheel Assembly

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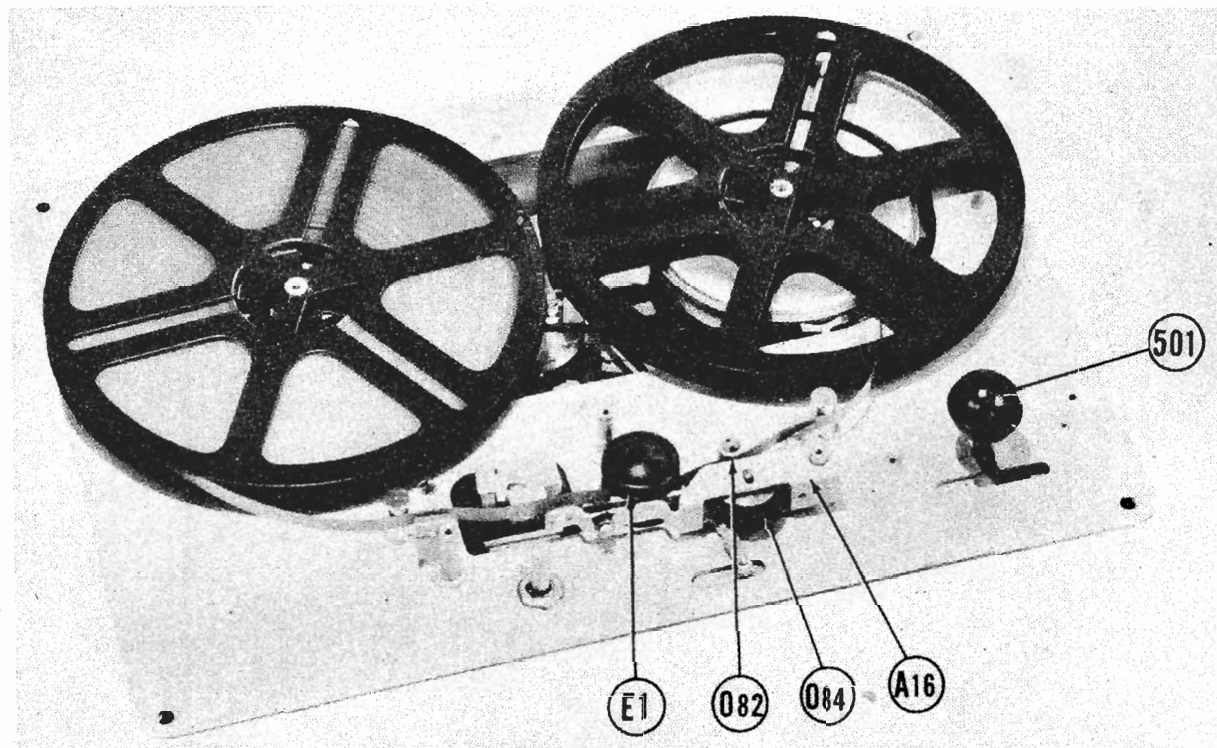


Fig. 10—Reeling Mechanism—Reels and Ribbon in position

Reeling Mechanism

(See Fig. 38)

The reeling mechanism consists of two turntables (O-53) and two clutch assemblies (O-56 and O-58) mounted on the two reel shafts (O-57), and two pulleys (O-59) mounted on bearings (O-63), all of which are driven by the motor (B-1) through the rubber drive belt (O-76, Fig 8).

The two turntable assemblies consist of two cups fitted together to serve three purposes:

1. The upper cup (O-53) which supports the reel.
2. The upper and lower cups fitted together to house the rewind trigger (O-54) and the take-up trigger (O-55).
3. The lower cup (O-56) to form the clutch facing which contacts the felt disc (O-58 mounted on the pulley (O-59) when the turntable assembly is lowered.

The clutch assembly, actuated by the clutch raising lever (O-86, Fig. 11) and pin (H-115, Fig.

38) is considered to be engaged when the felt disc contacts the facing of the cup (O-56). While engaged the rewind clutch turns clockwise and the take-up clutch turns counter-clockwise.

The two triggers (O-54 and O-55) are for the purpose of tripping the automatic control levers (O-89 and O-90 Fig. 8) respectively.

The rewind trigger (O-54) which is held in a cocked position by the ribbon on the reel is released when only 20 to 40 turns of ribbon remain on the reel. When released the trigger trips the rewind trip lever (O-89) which actuates the control mechanism to rewind the ribbon automatically.

The take-up trigger (O-55) is held in a cocked position by the first turn of ribbon on the take-up reel, and when the automatic rewinding is completed the ribbon leaves the reel and releases the trigger (O-55). When the trigger is released the centrifugal force causes the trigger to protrude through the opening in the outer edge of the take-up turntable and strike the trip lever (O-90) which actuates the control mechanism to stop the motor.

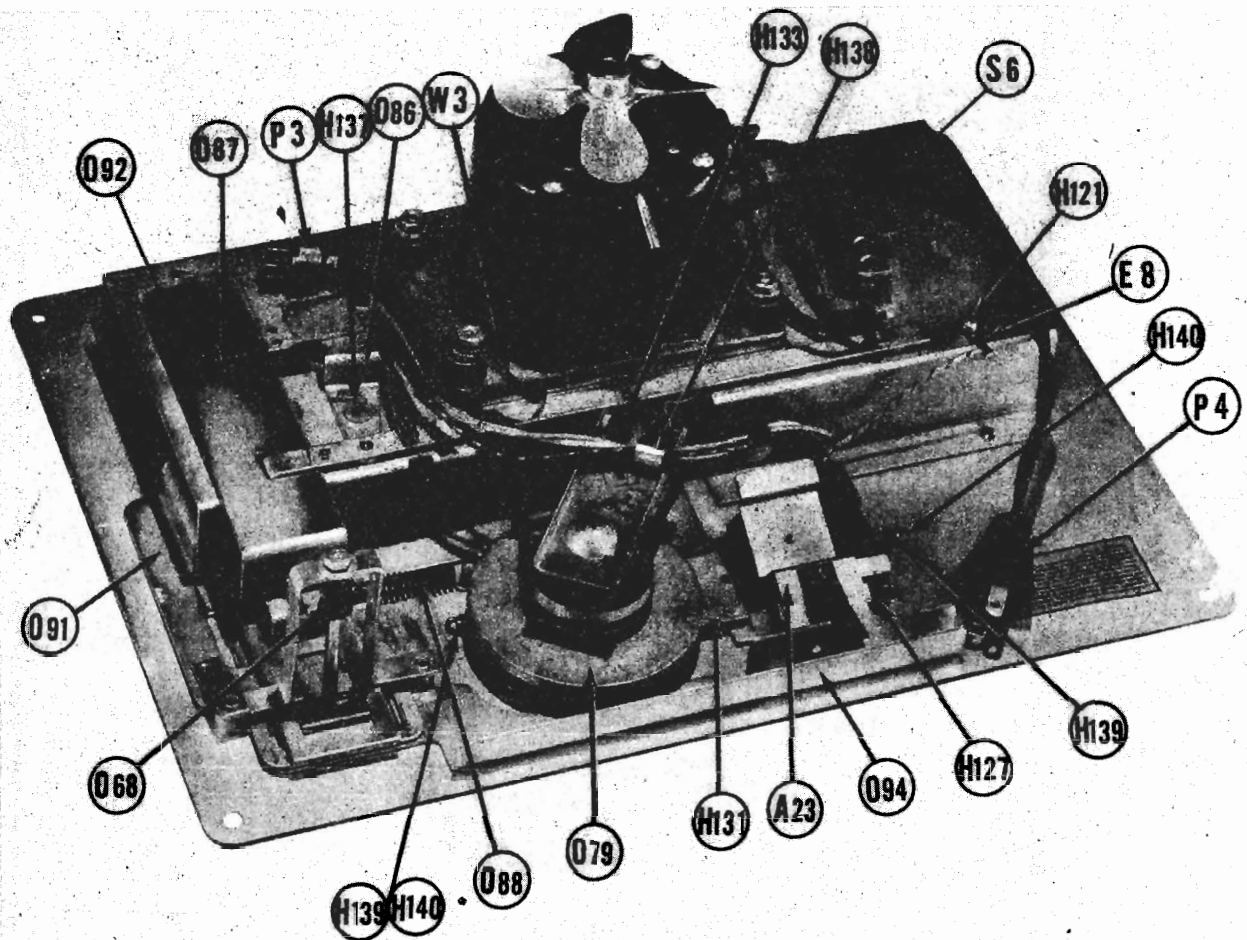


Fig. 11—Control Mechanism—Bottom View

Control Mechanism

The control mechanism is actuated by two control levers which are operated manually and two trip levers which are operated automatically by the reeling mechanism triggers. The manual controls are: The "Control Lever" and the "Erase Pin" (See Fig. 5). The control lever moves the corresponding engaging levers to the following positions:

1. "Play or Record" Position

Placing the control lever in this position causes:

(a) The latch cam slide (O-91, Fig. 11) which actuates the trip lever latch (H-141, Fig. 13) and the trip bar (O-99, Fig. 12) to engage and set the take-up trip lever (O-90, Fig. 13) and the rewind trip lever (O-89, Fig. 12).

(b) The head locking slide (O-94, Fig. 11) to lock the erase head in position against the ribbon

(when the erase pin is pressed), the pressure wheel (O-84, Fig. 12) to bear against the capstan (O-82, Fig. 12), and the pressure pad (MS-2, Fig. 12) to bear against the record head (E-1, Fig. 12).

(c) The clutch lever (O-92, Fig. 11 & 14) which couples to the raising lever assembly (O-86, Fig. 14) to engage the take-up clutch, disengage the rewind clutch, and close the motor switch contacts (S-6, Fig. 11).

(d) The latching gate (O-93, Fig. 14) to lock the control mechanism in "Play or Record" position until released either manually (by placing control lever in "Rewind" or "Stop" position) or automatically (by action of the rewind trip lever). The latching gate is moved to the locking position by a spring (O-97, Fig. 14). This gate should be lubricated periodically with light oil (SAE-10) to prevent binding.

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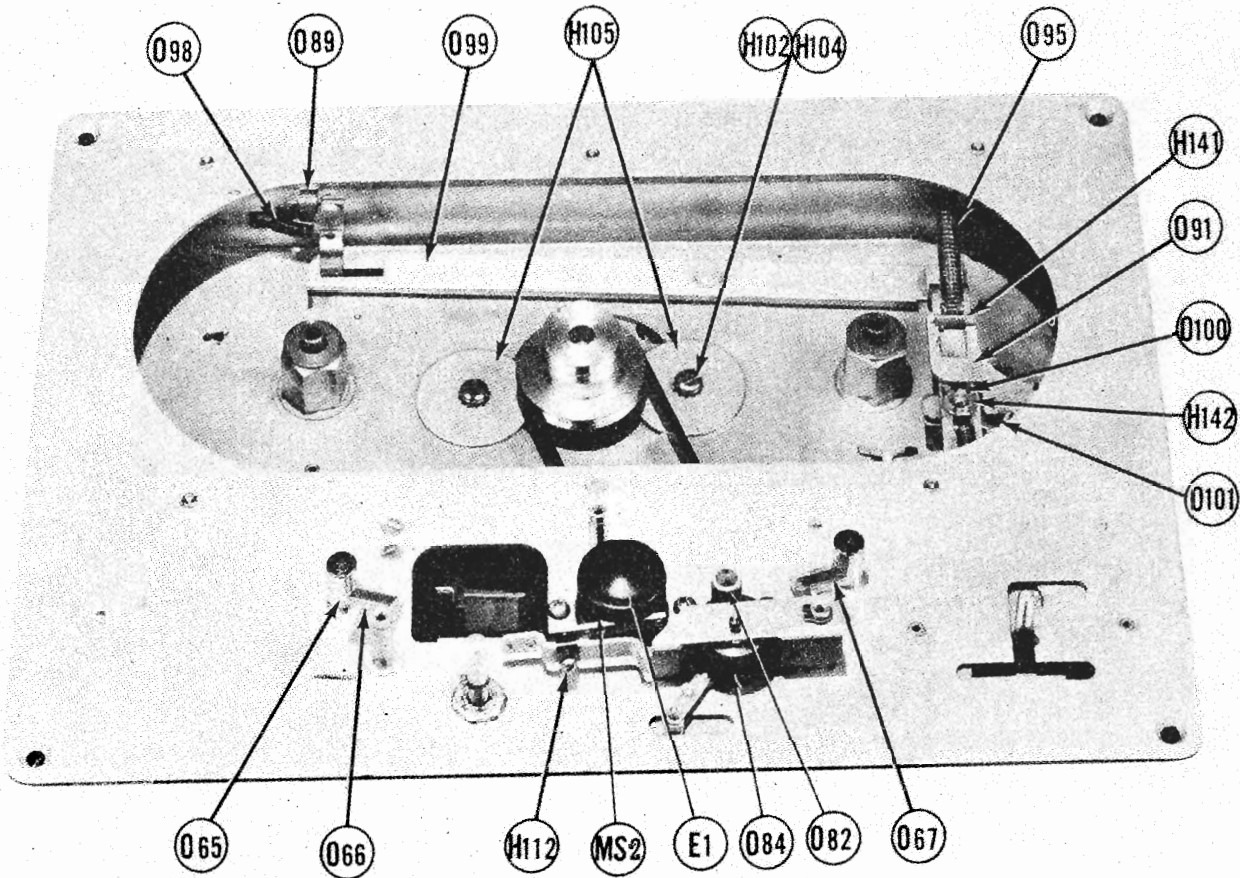


Fig. 12—Control Mechanism—Rewind Trip Lever View

2. "Rewind" Position

Placing the control lever (Fig. 2) in the "Rewind" position initiates the following actions:

(a) The latching gate (O-93, Fig. 14) is moved half-way out of its locked position.

(b) The spring (O-87, Fig. 11) then moves the raising lever assembly (O-86, Fig. 11) to its extreme opposite position to disengage the take-up clutch and engage the rewind clutch to cause the reels to turn in the reverse direction and rewind the ribbon from the take-up reel onto the supply reel.

(c) The pressure wheel (O-84, Fig. 10) is moved away from the capstan (O-82) to allow free movement of the ribbon during the rewind operation.

(d) The head locking slide (O-94, Fig. 11) is moved to release and drop the erase head from its engaged position after completion of a recording.

3. "Stop" Position

Placing the control lever in the "Stop" position releases all levers remaining engaged, and opens the motor switch contacts. The raising lever assembly (O-86, Fig. 11) is moved to a position which allows both clutches to engage and produce a friction brake to stop the reels quickly.

4. "Fast-Forward" Position

Placing the control lever in the "Fast-Forward" position causes the take-up clutch to engage, the rewind clutch to disengage, and the motor switch contacts to close and cause the ribbon to wind forward rapidly.

5. "Fast-Reverse" Position

Placing the control lever in the "Fast-Reverse" position causes the rewind clutch to engage, take-up clutch to disengage, and the motor switch contacts to close and cause the ribbon to rewind rapidly.

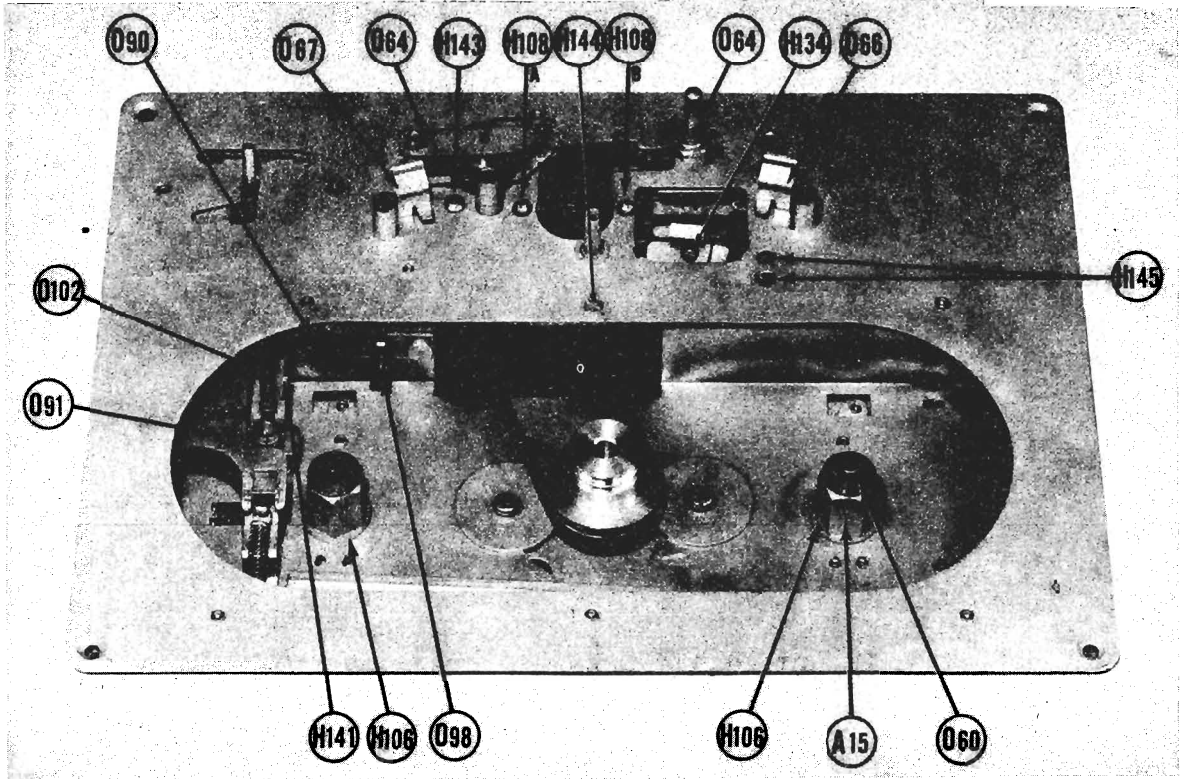


Fig. 13—Control Mechanism—Take-up Trip Lever View

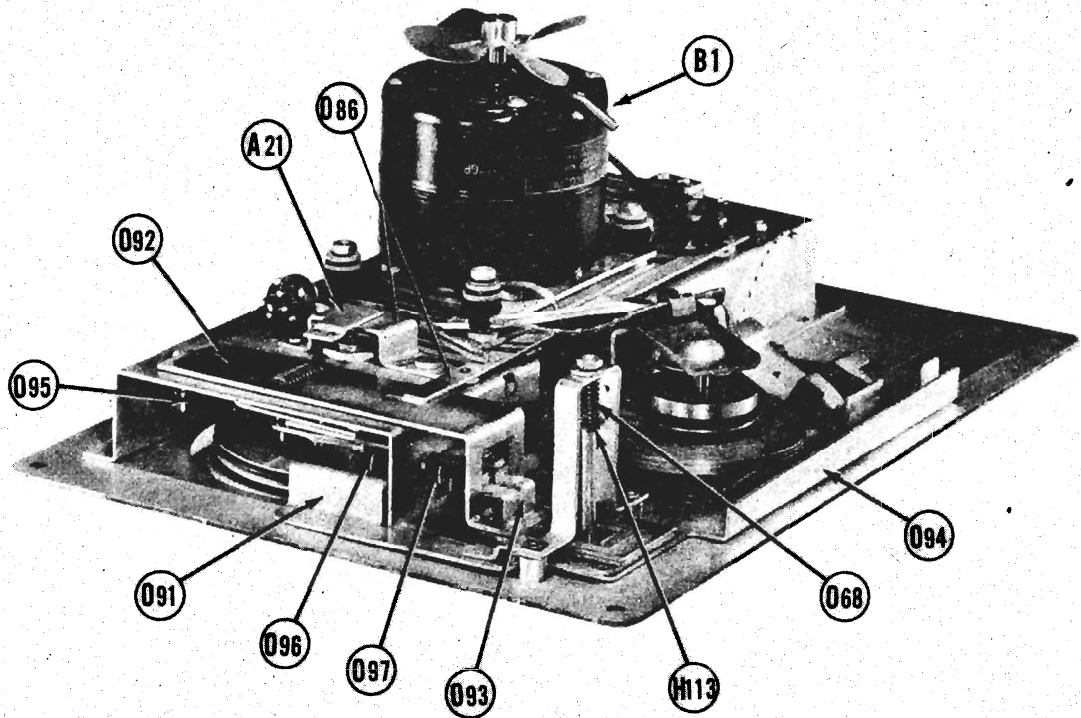


Fig. 14—Control Mechanism—Spring View

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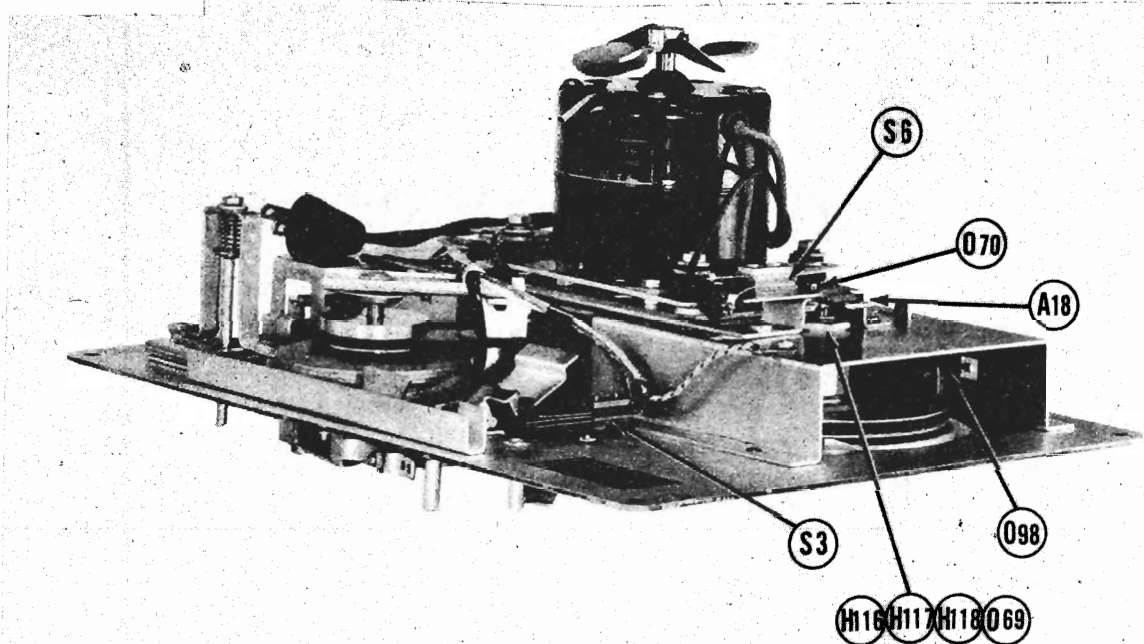


Fig. 15—Control Mechanism—Switch View

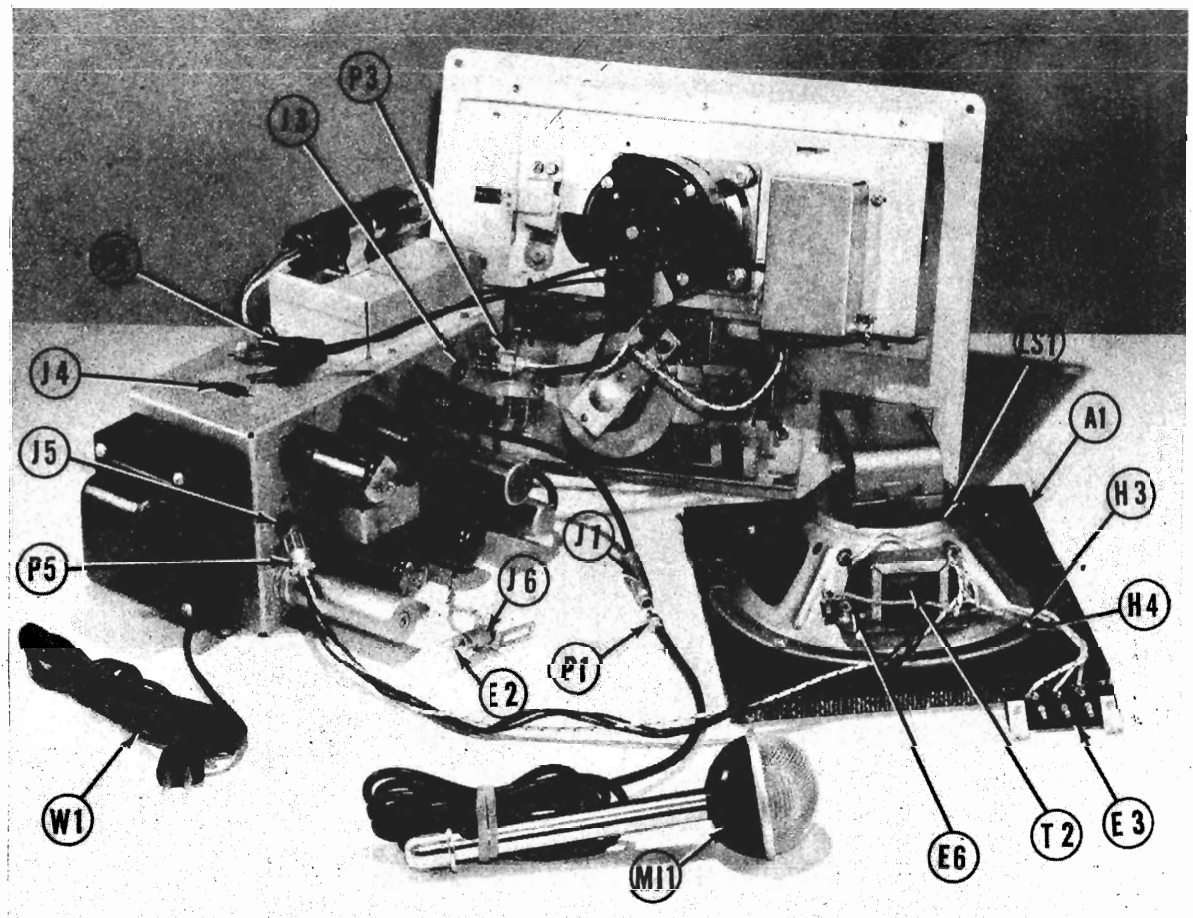


Fig. 16—Model BK-411—Removed from Cabinet

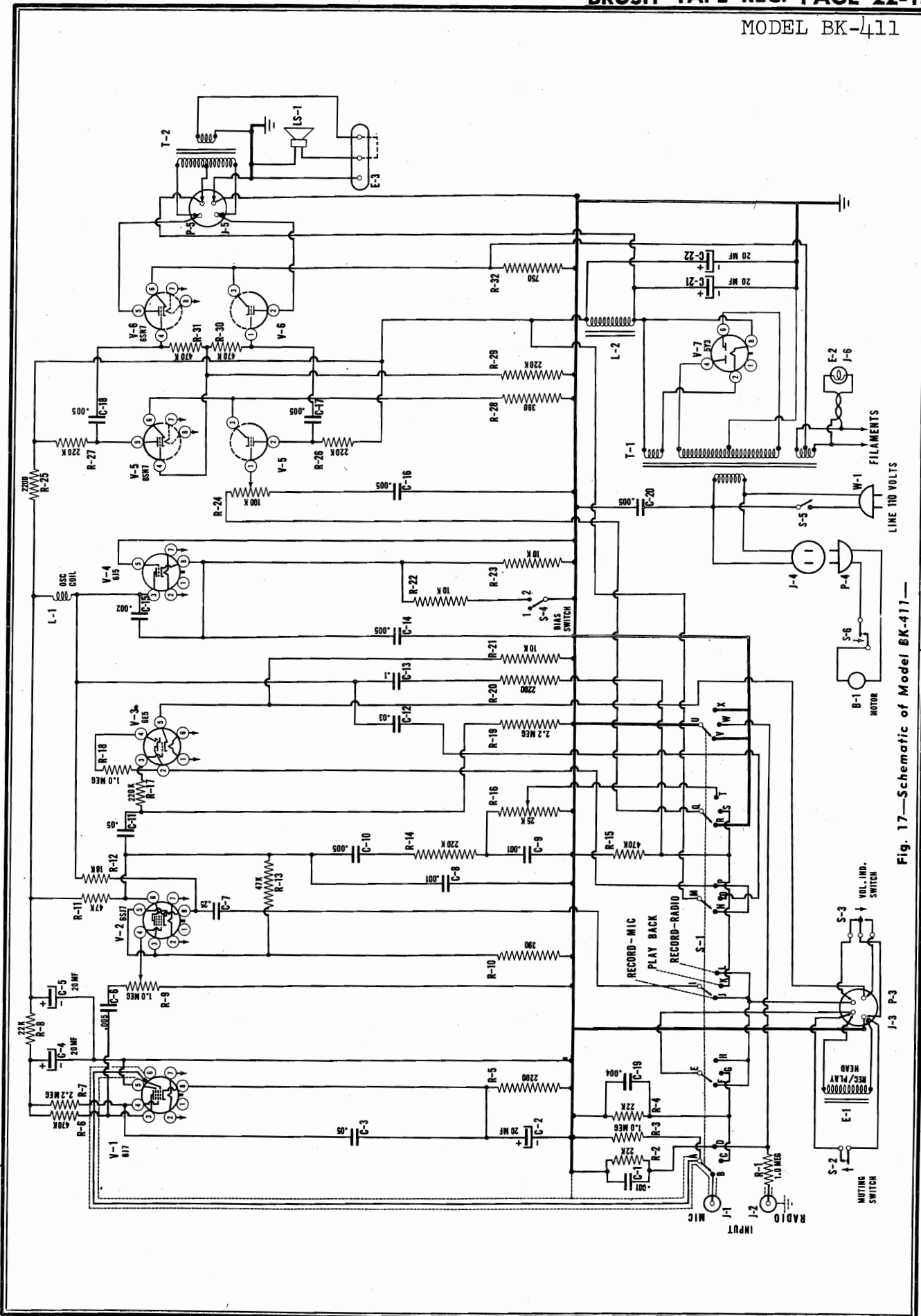


Fig. 17—Schematic of Model BK-411—

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VOLTAGE
(D.C. unless otherwise specified)

| Tube | Pin No. 1 | Pin No. 2 | Pin No. 3 | Pin No. 4 | Pin No. 5 | Pin No. 6 | Pin No. 7 | Pin No. 8 | Cap | Notes |
|------|-----------|-----------|-----------------|-------------------|-----------|-------------------|-----------|--------------------------------|-----|--------------------------------------------------------------------------------------|
| V-1 | 0 | 12 | 80 | 30 | 0 | N.C. | 12 | 1.4 | 0 | |
| V-2 | 0 | 12 | 3 | 0 | 3 | 115 | 12 | 230 A.C.:65 | | A.C. voltage at 28 K.C. |
| V-3 | 12 | Rec. 32 | -0.75 | 365 | 0 | 12 | | | | Pin No. 5 Grounded for measurement to allow 6E5 to be in operating condition. |
| V-4 | 0 | 12 | 325 A.C.: 80 | Rec. 26 Play 0 | 0 | Rec. 0 Play -6 | 12 | Rec. 55 Play 15 A.C.: 20 | | Pin No. 4 - .5 volts on long amplifiers. Pin No. 6 - .2 volts on long amplifiers. |
| V-5 | 0 | 35 | 1.1 | 0 | 33 | 1.1 | 12 | 12 | | |
| V-6 | 0 | 370 | 12 | 0 | 370 | 12 | 12 | 12 | | |
| V-7 | 0 | 370 | 365 | A.C.: 300 | 335 | A.C.: 300 | 0 | 370 | | Long Amplifiers have 45 V.D.C. on Pin No 1, N.C. Pin No. 3 and 7. |

Tests made with 20K ohms per volt meter. All controls turned counter-clockwise. Bias Switch closed. Line voltage 115V A.C.

RESISTANCE

| Tube | Pin No. 1 | Pin No. 2 | Pin No. 3 | Pin No. 4 | Pin No. 5 | Pin No. 6 | Pin No. 7 | Pin No. 8 | Cap | Notes |
|------|-----------|-----------------------|-----------|--------------------------|-----------|-----------|-----------|-----------|----------|-------------------------------------------------------------------------------------------------------------------------------|
| V-1 | 0 | 750 | 550K | 2.2 Meg. | 0 | N.C. | 750 | 2200 | See note | Cap 1 Meg.-Rec. Mike Position 22K Play Position 22K Rec. Radio Position |
| V-2 | 0 | 750 | 390 | 1 Meg. | 390 | 35K | 750 | 58K | | |
| V-3 | 750 | Rec. 45K Play Inf. | 2.4 Meg. | Rec. 1 Meg. Play Inf. | 10K | 750 | ... | ... | | |
| V-4 | 0 | 750 | 45K | 10K | 0 | 2.4 Meg. | 750 | See note | | Pin No. 4 2.4 meg. on long amplifiers. Pin No. 6 2.2 meg. Pin No. 7 10K with S-4 open. Pin No. 8 5K with S-4 closed. |
| V-5 | See note | 260K | 390 | 220K | 260K | 390 | 750 | 750 | | Pin No. 1 0 ohms in Rec. Mike position. 50K ohms in Play. 25K ohms in Rec. Radio Position. |
| V-6 | 690K | Inf. | 750 | 690K | Inf. | 750 | 750 | 750 | | |
| V-7 | 0 | 45K | 45K | 85 | 45K | 85 | 2.2 Meg. | 45K | | Pin No. 1 10K on long amplifiers. No. 3 N.C. No. 5 0. No. 7 N.C. |

Measurements made to chassis ground. Head and speaker unplugged. All controls turned clockwise. Tubes in sockets.

Voltage-Resistance Chart

ELECTRICAL SECTION

(See Schematic Fig. 17)

Operating Power

The line power (105 to 120 volts 60 cycles A.C.) is supplied to the amplifier through the line cord and plug assembly (W-1). The power is turned on by the switch S-5 which is attached to the "Tone" control: The power is then supplied to the drive motor through the inter-connecting plug P-4 and jack J-4 located on the amplifier chassis. (See Fig. 16).

The motor is controlled by a switch (S-6, Fig. 15) which is actuated when a ball (O-70, Fig. 15) is forced against a bakelite bushing mounted on the moving contact of the switch.

During operating positions of the Control Lever the rewind clutch raising lever forces the ball against the bushing to close the contacts of the switch. During the "Stop" position the ball recesses into an indentation in the raising lever and allows the switch contacts to open.

Pilot Lamp

The pilot lamp (E-2, Fig. 16) is of the 6-8 volt, .25 amp. Bayonet Base type—Mazda No. 44. See Pilot Lamp Replacement Page 34.

ELECTRONIC SECTION

The electronic circuit of the BK-411 is shown in the schematic (Fig. 17) and the block diagram (Fig. 18) and is, for discussion purposes, divided into the following circuits, namely: Input Circuits, Record Amplifier Circuit, Record Bias Circuit, Record Volume Indicator Circuit, Monitor Amplifier Circuit, Reproduce Amplifier Circuit, Output Circuit, and Power Supply Circuit. Location of the electronic components is found in Figs. 20 through 26.

Input Circuits**Microphone Input**

The microphone input circuit consists of a shielded cable from the Microphone plug (P1 and jack J-1) to the grid of the input tube V-1 through connections "A" and "B" of the selector switch (S-1) (for reference to contacts of S-1 see Fig. 19).

The input impedance of this circuit is approximately one megohm due to the resistance of R-3.

Radio Input

The Radio input connections are made through the plug (P-2) and jack (J-2), through the one

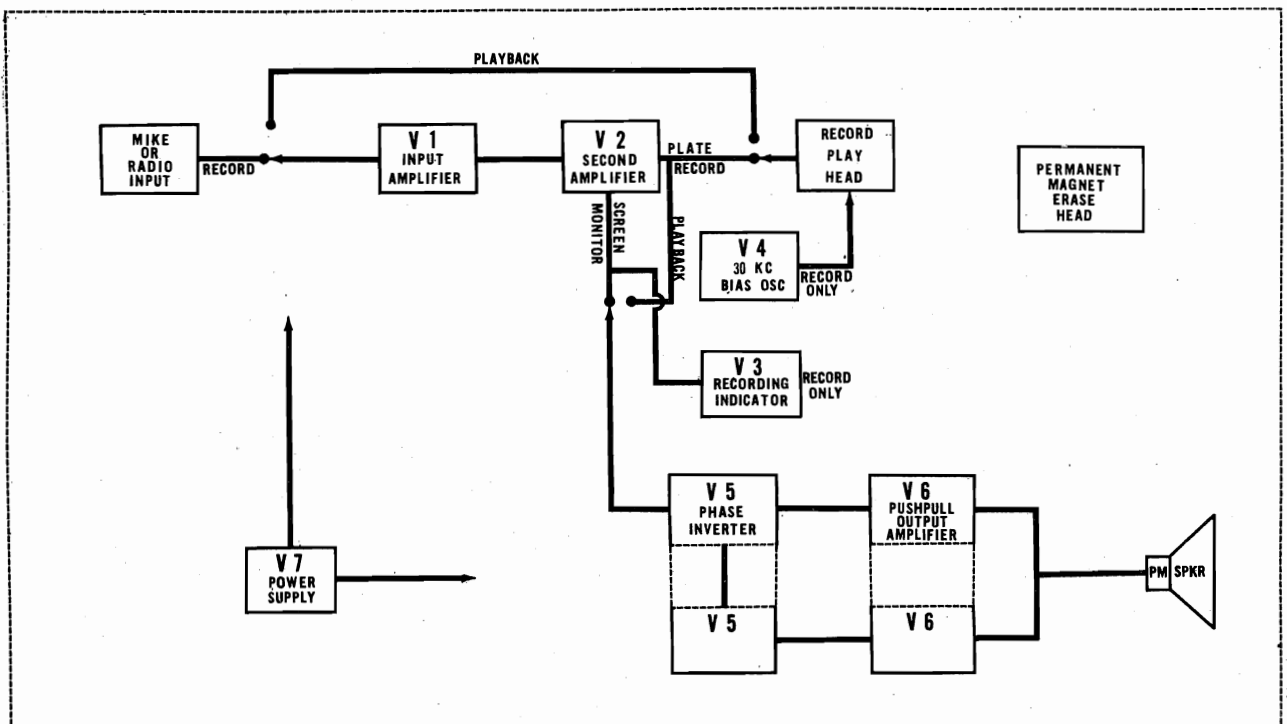


Fig. 18—Block Diagram of Model BK-411

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megohm resistor R-1, and through contacts "D" and "A" of the selector switch (S-1), at which point a voltage dropping resistor (R-2) is connected with R-1 to drop the radio input voltage (at a ratio of 46 to 1) before applying it to the grid of V-1. No more than 10 volts can be applied at the radio input plug to avoid overloading of the input stage.

The capacitor C-1 bypasses to ground frequencies of approximately 30KC and above. This reduces the feedback in the amplifier caused by the 30KC bias oscillator.

During the Playback process the Radio input circuit is connected to ground through contacts "U" and "W" of the selector switch S-1. This prevents the signal from being amplified (by way of interwiring capacities, etc.) and interfering with the playback signal from the "Magic Ribbon."

Record Amplifier Circuit

First Record Amplifier Stage (V-1)

The first record amplifier stage is a 6J7 tube and has a gain of approximately 120. The grid is connected to contact "A" of the selector switch (S-1) and is switched to contact "B" while recording from the Microphone and to contact "D" while recording from the Radio Input Circuit.

The filter network in the B+ supply circuit to this stage is composed of capacitors C-4 and C-5 and resistor R-8 and is for the purpose of preventing the stage from motor-boating as well as removing any slight hum from the power supply.

The screen and cathode are by-passed to ground in the conventional manner.

The output of this stage provides a flat frequency response at the grid of V-2 (through capacitor C-6 and volume control R-9).

Record Current Converter Stage (V-2)

The 6SJ7 tube (V-2) is a converter tube and functions to convert the voltage from V-1 into a current which flows through the coupling capacitor C-8, through the contacts "I" and "J" or "I" and "L" of the selector switch (S-1) and into the Record Head (E-1).

The proper amount of signal recording current through the record head is 0.8 ma.

During the recording process a 30 KC signal is present at the plate of V-2. It joins the audio signal and is fed to the recording head. It is in amplitude about three times greater than the audio signal, thus in order to operate the Record Volume Indicator (V-3) and the monitor amplifier from this stage the signal is taken from the screen. The

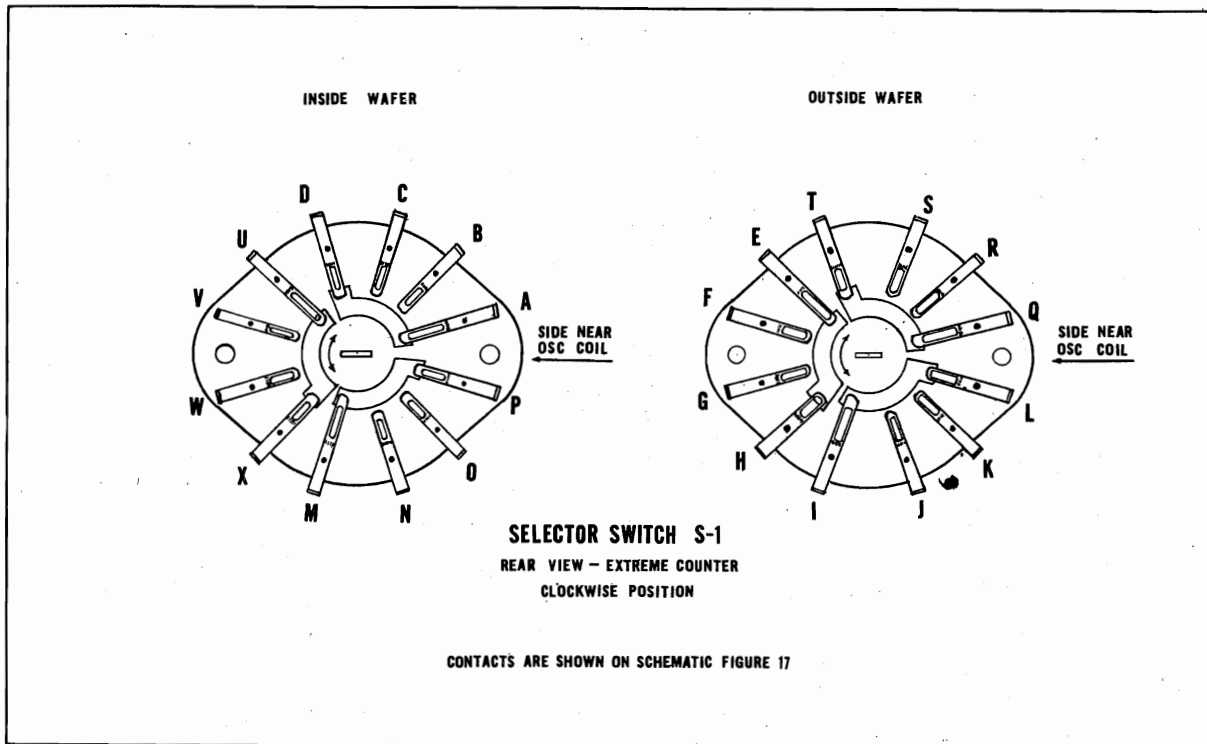


Fig. 19—Selector Switch S-1 Contacts

screen is by-passed to ground with a small capacity of C-8 and C-9 (.001 MFD each) to prevent any trace of the 30 KC signal from being applied to the recording indicator.

A resistor (R-13) is connected from the screen to the cathode to reduce the screen degeneration.

The signal from the screen to the monitor amplifier is coupled by means of the network C-10, R-14 and Volume Control R-16.

The signal from the screen to the Record Volume Indicator (V-3) is coupled through the capacitor C-11 and the resistor R-17. The resistor R-17 is for the purpose of preventing the grid current of V-3 from distorting the recording.

Record Volume Indicator (V-3)

The Record Volume Indicator is a 6E5 tube and functions to visually indicate the level of sound being recorded on the 'Magic Ribbon'.

It receives a signal from the screen of V-2 through the coupling capacitor C-11 and the resistor R-17.

When the Selector Switch S-1 is in the "Record" position, the Volume Indicator remains closed until the Erase Pin is pressed to close the contacts of switch S-3 (see Fig. 15) which connects the cathode of V-3 to ground.

The resultant action of switch S-3, when the erase pin has not been pressed, is a reminder to the operator to press the erase pin to make a recording, otherwise the signal is shorted to ground by the other half of the switch (S-3) to prevent a recording from being made over a previous recording and ruining either the first, the latter, or both recordings.

The B+ voltage to the plate of V-3 is used only during the recording process and is connected through contacts "M" and "N" of selector switch S-1 while recording from the microphone and through contacts "M" and "P" while recording from the radio input circuit.

Record Bias Circuit

The record bias oscillator tube (V-4) is a 6J5. It supplies the necessary bias current for recording on the "Magic Ribbon".

Various types of recording ribbon are available. Some types require more bias current than others for better quality recordings. For this reason, a switch (S-4) is provided in the cathode circuit of V-4 to change the amount of recording bias current according to the type of ribbon to be used.

Two positions are indicated on this switch as "1" and "2". Number 1 position opens the switch and number 2 position closes the switch. When the switch is open only Resistor R-23 is in the

cathode circuit and the output of V-4 supplies a bias current of 2.0 ma. to the record head, and when closed connects R-22 in parallel with R-23 which increases the current to 4.5 ma. in the head.

The bias oscillator frequency is approximately 30KC and is produced by the inductance of L-1 and the capacitance of C-15, which constitute a Colpitts Oscillator circuit.

Monitor Amplifier Circuit

The monitor amplifier circuit consists of the same input circuit as the recording amplifier circuit with the exception that the signal is taken from the screen of the second stage (V-2) and fed to the phase inverter stage (V-5), which is a 6SN7 twin triode tube. A 6SL7 tube may be used in this position to obtain more output volume during the monitor or playback process.

The output of the phase inverter is coupled to the pushpull output stage (V-6) through capacitors C-17 and C-18. The output of V-6 is then fed to the output transformer (T-2) through the interconnecting plug P-5 and jack J-5 and thence to the speaker (LS-1).

The volume of the monitor amplifier is controlled by the potentiometer R-16, and the tone is controlled by the potentiometer R-24.

The Monitor Amplifier is purposely muted while recording from the microphone to prevent acoustic feedback.

Reproduce Amplifier Circuit

The reproduce (Playback) amplifier circuit operates as follows: the signal is picked up from the "Magic Ribbon" by the reproduce head (E-1) and is applied to the grid of V-1, amplified and fed to the next stage (V-2) through the capacitor C-6 and volume control R-9. It is then taken from the plate of V-2 through capacitor C-7 and contacts "T"/"K" and "Q"/"S" of the selector switch S-1 and coupled to the grid of V-5 through the tone control R-24. Tube V-5 is a phase inverter which supplies the signal to a pushpull output amplifier stage V-6, where it is converted into a power output signal of approximately one watt (undistorted) in the loudspeaker (LS-1). A 6SN7 tube is used in the Phase inverter stage V-5 and may be interchanged with a 6SL7 tube if more output volume is desired. This may increase any microphonics occurring in the first stage (V-1), but this in turn may be improved by the use of a selected 6J7 tube that does not have a tendency to be microphonic, or in cases where microphonics become a problem the 6J7 tube may be replaced with a type No. 1620 tube which is more expensive but less microphonic.

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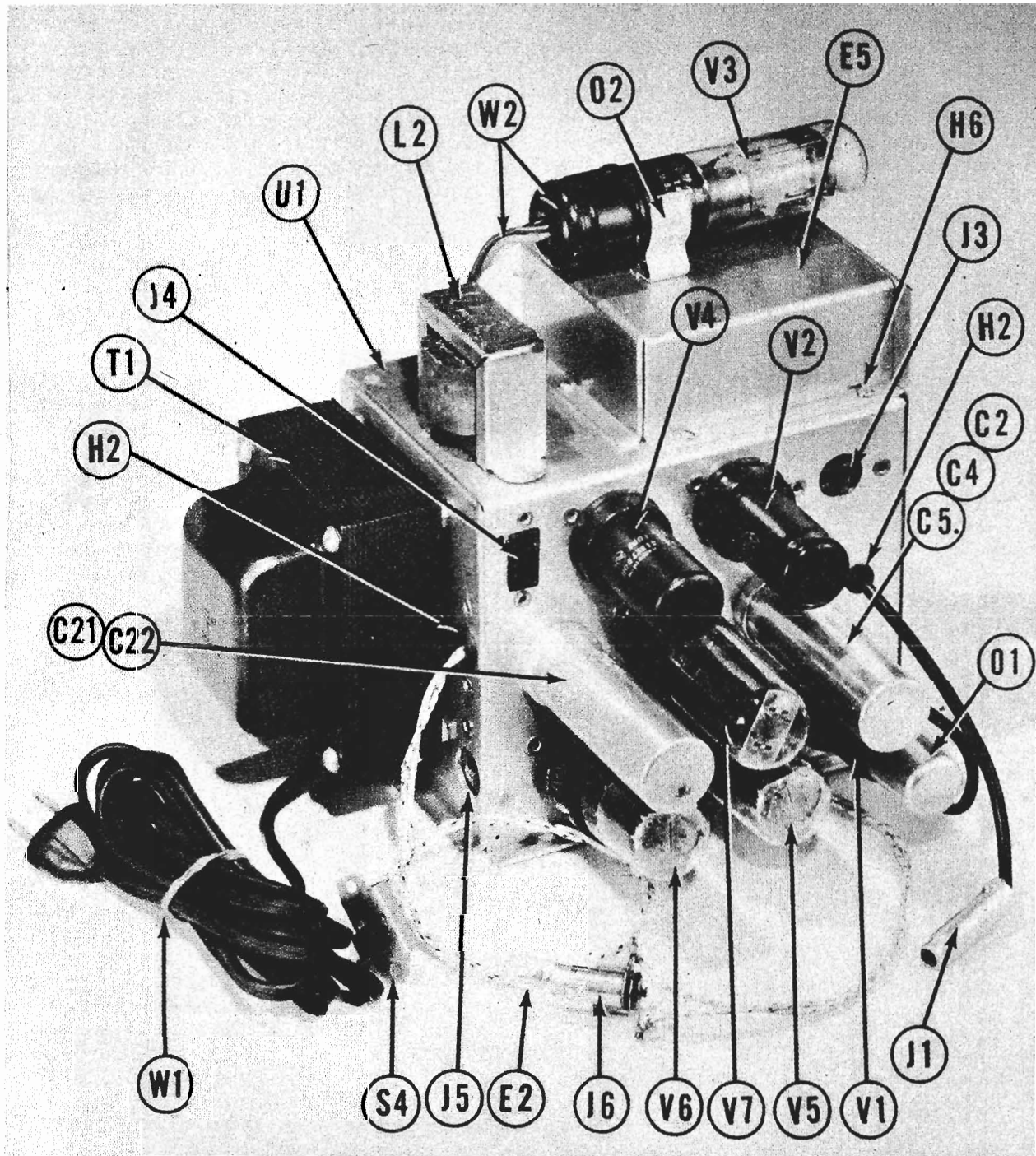


Fig. 20—Small Amplifier Chassis—Tube View

During the playback process the 30 KC oscillator circuit becomes inoperative when the oscillator coil L-1 is shunted by a .03 mfd. capacitor (C-12). This shunting takes place when the selector switch S-1 connects the capacitor C-12 to the power supply and thence to ground through the capacitor C-22. The oscillator coil L-1 is grounded through the capacitor C-5, thus a common connection from L-1 to C-12 is made through the ground circuit.

The shunting of the inductance coil L-1 with the capacitor C-12 is used in conjunction with the combination of the resistor R-20 and capacitor C-13 to form a frequency compensating network in the output circuit of V-2.

This compensating network provides an overall frequency response necessary to equalize the natural frequency characteristic of the 'Magic Ribbon'.

The inductance of L-1 and the capacitance of

C-12 when paralleled form a circuit resonating at 5000 cycles. This boosts the high frequency response, while at middle frequencies (around 1000 cycles) the impedance of this network becomes quite low, and in series with capacitor C-13 and resistor R-20 attenuates these frequencies. At lower frequencies, down to about 100 cycles, the impedance of capacitor C-13 becomes higher causing the network to appear open and permit these lower frequencies to be passed on to the next stage V-5 through capacitor C-7.

A capacitor C-19 is connected across the reproduce head during the playback process to tune the head to the higher frequencies, around 5000 cycles. The frequency response curve shown in Fig. 29 gives the average overall response of the complete

recorder and reproducer amplifier with "Magic Ribbon".

A muting switch S-2 is included in later units to short-circuit the reproduce-head during the automatic rewind process. This prevents the signal from being heard as the ribbon passes the reproduce head in the reverse direction.

This switch S-2 is mounted on the control lever bracket and is actuated by the latching gate (O-93, see Fig. 45) while the unit is in the automatic rewind position.

Output Circuit

The output circuit consists of the output transformer (T-2), the loudspeaker (L-S-1), and a terminal strip (E-3). These components are mounted on the speaker, except the terminal strip, which is mounted on the cabinet near the back.

The purpose of the terminal strip is for connecting the output of the recorder to other speakers, amplifiers, etc.

The secondary impedance of the output transformer is 3.2 ohms when its part number is No. 200923 and 8.0 ohms when its part number is No. 206792. The corresponding speaker in each case is 3.2 ohms when its part number is No. 305975 and 8.0 ohms when its part number is No. 306793. These part numbers are stamped on the individual components.

Power Supply Circuit

The power supply circuit is conventional and uses a 5Y3 tube (V-7) as the rectifier for the high voltage. The rectified voltage is filtered by a capacitor C-21, choke L-2, and capacitor C-22.

The filament center tap is returned to ground through the cathode resistor R-32 of the pushpull output stage (V-6) for the purpose of biasing the filament with a positive potential. This tends to reduce any hum from the first stage V-1, due to heater/cathode leakage.

A receptacle (J-4) is provided in the power supply circuit for the purpose of connecting the top panel motor circuit to the power source (105 to 120 volts 60 cycles a-c).

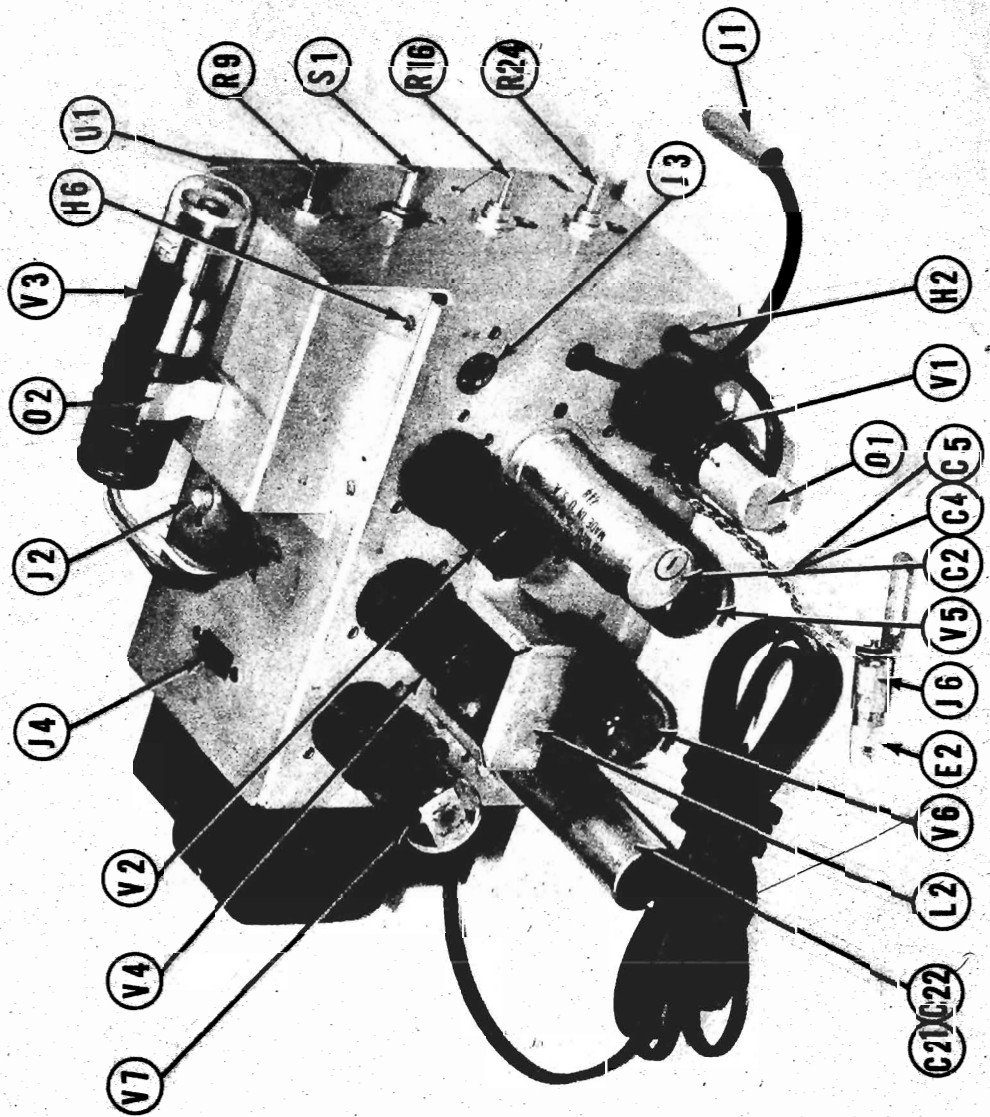
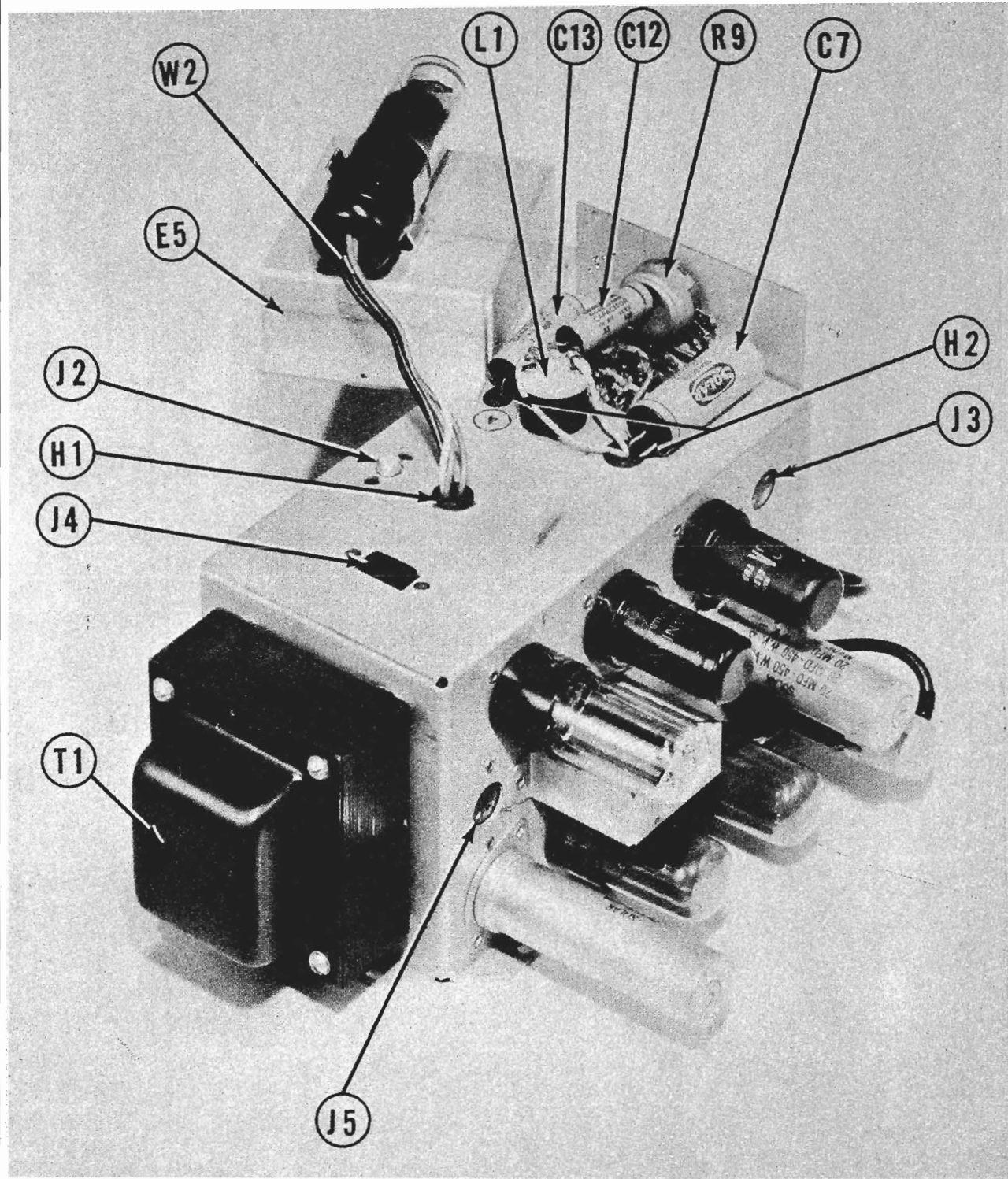


Fig. 21—Large Amplifier Chassis—Tube View

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**Fig. 22—Large Amplifier Chassis—Oscillator
Components View**

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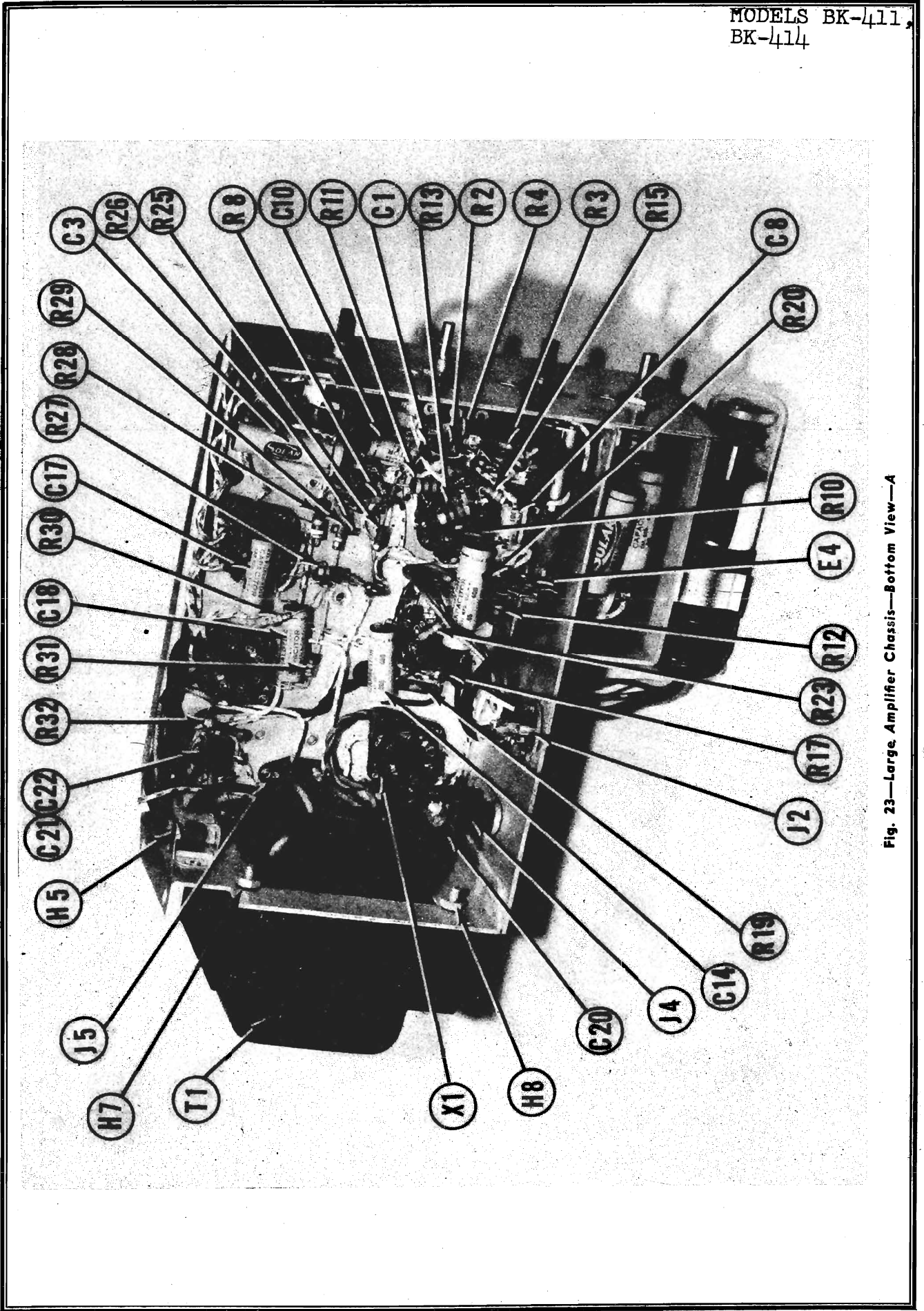


Fig. 23—Large Amplifier Chassis—Bottom View—A

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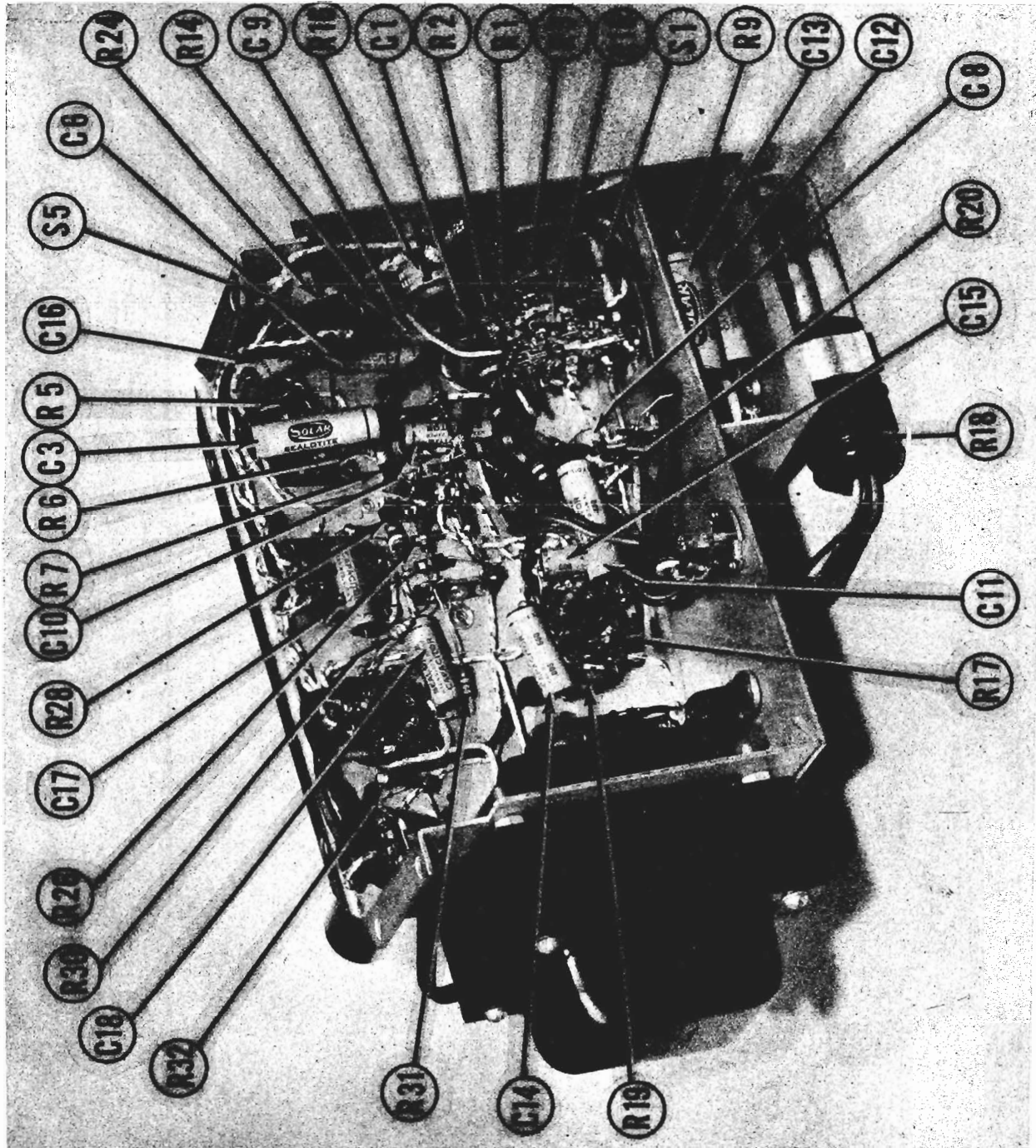


Fig. 24—Large Amplifier Chassis—Bottom View—B

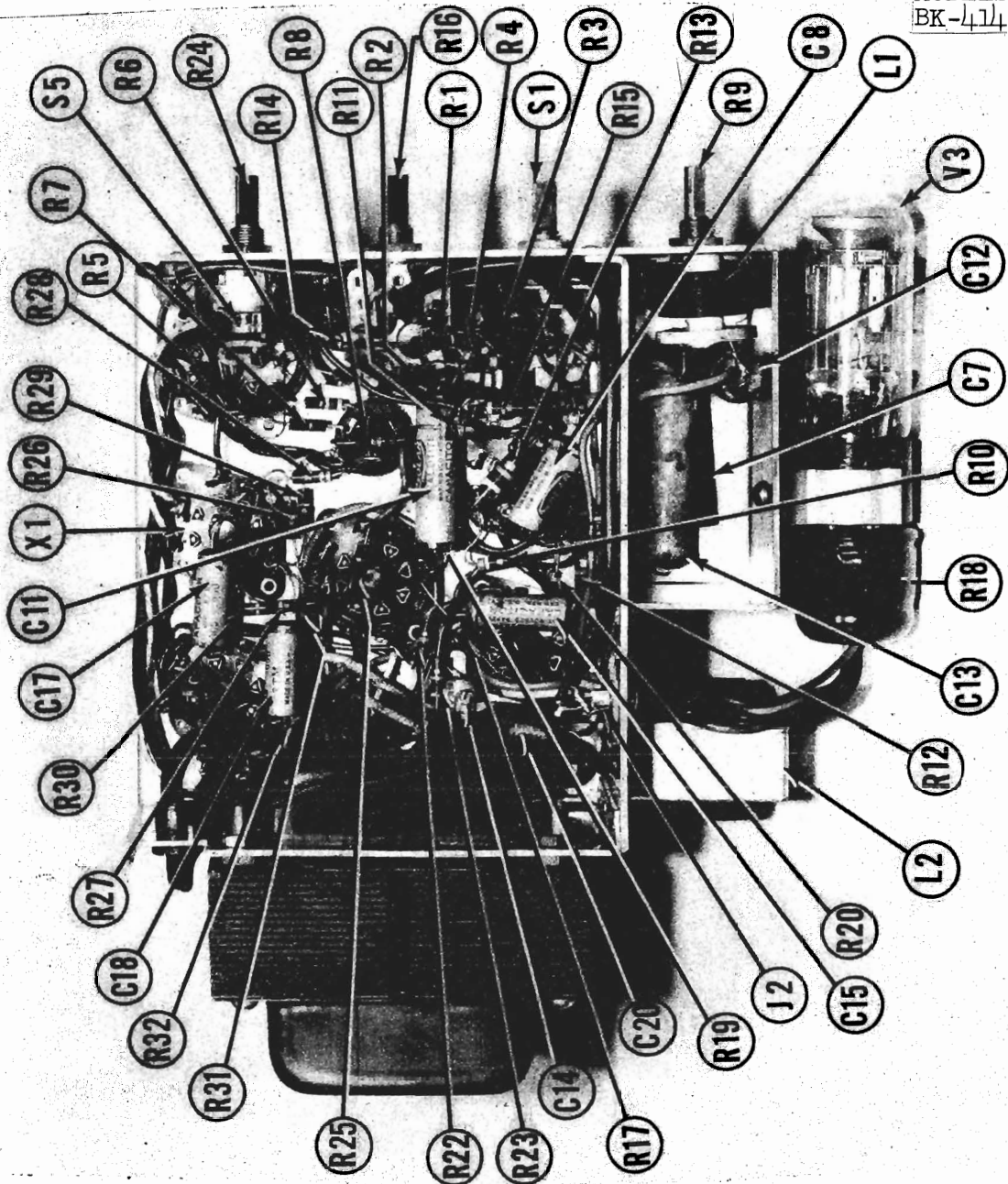
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Fig. 25—Small Amplifier Chassis—Bottom View—A

SECTION III Principles of Operation INTRODUCTION

Fundamentally the art of magnetic recording is old, dating back from the last century.

Although a detailed explanation of the theory of magnetic recording is probably not in order in this type of instruction book, it nevertheless appears desirable to include a sufficiently extensive investigation of the principles to make clear the relationships between, and the need for, the various elements in the present magnetic recorder.

A magnetic recording can be made in any type of material which permits a varying degree of permanent magnetization and which is mechanically stable and physically formed in a fashion permitting it to be handled in a reeling and scanning mechanism. The process of making a magnetic recording is basically one of moving the recording material at a fixed rate of speed through a station which functions to impress upon the material the desired magnetic state. In the reproducing process, the requirement is to move the material at the same rate of speed as in the recording process through the reproducing station, whose function is to derive from the magnetic state of the material a signal voltage which can be amplified in the electronic section of the recorder to produce a usable audio power.

Magnetic recording also lends itself to a further basic operation which gives to magnetic recording a unique advantage over almost any other type of recording. This principle is the erasing principle. Since a magnetic recording consists of a varying degree of magnetization in some form of carrier, it is possible to conceive of the idea of erasing a magnetic recording by subjecting the material to some operation which will demagnetize the material. In the conventional magnetic recorder this process of erasing is automatically and simultaneously effected when a recording is being made, since it is obvious that if a new recording is being made on a piece of material, it is desirable to erase from that material any old recording.

We shall now consider under the three heads of Recording, Erasing, and Play-Back, how these basic operations in magnetic recording are accomplished.

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RECORDING

Fig. 27 shows an electromagnet in contact with a section of magnetic ribbon. The dashes in the ribbon and the arrows in the magnet indicate their direction and concentration the magnetic condition of any particular part of the system. Note that to the left of the magnet and in the unrecorded portion the particles in the ribbon are completely unoriented, having no net force. This case of disorientation is one which exists in a demagnetized magnetic material and represents, in magnetic recording an erased or unrecorded section of ribbon. Note that the force lines in the electromagnet set up across the air gap, where the ribbon makes contact with this electromagnet, a relatively intense field as indicated by the bunching of the arrows. This intense field penetrates the ribbon causing the unoriented condition of the magnetic particles in the ribbon to be changed to a more or less oriented condition. The amount of current flowing instantaneously in the recording magnet. It is well to understand that it requires more energy to produce complete orientation of the magnetic particles than it does to obtain partial orientation. In this way, if the current through the recording head increases slowly, for example, more and more orientation is established in the material until finally all of the particles are completely oriented and this represents the maximum energy which can be stored in the material. The condition of completely unoriented particles corresponds to the noise level of the material, and the condition of saturation, when all of the particles are oriented, corresponds to the maximum signal which can be recorded on the material. The ratio between these two figures is the maximum dynamic range of the material.

This simple picture of the mechanics of making a magnetic recording is unfortunately obscured by the fact that the remaining magnetization of the recording material is not quite proportional to the recording magnetic field, particularly at small recording currents, and this results in a distorted magnetic pattern after the ribbon leaves the recording pole-pieces. To guard against this happen-

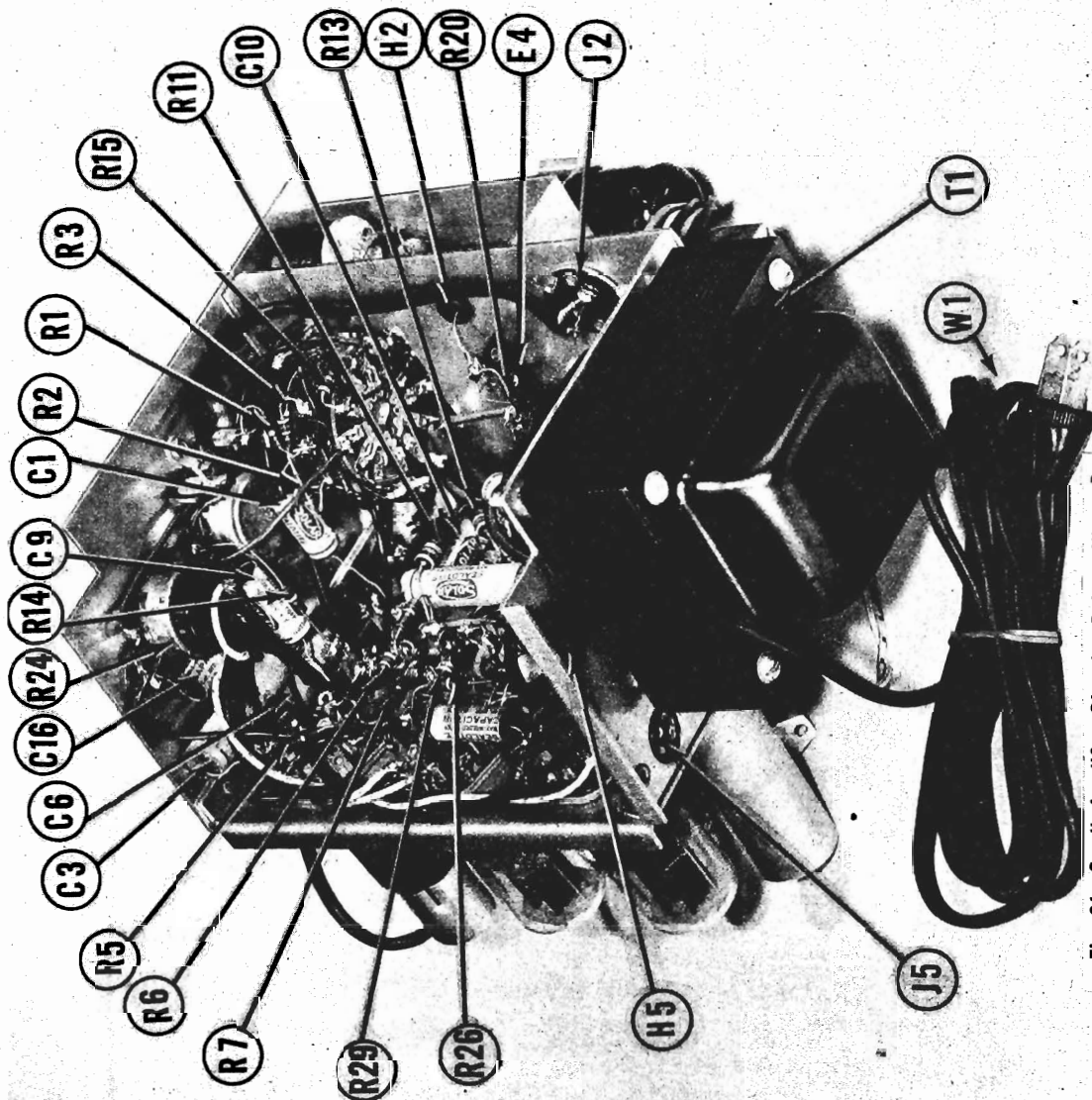


Fig. 26—Small Amplifier Chassis—Bottom View—3

ing, a very simple trick is used. This trick consists of superimposing upon the current in the coil corresponding to the signal a second current of relatively high amplitude but of such a high frequency that it cannot be heard in the reproducing process. The function of this high frequency, current, which will hereafter be termed "bias current", can be understood very simply if one considers that it is to add to the relatively weak signal current sufficient energy to leave in the ribbon permanent magnetic orientation proportional to the signal currents. By the use of this bias current superimposed on the signal current any intensity of recording signal from the very lowest to complete saturation will leave a corresponding degree of magnetization in the magnetic material, and this magnetization will be as permanent as the material itself until the material is again subjected to some form of magnetic process.

ERASING

Magnetic Erasing can be defined as the process of removing from a magnetic medium any net orientation in its magnetic state.

There are two basically different methods of erasing a magnetic recording; one method, which is the earliest and most simple, utilizes a powerful Direct Current field, such as that produced by a permanent magnet (See Fig. 28 A). As the recording medium passes this magnet the field magnetizes the material to saturation leaving the magnetic state of the material oriented in such a manner as to completely wipe out the modulations which had represented the recorded signal.

This simple method, however, does not leave the magnetic recording medium in the best state for a subsequent noise-free recording when A. C. bias is employed. Therefore, the second basic method of erasing is used almost exclusively. This preferred method utilizes an alternating current magnetic field for erasing. (See Fig. 28 B). As the magnetically recorded material approaches the alternating field type erase head, each incremental section of material is magnetized first one way and then the other, as the direction of field reverses, and when the material is in the center of such an erasing head, these magnetic cycles are of sufficient magnitude to saturate the material, which effectively erases the previously recorded signal. As the

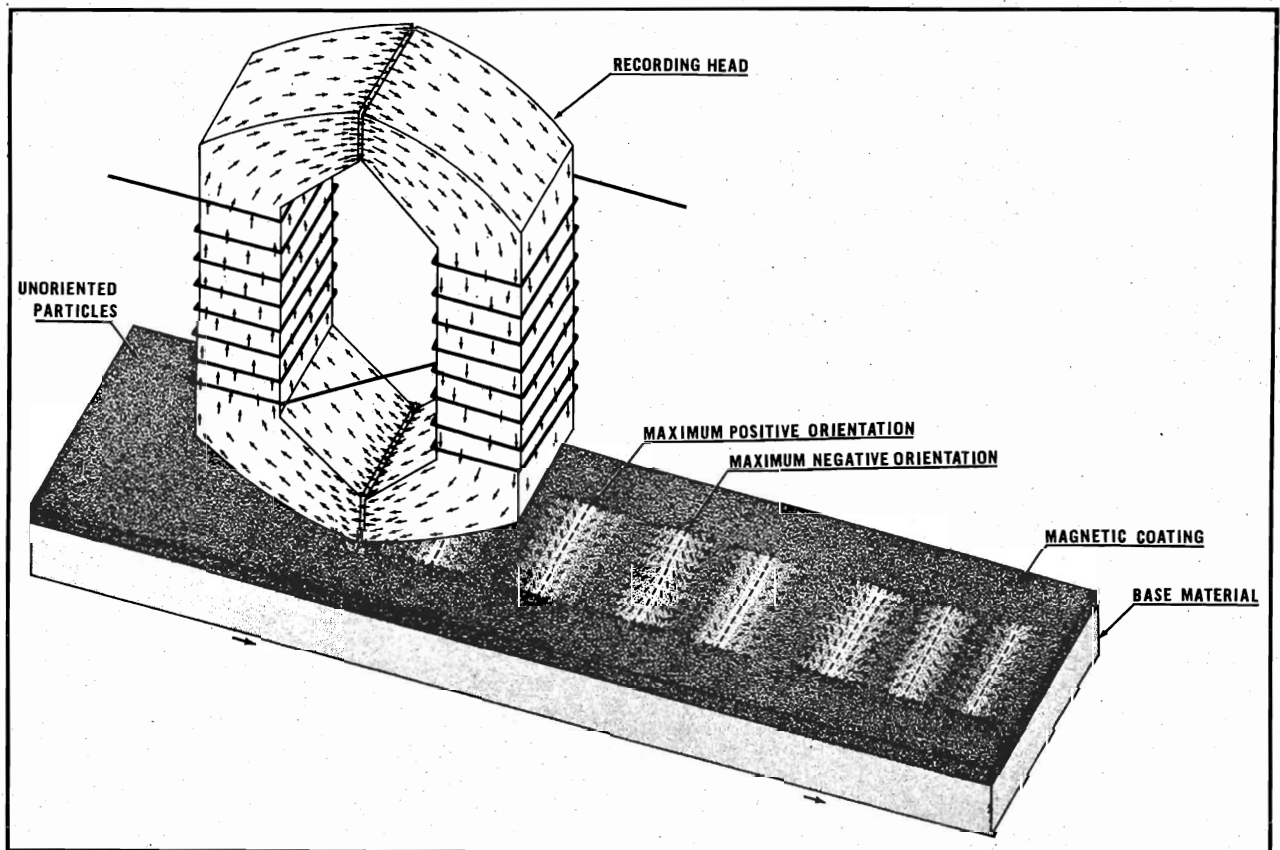


Fig. 27—Principles of Magnetic Recording

Fig. 27 is not quantitative as to flux distribution as it is only intended to schematically illustrate the principle of operation of a magnetic recorder head.

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material leaves the erasing head, it is still subjected to the reversing field directions, but each succeeding cycle is weaker than the last, due to the increasing distance between a given section of material and the erase head. The final result is such that the recording medium is left completely demagnetized, ready for a new recording.

In the Model BK-411, this type of erase is accomplished by the use of permanent magnets arranged in such a manner to produce a reversing field in the recording medium as the medium passes each pole of the magnets (See Fig. 28 c and 28 d).

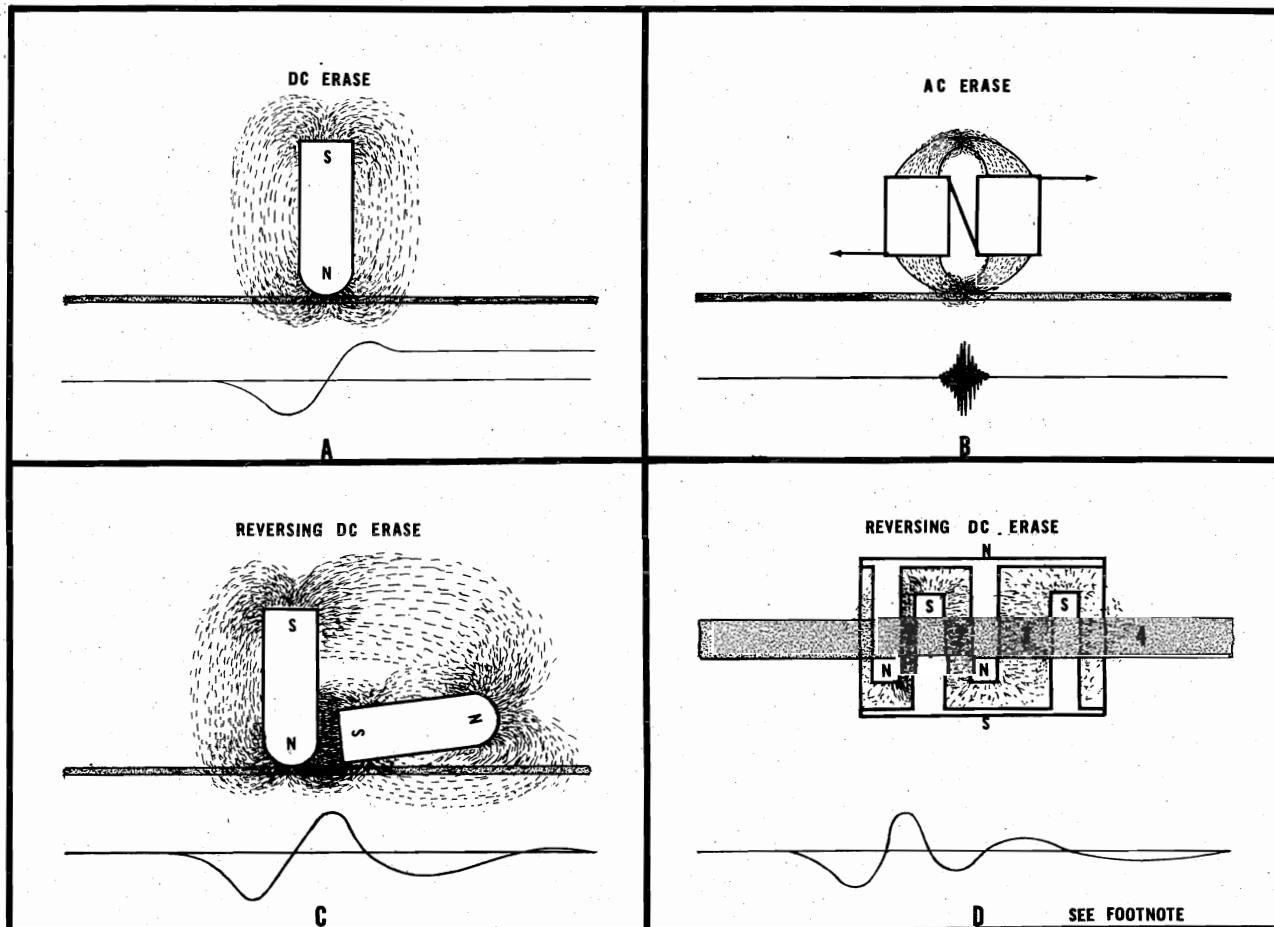


Fig. 28—Magnetic Erasing (Illustrating the Lengthwise Magnetization Component of the Recording Medium)

As the ribbon passes this type erase head it should contact the first pole and gap (1) to become completely magnetized, pass through the magnetic field of the second gap (2) at a small distance from the second pole to become partially magnetized in the opposite direction, pass through the third gap (3) at a greater distance from the third pole to become magnetized again in an opposite direction but to a lesser degree than before, and finally pass through the fourth magnetic field (4) at a greater distance from the last pole. This results in a demagnetized state of the ribbon.

PLAYBACK

The playback process is possibly the easiest to understand of the three processes in magnetic recording. Here it can quite easily be appreciated that any degree of net orientation of the magnetic particles of a given section of recording medium will produce a net external magnetic field. If we move a conductor across such a field a voltage will be established in the conductor. This is the basic theory of the dynamo and was discovered by Faraday in 1831. In magnetic recording these net fields are very weak and therefore special efforts have to be made to produce from these fields as much voltage as is possible; practically speaking, these efforts

result in a pickup structure which may be identical to the recording structure. Instead of having a single turn of wire close to the magnetic medium, a set of polepieces are in contact with the medium and any difference in the field from one section of medium to another sets up a magnetic field across these polepieces. Many turns of extremely fine wire are wound on these polepieces and as the magnetized medium moves by the polepieces the magnetic force exerted thereby thread through the polepieces and induce a voltage in the many turns of fine wire. This voltage is then fed to an amplifier wherein it produces sufficient power to operate a speaker.

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EQUALIZATION

It might be expected in such a complicated series of processes as have been described that the frequency response of such an over-all system would not be exactly the same to a high frequency audio signal as it would be to a low frequency audio signal. Such is the case, unfortunately, and since a recorder should do equal justice to any frequency to be recorded, it requires that the amplifiers associated with the magnetic recorder must have characteristics which are the inverse of those of the recording medium, thus producing a net over-all effect which is reasonably independent of frequency.

To illustrate this problem of equalization, Fig. 29 Curve A shows the frequency response obtained using flat amplifiers in recording and reproducing on the BK-411 Recorder using the head and the speed of that particular recorder. It will be seen that such a system would be deficient in both low frequencies and very high frequencies. Curve B shows the frequency characteristics of the amplifier actually used with the BK-411 when that amplifier is in recording position. Curve C shows the characteristics of the playback amplifier and Curve D is the result of superimposing Curve C upon Curve A and B and shows the actual measured over-all frequency response of the recorder.

In addition to these fixed characteristics of the recording process and of the recording amplifier and playback amplifier, the BK-411 Recorder has a

variable frequency network, the "Tone" control, which operates to suppress as much as desired the high frequencies in the playback process. The "Tone" control has no effect on a recorded signal although it might appear that it was doing so because it does affect the sound through the speaker while a recording is being made from the radio input circuit.

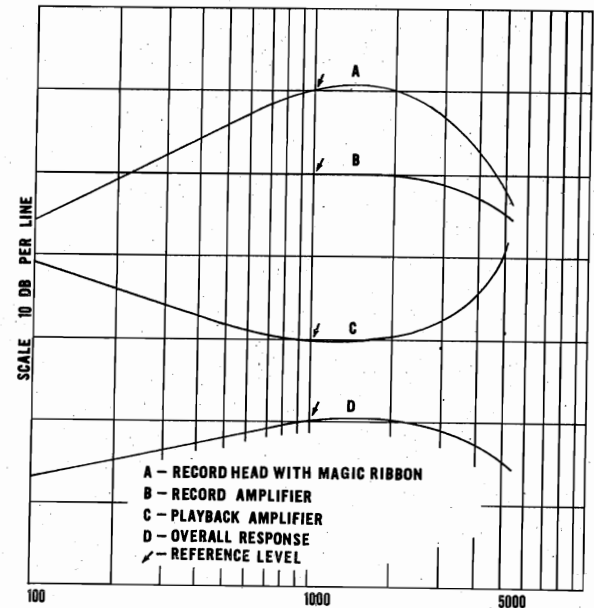


Fig. 29—Frequency Characteristics

SECTION IV Operating Instructions

INTRODUCTION

Best results are obtained when proper care is given the Model BK-411 Soundmirror.

IMPORTANT—Before connecting the Soundmirror to a power source be sure that it is 105 to 120 Volts 60 cycles alternating current. **DO NOT** connect the unit to a Direct Current Source. The warranty is void if the Soundmirror is connected to a power source other than 105 to 120 Volts 60 cycles a.c.

If other than the voltage or frequency specified above is the only available power source a 150 watt transformer, inverter, or converter must be installed in the line.

PREPARATION

Power—Plug the line cord into a power line receptacle of 105 to 120 volts, 60 cycles a.c. and turn the "Tone Control" clockwise to turn "power on". The power switch is attached to the Tone Control.

Operate the control lever through the "Stop" position to cause all control mechanisms to be in neutral position before threading. Allow the unit to warm up a few moments before using.

Reels—Place the reel with "Magic Ribbon" on the left hand turntable so that the ribbon comes off the left side of the reel. Be sure the magnetic coating on the ribbon faces the center of the reel. (In the Brush "Magic Ribbon" this coating is the black side).

Place the empty reel on the right hand turntable. Be certain that the key pin (A) of each turntable fits into the key slot (B) of each reel. (See Fig. 30). Correct positioning allows proper action of each automatic trip lever (C).

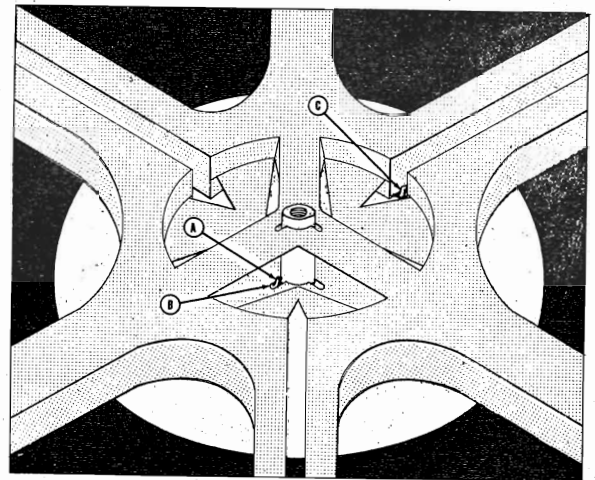


Fig. 30—Reel Keying of Turntable

THREADING

1. After placing reels on turntables, as instructed in paragraph above, grasp the free end of the ribbon in the right hand, and with the left hand

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guide the ribbon into the "Recording Slot", from the left side to the right side keeping the slack adjusted until the ribbon rides smoothly when pulled through the slot (see illustration Fig. 31).

2. Thread the free end of the ribbon into the

hub of the take-up reel. Give the reel one or two complete turns by hand to allow the ribbon to grip around the hub of the reel and take up the slack. (See illustration Fig. 32).

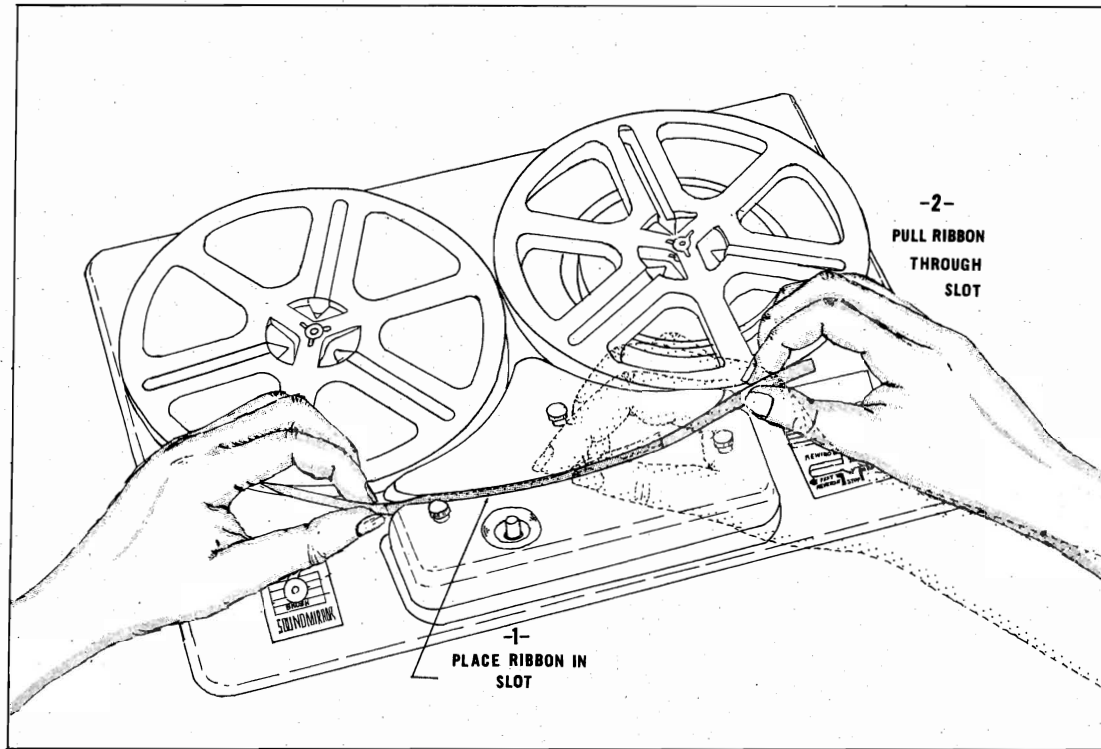


Fig. 31—Threading Ribbon In Slot

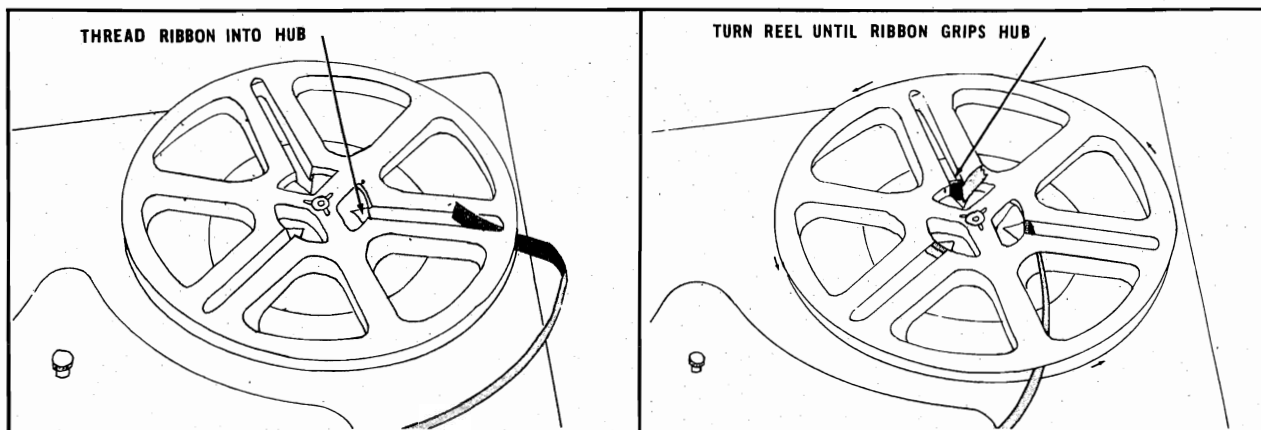


Fig. 32—Threading Ribbon In Take-up Reel

RECORDING FROM MICROPHONE

Set the controls as follows: (See Fig. 33 for controls).

1. Turn the Selector Switch (3) to the "Record-Mic." position.
2. The "Speaker Volume" control (4) is used only when recording from the radio input circuit.
3. The "Tone Control" (5) does not affect the recording process, but can be used during monitoring or playback operation.

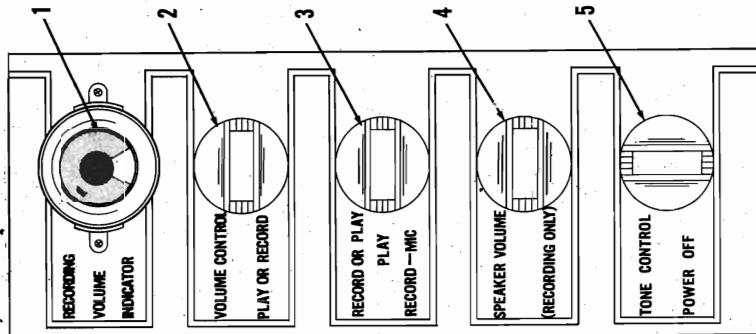


Fig. 33—Amplifier Controls

4. Shift the Control Lever (Fig. 34) up, and to the right, as far as possible to the "Record" position while pressing on the Erase Pin which locks the erase head against the ribbon. This operates a switch which causes the Volume Indicator shadow to open. This position sets the ribbon in

REWIND

If the recording is allowed to continue to the end, the ribbon will automatically rewind. When desiring to rewind the ribbon before reaching the end, the control lever may be moved to the position marked "Rewind," being careful not to shift the lever on past to the "Stop" position.

This sets the machine for rewind and the lever can then be released. The lever must be moved to the "Stop" position before returning it to the "Record" or "Play" position.

FAST FORWARD OR FAST REVERSE

The ribbon may be run rapidly in either direction by moving the control lever to the proper position; "Fast Forward" at the bottom right or "Fast Reverse" at the bottom left (Fig. 34). The lever must be held in position during either operation. If it is desired to stop the ribbon at any point after it has attained a fairly high speed in either direction, the lever should be held in the opposite direction for a moment to cause a braking action and to prevent "slacking" of the ribbon. As the reels come to rest, the lever should then be moved to the "Stop" position to prevent winding in the opposite direction.

PLAYBACK

To play a recording after the ribbon has been rewound, and if necessary rethreaded, set the controls as follows:

1. Turn the selector switch (3 Fig. 33) to the "Play" position.
2. The "Speaker Volume" control (4) is not used during the playback operation.
3. Shift the control lever to "Play" position. This sets the ribbon in motion.
4. Adjust the "Volume Control" (2) for the desired listening volume.
5. Adjust the "Tone Control" (5) for the desired listening tone.

motion. Note: The control Lever, when released, will automatically return to its neutral position.

5. Turn the "Volume Control" (2) clockwise gradually to set the recording level, which is indicated by the "Recording Volume Indicator". (1)

Correct recording level is obtained when the Indicator shadow just closes with the loudest sounds being recorded.

6. At the end of each recording turn the recording volume control (2) completely counter-clockwise, gradually, before stopping the ribbon to prevent sudden breaks of sound during playback.

RECORDING FROM RADIO

The Soundmirror should preferably be wired to the Radio. For wiring instructions see Page 42.

Set the controls as follows:

1. Turn the Selector Switch (3 Fig. 33) to the "Record-Radio" position.
2. Adjust the "Speaker-Volume" control (4) for the desired listening volume from the Soundmirror speaker.
3. Adjust the "Tone Control" (5) for the desired listening tone.
4. Follow steps 4, 5, and 6 in "Recording from Microphone."

STOP

The "Magic Ribbon" may be stopped at any point by shifting the control lever to the position marked "Stop". (See Fig. 34).

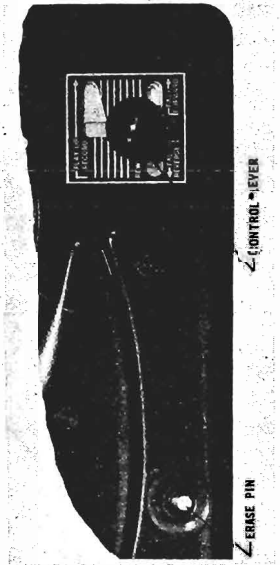


Fig. 34—Control Lever

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OPERATIONAL CARE

The model BK-411 Soundmirror is designed to give long service with a minimum of maintenance. It is recommended, however, that care be exercised in handling and operating the Soundmirror to assure high quality performance. The following should be kept in mind at all times:

1. Keep the pole-pieces of the Record-head clean and free from accumulated dust, dirt, or ribbon residue.

Whenever the ribbon residue becomes collected and "piled" on the pole pieces it may be removed by the "flick" of a toothpick or similar non-metallic implement. In stubborn cases the use of a small swab dampened with acetone may be required.

CAUTION: Use acetone sparingly and avoid getting it on the felt pad which presses the ribbon against the head.

Care should be exercised with the use of any implement to prevent marring the surface of the pole pieces.

Loss of high frequencies is evidence of a dirty head. The front trim cover (A-12, Fig. 4) must be removed to clean the head.

When the trim covers are removed for any purpose, be sure to replace them so they do not interfere with the action of the erase head bracket (18), the roller bracket (44), or the reels. (See points A and B of Fig. 4).

2. Dust from the surface of the ribbon gradually accumulates on the capstan bearing block. (O-82, Fig. 8). Large accumulations of this material can cause trouble. This material should be brushed

away with a small dry brush (toothbrush or similar implement). Do not use anything hard which will mar the surface of the capstan. The front trim cover (A-12 Fig. 4) must be removed for this operation.

3. An attempt to operate the recorder in a warm room immediately after prolonged exposure to low temperatures may produce a poor recording because of moisture condensation on friction drive surfaces.

4. Any deformation in the rubber pressure wheel (O-84, Fig. 9) which presses the ribbon against the capstan spindle, will be kneaded-out by the normal operation of the recorder. However, should the Control Lever have inadvertently been left in the "Play or Record" position and the pressure wheel left in contact with the spindle for an extended length of time, there will temporarily be a speed variation in the movement of the ribbon until this rubber has been kneaded into a uniform state. Therefore, to obtain highest quality recordings, it is desirable to run the recorder for a few minutes before actually attempting to make a recording. Upon completion of recording or playing be sure to shift the control lever to the "Stop" position. This position disengages the pressure wheel from the capstan spindle.

5. Sufficient ventilation should be provided for best results in the operation of the Soundmirror. Do not set the recorder on a radiator. Allow at least three inches space between the rear of the cabinet and the adjacent wall for air circulation.

SECTION V

Maintenance

INTRODUCTION

Servicing the Model BK-411 Soundmirror is as simple as servicing any popular combination radio and record changer.

The following information will aid the serviceman in a quick and thorough analysis and overhaul of the subject equipment.

A Symptom - Cause - Remedy - chart will be found on pages - - to provide a quick reference to possible troubles and their remedy.

Photographs and drawings of the complete and sub-assemblies as well as descriptive methods for disassembly and re-assembly of various parts are included throughout the book.

The reference numbers located on the photographs, schematic and exploded view drawings are a reference to items in the list of Material.

DISASSEMBLY OF UNIT

To Remove Amplifier From Cabinet

1. Disconnect the Soundmirror from the power source.
2. Remove reels and ribbon.
3. Remove the cardboard back from the cabinet. (Provided on later units.)
4. Disconnect the interconnecting plugs P-3 and P-4 (Fig. 16) which connect the top panel to the amplifier. Be careful when removing plugs to not damage the sockets. **DO NOT PRY PLUGS FROM SOCKETS.**
5. Disconnect the speaker plug P-5 from jack J-5.
6. Disconnect the microphone plug P-1 from the jack J-1.

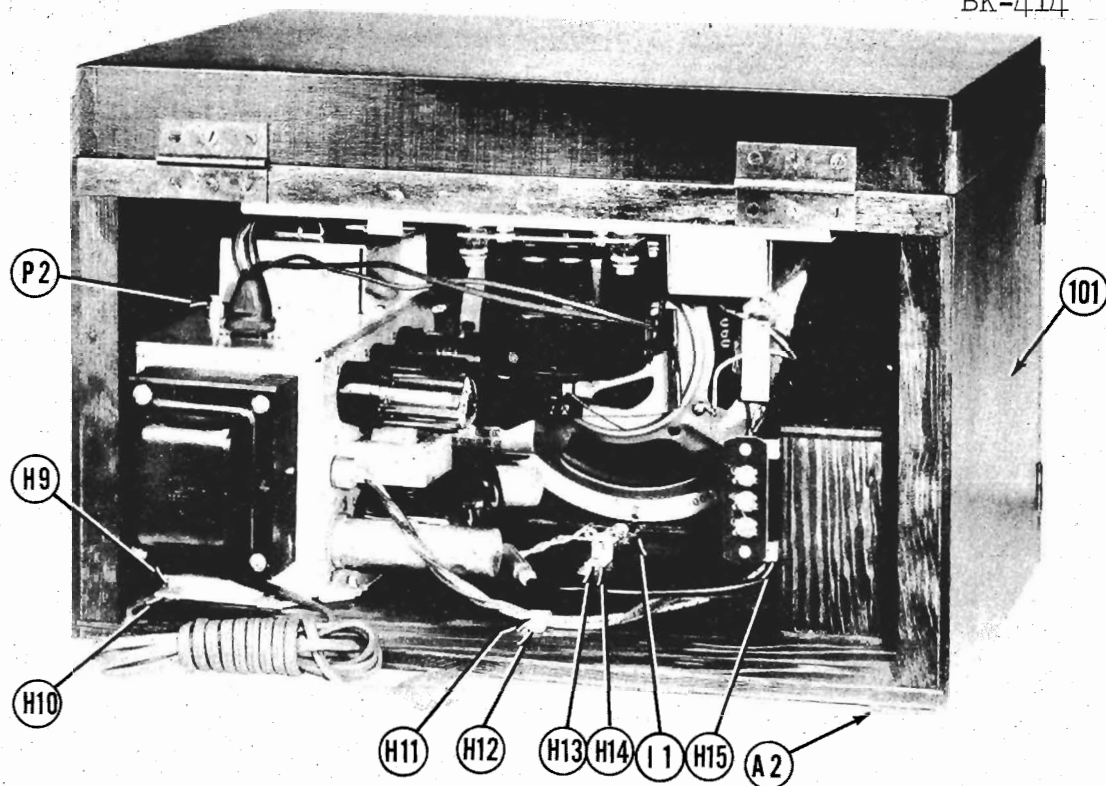
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Fig. 35—Model BK-411—Rear View

7. Remove the pilot lamp holder from its mounting.

8. Remove the four control knobs A, B, C, and D located on the front panel (Fig. 6).

9. Remove the screws (H9 Fig. 35) which hold the amplifier chassis to the bottom of the cabinet.

10. Carefully slide the amplifier out the rear of the cabinet.

To Remove Top Panel From Cabinet

11. Follow steps 1 through 4.

12. Remove the two small trim covers A-10 and A-12 held in place by three knurled thumb screws H-101. (See Fig. 4).

13. Remove the control lever knob (501) by screwing it counter-clockwise while holding the lever with a pair of pliers.

14. Remove the large trim cover A-14.

15. Remove the four screws which mount the top panel to the cabinet and lift the panel from the cabinet.

To Remove The Speaker

16. Follow steps 1 through 15.

17. Remove the screws which mount the speaker terminal strip to the side of the microphone compartment. (H-15, Fig. 35).

18. Remove the screw (H-12) which mounts the speaker cable clamp (H-11) to the bottom of the cabinet.

19. Remove the four screws which mount the speaker to the grille board and lift the speaker out of the cabinet.

To Remove The Speaker Grille

20. Follow steps 1 through 19.

21. Remove the four screws which mount the grille board to the cabinet.

22. Remove the tacks or staples holding the grille cloth to the edge of the grille board.

23. Remove the staples holding the grille to the face of the grille board.

To Remove Pilot Light Rod

24. Follow steps 1 through 19.

25. Remove the staples holding the rod in place.

26. Drive the rod through the hole (from outside to inside) with a small mallet and pin drift or similar implement.

When replacing the rod, drive it in from the outside, keeping the beveled portion of the rod facing upward so that the light from the pilot lamp will be directed toward it when in the final position.

TUBE REPLACEMENT

Tubes are made accessible by removing the back cover from the cabinet.

CAUTION: TO AVOID BURNS AND CUTS caused by heated tubes and moving fan blades, **TURN THE POWER OFF**, and allow the tubes to cool and the fan to stop before attempting tube replacement.

The tubes are located as shown in Figs. 20 and 21.

NOTE: When replacement of the 6J7 tube becomes necessary be sure to place the shield cap (O-1) on the grid, otherwise hum may occur. The

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shielded lead to the grid cap should be carefully placed for minimum hum. The best position will usually be with this lead as close to the bottom of the cabinet as possible.

It is also recommended that this tube be selected for a minimum of microphonics.

PILOT LAMP REPLACEMENT

To replace the Pilot lamp the back cover of the cabinet must be removed.

The lamp is of the bayonet base type and may be removed from its socket by pressing the lamp into the socket slightly and twisting it until the guide pins allow the lamp to come out of the socket.

Early units have a lamp socket mounted on a bracket which in turn is mounted on the floor of the cabinet immediately behind the pilot light rod. Later units have a lamp holder which clips onto the flange of the speaker frame. In either case the lamp should be positioned to align with the pilot light rod so that the rod will transfer the most light.

RECORD-PLAY HEAD REPLACEMENT

Remove the Record-Play Head as follows:

1. Remove the top panel from the cabinet. (See steps 11 through 14 above).

2. Remove the record-play head mounting screws. (H-108, Fig. 13).

3. Remove the capstan drive assembly mounting screws (H-143 and H-144) and carefully lower the assembly away from the panel enough to slip the record-play head out of the hole.

Replace head as follows:

4. Assemble the capstan drive assembly and the Record-Play head (E-1) by placing the head and the mounting clamp (H-131) between the flywheel and the bracket.

5. Hold the assembly in the left hand and position it onto the panel while tightening the flat head screw (H-144, Fig. 13) enough to hold the drive assembly until the other mounting screws are placed in position in the following sequence:

a. The screw between the head and the capstan spindle (H-108-A, Fig. 13).

b. The screw nearest the erase head (H-108-B).

c. The screw between the capstan spindle and the right hand ribbon guide (H-143).

6. Adjust the head for hum cancellation as outlined on page 40.

7. Alternately tighten (a) and (b) until the head is aligned vertically when the screws are completely tightened.

8. Tighten screws (H-143 and H-144) completely.

ERASE HEAD REPLACEMENT

Replacement of the erase head will only become necessary when the magnets are too weak to thoroughly erase any signal from the ribbon, or if any part becomes damaged. If such is the case replacement procedure is as follows:

1. Remove the small Trim Covers A-10 and A-12 (Fig. 4).

2. Set the mechanism control as for recording (the control lever being moved to the "Record" position while pressing the erase pin to lock the erase head in an accessible position).

3. Remove the screw (H-134, Fig. 13, or H-22, which holds the erase head to its bracket.

At this point the parts held together by the clamp (H-136, will tend to fall apart, therefore it is desirable to hold the parts with the left hand while removing the above mentioned screw.

In the case of the multipolepiece type erase head, the parts are held together by the two screws H-21.

4. Assemble new and/or old parts in order

Be sure that the orientation of the magnets (E-7a and b) permits them to attract each other and that the rounded end of the magnets (E-7a) faces the ribbon.

In the case of the multi-polepiece erase head, the mounting hole is relocated on the bracket A-23 to accommodate the change in overall dimensions of the head. When desiring to install the multi-polepiece erase head on previous units the bracket A-23 must be replaced by bracket A-23a (part number 107272-501) or, a hole must be drilled in the bracket A-23, and tapped for a No. 4-40 screw.

Note: Brass screws are used in this assembly to prevent a partial short-circuit of the magnetic field.

5. Place the assembly on the mounting bracket and replace the screw which holds the head in position.

6. Adjust the head for minimum noise as outlined on page 38, then tighten screw to hold the head in the proper position.

7. Replace the trim covers. Be sure they do not interfere with the action of the erase head bracket moving up and down, the pressure wheel bracket, and the takeup reel when tightened in position.

REPLACEMENT OF CAPSTAN DRIVE ASSEMBLY

To replace the capstan drive assembly follow procedure outlined in "Record-Play Head Replacement" page 34. Some units contain a type of capstan drive assembly which can be disassembled from the lower end of its mounting bracket by the following procedure:

1. Remove the top panel from the cabinet as outlined in steps 11 through 15 on page

2. Remove the drive belt (O-77, Fig. 8).

3. Remove the two allen-head screws (H-133,

4. Carefully pull the capstan spindle and flywheel assembly out of the upper bearing (O-78,

This allows replacement of only the spindle and flywheel assembly and the lower bearing assembly. To replace the upper bearing and bracket assembly, follow procedure as outlined in "Record-Play Head Replacement" page 34.

5. Replace parts and/or assemblies in reverse order as outlined above.

Before and after replacement of spindle and flywheel assembly, check for binding in the bearings. Spin the flywheel with the finger to be sure the

assembly rotates freely. The drive belt must be displaced for this check. If binding occurs in the lower bearing, realign the bearing by tapping lightly on all its sides. This should jar the bearing just enough to cause it to align itself with the spindle (O-82). If the binding occurs in the upper bearing (O-78), reposition the lower bearing bracket (A-26) to center the spindle (O-82) in the upper bearing (O-78). To reposition the bracket, loosen the two allen head screws (H-133) just enough to move the bracket to a point which allows the spindle to turn freely in the upper bearing (O-78) when the set screws are again tightened.

If correct alignment of bearings, etc. does not eliminate the binding, check for a bent capstan spindle, and replace if bent.

NOTE: Any binding or excessive friction in any part of the drive assembly will result in a speed variation of the ribbon and thus produce a pitch variation known as "Flutter".

The capstan flywheel is made of three identical discs which rotate on the same axis. Each disc contains an indexing notch on its circumference. These notches are spaced 120° apart to provide a balance in the flywheel and produce a minimum of "Flutter" during recording or reproduction.

REPLACEMENT OF PRESSURE WHEEL ASSEMBLY

The pressure wheel assembly (Fig. 9) consists of a bracket (A-16), a spring (O-85), a shaft (O-83), a wheel (O-84), and a pressure pad (MS-2) which is attached to the bracket. To replace the complete assembly:

1. Remove the small trim cover (A-12) and the "Tru-Arc" retaining ring (O-64), see Fig 4.
2. Lift the assembly off the post, being careful not to damage the spring (O-85).
3. Slide the spring out the end of the bracket. The wheel and shaft should then come out easily.
4. Replace parts in reverse sequence of steps 1, 2, and 3.

The link which couples the control lever system to the pressure wheel bracket is coined on one edge to increase the width and thus prevent a locking effect which occurs if the center line of the link intersects the pressure wheel bracket pivot point. (See point "A" of Fig. 8). Should the link become worn to the extent that the mechanism locks, replacement of the complete pressure wheel bracket assembly is required.

REPLACEMENT OF PRESSURE PAD

The friction between the pressure pad and the ribbon will in time wear the felt pad. When it becomes necessary to replace this pad it is recommended that a good cement such as Bakelite Corporation No. BC-6052 be used. Care should be taken to prevent any cement from getting on the

face of the felt which contacts the ribbon. After replacement is made the pressure should be adjusted as outlined on page 42.

REPLACEMENT OF BELTS

If the unit fails to start with a full reel of ribbon on the take-up turntable, due to slippage of the clutch belt (O-76, Fig. 8), this belt should be replaced.

When replacing either belt, install it as shown in Fig. 8. Be sure that the clutch belt does not rub against itself at the crossover point. This may be adjusted by raising or lowering the drive pulley on the motor shaft. Under normal operation, rubber dust from the clutch belt will accumulate. This dust should be removed thoroughly from the mechanism.

DISASSEMBLY AND REPLACEMENT OF TURNTABLE ASSEMBLY

1. Remove the "Tru-Arc" retaining ring (O-52, Use a number 22 "Tru-Arc" pliers.
2. Lift the turntable assembly from the reel post (O-57). The assembly may be divided into the upper cup (O-53), the lower cup (O-56), and the tripping trigger (O-54 or O-55).
3. Replace either trigger if damaged.
4. Reassemble parts in order
Be sure cups fit together with insides facing each other and indexed according to the notches and slots in their edges.

NOTE: If the reel guide pin is broken off, the cup must be replaced. **DO NOT ATTEMPT TO BEND THE PIN** into position because it is likely to break off.

5. Install the assembly on the reel post and replace the "Tru-Arc" retaining ring making sure it fits into the groove on the reel post. A slight downward pressure on the cup near the post will reveal the groove.

DISASSEMBLY AND REPLACEMENT OF CLUTCH ASSEMBLY

1. Remove top panel from cabinet (see steps 11 through 15, page 34).
2. Remove the turntable assembly as in steps 1 and 2 of "Disassembly of Turntable", above.
3. Remove the clutch belt (O-76, Fig. 8).
4. Remove the two screws which mount the clutch lifter bracket assembly (A-18 or A-21, Slide the assembly out at one side being careful not to distort the clutch lifter spring attached to the bracket. Remove the switch cover A-22 for access to the rewind bracket. **NOTE:** Be careful not to lose the ball actuator (O-70) from the rewind bracket (A-18).
5. While holding the clutch raising lever in an extreme position carefully remove the small "Tru-Arc" retaining ring (O-69) located at the lower end

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of the reel post (O-57). This requires the use of the No. 0018 "Tru-Arc" pliers.

6. Lift out the reel post assembly being careful not to lose the clutch lifter pin (H-115). This allows the clutch and pulley to be lifted from the clutch bearing assembly (A-15).

7. The felt clutch (O-58) is cemented to the upper face of the pulley and under normal conditions need not be removed, however if damaged it may be replaced in the following manner:

- a. Peel off the old felt from the pulley.
- b. Remove the old cement by washing the pulley thoroughly with benzol or similar solvent.
- c. Apply a coat of cement (such as No. BC-6052 made by the Bakelite Corporation) to the upper face of the pulley. Apply only to the area to be covered by the felt. Allow it to dry. Apply a second coat to the pulley and allow it to become tacky.
- d. Place the felt on the pulley and center it on item O-59 and allow it to become completely set. Note: The use of a small weight to press the felt to the pulley while it is setting will assure a firm adhesion.
- e. After the cement is thoroughly set and dry, apply a few drops of light oil to the felt and allow it to soak in.

8. If necessary, remove the clutch-pulley bearing assembly by removing the hex nut (H-117) on lower side of chassis. Replace any damaged or worn out parts.

In some early units, trouble may be encountered with the recording ribbon continually dragging on the lower edge of the take-up reel during the recording or playing process, even though the clutches are adjusted properly. This may be corrected by removing the appropriate spacer washer (H-106, Fig. 13) from beneath the clutch bearing housing (A-15). To do this the spring (O-102) must be lowered slightly to prevent the dragging on it of the clutch pulley (O-59). To lower the spring, a hole (approximately $\frac{1}{16}$ " diameter) should be drilled in the chassis immediately above the trip lever latch (H-141, Fig. 13) and below the spring post. The end of the spring should then be placed through the hole and one leg of the spring anchor slot in a manner which provides the lowest positioning of the spring.

9. Reassemble the clutch pulley, the reel post, and the lifter pin and install onto the clutch bearing.

10. Install the "Tru-Arc" retaining ring on the lower end of the reel post.

Install the clutch lifter bracket assembly. Note: If installing the rewind bracket—be sure to replace the ball (O-70) which actuates the contact arms of the motor switch.

11. Install the turntable assembly. (See step 5 of "Disassembly of Turntable",

12. Install the clutch belt (O-76) as shown in Fig. 8.

13. Position the clutch lifter brackets and adjust the clutches as outlined in "Clutch Adjustment",

14. Plug the motor leads into a power source.

15. Wear in the clutch felts for about 15 to 30 minutes each in the following manner:

- a. Place a full reel on the take-up turntable and anchor it in a stalled position by applying a piece of Scotch Tape from the reel to the panel.
- b. Shift the control lever into the "Record or Play" position and allow the unit to operate.
- c. After the takeup clutch is worn in, place the full reel on the rewind turntable and anchor as in "a" above.
- d. Shift the control lever to the "Rewind Position" and allow unit to operate.

16. After the clutch felts are worn in, readjust the clutches to be sure conditions listed under "Clutch Adjustment", page 41, are still satisfied.

REPLACEMENT OF MOTOR

1. Remove the top panel from the cabinet. (See steps 11 through 15,

2. Remove the shield (A-22) from the rewind clutch lifter bracket and disconnect the motor wire from the switch (S-6).

3. Disconnect the other wire from the interconnecting power plug P-4.

4. Remove the rubber belts (O-76 and O-77 Fig. 8).

5. Remove the two binding head screws (H-102 Fig. 38) which mount the motor to the chassis.

6. Loosen the 8-32 allen head set screws (H-103) and remove the drive pulley (O-62) from the motor shaft.

7. Remove the 4 hex nuts which mount the motor to the plate assembly (A-19).

8. To replace the rubber shocks; remove the 4 hex nuts (H-126) holding the shocks in place, remove the motor mounting plate (A-19) from the plate assembly (A-17), remove the rubber shocks from the plate and install new ones, install onto plate assembly and replace screws. Note: It is best to replace all four rubber shocks to assure proper balance of motor.

Be sure to replace ground wire (W-3, Fig. 11) to prevent electrical hum from motor.

9. Install new motor and reassemble onto chassis in reverse order of steps 3 through 8.

10. After installation of rubber belts adjust the height of the drive pulley on the motor shaft to a position which prevents rubbing at the crossover point of the clutch belt (O-76).

11. Adjust the position of the motor on the chassis to a point which causes least vibration of the drive belt (O-77), and which gives the greatest tension to the clutch belt (O-76).

REPLACEMENT OF CONTROL SPRINGS

The control mechanism requires nine springs

of various sizes. Do not interchange springs of different sizes, as the tension of each spring is critical.

Identification of springs is found in Figs. 11 through 15.

ADJUSTMENT OF ERASE HEAD FOR MINIMUM NOISE

The erase head of the early BK-411 consists of two rectangular permanent magnets which are located in a position against the ribbon (when engaged) so that any previous recording becomes erased as the ribbon passes it.

The erasing process should disarrange the minute particles of the magnetic material on the ribbon so that no signal is reproduced from the playback head. However, if the two magnets do not approach the ribbon at the proper angle, the erasing effect is changed and results in an arrangement of the particles so that they produce a noise signal in the playback head.

It is desirable to find a position which will result in a minimum of noise being produced. This may be done by the following method.

1. Thread the Soundmirror with ribbon containing a recorded portion which may be erased during this adjustment.

2. Remove the two small trim covers A-10 and A-12.

3. Turn the power switch (on the tone control) clockwise to the "on" position and allow the tubes to warm.

4. Set the Amplifier controls for "Playback" operation and the top panel controls for "Record" operation. (This puts the erase head in contact with the ribbon, thus erasing the ribbon before it enters the playback head.)

5. Adjust the playback volume control for maximum volume and the tone control for maximum high frequency response.

6. Loosen the screw (H-134, Fig. 13) that holds the erase head to its mounting bracket and rotate the head first one way and then the other until a point of minimum noise is found. (Do not rotate the head too far in either direction, or erasure will be incomplete.)

7. Tighten the screw to lock the head in this position.

8. Shift the control lever to the "STOP" position to allow the erase head to drop away from the ribbon.

9. Replace the trim covers.

In later production of the model BK-411 the multi-polepiece erase head is used. This head contains only one magnet. However, due to the arrangement of the polepieces assembled with the magnet, the resultant effect of its use is that of many magnets, thus increasing the number of magnetic flux reversals in the recording ribbon as it passes the head, and producing more effectively an a.c. type of erase. (See Fig. 28d footnote).

The adjustment for minimum noise from the multi-polepiece erase head is the same as the adjustment for the two-magnet type erase head listed in steps 1 to 9 above.

Note: Any remaining noise produced by the erase head will be even further reduced by the action of the 30 K. C. bias current present in the record head during the normal recording process.

ADJUSTMENT OF RECORD-PLAY HEAD FOR MINIMUM HUM AND/OR MAXIMUM HIGH FREQUENCY RESPONSE

Excessive hum during any pause in the recording while the unit is in the play-back position may be caused by magnetic lines of force being radiated from sources such as the motor, power transformer, filter choke, etc., inductively creating an unbalanced voltage in the play-back head.

This condition may be corrected by reestablishing the balance by properly directing the magnetic lines of force through the two windings of the head, and is accomplished by slightly rotating the head either clockwise or counter-clockwise as the case may require.

To find the correct position:

1. Turn the power on and allow the tubes to warm.

2. Set the Amplifier Controls for playback operation at full volume.

3. Remove the small trim covers (A-10 and A-12 Fig. 4).

4. Loosen the mounting screws (H-108, Fig. 13) on either side of the record-play head enough to allow the head to be rotated slightly.

5. Place the ribbon around the back side of the record-play head and the capstan drive spindle.

6. Shift the control lever to the "Play" position.

7. Rotate the record-play head in either direction until a point of minimum hum is found.

8. Tighten the screws to hold the head in this position.

9. Shift the control lever to the "Stop" position to stop the reels. Fig. 39, Section 1, shows the head in the normal position. The cut-away of the head shows how the polepieces should contact the ribbon.

It is important to check this position after rotating the head to prevent the results shown in section 2 of Fig. 39. If the head is rotated too far in either direction the gap will not contact the ribbon and will result in a lack of high frequencies or no signal at all being recorded or reproduced. To check this condition:

10. Place a mark on the panel at point "B" of Fig. 39 to identify the "minimum hum" position of step 7 above. The mark should be made in line with the end edge of the opening in the record head.

11. Place a recorded portion of the ribbon through the record-play head and the capstan drive spindle.

12. Shift the control lever again to the "Play" position.

13. Loosen the record-play head mounting screws enough to rotate the head toward "A" or "C" (Fig. 39) while listening to the signal being reproduced from the ribbon. When the position is found which allows the higher frequencies to be reproduced, place a second mark on the panel to identify this position.

If this position does not coincide with the position of least hum, then a choice or a compromise position must be made.

14. Alternately tighten the screws to lock the head in the position chosen.

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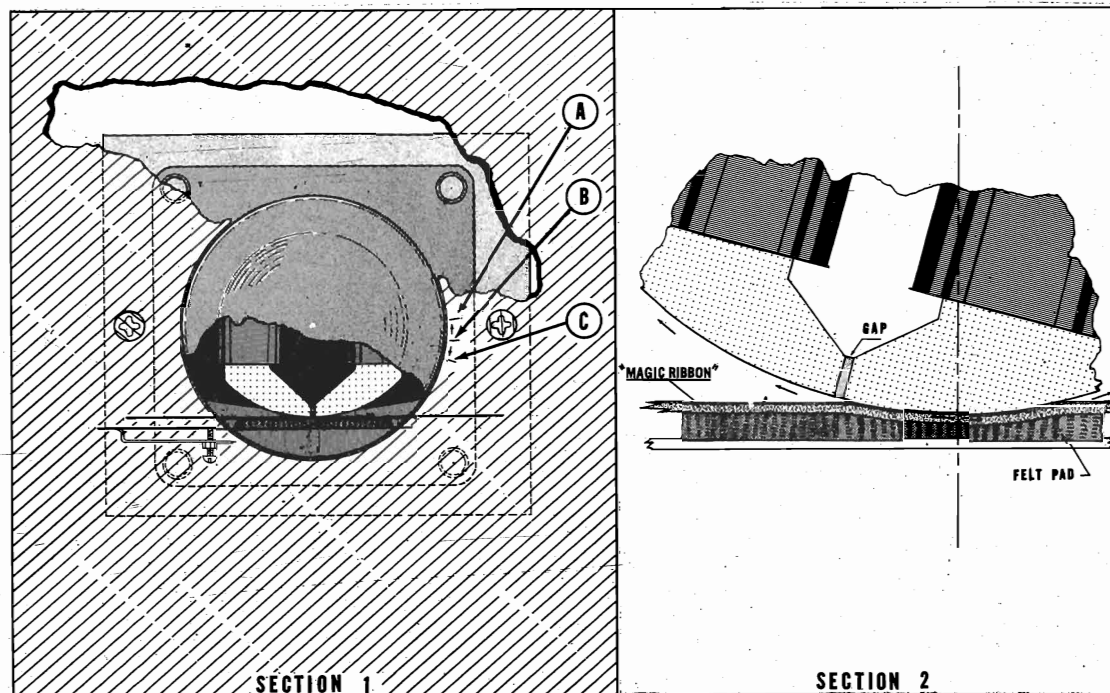


Fig. 39—Record-Play Head Adjustment

ADJUSTMENT OF CLUTCHES

The clutches are adjusted and set at the factory and under normal conditions should not require readjustment. In early BK-411 units the set screws for this adjustment were first dipped in glyptal then put into the reel posts and adjusted. As the glyptal dried the adjustment became set.

In later production of the model BK-411, longer set screws were installed, including a locking nut to secure their position after the clutch adjustments were made. items H-19 and H-20). This was done to facilitate adjustments as well as accommodate the reel hold-down nut which fits on the upper portion of the setscrews. (See item H-18,

No glyptal is required with this arrangement, therefore the following step No. 2 and the latter part of steps No. 1 and No. 10 shall be ignored in the adjustment of the above set screws H-20.

If it becomes necessary to replace any part of the clutch assembly, readjustment becomes necessary and proper procedure is as follows:

1. Remove the set screws located in the top end of the reel posts with a number 8 allen wrench. If the old glyptal is set too hard for the screws to turn readily, apply a few drops of solvent such as G. E. No. 1500 Glyptal thinner to dissolve the glyptal.

2. Re-dip the set screws in the G. E. No. 1201 glyptal and replace into reel posts.

3. Place the control lever in the "Fast Forward" position and adjust the set screws so that the rewind clutch turns freely and the take-up clutch is engaged.

Note: Turning the screws clockwise disengages and counter-clockwise engages the clutch.

4. Place the control lever in the "Fast Reverse" position and adjust set screws so that the take-up clutch turns freely and the rewind clutch is engaged.

Note: Some units may contain a small friction brake placed between each turntable and its corresponding clutch-cup face. This will apply a small amount of drag on each turntable, preventing complete freedom of its rotation when not engaged with the clutch.

5. Recheck to be sure condition 5 is satisfied.

6. Place the lever in the "Play or Record" position and be sure condition 3 is still satisfied.

7. Trip the automatic rewind trip lever (Fig. 5) and be sure condition 4 is satisfied. This should be checked with the erase head up and again with the erase head down.

8. Correct adjustment satisfies all conditions listed above.

9. Check adjustments also to be sure retainer

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ring (O-69) does not bind on the adjacent washer and bearing housing (H-118 and A-15) when the clutch raises. (The mechanism must be removed from the cabinet to see these parts.)

10. Both clutches should engage in the "Stop" position to produce complete braking action. When the clutch adjustments are completed, the machine should be allowed to set without operating for approximately four hours to allow the glyptal to harden.

ADJUSTMENT OF RIBBON TENSION

The pressure of the ribbon against the record head can be adjusted by turning the screw (H-112, Fig. 12) mounted on the pressure wheel bracket assembly. (Be sure to first loosen the hex nut before making adjustment.)

This pressure is measured in terms of tension by attaching a scale to the end of a piece of ribbon which is drawn through the ribbon guides, record head, pressure pad, and behind the capstan assembly at approximately $7\frac{1}{2}$ inches per second to produce a scale reading of $1\frac{1}{2}$ to $2\frac{1}{2}$ ounces. This adjustment is made accessible by removing both trim covers (A-10 and A-12).

ADJUSTMENT OF RIBBON GUIDES

The ribbon guides (O-66 and O-67) are located beneath the head trim cover (A-10) and are mounted on the panel with the guide posts (O-65) by mounting screws (H-140, Fig. 11).

Approximate positioning of guides on panel is shown in Fig. 4. Final adjustment of guides is made by slightly rotating the guide clockwise or counter-clockwise around the guide post to increase or decrease the friction of the ribbon through the guides during the "Fast-Reverse" or "Fast-Forward" process. Proper adjustment allows the ribbon to wind tightly onto the reel within a reasonably short length of time. The guides should be shaped in a vertical plane with respect to the posts to facilitate the ease of threading.

Note: Units containing the small friction brakes attached to the clutch-cup face do not require the ribbon guides since the proper friction or drag on the turntables is obtained by their use.

ADJUSTMENT OF ROLLER PRESSURE

The pressure of the rubber wheel (O-84, Fig. 9) against the ribbon and capstan spindle (O-82, Fig. 10) is adjusted at the factory and it is not recommended that any adjustment be attempted in the service field but rather that any component found to be defective be replaced with a new part.

If the ribbon tends to crawl up or down on the capstan spindle, it indicates that the spring (O-85) may not be seating properly in the grooves of the wheel shaft (O-83). If this condition is not the case, then the spring may have inadvertently been bent in a manner causing one arm to press more than the other. Since the adjustment is critical, it is recommended the spring be replaced rather than adjusted.

Another possible cause for this trouble is insufficient ribbon tension at the record-play head. For adjustment see "Adjustment of Ribbon Tension", above.

LUBRICATION

Caution: Do Not Over Oil

MOTOR—The motor should be oiled once every three months with No. SAE 20 oil.

MECHANISM — All moving or sliding parts should be cleaned thoroughly of any dirt, dust, or rubber dust that may have accumulated. After cleaning apply a thin coat of light oil to all sliding surfaces. Wipe off any excess amount of oil. Do not allow oil to get onto the belts or the driving surfaces of the pulleys.

OILITE BEARINGS—The following are of this type and need very little lubrication.

1. Clutch Pulley Bearings.
2. Capstan Spindle Bearing.
3. Pressure Wheel Bearing.

CONNECTING SOUNDMIRROR TO RADIO

To Record From Radio:

Fig. 40 illustrates a preferred method of connecting the Model BK-411 Soundmirror to most radios. The connection, as illustrated, is made at the last detector stage preceding the audio ampli-

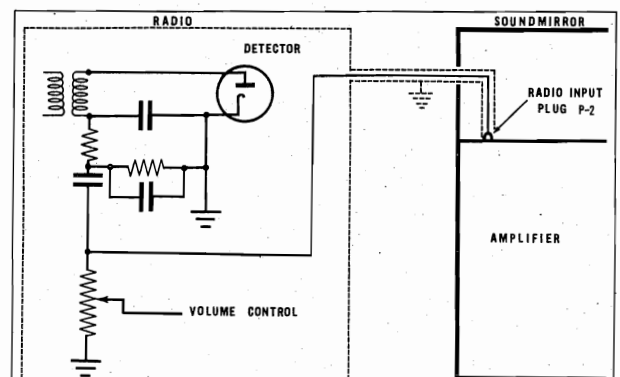


Fig. 40—Radio Connections to Soundmirror

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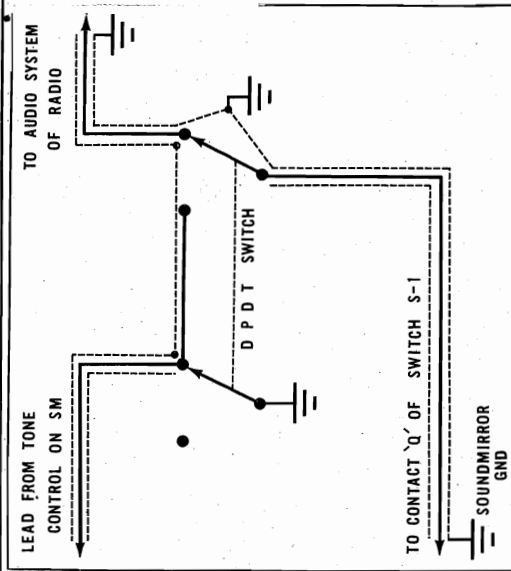


Fig. 41—Soundmirror Connection to Radio

REMEDY

1. Replace (See instructions, page 35).
2. Readjust as instructed on page 38.
3. Place as shown
1. Check connections and leads to switch S-2 and S-3.
2. Line inside of Shield Cap with insulating material.
3. Replace capacitor.
4. Replace.
5. Replace.
6. Replace.
7. Replace.
8. Replace.
9. Rewire.
1. Proper current is 2.0 MA with S-4 in No. 1 position and 4.5 MA in No. 2 position.
2. Replace defective component (Check L-1).
3. Replace defective component.
4. Replace defective component.

CAUSE

1. Weak Magnets (E-7).
2. Misaligned Magnets.
3. Misplaced Magnets.
1. Shorted or open head circuit.
2. Grid shield cap shorted to grid lead on V-1.
3. Open Coupling Capacitors C-6 or C-7.
4. Defective V-1, V-2, or V-7.
5. Open L-1.
6. Defective S-1.
7. Defective J-1, or J-2 (Radio input only.)
8. Defective associated resistors.
9. Defective wiring.
1. Insufficient 30 KC Bias Current through record head.
2. Defective components in Osc. circuit V-4.
3. Leaky or shorted coupling capacitors C-6 or C-7.
4. Defective components in associated circuits of V-1 and V-2.

SYMPTOM

INSUFFICIENT OR NO ERASE

1. Weak Magnets (E-7).
2. Misaligned Magnets.
3. Misplaced Magnets.

DOES NOT RECORD

1. Shorted or open head circuit.
2. Grid shield cap shorted to grid lead on V-1.
3. Open Coupling Capacitors C-6 or C-7.
4. Defective V-1, V-2, or V-7.
5. Open L-1.
6. Defective S-1.
7. Defective J-1, or J-2 (Radio input only.)
8. Defective associated resistors.
9. Defective wiring.

**DISTORTION
Record Channel**

1. Insufficient 30 KC Bias Current through record head.
2. Defective components in Osc. circuit V-4.
3. Leaky or shorted coupling capacitors C-6 or C-7.
4. Defective components in associated circuits of V-1 and V-2.

To Playback Through Radio:

Radios of the console type usually contain a high fidelity audio amplifier system which makes it desirable to play the Soundmirror recording

through that system. A connection for this purpose is illustrated in Fig. 41. The double pole double throw toggle switch shown may be installed on the back of the Soundmirror.

The lead from the radio to the Soundmirror Amplifier should be shielded to prevent hum pickup from being fed into the radio amplifier. To make the connection to the Soundmirror Amplifier:

1. Disconnect the wire which leads from the tone control (R-24) to contact "Q" of the Selector Switch (S-1).
2. Connect the D. P. D. T. Switch, as instructed in Fig. 41, to the contacts remaining vacant as a result of step 1 above.
3. The shield of the switch leads should be connected to the nearest ground tie point in the Soundmirror amplifier.

Radio circuits having a d. c. potential on the volume control will require a blocking capacitor between the radio and the Soundmirror connection. The value of the capacitor should not be less than .002 mfd.

To eliminate hum pick-up while recording from the radio, a low capacity coaxial type cable should be used to make the connection. To prevent loss of high frequencies it is suggested that this cable be as short as possible. More than five feet will result in appreciable loss of high frequencies.

| SYMPTOM | CAUSE | REMEDY |
|----------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Monitor Channel ("Record-Radio" position only) | <ol style="list-style-type: none"> 1. Check for shorted coupling capacitors C-6, C-10, C-17, or C-18. 2. Defective associated components of V-1, V-2, V-5, and V-6. 3. Overloading of Input Stage V-1 by signal from Radio. 4. Defective Output transformer or Speaker. | <ol style="list-style-type: none"> 1. Replace defective component. 2. Replace defective component. 3. Reduce radio signal voltage to Soundmirror. 4. Replace. |
| Playback Channel | <ol style="list-style-type: none"> 1. Check for shorted coupling capacitors C-6, C-7, C-17, C-18. 2. Defective V-1, V-2, V-5, or V-6 or any associated circuit component. 3. Open grid of one half of V-6. 4. Defective output transformer or speaker. 5. Insufficient erasure of previous recording causing undesired or unintelligible signal. 6. Flutter. | <ol style="list-style-type: none"> 1. Replace defective components. 2. Replace defective components. 3. Check tube socket contacts and squeeze together enough to grip tube prongs. 4. Replace. 5. See "Insufficient or No. Erase" of Symptoms. 6. See "Wow and Flutter" of Symptoms. |
| HIGH HUM | <ol style="list-style-type: none"> 1. Defective tubes or ground connections. 2. One side of filament shorted to ground. 3. Open grid circuit. 4. Microphonic tube. | <ol style="list-style-type: none"> 1. Replace or rewire accordingly. 2. Check Pilot lamp holder and associated wiring. 3. Rewire. 4. Replace defective tube. |
| MICROPHONICS (Howling or Whistling when unit is jarred) | <ol style="list-style-type: none"> 1. Microphonic 6J7 tube V-1. | <ol style="list-style-type: none"> 1. Select non-microphonic tube and replace. |
| WEAK OR NO OUTPUT | <ol style="list-style-type: none"> 1. Broken jumper wire on output terminal strip (E-3). 2. Defective power cord or plug. 3. Defective tubes. 4. Shorted capacitors—check C-4, C-5, C-8, C-9, C-19, C-21, or C-22. 5. Open capacitors—check C-6, C-7, or C-10. 6. Open Osc. Coil L-1 (No B + to V-2). 7. Defective Output transformer or Speaker. 8. Defective contacts or wiring of selector switch S-1. 9. Defective Power Transformer. 10. Open playback head. | <ol style="list-style-type: none"> 1. Replace wire. 2. Replace. 3. Replace defective tube. 4. Replace defective part. 5. Replace defective capacitor. 6. Replace coil. 7. Replace defective part. 8. Replace or rewire. 9. Replace. 10. Replace. |

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| SYMPTOM | CAUSE | REMEDY |
|-----------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| POOR FREQUENCY RESPONSE Insufficient Highs | 11. Dirty polepieces of head (produces weak output). 12. Defective contacts from head to amplifier. 1. Accumulation of dirt and ribbon residue on record/play head. 2. Insufficient recording bias current. 3. Defective component in compensating network. | 11. Clean heads. 12. Rewire or replace defective plug or socket. 1. Clean head. 2. See "Insufficient Record Bias" of Symptoms. 3. Replace defective part. |
| Insufficient Lows | 1. Insufficient recording bias current. 2. Defective component in compensating network. | 1. See "Insufficient Record Bias" of Symptoms. 2. Replace defective part. |
| CONTINUAL TRIPPING OF RE-WIND TRIP LEVER | 1. Reels improperly placed on turntable. 2. Rewind trigger (Fig. 5) bent. | 1. Place the reel on turntable so that the ribbon nearest the center of the reel holds the trigger above the trip lever until approximately 20-40 turns of ribbon remain on the reel, at which time the trigger should drop down and trip the lever to cause the ribbon to rewind. (See Fig. 5). 2. Reshape item O-54. |
| RIBBON SPEED TOO SLOW (Correct speed 7.2 to 7.9 inches per second.) Nominal: 7.5 inches per second. | 1. Pressure pad—pressure too great. 2. Rewind clutch misadjusted causing it to be engaged. 3. Capstan flywheel shaft binding in lower bearing. 4. Motor shaft binding in motor bearings. | 1. Readjust according to procedure outlined in "Adjustment of Ribbon Tension", page 42. 2. Readjust — see "Adjustment of Clutches", page 41. 3. Replace capstan drive assembly. See "Replacement of Capstan Drive Assembly", page 35. 4. Replace motor. |
| "REWIND", "FAST-REWIND" OR "FAST-FORWARD" STICKS (Will not return to neutral upon actuating control lever.) | 1. Control lever mechanism binding at some point. 2. Motor switch mounting bracket not positioned properly. | 1. Clean dirt, burrs, or cause of binding. After cleaning, lubricate parts with (SAE-10) light oil. 2. Reposition bracket slightly to satisfy condition. Check conditions to be sure ball (O-70, Fig. 15) does not fall out when control mechanism is actuated. |
| WOW AND FLUTTER | 1. Pressure wheel defective, binding, or rubbing on capstan bearing housing. 2. Excessive pressure of pressure pad against record/play head. 3. Binding motor shaft bearing. 4. Binding capstan lower bearing. | 1. Replace defective wheel. Remove source of binding (check wheel shaft for possible source), also check alignment of pressure spring against shaft. See "Adjustment of Roller Pressure", page 42. 2. Readjust—See "Adjustment of Ribbon Tension", page 42. 3. Replace motor. 4. Replace capstan drive assembly. |

| SYMPTOM | CAUSE | REMEDY |
|-----------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| RIBBON BREAKS AT CAPSTAN SPINDLE | <ol style="list-style-type: none"> Binding reel-post bearing. Damaged capstan drive belt. Bent capstan. | <ol style="list-style-type: none"> Clean or replace bearing or reel post. Replace belt. Replace capstan drive assembly. |
| FAILURE TO OPERATE WITH POWER ON | <ol style="list-style-type: none"> Pressure wheel shaft improperly seated on pivot. Line voltage too low. Control lever inadvertently left in "Rewind" position. Clutches misadjusted. Controls fail to lock in "Record" position, or jammed due to excessive dirt in mechanism. Dislocated ball actuator on motor switch mechanism (Item O-70, Fig. 15). Capstan drive belt worn out. Defective motor switch. Defective motor. | <ol style="list-style-type: none"> See "Adjustment of Roller Pressure", page 42. Proper line voltage is 105-120 volts, 60 cycles a.c. Shift control lever to "Stop" position then to "Record" or "Play". See "Adjustment of Clutches", page 41. Clean mechanism thoroughly and lubricate. Replace ball and readjust mounting of switch bracket to prevent ball from being dislocated when clutch raising lever is actuated. Replace belt. Replace switch. Replace motor. |
| FAILURE OF CAPSTAN TO PULL RIBBON | <ol style="list-style-type: none"> Capstan spindle-shaft binding in lower bearing. Broken or weak capstan drive belt. Capstan spindle jammed with accumulated ribbon residue on bearing. Roller pressure insufficient. | <ol style="list-style-type: none"> Replace capstan drive assembly. Replace belt. Clean thoroughly. See "Adjustment of Roller Pressure", page 42. |
| FAILURE TO TAKE-UP RIBBON OR WINDS TOO LOOSELY ON TAKE-UP REEL | <ol style="list-style-type: none"> Clutches misadjusted. Ribbon guides misadjusted. Clutch belt slipping. | <ol style="list-style-type: none"> Readjust—See "Adjustment of Clutches", page 41. Readjust—See "Adjustment of Ribbon Guides", page 42. Clean motor drive pulley with carbon tetrachloride. Reposition motor to tighten belt. If unsatisfactory, replace belt. |
| FAILURE TO REWIND RIBBON PROPERLY | <ol style="list-style-type: none"> Clutches misadjusted. Ribbon guides misadjusted. Failure of automatic trip, due to reel binding against edge of trigger. Binding of slide assembly (O-94, Fig. 11). | <ol style="list-style-type: none"> Readjust—See "Adjustment of Clutches", page 41 Readjust—See "Adjustment of Ribbon Guides" page 42. Readjust angle of reel key pin to prevent reel from binding trigger. (See Fig. 30). Clean mechanism thoroughly and lubricate. |

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MODEL BK-414 PORTABLE SOUNDMIRROR

INTRODUCTION

The operation and function of the Model BK-414 Portable Soundmirror is basically the same as that of the Model BK-411 Soundmirror.

The construction features in the carrying case and the cabinet for these two models are different however, and require different procedures for their disassembly and reassembly.

The following information in addition to the preceding information, in general, will be sufficient to service and overhaul the Model BK-414.

The parts listed on pages 56 to 63 is a combined parts list for the Models BK-411 and BK-414.

DISASSEMBLY OF MODEL BK-414

To remove unit from case:

1. Remove the control knob (501) and the trim covers (A-10, A-12, and A-14). (See Fig. 43).

Note: On later units the trim cover (A-14) is held in position by two additional screws located at each corner of the cover near the control panel.

2. Remove the two screws (H-146) located at the front of mechanism panel. (See Fig. 44).

3. Lift up the mechanism at the front, allowing it to fold back on the hinge far enough to facilitate the disconnecting of the record head inter-

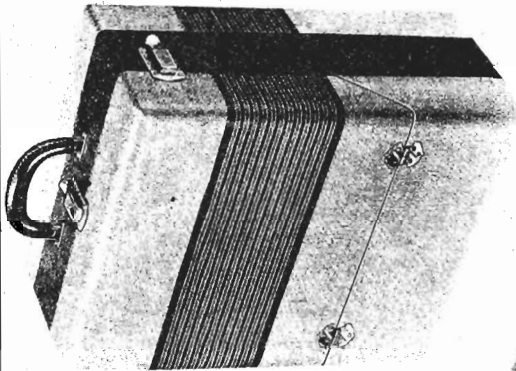


Fig. 42—Model BK-414 Portable Soundmirror

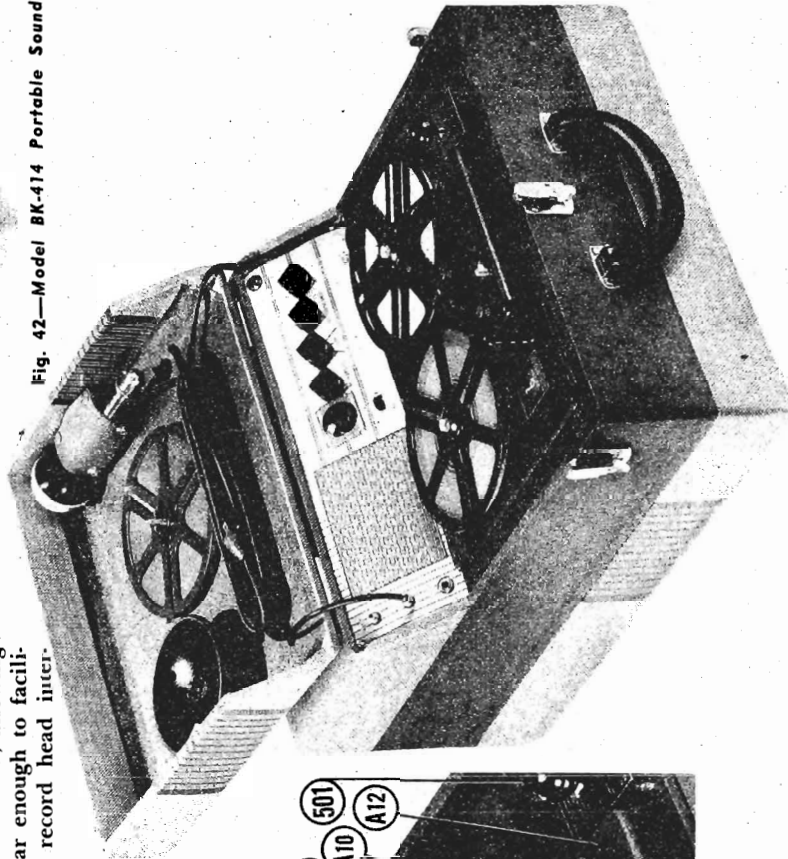


Fig. 43—Model BK-414 Control Panel View, and Disassembly Step No. 1



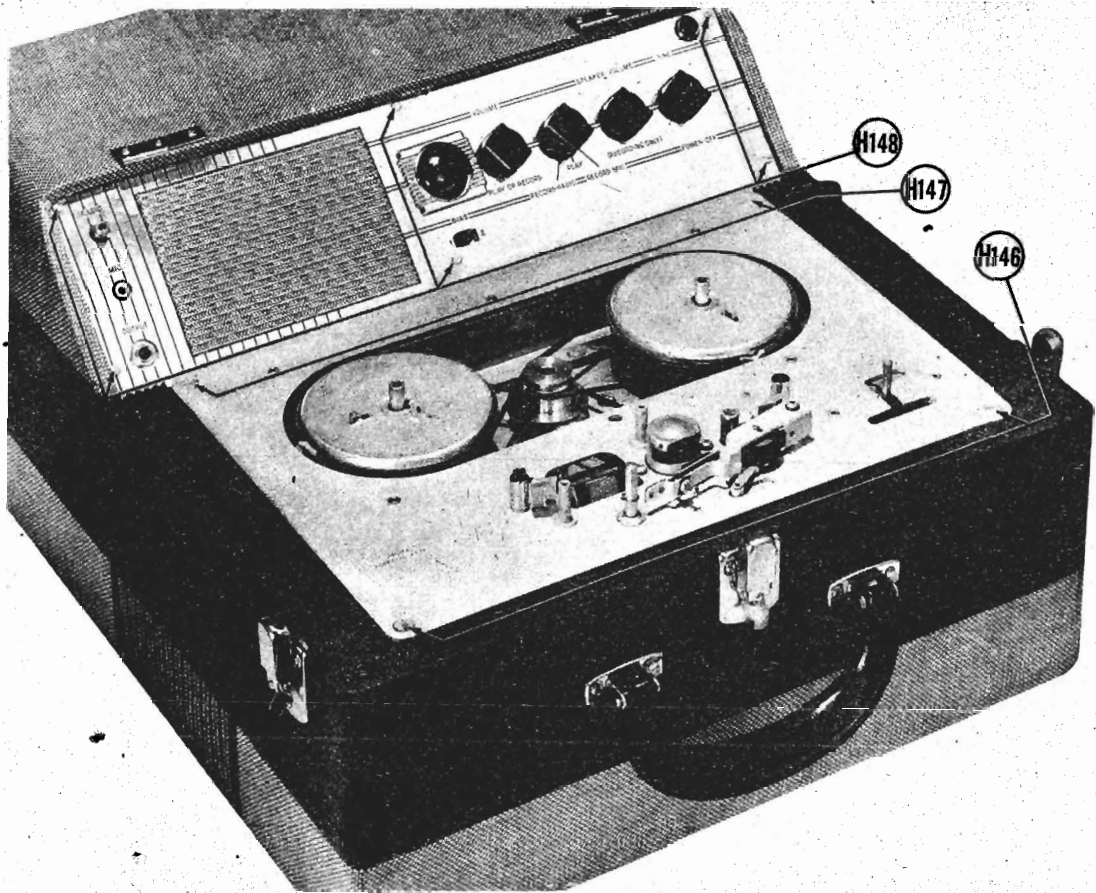


Fig. 44—Disassembly Step No. 2, 4 and 7

connecting cable (W-4) and the motor connecting plug (P-4). (See Fig. 45).

4. Remove the two screws (H-147) holding the mechanism to the hinge and lift the mechanism from the case. (See Fig. 44).

5. Remove the five screws (H-150) holding the ventilating grilles (O-103) and (O-104) to the case. (See Fig. 46). Note: The two screws nearest the control panel must be completely removed to facilitate the removal of the amplifier.

6. Remove the four control knobs (601) from the amplifier control panel. (See Fig. 46).

7. Remove the six screws (H-148) holding the amplifier trim panel in position. (See Fig. 44).

8. Carefully remove the trim panel (A-27, Fig. 47). Note: Some trim panels fit very snugly between top of case and edge of hinge at points

shown by arrows, in Fig. 47, and may require a slight amount of prying at these points to lift the trim over the edge of the hinge. Be careful in prying not to bend or damage the trim panel.

9. Remove the three screws (H-152) holding the amplifier to the case. (See Fig. 48).

10. Remove the screw (H-154) holding the amplifier base board in the track. (See Fig. 48).

11. Carefully slide the amplifier unit toward the front of the case and lift it out when the amplifier base board clears the top of the case. (See Fig. 49). Note: While sliding the unit forward, hold the left side of the unit to prevent tearing of the leatherette covering of the case at the point indicated by the arrow in Fig. 49.

12. After servicing amplifier reassemble it in the case in the reverse sequence of steps 1 through 11.

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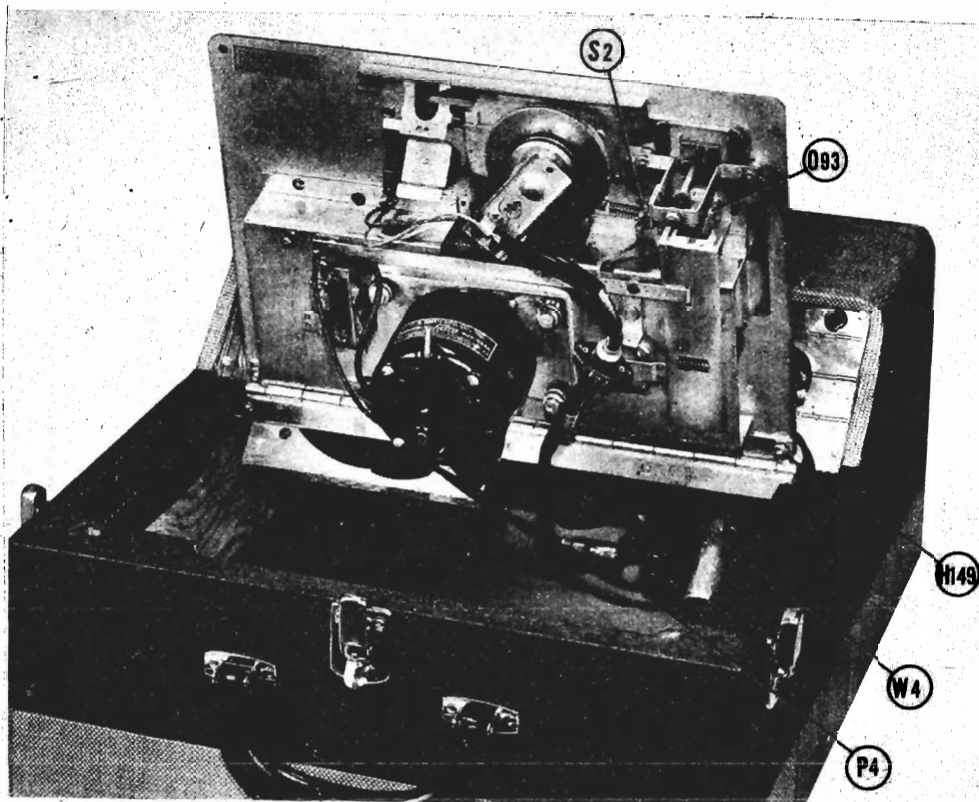


Fig. 45—Disassembly Step No. 3

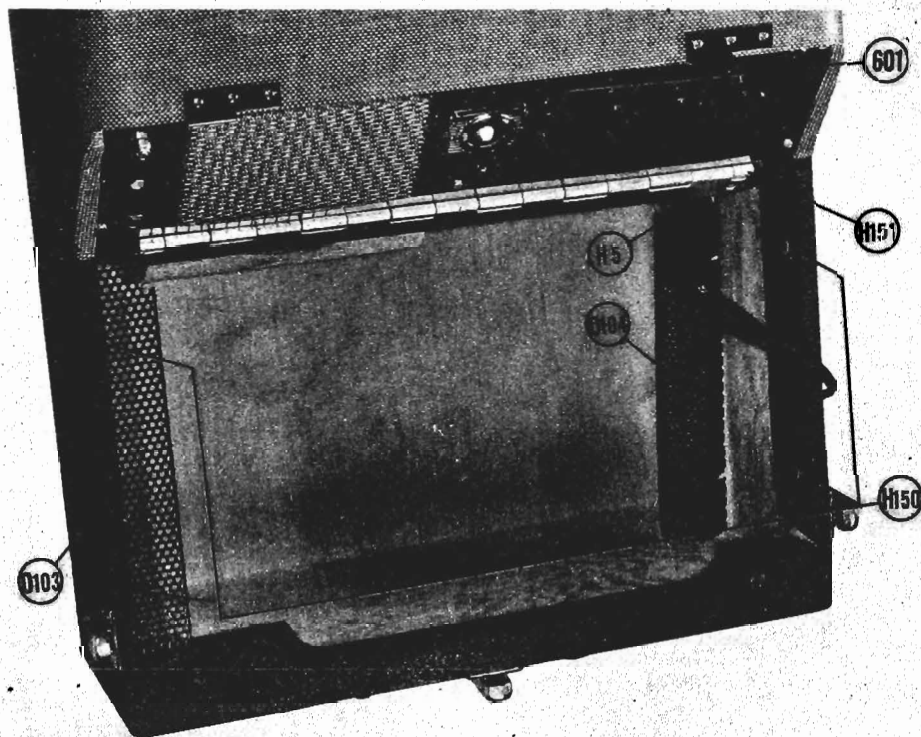


Fig. 46—Disassembly Step No. 5 and 6

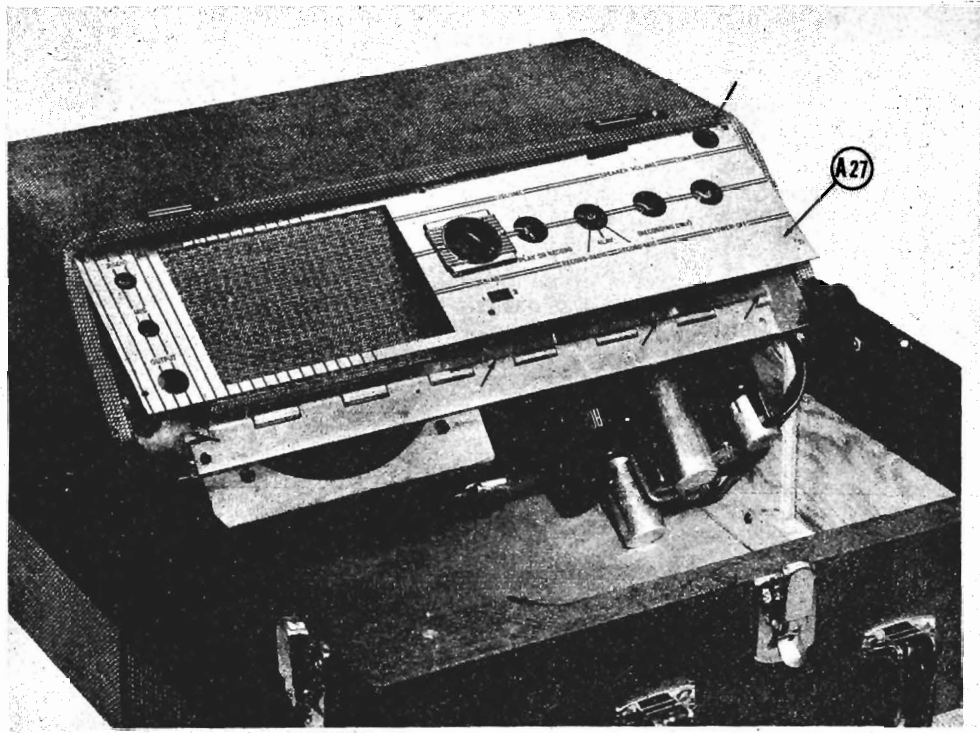


Fig. 47—Disassembly Step No. 8

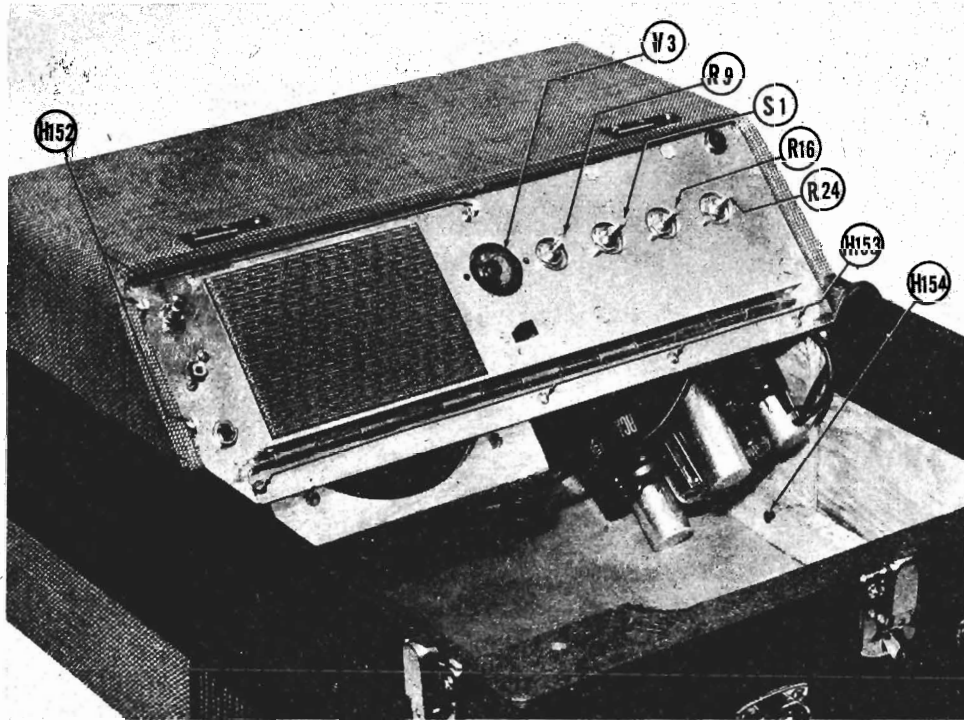


Fig. 48—Disassembly Step No. 9 and 10

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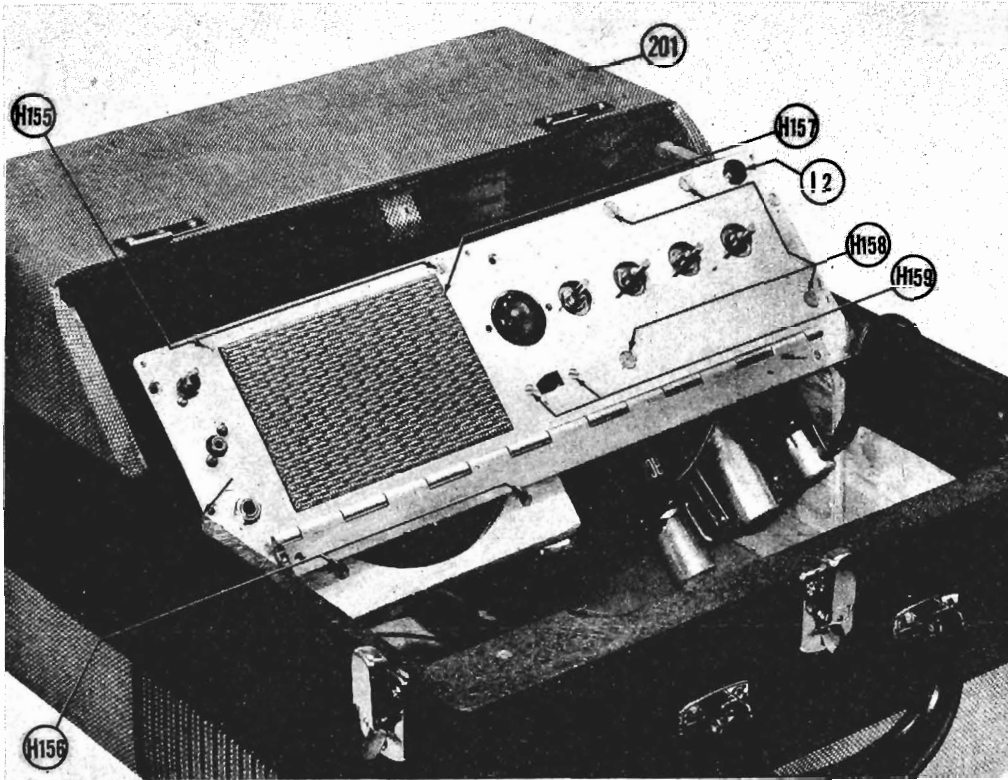


Fig. 49—Disassembly Step No. 11

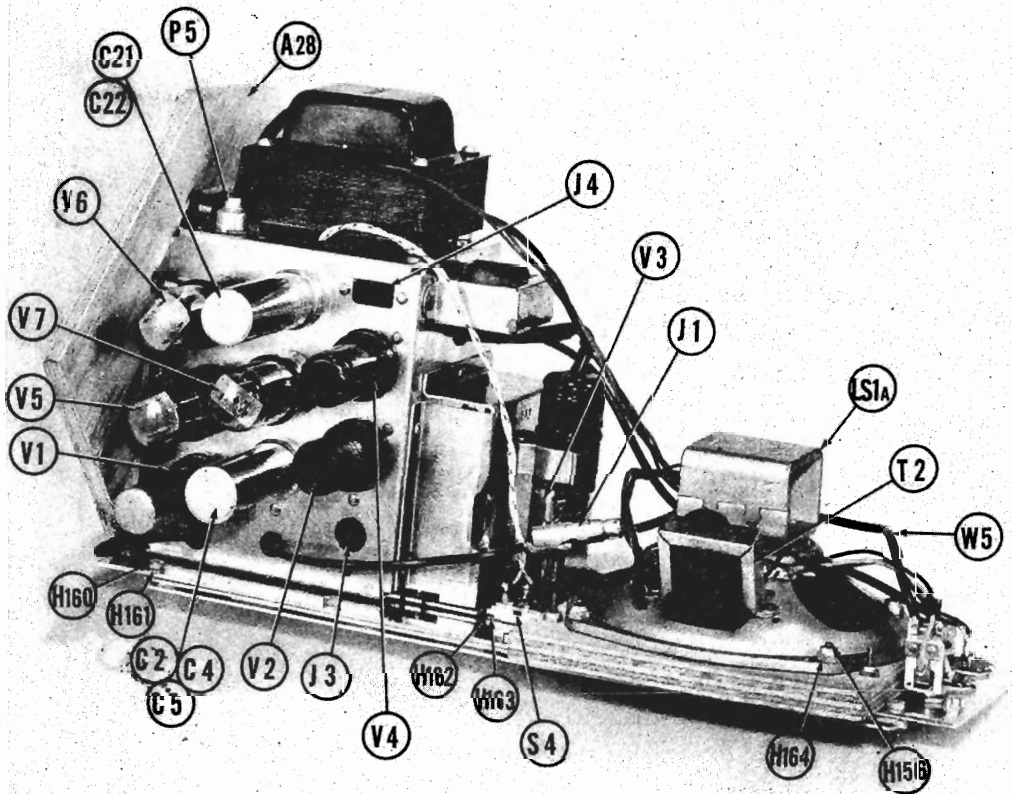


Fig. 50—Amplifier for Model BK-414—Tube View

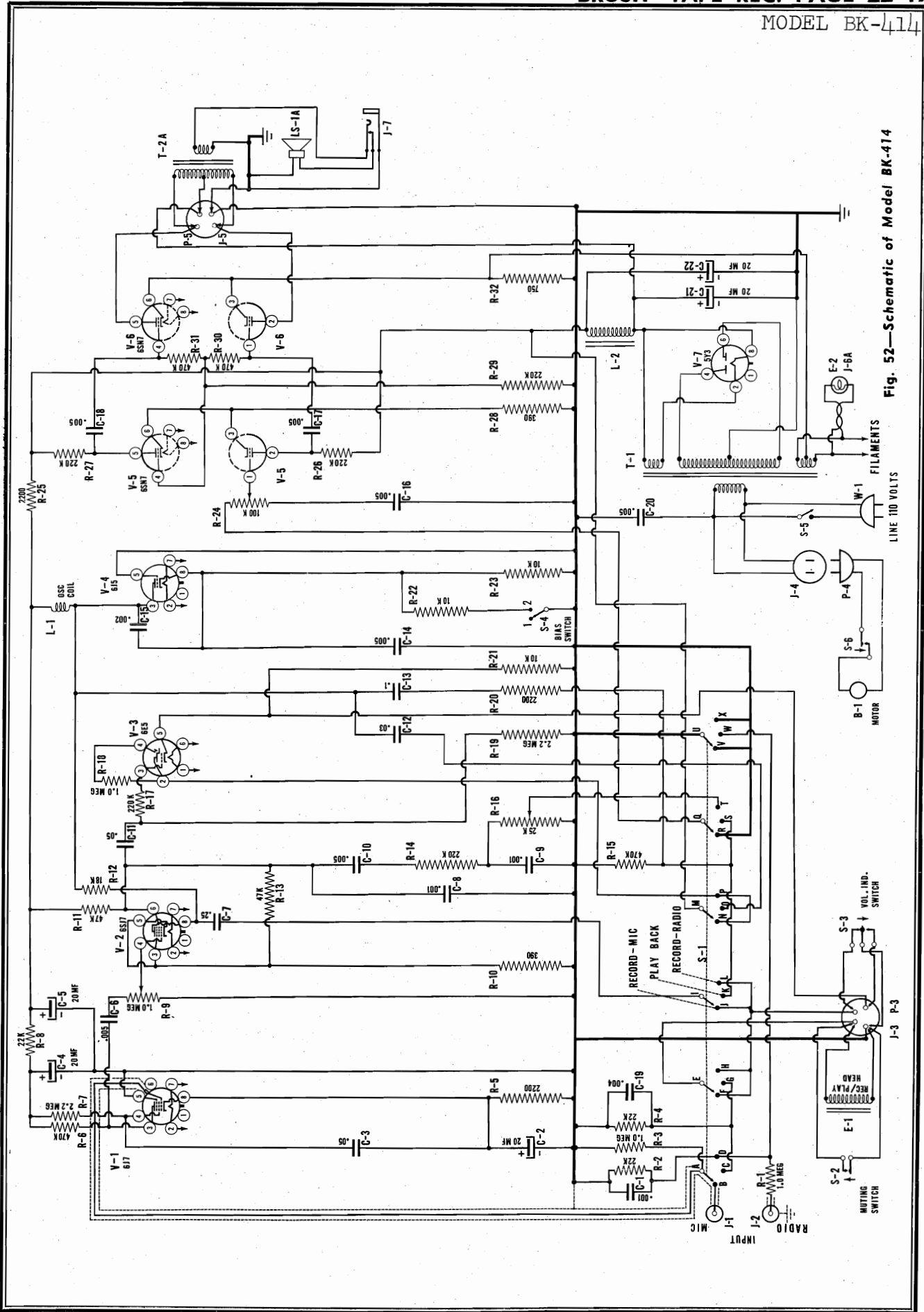
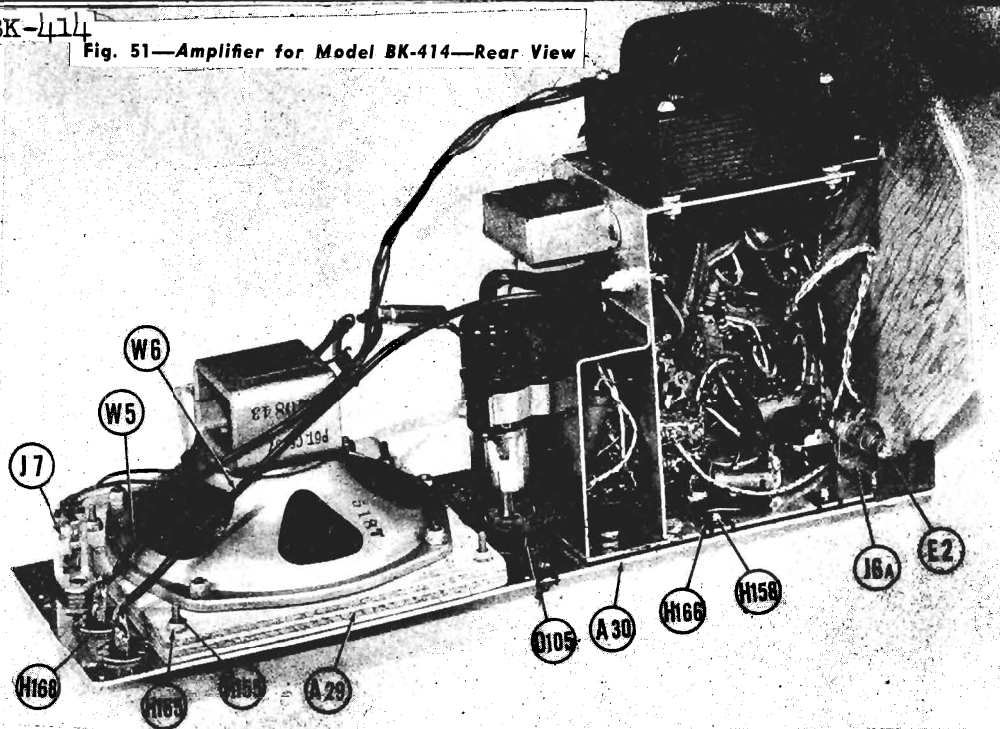


Fig. 52—Schematic of Model BK-414

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Fig. 51—Amplifier for Model BK-414—Rear View



The electronic circuit of the above amplifier is shown in Fig. 52. Location of the various electronic components may be seen in figures 20 through 26 as well as Fig. 50 and 51.

LIST OF MATERIAL

| BRUSH Symbol | Part Number | DESCRIPTION |
|--------------|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A-1 | 206790-501 | BOARD, Speaker Mounting: including grille cloth and screen; for mounting 8" speaker. |
| A-2 | | FOOT, Mounting: $\frac{3}{8}$ " thick cork $1\frac{1}{4}$ " diameter. |
| A-3 | 104215-501 | BASE, Microphone. |
| A-10 | 206517-501 | COVER, Trim: for covering the record and erase head to give dress finish to mechanism; includes rubber moulding (A-11) and knurled thumb screw (H-101). |
| A-11 | 106827-1 | MOULDING, Rubber: for protecting finish of adjacent trim covers A-14; mounts onto trim cover A-10. |
| A-12 | 306518-501 | COVER, Trim: for covering the pressure wheel mechanism; includes rubber moulding (A-13) and knurled thumb screws (H-101). |
| A-13 | 106827-2 | MOULDING, Rubber: for protecting finish of adjacent trim cover A-14; mounts onto trim cover A-12. |
| A-14 | 306503-501 | COVER, Panel Trim: for covering top panel mechanism to give dress finish; includes control instruction plate. |
| A-15 | 106365-501 | HOUSING, Clutch bearing: supports and houses clutch bearing. |
| A-16 | 206444-501 | BRACKET, Pressure Wheel: for mounting pressure wheel and associated mechanism. |
| A-17 | 106163-501 | PLATE, Motor Shock Mount. |
| A-18 | 206409-501 | BRACKET, Clutch lifter: Rewind position. |
| A-19 | 106122 | PLATE, Motor Mounting. |
| A-20 | 104213-4 | MOUNT, Vibration: Rubber; $\frac{5}{8}$ " lg. x $\frac{1}{2}$ " diameter. |
| A-21 | 106407-501 | BRACKET, Clutch Lifter: Take-up position. |
| A-22 | 206293 | COVER, Switch: covers switch S-6; overall dimension $3\frac{1}{2}$ " lg. x 2" wd. x $1\frac{1}{4}$ " high; mtg. flange on one side. |
| A-23 | 106408-501 | BRACKET, Erase Head Mounting. (Deleted) |
| A-23A | 107272-501 | BRACKET, erase head: for mounting new type erase head (see figure 36); mounting hole drilled and tapped to accomodate new type erase head. |
| A-24 | 206332 | BASE, Erase Head Mounting. (Deleted) |
| A-25 | 206139 | BRACKET, Capstan Drive Mechanism. |
| A-26 | 106394-501 | BRACKET, Capstan Bottom Bearing. |
| A-27 | 307032 | PANEL, trim: Etched; for Amplifier Control panel. |
| A-28 | 207326 | BOARD, Amplifier Mtg.: $\frac{3}{8}$ " Plywood drilled for five mtg. screws; overall dimension $9\frac{5}{16}$ " lg. x $7\frac{13}{16}$ " high x $\frac{3}{8}$ " thick. |
| A-29 | 207050 | BOARD, speaker mtg.: $\frac{1}{2}$ " 5 ply plywood; milled with one $5\frac{1}{2}$ " diameter hole for speaker; four speaker mtg. holes, and four holes for mtg. board to panel; overall dimension $6\frac{1}{4}$ " long x $6\frac{1}{4}$ " high x $\frac{1}{2}$ " thick. |

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| | | |
|---------------------|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A-30 | 407024 | PANEL, recorder mtg.: No. 11 gauge aluminum panel with necessary holes for mtg. complete amplifier equipment; overall dimension $15\frac{31}{32}$ " long x $5\frac{1}{8}$ " wide. |
| B-1 | 206322 | MOTOR, A.C.: four pole shaded pole induction type; 1/50 hp.; 1400 R.P.M. full load; 115 v. a.c.; 60 cy.; single phase; .93 amps. at full load; includes cooling fan and No. 18-32 set screw. |
| C-1 | 3-106093-3 | CAPACITOR, fixed: paper; .001 mfd. \pm 20%; 600 VDCW. |
| C-2 | 103253 | CAPACITOR, fixed: electrolytic; section (\square) of 3 sections; 20 mfd.; 25 VDCW; 3" long x 1" diameter metal can (can includes C-4 and C-5). |
| C-3 | 2-106094-2 | CAPACITOR, fixed: paper; .05 mfd. \pm 15%; 400 VDCW. |
| C-4 | 103253 | CAPACITOR, fixed: electrolytic; section (\square) of 3 sections; 20 mfd.; 450 VDCW; 3" long x 1" diameter metal can (can includes C-2 and C-5). |
| C-5 | 103253 | CAPACITOR, fixed: electrolytic; section (Δ) of 3 sections; 20 mfd.; 450 VDCW; 3" long x 1" diameter metal can (can includes C-2 and C-4). |
| C-6 | 3-106093-4 | CAPACITOR, fixed: paper; .005 mfd. \pm 20%; 600 VDCW. |
| C-7 | 3-106093-7 | CAPACITOR, fixed: paper; .25 mfd. \pm 20%; 600 VDCW. |
| C-8 | 3-106093-3 | CAPACITOR, fixed: paper; .001 mfd. \pm 20%; 600 VDCW. |
| C-9 | 3-106093-3 | CAPACITOR, fixed: paper; .001 mfd. \pm 20%; 600 VDCW. |
| C-10 | 3-106093-4 | CAPACITOR, fixed: paper; .005 mfd. \pm 20%; 600 VDCW. |
| C-11 | 2-106094-2 | CAPACITOR, fixed: paper; .05 mfd. \pm 15%; 400 VDCW. |
| C-12 | 4-106093-8 | CAPACITOR, fixed: paper; .03 mfd. \pm 10%; 600 VDCW. |
| C-13 | 2-106094-1 | CAPACITOR, fixed: paper; .1 mfd. \pm 15%; 400 VDCW. |
| C-14 | 3-106093-4 | CAPACITOR, fixed: paper; .005 mfd. \pm 20%; 600 VDCW. |
| C-15 | 4-106093-6 | CAPACITOR, fixed: paper; .002 mfd. \pm 10%; 600 VDCW. |
| C-16 | 3-106093-4 | CAPACITOR, fixed: paper; .005 mfd. \pm 20%; 600 VDCW. |
| C-17 | 3-106093-4 | CAPACITOR, fixed: paper; .005 mfd. \pm 20%; 600 VDCW. |
| C-18 | 3-106093-4 | CAPACITOR, fixed: paper; .005 mfd. \pm 20%; 600 VDCW. |
| C-19 | 3-106094-5 | CAPACITOR, fixed: paper; .004 mfd. \pm 10%; 400 VDCW. |
| C-20 | 106100-6 | CAPACITOR, fixed: paper; (Mica Mold); .005 mfd. — 20 + 40%; 600 VDCW. |
| C-21 and C-22 | 102711 | CAPACITOR, fixed: electrolytic; two sections; 20-20 mfd.; 450 VDCW; 3" long x 1" diameter metal can. |
| E-1 | 306784-501 | RECORD-REPRODUCE HEAD: Includes cable assembly and connecting plug. |
| E-2 | 105710-1 | LAMP, incandescent: Pilot lamp, 6-8 volts; .25 amps; Bayonet base; Mazda No. 44. |
| E-3 | 106441-501 | BOARD, terminal: 3 screw terminals mounted on molded bakelite strip $2\frac{1}{2}$ " long x $\frac{1}{8}$ " wide x $\frac{1}{8}$ " thick; for external speaker connections. |
| E-4 | 104099-3 | BOARD, terminal: two lug terminals; one lug support; mounted on $\frac{1}{16}$ " bakelite. |
| E-5 | 206684 | SHIELD, oscillator: covers oscillator coil and supports clamp for V-3; overall dimension $3\frac{7}{8}$ " long x $3\frac{15}{16}$ " wide x $1\frac{3}{8}$ " high. |
| E-6 | 104099-2 | BOARD, terminal: one lug terminal; one lug support mounted on $\frac{1}{16}$ " thick bakelite; used on speaker assembly. |
| E-7 | 106469 | MAGNET, erase head. |
| E-8 | L-83 | LUG, terminal. |
| E-9 | 206931 | POLEPIECE, top: for new type erase head (see figure 36). |
| E-10 | 106939 | MAGNET, erase head: for new type erase head (see figure 36). |
| E-11 | 206932 | POLEPIECE, bottom, for new type erase head (see figure 36.) |
| H-1 | 3219-5 | GROMMET, rubber: fits $\frac{3}{8}$ " hole in $\frac{1}{16}$ " panel; I.D. $\frac{9}{32}$ ". |
| H-2 | 7618-3 | GROMMET, rubber: fits $\frac{5}{16}$ " hole in $\frac{1}{16}$ " panel; I.D. $\frac{3}{16}$ ". |
| H-3 | | SCREW, wood: No. 6 x $\frac{3}{4}$ "; mounts speaker to baffle board. |
| H-4 | | WASHER, plain: $\frac{3}{8}$ " x $\frac{5}{32}$ " x $\frac{1}{32}$ "; steel cad plated. |
| H-5 | 103890 | CLAMP, power cord: lock type; used on early units only. |
| H-5 | 105859-1 | CLAMP, power cord: strain relief type; .530" diameter x .545" long. |
| H-6 | | SCREW, self tapping: type "Z"; No. 4 x $\frac{1}{4}$ " binding head; secures oscillator shield to chassis. |
| H-7 | | WASHER, internal lock: No. 8. |
| H-8 | | NUT, hexagon: No. 8-32. |
| H-9 | | SCREW, self tapping: No. 10 x $\frac{3}{4}$ "; type "Z"; rd. hd. |
| H-10 | 103838-4 | NUT, speed: "U" type; fits .072—.081 panel thickness; for type No. 10 "Z" screws. |
| H-11 | 100511 | CLAMP, cable: for routing speaker cable along floor of cabinet. |
| H-12 | | SCREW, wood: No. 6 x $\frac{1}{2}$ "; rd. hd.; for mounting H-11. |
| H-13 and H-14 | obsolete | SCREWS AND WASHERS: obsolete; new type pilot lamp holder clips onto flange of speaker frame above indicator rod. (see J-5 for new lamp holder). |
| H-15 | | SCREW, wood: No. 6 x $\frac{5}{8}$; Phillips round head. |
| H-16 | 104788 | CLIP, microphone support. |
| H-17 | 106723 | ESCUTCHEON: for 6E5 Volume Indicator. |
| H-18 | 107185 | NUT, reel clamping: knurled cap; $\frac{3}{4}$ " diameter skirt; $\frac{1}{16}$ " diameter cap; tapped at top for 8-32 thread; drilled at bottom $\frac{3}{8}$ " diameter; $\frac{5}{16}$ " high. |
| H-19 | | NUT, hex: No. 8-32, small; $\frac{7}{32}$ " across flats, $\frac{3}{32}$ " thick. |
| H-20 | | SCREW, set: No. 8-32 x $\frac{5}{8}$ " long; allen head; cup point. |

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LIST OF MATERIAL

| Symbol | BRUSH Part Number | DESCRIPTION |
|--------|----------------------|---------------------------------------------------------------------------------------------------------------------------|
| H-21 | | SCREW, machine: No. 5-40 x $\frac{1}{16}$ " long; round head; brass, cad. plated. |
| H-22 | | SCREW, machine: No. 4-40 x $\frac{3}{4}$ " long; round head; brass. |
| H-23 | | WASHER, internal lock: No. 4; bronze. |
| H-101 | | SCREW, knurled thumb: No. 6-32 x $\frac{1}{4}$ " long; brass-antique bronze; secures trim covers A-10 and A-12. |
| H-102 | | SCREW: No. 10-24 x $\frac{3}{8}$; shakeproof, bd. hd.; motor mounting. |
| H-103 | | SCREW, set: No. 8-32 x $\frac{1}{4}$; hollow cup; for drive pulley. |
| H-104 | | WASHER, external lock: No. 10; for motor mounting. |
| H-105 | 106120-1 | WASHER, motor mounting. |
| H-106 | 106527 | WASHER, spacer: for clutch bearing housing (deleted on later units). |
| H-107 | | NUT, hex: $\frac{3}{8}$ -32; secures erase bracket sleeve. |
| H-108 | | SCREW, machine: No. 6-32 x $\frac{3}{8}$ round head; record head mounting. |
| H-109 | | WASHER, internal lock: No. 6 int.; record head mounting. |
| H-110 | 106454-1 | SPEED NUT, Tinnerman: pressure pad adjustment. |
| H-111 | | NUT, hex: No. 4-40; pressure pad adjustment. |
| H-112 | | SCREW, machine: No. 4-40 x $\frac{1}{2}$; pressure pad adjustment. |
| H-113 | | PIN, cotter: $\frac{1}{16}$ " diameter x $\frac{1}{16}$ " long; for control lever. |
| H-114 | | WASHER, plain: No. 8; for control lever. |
| H-115 | 106117 | PIN, clutch lifter. |
| H-116 | | WASHER, internal lock: $\frac{1}{2}$ "; bearing housing mounting. |
| H-117 | 106157 | NUT, hex: bearing housing mounting. $\frac{1}{2}$ -20 N. C. two thread. |
| H-118 | | WASHER, plain: No. 8; clutch bearing thrust. |
| H-119 | | SCREW, machine: No. 5-40 x $\frac{1}{2}$ "; fl. hd.; motor switch (S-6) mounting. |
| H-120 | | WASHER, internal lock: No. 6; switch cover mounting. |
| H-121 | | SCREW, type "Z": No. 6 x $\frac{1}{4}$ "; round head; switch cover mounting. |
| H-122 | 106170 | HINGE, erase head bracket. |
| H-123 | 106179 | WASHER, spacer: motor vibration. |
| H-124 | 106671 | WASHER, plain: .172" I.D., x $\frac{1}{2}$ " O.D. x .049" thick; motor vibration mounting. |
| H-125 | | WASHER, internal lock: No. 8; motor vibration mounting. |
| H-126 | | NUT, hex: No. 8-32; motor vibration mounting. |
| H-127 | | PIN, cotter: $\frac{1}{16}$ " diameter x $1\frac{1}{2}$ " long; erase head bracket mounting. |
| H-128 | | WASHER, internal lock: No. $\frac{3}{8}$ "; capstan bearing mounting. |
| H-129 | | NUT, hex: No. $\frac{3}{8}$ -32; capstan bearing mounting. |
| H-130 | 106173 | WASHER, flat: spacer, capstan drive. |
| H-131 | 106269 | CLAMP, cable: record head cable clamp. |
| H-132 | | WASHER, spring lock: No. 10; capstan lower bracket mounting. |
| H-133 | | SCREW, cap: No. 10-32 x $\frac{3}{8}$ "; socket head; capstan lower bracket mounting. |
| H-134 | | SCREW, machine: No. 4-40 x $\frac{1}{2}$ "; round head; erase head mounting (deleted see H-22). |
| H-135 | | WASHER, internal lock: No. 4; erase head mounting. (deleted see H-23). |
| H-136 | 106331 | CLAMP, erase magnet (deleted). |
| H-137 | 106155 | RIVET, solid: mounts clutch raising lever assembly. |
| H-138 | Deleted | CLAMP, cable: secure cables from record head and switch (S-3). |
| H-139 | | WASHER, internal lock: No. 8; mounts ribbon guide posts. |
| H-140 | | SCREW, machine: No. 8-32 x $\frac{3}{8}$ "; round head brass; mounts ribbon guide posts. |
| H-141 | 206159 | LATCH, trip lever. |
| H-142 | | WASHER, flat: latch retaining; No. 8 plain. |
| H-143 | | SCREW, machine: No. 6-32 x $\frac{1}{4}$ " long; round Phillips head; mounts capstan drive assembly. |
| H-144 | | SCREW, machine: No. 6-32 x $\frac{1}{4}$ " long. fl. hd.; mounts capstan drive assembly. |
| H-145 | | SCREW, machine: No. 5-40 x $\frac{1}{2}$ " long; fl. hd.; mounts item S-3. |
| H-146 | | SCREW, self tapping: P.K. type "A"; No. 10 x 1" fl. hd. for mounting mechanism panel to case. |
| H-147 | | SCREW, machine: No. 10-32 x $\frac{3}{8}$ " fl. hd.; for mounting mechanism panel to hinge. |
| H-148 | | SCREW, self tapping: P.K. type "Z"; No. 4 x $\frac{3}{16}$ " bd. hd.; for mounting trim panel to amplifier control panel. |
| H-149 | | NUT, hex: No. 10-32; for mounting mechanism panel to hinge. |
| H-150 | | SCREW, wood: No. 4 x $\frac{3}{8}$ " round head; for mounting ventilator grilles to case. |
| H-151 | 207051 | HINGE, panel: for mounting recorder mechanism to amplifier panel. |
| H-152 | | SCREW, wood: No. 6 x $\frac{1}{2}$ " flat head; for mounting amplifier panel to case. |

LIST OF MATERIAL

| Symbol | BRUSH Part Number | DESCRIPTION |
|--------|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| H-153 | | SCREW, machine: No. 6-32 x $\frac{1}{4}$ " round head; for mounting hinge to amplifier panel. |
| H-154 | | SCREW, wood: No. 8 x 1" round head; for locking amplifier mounting board in track of case. |
| H-155 | | SCREW, machine: No. 6-32 x $\frac{7}{8}$ " flat head; for mounting speaker mounting board to amplifier control panel. |
| H-156 | | SCREW, machine: No. 8-32 x 1" flat head; for mounting speaker to speaker mounting board. |
| H-157 | 207053 | GRILLE, speaker. |
| H-158 | | SCREW, self tapping: P.K. type "Z", No. 10 x $\frac{3}{8}$ " flat head; for mounting amplifier chassis to amplifier control panel. |
| H-159 | | SCREW, machine: No. 4-40 x $\frac{1}{4}$ " flat head; for mounting bias switch (S-4) to control panel (model BK-414 only). |
| H-160 | | NUT, hex: No. 6-32; for mounting hinge to amplifier control panel. |
| H-161 | | WASHER, internal lock: No. 6; for mounting hinge to amplifier control panel. |
| H-162 | | NUT, hex: No. 4-40; for mounting bias switch (S-4) to amplifier control panel. |
| H-163 | | WASHER, internal lock: No. 4; for mounting bias switch (S-4) to amplifier control panel. |
| H-164 | 104870-7 | NUT, elastic stop: No. 8-32; cad. plated; for mounting speaker to speaker mounting board. |
| H-165 | 104870-6 | NUT, elastic stop: No. 6-32; cad. plated; for mounting speaker mounting board to amplifier control panel. |
| H-166 | 103838-4 | SPEEDNUT: for mounting amplifier chassis to control panel. Same as H-10. |
| H-167 | | SCREW, self tapping: P.K. type "Z"; No. 10 x $\frac{3}{4}$ " flat head; for mounting amplifier chassis to amplifier mounting board. |
| H-168 | 106739 | WASHER, insulating: for microphone input jack located on control panel. |
| I-1 | 106705 | ROD, pilot indicator: translucent; lucite; amber; 3" long x $\frac{1}{4}$ " diameter; one end rounded other end beveled 45°. |
| I-2 | 1-105708-1. | LENS, indicator light: pilot light jewel. |
| J-1 | 106763 | CONNECTOR, female contact: microphone input jack; single contact; extension type. |
| J-2 | 104546 | CONNECTOR, female contact: radio input jack; single contact phonoplug type. |
| J-3 | 106730 | CONNECTOR, female contact: record-play head connector; four round contacts; wafer socket type. |
| J-4 | 104765 | CONNECTOR, female contact: power receptacle for motor circuit; two (2) rectangular contacts; molded bakelite; 10 amps at 250 v. or 15 amps at 125 v. |
| J-5 | 106730 | CONNECTOR, female contact: output transformer circuit; four round contacts; wafer socket type. |
| J-6 | 106786 | LAMPHOLDER, pilot light: bayonet base type; for 6-8 volt pilot lamp; clip on type mounting; solder lug connections. |
| J-6-A | 105707 | HOLDER, indicator lamp: pilot lamp bracket (model BK-414 only). |
| J-7 | 21421 | JACK, output: for tip and sleeve type plug; see wiring diagram figure 52. |
| L-1 | 103865 | COIL, oscillator: 30 mh. \pm 5 mh. at 1000 cps.; "Q" not less than 1 at 1000 cps.; for 30 K.C. bias oscillator circuit. |
| L-2 | 200925 | REACTOR, filter: choke; 10 hy.; 62 ma.; 300 ohms D.C. resistance; open metal frame; $2\frac{7}{8}$ " long x $1\frac{1}{2}$ " wide x $1\frac{5}{8}$ " high; 2 mounting holes $2\frac{3}{8}$ " center to center. |
| LS-1 | 305975 | SPEAKER, magnetic: 3.2 ohms voice coil; permanent magnet type; overall dimension $8\frac{3}{32}$ " diameter x $3\frac{53}{64}$ " deep. R.M.A. Std. Mtg. |
| LS-1-A | 207496 | SPEAKER: 3-4 ohm voice coil Jensen Model P6-T, spec. no. S3914. |
| MI-1 | 206789-501 | MICROPHONE, crystal: Brush Development Company Model BA-106-B. |
| MS-1 | 11293-2 | PAD, felt: for erase head bracket. |
| MS-2 | 106129 | PAD, felt: for ribbon pressure at record-play head. |
| O-1 | 104655 | SHIELD, grid cap: for V-1 (6J7) grid; $2\frac{7}{32}$ " diameter x 1" long cad. plated. |

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LIST OF MATERIAL

| Symbol | BRUSH Part Number | DESCRIPTION |
|--------|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| O-2 | 100699-4 | CLIP: for mounting V-3 (6E5 tube) volume indicator; 1¼" long x 1¼" high x ⅜" wide (overall dimensions). |
| O-3 | 106930 | SPACER, polepiece: brass; for new type erase head (see figure 36). |
| O-50 | BK-921 | REEL, Ribbon: empty; 7" diameter x ⅜" thick. |
| O-51 | 106516 | RETAINER, thumb screw: flat washer; ⅜" diameter x .015 thickness; hole .120" diameter. |
| O-52 | 104307-5 | RING, retaining: "Truarc"; I.D. .281"; cat. No. 5100-31. |
| O-53 | 206147 | CUP, reel drive: reel support; 3.925" diameter x ⅜" deep. |
| O-54 | 106423-501 | TRIGGER, rewind: actuates automatic rewind trip lever; located in rewind reel cup sub-assembly. |
| O-55 | 106152 | TRIGGER, take-up: actuates automatic stop trip lever; located in take-up reel cup sub-assembly. |
| O-56 | 206148 | CUP, clutch: faces on clutch; 3.937" I.D. x ⅜" deep. |
| O-57 | 106351-501 | POST, reel: sub-assembly; supports reel cups. |
| O-58 | 106146 | FELT, clutch: clutch facing. |
| O-59 | 106366-501 | PULLEY, clutch: sub-assembly; 3 ²⁵ / ₃₂ " diameter x 1 ⁵ / ₆₄ " thick; pulley "V" angle 60° |
| O-60 | 106212 | BEARING, clutch thrust: oilite; .750" O.D., .315" I.D. x .031" thick. |
| O-61 | 106213 | RETAINER, oil: felt; ⅝" O.D., ⅜" I.D., ⅜" to ⅜" thick. |
| O-62 | 106472 | PULLEY, belt drive: overall dimension—1.656" diameter x 1 ³ / ₃₂ " high; 3 belt grooves, 1 large diameter and 2 small diameter; mounts on drive motor shaft .3130—.3135 diameter. |
| O-63 | 105711-3 | BEARING, reel post: standard oilite No. A-375-3; press fitted to item A-15; reamed to .188" I.D. |
| O-64 | 104307-1 | RING, retaining: "Truarc" No. 5100-25; I.D. .225". |
| O-65 | 106262 | POST, ribbon guide: ⅝" long x .370" diameter; one end tapped for No. 8-32 machine screw. |
| O-66 | 206320 | GUIDE, ribbon: left hand; overall dimension 2 ⁹ / ₃₂ " long x 2 ³ / ₃₂ " wide x 2 ⁵ / ₃₂ " high. |
| O-67 | 206321 | GUIDE, ribbon: right hand; overall dimension 2 ⁹ / ₃₂ " long x 2 ³ / ₃₂ " wide x 2 ⁵ / ₃₂ " high. |
| O-68 | 106119 | SPRING, shift rod: control lever; free length 2 ⁷ / ₃₂ " long; I.D. 7 ¹ / ₃₂ "; consists of 9½ coils of No. 18 B. & S. GA. spring bronze. |
| O-69 | 104307-6 | RING, retaining: "Truarc" No. 5100-18; .170/.164 I.D. |
| O-70 | 7553 | BALL, steel: ⅜" diameter; ball actuator for switch S-6. |
| O-71 | 106270-501 | ROD, control lever: shift rod; 3 ¹⁷ / ₃₂ " long x ⅜" diameter. |
| O-72 | 106401 | INSULATOR, switch cover: made from .032" thick Wilmington fiberoid armature slot paper cut 5 ¹¹ / ₁₆ " long x 1 ⁵ / ₁₆ " wide; folded 1 ¹ / ₈ " from each end. |
| O-73 | 206460-501 | CAPSTAN, drive: sub-assembly, complete; includes spindle, spindle bearing, flywheel, pulley, lower bearing, and mounting bracket. |
| O-74 | 106143 | SLEEVE, erase pin: mounts erase bracket hinge (H-122) and supports erase pin (O-75); overall dimension ½" square x ⅜" high; one end threaded ⅜-32; sleeve I.D. ¼"; |
| O-75 | 106142 | PIN, erase: actuates erase head bracket to engage head; 1 ¹⁷ / ₃₂ " long x .240" diameter; stop flange at one end ½" thick; .028" wide retainer slot milled ¼" from flange end. |
| O-76 | 106340 | BELT, rubber: clutch drive; circular shape 8 ⁵ / ₈ " diameter x ⅜" cross sectional diameter. |
| O-77 | 106339 | BELT, rubber: motor drive; circular shape 3 ⁵ / ₈ " diameter x ⅜" cross sectional diameter. |
| O-78 | 106364-501 | BEARING, capstan spindle: sub-assembly; overall dimension 1" long x .374" diameter with flange .748" diameter x .032" thick near threaded end; thread size ⅜-32. |
| O-79 | 106137 | DISC, flywheel: for capstan drive assembly; uses 3 each; overall dimension 3" diameter x .060" thick; indexing notch ⅜" x ⅜" along outer circumference. |

LIST OF MATERIAL

| Symbol | BRUSH Part Number | DESCRIPTION |
|--------|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| O-80 | Sold only as | CAPSTAN, drive: sub-assembly; includes items O-80, O-81, and O-82 press fitted and riveted together; individual parts not readily replaceable. |
| O-81 | one sub-assembly unit part | |
| O-82 | No. 106338-501 | |
| O-83 | 106127 | SHAFT, pressure wheel: overall dimension $1\frac{1}{16}$ " long x .1239" diameter. |
| O-84 | 106125 | WHEEL, pressure: rubber tire mounted on metal rim with oilite bearing; overall dimension 1" diameter x $\frac{5}{16}$ " wide; bearing $\frac{7}{16}$ " long x .314" diameter, $\frac{1}{8}$ " center hole. |
| O-85 | 106128 | SPRING, pressure wheel: Special; made from No. 16 G.A. (.037) music wire; overall dimension $2\frac{1}{8}$ " long x $\frac{7}{16}$ " wide x $1\frac{1}{32}$ " high. |
| O-86 | 206410 | LEVER ASSEMBLY, raising; two (2) levers part No. 106113 riveted to a lever raising link part No. 106118; functions to engage or disengage the turntable clutches, |
| O-87 | 106616 | SPRING, compression: clutch lever; free length $2\frac{7}{32}$ "; consists of $9\frac{1}{2}$ coils .312" max. O.D.; 3 lb. force at $\frac{5}{8}$ " compressed length, $\pm 5\%$. |
| O-88 | 106405 | SPRING, extension: for head locking slide sub-assembly; free length $1\frac{1}{16}$ " center of end loop to center of other end loop; consists of 24 coils .255 O.D.; 4 lb. force at expanded length of $1\frac{5}{16}$ ". |
| O-89 | 106153 | LEVER, rewind trip: for tripping automatic rewind controls; overall dimension $\frac{7}{16}$ " x $\frac{9}{16}$ " x $1\frac{1}{2}$ ". |
| O-90 | 106154 | LEVER, take-up trip: for tripping automatic stop controls; overall dimension $2\frac{3}{16}$ " x $2\frac{7}{32}$ " x $\frac{9}{16}$ ". |
| O-91 | 206112 | SLIDE, latch cam: functions to reset take-up trip lever; overall dimension $6\frac{1}{8}$ " long x $2\frac{39}{64}$ " wide x $\frac{5}{8}$ " high. |
| O-92 | 206502 | LEVER, clutch: actuates clutch raising lever assembly; overall dimension $7\frac{11}{16}$ " long x $1\frac{3}{8}$ " wide x $1\frac{7}{32}$ " high. |
| O-93 | 206169 | GATE, latching: functions to latch the clutch lever and the head locking slide; overall dimension $2\frac{4}{64}$ " long x $1\frac{3}{8}$ " wide x $\frac{13}{16}$ " high. |
| O-94 | 206391-501 | SLIDE, head locking: functions to lock the erase head in its engaged position; overall dimension $8\frac{5}{16}$ " long x $3\frac{1}{16}$ " wide by $\frac{13}{16}$ " high. |
| O-95 | 106615 | SPRING, extension: for trip bar extension return; free length $1\frac{3}{16}$ " including end loops; consists of $22\frac{1}{2}$ coils, close wound, .255 O.D.; 4 lb. force at extended length of $1\frac{5}{16}$ "; made from .032" diameter stainless steel type 302. |
| O-96 | 106406 | SPRING, extension: for latch cam return; free length 1" including end loops; consists of 20 coils, close wound, .281 max. O.D.; 1 lb-14 oz. force at extended length of $1\frac{23}{32}$ "; made from .026" diameter music wire. |
| O-97 | 106404 | SPRING, extension: for latching gate; free length $\frac{3}{4}$ " including end loops; consists of 22 coils close wound, from .017" diameter music wire; coils $\frac{3}{16}$ " O.D.; 12 oz. force at extended length of $1\frac{1}{32}$ ". |
| O-98 | Same as O-97 | SPRING, extension: for rewind trip lever. |
| O-99 | 206392-501 | BAR, trip lever sub-assembly; attached to trip lever bar link; part of control mechanism. |
| O-100 | 103142 | CLIP, latch cam retainer: General Industries Co. part No. 21914; $\frac{7}{16}$ " long; made from No. 11 Ga. steel music wire. |
| O-101 | 106160 | CAM, latch: part of control mechanism; overall dimension $1\frac{5}{32}$ " long x $2\frac{1}{32}$ " wide x $\frac{3}{8}$ " high. |
| O-102 | 106617 | SPRING, extension: for trip lever latch; free length $2\frac{7}{32}$ " including end loops; consists of $14\frac{1}{2}$ coils close wound from .028" diameter stainless steel type 302; coils .205" O.D.; $2\frac{3}{8}$ lbs. force at extended length of $1\frac{1}{8}$ ". |
| O-103 | 207126 | GRILLE, ventilator: for left side of case (Model BK-414 only). |
| O-104 | 207060 | GRILLE, ventilator: for right side of case (Model BK-414 only). |
| O-105 | 107220 | BUSHING, tube: rubber bushing for protecting volume indicator tube. |
| P-1 | 106738-3 | CONNECTOR, male contact: microphone input plug; single pin contact .125" diameter; phono-plug type with opening in shield for .175" diameter core. |
| P-2 | 106738-3 | CONNECTOR, male contact: radio input plug; same as P-1. |

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LIST OF MATERIAL

| Symbol | BRUSH Part Number | DESCRIPTION |
|--------|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| P-3 | 106765 | CONNECTOR, male contact: record/play head connection; four pin-type contacts mounted and indexed on wafer insulator. Does not include shell (part number 106764). |
| P-4 | 1-107306-1 | CONNECTOR, male contact: power connection of A.C. motor; 2 prong contacts; .138" x .230" opening for wire. |
| P-5 | 106765 | CONNECTOR, male contact: output transformer circuit; four pin-type contacts mounted and indexed on wafer insulator. Does not include shell (part number 106764). |
| R-1 | 3-106771-3 | RESISTOR, fixed: 1 megohm \pm 20%; 1/2 watt; radio input circuit. |
| R-2 | 3-106771-7 | RESISTOR, fixed: 22,000 ohms \pm 20%; 1/2 watt; radio input circuit. |
| R-3 | 3-106771-3 | RESISTOR, fixed: 1 megohm \pm 20%; 1/2 watt; V-1 grid return. |
| R-4 | 3-106771-7 | RESISTOR, fixed: 22,000 ohms \pm 20%; 1/2 watt; reproduce-head shunt (play-back only). |
| R-5 | 3-106771-2 | RESISTOR, fixed: 2200 ohms \pm 20%; 1/2 watt; V-1 cathode. |
| R-6 | 103806-12 | RESISTOR, fixed: 470,000 ohms \pm 10%; 1/2 watt; V-1 plate load. |
| R-7 | 3-106771-8 | RESISTOR, fixed: 2.2 megohms \pm 20%; 1/2 watt; V-1 screen. |
| R-8 | 3-106771-7 | RESISTOR, fixed: 22,000 ohms \pm 20%; 1/2 watt; decoupling and B \pm filter for V-1, |
| R-9 | 103469 | RESISTOR, variable: 1 megohm; potentiometer; "Play" or "Record" volume control. |
| R-10 | 3-106771-5 | RESISTOR, fixed: 390 ohms \pm 20%; 1/2 watt; V-2 cathode. |
| R-11 | 2-106772-3 | RESISTOR, fixed: 47,000 ohms \pm 10%; 1 watt; V-2 screen. |
| R-12 | 2-106772-2 | RESISTOR, fixed: 18,000 ohms \pm 10%; 1 watt; V-2 plate load. |
| R-13 | 2-106772-3 | RESISTOR, fixed: 47,000 ohms \pm 10%; 1 watt; V-2 screen to cathode. |
| R-14 | 3-106771-1 | RESISTOR, fixed: 220,000 ohms \pm 20%; 1/2 watt; monitor volume limiting. |
| R-15 | 103806-12 | RESISTOR, fixed: 470,000 ohms \pm 10%; 1/2 watt; V-5 grid return (play-back only). |
| R-16 | 103469-2 | RESISTOR, variable: 25,000 ohms; potentiometer; monitor volume control (record-radio only). |
| R-17 | 3-106771-1 | RESISTOR, fixed: 220,000 ohms \pm 20%; 1/2 watt; V-3 grid. |
| R-18 | 3-106771-3 | RESISTOR, fixed: 1 megohm \pm 20%; 1/2 watt; B \pm supply to 6E5 target. |
| R-19 | 3-106771-8 | RESISTOR, fixed: 2.2 megohm \pm 20%; 1/2 watt; V-3 grid return. |
| R-20 | 3-106771-2 | RESISTOR, fixed: 2200 ohms \pm 20%; 1/2 watt; frequency compensating network. |
| R-21 | 1-106771-9 | RESISTOR, fixed: 10,000 ohms \pm 5%; 1/2 watt; closes shadow of 6E5 until erase-pin is pressed (not shown on photographs). |
| R-22 | 1-106771-9 | RESISTOR, fixed: 10,000 ohms \pm 5%; 1/2 watt; increases 30 KC bias current from V-4. |
| R-23 | 1-106771-5 | RESISTOR, fixed: 10,000 ohms \pm 5%; 1/2 watt; V-4 cathode. |
| R-24 | 106762-1 | RESISTOR, variable 100,000 ohms; potentiometer; tone control (play-back and monitor only); includes power switch S-5. |
| R-25 | 3-106772-4 | RESISTOR, fixed: 2200 ohms \pm 20%; 1 watt; B + voltage dropping. |
| R-26 | 3-106771-1 | RESISTOR, fixed: 220,000 ohms \pm 20%; 1/2 watt; phase inverter (V-5) plate load (1st section). |
| R-27 | 3-106771-1 | RESISTOR, fixed: 220,000 ohms \pm 20%; 1/2 watt; phase inverter (V-5) plate load (2nd section). |
| R-28 | 3-106771-5 | RESISTOR, fixed: 390 ohms \pm 20%; 1/2 watt; phase inverter (V-5) cathode. |
| R-29 | 3-106771-1 | RESISTOR, fixed: 220,000 ohms \pm 20%; 1/2 watt; phase inverter (V-5) voltage divider. |
| R-30 | 103806-12 | RESISTOR, fixed: 470,000 ohms \pm 10%; 1/2 watt; pushpull output (V-6) grid (1st section). |
| R-31 | 103806-12 | RESISTOR, fixed: 470,000 ohms \pm 10%; 1/2 watt; pushpull output (V-6) grid (2nd section). |
| R-32 | 103713-40 | RESISTOR, fixed: 750 ohms \pm 5%; 1/2 watt; V-6 cathode. |
| S-1 | 106746-3 | SWITCH, rotary: record-play selector; 2 sections, 3 poles each section, 3 positions. |

LIST OF MATERIAL

| Symbol | BRUSH Part Number | DESCRIPTION |
|--------|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| S-2 | 106909-501 | SWITCH, lever: reproduce head muting switch; S.P.S.T. actuated by control lever mechanism. |
| S-3 | 106916-501 | SWITCH, lever: renders volume indicator inoperative until erase head is engaged; S.P.D.T. |
| S-4 | 106801-1 | SWITCH, slide: bias level; S.P.S.T. |
| S-5 | See R-24 | SWITCH, power: part of tone control R-24. |
| S-6 | 106317-501 | SWITCH, lever: operates A.C. motor when actuated by control levers. |
| T-1 | 204902 | TRANSFORMER, power: filament and plate type; input 117 v., 60 cycles, single phase; three secondary windings as follows—(1) high voltage 300 v. E.S.C. at 80 ma., leads red, red and yellow, and red, (2) rectifier filament 5 volts at 2 amps., leads yellow and yellow, (3) filament 6.3 volts at 4.8 amps., leads green, green and yellow, and green; overall dimensions 3 $\frac{3}{4}$ " long x 3 $\frac{1}{8}$ " wide x 3 $\frac{1}{2}$ " high. |
| T-2 | 200923 | TRANSFORMER, A.F. output: plate coupling type; primary impedance—22,000 ohms; 10 ma. E.S.C.; secondary—3.2 ohms; overall dimensions 2 $\frac{3}{8}$ " long x 1 $\frac{1}{16}$ " high x 1 $\frac{1}{2}$ " wide. |
| T-2-A | 107497 | TRANSFORMER, A.F. output: plate coupling type; primary impedance 22,000 ohms; 10 ma. E.S.C.; secondary—3 to 4 ohms; overall dimensions 1 $\frac{3}{4}$ " lg. x 1 $\frac{1}{2}$ " wd. x 1 $\frac{3}{8}$ " high. |
| U-1 | 406800-501 | AMPLIFIER, A.F.: record/reproducer amplifier chassis, wired, complete with tubes. |
| V-1 | 7075 | TUBE, electron: R.M.A. No. 6J7; input amplifier. |
| V-2 | 13678 | TUBE, electron: R.M.A. No. 6SJ7; second stage; current converter. |
| V-3 | 105206 | TUBE, electron: R.M.A. No. 6E5; record volume indicator. |
| V-4 | 9834 | TUBE, electron: R.M.A. No. 6J5; 30 K.C. bias oscillator. |
| V-5 | 103185 | TUBE, electron: R.M.A. No. 6SN7 GT.; twin-triode; phase invert |
| V-6 | 103185 | TUBE, electron: R.M.A. No. 6SN7 GT.; twin-triode; pushpull power output. |
| V-7 | 102705 | TUBE, electron: R.M.A. No. 5Y3-GT; rectifier, full wave; D.C. power supply. |
| W-1 | 206923 | CABLE ASSEMBLY, power: P.O.S.J. 32, two conductor No. 18; stranded; rubber insulated; includes plug. |
| W-2 | 206741-501 | CABLE ASSEMBLY, volume indicator: includes socket and socket shield for 6E5 tube; 5 color coded wires as follows: one (1) white-yellow tracer, one (1) white-red tracer, one (1) white-black tracer, one (1) white-blue tracer, one (1) white-green tracer; 1 megohm resistor; spaghetti tubing for covering all wires. |
| W-3 | 106515 | STRAP, ground: No. 30 (.010) B & S GA. Phos. Bronze; overall length 2 $\frac{3}{4}$ "; $\frac{1}{64}$ diameter punch hole each end. |
| W-4 | 207203-501 | CABLE, head extension: for connecting the record head and switch S-3 (located on mechanism panel) to amplifier (Model BK-414 only). |
| W-5 | 207059-501 | CABLE, input extension: for microphone input jack on control panel to amplifier; includes input jack, shielded cable, and plug. |
| W-6 | 207059-501 | CABLE, input extension: for radio input jack on control panel to amplifier; includes input jack, shielded cable, and plug. |
| X-1 | 106740 | SOCKET, tube: 8 prong wafer type; mounting holes spaced 1 $\frac{1}{2}$ " center to center. |
| 101 | 506690-501 | CABINET; for housing complete recorder-reproducer mechanism and amplifier equipment for Brush Model BK-411 Soundmirror. |
| 201 | 507055-501 | CASE, carrying: for mounting amplifier and recorder mechanism; includes lid (Model BK-414). |
| 501 | 106296 | KNOB, control shift: for shifting positions of control mechanism; overall dimension 1" diameter; tapped for No. 10-32 thread; Kurz-Kasch, Inc. part No. S-801-10D. |
| 601 | 2-103468-2 | KNOB, control: for amplifier controls; walnut finish; push-on type w/spring; for $\frac{1}{4}$ " shaft flattened to .156"; depth of shaft hole $\frac{1}{32}$ "; overall dimension 1" diameter x $\frac{5}{8}$ " high; Kurz-Kasch Inc. part No. S-453-29. |

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Since the initial preparation of the BK-411 and BK-414 Service Manual, a considerable amount of service information has become available through field experience. This supplement is therefore issued to bring this information to the serviceman's attention and should be read thoroughly in conjunction with the manual. In addition to the items noted below, a revised symptom-cause-remedy chart is appended which has been based on this experience.

OUTPUT PLUG AND SHORT CIRCUITING

In early production of the BK-411 and BK-414, the output plug was mounted so that the shell of the plug could come in contact with the chassis and it was possible for a short circuit to occur from B+ to ground through the metal shell of this plug. This failure would cause a loud hum and might burn out either the rectifier or the output transformer. As soon as this condition was noted, an immediate change was made in production and all "Soundmirrors" in stock were protected by the addition of an insulating washer over the prongs of the output plug, making it impossible for the plug shell to ground to the chassis. All recorders should be checked to see that either the output plug socket has been remounted so that the plug shell cannot short or the insulating washer is present.

REDUCTION OF HUM

Excessive hum in these recorders is most commonly due to improper placement of the grid lead of the first 6J7 tube. This lead should be carefully oriented for minimum hum.

FAILURE OF MOTOR SWITCH

In early production of the BK-411 and

BK-414, some difficulty has been encountered in the field with the motor switch's failing to operate, usually due to the actuator ball's having jumped out of the switch. If the ball is replaced and the recorder tripped into automatic rewind, it can be seen that the blade on which this ball rides almost escapes from under the ball. This switch should be carefully adjusted so that the ball remains positioned over the edge of the blade and the ball cannot escape. After this has been done, the switch should be checked to see that when the control lever is in the neutral position, the ball is actually in the center of the dimple made to receive it. In later production of the "Soundmirror", a protuberance was staked out on the side of the actuator lever so that the ball is not permitted to escape. In most recent construction, the pivot tongue on Part #092, Figure 11, Page 8, has been lengthened so that this pivot point can be adjusted by bending the tongue to prevent difficulty in adjustment of the motor switch.

If the recorder has the new type of clutch operating lever so that the pivot tongue can be adjusted, the following procedure should be used:

1. Loosen the clutch adjusting set screws (H-20) five or six turns each.
2. Raise the mechanism panel.
3. Move the control lever to the "Stop" position and release it. This assures that the mechanism is in the "Stop" condition.
4. Remove the two screws (H-121) holding the switch cover (A-22) over the automatic motor switch and remove the cover with its fiber inner lining.
5. Loosen but do not remove the two screws holding the clutch lifter bracket

assembly (A-18, Fig. 15) in place so the assembly can be moved freely. If the spring is distorted, straighten it or replace the assembly.

6. At this time check the positioning of the clutch operating lever (O-92, Fig. 14). In its neutral position, the axis of the round rod of the control lever (O-71, Fig. 5) should lie on the center line of the clutch operating lever. This means that the angular excursion of the clutch operating lever should be the same from neutral to the "Fast Forward" limit stop as it is from neutral to the "Fast Reverse" limit stop. In no case should the excursion from neutral to the "Fast Reverse" limit stop exceed the excursion from neutral to the "Fast Forward" limit stop. If the neutral position must be shifted slightly, it may be done by bending sideways the narrow section of the clutch operating lever (O-92, Fig. 11) that serves as a pivot, since the neutral position is determined by this pivot and the spring (O-87, Fig. 11).

7. The clutch lifter bracket assembly should now be so located that with the clutch operating lever centered, and the backlash of the connecting linkages taken up by moving the dimpled end of the clutch raising lever toward the motor, the ball actuator (O-70, Fig. 15) just drops into the dimple of the clutch raising lever. Tighten the two screws (H-169) securely.

8. Check to make sure that in the "Fast Forward" and "Play-Record" positions of the mechanism the raising lever does not jam and distort the bronze spring near the end where it is riveted.

9. Check to make sure that in the extreme excursion of "Rewind" and "Fast Reverse" positions the ball actuator (O-70, Fig. 15) cannot drop out.

10. Check to make sure that in both the "Fast Forward" and the "Fast Reverse" positions, the motor switch contacts close firmly, and that they are open in the "Stop" position.

11. If the spring of the clutch lifter bracket associated with the take-up reel is distorted, it should be repaired or the assembly replaced as is indicated above.

12. When replacing this assembly, adjust its position so that the dimple of the lifter lever causes maximum displacement of the bronze spring when moving from the "Stop" condition to the "Fast Reverse" condition. Check to make sure that in "Rewind" position the lifting lever does not jam and distort the bronze spring near the end where it is riveted. Tighten the two screws (H-169) securely.

13. Replace the switch cover (A-22) and tighten its screws securely.

14. Lower the unit back down onto the cabinet and adjust the clutches.

NOISY MOTOR

When an apparently noisy motor is encountered in the BK 411 or BK-414, first the clutch drive belts and then the capstan drive belt should be disengaged from the motor to definitely establish that the vibration is originating in the motor itself. If this is the case, the fan should be carefully examined for loose or bent blades. Many cases of vibration prove to be due to the shock mounts of the motor having become misaligned in shipments so that one mount is jammed and the motor is not really isolated from the chassis. A few "Sound-mirrors" were constructed in which the ground strap for the motor was of much too heavy material and transmitted vibration to the chassis. In almost all cases, if the fan is in good condition and

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the shock mounts are free and functioning properly, the motor noise will be found to be unobjectionable.

BELT GUIDE

Some difficulty was encountered in early production with the clutch drive belt, Part O-76, Figure 8, Page 6, jumping on the motor pulley so that the belt rubbed against itself and wore out quite rapidly. This problem has been eliminated by the use of a shorter and heavier belt and by the installation of a belt guide. This belt guide, Part #207143, should be installed under the motor mounting screw, Part H102, Figure 12, Page 9, and adjusted so that the belt does not touch the guide but is prevented by the guide from jumping out of its proper grooves. To install this guide the present motor mounting screw will require replacement with a half-inch No. 10 self-tapping screw. The belt guide is slipped under the screwhead and a No. 10 flat washer placed over the belt guide and a lock washer between the screwhead and the flat washer.

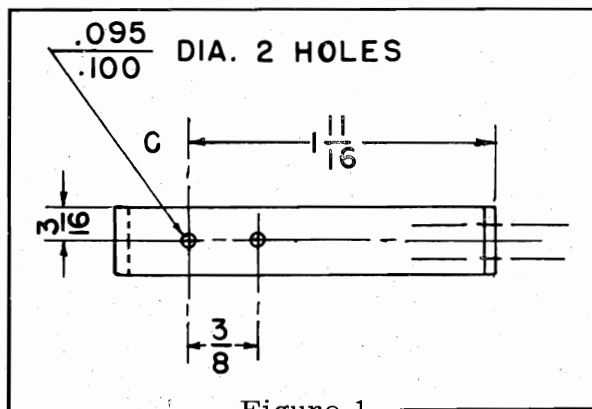
PRESSURE BRACKET BENDING

Quite frequently complaints of low volume, distorted recording and poor high frequency response prove to be due to the pressure bracket, A16, Fig. 9, Page 6, bending at the point where the arm joins the bracket, which in turn causes the head pad, MS2, no longer to bear directly on the recording head gap. This bending has only occurred in certain brackets which had a sharp corner in place of a radius in the arm of the bracket and then, only in machines which used the early relatively heavy head locking slide spring, Part O-88, Figure 11, Page 8. When this condition is discovered, the pressure wheel bracket should be replaced with one which has a satisfactory radius at the bends, and the head locking slide spring

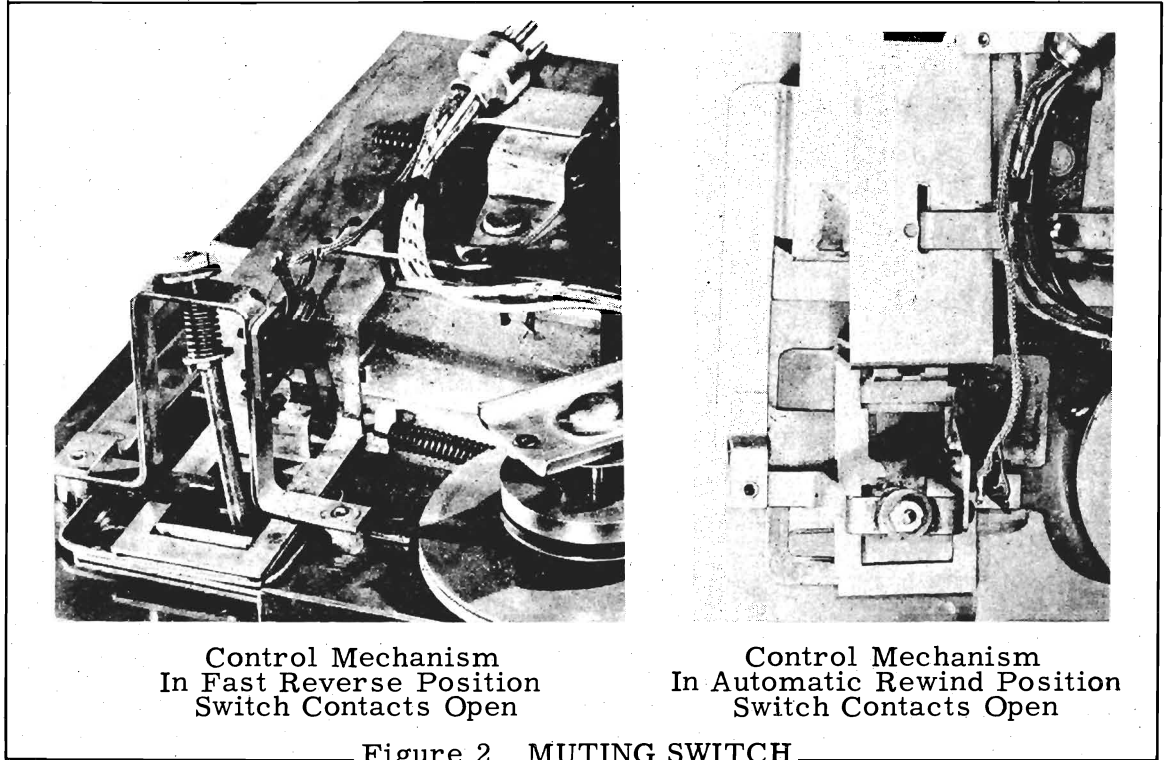
replaced with one of the newer type springs which will eliminate the violent recoil of this bracket which has contributed to the original bending.

MUTING SWITCH

Early production of the BK-411 "Sound-mirror" was shipped without the installation of the muting switch which silences the recorder during automatic rewind. This switch, S-2, Part #106909-501, should be mounted on the inner side of the control rod bracket as shown in Figure 2. Most of these recorders have this bracket drilled for the mounting of this switch; however, if these holes have not been drilled, holes should be drilled as indicated in Figure 1. The



switch is mounted on the control rod bracket as shown in Figure 2 by means of two No. 4 self-tapping screws. On most recorders a shielded lead has been brought over to the switch position and taped back, which should be connected to the switch. However, if the lead is not present, a shielded lead should be run from the head plug and connected across the head. The shield of the lead should be connected to the inner blade of this switch and the center conductor to the outer contact. After mounting, the switch should be adjusted so that the actuator button passes inside of Part O-93, Figure 14, in all positions except automatic rewind, in which position the button is actuated by O-93.

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Control Mechanism
In Fast Reverse Position
Switch Contacts Open

Control Mechanism
In Automatic Rewind Position
Switch Contacts Open

Figure 2 MUTING SWITCH

ELIMINATION OF RADIO AND TELEVISION INTERFERENCE

When operated in high field strengths of FM or television stations, the BK-411 and BK-414 "Soundmirrors" are sometimes subject to interference. In the case of interference from television stations, this sometimes appears as a loud hum or whistle, due to the synchronizing signals' getting into the recorder. To eliminate this interference, the steps listed below should be tried in order:

1. A 50 mm condenser should be added between the point on the rotary selector switch, Part S1, Figure 25, to which the grid of V-1 returns, and the center or ground lug on the three-terminal strip which is situated on the front panel of the amplifier adjacent to the selector switch.

2. The condenser, C-4, bypassing the screen of the first gain stage, should be changed to the extent of removing the

condenser connection from the cathode pin of the tube socket and connecting it to the ground lug on the condenser C-1, C-3, C-6.

3. A mica .001 condenser should be added from the cathode pin of V-1 to the same ground point on the electrolytic condenser as used in "2".

4. A mica .001 condenser should be added from the screen of V-1 to the same point on the electrolytic condenser as was used in "2" and "3".

INSTALLATION OF VU METER ON BK 401, BK 403, BK-411 AND BK-414 "SOUNDMIRRORS"

Requests have been received from the field, from time to time, for information on the connection of a VU meter to replace the cathode eye used as a volume indicator on the "Soundmirror". The changes required to do so are very simple, involving the connection of a VU meter from ground to the screen of

MODELS BK-411,
BK-414

the recording stage through a capacitor and, in the case of the BK-411 and BK-414, the addition of a series limiting resistor.

For the BK-401 and BK-403, the coupling capacitor from the recording stage screen to the 6E5 grid, C-25, should be changed from 0.1 mfd to 0.05 mfd, 600 volts. The meter is then connected directly from the capacitor to ground and the 6E5 tube removed.

In the case of the BK-411 and BK-414, the coupling capacitor, C-11, 0.05 mfd, should be changed to a 0.1 mfd, 600 volt capacitor, in series with a 6800 ohm 1/2 watt resistor. The meter is then connected from the 6800 ohm resistor to ground and the 6E5 tube removed.

In the case of the BK-411 and BK-414, the frequency response of the meter will be within $1\frac{1}{2}$ db over the normal recording range and is down only 5 db at 10 kc. In the case of the BK-401 and BK-403, the frequency response will be about ± 3 db over the range from 50 to 10,000 cycles. Due to the fact that the source impedance is not that recommended for the standard VU meter, the dynamic characteristics of the meter will be slightly altered. However, we believe that this will not be sufficient to interfere with its utility.

CONNECTION OF BK-411 AND BK-414 TO PERMIT MONITORING DURING MICROPHONE RECORDING AND USE AS A PUBLIC ADDRESS SYSTEM

In the BK-411 and BK-414, the amplifier has been deliberately constructed so that it is not possible to monitor during microphone recording. This has been done to eliminate the possibility of spoiling recordings by accidentally opening the monitor gain control and producing acoustic feedback during the recording process. However, in cases where the microphone is to be placed in another room or where the "Sound-mirror" may be needed as a low-power public address system, it may be advantageous to make a modification of this circuit.

The necessary connection is made on the rear deck of the selector switch. The end of the 470K resistor, which is now common with the white lead with black tracer which goes to ground, should be removed from the switch. The resistor should be left connected to ground. A jumper should be run from the terminal thus vacated to the third terminal on the left which has a white lead with yellow tracer which goes to the rotor of the monitor gain control. With this change, the monitor amplifier will be in operation in recording from both microphone and radio. Therefore, care must be exercised when the microphone is in the vicinity of the recorder not to open the monitor gain control while recording.

| SYMPTOM | CAUSE | REMEDY |
|-----------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DOES NOT RECORD | | |
| a. Cathode eye does not light. | 1. Record play switch in play position. (Fig. 6) | 1. Set controls as outlined in operating instructions. |
| b. Cathode eye lights but does not indicate. Monitor O.K. | 1. No input. 2. Erase pin not depressed. (Fig. 2) 3. Erase switch (S-3) not operating. 4. Defective coupling condenser C 7 or C 6. 5. Defective tube V-2. | 1. Check input connections. 2. Check trim plate to see that it is not obstructing erase head. 3. Check for dirty or poorly adjusted contacts. 4. Replace. 5. Replace. |
| c. Eye indicates. Monitor O.K. | 1. Defective coupling condenser C 7. 2. Shorting erase-switch S-3. 3. Defective head E-1. | 1. Replace. 2. Adjust switch and leads. 3. Replace. |
| FAILURE TO DRIVE | | |
| a. Motor operates but reels do not revolve. | 1. Defective belt O-76. (Fig. 8) 2. Trim cover binding A-10. (Fig. 4) 3. Defective belt O-77. (Fig. 8) 4. Improper clutch adjustment. | 1. Replace. 2. Adjust position of cover. 3. Replace. 4. Adjust according to instruction Pg. 41. |
| b. Motor does not run. | 1. Ball jumped from position O-7. (Fig. 38) 2. Defective switch S-6. (Fig. 38) (See supplement) 3. Motor plug out P-4. (Fig. 16) 4. Fan blocked. 5. Capstan bearing binding O-78, A-26. (Fig. 37) | 1. Replace ball and readjust according to supplement. 2. Clean and adjust contacts. 3. Insert P-4 into S-4. 4. Dress and/or lace wire leads. 5. Align bearing, lubricate. If bearing is damaged, replace. |
| FAILURE TO DRIVE IN REWIND | 1. Improper clutch adjustment. | 1. Adjust, Page 41. |

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BK-414

SYMPTOM

CAUSE

REMEDY

2. Improper ribbon guide adjustment.
3. Rewind clutch lifter bracket requires adjustment A-18. (Fig. 38)
4. Pressure wheel assembly (A-16 Fig. 38) does not disengage--head locking slide spring too weak O-88. (Fig. 11)

2. Adjust, Page 42.
3. Reform phosphor bronze spring and adjust bracket. See supplement.
4. Replace spring O-88.

FAILURE TO DRIVE IN FAST FORWARD

1. Improper clutch adjustment.
2. Improper ribbon guide adjustment.
3. Clutch lifter bracket maladjusted A-21. (Fig. 38)

1. Adjust clutches, Page 41.
2. Adjust ribbon guides, Page 42.
3. Reform phosphor bronze spring, adjust bracket; see supplement.

BREAKS TAPE

1. Insufficient head pad pressure.
2. Pressure roller not adjusted or spring deformed.

1. See ribbon tension adjustment, Pg. 42.
2. See roller pressure adjustment, Pg. 42.

FAILURE TO AUTOMATICALLY REWIND

1. Rewind trigger binding on reel O-54. (Fig. 38)
2. Rewind trigger bent.
3. Rewind trigger spring too weak.
4. Bar, trip lever (O-99, Fig. 12) binding.
5. Recorder not fully cocked take-up trip lever O-90 (Fig.13) did not catch on trip lever latch H-141. (Fig. 13)

1. Reposition reel to allow free movement of trip.
2. Reshape as in O-54, Fig. 38.
3. Reshape to increase tension.
4. Clean dirt, burrs or cause of binding and lubricate parts with Molycote and thin with carbon tetrachloride or use S A E 10 oil.
5. Oil take-up trip lever. Replace spring if necessary O-98. Bend lip on part H-141 toward part O-91 at their point of contact to allow part H-141 to travel greater distance.

FAILURE TO STOP AUTOMATICALLY

1. Reel binding take-up trigger O-55. (Fig. 38)
2. Take-up trigger bent.

1. Reposition reel to allow free movement of trip.
2. Reshape trigger O-55 as in Fig. 38.

| SYMPTOM | CAUSE | REMEDY |
|-----------------------------|-----------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| MOTOR CONTINUES TO RUN | 3. Take-up trip lever binding in reel cup. | 3. Loosen hold down reel nut so as not to buckle cups. |
| MOTOR CONTINUES TO RUN | 1. Switch improperly adjusted S-6. (Fig. 38) | 1. Adjust switch contacts to open in stop position. |
| CONTROL KNOB FAILS TO LATCH | 1. Latching gate binding O-93. (Fig. 14) | 1. Clean dirt burrs or cause of binding, lubricate parts with Molycote or SAE 10 oil, replace spring O-97, Fig. 14, if necessary. |
| | 2. Trim cover jamming pressure wheel or link (See Pg. 3) (Trim Cover) | 2. Reposition covers to allow free movement of mechanism. |
| | 3. Erase head binding on trim plate or not rising fully. | 3. Reposition trim plate or file trim plate to allow head clearance. |
| POOR ERASE | 1. Misaligned erase head. | 1. See adjustment, Page 38. |
| | 2. Head is dirty. | 2. Brush away tape accumulation with stiff bristle brush. |
| | 3. Ribbon guide mis-adjusted. | 3. See ribbon guide adjustment, Pg. 42. |
| | 4. Weak magnets. | 4. Replace. |
| REWINDS SPONTANEOUSLY | 1. Rewind trip lever misformed. | 1. Reshape rewind trip lever O-54 as in Fig. 38. |
| | 2. Tape wound loosely. | 2. See adjustment of ribbon guides, Pg. 42. |
| HUM | 1. Defective input, defective mike, etc. | 1. Check connections and grounds. |
| With Volume Control | 2. Mike plug grounding on panel. | 2. On models BK-414 readjust trim plate A-27 or enlarge hole. |
| Open | 3. Grid lead to V-1 misplaced. | 3. Dress grid lead for minimum hum. |
| | 4. High voltage transformer leads not dressed down to chassis. | 4. Dress against chassis. |

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BK-4114

| SYMPTOM | CAUSE | REMEDY |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MECHANICALLY NOISY | <ol style="list-style-type: none"> 5. Defective first stage tube V-1. 6. Poor ground connection on chassis. 1. Belt Whipping. 2. Loose or bent fan. 3. Dirty clutch bearing. 4. Dirty capstan bearings. 5. Capstan belt hitting belt guide or head lead. 6. Spaghetti on flywheel drive pins misplaced. (See Fig. 37) | <ol style="list-style-type: none"> 5. Replace. 6. Check all ground connections. 1. Adjust motor pulley O-62, Fig. 38. 2. Straighten or tighten. 3. Disassemble and clean, Page 37. 4. Disassemble and clean, Page 35. 5. Move guide or head lead. 6. Reposition, Page 36. |
| POOR FREQUENCY RESPONSE | <ol style="list-style-type: none"> 1. Insufficient head pad pressure (Pg.42) 2. Pressure pad not parallel to recording head gap. 3. Misadjustment of recording head. 4. Compensating condenser C-12 failed. 5. Dirty head. | <ol style="list-style-type: none"> 1. See adjustment of ribbon pressure, Page 42. 2. Bend arm so pad is parallel and adjust pressure. 3. Readjust, See Page 40. 4. Replace. 5. Clean. |
| b. No Lows | <ol style="list-style-type: none"> 1. Insufficient bias. Note: Bias may be measured with a sensitive A-C voltmeter by placing a ten ohm resistor in series with ground lead from head. 2. C-13 or R-20 defective. 3. Low capacity coupling condensers. | <ol style="list-style-type: none"> 1. See Page 16 Record bias circuit. 2. Replace. 3. Replace. |
| LOW OUTPUT | <ol style="list-style-type: none"> 1. See above poor frequency response. 2. Low emission tube. 3. Defective head. 4. Defective output transformer or speaker. | <ol style="list-style-type: none"> 2. Replace. 3. Replace. 4. Replace. |

| SYMPTOM | CAUSE | REMEDY |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| NO OUTPUT | <ol style="list-style-type: none"> 1. Set not turned on. 2. Head plug out. 3. Output plug out. 4. Output plug shorted. 5. Speaker leads shorted. 6. Shorting link missing between terminals 1 and 2 on output terminal strip E-3. 7. Tube out. | <ol style="list-style-type: none"> 4. Replace. Add insulated washer. 6. Replace. |
| MICROPHONIC | <ol style="list-style-type: none"> 1. Defective V-1. 2. Defective V-2. 3. Defective V-5. | <ol style="list-style-type: none"> 1. Replace. 2. Replace. 3. Change V-5 to 6SN7 if 6SL7 was used. |
| LOOSE REWIND | <ol style="list-style-type: none"> 1. See Tape Tension, Page 42. | |
| TOO SLOW | | |
| a. Fast Forward | <ol style="list-style-type: none"> 1. See failure to drive above. | |
| b. Fast Rewind | <ol style="list-style-type: none"> 1. See failure to drive above. | |
| c. Record or Play | <ol style="list-style-type: none"> 1. Capstan binding in bearings. 2. Line voltage too low. 3. Capstan belt off groove. | <ol style="list-style-type: none"> 1. Clean, see Page 35. 3. Replace. |
| TOO FAST | <ol style="list-style-type: none"> 1. Pressure assembly not engaged. | <ol style="list-style-type: none"> 1. Correct cause of binding. |
| WOW AND FLUTTER | <ol style="list-style-type: none"> 1. Pressure wheel defective, binding or rubbing on capstan bearing housing. 2. Excessive pressure of pressure pad against record/play head. 3. Binding motor shaft bearing. 4. Binding capstan lower bearing. 5. Binding, reel-post bearing. 6. Damage of capstan drive belt. 7. Bent capstan. | <ol style="list-style-type: none"> 1. Adjust or replace. 2. Adjust. 3. Clean, align, or replace. 4. Clean and align. 5. Disassemble and clean, Page 37. 6. Replace. 7. Replace. |

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BK-437, BK-437S, BK-439,
BK-441

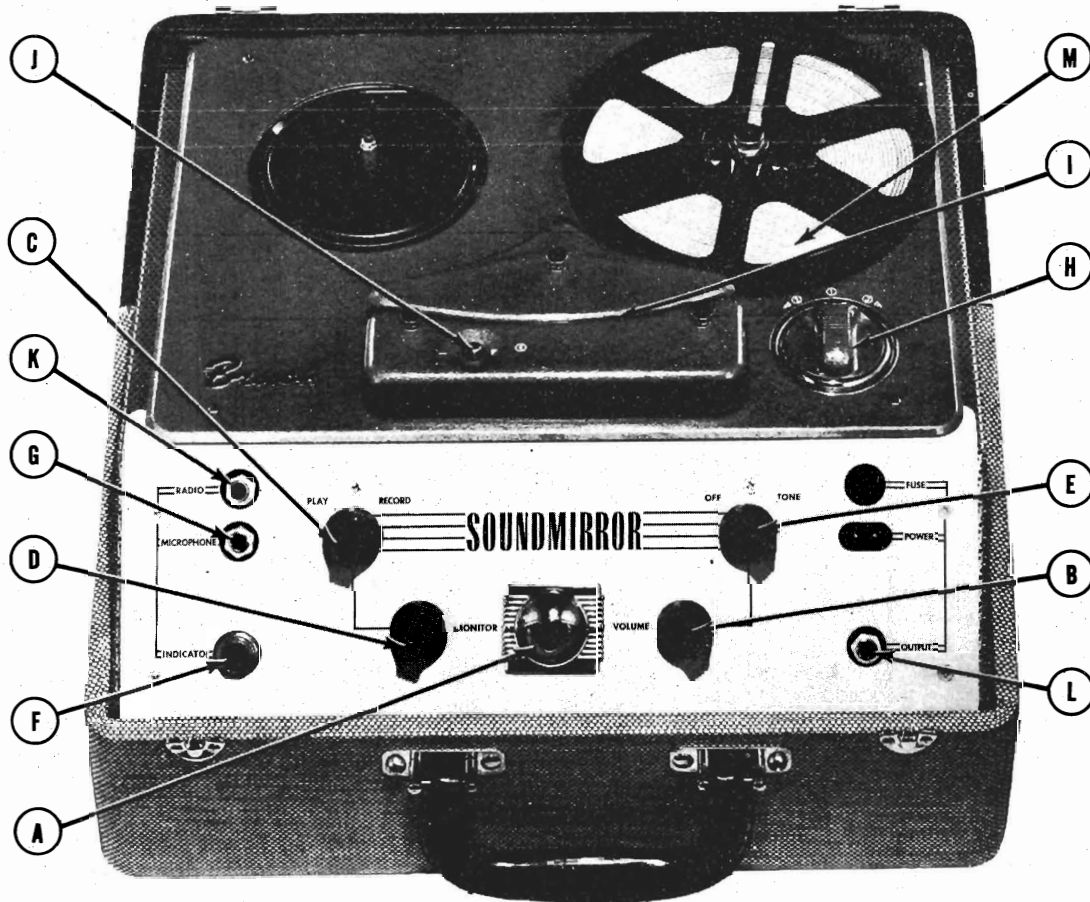
INTRODUCTION

This manual contains service information for a new series of "Soundmirrors" whose principal distinguishing characteristic is a rotary knob control in place of the lever control.

Most important in this line are the BK-442 table unit and the BK-443P portable unit which are covered in detail in the text. A number of variations of these will be encountered in the field such as the "-1" (50 cycle) units and the "S" units operating at one-half the tape speed. A number of mechanical chassis are in the field, designated by the model number BK-437 or BK-437S. Service information on these is precisely the same as on the mechanical sections of the complete machines. Small numbers of other machines of this series will be encountered in the field under model number BK-439 and BK-441. These are both table models which vary from a BK-442 only in the combination of speaker and output transformer employed. Specific service on these is otherwise the same as for the BK-442.

Certain of these models appear in an Underwriters' approved form and carry a further letter designation "U". The principal difference is the use of a number of extra shields for power wiring and these shields must be replaced when servicing such a unit.

FIGURE 1—PORTABLE SOUNDMIRROR



SOUNDMIRROR DESCRIPTION

The following letters "A" to "M" with description pertain to figures 1 and 2 for table model or portable model.

- A. Recording Volume Indicator
- B. Play or Record Volume Control
- C. Selector Switch—Play or Record

- D. Speaker Monitor Volume Control
- E. Line Power Switch and Tone Control
- F. Line Power Indicating Lamp
- G. Microphone Input Connection
- H. Tape Transport Control Knob

MODELS BK-442, BK-443P, BK-437, BK-437S, BK-439, BK-441

- I. Tape Slot—Play or Record
- J. Erase Button—When recording depress this button in addition to moving the Control to Record Position
- K. Radio Input Jack
- L. Output Jack for External Speaker
- M. Indexing Disc

Standard equipment with all models includes one 7-in. reel of Magic Ribbon* magnetic recording tape, one empty metal take-up reel and Brush non-directional microphone with cord and jack connection and detachable base.

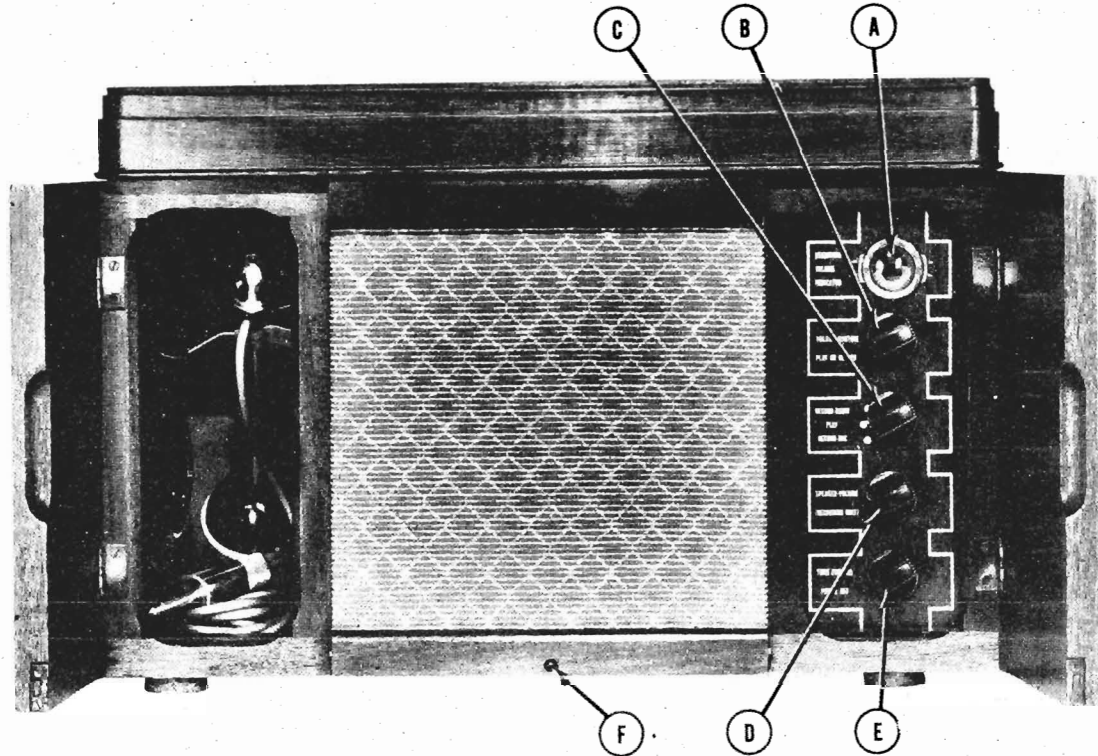


FIGURE 2—TABLE MODEL SOUNDMIRROR

MECHANICAL FUNCTIONS

The Soundmirror uses a single motor with one rubber belt to drive the capstan and another, crossed, to drive both turntable pulleys. Thus, whenever the motor is running, the pulleys revolve in opposite directions at constant speed.

Cemented to the top surface of each of the pulleys is a felt pad capable of engaging the lower surface of the associated turntables with the action of a light friction clutch. The direction of rotation of the pulleys is such that each turntable, when resting on its pulley, tends to reel in tape. A pair of cams are provided, one under each reel shaft, mounted and adjusted so that they can be used to lift the associated turntable free of its pulley. Two small felt pads which are mounted on springs on the pulley face remain in contact with the turntable when it is elevated and offer a slight amount of reverse drive torque when tape is being pulled from a reel. This action provides back tension to the tape and insures that the tape is wound tightly in fast forward and fast reverse.

The capstan is rotated by the motor by means of the smaller drive belt and provides a means for driving the

tape at a fixed linear speed. This drive becomes effective when the pressure roller assembly is moved in and engages the tape against the capstan drive spindle. Under these conditions, the tape which ordinarily would have moved at fast forward speed is held to a constant playing speed by the capstan, the slippage in the felt clutch of the takeup reel turntable compensating for the difference in speeds.

The main arm performs several functions. When the control knob is depressed and rotated into play (record) position it rotates the main arm and locks into position. (1) The spring extending from the main arm applies a force against the erase pin providing a jam proof arrangement for depressing the pin either before or after the motion of the arm takes place. (2) The micro-switch actuator releases the micro-switch arm for operation. If no tape is present, the micro-switch arm passes through the slot in the tape guide, and the motor will not run. (In fast forward or fast rewind this feature is inoperative and the motor will run with or without tape). (3) The pressure wheel presses the tape against the capstan spindle, causing the tape to be driven at constant speed.

MODELS BK-442, BK-443P, BK-437, BK-437S, BK-439, BK-441

The tape is also pressed against the two heads by the erase pressure pad assembly and the roller pressure pad assembly to insure close contact between the tape and the heads in the region of the gaps.

Steps in a typical operation are as follows:

FAST FORWARD: The control knob is rotated in direction of # 3. This rotates the clutch lever which turns on the motor and raises the rewind turntable, allowing the takeup turntable to remain engaged.

FAST REWIND: The control knob is rotated in the direction of #2. This rotates the clutch lever which turns on the motor and raises the takeup turntable, allowing the rewind turntable to remain engaged.

PLAY-RECORD: The control knob is depressed in the #1 position and rotated clockwise in the direction of #3, the clutch levers engage in the same fashion as occurs in fast forward; the control arm presses the roller assembly against the tape and capstan, thus giving the tape a constant linear speed, the micro-switch arm is released for operation and the erase spring engages the erase pin.

OFF: In any case when the control knob is rotated to the off (#1) position, the clutch lever is centered, opening the motor switch and allowing both turntables to engage their clutches. This acts as a brake to halt the motion of the tape.

PORTABLE MODEL GENERAL DISASSEMBLY

To Remove Sub Assembly From Case

1. Remove the two small trim covers (A-201 and A-203) held in place by three knurled thumb screws.
2. Remove the four binding head screws, then the main trim cover (A-205).
3. Remove the three screws (H-245) at the rear of the mechanical chassis.
4. Remove the two screws (H-244) holding the handle to the case.
5. Lift assembly out of the case slightly and disconnect the power supply, plug and the speaker plug. Remove the main sub assemblies.
 - (a) This exposes the power supply which is attached to the case, and the speaker assembly.
6. Disconnect the erase head plug, the record head plug, and the motor plug.
7. Remove the four 8-32 flat head screws (H-235) located on each side of the mechanism.
8. Remove the two 10-32 screws (H-237) located on the front corners of the mechanism.
9. Remove the mechanism by sliding it away from the amplifier.

To Remove the Amplifier

10. Remove the four screws (H-233) on the front etched panel.

To reassemble the unit the exact reverse is done carefully when attaching the mechanism so that the projecting edge of the front etched panel goes between the

erase spring actuator and the main chassis of the mechanism.

NOTE: Symbols for the mechanical chassis are shown on the exploded view page 23.

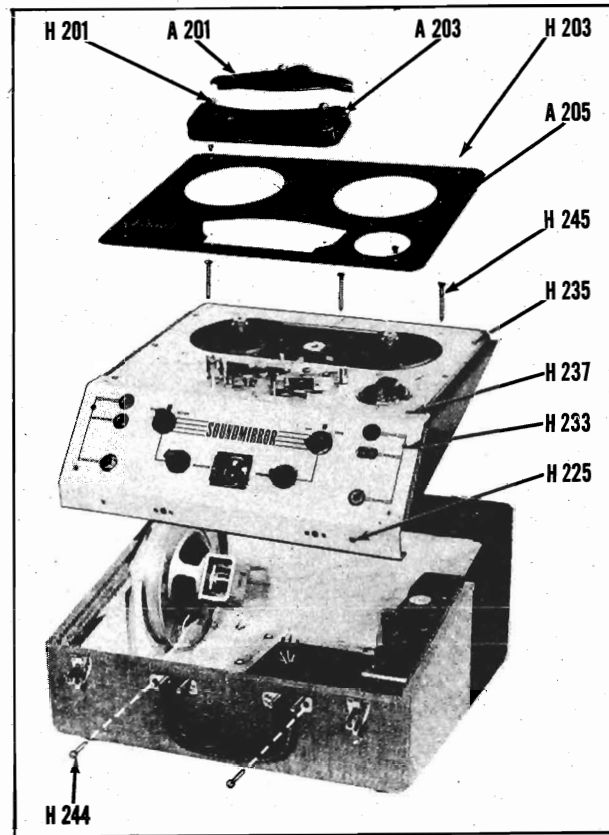


FIGURE 3—PORTABLE DISASSEMBLY

TABLE MODEL GENERAL DISASSEMBLY

To Remove Amplifier From Cabinet

1. Disconnect the Soundmirror from the power source.
2. Remove the cardboard back from the cabinet.
3. Disconnect the record head plug, speaker plug, erase head plug, motor plug, and remove the microphone and radio jacks from the output jack board. (Removing clamp which secures them).
4. Remove the pilot lamp holder from its mounting.
5. Pull off the control knobs located on the front panel.
6. Remove the screws which hold the amplifier to the bottom of the cabinet.
7. Slide the amplifier out of the rear of the cabinet.

To Remove the Mechanical Chassis From the Cabinet

8. Follow steps 1 through 3, (with the exception of jacks).
9. Remove the reels.

MODELS BK-442, BK-443P, BK-437, BK-437S, BK-439, BK-441

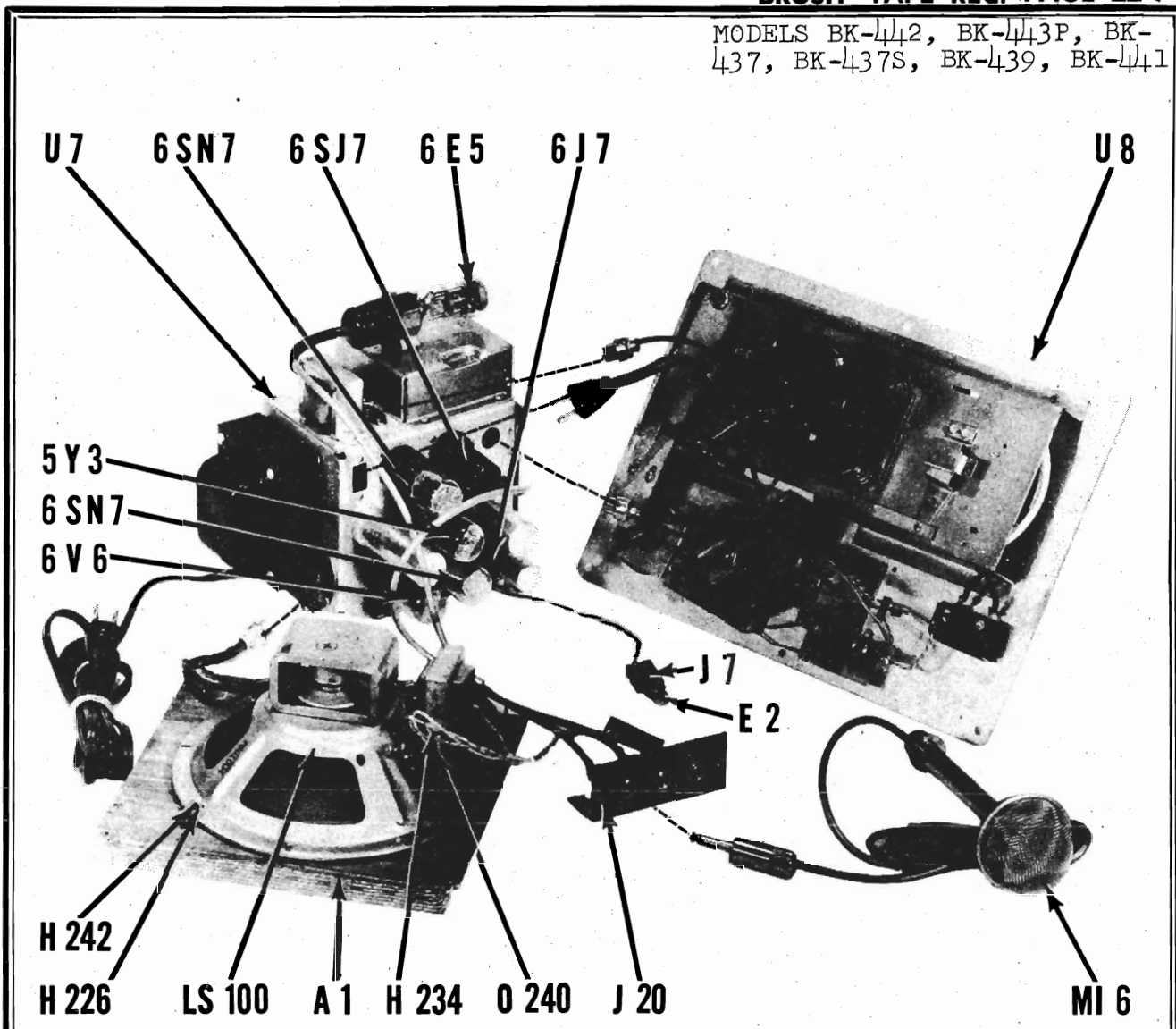


FIGURE 4—TABLE MODEL DISASSEMBLED

10. Remove the two small trim covers (A-200 and A-202) held in place by three knurled thumb screws.
11. Remove the four binding head screws, then the main trim cover (A-204).
12. Remove the four screws which mount the mechanical chassis to the cabinet and lift the chassis from the cabinet.

To Remove the Speaker

13. Remove the mechanical chassis and amplifier, steps 1 through 12 (above).
14. Remove the screw which mounts the speaker cable clamp to the bottom of the cabinet.
15. Remove the speaker output jack from the jack output board.
16. Remove the four screws which mount the speaker to the grille board and lift the speaker out of the cabinet.

NOTE: Symbols for the mechanical chassis are shown in the exploded view, Page 23.

SERVICE PROCEDURE

The operation and function of the portable and table model Soundmirrors are basically the same, except in the disassembly and reassembly as previously outlined. The following information is incorporated for both.

TUBE REPLACEMENT

Tubes are made accessible by removing the back cover from the table model cabinet. For the portable model follow steps 1 to 5 on page 4.

CAUTION: To avoid burns and cuts caused by heated tubes and moving fan blades, turn the power off, and allow the fan to stop and the tubes to cool before attempting tube replacement.

PILOT LIGHT REPLACEMENT

To replace the table model pilot light, the back cover of the cabinet must be removed. To replace por-

MODELS BK-442, BK-443P, BK-437, BK-437S, BK-439, BK-441

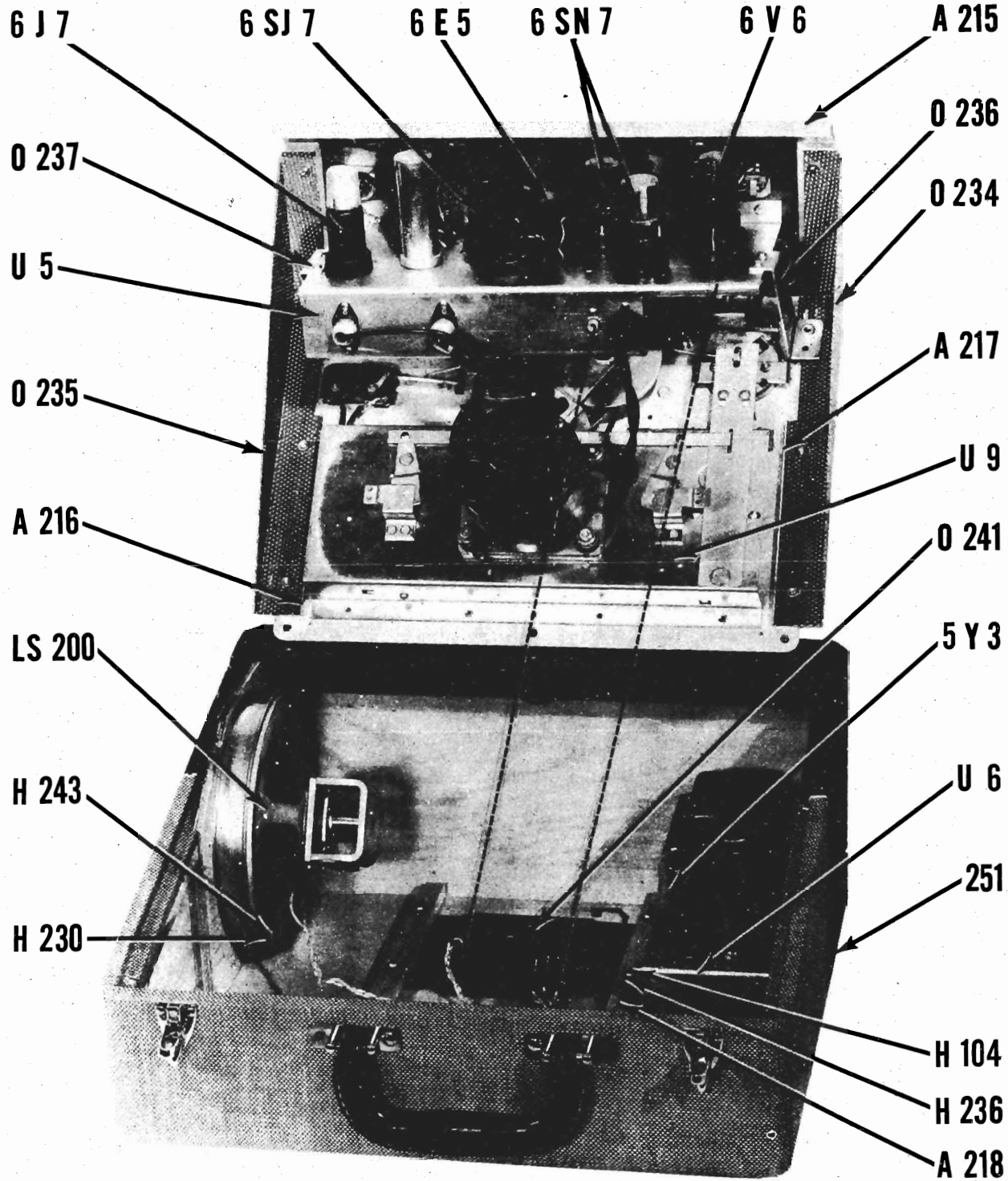


FIGURE 5—PORTABLE SOUNDMIRROR DISASSEMBLED

MODELS BK-442, BK-443P, BK-437, BK-437S, BK-439, BK-441

table model pilot light unscrew lens from etched panel. (Both are bayonet base bulbs).

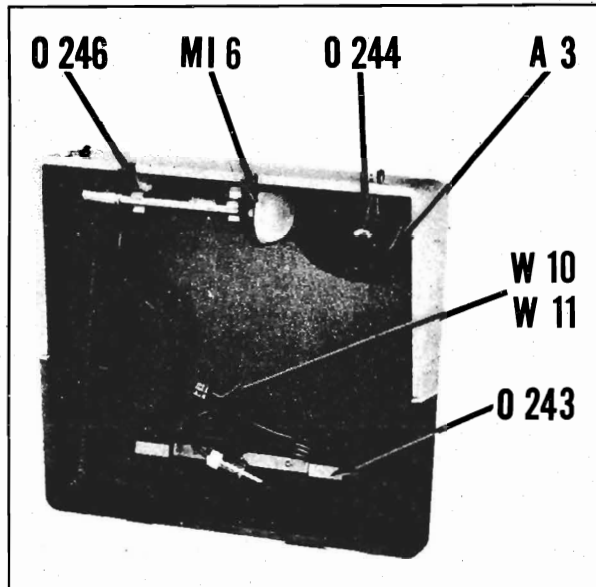


FIGURE 6—PORTABLE SOUNDMIRROR COVER

REPLACEMENT OF PRESSURE WHEEL ASSEMBLY

The pressure wheel assembly consists of a bracket, spring, shaft, wheel, and pressure pad which is attached to the bracket. To replace the complete assembly:

1. Remove the small trim cover and the "Tru-Arc" retaining ring.
2. Lift the assembly off the post, being careful not to damage the spring.
3. Slide the spring out the end of the bracket. The wheel and shaft will come out easily.
4. Replace parts in reverse sequence of steps 1, 2, & 3.

REPLACEMENT OF PRESSURE PAD

The friction between the pressure pad and the ribbon will in time wear the felt pad. When it becomes necessary to replace this pad, any quick drying cement may be used. Care should be taken to prevent any cement from getting on the felt which contacts the ribbon. After replacement is made, the pressure should be adjusted as outlined on adjustment of ribbon tension.

ADJUSTMENT OF ROLLER PRESSURE

The pressure of the rubber wheel against the ribbon and the capstan spindle is adjusted at the factory. It is not recommended that any adjustment be attempted in the service field, but that the defective part be replaced.

If the ribbon tends to crawl up or down on the capstan spindle, it indicates that the spring may not be seating properly in the grooves of the wheel shaft. If this is not the cause, then the spring may have been bent in a manner causing more pressure from one arm than the other. Since this is a critical adjustment it

is recommended the spring be replaced rather than adjusted.

ADJUSTMENT OF RIBBON TENSION

This tension is measured by attaching a spring balance to the end of a piece of ribbon drawn only through the erase head, then through the record head. The tension required to move the tape through the erase head should be from 1 to 1½ oz.

The pressure of the ribbon against the erase head can be adjusted by bending the spring located on the erase arm assembly.

The pressure of the ribbon against the record head can be adjusted by turning the screw (H-112) mounted on the pressure wheel bracket assembly. (Be sure to first loosen the hex nut (H-111) before making adjustment).

ADJUSTMENT OF RIBBON GUIDES

The ribbon guides (0-67 and 0-209) are located beneath the head trim cover and are mounted on the panel with the guide posts (0-65) by mounting screws (H-209). The guides must be mounted so that they will be parallel to the path to the tape.

RECORD-PLAY HEAD REPLACEMENT

1. Remove the mechanical chassis from the unit.
2. Remove the record-play head mounting screws.
3. Unsolder the three wires from erase switch (S-20), cut the lashing holding the head cable to the capstan bracket (A-25).
4. Remove the capstan drive assembly mounting screws (H-221, H-222 and H-224) and carefully lower the assembly away from the panel enough to slip the record-play head (E-21) out of the hole.
5. Assemble the capstan drive assembly and the record-play head by placing the head and the mounting clamp (H-131) between the flywheel and the bracket.
6. Hold the assembly in the left hand and position it onto the panel while tightening the flat head screw (H-224) to hold the drive assembly until the other mounting screws are placed in position in the following sequence.
 - (a) The screw (H-222) between the head and capstan spindle.

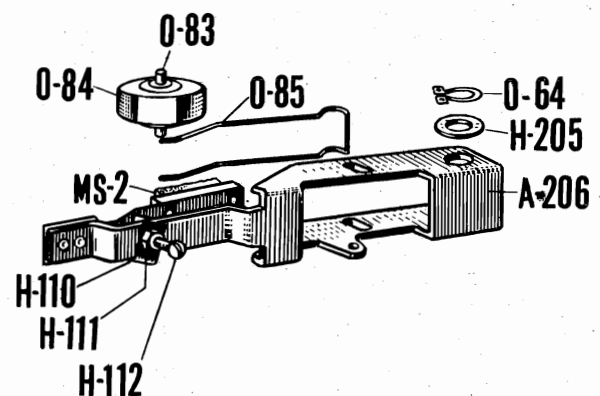


FIGURE 7—PRESSURE WHEEL ASSEMBLY

MODELS BK-442, BK-443P, BK-437, BK-437S, BK-439, BK-441

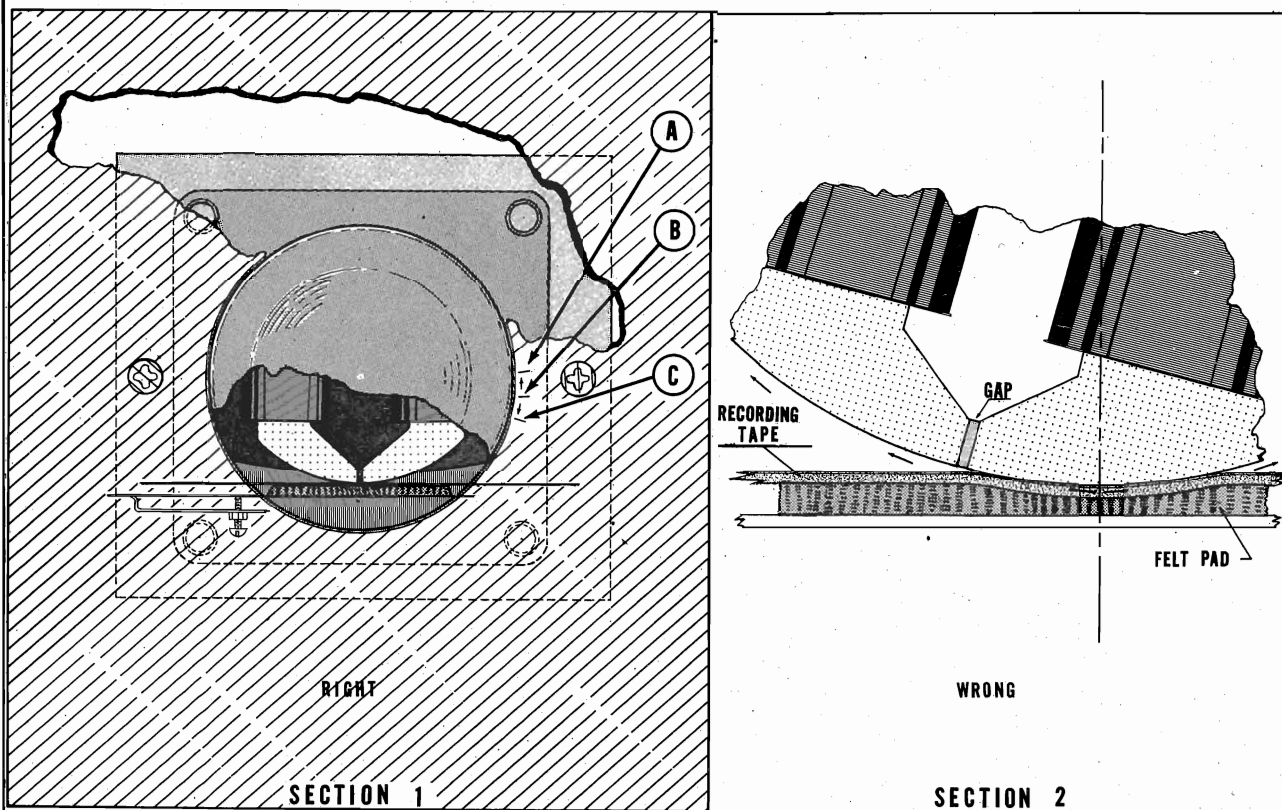


FIGURE 8—RECORD-PLAY HEAD ADJUSTMENT

- (b) The screw nearest the erase head (E-20).
- (c) The screw (H-221) between the capstan spindle and the right-hand ribbon guide (O-65).
- 7. Adjust the head for hum cancellation as outlined in the following paragraph.
- 8. Tighten all screws completely.

Adjustment of Record Play Head for Minimum Hum and /or Maximum High Frequency Response

Excessive hum during any pause in the recording while the unit is in the play-back position may be caused by magnetic lines of force being radiated from sources such as the motor, power transformer, filter choke, etc., inductively creating an unbalanced voltage in the play-back head.

This condition may be corrected by reestablishing the balance by properly directing the magnetic lines of force through the two windings of the head. This is accomplished by slightly rotating the head either clockwise or counter-clockwise as the case may require.

To find the correct position:

1. Turn the power on and allow the tubes to warm.
2. Set the Amplifier Controls for play-back operation at full volume.
3. Remove the small trim covers.
4. Loosen the mounting screws (H-222) on either side of the record-play head (E-21) enough to allow the head to be rotated slightly.

5. Place the ribbon around the back side of the record-play head and the capstan drive spindle (O-78).
6. Turn the control knob to the "Play" position, control knob depressed and rotated clockwise in the direction of #3.
7. Rotate the record-play head in either direction until a point of minimum hum is found. NOTE: If the head requires excessive rotation to reduce the hum sufficiently to meet the dynamic range specification, the head should be replaced.
8. Tighten the screws to hold the head in this position.
9. Turn the control knob to the "off" position #1 to stop the reels. The cut-a-way of the head (Fig. 8) shows how the polepieces should contact the ribbon. If the head is rotated too far in either direction the gap will not contact the ribbon which will result in a lack of high frequencies or no signal at all being recorded or reproduced.

To check this condition:

10. Place a mark on the panel at point "B" of Figure 8 to identify the "minium hum" position of step 7. The mark should be made in line with the end edge of the opening in the record head.
11. Place a recorded portion of the ribbon through the record-play head (E-21) and the capstan drive spindle (O-78).
12. Turn the control knob again to the "Play" position.

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- Loosen the record-play head mounting screws (H-222) enough to rotate the head toward "A" or "C" while listening to the signal being reproduced by the ribbon.

When the position is found which allows the higher frequencies to be reproduced, place a second mark on the panel to identify this position. If this position does not coincide with the position of least hum, then a choice or a compromise position must be made.

- Alternately tighten the screws to lock the head in the position chosen.

ERASE HEAD REPLACEMENT

- Remove mechanical chassis from the unit.
- Remove the mounting assembly by removing the three screws (H-225) which secure it to the chassis.
 - Cut lashing which holds the head cable to the capstan bracket.
- Remove the mounting plate.

REPLACEMENT OF BELTS

Belts should be replaced whenever they show noticeable wear. When replacing either belt, check height of motor pulley to be sure that capstan drive belt is parallel to the panel. Under normal operation, rubber dust from the clutch belt will accumulate. This dust should be removed thoroughly from the mechanism.

REPLACEMENT OF TURNTABLE ASSEMBLY

- Remove the "Tru-Arc" retaining ring, using No. 22 "Tru-Arc" pliers.
- Lift the turntable assembly from the reel post. The assembly is divided into upper and lower cups.
- Reassemble parts in order shown on page 23. Be sure the cups fit together with insides facing each other and indexed according to the notches and slots in their edges.

NOTE: If the reel guide pin is broken off, the reel post (O-203) must be replaced. If the pin is more than slightly bent it will be badly weakened by straightening. The post should be replaced.

- Install the assembly on the reel post and replace the

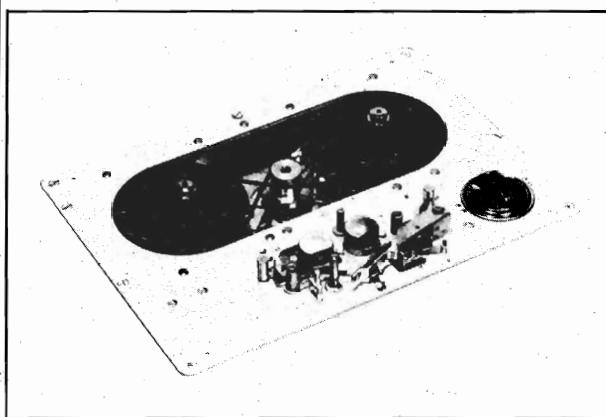


FIGURE 9—MECHANICAL CHASSIS, TOP VIEW

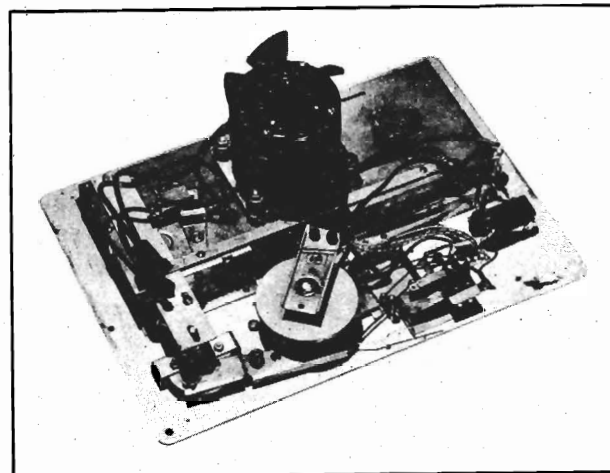


FIGURE 10—MECHANICAL CHASSIS, BOTTOM VIEW

"Tru-Arc" retaining ring making sure it fits into the groove on the reel post, and that its sharper edge is up.

REPLACEMENT OF CLUTCH ASSEMBLY

- Remove the mechanical chassis from the unit.
- Remove the turntable assembly.
- Remove the clutch belt.
- Remove the two screws (H-215) which mount the clutch lifter bracket assembly (A-21 and A-211). Slide the assembly out at one side being careful not to distort the clutch lifter spring attached to the bracket.
- While holding the clutch raising lever in its extreme position, carefully remove the small "Tru-Arc" retaining ring (O-69) and washer (H-210) located at the lower end of the reel post. This requires the use of No. 0018 "Tru-Arc" pliers.
- Lift out the reel post assembly being careful not to lose the clutch lifter pin (H-115). This allows the clutch and pulley to be lifted from the clutch bearing assembly.
- The felt clutch is cemented to the upper face of the pulley and ground flat after assembling. Under normal conditions it should not require replacement, however, if damaged it is possible that pulley assembly (O-202) should be replaced.
- If necessary, remove the clutch-pulley bearing assembly (O-204) by removing the hex nut (H-117) on lower panel of chassis. Replace any damaged or worn out parts.
- Reassemble the clutch pulley, the reel post, and the lifter pin and install onto the clutch bearing.
- Install the washer and "Tru-Arc" retaining ring on the lower end of the reel post.

ADJUSTMENT OF CLUTCHES

The clutches are adjusted and set at the factory and under normal conditions should not require readjustment.

If it becomes necessary to replace any part of the

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clutch assembly, readjustment becomes necessary and proper procedure is as follows:

The power should be turned off, a loaded reel placed on the supply turntable, and the control knob rotated from the neutral position #1, towards fast forward position #3. As this is done the supply turntable should rise very slightly, not over 1/32 of an inch. If the turntable does not rise this amount, the locking nut (H-19) on the clutch adjusting screw (H-20) should be loosened with pliers or wrench, and the Allen screw turned in with a #8 Allen Wrench until this amount of lift is obtained.

The adjustment should then be relocked, and with the control in the fast forward position, the turntable should be lifted by taking hold of the reel post. Make certain that it still has vertical clearance when it is fully elevated and in position.

The loaded reel should then be moved to the take-up turntable, the control knob rotated towards the fast rewind position #2 and the reel observed for lift. Adjustment should be made as previously outlined.

When both reels are properly adjusted, and do not bind when they are engaged, the recorder should operate satisfactorily. If the recorder does not operate satisfactorily it is possible that:

- (a) Clutch pads are dirty and require cleaning.
- (b) Tape guides (O-67) and (O-209) have been bent and are causing too much drag on the tape.

REPLACEMENT OF MOTOR

1. Remove the mechanical chassis from the unit.
2. Remove the rubber belts.
3. Remove the toggle switch bracket (A-212) from the chassis.
 - (a) Disconnect Motor Wire.
4. Disconnect motor wire from plug.
5. Remove the two binding head screws which mount the motor to the chassis.
6. Loosen the 8-32 Allen head set screw and remove the drive pulley from the motor shaft.
7. Remove the 4 hex nuts which mount the motor to the plate assembly (A-19).
8. To replace the rubber shock mounts (A-20): (a) remove the 4 hex nuts holding the mounts in place. (b) remove the motor mounting plate (A-17) from the plate assembly. (c) remove the rubber mounts from the plate and install new ones. (d) install onto plate assembly and replace screws.

NOTE: It is best to replace all four rubber mounts to assure proper balance of motor. Be sure to replace ground wire (W-3) to prevent electrical hum from motor.

9. Install new motor and reassemble onto chassis in reverse order.
10. After installation of rubber belt adjust the height of the drive pulley so that the capstan belt is parallel to the panel.
11. Adjust the position of the motor on the chassis to a point which causes least vibration of the drive belt, and which gives the greater tension to the clutch belt.

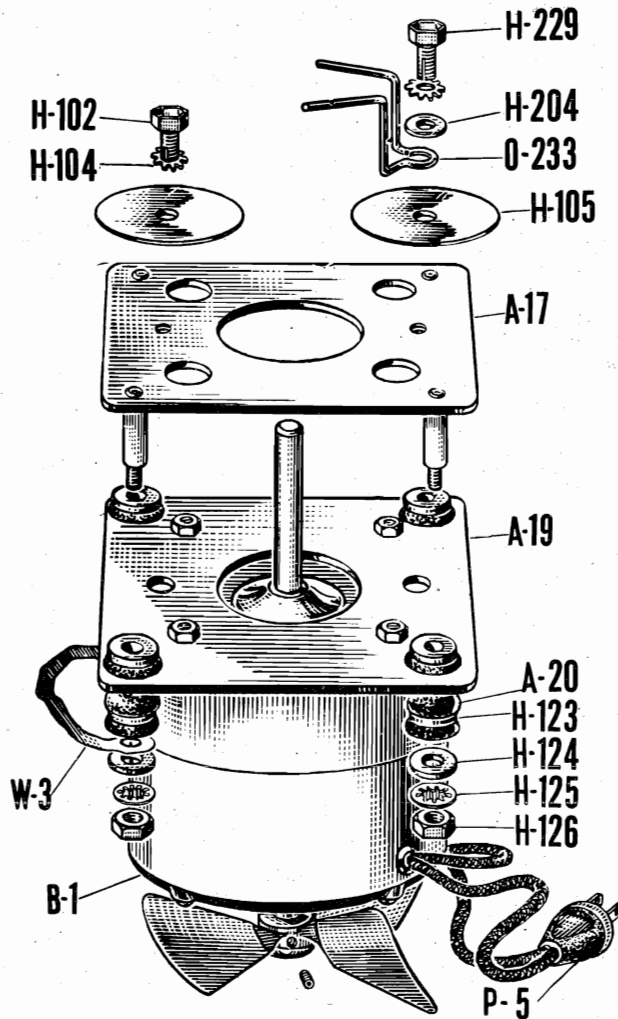


FIGURE 11—MOTOR ASSEMBLY

ADJUSTMENT OF THE MOTOR SWITCH BRACKET

The motor switch bracket (A-214) is used to accomplish two functions. It centers the control knob and clutch lever, and it regulates the motion of the clutch lever.

As little play as possible must be had between the switch and the bracket in the fast forward, fast reverse and off positions.

Rotate the control knob clockwise to the fast forward position #3 and slowly move it to the off (centered) position #1. If the bracket moves more than 1/64" to contact the face of the bat, it must be moved closer to the motor switch to take up this play. The same holds true for fast reverse, knob rotated counter-clockwise in the direction of #2.

REPLACEMENT OF CAPSTAN ASSEMBLY

- (1) Remove the mechanical chassis from the unit.

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REPLACEMENT OF TAPE TRANSPORT CONTROL SPRINGS

Push a screw driver up through the slot of the cup assembly (O-216). Tap lightly and knob can be removed. The control knob spring (O-213) will then be released (O-216). Remove the "Tru-Arc" retaining ring and washer, and the control shaft spring (O-214). When assembling, make sure that the turned edge of the control shaft spring falls into its square limit stop. Upon completion of assembly the knob should have as little play as possible in the vertical elevated position.

LUBRICATION

MOTOR—The Motor should be oiled once every three months with Number 20 SAE Oil. Caution: Do Not Over-Oil.

MECHANISM—All moving or sliding parts should be cleaned thoroughly of any dirt, common dust, or rubber dust that may have accumulated. After cleaning, apply a thin coat of light oil to all sliding surfaces. Wipe off excessive oil. Do not allow oil to get onto the belts or the driving surfaces of the pulleys. The cam surface of the control arm and the cam follower should also be greased periodically.

OILITE BEARINGS—The following are of this type and need very little lubrication.

1. Clutch Pulley Bearing
2. Capstan Spindle Bearing
3. Pressure Wheel Bearing.

SOUNDMIRROR VARIATIONS (BK-442, BK-443-P) 50 CYCLE

Aside from the standard line of "Soundmirrors", Brush also furnishes units capable of operating on 50 cycles, (110, 150, 220, 250) volts.

These units will be designated as BK-442-1, BK-443-P-1 and will be identical in construction to the standard models of the BK-442 and BK-443 with the following exception:

1. Motor, 50 cycle, #207259.
2. Pulley, 50 cycle, #107248.
3. Transformer, 50 cycle with taps for 110, 150, 220, 250 volts, #208369.

To mount the above transformer:

- (a) Bracket #107621-4.
- (b) Brackets #106665-1 (two required).

Slow Speed (1 hour)

These units will be designated as BK-442-S and BK-443-PS and are identical in construction to the standard BK-442 and BK-443-P except:

1. Slow Speed Motor pulley, #108357.
2. Slow Speed Capstan, #209800-501.

The amplifier is compensated by:

- (a) Shorting C-9 connections.
- (b) C-17 and C-19 will be .004 mmf condenser #3-106094-5.
- (c) C-10 should be 1 mmf condenser #2-106094-1.

Combination 50 Cycle Slow Speed

These units will be designated as BK-442-S-1, BK-443-PS-1 and are combination slow speed 50 cycle units and are identical to the BK-442 and BK-443-P with the following exceptions:

- (2) Remove the capstan drive belt.
- (3) Remove the two Allen head screws (H-133) on base.
- (4) Carefully pull out the capstan assembly and base bracket (A-26) take care that the ball bearing (O-231) on the base of the capstan assembly is not lost.
- (5) Replace parts and/or assemblies in reverse as outlines above.

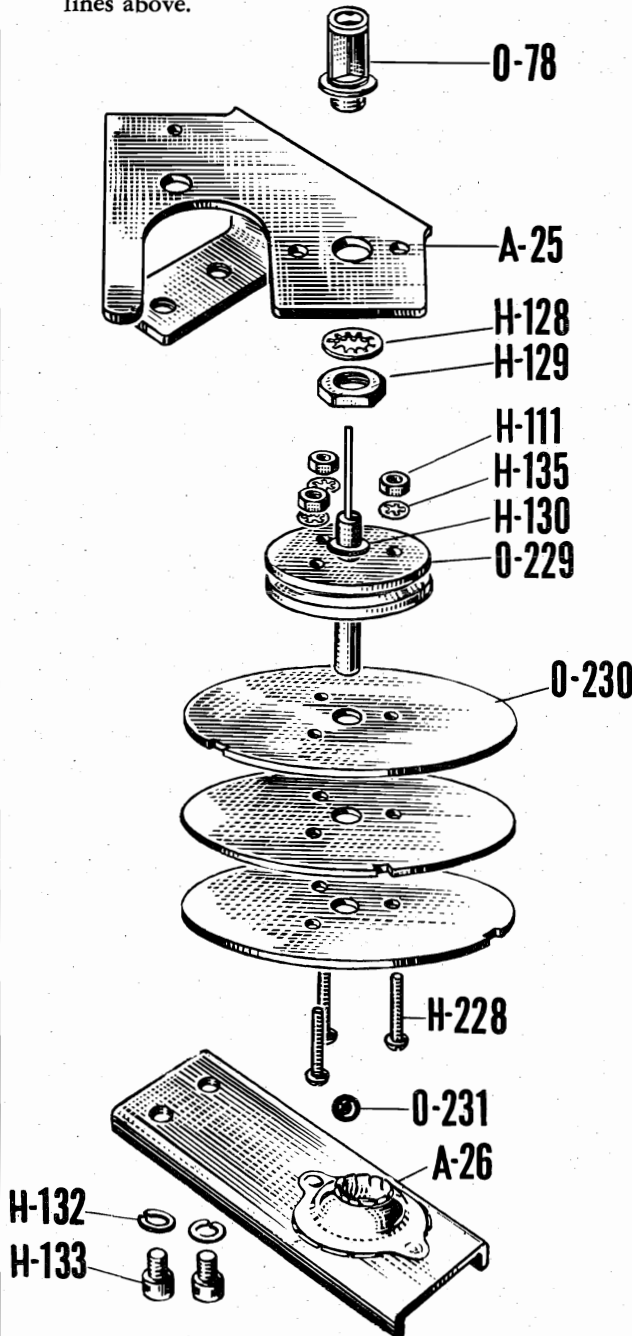


FIGURE 12—CAPSTAN ASSEMBLY

- (a) When tightening the two Allen head screws, make certain that they are tightened alternately to avoid moving the bottom bracket away from its true center, thus applying a force perpendicular to the shaft of the capstan.

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1. Motor, 50 cycle #207259.
2. Motor Pulley, slow speed 50 cycle #109786.
3. Capstan, slow speed #209800-501.

Amplifier compensation:

- (a) Shorting C-9 connections.
- (b) C-17 and C-19 will be .004 mmf condenser #3-106094-5.
- (c) C-10 should be 1 mmf condenser #2-106094-1.

CONNECTION OF THE SOUNDMIRROR TO A RADIO

The Brush Soundmirror may be electrically connected to any radio receiver. This is to be preferred to placing a microphone at the loudspeaker because of speaker distortions and room noises.

A simple direct connection can be made from the voice coil terminals of the radio input of the Soundmirror. Use the radio input jack of the Soundmirror. No shielding is needed.

No method is ideal for the so-called AC/DC receivers but the above method may be used.

These receivers are not isolated from the power lines and can be potential hazards if not carefully treated. The loudspeaker voice coil must be isolated completely from the remainder of the circuit. It may be necessary to use an isolation transformer.

LIST OF MATERIAL

| Symbol | Part Number | Description |
|--------|-------------|-----------------------------------------------------------------------------------------------------------------|
| A-1 | 206790-501 | BOARD, speaker mounting: includes grille cloth and screen. |
| A-3 | 104215-501 | BASE, microphone. |
| A-13 | 106827-2 | BEADING, rubber. |
| A-17 | 106163-501 | PLATE, motor shock mount. |
| A-19 | 106122 | PLATE, motor mounting. |
| A-20 | 104213-4 | MOUNT, vibration: rubber. |
| A-21 | 106407-501 | BRACKET, clutch lifter: take up side. |
| A-25 | 206139 | BRACKET, capstan drive. |
| A-26 | 106394-501 | BRACKET, capstan; bottom bearing assembly. |
| A-200 | 108613-PL1 | COVER assembly, head: Dark. |
| A-201 | 110326-PL1 | COVER assembly, head: Light. |
| A-202 | 310255-501 | COVER assembly, pressure wheel: Dark. |
| A-203 | 310311-501 | COVER assembly, pressure wheel: Light. |
| A-204 | 310254-501 | COVER assembly, panel: Dark. |
| A-205 | 310208-501 | COVER assembly, panel: Light. |
| A-206 | 210094 | BRACKET, pressure wheel; record head. |
| A-207 | 110147-501 | KNOB, control: assembly, Dark. |
| A-208 | 110312-501 | KNOB, control: assembly; Light. |
| A-209 | 110036 | PLATE, erase head mounting. |
| A-210 | 110029 | BRACKET, erase switch. |
| A-211 | 210180-501 | BRACKET, clutch lifter: supply side. |
| A-212 | 110014 | PLATE, switch mounting. |
| A-213 | 107998 | PLATE, switch. |
| A-214 | 110032 | BRACKET, switch actuator. |
| A-215 | 110327-PL1 | PANEL, etched: assembly. |
| A-216 | 210133 | SPACER, left side. |
| A-217 | 210134 | SPACER, right side. |
| A-218 | 110162 | BLOCK, wood: ventilator hold down. |
| A-219 | 10-108082-1 | HANDLES, for Table Model. |
| A-220 | 206699 | PANEL, control: embossed. |
| B-1 | 206322 | MOTOR, drive: A.C. 115 V; 60 cycles; four pole; shaded pole induction type; includes cooling fan and set screw. |

If "professional" type recordings are desired, a radio technician should make the following recommended connections to the radio receiver. See Fig. 13. In these circuits recording volume control setting is independent of radio speaker volume. These circuits are not recommended for AC/DC type receivers. Where Fig. 14 is used, it is possible in most cases to play back through the radio amplifier. Remove the plug from the microphone input jack and place it in the output jack of the Soundmirror, and operate the Soundmirror in the play position.

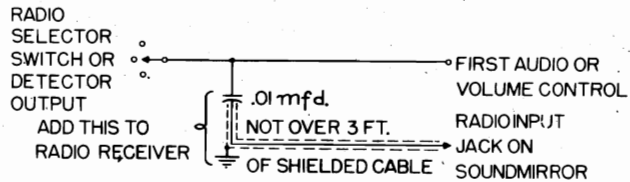


FIGURE 13—CONNECTION OF THE SOUNDMIRROR TO A RADIO

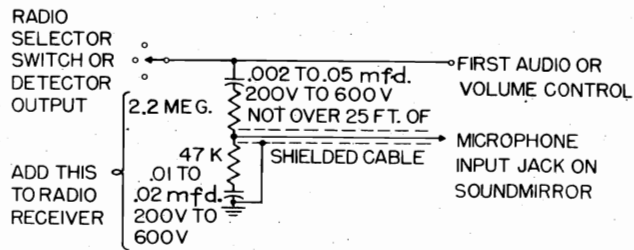


FIGURE 14—CONNECTION OF THE SOUNDMIRROR TO A RADIO

MODELS BK-442, BK-443P, BK-437, BK-437S, BK-439, BK-441

| Symbol | Part Number | Description |
|--------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| B-2 | 207259 | MOTOR, drive: A.C. 115 V; 50 cycles; four pole; shaded pole induction type; includes cooling fan and set screw. |
| B-11 | 206432-501 | MOTOR assembly, 60 cycle; includes 60 cycle motor; B-1; and motor mounting assembly; motor mounting assembly is the same for 50 or 60 cycle motor. |
| B-12 | 107524-PL1 | MOTOR assembly, 50 cycle; includes 50 cycle motor; B-2; and motor mounting assembly; motor mounting assembly is the same for 50 or 60 cycle motor. |
| E-6 | 104099-2 | BOARD, terminal. |
| E-20 | 110098-501 | ERASE HEAD, assembly; includes cable assembly and connecting plug. |
| E-21 | 310226-501 | RECORD REPRODUCE HEAD Assembly: Includes cable assembly and connecting plug. |
| E-22 | 11528-35 | LUG, soldering. |
| H-1 | 5-3219 | GROMMET, rubber. |
| H-9 | | SCREW, self tapping: #10 x 3/4" long; type "Z"; round head. |
| H-11 | 100511 | CLAMP, cable. |
| H-17 | 106723 | ESCUTCHEON; for 6E5 Volume indicator. |
| H-18 | 107185 | NUT, reel clamp; Antique Bronze. |
| H-19 | | NUT, hex: #8-32 small pattern. |
| H-20 | | SCREW, set: #8-32 x 3/8" long; allen head; cup point. |
| H-101 | | SCREW, knurled thumb: #6-32 x 1/4" long; Antique Bronze. |
| H-102 | | SCREW, machine: #10-24 x 3/8" long; Sems hex head. |
| H-103 | | SCREW, set: #8-32 x 1/4" allen head; cup point. |
| H-104 | | WASHER, external lock: #10. |
| H-105 | 106120-1 | WASHER, motor mounting. |
| H-107 | | NUT, hex: 3/8-32. |
| H-109 | | WASHER, internal lock; #6. |
| H-110 | 106454-1 | NUT, speed: Tinnerman C-991-440; #4-40. |
| H-111 | | NUT, hex: #4-40. |
| H-112 | | SCREW, machine: #4-40 x 1/2" long; round head. |
| H-115 | 106117 | PIN, clutch lifter. |
| H-116 | | WASHER, internal lock: 1/2". |
| H-117 | 106157 | NUT, hex: 1/2-20 N. C. 2 thread. |
| H-123 | 106179 | SPACER, vibration mounting. |
| H-124 | 106671 | WASHER, plain: .172" I.D. x 1/2" O.D. x .049" thick. |
| H-125 | | WASHER, internal lock: #8. |
| H-126 | | NUT, hex: #8-32. |
| H-128 | | WASHER, internal lock: 3/8". |
| H-130 | 106173 | SPACER, capstan drive: fibre, used when necessary. |
| H-132 | | WASHER, spring lock: #10. |
| H-133 | | SCREW, cap: # 10-32 x 3/8" long; socket head. |
| H-135 | | WASHER, internal lock: #4. |
| H-152 | | SCREW, wood: #6 x 1/2" long; flat head. |
| H-160 | | NUT, hex: #6-32. |
| H-200 | 107185-1 | NUT, reel clamp: Chrome. |
| H-201 | | SCREW, knurled thumb: #6-32 x 1/4" long; Chrome. |
| H-202 | | SCREW, machine: #4-40 x 3/16" long; slot B.H.; Antique Bronze. |
| H-203 | | SCREW, machine: #4-40 x 3/16" long; slot B.H.; Chrome. |
| H-204 | | WASHER, plain: #10. |
| H-205 | 108566 | WASHER, shim. |
| H-206 | 1-104914 | CLAMP, cable. |
| H-207 | | SCREW, #8 x 1/2" long: P. K.; type "Z." |
| H-208 | | SCREW, machine: #6-32 x 3/8" long; round head. |
| H-209 | | SCREW, machine: #8-32 x 3/8" long; Sems hex head; elw. |
| H-210 | 108605 | WASHER, shim. |
| H-211 | 110089 | WASHER, plain: control shaft. |
| H-212 | | SCREW, machine: #4-40 x 5/16" long; filister head. |
| H-213 | | SCREW, machine: #4-40 x 3/8" long; flat head. |
| H-214 | | WASHER, plain: #4. |
| H-215 | | SCREW, thread cutting: #6-32 x 3/8" long; Sems hex head; elw. |
| H-216 | | SCREW, machine: #4-40 x 1" long; Philips flat head. |
| H-217 | | SCREW, machine: #8-32 x 5/16" long; Philips round head. |
| H-218 | | WASHER, internal lock: 15/32". |
| H-219 | | SCREW, #6 x 1/4"; Thread cut; Type "1". |
| H-220 | L-83 | LUG, soldering. |

TAPE REC. PAGE 22-80 BRUSH

MODELS BK-442, BK-443P, BK-437, BK-437S, BK-439, BK-441

| Symbol | Part Number | Description |
|--------|--------------|----------------------------------------------------------------------------------|
| H-221 | | SCREW, machine: #6-32 x 1/4" long; Sems hex head. |
| H-222 | | SCREW, machine: #6-32 x 3/8" long; Sems hex head. |
| H-223 | | SCREW, machine: #6-32 x 1/4" long; filister head. |
| H-224 | | SCREW, machine: #6-32 x 1/4" Philips flat head. |
| H-225 | | SCREW, machine: #6-32 x 3/8" Philips flat head. |
| H-226 | | WASHER, plain; #6. |
| H-227 | | SCREW, machine: #6-32 x 1/4" long; Philips binding head. |
| H-228 | | SCREW, machine: #4-40 x 3/4" Philips head. |
| H-229 | | SCREW, machine: #10-24 x 1/2" long; Sems hex head; type "1" thread cut ELW. |
| H-230 | | WASHER, external lock: #6. |
| H-231 | | WASHER, external lock: #8. |
| H-232 | | SCREW, Machine: #4-40 x 1/2" long; Philips round head; Antique Bronze. |
| H-233 | | SCREW, machine: #6-32 x 1/2" long; Philips flat head. |
| H-234 | | SCREW, machine: #6-32 x 1 3/4" long; Round head. |
| H-235 | | SCREW, machine: #8-32 x 3/8" long; Philips flat head. |
| H-236 | | SCREW, machine: #10-32 x 3/8" long; Philips round head. |
| H-237 | | SCREW, machine: #10-32 x 5/8" long; Philips flat head. |
| H-238 | | SCREW, wood: #4 x 3/8" long; Philips round head. |
| H-239 | | SCREW, wood: #6 x 1/4" long round head. |
| H-240 | | SCREW, wood: #6 x 3/8" long; Philips round head. |
| H-241 | | SCREW, wood: #6 x 7/16" long; Philips round head. |
| H-242 | | SCREW, wood: #6 x 1/2" long; Philips round head. |
| H-243 | | SCREW, wood: #6 x 1 3/8" long; round head. |
| H-244 | 110197 | SCREW, machine: to fasten handle to case and recorder. |
| H-245 | 110196 | SCREW, machine: to fasten base mounting plate. |
| J-20 | 210182-501 | JACK assembly. |
| J-21 | 21421-2 | JACK, midget. |
| LS-1 | 305975 | SPEAKER; Cinaudagraph: 3.2 ohms voice coil; Table Model. |
| LS-100 | 310792-501 | SPEAKER assembly; includes speaker, transformer and cable assembly; Table Model. |
| LS-200 | 210165-501 | SPEAKER assembly; includes cable assembly; Portable Model. |
| LS-201 | 308912 | SPEAKER, R.C.A. accordion; Portable Model. |
| MI-5 | 211032-501 | MICROPHONE, crystal: includes base, and cable assembly. |
| MI-6 | 200977-501 | MICROPHONE, crystal: does not include base A-3. |
| MS-2 | 106129 | PAD, pressure; record head. |
| MS-4 | 110075 | PAD, pressure: erase head. |
| O-50 | 304838-501 | REEL, Ribbon: Empty. |
| O-51 | 106516 | RETAINER, thumb screw: flat washer. |
| O-52 | 104307-5 | RING, retaining: "Truarc"; Cat. No. 5100-31; 281" I.D. |
| O-56 | 206148 | CUP, clutch. |
| O-62 | 106472 | PULLEY, motor drive: one half-hour recorder, 60 cycles. |
| O-64 | 104307-1 | RING, retaining: "Truarc" No. 5100-25; .225" I.D. |
| O-65 | 106262 | POST, ribbon guide. |
| O-67 | 206321 | GUIDE, ribbon: right hand. |
| O-69 | 104307-6 | RING, retaining: "Truarc" no. 5100-18; .170"-.164" I.D. |
| O-74 | 106143 | SLEEVE, erase pin. |
| O-76 | 106340 | BELT, rubber; clutch drive. |
| O-77 | 106339 | BELT, rubber: capstan drive. |
| O-78 | 106364-501 | BEARING, capstan spindle: sub-assembly. |
| O-83 | 106127 | SHAFT, pressure wheel; record head. |
| O-84 | 106125 | WHEEL, pressure; record head. |
| O-85 | 106128 | SPRING, pressure wheel; record head. |
| O-200 | 206950 | DISC, indexing. |
| O-201 | 210055-1 | CUP, reel drive: reel support. |
| O-202 | 107980-501 | PULLEY, clutch: sub-assembly. |
| O-203 | 109300-501 | POST, reel: sub-assembly. |
| O-204 | 1-210072-501 | BEARING assembly, clutch support. |
| O-205 | 108357 | PULLEY, motor drive: one hour recorder 60 cycles. |
| O-206 | 107248 | PULLEY, motor: one half hour recorder; 50 cycles. |

| Symbol | Part Number | Description | MODELS BK-442, BK-443P, BK-437, BK-437S, BK-439, BK-441 |
|--------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|
| O-207 | 109786 | PULLEY, motor: one hour recorder; 50 cycles. | |
| O-208 | 210093-501 | PRESSURE WHEEL assembly, tape pressure; record head. | |
| O-209 | 210043 | GUIDE, ribbon: left hand. | |
| O-210 | 110056-501 | ARM assembly, erase head pressure. | |
| O-211 | 110076 | SPRING, pressure arm. | |
| O-212 | 110078 | SPRING, pressure wheel bracket. | |
| O-213 | 110039 | SPRING, control knob. | |
| O-214 | 110030 | SPRING, control shaft. | |
| O-215 | 104307-10 | RING, retaining: "Truarc" No. 5100-34; .304" .311" I.D. | |
| O-216 | 110058-501 | CUP assembly, control. | |
| O-217 | 110061-501 | SHAFT assembly, control. | |
| O-218 | 110028 | CLAMP, control mounting. | |
| O-219 | 110027 | SPRING, leaf: erase switch. | |
| O-220 | 110016 | PIN, erase switch actuating. | |
| O-221 | 104644-2 | RING, retaining: Waldes Kohinoor; Type "E" No. 5133-12; .094" I.D. | |
| O-222 | 110057-501 | CONTROL ARM assembly. | |
| O-223 | 110052 | SPRING, erase actuator. | |
| O-224 | 110046 | ARM, switch disabling. | |
| O-225 | 206460-501 | CAPSTAN, drive: assembly includes spindle, spindle bearing, flywheel, pulley, lower bearing, and mounting bracket, one-half hour recorder. | |
| O-226 | 209823-501 | CAPSTAN, drive: assembly includes spindle, spindle bearing, flywheel, pulley, lower bearing, and mounting bracket, one hour recorder. | |
| O-227 | 208190-501 | CAPSTAN, drive: sub-assembly with plates for one half-hour recorder. | |
| O-228 | 209800-501 | CAPSTAN, drive: sub-assembly with plates for one hour recorder. | |
| O-229 | 108189-501 | CAPSTAN, drive: sub-assembly includes shaft and pulley for one-half or one hour recorder. | |
| O-230 | 108192 | DISCS, flywheel: for all types of recorders. | |
| O-231 | 104636-1 | BALL, steel: 1/8" diameter. | |
| O-232 | 310090-501 | CHASSIS assembly, mechanical: includes posts; clutch lifter lever; clutch lever. | |
| O-233 | 207143 | GUIDE, belt. | |
| O-234 | 210199-501 | PLATE assembly, right side. | |
| O-235 | 210198-501 | PLATE assembly, left side. | |
| O-236 | 210192-501 | SUPPORT assembly, right side. | |
| O-237 | 210193-501 | SUPPORT assembly, left side. | |
| O-238 | 110026 | GRILLE, speaker. | |
| O-239 | 106697-1 | GRILLE, cloth: for speaker. | |
| O-240 | 111015 | SPACER, speaker transformer. | |
| O-241 | 210189 | GRILLE, ventilator. | |
| O-242 | 206903 | BACK, cabinet: Table Model. | |
| O-243 | 210178 | REEL, cord. | |
| O-244 | 105785 | HOLDER, microphone base. | |
| O-245 | 110802-PL1 | ADAPTER, microphone: to adapt microphone to floor stand. | |
| O-246 | 104788 | CLIP, microphone. | |
| P-2 | 110636 | CONNECTOR, male contact: 2 prong. | |
| P-5 | 106765 | CONNECTOR, male: 4 prong; does not include shell P-11. | |
| P-11 | 106764 | SHELL; for connector P-5. | |
| S-20 | 110086 | SWITCH, erase; includes mounting screws. | |
| S-21 | 110059-501 | SWITCH assembly, tape brake. | |
| S-22 | 110111 | SWITCH, toggle. | |
| U-5 | 110203-PL1 | AMPLIFIER, assembly: Portable Model; does not include power supply U-6. | |
| U-6 | 310209-501 | CHASSIS, assembly power supply: complete; Portable Model. | |
| U-7 | 110250-PL1 | AMPLIFIER, A.F.: Record/reproducer amplifier chassis, wired, complete with tubes; Table Model. | |
| U-8 | 110347-PL1 | RECORDER assembly, mechanical chassis; rotary knob; Table Model. | |
| U-9 | 110206-PL18 | RECORDER assembly, mechanical chassis; Portable Model. | |
| W-3 | 106515 | STRAP, ground. | |
| W-10 | 108672-1 | CABLE, power: elliptical used on earlier models, has been replaced on later models by a circular power cable #111178-1. Not interchangeable. | |
| W-11 | 111178-1 | CABLE, power: circular used on later models (replaces elliptical power cable #108672-1. Not interchangeable). | |
| 151 | 309039-501 | CABINET: for housing complete recorder/reproducer mechanism and amplifier; Table Model. | |
| 251 | 510194 | CASE, carrying: for mounting amplifier and recorder mechanism; includes cover. | |
| 601 | 2-103468-2 | KNOB, control: for amplifier controls. | |

MODELS BK-442, BK-443P, BK-437, BK-437S, BK-439, BK-441

SYMPTOM

REMEDY

CAUSE

POOR FREQUENCY RESPONSE

1. Accumulation of dirt on ribbon, residue on record/play head.
2. Too much or too little bias. This can be caused by the frequency varying from the desired 40 Kc.
3. Defective component in compensating network.

1. Clean head.
2. Replace faulty component.
3. Replace.

RIBBON SPEED TOO SLOW

1. Pressure pads on record and erase head—excessive pressure.
2. Rewind clutch misadjusted causing it to be engaged.
3. Capstan flywheel shaft binding.
4. Motor shaft binding in bearings.
5. Capstan badly worn.

1. Readjust.
2. Readjust.
3. Clean capstan and realign.
4. Loosen bearings and oil or replace motor.
5. Replace.

WOW AND FLUTTER

1. Pressure wheel defective, binding, or rubbing on capstan bearing housing.

1. Replace defective wheel. Remove source of binding (check wheel for possible spring) also check alignment of pressure spring against shaft. See "Adjustment of Roller Pressure", Page 7.
2. Readjust—See "Adjustment of Ribbon Tension" Page 7.
3. Replace motor.
4. Replace capstan drive assembly.
5. Clean or replace bearing or reel-post.
6. Replace belt.
7. Replace capstan drive assembly.

2. Excessive pressure of pressure pad against record/play head.
3. Binding motor shaft bearing.
4. Binding capstan lower bearing.
5. Binding reel-post bearing.
6. Damaged capstan drive belt.
7. Bent capstan.

1. Adjust pressure pads.
2. Clean.
3. Replace.
4. Align to right angle with panel.
5. Replace.

RIBBON BREAKS AT CAPSTAN SPINDLE

1. Too little pressure on head pads.
2. Dirty capstan spindle.
3. Worn capstan spindle.
4. Tape guide post bent.
5. Pressure wheel worn.

1. Thread tape properly.
2. Replace.
3. Adjust.
4. Replace.
5. Replace.
6. Replace.
7. Replace.
8. Adjust.
9. Adjust.
1. Press
2. Adjust
3. Replace
4. Adjust by bending or replace
1. Clean
2. Replace
3. Replace

FAILURE TO MOVE TAPE WITH POWER ON

1. Tape not properly threaded thru tape break switch.
2. Fuse blown.
3. Clutch misadjusted.
4. Capstan drive belt worn.
5. Defective motor switch.
6. Defective motor.
7. Defective tape break switch.
8. Tape break switch not adjusted properly.
9. Switch disabling arm bent.

1. Thread tape properly.
2. Replace.
3. Adjust.
4. Replace.
5. Replace.
6. Replace.
7. Replace.
8. Adjust.
9. Adjust.
1. Press
2. Adjust
3. Replace
4. Adjust by bending or replace
1. Clean
2. Replace
3. Replace

NO ERASE AND THE EYE DOES NOT OPERATE

1. Erase button not depressed
2. Erase switch not functioning
3. Defective record play switch S1
4. Erase actuator spring bent
1. Dirty head
2. Faulty 6SN7 V3
3. Faulty Component in V3 circuit

1. Thread tape properly.
2. Replace.
3. Adjust.
4. Replace.
5. Replace.
6. Replace.
7. Replace.
8. Adjust.
9. Adjust.
1. Press
2. Adjust
3. Replace
4. Adjust by bending or replace
1. Clean
2. Replace
3. Replace

INSUFFICIENT OR NO ERASE, EYE OPERATES

1. Dirty head
2. Faulty 6SN7 V3
3. Faulty Component in V3 circuit

1. Thread tape properly.
2. Replace.
3. Adjust.
4. Replace.
5. Replace.
6. Replace.
7. Replace.
8. Adjust.
9. Adjust.
1. Press
2. Adjust
3. Replace
4. Adjust by bending or replace
1. Clean
2. Replace
3. Replace

MODELS BK-442, BK-443P, BK-437, BK-437S, BK-439, BK-441

DOES NOT RECORD, EYE FUNCTIONS

4. Faulty Erase head
5. Insufficient pressure on erase head pad.

4. Replace
5. Adjust

DOES NOT RECORD, EYE DOES NOT FUNCTION

1. Shorted Head
2. Faulty wiring to record head
3. C 26 open
4. Faulty Contact on S1

1. Replace
2. Correct Wiring
3. Replace
4. Clean or replace

1. Erase button not pressed
2. Erase switch not functioning
3. Defective record play switch S1
4. Erase actuator spring bent
5. Faulty 1st stage 6J7 or Component
6. Faulty 2nd stage 6SJ7 or Component

1. Press
2. Adjust
3. Replace
4. Adjust by bending or replace
5. Replace
6. Replace

DISTORTION IN PLAYBACK, MONITOR OK

1. Worn Head pad on record head
2. Insufficient pressure on head
3. Leaky C 26
4. Flutter

1. Replace
2. Adjust V
3. Replace
4. Clean capstan or replace if worn
1. Check tube V3 and components in associated circuit.

DISTORTED RECORDING

1. Insufficient or no bias

1. Replace or rewire accordingly.

HIGH HUM

1. Defective tubes or ground connections.
2. One side of filament shorted to ground.
3. Open grid circuit.
4. Microphonic tube.

2. Check Pilot lamp holder and associated wiring.
3. Rewire.
4. Replace defective tube.

MICROPHONICS WEAK OR NO OUTPUT

1. Microphonic 6J7 tube V-1

1. Select non-microphonic tube and replace.

FAILURE OF CAPSTAN TO PULL RIBBON

1. Defective fuse, power cord or plug.
2. Poor contacts or wiring connections on output plug.

1. Replace
2. Clean contacts or replace wire.

3. Defective tubes.
4. Defective cord or resistors.
5. Defective output transformer or speaker.

3. Replace.
4. Replace.
5. Replace.

6. Open playback head.
7. Dirty pole pieces of playback head.
8. Defective selector switch contacts.
9. Defective power transformer.

6. Replace.
7. Clean.
8. Clean or replace.
9. Replace.

FAILURE OF CAPSTAN TO PULL RIBBON

1. Capstan spindle-shaft binding in lower bearing.

1. Replace capstan drive assembly.

2. Broken or weak capstan drive belt.
3. Capstan spindle jammed with accumulated ribbon residue on bearing.
4. Roller pressure insufficient.

2. Replace belt.
3. Clean thoroughly.

FAILURE TO TAKEUP RIBBON OF WINDS TO LOOSELY ON TAKEUP REEL

1. Clutches misadjusted.

4. See "Adjustment of Roller Pressure" Page 7.
1. Readjust—See "Adjustment of Clutches" Page 9.

2. Ribbon guides misadjusted.

2. Readjust—See "Adjustment of Ribbon Guides", Page 7.

3. Clutch belt slipping.

3. Clean motor drive pulley with carbon-tetrachloride. Reposition motor to tighten belt. If unsatisfactory, replace belt.

MODELS BK-442, BK-443P, BK-437, BK-437S, BK-439, BK-441

VOLTAGE AND RESISTANCE CHART

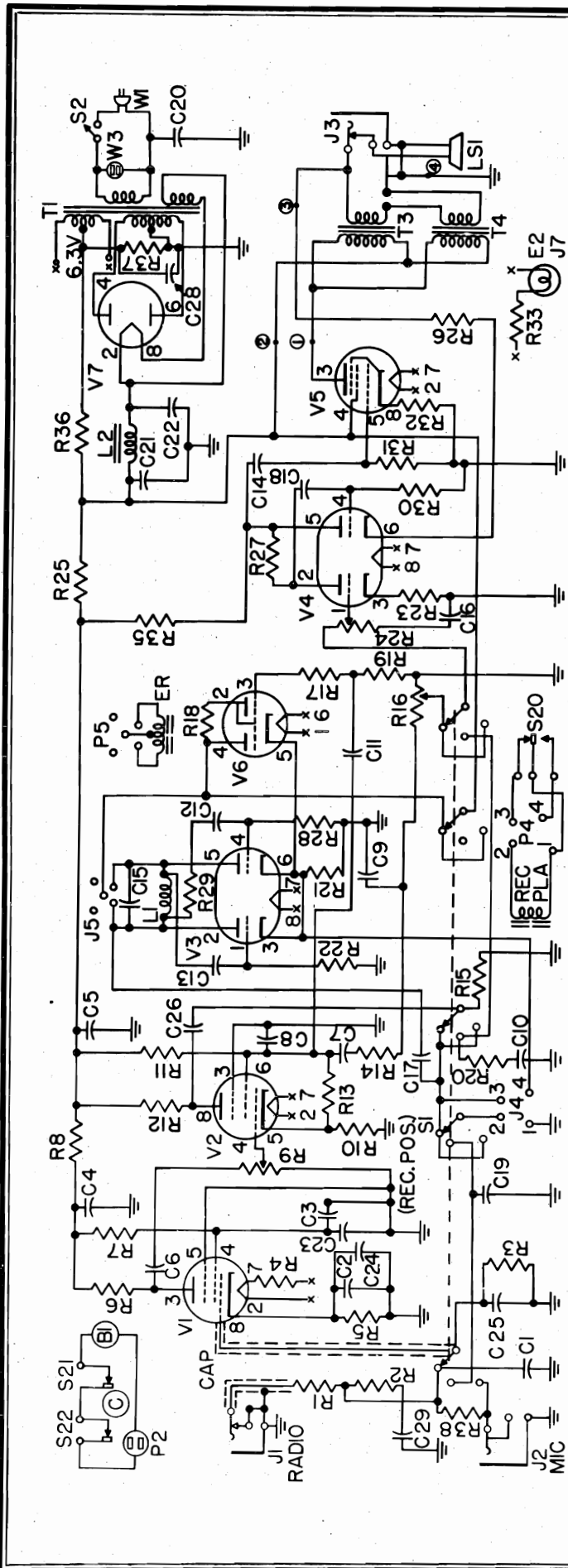
These measurements are from indicated Pin to Ground. Voltages are plus unless otherwise indicated, and are at 117 Volts, 60 cycle. K indicates value of resistance times 1000. Remove line connection when measuring resistances.

| TUBE | POSITION | MEASURE | PIN | | | | | | | | NOTES |
|------|----------|--------------------|----------------|---------------|-----------------------------|-------------------|---------------|-------------------|-------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | |
| V-1 | PLAY | VOLTAGE RESISTANCE | 0 | 30* 22 K | 100 500 K | .35 2.2 meg. | 0 | — | 30* 22 K | 1.1 2200 | *—6.3 volts a.c. between pins so marked—4.5 volts a.c. on 6J7 pins 2 to 7. **—70 volts at 40 kc. ***—Grid Cap—130 ohms play—1 meg. record. x—80 volts at 40 kc. xx—25 volts at 40 kc. |
| | RECORD | VOLTAGE RESISTANCE | 0 | 30* 22 K | 95 500 K | 37 2.2 meg. | 0 | — | 30* 22 K | 1.1 2200 | |
| V-2 | PLAY | VOLTAGE RESISTANCE | 0 | 30* 22 K | 0 | 0 | 3.5 390 | 120 45 K | 30* 22 K | 110 150 K | |
| | RECORD | VOLTAGE RESISTANCE | 0 | 30* 22 K | 0 | 0 | 1 meg. | 100 45 K | 30* 22 K | 120** 150 K | |
| V-3 | PLAY | VOLTAGE RESISTANCE | 0 | 0 | 0 | 0 | 0 | 0 | 30* 22 K | 30* 22 K | |
| | RECORD | VOLTAGE RESISTANCE | 0 | 0 | 0 | 0 | 0 | 0 | 30* 22 K | 30* 22 K | |
| 6SN7 | PLAY | VOLTAGE RESISTANCE | —40xx 220 K | 300x 100 K | 0 | —39 220 K | 300x 100 K | 0 | 30* 22 K | 30* 22 K | |
| | RECORD | VOLTAGE RESISTANCE | 0 | 160 150 K | 6 2200 | 0 | 30 300 K | 1.2 2200 | 30* 22 K | 30* 22 K | |
| 6SN7 | PLAY | VOLTAGE RESISTANCE | 0 | 155 150 K | 6 2200 | 0 | 30 300 K | 1.1 2200 | 30* 22 K | 30* 22 K | |
| | RECORD | VOLTAGE RESISTANCE | 0 | 30* 22 K | 310 100 K | 325 100 K | 0 | 0 | 30* 22 K | 19 390 | |
| 6V6 | PLAY | VOLTAGE RESISTANCE | 0 | 30* 22 K | 300 100 K | 315 100 K | 0 | 0 | 30* 22 K | 17 390 | |
| | RECORD | VOLTAGE RESISTANCE | 30* 22 K | 0 | 0 | 0 | 0 | 0 | — | — | |
| 6E5 | PLAY | VOLTAGE RESISTANCE | 30* 22 K | 30 1 meg. | — $\frac{3}{4}$ 2.2 meg. | 310 100 K | 0 | 30 | — | — | |
| | RECORD | VOLTAGE RESISTANCE | — | 350 100 K | — | 325 a.c. 100 K | open | 325 a.c. 100 K | — | 350 100 K | |
| 5Y3 | PLAY | VOLTAGE RESISTANCE | — | 330 100 K | — | 310 a.c. 100 K | — | 310 a.c. 100 K | — | 330 100 K | |
| | RECORD | VOLTAGE RESISTANCE | 22 K | 0 | 22 K | 22 K | 22 K | 22 K | open | open | |

Signal measurements: Line 117 volts, 60 cycles. Record position 0.2 volts, 300 cycle signal radio input, V-3 removed. Measured with electronic a.c. voltmeter (1/2 meg. input).

| Location | Signal Strength | Location | Signal Strength | Location | Signal Strength | Location | Signal Strength |
|-----------------|-----------------|------------------|-----------------|-----------|-----------------|-------------------|-----------------|
| Radio input | 0.2 Volts | V-2 Plate-Pin 8 | 1. Volt | V-4 Pin 5 | 9 Volts | V-5 Pin 3 | 130 Volts |
| V-1 Grid-Cap | .005 Volts | V-2 Screen-Pin 6 | 5. Volts | V-4 Pin 1 | 9 Volts | Voice Coil-output | 2.8 Volts |
| V-1 Plate-Pin 3 | 0.7 Volts | V-6 Pin 3 | 3. Volts | V-4 Pin 2 | 23 Volts | | |
| V-2 Grid-Pin 4 | 0.7 Volts | V-4 Pin 4 | 0.8 Volts | V-5 Pin 5 | 23 Volts | | |

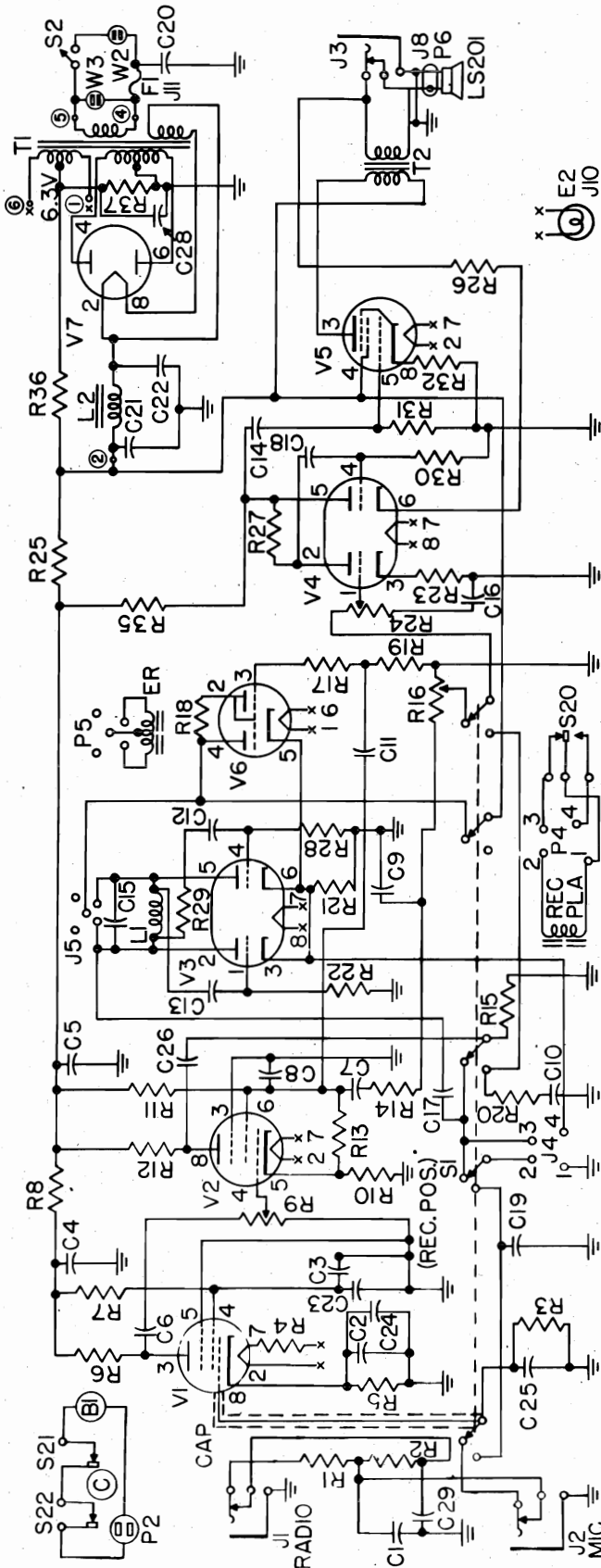
MODEL BK-442 SCHEMATIC



| SYM. | DESCRIPTION | PART NUMBER |
|------|-------------------------------|-------------|
| B-1 | MOTOR | 206322 |
| C-1 | .001 MFD. | 3-106093-3 |
| C-2 | 20-20 MFD., 450-450-25 V. | 103253 |
| C-3 | .05 MFD. | 106094-2 |
| C-4 | 20-20 MFD., 450-450-25 V. | 103253 |
| C-5 | 20-20 MFD., 450-450-25 V. | 103253 |
| C-6 | .05 MFD. | 3-106093-4 |
| C-7 | .001 MFD. | 2-106094-2 |
| C-8 | .001 MFD. | 3-106093-3 |
| C-9 | .001 MFD. | 3-106093-3 |
| C-10 | .05 MFD. | 2-106094-2 |
| C-11 | .001 MFD. | 1-106094-2 |
| C-12 | .001 MFD. | 1-106094-2 |
| C-13 | .001 MFD. | 1-106094-2 |
| C-14 | .001 MFD. | 1-106094-2 |
| C-15 | .001 MFD. | 1-106094-2 |
| C-16 | .001 MFD. | 1-106094-2 |
| C-17 | .001 MFD. | 1-106094-2 |
| C-18 | .001 MFD. | 1-106094-2 |
| C-19 | .001 MFD. | 1-106094-2 |
| C-20 | .001 MFD. | 1-106094-2 |
| C-21 | 20-20 MFD., 450-450 V. | 102711 |
| C-22 | 20-20 MFD., 450-450 V. | 1-106972-5 |
| C-23 | .001 MFD. | 1-106972-5 |
| C-24 | 50 MMFD. | 1-107461-2 |
| C-25 | .25 MFD. | 3-106093-7 |
| C-26 | .05 MFD. | 1-109348-5 |
| C-27 | .05 MFD. | 3-106093-8 |
| C-28 | .05 MFD. | 21421-2 |
| C-29 | .05 MFD. | 21421-2 |
| J-1 | JACK | 21421-2 |
| J-2 | JACK | 21421-2 |
| J-3 | JACK | 21421-2 |
| J-4 | SOCKET, WAFER-4 CONTACT | 106730 |
| J-5 | SOCKET, 5 CONTACT | 107470 |
| J-6 | SOCKET, 4 CONTACT | 106730 |
| J-7 | SOCKET, PILOT LAMP | 103865 |
| L-1 | COIL, OSCILLATOR | 200925 |
| L-2 | CHOKE, FILTER | 305975 |
| LS-1 | SPEAKER, MAGNETIC | 106765 |
| P-1 | PLUG, 4 PRONG | 110636 |
| P-2 | CONNECTOR, MALE-2 PRONG | 106765 |
| P-3 | PLUG | 107469 |
| P-4 | PLUG | 3-106771-3 |
| P-5 | 1 MEG. 1/2 W. | 3-106771-7 |
| P-6 | 22 K. 1/2 W. | 3-106771-3 |
| P-7 | 1 MEG. 1/2 W. | 1-106005-3 |
| P-8 | 5 1 W. (OR 4.7 OR 5.1) | 1-106005-3 |
| P-9 | 2.2 K. 1/2 W. | 3-106771-2 |
| P-10 | 470 K. 1/2 W. | 1-107989-9 |
| P-11 | 2.2 MEG. 1/2 W. | 3-106771-8 |
| P-12 | 22 K. 1/2 W. | 3-106771-7 |
| P-13 | 1 MEG. POTENT. | 103469 |
| P-14 | 390 1/2 W. | 2-106772-3 |
| P-15 | 47 K. 1 W. | 2-106772-3 |
| P-16 | 47 K. 1 W. | 2-106772-3 |
| P-17 | 100 K. 1/2 W. | 2-106771-10 |
| P-18 | 220 K. 1/2 W. | 2-106771-12 |
| P-19 | 25 K. POTENT. | 103469-2 |
| P-20 | 220 K. 1/2 W. | 3-106771-1 |
| P-21 | 1 MEG. 1/2 W. | 3-106771-3 |
| P-22 | 4.7 K. 1/2 W. AL.T. 103713-22 | 103806-18 |
| P-23 | 22 K. 1/2 W. | 3-106771-7 |
| P-24 | 22 K. 1/2 W. | 3-106771-7 |
| P-25 | 2.2 K. 1/2 W. | 3-106771-2 |
| P-26 | 2.2 K. 1/2 W. | 3-106771-2 |
| P-27 | 220 K. 1/2 W. | 3-106771-1 |
| P-28 | 220 K. 1/2 W. | 3-106771-1 |
| P-29 | 22 K. 1/2 W. | 3-106771-7 |
| P-30 | 470 K. 1/2 W. | 103806-12 |
| P-31 | 470 K. 1/2 W. | 103806-12 |
| P-32 | 390 1 W. | 2-106772-5 |
| P-33 | 5 1 W. | 1-106005-3 |
| P-34 | 47 K. 1 W. | 2-106772-3 |
| P-35 | 220 K. 1/2 W. | 3-106771-1 |
| P-36 | 22 K. 1/2 W. | 3-106771-7 |
| P-37 | 1 MEG. 1/2 W. | 3-106771-3 |
| P-38 | SWITCH, SELECTOR | 106746-3 |
| S-1 | SWITCH, ERASE | 110086 |
| S-2 | SWITCH, PART OF R-24 | 110059-501 |
| S-3 | SWITCH ASSEM. TAPE BREAK | 110111 |
| S-4 | SWITCH, TOGGLE-S.P.D.T. | 204802 |
| S-5 | TRANSFORMER, POWER | 200923 |
| S-6 | TRANSFORMER, OUTPUT | 200923 |
| S-7 | TUBE, ELECTRON 6X7 | 7075 |
| S-8 | TUBE, ELECTRON 6S7 | 103205 |
| S-9 | TUBE, ELECTRON 6SN7 | 103185 |
| S-10 | TUBE, ELECTRON 6SN7 | 102705 |
| S-11 | TUBE, ELECTRON 6S6 | 103206 |
| S-12 | TUBE, ELECTRON 6S5 | 102705 |
| S-13 | CORD, POWER | 206823 |
| S-14 | CONNECTOR, FEMALE-3 CONTACT | 104765 |

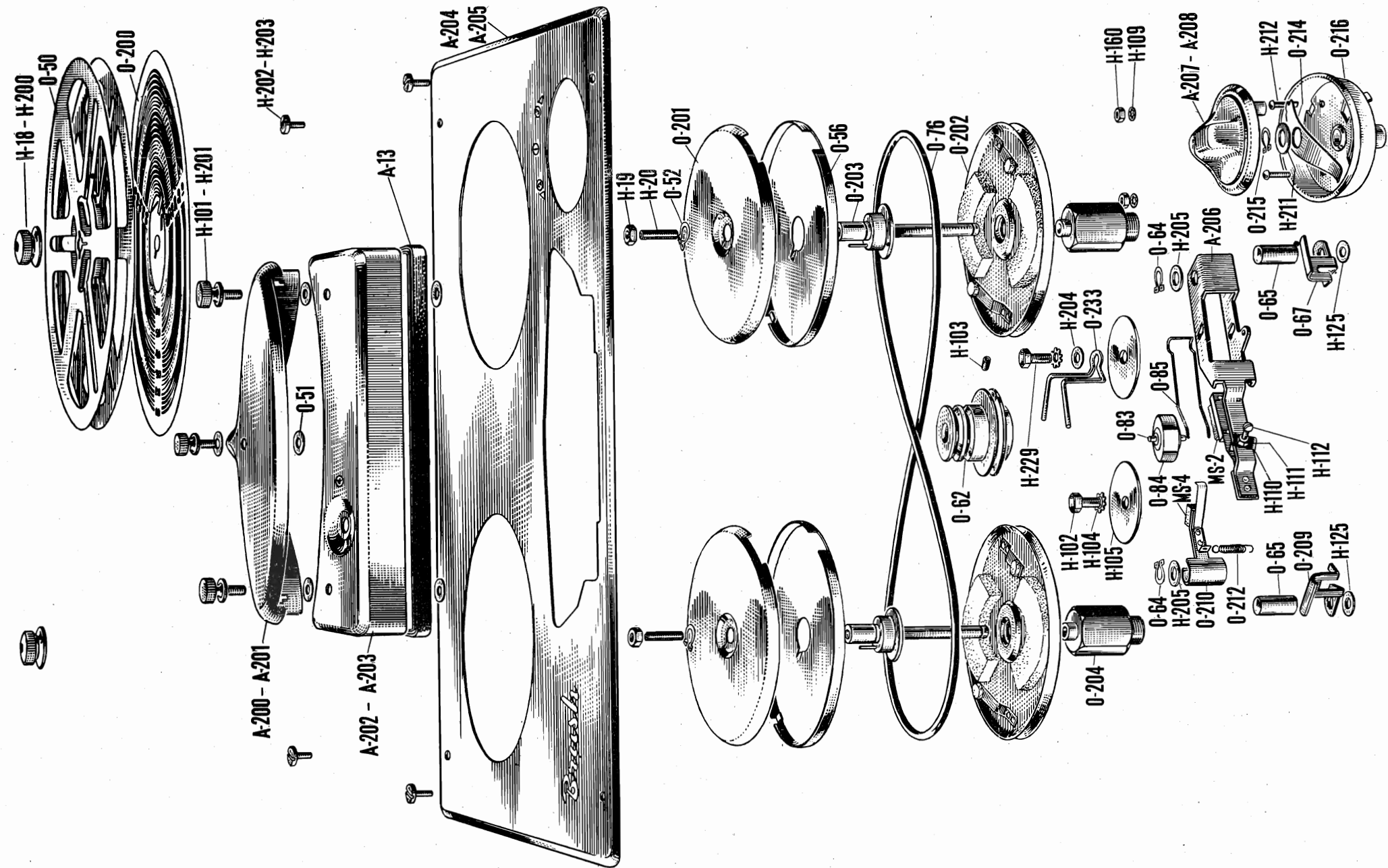
MODEL BK-443

MODEL BK-443 SCHEMATIC



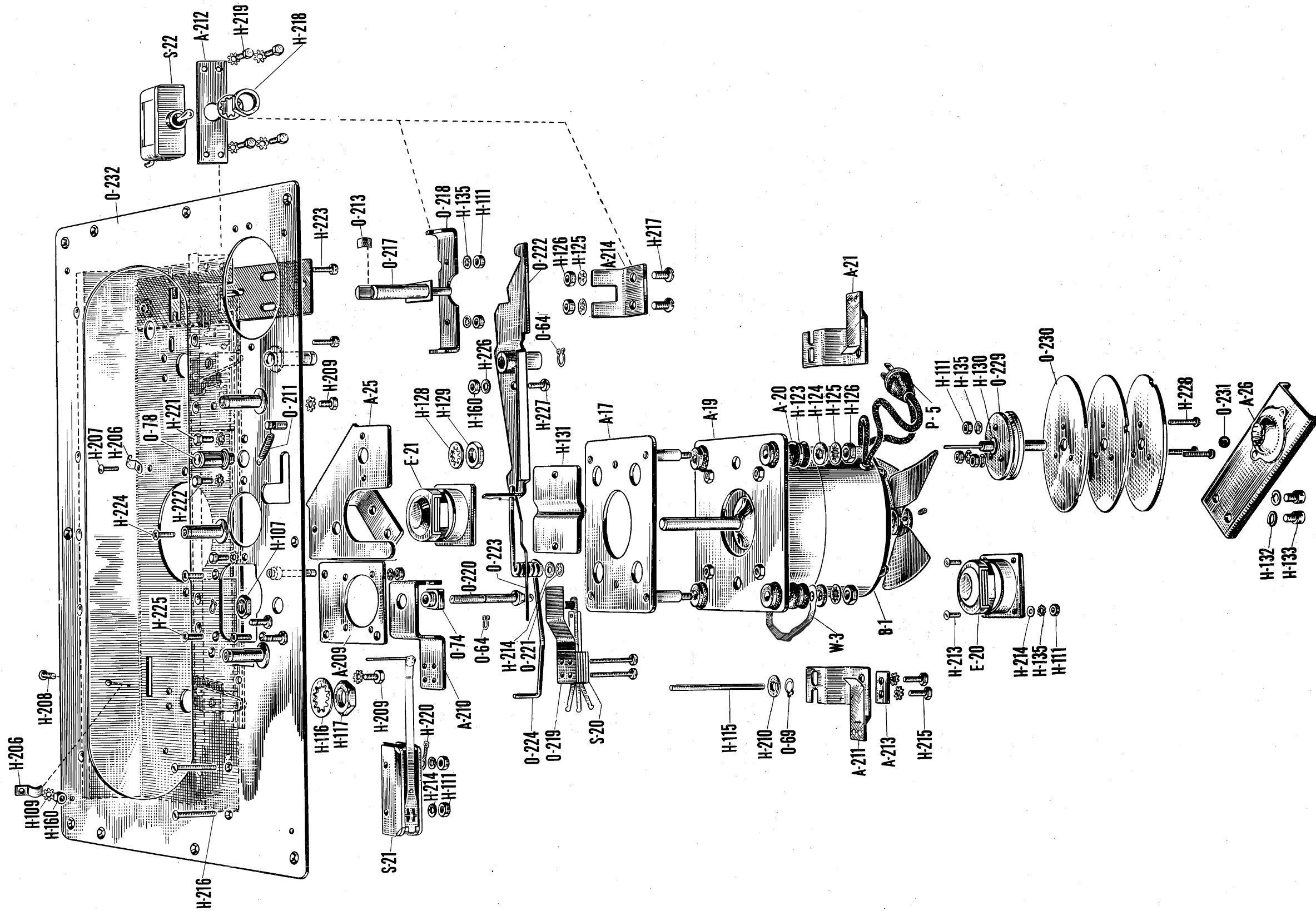
| SYM. | DESCRIPTION | PART NUMBER | SYM. | DESCRIPTION | PART NUMBER | SYM. | DESCRIPTION | PART NUMBER |
|------|------------------------------|-------------|--------|--------------------------------|-------------|------|-----------------------------|-------------|
| B-1 | MOTOR | 206322 | J-3 | JACK | 21421-2 | R-20 | 4.7 K. 1/2 W. | 103713-22 |
| C-1 | .001 MFD. | 3-106093-3 | J-4 | SOCKET, WAFFER-4 CONTACT | 106730 | R-21 | 22 K. 1/2 W. | 3-106771-7 |
| C-2 | 20-20-20 MFD., 450-450-25 V. | 103253 | J-5 | SOCKET, 5 CONTACT | 107470 | R-22 | 220 K. 1/2 W. | 3-106771-1 |
| C-3 | .05 MFD. | 3-106094-2 | J-8 | CONNECTOR | 104546 | R-23 | 2.2 K. 1/2 W. | 3-106771-2 |
| C-4 | 20-20-20 MFD., 450-450-25 V. | 103253 | J-10 | HOLDER, INDICATOR LAMP | 110352 | R-24 | 100 K. POTENT. | 106762-1 |
| C-5 | 20-20-20 MFD., 450-450-25 V. | 103253 | J-11 | HOLDER, FUSE | 107147 | R-25 | 2.2 K. 1 W. | 3-106772-4 |
| C-6 | .005 MFD. | 3-106093-4 | L-1 | COIL, OSCILLATOR | 103865 | R-26 | 2.2 K. 1/2 W. | 3-106771-2 |
| C-7 | .05 MFD. | 2-106094-2 | L-2 | CHOKE, FILTER | 200925 | R-27 | 220 K. 1/2 W. | 3-106771-1 |
| C-8 | .001 MFD. | 3-106093-3 | LS-201 | SPEAKER, MAGNETIC | 308912 | R-28 | 220 K. 1/2 W. | 3-106771-1 |
| C-9 | .001 MFD. | 3-106093-3 | P-1 | PLUG, 6 PRONG | 104212-3 | R-29 | 2.2 K. 1/2 W. | 3-106771-2 |
| C-10 | .05 MFD. | 2-106094-2 | P-2 | CONNECTOR, MALE-2 PRONG | 106336 | R-30 | 470 K. 1/2 W. | 103806-12 |
| C-11 | .05 MFD. | 2-106094-2 | P-4 | PLUG | 107469 | R-31 | 470 K. 1/2 W. | 103806-12 |
| C-12 | .0001 MFD. | 1-109354-3 | P-5 | PLUG | 106765 | R-32 | 390 1 W. | 103806-12 |
| C-13 | .0001 MFD. | 1-109354-3 | P-6 | PLUG | 107469 | R-35 | 47 K. 1 W. | 2-106772-5 |
| C-14 | .005 MFD. | 3-106093-4 | R-1 | 1 MSG. 1/2 W. | 106738-5 | R-36 | 220 K. 1/2 W. | 2-106772-3 |
| C-15 | .001 MFD. | 3-106972-5 | R-2 | 22 K. 1/2 W. | 3-106771-3 | R-37 | 22 K. 1/2 W. | 3-106771-1 |
| C-16 | .005 MFD. | 3-106093-4 | R-3 | 1 MSG. 1/2 W. | 3-106771-3 | S-1 | SWITCH, SELECTOR | 106746-3 |
| C-17 | .002 MFD. | 3-106093-6 | R-4 | 5 1 W. (4.7 OR 5.1) | 1-106005-3 | S-2 | SWITCH, PART OF R-24 | 110086 |
| C-18 | .005 MFD. | 3-106093-4 | R-5 | 2.2 K. 1/2 W. | 3-106771-2 | S-20 | SWITCH, ERASE | 110059-501 |
| C-19 | .002 MFD. | 3-106093-6 | R-6 | 470 K. 1/2 W. | 1-107989-9 | S-21 | SWITCH ASSEM., TAPE BREAK | 101011 |
| C-20 | .005 MFD. | 106100-6 | R-7 | 2.2 MEG. 1/2 W. | 3-106771-8 | S-22 | SWITCH, TOGGLE-S.P.D.T. | 204902 |
| C-21 | 20-20 MFD., 450-450 V. | 102711 | R-8 | 22 K. 1/2 W. | 3-106771-7 | T-1 | TRANSFORMER, POWER | 208913 |
| C-22 | 20-20 MFD., 450-450 V. | 102711 | R-9 | 1 MEG. POTENT. | 103469 | T-2 | TRANSFORMER, OUTPUT | 7075 |
| C-23 | .001 MFD. | 1-106872-5 | R-10 | 390 1/2 W. | 3-106771-5 | V-1 | TUBE, ELECTRON 6J7 | 105205 |
| C-24 | .001 MFD. | 1-106872-5 | R-11 | 47 K. 1 W. | 2-106772-3 | V-2 | TUBE, ELECTRON 6SN7 | 103185 |
| C-25 | 50 M.M.F. | 1-107461-2 | R-12 | 47 K. 1 W. | 2-106772-3 | V-3 | TUBE, ELECTRON 6SN7 | 102709 |
| C-26 | .25 MFD. | 3-106093-7 | R-13 | 47 K. 1/2 W. | 2-106771-10 | V-4 | TUBE, ELECTRON 6V6 | 105206 |
| C-28 | .05 MFD. | 2-106094-2 | R-14 | 100 K. 1/2 W. | 2-106771-12 | V-5 | TUBE, ELECTRON 6E5 | 102705 |
| C-29 | .03 MFD. | 3-106093-8 | R-15 | 220 K. 1/2 W. | 3-106771-1 | V-6 | TUBE, ELECTRON 6E5 | 102705 |
| E-2 | LAMP, PILOT | 105710-1 | R-16 | 250 K. 1/2 W. | 104662-2 | *W-2 | CONNECTOR, MALE-2 CONTACT | 108673 |
| F-1 | FUSE | 102625-9 | R-17 | 220 K. 1/2 W. | 3-106771-1 | W-3 | CONNECTOR, FEMALE-2 CONTACT | 104765 |
| J-1 | JACK | 21421-1 | R-18 | 1 MEG. 1/2 W. | 3-106771-3 | | | |
| J-2 | JACK | 21421-2 | R-19 | 2.2 MEG. 1/2 W. ALT. 103806-18 | 3-106771-8 | | | |

*W-2 Elliptical power socket has been replaced in later models with a circular receptacle #111180 (cables not interchangeable).

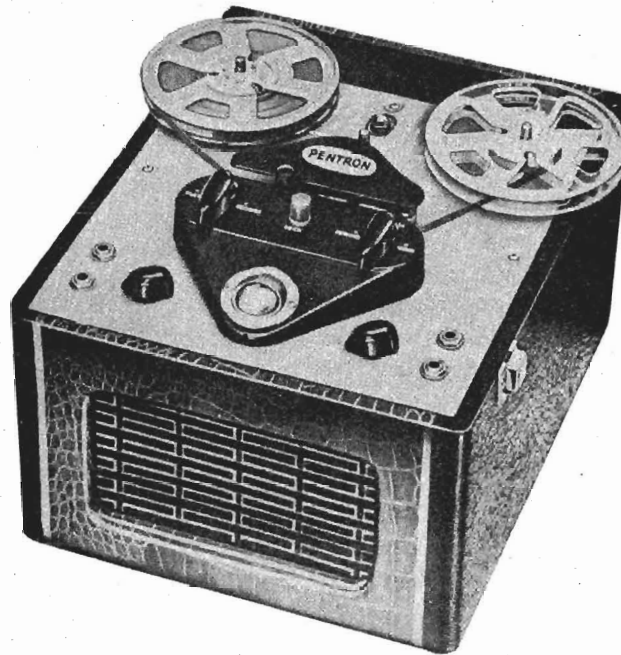


TAPE REC. PAGE 22-89.90 BRUSH

MODELS BK-442, BK-443P, BK-437, BK-437S, BK-439, BK-441



MECHANICAL CHASSIS, EXPLODED VIEW



The Pentron tape recorder is an instrument for making high fidelity recordings of music or speech on magnetic tape. Realistic reproduction of the recordings is provided by a self-contained, high power amplifier and speaker.

A brief description of the operating components follows. It is recommended that the prospective operator use this to familiarize himself with their operation before attempting to use the instrument.

TAPE — The Pentron recorder uses $\frac{1}{4}$ " wide Magnetic Recording Tape with Type A winding. Type A winding simply means that the magnetic coating or dull side of the tape is wound facing in. Type B tape (dull side facing out) can be changed to Type A for use on this machine by merely rewinding with a half twist.

Either plastic or paper recording tape can be used. For best results, use a red oxide tape, preferably plastic. Since the Pentron recorder is very easy on tape, it is quite practical to use the higher priced plastic tape. Recordings can be played back and tape re-used many thousands of times without noticeable change in performance.

For use on this machine tape may be wound on either the popular 7" reel (1200 feet) or any smaller size reel.

Tape can be spliced by bringing the ends together (not lapped) and applying a small piece of transparent scotch tape to the shiny side on plastic tape or to the grey side on paper tape.

Always keep tape clean and store preferably in humidors, much the same as you would movie film.

CAPSTANS — There are two Capstans which control the speed of the recorder. The small Capstan which carries the tape past the heads at a speed of $3\frac{3}{4}$ " per second, (one hour playing time in one direction on a 1200' reel), or the larger Capstan which moves the tape at $7\frac{1}{2}$ " per second, (one-half hour playing time in one direction on a 1200' reel). The smaller Capstan is permanently built into the machine and should not be removed unless service is required. The larger Capstan is a sleeve which can be slipped over the smaller Capstan and tightened effectively by turning its knurled head a few turns in a clockwise direction. **MASTER CONTROL KNOB MUST BE IN "IDLE" POSITION, MACHINE MUST BE TURNED OFF, AND MOTOR RELEASE PIN MUST BE IN THE "IN" POSITION SO THAT CAPSTAN CANNOT BE PUT ON TOO TIGHTLY.** Otherwise difficulty will be experienced in removing the Capstan. To remove the large Capstan, the motor must be turned OFF, the motor release pin in the OUT position, and with the Master Control Knob in the IDLE position, proceed to unscrew the Capstan. The initial loosening can be accomplished by grasping the knurled portion of the Capstan and giving it a quick twist in a counter-clockwise direction. If capstan is difficult to remove, grasp right hand reel spindle and push firmly toward rear of case at same time turning capstan counter-clockwise.

The smaller or slow speed Capstan is used for economic long period playing. The reproducing qualities are about the same as that of a very good AM radio broadcast.

The larger or high speed Capstan is recommended where best high fidelity is required particularly on exceptionally fine music, the reproducing qualities being equivalent to that of a very fine FM radio broadcast.

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A recording made at high speed must be played back at high speed and similarly, a recording made at slow speed must be played back at slow speed.

DUAL TRACKS TWO CHANNEL — After a reel of tape has been recorded, the reel with the tape will be on the left hand spindle. To record on the second channel, turn the reel over and place it on the right hand spindle. It will then be in position for recording or playing back on the second track. On completion of the second track, you are then ready to repeat playing of the first track without rewinding. Switching of the reels selects the right track.

POWER SUPPLY — This unit operates only on 110 Volt, 60 Cycle, AC current. Use of any other supply directly into the unit will result in serious damage to the Amplifier section.

MECHANICAL INTERLOCK — An automatic mechanical interlock, not visible from outside, makes it impossible to actuate one control knob while the other is being used. Therefore, do not attempt to force the knobs.

TONE CONTROL — The Tone Control also contains the master switch which turns the amplifier and mechanism OFF and ON. The click of this switch can be heard when this Control Knob is turned to the extreme counter clockwise position.

The Tone Control decreases the high frequency response when turned clockwise. It is automatically disconnected during recording. Therefore, when recording from a radio be sure the tone control on the radio is set for maximum treble. These highs may be subdued with the Tone Control on Recorder during playback.

VOLUME CONTROL — This controls the volume for both playing and recording. For recording, the Volume Control should be set according to the reactions on the Volume Indicator Eye.

EXTERNAL AMPLIFIER JACK — To use your tape recorder with an external amplifier simply connect the external amplifier to the proper jack. The VOLUME and TONE controls on the recorder should be turned completely clockwise; the recorder will then operate through the external amplifier. Use the volume and tone controls on the external amplifier for proper adjustment.

EXTERNAL SPEAKER JACK — When an external speaker (3.2 voice coil) is connected to your recorder the internal speaker is automatically disconnected and the entire output will be heard through the external source. For privacy of playback a set of low impedance earphones can be

plugged into this jack.

RADIO JACK — For recording or enjoying any radio program, plug your radio tuner in the Radio Jack, using other controls in the conventional manner for recording or listening. The radio jack will also take the output of any external high fidelity, high impedance pick up.

MOTOR RELEASE PIN — When this pin is pulled to the OUT position, the motor is engaged with the flywheel. When it is in the IN position the motor and flywheel are disengaged.

Always leave the Pin in the IN position when the machine is not in use. This prevents bumps or dents in the rubber surface of the flywheel which result in rough operation.

OPERATION

MASTER CONTROL KNOB — When this knob is turned to the PLAY position, the machine will reproduce the program recorded on the tape.

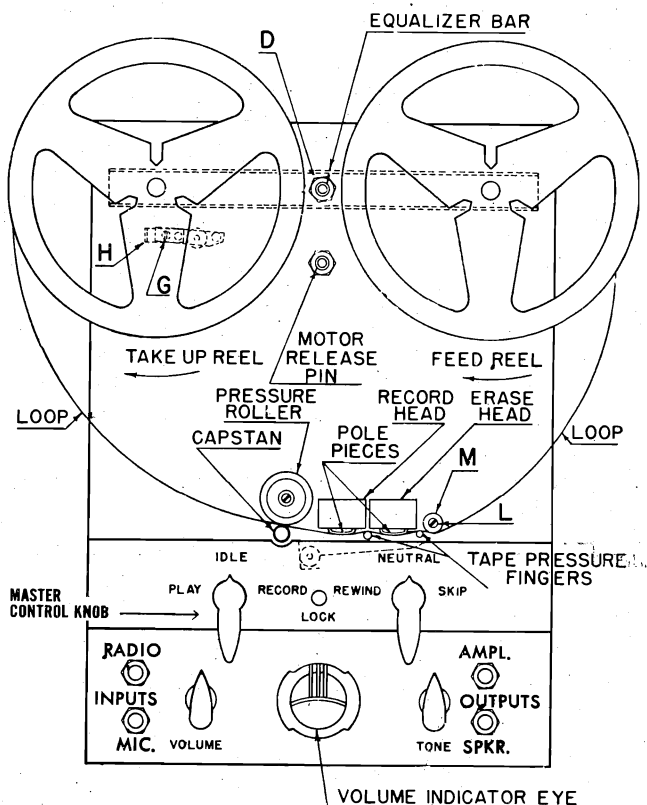


FIGURE - 1

When turned to the RECORD position, the machine will record whatever material that is desired. This position cannot be gone into without first pressing the RED

Lock Button. This is a safety feature which prevents accidental erasure of the recorded program. When turned to the IDLE position the tape will stand still, unless it is desired to rewind or skip.

REWIND AND SKIP KNOB — With the Master Control Knob in the IDLE position, turning this knob toward the REWIND position will cause the tape to rewind on the Feed Reel at any desired speed up to a top speed of 187 inches per second. Similarly, by reversing the knob and turning it toward the SKIP position you can reach the desired spot within a matter of seconds.

Switching the direction of this control knob will act as a very effective brake in cutting down the speed of the reels and it is recommended that this method be used where fast stopping is necessary. However, it is better for the mechanism if this fast-braking is used moderately.

NEVER GO FROM FAST REWIND INTO PLAY OR RECORD WITHOUT FIRST BRINGING THE REELS TO A STOP. FAILURE TO COMPLY WITH THIS MAY RESULT IN UNROLLED AND POSSIBLY TORN TAPE.

LOCK BUTTON — When this button is pushed, the machine is switched from a reproducer to a recorder. It thus erases whatever passes in front of the Erase Head whether the machine is playing, rewinding or recording. It must be depressed manually and it will stay down when the Master Control Knob is turned to RECORD. This makes it possible to make new recordings on tape which already has undesirable recordings on it and it can be held down manually when the Master Control Knob is in the PLAY position. This makes it a most desirable feature for spot erasing or dubbing in on pre-recorded tape. This can be done so rapidly that words can be erased and new ones added with split second accuracy.

VOLUME INDICATOR EYE — This is intended for use during recording. Ideal recording volume level is attained when the loudest portions of the signal just cause the eye to close. If too high a level is used, distortion will occur; too low a level will result in relatively higher background noises.

THREADING — Refer to Figure 1. Place an empty reel on the Take Up Reel Spindle (left hand spindle).

Place a reel of tape on the Feed Reel Spindle (right hand spindle) so that it unwinds clockwise. Be sure that both reels are engaged with the drive pins on the spindles. Bring the end of the tape over to the Take Up Reel and take up several turns of tape. A pencil or similar object is useful in holding the tape against the hub while making these preliminary turns. Now pick up the loop of tape between the reels and drop it into the slot in front

of the Recording Head and between the Capstan and Pressure Roller. Make sure the tape is all the way down in the slot.

REPRODUCING OR PLAYING BACK RECORDED TAPE — Place reel of tape on machine. Plug into 110 Volts, 60 Cycle, AC receptacle and turn Tone Control Knob clockwise to switch ON position. Allow a few moments for the Amplifier to warm up as you would on a radio set. Now turn the Master Control Knob to PLAY and adjust the Volume and Tone Controls to suit. Do not press the RED Lock Button unless you wish to erase.

RECORDING—Using Microphone — Plug Microphone into the Mic. Jack. Set up the rest of the machine as you would for PLAY but do not turn the Master Control Knob as yet. It is generally advisable to set the volume level before starting the recording. To do this, hold down the Lock Button and adjust the volume control while a sample program is going on. (The tape is standing still.) Now you are ready to record. Start recording by turning the Master Control Knob to RECORD. The position of the microphone is important. For recording voice, the distance from the source to the microphone should be kept as small as possible for best results. In recording music, greater distances are desirable because the room acoustics usually improve the music.

SERVICE

GENERAL — The Pentron tape recorder was engineered and developed to give excellent performance over a long period of time. It is, of course, expected that there will be occasional tube failures as with radio and television but this will be at a minimum.

The machine should be kept clean and any accumulation of dust from the tapes should be blown or brushed away from the Heads or around the Capstan. The faces for the Pole Pieces in the Heads can be cleaned by wiping them with a cloth dampened with Carbon Tetrachloride.

LUBRICATION — This machine is equipped with special oil impregnated bearings on all wearing surfaces and will never need lubrication during its entire lifetime.

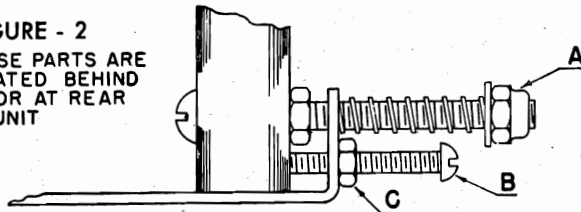
ADJUSTMENTS — To take unit from case, remove 4 screws from the bottom side and lift unit out.

All adjustments on this unit are of a permanent nature and have been set precisely at the factory, therefore, they should need no further setting. If the unit requires

MODEL 9T3

readjustment, the following procedure will put the unit in operating condition. This outline covers a complete re-adjustment of all parts and all may not be required in every case. In the event that only individual adjustments are required, these can be made by following the applicable instructions.

FIGURE - 2
THESE PARTS ARE LOCATED BEHIND MOTOR AT REAR OF UNIT



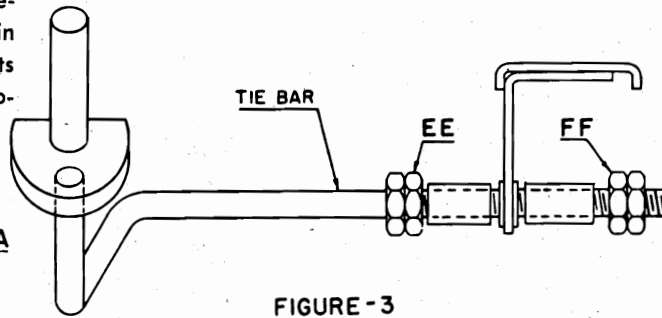
ADJUSTING MOTOR DRIVE — The motor drive is adjusted by the turning of screw B (Fig. 2). The correct amount of engagement is determined by stopping the large capstan with the finger while it is running in the play position. When this becomes rather difficult to do, there is sufficient engagement to insure proper operation. Loosening screw B increases engagement; tightening screw B decreases engagement.

Do not adjust screw B beyond proper engagement as this will place unnecessary and excessive load on the motor which might result in distortion and wows. After adjustment has been made with screw B, lock in place with nut C.

Nut A has been adjusted in the factory and ordinarily need not be touched. If for any reason, sufficient engagement cannot be obtained by adjusting screw B, turn Nut A several revolutions clockwise. Before replacing unit in the case, loosen the large capstan. To do so, it may be necessary to hold the flywheel located at the lower end of the capstan shaft.

TRACTION OR "DRAG" ON REEL SPINDLES—Loosen Screw D (Figure 1) to move Equalizer Bar forward or backward. With Control Knob in IDLE position and with an equal amount of tape on each reel move the Equalizer Bar back until a slight amount of drag is noticeable on each reel spindle. Check by drawing a small loop of tape from each reel. These loops should stay immobile. If the reels take up the slack at this point, the amount of drag is too great and should be relieved very slightly.

Should the tape have a tendency to wind up or creep onto the Take-Up Reel while making the above adjustment, correction can be made by maneuvering the Nuts EE and FF (Figure 3) backwards on the Tie Bar. These parts are located on the underside of the Top Mechanism Plate and below the Feed Reel.



TAKE UP ON TAKE UP REEL — Take up adjustment on the Take Up Reel is required if when the Control Knob is placed in the PLAY or RECORD position, a loop of tape feeds out before the Take Up Reel starts turning, or if the Tape Pressure Fingers in front of the Heads are not engaged with the tape before the Take Up Reel starts turning.

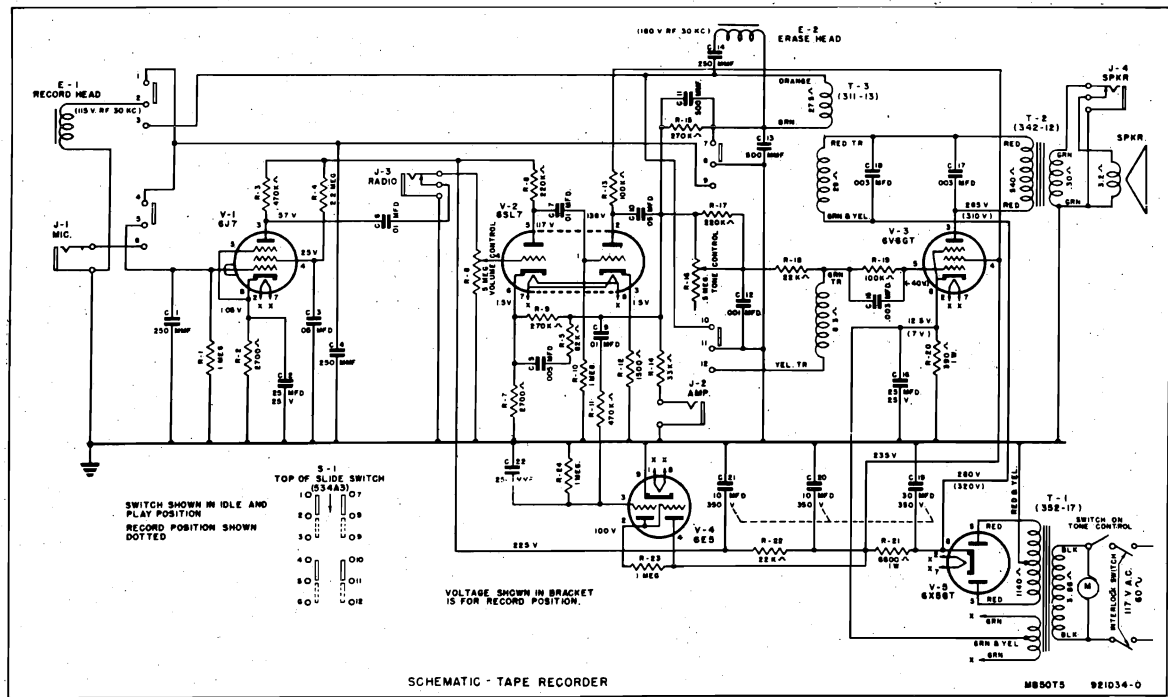
This adjustment is accomplished by loosening screw G (Figure 1) and moving bar H towards the Equalizer bar for decreasing the time required for the Take Up Reel to start turning and, of course bar H must be moved away from Equalizer Bar to increase the time.

TAPE PRESSURE FINGER ADJUSTMENT — For most satisfactory results the tape should lay across the full face of the Pole Pieces. Too little coverage of the Pole Piece face will result in indistinct recordings and reproductions. Too much pressure will be accompanied by increased drag and unnecessary wear on the tape. The Tape Pressure Fingers are properly adjusted when the tape is depressed approximately 1/16" from the front face of the Pole Piece. This is accomplished by loosening Screw L (Figure 1) and moving Post M to the desired location.

HINTS

MONITORING — When recording from an external source, (such as FM or AM tuners, phono pickup) the program may be heard by plugging earphones into the amplifier jack.

FLAT SPOT — Flats may develop on the flywheel if the motor release pin is not pushed in (according to direction) while machine is not in use. To remedy this condition, set the machine in play position and let run until flats are removed.



PARTS LIST

| Qty. Per Unit | Part Number | Description |
|---------------|-------------|--------------------------------------------------|
| 1 | 899-3 | Flat Belt (Fly Wheel to Take-up Reel) |
| 1 | 899-2 | Flat Belt (Motor Pulley to Feed Reel) |
| 1 | 711-B-57 | Motor Mounting Plate |
| 1 | 964-A-58 | Capstan Bearing |
| 1 | 714-A-110 | Capstan (3.75" per second) |
| 1 | 714-A-111 | Capstan (7.5" per second) |
| 1 | 714-A-113 | Motor Release Pin |
| 1 | 964-A-40 | "Play-Record" Cam Assembly |
| 1 | 964-A-27 | Fly Wheel with Tire |
| 1 | 943-B-4 | Record Head |
| 1 | 943-B-5 | Erase Head |
| 1 | 714-A-82 | Adjusting Nut "D" (Equalizer Bar) |
| 1 | 711-A-193 | Head Bracket |
| 1 | 714-A-41 | Motor Pulley |
| 1 | 711-A-195 | Spring Anchor Disk |
| 1 | 713-A-3 | Tie Rod |
| 1 | 964-A-25 | Pressure Roller Assembly |
| 1 | 712-A-8 | Spring (Interlock Bar) |
| 1 | 712-A-10 | Spring (Take-up Pulley—Feed Reel) |
| 1 | 712-A-5 | Spring (Take-up Bar—Take-up Reel) |
| 1 | 712-A-6 | Spring (Pressure Roller Slider) |
| 2 | 712-A-9 | Sleeves (Tie Bar) |
| 1 | 964-B-7 | Equalizer Bar and Pulley Assembly |
| 1 | 964-A-72 | Record Pole Piece |
| 1 | 964-A-73 | Erase Pole Piece |
| 1 | 367-C-2 | Motor |
| 1 | 534-A-3 | Slide Switch |
| 1 | 345-A-12 | Speaker |
| 1 | 556-1 | Eye Tube Socket, 6 Prong (Stealtite-Type) |
| 1 | 558-A-4 | Floating Octal Tube Socket |
| 2 | 558-A-2 | Octal Tube Socket |
| 1 | 352-17 | Power Transformer (T-1) |
| 1 | 342-12 | Output Transformer (T-2) |
| 1 | 311-13 | Oscillator Transformer (T-3) |
| 2 | 552-1 | Jack (Phone) |
| 4 | 111-10521 | Resistor, 1 Meg 1/2 Watt (R-1, R-10, R-23, R-24) |

| Qty. Per Unit | Part Number | Description |
|---------------|---------------|----------------------------------------------------------|
| 2 | 111-27221 | Resistor, 2700 Ohms 1/2 Watt (R-2, R-7) |
| 2 | 111-47421 | Resistor, 470 K Ohms, 1/2 Watt (R-3, R-11) |
| 1 | 111-22521 | Resistor, 2.2 Meg 1/2 Watt (R-4) |
| 1 | 111-82321 | Resistor 82 K, 1/2 Watt (R-5) |
| 1 | 124-A-50413-7 | Volume Control 5 Meg Audio Taper (R-6) |
| 2 | 111-22421 | Resistor 220 K Ohms, 1/2 Watt (R-8, R-17) |
| 2 | 111-27421 | Resistor 270 K Ohms, 1/2 Watt (R-9, R-12, R-15) |
| 2 | 111-10421 | Resistor 100 K Ohms, 1/2 Watt (R-13, R-19) |
| 1 | 111-15221 | Resistor 1500 Ohms, 1/2 Watt (R-14) |
| 2 | 111-22321 | Resistor 22000 Ohms, 1/2 Watt (R-18, R-22) |
| 1 | 126-A-50413-4 | Tone Control .5 Meg Audio Taper (R-16, with switch) |
| 1 | 111-68231 | Resistor 6800 Ohms, 1 Watt (R-21) |
| 1 | 111-39131 | Resistor 390 Ohms, 1 Watt (R-20) |
| 1 | 285-5064 | Lytic 30-10 MFD, 350V (C-19) |
| 1 | | C-20, C-21, C-16, 25 MFD, 25V |
| 1 | 273-2561 | Lytic Tubular 25 MFD, 25V (C-2) |
| 1 | 263-1024 | Condenser Tubular, .001 MFD, 400V (C-12) |
| 2 | 263-3024 | Condenser Tubular, .003 MFD, 400V (C-5, C-15, C-17) |
| 1 | 232-3024 | Condenser Mica .003 MFD, 400V (C-18) |
| 3 | 263-1034 | Condenser Tubular .01 MFD, 400V (C-6, C-7, C-9) |
| 2 | 263-5034 | Condenser Tubular .05 MFD, 400V (C-3, C-10) |
| 4 | 232-2515-2 | Condenser Mica 250 MMF, 500V (C-1, C-4, C-8, C-14, C-22) |
| 2 | 232-5015 | Condenser Mica 500 MMF, 500V (C-13, C-14) |

SECTION 1 GENERAL

INTRODUCTION

SCOPE OF MANUAL

This booklet is written for the express purpose of guiding the repairman in the servicing of Revere Tape Recorders. When Revere Tape Recorders are brought in for servicing, a complete disassembly, inspection, repair and reassembly is recommended.

Such servicing should be done with a thorough understanding of this Service Manual in order to maintain the high quality workmanship originally built into each recorder. In the long run, this will reduce service call-backs and result in greatest customer satisfaction.

MODELS COVERED

This manual covers the following models of the Revere Tape Recorder:

- T-100 (105-120 V, 60 cps)
- TR-200 (105-120 V, 60 cps)
- TS-300 (105-120 V, 50 cps)
- TS-301 (210-240 V, 50 cps)

SPECIFICATIONS

POWER CONSUMPTION

Power consumption is 100 watts.

WEIGHT

Weight of the recorder is approximately 25 pounds.

RECORDING MEDIUM

Recorders are furnished with Tape No. 111, plastic backing, made by Minnesota Mining and Manufacturing Company. Any equivalent magnetic-recording tape having the following specifications may be substituted: paper or plastic base, 1/4 inch wide, magnetic-oxide coated, "A" wind, five-inch reel capacity.

TAPE SPEED

Recording or playback tape speed is 3.75 inches per second.

Playing time is one hour using a five inch reel with manual turnover (1/2 hour per side).

RAPID TAPE TRANSPORT

Rapid Forward Speed: approximately ten times normal playing speed, accomplished without disturbing or re-threading the tape.

Rewind: approximately 30 times normal playing speed; 600 feet of tape may be rewound in approximately one minute without disturbing or re-threading the tape.

INPUT CONNECTIONS

Two jacks on the rear of the recorder permit microphone input at 220,000 ohms (suitable for signals from minus 90 VU to minus 30 VU), and radio-phonograph input at one megohm (suitable for signals from minus 3 VU to plus 30 VU).

OUTPUT CONNECTIONS

Normal playback output is through a 5x7-inch elliptical, built-in, permanent magnet, dynamic speaker. Extension speaker jack on the back of the recorder permits output to any external speaker system having a 3.2 ohm impedance.

RECORD-PLAYBACK HEAD

Recorder is equipped with Shure Brothers, Inc. Model TR-5 head.

DRIVE MOTOR

Four pole, shaded-pole motor is rated at 1/80 horsepower.

MICROPHONE

Controlled reluctance dynamic microphone, rated 52 db below one-volt-per-dyne-per-square-centimeter is furnished.

RADIO ATTACHMENT CORD

Attachment cord with input plug and speaker clips permits connection of recorder to external input or output.

ERASURE

Erase of saturated 400 cps signal by high frequency erase head exceeds 55 db.

TAPE REC. PAGE 22-2 REVERSE

MODELS T-100, TR-200,
TS-300, TS-301

FREQUENCY RESPONSE

| POSITION TONE CONTROL | FREQUENCY RESPONSE |
|--------------------------|-----------------------------------------------------------|
| ↑ Treble | ± 3 db, 100-7500 cps |
| Normal | ± 3 db, 60-6500 cps (-10 db at 50 and 7000 cps) |
| ↓ Bass | ± 3 db, 50-3500 cps |

DISTORTION

Amplifier distortion at low levels is less than 2 per cent total harmonic content. At 5 watts (maximum undistorted output) distortion is 8 per cent at 1000 cps.

Tape distortion at nominal recording level is less than 3 per cent; at maximum recording level, it is less than 10 per cent.

SIGNAL TO NOISE RATIO

Ratio exceeds 45 db at normal recording level.

TUBE COMPLEMENT

- 1 - 6SJ7
- 1 - 6K6-GT
- 1 - 6V6-GT
- 2 - 6J7
- 1 - 6X5-GT (Rectifier)

OPTIONAL ACCESSORIES

The following accessories are available as optional equipment:

Ear phone set (single ear type with special Revere plug).

Microphone extension cord (extends microphone lead 15 feet).

Microphone stand (Shure Brothers, Inc.).

CONTROLS AND INDICATORS

(Controls and indicators are illustrated in Figure 1.)

PILOT LAMP

Indicates power on-off condition.

FUNCTION SWITCH

Permits selection of recording, playback, rewind and stop operations.

RAPID FORWARD LEVER

Engages drive mechanism for rapid forward speed.

ON-OFF, VOLUME CONTROL

Turns recorder on and off; controls volume of input and output signals.

TONE CONTROL

Governs tone quality of output signal.

INSTANT STOP ARM

Starts and stops tape instantaneously.

RECORDING LEVEL INDICATOR

Dual-level neon indicator shows nominal recording level (two per cent distortion) and overload recording level (eight per cent distortion).

TIME-FOOTAGE INDICATOR

Shows elapsed time in terms of minutes and feet of tape.

RECORD SAFETY BUTTON

Prevents accidental erasures by controlling movement of Function switch to RECORD position.

OPERATING INSTRUCTIONS

Operating procedures are printed here for convenient reference. For complete detailed instructions, see Operating Instructions, a booklet furnished with every Revere Tape Recorder.

PRELIMINARY OPERATIONS

For all operations, place recorder in condition as follows:

- (1) Turn Function switch to STOP.
- (2) Turn On-Off switch to ON.
- (3) Thread tape from left-hand reel through head slot to right-hand reel with dull side of tape against head (facing toward rear of recorder).

Recorder is now in readiness for any sequence of operations as described below.

TO RECORD

- (4) Connect MICROPHONE or PHONO-RADIO jack (on back of recorder) to appropriate input signal source.

MODELS T-100, TR-200,
TS-300, TS-301

- (5) Depress Record Safety button.
- (6) Turn Function switch to RECORD position corresponding to type of input in use (MICROPHONE or PHONORADIO).

(6a) For machines equipped with an Instant Stop arm: A preliminary adjustment of the Volume control, using a sample signal, should be made while holding the recording tape at a standstill with the Instant Stop arm. For best recording level, adjust Volume control so that one-half section of the Recording Indicator glows for average input signal.

- (7) Start recording.

NOTE

If Tape Recorder being serviced is not equipped with Instant Stop arm, immediately adjust Volume control so that approximately one-half of Recording Indicator glows on average signal.

TO REWIND

- (4) Turn Function switch to REWIND.

TO PLAYBACK

- (4) Turn Function switch to PLAY.
- (4a) To reach a desired section of tape quickly, Rapid Forward lever may now be actuated, resulting in accelerated forward motion of tape.

- (5) Adjust Volume control and Tone control.

TO SHUT-OFF

To cease any recorder operation, turn Function switch to STOP. Then turn ON-OFF switch to OFF.

NOTE

Always store recorder with Function switch in STOP position.

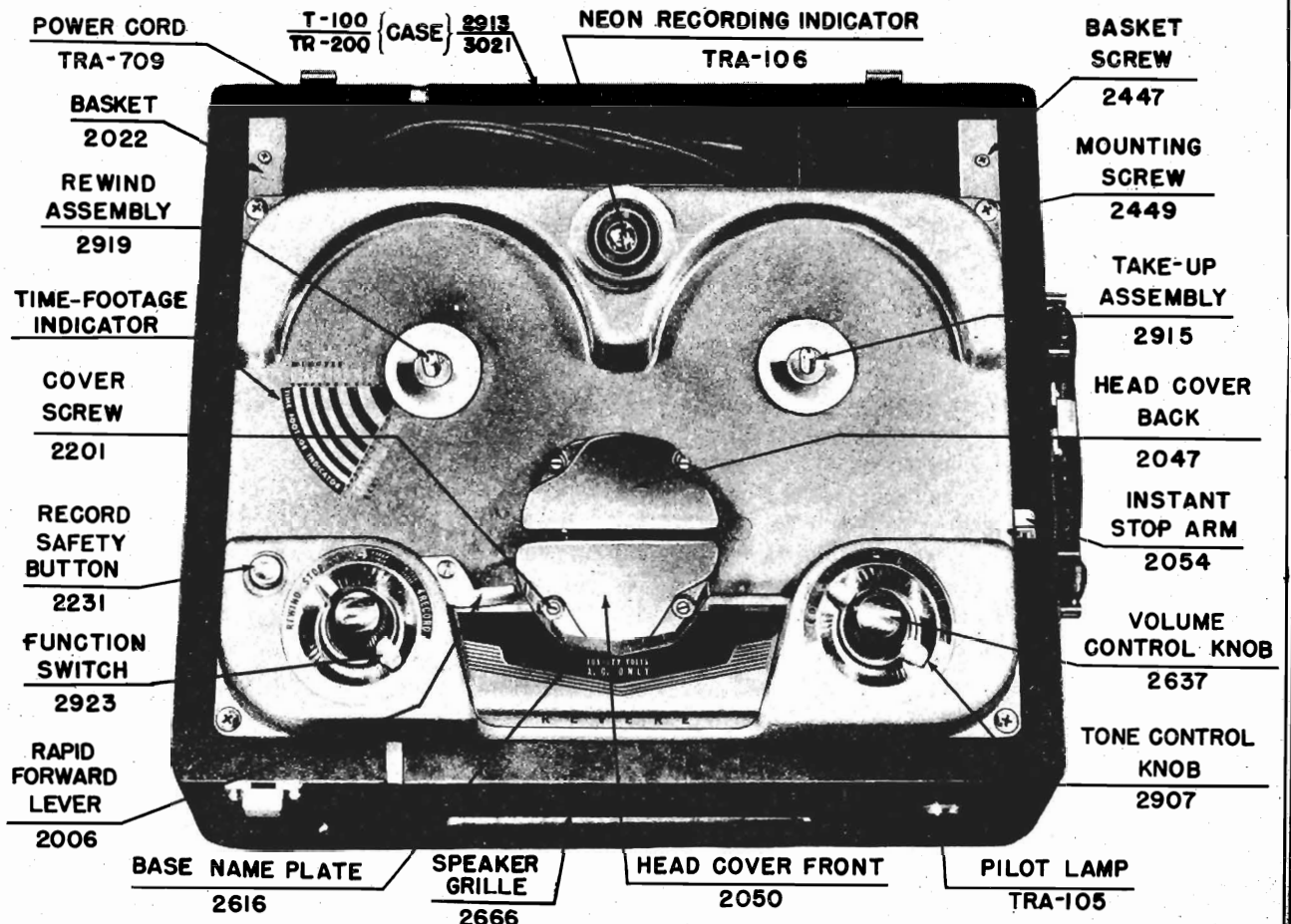


FIG. 1 - Revere Tape Recorder Controls and Indicators.

MODELS T-100, TR-200,
TS-300, TS-301

SECTION 2 SERVICING MECHANICAL SYSTEM

TROUBLE SHOOTING

The following trouble-shooting methods are general guides to quick isolation of mechanical difficulties.

NOTE

All friction drive surfaces should be

cleaned with carbon tetrachloride. Because of their precision tolerances and critical surface finishes, all worn mechanical parts should be replaced with new factory-supplied parts.

| <u>Trouble</u> | <u>Possible Cause</u> | <u>Remedy</u> |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A-Weak Volume. | (1) Dirty head. (2) Worn or missing pressure pad. (3) Wrong type of tape. (4) Reversed tape wind. | Remove front head cover, clean head with carbon tetrachloride or alcohol. Replace pad (Fig. 2); fasten with household cement. Use tape as specified in Section 1. Use "A" type wind (dull side of tape facing head laminations, see Fig. 2). Replace pad (Fig. 2); fasten with household cement. See Section 3. |
| B-No Erase. | (1) Erase pressure pad missing. (2) Defective electrical components. | Insert head plug in socket. Insert tubes in sockets. See Section 3. |
| C-No Sound. | (1) Head plug and/or tubes out of socket. (2) Defective electrical components. | See Section 2, Take-up Assembly. Clean capstan and pressure roller with carbon tetrachloride. Replace with new capstan (#2910). Adjust rewind brake as explained in Section 2, Rewind Brake Adjustment. Replace pressure roller spring (Fig. 11). |
| D-Tape Slip-page. | (1) Excessive take-up. (2) Oil on capstan or pressure roller. (3) Smooth driving surface on capstan. (4) Excessive drag on storage reel. (5) Insufficient tension of pressure roller against capstan. | Replace flywheel assembly (#2910, Fig. 7) and flywheel bearing (#2209, Fig. 11). Replace idler. Clean bearing surface. Replace pressure roller if necessary. Replace flywheel. |
| E-Drive Irregularities. | (1) Binding flywheel due to insufficient clearance between flywheel shaft and bearing. (2) Irregularities in surface of rubber idler. (3) Binding pressure-roller bearing. (4) Smooth surface on flywheel rim. (5) Oil on drive surfaces. (6) Excessive motor vibration. | Clean capstan, pressure roller, flywheel, idler, motor pulley, take-up, and rewind pulley with carbon tetrachloride. Fan blade out of balance; replace. Tighten mounting screws. Replace defective motor. Clean with carbon tetrachloride. Check for correct "free" length (21/32" to 23/32", Fig. 8). |
| F-Insufficient Take-up. | (1) Oil on clutch plate. (2) Weak clutch spring. | |

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TS-300, TS-301

| <u>Trouble</u> | <u>Possible Cause</u> | <u>Remedy</u> |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| G-Slow Rapid-Forward Speed. | (1) Oil on clutch plate. (2) Rewind brake out of adjustment. (3) Insufficient clearance between reel and back head cover. | Clean with carbon tetrachloride. Refer to Section 2, Rewind Brake Adjustment. Adjust for sufficient clearance. |
| H-Tape Spill. | (1) Improper brake and cam adjustment. | Refer to Section 2, Knockout Cam and Brake Adjustments. |
| I-Defective Instant Stop Brake. | (1) Instant stop spring out of adjustment. | Refer to Fig. 11. |
| J-Slow Rewind. | (1) Take-up brake and cam out of adjustment. (2) Eccentric out of adjustment. | Refer to Section 2, Knockout Brake and Cam Adjustments. Refer to Section 2, Eccentric Adjustment. |

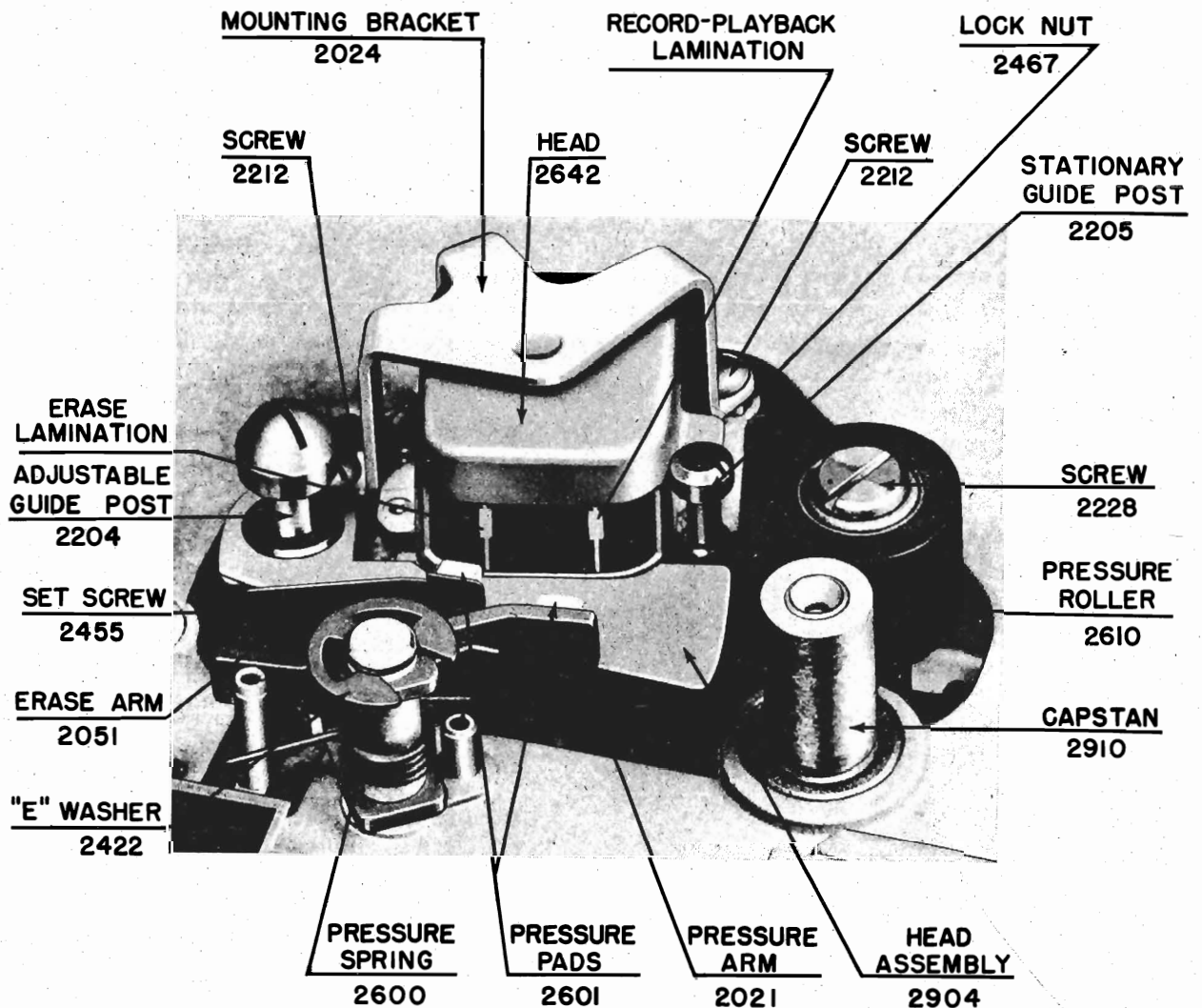


FIG. 2 - Recorder with Head Covers Removed Showing Head Mechanism.

MODELS T-100, TR-200,
TS-300, TS-301

REPAIR PROCEDURE

It is recommended that this section be thoroughly understood before any work is begun. Mechanical assemblies can then be easily serviced in the step-wise fashion indicated and with reference to the illustrations.

HEAD REPLACEMENT

If recording head has been proven defective, the following step-wise procedure should be followed:

- (1) Remove head covers.
- (2) Remove mounting bracket #2024 (note assembly of #2212 screws and #2467 lock nuts, see Fig. 2).
- (3) Remove head wire leads from clips on under side of top casting and remove head plug from socket.
- (4) Place Function switch in PLAY position and remove head wiring and plug through clearance in casting.

(5) Return Function switch to STOP position.

(6) The tape guide post #2204 will have to be re-aligned with the position of the head. This is accomplished by loosening set screw #2425 and adjusting the guide for maximum signal output using a 1000 cycle head alignment tape.

REMOVING RECORDER FROM CASE

- (1) Place tape recorder on table or bench. Remove all literature and spare parts from basket. Remove basket screws (#2447) and mounting screws (#2449, see Fig. 1).
- (2) Lift basket from case.
- (3) Slide mechanism to rear of case (about 1/4 inch) and lift out.

REMOVING AMPLIFIER FROM MECHANISM

(1) Removal: Place machine face down in wooden rack (see Fig. 3). Remove only truss head screws shown in illus-

#6 SET SCREW
BEHIND SPEAKER (ON
FUNCTION SWITCH
SHAFT, SEE FIG. 5)

TRUSS HEAD
SCREWS

2445

TRUSS HEAD
SCREWS

2445

PILOT LAMP

TRA-105

SPEAKER

TRA-600

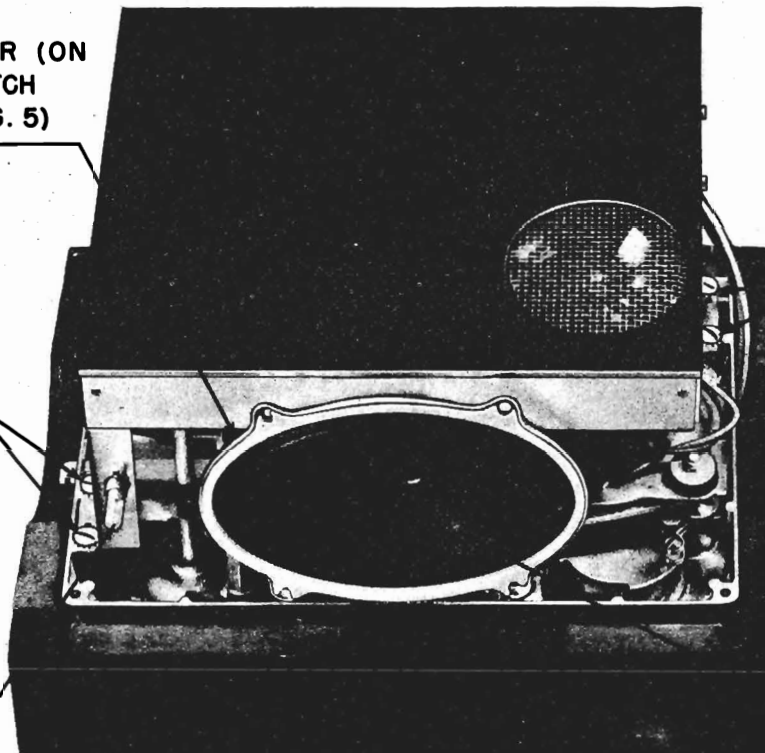


FIG. 3 - Bottom View of Recorder with Case Removed.

MODELS T-100, TR-200,
TS-300, TS-301

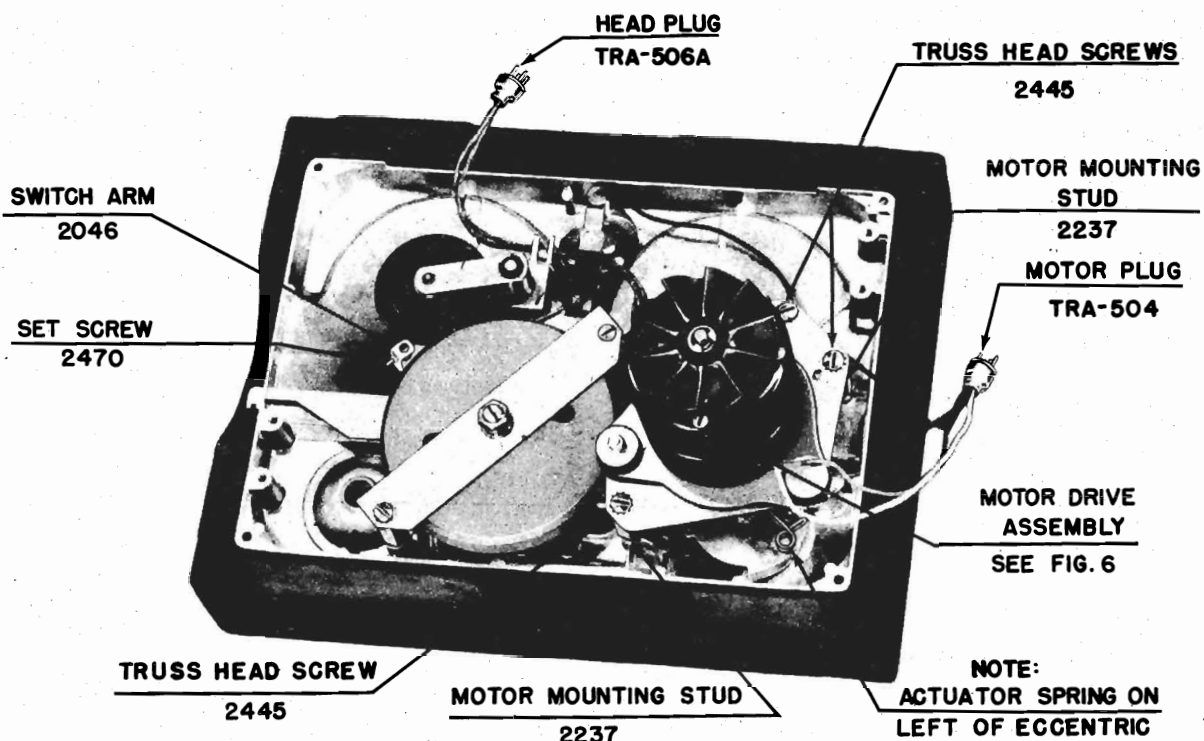


FIG. 4 - Bottom View of Recorder with Case and Amplifier Removed.

tration. Disconnect head and motor plugs from amplifier (see Fig. 4). Turn Function switch to REWIND position. Loosen set screw on switch arm (#2046). Return Function switch to STOP position. Remove amplifier from mechanism.

(2) Assembly (see Fig. 3): Place mechanism face down in wooden rack. Position amplifier above mechanism. Insert Function switch shaft through switch arm (#2046) and into boss in body casting (see Fig. 10). Turn Function switch to REWIND position; tighten switch-arm set screw against flat on switch shaft. Return Function switch to STOP position. Replace truss head screws (#2445) through amplifier mounting bracket. Replace head and motor plugs.

NOTE

Function switch should be in STOP position to remove pressure from rubber drive surfaces.

MOTOR DRIVE ASSEMBLY

NOTE

It is advisable that pulley spring (#2664) and eccentric (#2253) remain in their original positions.

Recorders built for 50 cycle operation have clip (#2053) mounted on right side of actuator (#2033) as viewed in Fig. 6.

(1) Disassembly: (See Fig. 4). Remove truss head screws (#2445). Lift motor free from motor mounting studs (#2237).

CAUTION

Do not damage fan blades.

(2) Inspection: (See Fig. 6). Check motor shaft for free rotation. Inspect idler wheel for wear. Check actuator (#2033) for free rotation on lower motor

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MODELS T-100,
TR-200, TS-300, TS-301

bracket (#2901) bearing surface. Inspect motor pulley for wear.

(3) Repair: If motor shaft binds, tap motor with rawhide hammer. If this fails to allow free motor shaft rotation, replace motor.

Replace worn idler wheel. Replace worn motor pulley.

(4) Reassembly: Assemble motor assembly in sequence as shown in exploded view (Fig. 6). Check position of actuator spring (#2617) as noted in Fig. 4.

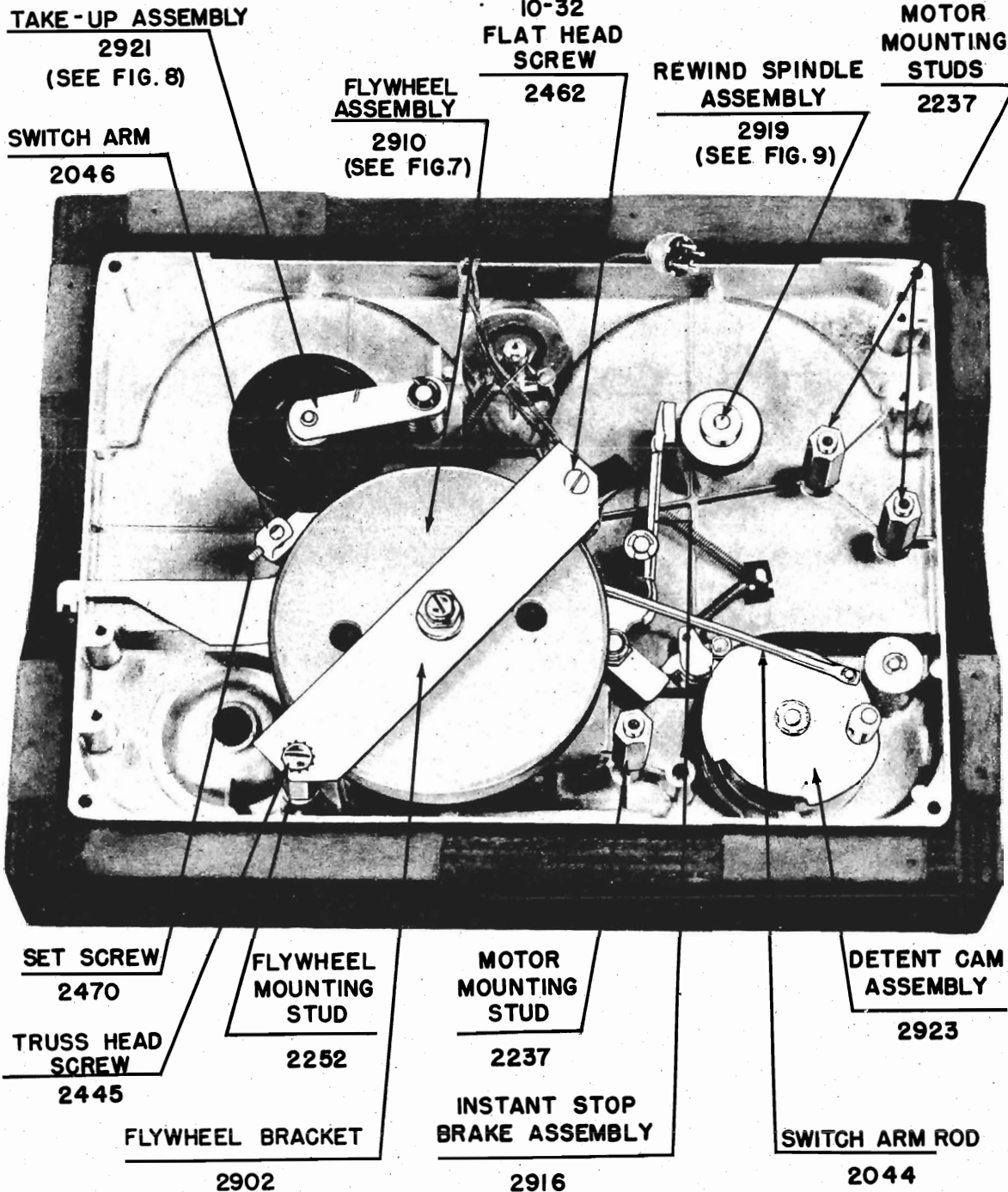


FIG. 5 - Bottom View of Recorder after Removing Motor Drive Assembly.

MODELS T-100, TR-200,
TS-300, TS-301

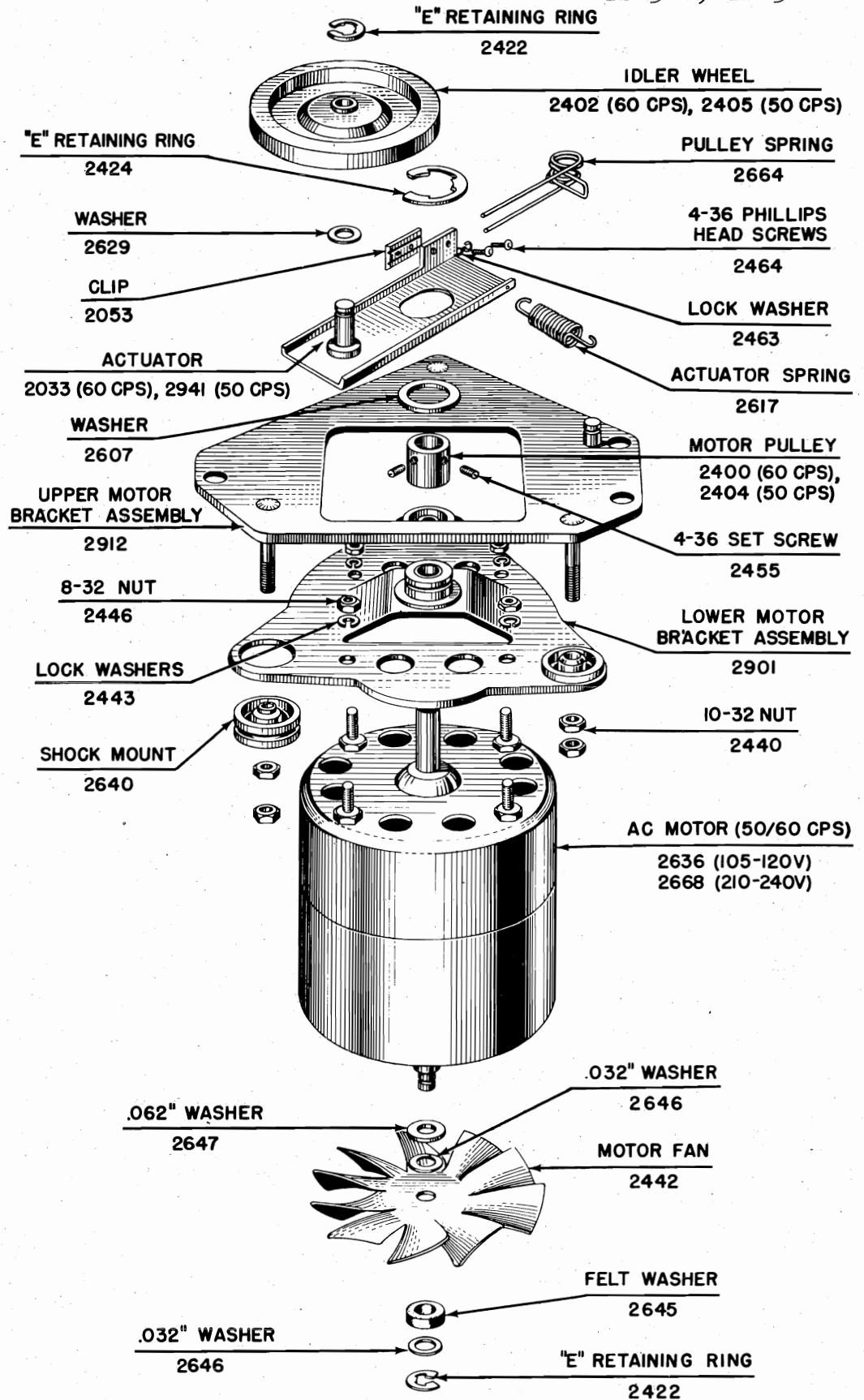


FIG. 6 - Exploded View, Motor Drive Assembly.

MODELS T-100,
TR-200, TS-300,
TS-301

FLYWHEEL ASSEMBLY

(1) Disassembly: (See Fig. 7.) Remove screws (#2462) and (#2445) from flywheel bracket. Lift bracket (#2902) from studs (#2252). Lift thrust ball (#2431) and thrust disc (#2042) from thrust socket.

(2) Inspection: Inspect thrust ball (#2431), thrust disc, (#2042) and flywheel (#2910) surfaces for burrs and wear.

(3) Repair: Replace worn parts. Capstan bearing (Fig. 11) should be replaced if capstan shaft circumference indicates wear.

(4) Reassembly: Lubricate thrust ball (#2431) and socket with Andox "B" Grease. Lubricate capstan shaft with Stan-Oil No. 75. Assemble parts in order shown in Fig. 7. Set thrust adjusting screw (#2229) to allow flywheel $3/64$ inch vertical play along capstan

shaft axis. Tighten lock nut (#2232).

TAKEUP ASSEMBLY

(1) Disassembly: (See Fig. 8.) Disconnect ends of arm spring (#2615). Remove "E" retaining rings (#2422 and #2423). Lift assemblies from stud (#2224) and spindle assembly (#2915).

(2) Inspection: Inspect take-up wheel (#2926) rubber surface, felt pad, and clutch plate (#2040) for wear. Check clutch spring (#2650) for correct free length ($21/32$ inch to $23/32$ inch).

(3) Repair: Replace worn parts. Clean takeup pulley and clutch plate with carbon tetrachloride.

(4) Reassembly: Reassemble parts in specified relation (see Fig. 8). Be sure brake assembly (#2932) moves freely about stud (#2224). Clip arm spring (#2615) to arm assembly (#2917) and brake assembly (#2932).

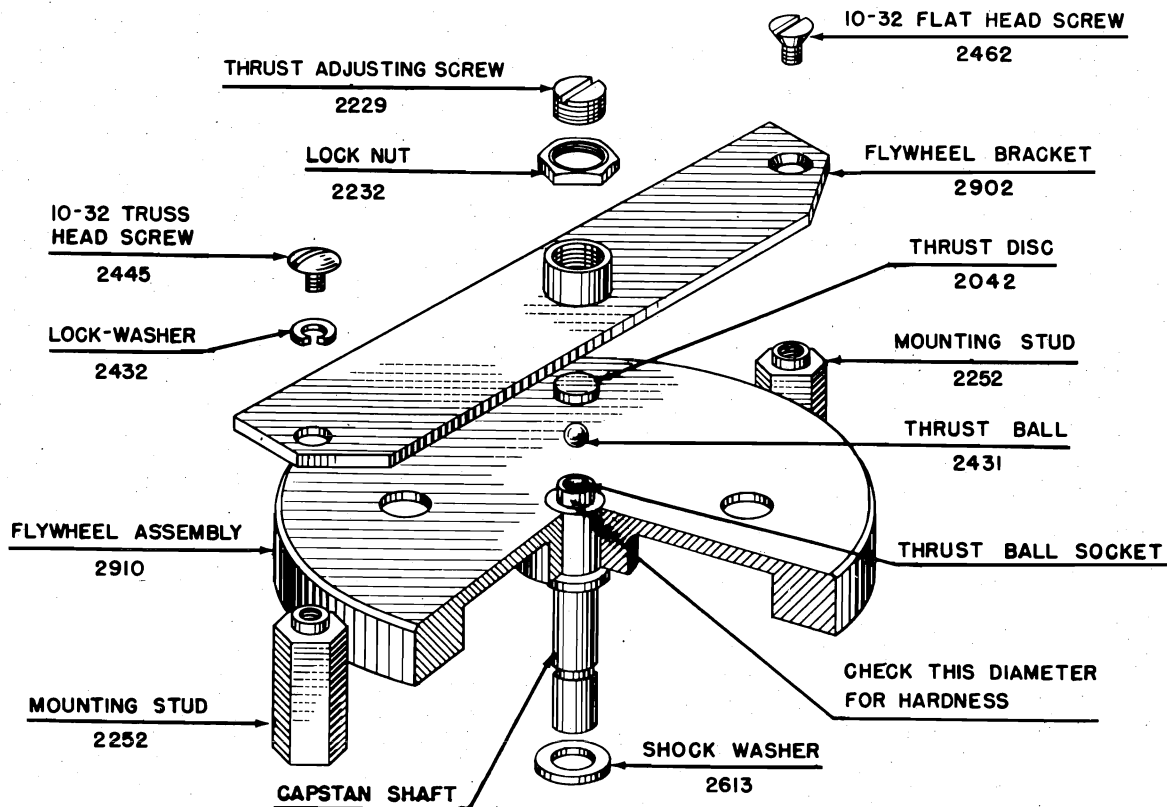


FIG. 7 - Exploded View, Flywheel Assembly.

MODELS T-100, TR-200,
TS-300, TS-301

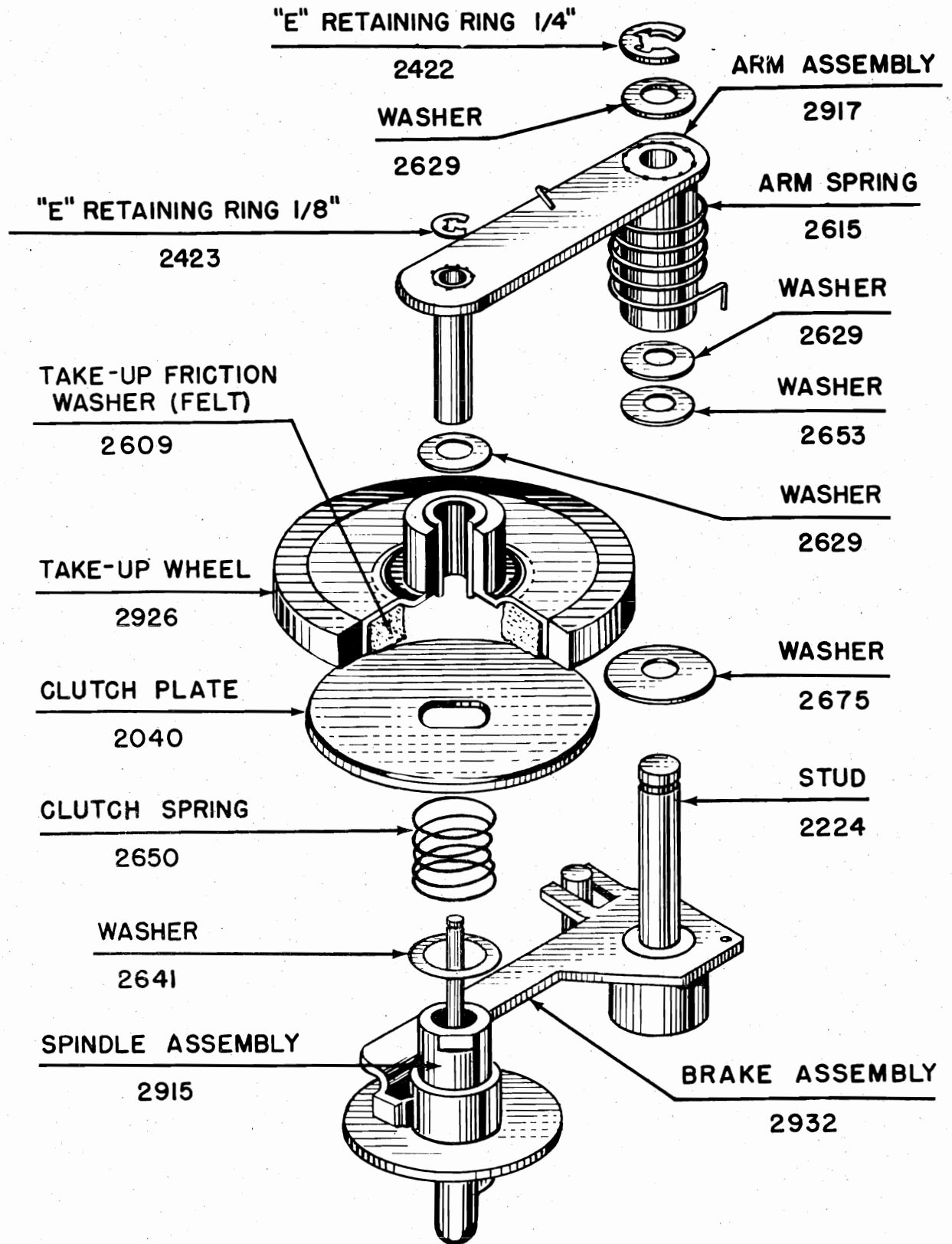


FIG. 8 - Exploded View, Takeup Spindle Assembly.

MODELS T-100, TR-200,
TS-300, TS-301

REWIND ASSEMBLY

- (1) Disassembly: (See Fig. 9.) Loosen set screws (#2429). Lift rewind pulley assembly (#2403), karropak washer (#2654) and felt washer (#2658) from rewind shaft assembly (#2919). Slip rewind shaft assembly (#2919) out of bearing (#2612).
- (2) Inspection: Check rewind pulley (#2403) surface, rewind shaft (#2919) and bearing (#2612) for wear.
- (3) Repair: Replace worn parts.
- (4) Reassembly: Grease rewind shaft (#2919) with ANDOX "B" Grease. Assemble as shown in Fig. 9. Tighten set screws (#2429) against flats of rewind shaft (#2919), allowing 1/64 inch play along axis of shaft.

KNOCKOUT CAM AND BRAKE ADJUSTMENTS

Fig. 10 illustrates further adjustments and checks which must be made. The following step-wise procedure is necessary.

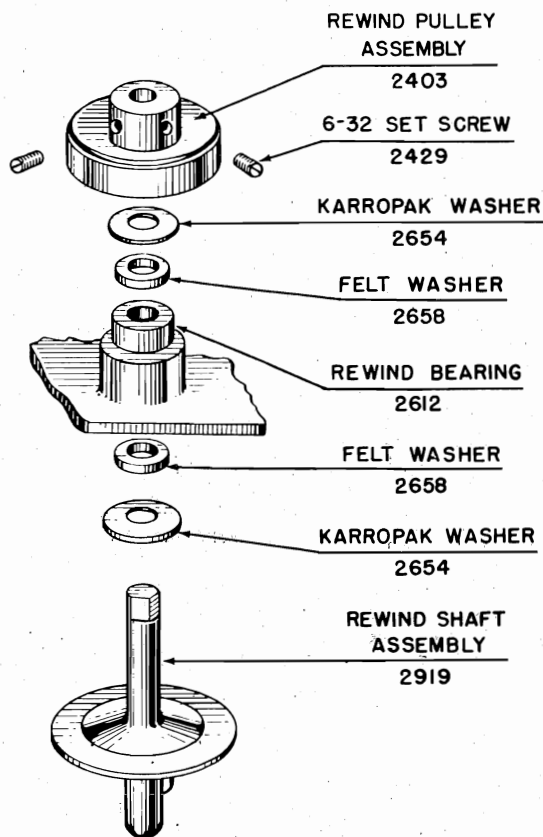


FIG. 9 - Rewind Assembly.

- (1) With Function switch in REWIND position, be sure set screw is clamped against flat on Function switch shaft.
- (2) With Function switch in PLAY position, adjust for 3/32 inch clearance between clutch knockout cam (#2933) and takeup arm assembly (#2917).
- (3) With Function switch in REWIND position, adjust ear for .015 inch clearance between shoe of brake assembly (#2932) and shaft of takeup spindle assembly (#2915).

Upon completion of steps 1 through 3, the following steps indicate proper operation.

- (4) With Function switch in PLAY and RECORD position, takeup wheel (#2926) should contact flywheel and takeup spindle assembly (#2915) should be disengaged from shoe of brake assembly (#2932).
- (5) With Function switch in STOP position, brake assembly (#2932) should engage takeup spindle assembly (#2915) and takeup wheel should be disengaged from flywheel.
- (6) With Function switch in REWIND position takeup wheel (#2926) should be disengaged from flywheel (#2910), and shoe of brake assembly (#2932) should be disengaged from takeup spindle assembly (#2915).

REWIND BRAKE ADJUSTMENT

Place Function switch in STOP position and adjust for 1/64 inch clearance between felt pad and shaft (see Fig. 11).

INSTANT STOP SPRING ADJUSTMENT

Place Function switch in PLAY position and adjust for 1/8 inch clearance as noted in Fig. 11.

ECCENTRIC ADJUSTMENT

Rotate eccentric (#2253, see Fig. 11) around its mounting pin to afford:

- (1) Maximum power to rewind spindle with Function switch in REWIND position and,
- (2) Maintain clearance between idler and motor pulley, with Function switch in STOP position.

NOTE

As viewed in Fig. 11, top flat surface of eccentric should be flush with end of its mounting pin.

MODELS T-100, TR-200,
TS-300, TS-301

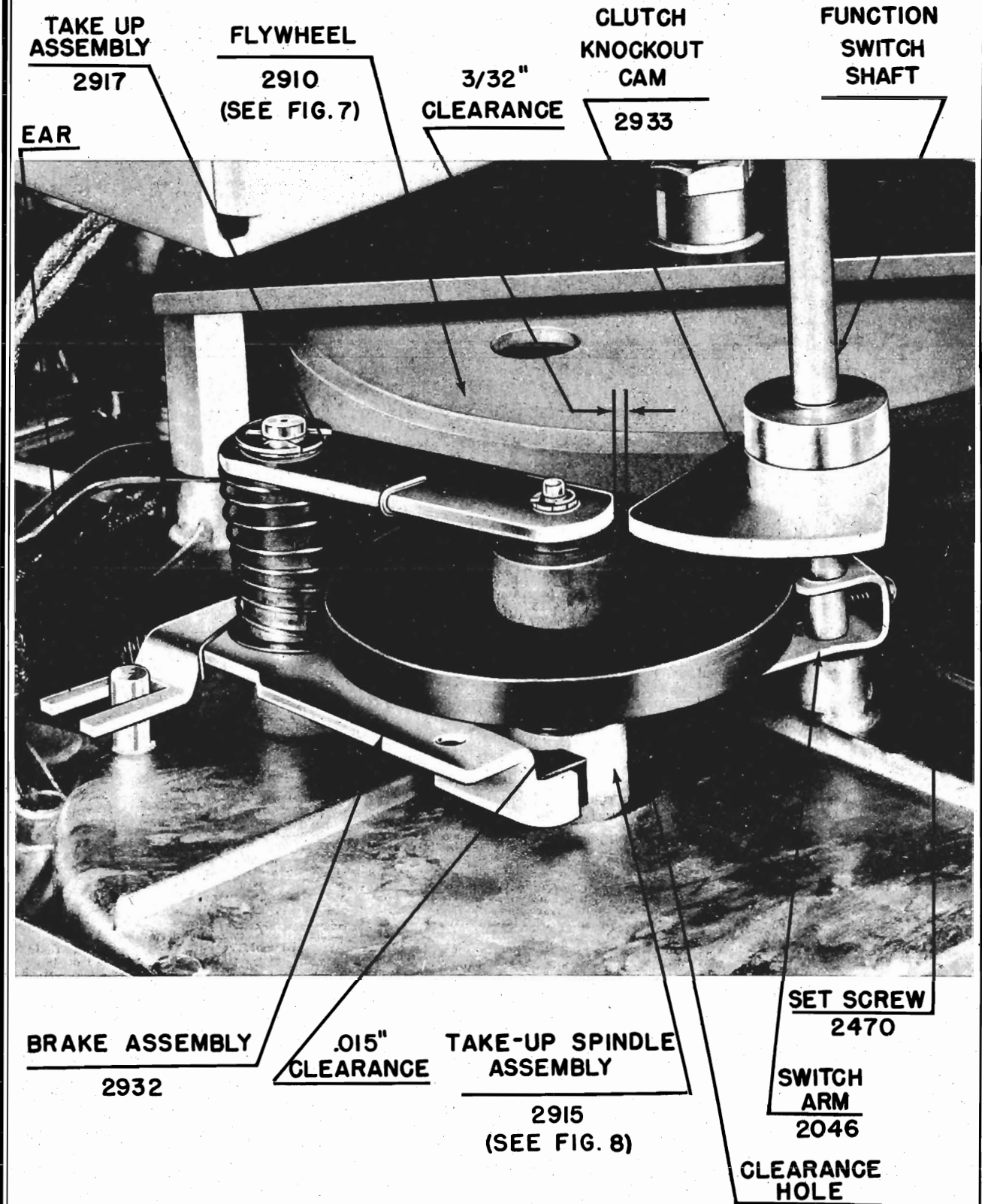


FIG. 10 - Knockout Cam and Brake Adjustments.

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MODELS T-100, TR-200,
TS-300, TS-301

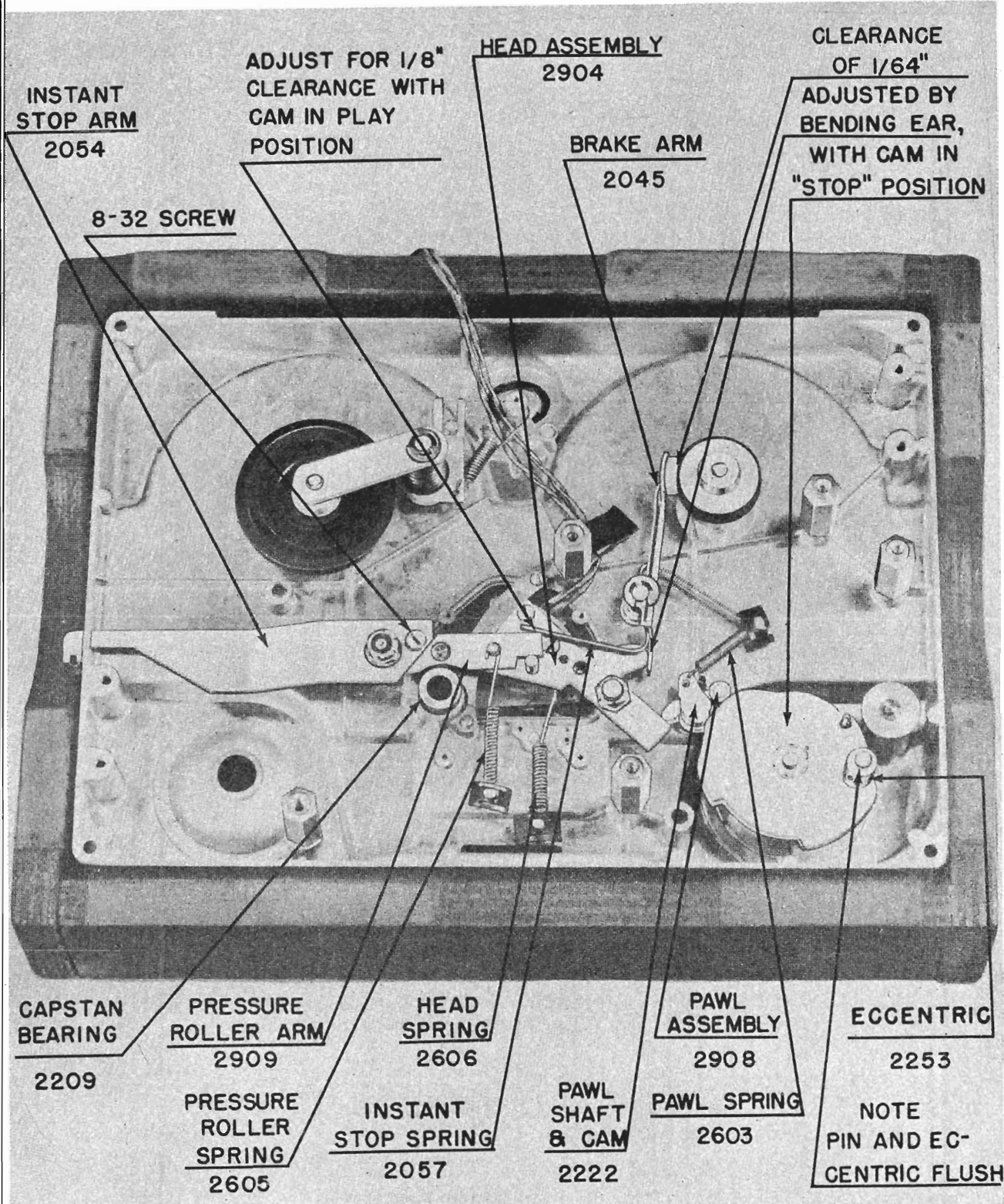


FIG. 11 - Bottom View of Recorder After Removing Flywheel Assembly.

MODELS T-100, TR-200,
TS-300, TS-301

MODIFICATIONS

Since the first Revere Tape Recorders were made, continued research has brought about improved features. The following paragraphs describe how any Revere Tape Recorder not already equipped with these improvements, can easily be modified to include them.

INSTANT STOP ARM

Recorders below Serial No. 15100 are not equipped with the Instant Stop arm; however, this feature can be added to these machines. Consult the factory for information.

MODIFIED CLUTCH BRAKE

An improved clutch-brake assembly can be installed on all machines below Serial No. 18600. Referring to Figure 12, procure and assemble parts as shown, enlarging clearance hole for takeup spindle assembly (see Fig. 10) to 1 inch diameter.

IMPROVED FLYWHEEL

Check shaft diameter noted in Figure 7. If this diameter is not "file hard", replace flywheel assembly (#2910) and capstan bearing (#2209).

MECHANICAL PARTS LIST

This parts list is tabulated with reference to the main mechanical groups. Individual parts listed are used only once except as otherwise stated.

ORDERING INFORMATION

To order any part listed below, specify part name and part number; precede part number with "TR-". (Example: Top Mechanism Casting, TR-2001.)

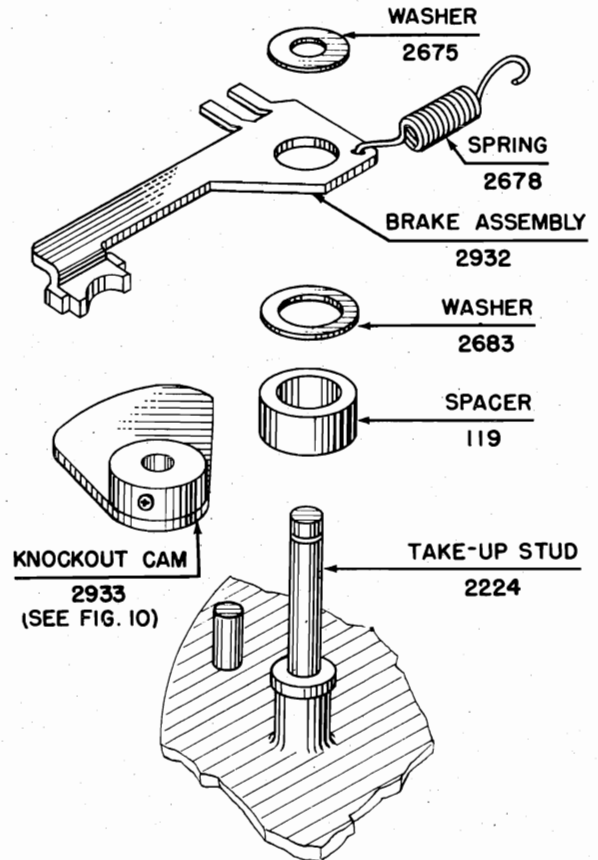


FIG. 12 - Clutch Brake Assembly.

MAIN CASTING GROUP (#2918)

- 2001 Top Mechanism Casting
- 2224 Take-up Swivel Stud
- 2612 Rewind Bearing
- 2239 Rapid Forward Brake Stud
- 2441 Rollpin
- 2675 Spacing Washer
- 2435 Rollpin
- 2458 Rollpin
- 2243 Rapid Forward Bushing
- 2209 Flywheel Bearing
- 2230 Pressure Roller Pivot Arm Stud
- 2227 Head Casting Pivot Arm Stud

HEAD ASSEMBLY GROUP (#2904)

- 2002 Head Casting
- 2024 Head Mounting Bracket
- 2026 Head Casting Guide
- 2031 Head Casting Pivot Arm
- 2055 Shim for Head Casting

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MODELS T-100, TR-200,
TS-300, TS-301

- 2204 Adjustable Record Tape Guide Post
- 2205 Stationary Record Tape Guide Post
- 2241 #5-40 Screw, Head Guide
- 2421 Tape Guide Set Screw, #4-36
- 2433 #6-32 x 5/16" Flat Head Screw (three used)
- 2631 Head Casting Arm Washer
- 2632 Head Casting Arm Washer
- 2642 Record Head, Shure Bros. Inc. Model TR-5
- 2455 Adjustable Record Tape Guide Set Screw

DETENT CAM ASSEMBLY (#2923)

- 2030 Detent Cam
- 2214 Detent Cam Hub
- 2216 Detent Pin Pulley Shifter
- 2220 Detent Pin Pawl Lock
- 2439 Groove Pin, Cam
- 2460 Detent Cam Groove Pin
- 2900 Detent Assembly, Switch-Nut-Washer

PAWL GROUP

- 2006 Rapid Forward Lever
- 2222 Pawl Shaft and Cam
- 2603 Pawl Tension Spring
- 2633 Pawl Shaft Washer
- 2639 Rapid Forward Washer
- 2908 Pawl Assembly

MOTOR GROUP

- 2422 "E" Retaining Rings (two used)
- 2402 Idler Wheel, 60 cycle
- 2405 Idler Wheel, 50 cycle
- 2424 "E" Retaining Ring
- 2629 Spacer Washer
- 2053 Spring Retaining Clip
- 2033 Actuator Arm
- 2903 Actuator Arm Assembly, 60 cycle
- 2941 Actuator Arm Assembly, 50 cycle
- 2664 Pulley Actuator Spring
- 2464 #4-36 Phillips Head Screw (two used)
- 2463 Lock Washer (two used)
- 2617 Actuator Spring
- 2607 Spacer Washer (two used)
- 2400 Motor Pulley, 60 cycle

- 2404 Motor Pulley, 50 cycle
- 2912 Upper Motor Bracket Assembly
- 2455 Screw (two used)
- 2446 #8-32 Nuts (four used)
- 2443 Lock Washers (four used)
- 2901 Lower Motor Bracket Assembly
- 2636 Motor, 50-60 cycle, 105-120 V
- 2668 Motor, 50-60 cycle, 210-240 V
- 2440 #10-32 Nuts (six used)
- 2647 Spacer Washer
- 2646 Spacer Washers .032" (two used)

FLYWHEEL GROUP

- 2462 #10-32 Flat Head Screw
- 2229 Thrust Adjusting Screw
- 2232 Lock Nut
- 2902 Flywheel Bracket
- 2445 #10-32 Truss Head Screw
- 2432 Lock Washer
- 2252 Flywheel Mounting Stud (two used)
- 2042 Thrust Disc
- 2431 Thrust Ball
- 2910 Flywheel Assembly
- 2613 Shock Washer

TAKE UP SPINDLE GROUP

- 2422 "E" Retaining Ring 1/4"
- 2629 Spacer Washers (three used)
- 2917 Take-up Swivel Assembly
- 2423 "E" Retaining Ring 1/8"
- 2615 Take-up Pulley Spring
- 2653 Spacer Washer
- 2926 Take-up Wheel Assembly
- 2675 Spacer Washer
- 2040 Clutch Plate
- 2650 Clutch Spring
- 2641 Take-up Bearing Spring Washer
- 2915 Spindle Assembly
- 2932 Brake Assembly
- 2678 Brake Spring
- 2609 Take Up Friction Washer (Felt)

REWIND SPINDLE GROUP

- 2403 Rewind Pulley
- 2429 #6-32 Set Screw (two used)
- 2654 Karropak Washer (two used)
- 2658 Felt Spacer Washer (two used)
- 2919 Rewind Shaft Assembly (two used)

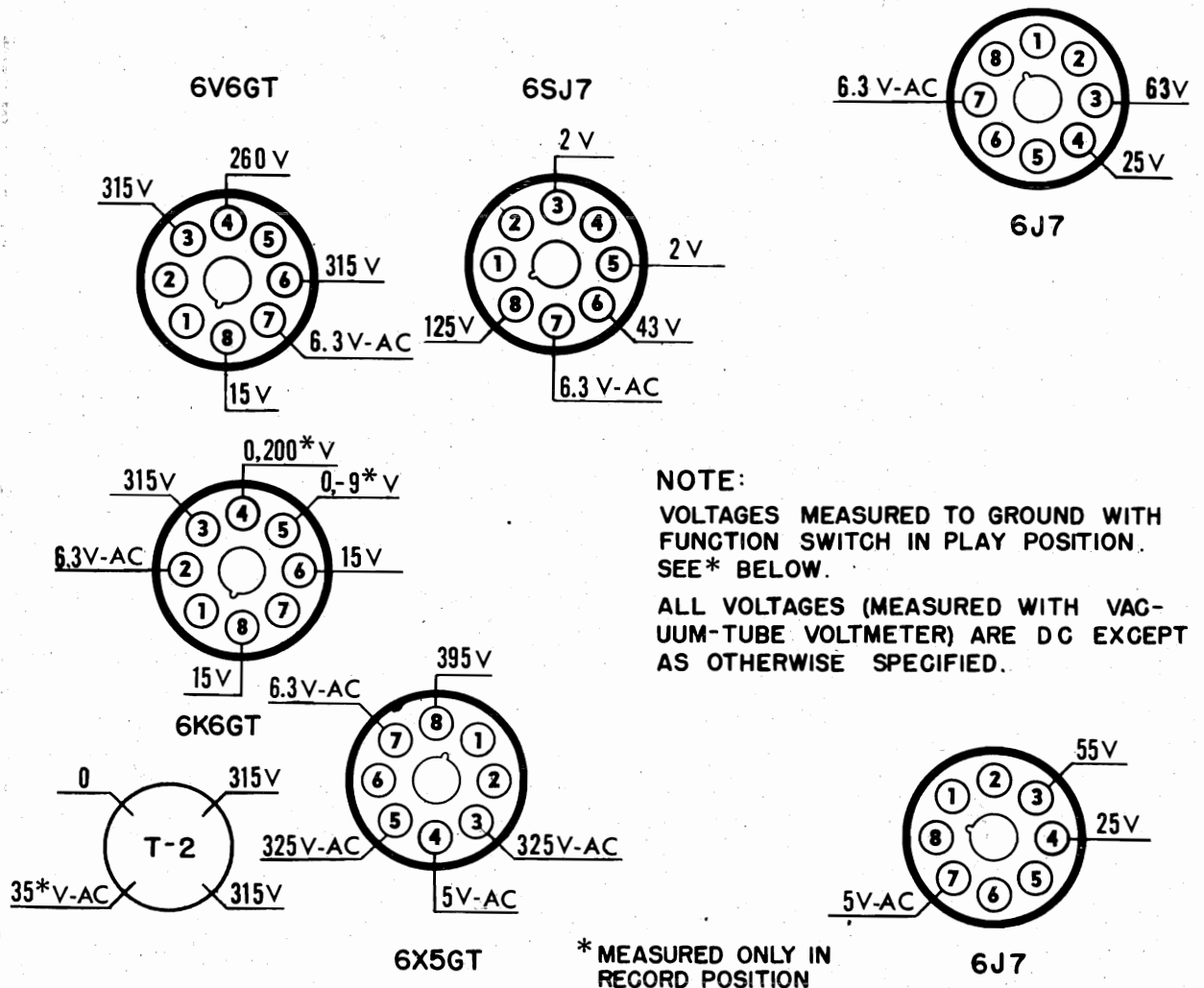
SECTION 3 SERVICING ELECTRICAL SYSTEM

Each unit is tested at the factory for noise, hum, sensitivity, frequency response, power output and erase. Shipment, misuse, wear, and aging, all contribute to the need of service. It is the intention of this section to acquaint the serviceman with the characteristics of a normal operating unit and possible defects, so that his servicing problems

can be reduced.

PRELIMINARY CHECKS

- (1) Be sure all tubes are firmly seated in their sockets.
- (2) Check voltages for valves given in Fig. 13 using a vacuum-tube voltmeter. These may vary from those given due to circuit variables and loadings.



NOTE:

VOLTAGES MEASURED TO GROUND WITH FUNCTION SWITCH IN PLAY POSITION. SEE* BELOW.

ALL VOLTAGES (MEASURED WITH VACUUM-TUBE VOLTMETER) ARE DC EXCEPT AS OTHERWISE SPECIFIED.

* MEASURED ONLY IN RECORD POSITION

FIG. 13 - Socket-Pin Voltages.

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MODELS T-100, TR-200,
TS-300, TS-301

NOTE

Neon lamp Recording-Level Indicator is biased with a DC potential in addition to audio-frequency signal voltage.

TEST TAPE

It is helpful to pre-record a tape with the following signals:

- (1) Low intensity, 1000 cps for sensitivity checking.
- (2) Nominal intensity, 120 and 5000 cps for frequency response.
- (3) High intensity, 1000 cps for power output.
- (4) Variable frequency for speaker rattle.

CONDENSERS-RESISTORS

Before checking condensers or resistors observe polarity of ohmmeter and allow tubes to cool.

(1) Condensers should be checked for DC leaks. (D.C. resistance should exceed 200 megohms.) Open condensers can only be checked by by-passing suspected condenser with a similar good one.

(2) Check for noisy resistors in input circuit by by-passing suspected resistor with .1 mfd condenser.

FUNCTION SWITCH

Control of major recorder operations is accomplished by operation of the Function switch.

| FUNCTION SWITCH POSITIONS RECORDING COMPONENTS ↓ | REWIND | STOP | PLAY | RECORD PHONO RADIO | RECORD MICROPHONE |
|--------------------------------------------------------|--------|------|---------------|--------------------------|----------------------|
| Record-Playback Head (Fig. 14, 15) Connected to: | | | Amp. Input | Amp. Output | Amplifier Output |
| 6K6 Tube (Erase) | | | | X | X |
| 1st 6J7 Tube; Compensating Network (Fig. 14) | | | X | | |
| 2nd 6J7 Tube; 6SJ7, 6V6, and 6X5 Tubes; Volume Control | X | X | X | X | X |
| Phono Jack | X | X | | X | |
| Microphone Jack | | | | | X |
| Speaker | X | X | X | (Muted) | |
| Tone Control | | | X | | |

X = OPERATIVE CONDITION

Amplifier Operation Chart

CIRCUIT DIAGRAMS

A complete schematic circuit diagram is shown in Figure 16. In addition, Figures 14 and 15 show simplified circuits for the recorder head when the Function switch is in the PLAY and RECORD positions.

The coil L-1 is used for both recording and playing back signals on the tape. The .003 mfd. condenser, shunting L-1, resonates the coil thereby intensifying the higher audio frequencies. When the recorder is in RECORD position, L-2 is energized with a 25 kc erase signal. Frequency compensation occurs during playback only. See Fig. 14.

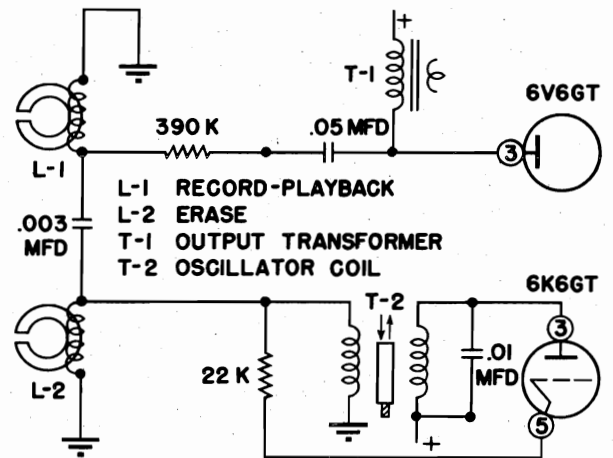


FIG. 15 - Recording Head Circuit.

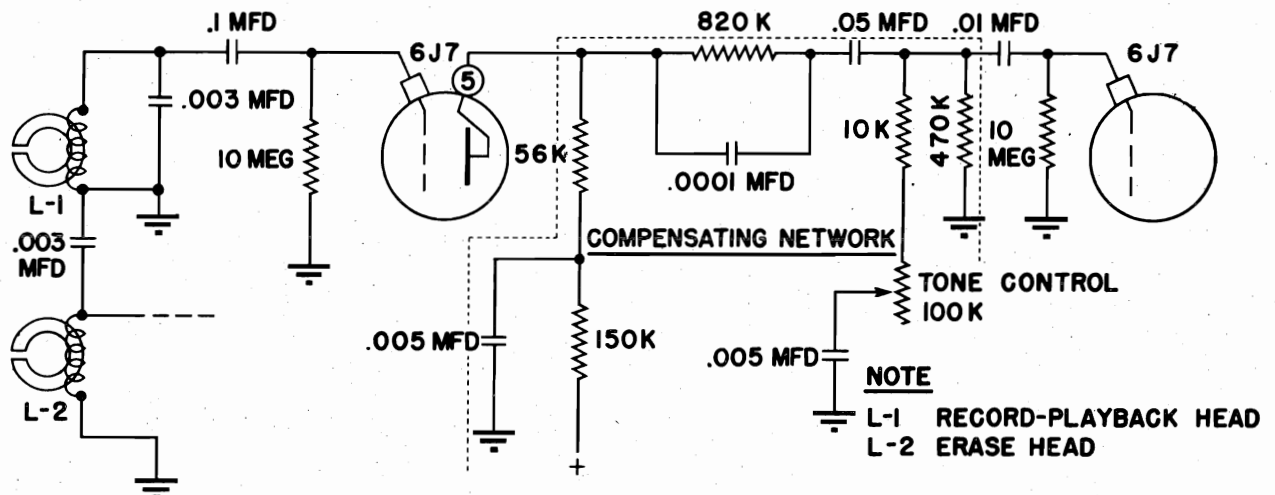


FIG. 14 - Simplified Playback Head Circuit.

TRUBLE SHOOTING

| DEFECT | SYMPTOM | CHECK |
|-----------------|--------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| A-Recorder Dead | (1) Pilot light and glass tubes dead with Off-On switch in ON position, motor inoperative. | Power cord or switch open. |
| | (2) Motor operates; glass tubes, pilot light dead. | Power-transformer primary or filament winding open. |
| | (3) Motor operates, glass tubes lighted. | Check 6X5 GT tube. |
| | (4) Burnt odor. | 6X5 GT tube shorted (operate for 30 minutes after replacing tube to reveal transformer damage by excessive heating). |
| | (5) Burnt odor (AC unit connected to DC). | 6X5 GT tube OK; check power switch and transformer primary for open. |
| | (6) Burnt odor (115 volt unit plugged into 230 volt supply). | 6X5 GT tube shorted; electrolytic condenser, C-21, shorted; R-28 open; power-transformer primary open |

| DEFECT | SYMPTOM | CHECK | DEFECT | SYMPTOM | CHECK |
|----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| B-Dead Playback Only | (7) No sound from speaker. Glass tubes and pilot light operating; Recording Level indicator inoperative. (8) Recording Level indicator operates; no sound from speaker in PLAYBACK or RECORD; Extension Speaker jack dead. | (operate 30 minutes after repairing if transformer appears OK). Defective tubes; open primary in T-1; open secondary, power transformer; C-5, C-8, C-10 open. Contacts on Function switch open; T-1 secondary open (check with Extension Speaker jack contacts open). | J-Tone Control Inoperative K-Records with Background Hum L-Hum On M-Microphonic N-Loss of High Frequencies in PLAYBACK | No control of tone in PLAYBACK. Playback-hum high; lower on pre-recorded tape. Falls off with decrease in Volume control level. Dies out when volume level is reduced. Pre-recording "boomy". | Open Tone control R-31. Open C-12. NOTE: Tone control operates only on PLAYBACK. C-21 defective; cathode to filament leakage in 2nd stage 6J7, 6SJ7, 6V6 GT, or 6K6 GT tubes. Cathode to filament leakage in 6J7 tube. Tap 1st Stage, 6J7 tube, for indication. (Retain 1st stage microphonic tube as replacement in 2nd stage.) Check C-17. |
| C-Weak Playback Only | Operates properly in RECORD. | Check items immediately above (B); C-1 open. | O-Loss of Low Frequency in PLAYBACK | Pre-recording "tinny". | R-31, C-11, or C-12 open. |
| D-Weak or Distorted Record | OK in PLAYBACK on a pre-recorded tape. | Check C-7 for leakage (remove head plug and check for DC Voltage on R-26). Erase not operating (check for 35 volts AC across secondary of T-2). Replace head plug; check for AC across both sides, C-14. Open phono circuit through switch. R-1, R-4, or radio attachment cord open. Open microphone circuit through switch. Microphone or its cord defective. | P-Noisy in PLAYBACK | (1) "Shot effect"; high frequency hiss. (2) Low frequency "rumble". | R-13 noisy, R-31, C-11, or C-12 open. R-2 or R-14 noisy. |
| E-Weak or Dead RECORD-PHONO | OK in MICROPHONE RECORD position. | Open phono circuit through switch. R-1, R-4, or radio attachment cord open. | Q-No Erase | Records over previous recordings without erasing. | Defective 6K6 GT tube. First, remove head plug from SO-1 and check for AC voltage across secondary of T-2; replace head plug; check voltage again. C-9 open or shorted; T-2 shorted or R-5 open. NOTE: Adjust T-2 for 35 volts AC across L-2. |
| F-Weak or Dead RECORD-MICROPHONE | OK in PHONO RECORD. | Open microphone circuit through switch. Microphone or its cord defective. | | | |
| G-Recording Level Indicator inoperative | Records and plays properly but Recording Level indicator not operating. | Loose or defective indicator lamp. C-7 open. | | | |
| H-Recording Level Indicator Always Glows | Not affected by Volume control. | Defective C-7. | | | |
| I-Recording Level Indicator Glows on PLAYBACK Only | Affected by Volume control. Weak or distorted playback (parasitic oscillation). | Open C-13. | | | |

ELECTRICAL PARTS LIST

The electrical system parts list is keyed to the figures throughout this manual; circuit symbols as tabulated in this list represent the components similarly labelled in the figures. (For resistor and condenser locations, see Fig. 17.)

| CIRCUIT SYMBOL | PART NO. | DESCRIPTION |
|----------------|----------|----------------------------|
| RESISTORS | | |
| R1, R2, R3 | TRA 302 | 1 megohm, 20%, 1/2 watt |
| R4, R5 | TRA 309 | 22,000 ohm, 20%, 1/2 watt |
| R6, R7, R8, R9 | TRA 305 | 220,000 ohm, 20%, 1/2 watt |

TAPE REC. PAGE 22-22 REVERSE

MODELS T-100, TR-200,
TS-300, TS-301

PART NO. DESCRIPTION

RESISTORS - Continued

| | |
|---------|----------------------------|
| TRA 308 | 10 ohm, 20%, 1 watt |
| TRA 303 | 68,000 ohm, 20%, 1/2 watt |
| TRA 312 | 330 ohm, 20%, 1 watt |
| TRA 301 | 390,000 ohm, 20%, 1/2 watt |
| TRA 316 | 68,000 ohm, 10%, 1/2 watt |
| TRA 311 | 10,000 ohm, 10%, 2 watt |
| TRA 319 | 1,300 ohm, 10%, 5 watt |
| TRA 304 | 4.7 ohm, 10%, 1/2 watt |
| TRA 306 | 100,000 ohm, 20%, 1/2 watt |
| TRA 320 | Volume-Tone control |

CONDENSERS

| | |
|---------|-----------------------------------------|
| TRA 203 | .05 mfd, 400v, paper tubular |
| TRA 205 | .01 mfd, 400v, paper tubular |
| TRA 207 | .005 mfd, 600v, paper tubular |
| TRA 204 | .003 mfd, 600v, paper tubular |
| TRA 202 | .1 mfd, 200v, paper tubular |
| TRA 208 | 100 mmf, 10%, 500v mica |
| TRA 209 | 500 mmf, 20%, 400v ceramic |
| TRA 206 | 005 mfd, 1000v, paper tubular |
| TRA 200 | 15-15 mfd, 350v, electrolytic |
| TRA 201 | 10-30-25 mfd, 450-350-25v, electrolytic |

MISCELLANEOUS

| | |
|---------|-----------------------------------------|
| TRA 511 | Function Switch |
| TRA 401 | Output Transformer |
| TRA 402 | Oscillator Coil |
| TRA 105 | Pilot Lamp (#47) |
| TRA 106 | NE 45 Neon Recording Indicator Lamp |
| TRA 400 | Power Transformer, 105-120 volts |
| TRA 403 | Power Transformer, 210-240 volts |
| TRA 512 | Speaker Plug (Male) |
| TRA 600 | 5x7 Speaker |
| TRA 709 | Power Cord Assembly |
| TRA 801 | Trimount Stud |
| TRA 900 | Chassis Assembly |
| TRA 901 | Radio Attachment Cord |
| TRA 904 | Microphone |
| TRA 905 | Microphone Extension Cord Jack (Female) |
| TRA 906 | Microphone Plug (Male) |
| TRA 100 | 6V6 GT Vacuum Tube |
| TRA 101 | 6X5 GT Vacuum Tube |
| TRA 102 | 6J7 Vacuum Tube |
| TRA 103 | 6K6 GT Vacuum Tube |
| TRA 104 | 6SJ7 Vacuum Tube |

CIRCUIT SYMBOL

RESISTORS - Continued

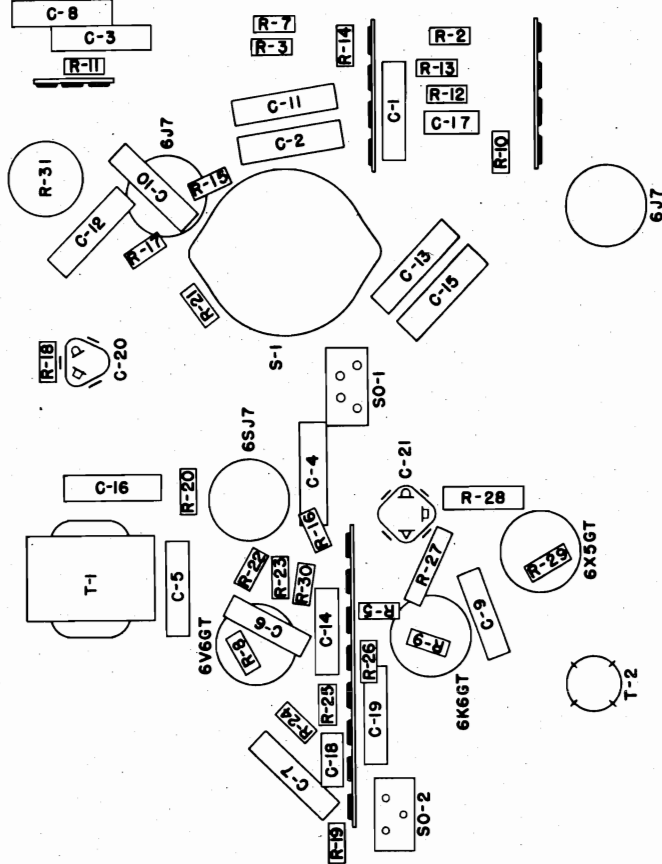
| | |
|---------|----------------------------|
| TRA 300 | 10 megohm, 20%, 1/2 watt |
| TRA 313 | 820,000 ohm, 10%, 1/2 watt |
| TRA 318 | 56,000 ohm, 10%, 1 watt |
| TRA 315 | 150,000 ohm, 10%, 1/2 watt |
| TRA 321 | 470,000 ohm, 20%, 1/2 watt |
| TRA 307 | 10,000 ohm, 20%, 1/2 watt |
| TRA 317 | 47,000 ohm, 20%, 1/2 watt |
| TRA 322 | 1,000 ohm, 20%, 1/2 watt |

| | |
|----------------------------|--|
| C1, C2, C3, C4, C5, C6, C7 | |
| C8, C9, C10 | |
| C11, C12 | |
| C13, C14 | |
| C15, C16 | |
| C17 | |
| C18 | |
| C19 | |
| C20 | |
| C21 | |

| | |
|----|--|
| S1 | |
| T1 | |
| T2 | |

CIRCUIT SYMBOL

| | |
|----------|--|
| R10, R11 | |
| R12 | |
| R13 | |
| R14 | |
| R15, R16 | |
| R17 | |
| R18, R19 | |
| R20 | |

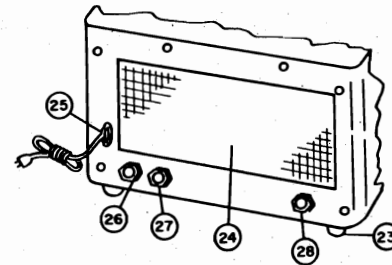
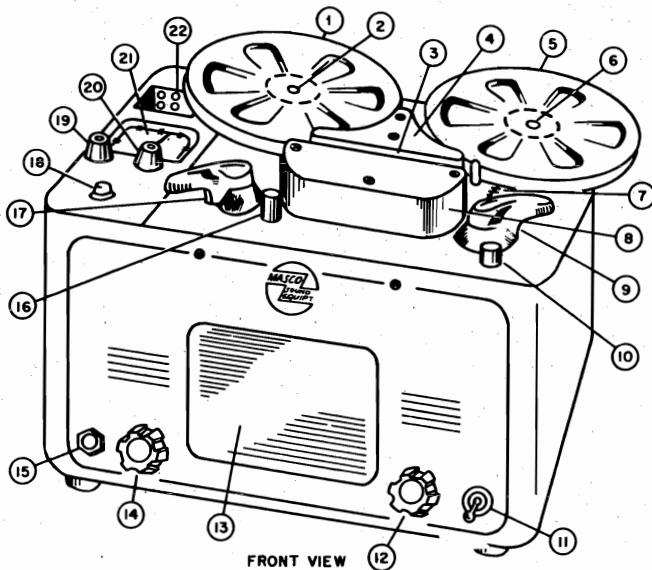


| | | |
|-----|-----|-----|
| R-1 | R-4 | R-6 |
|-----|-----|-----|

FIG. 17 - Electrical Component Locations, Bottom View of Amplifier.

MODELS D-37, D-37R,
DC-37R, LD-37, LD-37R

MASCO SOUND REEL DUAL SPEED DUAL-TRACK MAGNETIC TAPE RECORDER



MARK SIMPSON
MODELS D-37, D-37R, DC-37R, LD-37, LD-37R

SPECIFICATIONS

POWER CONSUMPTION: 80 watts at 117 volts, 60 cps (Models D-37, DC-37, LD-37)
95 watts at 117 volts, 60 cps (Models D-37R, DC-37R, LD-37R)

POWER OUTPUT: 5 WATTS (to internal or external speaker)

HUM LEVEL: 50 db below full output

FREQUENCY RESPONSE: 80-8500 cps ± 3 db at 7.50"/sec.
80-5000 cps ± 3 db at 3.75"/sec.

SIGNAL-TO-NOISE RATIO: 45 db at 7.50"/sec. 40 db at 3.75"/sec.

ERASE AND BIAS FREQUENCY: 60 Kc

INPUTS: (1) Microphone-1 megohm impedance, .003 volts sensitivity
(1) Radio-Phono-0.5 megohm impedance, 0.4 v. sensitivity
(1) External Speaker, 8-16 ohm voice coil, 5 watts
(1) External Amplifier, 500 ohms, 1.7 volts to line or amplifier (any 500 ohm or high impedance radio-phono input may be used)

MONITORING: The EXTERNAL SPEAKER jack takes a phono-type plug and may be used with any headphones for HEADPHONE MONITORING simultaneously with recording. The INTERNAL SPEAKER may also be used for monitoring.

MONITOR SWITCH: On tone control

AMPLIFIER CONTROLS: (1) Volume; (1) Tone

SPEAKER: 6" PM. 3.2 ohm voice coil

PLAYBACK EQUALIZATION: Separate for each speed

REWIND SPEED: 1200 feet in 3 minutes (approx.)

RECORDING VOLUME LEVEL INDICATOR: Neon bulb also acts as Pilot Light in "PLAYBACK"

TAPE TIME (with 1200' reel): 7.50"/sec. - 1 hr. dual track; 1/2 hr. single track
3.75"/sec. - 2 hrs. dual track; 1 hr. single track

TAPE: Any "A" wound tape (dull or coated side facing in toward hub of reel) may be used.

AMPLIFIER TUBES: (1) 12AX7 equalized tape playback pre-amplifier
(1) 6SL7GT dual purpose microphone voltage amplifier and intermediate amplifier.
(1) 6SN7GT dual purpose: recording head driver in "RECORD" output amplifier tube driver in "PLAYBACK"; monitor amplifier in "RECORD"

TAPE REC. PAGE 22-2 MARK SIMPSON

MODELS D-37, D-37R,
DC-37R, LD-37, LD-37R

(1) 6V6GT 60 Kc. Bias and erase oscillator in "Record",
power output amplifier in "Playback".

AM RADIO TUNER: (1) 6X5GT full wave rectifier
(Models D-37R, LD-37R, DC-37R only); TUBES:

- (1) 6BA6 RF amplifier
- (1) 6BE6 Oscillator-converter
- (1) 6SF7 IF amplifier and detector
- (1) Selenium Rectifier

Radio ON-OFF Switch on radio tuner operates a separate power supply for the tuner.

CALL OUT DIAGRAM LEGEND

1. SUPPLY REEL Reels up to 7" in diameter may be used.
2. SUPPLY REEL SPINDLE Threaded (6-32) to permit bolting down of reels.
3. TAPE SLOT Can be used for attaching recording counter.
4. RECORD AND ERASE HEAD Shure Type TR5H. Head mounts on head alignment pins and may be replaced without any special alignment tools. Head is kept firm by means of a felt pressure pad.
5. TAKE-UP REEL 7", supplied with recorder.
6. TAKE-UP REEL SPINDLE Threaded (6-32). Braking pressure is applied to this spindle shaft during "Rewind" to ensure even winding of tape and to prevent slippage.
7. ELAPSED TIME INDICATOR SCALES
8. CAPSTAN TURRET Feeds tape at constant speed.
9. CONTROL LEVER No. 1-&2- position control:
Position 1: Off-Stop tape - Rewind
Position 2: Record - Playback
10. RECORD PUSHBUTTON Used for recording at either speed. This button must also be depressed to ERASE
11. MAIN POWER SWITCH Turns on amplifier and motor. If control levers are at OFF motor will idle with capstan disengaged.
12. tone CONTROL AND MONITOR SWITCH Continuous Treble attenuation type tone control. The control is not effective when recording, CORRECT tonal values being determined by the equalizing circuits. The MONITOR SWITCH, operated by the tone control, allows the user to listen while recording.
13. SPEAKER
14. VOLUME CONTROL Used for adjusting the recording volume level and also for controlling the volume in "Playback"
15. MICROPHONE INPUT Takes standard phone-type plug.
16. 3.75 SPEED CHANGE PUSHBUTTON Used only when recording or playing back at 3.75"/sec.
17. CONTROL LEVER No. 2- a 3- position control:
Position 1: Rewind
Position 2: Off-Stop Tape
Position 3: Record - Playback
18. VOLUME LEVEL INDICATOR AND PILOT LIGHT Neon bulb acts as indicator of correct recording volume in "Record" and as pilot light at all other times.
19. TUNING CONTROL For built-in AM radio (models with radio only).
20. RADIO ON-OFF SWITCH Main power switch must be ON to permit radio to be operated (models with radio only).
21. RADIO DIAL
22. MICROPHONE STORAGE COMPARTMENT (on models without radio only)
23. BUMPER FEET
24. REMOVABLE BACK Perforated for ventilation and provided with safety interlock to automatically disconnect power when back is removed.
25. AC POWER CORD For operation on 117 volts, 60 cycles AC only.

MODELS D-37, D-37R,
DC-37R, LD-37, LD-37R

- 26. EXTERNAL SPEAKER AND MONITOR JACK Delivers full audio power to external 8-16 ohms speaker or headphones.
- 27. EXTERNAL AMPLIFIER OUTPUT
- 28. RADIO AND PHONOGRAPH INPUT Any radio, tuner or phonograph can be adjusted for use with this input.

TAPE RECORDER, RADIO TUNER, VOLTAGE AND RESISTANCE CHARTS

| VOLTAGE MEASUREMENTS | | | |
|----------------------|-----------|---------|-----------|
| TUBE | 6BA6 | 6BE6 | 6SF7 |
| Pin #1 | -0.85V DC | -2V DC | -- |
| #2 | 0 | 0 | -0.85V DC |
| #3 | 0 | 0 | 0.6V DC |
| #4 | 6.3V AC | 6.3V AC | 107 V DC |
| #5 | 94V DC | 94V DC | -0.95V DC |
| #6 | 102V DC | 60V DC | 90V DC |
| #7 | 0.3V DC | 0 | 6.3V AC |
| #8 | - | - | 0 |

| RESISTANCE MEASUREMENTS | | | |
|-------------------------|----------|--------|----------|
| TUBE | 6BA6 | 6BE6 | 6SF7 |
| PIN #1 | 3.2 meg. | 15,000 | 0 |
| #2 | 0 | 0.2 | 3.2 meg. |
| #3 | 0 | 0 | 270 |
| #4 | 0.3 | 0.3 | 33,000 |
| #5 | 28,000 | 28,000 | 520,000 |
| #6 | 33,000 | 38,000 | 28,000 |
| #7 | 150 | 4.7 | 0.3 |
| #8 | - | - | 0 |

All voltages to ground, measured with 20,000 ohm/volt meter.

All resistances measured to ground.

INSTALLATION

This recorder is designed to operate from 105-125 volts 60 cycles AC. Operation on any other voltage or frequency may result in serious damage and/or improper operation and will void the guarantee. If in doubt consult your MASCO dealer or power company.

- 1. Insert the AC power plug into any 105-125 volt, 60 cycle AC socket.
- 2. Remove full reel of tape, empty take-up reel and microphone from storage.

OPERATION

Before reading the operating instructions, it is suggested that you familiarize yourself with the various controls and features of your recorder as described in the preceding pages.

TO RECORD FROM MICROPHONE

- 1. Make certain that CONTROL LEVERS No. 1 and 2 are at OFF.
- 2. Place MAIN POWER SWITCH TO ON
- 3. Place full reel of tape on the SUPPLY REEL SPINDLE so that the glossy side of the tape faces you and the reel will unwind counter-clockwise. Make certain that one of the slots in the hub of the reel engages the fin or key of the reel spindle.
- 4. Place the empty take-up reel on the TAKE-UP REEL SPINDLE, making sure that the reel slot engages the fin at the base of the spindle.
- 5. Unwind about 2 feet of tape from the Supply Reel. Drop the tape into the TAPE SLOT and run it in FRONT of the tape guide pin on the right of the RECORD HEAD housing.
- 6. Insert free end of tape into slot on take-up reel and rotate the reel counter-clockwise (to the left) for a few turns until the tape is engaged. BE SURE THAT THE GLOSSY SIDE OF THE TAPE FACES YOU. Rotate reel to take up slack.
- 7. By this time the neon-bulb PILOT LIGHT should be glowing steadily to indicate that the equipment is warmed up and ready to operate. Plug microphone into MICROPHONE INPUT.
- 8. Depress the RECORD PUSHBUTTON. While keeping the button depressed, rotate CONTROL LEVER No. 1 to "RECORD" position.
- 9. The PILOT LIGHT goes out as a result of the above operation and becomes the RECORDING VOLUME LEVEL INDICATOR. Hold the microphone firmly in the hand about 6 to 12 inches away from the mouth. While speaking into the

TAPE REC. PAGE 22-4 MARK SIMPSON

MODELS D-37, D-37R,
DC-37R, LD-37, LD-37R

microphone in a normal tone of voice, rotate the VOLUME CONTROL clockwise until the neon bulb VOLUME LEVEL INDICATOR flickers occasionally. The VOLUME CONTROL should not be advanced to the point where the neon bulb glows continuously, to avoid distortion. IT IS RECOMMENDED THAT THE USER MAKE SEVERAL TEST RECORDINGS TO GAIN EXPERIENCE WITH THE PROPER SETTING OF THE RECORDING VOLUME LEVEL.

- 10 You may now Record. To listen to the recording being made, you may, at this point, turn on the internal SPEAKER by means of the MONITOR SWITCH on the TONE CONTROL, or you may plug in an external speaker (8 to 16 ohms voice coil) or headphones at the EXTERNAL SPEAKER jack. The TONE CONTROL setting has no EFFECT WHILE recording.
11. To Record at 7.50 inches per second (for high fidelity reproduction), rotate CONTROL LEVER No. 2 to RECORD position. The tape will begin to move and you may proceed to record.
12. To record at 3.75 inches per second. FIRST depress the 3.75 SPEED CHANGE PUSHBUTTON, and while keeping this BUTTON FIRMLY DEPRESSED, ROTATE CONTROL LEVER No. 2 to RECORD POSITION. You may now proceed to record.

To Record from External Radio, Phonograph, Tape or Wire Recorder

1. The output of any radio, radio-tuner, phonograph, tape or wire recorder may be connected through a suitable cable to the RADIO-PHONOGRAPH INPUT. An output of 0.5 volts or more is required. The necessary modifications can be made by any competent radio serviceman.
2. Recording is accomplished in the same manner as described under "TO RECORD FROM MICROPHONE."

To Record from Built-In Radio (Models D-37R, DC-37R, LD-37R)

- a. Prepare machine for recording as under "INSTALLATION" and paragraphs 1 through 8 of "TO RECORD FROM MICROPHONE", except that microphone is not plugged in.
- b. Turn on MONITOR SWITCH on TONE CONTROL.
- c. Turn RADIO SWITCH TO "ON".
- d. Tune in desired station. The hank of antenna wire supplied should be extended about the room or may be connected to an external antenna.
- e. Adjust RECORDING VOLUME LEVEL INDICATOR (NEON BULB) by means of the VOLUME CONTROL for correct recording level, as in paragraph 9 under "TO RECORD FROM MICROPHONE" and proceed to record as described in that section.

To Record on the Second Track

Having recorded one track of an entire reel, to record on the second track merely lift the full TAKEUP reel, turn it upside down and place it on the SUPPLY REEL SPINDLE. Place the empty reel on the TAKEUP REEL SPINDLE. Re-thread and continue to record as under "TO RECORD FROM MICROPHONE".

To Stop Tape

To stop Tape at any time, always operate Control Lever No. 2 FIRST to STOP TAPE position, then turn CONTROL LEVER No. 1 to STOP TAPE Position.

To Rewind

- a. Stop tape as above.
- b. Put CONTROL LEVER No. 1 into REWIND POSITION.
- c. Put CONTROL LEVER No. 2 into REWIND POSITION.
- d. Turn VOLUME CONTROL to minimum.

To Change Tape Speeds while Recording

1. Stop tape by operating CONTROL LEVER No. 2 only to STOP TAPE position.
2. If you were recording at 7.50 inches per second and desire to change to 3.75, FIRST depress the 3.75 SPEED CHANGE PUSHBUTTON, and, while keeping this button depressed, turn CONTROL LEVER No. 2 to RECORD position.
3. If you were recording at 3.75 inches per second, to change to 7.50 simply turn CONTROL LEVER No. 2 back to RECORD position.

To Play Back Tape Recordings

- a. Follow the procedures under "INSTALLATION" in paragraphs 1 through 7 of "TO RECORD FROM MICROPHONE" except that microphone is not plugged in.
- NOTE: Recordings made at 3.75 inches per second MUST BE PLAYED BACK AT THE SAME SPEED, and similarly for recordings made at 7.50 inches per second.
- b. Rotate CONTROL LEVER No. 1 to PLAYBACK position.
 - c. Rotate CONTROL LEVER No. 2 to PLAYBACK position.
 - d. Adjust VOLUME AND TONE CONTROLS for suitable loudness and desired tone quality.

Changing the Tape Speed or Stopping Tape during PLAYBACK is accomplished in the same manner as during RECORD.

Erasing of Tape - is accomplished in the same manner as recording, except that nothing is recorded. Erasing occurs automatically when RECORDING NEW MATERIAL ON TAPE WHICH WAS PREVIOUSLY USED.

SERVICE AND MAINTENANCECare of Tape

The storage and care of tape is important. Reels of tape should be stored where they will not be subjected to extremes of temperature and humidity. Rewind tape once before using when it has been stored 6 months or longer. It is recommended that new reel of tape be rewound once before recording.

Cleaning the Capstan and Recording Head is important after reasonable use. Dirt and slight gum deposits from the tape gradually accumulate on the recording head and rubber capstan. The recording head and capstan may be reached for cleaning by removing the two Phillips-head screws from the RECORD AND ERASE HEAD HOUSING and gently lifting off the housing cover. Cleaning is accomplished by means of a cloth dipped in carbon tetrachloride (obtainable from radio parts suppliers, hardware stores, drug stores, etc.)

Service

Proper care of your recorder will result in excellent service for years to come. Follow these simple rules:

NEVER OIL your recorder. Surfaces which are subject to wear are provided with oil-less bearings sealed for a lifetime operation.

THIS EQUIPMENT SHOULD BE SERVICED ONLY BY QUALIFIED TECHNICIANS. DO NOT remove the top plate of the mechanism. Doing so will VOID the warranty.

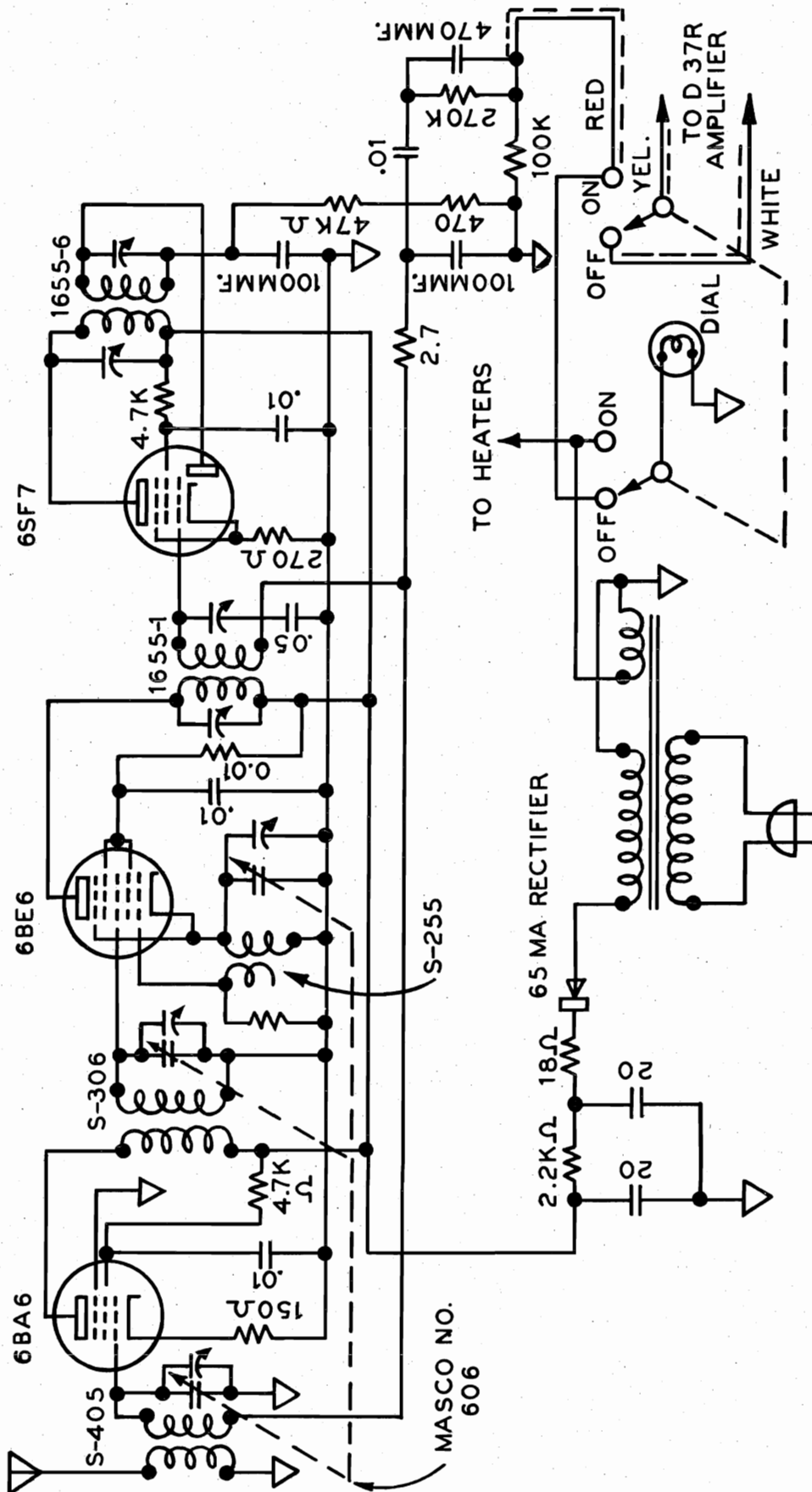
FOR BEST RESULTS: When beginning to record or playback, always use the right-hand CONTROL LEVER No. 1 FIRST. When stopping tape, always use the left-hand CONTROL LEVER No. 2 FIRST.

MAKE SURE ALL CONTROLS ARE IN OFF POSITION BEFORE LEAVING YOUR RECORDER.

MODELS D-37, D-37R,
DC-37R, LD-37, LD-37R

MASCO SOUND REEL DUAL SPEED, DUAL TRACK, TAPE RECORDER

RADIO TUNER



UNLESS OTHERWISE SPECIFIED
ALL RESISTORS IN MEGOHMS (1/2 WATT)
ALL CAPACITORS IN MICROFARADS
295121 WN

Service Instructions

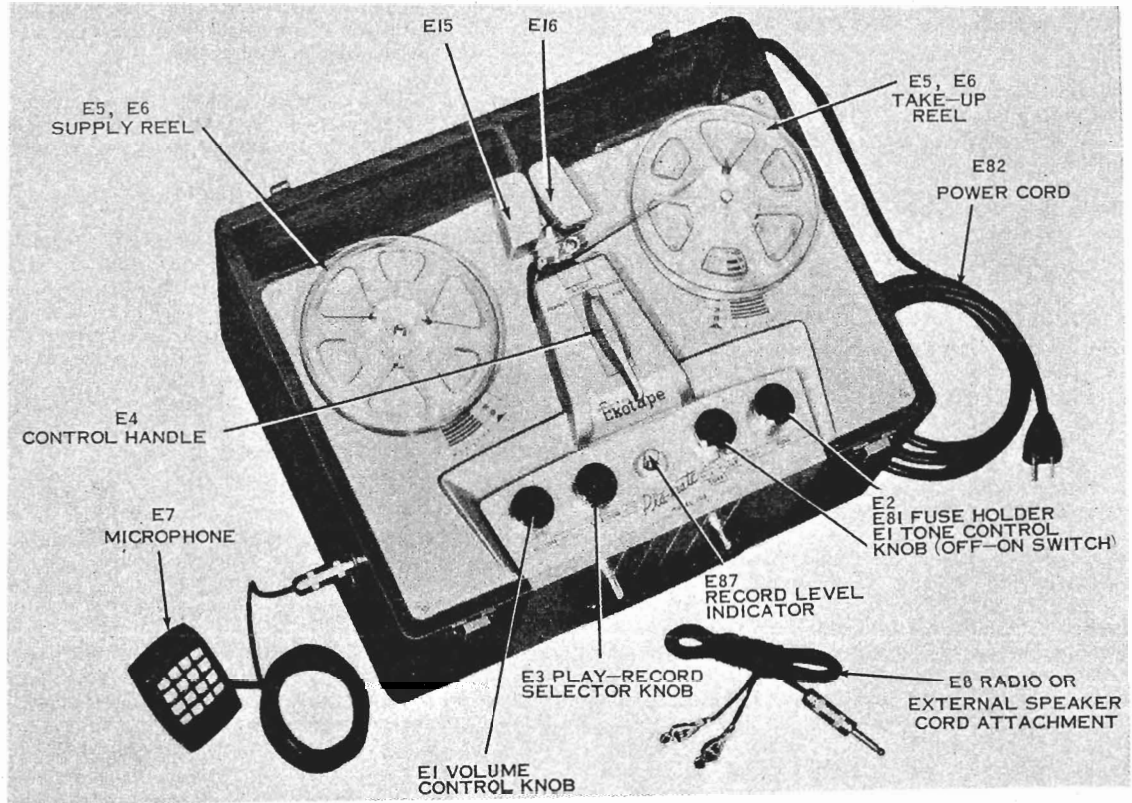
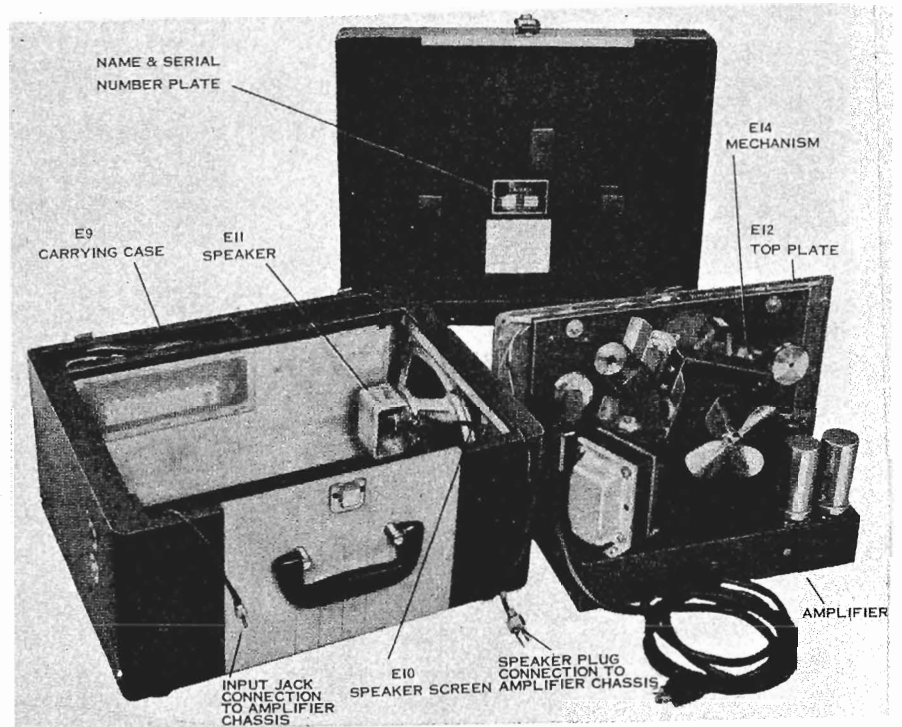


Figure 1.

Unit Removed From Case



MODELS 109,
110, 111, 112

2. DESCRIPTION OF MODELS.

The EKOTAPE models 109, 110, 111 and 112 described in this manual are all of the same basic design and construction. All are portable models and include the same accessories. Model 109 is the basic unit; all other models have slight variations and are described in the following paragraphs.

Model 109 operates on 117 volts at 60 cycles per second with a tape speed of 3-3/4 inches per second. Different tube compliments have been used as follows:

- Serial No. 5202 and Below - See figure 8.
 - Rectifier 5Y3GT
 - Input (Playback only) 6AU6
 - Amplifier 12AT7
 - Output 6V6GT
 - Oscillator 6V6GT
- Serial No. 5203 to 12249 - See figure 9.
 - Rectifier 5Y3GT
 - Input (Playback only) 5879
 - Amplifier 12AX7
 - Output 6V6GT
 - Oscillator 6V6GT

After Serial 12250 the type 12AX7 is replaced by two type 6AV6.

MODEL 110. Operates on 115/230 volts at 50 cycles per second. Tape speed is 3-3/4 inches per second. The amplifier is the same as Model 109 except a larger power transformer is used which incorporates a tapped primary for selection of 115 or 230 volt operation as shown in the schematic, figure 9. Units are shipped connected for 115 volt operation. For 230 volt operation it is necessary to move one wire in the amplifier, see paragraph 20. The motor pulley is larger and the flywheel tire is smaller on this model than on Model 109. After Serial 12250, the type 12AX7 tube is replaced by two type 6AV6.

MODEL 111. Operates on 117 volts at 60 cycles per second. Tape speed is 7-1/2 inches per second. Mechanically, this model is the same as Model 109 except motor pulley to flywheel tire ratio is different to give faster tape speed. The amplifier has some differences from Model 109 to accommodate the increased tape speed (see schematic, figure 10.) After Serial 12250, the 12AX7 is replaced by two type 6AV6 tubes.

MODEL 112. Operates on 115/230 volts at 50 cycles per second. Tape speed is 7-1/2 inches per second. The amplifier is the same as Model 111 except a larger power transformer is used which incorporates a tapped primary for selection of 115 or 230 volt operation as shown in the schematic, figure 10. Units are shipped connected for 115 volt operation. For 230 operation, it is necessary to move one wire in the amplifier, see paragraph 20.

NAMEPLATE. The model number, serial number and power requirements of each unit are stamped on the nameplate in the cover of the carrying case.

3. REMOVING UNIT FROM CASE.

All service work except cleaning the head assembly requires removal of the unit from the carrying case, figure 1. To remove the chassis, remove the screws in the corners of the top plate and carefully lift out the complete unit. Disconnect the speaker and the input plugs; then lift the unit free. When replacing the unit, connect the plugs and be sure the power cord is looped under the speaker to clear all moving parts and is in the slot in the case before lowering the unit in place.

4. TROUBLE CHART.

No matter how well equipment is designed and manufactured there are faults which normally occur in service. This section is designed to aid in quick location and correction of the troubles.

Before starting disassembly of the unit and actual point to point testing for troubles in the amplifier, it is often possible to localize the trouble to a particular circuit or component by simple preliminary tests and checks. Set the power switch to its ON position and make sure that power is being supplied to the unit. Lift up the top plate and inspect tubes. If one or more tubes do not light up, test the tubes. If tubes are in working condition, remove bottom cover of amplifier and check for loose connections or other visual signs of troubles.

Troubles which are not listed in this chart or which cannot be corrected by normal procedure should be referred to the factory or an Authorized Ekotape service station, giving the model and serial number of the unit.

| TROUBLE | CAUSE | REMEDY |
|----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Motor and amplifier inoperative with switch ON. | Blown fuse. Power supply source. Damaged power cord assy. Broken OFF-ON switch. | Replace fuse, par. 5. Check for correct voltage as shown on nameplate. Repair or replace. Replace tone control and switch assembly. |
| 2. Sound is fuzzy, faint, distorted, or no sound. | Dirty head. Over-recorded or under-recorded tape. Amplifier defect. Pressure pad not functioning. Worn or dirty pressure pad. Record head not operating. | Clean head, par. 6. Do not remove or change position of head. See Operating Guide. Check amplifier, par. 16. Check action of pressure pad lever. Replace or clean pressure pad lever assembly. Check oscillator bias voltage to record head, par. 11. |
| 3. No sound, but motor operates and tubes light. | Amplifier trouble. Open circuit to speaker. | Check amplifier, par. 16. Check continuity through plug to speaker. |

| | | |
|--------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4. Not erasing. | Dirt on face of head. Oscillator coil assy or tube not operating. Defective erase coil in head. | Clean head, par. 6. Replace oscillator coil or tube, par. 11. Replace head, par. 11. |
| 5. Erasing incomplete - background of old recording audible. | Erase head not operating properly. Pressure pad worn or not properly adjusted. | Check erase voltage with AC vacuum tube voltmeter. Should be approximately 45 volts, par. 11. Check erase head continuity. Adjust pressure pad or replace. |
| 6. Does not record. | Record coil open. Insufficient bias voltage. | Replace head unit. Check bias voltage across record head with AC vacuum tube voltmeter. Should be approximately 100 volts. If low, check bias oscillator circuit, par. 11. |
| 7. Does not reproduce. Sound of amplifier only. | Open coil in head. Open in input circuit. | Replace head unit, par. 11. Check circuit, par. 16. |
| 8. No drive, noisy or irregular drive on REWIND. | Rewind belt broken, dirty or defective. Control knob loose. Motor mount misaligned. Drive pulley loose. Bent or damaged motor bracket or engagement bracket lever. Lift lever out of adjustment. | Replace rewind belt, par. 8. Tighten control knob setscrew. Realign motor mount, par. 14. Tighten pulley set screw. Adjust or replace bracket lever to normal operating position, par. 14. Adjust lift lever, par. 13. |
| 9. Tape rewinds slowly (creeps) at stop position. | Motor mount misaligned. Bent or damaged motor engagement bracket lever. | Realign motor mount, par. 14. Replace or adjust bracket lever, par. 14. |
| 10. No drive, noisy or irregular drive on FAST forward. | Drive belt broken, dirty or Broken fast forward spring. Trip brake spring not clearing rewind belt. Motor out of alignment. | Replace drive belt, par. 8 Replace spring. Adjust trip brake spring, par. 14. Align motor, par. 14. |
| 11. Supply reel over runs on fast forward. | Broken brake spring or unhooked trip spring. Trip brake tension to light. | Replace brake spring or fasten trip spring. Adjust trip brake, par. 14. |
| 12. Take-up reel does not take up tape on PLAY position. | Broken or defective take-up drive belt. Dirt under take-up disc or dirt in reel spindle. Lift lever out of adjustment. Broken or defective lift lever spring. | Replace belt, par. 8 Clean and lubricate reel spindle, par. 7 and 8. Adjust lift lever, par. 13. Replace spring, par. 13. |
| 13. Tape overruns from rewind to stop. | Brake lever spring E31, fig. 4, broken. Take-up pulley and shaft E60, fig. 4, out of adjustment. Pads on brake yoke, E30, missing. | Replace spring. Adjust take up disc and shaft assy, par. 8. Replace brake yoke, E30, fig. 4. |
| 14. Uneven sound, wows causes by tape slipping. | Foreign substance caked on pinch roller or capstan. Worn or damaged pinch roller. Broken or defective pinch roller spring. Uneven pull on supply reel due to gummy or dirty bearing. Excessive pressure pad tension on heads. | Clean roller and capstan, par. 6. Replace pinch roller assembly. Replace spring. Clean supply reel spindle, par. 7 and 8. Relieve pressure pad tension. |
| 15. Howl or ringing sound. | Microphonic tube. | Replace defective tube, par. 17. |
| 16. Troubles common to radio receivers. | Defective components. | Check and replace in accordance with standard practice, par. 16. |

MODELS 109,
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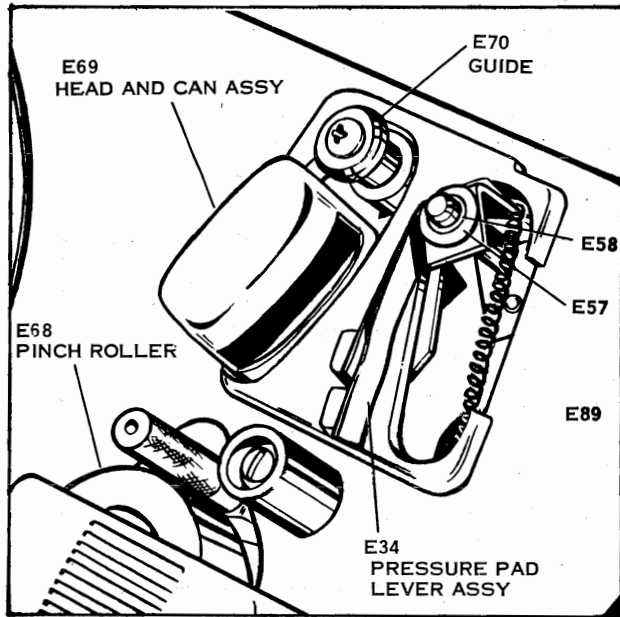


Figure 2. Record Head and Pressure Pads

5. FUSE.

Before replacing the fuse, determine cause of fuse failure. A standard cartridge type 3AG 2-ampere fuse is installed in a fuse holder at the right side of the top panel.

6. CLEANING.

When operation of the unit indicates cleaning is required (see Trouble Chart), wipe off the record and erase head contact surfaces (figure 2) carefully with a clean dry cloth. If dirt is caked or hard and will not come off with a dry cloth, dampen the cloth slightly with carbon tetrachloride.

NOTE

Do not use a brush or excessive amount of solvent on the pole surfaces.

Also clean the capstan and guide roller in the same manner.

7. LUBRICATION.

In normal use, the EKOTAPE requires no lubrication. Motors, flywheel shaft and spindles operate in oilite bearings. When unit is disassembled for repair, clean all bearings and lubricate with light oil. If cam and lever actions become sluggish and slow to respond, it may be due to gum or dirt in the pivots and under the levers. To clean and lubricate the levers, remove the top plate, paragraph 9. Clean off all old lubricant, accumulated dirt and gum with a clean cloth and cleaning solvent. Apply lubricant in thin film on working surfaces only. Do not over lubricate.

LUBRICANTS TO USE.

Oilite bearings only - Light machine or spindle oil.

Moving parts - Wadhams BRB#1 or Lubriplate.

8. REPLACING SPINDLE DRIVE BELTS.

The FAST FORWARD and REWIND spindle drive belts, figure 3, can be replaced without disassembly other than removing chassis from the carrying case, figure 1. Use care in handling the drive belts to prevent distortion or contact with grease or oil. Be sure there is no grease or oil on pulleys.

Start installing either belt by working it over the drive pulley under the motor mount. With the belt in the drive pulley groove, carefully work it over the spindle pulley flange to prevent distortion.

The FORWARD take-up spindle drive belt is located under the top plate, figure 4. Remove the top plate, paragraph 9. Loosen set screw in fast forward drive pulley, figure 6, and remove reel shaft assembly. Remove pulley assembly and work belt over pinch roller.

Clean and lubricate bearing and shaft with light machine oil. Work new belt over pinch roller; then reassemble reel shaft, FORWARD drive pulley and FAST FORWARD drive pulley. With control knob in FORWARD position, tighten FAST FORWARD drive pulley set screw E63, figure 6, at point where there is 0.010 to 0.015 inch clearance between pulley and bearing.

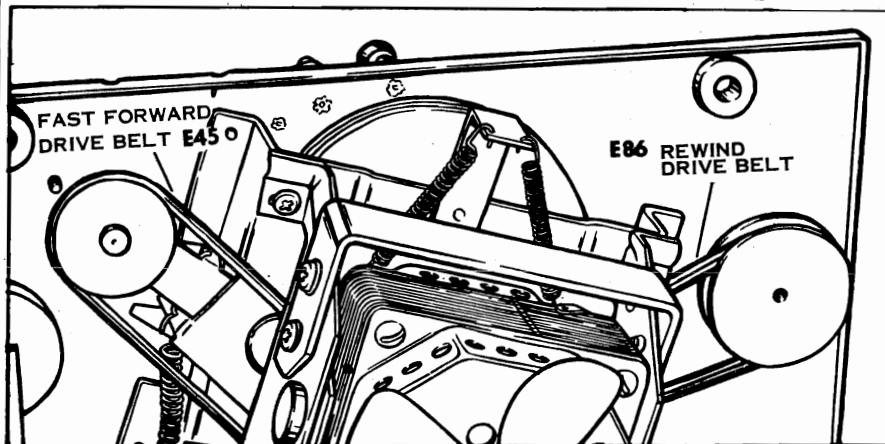


Figure 3.

Reel Drive Belts

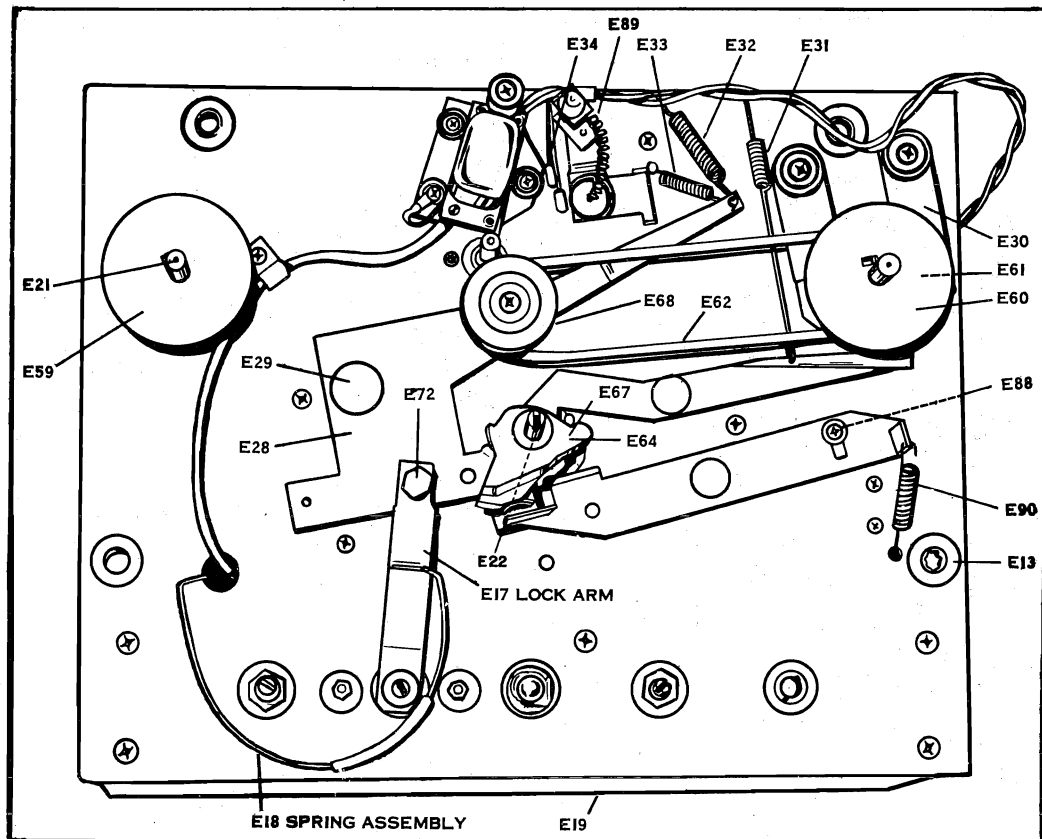


Figure 4. Top Plate of Chassis with Top Plate Removed

9. REMOVING TOP PLATE.

Removal of the top plate is required for access to the operating mechanism, figure 4. This plate is rubber mounted on the mechanism mounting plate and held in place by four screws and large washers installed from the back of the chassis. Remove the fuse holder cover, and pull off the VOLUME and TONE control knobs. The selector knob and control knob each have a socket head set screw which must be loosened before removing the knob. Remove the cover over the pressure pads; then remove the retaining ring, tension washer and lift off the pressure pad assembly. Remove the top plate attaching screws and washers, and carefully work the top plate off the rubber mounts. Whenever the top plate is removed, clean and lubricate the mechanism, paragraph 7, and check its action. Replace the top plate with the attaching screws, washers and lockwashers. The lower right hand screw (from rear) also attached the grounding strap.

Install the pressure pad assembly, tension washer, retaining ring, spring and cover. Replace knobs and fuse holder.

10. REPLACING FLYWHEEL.

Irregularities on the flywheel drive tire or capstan require replacement of the flywheel assembly, figure 5.

Place the control knob at STOP. Remove the chassis from the case, figure 1, and remove the top plate,

paragraph 9.

Unhook the motor springs, fast forward spring and remove rewind belt from reel shaft spindle. Remove five screws attaching the flywheel support bracket and pull off the bracket and flywheel.

When installing a new flywheel, check fit in bearings carefully and be sure bearing is snug in mount. If bearing fit is sloppy or binds, replace the bearings. After the flywheel and bracket are reinstalled, check for free operation while rotating before turning on motor. If flywheel is tight, tap flywheel to align bearings. Connect motor springs, fast forward spring and rewind belt. Check operation on REWIND, STOP, FORWARD and FAST before completing reassembly, paragraph 14. Be sure fast forward drive is in proper position before attaching springs, see figure 6.

11. RECORD HEAD AND OSCILLATOR.

Check oscillator bias voltages with a-c vacuum tube voltmeter, referring to L, of figures 8, 9 and 10, for rated erase and record voltages. When tests indicate record or erase coil in the record head and can assembly is defective, replace the assembly. Remove the top plate, paragraph 9; then remove three screws and washers attaching the assembly to the mounting plate and lift off the head.

When installing the new head, connect wires to the head terminals as indicated in the following sketch. Be sure plastic tubing covers the shielded lead. The

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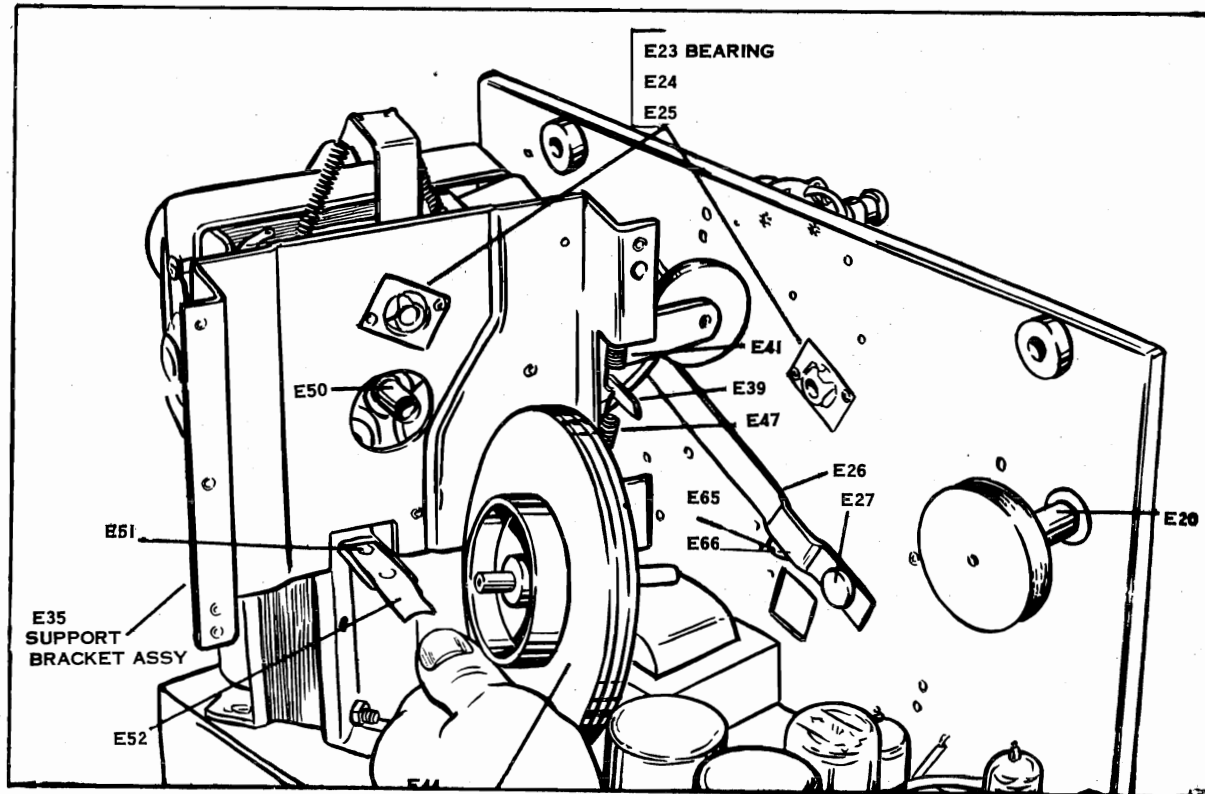


Figure 5. Replacing Flywheel Assembly

ground strap terminal goes between one of the mounting screw heads and washers. After the head is replaced, it will be necessary to align it for optimum output level and maximum high frequency response. If a constant frequency tape is not available, play back a tape previously recorded. Adjust the three head mounting screws for maximum high frequency response.

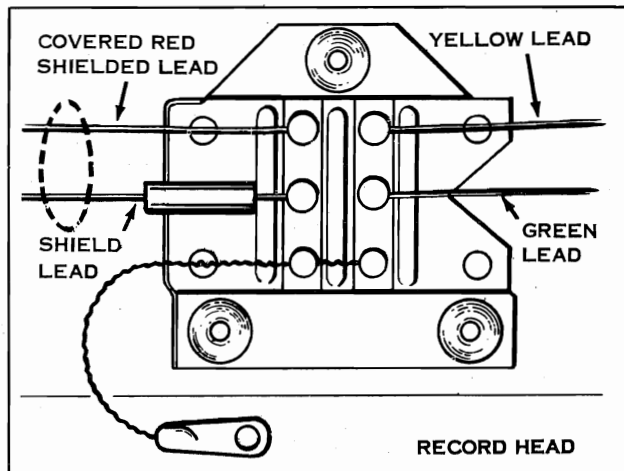
the control knob is moved to any other position.

To remove the arm, remove the spring assembly first; then loosen two socket head set screws in the hub.

To install the arm, set the control knob at FORWARD and turn the selector shaft to its extreme counterclockwise position; install the arm with indexing ball in the index hole in the pinch roller lever and shaft assembly; then move arm approximately 1/16 inch farther counterclockwise tighten set screws in place and replace spring assembly, E18.

The PLAY-RECORD switch shaft has been previously drilled and the cone point set screw should go into this indentation in the shaft.

If a new PLAY-RECORD switch or record lock has to be installed, position the record lock arm as instructed in the previous paragraph, then with the cone point set screw removed, drill a 1/32 inch indentation in the switch shaft with a No. 38 drill. Install the spring as shown in figure 4. Check operation by turning control knob to STOP. The record lock arm should move counterclockwise and turn selector knob to PLAY position.



12. RECORD LOCK ARM.

The record lock arm, E17, figure 4, interlocks RECORD position of the selector knob in FORWARD position only. It is an indexing arm which automatically returns selector knob to PLAY position when

NOTE

On record lock arm assembly, E17, figure 4, loosen adjusting screw in slot of arm and adjust steel ball in hole in pinch roller lever in record position and tighten screw.

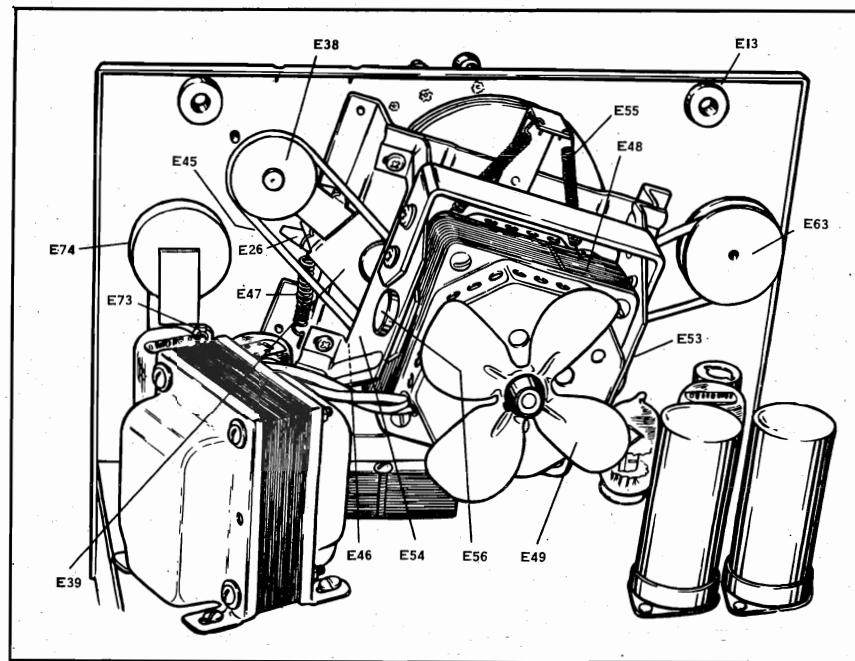


Figure 6. Operating Mechanism

13. FAST FORWARD - REWIND LIFT LEVER ADJUSTMENT.

The top plate must be removed to adjust the lift lever clearance, paragraph 9. Place control knob in FORWARD position and turn adjusting screw, E88, figure 4 holding lock nut, E73, figure 6, until clearance between lever and ball in pulley is 1/16 to 1/32 inch. Turn control knob to REWIND position and check to be sure lever lifts take-up spindle. Hold adjustment screw in position with a screw driver from the top and tighten the lock nut.

14. REPLACING MOTOR.

When replacing motor, it is necessary to adjust the drive clearance carefully so the mechanism will function properly in all control knob positions. Two different styles of motors are used, one with a square frame and the other with a round. Consult the parts list for proper type of motor as well as mounting brackets when ordering replacements.

With all springs attached check the following:

a. FAST FORWARD position - the fast forward drive belt should engage the motor drive pulley and fast forward drive pulley, E38, with kick out lever, E26, clear of fast forward plate and pulley assembly, E39, figure 6. The trip pin on the fast forward drive mechanism should engage the brake trip of the trip assembly passing beyond the "dog" of the brake trip not exceeding 1/16 inch. This prevents over-run or looping of the tape in going from "Fast Forward" to "Forward." To correct any misalignment of above, loosen the four mounting screws and with all springs attached and mechanism in "Fast Forward" position, make adjustments by shifting motor bracket in slotted mounting holes. After proper adjustment is made, hold bracket in position and tighten the four mounting screws.

NOTE

Check fast forward brake spring to see that a clearance of approximately 3/64 inch exists between spring and rewind belt in "Fast Forward" and "Forward" positions.

b. REWIND and STOP position - motor drive pulley should not touch anything at STOP position. At REWIND, motor drive should engage the rewind belt. Adjustment is made by slightly bending the rocker arm bracket on the motor mounting bracket E51, figure 5.

c. FORWARD position - motor should engage flywheel tire only. Adjustment is made by moving motor bracket in slotted mounting holes.

15. OPERATION MECHANISM.

Removal of top plate, paragraph 9, and disassembly for replacement of the flywheel, paragraph 10, are sufficient to make all parts accessible for replacement. Illustrations throughout the manual are keyed to the parts list at the back of the book for replacement purposes.

Spindles can be replaced by loosening set screws in the drive pulleys on the bottom. Replace the brake yoke assembly, E30, figure 4, when pads are worn or otherwise ineffective. The assembly is held in place by two rubber mounts and screws and is easily replaceable. Refer to paragraph 8 for adjusting.

The pinch roller is replaced by removing the center attaching screw. When installing a new roller, be sure it fits without play but revolves freely.

If any of the mechanism levers are bent, damaged or excessively worn, replace the complete mounting plate assembly or return the complete unit to the factory for repair.

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MAINTENANCE INSTRUCTIONS

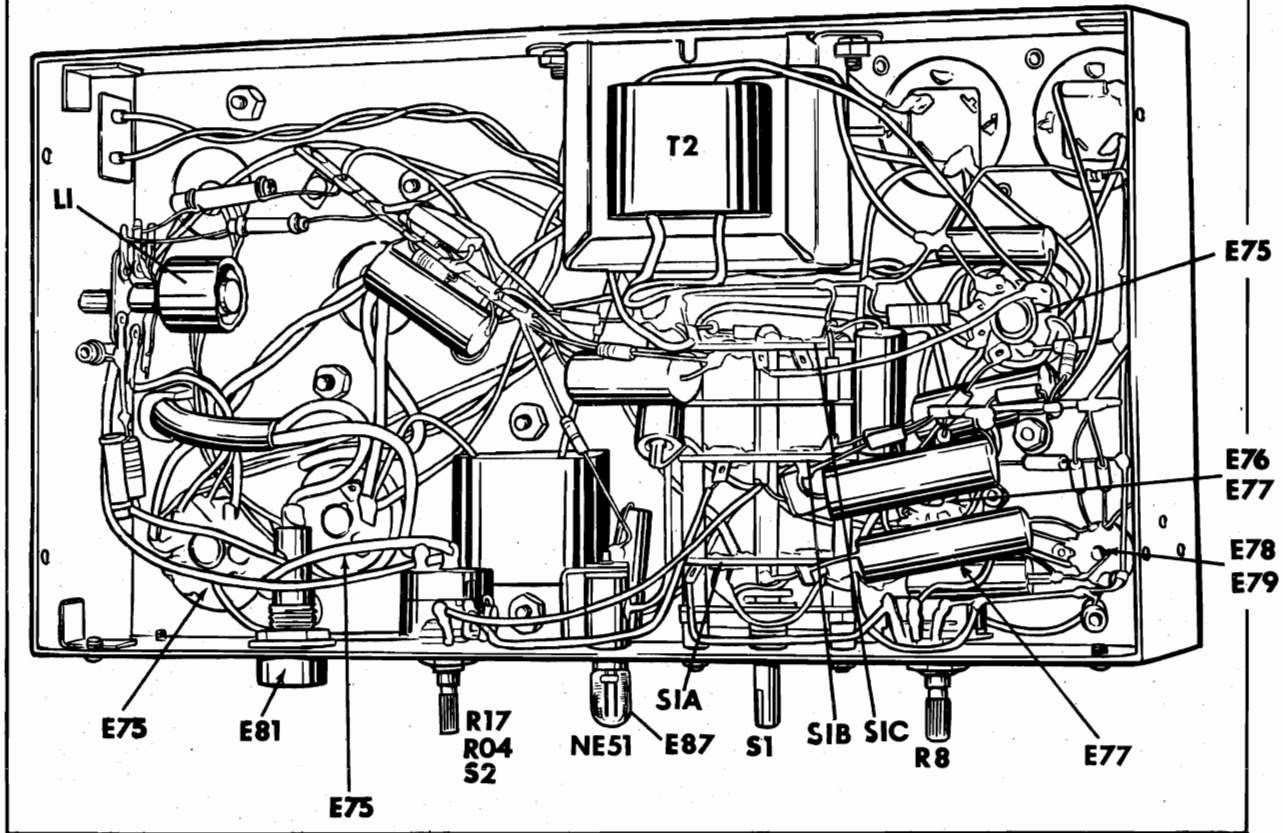
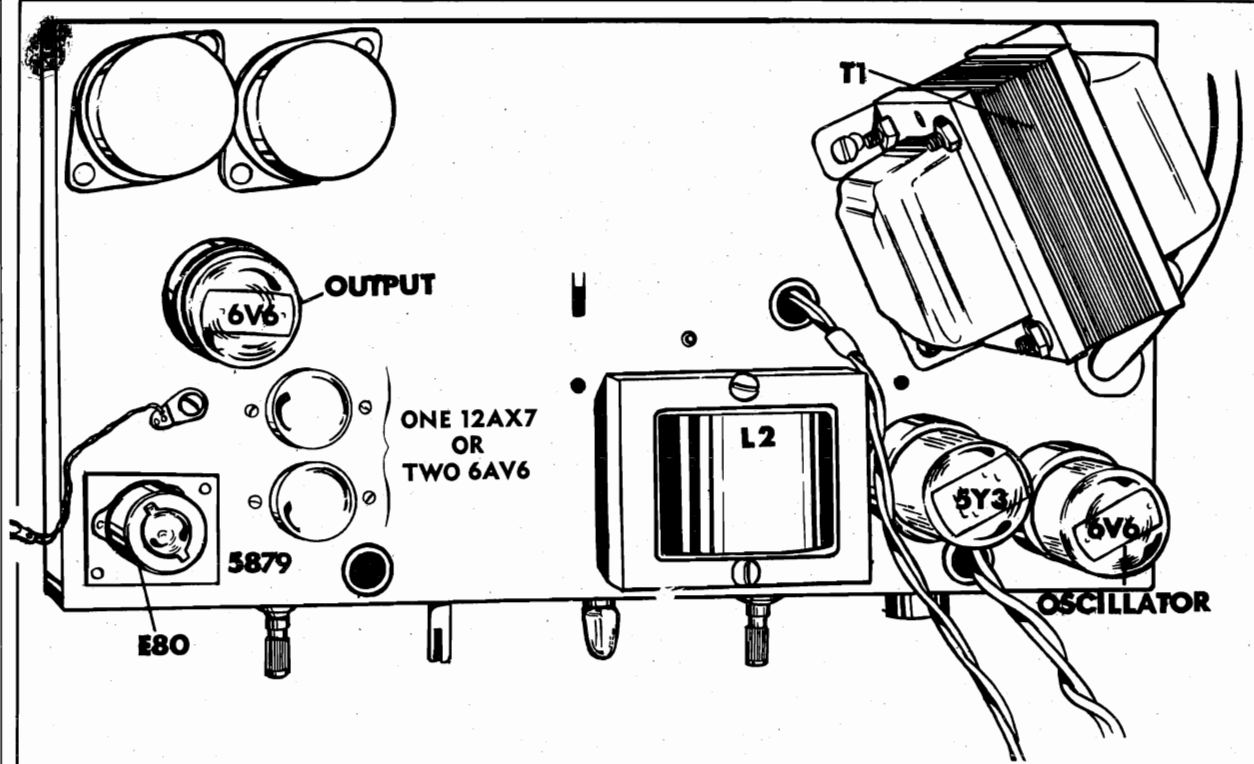


Figure 7. Top and Bottom Views of Amplifier

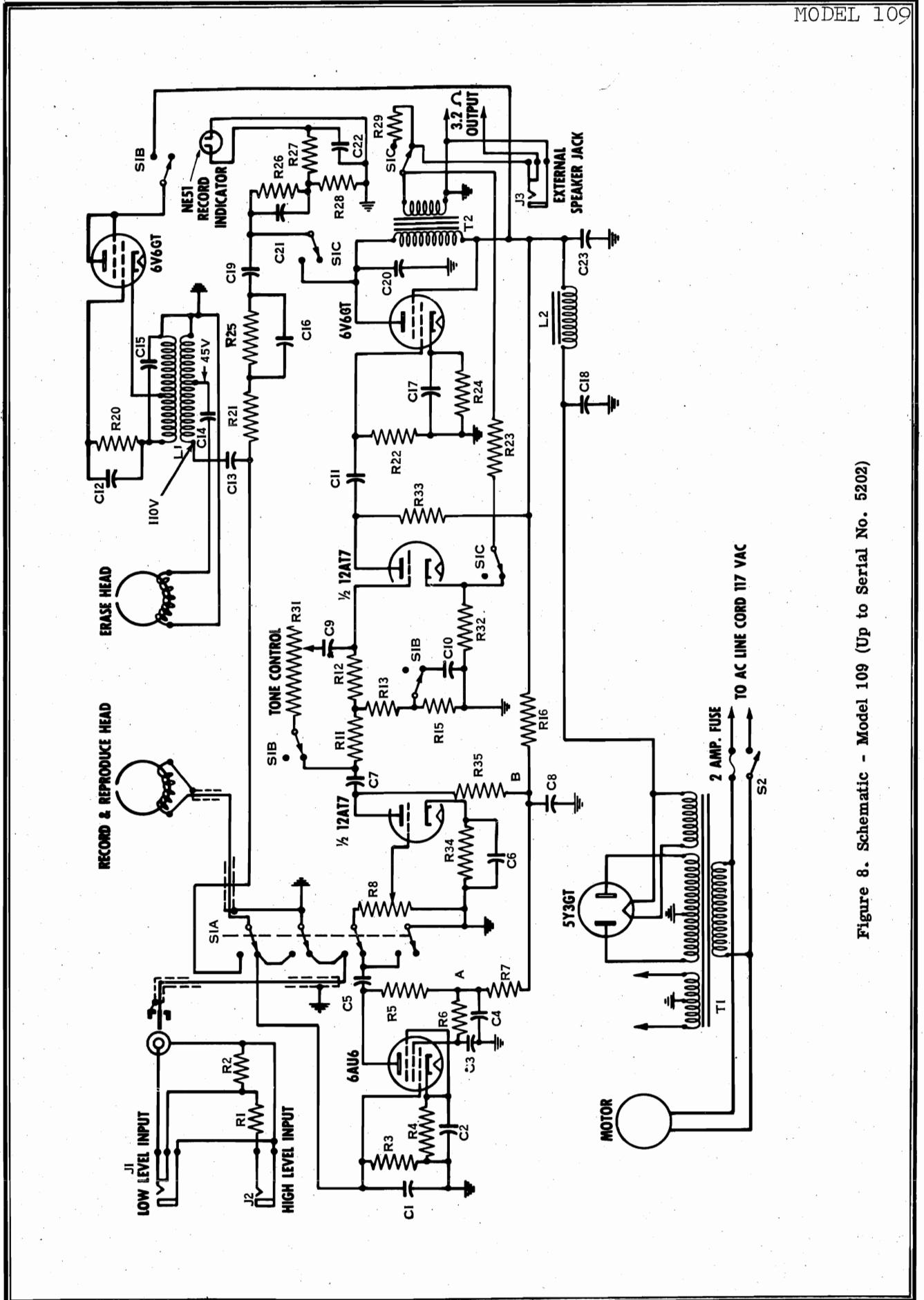


Figure 8. Schematic - Model 109 (Up to Serial No. 5202)

MODEL 109

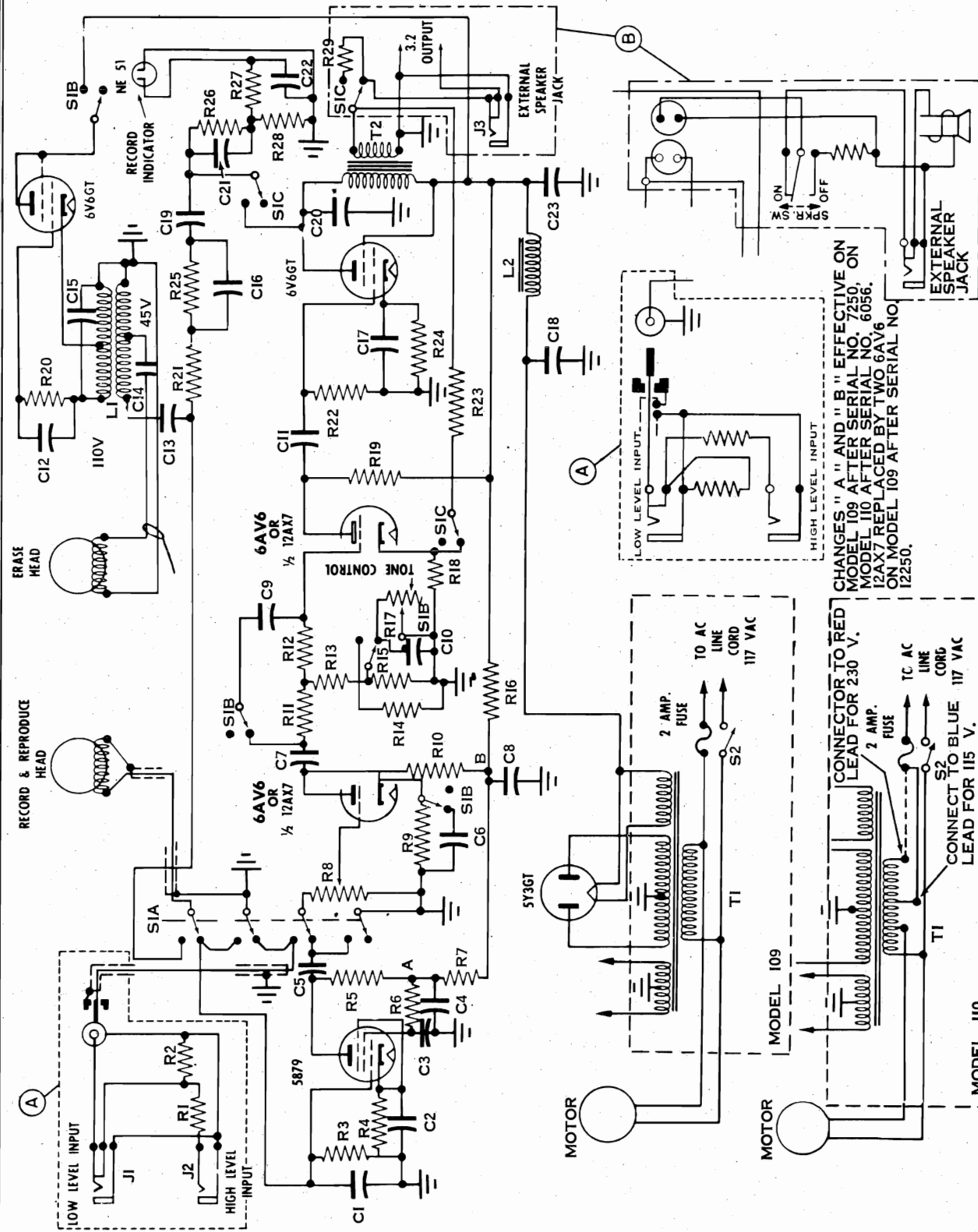


Figure 9. Schematic - Model 109 (Serial No. 5203 and Higher)

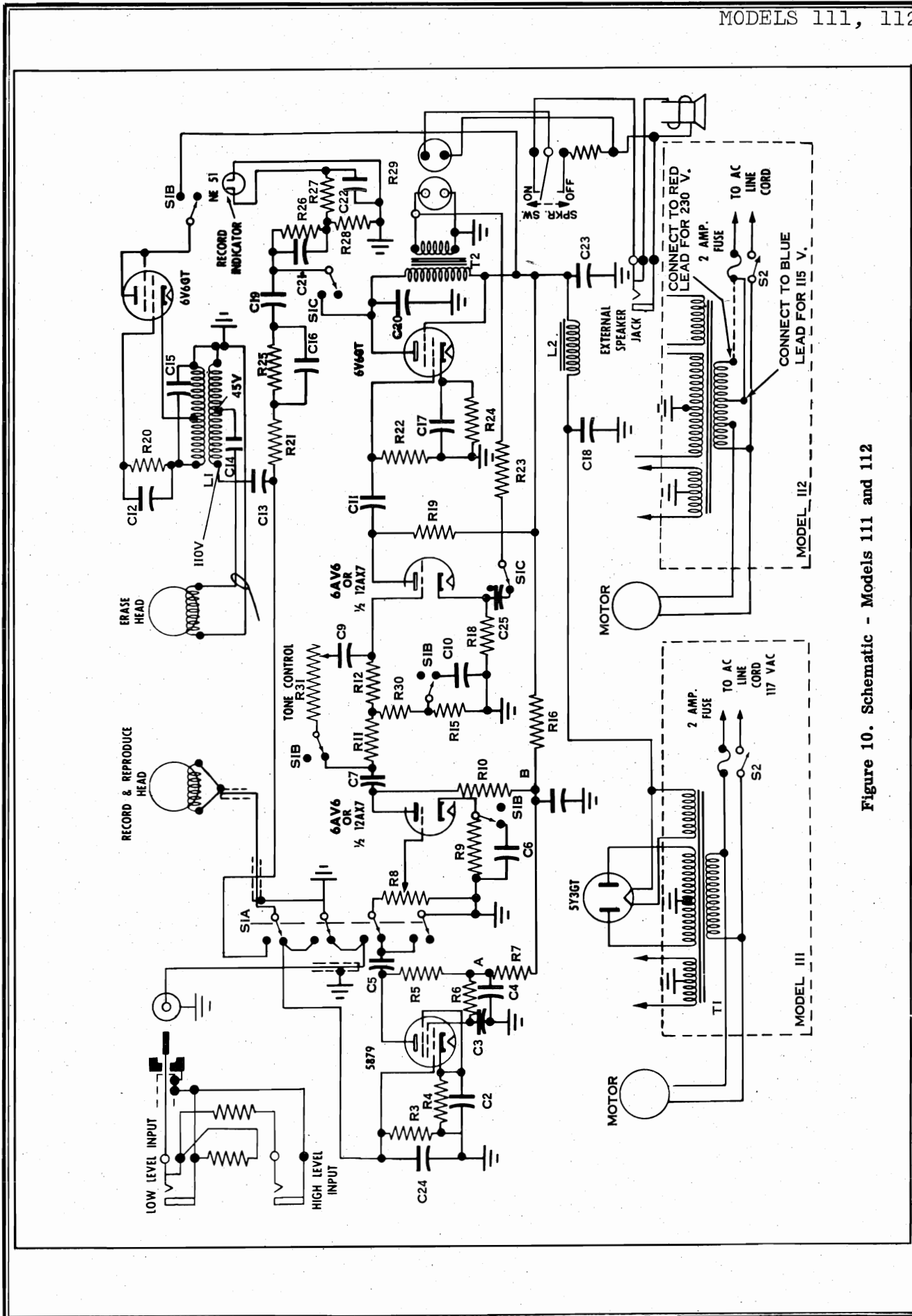


Figure 10. Schematic - Models 111 and 112

MODELS 109,
110, 111, 112

| Tube | Pin Voltages | | | | | | | | | |
|-----------------------------------------------------|--------------|---------|---------|--------|--------|--------|---------|---------|--------|--------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | |
| Model 109 (Up to Serial No. 5202) | | | | | | | | | | |
| 6AU6 | 130 | .55 | 6.2 AC | 6.2 AC | 75 | 25 | .55 | 1.7 | 6.2 AC | |
| 12AT7 | | 1.7 | 6.2 AC | 6.2 AC | 6.2 AC | 110 | 6.2 AC | | | |
| 6V6 | | 6.2 AC | 230 | 250 | -50 | 270 AC | 6.2 AC | | | 12.5 |
| 6V6 (OSC.) | | 6.2 AC | 250 | 250 | | | 6.2 AC | | | 6.2 AC |
| 5Y3GT | | 4.95 AC | 270 AC | 270 AC | | | 4.95 AC | | | |
| Models 109 (Serial No. 5203 and up) 110, 111, & 112 | | | | | | | | | | |
| 5879 | 118 | .95 | .75 | 6.2 AC | 6.2 AC | 102 | 30 | 50 | .75 | |
| 12AX7 | | | 1 | 6.2 AC | 6.2 AC | | .95 | 6.2 AC | | |
| 6AV6 (1st) | | | 6.2 AC | 6.2 AC | 102 | | 14 | | | |
| 6AV6 (2nd) | | | 1.5 | 6.2 AC | 6.2 AC | | | 118 | | |
| 6V6 | | | 6.2 AC | 245 | 265 | | 6.2 AC | | | |
| 6V6 (OSC.) | | | 6.2 AC | 265 | 265 | | -75 | 6.2 AC | | |
| 5Y3GT | | | 4.95 AC | 270 AC | 270 AC | | 270 AC | 4.95 AC | | |

All voltages DC unless otherwise indicated. Point A - 198 volts
Point B - 220 volts
Measurements made from point indicated to chassis using 20,000 ohm per volt meter with RECORD - LISTEN switch in RECORD position and unit operating at rated line voltage.
Refer to Schematics, figures 8, 9, and 10

Figure 11. Voltage Measurements

16. AMPLIFIER.

As shown in the schematic diagrams, figure 8, 9 and 10, there are several variations in the basic amplifier used on EKOTAPE models. Use of the schematics, voltage tables (figure 11) and views of the amplifier (figure 7) should be made in troubleshooting and repairing the amplifier.

For tube replacement and access to the top of the amplifier only, refer to paragraph 3.

For access to the bottom of the amplifier, remove the amplifier bottom plate which is held in place by two screws at each end of the amplifier. When troubleshooting on the amplifier, always be sure the power is of correct voltage and frequency indicated on the nameplate in the cover of the carrying case. Also be sure to use the voltage values in the schematics and charts which apply to the model being tested. Before starting troubleshooting procedure, make a careful visual check for loose connections or other obvious defects.

17. TUBES.

Location of tubes is shown in figure 7. For access to the tubes, remove four screws, and lift the top plate carefully from the case, paragraph 9. Tube complements for the various models are listed in paragraph 2. When removing tubes, excessive movement of the tube in its socket weakens socket pins and spreads the contacts in the sockets, so remove carefully. Insert new tubes so that key in the tube base lines up with keyway in tube socket, and push down firmly until tube locks in the socket.

18. VOLTAGE MEASUREMENTS.

All voltage measurements indicated in figure 11 are made from points indicated to chassis with a 20,000 ohm-per-volt meter and with RECORD-PLAY switch in RECORD position. Power supply must be same as indicated on nameplate in cover of carrying case.

19. RESISTOR AND CAPACITOR MEASUREMENTS.

All resistors and capacitors are keyed to the schematics, figures 8, 9 and 10 and are listed with their values in the parts list. The same reference numbers are also used in the top and bottom views of the amplifier, figure 7.

20. CHANGING FROM 115 VOLTS TO 230 VOLTS.

Models 110 and 112 have a power transformer tapped for 115 or 230 volt operation. Both models are shipped connected for 115 volt operation. To change from 115 to 230 volt operation, change one connection in the amplifier as follows:

The black wire coming from the fuse holder is connected to a lug on a terminal strip in the chassis. This lug is connected to a blue wire coming from the power transformer. This is the 115 volt connection. There is another lug on the terminal strip which is connected by a red wire to the power transformer. For 230 volt operation remove the black wire from the lug with the blue transformer wire and resolder it on the lug with the red transformer wire.

After changing to 230 volt operation, mark the nameplate in the cover of the carrying case for future reference when servicing is required.

21. IMPORTANT ORDERING INSTRUCTIONS.

Most of the parts listed in the following parts lists are illustrated in various illustrations in this instruction manual. Parts are indicated on the illustrations with reference numbers which also appear in the parts lists.

When ordering parts always refer to the model and serial number stamped on the name plate inside the top cover of the unit for which the parts are required.

It is preferable to replace complete sub-assemblies both from the standpoint of saving time on the repairs and for better performance of the equipment after it has been repaired.

ELECTRICAL PARTS

See schematics, figures 8, 9 and 10

| SYMBOL | PART NAME | PART NO. |
|--------|--------------------------------------------------------------------------------------------------------------------|-------------|
| C1 | CAPACITOR, CERAMIC, .0017 MFD 500V (USED ON MODELS 109 & 110 ONLY. MODELS 111 & 112 USE C24 IN PLACE OF C1.) | 241-14260-2 |
| C2 | CAPACITOR, ELECTROLYTIC, 50 MFD 6V | S6063 |
| C3 | CAPACITOR, PAPER, .1 MFD 400V | S3595 |
| C4 | CAPACITOR, ELECTROLYTIC, 40-40 MFD 450V, 40 MFD 25V (INCLUDES C4, C8 & C17) | 241-14238 |
| C5 | CAPACITOR, PAPER, .05 MFD 400V | S4261 |
| C6 | CAPACITOR, ELECTROLYTIC, 50 MFD 6V | S6063 |
| C7 | CAPACITOR, PAPER, .1 MFD 400V | S3595 |
| C8 | (SEE C4) | |
| C9 | CAPACITOR, MICA, .00005 MFD 500V | 29670-2 |
| C10 | CAPACITOR, PAPER, .05 MFD 400V | S4261 |
| C11 | CAPACITOR, PAPER, .05 MFD 400V | S4261 |
| C12 | CAPACITOR, CERAMIC, .003 MFD 500V | 241-14260-1 |
| C13 | CAPACITOR, CERAMIC, .001 MFD 500V | S6065-5 |
| C14 | CAPACITOR, CERAMIC, .0017 MFD 500V | 241-14260-2 |
| C15 | CAPACITOR, CERAMIC, .003 MFD 500V | 241-14260-1 |
| C16 | CAPACITOR, MICA, .0002 MFD 500V | 29670-4 |
| C17 | (SEE C4) | |
| C18 | CAPACITOR, ELECTROLYTIC, 40-40 MFD 450V (INCLUDES C18 & C23) | 241-14236 |
| C19 | CAPACITOR, PAPER, .05 MFD 400V | S4261 |
| C20 | CAPACITOR, CERAMIC, .003 MFD 500V | 241-14260-1 |
| C21 | CAPACITOR, PAPER, .05 MFD 400V | S4261 |
| C22 | CAPACITOR, PAPER, .0005 MFD 600V | S4556 |
| C23 | (SEE C18) | |
| C24 | CAPACITOR, CERAMIC, .0005 MFD 500V (MODELS 111 & 112 ONLY. OTHER MODELS USE C1) | S3750 |
| C25 | CAPACITOR, PAPER, .25 MFD 150V (MODELS 111 & 112 ONLY) | 241-14974 |
| J1 | LOW LEVEL INPUT JACK BRACKET AND CONNECTOR ASSY (MICROPHONE) | 242-14190 |
| J2 | MICROPHONE JACK ONLY | S4323 |
| J3 | HIGH LEVEL INPUT JACK (RADIO/PHONO) | S4323 |
| L1 | EXTERNAL SPEAKER JACK | S4324 |
| L2 | OSCILLATOR COIL ASSY | 242-14603 |
| L3 | FILTER CHOKE | 811A-1 |
| R1 | RESISTOR, 510,000 OHM 1/2 WATT | 29501-53 |
| R2 | RESISTOR, 22,000 OHM 1/2 WATT | 29501-29 |
| R3 | RESISTOR, 510,000 OHM 1/2 WATT | 29501-53 |
| R4 | RESISTOR, 1,000 OHM 1/2 WATT | 29501-11 |
| R5 | RESISTOR, 240,000 OHM 1/2 WATT | 29501-48 |
| R6 | RESISTOR, 1 MEGOHM 1/2 WATT | 29501-57 |
| R7 | RESISTOR, 22,000 OHM 1/2 WATT | 29501-29 |
| R8 | VOLUME CONTROL, 500,000 OHM | 241-14233 |
| R9 | RESISTOR, 2,000 OHM 1/2 WATT (MODEL 109 UP TO NO. 5202 USES R34 IN PLACE OF R9) | 29501-14 |
| R10 | RESISTOR, 240,000 OHM 1/2 WATT (MODEL 109 UP TO NO. 5202 USES R35 IN PLACE OF R10) | 29501-48 |
| R11 | RESISTOR, 100,000 OHM 1/2 WATT | 29501-41 |
| R12 | RESISTOR, 100,000 OHM 1/2 WATT | 29501-41 |
| R13 | RESISTOR, 5,100 OHM 1/2 WATT (MODELS 109 AND 110 ONLY, MODELS 111 AND 112 USE R30) | 29501-21 |

| SYMBOL | PART NAME | PART NO. |
|--------|-------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|
| R14 | RESISTOR, 51,000 OHM 1/2 WATT (MODEL 109 NO. 5203 AND HIGHER AND MODEL 110 ONLY) | 29501-35 |
| R15 | RESISTOR, 1 MEGOHM 1/2 WATT | 29501-57 |
| R16 | RESISTOR, 22,000 OHM 1/2 WATT | 29501-29 |
| R16 | RESISTOR, 5,100 OHM 1/2 WATT (USED WHEN 6AV6 TUBE REPLACES 12AX7) | 29501-21 |
| R17 | tone control with off-on switch S2 (MODEL 109 NO. 5203 AND HIGHER AND MODEL 110 ONLY, OTHER MODELS USE R31) | 241-14234 |
| R18 | RESISTOR, 2,000 OHM 1/2 WATT (ALL MODELS EXCEPT 109 UP TO NO. 5202 ONLY WHICH USES R32) | 29501-14 |
| R19 | RESISTOR, 240,000 OHM 1/2 WATT (USED ON ALL MODELS EXCEPT MODEL 109 UP TO NO. 5202 WHICH USES R33) | 29501-48 |
| R20 | RESISTOR, 10,000 OHM 1 WATT | 29501-76 |
| R21 | RESISTOR, 240,000 OHM 1/2 WATT | 29501-48 |
| R22 | RESISTOR, 240,000 OHM 1/2 WATT | 29501-48 |
| R23 | RESISTOR, 8,200 OHM 1/2 WATT | 29501-23 |
| R24 | RESISTOR, 300 OHM 1 WATT | 29501-98 |
| R25 | RESISTOR, 240,000 OHM 1/2 WATT | 29501-48 |
| R26 | RESISTOR, 390,000 OHM 1/2 WATT | 29501-51 |
| R27 | RESISTOR, 51,000 OHM 1/2 WATT | 29501-35 |
| R28 | RESISTOR, 51,000 OHM 1/2 WATT | 29501-35 |
| R29 | RESISTOR, 10 OHM 1/2 WATT | 29501-94 |
| R30 | RESISTOR, 3,600 OHM 1/2 WATT (USED ON MODELS 111 & 112 ONLY, OTHER MODELS USE R13) | 29501-19 |
| R31 | tone control with off-on switch S2 (USED ON MODEL 109 SERIAL NO. UP TO 5202 AND ON MODELS 111 & 112 ONLY, ALL OTHER MODELS USE R17) | 241-14234-1 |
| R32 | RESISTOR, 1,000 OHM 1/2 WATT (USED ON MODELS 109 SERIAL NO. UP TO 5202 ONLY ALL OTHER MODELS USE R18) | 29501-11 |
| R33 | RESISTOR, 51,000 OHM 1/2 WATT (USED ON MODELS 109 SERIAL NO. UP TO 5202 ONLY, ALL OTHER MODELS USE R19) | 29501-35 |
| R34 | RESISTOR, 1,000 OHM 1/2 WATT (USED ON MODEL 109 UP TO SERIAL NO. 5202 ONLY, ALL OTHER MODELS USE R9) | 29501-11 |
| R35 | RESISTOR, 51,000 OHM 1/2 WATT (USED ON MODEL 109 UP TO SERIAL NO. 5202 ONLY, ALL OTHER MODELS USE R10) | 29501-35 |
| S1 | SELECTOR SWITCH ASSY MODEL 109 UP TO SERIAL NO. 5202 MODELS 109 & 110 MODELS 111 & 112 | 242-14555 242-14555-3 242-14555-4 |
| S2 | OFF-ON SWITCH (PART OF TONE CONTROL R17 & R31) | |
| T1 | POWER TRANSFORMER MODELS 109 & 111 | 242-14228 |
| T2 | MODELS 110 & 112 | 242-15004 |
| T2 | OUTPUT TRANSFORMER | 242-14230 |

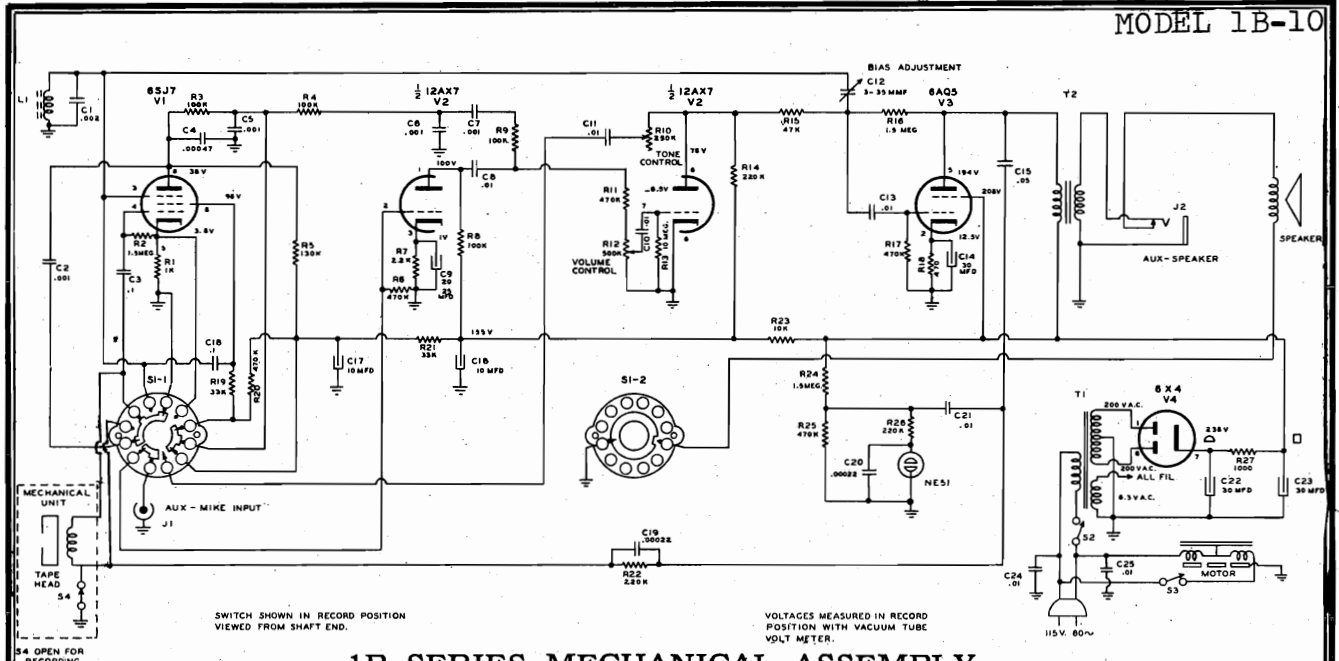
MODELS 109,
110, 111, 112

MECHANICAL PARTS
See schematics, figures 2 to 6

| SYMBOL | PART NAME | PART NO. |
|--------|--------------------------------------------------------------------------------|----------------------------|
| E1 | TOP CONTROL KNOB | 241-14066 |
| E2 | FUSE ASSEMBLY KNOB | 242-14054 |
| E3 | SELECTOR KNOB | 241-14071 |
| E4 | SELECTOR KNOB SET SCREW, CONE POINT, SOCKET HD. NO. 8-32 X 1/4 IN. | 29542-1 |
| | CONTROL HANDLE SET SCREW, CONE POINT, SOCKET HD. NO. 8-32 X 1/4 IN. SPECIAL | 241-14072-1 |
| E5 | REEL, 5 IN. | 241-15116 |
| E6 | REEL AND TAPE, 5 IN. | 241-14067 |
| E7 | MICROPHONE ASSEMBLY | 241-14068 |
| E8 | EXTERNAL SPEAKER CORD AND PLUG ASSY | 242-14069 |
| E9 | CARRYING CASE | 242-14286 |
| E10 | SPEAKER SCREEN | 241-14053 |
| E11 | SPEAKER | 241-14057 |
| E12 | TOP PLATE ASSEMBLY | 241-14070 |
| E13 | OPERATING MECHANISM GROMMET | 242-14147 |
| E14 | RECORD HEAD COVER, LEFT | 241-14251 |
| E15 | RECORD HEAD COVER, RIGHT | 242-14051 |
| E16 | COVER SCREW, RECESSED OVAL HD, NO. 4-40 X 3/8 IN. | 241-14062-3 |
| | RECORD LOCK ARM ASSEMBLY | 241-14062-4 |
| E17 | RECORD LOCK ARM ASSEMBLY | 29528-5 |
| E18 | RECORD LOCK SPRING ASSEMBLY | 242-14073 |
| E19 | MOUNTING PLATE ASSEMBLY | 242-14762 |
| E20 | SUPPLY REEL SPINDLE BEARING | 242-14079 |
| E21 | TAKE UP REEL SPINDLE BEARING | 241-14081 |
| E22 | CONTROL SHAFT BEARING | 241-14082 |
| E23 | SELF ALIGNING BEARING | 241-14083 |
| E24 | BEARING RETAINER | 241-14084 |
| E25 | BEARING RETAINER EYELET | 241-14085 |
| E26 | FAST FORWARD RELEASE LEVER | P9551-3 |
| E27 | PIVOT | 241-14086 |
| E28 | PINCH ROLLER LEVER AND SHAFT ASSY | 241-14088 |
| E29 | PINCH ROLLER PIVOT | 242-14090 |
| E30 | BRAKE YOKE ASSEMBLY | 241-14093 |
| E31 | BRAKE LEVER SPRING | 242-14095 |
| E32 | PINCH ROLLER SPRING | 241-14099 |
| E33 | BELL CRANK SPRING | 241-14187 |
| E34 | PRESSURE PAD LEVER ASSY ON UNITS | 241-14116 |
| E34 | PRESSURE PAD LEVER ASSY ON UNITS | 242-14200 |
| E35 | ABOVE SERIAL 5550 | 242-15134 |
| E36 | SUPPORT BRACKET-ASSEMBLY | 242-14123 |
| E37 | REWIND PULLEY ASSEMBLY | 242-14103 |
| E38 | REWIND PULLEY SHAFT | 241-14107-1 |
| E39 | FAST FORWARD ARM AND PULLEY ASSY | 242-14108 |
| E40 | PULLEY PLATE PIVOT | 242-14111 |
| E41 | FAST FORWARD PULLEY SPRING | 241-14115 |
| E42 | FAST FORWARD TRIP ASSEMBLY | 242-14117 |
| E43 | FAST FORWARD BRAKE SPRING | 241-14119 |
| E44 | FLYWHEEL ASSEMBLY | 242-14124 |
| E45 | FAST FORWARD BELT | 241-14123-2 |
| E46 | TRIP MECHANISM SPRING | 241-14130 |
| E47 | FAST FORWARD MECHANISM SPRING | 241-14131 |
| E48 | MOTOR (SQUARE FRAME) | 241-14133 |
| E49 | MOTOR FAN | 241-15306 |
| E50 | MOTOR PULLEY | 241-14134 |
| E51 | MOTOR MOUNTING BRACKET AND SPRING ASSY (SQUARE FRAME) | * 241-14135-2 242-14136 |

| SYMBOL | PART NAME | PART NO. |
|--------|---------------------------------------------------------|-------------|
| E51 | MOTOR MOUNTING BRACKET AND SPRING ASSY (ROUND FRAME) | 242-14136-1 |
| E52 | MOTOR ROCK SPRING | 241-14139 |
| E53 | MOTOR SUSPENSION BRACKET, R. H. | 241-14140 |
| E54 | MOTOR SUSPENSION BRACKET, L. H. | 241-14141 |
| E55 | MOTOR RETURN SPRING | 241-14220 |
| E56 | MOTOR SHOCK MOUNT | 241-13665-1 |
| E57 | PRESSURE PAD WAVE WASHER | 241-12059 |
| E58 | PRESSURE PAD RETAINING RING | 29651-1 |
| E59 | SUPPLY SHAFT AND DISC ASSEMBLY | 242-14142 |
| E60 | TAKE UP SHAFT AND DISC ASSEMBLY | 242-14145 |
| E61 | TAKE UP PULLEY AND DISC ASSEMBLY | 242-14146 |
| E62 | TAKE UP DRIVE BELT | 241-14129-3 |
| E63 | SUPPLY PULLEY | 241-14152 |
| E64 | CONTROL CAM AND SHAFT ASSEMBLY | 242-14153 |
| E65 | CONTROL CAM WASHER | 29602-133 |
| E66 | CONTROL CAM RETAINING RING | 29650-2 |
| E67 | CONTROL CAM INDEX SPRING | 241-14154 |
| E68 | PINCH ROLLER ASSEMBLY | 242-14155 |
| E69 | RECORD HEAD AND CAN ASSEMBLY | 242-14159 |
| E70 | TAPE GUIDE ASSEMBLY | 242-14181 |
| E71 | TAPE GUIDE TOP | 241-14205 |
| E72 | INDEX BALL (CONTROL CAM & LOCK ARM) | 241-13609 |
| E73 | LIFT LEVER ADJUSTING LOCK NUT | 241-12035 |
| E74 | FAST FORWARD PULLEY ASSEMBLY | 242-14785 |
| E75 | TUBE SOCKET, 8 PRONG OCTAL | 54530 |
| E76 | TUBE SOCKET ASSY (12AT7 & 12AX7) | 242-14541 |
| E77 | TUBE SOCKET - 6AV6 - 7 PIN MINATURE MINATURE | 241-12175 |
| E78 | TUBE SOCKET AND PLATE ASSY (5879) | 241-13119 |
| E78 | TUBE SOCKET AND PLATE ASSY (5879) | 242-14830 |
| E79 | TUBE SOCKET (5879) | 242-14746 |
| E79 | TUBE SOCKET (5879) | 241-14846 |
| E80 | TUBE SOCKET (GAU6) | 241-14226 |
| E80 | TUBE SHIELD (5879) | 241-14845 |
| E81 | TUBE SHIELD (GAU6) | 241-14227 |
| E81 | FUSE HOLDER | 241-14245 |
| E82 | AC LINE CORD AND PLUG ASSEMBLY | 241-14240 |
| E83 | INPUT CORD AND PLUG ASSEMBLY | 241-12001-1 |
| E84 | BRACKET & MOTOR ASSY (SQUARE FRAME) | * 242-14132 |
| E84 | BRACKET & MOTOR ASSY (ROUND FRAME) | 242-15304 |
| E85 | CHASSIS BOTTOM COVER | 242-14242 |
| E86 | REWIND DRIVE BELT | 241-14129-1 |
| E87 | RECORD LEVEL INDICATOR | 241-14225 |
| E89 | PRESSURE PAD SPRING ON SERIAL 5550 AND HIGHER | 241-14219 |
| E90 | LIFT LEVER SPRING | 241-15210 |

* PARTS SHOWN FOR MODEL 109. OTHER MODELS AS FOLLOWS
 FLYWHEEL (MODEL 110) 242-14124-2
 FLYWHEEL (MODEL 111) 242-14124-1
 FLYWHEEL (MODEL 112) 242-14124-3
 MOTOR PULLEY (MODEL 110) 241-14135-3
 MOTOR PULLEY (MODEL 111) 241-14772-1
 MOTOR PULLEY (MODEL 112) 241-15032-1
 BRACKET AND MOTOR ASSY (MODEL 110) SQUARE 242-14132-2
 BRACKET AND MOTOR ASSY (MODEL 110) ROUND 242-15304-1
 BRACKET AND MOTOR ASSY (MODEL 111) SQUARE 242-14132-1
 BRACKET AND MOTOR ASSY (MODEL 111) ROUND 242-15304-2
 BRACKET AND MOTOR ASSY (MODEL 112) SQUARE 242-14132-3
 BRACKET AND MOTOR ASSY (MODEL 112) ROUND 242-15304-3



1B SERIES MECHANICAL ASSEMBLY OPERATION

Precautionary Service: Unnecessary service to correct supposedly defective recording equipment frequently is due to operational errors on the part of the recordist. Here are a few typical examples from factory service files:

- 1—Improper feed-in of the disc pick-up arm; incorrect operation of the mercury switch; erratic operation of the tape reel clutch plates.—All may result from failure to level the 1B10 TAPE RECORDIO.
- 2—Failure to record or play tape, operation normal in other positions.—(a) Wind all slack tape on the take-up reel before attempting to record or play; (b) Tape threaded on the wrong side of the mercury switch actuating lever. Occurs when tape is threaded with the turntable removed. Tape must pass around the lever on the side nearest the control knob.

The ability to recognize such errors promptly is an important asset in servicing this equipment. Paragraphs following are intended to familiarize service personnel with the mechanical functions of the tape assembly and thereby facilitate quick and accurate trouble-shooting.

Mercury Switch: The mercury switch, with its mounting assembly, acts as an off-on switch and is held open when the control knob is in the off position. If recording tape has not been threaded around the capstan drive and the mercury switch lever, the turntable will operate in only the Phono, Reverse, and Forward positions of the control knob; and the tape reels will operate only in the Reverse and Forward positions. In Off position, a cam section of the function shift lever contacts the stud portion of the mercury switch assembly—the rod that protrudes through the base plate. This cam tilts the mercury switch assembly so that the switch circuit is opened. In Phono, Reverse, or Forward positions the function shift lever, through the switch actuator lever, contacts the stud portion of the mercury switch assembly and holds the switch in a closed position. Thus, voltage is applied to the motor.

Automatic Shut-Off: Note that in Record and Playback positions the function mechanism does *not* hold the mercury switch closed. The switch is closed by the tension of the tape against the switch lever as it passes from the capstan to the take-up reel. This arrangement permits automatic shut-off in Record and Playback. When all of the tape has been wound on the take-up reel, the tension against the mercury switch lever is released and the switch tilts to open the motor circuit.

Pressure Pad and Pinch Roller: When the control knob is in either Record or Playback Position, the function shift lever contacts the pressure pad and pinch roller assembly actuating spring. This brings the pinch roller in firm contact with the tape and the driving capstan. The pressure pad at the same time contacts the recording tape and holds it firmly against the recording head.

The driving capstan is located on the turntable center spindle. The large 10" turntable acts as a flywheel to minimize any flutter or wow effect that might result from fluctuation in tape velocity. The recording head is a very short distance from the driving capstan, thus lessening the possibility of the tape whipping as it passes across the recording head and causing flutter in the recording. The net result of this driving arrangement is excellent frequency response with a minimum of distortion.

MODEL 1B-10

Reel Clutch Assemblies: With the control knob in the Reverse or Forward position, the function shift lever actuates the pressure pad and pinch roller assembly spring, and this assembly is pulled from contact with the tape by the coil tension spring. In Reverse position, the function shift lever depresses one end of the front lift lever, which in turn lifts the front (take-up) reel assembly off the clutch. Now there is no restraining force applied to the front reel, and the back (supply) reel rewinds the tape rapidly.

The opposite condition is true when the control knob is placed in the forward position. Here the function shift lever depresses the rear lift lever to disengage the rear reel from the clutch assembly. The front reel then is free to wind the tape in a forward direction.

Erase Head: In the Record position the erase head contacts the tape, and erases the lower track only, just before it passes over the recording head. Thus, tapes may be re-recorded as often as desired.

The Bias Switch is opened, in Record position, by an actuating sleeve in the shifting mechanism. In all positions, other than Record, the bias switch is connected directly across the recording head through the amplifier function switch. This short-circuit condition is opened by the function switch in playback position.

ADJUSTMENTS

Model 1B10 TAPE RECORDIO is completely adjusted for satisfactory operation when shipped from the factory. In the event that adjustments may become necessary, the following procedure should be followed.

Adjustment of Lift Lever, Control of Reel Pan: In the Forward speed position, the rear reel pan must be raised to a position that clears the clutch plate. At the same time the front pan must be lowered to contact the clutch plate, and the lift lever must clear the lower end of the reel pan shaft by approximately 1/32" to 1/16". Adjustment of the lift lever is made by bending the short unflanged section of the lever immediately under the reel pan shaft.

To adjust in the Reverse speed position, the opposite of the above conditions are true.

In the Record and Playback positions the lift levers must clear both reel pan shafts so that both pans contact the clutch plates.

Tracking of the tape through the recording head is controlled by tipping the tape capstan slightly with the two adjusting screws located under the mounting flange of the auxiliary shaft housing, and under the base plate. The capstan should be adjusted so that the tape tracks in the center, or toward the top of the guide slot in the recording head—never towards the bottom of the guide slot.

Pressure Pad Adjustment: Remove the pinch roller cover plate to reach the lock nut on the pressure pad adjusting screw. Set the function knob in the Record position. Turn the adjusting screw in against the pressure pad spring until the pad just contacts the recording head. Then turn the screw one-half to three-quarters of a turn clockwise and tighten the lock nut.

LUBRICATION

Reel Pan Shaft, Reel Sheave, Reel Sheave Bearing, and Reel Pan Clutch Springs.

(a) Remove Truarc "E" ring on lower end of reel pan shaft; lift reel pan and clutch plates off machine to expose parts to be lubricated. (In removing "E" ring, be careful that no burr is turned up on the shaft at the edge of the ring slot.)

(b) Use SAE 10 oil on reel pan shaft and on the inside only of the reel sheave bearing.

(c) Use SAE 10 oil between reel sheave bearing and the hub of the reel sheave. It is not necessary to remove the sheave since there is a countersink well at the top of the reel sheave hub into which the oil may be placed and allowed to run down through the bearing.

NOTE: DO NOT OVER-LUBRICATE IN PARAGRAPHS B & C. Excessive oil will throw out onto the base plate or belt. Recommended amount is 2 or 3 drops on the reel pan shaft, and 5 or 6 drops on the sheave. The bearing is porous bronze and will hold a reasonable amount of oil to afford continuous lubrication.

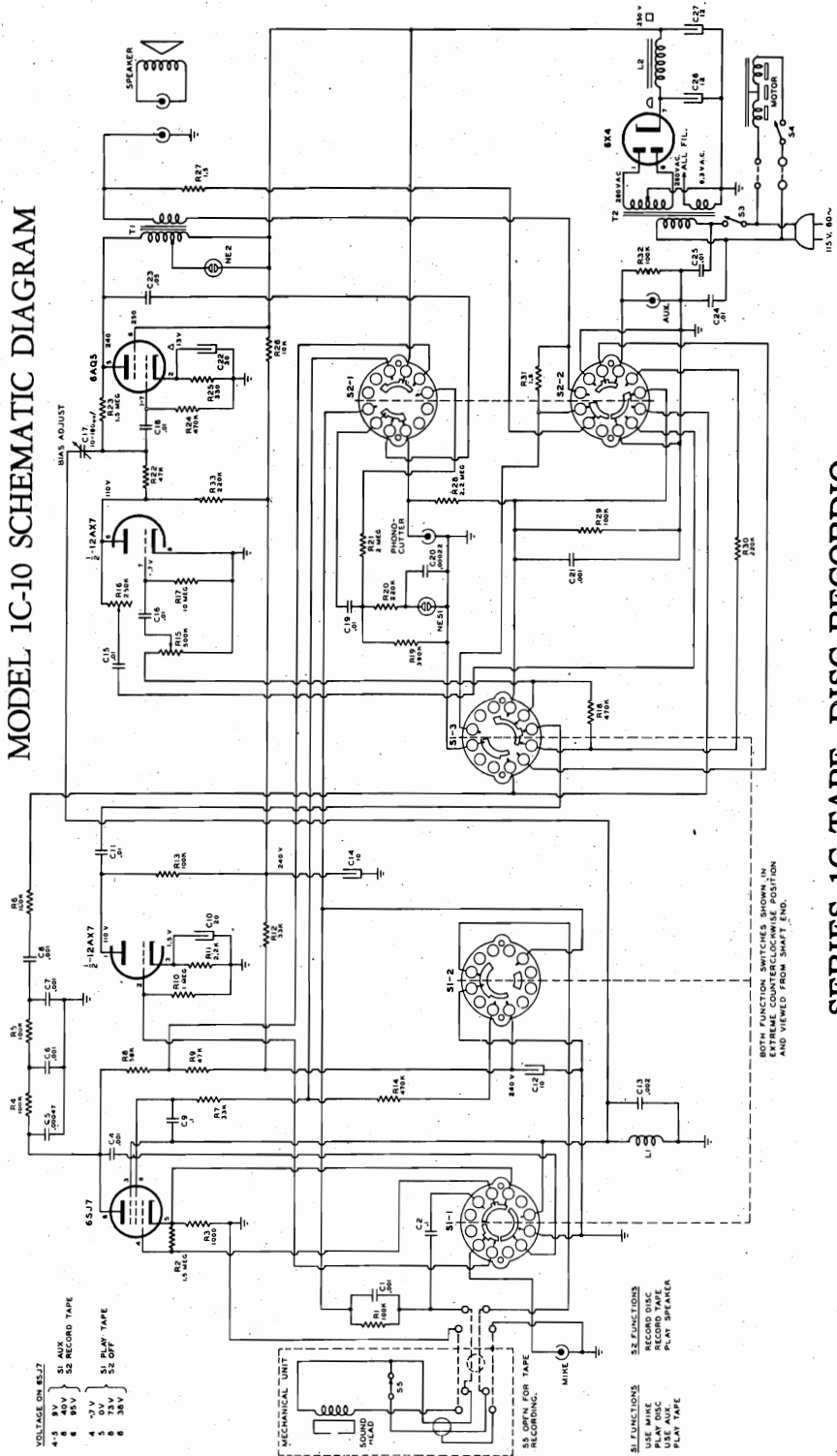
(d) The felt pads on the clutch plates are saturated with SAE 10 oil. Here, again, do not over-lubricate. Do not add oil unless it is absolutely necessary, and then sparingly. The shearing of the oil in the pads is partially responsible for the drive of the clutches. Therefore, do not over-saturate the felt. There is sufficient oil in the felt when medium finger pressure causes a small bead of oil to appear along the edge of the felt. When the finger pressure is released, all oil should be reabsorbed by the felt.

Turntable Drive Wheel Shaft and Bearing: Set the tape assembly on edge and raise the rubber tire drive wheel in the bearing as far as it will go. There will be sufficient room to apply 2 or 3 drops of SAE 10 oil to the shaft on top of the bearing. Bearing is porous bronze and will hold sufficient oil to afford continuous lubrication. **CAUTION:** No oil can be tolerated on the rubber tire drive wheel.

The Motor Bearings are fed by an oil wick and should not require new lubrication. If they are lubricated, a few drops of SAE 10 oil may be placed on the rotor shaft so as to run down into the bearing assembly.

Pinch Roller: Remove cover plate and apply not more than one (1) drop of #10 oil to the stud holding the pinch roller. Extreme care should be exercised to prevent any oil reaching the rubber section of the pinch roller.

MODEL 1C-10 SCHEMATIC DIAGRAM



SERIES 1C TAPE - DISC RECORDIO

OPERATION

Failure to level the instrument may result in improper feed-in of the pickup arm (85), incorrect operation of mercury switch (76), erratic operation of tape reel clutch plates (96) (97), and an unbalanced condition of disc recording arm (85) when in disc record position.

The mercury switch (76) and its mounting assembly (51) acts as an off-on switch, and is held in an off position when the control knob (82) is in the off position. Without recording tape being threaded around the drive capstan, the turntable (99) will operate in only the "Phono", "Reverse", and "Forward" positions of control knob (82) and the tape reels will operate only in the "Reverse" and "Forward" positions of control knob (82). When in "off" position, a cam section of function shift lever (80) contacts the stud portion of mercury switch assembly (51), which protrudes through base plate (32). This cam section tilts the mercury switch assembly (51), to which is attached mercury switch (76) to such an extent that the circuit of the mercury switch (76) is opened and held in this position until control knob (82) is again moved. When moving the control knob (82) to "Phono", "Reverse", or "Forward" positions, the function shift lever (80), which is attached to control knob (82) lets the switch actuator lever (71) contact the stud position of the mercury switch assembly (51) which in turn holds the mercury switch (76) in a closed position and voltage is applied to the motor.

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MODEL 1C-10

A reel (3" or 5" diameter) of either plastic or paper base recording tape is placed on the rear reel pan (45) and over reel sleeve bushing (41) with one slot of the reel engaging key (42). A second but empty reel, is placed on the front reel pan (45) and locked in position with key (42). The rear reel is to be turned so the tape will be taken from the rear side.

With the control knob (82) in "off" position, unwind approximately three feet of tape. If plastic tape is used, the dull side should be on the inside; if paper, the oxide (black or red) side on the inside. The tape is placed around the turntable and the end is fastened to the front reel. The slack in the tape is taken up by turning the front reel. When tape is tightened, it will slide under the turntable and contact the rubber capstan. The recorder is now ready for operation, and with proper amplifier control selection, the tape can be recorded or played back. To record tape the control knob (82) is moved forward slightly, and then to the right until it is aligned with the record position. The control knob (82) is then pushed forward and at the same time, the record lock button (86) is pulled toward the operator to permit full engagement of control knob (82) in the record position.

When in record position, erase head (52) contacts the recording tape and erases the lower track only at the instant just prior to passing over the recording head.

Bias switch (60) is opened by sleeve (12) when in record position. In all positions other than record, the bias switch (60) is connected directly across the recording head (66) through the amplifier's function switch.

When in either the record or playback position the tape always travels from the rear reel to the front reel. Only the lower track of the tape is recorded or played back. Upon the completion of the transfer of tape from the rear reel to the front reel, to continue recording or playback it is necessary to remove the front reel, inverting it and placing it on the rear platform and at the same time putting the empty reel from the rear platform onto the front platform. The tape is again threaded in accordance with procedure outlined above. In this manner, one hour full recording time or playback time is available from a 5" reel of tape. Recording speed or playback speed is $3\frac{3}{4}$ " per second.

When control knob (82) is in either record or playback position, the function shift lever (80) contacts the pressure pad and pinch roller assembly actuating spring (101). This brings the pinch roller (103) in firm contact with the tape and the driving capstan. The pressure pad (102) which is also a part of this assembly, is brought into contact with the recording tape and holds it firmly against the recording head (66). This assures firm contact between the driving capstan and the tape, as well as holding the recording tape firmly against the recording gap which is a part of the recording head (66). The driving capstan is in turn driven by the large 10" turntable which acts as a flywheel, thus minimizing any flutter or wow effect as a result of changing velocity of the tape. The recording head is only a very short distance from the driving capstan, thus minimizing the possibility of whipping of the tape as it travels across the recording head which would result in flutter.

With control knob (82) in reverse or forward position, the function shift lever (80) actuates spring (101), and the pinch roller and pressure pad assembly is pulled out of contact with the recording tape by spring (98). In reverse position, the function shift lever (80) depresses one end of lift lever (56) which in turn lifts the front reel assembly off the clutch. When this happens, there is no restraining force applied to the front reel; consequently the back reel rewinds tape very rapidly. The opposite condition is true when the control knob (82) is placed in the forward position. Here the function shift lever (80) depresses the rear lift lever (56) which disengages the rear reel from the clutch assembly. The front reel will then rapidly wind tape in a forward direction. The fast forward or fast reverse speed is approximately 20 to 1 over the $3\frac{3}{4}$ " per second normal recording or playback tape speed.

To play standard 78 RPM phonograph records, it is only necessary to position the control knob (82) in the phono position. With the control knob (82) in the phono position, the function shift lever (80) depresses both the front and rear lift levers (56) thus disengaging both the front and rear reel clutches. This eliminates the driving of the tape, and the only function the unit performs is to actually turn the turntable. In playing phonograph records, the rear portion of the pickup arm (85) is depressed, and a standard playback needle is inserted in the pickup cartridge (65), and it is held in position with the thumb screw.

It is possible to cut disc recordings from recorded information on the tape or any external source which might be fed into the amplifier. To cut home recordings, it is necessary to remove the playback needle from pickup cartridge (65) and insert a standard $\frac{5}{8}$ " recording stylus. The recording blank is placed on the turntable, being sure that the off-center hole of the recording blank is inserted over the drag pin (30), thus assuring the disc to revolve constantly with the turntable. The pickup arm (85) is lifted off the tone arm rest (83) and the point of the cutting stylus is placed on the outer edge of the recording blank at the approximate location at which the recording is to start. These operations are performed with the control knob (82) in the off position. The rear of the pickup arm is lifted by the finger extending to the right side. At a certain point, there will be a definite feeling of the pickup arm locking into position; and at this location, the follower arm (61) engages the lead screw (23). It is now only necessary to move the control knob into the phono position if the recording is being done from some source other than the tape. Place knob into the playback position if it is desired that information on the tape be recorded on a recording blank. With the proper setting of the amplifier controls the information will be recorded on the disc, and it is desirable that occasionally the thread from the cutting operation of the cutting stylus be wiped toward the center of the turntable so as to wrap around the turntable spindle. Upon completion of the disc recording, it is only necessary to apply a slight downward pressure to the lift finger of the pickup arm, and it will be disengaged from the holding lock, thus permitting it to be lowered to its normal position and will then be ready for phono playback by exchanging needles.

The 1C series tape-disc Recordio incorporates features for automatic shutoff upon the completion of the recording or playback of a reel of tape. This is accomplished by the tension of the tape holding the mercury switch assembly (51) in a position so that the mercury switch (76) is closed, thus permitting power to be supplied to the motor. When in the record or playback position and the tape tension is released as a result of all the tape being wound on the forward reel, the switch assembly which includes the mercury switch is permitted to tip in a manner opening the motor circuit, thus automatically stopping the unit.

Frequently, it is desirable to record a full half-hour program of uninterrupted music and this can be accomplished by recording music from records to tape. So as to eliminate any interruptions between records, it is possible to, at the conclusion of one record, stop the forward reel by hand, thus releasing the tape tension and permitting the mercury switch assembly (51) to open the motor circuit. At this time, the records can be interchanged on the turntable, the pickup arm again placed on the second record, and the tape tension tightened by a slight clockwise rotation of the forward reel. This will again position the mercury switch assembly so as to close the motor circuit, thus starting the recording process. This procedure can be continued until the entire reel of tape is recorded; and when it is played back, there will be no apparent interruptions from one record to the next.

GENERAL ADJUSTMENTS

It is seldom necessary to make any adjustment on the 1C series tape-disc Recordio in the field, as it is shipped from the factory completely adjusted for satisfactory operation. In the event that adjustments may become necessary, it is recommended that the following procedure be followed.

Adjustment of lift lever (56), Control of reel pan (45). Adjustment is easily made in the forward and reverse positions. In the forward speed position, the rear reel pan (45) must be raised to the position that it clears the clutch spring (97). At the same time the front pan (45) must be lowered to contact the clutch spring (96) and the lift lever must clear the lower end of the reel pan shaft (43) by approximately 1/32" to 1/16". The adjustment of the lift lever (56) is made by bending the short unflanged section of the lever immediately under the reel pan shaft (43). To adjust in the reverse speed position, the opposite of the above condition is true. In the record and play-back positions the lift lever (56) must clear both reel pan shafts (43) so that both the pans will contact the clutch springs (96-97).

Tracking of the tape through the recording head (66) is controlled by tipping the tape capstan (53) slightly with the two adjusting screws (27) located under the mounting flange of the auxiliary shaft housing (55) under the base plate (32) of the machine. The capstan (53) should be so adjusted that the tape tracks in the center or toward the top of the guide slot in the recording head (66) - never toward the bottom of the guide slot.

To adjust the pressure pad (102) against the tape recording head (66), it is necessary to remove the pinch roller cover plate (104) to reach the lock nut (107) on the pressure pad adjusting screw (106). To adjust the pad (102) for proper pressure against the tape recording head (66), set the speed shift lever (82) in the record position. Turn the adjusting screw (106) in against the pressure pad spring (102) until the pressure pad just contacts the recording head (66). Then turn the screw one-half to three-quarters of a turn clockwise and tighten the lock nut (107).

Engagement of follower arm (61) to lead screw (23) during disc recording operation. When lifting the rear section of pickup cutter arm assembly (85), the follower arm (61) should engage the lead screw (23) before the rear of the pickup arm locks in the up position. This engagement should be at a point of between 1/8 and 1/4 inch before the rear of the pickup arm locks. If it is necessary to adjust this point of engagement, it can be accomplished by slightly bending follower arm (61). If the follower arm engages the lead screw too tightly, an excessive load will be put on the lead screw, thus injecting wow in the recording. If the engagement is not sufficiently heavy, there is a possibility of grouping which is the result of the follower arm lifting up on the threads of the lead screw (23) rather than moving along in a smooth and continuous pattern.

GENERAL LUBRICATION

To lubricate reel pan shaft (43), reel sheave (36), reel sheave bearing (33), and reel pan clutch springs (97-96).

- a. Remove TRUARC "E" ring (75) on lower end of reel pan shaft (43) and lift reel pan (45) and clutch springs (96-97) off machine to expose parts to be lubricated. In removing "E" ring (75), care must be exercised to see that no burr is turned up on the shaft (43) at the edge of the ring slot.
- b. Use SAE10 oil on reel pan shaft (43) and the inside only of the reel sheave bearing (33).
- c. Use SAE20 oil between reel sheave bearing (33) and the hub of the reel sheave (36). It is not necessary to remove the sheave from the machine since there is a countersink well at the top of the reel sheave hub into which the oil may be placed and allowed to run down through the bearing. Do not over-lubricate in paragraphs B and C, as excessive oil may throw out onto the base plate or belt of the machine. On the reel pan shaft, two or three drops, and on the sheave, five or six drops is sufficient. The bearing is porous bronze and will hold a reasonable amount of oil to afford continuous lubrication.
- d. The felt pads on the clutch springs (96-97) are saturated with SAE60 oil. The shearing of the oil in the pads is partially responsible for the drive of the clutches; therefore, do not over-saturate the felt. There is sufficient oil in the felt when medium finger pressure on the felt causes a small bead of oil to appear along the edge of the felt. With a release of the pressure, all the oil should be reabsorbed by the felt.

Turntable drive wheel shaft (47) and bearing (48). It should not be necessary to disassemble the drive in order to lubricate. If the machine is set on edge and the rubber tire drive wheel raised in the bearing as far as it will go, there is sufficient room to apply two or three drops of SAE10 oil to the shaft on top of the bearing. This bearing is of porous bronze and will hold a reasonable amount of oil to afford continuous lubrication. No oil can be permitted on the rubber tire drive wheel.

The motor (29) bearings are fed with an oil wick and should not require new lubrication. If they are to be lubricated, use only SAE10 oil and it can be accomplished by placing a few drops of oil on the rotor shaft so as to run down into the bearing assembly.

The auxiliary shaft housing assembly (55) is packed with Torrington Houghton twister ring grease and SAE20 oil at the factory and should not need lubrication.

Pivot post (63) and bushing (74) may be lubricated by raising the tone arm to its highest position and putting two or three drops of SAE20 oil on the post. It is well then to move the post up and down several times so as to secure equal distribution of the oil over the entire bearing surface.

Pinch roller (103). Remove cover plate (104) and use not more than one drop of No. 10 oil to the stud holding the pinch roller (103). Extreme care should be exercised to assure no oil reaching the rubber section of the pinch roller.

MODEL IC-10

Figure 1 — Top View

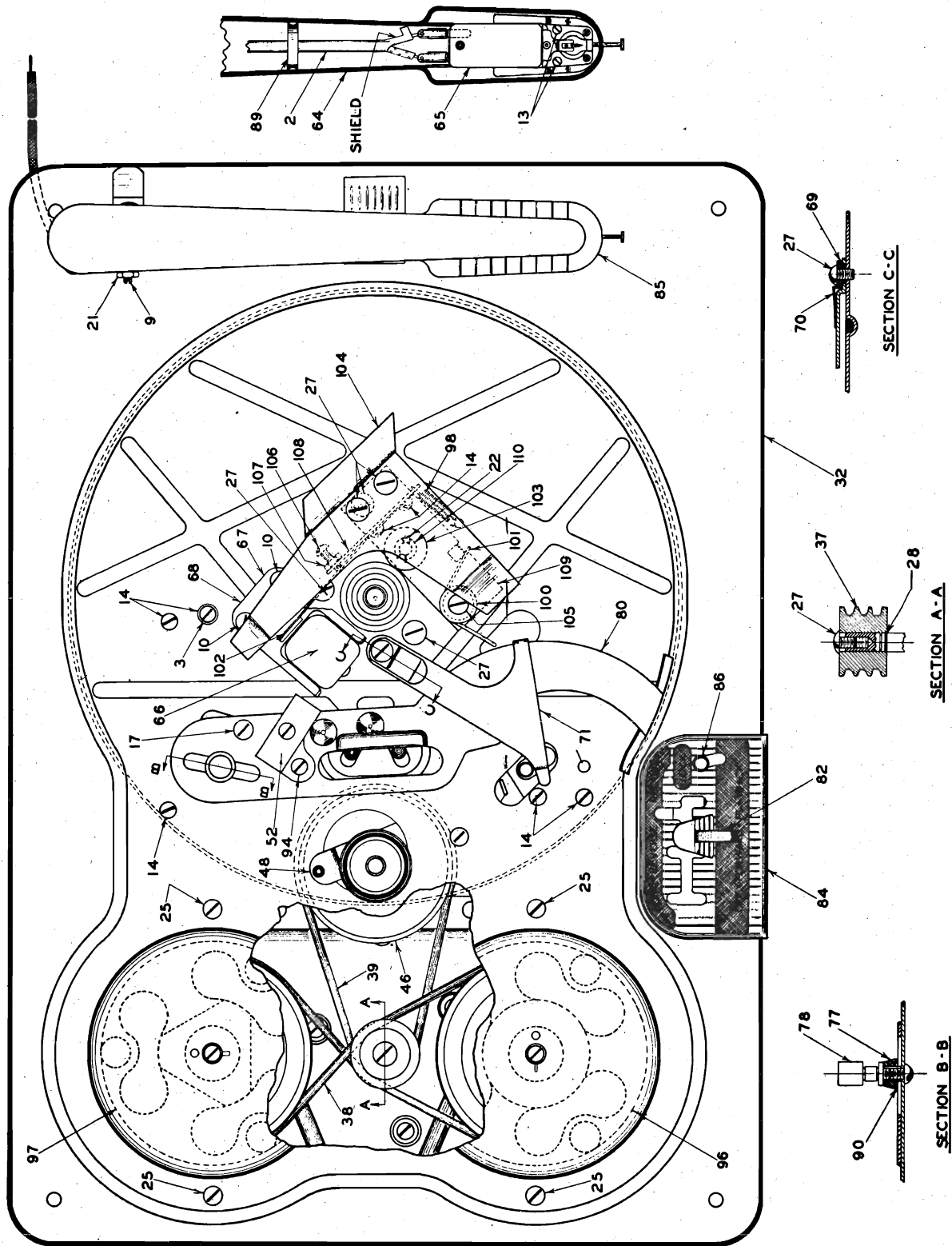


Figure 2 — Bottom View

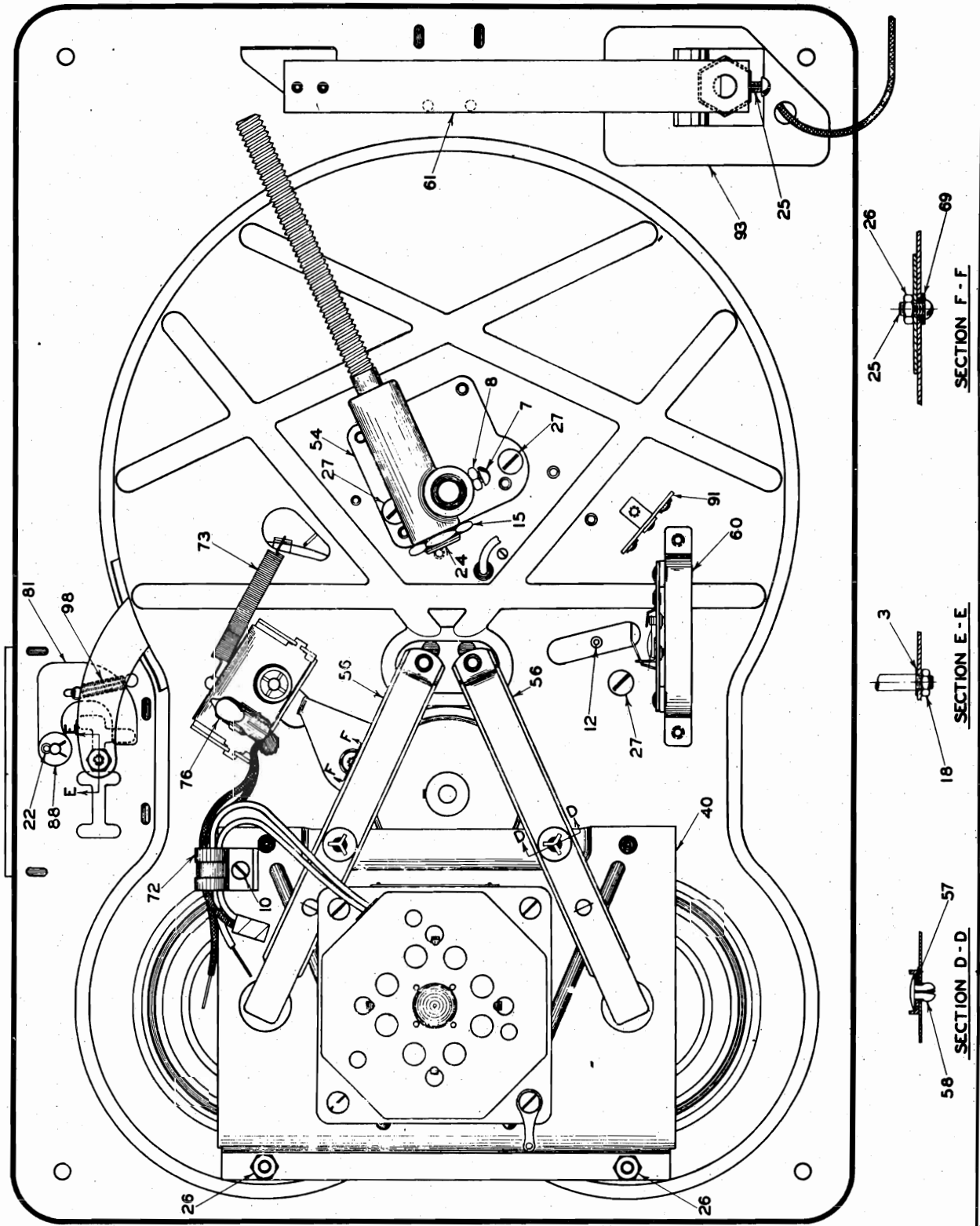


Figure 3 — Front View

