PERPETUAL

TROUBLE SHOOTER'S MANUAL


VOLUME XI

by

JOHN F. RIDER

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MODEL 3980

Schematics, Socket
Trimmers, Voltage

AIR KING PRODUCTS CORP.
MODELS 4, 23X, 9722,
9822, 9822A, 9823, 9922

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MODEL 4012
MODEL 4200
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AIR KING PRODUCTS CORP.

Voltages: 6 volts "A"—90 volts "B"

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ALIGNMENT

   Dial at 1400 KC Adjust B.C.
   Osc. trimmer to max. Similarly B.C. Pad at 600 KC. Recheck at 1400 KC.
3. Switch in INT. use .0002 mfd cond with 400 ohm series resistor as dummy. Dial and oscillator at 5100 KC. Adjust ant. and osc. trimmers to maximum. Adjust pad at 1800 KC. Recheck at 5100 KC.
4. S.W. Switch in S.W. position. Use 400 ohm resistor as dummy, Oscillator and dial at 15.100 KC. Adjust S.W. ant. and osc. trimmers to maximum.

Sensitivity check at 8000 KC. If receiver lacks sensitivity check .0035 cond for short.
I.F. ALIGNMENT

With the wave switch in the broadcast band and the gang condenser set at minimum, adjust the test oscillator to 456 KC and connect the output to the grid of the first detector tube (6DG3) through a .08 or .1 mfd. condenser. The ground on the test oscillator can be connected to the chassis ground. Align all four I.F. trimmers to peak or maximum reading on the output meter.

BROADCAST BAND ALIGNMENT

Connect the output of the signal generator to the antenna lead (blue) through a .0002 mfd. mica condenser. Set the gang condenser to minimum and the oscillator to 1730 KC and adjust the "oscillator trimmer" to receive this signal. Make no other adjustments at this frequency. Then set the generator to the 1400 KC and tune in this signal by rotating the gang to 1400 on the dial. Adjust the "antenna" trimmer to maximum signal. Set the signal generator to 600 KC and tune in the signal on the receiver.

Note: Approximately the same sensitivity should be noted at this point as was at 1400 KC. The signal strength may sometimes be improved by padding the circuits. This is done by slowly increasing or decreasing the oscillator padding condenser and, at the same time, continuously tuning back and forth across the signal with the receiver until the maximum reading is obtained on the output meter. This adjustment may seem a little complicated but is the easiest way to adjust the oscillator to the antenna. Return to 1400 KC and again go over the adjustments of this frequency to be certain that they were not put slightly out of alignment when alignment was made at 600 KC.

POLICE BAND ALIGNMENT

The police band is adjusted by replacing the .0002 dummy with a 400 ohm resistor and setting the generator to 5600 KC. With the gang set at minimum, adjust the "police oscillator trimmer" to receive this signal, then set the signal generator to 4000 KC and adjust "police antenna trimmer" to give maximum output. Next, set the oscillator to 1800 KC and "pad" the circuit at this frequency as described in the instructions for padding the broadcast circuits.

SHORT WAVE BAND ALIGNMENT

The short wave band is adjusted by setting the generator to 18,100 KC and with the gang at minimum, adjust the "short wave oscillator trimmer" to receive the signal. Set the generator at 18,000 KC and adjust the "short wave antenna" to give maximum output. As there is no variable low frequency padding condenser on this band, the sensitivity of the receiver should be checked at 6000 KC to determine whether the circuits are in line at this frequency. Should the receiver lack sensitivity at 6000 KC, the antenna and oscillator coils, as well as the .004 mica padding condenser, should be tested for defects as sometimes these components become subject to mechanical or electrical injuries, despite their rugged construction and liberal ratings.

SERVICE DATA FOR ALL BANDS

If it is suspected that the oscillator has stopped but is doubtful due to the presence of the usual amount of noise, it is advised that the oscillator plate voltage be checked. To ascertain whether the tube is oscillating, ground the oscillator grid of the 6DG3 (shorting the resistor and rotor plates of oscillator section as gang condenser). If oscillating properly, grounding the grid will cause an appreciable drop in oscillator voltage.
CONVENTIONAL ALIGNMENT SEE SPECIAL SECTION VOL. VIII.
THIS RADIO IS DESIGNED SO THAT IT MAY BE PLACED IN A HORIZONTAL OR UPRIGHT POSITION. AS THE OPERATION AND PERFORMANCE OF THE RECEIVER IS THE SAME IN EITHER POSITION, IT IS A MATTER OF PERSONAL PREFERENCE AS TO WHICH POSITION TO USE.

The approximate position on the dial that any nine stations will be tuned in may be quickly determined by pressing a paper tab having the station call letters into the round depressions on the front of the cabinet.

THE STATIONS SELECTED MUST OPERATE ON A FREQUENCY 40 Kilocycles or MORE APART. OTHERWISE IT WILL BE IMPOSSIBLE TO PLACE THE CALL LETTER TABS IN THEIR PROPER POSITION IN CABINET DEPRESSIONS.

While it will be found that only the approximate location will be indicated, the station call tabs properly located will be an extremely helpful tuning aid.

To set the proper station call letter tabs into the cabinet depressions proceed as follows:

(a) Determine which nine stations call letters you wish to have on the cabinet—press paper call letter tabs out of the call letter sheet provided.

(c) Carefully tune in the selected station that broadcasts on the lowest frequency—the least number of kilocycles.

(b) Carefully tune in the selected station that broadcasts on the lowest frequency—least number of kilocycles.

(c) Place a little mucilage or cellulose on back of paper tab. Press the paper call letter tab so that the printed call letters of the station tuned in are at the same angle as the printing on the dial—into the round depression on the cabinet front that is nearest to the dial pointer. By placing call letter tab on angle the call letter can easily be read with cabinet in either a horizontal or upright position.

(d) Tune in the next selected station having the lowest kilocycle frequency, pressing the call letter for this station into the round cabinet depression nearest to the dial pointer needle—continuing on in this way until station call letters have been placed into all nine cabinet depressions.

After the station call letters are set it will be a simple matter to determine the approximate dial position of any of these stations—just rotate a tuning knob until the dial pointer needle points to station call letter of desired station. It must be remembered that only the approximate tuning location will be indicated by the dial pointer needle; each station must be correctly tuned in by rotating the tuning control knob until a station is tuned in with greatest clarity.

ALIGNMENT PROCEDURE:

NOTE: BE SURE TO FOLLOW PROCEDURE CAREFULLY WHEN ALIGNING. OTHERWISE THE RECEIVER WILL BE INSENSITIVE AND THE DIAL CALIBRATION WILL BE INCORRECT. THE TRIMMERS AND PADDED CONDENSERS WILL BE REFERRED TO BY THEIR FUNCTION AS INDICATED ON THE PARTS DIAGRAM.

IT IS ABSOLUTELY NECESSARY THAT AN ACCURATELY CALIBRATED TEST OSCILLATOR WITH SOME TYPE OF OUTPUT MEASURING DEVICE BE USED WHEN ALIGNING THE RECEIVER.

ALIGNING IF STAGE AT 465 Kilocycles:

(a) Connect the ground lead of the test oscillator to the chassis or set ground lead. Connect the other lead of the test oscillator to the grid cap of the 6AG7 tube through a .00025 Mfd. series condenser. DO NOT REMOVE GRID CLIP.

(b) Set test oscillator to EXACTLY 465 kilocycles and turn receiver volume control on full.

(c) Peak each of the second IF transformer trimmers.

(d) Peak each of the first IF transformer trimmers.

To assure most accurate trimmer setting repeat above adjustment several times always using lowest possible test oscillator output consistent with readable output meter scale deflection.

ALIGNING 1720-540 Kilocycle Band:

(a) Remove test oscillator lead from grid of 6AG7 tube and attach it to the receiver antenna lead through a .00025 Mfd. series condenser.

(b) Check tuning dial adjustment by turning gang condenser until plate reads 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 the dial needle does not point exactly to the last line move needle to correct position.
ALIGNMENT PROCEDURE:

ALIGNMENT PROCEDURE AT 465 KILOCYCLES:

1. Connect the trimmer lead of the first stage to the chassis of the unit. Connect the other lead to the master trimmer for the 465 kc range. Move the trimmer to the center position of the master trimmer. Repeat for all 465 kc bands.

2. Place the selector switch on the 465 kc position. Check the trimmer a few intervals, and check the trimmer at the center position. Repeat for all 465 kc bands.

3. Adjust the trimmer for the best possible frequency. Repeat for all 465 kc bands.

ALIGNMENT PROCEDURE AT 1200 KILOCYCLES:

4. Connect the trimmer lead of the second stage to the chassis of the unit. Connect the other lead to the master trimmer for the 1200 kc range. Move the trimmer to the center position of the master trimmer. Repeat for all 1200 kc bands.

5. Place the selector switch on the 1200 kc position. Check the trimmer a few intervals, and check the trimmer at the center position. Repeat for all 1200 kc bands.

6. Adjust the trimmer for the best possible frequency. Repeat for all 1200 kc bands.

ALIGNMENT PROCEDURE AT 6300 KILOCYCLES:

7. Connect the trimmer lead of the third stage to the chassis of the unit. Connect the other lead to the master trimmer for the 6300 kc range. Move the trimmer to the center position of the master trimmer. Repeat for all 6300 kc bands.

8. Place the selector switch on the 6300 kc position. Check the trimmer a few intervals, and check the trimmer at the center position. Repeat for all 6300 kc bands.

9. Adjust the trimmer for the best possible frequency. Repeat for all 6300 kc bands.

Note: All trimmers should be adjusted to the center position of the master trimmer.
**SETTING UP SELECTOR MECHANISM**

1. Using the manual selector knob, tune in station No. 1, the station near the left hand end of the dial — the 170 K.C. end. Make certain that the station is properly tuned in.

2. From the back of the receiver loosen thumb screw No. 1 (See Figure 2) just enough to allow it to slide freely in the groove.

3. Now adjust the thumb screw until the contact is resting directly on the fibre dead spot.

4. Tighten thumb screw securely, making sure that when tightening you do not move the contact off the fibre dead spot.

5. Check the above operation by pressing button No. 1 and note if there is any pointer movement. If there is no pointer movement, the contact is properly set. If the pointer moves, the contact was not set directly on fibre dead spot. In this case, the station should be re-tuned manually, and procedure No. 3 should be repeated.

6. Using the same procedure, set up the remaining five stations, in each case using the station of the next highest frequency and the thumb screw having the same number as the corresponding button. Never skip buttons, always set up in numerical order from button 1 to 6 from left to right.

7. After all the stations have been set up, insert the proper station call tabs (found with the instructions) into the recesses of their respective buttons.

8. To receive any of the six stations set up as described above turn receiver “ON” by rotating the left hand knob to the right until the switch clicks. Allow the tubes to heat up, press the buttons designated by the call letter of the station desired and hold the button in until the pointer stops moving and the station comes in. Adjust tone and volume. IMPORTANT: Be sure the band switch is in the position for Standard Broadcast Reception.

**INSTRUCTIONS FOR INSTALLING AND OPERATING “AUTOMATIC PUSH BUTTON”**

Five stations operating in the 1720-3440 kilocycle broadcast band may be controlled by the two trimmer knobs accessible through holes in the back of the chassis.

**AS THE PUSH-BUTTONS ARE NOT PRE-SET AT THE FACTORY FOR ANY DEFINITE STATION BE SURE TO SET THEM CORRECTLY.**

(a) It is important to have the serial number of the set, which will be used with the set, attached to the radio when adjusting the trimmers.

(b) Be sure to operate the set at least one-half hour before adjusting trimmers. If set is not thoroughly warmed up when trimmers are adjusted, the trimmers may drift position after a short time, and it may be necessary to readjust them.

(c) For best results set push-buttons for local or strong, nearby stations only. Obtain the transmitter frequency—number of kilocycles—and call letters from the broadcast station that you wish to “Push-Button” tune in. Press and hold the button for operation on 1720-3440 kilocycles.

(d) Press in “MANUAL” tuning button—see diagram.

(e) With the trimmers set correctly, hold the button depressed and readjust trimmers to obtain exact frequency. When tuning the station equals the frequency it is tuned.

(f) Using “MANUAL” tuning button carefully tune in station selected whose frequency is between 456-888 kilocycles. Press in “AUTOMATIC” tuning button. NOTE: Station signal will disappear, or may be distorted, and in some instances another station may be heard.

(g) With a small screwdriver carefully tune in the selected 456-888 kilocycle station by slowly adjusting trimmer 1A—then adjust trimmer 1B for maximum volume. BE SURE TO WATCH TUNING EYE AND ADJUST TRIMMERS SO THAT THE TWO OPEN ENDS OF THE GREEN INTERMITTENT TUNING EYE ARE CLOSED FUZZY. AT THIS POINT THE SIGNAL WILL BE HEARD WITH GREATEST VOLUME OF ANY TONE.

(h) Maintain ganged bank of selected 456-888 K.C. stations paper tab and press into round depression in 460-485 K.C. push button.

(i) After trimmers 1A and 1B have been properly set for the selected station operating between 456-888 kilocycles, adjust other trimmers in the same manner and in the following order.

(j) Set trimmers 2A and 2B for selected station operating between 490-519 kilocycles.

(k) Set trimmers 3A and 3B for the selected station operating between 500-515 kilocycles.

(l) Set trimmers 4A and 4B for selected station operating between 520-540 kilocycles.

(m) Set trimmers 5A and 5B for selected station operating between 1600-1750 kilocycles.

**AS THE TRIMMERS SHOULD NEVER BE TOO LOOSELY OR TOO TIGHTLY ADJUSTED IT IS IMPORTANT THAT THE PROPER TRIMMERS BE USED.**

In some instances it may be necessary after the set is operated for a period of time to reset the trimmers as they may drift due to heat, humidity, etc.
ALIGNMENT

I.F.  Set oscillator at 465 KC.  Feed signal to grid of the 6A7 tube.  Adjust trimmers on the intermediate frequency transformers for peak readings.

B.C.  Turn switch to B.C. position.  Set oscillator and receiver dial to 1400 KC.  Use a .0002 mfd. condenser in the signal lead.  Set volume control at maximum.  Adjust B.C. OSC trimmer to maximum.  Reset dial and oscillator to 600 KC and adjust B.C. Pad.  Recheck at 1400 KC.

INT.  Turn switch to INT. position.  Use .0002 mfd. condenser with 400 ohm series resistor as dummy antenna.  Set dial and oscillator at 5100 KC, Adjust antenna and oscillator trimmers to maximum.  Reset dial and oscillator to 1800 KC and adjust padder.  Recheck alignment at 5100 KC.

S.W.  With switch in S.W. position, using a 400 ohm resistor as a dummy with oscillator and dial set to 15 MC, adjust S.W. antenna and oscillator trimmers to maximum.  Check sensitivity at 6000 KC.  If receiver lacks sensitivity check the .0035 mica condenser for short circuit.
CONVENTIONAL ALIGNMENT
SEE SPECIAL SECTION VOL. VIII

IF PEAK 456 KC
BAND SWITCH IN BROADCAST POSITION
L.F. - 456 KC
V.C. - VOLUME CONTROL
T.C. - TONE CONTROL

535 to 1730 Kilocycles
5650 to 18,100 Kilocycles

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**LF. ALIGNMENT.** Adjust the test oscillator to 456 KC and connect the output to the grid of the first detector tubes (6A8) through a .05 or .1 mfd. condenser. The ground on the test oscillator can be connected to the chassis ground. Align all four LF. trimmers to peak or maximum reading on the output meter.

**BROADCAST BAND ALIGNMENT.** Connect the output of the oscillator to the antenna lead of the receiver through a 50 mfd condenser. This antenna lead should be a two foot length of standard low capacity shielded loom fitted with the proper bayonet type plug to accommodate the antenna input receptacle on the receiver. Set the oscillator to 1550 KC and with the gang condenser at minimum, adjust the oscillator trimmer to receive this signal. Then set the oscillator to 1400 KC and adjust the antenna trimmer to give maximum output.
6 Tube Automobile Radio
ALIGNMENT DATA

GENERAL DATA. The alignment of this receiver requires the use of a test oscillator that will cover the frequencies of 175, 600, 1400 and 1550 K.C., and an output meter to be connected across the primary or secondary of the output transformer. If possible, all alignment should be made with the volume control on maximum and the test oscillator output as low as possible to prevent the A.V.C. from operating and giving false readings.

CORRECT ALIGNMENT PROCEDURE. The intermediate frequency (I.F.) transformers should be aligned properly as the first step.

I.F. ALIGNMENT. Adjust the test oscillator to 175 K.C. and connect the output to the grid of the first detector tube, 6A5G, through a .1 mfd. condenser. The ground on the test oscillator can be connected to the chassis ground. Align the trimmers of the first and second I.F. transformers to peak or maximum reading on the output meter.

R.F. ALIGNMENT. Adjust the test oscillator to 1550 K.C. and connect the output to the antenna through a .00005 mfd. mica condenser to give the equivalent of a low capacity average auto antenna. When this adjustment is made, the signal must be introduced into the receiver through the shielded lead supplied with the receiver. The plug should be inserted to conform with the “Low Capacity” position. (See Figure 18). Set the gang condenser to minimum and adjust the oscillator trimmer to peak. (Center section of gang condenser). The next step is to set the test oscillator and receiver to 1400 K.C. and adjust the front and rear trimmers of the gang condenser to peak. The rear section of the gang condenser tunes the antenna amplifier stage (6K7 tube), and the front condenser section tunes the detector grid coil of the 6A5G tube.
ANDREA RADIO CORP.

MODELS 2FL2, 6FL2
Controls, Assembly
Chassis Wiring

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DEFLECTION CHASSIS - "DP-12"

CONTROLS - There are eight controls on the end of the Deflection Chassis. Three of these are knobs and five are screwdriver adjustments.

1. Horizontal Centering - This is a screwdriver adjustment on the extreme left of the control panel. It serves to center the picture horizontally on the Kinescope screen and is made at the time of installation of the complete receiver. It will require resetting due to the earth's magnetic field whenever the receiver location is changed. The position to which the control is set will be noted when the receiver is first placed in operation and it should be left. It may be occasionally checked to insure continuous best focusing.

2. Vertical Linearity - This is controlled by means of 60 CYCLES.

3. Focus Control - The next control is a knob for adjustment of the first knob voltage to properly focus the picture. This adjustment can be made when the receiver is first placed in operation and it should be left. It may be occasionally checked to insure continuous best focusing.

4. Wein Filter Tuning - This Wein filter knob is used to tune the Wein filter circuit which is used to filter out unwanted frequencies from the RF signal.

5. Vertical Hold - This control is used to adjust the vertical hold on the screen. It is adjusted to a point approximately at the center of the range in which the picture "locks-in" horizontally. Synchronizing voltage, when properly applied, will hold the horizontal oscillator in step, and then correct setting will be indicated by the horizontal stability of the picture.

6. Height - This screwdriver control determines the height of the picture and should be adjusted in conjunction with the Wein Control to give the correct vertical proportions to the picture. It may require readjustment if the Vertical Centering Control is reset.

7. Horizontal Hold - This control adjusts the free running speed of the horizontal oscillator. It is adjusted to a point approximately at the center of the range in which the picture "locks-in" horizontally. Synchronizing voltage, when properly applied, will hold the horizontal oscillator in step, and then correct setting will be indicated by the horizontal stability of the picture.

8. Vertical Centering - This control is a screwdriver adjustment on the extreme right of the control panel. It serves to center the picture vertically on the Kinescope screen and is made at the time of installation of the complete receiver. It will require resetting whenever the receiver location is changed. The position to which the control is set will be noted when the receiver is first placed in operation and it should be left. It may be occasionally checked to insure continuous best focusing.

CAUTION - The power supply to the deflection chassis should never be cut off while the high voltage supply is turned on! A brown spot may appear on the Kinescope screen if this warning is disregarded. An input reverse spot that may cause a burn will also appear if the Kinescope voltage is reversed. The tube fuse pulls out, or both deflection circuits reversed making by these means or other means.
POWER RATING: The ANDREA 8812 and 8810 receivers operate on 110 to 125 volts, 60 cycle AC current only. The unit should be disconnected from the AC source and the connections made to the instrument before plugging it into a suitable outlet or socket.

This receiver is equipped with two safety lock-in switch devices and when the lock is in the 'on' position, power is cut off from all circuits and the on the inside of the two side panels. No danger is possible from the high voltage telecommunication series operated on these two switches are simultaneously pushed in. Under no circumstances should these switches be tampered with.

ANTENNA: A television receiving antenna and those installation must conform to much higher standards than that of a telephone and the system should be designed for reception of international short wave and standard broadcasts because:

1. At the ultra short wave frequencies in television, increasing obstacles have a pronounced shielding effect, and often severe trouble with multi-path transmissions. These produce blurring and multi-image pictures. See picture chart - Figure 80 - for effect.

2. The picture signal is comprised of a very wide band or range of frequencies, all of which must be received with good efficiency.

3. The discernment of the eye is much more critical than that of the ear.

Television pictures may be transmitted in certain ways with motion pictures.

The illumination in the room should be dimmed - no light close to or falling on the screen. During the day it will usually suffice to draw the curtains.

The special ANDREA Televisor - picture and sound antenna - Model 66 - is available.

TELEVISION OPERATION

CAUTION: Before the receiver is turned on at any time, turn wave band selector knob clockwise to position "off." This turns the television section of the instrument "on" and automatically eliminates all dial illumination. Allow sufficient time for the tubes to heat before proceeding further.

HOW TO CONTROL TELEVISION SOUND RANGE

SELECTOR CONTROL Switch - The television Channel Selector Control knob (Fig. 1) selects automatically, the reception of two accompanying sound programs, the one of which is designated and desired by the channel selector knob.

Channel channel: Channel 1 - 44-45 MC Channel 2 - 50-56 MC Channel 3 - 52-94 MC Channel 4 - 64-72 MC

Set the knob to the channel corresponding to the television station desired.

FIRE TUNING CONTROL: This control is used to obtain best picture reception by eliminating possible distortion arising from interfering signals which show a moving ripple in the picture. Should the control be incorrectly set, picture distortion will result. In most cases, this control should be adjusted for each television channel by listening to the accompanying sound until maximum volume is obtained, using a medium to low level and noting that the picture is not distorted at this setting. See picture chart - Figure 5 illustrates the test chart picture when all controls are correctly adjusted. Figure 8 shows the test chart picture showing on the screen of a television receiver in a television station. In some cases, this control may be adjusted by a slight readjustment of the fine tuning control. Figure 10 shows what may also occur when the fine tuning control is incorrectly set.

CONTRAST CONTROL: The contrast knob, located in the top panel (Fig. 1), regulates the contrast level of the picture. Turning this control slowly clockwise increases the picture contrast, and controls may affect your current mask. Excessive control settings blur or contaminate edges or fine detail in the images which lack half tones, while too little contrast results in an extremely sharp picture. The correct adjustment is to set the controls so that contrast and brightness are slightly off, making the edges and detail clear and well defined. Therefore, the correct contrast control must be turned counterclockwise. See picture chart - Figure 5 to determine the correct setting for your picture. Note also that the receiver face should be turned clockwise.

NOTE THAT IF THE BRIGHTNESS CONTROL IS OPERATED TOO HIGH THE CONTRAST CONTROL IS SET TOO LOW, WHITE DIAGONAL LINES WILL BE SEEN ACROSS THE PICTURE, WHICH INDICATES THAT THE BRIGHTNESS CONTROL MUST BE REDUCED. IN SUCH CASES, THE ANTEE S NIPUP IS INSUFFICIENT, THE SAME RESULTS WILL OCCUR.

HOW TO RECEIVE: Before turning the receiver on, proceed as follows:

1. Turn Brightness and Contrast controls (Fig. 1) completely counterclockwise.

2. Open doors of radio panels (Fig. 1). Turn wave band selector knob (Fig. 1) clockwise to position "off." Repeat this exercise until the picture is the same as described in paragraph 1.

3. Turn master OFF-ON Control (Fig. 1) clockwise until click is heard. Turn OFF-ON control to position "off." See picture chart - Figure 8.

4. Turn Volume Control (Fig. 1) 1/4 turn, clockwise. The Wave Band Selector knob may be set in either the "on" or "off" position.
SERVICE NOTE

The simplicity of the ANDREA RADIO push-button controls, requiring only the use of a thin-blade screw driver, makes it easy to correct any of the control settings. It is essential, however, that the controls are set exactly, otherwise, the tone quality will be destroyed.

CHOOSING YOUR STATIONS

Make a list of the desired six stations to operate on the push-buttons. Set down their call letters and put them in the order of your preference, highlighting the three with the most frequent use. These three stations are designated as station 1 selecting button at the left. The kilocycle tuning ranges of the button controls are as follows:

- **Extreme Left**
  - Station 1 - 1100 to 1400 KE.
  - Station 2 - 800 to 1340 KE.
  - Station 3 - 700 to 1280 KE.

- **Extreme Right**
  - Station 4 - 700 to 1280 KE.
  - Station 5 - 500 to 1020 KE.
  - Station 6 - 440 to 980 KE.

It is necessary to choose stations whose kilocycle ratings come within these push-button tuning ranges. The ranges given in the list above are conservative. Consequently, it may be possible to tune in a station which is just outside the range of any particular push-button control. For example, on Station 2, although the range is shown as 700-1280 KE., it may be possible to tune in a station on 660 KE., or one on 1300 KE. Select the proper markers for the stations on your list, insert the markers in the same order as your kilocycle list, starting with Station 1 on the first button on the left. Do not attempt to glue the markers in place. In the event you want to change a marker, you can pry it out with the point of a pin.

ADJUSTING THE PUSH-BUTTON STATION CONTROLS

Remove push-button escutcheon cover plate (Fig. 1). All station adjustment screws and switch are now accessible for station adjustment from the front of the cabinet.

Remember to set the push-button adjusting switch: Located on the right hand corner of the push-button control section, it is a small lever which can be turned to the "UP" position for dial tuning. Tune in the station manually, using call letters you have put on the front push-button panel as a guide. Adjust the push-button until the station is in position, then turn the volume control to 4. Push the dot for the wave selector switch in position for the wave you desire. Push in the dot for the button you want. Adjust the tuning knob to the position, and turn the volume control to maximum. When the set has been turned "ON" for at least 10 minutes so that it has become thoroughly warm, you will be ready to make the push-button adjustments. The adjusting screws can be reached easily. Each push-button has two adjustment controls marked "LBP" and "OCR", in pairs. The pair corresponding to Station 1 on your list at the extreme left. This set is so designed that the tuning indicator operates with the push-button control. Therefore, you can set the controls with absolute accuracy by watching the opening and closing of the indicator.

The exact setting for each adjustment is obtained when the Mystic Ray indicator is closed as far as possible.

A thin-blade screw driver to adjust the screws: Do not force a thick blade into the slot. First adjust the oscillator screw for Station 1, turning it until you hear the oscillator tune in your ears. If the breaker breaks into a hole, you have overadjusted. During this adjustment, turn the Station 1 antenna screws to the right or left until the tone stops. After you have an accurate setting of the oscillator screw, adjust the corresponding antenna screw for maximum volume. The final adjustment should be made by turning the oscillator screw slowly in the "UP" position. If the oscillator is not in the "UP" position, tune in the same way, get a final adjustment for the antenna screw.

For Stations 2 by tuning the station on the dial first with Wave Selector switch in "UP" position, then changing "OCR" screws. Continue this method for each setting and button. To check the accuracy of the settings, turn the Wave Band switch to position "M". The station should sound practically the same whether the switch is in the "M" or "H" position. If there is a considerable difference, the station is not tuned accurately with the dial, or else the corresponding push-button controls were not set correctly.

To change any button to another station, if the station's kilocycle rating is within the range of the corresponding controls, it is only necessary to put in a new button setting, and then the controls in accordance with the preceding instructions to change the control.

CAUTION

This is very important: When all adjustments have been made, it is necessary to touch up each one again, to assure absolute accuracy. After this has been completed, the Vertical Centering control is used to achieve normal operation. Otherwise, loss of efficiency and quality will result. Replace push-button escutcheon cover plate, taking care that the holes in cover align with buttons.
Set the signal generator at 455 kc, and connect the high side to the grid of the 1A7GT, through a .1 mfd. condenser. Align the two trimmers on the 1st and 2nd I.F. transformers, indicated in the illustration, for maximum output.

Connect the high side of the signal generator through a 200 mfd. condenser to the ANT post of the receiver, and the ground side to the GND post of the receiver. Connect a copper-oxide meter across the voice coil of the loudspeaker.

Set the signal generator at 1500 kc, the dial pointer at 1500 kc, and adjust the oscillator trimmer on the gang condenser for maximum output.

With the back of the set closed, remove the plug button at the rear of the case and adjust the loop shunt condenser through the hole for maximum output at 1500 kc.

Set the signal generator at 600 kc and the dial pointer on the set at 600 kc. Remove the plug button at the back of the case, and adjust the oscillator series condenser through the hole for maximum output. While you make this adjustment, rock the tuning condenser control knob slightly for each small adjustment of the oscillator series condenser. Otherwise, the alignment will not be accurate.

**TABLE OF REPLACEMENT BATTERIES**

<table>
<thead>
<tr>
<th>NAME</th>
<th>TYPE NO. OF &quot;A&quot; BATTERY</th>
<th>TYPE NO. OF &quot;B&quot; BATTERIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bright Star</td>
<td>No. 860</td>
<td>30-30</td>
</tr>
<tr>
<td>Burgess</td>
<td>No. 8F</td>
<td>B30</td>
</tr>
<tr>
<td>Eveready</td>
<td>No. 741</td>
<td>762</td>
</tr>
<tr>
<td>Usalite</td>
<td>No. 635</td>
<td>624</td>
</tr>
</tbody>
</table>
SERVICE: ELECTRICAL SYSTEM. The most common cause of trouble is dirt falling between strings and pick-up heads causing noise. To elim. this shut off current, press down sustaining pedal, and bang on keys up and down the keyboard. If not dislodged take off back panel and blow out obstructions with hand bellows. Another source of trouble might be tube with microphonic characteristics, which would show up as high-pitched whistle or singing noise in speaker. If any note is too loud or soft take off back panel, trace strings to lower end, loosen lock nut and turn screw back a bit to soften, or in a bit to louden the note, being careful that pick-up head never touches strings at their extreme of vibration. Tighten lock nut after this operation. Amplifier is located under top cover. For tuning strings remove the 2 large screws holding amplifier brackets to back frame. Amp. can be tilted back and held in raised pos. by 2 hinged wooden strips designed to hold it up for tuning or service. INSTALLATION (AC only). Ground spring clip. If pilot light does not indicate current flowing, a fuse in cable plug may have blown out. Use a five-ampere fuse - never more than 10-ampere. Connect lead-in wire from aerial to upper binding post marked "ANT." Gnd., comm. in cable usually suffices, but may be improved if cable clip is comm. to plate of wall socket, extra gnd. wire run from lower bind. post to clamp on radiator or pipe.

CONTROLS: RADIO DIAL. Covers standard American bc band, 550 to 1,600 kc. TUNING KNOB. Operating pointer on radio dial. TCNE CONTROL KNOB. For records and radio - variable. Turned to left, high freq. reduced, static and needle scratch reduced; to right for high fidelity. VOL. CONTROL KNOB. For records and radio, increasing to right. Should be turned to "off" pos. when neither is in use, or when switching from one to the other.

DYNAPHONE TURNABLE. Motor speed regulator set for correct 78 r.p.m. with pointer in center of scale. MAIN SWITCH & PILOT LIGHT. Pilot light glows if power is on. VOL. CONTROL FOR DYNATONE. Turned to extreme left there is no amplification and harpsichord quality is produced; to right, piano quality; in median pos., to 6-ft. grand piano. Should be turned off when Dynophone or Radio is in use, unless to accompany a record at the keyboard. SOFT PEDAL, at left. SUSTAINING PEDAL, at right. Keyboard and action are standard in every way. Pedals are regular soft and sustaining or "loud", having usual functions in correct location of the lyre of the grand piano. There is nothing unusual about playing the ANSLEY DYNATONE. The pianist simply has the privilege of altering the general volume level and character of the tone by means of the controls provided; an advantage the earlier or acoustical piano cannot offer.

Below the keyboard at the right, back of the small door, are the customary controls for Dynophone and Radio. In case of serious trouble with amplifier and power units, it may be necessary to disconnect and return to the factory. All connections to these parts are made with detachable plugs. RADIO-DYNAPHONE SELECTOR KNOB. Turn to the left to play records, to the right for radio.
NOTE: 1. LEAD "A" ROTOR OF CONDENSER
    GROUNDED THROUGH TWO .05 MFD. COND. TO B-.
  2. TERMINALS MARKED "B" ARE ON A
    COMMON SHAFT INSULATED FROM EACH OTHER
    "E" IS THE EXPANDED POSITION, "C" IS THE CONTRACTED
    POSITION OF THE IF, AND PHONO IS THE PHONO-
    GRAPH POSITION
  3. LEADS MARKED "D" ARE CONNECTED TOGETHER.

AERIAL AND GROUND CONNECTIONS. If a regular indoor or outside aerial
is used, connect it to the Blue wire and connect the Green and Black wires
together to a ground connection -- (a water pipe or radiator). If a special
"doubled" aerial is used, connect the two leads from this to the Blue and
Green wires and connect the Black wire to the ground.
SETTING PUSH BUTTONS MODELS 106, 148, 148-2, 168, 359

1. By means of the Station Selector Knob tune in WITH THE RIGHT HAND AS ACCURATELY AS POSSIBLE the station having the lowest frequency—that is, your selected station which is tuned in nearest the right-hand side of the dial.

2. After the station has been tuned in accurately with the right hand, continue to hold it in its exact position firmly, and with the left hand loosen the Push-Button to be set up for that station by unscrewing the Push-Button about one turn to the left (counterclockwise).

3. Continuing to hold the Station Selector Knob in its exact position, PUSH THE PUSH-BUTTON IN ALL THE WAY with the left hand.

4. After the Push-Button has been depressed all the way, tighten it gently toward the right (clockwise). Release Push-Button slowly and when in normal position grip button and tighten firmly.

The Push-Button tuning system is now correctly set up for your first selected station of lowest frequency and the Call Letter Tab for this station should be at the extreme right of the Call Letter Holder.

ALIGNMENT PROCEDURE MODELS 148, 148-2, 168.

All alignments must be made with the volume control turned full on and with the signal input from the generator reduced to as low a value as possible while still giving a sufficient output to be easily read on the output meter.

Connect the output meter, through a .5 M.F. condenser and a resistance of such a value as to make the total meter resistance approximately 7000 ohms, to plate of output tube and B+ or a low voltage A.C. meter may be used connected across speaker voice coil. The output meter remains connected during the entire alignment procedure.

Connect the signal generator to the grid cap of the 6A7 tube through a .1 M.F. condenser. Connect the ground of the generator to the ground lead of the receiver. Set the dial to about 1000 K.C., feed in a 455 K.C. signal. Adjust first and second I.F. trimmers for maximum output. Refer to chassis lay-out for location of trimmers.

Turn the dial to the extreme high frequency end. Feed a 1760 K.C. signal to the receiver antenna lead through a .00005 M.F. mica condenser. Adjust the 1760 K.C. oscillator trimmer until maximum output is shown. Set the generator to 1500 K.C. and tune in this signal on the receiver. Then adjust the 1500 K.C. antenna trimmer to the maximum output. Then impress a 600 K.C. signal into the receiver antenna lead and tune in this signal on the receiver. Adjust oscillator padding condenser to the maximum output. Follow through with this procedure several times in order to obtain the best alignment adjustment possible. This completes the alignment.
TUBE SOCKETS ARE VIEWED FROM INNER SIDE OF CHASSIS.
VOLTAGE READINGS AT INDICATED SOCKET PLUGS ARE TO CHASSIS.
VOLTAGES MUST BE MEASURED WITH MHz SIGNAL.
ALIGNMENT IS TO MAKE AT THE FREQUENCIES SHOWN AT THE TRIMMER CAPACITORS.
WHERE NO VOLTAGE READING IS SHOWN AT SOCKET PLUGS, IT INDICATES 200 VOLTS OR A VERY LOW READING.
FIGURES AT CATHODES ARE CATHODE CURRENT IN MILLIAMPERES.
CAPACITY VALUES ARE IN MICROMICROFARADS.

Output Meter Connections—Across Loud Speaker Voice Coil
Output Meter Reading to Indicate 1 Watt—1.5 Volts
Generator Ground Lead Connection—Receiver Chassis
Generator Modulation—30%, 400 Cycles
Position of Volume Control—Fully On

Position of Generator
Variable Frequency Antenna
Closed 450 KC .1 mfd.
Fully Open 1500 KC .0002 mfd.
1400 KC 1400 KC .0002 mfd.
600 KC 600 KC .0002 mfd.
The variable condenser should be at 600 KC for antenna adjustment.
The alignment procedure should be repeated in the original order, step by step, to insure greater accuracy. A final adjustment of antenna ladder condenser C3 is always made after the receiver is installed in the car, in order to match the car antenna.

Always keep the output power from the generator at its lowest possible value to prevent the A.V.C. of the receiver from interfering with accurate alignment.

If an antenna was located coming from the corner post of the car, it will probably have an inner wire covered with the metal braid. (If it has a plug at its end, cut off the plug). Scrape clean and solder the white wire of the receiver's antenna lead to the inner wire of the car antenna lead. Be certain these inner wires do not at any time touch the outer shield. (See Fig. 6.)

After the connection is cleaned and connected, cover joint with tape. (See Fig. 6.)

Connect the pigtail of the receiver's antenna wire to the pigtail braid of the car's antenna lead. Wrap pigtail and solder together using rosin core solder. IMPORTANT—Make certain when bolting soldered pigtail ends to car that the section is scraped clean and a good chassis ground. (See Fig. 7.)

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PUSH-BUTTON LINE-UP MODELS 442, 443, 446

To adjust push-buttons to desired stations:
1. Press second button from right and tune in manually the one of the four desired stations having the lowest number of kilocycles (nearest right hand end of tuning dial). Note its program.
2. Press third button from right with volume control set to full volume, insert screwdriver blade into slot of large screw in corresponding hole at rear of set directly behind this button, and rotate one turn or two in either direction until same station is heard at maximum volume, then adjust small screw in same hole until greatest volume and best quality are obtained.
3. Adjust fourth button in the same manner to the desired station with the next higher kilocycle reading (next station to the left on the manual tuning dial).
4. Repeat this procedure for buttons 5 and 6.

In some cases it may be desirable to make a slight final readjustment on all four buttons some time after the original setting, to compensate for changes due to temperature and climatic conditions.

PUSH-BUTTON DATA MODELS 402, 403, 404, 405, 406, 408

1. Loosen all buttons by turning them counter-clockwise.
2. Locate a desired station by manual tuning.
3. Adjust one button to this station by pushing button in as far as it will go, keeping the station tuned in, then release.
4. When button returns to original position, tighten it by turning clockwise. Station is now tuned in permanently on this button.
5. Repeat operations 2, 3 and 4 on each succeeding button until all have been adjusted to stations desired.

In some cases it may be desirable to make a slight final readjustment on all four buttons some time after the original setting to compensate for changes due to temperature and climatic conditions.

CAUTION: In setting up push buttons, for consistent reception, be sure the adjustments are made to the local station on a network broadcast, and that a weaker, distant station with the same program is not selected.

PUSH-BUTTON DATA MODELS 442, 443, 446

NOTE: To adjust to desired station, press in corresponding button directly in front. Turn main adjusting screw to obtain selected station, then turn final adjusting screw to obtain best clarity and volume. Do not turn volume control on full while making adjustments.
ALIGNMENT AND TRIMMER LOCATIONS

IF. Connect signal lead at 456 KC to the 6A8 control grid. Connect output meter across secondary of speaker output transformer. With weakest signal necessary to obtain .5 volt deflection on the output meter, peak the trimmers on the first and second IF transformers.

RF. Align intermediate band first. Follow procedure carefully. Connect a 200 mmf condenser in series with the signal lead to the antenna terminal of the receiver. Turn the band switch counter-clockwise to the intermediate band position. Adjust oscillator trimmer located at the rear of the variable condenser, to 1550 KC with the variable condenser set at mechanical zero. Pad lower section of the dual padder, located under the composite coil, to 800 KC. Trim antenna section (front) of the variable condenser at 1400 KC.

Turn wave switch to the clockwise or long wave position. Adjust oscillator trimmer mounted on the wave switch to 346 KC with the variable condenser set at mechanical zero. Pad upper section of the dual padder at 149 KC. Adjust antenna trimmer to 300 KC through hole on top of the antenna coil.

When installed in an automobile best results will be had on the long wave band if the trimmer is realigned. Tune in some station near 900 meters; remove the plug located on the right hand side of the receiver; insert a screwdriver into the trimmer condenser slot; and rotate slowly in either direction until best results are obtained.
NOTE: The "A" battery should be placed in the cabinet so that the plug-in socket on the top of the battery is nearer to the side of the cabinet which is faced down than to the side of the cabinet which is facing up. Also, the "A" battery should be pushed all the way into the cabinet so that it fits between the left end of the radio chassis and the side of the cabinet.
## MODEL 411 (Series A)

<table>
<thead>
<tr>
<th>BAND</th>
<th>Frequency Setting</th>
<th>Dummy Antenna</th>
<th>Connection to Radio</th>
<th>Position of Band Switch</th>
<th>Variable Condenser Setting</th>
<th>Trimmers Adjusted (in Order Shown)</th>
<th>Trimovol Function</th>
<th>Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>L. F.</td>
<td>465 Kc.</td>
<td>.1 MFD.</td>
<td>Grid of 1A/G Tube</td>
<td>&quot;M.W.&quot;</td>
<td>Rotor full open (Plates out of mesh)</td>
<td>Four trimmers on top (See Fig. 1)</td>
<td>Output and input L. P.</td>
<td>(See Note &quot;A&quot;)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Adjust to maximum output</td>
</tr>
<tr>
<td>MEDIUM</td>
<td>1700 Kc.</td>
<td>.1 MFD.</td>
<td>Grid of 1A/G Tube</td>
<td>&quot;M.W.&quot;</td>
<td>Rotor full open (Plates out of mesh)</td>
<td>Trimmer (C3) front section of gang (See Fig. 4)</td>
<td>Medium Wave Oscillator</td>
<td>(See Note &quot;A&quot;)</td>
</tr>
<tr>
<td>WAVE</td>
<td>140 Kc.</td>
<td>See Note &quot;C&quot;</td>
<td>&quot;M.W.&quot;</td>
<td>Set dial at 1400 Kc.</td>
<td></td>
<td>Trimmer (C3) rear section of gang (See Fig. 4)</td>
<td>Antenna</td>
<td>Adjust to maximum output</td>
</tr>
<tr>
<td>BAND</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LONG.</td>
<td>375 Kc.</td>
<td>See Note &quot;C&quot;</td>
<td>&quot;L.W.&quot;</td>
<td>Rotor full open (Plates out of mesh)</td>
<td></td>
<td>Trimmer (C4) (See Fig. 5)</td>
<td>Long Wave Oscillator</td>
<td>Adjust to maximum output</td>
</tr>
<tr>
<td>WAVE</td>
<td>375 Kc.</td>
<td>See Note &quot;C&quot;</td>
<td>&quot;L.W.&quot;</td>
<td>Rotor full open (Plates out of mesh)</td>
<td></td>
<td>Trimmer (C2) (See Fig. 5)</td>
<td>Antenna</td>
<td>Adjust to maximum output</td>
</tr>
<tr>
<td>BAND</td>
<td>150 Kc.</td>
<td>See Note &quot;C&quot;</td>
<td>&quot;L.W.&quot;</td>
<td>Set dial at 150 Kc.</td>
<td></td>
<td>Trimmer (C1) (See Fig. 5)</td>
<td>Long Wave Osc. Pad.</td>
<td>Adjust to maximum output</td>
</tr>
</tbody>
</table>

**NOTE "A"**—A 1 megohm resistor must be connected between the two loop antenna leads from the chassis when aligning the L. F. transformers and setting the oscillator trimmer, (C3). The loop antenna must be disconnected from the chassis.

**NOTE "B"**—Remove the 1 megohm resistor from the loop antenna leads; mount the chassis and the loop antenna in the cabinet, connect the loop antenna to the chassis. Adjust trimmer (C3). (See note "C").

**NOTE "C"**—Lay the output lead from the signal generator in back of the loop antenna. Turn up the output of the generator, picking up the energy in the loop antenna without any electrical connection from the signal generator.

**NOTE "D"**—Turn the dial back and forth slightly (rock) and adjust trimmer until the peak of greatest intensity is obtained.

### TEST FREQUENCIES USED:

<table>
<thead>
<tr>
<th>Kilocycles</th>
<th>Meters</th>
</tr>
</thead>
<tbody>
<tr>
<td>L. F.</td>
<td>465</td>
</tr>
<tr>
<td>Long Wave</td>
<td>150</td>
</tr>
<tr>
<td></td>
<td>375</td>
</tr>
<tr>
<td>Medium Wave</td>
<td>1400</td>
</tr>
<tr>
<td></td>
<td>1700</td>
</tr>
</tbody>
</table>

---

## MODEL 510 (Series A)

<table>
<thead>
<tr>
<th>BAND</th>
<th>Frequency Setting</th>
<th>Dummy Antenna</th>
<th>Connection to Radio</th>
<th>Position of Iron Core (Dial Setting)</th>
<th>Trimmers Adjusted (in Order Shown)</th>
<th>Trimovol Function</th>
<th>Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>L. F.</td>
<td>465 Kc.</td>
<td>.1 MFD.</td>
<td>Connect to Terminal &quot;B&quot; (See Fig. 4)</td>
<td>Iron Cores All the way out</td>
<td>Two trimmers on top (See Fig. 1)</td>
<td>Output L. P.</td>
<td>Adjust to maximum output</td>
</tr>
<tr>
<td></td>
<td>465 Kc.</td>
<td>.1 MFD.</td>
<td>Connect to Terminal &quot;B&quot; (See Fig. 4)</td>
<td>Iron Cores All the way out</td>
<td>Two trimmers on top (See Fig. 1)</td>
<td>Output L. P.</td>
<td>Adjust to maximum output</td>
</tr>
<tr>
<td>BROADCAST</td>
<td>1720 Kc.</td>
<td>.1 MFD.</td>
<td>Connect to Terminal &quot;A&quot; (See Fig. 4)</td>
<td>Iron Cores All the way out</td>
<td>Trimmer (C3) (See Fig. 3)</td>
<td>Oscillator</td>
<td>Adjust to maximum output</td>
</tr>
<tr>
<td>BAND</td>
<td>1720 Kc.</td>
<td>.1 MFD.</td>
<td>Connect to Terminal &quot;A&quot; (See Fig. 4)</td>
<td>Iron Cores All the way out</td>
<td>Trimmer (C3) (See Fig. 3)</td>
<td>Oscillator</td>
<td>Adjust to maximum output</td>
</tr>
<tr>
<td></td>
<td>1400 Kc.</td>
<td>.2 MFD.</td>
<td>Terminal &quot;A&quot; (See Fig. 4)</td>
<td>Connect to coil up or down (See Fig. 4)</td>
<td>Antenna</td>
<td>Antenna Coil Adjustment</td>
<td>Adjust to maximum output</td>
</tr>
<tr>
<td></td>
<td>1720 Kc.</td>
<td>.2 MFD.</td>
<td>Terminal &quot;A&quot; (See Fig. 4)</td>
<td>Turn Dial to 1720 Kc.</td>
<td>Adjust trimmer (C3) (See Fig. 3)</td>
<td>Output L. P.</td>
<td>Adjust to maximum output</td>
</tr>
</tbody>
</table>

**NOTE "A"**—The antenna coil assembly is made so that it is movable up or down. When making the adjustment as given in the alignment procedure, move the coil assembly very slowly. It can be moved by hand or by pivoting one edge of the blade of a screwdriver in the hole and engaging the blade in the gear teeth of the coil form.

Connect a 3 of radio chassis to ground post of signal generator through .1 mfd condenser.

**NOTE "B"**—After the antenna coil has been tracked at 1400 Kc, it is necessary to check the antenna trimmer trimmer (C3) adjustment again at 1720 Kc. If no appreciable change in trimmer adjustment is made, the coil is in track. If the trimmer requires considerable change it will be necessary to again adjust the position of the antenna coil at 1400 Kc. These two adjustments should be tried several times until no change of trimmer adjustment is required at 1720 Kc.
BELMONT RADIO CORP.

MODEL 511, Series A
Schematic, Voltage Socket, Alignment

Compliments of www.nucow.com

BELMONT PAGE 11-7

I.F. 465 KC

I.F. alignment conventional
SW- Trim 17 MC; pad 6 MC
BB- Trim osc at 1750 ko
Trim ant. at 1400 ko
Pad at 600 ko

PARTS
T1 111117 Antenna Coil Complete
T2 110006 Oscillator Coil Complete
T3 108195 Input I.F. 465 kc. complete
T4 108635 Interstage I.F.-465 kc. complete
T5 108134 Output I.F.-465 kc. complete
T6 114115 6" F. M. Speaker
L1 10568 "A" Choke
L2 1233 R. F. "B" Choke
S1 12571 Wave Band Switch
S2 D. P. S.T. Switch on Volume Control
T7 10559 Output Transformer

ALIGNMENT

RESISTORS
R1 200 M ohm—½ w.
R2 50 M ohm—½ w.
R3 1 megohm—½ w.
R4 3 M ohm—½ w.
R5 2 megohm—½ w.
R6 250 M ohm—volume control
R7 4 megohm—½ w.
R8 1 megohm—½ w.
R9 180 ohm—½ w.
R10 450 ohm—½ w.
R11 500 M ohm—½ w.
R12 1 megohm—½ w.

CONDENSERS
C 2 gang variable condenser
C1 .0001 mica
C2 S.W. Antenna Adj. Trimmer
C3 B.C. Antenna Adj. Trimmer
C4 .05 x 200 v.
C5 .25 x 200 v.
C6 S.W. Osc. Adj. Trimmer on gang
C7 S.W. Adj. Series pad .003 w. c.
C8 B.C. Osc. Adj. Trimmer
C9 B.C. Adj. Series Pad 500 mfn. w. c.
C10 .00005 mica
C11 .05 x 200 v.
C12 .1 x 200 v.
C13 .05 x 200 v.
C14 .25 x 200 v.
C15 .1 x 200 v.
C16 .00025 mica
C17 .006 x 600 v.
C18 .0002 mica
C19 .01 x 400 v.
C20 20 mfd. lytic w. v. 25 v.
C21 .004 x 600 v.
C22 .25 x 200 v.
ALIGNMENT PROCEDURE CHASSIS 559

No aligning adjustments should be attempted with the chassis in the cabinet.

The following equipment is required for aligning:
- A 10mc signal generator which will provide an accurately calibrated signal at the test frequencies as listed.
- Output indicator meter.
- Non-metallic screwdrivers.
- Dummy antenna—1 m, 200 MmL, 400 Ohms.

<table>
<thead>
<tr>
<th>BAND</th>
<th>SIGNAL GENERATOR</th>
<th>Dummy Antenna</th>
<th>Connection to Radio</th>
<th>Position of Band Switch</th>
<th>Variable Condenser Setting</th>
<th>Trimmers Adjusted (in Order Shown)</th>
<th>Trimmer Function</th>
<th>Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. F.</td>
<td>465 Kc. .1 MFD.</td>
<td>Grid of 6SR7</td>
<td>L. F. Tube</td>
<td>Broadcast (Rotors only in mesh)</td>
<td>Two trimmers on top</td>
<td>Output L. F.</td>
<td>Adjust to maximum output</td>
<td></td>
</tr>
<tr>
<td>I. F.</td>
<td>465 Kc. .1 MFD.</td>
<td>Grid of 6SA7</td>
<td>L. F. Tube</td>
<td>Broadcast (Left Rotation)</td>
<td>Two trimmers on top</td>
<td>Input L. F.</td>
<td>Adjust to maximum output</td>
<td></td>
</tr>
<tr>
<td>SHORT</td>
<td>21 Mc. 400 ohms</td>
<td>Antenna lead</td>
<td>Short Wave</td>
<td>Set Dial at 21 MC</td>
<td>Trimmer (C7) (See Fig. 3)</td>
<td>Short wave oscillator</td>
<td>See Note &quot;A&quot;</td>
<td>Adjust to maximum output</td>
</tr>
<tr>
<td>WAVE BAND</td>
<td></td>
<td></td>
<td>(Right Rotation)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEDIUM</td>
<td>6 Mc. 400 ohms</td>
<td>Antenna lead</td>
<td>Medium Wave</td>
<td>Set Dial at 6 MC</td>
<td>Trimmers (C8, C2) (See Fig. 5)</td>
<td>Medium wave oscillator and antenna</td>
<td>Adjust to maximum output</td>
<td></td>
</tr>
<tr>
<td>WAVE BAND</td>
<td></td>
<td></td>
<td>(Right Rotation)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BROADCAST</td>
<td>2.5 Mc. 400 ohms</td>
<td>Antenna lead</td>
<td>Medium Wave</td>
<td>Set Dial at 2.5 MC</td>
<td>Trimmer (C9) (See Fig. 5)</td>
<td>Medium wave oscillator series pad</td>
<td>Adjust to maximum rock dial. (See note &quot;B&quot;)</td>
<td></td>
</tr>
<tr>
<td>BAND</td>
<td>1700 Kc. 200 mml.</td>
<td>Antenna lead</td>
<td>Broadcast (Left Rotation)</td>
<td>Rotor full open (Plates out of mesh)</td>
<td>Trimmer (C8) (See Fig. 3)</td>
<td>Broadcast oscillator</td>
<td>Adjust to maximum output</td>
<td></td>
</tr>
<tr>
<td>BAND</td>
<td>1500 Kc. 200 mml.</td>
<td>Antenna lead</td>
<td>Broadcast</td>
<td>Set Dial at 1500 Kc</td>
<td>Trimmer (C3) (See Fig. 3)</td>
<td>Broadcast</td>
<td>Adjust to maximum output</td>
<td></td>
</tr>
<tr>
<td>BAND</td>
<td>600 Kc. 200 mml.</td>
<td>Antenna lead</td>
<td>Broadcast</td>
<td>Set Dial at 600 Kc</td>
<td>Trimmer (C1) (See Fig. 3)</td>
<td>Broadcast oscillator series pad</td>
<td>Adjust to maximum rock dial. (See note &quot;B&quot;)</td>
<td></td>
</tr>
</tbody>
</table>

NOTE "A"—It is extremely necessary when making this adjustment that the fundamental oscillator signal be tuned in and not the image frequency which will fall below the fundamental.

NOTE "B"—Turn the dial back and forth slightly (rock) and adjust trimmer until the peak of greatest intensity is obtained.

Attenuate the signal from the signal generator to prevent the leveling-off action of the AVC.

After each range is completed, repeat the procedure as a final check.

PROCEDURE FOR SETTING THE AUTOMATIC LEVERS MODEL 577D

There are five levers on the dial by means of which five stations may be selected, (See "B" Fig. 2).

Make a list of local stations you tune in regularly; any number up to and including five.

Punch out of the set of station call letter tabs supplied, the call letters of the stations you have selected.

On the front of each automatic tuner lever an opening is provided for inserting the call letter tabs, (See "A" Fig. 2).

Insert the call letter tabs in the rectangular openings of each of the automatic tuner levers. One of the small celluloid tabs supplied should be snapped into place over each of the station call letter tabs.

Press DOWN ALL THE WAY any one of the automatic tuner levers. Holding it down FIRMLY, carefully tune in the station assigned to this lever. Release the lever.

Follow this procedure until you have selected all of your favorite stations.

Now rotate the tuning knob (No. 1) the right (clockwise) as far as it will turn, and tighten the special locking screw "C" located on left side of tuner dial assembly (See Fig. 2).

It is VERY IMPORTANT that this locking screw is turned until it is ABSOLUTELY TIGHT.

This screw will lock in place all the stations you have selected on the automatic tuner levers. (Note: Locking screw "C" is loose when radio is shipped from factory).

If you should desire to change any station you selected to another, loosen the locking screw "C" one or two turns, select the new station as explained. Be sure to retighten the locking screw, otherwise the stations you have selected will not stay adjusted to the levers.

The automatic dial is now set up for quick tuning. Press down lever and your favorite station is selected.
Slight adjustments to the oscillator and antenna circuits can be made without removing the chassis from the cabinet through a hole which is provided on the bottom of the cabinet. (Remove snap-in button.)

The two adjustments on the trimmer assembly can be reached with a long insulated type screwdriver through this hole.

**SERVICE NOTES:**

Voltages taken from different points of circuit to -B are measured with all tubes in their sockets and speaker connected, with a volt meter having a resistance of 1000 ohms per volt.

All voltages as indicated on the voltage chart are measured with 117 volt A.C. line.

Resistance of coil windings are indicated in ohms on the schematic circuit diagram.

To check for open by-pass capacitors, 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.

Excessive hum, stuttering, low volume and a reduction in all D.C. voltages is usually caused by a shorted electrolytic condenser; open by-pass condensers frequently cause oscillation and distorted tone.
ALIGNMENT PROCEDURE

- Connect the coil to the generator through a 3 MHz condenser.
- Insert a low-loss, low-inductance wire in the coil. The coil should be mounted at least 3/4" from the metal case.
- Connect the output of the generator to the input of the coil. The output of the generator should be at least 3 dB above the input level.
- Set the generator to the desired frequency and adjust the output level to the desired level.

MODEL 571 SERIES A

<table>
<thead>
<tr>
<th>BAND</th>
<th>SIGNAL GENERATOR</th>
<th>Antenna Setting</th>
<th>Position of Band Switch</th>
<th>Trimmer Adjusted (In Order Shown)</th>
<th>Trimmer Function</th>
<th>Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>L.F.</td>
<td>60 Kc.</td>
<td>Grid of 60 Kc.</td>
<td>Grid of 60 Kc.</td>
<td>Two trimmers up</td>
<td>Two trimmers up</td>
<td>Two trimmers up</td>
</tr>
<tr>
<td>1220 Kc.</td>
<td>1 MFD.</td>
<td>Grid of 60 Kc.</td>
<td>Grid of 60 Kc.</td>
<td>Two trimmers up</td>
<td>Two trimmers up</td>
<td>Two trimmers up</td>
</tr>
<tr>
<td>2450 Kc.</td>
<td>1 MFD.</td>
<td>Grid of 60 Kc.</td>
<td>Grid of 60 Kc.</td>
<td>Two trimmers up</td>
<td>Two trimmers up</td>
<td>Two trimmers up</td>
</tr>
<tr>
<td>4900 Kc.</td>
<td>1 MFD.</td>
<td>Grid of 60 Kc.</td>
<td>Grid of 60 Kc.</td>
<td>Two trimmers up</td>
<td>Two trimmers up</td>
<td>Two trimmers up</td>
</tr>
</tbody>
</table>

NOTE: The alignment procedure is designed so that it is easy to use and can be performed without any special equipment. It is recommended to use a test oscillator to check the alignment. After each adjustment is completed, the oscillator should be tuned to the desired frequency and the output level should be adjusted to the desired level.

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BELMONT RADIO CORP.

6SA7 Mixer first detector and oscillator.

6SK7 I.F. Amplifier.

6SQ7 Second Detector, A.V.C. Output

6X5G Rectifier.

6K6G

I.F. 465 K.C.

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BELMONT PAGE 11-13

MODEL 577D

Serial No. 214845 Up

Schematic, Voltage, Socket Trimmers, Alignment

Compliments of www.nucow.com

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Fig. 3—Top View

Adjust Antenna Trimmer

Tune in a weak signal at approximately 600 K.C. with volume control about three-fourths on. Adjust trimmer screw "X" until maximum output is obtained.
BELMONT RADIO CORP.

MODEL 629, Series A
Serial No. 9L225000 and up

Schematic, Voltage, Socket
Trimmers

Converer
I. F. Amplifier
Second Detector, A.V.C. Driver
6SA7
6SK7
6SQ7
6P5G
6AC5G

5Y3G

FOR ALIGNMENT
SEE INDEX

FREQUENCY RANGE
5.5 to 183 MC.
355 to 1720 KC.

MODEL 629
SERIES A
(1.5 Watts Undistorted, 2.4 Watts Maximum)

Power Consumption 50 Watts (At 115 volts 50-60 cycles)

TRANSFORMERS are available and chassis are sometimes
equipped with universal transformers for operation on 25, 40
and 60 cycles and with primary taps for 110, 130, and 230
volts.

Power Output 1.5 Watts

Ref. No.
101214
1295
12964
10022
124121
124122
124131
124121
12939
10013
10007
C12
C13
C11
C8
C7
C6
C5
C4
C3
C2
C1
C122
C125
C1002
C124121
C124122
C124131
C124121
C12939
C10013
C10007

C122
C125
C1002
C124121
C124122
C124131
C124121
C12939
C10013
C10007

Description
2 gang variable condenser
0.0015 mica
9250 mica
.015 x 300 v.
Dual Adjustable Condenser (S. W. Osc.)
Dual Adjustable Condenser (S. W. Ant.)
Dual Adjustable Condenser (B. C. Ant.)
.0015 mica,
.0005 mica
.004 x 200 v.
.001 x 600 v.
.005 x 600 v.
.003 x 600 v.
.01 x 400 v.
.002 x 400 v.
.001 x 400 v.
.006 x 200 v.

CONDUCTORS

Resistors

Parts

©John F. Rider, Publisher

Compliments of www.nucow.com
1—Type 12SA7 Mixer, First Detector-oscillator.
2—Type 12SK7 I. F. Amplifier.
3—Type 12J5GT Second Detector, A.V.C.
4—Type 12SQ7 First Audio Amplifier.
5—Type 35L6GT Beam Output Amplifier.
6—Type 35Z5GT High Vacuum Rectifier.

Mica condensers are coded with an additional dot indicating tolerance:

<table>
<thead>
<tr>
<th>Tolerance percent</th>
<th>Color of Dot</th>
</tr>
</thead>
<tbody>
<tr>
<td>25%</td>
<td>White</td>
</tr>
<tr>
<td>5%</td>
<td>Red</td>
</tr>
<tr>
<td>10%</td>
<td>Blue</td>
</tr>
<tr>
<td>15%</td>
<td>Yellow</td>
</tr>
<tr>
<td>20%</td>
<td>None</td>
</tr>
<tr>
<td>More Than 20%</td>
<td>None</td>
</tr>
</tbody>
</table>

**ALIGNMENT**

Connect B- of radio chassis to ground post of signal generator through .1 mf condenser.

I.F. peak 465 kc. I.F. alignment conventional. See Vol. VIII.

Trim oscillator at 1650 kc.
Trim antenna at 1400 kc. (Lay signal generator lead near, but not on, loop when adjusting trimmer.)
1—Type 12SK7 R. F. Amplifier.
1—Type 12SA7 Mixer, First Detector-oscillator.
1—Type 12SK7 I. F. Amplifier.
1—Type 12SQ7 Second Detector, A.V.C. and First Audio.
1—Type 35L6GT Beam Output Amplifier.
1—Type 35Z5GT High Vacuum Rectifier.

**RESISTORS**
- R1 130218 5M ohm—1/4 w.
- R2 13020 100M ohm—55 w.
- R3 130176 200M ohm—55 w.
- R4 130205 25 ohm—1 watt
- R5 130205 25 ohm—1 watt
- R6 130100 150M ohm—55 w.
- R7 130203 40 ohm—55 w.
- R8 1304 3 megohm—7/8 w.
- R9 13012 50M ohm—55 w.
- R10 101127 1 megohm volume control
- R11 130257 5 megohm—7/8 w.
- R12 130111 50M ohm—55 w.
- R13 130153 500M ohm—55 w.
- R14 130166 150 ohm—7/8 w.

**CONDENSERS**
- C1 102104 1 mfd. variable condenser
- C2 1251 .00125 Mica
- C3 1291 .00035 Mica
- C4 100060 .01 x 400 v.
- C5 Antenna Trimmer on gang
- C6 Oscillator trimmer on gang
- C7 100061 .01 x 400 v.
- C8 10005 .01 x 200 v.
- C9 1251 .0001 Mica
- C10 1291 .0001 Mica
- C11 13009 .05 x 200 v.
- C12 1251 .0001 Mica
- C13 1291 .0001 Mica
- C14 100010 .1 x 400 v.
- C15 11953E 30 mfd. lytic—150 w. v.
- C16 11953E 30 mfd. brist—150 w. v.
- C17 1251 .0001 Mica
- C18 100028 .04 x 200 v.
- C19 11953E 40 mfd.—25 w. v. lytic
- C20 10006 .02 x 400 v.
- C15, C16, and C19 in same unit

**I.F. 465 Kc**

**PARTS**
- T1 111139 Loop Antenna
- T2 111028 Oscillator Coil
- T3 108124F Input I. F. Coil
- T4 108143B Output I. F. Coil
- T5 105885B Output Transformer
- T6 114116G 5" Dynamic Speaker (450 ohm field)
- L1 1259 Antenna Loading Coil
- P1 109249 6.8 volt, Pilot light — T-47
- S1 Off-on Switch on Volume Control

For alignment procedure, see instructions for Belmont Model 655, Series A.
ALIGNMENT PROCEDURE

SERVICES NOTES:

Voltages taken from different points of circuit to chassis are measured with voltmeter full on, all tubes in their sockets and speaker connected, with a volt meter having a resistance of 1000 ohms per volt.

IN ORDER TO PREVENT SIGNAL FROM ACTING UPON AVC AND AFFECTING ACCURACY OF VOLTAGE MEASUREMENTS, AERIAL AND GROUND LEADS SHOULD BE SHORT CIRCUITED WHILE MAKING MEASUREMENTS.

The following equipment 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 ft., 200 mm. 400 ohms.

<table>
<thead>
<tr>
<th>BAND</th>
<th>SIGNAL GENERATOR Frequency Setting</th>
<th>Dummy Antenna</th>
<th>Connection to Radio</th>
<th>Position of Band Switch</th>
<th>Variable Condenser Setting</th>
<th>Trimmers Adjusted (in Order Shown)</th>
<th>Trimmer Function</th>
<th>Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.F.</td>
<td>465 Kc.</td>
<td>.1 MFD</td>
<td>Grid of 6K8</td>
<td>Broadcast</td>
<td>Rotor full open (Plates out of mesh)</td>
<td>Two trimmers on top (See Fig. 1)</td>
<td>Output I.F.</td>
<td>Adjust to maximum output</td>
</tr>
<tr>
<td></td>
<td>465 Kc.</td>
<td>.1 MFD</td>
<td>Grid of 6K8</td>
<td>Broadcast</td>
<td>Rotor full open (Plates out of mesh)</td>
<td>Two trimmers on top (See Fig. 1)</td>
<td>Input I.F.</td>
<td>Adjust to maximum output</td>
</tr>
<tr>
<td>SHORT</td>
<td>MID-</td>
<td>6.5 Mca</td>
<td>400 ohms</td>
<td>Short Wave</td>
<td>Set Dial at 23 MC</td>
<td>Trimmer (C15) (See Fig. 3)</td>
<td>Short wave oscillator</td>
<td>See Note &quot;A&quot; Adjust to maximum output</td>
</tr>
<tr>
<td>WAVE</td>
<td>BAND</td>
<td>6.5 Mca</td>
<td>400 ohms</td>
<td>Medium Wave</td>
<td>Set Dial at 6.5 MC</td>
<td>Trimmer (C16) (See Fig. 3)</td>
<td>Medium wave oscillator</td>
<td>Adjust to maximum output</td>
</tr>
<tr>
<td></td>
<td>BAND</td>
<td>6.5 Mca</td>
<td>400 ohms</td>
<td>Medium Wave</td>
<td>Set Dial at 6.5 MC</td>
<td>Trimmer (C17) (See Fig. 3)</td>
<td>Medium wave oscillator</td>
<td>Adjust to maximum output</td>
</tr>
<tr>
<td>BROAD-</td>
<td>CAST</td>
<td>2000 Kc</td>
<td>200 mmf.</td>
<td>Broadcast</td>
<td>Rotor full open (Plates out of mesh)</td>
<td>Trimmer (C18) (See Fig. 3)</td>
<td>Broadcast oscillator</td>
<td>Adjust to maximum output</td>
</tr>
<tr>
<td>BAND</td>
<td>1800 Kc</td>
<td>200 mmf.</td>
<td>Antenna lead</td>
<td>Broadcast</td>
<td>Set Dial at 1800 Kc</td>
<td>Trimmer (C19) (See Fig. 3)</td>
<td>Broadcast antenna and R.F.</td>
<td>Adjust to maximum output</td>
</tr>
<tr>
<td></td>
<td>550 Kc</td>
<td>200 mmf.</td>
<td>Antenna lead</td>
<td>Broadcast</td>
<td>Set Dial at 520 Kc</td>
<td>Trimmer (C20) (See Fig. 3)</td>
<td>Broadcast oscillator series pad</td>
<td>Adjust to maximum rock dial. (See note &quot;C&quot;)</td>
</tr>
</tbody>
</table>

NOTE "A"—It is extremely necessary when making this adjustment that the fundamental oscillator signal be tuned in and not the image frequency which will fall below the fundamental. As an example of this a fundamental 23 megacycle signal can be tuned in not only at 23 on the dial, but also at approximately 22 megacycles.

NOTE "B"—When adjusting the antenna and R.F. trimmers be sure and "follow" the signal to exact resonance by slight readjustment of the tuning condenser as trimmer reaction on oscillator frequency is quite noticeable at high frequencies.

NOTE "C"—Turn the dial back and forth slightly (rock) and adjust trimmer until the peak of greatest intensity is obtained.

Attenuate the signal from the signal generator to prevent the leveling-off action of the AVC.

After each range is completed, repeat the procedure as a final check.

Chassis No. 707—Series A
(Serial No. 9K173300 and up)
BALLAST RESISTOR TUBES:
Use one of the following:

Type No. 5465 for 100 to 125 volt line voltage.

Type No. 5463 for 125 to 145 volt line voltage.

Type No. 5464 for 210 to 250 volt line voltage.
Installing the Model 709 Power Unit
(For 100-250 Volt 40/60 Cycle A. C. Operation)

In Chassis 706,
1. Remove the chassis from the cabinet, by removing the four chassis mounting bolts from the bottom of the cabinet.
2. Refer to Fig. 1, note that the 6-volt power unit is fastened to the top of the radio chassis with eight copper head screws, (six on top of chassis, and two on rear flange of chassis).
3. Remove the eight copper head screws.
4. Disconnect the four flexible leads of the power unit from the chassis connector strip. These leads clip into pin jacks. Note that the color of each flexible lead matches the color dot on the chassis pin jack connector strip.
5. Place the model 709 A.C. power unit (see Fig. 2) on the top of the radio chassis and plug the four flexible leads into the pin jacks on the chassis connector strip.

![Diagram of Model 709 A.C. Power Unit]

**Procedure for Setting the Automatic Push Buttons**

**For Chassis 706, 707, 708, 792, and 793B.**
1. Pull the "Reset" button all the way out (see control No. 6, Fig. 1), and rotate the button to the left (counterclockwise) until it cannot be turned any further.

   You will note that as the button is rotated it will turn easily until the pointer reaches the end of the dial scale and then a slight amount of force will be required to actually start unlocking the tuner mechanism. Beyond this point the button will turn quite easily again until the tuner mechanism is completely unlocked. At this point do not force the button any further. The tuner mechanism is now unlocked.

   (NOTE:—Automatic tuner mechanism is locked tight when radio is shipped from the factory.)

   2. Push in all the way any one of the push buttons and at the same time push in firmly on the dial tuning knob. Both the dial tuning knob and the push button should be pushed hard enough to make them stay latched in.

   You may find it necessary to rotate the dial tuning knob slightly when pushing it in to make certain that the gears mesh properly.

   **For Chassis 792 and 793B only.**

   3. Both the pushbutton and the dial tuning knob are now latched in. Do not hold the pushbutton in by hand while tuning in a station. Tune in by means of the dial tuning knob the station indicated on the station call letter tab on the pushbutton which is latched in. Turn the dial tuning knob very slowly back and forth until the station is clearest. The station will then be accurately tuned.

   **For Chassis 706, 707, and 708 only.**

   3. Press in on the push button which is latched in. Holding it in firmly, tune in by means of the dial tuning knob the station indicated on the station call letter tab on this push button. Turn the dial tuning knob very slowly back and forth (while still pressing in firmly on the push button).

   **For all Models**

   4. Push in all the way another push button, at the same time push the dial tuning knob in so that both the push button and the dial tuning knob are latched in together. Holding the push button in firmly, tune in the station indicated on the call letter tab on this push button.

   5. Follow this procedure until you have tuned in all of your favorite stations.

   **Changing Stations:**

   If you should desire to change any station you selected to another, pull the "Reset" button all the way out and rotate the button to the left (counterclockwise) and unlock the tuner mechanism. Select the new station as explained.

   (NOTE:—If the dial mechanism works hard when setting up a new station for one of the automatic tuner push buttons, it is due to the tuner mechanism not being unlocked all the way. Pull the "Reset" button out all the way and rotate the button to the left (counterclockwise) until it will turn no further. The dial mechanism should work freely with the tuner push button pressed in).

   After you have selected the new station, pull the "Reset" button all the way out and rotate the button to the right (counterclockwise) to lock the tuner mechanism. Be sure the button is turned until it will turn no further.
TUBES:
The tube complement of this chassis consists of the following octal base glass and metal tubes.
The type and function of each tube is as follows.
1—Type 12SK7 R. F. Amplifier.
1—Type 12SA7 Mixer, First Detector-oscillator.
1—Type 12SQ7 I. F. Amplifier.
1—Type 12SQ7 Second Detector, A.V.C. and First Audio.
1—Type 5L6GT Beam Output Amplifier.
1—Type 3S25GT High Vacuum Rectifier.

SERVICE NOTES:
Voltages taken from different points of circuit to chassis are measured with volume control at minimum, all tubes in their sockets and speaker connected, with a volt meter having a resistance of 1000 ohms per volt.
All voltages as indicated on the voltage chart are measured with 117 volt A.C. or D.C. line.
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.
Excessive hum, stuttering, low volume and a reduction in all D.C. voltages is usually caused by a shorted electrolytic condenser; open by-pass condensers frequently cause oscillation and distorted tone.

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 line voltage, defective tubes, condensers and resistors. In order to properly align this radio, the chassis should be removed from the cabinet. It is important during alignment that the same distance between the loop antenna and the chassis be maintained as when the chassis is installed in the cabinet.

IMPORTANT: SEE ALIGNING INSTRUCTIONS.
- Loop antenna connected to radio.
- Volume control—Maximum all adjustments.
- Connect radio ground to ground post of signal generator with a short heavy lead.
- Connect dummy antenna values in series with generator output lead.
- Connect output meter across primary of output transformer.
- Allow chassis and signal generator to “heat up” for several minutes.

<table>
<thead>
<tr>
<th>BAND</th>
<th>SIGNAL GENERATOR</th>
<th>Frequency Setting</th>
<th>Dummy Antenna</th>
<th>Connection to Radio</th>
<th>Position of Band Switch</th>
<th>Variable Condenser Setting</th>
<th>Trimmer(Ad)</th>
<th>Trimmer Function</th>
<th>Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. F.</td>
<td>465 Kc.</td>
<td>.1 MFD.</td>
<td>Grid of 12SK7</td>
<td>Broadcast</td>
<td>Rotor full open (Plates out of mesh)</td>
<td>Two trimmers on top (See Fig. 1)</td>
<td>Output L.F.</td>
<td>Adjust to maximum output</td>
<td></td>
</tr>
<tr>
<td>I. F.</td>
<td>465 Kc.</td>
<td>.1 MFD.</td>
<td>Grid of 12SA7</td>
<td>Broadcast</td>
<td>Rotor full open (Plates out of mesh)</td>
<td>Two trimmers on top (See Fig. 1)</td>
<td>Output L.F.</td>
<td>Adjust to maximum output</td>
<td></td>
</tr>
</tbody>
</table>

SHORT WAVE BAND

<table>
<thead>
<tr>
<th>BAND</th>
<th>SIGNAL GENERATOR</th>
<th>Frequency Setting</th>
<th>Dummy Antenna</th>
<th>Connection to Radio</th>
<th>Position of Band Switch</th>
<th>Variable Condenser Setting</th>
<th>Trimmer(Ad)</th>
<th>Trimmer Function</th>
<th>Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>4000 Kc.</td>
<td>200 mmf.</td>
<td>Antenna Clip</td>
<td>Short Wave</td>
<td>Broadcast</td>
<td>Rotor full open (Plates out of mesh)</td>
<td>Trimmer C7 (See Fig. 3)</td>
<td>Short Wave oscillator</td>
<td>Adjust to maximum output</td>
<td></td>
</tr>
<tr>
<td>3500 Kc.</td>
<td>200 mmf.</td>
<td>Antenna Clip</td>
<td>Short Wave</td>
<td>Broadcast</td>
<td>Set Dial at 3.5 M.</td>
<td>Trimmer C6 (See Fig. 3)</td>
<td>Short Wave oscillator</td>
<td>Adjust to maximum output</td>
<td></td>
</tr>
<tr>
<td>1650 Kc.</td>
<td>200 mmf.</td>
<td>Antenna Clip</td>
<td>Short Wave</td>
<td>Broadcast</td>
<td>Set Dial at 1.65 M.</td>
<td>Trimmer C5 (See Fig. 3)</td>
<td>Short Wave oscillator</td>
<td>Adjust to maximum rock oscillator series pad (See note “A”)</td>
<td></td>
</tr>
</tbody>
</table>

BROADCAST BAND

<table>
<thead>
<tr>
<th>BAND</th>
<th>SIGNAL GENERATOR</th>
<th>Frequency Setting</th>
<th>Dummy Antenna</th>
<th>Connection to Radio</th>
<th>Position of Band Switch</th>
<th>Variable Condenser Setting</th>
<th>Trimmer(Ad)</th>
<th>Trimmer Function</th>
<th>Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1500 Kc.</td>
<td>200 mmf.</td>
<td>Antenna Clip</td>
<td>Broadcast</td>
<td>Broadcast</td>
<td>Rotor full open (Plates out of mesh)</td>
<td>Trimmer C8 (See Fig. 3)</td>
<td>Broadcast oscillator</td>
<td>Adjust to maximum output</td>
<td></td>
</tr>
<tr>
<td>1400 Kc.</td>
<td>200 mmf.</td>
<td>Antenna Clip</td>
<td>Broadcast</td>
<td>Broadcast</td>
<td>Set Dial at 1400 Kc.</td>
<td>Trimmer C6 (See Fig. 3)</td>
<td>Broadcast oscillator</td>
<td>Adjust to maximum output</td>
<td></td>
</tr>
<tr>
<td>600 Kc.</td>
<td>200 mmf.</td>
<td>Antenna Clip</td>
<td>Broadcast</td>
<td>Broadcast</td>
<td>Set Dial at 600 Kc.</td>
<td>Trimmer C8 (See Fig. 3)</td>
<td>Broadcast oscillator series pad</td>
<td>Adjust to maximum rock oscillator series pad (See note “B”)</td>
<td></td>
</tr>
</tbody>
</table>

NOTE “A”—Turn the dial back and forth slightly (rock) and adjust trimmer until the peak of greatest intensity is obtained.
NOTE “B”—Turn the dial back and forth slightly (rock) and adjust trimmer until the peak of greatest intensity is obtained.

Attenuate the signal from the signal generator to prevent the leveling-off action of the A.V.C.
After each band is completed, repeat the procedure as a final check.

BAND SWITCH | BAND | FREQUENCY RANGE |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Extreme Right Rotation</td>
<td>Short Wave</td>
<td>1.5 to 4.0 M.C.</td>
</tr>
<tr>
<td>Extreme Left Rotation</td>
<td>Broadcast</td>
<td>540 to 1550 K.C.</td>
</tr>
<tr>
<td>Power Consumption</td>
<td>.35 Watts</td>
<td></td>
</tr>
<tr>
<td>Power Output</td>
<td>1.25 Watts Undistorted, 1.8 Watts Maximum</td>
<td></td>
</tr>
<tr>
<td>Intermediate Frequency</td>
<td>465 K.C.</td>
<td></td>
</tr>
</tbody>
</table>
Compliments of www.nucow.com
Compliments of www.nucow.com

**BAND**

<table>
<thead>
<tr>
<th>Frequency Setting</th>
<th>Dummy Antenna</th>
<th>Connection to Radio</th>
<th>Position of Band Switch</th>
<th>Variable Condenser Setting</th>
<th>Trimmers Adjusted (in Order Shown)</th>
<th>Trimmer Function</th>
<th>Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.F. 465 Kc.</td>
<td>.1 MFD.</td>
<td>Grid of 2SK7</td>
<td>Broadcast</td>
<td>Rotor full open (Plates out of mesh)</td>
<td>Two trimmers on top (See Fig. 2)</td>
<td>Output</td>
<td>Adjust to maximum output</td>
</tr>
<tr>
<td>465 Kc.</td>
<td>.1 MFD.</td>
<td>Grid of 2AR07</td>
<td>Broadcast</td>
<td>Rotor full open (Plates out of mesh)</td>
<td>Two trimmers on top (See Fig. 2)</td>
<td>Input</td>
<td>Adjust to maximum output</td>
</tr>
</tbody>
</table>

**SHORT WAVE BAND**

(Same Notes A and B)

- **17 Mc.** 400 Ohms: External Antenna and Ground
  - Short Wave: Set Dial at 17 Mc.
  - Short Wave oscillator: Trimmer C1 (See Fig. 2)
  - Short Wave antenna: Adjust to maximum output

- **17 Mc.** 400 Ohms: External Antenna and Ground
  - Short Wave: Set Dial at 17 Mc.
  - Short Wave oscillator: Trimmer C2 (See Fig. 4)
  - Short Wave antenna: Adjust to maximum output

- **6 Mc.** 400 Ohms: External Antenna and Ground
  - Short Wave: Set Dial at 6 Mc.
  - Short Wave oscillator: Trimmer C3 (See Fig. 4)
  - Short Wave oscillator series pad: Adjust to maximum output

**BROADCAST BAND**

(Same Notes A and B)

- **1550 Kc.** 200 m.m.: Grid of 2AR07
  - Broadcast: Rotor full open (Plates out of mesh)
  - Broadcast oscillator: Trimmer C1 (See Fig. 2)
  - Broadcast oscillator series pad: Adjust to maximum output

- **540 Kc.** 200 m.m.: Grid of 2AR07
  - Broadcast: Set Dial at 540 Kc.
  - Broadcast oscillator: Trimmer C2 (See Fig. 4)
  - Broadcast oscillator series pad: Adjust to maximum output

- **1400 Kc.** 200 m.m.: Grid of 2AR07
  - Broadcast: Set Dial at 1400 Kc.
  - Broadcast antenna: Adjust to maximum output

**LOOP ALIGNMENT**

(Same Notes A and B)

- **600 Kc.** 200 m.m.: Grid of 2AR07
  - Broadcast: Rotor full open (Plates out of mesh)
  - Iron Core: Trimmer T3 (See Fig. 3)
  - Tracking Coil: Adjust to maximum output

---

**NOTES**

**A**—The signal generator is connected to the “ANT.” and “GND.” terminals on the back of the chassis when aligning the Short Wave Band and to the grid of the 2AR07 tube and ground terminals when setting the Broadcast Band coil or end frequencies (1550 and 540 Kc.).

The loop antenna must not be connected to the radio when making these adjustments.

**B**—Loop alignment is made with the chassis mounted in the cabinet and the loop antenna connected to the terminal board. The signal generator is connected to the “ANT.” and “GND.” terminals. (See Fig. 1).

**NOTE C**—Turns the dial back and forth slightly (rock) and adjust trimmer until the peak of greatest intensity is obtained.

After each band is completed, repeat the procedure as a final check.

---

**FIGURES TO LEFT REFER TO MODEL 791; FIGURES TO RIGHT REFER TO MODEL 792 Series A.**

---

**FIGURE 2—TOP VIEW**

**FIGURE 4—FRONT OF CHASSIS**

**FIGURE 1—REAR VIEW OF CHASSIS**

---

**FIGURE 5—REAR VIEW OF CHASSIS**
CHASSIS 792, 793B

ALIGNMENT PROCEDURE

- Volume control—Maximum all adjustments.
- Connect radio ground to ground post of signal generator with a short heavy lead.
- Connect dummy antenna valve in series with generator output lead.
- Connect output meter across primary of output transformer.
- Allow chassis and signal generator to "heat up" for several minutes.

The following equipment 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 mfd, 200 mmf, 400 ohms.

### SIGNAL GENERATOR

<table>
<thead>
<tr>
<th>BAND</th>
<th>Frequency Setting</th>
<th>Dummy Antenna</th>
<th>Connection to Radio</th>
<th>Position of Band Switch</th>
<th>Variable Condenser Setting</th>
<th>Trimmers Adjusted (in Order Shown)</th>
<th>Trimmer Function</th>
<th>Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.F.</td>
<td>465 Kc.</td>
<td>.1 MFD.</td>
<td>Grid of 12AG7</td>
<td>Broadcast</td>
<td>Rotor full open (Plates out of mesh)</td>
<td>Two trimmers on top (See Fig. 2)</td>
<td>Output I.F.</td>
<td>Adjust to maximum output</td>
</tr>
<tr>
<td></td>
<td>465 Kc.</td>
<td>.1 MFD.</td>
<td>Grid of 12AG7</td>
<td>Broadcast</td>
<td>Rotor full open (Plates out of mesh)</td>
<td>Two trimmers on top (See Fig. 2)</td>
<td>Input I.F.</td>
<td>Adjust to maximum output</td>
</tr>
<tr>
<td>SHORT WAVE BAND</td>
<td>17 Mc.</td>
<td>400 Ohms</td>
<td>External Antenna and Ground</td>
<td>Short Wave</td>
<td>Set Dial at 17 Mc.</td>
<td>Trimmer C3 (See Fig. 5)</td>
<td>Short Wave oscillator</td>
<td>Adjust to maximum output</td>
</tr>
<tr>
<td></td>
<td>17 Mc.</td>
<td>400 Ohms</td>
<td>External Antenna and Ground</td>
<td>Short Wave</td>
<td>Set Dial at 17 Mc.</td>
<td>Trimmer C3 (See Fig. 5)</td>
<td>Short Wave antenna</td>
<td>Adjust to maximum output</td>
</tr>
<tr>
<td>(See Note A)</td>
<td>6 Mc.</td>
<td>400 Ohms</td>
<td>External Antenna and Ground</td>
<td>Short Wave</td>
<td>Set Dial at 6 Mc.</td>
<td>Trimmer C10 (See Fig. 4)</td>
<td>Short Wave oscillator</td>
<td>Adjust to maximum output</td>
</tr>
<tr>
<td>BROADCAST BAND</td>
<td>1550 Kc.</td>
<td>200 mmf.</td>
<td>Grid of 12AG7</td>
<td>Broadcast</td>
<td>Rotor full open (Plates out of mesh)</td>
<td>Trimmer C4 (See Fig. 5)</td>
<td>Broadcast oscillator</td>
<td>Adjust to maximum output</td>
</tr>
<tr>
<td>(See Note A)</td>
<td>540 Kc.</td>
<td>200 mmf.</td>
<td>Grid of 12AG7</td>
<td>Broadcast</td>
<td>Set Dial at 540 Kc.</td>
<td>Trimmer C10 (See Fig. 4)</td>
<td>Broadcast oscillator</td>
<td>Adjust to maximum output</td>
</tr>
<tr>
<td>LOOP ALIGNMENT</td>
<td>1400 Kc.</td>
<td>200 mmf.</td>
<td>External Antenna and Ground</td>
<td>Broadcast</td>
<td>Set Dial at 1400 Kc.</td>
<td>Trimmer C1 (See Fig. 5)</td>
<td>Broadcast antenna</td>
<td>Adjust to maximum output</td>
</tr>
<tr>
<td>(See Note B)</td>
<td>600 Kc.</td>
<td>200 mmf.</td>
<td>External Antenna and Ground</td>
<td>Broadcast</td>
<td>Set Dial at 600 Kc.</td>
<td>Trimmer T2 (See Fig. 5)</td>
<td>Tracking Coil</td>
<td>Adjust to maximum output</td>
</tr>
</tbody>
</table>

It is important during loop alignment that the same distance between the loop antenna and the chassis be maintained as when the chassis is installed in the cabinet.

**NOTE "A"**—The signal generator is connected to the "ANT." and "GND." terminals on the rest of the chassis when aligning the Short Wave Band and to the grid of the 12AG7 tube and ground terminal when setting the Broadcast Band oscillator end frequencies, (1550 and 540 K.C.).

The loop antenna need not be connected to the radio when making these adjustments.

**NOTE "B"**—Loop alignment is made with the chassis mounted in the cabinet and the loop antenna connected to the terminal board. The signal generator is connected to the "ANT." and "GND." terminals and the jumper on the terminal board connected to the "EXT." terminal (See Fig. 1).

**NOTE "C"**—Turn the dial back and forth slightly (rock) and adjust trimmer until the peak of greatest intensity is obtained.

Attenuate the signal from the signal generator to prevent the leveling-off action of the AVC.

After each band is completed, repeat the procedure as a final check.

---

*FIG. 4*

*FIG. 5—TOP VIEW*
The tube complement of this chassis consists of the following octal base glass and metal tubes:

1. Type 12A8GT First Detector-oscillator.
3. Type 12Q7GT Triode Diode Triode Second Detector, A.V.C. and First Audio.
4. Type 12Q7GT Triode Diode Triode Second Detector, A.V.C. and First Audio.
5. Type 35L6GT Push-Pull Output Amplifier.
6. Type 35Z4GT High Vacuum Rectifier.

**TUBES:**

**Resistors**

- R1 12079 40 ohm—54 w.
- R2 12078 1 megohm—54 w.
- R3 12077 100 ohm—54 w.
- R4 12076 500 ohm—54 w.
- R5 12075 150 ohm—54 w.
- R6 12074 3 megohm—54 w.
- R7 12073 50 ohm—54 w.
- R8 12072 1 megohm—54 w.
- R9 12071 10 ohm—54 w.
- R10 12070 2 megohm—54 w.
- R11 12069 5 megohm—54 w.
- R12 12068 10 megohm—54 w.
- R13 12067 200 megohm—54 w.
- R14 12066 2000 megohm—54 w.
- R15 12065 12000 ohm—54 w.
- R16 12064 300 ohm—54 w.
- R17 12063 500 ohm—54 w.
- R18 12062 1000 ohm—54 w.
- R19 12061 20000 ohm—54 w.
- R20 12060 3000 ohm—54 w.
- R21 12059 100 ohm—54 w.
- R22 12058 500 ohm—54 w.
- R23 12057 50 megohm—54 w.

**Condensers**

- C1 12011 10000 ufd.
- C2 12012 10000 ufd.
- C3 12013 10000 ufd.
- C4 12014 10000 ufd.
- C5 12015 10000 ufd.
- C6 12016 10000 ufd.
- C7 12017 10000 ufd.
- C8 12018 10000 ufd.
- C9 12019 10000 ufd.
- C10 12020 10000 ufd.
- C11 12021 10000 ufd.
- C12 12022 10000 ufd.
- C13 12023 10000 ufd.
- C14 12024 10000 ufd.
- C15 12025 10000 ufd.
- C16 12026 10000 ufd.
- C17 12027 10000 ufd.
- C18 12028 10000 ufd.
- C19 12029 10000 ufd.
- C20 12030 10000 ufd.
- C21 12031 10000 ufd.
- C22 12032 10000 ufd.
- C23 12033 10000 ufd.
- C24 12034 10000 ufd.
- C25 12035 10000 ufd.

**Parts:**

- T1 11114 Loop Antenna
- T2 11115 Loop Adjusting Coil (Iron Core Tracking Coil)
- T3 11116 S. W. Antenna Coil
- T4 11117 B. C. - S. W. Oscillator Coil
- T5 11118 Input I. F. - 465 Kc.
- T6 11119 Output I. F. - 465 Kc.
- T7 11120 10" P. M. Speaker
- T8 11121 Output Transformer
- T9 11122 Power Transformer
- T10 11123 Automatic Record Changer complete
- S1 12594 Band Switch
- S2 12595 Phono-Radio Switch
- S3 12596 Tone Switch
- S4 12597 Off-on switch on volume control
- S5 12598 Off-on switch on record changer
- P1 10794 2 6.8 v. pilot lights
- P2 10795 Indicator Light
### SIGNAL GENERATOR

<table>
<thead>
<tr>
<th>Band</th>
<th>Frequency Setting</th>
<th>Dummy Antenna</th>
<th>Connection to Radio</th>
<th>Position of Band Switch</th>
<th>Variable Condenser Setting</th>
<th>Trimmer Adjusted (in Order Shown)</th>
<th>Trimmer Function</th>
<th>Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.F.</td>
<td>465 Kc.</td>
<td>.1 MFD.</td>
<td>Grid of 12SK7</td>
<td>Broadcast</td>
<td>Rotor full open (Plates out of mesh)</td>
<td>Two trimmers on top (See Fig. 2)</td>
<td>Output I.F.</td>
<td>Adjust to maximum output</td>
</tr>
<tr>
<td>I.F.</td>
<td>465 Kc.</td>
<td>.1 MFD.</td>
<td>Grid of 12AG7</td>
<td>Broadcast</td>
<td>Rotor full open (Plates out of mesh)</td>
<td>Two trimmers on top (See Fig. 2)</td>
<td>Input I.F.</td>
<td>Adjust to maximum output</td>
</tr>
</tbody>
</table>

### SHORT WAVE BAND

<table>
<thead>
<tr>
<th>Band</th>
<th>Frequency Setting</th>
<th>Dummy Antenna</th>
<th>Connection to Radio</th>
<th>Position of Band Switch</th>
<th>Variable Condenser Setting</th>
<th>Trimmer Adjusted (in Order Shown)</th>
<th>Trimmer Function</th>
<th>Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>17 Mc.</td>
<td>400 Ohms</td>
<td>External Antenna and Ground</td>
<td>Short Wave</td>
<td>Set Dial at 17 Mc.</td>
<td>Trimmer C (See Fig. 5)</td>
<td>Short Wave oscillator</td>
<td>Adjust to maximum output</td>
<td></td>
</tr>
<tr>
<td>17 Mc.</td>
<td>400 Ohms</td>
<td>External Antenna and Ground</td>
<td>Short Wave</td>
<td>Set Dial at 17 Mc.</td>
<td>Trimmer C (See Fig. 5)</td>
<td>Short Wave antenna</td>
<td>Adjust to maximum output</td>
<td></td>
</tr>
<tr>
<td>6 Mc.</td>
<td>400 Ohms</td>
<td>External Antenna and Ground</td>
<td>Short Wave</td>
<td>Set Dial at 6 Mc.</td>
<td>Trimmer C (See Fig. 4)</td>
<td>Short Wave oscillator series pad</td>
<td>Adjust to maximum output</td>
<td></td>
</tr>
</tbody>
</table>

### BROADCAST BAND

<table>
<thead>
<tr>
<th>Band</th>
<th>Frequency Setting</th>
<th>Dummy Antenna</th>
<th>Connection to Radio</th>
<th>Position of Band Switch</th>
<th>Variable Condenser Setting</th>
<th>Trimmer Adjusted (in Order Shown)</th>
<th>Trimmer Function</th>
<th>Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1500 Kc.</td>
<td>200 mfd.</td>
<td>Grid of 12AG7</td>
<td>Broadcast</td>
<td>Rotor full open (Plates out of mesh)</td>
<td>Two trimmers on top (See Fig. 2)</td>
<td>Broadcast oscillator series pad</td>
<td>Adjust to maximum output</td>
<td></td>
</tr>
<tr>
<td>540 Kc.</td>
<td>200 mfd.</td>
<td>Grid of 12AG7</td>
<td>Broadcast</td>
<td>Rotor full open (Plates out of mesh)</td>
<td>Two trimmers on top (See Fig. 2)</td>
<td>Broadcast oscillator series pad</td>
<td>Adjust to maximum output</td>
<td></td>
</tr>
</tbody>
</table>

### LOOP ALIGNMENT

<table>
<thead>
<tr>
<th>Band</th>
<th>Frequency Setting</th>
<th>Dummy Antenna</th>
<th>Connection to Radio</th>
<th>Position of Band Switch</th>
<th>Variable Condenser Setting</th>
<th>Trimmer Adjusted (in Order Shown)</th>
<th>Trimmer Function</th>
<th>Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1600 Kc.</td>
<td>200 mfd.</td>
<td>External Antenna and Ground</td>
<td>Broadcast</td>
<td>Set Dial at 1600 Kc.</td>
<td>Trimmer C (See Fig. 5)</td>
<td>Broadcast oscillator</td>
<td>Adjust to maximum output</td>
<td></td>
</tr>
<tr>
<td>600 Kc.</td>
<td>200 mfd.</td>
<td>External Antenna and Ground</td>
<td>Broadcast</td>
<td>Set Dial at 600 Kc.</td>
<td>Trimmer C (See Fig. 5)</td>
<td>Iron Core Tracking Coil</td>
<td>Adjust to maximum output</td>
<td></td>
</tr>
</tbody>
</table>

#### NOTE A
- The signal generator is connected to the "ANT." and "GND." terminals on the rear of the chassis when aligning the Short Wave Band and to the grid of the 12AG7 tube and ground terminal when setting the Broadcast Band oscillator end frequency. (1550 and 540 Kc.)

#### NOTE B
- Loop alignment is made with the chassis mounted in the cabinet and the loop antenna connected to the terminal board. The signal generator is connected to the "ANT." and "GND." terminals and the jumper on the terminal board connected to "EXT." terminal. (See Fig. 1.)

#### NOTE C
- Turn the dial back and forth slightly (rock) and adjust trimmer until the peak of greatest intensity is obtained. Attenuate the signal from the signal generator to prevent the leveling-off action of the AVC.

After each band is completed, repeat the procedure as a final check.

### BAND SWITCH

- **External Right Rotation**: Short Wave 3.7 to 18.3 Mc.
- **External Left Rotation**: Broadcast 540 to 1550 Kc.

Power Consumption (Radio Chassis only, less Phono Motor) 55 Watts
Power Output 3 Watts Undistorted, 5.6 Watts Maximum
Intermediate Frequency 465 Kc.

---

**FIG. 2—TOP VIEW**

**FIG. 4—REAR VIEW OF CHASSIS**

**FIG. 5—TOP VIEW**

**PHONOGRAPH OPERATION**

The Phono-Radio switch is of the push button type. (See button 5, fig. 3.)

For Phono operation push Phono push button all the way in. This will disconnect the radio and connect the phonograph pick-up. The volume and tone controls on the front panel of the radio are used for either radio or for phonograph.

To switch back to radio playing position push in on any one of the automatic tuning push buttons or the manual dial tuning control knob.

Included with this manual is a separate instruction manual for the Automatic Record Changer. Before operating the Record Changer familiarize yourself with the controls and the operation of the mechanism.
Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the alignment test are shown in the schematic drawing.

Output Meter Alignment—Use this method in cases where cathode-ray alignment cannot be obtained.

Test Oscillator—For all alignment operations, connect the low side of the test oscillator to the receiver ground binding post and keep the output as low as possible to avoid A.V. action.

Calibrating Marks—The tuning dial is in the cabinet and cannot be used for reference during alignment. Therefore, calibration marks corresponding to dial readings of 1500 kc, 2000 kc, and 2500 kc have been marked in the plate on the front of the chassis as shown in the accompanying diagram. Once these marks are found, the indicator should point to 1/16 inch to the left of the maximum capacity mark on the calibration plate.

Dial Indicator Adjustments—-When the chassis is placed in the cabinet and with the gang condenser in full stack, the indicator should be set at 1/16 inch to the left of the maximum capacity mark on the calibration plate.

Table of Steps

<table>
<thead>
<tr>
<th>Steps</th>
<th>Connect the high side of the test-osc to</th>
<th>Tune test osc. to</th>
<th>Type radio dial to</th>
<th>Adjust the following for maximum peak output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Antennas turned</td>
<td>450 kc</td>
<td>&quot;A&quot; Band Quiet point between 550-750 kc</td>
<td>C7 and C8 (6.8 l.f. mem.)</td>
</tr>
<tr>
<td>2</td>
<td>Antennas turned in series with 300 ohms</td>
<td>20 mc</td>
<td>&quot;C&quot; Band 1.500 kc calibration mark</td>
<td>C8 (comp.)</td>
</tr>
<tr>
<td>3</td>
<td>Antennas turned in series with 300 ohms</td>
<td>600 mc</td>
<td>&quot;A&quot; Band 1.500 kc calibration mark</td>
<td>C7 (comp.)</td>
</tr>
</tbody>
</table>

* Use minimum capacity peaks if any can be obtained. Check to determine that C5 has been adjusted properly by tuning receiver to approximately 1500 kc where a weaker signal should be received.

** Use minimum capacity peaks if any can be obtained. Check to determine that C5 has been adjusted properly by tuning receiver to approximately 1500 kc where a weaker signal should be received.

Alignment Adjustments for Push-Button Tuning

1660, 2660, 2669 A-2600 A-2620

The push-buttons should be adjusted for six favorite stations after the receiver has been operating for a period of several hours. Each button may be set up to suit the individual listener's preferences for range and sensitivity. The following adjustments should be made:

1. Locate the push-buttons by turning counter-clockwise until they come in their high position.
2. Check to make sure the Radio-Front switch is in "Radio" position.
3. Press in push-button No. 1 (left) as far as it will go without undue pressure, hold it in, and signal should be received, and then carefully release the switch to test the range. This may be repeated on the other push-buttons.

* Use minimum capacity peak if any can be obtained. Check to determine that C5 has been adjusted properly by tuning receiver to approximately 1500 kc where a weaker signal should be received.

** Use minimum capacity peak if any can be obtained. Check to determine that C5 has been adjusted properly by tuning receiver to approximately 1500 kc where a weaker signal should be received.

Dial Indicator and Drive Mechanism

Refer to "Alignment Procedure" for explanation of the "Alignment marks" shown in the diagram.

A-2620 & A-2620 Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the test-oscillator test are shown in the schematic drawing.

Output Meter Alignment—Use this method in cases where cathode-ray alignment cannot be obtained.

Test Oscillator—For all alignment operations, connect the low side of the test-oscillator to the receiver ground binding post and keep the output as low as possible to avoid A.V. action.

Calibrating Marks—The tuning dial is in the cabinet and cannot be used for reference during alignment. Therefore, calibration marks corresponding to dial readings of 1500 kc, 2000 kc, and 2500 kc have been marked in the plate on the front of the chassis as shown in the accompanying diagram. Once these marks are found, the indicator should point to 1/16 inch to the left of the maximum capacity mark on the calibration plate.

Dial Indicator Adjustments—-When the chassis is placed in the cabinet and with the gang condenser in full stack, the indicator should point to 1/16 inch to the left of the maximum capacity mark on the calibration plate.

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<td>450 kc</td>
<td>&quot;A&quot; Band Quiet point between 550-750 kc</td>
<td>C7 and C8 (6.8 l.f. mem.)</td>
</tr>
<tr>
<td>2</td>
<td>Antennas turned in series with 300 ohms</td>
<td>20 mc</td>
<td>&quot;C&quot; Band 1.500 kc calibration mark</td>
<td>C8 (comp.)</td>
</tr>
<tr>
<td>3</td>
<td>Antennas turned in series with 300 ohms</td>
<td>600 mc</td>
<td>&quot;A&quot; Band 1.500 kc calibration mark</td>
<td>C7 (comp.)</td>
</tr>
</tbody>
</table>

* Use minimum capacity peaks if any can be obtained. Check to determine that C5 has been adjusted properly by tuning receiver to approximately 1500 kc where a weaker signal should be received.

** Use minimum capacity peaks if any can be obtained. Check to determine that C5 has been adjusted properly by tuning receiver to approximately 1500 kc where a weaker signal should be received.

Alignment Adjustments for Push-Button Tuning

1660, 2660, 2669 A-2600 A-2620

The push-buttons should be adjusted for six favorite stations after the receiver has been operating for a period of several hours. Each button may be set up to suit the individual listener's preferences for range and sensitivity. The following adjustments should be made:

1. Locate the push-buttons by turning counter-clockwise until they come in their high position.
2. Check to make sure the Radio-Front switch is in "Radio" position.
3. Press in push-button No. 1 (left) as far as it will go without undue pressure, hold it in, and signal should be received, and then carefully release the switch to test the range. This may be repeated on the other push-buttons.

* Use minimum capacity peak if any can be obtained. Check to determine that C5 has been adjusted properly by tuning receiver to approximately 1500 kc where a weaker signal should be received.

** Use minimum capacity peak if any can be obtained. Check to determine that C5 has been adjusted properly by tuning receiver to approximately 1500 kc where a weaker signal should be received.

Dial Indicator and Drive Mechanism

Refer to "Alignment Procedure" for explanation of the "Alignment marks" shown in the diagram.

A-2620 & A-2620 Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the test-oscillator test are shown in the schematic drawing.

Output Meter Alignment—Use this method in cases where cathode-ray alignment cannot be obtained.

Test Oscillator—For all alignment operations, connect the low side of the test-oscillator to the receiver ground binding post and keep the output as low as possible to avoid A.V. action.

Calibrating Marks—The tuning dial is in the cabinet and cannot be used for reference during alignment. Therefore, calibration marks corresponding to dial readings of 1500 kc, 2000 kc, and 2500 kc have been marked in the plate on the front of the chassis as shown in the accompanying diagram. Once these marks are found, the indicator should point to 1/16 inch to the left of the maximum capacity mark on the calibration plate.

Dial Indicator Adjustments—-When the chassis is placed in the cabinet and with the gang condenser in full stack, the indicator should point to 1/16 inch to the left of the maximum capacity mark on the calibration plate.
Alignment Procedure

Output Meter Alignment.—Connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—Connect the low side of the test-oscillator to the receiver chassis, through a .01 mfd. capacitor, and keep the output as low as possible.

Pre-setting Dial.—With gang condenser in full mesh, the pointer should be horizontal.

Power Output (125 volts, 60 cycle supply) 0.75 watts
Distorted Maximum ............................................. 0.5 watts
Undistorted ......................................... Mazda 51, 7.5 volts, 0.2 amp.

Power Supply Rating (Models 3580, 4580, T-1580 and T-2580)
A-C Rating .......................................................... 105-125 volts, 50-60 cycles, 30 watts
D-C Rating .......................................................... 105-125 volts, direct current, 30 watts
Model P-880—Although this model employs an ac-dc chassis it is not suitable for use on dc, as this would damage the motor.

The phonograph motor on Model P580 is a self-starting, constant-speed induction type. It should be lubricated every six months by applying a few drops of light machine oil to the top and bottom motor spindle bearings. To the swiveling spindle and to the swiveling drive wheel bearing.

CAUTION: Keep oil away from drive bushing on top of motor spindle and from rubber driving tire on swiveling drive wheel.

Power-Supply Polarity.—For operation on d-c (except Model P580) the power plug must be inserted in the outlet for correct polarity. If the set does not function, reverse the plug. On a-c, reversal of the plug may reduce hum.

Antenna.—The set is equipped with a built-in loop antenna. If an outdoor antenna is used, it may be connected to the "ANT" lead on rear of cabinet. It should not be longer than 100 feet, including lead-in. If it is longer, connect a 100 to 200 mfd. capacitor in series with the lead-in.
Automatic Record Changer

Before servicing the automatic record changer, inspect the assembly to see that all levers, parts, gears, springs, etc. are in good order and are correctly assembled.

A bind or jam in the mechanism can usually be relieved by rotating the turntable in the reverse direction.

The changer can be conveniently rotated through its change cycle by pushing the index lever to "Reject" and turning the turntable.

**ADJUSTMENTS**

A. Main Lever.—This lever is basically important in that it interlocks the mechanism which controls needle landing, tripping, record separation, etc. One adjustment is provided for the main lever. Rotate the turntable until the changer is out-of-cycle; and adjust index lever to position (A) so that the roller clears the nose of the cam plate by 1/16 inch.

B. Friction Clutch.—The motion of the inner arm toward the center of the record is engaged at the rear of the inner arm to the trip pawl "22" by the trip lever through a friction clutch "3". If the motion of the pickup is abruptly accelerated or becomes irregular due to swinging in the eccentric groove, the frictioner "24" moves the trip pawl into engagement with the pawl on the main gear. This movement of the tone arm causes positive movement of the trip pawl "22" without tendency of the clutch to slip. The friction should be just enough to prevent slippage, and is adjustable by means of screw "B." If adjustment is too tight, the needle will repeat grooves; if too loose, tripping will not occur at the end of the record.

C. Pickup Lift Cable Screw.—During the record change cycle, lever "16" is actuated by the main lever "15" so as to raise the tone arm clear of the record by means of the pickup lift cable. To adjust pickup for proper elevation, stop the changer in "in-cycle" at the point where pickup is raised to the maximum height above turntable plate, and then turn lever "15" at point closest to and parallel to a line connecting both nuts at the extreme left of the tone arm. This adjustment should be made several times to check action, then tighten cone pointed screw "F."

D. E. Needle Landing on Record.—The relation of coupling between the vertical shaft and lever "20" determines the landing position of the needle on a 10 inch record. Position of eccentric stud "E" in the landing of the needle on a 13 inch record; this, however, is dependent on the proper 10 inch adjustment.

To adjust for needle landing, place 10 inch record on turntable; push index lever to "Reject" position and return to the 10 inch position; see that pickup locating lever "17" is tilted fully toward turntable. Rotate mechanism through cycle until needle is just ready to land on the record; then in contact with "Step 7" on lever "17." The correct point of landing is 4-11/16 inches from lead-in end of the turntable spindle; loosen the two screws "D" and adjust horizontal position of tone arm to proper dimension. Reduce or disturb levers "14" and "15". Leave approximately 1/32 inch end play between hub lever "20" and pickup base bearing, and tighten the blunt nose screw "D"; run mechanism through several cycles as a check, then tighten cone pointed screw "D."

After adjusting for needle landing on a 10 inch record, place 12 inch record on turntable; push index lever to "Reject" and return to 12 inch position; rotate mechanism through cycle until needle is just ready to land on the record; the correct point of landing is 5-11/16 inches from nearest side of spindle. If the landing is incorrect, turn stud "E" until the eccentric end adjusts lever "14" to give correct needle landing. The eccentric end of the stud must always be to the rear of the motor board, otherwise incorrect landing may occur with 10 inch records.

**MISCELLANEOUS**

Incorrect adjustment of a particular mechanism of the changer is generally exhibited in a specific mode of improper operation. The following relations between effects on operation and the usual misadjustments will enable ready adjustment in most cases.

1. For any irregularity of operation, the adjustment of the main lever "15" should be checked first as in "A."
2. Needle does not land properly on both 10 and 12 inch records—Make complete adjustments "D" and "E."
3. Needle does not land properly on 12 inch record but correct on 10 inch—Effect adjustment "E."
4. Failure to trip at end of record—Increase clutch "G" friction by means of screw "F". Also, see levers "F" and "12" are free to move without touching each other.
5. Pickup strikes lower record of stack or drags across top record on turntable—Least lift cable per adjustment "C."
6. Needle does not track after landing—Friction clutch "G" adjustable. Six turntable revolutions are required for one change cycle. If the record changer or cabinet is not perfectly level, normal operation is likely to be affected.

A shorting switch, located in the pickup head, operates due to the moment when the pickup is placed on the pickup rest.

**F. G. Record Separating Knife.—The upper plate (knife) "25" on each of the record posts serves to separate the lower section from the stack and to support the remaining records during the change cycle. It is essential that the spacing between the knife and the rotating record shell be 27/32 inch. The spacing on the 10 inch record is nominally .058 inch, and for the 12 inch record is .075 inch. To adjust, rotate the knife to the proper vertical separation from the record shell and turn screw and locknut "F" to give .055-.056 inch separation. Screw "G" must not be depressed during this adjustment. After setting screw "F", it may be necessary to turn screw "G" so that when its tip is depressed flush with the top of record shell, the vertical spacing between the knife and the shell is correct, and the shell is 075-.078 inch."

**M. Record Support Shaft.—The record sleeve revolves during the change cycle to allow the pickup to drop onto the turntable. Record posts are rotated simultaneously by a gear and rack coupled to the main lever "15", and it is necessary that adjustment be such that the record is released from both sleeves at the same instant. To adjust, increase a 12 inch record on the point where the tone arm is at maximum distance outward from turntable; lift record upward until it is in contact with both separating knives, then loosen screws "H" and shift record sleeves so that the curved inner edges of the sleeves are uniformly spaced at least 1/16 inch from record edge. Tighten the blunt nose screw "H." Run mechanism through several times to check action, then tighten cone pointed screw "H."

If record sleeves or knives are bent, or not perfectly horizontal, improper operation and jamming of mechanism will occur.

**J. Tone Arm Rest Support (not shown).—When the changer is out-of-cycle, the front lower edge of the pickup housing is 13/32 inch above surface of motor board. This may be adjusted by bending the tone arm support bracket, which is associated with the tone arm mounting base, in the required direction.

**K. Trip Pawl Stop Pin.—The position of the trip pawl stop pin "K" in relation to the main lever "15" governs the point at which the roller enters the cam. By bending the stop pin in or away from trip pawl bearing stud, the roller can be made to enter the cam later or earlier, respectively. This adjustment should be made so that the roller definitely clears the cam outer guide as well as the nose of the cam plate.

**Lubrication.—Petroleum or petroleum jelly should be applied to cam, main gear, spindle pinion gear, and gears of record posts.

Light machine oil should be used in the tone arm vertical bearing, record post bearings, and all other bearings of various levers on underside of motor board.

Apply a few drops of light machine oil to the motor spindle bearing and oil hole adjacent to the spindle bearing. The oil hole has a screw for fitting the oil cap to prevent loss of oil.

Do not allow oil or grease to come in contact with, rubber mounting, tone arm base, rubber bumper, or rubber spindle cap.

**SERVICE HINTS**

- **Adjustment "B"** may be too tight; bind in tone arm vertical bearing; levers "9" and "12" flooded; or pickup output cable reversed.
- **Cycle commences before record is complete—Record is defective, or adjustment "B" of friction clutch "9" is too tight.**
- **Wow in record reproduction is defective, or instrument is not being operated at normal room temperature (65° F).**
- **Record knives strike edge of records—Records warped; record edges are rough; or knife adjustments "F" and "G" are incorrect.**
- **Record not released properly—Adjust record shell assemblies in respect to shaft by means of adjustment "H."
- **Needle lands in 10 inch position on 12 inch record or misses record when playing both types mixed—Increase tension of pickup locating lever spring "84."

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Compliments of www.nucow.com

**Models 1700, A2700, A3720**

**Brunswick Div.-Mersman Bros.**

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**Top View of Automatic Record Changer**

**Details of Record Shelf Posts and Locating Laser Assemblies**

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The corresponding position of the dial indicator for any setting of the calibration scale can be determined by drawing a line from this point on the bottom calibration scale to the same point on the top calibration scale. For example, 40° on the calibration scale corresponds to 600 kc on “A” band. Read instructions under “Alignment Procedure.”

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## Alignment Procedure

**Cathode-Ray Alignment** is the preferable method. Connections for the oscillograph are shown in the schematic drawing.

**Output Meter Alignment.**—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

**Test-Oscillator.**—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the output as low as possible to avoid s-v-c action.

**Calibration Scale on Indicator-Drive-Cord Drum.**—The tuning dial is fastened in the cabinet and cannot be used for reference during alignment; therefore, a calibration scale is attached to the tuning drum. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

As the first step in radio alignment, check the position of the drum. The 10° mark on the drum scale must be vertical and directly under the center of the shaft of the tuning drum when the plates are fully meshed. The drum is held to the shaft by means of two set-screws, which must be tightened securely when the drum is in the correct position.

On the inner side of the tuning drum are two projections which serve as stops to prevent extreme rotation of the gang condenser. The tuning drum should be set so that the stop limiting clockwise movement of the drum takes effect just as the gang condenser plates are becoming fully meshed, thus preventing stress on the gang due to extreme rotation.

### Tube and Trimmer Locations

<table>
<thead>
<tr>
<th>Steps</th>
<th>Connect the high side of the test-osc. to</th>
<th>Tune test-osc. to</th>
<th>Turn radio dial to</th>
<th>Adjust the following for maximum peak output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6SK7 grid in series with .01 mfd.</td>
<td>455 kc</td>
<td>&quot;A&quot; band Quiet point between 550-750 kc</td>
<td>L3 and L4 (2nd I-F trans.)</td>
</tr>
<tr>
<td>2</td>
<td>6SA7 grid in series with .01 mfd.</td>
<td>20 mc</td>
<td>(199°) &quot;C&quot; band</td>
<td>L1 and L2 (1st I-F trans.)</td>
</tr>
<tr>
<td>3</td>
<td>Ant. terminal in series with 300 ohms</td>
<td>6 m</td>
<td>(187.2°) &quot;B&quot; band</td>
<td>C3 (osc.) *</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>1,500 kc</td>
<td>(198.2°) &quot;A&quot; band</td>
<td>C5 (osc.) *</td>
</tr>
<tr>
<td>5</td>
<td>Ant. terminal in series with 200 mmd.</td>
<td>600 kc</td>
<td>(40°) &quot;A&quot; band</td>
<td>Rock gang</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Repeat step 5.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Use minimum capacity peak if two can be obtained.
** Use minimum capacity peak if two can be obtained.

*Note.—Oscillator tracks above signal on all bands.*

### Adjustments for Push-Button Tuning

The push-buttons should be adjusted for six favorite stations after the receiver has been operating for a brief warm-up period. Each button may be set up to any standard broadcast station. The preferable arrangement is to adjust for stations in the order of frequency, from low to high. Proceed as follows:

1. Loosen the push-buttons by turning counter-clockwise about one turn from their tight position so they turn freely.
2. Check to be sure the Phono-Radio switch is in "Radio" position.
3. Press in push-button No. 1 (left) as far as it will go without undue pressure, hold in, retune station with manual control if necessary for best reception, and then carefully tighten up the button. Do not tighten more than 1/4 turn after the screw begins to grip or damage to the mechanism may result.
4. Proceed in a similar manner for the remainder of the push-buttons.
5. Insert the station marker tabs in the recesses above the push-buttons.

The crystal pickup is sealed in a metal case as protection against extreme changes of climate. If failure occurs, do not attempt to repair the unit, but install a new crystal unit.
Fig. 9 General Arrangement - Dial & Drive Assembly

Fig. 10 Parts Layout - Tuner Unit - Bottom View
SERVICE HINTS

Disassembling For Parts Replacements

To replace condensers, resistors, coils, etc., remove eight screws as shown in Fig. 1. Raise the bottom edge of the speaker cover, keeping it pushed forward so that the speaker field will clear the power supply shield, as shown in Figs. 2 and 3.

Unsolder voice coil lead "A" in Fig. 3 and set the speaker to the left of the set, as shown in Fig. 4. This exposes all of the wiring side of the chassis and component parts.

To replace tubes, vibrator or to realign when required, it is only necessary to remove the back cover.

To replace dial drive cord, remove the speaker and back cover as outlined above and remove eight screws holding the tuner cover, as shown in Fig. 5. Lay the cover back, as shown in Fig. 6, exposing the tuner unit and component parts.

Dial Cord or Pointer Replacement

1. Unhook the cord eyelets from drive pulley. Illustration 99 in Fig. 10.
2. Move pointer by hand toward the 1500 KHz end of the dial until the pointer pivot pin drops through the enlarged end of the pointer guide slot.
3. Lift the pointer and pointer cord out of the tuner from the dial side.
4. File off the lower tip of the pointer guide pin, releasing the retaining washer and the cord pivot arms. Fig. 10.
5. With the pointer upside down and pointing away from the operator, put the long cord pivot arm on the left. Cord side up.
6. Place the short pivot arm (spring assembly) on the right. Cord side up.
7. Replace the retaining washer and solder it to the guide pin.
8. Replace the pointer. Place pivot pin in the enlarged end of the guide slot and then slide the rear end of the pointer into the rear support bearing.
9. Place the long cord behind the pointer and over pulleys. (Illustration 92 in Fig. 9 Page 130) Hook the cord eyelet over the drive pulley hook nearest the front of the tuner and push the cord into position around the pulley rim.
10. Put the spring loaded cord over pulleys in between the longer string and the tuner frame before hooking the cord eyelet to the drive pulley.

Fig. 1 Remove these 8 screws to disassemble

Fig. 2 Removing speaker cover
ANTENNA INSTALLATION INSTRUCTIONS

Three Vacuum Antenna packages released for use on 1940 Cadillac and LaSalle cars are:

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>1436388</td>
<td>40-50</td>
</tr>
<tr>
<td>1436389</td>
<td>40-52, 606, 62, 72, 76</td>
</tr>
<tr>
<td>1436390</td>
<td>40-75, 90</td>
</tr>
</tbody>
</table>

These packages are identical except for the insulators and attaching parts, but it is extremely important that the proper assembly be used for the particular car on which the installation is being made, else the bakelite insulators will not properly fit the hood contours.

TO INSTALL VACUUM ANTENNA

1. Place the template supplied in the antenna package on the cowl and punch the center of the 1-1/32" hole with a center punch, using the 1/4" pilot drill of Hinkley-Hyars J-1277-C tool to drill through the cowl at the angle shown in the top view of Fig. 1. After this hole is drilled raise the drill to a vertical position as shown in the lower view of Fig. 1 and drill through with the 1-1/32" cutter.

If a Hinkley-Hyars J-1277-C tool is not available this hole may be cut by drilling around the edge of the outline of the hole on the template with a 5/32" drill and filing off the rough edges. Cuts should be exercised so that the finished hole will not be too large.

Hinkley-Hyars tool J-1277-C may be purchased direct from Hinkley-Hyars Co., Jackson, Michigan.

2. Remove side panel kick pad.

3. Assemble the hoses supplied with the antenna to the control valve as shown in Fig. 2 and install in the far left hole provided in the left end of the lower flange of the instrument panel.

4. Attach the bottom antenna support bracket (L) to the front end body brace on Series 40-50, 52, 62 and 72 with self tapping screw, as shown in Fig. 3. The hole is provided in Series 40-50 but must be drilled in Series 40-52, 62 and 72. On Series 40-606, 76 and 90 this support is built into the body brace and it is only necessary to insert the rubber grommet through the hole.

5. Lower the antenna assembly through the hole in the cowl and put on rubber grommet (K) in Fig. 3 and washer (J) and rubber spacer (H) in Fig. 4.

6. Assemble lower hose connection to the bottom of the antenna, as shown in Fig. 5.
7. Assemble antenna lead and upper hose connection with parts in order as shown in Fig. 4.

8. Ground antenna lead shield to upper body brace with self-tapping screw. The hole for this screw is provided on Series 40-50, 60, 56 and 72. On Series 40-60, 62 and 70 it will be necessary to drill a 9/64th hole for this screw.

9. Attach the 14" length of hose securely to the upper antenna connection through cap, as shown in Fig. 4.

10. Attach the 36" length of hose to the lower hose connection on the antenna, as shown in Fig. 4.

11. Raise the antenna through the hole in the cow and install the rubber pad (A) Bakelite insulator (B) Washer (C) Brass Washer (D) Packing gland (E) and nut (F). Tighten nut (F) until the shroud and the antenna insulator seats against the top of antenna shield, as shown in Fig. 4. IMPORTANT - when tightening nut (F) do not get it too tight. Turn it down carefully until the stop is reached, then back off slightly.

12. Push grommet (X) into place in bracket (L) or the hole in the support brace, as shown in Fig. 6.

13. Cut windshield wiper hose and insert the tee connection. Attach the 40-inch length of hose to the tee connection, as shown in Fig. 6.

14. Plug the antenna lead into the radio set and check adjustment of the antenna trimmer for proper setting. Radios shipped from the factory are set for use with the Vacuum aerial.

15. Start the motor and check the operation of the antenna. Raise the control wave up to raise the antenna and pull down and lower the antenna. For best operation occasionally wipe the antenna rod free of dust and other accumulation.

TO SET UP PUSH BUTTON
It is important that the buttons be set accurately. This may be accomplished by lowering the vacuum aerial to a point where the signal is just being heard. Setting the stations selected by the push button has been made easy. Pulling off a button reveals a screwdriver slot recessed in a brass tube next to the button plunger arm. This screw, when rotated counterclockwise by means of a screwdriver furnished with the set in the factory, letter envelope, unlock the inner setting for that particular button. The plunger arm is then held in a fully depressed position while the station is tuned in by means of the manual tuning wheels. The plunger arm is then released and the locking screw is tightened by rotating in a clockwise direction with the screwdriver provided. Check accuracy of setting by tuning in from each end of the dial with the button.

FIGURE 4

COIL CONDENSER INSTALLATION
Install coil condenser, Part #1979556, in the top of the ignition coil, using Tool J-426 to remove the cover. Make sure the coil is well grounded to the dash by scraping off the paint on the dash and coil bracket.

FIGURE 6

FIGURE 7

Install generator condenser, Part #144904, on the generator terminal of the relay box.

Install suppressor, Part #454602, in the center terminal of the generator relay and connect the suppressor with the self-stick wire. See Fig. 6. Bend cotter key over the nut as shown, so that the clips do not interfere with the self-stick wire.

On some cars it may be necessary to bend the oil and throttle line to the dash.

Bend to the frame at the two motor supports, using the bond strips supplied in the antenna package.

Bend the exhaust system to the frame, using bond strips supplied with the antenna.

Bend transmission housing to center crossmember.

Bend transmission housing to the floorboard, making the bond as short as possible.

Bend both engine mounts to the dash.
CADILLAC 1940 AUTOMATIC RADIO FOR REAR COMPARTMENT INSTALLATION

SETTING UP STATIONS ON PUSH BUTTONS

There are six push buttons on the remote tuner unit by means of which six stations may be set up for automatic tuning (see Fig. 1).

Select the six stations desired and punch out from the set of station call letter tabs supplied the call letters of the stations selected. On the top of each push button a slot is provided for inserting the call letter tabs (see A, Fig. 1). Insert the tabs, then proceed as follows:

1. Push in all the way any one of the push buttons and at the same time hold in firmly the dial tuning knob. Both the dial tuning knob and the push button should be pushed hard enough to make them stay latched in. The reason for holding the dial tuning knob in firmly when the push button is pressed in is that the latching mechanism in the remote tuner unit which is so constructed as to release the tuning knob when a push button is not pressed in. When setting up stations for automatic tuning, however, it is necessary that both the dial tuning knob and the push button not be latched together.

2. Press in on the push button which is latched in. Holding it firmly, turn it by means of the manual tuning knob the station indicated on the station call letter tab on this push button. Turn the dial tuning knob very slowly back and forth (while still pressing in firmly on the push button), until the station is accurately tuned in.

3. Push in all the way another push button, at the same time holding the dial tuning knob in so that both the push button and the dial tuning knob are latched together. Holding the push button in firmly, tune in the station indicated on the call letter tab on this push button.

4. Follow this procedure until you have tuned in all six selected stations.

5. When the last push button has been properly set up it is necessary to release it from the latched-in position before the tuner mechanism can be locked. To release this push button, slightly depress any other push button, this will trip the latching mechanism and all the push buttons will be released to out position.

TO LOCK

(NOTE: All the push buttons must be in out position when locking the tuner mechanism.)

To lock the tuner mechanism push on the dial tuning knob hard enough to make it stay latched in. Rotate the dial tuning knob to the right (clockwise) until the knob cannot be turned any further with forcing it. (See Fig. 4.) This will lock the tuner mechanism and all the stations that have been set up on the buttons will be locked in place for automatic tuning.

ANTENNA

An under car antenna must be used with the rear compartment radio. Instructions for installation are supplied with each antenna.

ALIGNMENT PROCEDURE

Two separate alignment procedures are included in these instructions. The first is to be considered the usual alignment procedure and the second to be used only when a tuning coil has been replaced or where major change has been made in the tuning apparatus.

CAPACITY ALIGNMENT

I.F. Alignment at 455 KC

(a) Connect an output meter across the voice coil of the speaker leaving speaker connected or connecting a 1.7 ohm load instead of the speaker.

(b) Connect the ground lead of the signal generator to the set chassis and the signal lead to the 'C' prong of the 788 tube through a .1 md. condenser.

(c) With signal generator frequency set at 455 kilocycles adjust the I.F. trimmers 'A', 'B', 'D' & 'E' and I.F. core adjustment 'K' in the sequence named until maximum output is obtained. Fig. 5 & 6.

(d) Connect the signal lead of the signal generator to the antenna connection of the set through a 150 md. condenser. Adjust the I.F. trap adjustment 'F' for maximum output. (Generator frequency 456 KC) Fig. 5.

Alignment at 1530 KC

(a) Set frequency of the signal generator to 1530 KC.

(b) By means of the manual tuning control adjust the tuning control of the set to its highest frequency position against the high frequency stop.

(c) Adjust the oscillator trimmer ('osc' on tuning units) for maximum output. See Fig. 7.

Alignment at 600 KC

(a) Set the signal generator frequency to 600 KC.

(b) Tune set to this signal and adjust the RF trimmer ('F.R.' on tuning unit) for maximum output, while rocking tuning control back and forth through the signal. See Fig. 7.

(c) Adjust the antenna trimmings ('Ant 1' and 'Ant 2') on the tuning unit for maximum output. Fig. 7.

Alignment at 1600 KC

(a) Set signal generator frequency to 1600 kilocycles and tune set to this signal.

(b) Using an insulated three prong tool adjust the core positions for maximum output readings.
Compliments of www.nucow.com
At 250 KC: Use a .1 mfd. condenser as dummy. Signal to 6A8GT grid (LEAVE GRID CAP IN PLACE). Adjust second and then first IF trimmers.

At 1560 KC: Use a .00007 mfd. condenser as dummy. Signal to antenna post. Adjust oscillator parallel trimmer (e) for maximum output.

At 1400 KC: Use a .00007 mfd. condenser as dummy. Connections as for 1560 KC. Adjust antenna RF (f) and (g) trimmers for maximum output.

At 600 KC: With same connections adjust oscillator pad (h) at 600 KC while rocking condenser, for maximum output. Readjust at 1400 KC. With station selector, tune in 1400 KC signal for maximum output. Readjust trimmer on antenna section of gang condenser for maximum output.
The circuit used in this receiver is the conventional superheterodyne type and does not use any regeneration. A special tone control circuit is employed to give the desired tone with no distortion.

**POWER SUPPLY:** The power supply uses an OZ4 rectifier tube in conjunction with a full wave primary type vibrator.

<table>
<thead>
<tr>
<th>Production Service Part No.</th>
<th>Part No.</th>
<th>Description / Function</th>
</tr>
</thead>
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<td>100,000 ohms 5 Watt—A.V.C. Isolator</td>
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<td>15,000 ohms 3 Watt—Screen By-Pass</td>
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<td>150,000 ohms 5 Watt—Diode Filter</td>
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<td>15 megohm 5 Watt—6QT7 Grid</td>
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<td>Resistor, Ins.</td>
<td>350 ohm 1 Watt—Output Tube Bias</td>
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<td>7239031</td>
<td>Resistor, Ins.</td>
<td>250,000 ohms 5 Watt—Plate Dropping</td>
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<td>7239037</td>
<td>Resistor, Ins.</td>
<td>250,000 ohms 5 Watt—SV67 Grid</td>
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<td>7239038</td>
<td>Resistor, Ins.</td>
<td>250,000 ohms 5 Watt—Primary Power</td>
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<td>Resistor, Ins.</td>
<td>100 ohm 5 Watt—Secondary Primary Load</td>
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<td>600 ohm 1 Watt—&quot;B&quot; Filter</td>
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<td>Resistor, Ins.</td>
<td>820 ohm 5 Watt—Audio Coupling</td>
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<td>Transformer</td>
<td>Audio Output</td>
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<td>7239046</td>
<td>Transformer</td>
<td>Vibrator Power</td>
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<tr>
<td>7239048</td>
<td>Transformer</td>
<td>Dial Light</td>
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</tbody>
</table>
CIRCUIT ALIGNMENT

At 455 KC: Connect signal generator lead to "X" (see fig.1) which is the grid lead of the 6SA7GT tube through a .1 mfd. condenser. Adjust trimmers (a) (b) (c) and (d) for maximum output.

At 1520 KC: Connections as for 455 KC. Condenser at minimum capacity. Adjust (e) for maximum output.

At 540 KC: With connections as above, condenser at maximum capacity, adjust oscillator pad (f) for maximum output.

At 1400 KC: Use a .0002 mfd. condenser (ONLY) as dummy. Connect signal lead to antenna post (Place tap on antenna coil assembly to running board antenna position). Adjust antenna trimmer (g) to maximum output.

At 800 KC: Readjust oscillator pad (f) at this frequency while rocking condenser.

FOR CONVENTIONAL ALIGNMENT PROCEDURE SEE SPECIAL SECTION VOL. VIII.

ANTENNA SYSTEM: There are three antenna systems available for use with this receiver; the under car, the turret top, or the telescopic cowl antenna. Any one of these antennas will operate very efficiently when used with this Chevrolet radio.
This auto radio is a five tube single unit universal receiver with automatic push button tuning. Tuning is accomplished by a mechanical unit of rugged construction assuring accuracy. A special compensating condenser is employed in the oscillator circuit to minimize all receiver drift due to normal variation in car voltages and temperature ranges. The power supply consists of a 6X5GT power rectifier tube used in conjunction with a full wave plug in vibrator. The receiver is designed to mount in 1948 Chevrolet cars, and also in all other cars and trucks.
Voltagess measured with 1000 ohm per volt D.C. voltmeter between socket terminals and negative "B" supply.

*Oscillator voltages measured with R. F. choke in series with voltmeter lead.

NOTE: Voltages as indicated are measured with power switch in AC-DC position and radio connected to 115 volt 60 cycle AC line.

FIG. 4 TUBE VOLTAGE CHART
CIRCUIT ALIGNMENT

IMPORTANT: If maximum sensitivity is to be obtained from this receiver, after re-alignment, it is very important that the following procedure be closely observed:

   a. Connect the signal lead of the test oscillator to the grid of the 4A7GT tube, through a 1 mfd condenser.
   b. Connect the ground lead of the test oscillator to the negative "A" lead of the radio (gray wire of the "B" battery lead assembly).
   c. Connect the output meter across primary winding of the output transformer.
   d. Set the test oscillator to exactly 465 kilocycles.
   e. Adjust the trimmers on the 1st and 2nd I.F. transformers (Illus. No. 3 and No. 4, Fig. 1) carefully for maximum output.

These adjustments should be repeated several times and during the alignment the test oscillator output should be kept as low a value as possible, to obtain readable indication on the output meter.

2. Aligning at 1550 kilocycles.
   a. Leave the test oscillator leads connected the same as for aligning the I.F. circuits.
   b. Turn the rotor plates of the gang condenser all the way out and against the high frequency stop.
   c. Set the test oscillator to 1550 kilocycles.
   d. Adjust the trimmer for the oscillator section of the condenser gang (Illus. No. 5B, Fig. 1) for maximum output. It is very important that this frequency be set accurately as a slight mis-setting will cause the tuning to be out of track over the entire high frequency end of the dial.

3. Aligning at 1800 kilocycles.
   a. This adjustment should be made with the loop antenna placed alongside the chassis. It is important that the same distance between the loop antenna and the chassis be maintained as when the chassis and loop are installed in the cabinet.
   b. Connect the signal lead of the test oscillator to the external antenna terminal on the loop antenna through a 200 mfd. dummy.
   c. Connect the ground lead of the test oscillator to the external ground terminal on the loop antenna.
   d. Set the test oscillator to exactly 1800 K.C.
   e. Turn the condenser rotor plates until this frequency is tuned in with maximum output.
   f. Adjust the trimmer on the condenser gang (Illus. No. 5A, Fig. 1) for maximum output.
CONVENTIONAL ALIGNMENT SEE SPECIAL SECTION VOLUME VIII.

S.W. ALIGNMENT

Set the dial pointer to 6000 KC (also the test oscillator) and adjust the antenna and antenna trimmer to resonance. The short wave band coils are under the chassis and are located at the right front corner along side of wave band switch.
MODEL A2
Schematic, Socket
CONTINENTAL RADIO & TELEV. CORP.
Alignment, Trimmers

CONVENTIONAL ALIGNMENT
SEE SPECIAL SECTION
VOLUME VIII
CONTINENTAL RADIO & TELEV. CORP.

MODELS A4, B4
MODSLS C5, X5
Schematics, Alignment

Compliments of www.nucow.com

CONTINENTAL PAGE. 11-3

I.F. PEAK - 455 KC
TRIM OSC. - 1730 KC
TRIM ANT. - 1400 KC.

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A4, B4
For SOCKET LAYOUT
See INDEX

C5 & X5

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MARCH 1940

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Compliments of www.nucow.com
C10 and C12 used in model SQL only. On model SQ point "A" is connected to chassis.

Voltagess:— Line 115 V. A.C. — Power Consumption 30 Watts; — Vol. cont. max; 1000 A.C. — Antenna started to ground; — Meter scale 1000 γ per volt, 150 volt scale; — Taken from point indicated to point "A."

TRIM OSC—1750 KC  
TRIM ANT—1400 KC  

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WAVE TRAP ADJUSTMENT

At the rear of the chassis near the Antenna and Ground post is an adjustment screw connected to a trap circuit for elimination of code interference when operating on the broadcast band. If code interference is encountered adjustment of this screw will filter it out. It is to be used only if such interference is experienced in broadcast reception. It's use prevents code transmitters operating on a frequency around 456 K.C. from being received by the L.F. amplifier which is tuned to 456 K.C.

SERVICE DATA FOR ALL BANDS

If it is suspected that the oscillator has stopped but components should be accomplished by grounding is doubtful due to the presence of the usual amount the stator mounting nut to the frame of the coil noise level, it is suggested that the oscillator plate denser with a screw-driver or any metallic convoltage be checked. To ascertain whether the tube ductor.

is oscillating, ground the oscillator grid of the 6A9 (short stator and rotor plates of oscillator section on Do not wedge a screw-driver between the plates for gang condenser). If oscillating properly, grounding this is liable to permanently warp the plates and the grid will cause an appreciable drop in oscillator thus prevent the oscillator section of the gang convoltage. Grounding or shorting the stator and grid denser from tracking probably.
POWER SUPPLY

The power supply of this portable radio uses one Ray-O-Vac No. P96A, General No. 6F-1, Burgess No. 6FP1 or Eveready No. 743. Portable "A" battery and two Ray-O-Vac No. 5303, General No. V-30-B, Burgess No. B30P1 or Eveready No. 762 Portable "B" batteries.

ALIGNMENT

BROADCAST BAND
Trim Ant. - 1400 kc
06u - 1610 kc
I.F. - 455 kc

IF. ALIGNMENT

Remove the chassis from the cabinet and connect one end of a 100,000 ohm resistor to the grid of the 1A7 tube and the other end to the A.V.C. farnsworth clip (See "antenna and ground" for location of this clip). Adjust the signal generator to 455 KC and connect the output to the grid of the first detector tube (1A7) thru a .05 or .1 mfd. condenser. The ground of the signal generator should be connected to the chassis ground. Align all I.F. trimmers to peak or maximum reading on the output meter.
For Layout
See Index

ISSUE A
MARCH 1940

IF PEAK = 455 KC

Note:
C17 & C16 are used on XFB model only.
No other model uses only all common grounds
are connected to chassis ground.

No. Ohms
R1 50,000
R2 20,000
R3 440
R4 3,000
R5 250,000
R6 500,000
R7 5,000,000
R8 500,000
R9 200
R10 200
R11 500

No. Ohms
R12 50
R13 50
C9
C10
C11
C12
C2
C3
C4
C5
C6
C7

03% 5% Mic
cerode VOLTAGES: Line=117.5V AC; Power=25W. Volume
Contl=Max. Meter=1000 ohms/volt(150 V).
alignment procedure (see 7C-60 Automatic):

Trim OSC. at 1730 KC (Broadcast)
Pad OSC. at 500 KC (Broadcast)
Trim ANT. at 1400 KC (Broadcast)
Trim ANT. at 15000 KC (Short Wave)

VOLTAGES: Line=117.5V AC; Power=25W.
Vol. Contl=Max. Meter=1000 ohms/volt
Measure with respect to common gnd.
alignment (use common gnd): IF=455Kc
Trim Osc. at 1550 KC, Ant. at 1400KC

Power change switch A thru 21h and the pictorial view shown in the "AC-DC" position.

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I.F. ALIGNMENT

Adjust the test oscillator to 456 KC and connect the output to the grid of the first detector tube (6A7) through a .05 or .1 mfd. condenser. Connect ground of test oscillator to chassis ground through a .1 mfd. condenser. Align all three I.F. trimmers to peak or maximum reading on the output meter.

SHORTWAVE ALIGNMENT

Adjust the oscillator to 18,100 KC and connect the output to the antenna lead through a 400 ohm resistance. Set the gang condenser to minimum capacity and adjust the gang condenser trimmer (short wave oscillator) to receive this signal. After this has been carefully done, the next step is to set the generator to 16000 K.C. and after tuning in the signal adjust the shortwave antenna trimmer to peak.

The receiver should now be tuned to the 6 megacycle signal from the generator and the sensitivity checked. No adjustment is required at this point.

BROADCAST BAND ALIGNMENT

The broadcast band may now be aligned using a .0002 dummy antenna, set the generator to 1730 kilocycles. With the gang condenser at minimum capacity, adjust the broadcast oscillator trimmer to receive this signal. Then set the generator to 1400 kilocycles and adjust the broadcast antenna trimmer to peak. The generator is now set to 600 kilocycles and the broadcast padding condenser adjusted.
MODEL M5
CONTINENTAL RADIO & TELEV. CORP.
Trimmers, Alignment

SWITCH SHOWN IN BROADCAST POSITION
IF = 455 KC
RESISTOR VALUES
R1 = 100K
R2 = 500,000

CONVENTIONAL ALIGNMENT SEE SPECIAL SECTION VOLUME VIII.

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SCHEMATIC DIAGRAM MODEL 5N & 5NL

TUBE FUNCTIONS
1A7GT - MIXER-OSCILLATOR
1N5GT - I.F. AMPLIFIER
1H5GT - 2ND DET-AVC-1ST A.F.
3Q5GT - OUTPUT
70L7GT - RECTIFIER

FOR CONVENTIONAL ALIGNMENT
SEE SPECIAL SECTION VOL. VIII.
TRIM OSC - 1550 KC, TRIM ANT - 1400 KC
PAD - 600 KC

CONDENSERS
C1 - .002 mfd. 600 volt
C2 - .05 mfd. 400 volt
C3 - .00005 mfd. mica
C4 - .05 mfd. 400 volt
C5 - .002 mfd. 600 volt
C6 & C7 - 40-40 mfd. 25 volt elect.
C8 - .25 mfd. 200 volt
(used in SNL only)
C9 - .01 mfd. 400 volt
C10 - .00035 mica
C11 - .01 mfd. 400 volt
C12 - .002 mfd. 600 volt
C13 - .01 mfd. 400 volt
C14 - .05 mfd. 400 volt
C15 - 20-30 mfd. 150 volt elect.
C16 - .1 mfd. 200 volt

Gang Condenser
Trimmer Condenser

RESISTORS
R1 - 2,000,000 ohm ½ watt
R2 - 2,000,000 ohm ½ watt
R3 - 300,000 ohm ½ watt
R4 - 25,000 ohm ½ watt
R5 - 5,000,000 ohm ½ watt
R6 - 1,000,000 ohm Volume Control & Switch
R7 - 5,000,000 ohm ½ watt
R8 - 250,000 ohm ½ watt
R9 - 500,000 ohm ½ watt
R10 - 1,000 ohm ½ watt 10%
R11 - 30 ohm ½ watt 10%
R12 - 750 ohm ½ watt
R13 - 335 ohm 10 watt
R14 - 100,000 ohm ½ watt

Fig. 1—Top View
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MODELS 55, 55L
Schematics, Voltage Alignment

C10 and C14 used in model 5RL only. On model 5R point "A" is connected to ground.

Voltagers: From point indicated to "A", line 115 V. A.C. Power consumption 30 watts, meter 1000 ohms per volt. 150 volt scale.

FOR SOCKET LAYOUT SEE INDEX

C10 and C12 used in model 5SL only. On model SS point "A" is connected to chassis.

Voltagers: (See note Model 5R above).

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In model A6 all common grounds become chassis grounds; C2, C14, C16, R2 and R13 are omitted and point A is connected to point B and point C is connected to point D.
CONTINENTAL RADIO & TELEV. CORP.

I.F. ALIGNMENT CONVENTIONAL (SEE VOL. VIII).

BROADCAST BAND
TRIM OSC 1850 KC
TRIM ANT 1400 KC

In model 6M only C3, C4, C18, R13 and the R.F. choke (RFC) are not used and points "A" are connected to chassis.

I.F. ALIGNMENT CONVENTIONAL (SEE VOL.VIII).

BROADCAST BAND
TRIM OSC 1350 KC
TRIM ANT 1400 KC

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LF. ALIGNMENT

Adjust the signal generator to 455 KC and connect the output to the grid of the first detector tube (6A7) through a .05 or .1 mfd. condenser. Align all I.F. trimmers to peak or maximum reading on the output meter.

BROADCAST BAND ALIGNMENT

Adjust the signal generator to 1730 KC and connect the output to the antenna lead (blue) through a .0002 mfd. mica condenser. Set the gang condenser to minimum capacity and adjust the oscillator trimmer to receive this signal. The oscillator and antenna trimmers may be reached by removing the dial escutcheon. (See Fig. 3 for trimmer locations.) The next step is to set the signal generator to 1400 KC and after tuning in the signal adjust the antenna trimmer to peak. Next, re-set the dial pointer on the receiver and the signal generator to 600 KC. Slowly increase or decrease, the oscillator padding condenser and at the same time continuously tune back and forth across the signal with the receiver until the maximum reading is obtained on the output meter.

Return to 1400 KC and again go over the adjustments of this frequency to be certain that they were not put slightly out of alignment when adjustment was made at 600 KC.

SPEAKER (Part No. P3390) 12" Dynamic

Field resistance ........................................... 1500 ohms
D.C. voice coil resistance............................... 1.9 ohms
Voice coil impedance at 400 cycles... 2.2 ohms

Voltages—Line 115 volts A.C. Power consumption 90 watts. Volume control maximum. Meter 1000 ohms per volt. (Voltages are from point indicated to ground).

FOR TUNER SEE INDEX

SHORT WAVE BAND ALIGNMENT

The short wave band is adjusted by setting the signal generator to 18100 KC and connecting the output to the antenna lead through a 400 ohm resistor. Set the gang at minimum and adjust the "short wave oscillator trimmer" to receive the signal. Set the generator at 16,000 KC, tune in the signal and adjust the "short wave antenna trimmer" to give maximum output. As there is no variable low frequency padding condenser on this band, the sensitivity of the receiver should be checked at 6000 KC to determine whether the circuits are in line at this frequency. Should the receiver lack sensitivity at 6000 KC, the antenna and oscillator coils, as well as the mica padding condenser, should be tested.
NOTE: C18 is not used on the TH-FH Automatic, R18 connects directly to the Phono Pickup. In the TH-FH Automatic the value of R17 is 250,000 ohms 1/2 watt.

**PROCEDURE FOR SETTING UP PUSH BUTTONS**

Loosen one of the push buttons by turning the push button knob counter clockwise a turn or less and push it in; while holding the button in, tune in a desired station by means of the station selector knob. Turn the selector very slowly back and forth until the signal is clearest. Now while holding the push button in, tighten it by turning clockwise. Release the push button and turn the station selector to one end of the dial; push the tuning knob to the right and then check the button by pushing it in and if the station is tuned to the center of the area on the dial covered by the station the adjustment is correct.

Release the push button and loosen another push button and repeat the above procedure, doing this for the remaining buttons.

6A7 tube
- Plate (P) to ground: 190 volts
- Screen grid (G3) to ground: 94 volts
- Anode grid (G2) to ground: 183 volts
- Cathode (K) to ground: 3 volts

6D6 tube
- Plate (P) to ground: 190 volts
- Screen grid (G2) to ground: 94 volts

75 tube
- Plate (P) to ground: 85 volts

76 tube
- Plate (P) to ground: 103 volts
- Cathode (K) to ground: 5 volts

41 tube
- Plate (P) to ground: 181 volts
- Screen grid (G2) to ground: 190 volts
- Cathode (K) to ground: 12 volts

80 tube
- Filament (F) to ground: 260 volts

CONVENTIONAL ALIGNMENT
See SPECIAL SECTION VOLUME VIII.

ALIGNMENT FREQUENCIES

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<th>BROADCAST BAND</th>
<th>TRIM OSC.</th>
<th>TRIM ANT.</th>
<th>PAD</th>
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<td>1400 KC</td>
<td>600 KC</td>
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SHORT WAVES BAND

<table>
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<td>1800 KC</td>
<td>16000 KC</td>
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FOR TRIMMER LOCATIONS
See SOCKET LAYOUT.
WAVE TRAP ADJUSTMENT

At the rear of the chassis near the Antenna and Ground posts is an adjustment screw connected to a trap circuit for elimination of code interference when operating on the broadcast band. If code interference is encountered, adjustment of this screw will filter it out. It is to be used only if such interference is experienced in broadcast reception. It's use prevents code transmitters operating on a frequency around 456 K.C. from being received by the I.F. amplifier which is tuned to 456 K.C.

SERVICE DATA FOR ALL BANDS

If it is suspected that the oscillator has stopped but is doubtful due to the presence of the usual amount of noise level, it is suggested that the oscillator plate voltage be checked. To ascertain whether the tube is oscillating, ground the oscillator grid of the 6A8 (short stator and rotor plates of oscillator section on gang condenser). If oscillating properly, grounding the grid will cause an appreciable drop in oscillator voltage. Grounding or shorting the stator and grid condenser from tracking.

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Compliments of www.nucow.com
AUTOMATIC RECORD CHANGER

This Record Changer will automatically play a series of eight 10" or seven 12" records of the standard 78 R.P.M. type. Records of the last few years with the standard eccentric or spiral stopping groove on the inside and an eccentric on the outside will operate the automatic mechanism. However, records of any size up to 12" may be played manually.

OPERATION

Before operating the phonograph, either automatically or manually, be sure that the pickup is down and can be moved by hand. If not, a “cycle” must be completely brought in. To do this, turn Turntable Switch “On.” The turntable will begin to revolve and the cycle of action on the pickup arm will be resumed. When the pickup arm comes down, turn off the Turntable Switch.

CONTRROLS AND MECHANISM

INDEX AND RECORD REJECT LEVER

This lever is located near the front right corner of the motorboard and its index plate marked for four positions—“Manual,” “12,” “10,” and “Reject.”

When it is desired to change record selections manually, this lever should be set in the “Manual” Position. With the lever in the “12” position, the mechanism is set to play a series of 12” records automatically. To play either a series of 10” records or 10” and 12” records mixed, the lever should be set at the “10” position. To reject a record being played, or to start the record changer’s cycle in case the record just played does not have the standard eccentric or spiral stopping groove, simply push the lever to the “Reject” position and let go. The pickup will raise and swing outwards and the next record will drop down. Upon releasing the lever, it will automatically return to the “10” position. If it is desired to stop the “12” records, it is to be played, the lever should be returned to the “12” position after selecting a record. Keep the lever in its “Manual” position when not actually playing records automatically.

PICKUP AND TOP-LOADING NEEDLE SOCKET

The pickup is the new crystal type, with a hole in the top for insertion of needles. When not playing records, the pickup arm should be moved out to the right beyond the turntable and placed at rest on the support with the edge of the pickup arm in the groove and the pickup over the needle gauge plate. The pickup must be in this position to change needles.

To insert a needle initially, loosen the needle screw on the front of the pickup, place needle in hole at top so that it drops down against the needle plate and then tighten the needle screw.

NEEDLE EJECTOR

The extending tab on the needle gauge plate of the needle box operates the needle ejector. To change a needle, place pickup in rest position, loosen needle screw and press the extending tab on the needle gauge plate to drop the used needle into the box below. Release tab allowing the needle gauge plate to swing back, and then insert a new needle in the pickup as described above.

RECORD HOLDER SHELVES

To place a record on the turntable or to remove records, remove the record holder shelves by lifting with the fingers under the shell, and swing clear of the outer edge of record. Also push back vertical lever adjacent to the rear record holder post. The turntable is now accessible. Before loading the magazine for automatic operation, swing the record holder shelves back into position.

AUTOMATIC OPERATION

1. See that the pickup is over the needle gauge plate with the needle properly in place. If not, complete a “cycle” as explained in the first paragraph under “Operation.”

2. With the Index and Record Reject Lever at “Manual,” place the first of the series of records on the turntable and the remainder of the series (up to seven 10” or six 12” records) on the record holder posts (as shown in Fig. 2). The records should be arranged in the desired order with the desired selection face up and the last selection on top.

3. Set the Index and Record Reject Lever to the proper position. (See Controls: Indices and Record Reject Lever.)

4. Push the turntable switch to the left—“On.” Turntable should commence to revolve.

5. When the turntable has attained speed, lift pickup and lower gently on to the record so that the needle point enters the groove.

6. Adjust volume control to the desired intensity and tone control to the preferred setting.

7. Close the lid of the cabinet to eliminate mechanical reproduction of sound by the needle.

The whole series of records will now play without further attention, and the last record will repeat until the Turntable Switch is turned off. Allow the record-changing mechanism to complete its cycle before the turntable is stopped. Then lift the pickup, swing the arm to the right beyond the edge of the record and lower it onto the pickup rest with the pickup over the needle gauge plate. The record player is then ready for reloading, or for manual operation.
CONTINENTAL RADIO & TELEV. CORP.

MODEL 8C
Schematic, Socket
Trimmers, Voltage
Tuner, Alignment

Compliments of www.nucow.com

IF PEAK 455 KC FOR CONVENTIONAL ALIGNMENT
SEE SPECIAL SECTION OF VOLUME VIII.
ALIGNMENT

BROADCAST BAND
TRIM B.C. OSC. AT 1730 KC
TRIM B.C. ANT. AT 1400 KC
PAD B.C. PAD. AT 600 KC

SHORT WAVE BAND
TRIM S.W. OSC. AT 18100 KC
TRIM S.W. ANT. AT 16000 KC

41 tube
Plate (P) to ground............. 184 volts
Screen grid (G2) to ground..... 196 volts
Cathode (K) to ground.......... 13.5 volts

80 tube
Filament (F) to ground......... 302 volts

PROCEDURE FOR SETTING UP

PUSH BUTTONS

Volts Loosen one of the push buttons by turning the push button knob counter clockwise a turn or less and push it in; while holding the button in, tune in a desired station by means of the station selector knob. Turn the selector very slowly back and forth until the signal is clearest. Now while holding the push button in, tighten it by turning clockwise. Release, the push button and turn the station selector to one end of the dial; push the tuning knob to the right and then check the button by pushing it in and if the station is tuned to the center of the area on the dial covered by the station the adjustment is correct.

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Compliments of www.nucow.com
MODEL A-169 SPECIFICATIONS

This model Crosley is a six tube single unit automobile receiver. It incorporates an unusual electric push button tuning system of simple, rugged mechanical and electrical construction. The tubes used and their functions are as follows: one 6SK7 as resistance coupled R-F amplifier, one 6SA7 as oscillator-modulator, one 6SK7 as I-F amplifier, one 6SQ7 as detector, A.V.C., 1st audio, one 6K6GT as power output and one 6X5GT as rectifier.

Improvements to be noted in the circuit are, the resistance coupled R-F stage and the method of connecting oscillator coil and variable level bass compensation. Bias voltage for the 6SK7 R-F amplifier and the 6SK7 I-F amplifier is developed across item 38, a 450 ohm resistor. Bias voltage for the 6K6GT is developed across item 43, a 600 ohm resistor. The 6SQ7 is operated at zero bias. A.V.C. is applied to 6SK7 (R-F) and the 6SA7. The volume control serves as the A.V.C. load and items 29 and 36, ½ and 1 megohms respectively, act as filters. Item 16 is a chemical condenser which automatically compensates for temperature differences, preventing station drift. The filter circuit is similar to that of Model A-269 using a resistive circuit.

FOR ALIGNMENT AND TUNER DATA, SEE INDEX

JANUARY, 1940
ALIGNMENT PROCEDURE

All the circuits in this receiver are very accurately adjusted at the factory and normally should need no further adjustment. However, if it is definitely known that an adjustment is necessary, such as when an I-F assembly has been changed and etc., the circuit can best be properly aligned with the use of a MODULATED SIGNAL GENERATOR and an output meter.

CONNECTING OUTPUT METER

Connect the output meter to the plate and screen of the 6SK6GT outputtube. Be sure the meter is protected from D.C. by connecting a condenser (0.1 mf. or larger—foil electrolytic) in series with one of the meter leads.

1. Aligning the I-F to 455 Kilocycles
   (a) Connect the signal generator to the chassis frame. Connect the high side of generator through a 0.02 mf. condenser to the grid (pin No. 8) of the 6SA7 oscillator-modulator. Care should be exercised to keep signal generator leads as far as possible from the other grid leads.
   (b) Open gang condenser all the way (minimum) turn volume control to maximum and then set signal generator to 455 kilocycles.
   (c) Adjust both 2nd I-F trimmers for maximum output. Trimmers are accessible from bottom of the chassis between the 6SQ7 and 6SK7 sockets.
   (d) Adjust both 1st I-F trimmers for maximum output. Trimmers accessible from bottom of the chassis.
   (e) Repeat (c) and (d) with as low an output as gives a reasonable indication on output meter for more accurate adjustment.

2. Aligning the R-F
   (a) If the receiver is to be used with a whip or streamlined antenna, the output lead from the signal generator should be connected through a 0.001 mf. condenser to the “ANT” connection of the receiver. If a large antenna such as a running board type or built-in top antenna is to be used, a 0.002 mf. condenser should be used in place of the 0.001 mf. condenser.
   (b) Set the signal generator to 1400 kilocycles.
   (c) Adjust the station selector to 140 on the dial.
   (d) Adjust the trimmer on the “OSC” section of the tuning condenser for maximum output.
   (e) Adjust the trimmer on the “ANT” section of the tuning condenser for maximum output.
   (f) Readjust the station selector for maximum output.
   (g) Repeat operation (e) for more accurate adjustment.

3. Adjusting Antenna Compensating Condenser on Model A-169 only.
   (a) Set the signal generator to 600 kilocycles.
   (b) Tune the 600 kilocycle signal with the station selector for maximum output.
   (c) Adjust the antenna compensating condenser, located near antenna receptacle, for maximum output.
   (d) Repeat operations (b) and (c) alternately until no further improvement can be obtained.
   (e) Set the signal generator to 1400 kilocycles again.
   (f) Tune the 1400 kilocycle signal with the station selector for maximum output.
   (g) Readjust the trimmer on the “ANT” section of the tuning condenser for maximum output.

It will be necessary to adjust the antenna compensating condenser to the car antenna after the receiver has been installed in the car.

(a) After the installation is complete, tune in a WEAK station between 55 and 65 on the dial.
   (b) Adjust the antenna compensating condenser for maximum volume in the speaker.

4. Setting the Push Buttons

The push buttons are easily and accurately set from the front of the case without removing any panels, etc.

To set push buttons, lift up on push button and the setting screw is easily accessible. Loosen the screws of the buttons to be set, two or three turns to the left. It is not necessary that all the buttons be set at the same time.

Determine the five favorite stations whose call letters are to be placed in the call letter holder (holder enclosed in the instruction envelope). Place the call letters in the holder in the order of their frequency (kilocycles), that is, the station that is tuned-in nearest the 150 marking on the dial, should be placed in the right-hand opening, etc.—After call letters have been placed in the holder, break off the celluloid strip five pieces to insert in front of the call letters to protect and hold them in place.

With the special screws provided (two, enclosed in the instruction envelope) mount the call letter holder in place above the push buttons.

By means of the manual tuning knob tune-in as accurately as possible, the station whose call letter has been placed in the right-hand opening. REMEMBER: the accuracy of the push buttons depends upon how accurate YOU tune-in the station when setting them.

Lift up the right-hand push button and with a small screw driver push the key all the way down. While holding the key down, securely tighten the setting screw. It is essential that you apply pressure while tightening the setting screw, in order to keep mechanism lined up with station tuned-in.

Remove screw driver and the first button is set, follow through with the same procedure to set the rest of the push buttons.
MODEL A-259 SPECIFICATIONS

This model Crosley Roanio is a single unit five tube superheterodyne receiver. It incorporates an unusual electric push button tuning system of simple, rugged mechanical and electrical construction. The tubes used and their functions are as follows: one 6SA7 as oscillator-modulator, one 6SK7 I.F. amplifier, one 6SQ7 as diode detector, A.V.C., and 1st audio, one 6K6GT as pentode output and one 6X5GT as rectifier. The 6SA7 oscillator circuit is unusual in that the cathode is tied to a tap on the oscillator coil which is several turns above ground. Bias for the 6SK7 is obtained from the drop across item 30, a 450 ohm resistor and bias for the 6K6GT is obtained from the drop across item 29, a 600 ohm resistor. The 6SQ7 is operated at zero bias, A.V.C. is supplied to the 6SA7 and 6SK7 through item 29, a 500,000 ohm filter and item 34, a 1 megohm filter respectively. The B circuit is filtered by means of item 37, a 1,400 ohm resistor, and the two 10 mfd. sections of item 25, a three section electrolytic condenser. Item 14 is a chemical temperature compensating condenser used in the oscillator circuit to prevent station drift.

TUBE & FUNCTION

<table>
<thead>
<tr>
<th>PIN</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>6SA7 OSC-MOD.</td>
<td>1.450</td>
<td>1.600</td>
<td>1.650</td>
<td>1.700</td>
<td>1.750</td>
<td>1.800</td>
<td>1.850</td>
<td>1.900</td>
</tr>
<tr>
<td>6SK7 I.F. AMP.</td>
<td>1.450</td>
<td>1.600</td>
<td>1.650</td>
<td>1.700</td>
<td>1.750</td>
<td>1.800</td>
<td>1.850</td>
<td>1.900</td>
</tr>
<tr>
<td>6SQ7 DET-AMP</td>
<td>1.450</td>
<td>1.600</td>
<td>1.650</td>
<td>1.700</td>
<td>1.750</td>
<td>1.800</td>
<td>1.850</td>
<td>1.900</td>
</tr>
<tr>
<td>6X5GT OUTPUT</td>
<td>1.450</td>
<td>1.600</td>
<td>1.650</td>
<td>1.700</td>
<td>1.750</td>
<td>1.800</td>
<td>1.850</td>
<td>1.900</td>
</tr>
<tr>
<td>6X5 RECT.</td>
<td>1.450</td>
<td>1.600</td>
<td>1.650</td>
<td>1.700</td>
<td>1.750</td>
<td>1.800</td>
<td>1.850</td>
<td>1.900</td>
</tr>
</tbody>
</table>

* 50 VOLT SCALE, 1000 OHMS PER VOLT.
* A.C. TO GROUND
* 6.5 AMPERES AT 6 VOLTS, NORMAL OPERATING CURRENT.
* 7.0 AMPERES AT 6 VOLTS, SOLENOID OPERATING CURRENT.
* VOLTAGES MEASURED WITH 1200 Z PER VOLT VOLTMETER FROM TUBE PHONS TO CHASSIS.
* MAY VARY PLUS OR MINUS 10% OF VALUES GIVEN.
* SH-GROUND.
* OPEN—NO CONNECTION. J.B.—JUNCTION BLOCK.
SPECIFICATIONS

The Crosby Model 449 and 459 radio is a four-tube superhetdreney receiver designed for operation from batteries. The method of connecting the battery cable to the batteries is shown on the Wiring Diagram. The batteries required are: one Crosby A & B Battery Pack No. 828 or one 1.5 volt "A" (EVEREADY No. 790 or equivalent) and two plug-in type 4-volt "B" batteries.

TUBES AND VOLTAGE LIMITS

The following table gives the function of the tubes used, together with the voltage reading between the tube socket centers and the chassis. Voltage readings should be taken with a 1000 ohm per volt, 250 volt voltmeter (except filaments) with receiver operating condition and the volume control full on and no signal input. The filament voltages should be measured with an accurate low range DC voltmeter (approximately 0 to 10 volts). Voltage limits may vary plus or minus 10% of values given.

<table>
<thead>
<tr>
<th>Tube Function</th>
<th>H</th>
<th>F</th>
<th>S</th>
<th>G</th>
<th>Ga</th>
<th>Ga</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCR/Quatifier</td>
<td>72</td>
<td>85</td>
<td>82</td>
<td>72</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>IN5-G</td>
<td>72</td>
<td>85</td>
<td>82</td>
<td>72</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>IN6-Detector</td>
<td>10</td>
<td>20</td>
<td>8</td>
<td>10</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>IN7-Det &amp; 1st A-F.</td>
<td>15</td>
<td>20</td>
<td>8</td>
<td>20</td>
<td>8</td>
<td>8</td>
</tr>
</tbody>
</table>

Power Output approximately 5 Watts.

"A" Battery Pack approximately 5 milliamperes at 1.5 Volts.

"B" Battery Pack approximately 9 milliamperes at 90 Volts.

Measured at No. 8 Socket Lug and Chassis.

ALIGNMENT PROCEDURE

All the circuits in this receiver are very accurately adjusted at the factory and normally should need no further adjustment. However, if it is definitely known that an adjustment is necessary, the circuits can best be properly aligned with the use of a modulated signal generator and an output meter.

CONNECTING OUTPUT METER

Connect the output meter across the "F" and "S" terminals of the 1CA7 output tube. Be certain that the meter is protected from DC by connecting a condenser (.1 microfarad or larger—non-electrolytic) in series with one of the leads.

1. Tuning 1-F Amplifier To 455 Kilocycles

(a) Connect the output of the signal generator through a .02 microfarad condenser to the top tip of the 1A7G tube, leaving the tube's grid clip in place. Connect the grid clip from the signal generator to the GREEN lead of the receiver.

(b) Set the generator to 455 kilocycles.

(c) Adjust the "OSC" trimmer condenser and gage for maximum output.

2. Aligning R-F Amplifier

When aligning the R-F amplifier the output lead from the signal generator should be connected through a .0002 microfarad condenser to the RED lead of the receiver.

(a) Set the signal generator to 1725 kilocycles.

(b) Open the condenser gang all the way.

(c) Adjust the "OSC" trimmer condenser for gage for maximum output.

(d) Set the signal generator to 1400 kilocycles.

(e) Tune the receiver to the generator signal for maximum output (approximately 140 on the dial).

(f) Adjust the "ANT" trimmer condenser for gage for maximum output. DO NOT READJUST THE "OSC" TRIMMER AT 1400 Kilocycles.

(g) Repeat operations (c) and (f) alternately until no further improvement in output can be obtained.

SETTIN THE PUSH BUTTONS

Remove push buttons by pulling straight up. With a small screwdriver loosen the set screw a turn or two.

With the manual tuning knob tuned as ACCURATELY AS POSSIBLE the station for which the button is to be set.

Then push the button key all the way down and while you hold it in that position SECURELY TIGHTEN the set screw. Replace the push button. Use same procedure in resetting or adjusting the rest of the push buttons.
ALIGNMENT PROCEDURE

1. Tuning the I-F Amplifier To 455 Kilocycles.
   (a) Connect the output of the signal generator through a .02 mfd. condenser to the top cap of the 1AT7 tube, leaving the tube's grid clip in place. Connect the ground lead from the signal generator to the "G" terminal of the receiver. KEEP THE GENERATOR LEADS AS FAR AS POSSIBLE FROM THE GRID LEADS OF THE OTHER SCREEN GRID TUBES.
   (b) Set the station selector so that the tuning condenser plates are completely in mesh and turn the volume control knob to the right (ON).
   (c) Set the signal generator to 455 kilocycles.
   (d) Adjust both 2nd I-F trimmers located through rear of chassis flange for maximum reading on the output meter. (Fig. 2).
   (e) Adjust both trimmers located on the 1st I-F transformer (right end) for maximum output. (Fig. 2).
   (f) Check operations (d) and (e) for more accurate adjustments.
   ALWAYS USE THE LOWEST SIGNAL GENERATOR OUTPUT THAT WILL GIVE A REASONABLE READING ON THE OUTPUT METER.

2. Aligning the R-F Amplifier.
   When aligning the R-F amplifier the output lead from the signal generator should be connected through a .0002 mfd. condenser to the "ANT" terminal of the receiver.
   (a) Set the signal generator to 1725 kilocycles.
   (b) Open the condenser gang all the way.
   (c) Adjust the "OSC" trimmer condenser on gang for maximum output.
   (d) Set the signal generator to 1400 kilocycles.
   (e) Tune the receiver to the generator signal for maximum output (approximately 140 on the dial).
   (f) Repeat operations (c) and (d) until the output of the receiver is as high as possible for maximum output. DO NOT READJUST THE "OSC" TRIMMER AT 1400 Kilocycles.
   (g) Check operations (d) and (e). (f) (g) for more accurate adjustments.

SPECIFICATIONS

These models are five-tube superhetodyne receivers designed for operation on A.C. circuits as specified on the Model Label. The 518 and 6518 chassis are identical electrically but differ slightly in mechanical parts due to various cabinet combinations.

CIRCUIT DESCRIPTION

Five glass (ota) tubes are used and their connections are as follows: one 6AU6G as oscillator-modulator, one 6H7G as I-F amplifier, one 6Q7G as detector, A, V, C, and first audio amplifier, one 6SKG as power output and one 6Y3G as half-wave rectifier. The bias for the 6SKG is obtained from the drop across 290 a 975 ohm resistor which is in series with the speaker field (700 ohms) that is in the negative leg of the power supply.

SOCKET VOLTAGES

The tube socket voltages are measured from the tube socket contacts to the chassis with a 1000 ohm per volt, 500-volt D. C. voltmeter (except filament) with receiver in operating condition and no signal input. The filament voltages should be measured with an accurate low range A. C. voltmeter (approximately 0.10 volts).

TUBE SOCKET VOLTAGE READINGS

<table>
<thead>
<tr>
<th>Tube</th>
<th>Function</th>
<th>H</th>
<th>P</th>
<th>S</th>
<th>K</th>
<th>G</th>
<th>Ga</th>
<th>Gs</th>
</tr>
</thead>
<tbody>
<tr>
<td>56G</td>
<td>Oscillator Modulator</td>
<td>6.3</td>
<td>165</td>
<td>90</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>6UG</td>
<td>I-F Amplifier</td>
<td>6.3</td>
<td>165</td>
<td>90</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>6S7G</td>
<td>Detector A, V, C</td>
<td>6.3</td>
<td>75</td>
<td>25</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>6K5G</td>
<td>Power Output</td>
<td>6.3</td>
<td>125</td>
<td>150</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>6X5G</td>
<td>Grid</td>
<td>6.3</td>
<td>150</td>
<td>165</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>6X5G</td>
<td>Cathode</td>
<td>6.3</td>
<td>150</td>
<td>165</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Voltage drop across speaker field 25 volts. Maximum power output approximately 2 watts. Power consumption at 117 volts approximately .37 watts.

WAVE TRAP

Some chassies of this model are equipped with a wave trap for the purpose of eliminating interference from code stations which operate on a frequency of approximately 455 kilocycles. This assembly is located on the underside of the chassis and consists of a coil, a fixed condenser and a trimmer condenser as illustrated by dotted lines in the Wiring Diagram (item 42).

The wave trap should not be adjusted until all other adjustments have been made. To make the adjustment, feed a 455 kilocycle signal from the signal generator through a 100 mmfd. condenser into the antenna terminal of the receiver. With the band selector switch turned to the Broadcast Band position, the gang condenser open and the volume control full on, adjust the trimmer condenser on the wave trap for minimum output.

Should the interfering station be operating on a frequency of slightly more or less than 455 kilocycles, the exact frequency should be determined with the aid of the signal generator. Then, instead of feeding a 455 kilocycle signal into the receiver the exact frequency of the interfering signal should be used. If it is not possible to determine the exact frequency of the interfering signal the antenna tuner may be attached to the receiver and the receiver tuned to the position where the interfering signal is most noticeable. Then adjust the wave trap for minimum interference.
Power output approximately 2 watts.
Power consumption approximately 27 watts.
Voltage drop across speaker field 35 volts.
All voltages except filaments will be approximately
10% lower if measured on 117.5 volt DC power supply.
Voltage readings between the tube socket contacts and chassis.
THE CROSBY CORP.

50 CYCLE POWER TRANSFORMER ADJUSTMENT

Receivers equipped with a 50 cycle power transformer have a “High” and “Low” voltage tap on the under side of the chassis. The “High” voltage lead (BLACK) and the “Low” voltage lead (ORANGE) are connected to a terminal strip by the receiver chassis. The voltage range of the “Low” tap of the 50-130 volt transformer is from 95 to 1125/2 volts and of the “High” tap is from 1125/2 to 180 volts.

The accompanying illustration shows the connections for changing from high to low or low to high line voltage. Note the “jumpers” which are attached to the terminal at which one side of the power cord is attached. The other end of this jumper wire should be connected to the ORANGE or BLACK lead of the transformer. This is shown in the diagram, according to the line voltage the receiver is to be used on.

NOTE: Any change made in the power supply circuit of the receiver should be plainly stamped or otherwise permanently recorded on the rear of the chassis.

SETTING THE PUSH BUTTONS

With a small screwdriver or a penknife remove the front cover and the call letters. Insert screwdriver in the hole in the front of the button and loosen the set screw a turn or two. With the manual tuning knob, tune in an accurately tuned station whose call letters were in the button or that station for which the button is to be set. Then push the button all the way down and while you hold it in that position securely tighten the set screw. Replace the call letters and call letter cover. Use the same procedure in resetting or adjusting the rest of the push buttons.

WAVE TRAP

Some chassis of this model are equipped with a wave trap to eliminate interference from station which operate on a frequency of approximately 655 kilocycles. This assembly is located on the underside of the chassis and consists of a coil, a fixed condenser and a trimmer condenser as illustrated by dotted lines in the Wiring Diagram.

The wave trap should not be adjusted until all other adjustments have been made. To make the adjustment feed a 455 kilocycle signal from the signal generator through a 1000 ohm resistor to the antenna terminal of the receiver. With the band selector switch turned to the broadcast band position, the gain controls are wide open and the volume control full on, adjust the trimmer condenser on the wave trap for minimum interference.

Should the interfering station be operating on a frequency exactly 455 kilocycles, make the adjustment as described, and then feed a signal of exactly 455 kilocycles. The exact frequency should be determined with the aid of the signal generator. Then, instead of feeding a 455 kilocycle signal into the receiver the exact frequency of the interfering signal should be used. If it is not possible to determine the exact frequency of the interfering signal the antenna may be attached to the receiver and the receiver tuned to the position where the interfering signal is most noticeable. Then adjust the wave trap for minimum interference.

ALIGNMENT PROCEDURE CONNECTING OUTPUT METER

Connect one terminal of the output meter to the plate and the other terminal to the screen of the 5C6G Output tube. Be sure the meter is protected from D.C. by connecting a 0.1 mfd. or larger---not electrolytic---in series with one of the leads.

TUNING THE I-F AMPLIFIER TO 455 Kilocycles

(a) Disconnect the antenna coil from the receiver and connect the output of the signal generator through a 50 microfarad condenser to the antenna connection on the receiver. Do not use a ground return from the signal generator, the antenna coil must be absolutely well grounded. If it is found to be necessary, a small condenser (approximately 0.001 mfd.) should be connected in series with the ground terminal of the signal generator and the receiver chassis. KEEP THE GENERATOR LEADS AS FAR AS POSSIBLE FROM THE GRID LEADS OF THE OTHER GRID TUBES.

(b) Place the station selector so that the plates of the condensers are completely out of mesh and turn the volume controil to the (0N). (c) Set the signal generator to 455 kilocycles.

(d) Adjust the 2nd I-F trimmer condenser, Item 14, located on top of the front panel for maximum output.

(e) Adjust the 1st I-F trimmer condenser located on the rear of the chassis for maximum output.

(f) Repeat operations (a) and (e) for more accurate adjustments.

ALWAYS USE THE LOWEST SIGNAL GENERATOR OUTPUT THAT WILL GIVE A REASONABLE READING ON THE OUTPUT METER.

ALIGNING THE B-F AMPLIFIER

(a) Set the signal generator to 1725 kilocycles.

(b) With the condenser tuned to the minimum capacity position, adjust the trimmer condensers on the “OSC” section of the grid so that the 1725 kilocycle signal is heard. It is not necessary that the receiver be tuned to the signal.

(c) Set the signal generator to 1400 kilocycles.

(d) Tune the 1400 kilocycle signal in the region of the 140 on the dial for maximum output.

(e) Adjust the trimmer condenser located on the “ANT” section of the grid for maximum output.

NOTE: Do not attempt to align the “OSC” trimmers.

(f) Repeat operations (d) and (e) for more accurate adjustments.

MODELS 519 & 529, 668.

CHASSIS NO. 539 & 539

TOOLING PROCEDURE CONNECTING OUTPUT METER

Connect one terminal of the output meter to the plate and the other terminal to the screen of the 5C6G Output tube. Be sure the meter is protected from D.C. by connecting a 0.1 mfd. or larger---not electrolytic---in series with one of the leads.

TUNING THE I-F AMPLIFIER TO 455 Kilocycles

(a) Disconnect the antenna coil from the receiver and connect the output of the signal generator through a 50 microfarad condenser to the antenna connection on the receiver. Do not use a ground return from the signal generator, the antenna coil must be absolutely well grounded. If it is found to be necessary, a small condenser (approximately 0.001 mfd.) should be connected in series with the ground terminal of the signal generator and the receiver chassis. KEEP THE GENERATOR LEADS AS FAR AS POSSIBLE FROM THE GRID LEADS OF THE OTHER GRID TUBES.

(b) Place the station selector so that the plates of the condensers are completely out of mesh and turn the volume controil to the (0N). (c) Set the signal generator to 455 kilocycles.

(d) Adjust the 2nd I-F trimmer condenser, Item 14, located on top of the front panel for maximum output.

(e) Adjust the 1st I-F trimmer condenser located on the rear of the chassis for maximum output.

(f) Repeat operations (a) and (e) for more accurate adjustments.

ALWAYS USE THE LOWEST SIGNAL GENERATOR OUTPUT THAT WILL GIVE A REASONABLE READING ON THE OUTPUT METER.

ALIGNING THE B-F AMPLIFIER

(a) Set the signal generator to 1725 kilocycles.

(b) With the condenser tuned to the minimum capacity position, adjust the trimmer condensers on the “OSC” section of the grid so that the 1725 kilocycle signal is heard. It is not necessary that the receiver be tuned to the signal.

(c) Set the signal generator to 1400 kilocycles.

(d) Tune the 1400 kilocycle signal in the region of the 140 on the dial for maximum output.

(e) Adjust the trimmer condenser located on the “ANT” section of the grid for maximum output.

NOTE: Do not attempt to align the “OSC” trimmers.

(f) Repeat operations (d) and (e) for more accurate adjustments.

MODELS 548 & 548, 558.

ALIGNMENT PROCEDURE CONNECTING OUTPUT METER

Connect one terminal of the output meter to the plate and the other terminal to the screen of the 5C6G Output tube. Be sure the meter is protected from D.C. by connecting a 0.1 mfd. or larger---not electrolytic---in series with one of the leads.

TUNING THE I-F AMPLIFIER TO 455 Kilocycles

(a) Connect the output of the signal generator through a 50 microfarad condenser to the top cap of the 5C6G Osc-Mod tube, leaving the tube's grid clip in place. Connect the ground lead from the signal generator to the “GRID” terminal of the receiver.

(b) Set the station selector so that the tuning condenser plates are completely out of mesh. Turn the volume control knob to the right (0N).

NOTE: Approximately 750 ohms. *“A” battery drive approximately 0.5 milliamperes at 2 volts. **“B” battery drive approximately 15 milliamperes at 2 volts.

Voltage readings should be taken between the tube socket contacts and the negative side of the “A” battery circuit.
**MODEL 549**

**Voltage, Socket, Trimmers, Alignment**

The circuit is a conventional superheterodyne with a tuned loop antenna stage. Four 1.4 volt tubes and one 1176GT tube are employed as follows: one 1A7GT as oscillator-modulator, one 15SGT as 455 kc. 1-F Amplifier, one 11S5GT as diode detector; A.V.C. and first audio; one 1AG7T as power output and the 1176GT as rectifier (used only when plugged into 110 volt power circuits).

The filament of the 1.4 volt tubes are connected in series and have plate current compensating resistors one, 15SGT, 250 ohm resistor across the A1GT filament and the other, 1AG7T, 1,400 ohm resistor from the negative leg of the 1AG7T to chassis. When used on 110 volt power circuits one half the 1176GT supplies the filament voltage and the other half the B voltage. The rectified voltage for the filament string is well filtered by the following, 15SGT, which is a 7.5 watt 110 volt miniature lamp and does triple duty—1. regulates the voltage—2. acts as a filter—3. as an ON-OFF indicator; item 28 a 375 ohm resistor and item 32A, the relay coil which serves as a choke and their associated electrolytic condensers, i.e., item 15, 16, 16 mf.—item 38, 16 mf. and item 16, 125 mf. The above mentioned miniature lamp (item 28) should always be replaced with an exact duplicate should replacement become necessary.

The "B" voltage is filtered by means of item 25, a 2,600 ohm resistor and item 11—a 16 mf. electrolytic and one section of item 15 (twins electrolytic) 16 mf. condenser.

The relay automatically disconnects the batteries from the circuit when the receiver is operated on 110 volt circuits.

### VOLTAGE READINGS—WITH CR649 BATTERY PACK

<table>
<thead>
<tr>
<th>Tube</th>
<th>Socket Function</th>
<th>No. 1</th>
<th>No. 2</th>
<th>No. 3</th>
<th>PIN NUMBER</th>
<th>No. 4</th>
<th>No. 5</th>
<th>No. 6</th>
<th>No. 7</th>
<th>No. 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A7GT</td>
<td>Oscillator-Modulator</td>
<td>0</td>
<td>1.5</td>
<td>70</td>
<td>40</td>
<td>Neg.</td>
<td>70</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>1N5GT</td>
<td>I-F Amplifier</td>
<td>0</td>
<td>4.5</td>
<td>70</td>
<td>70</td>
<td>1.5</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1H5GT</td>
<td>Det. AVC, 1st Audio</td>
<td>0</td>
<td>3.0</td>
<td>11</td>
<td>11</td>
<td>—</td>
<td>1.5</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1A6GT</td>
<td>Output</td>
<td>0</td>
<td>6.0</td>
<td>68</td>
<td>70</td>
<td>0</td>
<td>4.5</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1176GT</td>
<td>Rectifier</td>
<td>0</td>
<td>0</td>
<td>68</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Power Output approximately 100 M. W.

"A" Battery Drain 50 M. A.

"B" Battery Drain 5.2 M. A.

### VOLTAGE READINGS—@ 117.5 VOLT LINE (A.C.)

<table>
<thead>
<tr>
<th>Tube</th>
<th>Socket Function</th>
<th>No. 1</th>
<th>No. 2</th>
<th>No. 3</th>
<th>PIN NUMBER</th>
<th>No. 4</th>
<th>No. 5</th>
<th>No. 6</th>
<th>No. 7</th>
<th>No. 8</th>
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<tbody>
<tr>
<td>1A7GT</td>
<td>Oscillator-Modulator</td>
<td>0</td>
<td>1.4</td>
<td>102</td>
<td>56</td>
<td>3</td>
<td>102</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>1N5GT</td>
<td>I-F Amplifier</td>
<td>0</td>
<td>4.5</td>
<td>102</td>
<td>102</td>
<td>1.5</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1H5GT</td>
<td>Det. AVC, 1st Audio</td>
<td>0</td>
<td>3.0</td>
<td>17</td>
<td>17</td>
<td>—</td>
<td>1.5</td>
<td>45</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1A6GT</td>
<td>Output</td>
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<td>102</td>
<td>—</td>
<td>30</td>
<td>15</td>
<td></td>
<td></td>
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<tr>
<td>1176GT</td>
<td>Rectifier</td>
<td>58  5 A.C.</td>
<td>117.5 5A.C.</td>
<td>142</td>
<td>117.5 A.C.</td>
<td>0</td>
<td>126</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Watts @ 117.5 volts 20 watts.

Above readings will be approximately 10% less when checked on D.C. power circuit.

### ALIGNMENT PROCEDURE

The chassis of this receiver is connected to one side of the power supply and for this reason all test equipment should be thoroughly insulated in order that the power supply will not become short circuited while aligning the receiver.

### CONNECTING OUTPUT METER

Connect one terminal of the output meter to the plate and the other terminal to the screen of the 1A7GT output tube. It is assumed that the meter is protected from D.C. by connecting a condenser (.1 md. or larger—electrolytic) in series with one of the leads.

### Tuning the I-F Amplifier to 455 Kilocycles

(a) Connect the output of the signal generator through a .02 md. condenser to the grid cap of the 1A7GT oscillator-modulator tube leaving the tubes grid cap in place. Do not use a ground return to the signal generator unless it is found to be absolutely necessary. If it is found to be necessary, a small condenser (approximately .001 md.) should be connected in series with the ground terminal of the signal generator and the receiver chassis. KEEP THE GENERATOR LEADS AS FAR AS POSSIBLE FROM THE GRID LEADS OF THE OTHER SCREEN GRID TUBES.

(b) Set the station selector so that the plates of the condenser gang are completely out of mesh and turn the volume control to the right (ON).

(c) Set the signal generator to 455 kilocycles.

(d) Adjust the 2nd I-F transformer for maximum output.

(e) Adjust the trimmer condenser located on the 1st I-F transformer for maximum output.

(f) Repeat operations (d) and (e) for more accurate adjustments.

ALWAYS USE THE LOWEST SIGNAL GENERATOR OUTPUT THAT WILL GIVE A REASONABLE READING ON THE OUTPUT METER.

### Aligning the R-F Amplifier

When aligning the R-F amplifier the output lead from the signal generator should be connected through a .0001 md. condenser to "A" terminal and the ground lead to the "G" terminal on the back of the cabinet.

It is essential that the following alignment be made with the receiver in the cabinet and the battery and back in position. Trimmer adjustments may be made on the two lug type carrying cases through the two holes in the top, beneath the carrying handle. On the walnut cabinet model the trimmer will have to be aligned before placing chassis in the cabinet and then adjust the antenna trimmer provided on the back.

Before aligning receiver check the position of the pointer by opening gang all the way, the pointer should then split the 1600 kilocycle calibration point.

(a) Set signal generator to 1400 kilocycles.

(b) Tune gang to 1400 on the dial, then adjust oscillator trimmer (rear section of gang) for maximum output.

(c) Adjust antenna trimmer (front section of gang) for maximum output.

### RELAY

The receiver, when plugged into 110 volt circuit, will operate on the batteries until rectifier warms up and trips the relay. When relay trips there should be no decrease of dead spot in output as rectifier should be warmed up sufficiently to carry load and give a slight increase in output due to higher plate voltage available.

The relay is insulated from the chassis and care should be exercised when probing so as not to short it.

In earlier models the relays have three sets of contacts and the single side must make contact at all times. The double side must make contact when batteries are used and both contacts (double contact side) must break when operated on 110 volt circuits. Later models the single contact side was omitted and a flexible braid connection used instead.
Power output approximately 2 watts.
Drop across field 28 volts.
Power consumption at 117.5 volts line 45 watts (A.C.).
All readings except filaments will be approximately 10% lower on 117.5 D.C.
CIRCUIT DESCRIPTION

Six glass (octal) tubes are used and their functions are as follows: one 6AG as oscillator-modulator, one 6K7 as I-F amplifier, one 6Q7 as diode detector and A. V. C., and 1st audio, one 6P5 as 2nd audio amplifier, one 6AC5 as dynamic coupled power output and one 5Y3G as a half-wave rectifier.

This model is a six-tube superheterodyne, phono combination receiver with Automatic Record Changer. The tuning range is from 540 to 1725 kilocycles.

For adapting the phono-motor to 60 cycle operation it is only necessary to change the drive pulley on the motor shaft, using pulley No. 46536.
MODEL 639
Socket, Trimmers
Phono Assembly

Fig. 1—Top View Model 639

Fig. 2—Top View Model 639

Fig. 3—Top View Model 639

Fig. 4—Top View Model 639

Fig. 5—Top View Model 639

Fig. 6—Top View Model 639

SPINDLE TO 12" SHELF
NEEDLE SET FOR 12"
NEEDLE SET FOR 10"

TONE ARM TRIP
TRIP FINGER STOP

CENTER PIN TO 12" SHELF

ADJUSTING GAUGE TEMPLATE

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Compliments of www.nucow.com
**MODEL -- 668**

**455 K.C. I.F.**

**ALIGNMENT PROCEDURE**

**CONNECTING OUTPUT METER**

Connect the output meter to the plate and screen of the 6V6 Output tube. Be certain that the meter is protected from D. C. by connecting a condenser (1 mfd. or larger—not electrolytic) in series with one of the leads.

**Tuning the I-F Amplifier To 455 Kilocycles.**

(a) Connect the output of the signal generator through a .02 mfd. condenser to the top cap of the 6AQ5 tube, leaving the tube's grid lead in place. Connect the ground lead from the signal generator to the ground terminal of the receiver. **KEEP THE GENERATOR LEADS AS FAR AS POSSIBLE FROM THE GRID LEADS OF THE OTHER SCREEN GRID TUBES.**

(b) Set the station selector so that the tuning condenser plates are completely out of mesh. Turn the volume control knob to the right (ON).

(c) Set the signal generator to 455 kilocycles.

(d) Adjust both trimmers located on top of the 2nd I-F transformer for maximum output. (Item 6, Fig. 2).

(e) Adjust both trimmers located on top of the 1st I-F transformer for maximum output. (Item 5, Fig. 2).

(f) Check operations (d) and (e) for more accurate adjustment. **ALWAYS USE THE LOWEST SIGNAL GENERATOR OUTPUT THAT WILL GIVE A REASONABLE READING ON THE OUTPUT METER.**

**Aligning the R-F Amplifier.**

When aligning the R-F amplifier the output lead from the signal generator is connected to the antenna lead of the receiver, a 100 mfd. condenser should be connected in series with the output lead of the signal generator.

(a) With the station selector adjusted so that the tuning condenser plates are completely out of mesh, adjust the "OSC" trimmer so that the MINIMUM CAPACITY SIGNAL (C) is heard (it is not necessary that the receiver tune through this signal).

(b) Adjust the station selector so that the SHUNT ALIGNMENT signal is tuned-in with maximum output. Then adjust the "ANT" trimmer for maximum output. Readjust the station selector slightly so that the generator signal is tuned-in with maximum output and check the adjustment of the "ANT" trimmer. **DO NOT READJUST THE OSCILLATOR TRIMMER.**

If any of the circuits have been re-adjusted it may be necessary to reset the push buttons.

**SOCKET VOLTAGES**

The tube socket voltages are measured from the tube socket contacts to the chassis with a 1000 ohm per volt, 500-volt D. C. voltmeter (except filaments) with receiver in operating condition and no signal input. The filament voltages should be measured with an accurate low range A. C. voltmeter (approximately 0.10 volts). Readings may vary plus or minus 10% of values given.

**TUBE SOCKET VOLTAGE READINGS**

<table>
<thead>
<tr>
<th>Tube</th>
<th>Function</th>
<th>H</th>
<th>P</th>
<th>S</th>
<th>K</th>
<th>G</th>
<th>Ga</th>
<th>Go</th>
</tr>
</thead>
<tbody>
<tr>
<td>6AG</td>
<td>Oscillator-Modulator</td>
<td>6.3</td>
<td>186</td>
<td>70</td>
<td>—</td>
<td>186</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>6AGG</td>
<td>I-F Amplifier</td>
<td>6.3</td>
<td>186</td>
<td>70</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>6P6G</td>
<td>Detector-A, V, C.</td>
<td>6.3</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>6P6G</td>
<td>1st A-F Amplifier</td>
<td>6.3</td>
<td>92</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>6V6G</td>
<td>Power Output</td>
<td>6.3</td>
<td>186</td>
<td>186</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>5Y5G</td>
<td>Rectifier</td>
<td>5</td>
<td>70</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

Voltage drop across speaker field 50 volts, using 396-BP-12 speaker.

Maximum power output approximately 3 watts.

Power consumption at 117 V. approximately 60 watts with phone operating.
SPECIFICATIONS

Crosley radials, Models 54B and 54C, are designed for operation on 110-120 Vac (60 cycle) or D.C. power inputs. The tuning range of Model 54B is from 250 to 2500 kilocycles. The tuning range of Model 54C is from 175 to 250 kilocycles.

The antenna terminals consist of a combination of a half-wave dipole and a variable condenser, which may be preset in the cabinet to suit the type of antenna used. The antenna terminals are also provided with a tuning condenser to adjust the antenna length and to control harmonic radiation. The receiver is designed for use with an external antenna, but it may also be used with an internal antenna if desired.

The receiver contains a pair of 250 kHz tubes and one metal tube. The tubes are contained in a metal chassis and are connected by means of external leads to the antenna terminals. The chassis is provided with a locking device to prevent accidental adjustments.

The receiver is designed for use with a 12 volt AC power supply, but it may also be operated from a 6 volt DC power supply. The receiver is supplied with a line switch and a push button for manual tuning. The receiver is also provided with a manual station selector, which allows the user to select either AM or FM broadcast stations.

The receiver is provided with a built-in detector and a 1-AF amplifier, which is supplied with A.C. voltage to the grid of the 6AS7 and 6F8-G tubes. The 6AS7 tube is connected in parallel with the 6F8-G tube and is driven by the output of the 250 kHz tube. The filament of the 6AS7 tube is connected to a separate filament transformer, which is isolated from the rest of the circuit. The filament of the 6F8-G tube is connected to the filament transformer of the 250 kHz tube. A filament transformer is used to provide separate filament voltages for the two tubes.

The filament voltages of the tubes are supplied by a separate filament transformer, which is isolated from the rest of the circuit. The filament voltages may vary plus or minus 10% of the values given.

The receiver contains a built-in detector, a 1-AF amplifier, and a 250 kHz oscillator. The 250 kHz oscillator is connected to the grid of the 6AS7 tube and its output is connected to the grid of the 6F8-G tube. The 6AS7 tube is connected in parallel with the 6F8-G tube and is driven by the output of the 250 kHz tube.

The receiver is provided with a built-in detector, a 1-AF amplifier, and a 250 kHz oscillator. The 250 kHz oscillator is connected to the grid of the 6AS7 tube and its output is connected to the grid of the 6F8-G tube. The 6AS7 tube is connected in parallel with the 6F8-G tube and is driven by the output of the 250 kHz tube. The filament of the 6AS7 tube is connected to a separate filament transformer, which is isolated from the rest of the circuit. The filament of the 6F8-G tube is connected to the filament transformer of the 250 kHz tube. A filament transformer is used to provide separate filament voltages for the two tubes.

The filament voltages of the tubes are supplied by a separate filament transformer, which is isolated from the rest of the circuit. The filament voltages may vary plus or minus 10% of the values given.
MODEL 689
Voltage, Tuner, Alignment

THE CROSLEY CORP.

MODEL 689
TUBE SOCKET VOLTAGE READINGS

<table>
<thead>
<tr>
<th>Tube</th>
<th>Function</th>
<th>H</th>
<th>P</th>
<th>S</th>
<th>Su</th>
<th>K</th>
<th>Ge</th>
<th>Gc</th>
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<tbody>
<tr>
<td>6AG7</td>
<td>Oscillator-Modulator</td>
<td>6.3</td>
<td>105</td>
<td>70</td>
<td></td>
<td>-10</td>
<td>105</td>
<td></td>
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<tr>
<td>6K7GT</td>
<td>I-F Amplifier</td>
<td>6.3</td>
<td>105</td>
<td>70</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>6SQ7GT</td>
<td>Det. A.C. A-F Amplifier</td>
<td>6.3</td>
<td>35</td>
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<td></td>
<td></td>
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<tr>
<td>2S5GT</td>
<td>Output</td>
<td>25.1</td>
<td>117.5 A.C.</td>
<td>105</td>
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<td>6</td>
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<tr>
<td>25Z6GT</td>
<td>Rectifier</td>
<td>25.1</td>
<td>117.5 A.C.</td>
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<tr>
<td>W-4673</td>
<td>Ballast Tube</td>
<td>Approx. 48.4 A.C. Drop</td>
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</tbody>
</table>

Power output approximately 2 watts.
Power consumption approximately 48 watts.
Voltage drop across speaker field 27 volts.
All voltages except filaments will be approximately 10% lower if measured on 117.5 volts DC power supply.

ALIGNMENT PROCEDURE

The chassis of this receiver is connected to one side of the power supply and for this reason all test equipment should be thoroughly insulated in order that the power supply will not become short circuited while aligning the receiver.

CONNECTING OUTPUT METER

Connect one terminal of the output meter to the plate and the other terminal to the screen of the 25L6GT tube. Be certain that the meter is protected from D.C. by connecting a condenser (1/2 mid., or larger—not electrolytic) in series with one of the leads.

Tuning the I-F Amplifier to 455 Kilocycles

(a) Connect the output of the signal generator through a .02 my condenser to the grid cap of 6AG7, leaving grid cap in place. Do not use a ground return from the signal generator unless it is found to be absolutely necessary. If it is found to be necessary, a small condenser (approximately .001 mid.) should be connected in series with the ground terminal of the signal generator and the receiver chassis. KEEP THE GENERATOR LEADS AS FAR AS POSSIBLE FROM THE GRID LEADS OF THE OTHER SCREEN GRID TUBES.

(b) Set the plate selector so that the plate of the condenser gang are completely out of mesh, turn the volume control to the right (ON), and turn the band switch to the right (B.C.).

(c) Set the signal generator to 455 kilocycles.

(d) Adjust the 2nd I-F trimmer condenser, Fig. 2, located between Push Button Assembly and speaker field, for maximum reading on the output meter.

(e) Adjust the 1st I-F trimmer condensers for maximum output.

(f) Repeat operations (d) and (e) for more accurate adjustments.

ALWAYS USE THE LOWEST SIGNAL GENERATOR

OUTPUT THAT WILL GIVE A REASONABLE READING ON THE OUTPUT METER.

Aligning the R-F Amplifier

When aligning the R-F amplifier the output lead of the signal generator should be connected, through a dummy antenna, to the BLUE lead extending from the rear of the chassis. For the standard Broadcast Band and special police band use a 5000 ohm condenser and for the short wave band a 250 ohm carbon resistor instead of the condenser.

(a) Set the signal generator to 1725 kilocycles.

(b) With the condenser gang turned to the minimum capacity position and band switch turned to B.C. position, adjust the B.C. "OSC" trimmer condenser of the gang so that 1725 kilocycle signal is heard. It is not necessary that the receiver tune through this signal.

(c) Set the generator to 1400 kilocycles.

(d) Tune-in the 1400 kilocycle signal in the region of 140 on the dial for maximum output.

(e) Adjust the trimmer condenser B.C. "ANT" for maximum output.

NOTE: Do not readjust the "OSC" trimmer.

(f) Repeat operations (d) and (e) for more accurate adjustments.

(g) Set signal generator to 2.5 megacycles and turn band switch to special police band (middle position).

(h) Tune in 2.5 signal on receiver and then adjust POL. "ANT" trimmer condenser (Fig. 2) for maximum output. There is no "OSC" adjustment for this band.

(i) Set signal generator to 18.5 megacycles, turn band switch to S.W. position (left) and open gang all the way.

(j) Adjust S.W. "OSC" trimmer condenser for maximum output.

(k) Set signal generator to 18 megacycles.

(l) Tune in 18 mc. signal on receiver, then adjust the S.W. "ANT" trimmer condenser for maximum output.

(m) Repeat (i) to (l) for more accurate adjustments.

NOTE: When shunt aligning the short wave band care should be exercised so that the circuits will be aligned on the correct frequency (fundamental) rather than on the image frequency which is approximately 910 kilocycles more than the fundamental. To check on this, increase the signal generator output approximately 10 times or more, and try to tune in the signal generator frequency as indicated on the station selector dial and at approximately 910 kilocycles less than the correct frequency. (180 mc. fundamental 1709 mc. image). If circuits have been properly aligned the signal can be tuned in at both positions but with a much stronger signal on the fundamental.

A few of the earlier releases of this model used a 6Q7GT in place of the 8Q7GT. This change was made to improve performance especially on the short wave band.

If any of the circuits have been re-aligned, check push buttons to see if they need resetting.

SETTING THE PUSH BUTTONS

The push buttons are easily and accurately set from the top of the receiver. It is not necessary that all the buttons be set at the same time. Remove the push buttons to be set by grasping the button between the forefinger and thumb and pulling straight up. Loosen the set screws on the keys but do not remove them.

Determine the favorite broadcasting stations whose call letters are to be placed in the buttons. By means of the manual tuning knob, tune-in AS ACCURATELY AS POSSIBLE the station having the highest frequency—that is the station that is tuned-in nearest the 1500 Kc. end of the dial. Then push the front key all the way down, and while you hold it in that position SECURELY TIGHTEN THE SET SCREW. Replace push button on key.

The push button tuning system is now correctly set for the first station. Follow through with this same procedure, setting the other stations in the order of their frequency (kilocycles). Detach the call letters of the favorite stations from the list supplied with your receiver and press them into the openings in the front of the push buttons. Thin pieces of clear celluloid are supplied in a small envelope and should be snapped in place over the call letters to protect and hold them in place.

TUBES AND VOLTAGE LIMITS

The following table gives the functions of the tubes used, together with the voltage readings between the tube socket contacts and chassis. Voltage readings are given in relation to the plate, cathode and chassis. Voltage readings should be measured with an accurate high range volt-meter. When measured on a 117.5 volt A.C. line voltage limits may vary plus or minus 10% of the values given.

SPECIFICATIONS

This model Crosley receiver is a three band superheterodyne receiver designed for operation on 110 volt A.C. (50-60 cycles) or D.C. power circuits.

The receiver incorporates an improved mechanical push button tuning system, built in loop antenna, A.V.C., terminals for phone or television sound and many improved circuit developments.

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FIG. 1-A—WIRING DIAGRAM—MODEL 719

FIG. 1-B—WIRING DIAGRAM—MODEL 719
**SPECIFICATIONS**

This model Croley is a seven tube superheterodyne receiver designed for operation on 110 volt—50 or 60-cycle power circuits. It may be adapted for 25 cycle operation by the addition of another filter condenser as indicated in wiring diagram.

**CIRCUIT DESCRIPTION**

There are three versions of this model in the field namely: one version with an improved mechanical push button tuning system; one version with mechanical push button tuning and loop antenna, and one version has the Magnetune electric push button tuning system.

The circuit is a conventional super with no regeneration. Item 23, a 60,000 ohm resistor in series with the volume control forms the A.V.C. load. Item 22, a 3 megohm resistor acts as a filter for the A.V.C. voltage applied to the 6A8GT and the 6SK7. Bias for the 25Z6GT is obtained from the voltage drop across item 23, a 140 ohm resistor. The two 25Z6GT rectifiers are in parallel and connected for voltage doubling.

The B voltage is filtered with the 900 ohm resistor, item 24, the speaker field (450 ohms) item 15, a twin 30 mf. electrolytic, and item 14, a single 30 mf. electrolytic.

The filaments of the tubes are wired in series. A .05 mfd. condenser, item 11, is connected across the power supply leads to reduce electrical interference from that source.

**TUBES AND VOLTAGE LIMITS**

The following table gives the functions of the tubes used, together with the voltage readings between the tube socket contacts and chassis. Voltage readings should be taken with a 1,000 ohm per volt, 250 volt volt-meter (except filaments) with the volume control full “O” and no signal input. The filament voltages should be measured with an accurate low range volt-meter. When measured on a 117.5 volt A.C. line voltage limits may vary plus or minus 10% of the values given.

---

Maximum power output 2.5 watts.
Drop across speaker field 40 volts.
Power consumption @ 117.5 volt line = 65 watts. Those with “Magnetune” coil 40 watts additional.

**ALIGNMENT PROCEDURE**

The chassis of this receiver is connected to one side of the power supply and for this reason all test equipment should be thoroughly insulated in order that the power supply will not become short-circuited while aligning the receiver.

**CONNECTING OUTPUT METER**

Connect one terminal of the output meter to the plate and the other terminal to the screen of the 25Z6GT output tube. Be certain that the meter is protected from D.C. by connecting a condenser (1 mf. or larger—not electrolytic) in series with one of the leads.

**Tuning The I-F Amplifier to 455 Kilocycles**

(a) Connect the output of the signal generator through a 100 mfd. condenser to the antenna lead on the receiver. Do not use a ground return from the signal generator unless it is found to be absolutely necessary. If it is found to be necessary, a small condenser (approximately .001 mfd.) should be connected in series with the ground terminal of the signal generator and the receiver chassis. KEEP THE GENERATOR LEADS AS FAR AS POSSIBLE FROM THE GRID LEADS OF THE OTHER SCREEN GRID TUBES.

(b) Set the station selector so that the plates of the condenser gang are completely out of mesh and turn the volume control to the right (ON).

(c) Set the signal generator to 455 kilocycles.

(d) Adjust the 2nd I-F trimmer condensers, item 6, for maximum reading on the output meter.

(e) Adjust the lst I-F trimmer condensers, item 5, for maximum output.

Repeat operations (d) and (e) for more accurate adjustments.

ALWAYS USE THE LOWEST SIGNAL GENERATOR OUTPUT THAT WILL GIVE A REASONABLE READING ON THE OUTPUT METER.

**Aligning the R-F Amplifier**

(a) Set the signal generator to 1725 kilocycles.

(b) With the condenser gang turned to the minimum capacity position, adjust the trimmer condenser on the “OSC” section of the gang so that the 1725 kilocycle signal is heard. It is not necessary that the receiver tune through this signal.

(c) Set the signal generator to 1400 kilocycles.

(d) Tune-in the 1400 kilocycle signal in the region of 140 on the dial for maximum output.

(e) Adjust the trimmer condenser located on the “ANT” section of the gang for maximum output.

NOTE: Do not readjust the “OSC” trimmer.

(f) Repeat operations (d) and (e) for more accurate adjustments.

The special police band has no provisions for alignment.

**WAVE TRAP**

Some chasis of this model may be equipped with a wave trap for the purpose of eliminating interference from code stations which operate on a frequency of approximately 455 kilocycles. This assembly is located on the top side of the chassis and consists of a coil and a condenser as illustrated by dotted lines in the Wiring Diagram, Fig. 1A.
THE CROSLEY CORP. MODEL 729 (Types 1 and 2) Schematics

MODEL -- 729
TUBES MAY BE METAL OR QT TYPES EXCEPT 6AB7
455 KC. I.F.

FIG. 1-A—WIRING DIAGRAM—MODEL 729 (MAGNETUNE)

MODEL -- 729
TUBES MAY BE METAL OR QT TYPES EXCEPT 6AB7
455 KC. I.F.

FIG. 1-B—WIRING DIAGRAM—MODEL 729 (MECH. P. B.—TWO BAND)

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THE CROSLEY CORP.

MODEL NO. 729

This model Crosley receiver is designed for operation on 110 volt, 50 or 60 cycle electric circuits. There are three versions of this model in the field which include: one version which is a two band super with a mechanical push button tuning system; one version which is a two band super with the "Magnetune" electric push button tuning system; one version which is a three band super with a loop antenna and a mechanical push button tuning system.

The circuit is a conventional superheterodyne with the exception of the three band series which is novel in the method in which the special police band is covered. This special band makes use of the image frequency (2 x I-F frequency more than fundamental) and the tap on the loop which is resonated at 2.4 megacycles.

The 6AG7, 6SK7, and 6FS5 are operated at zero bias and the 2SC6 bias is obtained from voltage drop across item 27, a 140 ohm 1/4 watt resistor. A.V.C. voltage is applied to the 6AG7 and the 6SK7 through filter resistor item 30 (3 megohms). Item 31, a 60,000 ohm resistor and item 45A, a 1 megohm volume control, serve as the A.V.C. load. The two 2526 rectifiers are hooked in parallel and connected voltage doubling. The speaker field (450 ohms) and item 35, a 800 ohm 7 watt resistor with condensers items 18 and 19 filter the B supply.

ALIGNMENT PROCEDURE

All circuits have been accurately adjusted at the factory and normally should need no further adjustment. However, if it is definitely known that an adjustment is necessary the circuits can best be properly aligned with the use of a modulated signal generator and an output meter.

NOTE: The circuit of this receiver is such that if the signal generator has one side of the line connected to the case or ground side and the generator and receiver are plugged into the same line, serious damage may result to either or both instruments.

ALWAYS ISOLATE SIGNAL GENERATOR GROUND LEAD BY INSERTING A .01 mf. OR SMALLER CONDENSER IN SERIES WITH THE LEAD BEFORE CONNECTING TO THE CHASSIS.

CONNECTING OUTPUT METER

One terminal of the output meter should be connected to the plate (No. 3 pin) and the other terminal to the screen (No. 4 pin) of the 2SKG7 output tube. Be sure the meter is protected from D.C. by connecting a .25 mf. condenser in series with one of the leads.

(1) I-F Amplifier Alignment

(a) Connect the output lead of the signal generator through a .02 mf. condenser to the top (GRID) cap of the 6AS7 tube (leaving the tubes grid connector in place).
(b) Connect the ground lead of the signal generator through a .01 mf. (or smaller .001 mf.) condenser to the chassis.
(c) Adjust station selector so that the rotor plates of the gang are completely disengaged, turn band to B.C. position and turn the volume control to maximum.
(d) Set the signal generator to 45 kc.
(e) Adjust the trimmer condensers on the 2nd I-F transformer for maximum output.
(f) Adjust the trimmer condensers on the 1st I-F transformer for maximum output.
(g) Set signal generator to 18.3 megacycles.
(h) Adjust S.W. oscillator trimmer for maximum output.
(i) Set signal generator to 18 megacycles.
(j) Tune in B.C. signal with manual control, then adjust the S.W. antenna trimmer condenser for maximum output.

Check to see that receiver is aligned on the fundamental and not the image frequency. Increase signal generator output approximately 10 times and tune in image frequency (2 x 45 kc. + fundamental) which will be approximately 910 kilocycles less than 18 mc, as indicated by dial (17.1 mc.) If correctly aligned, the image will come in as stated but will be much weaker than the fundamental.

The special police band in some models covering 2.3 to 2.5 mc. has no adjustments but can be checked by using a .0001 mf. condenser in series with the signal generator output lead, turning band switch to POL position, signal generator to 2.5 mc. and then tune in generator signal, which should come in with the dial pointer near the end of that band.

WILL GIVE A REASONABLE OUTPUT METER READING.

(2) Aligning R-F Amplifier

(a) Connect the signal generator output lead through a .0001 mf. condenser to the antenna lead (YELLOW) and the generator ground lead to the Black lead of the receiver. Turn band switch to B.C. band, open gang all the way and turn volume control on full.
(b) Set signal generator to 1725 kilocycles.
(c) Adjust B.C. oscillator trimmer for maximum output (receiver does not have to tune through this signal).
(d) Set signal generator to 1400 kilocycles.
(e) Tune in generator signal on receiver by means of manual tuning knob.
(f) Adjust B.C. antenna trimmer for maximum output. DO NOT readjust oscillator trimmer.
(g) Repeat above procedure for more accurate adjustments.
(h) Connect the signal generator output lead through a 250 ohm carbon resistor to the antenna lead of the receiver. Turn band switch to S.W. position, open gang condenser all the way, and turn volume on full.
(i) Set signal generator to 18.3 megacycles.
(j) Adjust S.W. oscillator trimmer for maximum output.
(k) Set signal generator to 18 megacycles.
(l) Tune in B.C. signal with manual control, then adjust the S.W. antenna trimmer condenser for maximum output.

PARTS LIST—MODEL 729

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Part No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>W - 47977</td>
<td>Dial Light Bulb, 110 Volt</td>
</tr>
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<td>2</td>
<td>W - 48169</td>
<td>Dial Light Cover</td>
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<tr>
<td>3</td>
<td>B - 56789A</td>
<td>Power Cord Plug</td>
</tr>
<tr>
<td>4A</td>
<td>G214 - 32000</td>
<td>Antenna Coil, Foreign</td>
</tr>
<tr>
<td>4B</td>
<td>G206 - 32002</td>
<td>Oscillator Coil (Foreign)</td>
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<tr>
<td>5</td>
<td>G221 - 32004</td>
<td>Coax Transformer, Foreign</td>
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<td>6</td>
<td>G185 - 32004</td>
<td>1st I-F Transformer Assembly</td>
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<td>7</td>
<td>G209</td>
<td>Loop Antenna</td>
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<tr>
<td>8</td>
<td>G249</td>
<td>Solid State Assembly</td>
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<td>G300</td>
<td>Condenser, 2500 Ohm, Molded</td>
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<td>G18 - 34000</td>
<td>Condenser, .0001 mf. Molded</td>
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<td>11</td>
<td>G248 - 34000</td>
<td>Condenser, .0001 mf., 120 Volts Paper</td>
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<tr>
<td>12A</td>
<td>G248 - 34000</td>
<td>Condenser, .0001 mf., 120 Volts Paper</td>
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<td>12B</td>
<td>W - 14257A</td>
<td>Trimmer Condenser</td>
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<td>12C</td>
<td>G209</td>
<td>Trimmer Condenser</td>
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<td>13</td>
<td>W - 47974</td>
<td>Spacers, (2 Req.) (4 Sect.) Trimmer</td>
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<tr>
<td>14A</td>
<td>G206 - 32002</td>
<td>Condenser, 550 Ohm, 160 Volt Paper</td>
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<td>14B</td>
<td>G301 - 32001</td>
<td>2 Sect. Var. Cond. (A) Condenser Section</td>
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<td>M2130</td>
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<td>16</td>
<td>M2131</td>
<td>Rivotted Mfg. Bracket, L. H.</td>
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<td>M2132</td>
<td>Cowl Bracket</td>
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<td>18</td>
<td>G816</td>
<td>Dial Back Face</td>
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<td>19</td>
<td>G806</td>
<td>Push Button Unit Assembly</td>
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<tr>
<td>20</td>
<td>G12</td>
<td>Polarity and Hub Assembly</td>
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<td>21</td>
<td>G13 - 34000</td>
<td>Condenser, .00001 mf. Molded</td>
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<td>G5 - 34000</td>
<td>Condenser, .00005 mf. Molded</td>
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<td>23</td>
<td>G6 - 34000</td>
<td>Condenser, .00015 mf. Molded</td>
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<td>24</td>
<td>W - 47985</td>
<td>Condenser, 30-150 Ohms 150 Volt Elect.</td>
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<td>25</td>
<td>W - 47985</td>
<td>Condenser, 30-150 Ohms 150 Volt Elect.</td>
</tr>
<tr>
<td>26</td>
<td>W - 47985</td>
<td>Condenser, 30-150 Ohms 150 Volt Elect.</td>
</tr>
<tr>
<td>27</td>
<td>W - 47985</td>
<td>Condenser, 30-150 Ohms 150 Volt Elect.</td>
</tr>
</tbody>
</table>

Figures in first column refer to parts in Diagrams.
ALIGNMENT PROCEDURE

All circuits have been accurately adjusted at the factory and normally should need no further adjustment. However, if it is definitely known that an adjustment is necessary the circuits can best be properly aligned with the use of a modulated signal generator and an output meter.

NOTE: The circuit of this receiver is such that if the signal generator has one side of the line connected to the case or ground side and the generator and receiver are plugged into the same line, serious damage may result to either of both instruments. ALWAYS ISOLATE SIGNAL GENERATOR GROUND LEAD BY INSERTING A .01 mf. OR SMALLER CONDENSER IN SERIES WITH THE LEAD BEFORE CONNECTING TO THE CHASSIS.

CONNECTING OUTPUT METER

One terminal of the output meter should be connected to the plate (No. 3 pin) and the other terminal to the screen (No. 4 pin) of the 2SL6GT output tube. Be sure the meter is protected from D.C. by connecting a .25 mf. condenser in series with one of the leads.

1.—I-F Amplifier Alignment

(a) Connect the output lead of the signal generator through a .02 mf. condenser to the top (GRID) cap of the 6A8GT tube (leaving the tubes grid connctor in place) or to the antenna lead.

(b) Connect the ground lead of the signal generator through a .01 mf. (or smaller, .001 mf.) condenser to the chassis.

(c) Adjust station selector so that the rotor plates of the gang are completely disengaged, turn band to B.C. position and turn the volume control to maximum.

(d) Set the signal generator to 455 kc.

(e) Adjust the trimmer condensers on the 2nd I-F transformer for maximum output.

(f) Adjust the trimmer condensers on the 1st I-F transformer for maximum output.

(g) Repeat (e) and (f) for more accurate adjustments. IN ORDER TO PREVENT A. V. C. ACTION, ALWAYS USE THE LOWEST SIGNAL GENERATOR OUTPUT THAT WILL GIVE A REASONABLE OUTPUT METER READING.

2.—Aligning R-F Amplifier

(a) Connect the signal generator output lead through a .0001 mf. condenser to the antenna lead (YELLOW OR BLUE) and the generator ground lead to the black lead of the receiver. Turn band switch to B.C. band, open gang all the way and turn volume control on full and tone control to treble position.

(b) Set signal generator to 1725 kilocycles. (Generator should be set to 1620 kilocycles for Model 7739).

(c) Adjust B.C. oscillator trimmer for maximum output (receiver does not have to "tune through this signal").

(d) Set signal generator to 1400 kilocycles.

(e) Tune in generator signal on receiver by means of manual tuning knobs.

(f) Adjust B.C. antenna trimmer for maximum output. DO NOT readjust oscillator trimmer.

(g) Repeat above procedure for more accurate adjustments.

(h) Set signal generator to 600 kilocycles.

(i) Tune in 600 kilocycle signal on receiver. While rocking the gang back and forth adjust the B.C. oscillator series condenser for maximum output.

(j) Repeat operations (d), (e) and (f) to correct any change caused by series alignment.

(k) Connect the signal generator output lead through a 250 ohm carbon resistor to the antenna lead of the receiver. Turn band switch to S.W. position, open gang condenser all the way, and turn volume on full, etc.

(l) Set signal generator to 18.3 megacycles.

(m) Adjust S.W. oscillator trimmer for maximum output.

(n) Set signal generator to 18 megacycles.

(o) Tune in 18 mc. signal with manual control, then adjust the S.W. antenna trimmer condenser for maximum output.

Check to see that receiver is aligned on the fundamental and not the image frequency. Increase signal generator output approximately 10 times and tune in image frequency (2 x 455 kc. + fundamental) which will be approximately 910 kilocycles less than 18 mc. as indicated by the dial calibrations (17.1 mc.). If correctly aligned, the image will come in as stated but will be much weaker than the fundamental.
The circuit used is a conventional superheterodyne without regeneration using a 6A8GT as Oscillator-Modulator (biased 6K8CT in some of the earlier models), a 6SK7 as I-F amplifier, a 6P5GT as diode detector, A. V. C., a 6SF5 as first audio amplifier, a 25L6GT as beam power output and two 25Z6GT rectifiers (connected for voltage doubling). A. V. C. is applied to the oscillator-modulator and I-F tubes. All tubes are operated at zero bias except the 25L6GT which obtains its bias from the voltage drop across a 140 ohm resistor between cathode and chassis.

Model 7739 uses a tapped volume control for variable level bass compensation. Models of either chassis in the later series are equipped with terminals for connecting a phonograph attachment.

Models J-739 and J-7739 are the same as models 739 and 7739 except for the following:

Model J-739 differs from Model 739 in that the negative or ground return is isolated from the chassis by a .2 mfd—160 volt condenser. For alignment procedure use same as outlined for Model 739. The voltage readings are the same as given for Model 739 except the MEASUREMENTS SHOULD BE TAKEN BETWEEN SOCKET CONTACTS AND THE LOW SIDE OF THE VOLUME CONTROL.

Model J-7739 is the same as Model 7739 except that Model J-7739 has a 1 to 1 isolating power transformer. For alignment procedure and socket voltages use same as given for the Model 739 etc.
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THE CROSLEY CORP. MODELS 819, 1019 (Loop Type) Schematic

FIG. 1—WIRING DIAGRAM—MODELS 819 AND 1019

455 K.C. I.F.

FEBRUARY, 1940

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Fig. 3-A—Bottom View Model 819 (No Loop)

The circuit is a conventional superheterodyne with no regeneration, having two stages of I-F amplification, the first of which is resistance coupled, variable level bass compensation, a three position tone control and impedance coupled push pull beam power output. No power transformers were used on those chassis which used two 25Z6GT Rectifiers. The power transformer used on the later versions having two SY3C Rectifiers is quite different from the regular type power transformer used in Model J-819, and care should be exercised when checking its voltages.

Fig. 3-B—Bottom View Models 819 and 1019

Model 1019 is the same as model 819 except for the cabinet, dial, switch box and knobs used. There are later releases that had a mechanical push button tuning system, loop antenna, two SY3C Rectifier tubes and a power transformer. Model J-819 and 1019 falls in this group.
Aligning The I-F Amplifier To 655 Kilocycles.

(a) Connect the output lead of the signal generator through a 0.0002 mfd. condenser to the receiver antenna lead (Black). Connect the signal generator ground lead through a 0.0002 mfd. or smaller condenser to the receiver ground lead (Black).

(b) Set the signal generator to 455 kilocycles. Turn the receiver hand switch to the broad band (left), the tone control switch to the speech position (left) and open the gain condenser all the way then turn the volume control on full (all the way to the right).

(c) Adjust the two trimmer condensers on the second I.F. assembly for maximum output (Fig. 2).

(d) Adjust the two trimmer condensers on the first I.F. assembly for maximum output. (Fig. 2).

(e) Repeat (c) and (d) for more accurate adjustments.

Aligning The R-F Amplifier.

(a) For aligning the broadcast band the setup remains the same. Using a 0.0002 mfd. condenser for a dummy antenna and etc.

(b) For models without loop antenna set the signal generator to 1725 kilocycles. For models with a loop antenna set the signal generator to 1500 kilocycles. Open condenser all the way, turn hand switch to left (B.C.), tone control to left (speech) and the volume control on full.

(c) For models without the loop antenna adjust B.C. oscillator shunt trimmer condenser (Fig. 2) for maximum output (gong does not have to tune through this signal). For models with a loop antenna there are two oscillator shunt trimmer condensers as will be noted in figure 2. Close the front oscillator shunt trimmer all the way, then open about 1/2 turn. Proceed in the other (rear) trimmer the 1350 kilo-cycle signal for maximum output.

(d) Set the signal generator to 1400 kilocycles.

(e) Tune the receiver to generator signal for maximum output (approximately 1400 on the dial).

(f) On models without the loop adjust the B.C. antenna shunt trimmer for maximum output, see (Fig. 2). On models with a loop a B.C. antenna shunt trimmer is located on top the loop antenna; adjust for maximum output.

Models equipped with a loop antenna have provisions for series aligning the oscillator circuit:

(1) Set signal generator to 600 kilocycles.

(2) Tune in generator signal on receiver.

(3) While rocking tuning condenser back and forth adjust oscillator series trimmer (Fig. 2) for maximum output. Then repeat (d) and (f) for more accurate alignment.

(g) Change dummy antenna from a 0.0002 mfd. condenser to a 250 carbon resistor.

(h) For models without loop antenna set the signal generator to 5.8 megacycles. Open gang condenser, turn hand switch to center position, T. C. to left (speech) and volume on full. For models with a loop antenna set signal generator to 5.8 megacycles.

(i) Adjust “Pol.” oscillator shunt trimmer condenser (Fig. 2) for maximum output.

(j) For models without loop antenna set signal generator to 5.5 megacycles. For models with a loop antenna set signal generator to 4.0 megacycles.

(k) Tune in generator signal with manual control for maximum output (approximately 5.5 or 4.0 megacycles on the dial). Adjust the “Pol.” antenna shunt trimmer condenser for maximum output.

(l) Set signal generator to 18.3 megacycles.

(m) With gang open and hand switch turned to the right (H.F.), adjust the H. F. (high frequency) oscillator trimmer (Fig. 2) for maximum output. Care should be taken to align the oscillator on the funda-mental and not the image frequency. When correctly aligned the image should be heard approximately 17.4 on the dial but will be comparatively weak compared to the fundamental frequency.

(n) Tune signal generator to 18.0 megacycles.

(o) Tune in the signal generator signal for maximum output; then adjust the H. F. antenna shunt trimmer for maximum output. When aligning the R.F. circuits always use the lowest signal input, which will give a reasonable indication on the output meter, to prevent A.V.C. action.

REPLACING DRIVE CORD

(1) Remove the broken drive cord, saving the small metal cord clamp, the tension spring and pointer.

(2) Carefully remove the dial glass.

(3) Cut a piece of drive cord about 8 inches long. Fasten the tension spring approximately one inch from one end.

(4) Open the condenser gang all the way. The eyelet in the large drive pulley should be near the top with the gang in this position.

(5) Hook the loose end of the tension spring on small ear formed in pulley and thread the drive cord through the eyelet in pulley rim from the inside.

(6) Bring cord forward over pulley then down to small pulley on manual drive shaft, make one complete turn around small pulley in a clockwise direction.

(7) Continue cord from the under side of drive shaft pulley over the lower left hand idler pulley, then making a half turn over the top of the lower right hand idler continue over to the top of pulley on drive shaft.

(8) Continue around pulley in a clockwise direction over to lower left hand idler pulley, over lower left hand pulley and up to upper left hand idler pulley, continue cord over upper left hand idler to upper right hand idler pulley.

(9) Bring cord over right hand idler pulley and down and under and around large drive pulley to eyelet.

(10) Insert end through the eyelet. Tie securely to tension spring. The cord should be so tied that the tension spring when hooked on ear formed in pulley, will be stretched to approximately 1/4 inches in length.

(11) Hook the pointer to the drive cord between the upper left hand and right hand idler pulleys. The cutout end of pointer is fastened to the top cord between the lower left hand and the pulley on the drive shaft. Replace dial glass.

Before clamping pointer or cementing it to the drive cord, open gang all the way. The pointer should then split the last graduation on the dial. Check travel from end to end then fasten pointer securely.

(12) Replace the cord clamp on drive cord inside the large drive pulley. The position of clamp should be no more than 1/16" from inside end of eyelet.
THE CROSLEY CORP.

MODELS 5519, 5529, 6519
J5519, J5529
Schematics

FEBRUARY, 1940

MODEL -- J5519 & J5529

MODEL J-5519—Same as model 5519 except the negative "B" circuit or ground return (one side of the line) is isolated from the chassis by a .25 mfd. condenser.

MODEL J-5529—Same as model 5529 except the negative "B" or ground return circuit (one side of the line) is isolated from the chassis by a .25 mfd. condenser.

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Compliments of www.nucow.com
Models 5519, J-5519, 6519

Fig. 2—Top View Models 5529, J-5529

TUBE SOCKET VOLTAGE READINGS

<table>
<thead>
<tr>
<th>Tube</th>
<th>Function</th>
<th>H</th>
<th>P</th>
<th>S</th>
<th>Su</th>
<th>K</th>
<th>Go</th>
<th>Ga</th>
</tr>
</thead>
<tbody>
<tr>
<td>12AQ7T</td>
<td>Oscillator-Modulator</td>
<td>12</td>
<td>90</td>
<td>48</td>
<td></td>
<td>3</td>
<td>4</td>
<td>50</td>
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<tr>
<td>12SK7GT</td>
<td>I.F. Amplifier</td>
<td>12</td>
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<td>90</td>
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<td></td>
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<tr>
<td>12AQ7CT</td>
<td>DET. AVC, A-F Amplifier</td>
<td>12</td>
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<td></td>
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<tr>
<td>50L6GT</td>
<td>Output</td>
<td>50</td>
<td>84</td>
<td>90</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>35Z5GT</td>
<td>Rectifier</td>
<td>35</td>
<td>117</td>
<td>5</td>
<td></td>
<td></td>
<td>117</td>
<td></td>
</tr>
</tbody>
</table>

Aligning the R-F Amplifier.

(a) Set the signal generator to 1725 kilocycles.
(b) With the condenser gang turned to the minimum capacity position, adjust the trimmer condenser on the “OSC” section of the gang so that the 1725 kilocycle signal is heard. It is not necessary that the receiver tune through this signal.
(c) Set the signal generator to 1400 kilocycles.
(d) Tune-in the 1400 kilocycle signal in the region of 140 on the dial for maximum output.
(e) Adjust the trimmer condenser located on the “ANT” section of the gang for maximum output.

NOTE: Do not readjust the “OSC” trimmer.
(f) Repeat operations (d) and (e) for more accurate adjustments.

Models 5519, J-5519, 6519, 5529, J-5529

MODEL 6519—Same electrically as model 5519. Has special spider loop mounted to a bracket on right side of chassis and is housed in a wood cabinet.

MODEL 5529—Same electrically as model 5519. Has a four station mechanical push button tuning system. There are two series of this model in the field, one series has a spider form loop antenna mounted on the back of the receiver and the other series has the pancake type loop mounted in the cabinet between chassis and right end of the cabinet.

MODEL 5519—Five tube superheterodyne with a pancake type loop antenna mounted between chassis and right side of the cabinet. Has a handle on top for carrying.

Conventional alignment for all models See Vol. VIII "How It Works"
To align the loop, break the seal covering the hole on the bottom of the cabinet. Tune the set to a weak signal on or near 1400 K.C. and with the volume control on full adjust the trimmer on the variable condenser for maximum output. A long screwdriver will be needed to reach the trimmer through the hole in the bottom of the cabinet.
Compliments of www.nucow.com

TUBES

Tubes required are:
1—6K8G Oscillator Translator
1—6K7G Intermediate Frequency Amplifier
1—6Q7G Detector AVC—First Audio Amplifier
1—6G5 Cathode Ray Tuning Tube

MODEL 314

IF PEAK 455 KC

1—76 Driver—Phase Inverter
2—6N6G Power Output
1—80 Rectifier
1—6G5 Cathode Ray Tuning Tube

MODEL 318

Tubes required are:
1—6A7 Oscillator Translator
1—6D6 I.F. Amplifier
1—75 Detector A.V.C. Audio Amplifier
1—41 Output
1—IV Rectifier
1—6U5 Tuning Tube

PART 72

FOR CONVENTIONAL ALIGNMENT, SEE SPECIAL ALIGNMENT DIRECTIONS, PAGE 116-117

Schematic—Model 318

DETROLA CORP.

DETROLA PAGE 115

Compliments of www.nucow.com
MODELS 321 and 324

IF PEAK 455 KC

The following tubes are used in this receiver:

6K8G—Oscillator, Translator
6K7G—L.F. Amplifier
6Q7G—Detector, Audio Amplifier, AVC.
25L6G—Power Output
25Z5—Rectifier
BK49BG—Ballast

ALIGN. FREQ.
IF 455 KC
WAVE TRAP 455 KC
B.C. OSC. 1720 KC
B.C. ANT. 1620 KC
B.C. PAR. 600 KC
S.W. OSC. 18200 KC
S.WANT 17000 KC

C438x417

COMPLIMENTS OF www.nucow.com
Symbol | Part No. | Description
--- | --- | ---
C1,2,3 | 7591 | Tuning Condenser
C4 to C12 | 7197 | Trimmer Condensers, 3-20 mmf.
C13 | 7721 | 0.007 mfd. plus or minus 5%
C14 | 7312 | 1440 mfd. plus or minus 3%
C15 | 7314 | Condenser Padder Adj.
C20,34 | 1286 | 210 mmf. Mica
C21,30 | 2780 | 50 mmf. Mica
C22,23,28,46 | 580 | 0.05-200
C24 | 575 | 1-400
C25 | 5780 | 20 mmf., 150 V. Electrolytic
C26 | 7473 | 2.5 mmf.
C27 | 2600 | 0.02-600 V
C29,31,38 | 572 | 1-200 V
C32,33 | 1285 | 100 mmf.
C35,36,37 | 824 | 0.002-600 V
C39 | 1285 | 100 mmf.
C40,41 | 2782 | 0.05-600
C42 | 3352 | 0.2-400
C43,45 | 7400 | 16 mfd. 400 V Electrolytic
C44 | 0.0012 | Mica
R1 | 10,000 | 1/3 W
R2.4 | 300 | 1/3 W
R3 | 20,000 | 1/2 W
R5 | 200 | 1/3 W
R6,19 | 50,000 | 1/3 W
R7 | 400 | 1/3 W
R8 | 2 Meg. | 1/3 W

ANTENNA-GROUND CONNECTIONS

The antenna and ground leads to the receiver are attached to a terminal strip at the rear of the chassis. The terminals on this strip are marked "A," "D," and "G," which are the abbreviations for "Antenna," "Doublet" and "Ground" respectively.

The receiver is normally shipped from the factory with a wire connecting terminal "D" to terminal "G." In such a condition the receiver is ready for a normal antenna and a ground wire to be attached to the terminals "A" and "G" respectively. If a doublet is used, the wire connecting terminal "D" to terminal "G" should be removed and the two leads from the doublet antenna connected to terminals "A" and "D." For best operation with the doublet, a normal ground lead should be connected to the "G" terminal.
ALLOCATION PROCEDURE
The following equipment is necessary to properly align this chassis:

1. As all W. Signal Generators which will provide a continuously calibrated signal at the frequency of 40 cycle.
2. A dummy antenna - minimum 200 mm, 400 ohms.
3. A dummy power transformer.

SERVICE SUGGESTIONS

POWER TRANSFORMERS

TUBES:
- LEl, 211/A (Amplifier, Direct, and Output tubes)
- LEl, 211/A (Input and Output tubes)
- LEl, 211/A (Input and Output tubes)
- LEl, 211/A (Input and Output tubes)

MODEL 326
Voltage, Alignment

REPEAT ABOVE BROADCAST ALIGNING PROCEDURE AT LEAST ONCE MORE

NOTE: Make sure to confirm that the oscillator is tuned to a frequency higher than the signal since it is very easy to mistakenly set the oscillator on the wrong side of the signal. Be sure to check this every 2-3 cycles.
**MODEL 3231 ALIGNMENT PROCEDURE**

Connect a high impedance AC voltmeter across the loudspeaker terminals. Volume control should be set a few degrees back of maximum volume position. Use a weak signal from the generator, strong signals tend to cause improper adjustments.

IV. Connect the generator ground to receiver chassis. Using .1 mfd. condenser in series with high side of the generator, apply 445 kc. signal to the grid of the 6K7G IF amplifier tube and align second IF transformer trimmers. Repeat for first IF transformer, applying signal to grid of the 6K8G tube.

RF. (See diagram for location of trimmers.) Using a 200 mfd. condenser in series with the high side of the generator, turn band selector switch to position "B," tuning condenser to minimum capacity. Feed 1720 kc. signal to antenna terminal and adjust broadcast oscillator trimmer for top frequency. Set generator frequency at some point around 1400-1500 kc. and adjust broadcast antenna and RF trimmers. Set generator for 600 kc., tune receiver to signal and adjust the pad. The tuning condenser should be rocked back and forth through the signal while varying the padder in order to assure perfect alignment.

A 400 ohm resistor must be used in series with the generator as a "dummy" antenna for proper alignment of the two short wave bands. Set the band selector switches in the "P" position. Adjust the oscillator top frequency for 5825 kc., then align the antenna trimmer at about 5000 kc. With the band selector in the extreme right position, adjust the top frequency of the high frequency band to 18,125 kc., and align the antenna trimmer at about 13,000 kc. In order to make sure that the top end of the lst band is set properly, it is best to screw the oscillator trimmer tight, then unscrew to the second peak. The antenna trimmer should be screwed down tight, then unscrewed to the first peak. This procedure must be followed in order that the oscillator and RF circuits will be set in the correct relation to each other, otherwise a "dead" spot at a lower frequency will result and the dial calibration will not be correct. Usually, it is best to rock the tuning condenser back and forth slightly while making these adjustments at high frequencies.

**MODELS 333-3281 ALIGNMENT PROCEDURE**

Turn the band switch to the Broadcast position.

Connect an output meter across the speaker voice coil. The volume control should be set a few degrees from the maximum volume position. Use a weak signal from the generator, strong signals tend to cause improper adjustments.

IF alignment: Connect the signal generator ground to the receiver chassis through a .1 mfd. condenser. Using a 1 mfd. condenser in series with the high side of the generator, apply a 445 kc. signal to the grid of the 6K7GT tube and align the 2nd IF transformer. Connect to the grid of the 6K8 tube and align the 1st IF transformer. (See Tube Layout Diagram for location of these adjustments.) From this position recheck both transformers again.

Broadcast Band Alignment: Turn the band switch to the Broadcast position, turn the tuning condenser to maximum capacity, set the generator at 18,500 kc., and adjust the coil trimmer. The oscillator coil is under the right hand end of the chassis and this trimmer is the one nearest the front of the chassis. To align the loop antenna, connect a single turn loop across the terminals of the generator, place the receiver about one foot in front of the single turn loop, set the generator at about 1400 kc., set the signal and adjust the trimmer on the loop antenna assembly for maximum response.

Short Wave Alignment: Using a 400 ohm resistor between the high side of the generator and the antenna terminal (on the LOOP frame), turn the tuning condenser to minimum capacity, set the generator at 18,500 kc., and adjust the short wave oscillator trimmer. This trimmer is immediately in back of the broadcast oscillator trimmer.

Set the generator at about 17,000 kc., tune in the signal and adjust short wave antenna trimmer for maximum response. This trimmer is mounted on the loop antenna. The best way is to use a 1:1 transformer to isolate either the receiver or the generator from the line. The adjustments of this receiver are very stable and no aligning should be attempted unless absolutely necessary.

**MODEL 326 PROCEDURE FOR SETTING THE STATION BUTTONS**

There are 6 buttons on the automatic tuning dial by means of which 6 stations may be set for quick tuning. Make a list of your favorite stations, those which you tune in regularly. It is better to list the station with the lowest kilocycle number first, the station with the next higher kilocycle number next and so on. Any button may be used for any station you can receive, although it will be better to set the stations so that the kilocycle numbers increase from left to right.

**SETTING A STATION BUTTON**

Pull the button at the extreme left off the shaft. When this is done, the locking screw under the shaft will be exposed.

Loosen this screw with a small screwdriver by turning several turns in a counter-clockwise direction. Continue to press in firmly on the screwdriver, thus holding the station button shaft depressed. Select the first station button shaft depressed. Select the first station from the list you have prepared and carefully tune in this station by means of the manual tuning knob.

Continue to press in firmly on the screwdriver and lock the mechanism by turning the locking screw in a clockwise direction until it is tight. The station is now set on this button.

Proceed in the same manner for setting any additional stations on your list on the remaining station buttons. After the stations are set and the mechanism is locked, tune in each of them by depressing the proper button. If any of them does not appear to be properly tuned in after the button has been depressed, reset the station for that button following the procedure as outlined above. If at any time you wish to change the setting of a button from one station to another, repeat the previous procedure. Changing the setting of one button will not affect the setting of the others.
A.C.-D.C. SUPERHETERODYNE SERIES 333
TUBES

1—6K8 Translator-Oscillator
6K7GT—Intermediate Frequency Amplifier
1—607GT Detector-AVC—First Audio
1—6J5GT Phase Inverter
1—25L6GT Power Output
1—25Z8GT Rectifier

FOR CONVENTIONAL ALIGNMENT FOR THESE MODELS, SEE SPECIAL SECTION VOLUME VIII.
**SUPERHETERODYNE SERIES 3231**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Part No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1,a,b,c</td>
<td>7483</td>
<td>Variable Condenser</td>
</tr>
<tr>
<td>C1</td>
<td>1.5mf, 200 volt</td>
<td>1mf, 200 volt</td>
</tr>
<tr>
<td>C2</td>
<td>2mf, 200 volt</td>
<td>2mf, 200 volt</td>
</tr>
<tr>
<td>C3</td>
<td>50 mfnf Mica</td>
<td>50 mfnf Mica</td>
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<tr>
<td>C4,5,8</td>
<td>2597</td>
<td>1-10 mfnf Trimmer</td>
</tr>
<tr>
<td>C6,9</td>
<td>1611</td>
<td>1-3.5 mfnf Trimmer</td>
</tr>
<tr>
<td>C7</td>
<td>3157</td>
<td>2-25 mfnf Trimmer</td>
</tr>
<tr>
<td>C10</td>
<td>2560</td>
<td>200-500 mfnf R.C. Osc Padder</td>
</tr>
<tr>
<td>C11</td>
<td>2471</td>
<td>1330 mfnf 5% Mica</td>
</tr>
<tr>
<td>C12</td>
<td>2793</td>
<td>.006 600 volt 10%e</td>
</tr>
<tr>
<td>C13</td>
<td>.1mf, 400 volt</td>
<td>.1mf, 400 volt</td>
</tr>
<tr>
<td>C14</td>
<td>2mf, 400 volt</td>
<td>2mf, 400 volt</td>
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<tr>
<td>C15,17</td>
<td>250 mfnf Mica</td>
<td>250 mfnf Mica</td>
</tr>
<tr>
<td>C16</td>
<td>.01mf, 200 volt</td>
<td>.01mf, 200 volt</td>
</tr>
<tr>
<td>C18,19</td>
<td>.02mf, 400 volt</td>
<td>.02mf, 400 volt</td>
</tr>
<tr>
<td>C20</td>
<td>.002mf, 600 volt</td>
<td>.002mf, 600 volt</td>
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<tr>
<td>C21</td>
<td>.005mf, 600 volt</td>
<td>.005mf, 600 volt</td>
</tr>
<tr>
<td>C23,24</td>
<td>7113</td>
<td>16mf, 450 volt Electrolytic</td>
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<td>R1,6,13</td>
<td>50M 1/3 watt</td>
<td>50M 1/3 watt</td>
</tr>
<tr>
<td>R2,3</td>
<td>100ohm 1/3 watt</td>
<td>100ohm 1/3 watt</td>
</tr>
<tr>
<td>R4</td>
<td>10M 1/3 watt</td>
<td>10M 1/3 watt</td>
</tr>
<tr>
<td>R5,16,17</td>
<td>1Meg 1/3 watt</td>
<td>1Meg 1/3 watt</td>
</tr>
<tr>
<td>R7</td>
<td>2726</td>
<td>500M Volume Control &amp; Switch</td>
</tr>
<tr>
<td>R8</td>
<td>200M 1/3 watt</td>
<td>200M 1/3 watt</td>
</tr>
<tr>
<td>R9</td>
<td>400M 1/3 watt</td>
<td>400M 1/3 watt</td>
</tr>
</tbody>
</table>

**CONVENTIONAL ALIGNMENT**

SEE SPECIAL SECTION VOLUME VIII

---

**WARNING!**

The clock with which this receiver is equipped will operate on 60 cycle alternating current only. A switch is provided on the back of the cabinet to disconnect the clock when the receiver is operated on direct current. Failure to throw the switch to the proper position as indicated on the back of the cabinet will result in serious damage to the clock.
DEWALT RADIO MFG. CORP.

This is a battery operated superhetodyne receiver with full automatic volume control. It is designed to function with an "A" supply of 1.8 volts and a "B" supply of 90 volts. The broadcast range coverage is 540-1600 kilocycles.

LA7G 1N5G 1H5G 1C5G

Model 409

CONVENTIONAL ALIGNMENT

SEE SPECIAL SECTION, VOL. VIII

MODELS 658-658LW, 661

Schematics, Alignment

I.F. PEAKED AT 456 K.C.

NO. 6076 6A7 606 25L66

MODELS 658-658LW, 661 (3 BANDS)

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DeWALD RADIO MFG. CORP.

MODEL 414
MODELS 415, R415

Schematics

The voltage and frequency at which the receiver will operate is specified on the back of the cabinet. The broadcast range coverage is 180–560 meters. The long wave range coverage is 880–2040 meters.

MODEL 414

1A7GT 1N5GT 1H5GT 1C5GT

IF peak 455 KC

This model is a battery operated superheterodyne receiver with full automatic volume control. A self-contained loop is incorporated which makes the use of an antenna unnecessary. It is designed to operate with an "A" supply of 1.5 volts and a "B" supply of 90 volts. The broadcast range coverage is 560–1600 kilocycles. For the "A" supply one Eveready #613, Burgess #773 or the equivalent may be used. For the "B" supply two Eveready #777, Burgess #350X or the equivalent batteries may be used.

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Compliments of www.nucow.com
**Model 542**
- 555-174 meters, 50-16 meters
- 540-1725 K.C., 6.0-18.5 M.C.

**Model 542 L.W.**
- 555-174 meters, 2000-750 meters
- 540-1725 K.C., 150-400 K.C.

**To Calibrate Receiver**
Connect antenna lead of the signal generator to antenna lead of receiver and ground lead of generator to receiver chassis. Short circuit front section of variable condenser. Adjust generator to 456 K.C. and peak I.F. trimmers for maximum signal.

**Broadcast Alignment:**
Remove short from variable condenser. Have wave band switch on broadcast position. Adjust generator and receiver to 1500 K.C. Peak trimmers for maximum signal. Adjust generator and receiver to 500 K.C.

**Short Wave Alignment:**
Short circuit front section of variable condenser. Adjust generator and receiver to 600 K.C. Peak trimmers for maximum signal. Adjust generator and receiver to 800 K.C.

**Long Wave Alignment:**
Adjust generator and receiver to 175 K.C. and peak Long Wave trimmers for maximum signal. Adjust generator and receiver to 300 K.C.

**If Peak 456 Kc**
peak the broadcast pad for maximum signal. The variable condenser should be "rocked" during this operation.

**For 6.0-18.5 M.C. (Model 542)**
Turn wave band switch to this band. Adjust the generator and receiver to 16.0 M.C. and peak trimmers for maximum signal. The low frequency is automatically adjusted by a fixed calibrated pad.

**For 542 L.W.**
Turn wave band switch to long wave band. Adjust the generator and receiver to 300 K.C. and peak trimmers for maximum signal. Adjust generator and receiver to 175 K.C. and peak Long Wave trimmers for maximum signal. The variable condenser should be "rocked" during this operation. Recheck 300 K.C.
These models are portable combination battery and electric operated superheterodyne receivers with full automatic volume control. A self-contained loop is incorporated which makes the use of an outside aerial unnecessary for broadcast reception. The receivers will operate with an "A" supply of 6 volts and a "B" supply of 90 volts. They will also operate on 105-125 volts, 40-60 cycles A.C. or D.C. unless otherwise specified.

**MODEL 545**
1700 - 540 K.C.

**MODEL 545 L.W.**

**MODEL 545 S.W.**
1700 - 540 K.C. & 17 - 5.5 M.C.
Notes:

For 220 VAC operation, install the transformer model 3466 to supply power to the G-30-50 Model. 662 was band A and band B (1.086 piddlers). Model 662A was band A and band C (1.086 piddler) and band C with one piddler on the L.H. side (shown on separate line). Model 665 were bands A, B, and C (1.056 piddler) and band C (5.84 piddler) with one piddler on the L.H. side. No piddler used in band C oscillator coil.

### I.F. ALIGNMENT
Connect antenna lead of the signal generator to antenna lead of receiver and ground lead of generator to receiver chassis. Short circuit front section of variable condenser. Adjust generator to 455 K.C. and peak I.F. trimmers for maximum signal.

### BROADCAST
Remove short from variable condenser. Wave band switch to broadcast position. Adjust generator and receiver to 1500 K.C. Peak trimmers for maximum signal. Adjust generator and receiver to 600 K.C., peak the broadcast padder for maximum signal. The variable condenser should be "rocked" during this operation.

### SHORT WAVE
For 2.7-8.2 M.C. (Model 665), turn wave band switch to ALIGNMENT this band. Adjust the generator and receiver to 7.0 M.C. and peak trimmers for maximum signal. The low frequency is automatically adjusted by a fixed calibrated padder.

### LONG WAVE
For 7.8-24.0 M.C. (Model 665) turn wave band switch to LONG WAVE alignment. Adjust the generator and receiver to 300 K.C. and peak trimmers for maximum signal. Adjust generator and receiver to 175 K.C. and peak Long Wave padder for maximum signal. The variable condenser should be "rocked" during this operation. Recompute 300 K.C.
Compliments of www.nucow.com

Tune in the desired station with the station switch or knob. Determine which button is to be used to receive this station. Loosen this button by turning it in a counterclockwise direction approximately one full turn. Then, push the button in as far as it will go and tighten it up by turning it clockwise. The adjustment may be checked by setting the pointer in any position, pushing the button in as far as it will go and noting if the intended station is received. After all adjustments have been made the station tabs may be placed in the escutcheon recess.

TO CALIBRATE RECEIVER

I.F. ALIGNMENT: Connect antenna lead of signal generator to antenna lead of receiver and ground lead of generator to receiver chassis. Short circuit front section of variable condenser. Adjust generator to 160 K.C. and peak I.F. trimpot for maximum signal.

BROADCAST: Remove short from variable condenser. Have wave band switch on broadcast position. Adjust generator and receiver to 1600 K.C. Peak trimmers for maximum signal. Adjust generator and receiver to 600 K.C. Peak the broadcast padler for maximum signal. The variable condenser should be "rooked" during this operation.

SHORT WAVE: For 2.7-8.5 M.C. (Model 706). Turn wave band switch to ALIGNMENT position. Adjust the generator and receiver to 7.0 M.C. and peak trimmers for maximum signal. The low frequency is automatically adjusted by a fixed calibrated padler.

For 7.0-24.0 M.C. (Model 706): Turn wave band switch to this band. Adjust the generator and receiver to 22.0 M.C. and peak trimmers for maximum signal. The low frequency is automatically adjusted by a fixed calibrated padler.

To 105-125 Volts 40-60 A.C. or D.C. Unless otherwise specified.

Note: On Model 704 Band A is Omitted.
Pilot light, 6.3 volt, 15 amp, Mazda No. 47

The color coding of the i-f transformer leads is as follows:

- Grid—green
- Grid return—black
- Plate—blue
- B plus—red

**VOLTAGE ANALYSIS**

Readings should be taken with a 1000 ohms-per-volt meter. Voltages listed below are from point indicated to B minus (switched) with the volume control turned on full and no signal. Line voltage for these readings was 117.5 volts, 60 cycles, a.c. All readings except heaters and cathodes were taken on 250 volt scale. Measurements made with 117.0 volts a.c. will be lower than those given below.

<table>
<thead>
<tr>
<th>Tube</th>
<th>Plate</th>
<th>Screen</th>
<th>Cathode</th>
<th>Grid</th>
<th>Osc. Plate</th>
<th>Full</th>
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<tbody>
<tr>
<td>12A6GT</td>
<td>88</td>
<td>45</td>
<td>0</td>
<td>84</td>
<td>12</td>
<td></td>
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<tr>
<td>12K7GT</td>
<td>88</td>
<td>45</td>
<td>0</td>
<td>84</td>
<td>12</td>
<td></td>
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<td>12S97GT</td>
<td>88</td>
<td>45</td>
<td>0</td>
<td>84</td>
<td>12</td>
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<td>88</td>
<td>45</td>
<td>0</td>
<td>84</td>
<td>12</td>
<td></td>
</tr>
</tbody>
</table>

Voltage at 3525 cathode—115 volts.

Voltage across speaker field—27 volts.

Voltage across pilot light—4.5 volts.

**Location of Coils and Trimmer Adjustments**

The first i-f transformer is mounted on top of the chassis deck to the right of the speaker. The trimmers are accessible through holes in the top of the can.

The second i-f transformer is mounted underneath the chassis beneath the variable condenser. The trimmers are accessible through holes in the top of the chassis directly beneath the variable condenser.

The two-band antenna coil is located to the left of the speaker. The trimmer for the broadcast antenna coil is located on the front section of the variable condenser. The trimmer for the long-wave antenna coil is mounted on the top of the antenna coil form. The two-band oscillator coil is located underneath the chassis below the antenna coil. The trimmer for the broadcast oscillator coil is located on the front section of the variable condenser. The trimmer and series pedder (condensers C26 and C26 resp.) for the long-wave oscillator coil are located at the bottom of the chassis below the antenna coil and can be reached through the bottom only. The section toward the rear of the chassis is C25, the shunt trimmer. The section toward the front of the chassis is C26, the series pedder condenser.

**Alignment**

1. i-f. Turn the band switch clockwise to broadcast position and swing the variable condenser to the maximum capacity position. Feed 455 kc to the grid-cath of the 12A6GT tube through a .01 mf condenser and adjust the four i-f trimmers for maximum response.

2. B.C. With the band switch in broadcast position, set the dial pointer at 290 meters. Feed 1500 kc through a .0001 mf condenser to the antenna lead and adjust first the oscillator trimmer (rear trimmer beneath the chassis), then the antenna trimmer (on antenna coil) for maximum response. Move the pointer to 1700 meters, feed 172 kc, and adjust the series pedder (front trimmer beneath the chassis), rocking the variable condenser back and forth while adjusting for maximum response. Return to 350 kc and repeat alignment.

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EMERSON RADIO & PHONOGRAPH CORP.

Chassis CULV

Schematic, Voltage, Parts Alignment

WAVE BAND SWITCH SHOWN IN LOAD WAVE POSITION
POSITION NO. 1 BROADCAST NO. 2 LONG WAVE

VOLTAGE ANALYSIS

Readings should be taken with a 1000 ohms-per-volt meter. Voltages listed below are from point indicated to ground (chassis) with volume control turned on full and no signal. The line voltage for these readings was 117.5 volts, 60 cycles, a.c. All readings except cathodes and heaters were taken on 250 volt scale. Readings taken on d.c. will be slightly lower.

<table>
<thead>
<tr>
<th>Tube</th>
<th>Plate</th>
<th>Screen</th>
<th>Cathode</th>
<th>Heater</th>
</tr>
</thead>
<tbody>
<tr>
<td>12K7GT, first r-f amplifier</td>
<td>85</td>
<td>2.3</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>12K7GT, second r-f amplifier</td>
<td>85</td>
<td>1.6</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>12K7GT, grid leak detector</td>
<td>25</td>
<td>0</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>50LE6GT, beam power output</td>
<td>.110</td>
<td>85</td>
<td>50</td>
<td></td>
</tr>
</tbody>
</table>

Voltage at rectifier cathode—120 volts. Power consumption 30 watts.

ALIGNMENT PROCEDURE

An oscillator with frequencies of 1500 kc and 350 kc is required.

Use as weak a test signal as possible. An output meter should be used across the voice coil or output transformer for observing maximum response.

Rotate variable condenser to the maximum capacity position and set the pointer at the next calibration mark beyond 550. Rotate band-switch clockwise to broadcast (medium-wave) position. Then rotate the variable condenser until the pointer is at 200 meters, feed 1500 kc to the antenna through a .0001 mf mica condenser and adjust both trimmer condensers on the variable condenser for maximum response.

Turn wave-band switch counter-clockwise to long-wave position. Rotate variable condenser until pointer is at 850 meters and feed 350 kc to antenna. Adjust the two long-wave interstage coil trimmers for maximum output. The first long-wave interstage coil trimmer is located on the speaker frame. The second (detector coil) long-wave trimmer is located beneath the chassis and is reached from the right end of the chassis.
Current drain ... "A" battery—0.3 amps.
"B" battery—0.10 amps. with no signal
Frequency range ... All Models except CX-285—540 to 1600 kc
Model CX-286—540 to 1730 kc
GENERAL NOTES

1. Batteries: The Model CX is designed to house the complete set of batteries within the cabinet. The battery compartment should be as follows:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5 volt “A”</td>
<td>1</td>
<td>+E</td>
<td>-F</td>
<td>-E</td>
</tr>
<tr>
<td>45 volt “B”</td>
<td>2</td>
<td>+E</td>
<td>-F</td>
<td>-E</td>
</tr>
</tbody>
</table>

FOR MODELS CX-263, CX-283, CX-294, CX-292 AND CX-305

2. The color coding of the I/F transformer leads is as follows:

- Green = B +, Red = B –

3. The color coding of the battery cable is as follows:

- Yellow = A plus, Black = A minus

4. Bias for the 1N407 tube is obtained across the resistor R11. The voltage drop across this resistor should be 7.0 volts.

VOLTAGE ANALYSIS

Readings should be taken with a 1000 ohm-per-volt meter. Voltages listed are from point indicated in chassis with the volume control turned off and no signal. The battery voltages for these readings were: “A” 1.5 volts, “B” 45 volts.

<table>
<thead>
<tr>
<th>Voltages</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>82</td>
<td>Line input</td>
</tr>
<tr>
<td>84</td>
<td>Line output</td>
</tr>
</tbody>
</table>

ADDITIONAL PARTS USED ON CX-292

- R1: 20 megohm 1/2 watt resistor
- R2: 1000 ohm 1/2 watt resistor
- C1: 0.05 microfarad 600 volt tubular condenser
- C2: 0.01 microfarad 600 volt tubular condenser
- C3: 0.001 microfarad 600 volt tubular condenser
- C4: 0.0001 microfarad 600 volt tubular condenser
- C5: 0.01 microfarad 600 volt tubular condenser
- C6: 0.001 microfarad 600 volt tubular condenser
- C7: 0.0001 microfarad 600 volt tubular condenser
- C8: 0.00001 microfarad 600 volt tubular condenser
- C9: 0.000001 microfarad 600 volt tubular condenser
- C10: 0.0000001 microfarad 600 volt tubular condenser

ADJUSTMENTS

An oscillator with frequencies of 450 and 1400 kc is required. An output meter should be used across the voice coil or output transformer for observing motion responses. Always use a weak output signal as possible when aligning the receiver.

Location of Coils and Trimmer Adjustments

The oscillator coil is located beneath the chassis. The trimmer for the oscillator is on the rear end of the variable condenser. On Model CX-283 the antenna coil is located between the two I/F transformers. On all other CX Models the loop antenna acts as the antenna coil. The trimmer for the loop C4 is on the loop frame for Models CX-263, 284 and 305. On Models CX-283, 292 and 305, C4 is on the front section of the variable condenser.

L-F Alignment

Swing variable condenser to minimum capacity position. Feed 455 kc to grid of the 1N407 tube through a 600 ohm condenser. Adjust the four I-F transformers for maximum response.

R-F Alignment

Set the dial pointer at 140. Feed 1400 kc through a 0.001 pf condenser to the following procedure:

1. Remove the back panel of the cabinet by taking out the wood screws.
2. Locate the battery cable on the bottom shelf of the cabinet.
3. With the battery not out of the cabinet, insert the three-prong plug on the battery cable into the "A" and "B" holes and secure with the wood screws.
4. Place the battery in the cabinet as indicated in the illustration. Note that the plug end of the battery is up against the front panel of the cabinet.
5. Replace the back panel of the cabinet and fasten it in place with the wood screws.

Battery Installation for Models CX-263, CX-283, CX-284, CX-292 and CX-305

The portable cabinets contain a shelf under the receiver for housing the batteries. To install and connect the batteries observe the following procedure:

1. Remove the back panel of the cabinet by taking out the wood screws.
2. Locate the battery cable on the bottom shelf of the cabinet.
3. With the battery not out of the cabinet, insert the three-prong plug on the battery cable into the "A" and "B" holes and secure with the wood screws.
4. Place the battery in the cabinet as indicated in the Illustration. Note that the plug end of the battery is up against the front panel of the cabinet.
5. Replace the back panel of the cabinet and fasten it in place with the wood screws.

Battery Selector for Model CX-285: The battery selector for Model CX-285 is designed to house completely the combined "A" and "B" pack. Place the battery pack in the cabinet at the rear of the receiver and insert the three-prong plug of the battery cable into the socket on the top of the battery.
SCHEMATIC FOR CHASSIS USING 12A6GT TUBE

Voltage rating ——— 105-125 volts, a.c. or d.c.
Power consumption ——— 30 watts.

The color coding of the i-f transformer leads is as follows:
Grid — green
Grid return — black
B plus — red

SCHERMASTIC FOR CHASSIS USING 12S4GT TUBE

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MODELS CV264, CV280, CV295
CV296, CV315, CV314, CV316 EMERSON RADIO & PHONOGRAPH CORP.
Chassis CV

Tube Data

THE TUBE COMPLEMENT IS AS FOLLOWS:

One 12SA7GT—pentagrid oscillator modulator
One 12K7GT—first if amplifier
One 12SQ7GT—diode detector, a-f amplifier, a.v.c.
One 70LE6GT—beam power output
One 12Z6GT—half-wave rectifier

(NOTE: Chassis bearing serial numbers below 2920685 use 12AB6GT instead of 12SA7GT)

VOLTAGE ANALYSIS

Readings should be taken with a 1000 ohms-per-volt meter. Voltages listed below are from point indicated to B minus (switch) with the volume control turned on full and no signal. Line voltage for these readings was 117.5 volts, 60 cycles, a.c. All readings except heaters and cathodes were taken on 750 volt scale. Measurements made with 117.5 volts d.c. will be lower than those given below.

<table>
<thead>
<tr>
<th>Tube</th>
<th>Plate</th>
<th>Screen</th>
<th>Cathode</th>
<th>Fil</th>
</tr>
</thead>
<tbody>
<tr>
<td>12SA7GT</td>
<td>88</td>
<td>88</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>12K7GT</td>
<td>88</td>
<td>88</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>12SQ7GT</td>
<td>40</td>
<td>-</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>70LE6GT</td>
<td>82</td>
<td>88</td>
<td>5.7</td>
<td>50</td>
</tr>
</tbody>
</table>

Voltage at 35Z5 cathode—115 volts.
Voltage across pilot light—4.5 volts.
Voltage across speaker field—27 volts.

*Item Part No.

T1 6VW-172AL Loop antenna assembly (see production change no. 4b)
T4 7BT-486A Oscillator coil (see production change no. 2)
T2 7BT-488C Double-tuned 455 kc first if transformer (see production change no. 3a)
T3 7FT-513D Double-tuned 455 kc second if transformer (see production change no. 3b)
R1 2CR-193 30,000 ohm 1/4 watt carbon resistor (see production change no. 1a)
R2 KR-73 50,000 ohm 1/4 watt carbon resistor (see production change no. 1a)
R3 3PR-293 140 ohm 1/4 watt wire-wound resistor
R4 NNR-220 3 megohm 1/4 watt carbon resistor
R5 6VR-364 Volume control 25 megohm with line switch
R6 4XR-327 15 megohm 1/4 watt carbon resistor
R7, R8 KR-56 500,000 ohm 1/4 watt carbon resistor
R10 LR-60 20,000 ohm 1/4 watt carbon resistor (see production change no. 1b)
R11 LR-61 210,000 ohm 1/4 watt carbon resistor (see production change no. 1b)
C1, C2 6RC-436 Two-gang variable condenser
C3, C16 3HC-274 0.002 mf, 600 volt tubular condenser
C4, C15, C23 4XC-394A 0.0002 mf mica condenser
C5, C11
C6, C7, C8, C9 Trimmers, part of variable condenser
C10, C13 BC-12 0.05 mf, 200 volt tubular condenser
C12 3CC-301 0.15 mf, 200 volt tubular condenser
C14 LC-64 0.05 mf, 400 volt tubular condenser
C17 6GC-427 0.024 mf, 400 volt tubular condenser
C18 6VC-446 20 mf, 190 volt dry electrolytic condenser (see change no. 1a)
C19 LC-65 0.02 mf, 400 volt tubular condenser (see change no. 3c)
C20, C21 6GJ-468B Dual 20 mf, 150 volt dry electrolytic condenser
C22 6ZC-460 20 mf, 25 volt dry electrolytic condenser (see change no. 1b)

*Item number locates the article on the schematic diagram.

†Not supplied separately.

Location of Coils and Trimmer Adjustments

The first if transformer is mounted on top of the chassis deck to the left of the speaker. The trimmers are accessible through holes in the top of the can.

The second if transformer is mounted on top of the chassis to the right of the speaker. The trimmers are accessible through holes in the top of the can.

The trimmers for the antenna and oscillator coils are located on the variable condenser. The trimmer on the front section is for the antenna coil (loop). The oscillator coil is located directly beneath the speaker.

Alignment

JF—Swing the variable condenser to the minimum capacity position. Feed 455 kc to the grid of the 12SA7GT tube through a .01 mf condenser and adjust the four i-f trimmers for maximum response. The grid of the 12SA7GT tube may be reached by clipping the input lead to the stator loop of the antenna (front section).

RF—Set the dial pointer at 140. Feed 1400 kc from the signal generator into a loop of wire about one foot in diameter. Hold this radiating loop about 12 inches away from and parallel to the receiver loop antenna. Advance the input to the loop until a satisfactory deflection is obtained on the output meter. Adjust first the oscillator trimmer (on rear section of variable condenser) then the antenna trimmer (on front section of variable condenser) for maximum response. If the loop antenna has been replaced it may be necessary to retract the loop inductance. With the dial set at 60 feed 600 kc to the antenna lead. A portion of the outside may be swung to either side of the center to give maximum response. Repeat the trimmer alignment at 140.

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Compliments of www.nucow.com
The tube complement is as follows:

1—1A7GT oscillator-modulator.
2—1N5GT 1st i-f amplifier.
3—1N5GT 2nd i-f amplifier.
4—1H5GT 2nd detector, a.v.c., a-f amplifier.
5—1Q5GT beam power output.

**Item** | **Part No.** | **DESCRIPTION**
--- | --- | ---
T1 | 4XT-432A | Antenna coil with 455 kc adjustable wave-trap.
T2 | 6RT-476 | Oscillator coil.
T3 | 6RT-479B | Double-tuned 455 kc first i-f transformer.
T4 | 4XT-436D | Double-tuned 455 kc diode i-f transformer.
R1, R14 | KR-53 | 50,000 ohm 1/4 watt carbon resistor.
R2 | ZZR-196 | 30,000 ohm 1/4 watt carbon resistor.
R6, R15 | KR-54 | 100,000 ohm 1/4 watt carbon resistor.
R3 | KR-50 | 500 ohm 1/4 watt carbon resistor.
R4, R8, R13 | HR-42 | 2 megohm 1/4 watt carbon resistor.
R5 | LR-65 | 10,000 ohm 1/4 watt carbon resistor.
R9, R10 | KR-56 | 0.5 megohm 1/4 watt carbon resistor.
R11 | 6ER-358 | 680 ohm 1/4 watt wire-wound resistor.
R12 | THR-363 | 500 ohm 500,000 ohms with double pole battery.
C1, C2 | 6RC-436 | Two gang variable condenser.
C3 | AC-6 | 0.01 mf, 200 volt tubular condenser.
†C4, C5 | Trimmers, part of variable condenser.
C6, C7 | BC-12 | 0.05 mf, 200 volt tubular condenser.
C9, C18 | LC-65 | 0.02 mf, 400 volt tubular condenser.
†C10, C11, C12, C13 | Trimmers, part of i-f transformer.
C14 | 5AC-984 | 0.0002 mf, 600 volt tubular or mica condenser.
C15, C17 | 4XC-394A | 0.0022 mf mica condenser.
C16, C19 | KC-58 | 0.01 mf, 400 volt tubular condenser.
C20 | 6EC-432 | 8 mf, 100 volt dry electrolytic condenser.

**VOLTAGE ANALYSIS**

Readings should be taken with a 1000 ohms-per-volt meter. Voltages listed are from point indicated to chassis with volume control turned on full and no signal. The battery voltages for these readings were: "A" 1.5 volts, "B" 90 volts.

<table>
<thead>
<tr>
<th>Tube</th>
<th>Plate</th>
<th>Screen</th>
<th>Osc. Plate</th>
<th>Fil.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A7GT</td>
<td>82</td>
<td>52</td>
<td>82</td>
<td>1.5</td>
</tr>
<tr>
<td>1N5GT</td>
<td>48</td>
<td>82</td>
<td>82</td>
<td>1.5</td>
</tr>
<tr>
<td>1N5GT</td>
<td>48</td>
<td>82</td>
<td>82</td>
<td>1.5</td>
</tr>
<tr>
<td>1H5GT</td>
<td>35</td>
<td>-</td>
<td>-</td>
<td>1.5</td>
</tr>
<tr>
<td>1Q5GT</td>
<td>77</td>
<td>82</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Bias for the 1Q5GT tube is obtained across the resistor R11. The voltage drop across this resistor should be 7.0 volts.

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Compliments of www.nucow.com
The tube complement is as follows:

- **T1**: 12J5GT, first r-f amplifier
- **T2**: 12K7GT, second r-f amplifier
- **R1**: 12SF5GT, grid leak detector
- **R3**: 60L6GT, beam power output
- **R5**: 3525GT, single half-wave rectifier

Voltage ratings: 105 to 125 volts, a.c. or d.c.

Power consumption: 30 watts.

Frequency range: 540 to 1730 kc.

VOLTAGE ANALYSIS

Readings should be taken with a 1000 ohms-per-volt meter. Voltages listed below are from point indicated to ground (chassis) with volume control turned on full and no signal. The line voltage for these readings was 117.5 volts, 60 cycles, a.c. All readings except cathode and heaters were taken on 250 volt scale. Readings taken on d.c. will be slightly lower.

<table>
<thead>
<tr>
<th>Tube</th>
<th>Plate</th>
<th>Screen</th>
<th>Cathode</th>
<th>Heater</th>
</tr>
</thead>
<tbody>
<tr>
<td>12J5GT</td>
<td>85</td>
<td>2.3</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>12K7GT</td>
<td>85</td>
<td>1.6</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>12SF5GT</td>
<td>25</td>
<td>0</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>60L6GT</td>
<td>110</td>
<td>6</td>
<td>50</td>
<td></td>
</tr>
</tbody>
</table>

Voltage at rectifier cathode—120 volts.

ALIGNMENT PROCEDURE

Use as weak a test signal as possible. An output meter should be connected across the voice coil or output transformer for observing maximum output.

With the pointer set at 150 feed 1500 kc to the antenna lead through a .0001 mf condenser, and adjust the trimmers, located on the variable condenser, for maximum response.
Octal-base tubes in this receiver may be replaced with either metal or bantam-type octal-base glass tubes. The letters "GT" at the end of the tube number indicates that the tube has a bantam glass envelope. In all other respects it is the same as the metal tube bearing the same number without the "GT."

1—6ASGT pentagrid oscillator-modulator.
1—6AK7GT first i-f amplifier.
†1—6S6GT diode detector, a-f amplifier, a.v.v. (see note).
1—25L6GT beam power output.
1—25Z6GT dual half-wave rectifier.

POWER TUNING

Frequency ranges:
106 to 125 volts, a.c. or d.c.
44 to 1700 kc and 2200 to 6600 kc. (Model CG)

Voltage readings:
106 to 125 volts, a.c. or d.c.
540 to 1700 kc and 2200 to 6600 kc. (Model CT)

VOLTAGE ANALYSIS

Readings should be taken with a 1000 ohms-per-volt meter. Voltages listed below are from point indicated to B minus (switch) with the volume control turned on full and no signal. Line voltage for these readings was 117.5 volts, 60 cycles, a.c. All readings except cathodes and heaters were taken on 220 volt scale. Readings taken on d.c. will be slightly lower.

<table>
<thead>
<tr>
<th>Tube</th>
<th>Plate</th>
<th>Screen</th>
<th>Cathode</th>
<th>Osc. Plate</th>
<th>PU.</th>
</tr>
</thead>
<tbody>
<tr>
<td>6ASGT</td>
<td>.95</td>
<td>45</td>
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<td>96</td>
<td>6.3</td>
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<td>95</td>
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<td>95</td>
<td>6.3</td>
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<tr>
<td>6S6GT</td>
<td>.38</td>
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<td>0</td>
<td>0</td>
<td>6.3</td>
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<tr>
<td>25L6GT</td>
<td>.95</td>
<td>95</td>
<td>6.5</td>
<td>28.0</td>
<td></td>
</tr>
</tbody>
</table>

Voltage at 25Z6 cathode—125 volts.
Voltage across speaker field—28 volts.
Voltage drop across ballast resistor (pins nos. 3, 7)—49 volts.
Voltage drop across pilot light section of ballast resistor (pins nos. 8 and 7)—4 volts.

※Note: CG chassis bearing serial numbers below 2,618,549 use 6G7GT.
Plate—blue
Grid—grid
Grid return—black
B plus—red
replacement parts list

<table>
<thead>
<tr>
<th>Item</th>
<th>Part No.</th>
<th>Description</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>TI</td>
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<td>6OT-468</td>
<td>2.45</td>
</tr>
<tr>
<td></td>
<td>L2</td>
<td>6Y7-455</td>
<td>1.10</td>
</tr>
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<td></td>
<td>L3</td>
<td>6Y7-469</td>
<td>1.45</td>
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<td></td>
<td>L4</td>
<td>6Y7-844</td>
<td>1.65</td>
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<tr>
<td></td>
<td>R1</td>
<td>43Y-484D</td>
<td>1.00</td>
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<td>R2</td>
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<td>6AU-558</td>
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<td>R4</td>
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<td>R5</td>
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<td>L10</td>
<td>6Y7-455</td>
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adjustments

an oscillator with frequencies of 545 khz, 990 khz, and 1800 khz is required. an output meter should be used across the voice coil and output transformer for obtaining maximum response. always use as weak a test signal as possible when aligning the receiver.

location of coils and trimmer adjustments

the first if transformer is located on top of the chassis deck. the trimmers are available through holes in the top of the case. the second if transformer is located on the rear wall underneath the chassis. the trimmers are available through holes in the rear wall.

the trimmers for the antenna and oscillator are located on the variable condenser. the trimmer on the front section is for the oscillator. the trimmer on the rear section is for the antenna.

the 455 khz wave-trap is part of the antenna coil assembly directly behind the variable condenser. the 455 khz wave-trap is mounted on the coil and is accessible from the rear of the chassis.

l-f and wave-trap alignment

rotate the wave-band switch to the broadcast (clockwise) position. set the variable condenser at the minimum capacity position and feed 455 khz, through a 0.022 uf paper condenser, to the grid cap of the 445 tube (do not remove the grid clip from the tube). adapt the four if trimmers for maximum response. feed 455 khz to the antenna through a standard dummy antenna (a 0.01 uf condenser may be used as a substitute) and adjust the wave-trap trimmer for maximum response. (see general notes no. 5)

short-wave alignment

with the wave-band switch in the short-wave position, counter-clockwise, set the dial pointer at 6 mc, and feed 600 khz through a standard dummy antenna (a 0.01 uf condenser may be used as a substitute) to the antenna lead. adapt the antenna coil trimmer (lower of the two trimmers) for maximum response. then the antenna trimmer (upper section of the variable condenser) for maximum response.

broadcast alignment

rotate the wave-band switch clockwise to the broadcast position, set the pointer at 150 and feed 1500 khz through a standard dummy antenna to the antenna lead. adjust the short-wave wave-trap trimmer (lower of the two trimmers) for maximum response. then the antenna trimmer (upper section of the variable condenser) for maximum response and then the antenna trimmer (lower section of the variable condenser) for maximum response.

readjustment of automatic tuning keys

select four nearby stations desired for automatic tuning. choose one of these stations and any button to be adjusted for s 0. follow the procedure outlined below:

1. with the switch in the scan position, press the scan in as far as possible with a flat thin-bladed tool such as a nail file or screwdriver. see fig. 1 at d.

2. insert a screwdriver into the hole in the tuning key. the locking screw is accessible through the tuning key hole. feed the ace up to the nut end of the locking screw to the tuning key. see fig. 1 at e.

3. move the tuning key to the point where the locking screw begins to turn. see fig. 1 at e.

4. loosen the locking screw a small amount. see fig. 1 at e.

5. turn the tuning key to the point where the locking screw begins to turn. see fig. 1 at e.

6. replace the plug cap in the front of the key. remove the tab bearing the station in a separate envelope with the receiver. mount the tab and place it on the top of the tuning key as indicated in fig. 4.
Compliments of www.nucow.com

VOLTAGE ANALYSIS

Readings should be taken with a 1000 ohms-per-volt meter. Voltages listed below are from point indicated to B minus (switch) with the volume control turned on full and no signal. Line voltage for these readings was 117.5 volts, 60 cycles, a.c. All readings except cathodes and heaters were taken on 250 volt scale. Readings taken on d.c. will be slightly lower.

<table>
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<th>Plate</th>
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<th>Cathode</th>
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<td>1#</td>
<td>0</td>
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Voltage at 25Z6—128 volts.
Voltage across speaker field—33 volts.
Voltage drop across ballast resistor (pins nos. 3, 7)—42 volts.
Voltage drop across pilot light section of ballast resistor (pins nos. 8 and 7)—4 volts.

Pilot light, 6.3 volt, .25 amp., Mazda No. 44

Voltage rating . . . . 105 to 125 volts, a.c. or d.c.
Power consumption 43 watts.
Frequency ranges 540 to 1780 kc and 5.6 to 18 m

Tube Data

1—6K8GT pentagrid oscillator-modulator.
1—6K7GT first i-f amplifier.
1—6SQ7GT diode detector, a-f amplifier, a.c.e.
1—6AE5GT audio amplifier.
1—25AC5GT dynamic coupled output.
1—25Z6GT dual half-wave rectifier.

Oct. 15, 1939
Six-Tube, A.C., Three-Band Superheterodyne
MODEL DA-287
CHASSIS MODEL DA

ADJUSTMENTS

An oscillator with frequencies of 455, 600, 1500, 1500, 2000, and 1800 kHz should be used.

An output meter should be placed across the voice coil of a speaker, or output transformer for observing maximum response of the antennas.

Use a dummy antenna for aligning any of the three bands. A 0.002 ft. condenser may be used for broadcast band dummy antenna, a 0.003 ft. condenser for the police-band dummy antenna, and a 0.002 ft. condenser for the shorter-wave dummy antenna.

Always use a wave as a test signal as possible during alignment.

The set's oscillator is higher in frequency than the signal on all three bands, so images should be observed on the low frequency side of the signal.

Always check the minimum capacity peak on oscillator trimmers and maximum capacity peaks on one antenna trimmer. The last motion in adjusting trimmers should always be tightening one, not loosening one.

Never leave trimmer with the outside pin less than there is no tension on the screw. Either bend the plate up or remove the trimmer for final minor adjustments. Careful adjustment of a dummy source of noise, drift, or microphone.

In placing antenna trimmers on the high-frequency side, there is usually a tendency for the oscillator to drift, due to the locking. To compensate for this always keep tuning the variable condenser as the trimmers are being adjusted.

I-f and Wave-Trap Alignment

Open the broadcast (clockwise) position. Set the variable condenser at the minimum capacity and position the grid and phase axis to the 60-80 tube (do not remove the grid clip from the beam). Adjust the I-f trimmer to the broadcast side of the alignment procedure. Then proceed to the broadcast side.

Short-Wave Alignment

With the variable condenser at the broadcast position, set the grid return to the broadcast point. Set the antenna feed to the broadcast point. Then proceed to the broadcast side.

Police Alignment

Set the variable condenser at the broadcast point and the signal at 1.8. Feed 1800 kHz to the antenna (using a dummy antenna) and adjust the antenna trimmer for maximum response. Then adjust the antenna trimmer for maximum response. Repeat the process and readjust the antenna trimmer for maximum response.

Short-Wave Alignment

Set the wave-band switch to the short-wave (counter-clockwise) position. Feed the signal to the antenna (using a dummy antenna) and adjust the antenna trimmer for maximum response. If two peaks are obtained, repeat the above procedure. If three peaks are obtained, adjust the antenna trimmer for maximum response.
Three-Band, Six-Tube Superheterodyne Receiver

MODELS DD-268, DD-270, DD-272 and DD-276

CHASSIS MODEL DD

- Voltage rating: 115 to 135 volts, a.c. or d.c.
- Power consumption: 43 watts
- Frequency ranges: 530 to 1600 kHz (400 to 187 meters)
- 6.6 to 15.5 mc (560 to 164 meters)

Three-Band, Six-Tube Superheterodyne Receiver

MODELS DD-268, DD-270, DD-272 and DD-276

CHASSIS MODEL DD

- Voltage rating: 115 to 135 volts, a.c. or d.c.
- Power consumption: 43 watts
- Frequency ranges: 530 to 1600 kHz (400 to 187 meters)
- 6.6 to 15.5 mc (560 to 164 meters)

Tube Data

The tube complement is as follows:

1. 6SA7GT pentagrid oscillator-modulator
2. 6SK7 pentagrid oscillator-modulator
3. 6C4GT double triode, a.v.c.
4. 6AK5YGT audiosilicon pentode
5. 5AI6GT dynamic coupled output
6. 6X5GT dual half-wave rectifier

GENERAL NOTE

The color coding of the i-f transformer leads is as follows:

Grid—green
Plate—blue
Grid return—black
B plus—red

VOLTAGE ANALYSIS

Readings should be taken with a 1000 ohm-per-volt meter. Voltages listed below are from point indicated to B plus (marked with the voltage control turned on full and no signal). Low voltage for these readings was 117 to 118 volts, 60 cycle, a.c. All readings except cathodes and heaters were taken on 250 volt scale. Readings taken on a.c. will be slightly lower.

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Voltage at 2505–130 volts.
Voltage across speaker field—25 volts.
Voltage across balast resistor (pins nos. 3, 7)—42 volts.
Voltage drop across pilot light section of balast resistor (pins nos. 8 and 7)—4 volts.

ADJUSTMENTS

Broadcast Alignment

Set the wave-band switch at the broadcast (control) position, and the pointer at 500 (meters). Feed 600 kc to the antenna (using a standard dummy antenna or just set n & s) and adjust the broadcast-band series pad for maximum response. Move the pointer to 500 (meters), feed 300 kc to the antenna, and adjust the short-wave series pad for maximum response. Move the pointer back to 500 (meters), adjust the short-wave trimmer for maximum response. Move the pointer back to 500 (meters) and adjust the series pad for maximum response. Return to 500 (meters) and check alignment. If readjustment is necessary return to 500 meters and repeat entire procedure.

Short-Wave Alignment

Set the wave-band switch at the short-wave (counter-clockwise) position. Move the pointer to 50 (meters) and feed 15,000 kc to the antenna (using a 400 ohm dummy antenna) and adjust the short-wave oscillator trimmer for maximum response. If two peaks are obtained choose the minimum capacity peak. Then adjust the antenna coil trimmer for minimum response. If two peaks are obtained choose the maximum capacity peak.
Schematic Diagram

Power Consumption 30 watts

MODEL CW

MODEL CZ

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Compliments of www.nucow.com
GENERAL NOTES

1. If replacements are made or the wiring disturbed in the r-f section of the receiver, the circuitry should be carefully re-aligned.

2. In operating the a-c-d-c combinations on d-c, it may be necessary to reverse the line plug for correct polarity.

3. The color coding of the l-f transformer leads is as follows:
   - Grid—green
   - Plate—blue
   - B plus—red

4. The receiver has a self-contained antenna and normally does not require additional antenna connection. For power failure protection, the antenna of this model, however, in a location far removed from broadcasting stations, the antenna would be recommended.

5. The self-contained loop antenna operates at maximum efficiency when its position is at right angles to the broadcasting source. It is important, therefore, that the antenna be installed in a position where the antenna is the most effective without the possibility of accidental contact with metal objects, chairs, etc.

6. The resistors in these combinations are of the A, D, and T types. The motors, however, in models of this series are identical and will be damaged if the combination is used on direct current.

PRODUCTION CHANGES

1. On CV-290 resistor R1 is 5 megohms.
2. On CV-289 and CV-291 resistor R11 is 2 megohms.
3. CV chassis bearing serial numbers below 2,746,302 use:
   - T4 6ST-116 Oscillator coil .35
   - T6 6VU-82 Dial face .30
   - T7 6M-171A Loop antenna (for CV-290, CV-291 and CV-291)
   - T8 6VW-118 Loop antenna (for CV-290 and CV-291) .38

THE TUBE COMPLEMENT IS AS FOLLOWS:

- One 12AU7 pentagrid oscillating point-contact tube.
- One 12AT7 triode amplifier tube.
- One 12AT7 plate transformer, 200,000 ohm value.
- One 12AU7 output transformer, 200,000 ohm value.
- One 12AT7 output transformer, 200,000 ohm value.
- One 12AU7 output transformer, 200,000 ohm value.

VOLTAGE ANALYSIS

Readings should be taken with a 1000 ohm per volt meter. Voltages listed below are from point indicated by B minus and are approximate. All readings except Standby circuits were taken by 250 volt meter. Measurements made with 117,5 volts d-c. All readings will be lower than those given below.

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Voltage at 325 volts—110 volts.
Voltage across speaker—25 volts.
Voltage across pilot light—43 volts.

* These readings are approximately 10% lower on CV-291 and CV-291.
+ This reading is approximately 20% higher on CV-291 and CV-291.

ADJUSTMENTS

An oscillator with frequencies of 450 and 1400 kHz is required.
An output meter should be used across the voice coil or output transformer for observing maximum response.
Always use as a test signal as possible when aligning the receiver.

Location of Coils and Trimmer Adjustments

The first l-f transformer is located at the extreme left end of the chassis. The trimmers are accessable through holes in the top of the can.

The second l-f transformer is located just to the left of the variable condenser. The trimmers are accessible through the holes in the top of the can.

The trimmers for the antenna and oscillator coils are located on the variable condenser. The trimmer on the front panel is the antenna coil (loop). The oscillator coil is located beneath the first l-f transformer.

1-F Alignment

Swing the variable condenser to the minimum capacity position. Feed 450 kx to the grid-cap of the 12A8GT tube through a .01 mf condenser and adjust the 1-f trimmers for maximum response.

R-F Alignment

Set the dial pointer at 160. Feed 1400 kHz through a .001 mf condenser to the antenna lead and adjust first the oscillator trimmer (on rear section of variable condenser) then the antenna trimmer (on front section of variable condenser) for maximum response. The antenna trimmer should be adjusted when the chassis is in place in the cabinet. The chassis should be connected to the motor board.

The chassis should be assembled to the antenna lead and adjusted first the oscillator trimmer (on rear section of variable condenser) then the trimmer (on front section of variable condenser) for maximum response. The antenna trimmer should be adjusted when the chassis is in place in the cabinet. The chassis should be connected to the motor board.

Reprinted by permission of Nucow Company.
(A)—Record Removing Lever.

A locknut provides adjustment for raising or lowering the record finger to engage the next to last record on the turntable. No adjustment is required unless the motor mounting screws should loosen and allow motor and turntable to shift upward or downward, or should record finger become bent.

Raising the record removing lever to the vertical position will repeat the top record on the turntable, either 10-inch or 12-inch for as long as desired.

(B)—Latch Mechanism.

The latch should engage one-half the depth of the notch. This may be adjusted by turning the eccentric washer.

(C)—Speed Regulator.

The motor speed can be regulated for "fast" or "slow" by moving lever to either side.

(D)—Adjustments for 10-inch and 12-inch Records.

The motor panel is stamped "10" and "12." Set the change lever opposite the size of record to be played.

(G)—Motor Mounting Screws.

(H)—Trip Mechanism.

All records having either the spiral or oscillating type trip groove are handled automatically by this trip mechanism. No adjustment required.

(L)—Record Reject Lever.

Pull the reject lever forward if removal of a record is desired before it is completely played.

(M)—Pickup and Tone Arm.

Turn screw in or out to place the needle properly on the edge of the record.

(N)—On-off Switch.

On-off switch for motor.
**Tubes and Wave-Trap Alignment**

1. **Attach the wave-trap switch to the broadcast (clockwise) position.** Set the variable condenser at the minimum capacitance position and feed 450 k. Through a 10,000 ohm paper condenser, use the grid cap of the 6AB7 tube (do not remove the anode from the tube). Adjust the trimmers for maximum response. Feed 450 k to the antenna through a standard dummy antenna (1000 ohms may be used as a substitute) and adjust the wave-trap trimmer for minimum response. (See General Notes No. 6.

**Short-Wave Alignment**

2. **Switch to the short-wave position, counter-clockwise, set the dial pointer at 6 mc, and feed 6000 k through a 400 ohm resistor to the antenna lead.**

3. **Adjust the grid leak trimmer (on front panel of the variable condenser) and the antenna trimmer (upper trimmer of dial assembly) for maximum response.**

**Broadcast Alignment**

4. **Attach the wave-trap switch as described in the broadcast position.**

**General Notes**

1. If replacements are made or the wiring disturbed in any portion of the circuit, the receiver should be carefully re-aligned.

2. The filament dropping resistor (LADD) on schematic is located at the rear of the chassis. This resistor will become quite hot under normal operating conditions. For voltage drop specifications, see below.

3. When operating the receiver on d.c., it may be necessary to reverse the line plug to obtain the correct polarity.

4. The LADD transformer is held in the chassis by snap-on fasteners. To remove it, simply pull up the Snap-on fasteners and lift the lid off from the chassis.

5. The color coding of the 6L6 transformer leads is as follows: Green = grid, Yellow = second grid, Blue = plate. B = red.

6. The wave-trap has been adjusted for maximum signal rejection at 450 k. If, however, persistent interference is experienced from some particular telegraphic station, adjust the wave-trap trimmer until the response from the offending station is at a minimum.

7. The receivers in these combinations are of the 6L6 type. The meters, however, are used in Model 6G-229 and 294 sets which are of the 6L6 only type and will be damaged if operated on direct current.

8. Any series of records to be played automatically must be of the same size. The changer will not play 78-rpm discs and place them on the turntable with the selection to be played facing upward.

9. Adjust the lever "T" for the size of records to be played. (See illustration.) Lower the pickup carefully so that the needle rides on the surface of the record edge of the record.

10. The Model 6G-229 and 294 only, before turning the motor on, check the 4000-mc. d.c. switch under which the turntable is located. The turntable should be pointed to the proper position. To operate, simply turn the turntable by pulling it slightly upward. If the power supply is in the switch, the turntable may be handled as vertically as desired for an a.c. supply to the a.c. position. When replacing the turntable be sure it is seated all the way over its shaft.

**Tube Table**

The tube complement is as follows:

- **1-6AB7** pentagrid oscillator-modulator.
- **1-5670** pentagrid oscillator-modulator.
- **1-6DQ5** detector, 6DQ5 amplifier, a.c. (see note).
- **1-6K6G** detector preamplifier.
- **1-6J7G** power oscillator.

**Crystal-base tubes in this receiver may be replaced with similar tube or ham-tube-type crystal-base glass tubes. The latter type of tube is of the same size and will operate in all other respects it is the same as the metal tube bearing the same number without the "G."**

**Voltage Analysis**

Readings should be taken with a 1000-ohm-per-volt meter. Voltages listed below are from point indicated to B plate (switch) with the volume control turned at full and all no signal. Line voltage for these readings was 117.2 volts, 60 cycles, a.c. All readings except cathode and heaters were taken on 350 volt scale. Readings taken on d.c. will be slightly lower.

**Notes:**
- **6G2A** crystal base.
- **6G6** crystal base.
- **6G7** crystal base.
- **6G12** crystal base.
Schematic: Voltage, Trimmers

MODELS DB-296 and DB-301

CHASSIS MODEL DL
MODEL: DL-330

CHASSIS MODEL DL

TUBE DATA

The tube complement is as follows:

All tubes are replaceable with other metal or equivalent h-tared glass tubes. The letters "O" at the end of the tube number indicate that the tube has a h-tared glass envelope. In all other respects it is the same as the normal tube having the same number without the "O".

VOLTAGE ANALYSIS

Readings should be taken with a 1000 ohm-per-volt meter. Voltages listed below are from point indicated to B- screen (cabinet) with the volume control turned full on and no signal. Line voltage for these readings was 117.5 volts, 60 cycles, 220. All readings except heater and cathodes were taken on 270 volt scale. Measurements made with 127.5 volts d.c. will be lower than those given below.

<table>
<thead>
<tr>
<th>Tube</th>
<th>Plate</th>
<th>Screen</th>
<th>Cathode</th>
<th>Fil.</th>
</tr>
</thead>
<tbody>
<tr>
<td>12SA7</td>
<td>22</td>
<td>88</td>
<td>0</td>
<td>125</td>
</tr>
<tr>
<td>12SR7</td>
<td>22</td>
<td>88</td>
<td>0</td>
<td>125</td>
</tr>
<tr>
<td>12SQ7T</td>
<td>18</td>
<td>88</td>
<td>0</td>
<td>125</td>
</tr>
<tr>
<td>506GT</td>
<td>60</td>
<td>0</td>
<td>0</td>
<td>125</td>
</tr>
</tbody>
</table>

All readings except heater and cathodes were taken on 270 volt scale. Measurements made with 117.5 volts d.c. will be lower than those given above.

<table>
<thead>
<tr>
<th>Tube</th>
<th>Plate</th>
<th>Screen</th>
<th>Cathode</th>
<th>Fil.</th>
</tr>
</thead>
<tbody>
<tr>
<td>12SA7</td>
<td>22</td>
<td>88</td>
<td>0</td>
<td>125</td>
</tr>
<tr>
<td>12SR7</td>
<td>22</td>
<td>88</td>
<td>0</td>
<td>125</td>
</tr>
<tr>
<td>12SQ7T</td>
<td>18</td>
<td>88</td>
<td>0</td>
<td>125</td>
</tr>
<tr>
<td>506GT</td>
<td>60</td>
<td>0</td>
<td>0</td>
<td>125</td>
</tr>
</tbody>
</table>

Voltage at 127V cathode-120 volts. Voltage across pilot light-4.5 volts.

Location of Coils and Trimmer Adjustments

The first i-f transformer is mounted on top of the chassis deck to the right of the variable condensers. The trimmers are accessible through holes in the top of the case.

The second i-f transformer is mounted on top of the chassis between the variable condensers and the speaker. The trimmers are accessible through holes in the top of the case.

The trimmers for the antenna and oscillator coils are located on the variable condensers. The trimmer on the front section is for the oscillator coil.

The oscillator coil is located underneath the chassis. The loop antenna acts as the antenna coil.

1. If replacements are made or the wiring disturbed in the i-f section of the circuit, the receiver should be carefully re-aligned.
2. In operating the receiver on d.c., it may be necessary to reverse the line plug for correct polarity.
3. The color coding of the i-f transformer leads is as follows:
   - Gold—ground
   - Green—black
   - Blue—blue
   - Red—brown

4. Models DB-296 and 301 have self-contained antennas and do not require additional antenna connections. For permanent indoor installations of either model, however, it is desired to improve reception of weak stations, an additional outdoor antenna should be used. For this purpose a lead has been brought out of the rear near the line cord.

5. The self-contained loop antennas operate at maximum efficiency when its position is at right angles to the broadcasting source. It is important, therefore, that the antenna is tuned to, or at least near the center of the field, and then through a quarter of a circle (90 degrees), leaving it at the position where the station is received with maximum volume.
VOLTAGE ANALYSIS

Readings should be taken with a 1000 ohms-per-volt meter. Voltages listed below are from point indicated to B minus (switch) with the volume control turned on full and no signal. Line voltage for these readings was 117.5 volts, 60 cycles, a.c. All readings except heaters and cathodes were taken on 250 volt scale. Measurements made with 117.5 volts d.c. will be lower than those given below.

<table>
<thead>
<tr>
<th>Tube</th>
<th>Plate</th>
<th>Screen</th>
<th>Cathode</th>
<th>Osc. Plate</th>
<th>Fil.</th>
</tr>
</thead>
<tbody>
<tr>
<td>12A8GT</td>
<td>65</td>
<td>40</td>
<td>0</td>
<td>65</td>
<td>12</td>
</tr>
<tr>
<td>12K7GT</td>
<td>65</td>
<td>65</td>
<td>0</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>12SQ7GT</td>
<td>40</td>
<td></td>
<td>0</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>60L6GT</td>
<td>100</td>
<td>65</td>
<td>5.7</td>
<td>5.7</td>
<td>10</td>
</tr>
</tbody>
</table>

Voltage at 3SZ2 cathode—110 volts.
Voltage across pilot light—4.5 volts.

The tube complement is as follows:

- One 12A8GT—pentagrid oscillator modulator
- One 12K7GT—first i-f amplifier
- One 12SQ7GT—diode detector, a-f amplifier, a.v.c.
- One 60L6GT—beam power output
- One 3SZ25GT—half-wave rectifier

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MODEL CW-279 and MODEL CZ-282

Location of Coils and Trimmer Adjustments

MODEL CW

The front if transformer is located between the variable condenser and the speaker. The trimmers are accessible through holes in the top of the cabinet. The rear if transformer is located on the rear wall underneath the chassis. The trimmers are accessible through holes in the rear of the cabinet. The trimmer on the antenna coil and oscillator coils are located on the bottom of the chassis.

MODEL CZ

The front if transformer is located to the left of the speaker and the oscillator coil underneath the chassis. The trimmers for both the antenna coil and oscillator coil are located on the bottom of the chassis.

T/L Antenna

The bass L with an antenna trimmer and transformer trimmer to the left of the chassis. The trimmer on the antenna coil is located on the bottom of the chassis.

I- and Wave-Trapp Alignment

MODEL CW

1. Remove the variable condenser to the minimum capacity position. Feed 475 kHz into the grid-cap of the 12AT7 tube through a 0.01 ufd condenser and adjust the if transformer for maximum response. Feed 475 kHz through a 0.01 ufd condenser to the antenna lead and adjust the trimmer for maximum response. (See General Notes, paragraph No. 4.)

MODEL CZ

Repeat the same procedure for Model CZ except for trap alignment. Model CZ does not use a wave trap.

R-Alignment

Set the dial pointer at 140. Feed 400 kHz through a 0.001 ufd condenser to the antenna lead and adjust the trimmer for maximum response. Set the dial pointer at 500 kHz and adjust the trimmer for maximum response. Set the dial pointer at 750 kHz and adjust the trimmer for maximum response. Set the dial pointer at 1000 kHz and adjust the trimmer for maximum response.

VOLTAGE ALIGNMENT

A voltage check should be made with a 1000 volt meter. Voltages listed below are from points indicated in Figures 1 to 4 with the tubes except the condenser and antenna leads taken on 100 volt scale. Voltages for these ranges are 10.5 volt, 10.5 volt, 4.5 volt, 4.5 volt, 4.5 volt, and 4.5 volt, respectively.

<table>
<thead>
<tr>
<th>Value</th>
<th>Plate</th>
<th>Screen</th>
<th>Cathode</th>
<th>Oct. Plate</th>
<th>Fk</th>
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<tbody>
<tr>
<td>T104CT</td>
<td>104CT</td>
<td>104CT</td>
<td>104CT</td>
<td>104CT</td>
<td>104CT</td>
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<td>104CT</td>
<td>104CT</td>
<td>104CT</td>
<td>104CT</td>
<td>104CT</td>
</tr>
</tbody>
</table>

Production Changes

1. The bass L with an antenna trimmer and transformer trimmer to the left of the chassis. The trimmer on the antenna coil is located on the bottom of the chassis.

Placement of Parts EMERSON RADIO & PHONOGRAPHER
VOLTAGE ANALYSIS

Readings should be taken with a 1000 ohms-per-volt meter. Voltages listed are from point indicated to chassis with volume control turned on full and no signal. The battery voltages for these readings were: "A" 9.0 volts, "B" 90 volts.

<table>
<thead>
<tr>
<th>Tube</th>
<th>Plate</th>
<th>Screen</th>
<th>Osc. Plate</th>
<th>Fill</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A7GT</td>
<td>88</td>
<td>50</td>
<td>82</td>
<td>1.5</td>
</tr>
<tr>
<td>1N9GT 1st i-f.</td>
<td>80</td>
<td>88</td>
<td>88</td>
<td>1.5</td>
</tr>
<tr>
<td>1N9GT 2nd i-f.</td>
<td>88</td>
<td>88</td>
<td>88</td>
<td>1.5</td>
</tr>
<tr>
<td>1H9GT</td>
<td>88</td>
<td>88</td>
<td>88</td>
<td>1.5</td>
</tr>
<tr>
<td>3Q9GT</td>
<td>88</td>
<td>88</td>
<td>88</td>
<td>3.0</td>
</tr>
<tr>
<td>70L7GT (line operation only)</td>
<td>86</td>
<td>95</td>
<td>95</td>
<td>70.0</td>
</tr>
<tr>
<td>117L7GT rectifier cathode (Pin no. 1) (line operation only)</td>
<td>86</td>
<td>95</td>
<td>95</td>
<td>117</td>
</tr>
<tr>
<td>or 117L7GT rectifier cathode (Pin no. 1) (line operation only)</td>
<td>86</td>
<td>95</td>
<td>95</td>
<td>117</td>
</tr>
</tbody>
</table>
## Emerson Radio & Phonograph Corp.

<table>
<thead>
<tr>
<th>Item</th>
<th>Part No.</th>
<th>Description</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>6WX-174</td>
<td>Loop antenna assembly</td>
<td>$1.15</td>
</tr>
<tr>
<td>L1</td>
<td>767-512</td>
<td>Iron core filter choke</td>
<td>$.90</td>
</tr>
<tr>
<td>T2</td>
<td>6K7-476</td>
<td>Oscillator Coil</td>
<td>$.35</td>
</tr>
<tr>
<td>T3</td>
<td>975-488A</td>
<td>Double-tuned 455 kc first i-f transformer</td>
<td>$1.00</td>
</tr>
<tr>
<td>T4</td>
<td>767-513</td>
<td>Double-tuned 455 kc diode i-f transformer</td>
<td>$1.60</td>
</tr>
<tr>
<td>R1</td>
<td>6K5-53</td>
<td>90,000 ohm ¾ watt carbon resistor</td>
<td>$.16</td>
</tr>
<tr>
<td>R2</td>
<td>ZZR-196</td>
<td>30,000 ohm ¾ watt carbon resistor</td>
<td>$.16</td>
</tr>
<tr>
<td>R3</td>
<td>KR-50</td>
<td>500 ohm ¾ watt carbon resistor</td>
<td>$.16</td>
</tr>
<tr>
<td>R4</td>
<td>OR-73</td>
<td>25,000 ohm ¾ watt carbon resistor</td>
<td>$.16</td>
</tr>
<tr>
<td>R5</td>
<td>KR-54</td>
<td>100,000 ohm ¾ watt carbon resistor</td>
<td>$.16</td>
</tr>
<tr>
<td>R7, R14</td>
<td>NNR-220</td>
<td>3 megohm ¾ watt carbon resistor</td>
<td>$.16</td>
</tr>
<tr>
<td>R8</td>
<td>3HR-240C</td>
<td>Volume control and battery switch</td>
<td>$1.05</td>
</tr>
<tr>
<td>R9</td>
<td>3RR-374</td>
<td>5 megohm ¾ watt carbon resistor</td>
<td>$.16</td>
</tr>
<tr>
<td>R10, R12</td>
<td>KR-56</td>
<td>500,000 ohm ¾ watt carbon resistor</td>
<td>$.16</td>
</tr>
<tr>
<td>R11</td>
<td>LR-61</td>
<td>200,000 ohm ¾ watt carbon resistor</td>
<td>$.16</td>
</tr>
<tr>
<td>R13</td>
<td>7FR-370</td>
<td>315 ohm metal clad resistor (see Production Change No. 2)</td>
<td>$.35</td>
</tr>
<tr>
<td>R15, R16</td>
<td>PR-79</td>
<td>1000 ohm ¾ watt carbon resistor (see General Note No. 9 and Production Change No. 3)</td>
<td>$.16</td>
</tr>
<tr>
<td>R17</td>
<td>7JK-376</td>
<td>330 ohm ¾ watt carbon resistor (see General Note No. 9 and Production Change No. 3)</td>
<td>$.16</td>
</tr>
<tr>
<td>C1, C2</td>
<td>6RC-456B</td>
<td>Two gang variable condenser</td>
<td>$2.35</td>
</tr>
<tr>
<td>C3</td>
<td>2HC-274</td>
<td>0.002 mf, 600 volt tubular condenser</td>
<td>$.20</td>
</tr>
<tr>
<td>C4, C6, C9, C26</td>
<td>BC-12</td>
<td>0.05 mf, 200 volt tubular condenser</td>
<td>$.20</td>
</tr>
<tr>
<td>C5</td>
<td>Trimmer part of loop assembly</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C7</td>
<td>BC-13</td>
<td>0.25 mf, 200 volt tubular condenser</td>
<td>$.20</td>
</tr>
<tr>
<td>C8, C18</td>
<td>LC-65</td>
<td>0.02 mf, 400 volt tubular condenser</td>
<td>$.20</td>
</tr>
<tr>
<td>C10, C11, C12, C13</td>
<td>XRC-394A</td>
<td>Trimmers, part of i-f transformers</td>
<td></td>
</tr>
<tr>
<td>C14, C27</td>
<td>4XG-394</td>
<td>0.0002 mf, mica condenser</td>
<td>$.20</td>
</tr>
<tr>
<td>C15</td>
<td>74C-388</td>
<td>0.25 mf, 100 volt tubular condenser</td>
<td>$.20</td>
</tr>
<tr>
<td>C16</td>
<td>7AC-384</td>
<td>0.0003 mf, 600 volt tubular or mica condenser</td>
<td>$.20</td>
</tr>
<tr>
<td>C17</td>
<td>HC-34</td>
<td>0.006 mf, 600 volt tubular condenser</td>
<td>$.20</td>
</tr>
<tr>
<td>C19</td>
<td>3VC-324</td>
<td>0.003 mf, 600 volt tubular condenser</td>
<td>$.20</td>
</tr>
<tr>
<td>C20</td>
<td>LC-64</td>
<td>0.05 mf, 400 volt tubular condenser</td>
<td>$.20</td>
</tr>
<tr>
<td>C21, C22</td>
<td>6LC-456B</td>
<td>Dual 20 mf, 150 volt dry electrolytic condenser</td>
<td>$.85</td>
</tr>
<tr>
<td>C23</td>
<td>NNC-199</td>
<td>0.001 mf, 600 volt tubular condenser (see Production Change No. 1)</td>
<td>$.20</td>
</tr>
<tr>
<td>C24</td>
<td>7PC-451</td>
<td>40 mf, 25 volt dry electrolytic condenser</td>
<td>$.80</td>
</tr>
<tr>
<td>C27</td>
<td>Trimmer, part of variable condenser</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Production Changes

1. Chassis using certain speakers use output condenser C23, part no. KG-78—.01 mf.—400 volt.
2. Chassis bearing serial numbers between 3000651 and 3001051 and between 3225600 and 3265999 use 11L7GT in place of 70L7GT and do not use resistor R13.
3. The schematic diagram of chassis using 70L7GT does not show resistors R16 and R17. These resistors occupy the same position in this chassis as they are shown in the schematic of chassis using 11L7GT.

Some chassis do not contain resistors R16 and R17. These resistors should be added to increase tube life.

On chassis bearing serial numbers between 2,888,350 and 2,963,000 use only bakelite base tubes when replacing the INSGTs.

To permit the use of metal base INSQT's in the above chassis, the following change must be made in the chassis:

1. Unsolder and remove the three leads from the #1 pin soldering lug of the INSQT socket at the rear of the chassis. (Three leads are condenser C26, resistor R17, and one wire.)
2. Solder these three leads to the #8 pin soldering lug of the 1A7GT socket. (This lug is a blank.)

The tube complement is as follows:

1. 1A7GT oscillator-modulator.
2. INSQT 1st i-f amplifier.
3. INSQT 2nd i-f amplifier.
4. 11F5GT 2nd detector, a.c., or a.f. amplifier.
5. 3Q5GT beam power output (battery operation only).
6. 70L7GT beam power output and half wave rectifier.
7. 11L7GT beam power output and half wave rectifier (see Production Change No. 2).

**Location of Coils and Trimmer Adjustments**

The oscillator coil is located beneath the chassis. The trimmer for the oscillator is on the rear section of the variable condenser.

The loop antenna acts as the antenna coil. The trimmer for the loop is on the loop frame.

The i-f transformers are located in cans mounted on top of the chassis. The first i-f transformer is the one at the left end of the chassis.

The i-f transformer is located between the 1N5GT first i-f tube and the variable condenser. The trimming condensers for both transformers can be reached through holes in the tops of the cans.

**Alignment**

**LE**—Swing variable condenser to minimum capacity position.

Feed 455 kc to the grid of the 1A7GT tube through a 0.01 mf condenser. Adjust the four i-f trimmers for maximum response.

**RF**—Set the dial pointer at 140. Feed 1400 kc through a 0.001 mf condenser to the antenna connection and adjust first the oscillator trimmer (on rear section of variable condenser) then the antenna trimmer (on loop frame) for maximum response.

If the loop antenna has been replaced it may be necessary to adjust the loop inductance. Align at 140. Set the dial at 60 and feed 600 kc to the antenna lead. A portion of the outside turn of the loop may then be swung to either side of the center to give maximum response. Return at 140.

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PRODUCTION CHANGES
1. DJ chassis bearing serial numbers below 3,017,129 use 70L7GT rectifier-output tube. See lower schematic.
2. In Model DJ-311 receivers after serial number 3,021,629, the door switch, part No. 7JS-444, has been omitted.

VOLTAGE ANALYSIS
Readings should be taken with a 1000 ohms-per-volt meter. Voltages listed are from point indicated to chassis with volume control turned on full and no signal. The battery voltages for these readings were: “A” 9.0 volts, “B” 90 volts.

<table>
<thead>
<tr>
<th>Tube</th>
<th>Plate</th>
<th>Screen</th>
<th>Osc. Plate</th>
<th>Fil.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A7GT</td>
<td>88</td>
<td>50</td>
<td>82</td>
<td>1.5</td>
</tr>
<tr>
<td>1N6GT 1st i-f.</td>
<td>50</td>
<td>88</td>
<td>—</td>
<td>1.5</td>
</tr>
<tr>
<td>1N6GT 2nd i-f.</td>
<td>88</td>
<td>88</td>
<td>—</td>
<td>1.5</td>
</tr>
<tr>
<td>1H5GT</td>
<td>27</td>
<td>—</td>
<td>—</td>
<td>1.5</td>
</tr>
<tr>
<td>3Q5GT</td>
<td>85</td>
<td>88</td>
<td>8</td>
<td>2.0</td>
</tr>
<tr>
<td>11L7GT (line operation only)</td>
<td>85</td>
<td>95</td>
<td>117</td>
<td></td>
</tr>
</tbody>
</table>
| 11L7GT rectifier cathode (Pin no. 1) (line operation only) | —     | —      | —125 volts. | (See production change no. 1.)

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## BATTERY COMPLEMENT

The cabinet is designed to house the complete set of batteries. The battery complement should be as follows:

<table>
<thead>
<tr>
<th>Type Battery</th>
<th>No. Req.</th>
<th>Eveready Part No.</th>
<th>Rayovac Part No.</th>
<th>Ruggage Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>4½ volt &quot;A&quot;</td>
<td>2</td>
<td>766 (4½ volt type)</td>
<td>P93 or RM-63</td>
<td>3G (piece type)</td>
</tr>
<tr>
<td>45 volt &quot;E&quot;</td>
<td>2</td>
<td>466 (piece type)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## DESCRIPTION

Type: Universal (Battery, A.C.-D.C.) Supertetradyne.  
Frequency Range: 560-1600 kc.  
Power Supply: Battery, A.C. or D.C.  
Voltage Rating: (Line operation) 105-125 volts, a.c.-d.c.  
Power Consumption: (Line operation) 80 watts.  
Current Drains: (Battery operation) 1 battery 0.05 amp.  
2 battery 0.10 amp.

## GENERAL NOTES

1. The color coding of the 4½ transformer leads is as follows:
   - Grid—green
   - Plate—blue
   - B plus—red

2. The color coding of the battery cables is as follows:
   - Red—B plus, 35 volts
   - Blue—A minus

3. If replacements are made on re-wiring the receiver should be carefully re-aligned.

4. A.C.-D.C. Operation: Open the small door at the back of the cabinet. It is important that this small door be left open while operating the receiver on either a-c. or d-c. power. Take out the line cord, removing the plug from the receptacle at the rear of the chassis. Insert the plug in the wall outlet. If the power supply is d-c. and the receiver does not operate at first, remove the plug from the wall outlet, turn it half way around and re-insert it in the outlet, thus obtaining the proper polarity.

5. Battery Operation: Important—Remove the line plug from the electrical outlet. Insert the plug into the receptacle at the rear of the receiver. This is important since the receiver will not operate from batteries with the plug out of the receptacle. The base portion of the cord can be cut off and placed in the battery compartment under the shelf.

## ADJUSTMENTS

Location of Coils and Trimmer Adjustments

The oscillator coil is located beneath the chassis. The trimmer for the oscillator is on the front section of the variable condenser.

The loop antenna acts as the antenna coil. The trimmer for the loop is on the rear section of the variable condenser.

## ADJUSTMENTS

- **Location of Coils and Trimmer Adjustments**
  - The oscillator coil is located beneath the chassis. The trimmer for the oscillator is on the front section of the variable condenser.
  - The loop antenna acts as the antenna coil. The trimmer for the loop is on the rear section of the variable condenser.

## T1 Coils

<table>
<thead>
<tr>
<th>Part No.</th>
<th>DESCRIPTION</th>
<th>PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>SW-306</td>
<td>$0.80</td>
</tr>
<tr>
<td>L1</td>
<td>777-024</td>
<td>$0.38</td>
</tr>
<tr>
<td>T2</td>
<td>777-021</td>
<td>$0.28</td>
</tr>
<tr>
<td>T3</td>
<td>777-048</td>
<td>$0.38</td>
</tr>
<tr>
<td>T4</td>
<td>777-044A</td>
<td>$0.38</td>
</tr>
<tr>
<td>R1, R6</td>
<td>CR-83</td>
<td>$0.30</td>
</tr>
<tr>
<td>R2</td>
<td>722-186</td>
<td>$0.30</td>
</tr>
<tr>
<td>R3</td>
<td>CR-83</td>
<td>$0.30</td>
</tr>
<tr>
<td>R3</td>
<td>722-186</td>
<td>$0.30</td>
</tr>
<tr>
<td>R4</td>
<td>722-186</td>
<td>$0.30</td>
</tr>
<tr>
<td>R5</td>
<td>722-186</td>
<td>$0.30</td>
</tr>
<tr>
<td>R6</td>
<td>722-186</td>
<td>$0.30</td>
</tr>
<tr>
<td>R7, R8</td>
<td>722-186</td>
<td>$0.30</td>
</tr>
<tr>
<td>B1, B11</td>
<td>334-074</td>
<td>$0.30</td>
</tr>
<tr>
<td>R10, R12</td>
<td>334-074</td>
<td>$0.30</td>
</tr>
<tr>
<td>B8, R11</td>
<td>334-074</td>
<td>$0.30</td>
</tr>
<tr>
<td>R12</td>
<td>334-074</td>
<td>$0.30</td>
</tr>
<tr>
<td>R18</td>
<td>334-074</td>
<td>$0.30</td>
</tr>
<tr>
<td>R15, R17</td>
<td>334-074</td>
<td>$0.30</td>
</tr>
<tr>
<td>R16</td>
<td>334-074</td>
<td>$0.30</td>
</tr>
<tr>
<td>C1, C2</td>
<td>722-186</td>
<td>$0.30</td>
</tr>
<tr>
<td>C3</td>
<td>722-186</td>
<td>$0.30</td>
</tr>
<tr>
<td>C6, C7, C8, C9</td>
<td>722-186</td>
<td>$0.30</td>
</tr>
</tbody>
</table>

*Item number located on schematic diagram. (Not supplied separately.)

Specify part numbers when ordering. List prices effective as of October 15, 1925. (Subject to change without notice.)

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PRODUCTION CHANGES

1. Chassis bearing serial numbers below 2,936,285 use .5 megohm at R10.
2. Chassis bearing serial numbers below 2,939,151 use diode i-f transformer

VOLTAGE ANALYSIS

Readings should be taken with a 1000 ohms-per-volt meter. Voltages listed are from point indicated to chassis with volume control turned on full and no signal. The battery voltages for these readings were: "A" 1.7 volts, "B" 90 volts.

<table>
<thead>
<tr>
<th>Tube</th>
<th>Plate</th>
<th>Screen</th>
<th>Osc. Plate</th>
<th>Fil.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A7GT</td>
<td></td>
<td>82</td>
<td>82</td>
<td>1.7</td>
</tr>
<tr>
<td>1NGT</td>
<td>70</td>
<td>82</td>
<td>82</td>
<td>1.5</td>
</tr>
<tr>
<td>1NGT</td>
<td>82</td>
<td>82</td>
<td>82</td>
<td>1.5</td>
</tr>
<tr>
<td>1BYGT</td>
<td>77</td>
<td>82</td>
<td>82</td>
<td>1.7</td>
</tr>
</tbody>
</table>

Bias for the 1Q6GT tube is obtained across the resistor R11. The voltage drop across this resistor should be 6.8 volts.

Location of Coils and Trimmer Adjustments

The five i-f transformers are located to the right of the variable condenser and the diode i-f transformer to the left of the variable condenser. Trimmers for both transformers are accessible through holes in the tops of the cans.

The oscillator coil is located under the chassis, beneath the variable condenser. Trimmer for the oscillator is located on the front section of the variable condenser.

The loop antenna acts as the antenna coil. Trimmer for the loop is located on the rear section of the variable condenser.

I-f Alignment

Swing variable condenser to minimum capacity position.
Feed 455 kc to the grid of the 1A7GT tube through a 0.01 mf condenser. Adjust the four i-f trimmers for maximum response.

R-f Alignment

Set the dial pointer at 140. Feed 1400 kc through a 0.001 mf condenser to the antenna connection and adjust first the oscillator trimmer (on front section of variable condenser) then the antenna trimmer (on rear section of variable condenser) for maximum response.

If the loop antenna has been replaced it may be necessary to adjust the loop inductance, align at 140. With the pointer set at 60 feed 600 kc to the antenna lead. A portion of the outside turn of the loop may be swung to either side of the center to give maximum response. Repeat the alignment at 140.
## EMERSON RADIO & PHONOGRAPH CORP.

**MODEL DL1-330**

**Chassis DL1**

**Schematic of Parts**

**DL1-330**

**Chassis Model: DL1**


When ordering, specify part numbers. List price each, effective as of Jan. 1, 1940. Subject to change without notice.

<table>
<thead>
<tr>
<th><em>Item</em></th>
<th>Part No.</th>
<th>Description</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>7BW-179</td>
<td>Loop antenna assembly</td>
<td>$0.90</td>
</tr>
<tr>
<td>T4</td>
<td>7BT-486</td>
<td>Oscillator coil (DL1)</td>
<td>$0.40</td>
</tr>
<tr>
<td>T4</td>
<td>7BT-486A</td>
<td>Oscillator coil (DL1)</td>
<td>$0.40</td>
</tr>
<tr>
<td>T2</td>
<td>7BT-488</td>
<td>Double-tuned 455 kc first i-f transformer</td>
<td>$1.00</td>
</tr>
<tr>
<td>T3</td>
<td>7BT-550B</td>
<td>Double-tuned 455 kc second i-f transformer</td>
<td>$0.95</td>
</tr>
<tr>
<td>R1</td>
<td>LR-60</td>
<td>20,000 ohm 1/4 watt carbon resistor</td>
<td>$0.16</td>
</tr>
<tr>
<td>R3</td>
<td>3FR-293</td>
<td>140 ohm 1/2 watt wire-wound resistor</td>
<td>$0.16</td>
</tr>
<tr>
<td>R4</td>
<td>NNR-220</td>
<td>3 meg ohm 1/4 watt carbon resistor</td>
<td>$0.16</td>
</tr>
<tr>
<td>R5</td>
<td>7LR-378</td>
<td>Volume control 0.5 megohm with line switch</td>
<td>$0.85</td>
</tr>
<tr>
<td>R6, R2</td>
<td>4XR-327</td>
<td>15 meg ohm 1/4 watt carbon resistor</td>
<td>$0.16</td>
</tr>
<tr>
<td>R7, R8</td>
<td>KR-56</td>
<td>500,000 ohm 1/2 watt carbon resistor</td>
<td>$0.16</td>
</tr>
<tr>
<td>R9</td>
<td>LR-61</td>
<td>200,000 ohm 1/2 watt carbon resistor (DL1)</td>
<td>$0.16</td>
</tr>
<tr>
<td>C1, C2</td>
<td>7BC-445A</td>
<td>Two-gang variable condenser</td>
<td>$2.25</td>
</tr>
<tr>
<td>C5, C11</td>
<td>C1, C2</td>
<td>Trimmers, part of variable condenser</td>
<td></td>
</tr>
<tr>
<td>C10, C23</td>
<td>BC-12</td>
<td>Trimmers, part of i-f transformers.</td>
<td></td>
</tr>
<tr>
<td>C14</td>
<td>LC-64</td>
<td>0.05 mf, 200 volt tubular condenser</td>
<td>$0.20</td>
</tr>
<tr>
<td>C12, C15, C4</td>
<td>4XC-394A</td>
<td>0.05 mf, 400 volt tubular condenser</td>
<td>$0.20</td>
</tr>
<tr>
<td>C16, C3</td>
<td>3HC-274</td>
<td>0.00022 mf mica condenser</td>
<td>$0.20</td>
</tr>
<tr>
<td>C17, C19</td>
<td>6JC-425</td>
<td>0.002 mf, 600 volt tubular condenser</td>
<td>$0.20</td>
</tr>
<tr>
<td>C20, C21</td>
<td>6JC-426C</td>
<td>0.024 mf, 400 volt tubular condenser</td>
<td>$0.20</td>
</tr>
<tr>
<td>C22</td>
<td>3CC-302</td>
<td>Dual 20 mf, 150 volt dry electrolytic condenser</td>
<td>$0.90</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.15 mf, 200 volt tubular condenser (DL1 only)</td>
<td>$0.20</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5&quot; dynamic speaker (DL1)</td>
<td>$3.80</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5&quot; dynamic speaker (DL1)</td>
<td>$3.85</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pilot light, 63 volts, .15 amp, Mazda No. 47</td>
<td>$0.20</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pilot light socket</td>
<td>$0.15</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dial face</td>
<td>$0.25</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Drive cord</td>
<td>$0.02</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Drive cord spring</td>
<td>$0.02</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Drive shaft and pulley</td>
<td>$0.10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dial pointer</td>
<td>$0.15</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dial crystal (DL1)</td>
<td>$0.25</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dial crystal (DL1)</td>
<td>$0.25</td>
</tr>
</tbody>
</table>

*Item number locates the article on the schematic diagram. *Not supplied separately.

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Compliments of www.nucow.com
Location of Coils and Trimmer Adjustments

The first i-f transformer is located on top of the chassis deck. The trimmers are available through holes in the top of the can. The second i-f transformer is located on the rear wall underneath the chassis. The trimmers are available through holes in the rear.

The trimmers for the antenna coil are mounted on the antenna coil assembly behind and to the right of the variable condenser. The trimmer in the center is for the broadcast band and the trimmer at the bottom for the short-wave band.

The trimmers for the oscillator coil are mounted on the oscillator coil assembly, located on the rear wall underneath the chassis. The trimmer farthest from the end is for the broadcast band. The center trimmer is the broadcast series padding condenser, and the trimmer closest to the end is for the short-wave band.

The 455 kc wave-trap is part of the antenna coil assembly. The trimmer for the trap is the uppermost trimmer of the assembly.

1- and Wave-Trap Alignment

Rotate the wave-band switch to the broadcast (clockwise) position. Set the variable condenser at the minimum capacity position and feed 455 kc through a 0.002 mf paper condenser, to the grid cap of the 6A8 tube (do not remove the grid clip from the tube). Adjust the few i-f trimmers for maximum response. Feed 455 kc to the antenna through a standard dummy antenna (a .0002 mf condenser may be used as a substitute) and adjust the wave-trap trimmer for minimum response. (See General Note No. 6.)

Short-Wave Alignment

With the wave-band switch in the short-wave position, counter-clockwise, set the dial pointer at 16 mc. Feed 16,000 kc through a standard short-wave dummy antenna (a 400 ohm resistor may be used as a substitute) to the antenna lead and adjust first the oscillator trimmer, then the antenna trimmer for maximum response.

Broadcast Alignment

Rotate the wave-band switch clockwise and set the pointer at 160. Feed 1600 kc through a standard broadcast dummy antenna to the antenna lead (a .0002 mf condenser may be used as a substitute) and adjust first the broadcast oscillator trimmer and then the antenna trimmer for maximum response. Move pointer to 60, feed 600 kc and adjust series padding (while rocking the variable) for maximum response.

Descriptive Diagrams

**TUBE MODEL: DP1-322**

**CHASSIS MODEL: DP1**

**Power supply:** A.C. or D.C.

**Voltage rating:** 105-125 volts.

**Power consumption:** 43 watts.

---

### VOLTAGE ANALYSIS

Readings should be taken with a 1000 ohm-charge volt meter. Voltages listed below are from point indicated on circuit (switches) with the volume control turned on full and no signal. Line voltage for these readings was 127.5 volts, 60 cycles, a.c. All readings except condensers, semiconductors and heaters were taken on 250 volt scale. Readings taken on d.c. will be slightly lower.

<table>
<thead>
<tr>
<th>Tube</th>
<th>Plate</th>
<th>Screen</th>
<th>Cathode</th>
<th>Ox. Plate</th>
<th>Fill</th>
</tr>
</thead>
<tbody>
<tr>
<td>6ShGT</td>
<td>65</td>
<td>65</td>
<td>0</td>
<td>70</td>
<td>6.3</td>
</tr>
<tr>
<td>6ShGT</td>
<td>80</td>
<td>60</td>
<td>0</td>
<td>6.3</td>
<td>6.3</td>
</tr>
<tr>
<td>6ShGT</td>
<td>60</td>
<td>60</td>
<td>0</td>
<td>6.3</td>
<td>6.3</td>
</tr>
<tr>
<td>6A6GT</td>
<td>90</td>
<td>14</td>
<td>14</td>
<td>6.3</td>
<td>6.3</td>
</tr>
<tr>
<td>25A8GT</td>
<td>110</td>
<td>0</td>
<td>0</td>
<td>25.0</td>
<td>25.0</td>
</tr>
</tbody>
</table>

---

### DESCRIPTION

**Type:** Two-band superheterodyne.

**Frequency range:** 540-1750 kc. 5.6-18 mc.

**Number of tubes:** Six.

---

### TYPES OF TUBES

1. 6ShGT, pentagrid oscillator-modulator
2. 6ShGT, first i-f amplifier
3. 6ShGT, second detector, a.f. amplifier, a.c.
4. 6A6GT, audio amplifier
5. 25A8GT, dynamic coupled output
6. 25Z6GT, dual half-wave rectifier.
ELECTROLYTIC CONDENSER COLOR CODE

With the positive (+) or center solder lug toward you, read the colored markings as follows from left to right:

LEFT HAND OR SECOND FROM LEFT OR MAXIMUM VOLTAGE COLOR CAPACITY COLOR

<table>
<thead>
<tr>
<th>Elect. Cond.</th>
<th>0 to 9 mfd.</th>
<th>10 to 19 mfd.</th>
<th>20 to 39 mfd.</th>
<th>40 to 99 mfd.</th>
<th>100 to 199 mfd.</th>
<th>200 to 299 mfd.</th>
<th>300 to 499 mfd.</th>
<th>500 to 999 mfd.</th>
<th>1000 mfd. and up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color</td>
<td>Black</td>
<td>Brown</td>
<td>Red</td>
<td>Yellow</td>
<td>Green</td>
<td>Orange</td>
<td>Red</td>
<td>Yellow</td>
<td>Blue</td>
</tr>
</tbody>
</table>

ELECTROLYTIC CONDENSER COLOR CODE

With the positive (+) or center solder lug toward you, read the colored markings as follows from left to right:

LEFT HAND OR SECOND FROM LEFT OR MAXIMUM VOLTAGE COLOR CAPACITY COLOR

<table>
<thead>
<tr>
<th>Condenser</th>
<th>0 to 9 mfd.</th>
<th>10 to 19 mfd.</th>
<th>20 to 39 mfd.</th>
<th>40 to 99 mfd.</th>
<th>100 to 199 mfd.</th>
<th>200 to 299 mfd.</th>
<th>300 to 499 mfd.</th>
<th>500 to 999 mfd.</th>
<th>1000 mfd. and up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color</td>
<td>Black</td>
<td>Brown</td>
<td>Red</td>
<td>Yellow</td>
<td>Green</td>
<td>Orange</td>
<td>Red</td>
<td>Yellow</td>
<td>Blue</td>
</tr>
</tbody>
</table>

ELECTROLYTIC CONDENSER COLOR CODE

With the positive (+) or center solder lug toward you, read the colored markings as follows from left to right:

LEFT HAND OR SECOND FROM LEFT OR MAXIMUM VOLTAGE COLOR CAPACITY COLOR

<table>
<thead>
<tr>
<th>Condenser</th>
<th>0 to 9 mfd.</th>
<th>10 to 19 mfd.</th>
<th>20 to 39 mfd.</th>
<th>40 to 99 mfd.</th>
<th>100 to 199 mfd.</th>
<th>200 to 299 mfd.</th>
<th>300 to 499 mfd.</th>
<th>500 to 999 mfd.</th>
<th>1000 mfd. and up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color</td>
<td>Black</td>
<td>Brown</td>
<td>Red</td>
<td>Yellow</td>
<td>Green</td>
<td>Orange</td>
<td>Red</td>
<td>Yellow</td>
<td>Blue</td>
</tr>
</tbody>
</table>
**VOLTAGE AND RESISTANCE DATA**

<table>
<thead>
<tr>
<th>No.</th>
<th>Connect Generator To</th>
<th>Signal Generator Setting Freq.</th>
<th>Dummy</th>
<th>Range Switch</th>
<th>Dial Setting Freq.</th>
<th>Meters</th>
<th>Stage</th>
<th>Trimmer No.</th>
<th>Peak For</th>
<th>Special Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6L7G Grid</td>
<td>456 KC</td>
<td>658</td>
<td>Broadcast</td>
<td>550 KC</td>
<td>550</td>
<td>2nd IF</td>
<td>1 Max.</td>
<td></td>
<td>4L7G Grid—Do not connect low side of signal generator to chassis pan. Connect to black ground lead.</td>
</tr>
<tr>
<td>2</td>
<td>6L7G Grid</td>
<td>456 KC</td>
<td>658</td>
<td>Broadcast</td>
<td>550 KC</td>
<td>550</td>
<td>2nd IF</td>
<td>2 Max.</td>
<td></td>
<td>4L7G Grid—Do not connect low side of signal generator to chassis pan. Connect to black ground lead.</td>
</tr>
<tr>
<td>3</td>
<td>6L7G Grid</td>
<td>456 KC</td>
<td>658</td>
<td>Broadcast</td>
<td>550 KC</td>
<td>550</td>
<td>1st IF</td>
<td>3 Max.</td>
<td></td>
<td>4L7G Grid—Do not connect low side of signal generator to chassis pan. Connect to black ground lead.</td>
</tr>
<tr>
<td>4</td>
<td>6L7G Grid</td>
<td>456 KC</td>
<td>658</td>
<td>Broadcast</td>
<td>550 KC</td>
<td>550</td>
<td>1st IF</td>
<td>4 Max.</td>
<td></td>
<td>4L7G Grid—Do not connect low side of signal generator to chassis pan. Connect to black ground lead.</td>
</tr>
<tr>
<td>5</td>
<td>Antenna Lead</td>
<td>350 KC</td>
<td>850</td>
<td>LW-A</td>
<td>550 KC</td>
<td>850</td>
<td>LW Osc</td>
<td>14 Max.</td>
<td></td>
<td>Antenna Lead—Keep Antenna and speaker leads separated when aligning to avoid regeneration.</td>
</tr>
<tr>
<td>6</td>
<td>Antenna Lead</td>
<td>350 KC</td>
<td>850</td>
<td>LW-A</td>
<td>356 KC</td>
<td>850</td>
<td>LW R.F.</td>
<td>15 Max.</td>
<td></td>
<td>Antenna Lead—Keep Antenna and speaker leads separated when aligning to avoid regeneration.</td>
</tr>
<tr>
<td>7</td>
<td>Antenna Lead</td>
<td>350 KC</td>
<td>850</td>
<td>LW-A</td>
<td>350 KC</td>
<td>850</td>
<td>LW Ant.</td>
<td>16 Max.</td>
<td></td>
<td>Antenna Lead—Keep Antenna and speaker leads separated when aligning to avoid regeneration.</td>
</tr>
<tr>
<td>8</td>
<td>Antenna Lead</td>
<td>1500 KC</td>
<td>200</td>
<td>BC-B</td>
<td>1500 KC</td>
<td>200</td>
<td>BC Osc</td>
<td>5 Max.</td>
<td></td>
<td>Antenna Lead—Keep Antenna and speaker leads separated when aligning to avoid regeneration.</td>
</tr>
<tr>
<td>9</td>
<td>Antenna Lead</td>
<td>1500 KC</td>
<td>200</td>
<td>BC-B</td>
<td>1500 KC</td>
<td>200</td>
<td>BC R.F.</td>
<td>6 Max.</td>
<td></td>
<td>Antenna Lead—Keep Antenna and speaker leads separated when aligning to avoid regeneration.</td>
</tr>
<tr>
<td>10</td>
<td>Antenna Lead</td>
<td>1500 KC</td>
<td>200</td>
<td>BC-B</td>
<td>1500 KC</td>
<td>200</td>
<td>BC Ant.</td>
<td>7 Max.</td>
<td></td>
<td>Antenna Lead—Keep Antenna and speaker leads separated when aligning to avoid regeneration.</td>
</tr>
<tr>
<td>11</td>
<td>Antenna Lead</td>
<td>6.0 MC</td>
<td>50</td>
<td>400 ohm Resistor</td>
<td>Pol-C</td>
<td>6.0 MC</td>
<td>50</td>
<td>8 Max.</td>
<td></td>
<td>Antenna Lead—Keep Antenna and speaker leads separated when aligning to avoid regeneration.</td>
</tr>
<tr>
<td>12</td>
<td>Antenna Lead</td>
<td>6.0 MC</td>
<td>50</td>
<td>400 ohm Resistor</td>
<td>Pol-C</td>
<td>6.0 MC</td>
<td>50</td>
<td>9 Max.</td>
<td></td>
<td>Antenna Lead—Keep Antenna and speaker leads separated when aligning to avoid regeneration.</td>
</tr>
<tr>
<td>13</td>
<td>Antenna Lead</td>
<td>6.0 MC</td>
<td>50</td>
<td>400 ohm Resistor</td>
<td>Pol-C</td>
<td>6.0 MC</td>
<td>50</td>
<td>10 Max.</td>
<td></td>
<td>Antenna Lead—Keep Antenna and speaker leads separated when aligning to avoid regeneration.</td>
</tr>
<tr>
<td>14</td>
<td>Antenna Lead</td>
<td>18 MC</td>
<td>17</td>
<td>400 ohm Resistor</td>
<td>SW-D</td>
<td>18 MC</td>
<td>17</td>
<td>11 Max.</td>
<td></td>
<td>Antenna Lead—Keep Antenna and speaker leads separated when aligning to avoid regeneration.</td>
</tr>
<tr>
<td>15</td>
<td>Antenna Lead</td>
<td>18 MC</td>
<td>17</td>
<td>400 ohm Resistor</td>
<td>SW-D</td>
<td>18 MC</td>
<td>17</td>
<td>12 Max.</td>
<td></td>
<td>Antenna Lead—Keep Antenna and speaker leads separated when aligning to avoid regeneration.</td>
</tr>
<tr>
<td>16</td>
<td>Antenna Lead</td>
<td>18 MC</td>
<td>17</td>
<td>400 ohm Resistor</td>
<td>SW-D</td>
<td>18 MC</td>
<td>17</td>
<td>13 Max.</td>
<td></td>
<td>Antenna Lead—Keep Antenna and speaker leads separated when aligning to avoid regeneration.</td>
</tr>
</tbody>
</table>
With the low side (G) of the signal generator connected to the chassis through a .01 mfd. 200 Volt condenser, the following procedure should be used when aligning the receiver:

**TABULATION FOR ALIGNMENT**

<table>
<thead>
<tr>
<th>STEPS</th>
<th>Connect High Side of Generator to</th>
<th>Set Generator at</th>
<th>Set Gang at</th>
<th>Adjust the following</th>
<th>Located</th>
<th>To obtain</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. SET VOLUME CONTROL AT MAXIMUM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>12K7GT I.F. Grid Cap in Series with .01 Mfd.*</td>
<td></td>
<td></td>
<td>2nd I.F. Trimmer</td>
<td>Top of Chassis</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>High Side of Loop in Series with .01 Mfd.</td>
<td>455 Kc.</td>
<td>A Quiet Point</td>
<td>1st I.F. Trimmers 2 used</td>
<td>End of Chassis</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td>Minimum Capacity</td>
<td>Oscillator Trimmer</td>
<td>Side of Gang Condenser</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. RECHECK ALL ABOVE ADJUSTMENTS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note:** Do not remove grid cap.

<table>
<thead>
<tr>
<th>Ref. No.</th>
<th>Part No.</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>773-16</td>
<td>20 M ohms—.1 W.</td>
</tr>
<tr>
<td>2</td>
<td>773-25</td>
<td>2 M meg.—.1 W.</td>
</tr>
<tr>
<td>3</td>
<td>773-26</td>
<td>250 M ohms—.1 W.</td>
</tr>
<tr>
<td>5</td>
<td>773-27</td>
<td>5 M meg.—.1 W.</td>
</tr>
<tr>
<td>6</td>
<td>773-28</td>
<td>500 M ohms—.1 W.</td>
</tr>
<tr>
<td>7</td>
<td>773-30</td>
<td>150 M ohms—.1 W—10%</td>
</tr>
<tr>
<td>8</td>
<td>775-9</td>
<td>1000 ohms—1 W.</td>
</tr>
<tr>
<td>9</td>
<td>353-1</td>
<td>100 mfd.—Mica</td>
</tr>
<tr>
<td>10</td>
<td>253-3</td>
<td>.02 mfd. 400 V.</td>
</tr>
<tr>
<td>11</td>
<td>253-3</td>
<td>500 mfd.—Mica</td>
</tr>
<tr>
<td>12</td>
<td>253-2</td>
<td>250 mfd.—Mica</td>
</tr>
<tr>
<td>13</td>
<td>255-1</td>
<td>.01 mfd. 400 V.</td>
</tr>
<tr>
<td>14</td>
<td>254-5</td>
<td>.02 mfd. 600 V.</td>
</tr>
<tr>
<td>15</td>
<td>251-3</td>
<td>.01 mfd. 400 V.</td>
</tr>
<tr>
<td>16 &amp; 17</td>
<td>256-1</td>
<td>20 mfd. — 30 mfd.—150 V.</td>
</tr>
<tr>
<td>18</td>
<td>256-3</td>
<td>.25 mfd. 200 V.</td>
</tr>
<tr>
<td>19</td>
<td>255-2</td>
<td>.05 mfd. 400 V.</td>
</tr>
<tr>
<td>20</td>
<td>388-1</td>
<td>Loop &amp; Shield Assembly</td>
</tr>
</tbody>
</table>

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Compliments of www.nucow.com
With the low side of the signal generator connected to the chassis through a .01 mfd. 200 volt condenser, the following procedure should be used when aligning the receiver:

**Alignment**

**Watts 50 Volts 105-125 AC**

**IF - 455 Kc.**

**Steps**

<table>
<thead>
<tr>
<th>Use in Series</th>
<th>Set Generator</th>
<th>Set Gang</th>
<th>Adjust</th>
<th>Located</th>
<th>To obtain</th>
</tr>
</thead>
<tbody>
<tr>
<td>With Generator</td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
</tr>
</tbody>
</table>

**Set Volume Control at Maximum**

- .01 mfd. to grid cap of 12K7GT I.F.*
- .01 to high side of loop
- 1000 mmfd. to antenna
- 1400 Kc.
- 1400 Kc.
- 800 Kc.
- 600 Kc.

**RECHECK ALL ABOVE ADJUSTMENTS**

*Do not remove grid cap.*
FARNESWORTH TELEV. & RADIO CORP.

Ref. No. | Part No. | Description
---|---|---
1 | 771-24 | 1 meg. ohm
2 | 771-34 | 100 ohm
3 | 771-48 | 50 M ohm
4 | 771-26 | 3 meg. ohm
5 | 771-37 | 500 M ohms Volume
6 | 771-16 | 25 M ohms Control
7 | 771-23 | 500 M ohms
8 | 771-21 | 250 M ohms
9 | 771-21 | 250 M ohms
10 | 771-29 | 10 meg ohms
11 | 256-1 | 0.1 mfd. 400 V
12 | 255-2 | 0.05 mfd. 400 V
13 | 256-3 | 0.2 mfd. 400 V
14 | 256-2 | 0.1 mfd. 200 V
15 | 255-5 | 0.005 mfd. 400 V
16 | 256-3 | 0.25 mfd. 200 V
17 | 258-4 | 4500 mmfd. ± 3%
18 | 258-3 | 50 mmfd.
19 | 258-2 | 250 mmfd.
20 | 2516-1 | 25 mfd. 200 V
21 | 2519-1 | Dual Antenna Trimmer
22 | 2519-2 | Dual Oscillator Trimmer
23 | 2514-1 | 600 Kc. Pac 200—600 mmfd.
24 | 2511-1 | Gang Condenser
25 | 2510-1 | Loop Antenna

**INTERMEDIATE FREQUENCY 455 KC**

**VOLTS**

195-125 AC-DC

**WATTS**

30

PUSH BUTTON SET UP

3. While holding button down, carefully tune in the station to be set up.
4. Tighten button—detune set and check button by depressing it.

The other three buttons are set up in the same manner.

ALIGNMENT PROCEDURE

To properly align this set an output meter and a signal generator are required. The generator must be calibrated at the following points: 456 Kc., 600 Kc., 1400 Kc., 1600 Kc., 6 Mc., 10 Mc., 15 Mc., and 18.3 Mc.

**STEPS**

1. SET VOLUME CONTROL AT MAXIMUM
2. 455 Kc. 2nd I.F. Trimmers
3. Minimum 1st I.F. Trimmers
4. 250 mmfd. 1600 Kc. B. C. Osc. Trimmer
5. 1400 Kc. Strongest Sig. & Rock Gang While Adjust. Is Made
6. 600 Kc. B. C. Pad
7. Recheck 1400 Kc.
8. 400 ohms 18.3 Mc. S.W. Osc. Trimmer
10. CHECK SIGNAL AT 6 Mc. and 70 Mc.

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Compliments of www.nucow.com
I.F. — 455 KC

Any combination of one 1½ volt "A" battery and two 45 volt "B" batteries that will fit in the receiver case will be satisfactory. Battery drain is .2 amp., at 1½ volts and 9 ma., at 90 volts.

Alignment

To properly align this receiver, a signal generator calibrated at 455 Kc., 1400 Kc., and 1730 Kc., is required. After aligning the I. F. stages, replace receiver in cabinet and FASTEN LOOP IN NORMAL POSITION before aligning the R. F. end through the openings in the end of the cabinet. These openings are closed by snap fasteners. The oscillator trimmer is nearest the front panel and the loop trimmer is directly behind it.

<table>
<thead>
<tr>
<th>STEPS</th>
<th>Use in Series With Generator</th>
<th>Set Generator at</th>
<th>Set Gang at</th>
<th>Adjust</th>
<th>Located</th>
<th>To obtain</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.02 mfd. to Chassis Connect high side of Generator to grid cap of 1A7G tube.</td>
<td>455 Kc.</td>
<td>Quiet Point</td>
<td>2nd I. F. Trimmers</td>
<td>Top of I. F. Trans.</td>
<td>MAXIMUM OUTPUT</td>
</tr>
<tr>
<td>2</td>
<td>Loop**</td>
<td>1730 Kc.</td>
<td>1730 Kc.</td>
<td>Oscillator Trimmer*</td>
<td>See Note Below</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Loop**</td>
<td>1400 Kc.</td>
<td>1400 Kc. and Rock Gang</td>
<td>Loop Trimmer*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*See preceding paragraph for location of trimmers.

**Loop to consist of five to ten turns of insulated wire wound on a three to four inch form to be closely coupled to the loop antenna in the receiver.
FARNE'S WORTH TELEV. & RADIO CORP.

MODEL AT-31
Chassis C7-1
Schematic, Voltage Alignment, Parts: Resistance

BATTERY CONSUMPTION:
A. Batt. Kc. — 10 mA.
B. batt. M.K. — 2 mA.

WATTS 30 VOLTS 105-125 AC-DC

<table>
<thead>
<tr>
<th>Ref. No.</th>
<th>Part No.</th>
<th>WATTS 30</th>
<th>VOLTS 105-125 AC-DC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>771-24</td>
<td>1 meg</td>
<td>23</td>
</tr>
<tr>
<td>2</td>
<td>779-19</td>
<td>100 M. ohm</td>
<td>24</td>
</tr>
<tr>
<td>3</td>
<td>771-45</td>
<td>15 M. ohm</td>
<td>24</td>
</tr>
<tr>
<td>4</td>
<td>771-50</td>
<td>150 ohm</td>
<td>25</td>
</tr>
<tr>
<td>5</td>
<td>771-41</td>
<td>2 M. ohm</td>
<td>26</td>
</tr>
<tr>
<td>6</td>
<td>786-1</td>
<td>500 M. ohm</td>
<td>27</td>
</tr>
<tr>
<td>7</td>
<td>771-25</td>
<td>2 meg</td>
<td>28</td>
</tr>
<tr>
<td>8</td>
<td>771-91</td>
<td>750 M. ohm</td>
<td>29</td>
</tr>
<tr>
<td>9</td>
<td>771-23</td>
<td>500 M. ohm</td>
<td>30</td>
</tr>
<tr>
<td>10</td>
<td>779-1</td>
<td>1900 ohm conduct.</td>
<td>31</td>
</tr>
<tr>
<td>11</td>
<td>771-32</td>
<td>50 ohm</td>
<td>32</td>
</tr>
<tr>
<td>12</td>
<td>778-1</td>
<td>250 ohm flexible</td>
<td>33</td>
</tr>
<tr>
<td>13</td>
<td>256-2</td>
<td>.1200 V.</td>
<td>34</td>
</tr>
<tr>
<td>14</td>
<td>256-4</td>
<td>.2200 V.</td>
<td>35</td>
</tr>
<tr>
<td>15</td>
<td>256-1</td>
<td>.6200 V.</td>
<td>36</td>
</tr>
<tr>
<td>16</td>
<td>256-1</td>
<td>.003 400</td>
<td>37</td>
</tr>
<tr>
<td>17</td>
<td>256-1</td>
<td>.06 400</td>
<td>38</td>
</tr>
<tr>
<td>18</td>
<td>256-1</td>
<td>.06200</td>
<td>39</td>
</tr>
<tr>
<td>19</td>
<td>256-2</td>
<td>.06 400</td>
<td>40</td>
</tr>
<tr>
<td>20</td>
<td>256-1</td>
<td>250 mfd. Mica</td>
<td>41</td>
</tr>
<tr>
<td>21</td>
<td>256-1</td>
<td>100 mfd. Mica</td>
<td>42</td>
</tr>
<tr>
<td>22</td>
<td>2517-1</td>
<td>20 mfd. 25 V</td>
<td>43</td>
</tr>
</tbody>
</table>

40 mfd. 150 V. | 40 mfd. 150 V. dual
Loop Assembly |
Gang Condenser |
Osc. Coil |
1st I. F. Transformer |
2nd I. F. Transformer |
Output Transformer |
Filter choke |
Change Over Switch |
Battery plug (3 prong) |
Battery plug (2 prong) |
Dial bulb |
Speaker less transformer |
Line Cord |
Dial Scale |
Dial Pointer |
Dial escutcheon and crystal |
Knob marked Volume |
Knob marked Tuning |
Knob for AC battery switch |
Dial Cord |
Dial shaft |

WHEN INSTALLING BATTERIES

1. Remove corner brackets. These lift out readily.
2. Put "B" battery against left wall of cabinet. Push against front panel, then slide as far to right as possible against wooden block. Insert other "B" battery in space just vacated.
3. If batteries stick, opening bottom door will facilitate installation.

ALIGNMENT

A signal generator calibrated at 455 Kc., 1400 Kc., and 1739 Kc., is necessary to properly align this receiver. After aligning the I. F. stages, replace receiver in cabinet and fasten loop in normal position before aligning the R. F. end through the openings in the end of the cabinet. These openings are closed by snap fasteners. The oscillator trimmer is nearest the front panel and the loop trimmer is directly behind it.

<table>
<thead>
<tr>
<th>STEPS</th>
<th>Use in Series with Generator</th>
<th>Set Generator at</th>
<th>Set Gang at</th>
<th>Adjust</th>
<th>Located</th>
<th>To obtain</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>.02 MFD in each lead Connect high side of generator to grid cap of 1A7G tube</td>
<td>455 Kc.</td>
<td>Quiet Point</td>
<td>2nd I. F. Trimmers</td>
<td>Top of I. F. Trans.</td>
<td>MAXIMUM OUTPUT</td>
</tr>
<tr>
<td>2.</td>
<td>Loop**</td>
<td>1730 Kc.</td>
<td>Minimum</td>
<td>Oscillator Trimmers*</td>
<td>See Note Below</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Loop**</td>
<td>1400 Kc.</td>
<td>1400 Kc. &amp; Rock Gang</td>
<td>Loop Trimmers*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*See preceding paragraph for location of trimmers.
**Loop to consist of five to ten turns of insulated wire wound on a three to four inch form to be closely coupled to the loop antenna in the receiver.

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Compliments of www.nucow.com
This set is designed to be used with an outdoor antenna which should be placed as high as possible and as far as possible from sources of interference. A good ground connection should be used.

ALIGNMENT

To properly align this receiver, an output meter and a signal generator are required. The generator must be calibrated at the following frequencies: 455 Kc, 600 Kc, 1400 Kc, and 1700 Kc. The volume control must be set at maximum and the signal generator at the lowest value that will give an accurate reading on the output meter. The high side of the generator is connected to the blue antenna lead and the low side is connected to the black lead.

<table>
<thead>
<tr>
<th>STEPS</th>
<th>In Series With Antenna</th>
<th>Set Generator at</th>
<th>Set Gang at</th>
<th>Adjust</th>
<th>Located</th>
<th>To obtain</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td><strong>SET VOLUME CONTROL AT MAXIMUM.</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td>455 Kc.</td>
<td>Minimum</td>
<td>2nd I.F. Trimmers</td>
<td>Top of I.F.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>250 mmf.</td>
<td>1700 Kc.</td>
<td>1700 Kc.</td>
<td>1st I.F. Trimmers</td>
<td>Top Front of Gang</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td>1400 Kc.</td>
<td>Strongest Signal and Rock Gang While Adjustment is Made</td>
<td>Oscillating Trimmer</td>
<td>Top Rear of Gang</td>
<td>MAXIMUM OUTPUT</td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
<td></td>
<td>Antenna Trimmer</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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**Models AC-70, AC-71 (Ch.CS-1, AC-76 (Ch.CS-2) and AC-90, AC-91 (Ch.CS-1)) and AK-96, AK-98 (Ch.CS-2)**

**TO REMOVE CHASSIS**

Before removing the chassis it is necessary to remove the loop antenna. This is done as follows:

1. First remove the 3 prong plug from the top of loop frame. loosen the bolt which goes through the wooden member at the bottom of the speaker enclosure. This will allow the bottom pivot (wood) to drop—allowing the top pivot of the loop to be removed from its bearing. Caution should be used so that the heavy rubber washer is not lost, also when the loop is removed from the top bearing, a lead which plugs into the top of the loop axis, must be disconnected, if the loop is dropped this lead may break. After the loop is free the set should be manually tuned to 900 K.C. and the pointer disconnected from the drive cord by bending the center tab toward the back of the cabinet and releasing the cord.

2. The chassis bolts may be removed and the chassis lifted out taking care that the two sets of leads to the loop do not catch on the chassis shelf.

3. When replacing the loop after the chassis, adjust the signal generator and the single lead to the center of the loop have been reinstalled, before replacing the loop make sure the lower bearing support has the dowel pointing away from the loudspeaker so that an angle of approximately 10° or 15° is made with a line parallel with the front panel. When the loop is installed back the label faces the back of the cabinet and that the loop is raised by the lower support so the rubber washer is slightly compressed, so the loop will not rotate by itself. Then plug in the three prong plug and check the leads are correct so no strain is on them when the loop is rotated.

**ALIGNMENT**

Connect the high side of the generator to the antenna terminal and the low side of it to the ground terminal making certain jumper on terminal strip is disconnected. Before aligning tighten waxing trap trimmer screw.

---

**Table: VOLUME AND TONE CONTROLS AT MAXIMUM**

<table>
<thead>
<tr>
<th>Steps</th>
<th>In Series with Antenna</th>
<th>Set Generator at</th>
<th>Set Gang at</th>
<th>Adjust</th>
<th>Located</th>
<th>To Obtain</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SET VOLUME CONTROL AT MAXIMUM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>450 Kc. Minimum 1st L.P. Trimmer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>1600 Kc. Top 1st L.P. Trimmer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>1500 Kc. S.C.R.F. Trimmer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>600 Kc. Top of Chassis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>1600 Kc. Recheck</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>1600 Kc. Top of Chassis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>181.1 Mc. Minimum 1st S.W. Trimmer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>16 Mc. S.W.R.F. Trimmer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Check Signal at 6 Mc. and 10 Mc.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Table: Maximum Output**

<table>
<thead>
<tr>
<th>Steps</th>
<th>In Series with Antenna</th>
<th>Set Generator at</th>
<th>Set Gang at</th>
<th>Adjust</th>
<th>Located</th>
<th>To Obtain</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SET VOLUME CONTROL AT MAXIMUM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>450 Kc. Minimum 1st L.P. Trimmer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>1600 Kc. Top 1st L.P. Trimmer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>1500 Kc. S.C.R.F. Trimmer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>600 Kc. Top of Chassis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>1600 Kc. Recheck</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>1600 Kc. Top of Chassis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>1600 Kc. Top of Chassis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>181.1 Mc. Minimum 1st S.W. Trimmer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>16 Mc. S.W.R.F. Trimmer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Check Signal at 6 Mc. and 10 Mc.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Notes:**

* Tighten oscillator trimmer screw for maximum capacity, then unscrew until second peak is secured.

** Tighten R.F. trimmer screw for maximum capacity, then unscrew until first peak is secured.
ALIGNMENT

Be sure to follow procedure carefully and in the order given—otherwise the receiver will be insensitive and the dial calibration incorrect. For alignment procedures read tabulations from left to right. If more than one adjustment is required on any one band, make the adjustments marked (1) first, (2) next, (3) third.

Before starting alignment:
(a) Check tuning dial adjustment by turning gang condenser until plate tunes maximum capacity stop (completely in mesh) or 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 the last line move to correct position.
(b) Use an accurately calibrated test oscillator with some type of output measuring device.
(c) Have ground lead of test oscillator attached to chassis.

TEST OSCILLATOR

<table>
<thead>
<tr>
<th>Set receiver dial to:</th>
<th>Adjust test oscillator frequency to:</th>
<th>Use dummy antennas in series with output of test oscillator consisting of:</th>
<th>Attach output of test oscillator to:</th>
<th>Refer to parts layout diagram for location of trimmers mentioned below:</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.F. Any point where no interfering signal is received</td>
<td>455 K.C.</td>
<td>.02 MFD condenser</td>
<td>High side to grid terminal of 6SA7 tube DO NOT REMOVE CAP. Receiver &quot;A&quot; antenna post.</td>
<td>Adjust each of the second I.F. transformer trimmers for maximum output—then adjust each of the first I.F. trimmers for maximum output.</td>
</tr>
</tbody>
</table>

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ALIGNMENT PROCEDURE

MODEL S-7402-3

I. F. ALIGNMENT. With the gang condenser set at minimum, adjust the test oscillator to 456 KC and connect the output to the grid of the first detector tube (12A8GT) through a .05 or .1 mfd condenser. Ground the oscillator and connect the condenser to the chassis ground. Adjust the oscillator trimmer to peak or maximum sensitivity of the output meter.

BROADCAST BAND ALIGNMENT. Remove chassis from cabinet and set it up on the bench. Care should be taken to have no iron or other metal near the loop. Do not make this set-up on a metal bench.

Connect the test oscillator to the antenna of the set through a 200 mafid. (.0002) condenser. With the gang condenser set at minimum capacity, set the oscillator at 1720 KC, and adjust the oscillator trimmer to peak or maximum signal. Next set the oscillator at 1400 KC, and tune in the signal on the gang condenser. Adjust the antenna trimmer for maximum signal. Next set the oscillator at 600 KC, and tune in signal on condenser to check alignment of coils.

MODEL S-7408-4

I. F. ALIGNMENT. With the gang condenser set at minimum, adjust the test oscillator to 456 KC and connect the output to the grid of the first detector tube (12A8GT) through a .05 or .1 mfd condenser. Ground the oscillator and connect the condenser to the chassis ground. Align all three I.F. trimmers to peak or maximum sensitivity of the output meter.

BROADCAST BAND ALIGNMENT. Remove chassis, shield, and loop antenna from cabinet and set them up on the bench so that they occupy exactly the same respective positions on the bench as they did in the cabinet. Care should be taken to have no iron or other metal near the loop. Do not make this set-up on a metal bench.

Connect the test oscillator to the antenna of the set through a 200 mafid. (.0002) condenser. With the gang condenser set at minimum capacity, set the oscillator at 1720 KC, and adjust the oscillator trimmer to peak or maximum signal. Next set the oscillator at 1400 KC, and tune in the signal on the gang condenser. Adjust the antenna trimmer for maximum signal. Next set the oscillator at 600 KC, and tune in signal on condenser to check alignment of coils.

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ALIGNMENT: An output meter and an accurately calibrated signal generator are required.
Connect the output meter across the voice coil or between the plate of the 6F6G output tube and ground in series with a .1 mfd. condenser, depending on the type of meter. (The more sensitive type should be connected across the voice coil.)
Connect the ground lead of the signal generator to the chassis.
Turn the volume control to the maximum volume position and keep it in this position throughout the entire alignment procedure.
Be sure the loop is properly connected and in the same relative position it occupies when in the cabinet.

**NOTE:** Trimmers must be aligned in order shown. After set is in cabinet realign No. 6 at 6MC. Then No. 8 at 1500 KC. On weak signals. Signal generator should be disconnected.

**DIAL AND MISCELLANEOUS PARTS**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>114955</td>
<td>Clamp for dial cord</td>
<td>.06</td>
</tr>
<tr>
<td>119559</td>
<td>Clamp—dial scale retainer</td>
<td>.08</td>
</tr>
<tr>
<td>112745</td>
<td>Clip—coil mounting</td>
<td>.01</td>
</tr>
<tr>
<td>117057</td>
<td>Cord—drive (supplied in 2 foot lengths)</td>
<td>.15</td>
</tr>
<tr>
<td>119655</td>
<td>Dial escutcheon</td>
<td>.45</td>
</tr>
<tr>
<td>119684</td>
<td>Dial background</td>
<td>.06</td>
</tr>
<tr>
<td>119777</td>
<td>Dial scale</td>
<td>.55</td>
</tr>
<tr>
<td>117029</td>
<td>Drive drum and bushing</td>
<td>.50</td>
</tr>
<tr>
<td>88348</td>
<td>Eyelet for dial cord</td>
<td>Per doz. .05</td>
</tr>
<tr>
<td>119644</td>
<td>Knob</td>
<td>.18</td>
</tr>
<tr>
<td>119577</td>
<td>Pointer</td>
<td>.12</td>
</tr>
<tr>
<td>119654</td>
<td>Push button</td>
<td>.85</td>
</tr>
<tr>
<td>91145</td>
<td>Retaining ring—for drive shaft</td>
<td>Per C .50</td>
</tr>
<tr>
<td>93924</td>
<td>Screw—self tapping 8x1/4</td>
<td>.01</td>
</tr>
<tr>
<td>119218</td>
<td>Screw—Escutcheon mounting</td>
<td>.02</td>
</tr>
<tr>
<td>95040</td>
<td>Screw—No. 6 Hex. Hd.</td>
<td>Per C .35</td>
</tr>
<tr>
<td>112743</td>
<td>Screw—No. 10x1/8 Chassis mfg.</td>
<td>Per C .35</td>
</tr>
<tr>
<td>85827</td>
<td>Set Screw—8-32 Square Head</td>
<td>.02</td>
</tr>
<tr>
<td>113191</td>
<td>Screw—No. 8-32x1/4</td>
<td>.01</td>
</tr>
<tr>
<td>110301</td>
<td>Socket—4 pcng (for speaker)</td>
<td>.12</td>
</tr>
<tr>
<td>116690</td>
<td>Socket—small octal base</td>
<td>.12</td>
</tr>
<tr>
<td>117078</td>
<td>Socket—octal with special grounding lug</td>
<td>.12</td>
</tr>
<tr>
<td>111090</td>
<td>Spacer—steel mfg.</td>
<td>.02</td>
</tr>
<tr>
<td>113177</td>
<td>Spring—dial cord tension</td>
<td>.09</td>
</tr>
<tr>
<td>119799</td>
<td>Station call letter tabs</td>
<td>.40</td>
</tr>
<tr>
<td>119624</td>
<td>Terminal strip—phano</td>
<td>.20</td>
</tr>
<tr>
<td>116660</td>
<td>Tuning shaft</td>
<td>.15</td>
</tr>
<tr>
<td>110829</td>
<td>Washer—chassis mounting</td>
<td>.01</td>
</tr>
<tr>
<td>111456</td>
<td>Washer—spring washer</td>
<td>Per C .56</td>
</tr>
<tr>
<td>118520</td>
<td>Washer—for back of knobs</td>
<td>.005</td>
</tr>
</tbody>
</table>

*(Prices Subject to Change without Notice)*

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Compliments of www.nucow.com
FOR ALIGNMENT: An output meter and an accurately calibrated signal generator are required.

1. Connect the output meter across the voice coil or between the plate of the 8S5G output tube and ground in series with a .1 mfd. condenser, depending on the type of meter. (The more sensitive type should be connected across the voice coil.)

2. Connect the ground lead of the signal generator to the “G” terminal or the chassis.

3. Turn the volume control to the maximum volume position and keep it in this position throughout the entire alignment procedure.

4. Remove the connector from between the “A” and “X” terminals. Check the pointer to see that it is correctly set.

<table>
<thead>
<tr>
<th>Dummy Ant in</th>
<th>Connection of Sig. Generator Output To Receiver</th>
<th>Signal Generator Frequency</th>
<th>Band Switch Position</th>
<th>Receiver Dial Setting</th>
<th>Trimmer Number</th>
<th>Trimmer Description</th>
<th>Type of Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>.1 MFD. Condenser</td>
<td>Front Leg of Gong Condenser</td>
<td>455 KC</td>
<td>Broadcast</td>
<td>Any Point Where It Does Not Affect The Signal</td>
<td>1-2</td>
<td>2nd I.F.</td>
<td>Adjust for maximum output. Then repeat adjustment.</td>
</tr>
<tr>
<td>2.0 MMFD. Micro Condenser</td>
<td>“A” Terminal</td>
<td>455 KC</td>
<td>Broadcast</td>
<td>Any Point Where It Does Not Affect The Signal</td>
<td>3-4</td>
<td>1st I.F.</td>
<td></td>
</tr>
<tr>
<td>2.0 MMFD. Micro Condenser</td>
<td>“A” Terminal</td>
<td>1500 KC</td>
<td>Broadcast</td>
<td>1500 KC</td>
<td>5</td>
<td>Wave Trap</td>
<td>Adjust for minimum output using a strong generator signal.</td>
</tr>
<tr>
<td>2.0 MMFD. Micro Condenser</td>
<td>“A” Terminal</td>
<td>1500 KC</td>
<td>Broadcast</td>
<td>1500 KC</td>
<td>6</td>
<td></td>
<td>Adjust for maximum output.</td>
</tr>
<tr>
<td>2.0 MMFD. Micro Condenser</td>
<td>“A” Terminal</td>
<td>600 KC</td>
<td>Broadcast</td>
<td>Tune To 600 KC Generator Signal</td>
<td>7</td>
<td></td>
<td>Adjust for maximum output.</td>
</tr>
<tr>
<td>400 OHM Carbon Resistor</td>
<td>“A” Terminal</td>
<td>14 MC</td>
<td>Foreign</td>
<td>14 MC</td>
<td>8</td>
<td></td>
<td>Adjust for maximum output.</td>
</tr>
<tr>
<td>400 OHM Carbon Resistor</td>
<td>“A” Terminal</td>
<td>14 MC</td>
<td>Foreign</td>
<td>14 MC</td>
<td>9</td>
<td></td>
<td>Adjust for maximum output.</td>
</tr>
<tr>
<td>400 OHM Carbon Resistor</td>
<td>“A” Terminal</td>
<td>14 MC</td>
<td>Foreign</td>
<td>14 MC</td>
<td>10</td>
<td></td>
<td>Adjust for maximum output.</td>
</tr>
</tbody>
</table>

TO SET UP THE BUTTONS FOR AUTOMATIC TUNING:

1. Turn the set on and allow it to operate at least fifteen minutes before attempting to set up the buttons.

2. Make a list of the frequencies of six nearby stations to which you wish to set up the buttons. Be sure to select the most powerful nearby stations, since weak signals will not give as satisfactory results. Also be sure to select stations that fall within the frequency range of the buttons.

3. Be sure the antenna is connected before proceeding further. It will be impossible to set up buttons properly without an antenna.

4. With the range switch in the Broadcast (Manual) position (position B) tune in the station to be set up. Then turn the range switch to Automatic Position (Position A) and push in the button to be set up, being sure to select a button with the proper frequency range (see Fig. 1). ALWAYS TRY TO SELECT THE BUTTON WHICH CAN BE SET UP TO A STATION WHOSE FREQUENCY IS WELL WITHIN THE BUTTON'S OPERATING RANGE.

5. At the back of the chassis will be found 6 holes numbered to correspond to the numbers of the buttons. See Fig. 1. Adjust the large screw with the number corresponding to the number of the button you have pushed in, until the same station is again heard. Tune accurately, adjusting for deepest tone.

6. Now adjust the small screw (located adjacent to the large screw just adjusted) until maximum output is obtained. Make a final adjustment on the large screw, always tuning for deepest tone.

7. The set-up is now complete for this button. The remaining buttons may be set up in the same way.

8. Call letter tabs which may be used to label the buttons are supplied with this radio.

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Compliments of www.nucow.com
FOR ALIGNMENT: An output meter and an accurately calibrated signal generator are required.
1. Connect the output meter across the voice coil or between the plate of the 6V6G output tube and ground in series with a .1 mfd. condenser, depending on the type of meter. (The more sensitive type should be connected across the voice coil.)
2. Connect the ground lead of the signal generator to the "GND" terminal or the chassis.
3. Turn the volume control to the maximum volume position and keep it in this position throughout the entire alignment procedure.
4. Check the pointer to see that it is correctly set.

<table>
<thead>
<tr>
<th>Dummy Ant in Series with Sig. Gen.</th>
<th>Connection of Sig. Generator Output To Receiver</th>
<th>Signal Generator Frequency</th>
<th>Band Switch Position</th>
<th>Receiver Dial Setting</th>
<th>Trimmer Number</th>
<th>Trimmer Description</th>
<th>Type of Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>.1 MFD. Condenser</td>
<td>Front Lur of Gany Condenser</td>
<td>455 KC</td>
<td>Broadcast</td>
<td>Any Point Where It Does Not Affect The Signal</td>
<td>1-2</td>
<td>2nd L.F.</td>
<td>Adjust for maximum output, then repeat adjustment.</td>
</tr>
<tr>
<td>200 MFD. Micro Condenser</td>
<td>&quot;Ant.&quot; Terminal</td>
<td>455 KC</td>
<td>Broadcast</td>
<td>Any Point Where It Does Not Affect The Signal</td>
<td>3-4</td>
<td>1st L.F.</td>
<td>Adjust for maximum output, then repeat adjustment.</td>
</tr>
<tr>
<td>500 MFD. Micro Condenser</td>
<td>&quot;Ant.&quot; Terminal</td>
<td>1500 KC</td>
<td>Broadcast</td>
<td>1500 KC</td>
<td>5</td>
<td>Wavé Trap</td>
<td>Adjust for minimum output using a strong generator signal.</td>
</tr>
<tr>
<td>500 MFD. Micro Condenser</td>
<td>&quot;Ant.&quot; Terminal</td>
<td>1500 KC</td>
<td>Broadcast</td>
<td>1500 KC</td>
<td>6-7</td>
<td>Broadcast Antenna</td>
<td>Adjust for maximum output.</td>
</tr>
<tr>
<td>500 MFD. Micro Condenser</td>
<td>&quot;Ant.&quot; Terminal</td>
<td>600 KC</td>
<td>Broadcast</td>
<td>600 KC</td>
<td>8</td>
<td>Broadcast Oscillator (Stunt)</td>
<td>Adjust for maximum output.</td>
</tr>
<tr>
<td>400 OHM Carbon Resistor</td>
<td>&quot;Ant.&quot; Terminal</td>
<td>16 MC</td>
<td>Foreign</td>
<td>16 MC</td>
<td>9</td>
<td>Foreign Oscillator (Stunt)</td>
<td>Adjust for maximum output.</td>
</tr>
<tr>
<td>400 OHM Carbon Resistor</td>
<td>&quot;Ant.&quot; Terminal</td>
<td>16 MC</td>
<td>Foreign</td>
<td>16 MC</td>
<td>10</td>
<td>Foreign Antenna</td>
<td>Adjust for maximum output.</td>
</tr>
</tbody>
</table>

DIAL AND MISCELLANEOUS PARTS

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>118969</td>
<td>Bases—cabinet complete with antenna and terminal...</td>
<td>$1.65</td>
</tr>
<tr>
<td>118968</td>
<td>Band indicator</td>
<td>$0.03</td>
</tr>
<tr>
<td>119035</td>
<td>Bracket—for tuning eye</td>
<td>$0.03</td>
</tr>
<tr>
<td>119031</td>
<td>Clamp—for dial scale retaining</td>
<td>$0.08</td>
</tr>
<tr>
<td>119030</td>
<td>Chart—for dial card</td>
<td>$0.06</td>
</tr>
<tr>
<td>119029</td>
<td>Clip—for tuning eye support</td>
<td>$0.14</td>
</tr>
<tr>
<td>119028</td>
<td>Dial—tune bow</td>
<td>$0.40</td>
</tr>
<tr>
<td>119023</td>
<td>Dial—for tuning eye</td>
<td>$0.06</td>
</tr>
<tr>
<td>119022</td>
<td>Dial for tuning eye</td>
<td>$0.14</td>
</tr>
<tr>
<td>119021</td>
<td>Dial for tuning eye</td>
<td>$0.14</td>
</tr>
<tr>
<td>119038</td>
<td>Enamochon—eye</td>
<td>$0.10</td>
</tr>
<tr>
<td>119037</td>
<td>Enamochon for push buttons</td>
<td>$0.10</td>
</tr>
<tr>
<td>119026</td>
<td>Enamochon—antenna</td>
<td>$0.10</td>
</tr>
<tr>
<td>119025</td>
<td>Enamochon—point</td>
<td>$0.10</td>
</tr>
<tr>
<td>119024</td>
<td>Enamochon—push button</td>
<td>$0.14</td>
</tr>
<tr>
<td>119020</td>
<td>Enamochon—pull button</td>
<td>$0.14</td>
</tr>
<tr>
<td>119017</td>
<td>Enamochon—spring wire</td>
<td>$0.10</td>
</tr>
<tr>
<td>119016</td>
<td>Enamochon—spring washer</td>
<td>$0.10</td>
</tr>
</tbody>
</table>

PHONOGRAPH CONNECTIONS: Connect the wires from a phonograph record player to the left hand and middle terminals on the terminal strip nearest the middle of the chassis on the back of the chassis. Push the black, sliding button on the back of the chassis to the right for phonograph or television reception. This switch must be pushed to the left for radio reception. Turn the volume knob on the record player to the maximum volume position and control volume by means of the volume control on the radio.

TELEVISION CONNECTIONS: Connect the wires from a television picture receiver to the right hand and middle terminals on the terminal strip. Operation will now be the same as for phonograph operation.
Preliminary:
Output meter connections
Generator ground lead connection
Connection of output lead
Position of Volume Control
Position of Tone Control
Position of Dial Pointer with variable fully closed

Alignment Procedure

Wave Band
Switch
Position
Generator
Dummy
Connection
Function

Model S-7404-2
Manual R.C. 500 kc 455 kc .0005 mfd. C7
Manual R.C. 800 kc 1400 kc .0001 mfd. C1
Manual R.C. 1200 kc 1600 kc .0001 mfd. C1

Model S-7427-8
Manual R.C. 500 kc 455 kc .0005 mfd. C7
Manual R.C. 800 kc 1400 kc .0001 mfd. C1
Manual R.C. 1200 kc 1600 kc .0001 mfd. C1

Waves of Variable Frequency Antenna Generator Connection

Manual R.C. 800 kc 1400 kc .0001 mfd. Ant. Term. C1
Manual R.C. 1200 kc 1600 kc .0001 mfd. Ant. Term. C1

Alignment Notes:
* The generator should be adjusted for high output. The trimmer should be adjusted for minimum output meter reading. Instead of the usual maximum reading. If the frequency of an interfering station around 455 kc is known, the generator should be adjusted to the frequency of that station instead of 455 kc.
* Mounted under the chassis.
* Where indicated by the word, "Rock", the variable should be rocked back and forth a degree or two while making the adjustment.
* The alignment procedure should be repeated stage by stage, in the original order, for greatest accuracy. Always keep the output from the test oscillator at its lowest possible value to make the AVG action of the receiver ineffective.

Locations of Parts on Top of Chassis

Compliments of www.nucow.com

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Preliminary:

Output meter connections... Locations of parts on top of chassis... Across loud speaker voice coil
Generator ground lead connection... Receiver chassis
Dummy antenna value to be in series with generator output... See chart below
Connection of output lead... See chart below
Generator modulation... 30%, 400 cycles
Position of Volume Control... Fully on
Position of Tone Control... Brilliant
Position of Dial Pointer with variable fully closed... On mark to left of 550 kc calibration mark

Wave Band
Switch position... Generator frequency... Dummy antenna... Generator... Trimmer connection (in order of trimmer function)

Position of variable... Generator... Dummy antenna... Generator... Trimmer connection (in order of trimmer function)

- Manual B.C. Closed... 455 kc... 0.0005 mfd... G5 of 66A7... T2, T1... IF
- Manual B.C. 600 kc... 0.0005 mfd... Ant. Term... C4... Wave Trap
- Manual B.C. Fully open... 1730 kc... 0.0005 mfd... Ant. Term... C12**... Oscillator
- Manual B.C. 1400 kc... 1400 kc... 0.0005 mfd... Ant. Term... C1... Translator
- Manual B.C. 600 kc... 0.0005 mfd... Ant. Term... C13... Padder
- Manual S.W. 15 mo. (rock)... 15 mo... 400 ohms... Ant. Term... G5... Translator

-The generator should be adjusted for high output. The trimmer should be adjusted for minimum output meter reading instead of the usual maximum reading. If the frequency of an interfering station around 455 kc is known, the generator should be adjusted to the frequency of that station instead of to 455 kc.

Mounted under the chassis, "Rock", the variable should be rocked back and forth a degree or two while making the adjustment.

The alignment procedure should be repeated stage by stage, in the original order, for greatest accuracy. Always keep the output from the test oscillator at its lowest possible value to make the AVG action of the receiver ineffective.

Push Button Tuning

Each of the buttons will be set up in the following manner:
1. Turn the BAND knob to the MANUAL BROADCAST position and tune in the desired station.
2. Turn the BAND knob to PUSH BUTTON. Push in the button that is to be set to the desired station.
3. Turn the large screw of the corresponding adjustment until the station is tuned in; then the small screw for finer tuning. Repeat with the large screw for final adjustment. Use the Tuning Eye to secure exact tuning. The BAND knob can be turned back to MANUAL BROADCAST in order to check if the station is the desired one.
4. Fasten the proper call letters in the escutcheon.

Proceed in the same manner for the remaining buttons.
Diagram

Part Number | Description | List Price | Diagram Port Number | Description | List Price
--- | --- | --- | --- | --- | ---
1 83539 Condenser—mica, 260 mfd. | .00 | 30 110078 Resistor—260 ohms, ¼ watt | .01 | 31
2 83793 Condenser—mica, 110 mfd. | .00 | 32 110640 Condenser—01 mfd, 600 volt | .01 | 33
3 4-5 85081 Condenser—mica, 51 mfd. | .15 | 34 116647 Condenser—04 mfd, 600 volt | .15 | 35
6 88587 Condenser—mica, .0042 mfd. | .00 | 36 116819 Condenser—05 mfd, 600 volt | .01 | 37
7 88831 Plug—4 prong, male | .05 | 38 117022 Condenser—002 mfd, 600 volt | .05 | 39
8 110553 Resistor—carbon, 220,000 ohms, ¼ watt | .12 | 40 30A-33B 119553 Condenser—tuning (with drum) | .30 | 41
9 110580 Resistor—carbon, 3.3 meq, ¼ watt | .12 | 42 34A-34B 119554 Range switch | .40 | 43
10 110554 Resistor—carbon 1 meq, ¼ watt | .12 | 44 35A-35D 119556 Condenser—trimmer (4 sections) | .60 | 45
11 110557 Resistor—carbon, 4,700 ohms, ¼ watt | .12 | 46 119557 Battery cable | .40 | 47
12 110564 Resistor—carbon, 33,000 ohms, ¼ watt | .12 | 48 119541 Coll—antenna | .25 | 49
13 110570 Resistor—carbon, 2.2 meq, ¼ watt | .12 | 50 119551 Volume control—1 meq | .95 | 51
15 110580 Resistor—carbon, 3.3 meq, ¼ watt | .12 | 52 99A-399 119552 Tone control—100,000 ohms, with switch | .95 | 53
17 112799 Condenser—padder | .36 | 54 119651 Transformer—output | 1.00 | 55
18 112899 Condenser—electrolytic 16 mfd., 150 volt | .50 | 56 119669 Coll—oscillator | .75 | 57
19 118816 Resistor—carbon, 6,700 ohms, ¼ watt | .12 | 58 119720 Transformer—1st L.F. | 1.25 | 59
20 110565 Resistor—carbon, 22,000 ohms, ¼ watt | .12 | 60 119707 Transformer—2nd L.F. | 1.25 | 61
21 114869 Condenser—mica, 15 mfd. | .12 | 62 M-115750 Cone & voice coil for M-115093—stacker 1.60 | 63
22 M-115095 Speaker—P.M. (8") | 7.50 | 64

Prices Subject to Change Without Notice

Socket Voltages

Antenna Grounded

<table>
<thead>
<tr>
<th>Tube</th>
<th>Function</th>
<th>G</th>
<th>G2</th>
<th>G3</th>
<th>P</th>
<th>D</th>
<th>S</th>
<th>F(x)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A7G</td>
<td>1st Det. &amp; Osc.</td>
<td>0</td>
<td>—1</td>
<td>74</td>
<td>85</td>
<td>—</td>
<td>49</td>
<td>1.4</td>
</tr>
<tr>
<td>1N5G</td>
<td>I.F.</td>
<td>0</td>
<td>—</td>
<td>60</td>
<td>85</td>
<td>85</td>
<td>1.4</td>
<td></td>
</tr>
<tr>
<td>1N5G</td>
<td>I.F.</td>
<td>0</td>
<td>—</td>
<td>85</td>
<td>85</td>
<td>85</td>
<td>1.4</td>
<td></td>
</tr>
<tr>
<td>1H5G</td>
<td>2nd Det. A.V.C.—A.F.</td>
<td>0</td>
<td>—</td>
<td>Note A</td>
<td>0</td>
<td>—</td>
<td>1.4</td>
<td></td>
</tr>
<tr>
<td>1A5G</td>
<td>Output</td>
<td>Note B</td>
<td>—</td>
<td>83</td>
<td>85</td>
<td>85</td>
<td>1.4</td>
<td></td>
</tr>
</tbody>
</table>

Note: Only a small voltage will be measured on the plate of the 1H5G when using a voltmeter having a resistance of 1000 ohms per volt.

Note: The bias on the 1A5G grid is —5 volts measured across resistor No. 23.
ALIGNMENT PROCEDURE

FOR ALIGNMENT an output meter and an accurately calibrated signal generator are required. Connect the output meter across the voice coil or between the plate of the 1A5G output tube and ground through a 0.1 Mfd. condenser, depending on the type of meter. (The more sensitive type should be connected across the voice coil.)

Connect the ground lead of the signal generator to the black ground wire or the chassis. Turn the volume control to the maximum volume position and keep it in this position while aligning. With the gang condenser in full mesh, set the dial pointer to the low frequency edge of the dial scale.

### Dummy Ant. in Series with Sig. Gen.

<table>
<thead>
<tr>
<th>Connection of Sig. Generator Output To Receiver</th>
<th>Signal Generator Frequency</th>
<th>Band Switch Position</th>
<th>Receiver Dial Setting</th>
<th>Trimmer Number</th>
<th>Trimmer Description</th>
<th>Type of Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Grid of 1A7G</td>
<td>455 KC</td>
<td>Broadcast</td>
<td>Any Point Where It Does Not Affect The Signal</td>
<td>1-2</td>
<td>2nd I. F.</td>
<td>Adjust for maximum output. Then repeat adjustment.</td>
</tr>
<tr>
<td>200 MMFD. Mica Condenser (Blue Wire)</td>
<td>1500 KC</td>
<td>Broadcast</td>
<td>1500 KC</td>
<td>3-4</td>
<td>1st I. F.</td>
<td>Adjust for maximum output.</td>
</tr>
<tr>
<td>200 MMFD. Mica Condenser (Blue Wire)</td>
<td>1500 KC</td>
<td>Broadcast</td>
<td>Tune To 1500 KC Generator Signal</td>
<td>5</td>
<td>Broadcast Oscillator (Shunt)</td>
<td>Adjust for maximum output.</td>
</tr>
<tr>
<td>200 MMFD. Mica Condenser (Blue Wire)</td>
<td>600 KC</td>
<td>Broadcast</td>
<td>Tune To 600 KC Generator Signal</td>
<td>6</td>
<td>Broadcast Antenna</td>
<td>Adjust for maximum output.</td>
</tr>
<tr>
<td>400 OHM Carbon Resistor (Blue Wire)</td>
<td>15 MC</td>
<td>Foreign</td>
<td>15 MC</td>
<td>7</td>
<td>Broadcast Oscillator (Series Pad)</td>
<td>Adjust for maximum output. Check to see if proper pack was obtained by tuning in image at approx. 14.1 MC. If image does not appear realism at 15 MC, with trimmer-screw farther out. Recheck image.</td>
</tr>
<tr>
<td>400 OHM Carbon Resistor (Blue Wire)</td>
<td>15 MC</td>
<td>Foreign</td>
<td>15 MC</td>
<td>8</td>
<td>Foreign Antenna</td>
<td>Adjust for maximum output. Try to increase output by detuning trimmer and retuning receiver dial until maximum output is obtained.</td>
</tr>
</tbody>
</table>

### MISCELLANEOUS PARTS

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>118558</td>
<td>Cabinet Back</td>
<td>$ .45</td>
</tr>
<tr>
<td>114055</td>
<td>Clamp—for dial cord</td>
<td>.01</td>
</tr>
<tr>
<td>112745</td>
<td>Clip—coil mounting</td>
<td>.01</td>
</tr>
<tr>
<td>117057</td>
<td>Cord—drive (supplied in 2 ft. lengths)</td>
<td>.15</td>
</tr>
<tr>
<td>118523</td>
<td>Dial Scale</td>
<td>.40</td>
</tr>
<tr>
<td>112265</td>
<td>Escutcheon— with celluloid window</td>
<td>2.10</td>
</tr>
<tr>
<td>116411</td>
<td>Indicator lever assembly</td>
<td>.09</td>
</tr>
<tr>
<td>118644</td>
<td>Knob—push on</td>
<td>.18</td>
</tr>
<tr>
<td>118568</td>
<td>Pointer</td>
<td>.25</td>
</tr>
<tr>
<td>81145</td>
<td>Retaining ring—for drive shaft</td>
<td>.50</td>
</tr>
<tr>
<td>83624</td>
<td>Screw—self tapping 8 x 1/8</td>
<td>.01</td>
</tr>
<tr>
<td>113191</td>
<td>Screw—special No. 8-32 x 1/8</td>
<td>.01</td>
</tr>
<tr>
<td>119587</td>
<td>Screw—No. 2 x 3/8 Phillips Round Head</td>
<td>.02</td>
</tr>
<tr>
<td>85827</td>
<td>Set Screw—8-32 Square Head</td>
<td>.02</td>
</tr>
<tr>
<td>119549</td>
<td>Shaft—extension for volume control</td>
<td>.25</td>
</tr>
<tr>
<td>116392</td>
<td>Shield base tube</td>
<td>.03</td>
</tr>
<tr>
<td>116395</td>
<td>Shield—tube</td>
<td>.08</td>
</tr>
<tr>
<td>85427</td>
<td>Socket—octal base (standard)</td>
<td>.15</td>
</tr>
<tr>
<td>110501</td>
<td>Socket—4 prong (for speaker)</td>
<td>.16</td>
</tr>
<tr>
<td>111090</td>
<td>Spacer—steel mounting</td>
<td>.02</td>
</tr>
<tr>
<td>113169</td>
<td>Spring—for indicator lever</td>
<td>.01</td>
</tr>
<tr>
<td>114989</td>
<td>Spring—dial cord tension</td>
<td>.03</td>
</tr>
<tr>
<td>111972</td>
<td>Washer—extension and top for mounting</td>
<td>.05</td>
</tr>
<tr>
<td>111456</td>
<td>Washer—spring washer</td>
<td>.50</td>
</tr>
</tbody>
</table>

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ALIGNMENT PROCEDURE

FOR ALIGNMENT: An output meter and an accurately calibrated signal generator with a tuning range from 465 Kc. to 1400 Kc. are required.

1. Connect the output meter across the speaker voice coil or between the plate of the 6K60 output tube and ground through a 0.1 mf condenser. The more sensitive type meter should be connected across the voice coil.

2. Connect the ground lead of the signal generator to the receiver chassis and leave it connected in this manner throughout the entire alignment procedure.

3. Turn the volume control to the maximum volume position.

4. With the gain condenser in full mesh, set the pointer to the last division on the low frequency end of the dial scale.

This can be done by releasing the clip holding the pointer to the dial cord and slide the pointer to the correct position. Then reposition the pointer clip on the dial cord.

DMY ANT. IN SERIES WITH SIGNAL GENERATOR | CONNECTION OF SIG. GEN. OUTPUT TO RECEIVER | SIGNAL GENERATOR FREQUENCY | RECEIVER DIAL SETTING | TRIMMER NUMBER | TRIMMER DESCRIPTION | TYPE OF ADJUSTMENT
--- | --- | --- | --- | --- | --- | ---
.1 MFDC CONDENSER | CONTROL GRID OF 6A8 | 465 KC | ANY POINT WHERE IT DOES NOT AFFECT THE SIGNAL | 1-2 | 2ND I.F. | ADJUST FOR MAXIMUM OUTPUT. THEN REPEAT ADJUSTMENT.

WHEN ALIGNING TRIMMERS NO. 5, 6 AND 7 CONNECT THE SIGNAL GENERATOR OUTPUT TO THE ANTENNA LEAD-IN PLUG ON THE LEFT SIDE OF THE RECEIVING CASE WITH A 100 MFDC (APPROX.) MICA CONDENSER IN SERIES WITH GENERATOR OUTPUT.

100 MFDC | TO SIG. | TO ANT. PLUG |

1400 KC | TUNE TO 1400 KC GENERATOR SIGNAL | OSCILLATOR (Shunt) CONDENSER | 5 | ADJUST FOR MAXIMUM OUTPUT.

600 KC | TUNE TO 600 KC GENERATOR SIGNAL | ANTENNA COMPENSATOR (Series Condenser) | 7 | ADJUST FOR MAXIMUM OUTPUT. TRY TO INCREASE OUTPUT BY RETUNING TRIMMER 6 AND BUMPING RECEIVER DIAL UNTIL MAXIMUM OUTPUT IS OBTAINED.

AFTER THE SET IS INSTALLED IN THE CAR, TUNE IN A FAIRLY WEAK STATION NEAR 600 KC. AND ADJUST TRIMMER 7 FOR MAXIMUM OUTPUT.

PARTS LIST

<table>
<thead>
<tr>
<th>PART NUMBER</th>
<th>DESCRIPTION</th>
<th>LIST PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>116137</td>
<td>Screw for mfg. nose esc.</td>
<td>.05</td>
</tr>
<tr>
<td>116138</td>
<td>Part no.</td>
<td>.01</td>
</tr>
<tr>
<td>116139</td>
<td>Trunk clamp- upper sect.</td>
<td>.15</td>
</tr>
<tr>
<td>116140</td>
<td>Trunk clamp-lower sect.</td>
<td>.08</td>
</tr>
</tbody>
</table>

DIAL AND MISCELLANEOUS PARTS

<table>
<thead>
<tr>
<th>PART NUMBER</th>
<th>DESCRIPTION</th>
<th>LIST PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>116170</td>
<td>Adjusting lag for shafts</td>
<td>.01</td>
</tr>
<tr>
<td>116171</td>
<td>Antenna lead receptacle</td>
<td>.05</td>
</tr>
<tr>
<td>116298</td>
<td>Clip - coil mounting</td>
<td>.02</td>
</tr>
<tr>
<td>116299</td>
<td>Clip - coil mounting</td>
<td>.02</td>
</tr>
<tr>
<td>116300</td>
<td>Dial Drive Drum &amp; Pinion</td>
<td>1.00</td>
</tr>
<tr>
<td>116301</td>
<td>Dial Frame &amp; Pulley</td>
<td>.50</td>
</tr>
<tr>
<td>116302</td>
<td>Dial Scale</td>
<td>.25</td>
</tr>
<tr>
<td>116304</td>
<td>Antenna compensator (4 ft)</td>
<td>.15</td>
</tr>
<tr>
<td>116306</td>
<td>Mechanical Tuner Assy.</td>
<td>2.50</td>
</tr>
<tr>
<td>116307</td>
<td>Nut for spkr. mfg.</td>
<td>.40</td>
</tr>
<tr>
<td>116308</td>
<td>Pointer - for dial</td>
<td>.06</td>
</tr>
<tr>
<td>116309</td>
<td>Push button</td>
<td>.10</td>
</tr>
<tr>
<td>116310</td>
<td>Retainer - for dial (large)</td>
<td>.15</td>
</tr>
<tr>
<td>116311</td>
<td>Retainer - for dial (small)</td>
<td>.01</td>
</tr>
<tr>
<td>116312</td>
<td>Ring</td>
<td>.50</td>
</tr>
<tr>
<td>116313</td>
<td>Nut for mfg. nose esc.</td>
<td>.05</td>
</tr>
<tr>
<td>116314</td>
<td>Push button</td>
<td>.10</td>
</tr>
<tr>
<td>116315</td>
<td>Push button</td>
<td>.08</td>
</tr>
<tr>
<td>116316</td>
<td>Socket - for dial lamp</td>
<td>.15</td>
</tr>
<tr>
<td>116317</td>
<td>Speaker plug</td>
<td>.05</td>
</tr>
<tr>
<td>116318</td>
<td>Spring - for dial cord</td>
<td>.08</td>
</tr>
<tr>
<td>116319</td>
<td>Tab - celluloid</td>
<td>.25</td>
</tr>
<tr>
<td>116320</td>
<td>Tab - call letters</td>
<td>.60</td>
</tr>
<tr>
<td>116321</td>
<td>Tube shield cap</td>
<td>.08</td>
</tr>
<tr>
<td>116322</td>
<td>Tube socket - octal type</td>
<td>.15</td>
</tr>
<tr>
<td>116323</td>
<td>Tube socket (spec. grd.)</td>
<td>.15</td>
</tr>
<tr>
<td>116324</td>
<td>Tuning shaft</td>
<td>.08</td>
</tr>
</tbody>
</table>

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The receiver must be in its case during alignment.

The signal generator should be adjusted for high output and the trimmer should be adjusted for minimum response.

The alignment procedure should be repeated in the original order, step by step, to insure greater accuracy.

Always keep the output power from the generator at its lowest value possible to prevent the AVO of the receiver from interfering with accurate alignment, except as noted by (*) above.
1. Fuse Container.
2. Connection to Ammeter.
4. Ammeter Condenser.
5. Dial Light Connection.
6. Volume Control Cable.
7. Station Selector Cable.
8. Tone Control Switch.
10. Screw Holding Bottom Cover.
12. Antenna Lead-in Cable.
13. On-Off Switch and Volume Control Knob.
14. Tuning Control Unit.
15. Station Selector Knob.

FOR ALIGNMENT, SEE INDEX

IF PEAK 455 KC
SPECIFICATIONS
This model is a single unit five-tube superheterodyne receiver. It incorporates an unusual push button tuning system of rugged construction and precision, that enables easy to adjust and operate.
A highly efficient superheterodyne circuitry employs five tubes in passive combination, using one 6AG8 as an oscillator and mixer or modulator, one 607C gridlead and one 6G6C as power output amplifier, one 607C as detector, A, V.C., and last A, F.F., one 6G6C as power output amplifier and one 6AGC as a rectifier. A C channel mixer is used in which the 607C is used as a detector. The 607C tube is obtained across item 17 (20 ohm resis-
tor) and the 6G6C across the “B” filter choke, item 7, and item 2.

TUBES AND VOLTAGE LIMITS
The following tables gives the functions of the tubes used, together with the voltage readings between the tube socket contacts and the receiver chassis. Voltage readings taken with a 1000 ohm per volt, 500 volt vol-
tmeter (except filament) with receiver in operating condition and no signal input. The filament voltages should be measured with an accurate low range D.C. voltmeter (approximately 0 to 10 volts). Voltage limits may vary plus or minus 10% of values given.

SETUP VOLTAGELAYOUT
Should it become necessary to realign the circuits of the receiver, it may also be necessary to reset the push buttons. The push buttons may be quickly and accurately set, either with the receiver in the case or out of the case and then realigned after the case is in place.

Insert a small screwdriver in the hole through each push button and loosen (do not remove) the set screw at the bottom of the hole. By means of the conven-
tional tinsam worm, turn-in AS ACCURATELY AS POSS-
IBLE the favorite station having the highest frequency—that is, the station nearest the turn-end of the dial. Completely depress and hold the No. 1 push but-
tion on the left and tighten the set screw (SECURELY).
The push button tuning system is now correctly set for the 1st station. Follow through with this same pro-
cedure and setting for all other frequencies in the order of their frequency (kilocycles).

ALIGNMENT PROCEDURE
All the circuits in this receiver are very accurately adjusted at the factory and should normally need no further adjustment. However, if it is definitely known that an adjustment is necessary the circuits can best be properly aligned with the use of a modulated signal generator and an output meter.

CONNECTING OUTPUT METER
Connect the output metro to P and S of the 607C gridlead. Be sure the meter is protected from D.C. by connecting a condenser (1 mf. for larger—non elec-
trically operated) across the leads and between the meter and the output meter.

1. Tuning I-F Amplifier To 455 Kilocycles
(a) Connect the output of the signal generator to the receiver chassis, parallel or direct, and the I-F ampli-
dier transformer to maximum volume in the speaker.

REPLACING DIAL DRIVE CORDS
Two dial drive cords are used and should the inner-
cord break, it will be necessary to replace the outer or-
cord and lager pulley before the inner cord can be replaced. To replace the inner cord:

(1) After removing the break, place the chassin on end with the push buttons “up” and the speaker toward you.

(2) Thread an 18” length of drive cord through the back button on one end of the tensioning device. For 607C, fow was removed from the pulley on the end of the push button rocker plate.

(3) Insert both ends of this cord through the eylet in the rocker plate pulley from the inside. Pull the cord through until the tension spring is pulled into the pulley, then ball the free end of the spring over the catch in the pulley side opposite the eylet.

(4) Open the condenser gang all the way.

(5) Pull all but approximately 45° of the cord through the eylet. Loop the 45° end of the cord around the lower half of the pulley.

(6) Loop the long end of the cord over the top of the pulley and back over the brass idler pulley to the drive shaft. Continue the cord around the drive shaft, threading from the inside and over the top. Wrap four complete turns of the cord around the drive shaft and continue the cord over the top of the rocker plate pulley.

(7) Pull on the short end of the cord until the ten-
sion spring in the pulley is stretched to within 1/2” of the eylet. Maintain this tension and tie a knot in the two ends of the cord which catches the pulley. Loop the cord over the spring catch so that the bow of the kern is on the spring and that the pulley is in view. This would be an added protection against coming untied.

To replace the outer cord:

(1) Place the chassis in a horizontal position with the speaker toward you.

(2) Close the condenser gang and mount the large drive pulley on the shaft. Place the pulley on the com-

(a) Replace operation (a) and (b) alternately until no further improvement can be obtained.

(b) Set the signal generator to 1400 kilocycles.

(c) Replace the “AN” section of the tuning condenser for maximum output.

(d) Recheck the signal generator for maximum output.

(e) Replace the “AN” section of the tuning condenser for maximum output.

(f) Read the tension in the 1400 kilocycle signal when the station selector for maximum output.

(g) Read the tension in the “AN” section of the tuning condenser for maximum output.

(h) The oscillator is now ready to be connected and the condenser to the receiver antenna after the receiver has been installed in the car.

(i) After the installation is complete, tune-in a WEAK station between 55 and 65 on the dial.

(j) Adjust the antenna compensating cord for maximum volume in the speaker.

REPLACING DIAL DRIVE CORDS
Two dial drive cords are used and should the inner-
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### Parts List

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<th>Part No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
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<td>1</td>
<td>G167-32000</td>
<td>Ant. Coil</td>
</tr>
<tr>
<td>2</td>
<td>G167-32002</td>
<td>Osc. Coil</td>
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<tr>
<td>3</td>
<td>G185-32004</td>
<td>1st I-F Assy., 455 Kc.</td>
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<td>G185-32004</td>
<td>2nd I-F Assy., 455 Kc.</td>
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<tr>
<td>5</td>
<td>G19-32077</td>
<td>Motor Noise Check</td>
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<tr>
<td>6</td>
<td>G27-28067</td>
<td>&quot;A&quot; Filter Choke</td>
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<tr>
<td>7</td>
<td>G16-28563</td>
<td>&quot;B&quot; Filter Choke</td>
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<tr>
<td>8</td>
<td>G50-33061</td>
<td>2 Section Gang Cond.</td>
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<tr>
<td>9</td>
<td>G50-33061A</td>
<td>Ant. Compensating Cond.</td>
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<tr>
<td>C</td>
<td>G50623</td>
<td>Glass Dial Face</td>
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<tr>
<td>W</td>
<td>G50545</td>
<td>L. H. Dial Mtg. Clip</td>
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<td>W</td>
<td>G50546</td>
<td>R. H. Dial Mtg. Clip</td>
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<tr>
<td>W</td>
<td>G50517B</td>
<td>Dial Mask (Maroon)</td>
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<td>W</td>
<td>G50518</td>
<td>Pointer</td>
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<tr>
<td></td>
<td>MG23-50550</td>
<td>Dial Mtg. Bracket Assy. (Riveted to Chassis)</td>
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<tr>
<td>G8</td>
<td>43564</td>
<td>Pulley and Hub Assy.</td>
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<tr>
<td>W</td>
<td>23877</td>
<td>Set Screw—Hub</td>
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<tr>
<td>W</td>
<td>23488</td>
<td>Drive Cord—40 Inches</td>
</tr>
<tr>
<td>W</td>
<td>50590</td>
<td>Spring—Cord Tension—Large Pulley</td>
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<tr>
<td>W</td>
<td>43561</td>
<td>Spring—Cord Tension—Small Pulley</td>
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<tr>
<td>W</td>
<td>50524B</td>
<td>Manual Drive Shaft</td>
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<td>10</td>
<td>G3-50369</td>
<td>Temp. Compensating Cond.</td>
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<tr>
<td>11A</td>
<td>W-32380</td>
<td>Condenser, .05 Mf. 200 V.</td>
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<tr>
<td>11B</td>
<td>W-32380</td>
<td>Condenser, .05 Mf. 200 V.</td>
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<td>11C</td>
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<td>Condenser, .05 Mf. 200 V.</td>
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<tr>
<td>11D</td>
<td>W-32380</td>
<td>Condenser, .05 Mf. 200 V.</td>
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<tr>
<td>12</td>
<td>W-37226</td>
<td>Condenser, .02 Mf. 160 V.</td>
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<td>13</td>
<td>W-32191A</td>
<td>Condenser, .01 Mf. 400 V.</td>
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<tr>
<td>14</td>
<td>W-32926</td>
<td>Condenser, .0065 Mf. 1,000 V.</td>
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<td>15A</td>
<td>W-50161</td>
<td>Condenser, .5 Mf. 120 V.</td>
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<tr>
<td>15B</td>
<td>W-50161</td>
<td>Condenser, .5 Mf. 120 V.</td>
</tr>
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<td>15C</td>
<td>W-50161</td>
<td>Condenser, .5 Mf. 120 V.</td>
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<td>Condenser, .1 Mf. 160 V.</td>
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<td>16B</td>
<td>W-50105</td>
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<tr>
<td>17Z</td>
<td>W-50161</td>
<td>Condenser, .4 Mf. 350 V.</td>
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<tr>
<td>17Y</td>
<td>W-50528</td>
<td>Condenser, 4. Mf. 350 V.</td>
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<td>18</td>
<td>G1-34028</td>
<td>Cond. Clump. 0.0025 Mf. Molded</td>
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<tr>
<td>19</td>
<td>G3-34028</td>
<td>Cond. Clump. 0.0005 Mf. Molded</td>
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<tr>
<td>20</td>
<td>35500</td>
<td>Resistor, 100,000 Ohm 1/4 W.</td>
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<tr>
<td>21A</td>
<td>35501</td>
<td>Resistor, 100,000 Ohm 1/4 W.</td>
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<td>21B</td>
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<td>Resistor, 100,000 Ohm 1/4 W.</td>
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<tr>
<td>22A</td>
<td>36322</td>
<td>Resistor, 500,000 Ohm 1/4 W.</td>
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<td>22B</td>
<td>36322</td>
<td>Resistor, 500,000 Ohm 1/4 W.</td>
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<tr>
<td>23</td>
<td>36322</td>
<td>Resistor, 150,000 Ohm 1/4 W.</td>
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<td>24</td>
<td>35502</td>
<td>Resistor, 1. Mf. 250 Ohm 1/2 W.</td>
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<td>25</td>
<td>35527</td>
<td>Resistor, 2. Mf. 250 Ohm 1/2 W.</td>
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<tr>
<td>26</td>
<td>36061</td>
<td>Resistor, 750 Ohm 1/4 W.</td>
</tr>
<tr>
<td>27</td>
<td>35043B</td>
<td>Resistor, 60 Ohm 1/4 W.</td>
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<tr>
<td>28</td>
<td>35043B</td>
<td>Resistor, 40 Ohm 1/4 W.</td>
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### Mounting Parts

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>W</td>
<td>50224 Cond. Clump</td>
</tr>
<tr>
<td>W</td>
<td>38023D Distrib. Suppressor</td>
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<tr>
<td>W</td>
<td>25754C Generator Condenser</td>
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<tr>
<td>W</td>
<td>25846 3/4 No. 10 P. K. Screw (Set Mgt.)</td>
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<tr>
<td>W</td>
<td>50131 25-20 Hex. Nut (Brkt. Mgt.)</td>
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<tr>
<td>W</td>
<td>50565 25-20 Screw (Brkt. Mgt.)</td>
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<td>W</td>
<td>32783 Ant. Cable (Accessory)</td>
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<tr>
<td>W</td>
<td>50167 Mtg. Bracket (Set)</td>
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<tr>
<td>W</td>
<td>50395 Ammeter Cond. (Accessory)</td>
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<tr>
<td>W</td>
<td>38853 Case Ground Clip</td>
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</table>

### TUBE SOCKET VOLTAGE READINGS

<table>
<thead>
<tr>
<th>Tube</th>
<th>Function</th>
<th>H</th>
<th>P</th>
<th>S</th>
<th>Su</th>
<th>K</th>
<th>Ga</th>
<th>Go</th>
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<tbody>
<tr>
<td>6A8-G</td>
<td>Oscillator-Modulator</td>
<td>6.0</td>
<td>190</td>
<td>100</td>
<td>100</td>
<td>0</td>
<td>102</td>
<td>0</td>
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<tr>
<td>6L7-G</td>
<td>I-F Amplifier</td>
<td>6.0</td>
<td>190</td>
<td>100</td>
<td>0</td>
<td>0</td>
<td>102</td>
<td>0</td>
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<tr>
<td>6Q7-G</td>
<td>Diode Detector &amp; A-F Amp.</td>
<td>6.0</td>
<td>150</td>
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<td>200</td>
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<td>200</td>
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<td>6K6-G</td>
<td>Output</td>
<td>6.0</td>
<td>185</td>
<td>200</td>
<td>200</td>
<td>200</td>
<td>200</td>
<td>200</td>
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<tr>
<td>6X5-G</td>
<td>Rectifier</td>
<td>6.0</td>
<td>185</td>
<td>200</td>
<td>200</td>
<td>200</td>
<td>200</td>
<td>200</td>
</tr>
</tbody>
</table>

Power Output approximately 4 Watts.
Battery Drain approximately 5.7 Amperes at 6 Volts.

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Compliments of www.nucow.com
NOTE
TERMINALS OF COILS SHOWN IN
PICTORIAL VIEWS ARE LETERED
TO CORRESPOND TO SIMILARLY
LETTERED TERMINALS ON THE
CIRCUIT DIAGRAM ABOVE. TERMIN-
ALS WHICH ARE CONNECTED
TOGETHER CARRY THE SAME
LETTER.

PARTS LIST

<table>
<thead>
<tr>
<th>PART</th>
<th>DESCRIPITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>6A8G</td>
<td>1st DET. &amp; OSC.</td>
</tr>
<tr>
<td>6K7</td>
<td>I.F.</td>
</tr>
<tr>
<td>6Q7G</td>
<td>2nd DET.-AV.C.-AUDIO</td>
</tr>
<tr>
<td>25L6G</td>
<td>OUTPUT</td>
</tr>
</tbody>
</table>

INTERMEDIATE FREQUENCY 465 KC.

DENOTES LINE CORD

ANTENNA GROUNDED

DIAGRAM NO. 23
PART NO. 113449

DIAGRAM NO. 22
PART NO. 113042

SDP32-222A

FIRESTONE TIRE & RUBBER CO.

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Compliments of www.nucow.com
ALIGNMENT EQUIPMENT & PROCEDURE

For Alignment: An output meter and an accurately calibrated signal generator with a tuning range from 465 Kc to 1500 Kc are required.

1. Connect the output meter across the voice coil or between the plate of the 6AG-6 output tube and ground through a .1 mfd. condenser, depending upon the type of meter. The more sensitive type should be connected across the voice coil.

2. Connect the ground lead of the signal generator to the chassis of the receiver through a .05 mfd. condenser and keep it connected throughout the entire alignment procedure. Failure to do this may have serious results as the signal generator may be connected to one side of the power line, or it may be grounded externally.

3. Turn the volume control to the maximum volume position and keep it in this position throughout the entire alignment procedure.

4. To calibrate the dial— Remove the chassis from the cabinet and set it on a flat surface (insulated from ground). Release the set screws on the rear panel which connects the gang condenser shaft with the tuning unit. Holding the gang in full scale turn the dial until the last dial division (just below 50) on the low frequency and is exactly at 3/8 inch above the table surface. Now retighten the set screw in the coupling collar. The 3/8 inch division on the ruler when measured vertically from the table surface is to be used as the dial indicator for all calibrations and alignment.

<table>
<thead>
<tr>
<th>Dummy Ant.</th>
<th>Connection of Signal Generator Output to Receiver</th>
<th>Signal Generator Operating Frequency</th>
<th>Receiver Main Setting</th>
<th>Trimmer Number</th>
<th>Trimmer Description</th>
<th>Type of Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>200 MFD. FILM CONDENSER</td>
<td>CONTROL GRID OF 6AG-6 TUBE</td>
<td>465 KC</td>
<td>ANY POINT WHERE IT DOES NOT AFFECT THE SIGNAL</td>
<td>1-2</td>
<td>187 I.F.</td>
<td>ADJUST FOR MAXIMUM OUTPUT THEN REPEAT ADJUSTMENT</td>
</tr>
<tr>
<td>200 MFD. LEAD CONDENSER</td>
<td>ANTENNA LEAD (Blue Wire)</td>
<td>1500 KC</td>
<td>1500 KC</td>
<td>3-4</td>
<td>200 I.F.</td>
<td>ADJUST TRIMMER TO BRING IN SIGNAL</td>
</tr>
<tr>
<td>200 MFD. LEAD CONDENSER</td>
<td>ANTENNA LEAD (Blue Wire)</td>
<td>1500 KC</td>
<td>TUNE TO 1500 KC GENERATOR SIGNAL</td>
<td>5</td>
<td>BROADCAST OSCILLATOR (Shunt)</td>
<td>ADJUST FOR MAXIMUM OUTPUT</td>
</tr>
</tbody>
</table>

HOW TO SET UP THE PUSH BUTTONS.

1. Be sure that the antenna wire furnished with the set is extended to its full length and placed under the carpet or around the floor molding. In most instances the 20 feet of brown insulated wire included with the antenna will make a satisfactory antenna. However, in localities remote from powerful broadcast stations, it may be necessary to use an outside antenna.

2. Turn the set on and allow it to operate at least one quarter hour before setting up the push buttons.

3. Select the four nearest stations to which you wish to set up the buttons. Be sure to select powerful stations, since weak signals generally give poor results.

4. The large tuning knob at the side of your set has a set screw located in the center. Grasp this tuning knob firmly and then using a screwdriver or a coin turn the screw clockwise-now do not turn a quarter turn.

5. Push down any one of the four buttons and holding it down turn the desired station using the tuning knob. The push button must be held down firmly while the station is being tuned. Otherwise the setting will be incorrect.

6. Continue to push the button that you have just set up. Now, the button that you have completed the set-up of all four buttons. Do not reposition the set-up of all four buttons.

7. Proceed to set up the next button by pushing down on the button firmly and tuning in the desired station, using the tuning knob. The rest of the procedure should be repeated in a similar manner.

8. After all of the buttons have been set up you MUST RETIGHTEN THE SCREW IN THE TUNING KNOB. OTHERWISE ALL SETTING OF THE BUTTONS WILL BE DISTORTED. GRASP THE KNOB FIRMLY AND USE A SMALL SCREW DRIVER OR A GENTLE TUG TO TIGHTEN THE SCREW SECURELY.

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Compliments of www.nucow.com
S-7425-9: POINTS MARKED "Z" ARE CONNECTED TOGETHER AND GROUNDED TO CHASSIS THROUGH CONDENSER NO. 28.
S-7425-6: POINTS MARKED "Z" ARE CONNECTED DIRECTLY TO CHASSIS.

I.F.
455 KC.

**Electrical Parts**

| Diagram | Part Number | Description | List
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</thead>
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<td>83539</td>
<td>Condenser—mica, 380 mfd....</td>
<td>80.20</td>
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<td>83793</td>
<td>Condenser—mica, 110 mfd...</td>
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<td>4</td>
<td>85296</td>
<td>Lamp—dial, 8 to 8 volt (maxxd 551)</td>
<td>.16</td>
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<td>5</td>
<td>85394</td>
<td>Condenser—mica, 510 mfd...</td>
<td>.25</td>
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<td>6-7</td>
<td>88025</td>
<td>Condenser—paper, .02 mfd, 400 volt</td>
<td>.25</td>
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<td>8</td>
<td>88050</td>
<td>Condenser—paper, .01 mfd, 400 volt</td>
<td>.25</td>
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<td>88050</td>
<td>Condenser—paper, .01 mfd, 400 volt (S-7425-9 only)</td>
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<td>Condenser—paper, .05 mfd, 200 volt</td>
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<td>88193</td>
<td>Condenser—paper, .05 mfd, 150 volt</td>
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<td>110560</td>
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<td>110565</td>
<td>Resistor—carbon, 33 meg., 1/4 watt</td>
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<td>110580</td>
<td>Resistor—carbon, 33 meg., 1/4 watt</td>
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<td>16</td>
<td>111252</td>
<td>Condenser—paper, .05 mfd, 400 volt</td>
<td>.13</td>
</tr>
<tr>
<td>17</td>
<td>112898</td>
<td>Condenser—electrolytic, 16 mfd., 150 volt</td>
<td>.50</td>
</tr>
<tr>
<td>18</td>
<td>112971</td>
<td>Resistor—inulated 470,000 ohms, 1/4 watt</td>
<td>.15</td>
</tr>
<tr>
<td>19</td>
<td>113472</td>
<td>Condenser—trimmer for loop antenna assembly</td>
<td>.56</td>
</tr>
</tbody>
</table>

**Socket Voltages**

**Antenna Grounded**

- **12SA7**
  - Condenser—0.2 mfd, 600 volt (S-7425-8 only) | .35
  - Condenser—33 ohms, 1 watt W.W. | .15
  - Condenser—trimmer for loop antenna assembly | .20

- **12SK7**
  - Condenser—0.2 mfd, 600 volt (S-7425-8 only) | .35
  - Condenser—33 ohms, 1 watt W.W. | .15
  - Condenser—trimmer for loop antenna assembly | .20

**Prices Subject to Change Without Notice**

Use a high resistance voltmeter of at least 1000 ohms per volt.
The Firestone Air Chief Stock No. 7425-6UA and 7425-9 (317 chassis) are identical in operation, performance and circuit wiring to the Firestone Air Chief Stock No. 7426-41 (511 chassis) except for the following differences:

The 317 chassis is designed for operation from a 117 volt 60 cycle power supply while the 511 chassis will operate on either 117 volt A.C. or D.C. power system. The only difference between the two models is that a one-to-one power transformer which also has a 25 volt and a 6 volt filament winding, has been substituted for the ballast resistor tube. A partial schematic diagram for the 317 chassis, showing only the power supply wiring, tube filament wiring, and associated parts list is shown below. All other circuit wiring is identical to the 511 chassis.
This line amplifier is a 5-stage push-pull circuit designed for operation on either 50 or 60 cycles alternating current, and incorporates an L-60-B ballast resistor tube. The tuning range of the receiver is from 540 to 1750 kc.

In cases where it is found that the push-button tuner does not tune in stations correctly due to external interference, it is only necessary to bend the two tuning fingers slightly. This will increase the tuning range and will result in more accurate tuning when using the push button tuner.

**ALIGNMENT EQUIPMENT & PROCEDURE**

For alignment, use an output meter and a calibrated signal generator, with a tuning range from 450 kc to 1600 kc.

1. Connect the output meter in the circuit and tune in a signal generator with a tuning range from 450 kc to 1600 kc.
2. Connect the output meter to the terminals of the signal generator and tune in the signal generator with a tuning range from 450 kc to 1600 kc.
3. Connect the output meter to the terminals of the signal generator and tune in the signal generator with a tuning range from 450 kc to 1600 kc.
4. With the output meter in position 1, connect the output meter to the terminals of the signal generator and tune in the signal generator with a tuning range from 450 kc to 1600 kc.
5. Connect the output meter to the terminals of the signal generator and tune in the signal generator with a tuning range from 450 kc to 1600 kc.

**I.F. TRANSFORMER & REGENERATION CONTROL**

This 5-stage amplifier employs only one intermediate frequency transformer. The windings of which are capacitively coupled and secondary of this transformer are mounted on the chassis as shown. Note that the tapping point of the intermediate frequency transformer is 1500 kc, and the coupling point is at 1500 kc. Selective and secondary of this transformer are mounted on the chassis as shown. Also associated with this intermediate frequency transformer is a transisterized regeneration control which varies the selectivity of the intermediate frequency signal appearing in the plate circuit of the 6J7 tube. This signal is inserted into the 6J7 grid circuit through a coupling coil. When the selectivity control is changed, the selectivity of the intermediate frequency transformer is changed and the selectivity of the 6J7 circuit is changed. This makes the performance of this set comparable to that which is obtained from a set employing an intermediate frequency stage.

When the alignment is complete, the intermediate frequency transformer is adjusted for maximum output, and the regeneration control is then adjusted for maximum output. This is done by connecting the output meter across the output terminals of the signal generator. The output meter is then connected across the output terminals of the signal generator, and the output meter is then connected across the output terminals of the signal generator.

**A-C OPERATION**

When the set is used with an alternating current, all B-C potentials are supplied by a 6AG7 rectifier tube and its associated filter circuit. The tube is connected for half-wave rectification of the A-C supply.

If you have noticed that the set is used on A-C, reversing the power plug in the receptacle is sometimes good. However, the set should be reversed for some time, or the filter capacitors should be replaced. If the filter operates properly, the set may still work when the set is first turned on. However, this may not turn on immediately upon reversal of the power plug. Although it may be advisable to operate the filter system in the circuit and serve two purposes. On normal 60-cycle power, the 6AG7 tube passes the D-C and the filter circuit aids in maintaining the supply, thus it should be reversed.
FOR ALIGNMENT: An output meter and an accurately calibrated signal generator are required.

1. Connect the output meter across the voice coil or between the plate of the 6F6-G output tube and chassis, depending on the type of meter. (The more sensitive type should be connected across the voice coil.)

2. Connect the ground lead of the signal generator to the "G" terminal or the chassis.

3. Turn the volume control to the maximum volume position and keep it in this position throughout the entire alignment procedure.

4. Remove the connector from between the "A" and "X" terminals.

5. Push in the "MANUAL" button, and keep it depressed during the entire alignment procedure.

<table>
<thead>
<tr>
<th>Dummy Ant. in Series with Sig. Gen.</th>
<th>Connection of Sig. Generator Output to Receiver</th>
<th>Signal Generator Frequency</th>
<th>Receiver Dial Setting</th>
<th>Trimmer Number</th>
<th>Trimmer Description</th>
<th>Type of Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>.1 MFD CONDEN.-SER. FRONT LUG ON GANG CONDEN.</td>
<td>455 KC</td>
<td>ANY POINT WHERE IT DOES NOT AFFECT THE SIGNAL</td>
<td>1-2</td>
<td>2nd I.F.</td>
<td>ADJUST FOR MAXIMUM OUTPUT, THEN REPEAT ADJUSTMENT.</td>
<td></td>
</tr>
<tr>
<td>200 MMFD. MICA CONDEN. &quot;A&quot; TERMINAL</td>
<td>455 KC</td>
<td>ANY POINT WHERE IT DOES NOT AFFECT THE SIGNAL</td>
<td>3-4</td>
<td>1st I.F.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>200 MMFD. MICA CONDEN. &quot;A&quot; TERMINAL</td>
<td>1500 KC</td>
<td>1500 KC</td>
<td>5</td>
<td>WAVE TRAP</td>
<td>ADJUST FOR MINIMUM OUTPUT USING A STRONG GENERATOR SIGNAL.</td>
<td></td>
</tr>
<tr>
<td>200 MMFD. MICA CONDEN. &quot;A&quot; TERMINAL</td>
<td>1500 KC</td>
<td>TUNE TO 1500 KC GENERATOR SIGNAL</td>
<td>6</td>
<td>BROADCAST OSCILLATOR (Shunt)</td>
<td>ADJUST FOR MAXIMUM OUTPUT.</td>
<td></td>
</tr>
<tr>
<td>200 MMFD. MICA CONDEN. &quot;A&quot; TERMINAL</td>
<td>1500 KC</td>
<td>MINIMUM OUTPUT</td>
<td>7</td>
<td>BROADCAST ANTENNA (Shunt)</td>
<td>ADJUST FOR MAXIMUM OUTPUT.</td>
<td></td>
</tr>
</tbody>
</table>

MISCELLANEOUS PARTS

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>117208</td>
<td>Background for dial</td>
<td>.60.05</td>
</tr>
<tr>
<td>89252</td>
<td>Bolt—chassis mfg. (No. 10 x 7/8)</td>
<td>.03</td>
</tr>
<tr>
<td>114945</td>
<td>Clamp—for dial cord</td>
<td>.01</td>
</tr>
<tr>
<td>112764</td>
<td>Clip—coil mounting</td>
<td>.01</td>
</tr>
<tr>
<td>117598</td>
<td>Clip—for mfg. wave trap coil</td>
<td>.01</td>
</tr>
<tr>
<td>116069</td>
<td>Clip—for antenna coil mfg.</td>
<td>.01</td>
</tr>
<tr>
<td>85321</td>
<td>Connector—for internal antenna</td>
<td>.01</td>
</tr>
<tr>
<td>118948</td>
<td>Cord—dial—6 ft. length</td>
<td>.18</td>
</tr>
<tr>
<td>117057</td>
<td>Cord—drive—3 ft. length</td>
<td>.15</td>
</tr>
<tr>
<td>117222</td>
<td>Dial scale</td>
<td>.60</td>
</tr>
<tr>
<td>117056</td>
<td>Drive drum and bushing</td>
<td>.50</td>
</tr>
<tr>
<td>117322</td>
<td>Escutcheon for dial with glass</td>
<td>.75</td>
</tr>
<tr>
<td>117333</td>
<td>Escutcheon for push buttons</td>
<td>.35</td>
</tr>
<tr>
<td>117067</td>
<td>Knob for volume</td>
<td>.12</td>
</tr>
<tr>
<td>117195</td>
<td>Pin—push buttons</td>
<td>.03</td>
</tr>
<tr>
<td>117227</td>
<td>Pointer</td>
<td>.25</td>
</tr>
<tr>
<td>117226</td>
<td>Push button</td>
<td>.06</td>
</tr>
<tr>
<td>117192</td>
<td>Retainer for dial scale</td>
<td>.01</td>
</tr>
<tr>
<td>81145</td>
<td>Retaining ring—for drive shaft</td>
<td>Per C .50</td>
</tr>
<tr>
<td>89324</td>
<td>Screw—self tapping 8 x 1/4</td>
<td>.01</td>
</tr>
<tr>
<td>85040</td>
<td>Screw—No. 6 Resist. D.</td>
<td>Per C .35</td>
</tr>
<tr>
<td>85827</td>
<td>Set Screw—8-32 Square Head</td>
<td>.02</td>
</tr>
<tr>
<td>114914</td>
<td>Screw—special head for mfg. escutcheon</td>
<td>Per Doz. .15</td>
</tr>
<tr>
<td>114117</td>
<td>Socket—dial lamp</td>
<td>.18</td>
</tr>
<tr>
<td>110501</td>
<td>Socket—4 prong (for sprkr)</td>
<td>.18</td>
</tr>
<tr>
<td>116060</td>
<td>Socket—octal base (small)</td>
<td>.12</td>
</tr>
<tr>
<td>111050</td>
<td>Spacer—steel mechanism mfg. to chassis</td>
<td>.02</td>
</tr>
<tr>
<td>113277</td>
<td>Spring—dial cord tension</td>
<td>.09</td>
</tr>
<tr>
<td>116338</td>
<td>Terminal strip (G.K.A.)</td>
<td>.15</td>
</tr>
<tr>
<td>116329</td>
<td>Washer (paper) for back of knobs</td>
<td>.005</td>
</tr>
<tr>
<td>111446</td>
<td>Washer—spring washer</td>
<td>Per C .50</td>
</tr>
</tbody>
</table>

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**MODEL S7427-1, Early**

**Chassis R314**

**Alignment, Trimmers**

**Socket**

**ALIGNMENT EQUIPMENT & PROCEDURE**

For alignment, an output meter and an accurately calibrated signal generator with a tuning range from 465 Kc. to 14 Mc. are required.

1. Connect the output meter across the voice coil or between the plate of either of the 6ES9 tubes and ground through 0.1 mfd. condenser. (These tubes are connected in parallel, not push-pull). The connection will depend upon the type of set. The more sensitive type should be connected across the voice coil.

2. Connect the ground lead of the signal generator to the chassis of the receiver and keep it connected in this manner throughout the entire alignment procedure.

3. Turn the voltmeter to the maximum voltage position and leave it in this position throughout the entire alignment procedure.

4. With the gang condenser in full mesh, set the pointer to the last mark on the left end of the dial scale. If the pointer is only slightly off calibration, loosen the set screw in the pointer cord drive drum, and with the gang condenser in full mesh turn the drum until the pointer is in the correct position. If the pointer is off calibration several dial divisions, release it from the pointer drive cord by spreading the clip on the pointer. Then slide the pointer along the cord until it is set to the last division on the left end of the dial scale. Hold the pointer in place and check to see if the gang condenser is still fully meshed, then tighten the pointer clip being careful not to cut the cord. Place a drop of household or sugar cement on the cord and pointer clip to prevent the pointer from slipping.

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**DIAL & MISCELLANEOUS PARTS**

**PART**

**DESCRIPTION**

**NOTE**

**LIST**

**PRICE**

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Compliments of www.nucow.com
FOR ALIGNMENT: An output meter and an accurately calibrated signal generator are required.

1. Connect the output meter across the voice coil or between the plate of the 6F6G output tube and ground in series with a .1 mfd. condenser, depending on the type of meter. (The more sensitive type should be connected across the voice coil.)

2. Connect the ground lead of the signal generator to the chassis.

3. Turn the volume control to the maximum volume position and keep it in this position throughout the entire alignment procedure.

4. Remove the blue wire from the extreme left hand screw at the rear of the chassis and allow it to float free.

<table>
<thead>
<tr>
<th>Dummy Ant in Series with Sig. Gen.</th>
<th>Connection of Sig Generator Output To Receiver</th>
<th>Signal Generator Frequency</th>
<th>Band Switch Position</th>
<th>Receiver Dial Setting</th>
<th>Trimmer Number</th>
<th>Trimmer Description</th>
<th>Type of Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>.1 MFD. Condenser</td>
<td>Front Lug of Gang Condenser</td>
<td>455 KC</td>
<td>Broadcast</td>
<td>Any Point Where It Does Not Affect The Signal</td>
<td>1-2</td>
<td>2nd I. F.</td>
<td>Adjust for maximum output. Then repeat adjustment.</td>
</tr>
<tr>
<td>400 OHM Carbon Resistor</td>
<td>Black Wire on Antenna Terminal Strip</td>
<td>14 MC</td>
<td>Foreign</td>
<td>14 MC</td>
<td>5</td>
<td>Foreign Oscillator (Bypass)</td>
<td>Adjust for maximum output. Check to see if proper peak was obtained. Adjust in stages at approx. 15 MC. If gain does not appear right at 15 MC, with trimmer screw further out. Replace lens.</td>
</tr>
<tr>
<td>400 OHM Carbon Resistor</td>
<td>Black Wire on Antenna Terminal Strip</td>
<td>14 MC</td>
<td>Foreign</td>
<td>14 MC</td>
<td>6</td>
<td>Foreign Antenna</td>
<td>Adjust for maximum output. Try to increase output by detuning trimmer and reducing receiver dial until maximum output is obtained.</td>
</tr>
<tr>
<td>200 MMFD. Micro Condenser</td>
<td>Black Wire on Antenna Terminal Strip</td>
<td>1500 KC</td>
<td>Broadcast</td>
<td>1500 KC</td>
<td>7</td>
<td>Broadcast Oscillator (Shunt)</td>
<td>Adjust for maximum output.</td>
</tr>
<tr>
<td>200 MMFD. Micro Condenser</td>
<td>Black Wire on Antenna Terminal Strip</td>
<td>1500 KC</td>
<td>Broadcast</td>
<td>Tune To 1500 KC</td>
<td>8</td>
<td>Broadcast Antenna</td>
<td>Adjust for maximum output.</td>
</tr>
<tr>
<td>600 KC</td>
<td>Black Wire on Antenna Terminal Strip</td>
<td>600 KC</td>
<td>Broadcast</td>
<td>Tune To 600 KC Generator Signal</td>
<td>9</td>
<td>Broadcast Oscillator (Series Pot)</td>
<td>Adjust for maximum output. Try to increase output by detuning trimmer and reducing receiver dial until maximum output is obtained.</td>
</tr>
</tbody>
</table>

DIAL AND MISCELLANEOUS PARTS

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>116280</td>
<td>Back cabinet</td>
<td>10.25</td>
</tr>
<tr>
<td>95323</td>
<td>Bolt—chassis mounting No. 10 x .5</td>
<td>.69</td>
</tr>
<tr>
<td>134442</td>
<td>Bracket—for tuning eye</td>
<td>.16</td>
</tr>
<tr>
<td>140005</td>
<td>Clamp—for dial cord</td>
<td>.21</td>
</tr>
<tr>
<td>134001</td>
<td>Clamp—for dial scale retaining</td>
<td>.36</td>
</tr>
<tr>
<td>137545</td>
<td>Clip—for end of loop mount</td>
<td>.18</td>
</tr>
<tr>
<td>139448</td>
<td>Cord—dial drive (supplied in 6 ft. lengths)</td>
<td>1.00</td>
</tr>
<tr>
<td>137567</td>
<td>Cord—drive</td>
<td>.35</td>
</tr>
<tr>
<td>184550</td>
<td>Dial scale</td>
<td>.90</td>
</tr>
<tr>
<td>138000</td>
<td>Enclosure—for dial</td>
<td>1.00</td>
</tr>
<tr>
<td>138900</td>
<td>Enclosure—for tuning eye</td>
<td>.10</td>
</tr>
<tr>
<td>138925</td>
<td>Enclosure—for push buttons</td>
<td>.35</td>
</tr>
<tr>
<td>175907</td>
<td>Knob—for loop or volume</td>
<td>1.25</td>
</tr>
<tr>
<td>134484</td>
<td>Mounting bracket for loop antenna</td>
<td>.50</td>
</tr>
<tr>
<td>173245</td>
<td>Pin for push buttons</td>
<td>.50</td>
</tr>
<tr>
<td>254002</td>
<td>Pointer—for dial</td>
<td>.45</td>
</tr>
<tr>
<td>137254</td>
<td>Push button</td>
<td>.38</td>
</tr>
<tr>
<td>81145</td>
<td>Retaining ring—for drive shaft</td>
<td>.81</td>
</tr>
<tr>
<td>83624</td>
<td>Screw—for 8 x 1/4</td>
<td>.25</td>
</tr>
<tr>
<td>80240</td>
<td>Screw—no. 6 hex. head</td>
<td>.15</td>
</tr>
<tr>
<td>13181</td>
<td>Screw—special No. 6—32 x 1/2</td>
<td>.50</td>
</tr>
<tr>
<td>134914</td>
<td>Screw—special head for mounting</td>
<td>.15</td>
</tr>
<tr>
<td>68287</td>
<td>Set screw—8—32 square head</td>
<td>.22</td>
</tr>
<tr>
<td>137475</td>
<td>Shield—for loop antenna</td>
<td>1.00</td>
</tr>
<tr>
<td>106011</td>
<td>Socket—4 prong—for speaker</td>
<td>.18</td>
</tr>
<tr>
<td>134417</td>
<td>Socket—dial loop</td>
<td>.05</td>
</tr>
<tr>
<td>166590</td>
<td>Socket—small control base</td>
<td>.12</td>
</tr>
<tr>
<td>13177</td>
<td>Spring—dial cord tension</td>
<td>.75</td>
</tr>
<tr>
<td>13711</td>
<td>Shuttle control tube</td>
<td>.55</td>
</tr>
<tr>
<td>18426</td>
<td>Tuning eye cable and socket</td>
<td>.005</td>
</tr>
<tr>
<td>11405</td>
<td>Washer—spring washer</td>
<td>.50</td>
</tr>
</tbody>
</table>

PHONOGRAPH & TELEVISION CONNECTIONS

PHONOGRAPH CONNECTIONS: Connect the wires from a phonograph record player to the left hand and middle terminals on the terminal strip nearest the middle of the chassis on the back of the chassis. Push the black sliding button on the back of the chassis to the right ("TELEPHONE" position) for phonograph or television operation. This switch must be in the "RADIO" position for radio reception.

Turn the volume knob on the record player to the maximum volume position and control volume by means of the volume control on the radio.

TELEVISION CONNECTIONS: Connect the wires from a television attachment unit to the right hand and middle terminals on the terminal strip. Operation will now be the same as for phonograph operation.
CHASSIS DESCRIPTION

The 6-75 chassis contains the following components: Oscillator, Amplifier, Base, Receiver Antenna, and Dial. The control panel includes the tuning knob, volume control, and power switch.

CIRCUIT FEATURES

The circuit features include a simple mechanical design with a direct coupling of the oscillator and amplifier stages. The receiver antenna is connected to the amplifier stage using a coaxial cable. The output of the amplifier is fed to the speaker via a simple audio amplifier circuit.

HOW TO SET UP THE PUSH BUTTONS

1. Be sure the push button is set in a fixed position and that the push button is in contact with the switch. If not, the push button may not function properly.

REMOTE CONTROL UNIT

This remote control unit consists of a simple on/off switch and a remote control receiver. The remote control receiver is connected to the main unit via a coaxial cable. The receiver is activated by a remote control transmitter with a range of up to 100 feet. The following are the steps to install the remote control unit:

1. Connect the remote control receiver to the main unit using a coaxial cable.
2. Connect the remote control transmitter to the receiver using a remote control cable.
3. Connect the main unit to the power source.
4. Test the remote control unit to ensure proper operation.

REPLACING THE POINTER DRIVE CORD

1. Before replacing the cord, remove the old cord and install the new cord into the connector.
2. Thread the new cord through the hole in the base and connect it to the connector.
3. Adjust the cord to ensure proper alignment.

TUNER MOTOR

The motor is a 12VDC motor with a speed of 1000 RPM. It is powered by a 12V battery and is controlled by a simple on/off switch. The motor is connected to the base via a simple DC motor controller.

Compliments of www.nucow.com
HOW TO SET UP THE PUSH BUTTON TUNER

1. Be sure that your set is connected to a good antenna system.

2. Turn on the set and allow it to operate at least one-quarter hour before setting up the push buttons.

3. Make a list of the frequencies of six nearby stations to which you wish to set up the buttons. Be sure to select nearby, powerful stations, since weak stations will generally give better results if tuned manually. Also BE SURE TO SELECT STATIONS FALLING WITHIN THE TUNING RANGE OF THE INDIVIDUAL BUTTONS, AS INDICATED IN FIG. 1.

4. Each of the buttons on your Push-Button Tuner has a definite range of frequencies to which it can be tuned as shown in Fig. 1. It is imperative that in setting up the buttons, you select stations whose frequency is in the indicated tuning range of that button. FAILURE TO SELECT THE PROPER BUTTON WILL RESULT IN THE INCORRECT SETTING OF THE TRIMMER ADJUSTING SCREW AND WILL ALSO CAUSE "SHIFTING." The correct frequencies of your local stations may be obtained from your newspaper or radio call magazine. For example, suppose you want to set a button to station WWJ whose frequency is 770 kilocycles. Refer to Fig. 1 which shows that this frequency falls within the operating range of buttons No. 3 or No. 4, whose range is 600 to 1200 kc. Therefore either button No. 3 or No. 4 can be used for the automatic tuning of WWJ.

5. Remove the escutcheon around the push buttons by taking out the six screws holding it to the cabinet. This will expose to view six pairs of adjusting screws, each pair of which is used to tune in a station that you wish to set-up on a particular button.

6. Turn the band switch (right hand knob) clockwise until the word "BROADCAST" appears in the lower opening in the dial scale. Then use the tuning knobs (center) to tune in the station you desire to set to button No. 5. This is done so that you may identify the station by hearing its program.

7. Now turn the band switch knob to the extreme clockwise position (the word "BROADCAST" will now appear in the center dial scale opening). You will note when this switch is turned, the station previously tuned in will not be heard.

8. Now push in the third button from the left (No. 3 in Fig. 10). Using a small screw driver, insert it in the second screw from the left (No. 3a in Fig. 1). Rotate the screw slowly until the word "BROADCAST" appears in the lower opening in the dial scale. This is done so that you may tune the station in the "tuning eye" being closest together. Now go back to screw No. 3a and see if any improvement in the reception can be made by adjusting it. Also repeat this adjustment for screw No. 3b.

9. Set up button No. 4 for the selected station in a similar manner, using screws No. 4a and 4b, and proceed to set up the remaining buttons in the same fashion, always tuning in the station initially with the "a" screw for that particular button.

10. Replace the escutcheon with its six retaining screws.

11. Label each button with the call letters of the stations you have selected, using the call letter tabs packed with your receiver. These tabs are to be mounted on their gowned side and inserted in the recesses in the escutcheon, directly above the push buttons.

HOW TO CHANGE THE OPERATING RANGE OF A BUTTON

The operating range of a button may be changed by merely changing the dual trimmer used with that button. Dual trimmers with the ranges indicated below can be obtained from your Firestone Dealer or serviceman under the following part numbers:

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Tuning Range</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>114506</td>
<td>770 to 1250 kc.</td>
<td>$0.35</td>
</tr>
<tr>
<td>115944</td>
<td>550 to 1000 kc.</td>
<td>$0.50</td>
</tr>
</tbody>
</table>

To make the change proceed as follows:

1. Remove the chassis from the cabinet.

2. By referring to Fig. 1, determine the dual trimmer associated with the button whose range you wish to change.

3. Unhold the leads from the four terminals on the back of this dual trimmer.

4. Remove the 6/38 machine screw holding the dual trimmer to the front of the chassis.

5. From the above list select a dual trimmer which will cover the desired range.

6. Mount it on the front of the chassis with the 6/38 machine screw, and solder the leads to its four terminals.

The button is now ready to be set to any strong station whose frequency is within the range of this new trimmer unit.

REPLACING THE DIAL POINTER DRIVE CORD

1. Tie a large knot in one end of about 6 in. of special dial cord, part No. 11303.

2. Thread the free end of the cord through hole A in drum C (threading from the inside of the drum out) See Fig. 2.

3. After pulling the cord through hole A, make one self turn around the drum G in a clockwise direction (viewed from the front), using the front groove in the drum.

4. Continue, drum C, the cord up around the back of pulley F to pulley G. From this point continue across to pulley B and around to pulley E.

5. Go over pulley E and down to the bottom of the front groove in drum C. Continue up around the drum to hole B.

6. Draw the cord through hole B and tie it to the end of the tension spring in such a manner that when the spring is clipped on to lug H it will be extended to about 1 in. long.
Current 7 amps at 6.3 volts.
Maximum power output 3.0 watts.
All voltages measured from socket terminal to chassis ground using 1000 ohm per volt meter.

SENSITIVITY AND STAGE GAIN MEASUREMENTS

All stage gain measurements must be made with the volume control set for full volume. The shielded lead from the signal generator is connected to the grid terminal of the tube through a 1.1 MP condenser, with a 5000 ohm resistor connected as a leak resistance between the grid of the tube and the grid lead which has been removed.

When measuring overall sensitivity at the antenna terminal, use a dummy, part No. 1X1000A, in place of the 1 MP. It must be remembered that the figures in the table are average and allowances must be made for variations between two sets of the same general type, due to difference of tube characteristics, etc.

<table>
<thead>
<tr>
<th>AVERAGE MICROVOLT</th>
<th>GENERATOR</th>
<th>VIBER.</th>
<th>INPUT</th>
<th>SET AT</th>
<th>LEAK RESISTANCE</th>
<th>OUTPUT READING</th>
</tr>
</thead>
<tbody>
<tr>
<td>10,000</td>
<td>455 K.C.</td>
<td>.1</td>
<td>.5</td>
<td>1.76</td>
<td></td>
<td></td>
</tr>
<tr>
<td>200</td>
<td>455 K.C.</td>
<td>.1</td>
<td>.5</td>
<td>1.76</td>
<td></td>
<td></td>
</tr>
<tr>
<td>310</td>
<td>455 K.C.</td>
<td>.1</td>
<td>.5</td>
<td>1.76</td>
<td></td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>600 K.C.</td>
<td>.1</td>
<td>.5</td>
<td>1.76</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>600 K.C.</td>
<td>.1</td>
<td>None</td>
<td>1.76</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* For one watt output.
** Meter connected across voice coil.
*** Use special dummy part No. 1X1000A or 1X4348 Booster Coil No. 19200 in series with a 25 MP condenser.

NOTE: If set is not used with a Motorola Booster antenna, substitute a 40 MPF condenser for the Special Dummy.
GALVIN MFG. CORP.

Alignment, socket trimmers, notes
Dial assembly

ALIGNMENT PROCEDURE

1. Remove the back cover (D) and place the radio on the service bench. Turn the volume control to maximum and leave it there throughout the alignment, reducing the signal generator output, if necessary.

I. P. ALIGNMENT

1. Connect the signal generator to the control grid (terminal No. 6) of the 6SK7/6S7GT oscillator tube and to chassis ground. Connect the 6SK7/6S7GT control grids in series with 6SK7/6S7GT. Connect the signal generator output to the speaker voice coil.

2. Set the signal generator at 455 Kc and carefully adjust the two trimmers in the diode coil can to the point showing the highest reading on the output meter. (Advance the signal generator attenuator, if necessary, to pick up signal.)

3. Adjust the two trimmers in the I.F. coil can to the point showing the highest output reading.

4. Repeat the I.F. and diode adjustment several times for maximum accuracy.

R.F. ALIGNMENT

1. If the radio is to be operated on a special booster antenna, a special dummy antenna (motorola part No. 12S818) should be used in series with the input from the signal generator to the antenna receptacle. Align the signal generator connection to the antenna lead, using the adjustable dummy antenna.

2. Set the signal generator at 1560 Kc and with the condenserPont still completely out of network, adjust the 6SK7/6S7GT trimmer in the oscillator coil can to the point showing highest output reading.

3. Turn condenser gang to fully washed position. Set the signal generator at 550 Kc and adjust the 6SK7/6S7GT oscillator pad in the oscillator coil can to point showing highest reading.

4. Set the signal generator at 1450 Kc and turn the condenser gang to the signal at 1450 Kc. Adjust the 6SK7/6S7GT trimmer in the oscillator coil can to point showing highest output reading.

5. Set the signal generator at 600 Kc and turn the condenser gang until the pointer reads 600 Kc. While adjusting the antenna grid to point showing highest output reading, rove the gang while maintaining this adjustment. Set condenser trimmer adjustment at 1560 Kc.

TO REMOVE THE CHASSIS FROM THE HOUSING

1. Place the radio in an upright position on the service bench. (See Fig. 4)

2. Disconnect the speaker plug.

3. Remove the speaker mounting bracket (C) from the back cover and speaker support bracket (B). (4 screws)

4. Pull the push-buttons off.

5. Remove the throw switch plate (2 screws)

6. Remove the celluloid dial background (2 snap-in plugs)

7. Remove the top cover (A) (13 screws), lift the dial light assembly off of the front cover.

8. Remove the speaker support bracket (B), (2 screws)

9. Turn radio over in an upright position. Remove 11 screws from the back cover (8)

10. Lay set on side and remove the remaining 3 screws on the back cover - (14 screws)

11. Remove the remaining 8 screws from the housing and unscold the various leads from the spring plate assembly. (See Fig. 6)

Note: When remounting, the long screws are to be used in position along side the antenna resonator.

Fig. 2

1. Remove the chassis from the housing, and place on service bench.

2. Remove broken string.

3. Set condenser gang to fully closed position.

4. Cut a length of 30 lb. silk fish cord 27 inches long.

5. Thread one end of cord through slot A in condenser pulley and with an ordinary paper clip fasten it to the rear pulley bracket to hold in place. (See Fig. 5)

6. In a clockwise direction run cord around condenser pulley, under brake shoe and over to idler pulley No. 1 and around it in a counterclockwise direction.

7. Route cord back across chassis and up under idler pulley No. 2.

8. Route cord up and around condenser pulley 1/4 turn to slot A.

9. Remove the paper clip from end of cord and knot the free ends of cord together inside of drive pulley. Fasten one end of the tension spring (41A 11099) to cord and the other end to hole "C" in the condenser pulley.

10. Cut off surplus cord.

11. Set the pointer to correct frequency, tune in a station of known frequency and adjust pointer on string.

TUNING CORD

1. Remove the chassis from the housing, and place on service bench.

2. Remove the broken string.

3. Turn the condenser gang to fully closed position.

4. Pull the push-buttons off.

5. Remove the throw switch plate (2 screws)

6. Remove the speaker mounting bracket (C) from the back cover and speaker support bracket (B). (4 screws)

7. Lay set on side and remove the remaining 3 screws on the back cover - (14 screws)

8. Turn radio over in an upright position. Remove 11 screws from the back cover (8)

9. Set condenser gang to fully closed position.

10. Cut off surplus cord.

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TO REMOVE CHASSIS FROM HOUSING

1. Lay the radio face down on the service bench and remove the back cover by removing the two wing screws.
2. Remove the rattle clip from the housing which is bonded to the push button assembly and pull the speaker pin terminals from their receptacles. Also remove the dial light from the mounting bracket. 
3. Remove the alligator assembly (6 screws).
4. Remove the screw along side of the antenna receptacle.
5. Turn the radio over on its boss.
6. Pull the push buttons out.

ALIGNMENT PROCEDURE

Remove the chassis from its housing and place it on the service bench. Turn the volume control to maximum and leave it there throughout the alignment.

1. Connect the signal generator to the control grid of the oscillator tube and to chassis ground using a ... the highest reading on the meter. (Advance the signal generator attenuator, if necessary, to give up signal.)
3. Adjust the two trimmers in the J.F. section until the signal generator connected to the antenna lead, using the special dummy.
4. Set the signal generator at 1800 K.C. and watch the indicator until it is completely out of the helix. Connect the oscillator trimmer to the point showing the highest output reading.
5. Set the signal generator at 1400 K.C. and turn the condenser gang to the signal at 1400 K.C.

SENSITIVITY AND STAGE GAIN MEASUREMENTS

All stage gain measurements must be made with the volume control set at full volume. The shielded lead from the signal generator is connected to the grid terminal of the tube through a 1000 ohm resistor, with a 500 ohm resistor connected in parallel to reduce the grid loss. The signal generator is connected to the antenna lead, using the special dummy. A list of the gain measurements is given in the table.

1. For one watt output:
2. For one watt output:
3. For one watt output:

TUNING CORD

1. Remove the chassis from the housing, and place it on service bench.
2. Remove the broken string.
3. Move the condenser gang to fully meshed position.
4. Adjust the length of the silk fish cord to the length from the condenser gang to the tuning control bracket so that the cord will stay in place.
6. In a clock-wise direction, wind cord one full turn around drive pulley and up to tuning shaft. (See Fig. 3.)
7. Route cord 1 turns around drive pulley and up to tuning shaft. (See Fig. 3.)
8. Continue the clock-wise direction, three turns around the condenser pulley.
9. Mount the two ends of cord together inside of drive pulley and fasten one end of spring to cord and the other end to hole (C) in condenser pulley.
10. Cut off surplus cord.

FIGURE 3

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GALVIN MFG. CORP.

ALIGNMENT PROCEDURE

Remove the chassis from its housing and place it on the service bench.

Turn the volume control to maximum position and leave it there throughout the alignment, reducing the signal generator output if necessary. Fig. 1 shows trimmer locations.

1. F. ALIGNMENT

1. Connect the signal generator to the control grid (terminal No. 8) of the 6AK7C oscillator-diode-tube using a .1 MF condenser and to chassis ground. Turn the condenser knob completely out of mesh. Connect an output meter across the speaker voice coil.

2. Set the signal generator at 455 K.C. and carefully adjust the trimmer to the diode cut-off to the point showing the highest output reading. (Advance the signal generator attenuator, if necessary, to pick up signal.)

3. Adjust the two trimmers in the I.F. coil cam to the point showing the highest output reading.

4. Repeat the I.F. and diode adjustment several times for maximum accuracy.

R. F. ALIGNMENT

NOTE — A special dummy antenna, Motorola part I1X8018 should be used in series with the lead from the signal generator to the antenna receptacle. If the receiver is to be operated on a Motorola Booster antenna, the cam antenna is not Booster equipped. See Fig. 2.

1. Change the signal generator connection to the antenna lead, using the special dummy.

2. Set the signal generator at 1550 K.C. and with the condenser knob still completely out of mesh, adjust the oscillator trimmer to the point showing the highest output reading.

3. Set the signal generator at 1400 K.C. and turn the condenser knob to the point showing the highest output reading. Also adjust the antenna selector located in the copper antenna coil cam to the point giving the highest output reading. (DO NOT ROCK GAN G FOR EITHER ADJUSTMENT.)

REMOVING CHASSIS FROM HOUSING

1. Lay the radio on the service bench on its right side.

2. Remove the left hand side of the housing by taking off the thumb nut.

3. Leave the radio in this position.

4. Remove the seven washers on the right hand side of the housing, including the two which hold the "A" lead clips.

5. Now remove the six screws from the other side.

6. Turn the radio over so that it is in an upright position.

SENSITIVITY AND STAGE GAIN MEASUREMENT

All stage gain measurements must be made with the volume control set at full volume. The alighted lead from the signal generator is connected to the grid terminal of the tube through a .1 MF condenser, with a 500M ohm resistor connected as a load resistance between the grid of the tube and the grid lead which has been removed.

When measuring over-all sensitivity at the antenna terminal, use a special dummy part 11X8018 in place of the .1 MF.** It must be remembered that the figures in the table are averages and allowances must be made for variations between two sets of the same general type, due to differences in tube characteristics, etc.

<table>
<thead>
<tr>
<th>AVERAGE INPUT</th>
<th>GENERATOR G.R.</th>
<th>GENERATOR PIRESSES CONNECTED TO</th>
<th>DEANCE DATA</th>
<th>DASH RESISTANCE</th>
<th>OUPUT MEASUREMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>12000</td>
<td>655 K.C.</td>
<td>I.F. Grid</td>
<td>.1 MF</td>
<td>5 Meg</td>
<td>1.76 Volts</td>
</tr>
<tr>
<td>550</td>
<td>655 K.C.</td>
<td>Mod. Grid</td>
<td>.1 MF</td>
<td>5 Meg</td>
<td>1.76 Volts</td>
</tr>
<tr>
<td>600</td>
<td>655 K.C.</td>
<td>Mod. Grid</td>
<td>.1 MF</td>
<td>5 Meg</td>
<td>1.76 Volts</td>
</tr>
<tr>
<td>65</td>
<td>655 K.C.</td>
<td>R.F. Grid</td>
<td>.1 MF</td>
<td>5 Meg</td>
<td>1.76 Volts</td>
</tr>
<tr>
<td>9</td>
<td>600 K.C.</td>
<td>R.F. Lead</td>
<td>***</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

**For one watt output

*Motor connected across voice coil

1.76 Volts equals 1 watt output for 8 ohm voice coil

*Use special dummy part No. 11X8018 or 6M446 booster coil Part No. 1750B in series with 25 MNP cond. (See Fig. 2)

TUNING CORD

1. Remove the chassis from the housing and place on service bench with the tubes up.

2. Remove the broken sitting.

3. Turn the condenser knob to fully halfway position.

4. Cut a length of 30u fish line cord 25 inches long.

5. Thread one end of cord thru hole (a) in drive pulley and with the other end feed thru volume control bracket so that cord will stay in place.

6. In a counter-clockwise direction, wind cord one full turn around drive pulley and down to tuning shaft. (See Fig. 3)

7. Wind cord in clockwise direction 7 turns around tuning shaft and up to drive pulley.

8. Continue in a counter-clockwise direction, three quarter turns total-(a).

9. Knot the two ends of cord together inside of drive pulley and fasten end of and spring (41A14750) to cord and the other end in hole (F) in condenser pulley.

10. Cut off surplus cord.

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MODEL 28-O FOR 1948 OLDSMOBILE
MODEL 30-P FOR 1949 PONTIAC
ALIGNMENT PROCEDURE

Remove the chassis from its housing and place it on the service bench. Turn the volume control to maximum and leave it there throughout the alignment, reducing the signal generator output, if necessary.

L. F. ALIGNMENT

1. Connect the signal generator to the control grid (terminal No. 8) of the 6SK7 or oscillator-modulator tube and to chassis ground using a .1 Mfd. condenser in series with lead. Turn the condenser gage completely out of mesh. Connect an output meter across the speaker voice coil.

2. Set the signal generator at 455 K.C. and carefully adjust the trimmer in the diode plate to the point showing the highest output reading.

3. Adjust the two trimmers in the I.F. coil to the point showing the highest output reading. Repeat the I.F. and Diode adjustment several times for maximum accuracy.

R. F. ALIGNMENT

1. Set the signal generator at 1400 K.C. and turn the condenser gage to the signal generator output. Adjust the antenna trimmer on the condenser gage to the point showing the highest output reading.

2. Set the signal generator at 600 K.C. and the condenser gage until the dial pointer reads 600 K.C. Adjust the oscillator trimmer to point giving highest output reading. Also adjust antenna trimmer located in the copper antenna coil to the point giving the highest output reading. (Do not rock gage for either adjustment.)

SENSITIVITY AND STAGE GAIN MEASUREMENTS

All stage gain measurements must be made with the volume control set for full volume. The shielded lead from the Signal Generator is connected to the grid terminal of the tube through a .1 Mfd. condenser, with a 500Mh. shunt resistor connected as a load resistance between the grid tube and the grid lead which has been shown to provide the highest output on the output meter. (Advance the signal generator attenuator, if necessary, to pick up signal.)

When measuring over-all sensitivity at the antenna terminal, use a special dummy, part No. 1X18018, in place of the .1 Mfd. It must be remembered that the figures in the table are average and allowance must be made for variations between two sets of the same general type, due to difference of tube characteristics, etc.

Table:

<table>
<thead>
<tr>
<th>MICROVOLT INPUT</th>
<th>GENERATOR SET AT</th>
<th>GENERATOR FLEDER CONNECTED TO</th>
<th>DUMMY ANTENNA</th>
<th>LEAK RESISTANCE</th>
<th>OUTPUT METER READINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>7000</td>
<td>455 K.C.</td>
<td>L. F. Grid</td>
<td>.1</td>
<td>5 Mag</td>
<td>1.36</td>
</tr>
<tr>
<td>390</td>
<td>455 K.C.</td>
<td>MOD. Grid</td>
<td>.1</td>
<td>2 Mag</td>
<td>1.36</td>
</tr>
<tr>
<td>35</td>
<td>600 K.C.</td>
<td>R. F. Grid</td>
<td>.1</td>
<td>2 Mag</td>
<td>1.36</td>
</tr>
<tr>
<td>3</td>
<td>600 K.C.</td>
<td>Ant. Lead</td>
<td>***</td>
<td>None</td>
<td>1.36</td>
</tr>
</tbody>
</table>

For one watt output, a load resistor across voice coil.

1.75 volts equals 1 watt output for 3 shunt voice coil.

The special dummy set No. 1X18018 is Motorola All-Transmitter Model 28-0 and may be used in series with the lead from the signal generator to the antenna leads. Change the signal generator connection to the antenna lead, using the special dummy.

When measuring over-all sensitivity at the antenna terminal, use a special dummy, part No. 1X18018, in place of the .1 Mfd. It must be remembered that the figures in the table are average and allowance must be made for variations between two sets of the same general type, due to difference of tube characteristics, etc.

When measuring over-all sensitivity at the antenna terminal, use a special dummy, part No. 1X18018, in place of the .1 Mfd. It must be remembered that the figures in the table are average and allowance must be made for variations between two sets of the same general type, due to difference of tube characteristics, etc.

TO REMOVE CHASSIS FROM HOUSING SEE INDEX (MODEL 28-O).

MODEL 35-N SPECIFICALLY DESIGNED TO INSTALL IN 1940 NASH
ALIGNMENT PROCEDURE

Remove the chassis from its housing and place it on the service bench. Turn the volume control to maximum and leave it there throughout the alignment, reducing the signal generator output, if necessary.

L. F. ALIGNMENT

1. Connect the signal generator to the control grid (terminal No. 8) of the 6SK7 oscillator-modulator tube and to chassis ground using a .1 Mfd. condenser in series with lead. Turn the condenser gage completely out of mesh. Connect an output meter across the speaker voice coil.

2. Set the signal generator at 455 K.C. and carefully adjust the trimmers in the I.F. coil to the point showing the highest output reading. Repeat the I.F. and Diode adjustment several times for maximum accuracy.

R. F. ALIGNMENT

1. If the radio is to be operated on a Motorola Booster Antenna, a special dummy antenna Motorola part No. 1X18018 must be used in series with the lead from the signal generator to the antenna receptacle. Change the signal generator connection to the antenna lead, using the special dummy.

2. Set the signal generator at 1400 K.C. and the condenser gage until the dial pointer reads 600 K.C. Adjust the oscillator trimmer to point giving highest output reading. Also adjust antenna trimmer located in the copper antenna coil to the point giving the highest output reading. (Do not rock gage for either adjustment.)

3. Set the signal generator at 600 K.C. and turn the condenser gage until the dial pointer reads 600 K.C. Adjust the oscillator trimmer to point giving highest output reading. Also adjust the antenna trimmer located in the copper antenna coil to the point giving the highest output reading. (Do not rock gage for either adjustment.)

4. Set the signal generator at 600 K.C. and turn the condenser gage until the dial pointer reads 600 K.C. Adjust the oscillator trimmer to point giving highest output reading. Also adjust the antenna trimmer located in the copper antenna coil to the point giving the highest output reading. (Do not rock gage for either adjustment.)

5. Set the signal generator at 1400 K.C. and turn the condenser gage to the signal generator output. Adjust the antenna trimmer on the condenser gage to the point showing the highest output reading.

6. Set the signal generator at 1400 K.C. and turn the condenser gage to the signal generator output. Adjust the antenna trimmer on the condenser gage to the point showing the highest output reading.

7. Set the signal generator at 600 K.C. and turn the condenser gage until the dial pointer reads 600 K.C. Adjust the oscillator trimmer to point giving highest output reading. Also adjust the antenna trimmer located in the copper antenna coil to the point giving the highest output reading. (Do not rock gage for either adjustment.)

May be used in series with the lead from the signal generator to the antenna leads. Change the signal generator connection to the antenna lead, using the special dummy.

The special dummy set No. 1X18018 is Motorola All-Transmitter Model 28-0 and may be used in series with the lead from the signal generator to the antenna leads. Change the signal generator connection to the antenna lead, using the special dummy.
Remove the chassis from its housing and place it on the service bench. Turn the volume control to maximum position and leave it there throughout the alignment, reducing the signal generator output if necessary.

1. F. ALIGNMENT
   1. Connect the signal generator to the control grid (terminal No. 6) of the output oscillator-modulator tube and to chassis ground. Turn the condenser gang completely out of each. Connect output meter across the speaker voice coil. Use a 100 pf condenser in signal generator lead.
   2. Set the signal generator at 455 K.C. and carefully adjust the two trimmers in the dodec cell to point showing the highest reading on the output meter. (Advance the signal generator attenuation control, if necessary.)
   3. Set the trimmers in the I.F. cell to point showing the highest output reading.
   4. Repeat the I.F. and dodec adjustment several times for maximum accuracy.

2. R. ALIGNMENT
   1. Change the signal generator connection to the antenna lead, using a 50 MF condenser in series with it.
   2. Set the signal generator at 1500 K.C. and with the condenser gang still completely out of each, adjust the oscillator trimmer to the point showing the highest output reading.
   3. Set the signal generator at 1400 K.C. and turn the condenser gang to the signal at 1400 K.C. and then the antenna trimmer to the condenser gang to a point showing the highest output reading.
   4. Set the signal generator at 600 K.C. and turn the condenser gang until the dial pointer reads 600 K.C. Adjust the oscillator trimmer to the point giving highest output reading. Also adjust the antenna trimmer located in the copper antenna coil to the point giving the highest output reading. (DO NOT ROCK GAIN FOR EITHER ALIGNMENT)

SENSITIVITY AND STAGE GAIN MEASUREMENTS

All stage gain measurements must be made with the volume control at zero full volume. The shielded lead from the signal generator is connected to the grid terminal of the tube through a 100 pf condenser, with a 150 ohm resistor connected as a leak between the grid of the tube and the grid lead which has been removed.

When measuring over-all sensitivity at the antenna terminal, use a 50 MF condenser in place of 1 PF.

The figures in the table are averages and allowances must be made for variations between two sets of the same general type, due to difference of tube characteristics, etc.

---

**Model 29-B**

TO INSTALL IN 1940 BUICK

1. Remove the chassis from the housing, and place it on the service bench with the tubes up.
2. Remove the bottom cover (4 thumb screws). Then pull back.
3. Remove the 8 screws around the top and sides of the front.
4. Remove the 3 remaining screws on the right side of the housing.
5. Remove the 3 remaining screws on the left side of the housing, including the one adjacent to the antenna receptacle.
6. Remove the 3 screws on the back of the housing.
7. Lay the radio face down on the service bench and lift the housing off.
8. When reassembling, the long screw is to be used in position along side of antenna receptacle.
9. The eliminator assembly is to be mounted last.

---

**Model 29-B**

TO INSTALL DIAL DRIVE CORD

1. Remove the chassis from the housing, and place it on the service bench with the tubes up.
2. Remove the broken string.
3. Turn the condenser gang to a fully meshed position.
4. Set a length of 30 inch fish wire 26 inches long.
5. Insert one end of cord through slot in drive pulley and wind it around the drive cord and up to tuning shaft.
6. In a counter-clockwise direction wind cord around drive pulley and up to drive pulley shaft.
7. Set the cord in the direction 9 turns around tuning shaft and down to drive pulley.
8. In a counter-clockwise direction, wind cord around drive pulley to slot (B).
9. Remove the three screws on the drive cord and the three end to hole in condenser pulley.
MODEL 41S ALIGNMENT

1. Conn. sig. gen. to grid of first det. tube and thru a .045 MF cond. and to chassis. Do not remove grid cap. Conn. o.p. meter across spkr. voice coil. Turn cond. gang completely out of mesh. Loop must be conn. to chassis at all times.

2. Set sig. gen. at 455 K.C.; carefully adj. the two I.F. trim. and the one DIODE trim. to point showing highest read. on o.p. metr.

3. Turn sig. gen. to 1560 K.C. and with cond. gang completely out of mesh, adj. OSC. trim. until 1560 K.C. sig. is heard.

4. No further adjustments.

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MODEL 41B, 41F ALIGNMENT

1. Connect signal generator to 1A7G through .05 MF cond.
and to chassis. Connect op. meter across speaker voice coil. Turn cond. gang out of mesh. Set band switch in B.C. pos. UP pos. is for S.W. DOWN pos. is for B.C.
2. Set gen. at 455 KC, adj. 4 I.F. trim, top of I.F. coil cans for max. read.
3. Band switch in S.W. pos. Set gen. to ant. and turn trimmers, using 400 ohm carbon res. in ant. lead. 4. Set gen. at 18.0 MC, cond. gang out of mesh adj. the S.W. OSC. trim until the 18.0 MC sig. is heard. 5. Set gen. at 16.0 MC, turn cond. gang to sig. at 16.0 MC. Adj. S.W. ANT. for max. read. 6. Band switch in B.C. pos. replace 400 ohm res. in sig. gen. lead with .0002 MF cond. 7. Set gen. at 1720 KC turn cond. gang to out of mesh pos. Adj. B.C. OSC. trim until 1720 KC sig. is heard. 8. Set gen. at 600 KC - rock pointer at 600 KC pos. on dial scale, while adj. B.C. pedder for highest op. read. If noise at 600 KC pedder can be adj. to max. noise without rocking gang and without use of sig. gen.

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ALIGNMENT PROCEDURE

1. Connect the signal generator to the grid of the first detector tube through a .05 MF capacitor and to chassis. Do not remove the grid cap. Connect the output of the meter across speaker. Voice coil. Turn condenser gang completely out of mesh. Loop must be connected to chassis at all times.

2. Set the signal generator at 455 KC; carefully adjust the two IF trimmers and the two DIODES trimmers to point show the highest read on the meter. Turn the signal generator to 1720 KC and with condenser gang completely out of mesh adjust OSC. trim until 1720 KC signal is heard. Place chassis in cab., conn. loop terms, and fasten back on cab.

3. Remove the plug from the side of the cabinet to expose the ANT. trim. Tune in a weak station near 1400 or 1500 KC and adjust ANT. trim. thru hole in cab. for max. volume.
SENSIBILITY AND STAGE GAIN MEASUREMENTS

All stage gain measurements may be made with the volume control set for full volume. The shielded lead from the signal generator is connected to the grid terminal of the tube through a .1 MF condenser, with a 5000 ohm resistor connected as a leak resistance between the grid of the tube and the grid lead which has been removed. When measuring over-all sensitivity of the antenna terminal, use a 200 MMF condenser in place of .1 MF.

To measure over-all sensitivity of loop models, connect the signal generator to the coupling turn in the loop, using a 400 ohm dummy. The lead, including the resistor should be thoroughly shielded and the receiver must be at least 3 ft. away from the signal generator.

The figures in the table are average and allowances must be made for variations between the sets of the same general type, due to difference of gain characteristics.

Models 5A and 8A

<table>
<thead>
<tr>
<th>Models</th>
<th>Average</th>
<th>Input</th>
<th>Generator</th>
<th>Dummy</th>
<th>Leak</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>415 K.C.</td>
<td>3 F Gold</td>
<td>1 MF</td>
<td>.5 Mag</td>
<td>.5 Volt</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>415 K.C.</td>
<td>3 F Gold</td>
<td>1 MF</td>
<td>.5 Mag</td>
<td>.5 Volt</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>415 K.C.</td>
<td>3 F Gold</td>
<td>1 MF</td>
<td>.5 Mag</td>
<td>.5 Volt</td>
<td></td>
</tr>
<tr>
<td>Model 5C</td>
<td>415 K.C.</td>
<td>3 F Gold</td>
<td>1 MF</td>
<td>.5 Mag</td>
<td>.5 Volt</td>
<td></td>
</tr>
<tr>
<td>75</td>
<td>415 K.C.</td>
<td>3 F Gold</td>
<td>1 MF</td>
<td>.5 Mag</td>
<td>.5 Volt</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>415 K.C.</td>
<td>3 F Gold</td>
<td>1 MF</td>
<td>.5 Mag</td>
<td>.5 Volt</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>415 K.C.</td>
<td>3 F Gold</td>
<td>1 MF</td>
<td>.5 Mag</td>
<td>.5 Volt</td>
<td></td>
</tr>
<tr>
<td>Model 5A and 6B</td>
<td>415 K.C.</td>
<td>3 F Gold</td>
<td>1 MF</td>
<td>.5 Mag</td>
<td>.5 Volt</td>
<td></td>
</tr>
<tr>
<td>75</td>
<td>415 K.C.</td>
<td>3 F Gold</td>
<td>1 MF</td>
<td>.5 Mag</td>
<td>.5 Volt</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>415 K.C.</td>
<td>3 F Gold</td>
<td>1 MF</td>
<td>.5 Mag</td>
<td>.5 Volt</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>415 K.C.</td>
<td>3 F Gold</td>
<td>1 MF</td>
<td>.5 Mag</td>
<td>.5 Volt</td>
<td></td>
</tr>
<tr>
<td>Model 6B</td>
<td>415 K.C.</td>
<td>3 F Gold</td>
<td>1 MF</td>
<td>.5 Mag</td>
<td>.5 Volt</td>
<td></td>
</tr>
<tr>
<td>75</td>
<td>415 K.C.</td>
<td>3 F Gold</td>
<td>1 MF</td>
<td>.5 Mag</td>
<td>.5 Volt</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>415 K.C.</td>
<td>3 F Gold</td>
<td>1 MF</td>
<td>.5 Mag</td>
<td>.5 Volt</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>415 K.C.</td>
<td>3 F Gold</td>
<td>1 MF</td>
<td>.5 Mag</td>
<td>.5 Volt</td>
<td></td>
</tr>
<tr>
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<td>3 F Gold</td>
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<td>.5 Volt</td>
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<td>3 F Gold</td>
<td>1 MF</td>
<td>.5 Mag</td>
<td>.5 Volt</td>
<td></td>
</tr>
<tr>
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<td>3 F Gold</td>
<td>1 MF</td>
<td>.5 Mag</td>
<td>.5 Volt</td>
<td></td>
</tr>
<tr>
<td>2.5</td>
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<td>3 F Gold</td>
<td>1 MF</td>
<td>.5 Mag</td>
<td>.5 Volt</td>
<td></td>
</tr>
<tr>
<td>1.25</td>
<td>415 K.C.</td>
<td>3 F Gold</td>
<td>1 MF</td>
<td>.5 Mag</td>
<td>.5 Volt</td>
<td></td>
</tr>
<tr>
<td>.5</td>
<td>415 K.C.</td>
<td>3 F Gold</td>
<td>1 MF</td>
<td>.5 Mag</td>
<td>.5 Volt</td>
<td></td>
</tr>
</tbody>
</table>

TO RESTRING DIAL DRIVE CORD

1. Remove dial crystal, pointer, dial scale, and plate.
2. Cut a length of silk fish cord approximately 12 inches long.
3. Make two turns with cord around tuning shaft. (See Fig. 2.)
4. Continue both ends of cord around condenser pulley in opposite directions until they meet at the hole (A) in the rim of the pulley.
5. Thread both ends through the hole and tie them securely together inside the hole.
6. Tie in the dial cord tension spring and hook the free end of the spring in hole (B). Cut off surplus cord.

TO RESTRING DIAL DRIVE CORD

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5. Thread both ends through the hole and tie them securely together inside the hole.
6. Tie in the dial cord tension spring and hook the free end of the spring in hole (B). Cut off surplus cord.

Note: All measurements from 0 to socket terminals, using 1000 ohms per volt.
5A, 5AA, 5G and 6B CHASSIS

NOTE: When aligning AC-DC receivers, use a block cond. in series with the gnd. conn. to the sig. gen. If your sig. gen. is AC operated it may not be possible to conn. to Mod. grid for IF align. because of hum. If so feed 455 KC sig. into ant. lead advancing sig. gen. attenuator accordingly. (In loop models, conn. to the coupling turn in the loop.)

5C CHASSIS ALIGNMENT

1. Conn. sig. gen. to grid of first det. tube thru a .05 MF cond., and to chass. Do not remove grid cap. Conn. o.p. meter across spkr. voice coil. Turn cond. gang completely out of mesh. Loop must be conn. to the chass. at all times. 2. Set sig. gen. at 455 KC and carefully adj. the two IF trims, and the two DIODE trims. to point show. highest read. on o.p. meter. 3. Turn sig. gen. to 1720 KC and, with cond. gang completely out of mesh, adj. OSC. trim. until 1720 KC sig. is heard. 4. Disconn. sig. gen. and tune in weak station near 1400 or 1500 K. Adj. ANT. trim. for max. volume.
ALIGNMENT PROCEDURE 6B Chassis

1. Conn. sig. gen. to grid of Osc.-Mod. tube thru a .05 MF cond. and to chass. Do not remove grid cap. Conn. o.p. meter across spkr. voice coil. Turn cond. gang completely out of mesh. Set band switch in BC position. NOTE: The band switch is the slider switch on rear of chass. base. UP position is for Short-Wave; DOWN for Broadcast.

2. Set sig. gen. at 455 KC; carefully adj. the four IF trim. to point show high. read. on o.p. meter. 3. Set band switch in "Short-Wave" position (UP). Conn. sig. gen. to ant. and gnd. terms. using 40 ohm carbon resistor in ant. lead. 4. Set sig. gen. at 18.0 MC and with cond. gang completely out of mesh adj. S.W. OSC. trim. until 18.0 MC sig. is heard. 5. Set sig. gen. at 16.0 MC and turn cond. gang to sig. at 16.0 MC. Adj. S.W. ANT. trim. to point giving greatest o.p. read. 6. Set band switch in Broadcast position and replace 400 ohm resistor in sig. gen. lead with .0002 MF cond. 7. Set sig. gen. at 1720 KC and turn cond. gang to out of mesh position. Adj. B.C. OSC. trim. until 1720 KC sig. is heard. 8. Set sig. gen. at 600 KC and rock pointer at 600 KC position on dial scale while adj. B.C. padder until combination is found which gives highest o.p. read. (NOTE: if there is noise at 600 KC padder can be adj. to max. noise without rocking gang and without use of sig. gen. Use short wire for pick-up if necessary.)
SENSITIVITY AND STAGE GAIN MEASUREMENTS

All stage gain measurements must be made with the volume control set for full volume. The shielded lead from the signal generator is connected to the grid terminal of the tube through a .1 MF condenser, with a 5000 ohm resistor connected as a leak resistance between the grid of the tube and the grid lead which has been removed.

When measuring over-all sensitivity at the antenna terminal, use a 200 MF condenser in place of .1 MF.

To measure over-all sensitivity of loop models, connect the signal generator to the coupling turn in the loop, using a 400 ohm dummy. The lead, including the resistor should be thoroughly shielded and the receiver must be at least 3 ft. away from the signal generator.

The figures in the table are average and allowance must be made for variations between two sets of the same general type, due to differences of tube characteristics, etc.

**MODELS 61C AND 61D**

<table>
<thead>
<tr>
<th>Average Sensitivity</th>
<th>Generator</th>
<th>@ 600 Hz</th>
<th>IF Grid</th>
<th>Med. Grid</th>
<th>Ant. Lead</th>
<th>Output Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.500</td>
<td>0.500</td>
<td>.1 MF</td>
<td>.1 MF</td>
<td>None</td>
<td>None</td>
<td>.20 Volts</td>
</tr>
<tr>
<td>0.500</td>
<td>0.500</td>
<td>.1 MF</td>
<td>.1 MF</td>
<td>None</td>
<td>None</td>
<td>.20 Volts</td>
</tr>
<tr>
<td>0.250</td>
<td>0.250</td>
<td>.1 MF</td>
<td>.1 MF</td>
<td>None</td>
<td>None</td>
<td>.20 Volts</td>
</tr>
</tbody>
</table>

**MODEL 61D (WITH LOOP)**

<table>
<thead>
<tr>
<th>Average Sensitivity</th>
<th>Generator</th>
<th>@ 6000 Hz</th>
<th>IF Grid</th>
<th>Med. Grid</th>
<th>Ant. Lead</th>
<th>Output Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>1500</td>
<td>6000</td>
<td>.1 MF</td>
<td>.1 MF</td>
<td>None</td>
<td>None</td>
<td>.20 Volts</td>
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<tr>
<td>1500</td>
<td>6000</td>
<td>.1 MF</td>
<td>.1 MF</td>
<td>None</td>
<td>None</td>
<td>.20 Volts</td>
</tr>
<tr>
<td>1500</td>
<td>6000</td>
<td>.1 MF</td>
<td>.1 MF</td>
<td>None</td>
<td>None</td>
<td>.20 Volts</td>
</tr>
</tbody>
</table>

**MODEL 81C (SQUARE LOOP)**

<table>
<thead>
<tr>
<th>Average Sensitivity</th>
<th>Generator</th>
<th>@ 1500 Hz</th>
<th>IF Grid</th>
<th>Med. Grid</th>
<th>Ant. Lead</th>
<th>Output Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.500</td>
<td>1500</td>
<td>.1 MF</td>
<td>.1 MF</td>
<td>None</td>
<td>None</td>
<td>.20 Volts</td>
</tr>
<tr>
<td>0.500</td>
<td>1500</td>
<td>.1 MF</td>
<td>.1 MF</td>
<td>None</td>
<td>None</td>
<td>.20 Volts</td>
</tr>
<tr>
<td>0.500</td>
<td>1500</td>
<td>.1 MF</td>
<td>.1 MF</td>
<td>None</td>
<td>None</td>
<td>.20 Volts</td>
</tr>
</tbody>
</table>

**ALIGNED PROCEDURE MODELS 61C AND 61D (WITH LOOP ANTENNA)**

1. Connect signal generator to control grid of last Det. tube (6AT) through a .3 MF condenser. Do not remove grid cap. Also connect output meter across speaker voice coil. Turn band switch to "Broadcast" position. Turn condenser gang completely out of mesh.
2. Set signal generator at 455 K.C. and carefully adjust the four LF trimmers (located at top of LF coil can) to point showing highest reading on output meter.
3. Leave band switch in "Broadcast" position. Connect signal generator to antenna and ground terminals, using a 00000 MF condenser in antenna lead. (Antenna — blue wire; ground — black wire.)
5. Set signal generator at 1400 K.C. and turn condenser gang to signal at 1400 K.C. Adjust BC ANT. trimmer to point showing highest reading on output meter.
6. Set signal generator at 600 K.C. and rock pointer at 600 K.C. position on dial scale, while adjusting BC condenser, until combination is found which gives highest output reading. (NOTE: If noise level is 600 K.C. condenser can be adjusted to maximum noise without rocking gang and without use of signal generator. Use short wire for pick-up as necessary.)
7. Turn band switch to "Short Wave" position. Replace 00000 MF condenser in signal generator lead with a 400 ohm carbon resistor.
8. Set signal generator and receiver dial both at 18.0 MC. Adjust S.W. OSC. trimmer until 18.0 MC signal is heard.
9. Set signal generator at 18.0 MC and tune condenser gang to signal at 18.0 MC. Adjust S.W. ANT. trimmer to point giving greatest output reading.
10. Set signal generator at 8.0 MC and rock pointer at 8.0 MC position on dial scale, while adjusting S.W. condenser, until combination is found which gives highest output reading. (NOTE: May also be adjusted to maximum noise.)

**MODEL 61D WITH LOOP ANTENNA**

1. Loop should be connected to chassis during alignment.
2. Alignment procedure is the same as above except for step 5, which should be omitted, as there is no BC ANT. trimmer in the loop version of this model.

**MODEL 81C WITH CYLINDRICAL LOOP**

1. When the chassis is aligned on the service bench, the loop may be disconnected if the WHITE and BLUE pin terminals are clipped or wired together. See Fig. 2 for trimmer locations.
2. Alignment procedure is the same as for Model 61C, plus the wave trap adjustment which is as follows:
3. Feed 455 EC signal into antenna lead and adjust wave trap trimmer to minimum reading on output meter.

**MODEL 81C WITH SQUARE LOOP**

1. Loop should be connected to chassis during alignment.
2. Alignment procedure is the same as for Model 61C, except for Step 5, which should be omitted, as there is no BC ANT. trimmer in this model.
3. There is no wave trap adjustment.

**VOLTAGE CHARTS**

**61C AND 61D**

<table>
<thead>
<tr>
<th>Tube</th>
<th>Position</th>
<th>Plane</th>
<th>Screen</th>
<th>Carbonode</th>
</tr>
</thead>
<tbody>
<tr>
<td>78</td>
<td>OSC</td>
<td>150</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>636</td>
<td>LF</td>
<td>260</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>637</td>
<td>IF</td>
<td>260</td>
<td>150</td>
<td>0</td>
</tr>
<tr>
<td>638</td>
<td>Out.</td>
<td>350</td>
<td>150</td>
<td>0</td>
</tr>
<tr>
<td>639</td>
<td>Rect. A.C.</td>
<td>400</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

* Note—.5 volts measured across resistor 43.
* Note—.5 volts measured across resistor 44.
* Note—18 volts measured across resistor 43.

**81C**

<table>
<thead>
<tr>
<th>Tube</th>
<th>Position</th>
<th>Plane</th>
<th>Screen</th>
<th>Carbonode</th>
</tr>
</thead>
<tbody>
<tr>
<td>79</td>
<td>OSC</td>
<td>150</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>636</td>
<td>LF</td>
<td>260</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>637</td>
<td>IF</td>
<td>260</td>
<td>150</td>
<td>0</td>
</tr>
<tr>
<td>638</td>
<td>Out.</td>
<td>350</td>
<td>150</td>
<td>0</td>
</tr>
<tr>
<td>639</td>
<td>Rect. A.C.</td>
<td>400</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

* Note—.5 volts measured across resistor 43.
* Note—1.5 volts measured across resistor 44.
* Note—18 volts measured across resistor 43.

Measurements from meter terminal to chassis can be used using 1200 ohms per volt meter.
When aligning AC-DC receivers, it is advisable to use a block condenser in series with grid conn. to sig. gen. If sig. gen. is AC operated, it may not be possible to connect to Mod. grid for IF align. because of hum. If so feed 455 KC sig. into ant. lead advancing sig. gen. attenuator accordingly. (In loop models conn. to cusp. turn in loop.)
CHECKING CLOCK CONTINUITY

Although we have sealed the Time Tuning Circuit against unauthorized tinkering, and have established a policy of retaining the circuit if the seal is broken, it is possible to completely check the clock circuit for defects without removing the mechanism from its housing. This can be done by "ear" and by continuity only if the seal is broken.

The first step in checking a clock is to make sure that the motor runs and that it keeps accurate time. Just plug it into its receptacle on the chassis and check its time-keeping qualities against a known source of accurate time.

If this test indicates that the clock motor is not running, it would be advisable to make certain that the receptacle on the chassis base is "live" and that 110 volts, 60 cycle A.C. is available at that point.

Before attempting to check the clock continuity, it would be helpful to go through a little practice course in listening to the sounds the clock makes. First, remove the clock assembly from its mounting on the center panel of the receiver, and hold it in your hands while you turn the time set knob on the back. While turning the knob, hold the clock up to your ear, listening for the clicks. When the minute hand passes any of the four-quarter-hour intervals into which each hour is divided, you will hear two clicks, the second of which falls very close after the first one. These clicks are caused by the quarter-hour cam switch blades dropping off the cams.

As you turn the time set knob, you will notice another single click which is a little louder and sounds a trifle more metallic than the double click which you get at the exact quarter-hour intervals. This single click will be heard when the minute hand is passing a point that is approximately half way between the quarter-hour positions. This click is caused by the contact on the twenty-four-hour hand as it falls off of one time bar to make contact upon the next time bar.

If you go through this operation several times, you will soon be able to identify these sounds. Once you are aware of the click times, you will be able to thoroughly check the continuity of the clock control circuit, without the necessity of looking inside the mechanism.

Procedure as follows:
1. With the time set knob, turn the clock hands until they read fifteen minutes to twelve on the day cycle. Look through the peephole and make sure of this.
2. Slowly turn the time set knob forward until the minute hand indicates approximately two minutes to twelve. In the course of this movement you will hear, unless the clock is defective, a single click which indicates that the twenty-four-hour contact has come to rest upon the twelve o'clock noon time bar.
3. Very slowly continue to turn the time set knob forward until you hear the first click, which indicates that the top blade of the twenty-four-hour cam has been lifted off of the large cam, causing the cam switch circuit to close. As soon as you hear this first click, stop turning the time set knob, for if you turn it far enough to hear the second click, the contact will be broken. The trick is to turn it far enough, but not too far.
4. Clear the clock of all previous settings by inserting a finger in the "OFF" position of the self-insulating dial, and dialing counter-clockwise until the stop is in the bottom of the dial. The clock will then be ready for testing.
5. With the round time-selecting knob on the front of the clock, turn the red time selecting pointer to 12:00 o'clock noon.
6. With a continuity meter, check continuity between Terminal No. 9 and all the other terminals on the plug at the end of the clock cable. You should get no reading. Terminal No. 9 is connected to the common lead.
7. Dial the "OFF" position just as you would if you were setting up the clock to turn the radio off at 12:00 o'clock noon. Check continuity between Terminal No. 9 and Terminal No. 7. You should get a full scale reading indicating a complete circuit. (Terminal No. 7 connects to the off relay when the clock is plugged into the chassis).
8. Dial Station No. 1 and check continuity between Terminal No. 9 and Terminal No. 1 of the clock cable. A full scale reading should result.
9. In their respective order, dial Stations 2, 3, 4, 5, and 6, checking continuity after each dialing between Terminal No. 9 and Terminals 2, 3, 4, 5, and 6, respectively. In each case you should get a full scale deflection of your continuity meter between Terminals No. 9 and the terminal which corresponds in number to the position you have dialed on the finger ring.

The procedure through which you have gone up to this point will, if the clock has been assembled correctly, tell you that the slider on the finger ring which represents the 12:00 o'clock noon position, is making a proper contact and that all the stations of the ring and the "OFF" ring in the clock.

10. Next turn the clock hands knob to the 12:15 o'clock position, then turn the red time-selecting pointer to the 12:15 o'clock position, and repeat Steps 1 to 9 for the 12:15 o'clock position. To check the 12:15 position, it will be necessary to repeat the procedure of the previous time bar.

If everything checks as above, you will know that your motor has a perfect mechanism.

ELECTRIC TUNER SERVICE SUGGESTIONS

Following you will find a list of troubles you may experience with the automatic tuning system.

Each possible failure is followed by suggestions which may aid you in quickly solving your service problems with this model.

**Motor Does Not Run**

1. Burned out 94 Tube (Black). This is a standby tube and should burn at all times.
2. Poor Contact at Push-Button Plug. Inspect the contacts between the plug and the receptacle on the chassis.
3. Open Circuit in Motor. Check all connections to motor and check motor winding for continuity.
4. 70 Mfd. motor starting condenser opened.
5. Motor magnesium coil opened. (See Fig. 3.)
6. B plus fuse (No. 55 Pilot bulb) burned out. Accessible from rear of chassis base. (See Fig. 1.)
7. Magnet Fails To Release. If the magnet which has previously been energized, fails to release the latch bar for any reason, the motor cannot turn the mechanism.

**Mechanism Runs Sluggishly**

1. Poor Contact Between Push-Button Plug and Receptacle. This will also result in voltage drop and lowered motor power.
2. Tension on motor contact armature too great.
3. Gears Not Properly Meshed. Check all gears in assembly. An improper meshing may cause defective Motor.—Replace.

**Motor Fails To Reverse**

1. Reversing Switch Not Properly Adjusted. See Fig. 2.
2. Open Circuit in Motor. If one side of motor circuit is open, motor will run in one direction only.
3. Open Magneto Winding. The open magneto will not pull latch down; consequently will not cause motor switch to reverse.
4. Latch Bar Spring Too Tight. If the latch bars operate under too much tension the mechanism may not be able to pull the latch down.

**Fails To Retain Original Setting**

1. Latch Rings Not Locked Securely. The locking screw must be pulled down securely otherwise, the shock of the sudden stopping will tend to unseal the assembly.
2. Original Setting Not Accurate. Resetting of magnets may be necessary after several days use, during which time the mechanism goes thru a "Shaking down" process.
3. Cable assembly from station magnets touching latch bars. Dress cable.

**Impossible to Set Up Stations**

1. Too Much Tension On Locking Levers. When the automatic locking screw is loose, the station rings should move freely. If the levers still hold the station rings partially locked, the screws which hold the levers in position should be loosened one half-turn.
2. Latch Rings "Out of Range." If the loosened latch rings slip on the drum until the notch falls out of reach of the latch bar, they can be brought back to position by following exactly the setting procedure outlined elsewhere in this book.

**FAILS TO STOP AT STATION**

1. Open Magneto Winding. Check for continuity and replace if necessary. Check latch bar assembly. See No. 6 below.
2. Latch Bar Deflection. Inspect latch bar to make sure that it has not been damaged. Replace latch bar, if required.
3. Poor Contact at Push-Button Plug. A poor contact here means a voltage drop which reduces the pulling power of the magnet.
4. Improper Spacing of Magnets. Check the spacing between the latch bar armature and the magnet pole. When the tip of the latch bar is seated all the way down in the notch in the latch ring, the armature should not quite touch the magnet pole. A hair line of light should be visible between them.
5. Latch Rings Not Locked Securely. If the latch rings are very loose the motor will continue to run.
6. Cable assembly from station magnets touching latch bars. Dress cable.

**Latch Bar Sticks In Notch**

1. Latch Bar Spring Weak. Check latch bar tension spring to make sure it is pulling away from the magnet with sufficient force. Spring tension is adjustable.
2. Armature Rotor Worn. There is a brass rivet at the tip of the armature, to prevent the armature from being drawn down, worn down, permitting the steel armature to actually touch the magnet pole, it may freeze in that position.
3. Burr On Tip of Latch. Latch tip should be smooth and shiny.
5. Latch Tips Not Centered On Latch Rings. Latch tips must mount halfway guide rings. The latch bar bearing shaft is adjustable.
6. Friction Clutch Too Tight. A tension washer between the motor pinion and the brass pinion collar acts as a friction clutch to absorb the shock of stopping the motor quickly when a station is tuned. If the tension is too tight, the torque of the stopped motor will hold the latch bar tip in the notch.

**Set Does Not Turn On**

1. "B" Fuse burned out (No. 55 Pilb Bulb) See Fig. 1.
2. Standby rectifier (black 94 tube) burned out.
3. Defective relay. See Fig. 1. Return to your Motorola distributor or factory for service. Relay plugs into socket in chassis base.
NOTE: This circuit does not use a standby transformer. Major parts used in the control circuit are listed below. Other parts are the same in both types of receivers.

25811706 Power Transformer
1821232 Power Relay
48011502 Dry Disc Rectifier
23912879 Electrolytic Cond. (2000 10-8V)
**MODEL 109K1, Types 1 & 2**

**ALIGNMENT PROCEDURE—MODELS 109K1 AND 109K2**

1. Connect signal generator to control grid of Modulator tube (6AG) through a .05 MF condenser and to chassis. Do not remove grid cap. Also connect output meter across speaker voice coil. Turn band switch to “Broadcast” position. Turn condenser gang completely out of mesh.

2. Set signal generator at 455 K.C. and carefully adjust the L.F. trimmers (located in top of L.F. coil case) to point showing highest reading on output meter.

3. Leave band switch in “Broadcast” position. Connect signal generator to antennas and ground terminals, using a .0002 MF condenser in antennas lead.

4. Set signal generator and receiver dial both at 1700 K.C. Adjust BC OSC. trimmer until 1700 K.C. signal is heard.

5. Set signal generator at 1400 K.C. and turn condenser gang to the signal at 1400 K.C. Adjust BC ANT. and BC RF trimmers to point showing highest reading on output meter.

6. Set signal generator at 600 K.C. and rock pointer at 600 K.C. position on dial scale, while adjusting BC paddler, until combination is found which gives highest output reading. (NOTE: If there is noise level at 600 K.C., paddler can be adjusted to maximum noise without rocking gang and without use of signal generator. Use short wire for pick-up if necessary.)

7. Turn band switch to “Police” position. Replace .0002 MF condenser in signal generator lead with a 400 ohm carbon resistor.

8. Set signal generator and receiver dial both at 7.0 MC. Adjust POLICE OSC. trimmer until 7.0 MC signal is heard.

9. Set signal generator at 6.0 MC and turn condenser gang to signal at 6.0 MC. Adjust POLICE ANT. and POLICE RF trimmers to point giving greatest output reading, while slightly rocking condenser gang.

10. Turn band switch to “Short Wave” position, still using 400 ohm carbon resistor in antenna lead to signal generator.

11. Set signal generator and receiver dial both at 22.0 MC. Adjust SW OSC. trimmer until 22.0 MC signal is heard.

12. Set signal generator at 18 MC and turn condenser gang to signal at 18 MC. Adjust SW ANT. and SW RF trimmers to point giving greatest output reading, while slightly rocking condenser gang.

13. Paddlers on “Police” and “Short Wave” bands are fixed. (No adjustment necessary.)
GALVIN MFG. CORP.

ALIGNMENT PROCEDURE—MODEL 89K3

1. Connect signal generator to control grid of Mod. tube (6AS7) through a .05 MF condenser and to chassis. Do not remove grid cap. Also connect output meter across speaker voice coil. Turn band switch to "Broadcast" position. Turn condenser gang completely out of mesh.

2. Set signal generator at 455 K.C. and carefully adjust the foam I.F. trimmers (port holes in top of I.F. coil cans) to point showing highest reading on output meter.


4. Set signal generator at 455 K.C. and adjust wave trap trimmer for minimum deflection of output meter.

5. Set signal generator and receiver dial both at 1700 K.C. Adjust BC OSC trimmer until 1700 K.C. signal is heard.

6. Set signal generator at 1400 K.C. and turn condenser gang to the signal at 1400 K.C. Adjust BC ANT. trimmer to point showing highest reading on output meter.

7. Set signal generator at 600 K.C. and rock point at 600 K.C. position on dial scale, while adjusting BC pad, until combination is found which gives highest output reading. (NOTE: If there is no noise level at 600 K.C., pad can be adjusted to maximum noise without rocking gang and without use of signal generator. Use short wire for pick-up if necessary.)

8. Turn band switch to "Short Wave" position. Replace .002 MF condenser in signal generator lead with a 400 ohm carbon resistor.

9. Set signal generator and receiver dial both at 18.0 MC. Adjust S.W. OSC trimmer until 18.0 MC signal is heard.

10. Set signal generator at 16.0 MC and turn condenser gang to signal at 16.0 MC. Adjust S.W. ANT. trimmer to point giving greatest output reading. (Use non-metallic screw driver.)

11. Set signal generator at 6.0 MC and rock point at 6.0 MC position on dial scale, while adjusting S.W. pad, until combination is found which gives highest output reading. (NOTE: May also be adjusted to maximum noise.)

Compliments of www.nucow.com
Current 6 amps at 6.3 volts.
Maximum power output 3.5 watts.

All voltages measured from socket terminal to chassis ground using 1000 ohm per volt meter.
VOLTAGE
All readings from chassis ground with 1000 ohms per volt meter.

Current - 6.5 Amps. at 6.3 Volts
Maximum power output - 3.5 Watts
**Model 300**

**ALIGNMENT PROCEDURE**

1. Connect the signal generator to the grid of the G.C.-Mod. tube (6AK7) through a .1 Ff. condenser, having first removed the grid cap from the top of the tube. Connect a 50,000 ohm resistor from the grid cap to the grid cap and removed from the tube. Turn the condenser and ANTENNA ADJUSTMENT

2. If the radio is to be operated on a Motorola Booster antenna, a special dummy antenna Motorola part No. 13X051 must be used in series with the lead from the signal generator to the antenna. Connect the signal generator to the antenna lead, using the special dummy.

3. Insert the dummy in place of the antenna and adjust for maximum output reading.


5. Set the generator at 680 K.C. and turn the condenser until the signal is heard. Adjust the dummy condenser for maximum output reading.


7. Set the generator at 680 K.C. and turn the condenser until the signal is heard. Adjust the dummy condenser for maximum output reading.

8. Set the generator at 1400 K.C. and turn the condenser until the signal is heard. Adjust the dummy condenser for maximum output reading.

9. For accurate readings, the dummy antenna must be used.

**SENSITIVITY AND STAGE GAIN MEASUREMENTS**

All stage gain measurements must be made with the volume control set for full volume. The shielded lead from the signal generator is connected to the grid terminal of the tube through a .1 Ff. condenser. The signal generator is then connected to the antenna terminal of the tube through the same .1 Ff. condenser. The signal generator is then connected to the antenna terminal of the tube through the same .1 Ff. condenser.

1. If the radio is to be operated on a Motorola Booster antenna, a special dummy antenna Motorola part No. 13X051 must be used in series with the lead from the signal generator to the antenna. Connect the signal generator to the antenna lead, using the special dummy.

2. Insert the dummy in place of the antenna and adjust for maximum output reading.

3. Adjust the 1400 K.C. C.R.F. trimmer on the condenser for maximum output reading.

4. For accurate readings, the dummy antenna must be used.

**Model 350**

**SENSITIVITY AND STAGE GAIN MEASUREMENTS**

All stage gain measurements must be made with the volume control set for full volume. The shielded lead from the signal generator is connected to the grid terminal of the tube through a .1 Ff. condenser. The signal generator is then connected to the antenna terminal of the tube through the same .1 Ff. condenser. The signal generator is then connected to the antenna terminal of the tube through the same .1 Ff. condenser.
All voltages measured from socket terminal to chassis ground using 1000 ohm per volt-meter. Maximum power output 4.25 watts. Current 6 amps at 6.3 volts.

©John F. Rider, Publisher
**Model 400**

**ALIGNMENT PROCEDURE**

Place the chassis on the service bench with the speaker, condenser, and battery connected to it. Turn the volume control to maximum position. Adjust the trimmer for maximum output. Note: Do not adjust the trimmer in the grid of the tube which is connected with a short circuit to the input. The trimmer should be set at the factory should not be tampered with. (Fig. 1 below, shows all trimmer locations.)

1. Connect the signal generator to the grid of the 6SL7, 6BQ7, or 6BQ5 and carefully adjust the trimmer in the grid of the tube to the grid of the tube which is connected with a short circuit to the input. The trimmer should be set at the factory should not be tampered with. (Fig. 1 below, shows all trimmer locations.)

2. Connect the signal generator to the control grid of the 6SL7, 6BQ7, or 6BQ5 and carefully adjust the trimmer in the grid of the tube to the grid of the tube which is connected with a short circuit to the input. The trimmer should be set at the factory should not be tampered with. (Fig. 1 below, shows all trimmer locations.)

3. Adjust the two trimmers in the i.f. coil can to the point showing the highest output reading.

4. Repeat the i.f. and diode adjustment several times for maximum accuracy.

**SETTING THE RANGE**

1. Connect the signal generator to the control grid of the 6SL7, 6BQ7, or 6BQ5 and carefully adjust the trimmer in the grid of the tube to the grid of the tube which is connected with a short circuit to the input. The trimmer should be set at the factory should not be tampered with. (Fig. 1 below, shows all trimmer locations.)

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4. Repeat the i.f. and diode adjustment several times for maximum accuracy.

**SENSITIVITY AND STAGE GAIN MEASUREMENTS**

All stage gain measurements must be made with the volume control set for full volume. The a.m. signal is fed from the Signal Generator to the grid of the tube and the grid lead which had been removed.

When measuring over-all sensitivity at the antenna terminal, use a special dummy, part No. 1139106, in place of the 1.0 MΩ. It must be remembered that the figures in the table are average and allowance must be made for variations between two sets of the same general characteristics, etc.

**AVERAGE MICROVOLTS INPUT**

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For one watt output:
- Meter connected across voice coil.
- 1.76 volts equals 1 watt output for 3 ohm voice coil.

**Model 450**

**ALIGNMENT PROCEDURE**

Place the chassis on the service bench with the speaker, condenser, and battery connected to it. Turn the volume control to maximum position. Adjust the trimmer for maximum output. Note: Do not adjust the trimmer in the grid of the tube which is connected with a short circuit to the input. The trimmer should be set at the factory should not be tampered with. (Fig. 1 below, shows all trimmer locations.)

1. Connect the signal generator to the control grid of the 6SL7, 6BQ7, or 6BQ5 and carefully adjust the trimmer in the grid of the tube to the grid of the tube which is connected with a short circuit to the input. The trimmer should be set at the factory should not be tampered with. (Fig. 1 below, shows all trimmer locations.)

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3. Adjust the two trimmers in the i.f. coil can to the point showing the highest output reading.

4. Repeat the i.f. and diode adjustment several times for maximum accuracy.

**R.F. AND ANTENNA ADJUSTMENT**

1. Still using the same 40 MHz condenser in the antenna lead, set the signal generator at 1400 K.C. and turn condenser knob until the signal is heard. Adjust trimmer for maximum output. Note: The two 20-turn screws "A" are to be loosened just a turn or two and then the tension is released, which will allow the eccentric screws to screw in place and the antenna will be in the proper position. Adjust the eccentric screws "B" in a clockwise order to tighten the locking screws "A" securely.

2. Connect the signal generator at 600 K.C. and carefully adjust the trimmer in the grid of the tube to the grid of the tube which is connected with a short circuit to the input. The trimmer should be set at the factory should not be tampered with. (Fig. 1 below, shows all trimmer locations.)

3. Adjust the two trimmers in the i.f. coil can to the point showing the highest output reading.

4. Repeat the i.f. and diode adjustment several times for maximum accuracy.

**SENSITIVITY AND STAGE GAIN MEASUREMENTS**

All stage gain measurements must be made with the volume control set for full volume. The a.m. signal is fed from the Signal Generator to the grid of the tube and the grid lead which had been removed.

When measuring over-all sensitivity at the antenna terminal, use a special dummy, part No. 1139106, in place of the 1.0 MΩ. It must be remembered that the figures in the table are average and allowance must be made for variations between two sets of the same general characteristics, etc.

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For one watt output:
- Meter connected across voice coil.
- 1.76 volts equals 1 watt output for 3 ohm voice coil.
GAMBLE-SKOGMO INC.

MODEL 6B Power Converter
MODEL 540, Late
Schematics

Speakers. This model is equipped with a balanced armature magnetic speaker. Should the armature "strike", causing a rattle or distortion, proceed as follows:

1. Trim Types (used on early production). Bend bracket holding armature snubber cup up or down until armature centers. This bracket is located on bottom of magnet housing.

2. Weight Decostrak Type. To center armature, remove small aluminum plate on bottom of magnet housing. Loosen one of the small set screws and tighten the other until the armature is floating in the center of poles.

CIRCUIT DIAGRAM NO. E17749
Model 540 Late

C-1 200 V
C-2 .05 200 V
C-3 5000 pF 500 V
C-4 .05 200 V
C-5 10000 pF 500 V
C-6 5000 pF 500 V
C-7 7000 pF 500 V
C-8 .01 500 V
C-9 002 600 V
C-10 10 \times 25 V ELECTRICALY

I.F. FREQUENCY 455 KC.
B.C. FREQUENCY 540 KC. TO 1725 KC.

NOTE: Fuse added in A—Battery lead after Serial No. 171

BATTERY SET

CIRCUIT DIAGRAM 6 VOLT POWER UNIT

Diagnosis of Troubles

<table>
<thead>
<tr>
<th>EFFECT</th>
<th>CAUSE</th>
</tr>
</thead>
</table>
| Does not operate | Storage Battery run-down. Battery connections loose. Relay not closing—-heavy red or black battery wires may be twisted inside unit and holding relay armature open. | Blow fuse—check all wiring before inserting new fuse. A defective vibrator will also "blow" the fuse. A good vibrator will have a smooth "hum" when holding your ear close to the unit; a worn vibrator will "spatter".

R. F. "Hash" noise in set, usually a buzzing sound | A good antenna and ground must be used on the set. Power unit should be located away from the set by the length of the cable. On sets having short wave bands, noise may always be noticed on some parts of the band but is usually not objectionable.

High battery drain | The total drain on the six volt battery should be approximately one ampere plus the normal "A" drain of the set. Example: with model 610, 1 amp. plus 1.5 total 1.5 amps. Excessive drain may be caused by defective transformer, vibrator, or filter condenser in the power unit or defective switch by or pass condenser in the set.
The type and function of each tube is as follows:

1—Type 12SA7 Mixer, First Detector-oscillator.
1—Type 12SK7 I. F. Amplifier.
1—Type 12SQ7 Second Detector, A.V.C. and First Audio.
1—Type 35L6GT Beam Output Amplifier.
1—Type 35Z4GT Rectifier.

SERVICE NOTES:

Voltages at different points of circuit to B are measured with all tubes in their sockets and speaker connected, with a voltmeter having a resistance of 1000 ohms per volt.

All voltages as indicated on the voltage chart are measured with 117 volt A.C. line.

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.

Excessive hum, stuttering, low volume and a reduction in all D. C. voltages is usually caused by a shorted electrolytic condenser; open by-pass condensers frequently cause oscillation and distorted tone.
PROCEDURE FOR SETTING THE AUTOMATIC LEVERS

There are five levers on the dial by means of which five stations may be selected, (See "B" Fig. 2).

* Make a list of local stations you tune in regularly; any number up to and including five.
* Punch out the set of station call letter tabs supplied, the call letters of the stations you have selected.
* On the front of each automatic tuner lever an opening is provided for inserting the call letter tabs, (See "A" Fig. 2).
* Insert the call letter tabs in the rectangular openings of each of the automatic tuner levers. One of the small celluloid tabs supplied should be snapped into place over each of the station call letter tabs.
* Press DOWN ALL THE WAY any one of the automatic tuner levers. Holding it down firmly, turn in by means of the tuning knob (No. 1) the station you have assigned to this lever. Turn the tuning knob very slowly back and forth (while still holding lever in downward position) until the signal is clearest. The station will then be accurately tuned in. Release the lever.

FIG. 2—FRONT VIEW

Press down another automatic tuner lever, Holding it down TOmeldy, carefully tune in the station assigned to this lever. Release this lever.

Follow this procedure until you have selected all of your favorite stations.

Now rotate the tuning knob (No. 1) to the right (clockwise) as far as it will turn, and tighten the special locking screw ("C") located on left side of tuner dial assembly (See Fig. 2).

It is VERY IMPORTANT that this locking screw is turned until it is ABSOLUTELY TIGHT.

This screw will lock in place all the stations you have selected on the automatic tuner levers. (Note: Locking screw "C" is loose when radio is shipped from factory).

If you should desire to change any station you selected to another, loosen the locking screw "C" one or two turns, select the new station as explained. Be sure to retighten the locking screw, otherwise the stations you have selected will not stay adjusted to the levers.

The automatic dial is now set up for quick tuning. Press down on the lever and your favorite station is selected.
GENERATOR INTERFERENCE

Remove the generator cutout mounting screw and fasten the condenser (100-81) bracket on the generator cutout mounting lug. Replace the cutout mounting screw and tighten down securely.

Connect the condenser lead to the battery terminal of the cutout. The generator condenser is absolutely necessary as it is used to eliminate a high pitched whining noise which would otherwise be heard as the motor is accelerated.

CONNECTIONS TO BATTERY

The battery cable number 107-82, (red wire with fuse receptacle at one end and terminal lug at other end) must be connected to battery terminal of ammeter. At the same time connect ammeter capacitor, number 100-82, to battery terminal of ammeter, other end of condenser to any convenient ground screw on back of instrument panel. Make certain that insulating sleeve is slipped over fuse when fuse is placed in receptacle, before connecting to short battery cable from receiver.

When connected properly, the discharge due to current drawn by the receiver should not indicate on the ammeter. This is important, since if improperly connected, as shown by the deflection of ammeter, additional motor interference may be encountered.

ADJUST ANTENNA TRIMMER

Tune in a weak signal at approximately 600 K.C. with volume control about three-fourths on. Adjust trimmer screw "X" until maximum output is obtained. (See Fig. 1, Adjustment "X" on right side of radio.)

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MODEL 577C
Schematic/Voltage
Battery Notes

January 1939
Serial No. 203070 Up

Compliments of www.nucow.com
ALIGNING INSTRUCTIONS

All of the adjustments have been very carefully set with signal generators at the factory and require no further adjustment, unless it becomes necessary to replace a coil or transformer, or if the adjustments have been tampered with in the field. Under no circumstances attempt any adjustments without first making certain that adjustment is necessary and only after voltages, tubes and condensers have been checked and found to be normal. To properly realign this receiver, a test oscillator, as well as an output meter, must be used.

DUMMY ANTENNAS

The dummy antennas referred to in the following instructions are:

"I.F. Dummy" — A .5 mfd. condenser connected in series with the test oscillator output lead.

"Broadcast Dummy" — A 125 mfd. condenser connected in series with the output lead of the test oscillator.

RESONANCE INDICATOR

Use as a resonance indicator an output meter connected across the primary of the speaker input transformer, or by means of an adapter between the plate and screen terminals of the type 6K6 output tube. Maximum deflection of the meter indicates resonance. Use only enough signal to get a readily readable output. A low range on the meter or the low scale of a multi-range meter should be used.

LF. ALIGNMENT: (465 K.C.)

1. With variable condenser in its minimum capacity position (plates entirely out of mesh) and with volume control full on, connect test oscillator set at 465 K.C. in series with I.F. dummy antenna, to grid of 6SK7 I.F. transformer.

2. Adjust trimmer condensers of output I.F. transformer No. 108121 to resonance with oscillator.

3. Move test oscillator connection to grid of 6SA7 tube and adjust trimmer condensers of input I.F. transformer No. 108139 to resonance with oscillator. There are two adjustments on each and they are accessible from the top of the transformer shield and should be adjusted with an insulated screw driver. (See Fig. 3—top view, page 3.)

BROADCAST ALIGNMENT

1. With variable condenser in its minimum capacity position, connect test oscillator set at 1550 K.C. in series with broadcast dummy to the antenna lead of receiver.

2. Adjust oscillator trimmer of variable condenser to resonance. This adjustment is the rear section of the two-gang condenser—see top view, Fig. 3.

3. Shift test oscillator to 1400 K.C. and pick up signal by rotating condenser and adjust antenna trimmer (front section of gang condenser) to resonance (see top view, Fig. 3).

4. Re-set test oscillator to 600 K.C. and rotate variable condenser to 600 K.C. Adjust series pad in the antenna circuit for maximum gain. This pad is mounted on the side of the antenna can, adjustment "X."

5. Go back and check 1400 K.C. If adjustment is made here, check 600 K.C. again.

6. Check for sensitivity at 1000 K.C. by setting test oscillator to this frequency and picking up the signal by rotating variable condenser. Under no circumstances bend plates of variable condenser sections to correct tracking.

PROCEDURE FOR SETTING THE AUTOMATIC LEVERS

There are five levers on the dial by means of which five stations may be selected. (See "B" Fig. 2.)

Make a list of local stations you tune in regularly; any number up to and including five.

Punch out from the set of station call letter tabs supplied, the call letters of the stations you have selected.

On the front of each automatic tuner lever an opening is provided for inserting the call letter tabs, (See "A" Fig. 2.)

Insert the call letter tabs in the rectangular openings of each of the automatic tuner levers. One of the small celluloid tabs supplied should be snapped into place over each of the station call letter tabs.

Press DOWN ALL THE WAY any one of the automatic tuner levers. Holding it down FIRMLY, tune in by means of the tuning knob (No. 1) the station you have assigned to this lever. Turn the tuning knob very slowly back and forth (while still holding lever in downward position) until the signal is clearest. The station will then be accurately tuned in Release the lever.

Press down another automatic tuner lever. Holding it down FIRMLY, carefully tune in the station assigned to this lever. Release this lever.

Follow this procedure until you have selected all of your favorite stations.

Now rotate the tuning knob (No. 1) to the right (clockwise) as far as it will turn, and tighten the special locking screw ("C") located on left side of tuner dial assembly (See Fig. 2).

It is VERY IMPORTANT that this locking screw is turned until it is ABSOLUTELY TIGHT.

This screw will lock in place all the stations you have selected on the automatic tuner levers. Locking screw "C" is loose when radio is shipped from factory.

If you should desire to change any station you selected to another, loosen the locking screw "C" one or two turns, select the new station as explained. Be sure to retighten the locking screw, otherwise the stations you have selected will not stay adjusted to the levers.

The automatic dial is now set up for quick tuning. Press down on the lever and your favorite station is selected.
**ALIGNING I.F. TRANSFORMERS: (465 K.C.)**

Part No. 108-83 Output I.F. Transformer  
Part No. 108-82 Input I.F. Transformer  

These I.F. transformers have two adjustments, both of which are accessible from the top of chassis (see top view).

1. With volume control full on (the extreme right of its rotation), and with the variable condenser set to approximately 1400 kilocycles, make the following adjustments:

   (a) Connect external oscillator set at 465 kilocycles, in series with .1 mfd. condenser, to the control grid cap of the type 78 tube, and adjust the output I.F. transformer (No. 108-83) to resonance.

   (b) Move oscillator output clip from grid of 78 grid cap of 6A7 and adjust input I.F. transformer (No. 108-82) to resonance.

   (c) With oscillator still connected to 6A7, readjust output I.F. transformer (108-83) if necessary.

---

**R.F. ALIGNMENT: (535-1720 K.C.)**

1. Unsolder the antenna wire from its terminal on the antenna coil and with a gang condenser in its minimum capacity position, plates entirely out of mesh, connect an external oscillator in series with a .5 mfd. condenser to the antenna terminal on the antenna coil and chassis ground and make the following adjustments:

   (a) With external oscillator set at 1720 kilocycles, adjust oscillator trimmer (rear of gang condenser).

   (b) Re-set external oscillator to 1550 kilocycles, rotate condenser, pick up oscillator signal and adjust antenna trimmer to resonance (front section of gang condenser).

   (c) Check sensitivity at 600 and 1000 kilocycles.
NOTE: Circuit diagram and voltage chart show connections and voltage measurements for the cathode-ray tuning indicator type 615. This data only applies to the model 765; the model 665 is not equipped with a cathode-ray tuning indicator.
MODELS 665 & 765 SERIES A

DESCRIPTION
The tube complement of this chassis consists of the following octal base glass and metal tubes:
1—Type 6K8G Triode Hexode, First Detector, or oscillator.
1—Type 6K7 Retent Cut-Off Pentode, I. F. Amplifier (465 K. C.).
1—Type 6D7G Duplex Diode Triode Second Detector, A. V. C. and First Audio.
1—Type 6PSG Driver Stage.
1—Type 6AC5G Positive Grid Triode Output Amplifier, 5 Y 3G High Vacuum Rectifier.
1—Type 6U5 Cathode-Ray Tuning Indicator Tube for Model 765.
Transformers are available and chassis are sometimes equipped with universal transformers for operation on 25, 40 and 60 cycles and with primary taps for 110, 130, and 230 volts, (see parts list).

SERVICE NOTES:
Voltage 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 1000 ohms per volt.
All voltages as indicated on the voltage chart are measured with 115 volts on the primary of the power transformer.
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.

ALIGNMENT PROCEDURE
The following equipment is required for aligning:
1 All wave signal generator which will provide an accurately calibrated signal at the test frequencies as listed.
1 Output indicating meter.
1 Non-metallic screwdriver.
1 Dummy antenna—1 m, 200 mmfd, and 400 ohms.

BAND   FREQUENCY SETTING   SIGNAL GENERATOR   DUMMY ANTENNA   CONNECTION TO RADIO   POSITION OF BAND SWITCH   VARIABLE CONDITIONER SETTING   TRIMMERS ADJUSTED (IN ORDER SHOWN)   TRIMMER FUNCTION   ADJUSTMENT

LF
465 Kc.    .1 MFD. Grid of 6K7    Broadcast (Extreme left rotation)    Rotors full open (Plates out of mesh)    Two trimmers on top (See Fig. 1)   Output: L. F.   Adjust to maximum output
465 Kc.    .1 MFD. Grid of 6K7    Broadcast (Extreme left rotation)    Rotors full open (Plates out of mesh)    Two trimmers on top (See Fig. 1)   Input: L. F.   Adjust to maximum output

SHORT WAVE BAND
17 Mc.    400 ohms Antenna lead    Broadcast (Extreme right rotation)    Set dial at 17 Mc.    Trimmer (C 7) (See Fig. 3)   Short wave Oscillator   Adjust to maximum output
17 Mc.    400 ohms Antenna lead    Broadcast (Extreme right rotation)    Set dial at 17 Mc.    Trimmer (C 4) (See Fig. 3)   Short wave Antenna   Adjust to maximum output

BROADCAST BAND
1400 Kc.    200 mfd. Antenna lead    Broadcast (Extreme left rotation)    Rotor full open (Plates out of mesh)    Trimmer (C 4) (See Fig. 3)   Broadcast Oscillator   Adjust to maximum output
1400 Kc.    200 mfd. Antenna lead    Broadcast (Extreme left rotation)    Set dial at 1400 Kc.    Trimmer (C 5) (See Fig. 3)   Broadcast Antenna   Adjust to maximum output
600 Kc.    200 mfd. Antenna lead    Broadcast (Extreme left rotation)    Set dial at 600 Kc.    Trimmer (C 11) (See Fig. 3)   Broadcast oscillator series pad   Adjust to maximum output

IMAGE REJECTION
2100 Kc.    200 mfd. Antenna lead    Broadcast (Extreme left rotation)    Pick up signal at 1700 Kc. on dial    Wire capacitor (CB) (See circuit diagram)   Image rejection   Adjust by twirling for minimum output. (See note "B")
2100 Kc.    200 mfd. Antenna lead    Broadcast (Extreme left rotation)    Pick up signal at 1700 Kc. on dial    Wire capacitor (CA) (See circuit diagram)   Image rejection   Adjust by moving mini- mum output. (See note "C")

NOTE "A"—Turn the dial back and forth slightly (rock) and adjust trimmer until the peak of greatest intensity is obtained.
NOTE "B"—200Kc is the image frequency of 1700 Kc. Adjust wire capacity (CB) by moving the wire either toward or away from the antenna coil winding until a minimum output is obtained on the output meter.
NOTE "C"—2600Kc is the image frequency of 1700 Kc. Adjust wire capacity (CB) by moving the wire either toward or away from the antenna coil winding until a minimum output is obtained on the output meter.

Excessive hum, stuttering low volume and a reduction in all D. C. voltages is usually caused by a shorted electrolytic condenser; open by-pass condensers frequently cause oscillations and distorted tone.

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 line voltage, defective tubes, condensers and resistors. In order to properly align this chassis, an oscillator (generator) is absolutely necessary. No aligning adjustments should be attempted with the chassis in the cabinet.

TO REMOVE CHASSIS FROM THE CABINET:
Remove the four bolts which are used to fasten the chassis to the cabinet shelf; pull the knob off the shafts and pull off the six button lever keys on front of dial.

NOTE: "A" Turn the dial back and forth slightly (rock) and adjust trimmer until the peak of greatest intensity is obtained.
NOTE "B"—200Kc is the image frequency of 1700 Kc. Adjust wire capacity (CB) by moving the wire either toward or away from the antenna coil winding until a minimum output is obtained on the output meter.
NOTE "C"—2600Kc is the image frequency of 1700 Kc. Adjust wire capacity (CB) by moving the wire either toward or away from the antenna coil winding until a minimum output is obtained on the output meter.
Connections to Battery:

CAUTION: Before making any battery connections, check polarity of the remote unit (combined in radio unit to determine whether it corresponds with the polarity of the storage battery in the car.

The radio is shipped from the factory with the vibrator and unit in place and will operate in cars in which the positive (+) post of the battery is grounded to the body of the car.

In cars in which the negative (−) post of the battery is grounded to the frame, the radio must be shipped with the field terminal connected to the frame. The reference plate must be mounted as close to the frame as possible so as not to cause the slightest chance of shorting to any metal part of the car or to cause the slightest chance of shorting to any metal part of the car.

Check the polarity of the storage battery in car either by checking the actual wire connections on the battery or by using a voltmeter. The correct polarity is positive to negative.

Antenna Connection:

Insert the antenna plug in cable into the back of the antenna. The wire at the connector end to the antenna, will be connected to the station unique antenna ground. The wire at the side of the connector will be connected to the negative terminal of the storage battery.

When the installation is made as shown in Fig. 1A, the shielded and the ground lead will be connected to the terminal of the storage battery.

A 6-inch shielded antenna cable is supplied. If a steel or buss bange type antenna is used, this cable will be long enough in practically all cases to reach the connector post or column at which the antenna lead comes down. The shielded cable should be pushed up into the column as far as possible. The reason for this is that there might be some difficulty in pushing it up if the cable is not long enough.

PROCEDURE FOR SETTING THE AUTOMATIC (Fig. 2):

1. To release the last pushbutton press in very slightly any of the other pushbuttons, the selector lever will trip the latching mechanism.

2. To lock the turner pushbutton, the knob must be turned hard enough to make it stay latched. Release the knob immediately. The knob must be turned hard enough to make it stay latched. Release the knob immediately. (NOTE: A pushbutton is not in position 5. Locking the turner mechanism.)

Radio Location and Mounting:

Determine the most satisfactory mounting position.

Lift the radio case up and temporarily hold it in the protruded position. The case should be mounted high enough to avoid interference with the control and the finish of the Remote Tuner unit in respect to the radio case should be considered. The limiting factor being the length of special connectors and the finish of the remote control unit to the radio case. (This cable should not be altered in any manner.)

Mount location for the mounting bolt, drill one half inch (½") hole, making sure that the plastic grommet is placed. A good ground connection between receiver and the frame or car.

CAUTION: Before fastening the radio unit, read carefully the paragraphs on CONNECTIONS TO BATTERY! This concerns the polarity of the vibrator unit and must be thoroughly understood as the radio will not operate unless the polarity of the vibrator unit corresponds with the polarity of the storage battery in the car.

Tuner Unit Mounting:

It may be necessary in some instances to move dash panel light switches or car meter control switches, however, in the majority of cases the Remote Tuner Unit will mount very satisfactorily under the dash panel to the left of the operator, either in the center or on the right. The pushbutton switch will be mounted close to the steering column as possible to allow clearance for the emergency brake and the handbrake in the seam of the car.

Details of mounting are shown in Fig. 1A and 1B, respectively. (Fig. 1A shows the Remote Tuner Unit mounting bolts. (See Fig. 1B.)

The bracket No. 115253 for mounting the Remote Tuner Unit is available in two lengths, 6 and 8 inches, to accommodate the needs of 6 and 8 inches, to accommodate the needs of the installation.

Mount the bracket using either the flat head self-tapping screw or the flat head screw heads, backwashers and nuts supplied.

Insert the two Remote Tuner Unit mounting bolts through the holes in the bracket to the length of the braces. Mount the nuts in place while mounting the unit to the bracket (see Fig. 1B). The screws should be tightened in the mounting bracket (right hand side of bolt is not shown) so that the remote unit can be moved forward or backward as desired. Fasten the bolt securely.

The full automatic operation is obtained by moving the selector from one position to another without forcing the knob. (See Fig. 1B.)

Press in any of the pushbuttons and YOUR FA-VORITE RADIO STATION will be automatically tuned in as shown in Fig. 1A and 1B.

The important steps to remember when setting up stations are:

1. To lock the turner mechanism press on the turner knob hard enough to make it stay latched. Release the knob immediately. The knob must be turned hard enough to make it stay latched. Release the knob immediately. (NOTE: A pushbutton is not in position 5. Locking the turner mechanism.)

2. The button on the turner knob must be turned hard enough to make it stay latched. Release the knob immediately. The knob must be turned hard enough to make it stay latched. Release the knob immediately. (NOTE: A pushbutton is not in position 5. Locking the turner mechanism.)

3. To release the last pushbutton press in very slightly any of the other pushbuttons, the selector lever will trip the latching mechanism.

4. To lock the turner pushbutton, the knob must be turned hard enough to make it stay latched. Release the knob immediately. The knob must be turned hard enough to make it stay latched. Release the knob immediately. (NOTE: A pushbutton is not in position 5. Locking the turner mechanism.)

5. To release the last pushbutton press in very slightly any of the other pushbuttons, the selector lever will trip the latching mechanism.
DESCRIPTION:

Model 678 is a six tube superheterodyne receiver having a tuning range of 335 K. C. to 1565 K. C., operates from a 6 volt storage battery and uses the automotive type 6.3 volt tubes. The "B" supply is obtained from the synchronous type vibrator. The I. F. frequency used is 465 K. C. The output I. F. coil has three tuned circuits giving superior band pass qualities and selectivity as compared to the conventional two tuned circuit coils. Antenna, R. F. and oscillator circuits are permeability tuned, offering automatic tuning applications that are both accurate and stable. The entire coil assembly is mounted in the Remote Tuner control head being connected to the oscillator and R. F. circuits by an R. F. transmission cable.

The R. F. oscillator, I. F. and audio amplifier including the power supply is contained in the speaker case.

- Volume control—Maximum all adjustments.
- Connect radio chassis to ground post of signal generator with a short heavy lead.
- Connect dummy antenna value in series with generator output lead.
- Disconnect output meter across primary of output transformer.
- Allow chassis and signal generator to "heat up" for several minutes.

SERVICES NOTES:

Voltages taken from different points of circuit to chassis are measured with voltmeter control full on, all tubes in their sockets and speaker connected, with a voltmeter having a resistance of 1000 ohms per volt. These voltages are clearly indicated on the voltmeter chart.

In order to prevent signal from acting upon A. V. C. and affecting accuracy of voltage measurements, aerial and ground leads should be short circuited while making measurements.

All voltages are to be measured with 6.3 volt input to receiver. Resistances of coils and transformer windings are indicated in ohms on schematic 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.

The following equipment is required for alignment:

- Output indicating meter.
- Non-metallic screwdriver.
- Dummy antenna—1 ml., 125 mm. L.

<table>
<thead>
<tr>
<th>BAND</th>
<th>Frequency Setting</th>
<th>Dummy Antenna</th>
<th>Connection to Radio</th>
<th>Remote Tuner Dial Setting</th>
<th>Trimmers Adjusted (In Order Shown)</th>
<th>Trimmer Function</th>
<th>Adjustment</th>
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</thead>
<tbody>
<tr>
<td>I. F.</td>
<td>465 Kc.</td>
<td>1 MFD.</td>
<td>Grid of 6SK7 L. F. Tube</td>
<td>Set dial at 1400 Kc.</td>
<td>Trimmers C9, C10 (See Fig. 3)</td>
<td>I. F.</td>
<td>See note &quot;A&quot; Adjust to maximum output</td>
</tr>
<tr>
<td>465 Kc.</td>
<td>1 MFD.</td>
<td>Grid of 6SK7</td>
<td></td>
<td>Set dial at 1400 Kc.</td>
<td>Trimmers C9, C10 (See Fig. 3)</td>
<td>I. F.</td>
<td>See note &quot;B&quot; Adjust to maximum output</td>
</tr>
<tr>
<td>465 Kc.</td>
<td>1 MFD.</td>
<td>Grid of 6AG</td>
<td></td>
<td>Set dial at 1400 Kc.</td>
<td>Trimmers C14, C15 (See Fig. 3)</td>
<td>I. F.</td>
<td>Adjust to maximum output</td>
</tr>
<tr>
<td>1565 Kc.</td>
<td>125 mm.</td>
<td>Antenna lead</td>
<td></td>
<td>Set dial at 1560 Kc.</td>
<td>Trimmers C5 (See Fig. 3)</td>
<td>Oscillator</td>
<td>Adjust to maximum output</td>
</tr>
<tr>
<td>1400 Kc.</td>
<td>125 mm.</td>
<td>Antenna lead</td>
<td></td>
<td>Set dial at 1400 Kc.</td>
<td>Trimmers C5, C5 (See Fig. 3)</td>
<td>I. F.</td>
<td>See note &quot;C&quot; Adjust to maximum output</td>
</tr>
<tr>
<td>600 Kc.</td>
<td>125 mm.</td>
<td>Antenna lead</td>
<td></td>
<td>Set dial at 600 Kc.</td>
<td>Antenna and R. F. (See Fig. 3)</td>
<td>Antenna series adj.</td>
<td>See note &quot;C&quot; Antenna series adj.</td>
</tr>
</tbody>
</table>

NOTE "A" IMPORTANT: To align the output I. F. transformer without using a cathode ray oscillograph a 10M ohm resistor must be shunted across the diode tuned circuit. Connect the resistor as indicated by points "X" and "Y" on the circuit diagram and the bottom view of the radio chassis Fig. 2. A 50 ohm on top of output I. F. can designate location of trimer "X." NOTE "B" Before adjusting trimmer C15 disconnect the 10M ohm resistor. Under no circumstances are the trimmers C14 or C20 after the 10M ohm resistor has been removed.

NOTE "C" Maximum gain for this adjustment depends on the capacity of the antenna system of the car in which the radio is installed. For the proper alignment of this adjustment see "Aligning Antenna Trimmers."
ALIGNMENT PROCEDURE:

- Volume control—Maximum all adjustments.
- Connect B - of radio chassis to ground post of signal generator through 1 MΩ condenser.
- Connect dummy antenna value is series with generator output lead.
- Connect output meter across primary of output transformer.
- Allow chassis and signal generator to "heat up" for several minutes.

ALIGNED INSTRUCTIONS:

- Do not remove the back cover of the radio which contains the loop antenna from the chassis. It is important during alignment that the same distance between the loop antenna and the chassis be maintained as when the chassis is installed in the cabinet.

- Slight adjustments to the oscillator and antenna circuits can be made without removing the chassis from the cabinet through two holes which are provided on the bottom of the cabinet.

- The two adjustments on the variable gang condenser can be reached with a long insulated type screw driver through these two holes.

The following equipment is required for aligning:

- An all wave signal generator.
- Output indicating meter.
- Non-metallic screwdriver.
- Dummy antennas—1 MΩ.

BAND | SIGNAL GENERATOR | Frequency Setting | Dummy Condenser | Connection to Radio | Variable Condenser Setting | Trimmers Adjusted (in Order Shown) | Trimmer Function | Adjustment
--- | --- | --- | --- | --- | --- | --- | --- | ---
I.F. | 465 Kc. | .1 MFD. | Grid of 12SA7 | Rotor full open (Plates out of mesh) | Four Trimmers on Top (See Fig. 1) | Output and Input L.F. | Adjust to maximum output

BROAD-
CAST

BAND | 1400 Kc. | See Note “A” | Set dial at 1400 Kc. | Trimmer bottom of Rear section of gang, (See bottom of radio) | Antenna | Adjust to maximum output

NOTE “A” Lay the output lead from the generator in back of the loop antenna. Turn up the output of the generator, picking up the energy in the loop antenna without any electrical connection from the generator.

Power Consumption: 800 Milliwatts Undistorted, 1.5 Watts Maximum

Intermediate Frequency: 465 Kc.
SERVICE NOTES:

Voltage taken from different points of circuit to chassis are measured with voltmeter control full on, all tubes in their sockets and speaker connected, with a volt meter having a resistance of 1000 ohms per volt.

IN ORDER TO PREVENT SIGNAL FROM ACTING UPON AVC AND AFFECTING ACCURACY OF VOLTAGE MEASUREMENTS, AUXILIARY AND GROUND LEADS SHOULD BE SHORT CIRCUITED WHILE MAKING MEASUREMENTS.

All voltages are to be measured with 115 volts A.C. line or a fully charged 6 volt storage battery.

Resistances of coils and transformer windings are indicated in ohms on schematic circuit diagrams.

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.

Excessive hum, stuttering, low volume and a reduction in all D.C. voltages is usually caused by a shorted electrolytic condenser, open by-pass condensers frequently cause oscillation and distorted tone.

SETTING THE AUTOMATIC TUNER LEVERS:

IMPORTANT—Read carefully before setting the automatic levers.

There are six levers by means of which six stations may be selected. Make a list of local stations or stations you tune into regularly; any number up to and including six.

1. Punch out from the set of station call letter tabs supplied, the call letters of the stations you have selected.

2. On the front of each automatic tuner lever button an opening is provided for inserting the call letter tabs.

3. Insert the call letter tabs in the rectangular openings of each of the automatic tuner buttons. One of the small celluloid tabs should be inserted into place over each of the station call letter tabs.

NOW, PROCEED AS FOLLOWS:

1. Pull the dial tuning knob all the way out (See Illus. “B,” Fig. 3), and rotate the tuning knob to the left (counterclockwise) until it cannot be turned any further (See Illus. “D,” Fig. 3). This will unlock the automatic tuner mechanism.

2. Press down all the way any one of the automatic tuner levers. Holding it down firmly, press in on the dial tuning knob No. 3 and tune in the station indicated on the station call letter tab on this lever. You will note that in order to tune the station, the dial tuning knob will have to be pressed in (See Illus. “E,” Fig. 3). Turn the dial tuning knob very slowly back and forth (while still holding the automatic tuner lever in downward position), noting the width of the shadow on the screen of the cathode-ray tuning indicator. Minimum width of the tuning indicator indicates the ideal tuning position (resonance). The station will then be clearest and accurately tuned in.

3. Press down another automatic tuner lever. Holding it down firmly, press in on the dial tuning knob and carefully tune in the station indicated on the call letter tab on this lever.

4. Follow this procedure until you have selected all of your favorite stations.

5. Pull the dial tuning knob all the way out (See Illus. “B,” Fig. 3) and rotate the tuning knob to the right (clockwise) until it cannot be turned any further (See Illus. “C,” Fig. 3). This will lock the automatic tuner mechanism and the stations you have set up for automatic tuning will be locked in place.

6. If you should desire to change any station you selected to another, pull the dial tuning knob all the way out and rotate the knob to the left (counterclockwise) and unlock the tuner mechanism. Select the new station as explained.

KNOB NO.3 (DIAL TUNING)

PULL OUT
A

PULL OUT NO.3 KNOB ALL THE WAY TO LOCK OR UNLOCK TUNING MECHANISM. (See Illus. C & D)

B

C

TO LOCK

D

TO UNLOCK

E

PUSH IN FOR MANUAL TUNING

FIG. 3

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FIG. 2—FRONT VIEW

(Nota:—If the dial mechanism works hard when setting up a new station for one of the automatic tuner levers, it is due to the tuner mechanism not being unlocked all the way. Pull the dial tuning knob out all the way and rotate the knob to the left (counterclockwise) until it will turn no further. The dial mechanism should work freely with the tuner lever pressed down).

7. After you have selected the new station, pull the dial tuning knob all the way out and rotate the knob to the right (clockwise) to lock the tuner mechanism. Be sure the knob is turned until it will turn no further, then press the dial tuning knob in.

8. The automatic tuner levers are now set up for quick tuning. Press down the lever key and—YOUR FAVORITE STATION IS SELECTED!

The important steps to remember when setting up stations on the tuner levers for automatic tuning are:

1. To unlock the tuner mechanism pull the dial tuning knob all the way out. You may find it necessary to rotate the knob slightly when pulling it out to make certain that the gears mesh properly. Rotate the dial tuning knob to the left (counterclockwise) as far as it will turn without forcing.

2. To set a lever, press down all the way and hold in this position while tuning in by means of the dial tuning knob the station you want this lever to be tuned to. (Note: you will notice that it will be necessary to keep pressing in on the dial tuning knob while tuning in the station as a spring tends to push the knob out.) Set all the levers in the same manner before locking the mechanism.

3. To lock the tuner mechanism pull the dial tuning knob all the way out. Rotate the dial tuning knob to the right as far as it will turn making certain that it is tight, but it is not necessary to use force.

4. After locking or unlocking the tuner mechanism always return the dial tuning knob to its normal position (pushed in).
### SIGNAL GENERATOR

<table>
<thead>
<tr>
<th>Band</th>
<th>Frequency Setting</th>
<th>Dummy Antenna</th>
<th>Connection to Radio</th>
<th>Position of Band Switch</th>
<th>Trimmers Adjusted (In Order Shown)</th>
<th>Trimmer Function</th>
<th>Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.F.</td>
<td>650 Kc.</td>
<td>.1 MFD</td>
<td>Grid of 6K7</td>
<td>Broadcast (Extreme left rotation) Rotor full open (Plates out of mesh)</td>
<td>Two trimmers on top (See Fig. 1)</td>
<td>Output I.F.</td>
<td>Adjust to maximum output</td>
</tr>
<tr>
<td></td>
<td>465 Kc.</td>
<td>.1 MFD</td>
<td>Grid of 6K8G</td>
<td>Broadcast (Extreme left rotation) Rotor full open (Plates out of mesh)</td>
<td>Two trimmers on top (See Fig. 1)</td>
<td>Input I.F.</td>
<td>Adjust to maximum output</td>
</tr>
</tbody>
</table>

### BROADCAST BAND

<table>
<thead>
<tr>
<th>Frequency Setting</th>
<th>Antenna lead</th>
<th>Connection to Radio</th>
<th>Position of Band Switch</th>
<th>Trimmers Adjusted (In Order Shown)</th>
<th>Trimmer Function</th>
<th>Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1720 Kc.</td>
<td>200 mml.</td>
<td>Broadcast</td>
<td>(Extreme left rotation) Rotor full open (Plates out of mesh)</td>
<td>Trimmer (C9) (See Fig. 4)</td>
<td>Broadcast oscillator</td>
<td>Adjust to maximum output</td>
</tr>
<tr>
<td>1500 Kc.</td>
<td>200 mml.</td>
<td>Broadcast</td>
<td>(Extreme left rotation) Rotor full open (Plates out of mesh)</td>
<td>Trimmer (C6) (See Fig. 4)</td>
<td>Broadcast oscillator</td>
<td>Adjust to maximum output</td>
</tr>
<tr>
<td>600 Kc.</td>
<td>200 mml.</td>
<td>Broadcast</td>
<td>(Extreme left rotation) Rotor full open (Plates out of mesh)</td>
<td>Trimmer (C10) (See Fig. 4)</td>
<td>Broadcast oscillator</td>
<td>Adjust to maximum output</td>
</tr>
<tr>
<td>465 Kc.</td>
<td>200 mml.</td>
<td>Broadcast</td>
<td>(Extreme left rotation) Rotor full open (Plates out of mesh)</td>
<td>Trimmer (C1) (See Fig. 4)</td>
<td>I.F. Wave Trap</td>
<td>Adjust for minimum output</td>
</tr>
</tbody>
</table>

### IMAGE REJECTION ADJUSTMENTS

<table>
<thead>
<tr>
<th>Frequency Setting</th>
<th>Antenna lead</th>
<th>Connection to Radio</th>
<th>Position of Band Switch</th>
<th>Trimmers Adjusted (In Order Shown)</th>
<th>Trimmer Function</th>
<th>Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>2330 Kc.</td>
<td>200 mml.</td>
<td>Broadcast</td>
<td>(Extreme left rotation) Rotor full open (Plates out of mesh)</td>
<td>Trimmer (C1) (See Fig. 4)</td>
<td>I.F. Wave Trap</td>
<td>Adjust for minimum output</td>
</tr>
</tbody>
</table>

### SHORT WAVE BAND

<table>
<thead>
<tr>
<th>Frequency Setting</th>
<th>Antenna lead</th>
<th>Connection to Radio</th>
<th>Position of Band Switch</th>
<th>Trimmers Adjusted (In Order Shown)</th>
<th>Trimmer Function</th>
<th>Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>17 Mc.</td>
<td>400 ohms</td>
<td>Short Wave</td>
<td>(Extreme right rotation) Rotor full open (Plates out of mesh)</td>
<td>Trimmer (C8) (See Fig. 4)</td>
<td>Short Wave oscillator</td>
<td>Adjust to maximum output</td>
</tr>
<tr>
<td>17 Mc.</td>
<td>400 ohms</td>
<td>Short Wave</td>
<td>(Extreme right rotation) Rotor full open (Plates out of mesh)</td>
<td>Trimmer (C7) (See Fig. 4)</td>
<td>Short Wave oscillator</td>
<td>Adjust to maximum output</td>
</tr>
<tr>
<td>6 Mc.</td>
<td>400 ohms</td>
<td>Short Wave</td>
<td>(Extreme right rotation) Rotor full open (Plates out of mesh)</td>
<td>Trimmer (C7) (See Fig. 4)</td>
<td>Short Wave oscillator</td>
<td>Adjust to maximum output</td>
</tr>
</tbody>
</table>

---

Attenuate the signal from the signal generator to prevent the leveling-off action of the AVC. After each band is completed, repeat the procedure as a final check.

---

**BOTTOM VIEW OF CHASSIS**

VOLTAGES MEASURED WITH 1000 OHM PER VOLT VOLTOMETER BETWEEN SOCKET TERMINALS & CHASSIS.

A.C. LINE VOLTAGE 115 Volts.

A - CANNOT BE READ WITH VOLTOMETER
B - 3.0 VAC BETWEEN PINS 8 AND 9
C - 650 VAC BETWEEN PINS 4 AND 8
D - 0.0 VAC ACROSS RESISTOR 490

---

**ALIGNMENT PROCEDURE**

*NOTE:* For clarity, all leads and parts shown are drawn in solid black and are controlled with a secondary lead or leadout until the part is installed in the chassis.

---

**GAMBLE-SKOGMO INC.**

MODEL 767 SERIES A

ATTACHMENTS: VOLTAGE

**TRIMMERS**

C1 - WAVE TRAP TRIMMER 465 K.C.
C3 - IMAGE REJECTION TRIMMER
C6 - B.C. ANT. TRIMMER
C7 - S.W. ANT. TRIMMER
C8 - S.W. OSC. TRIMMER
C9 - B.C. OSC. TRIMMER
C12 - B.C. OSC. PAD
C13 - S.W. OSC. PAD

---

**FIG. 4**

---

**REAR OF CHASSIS**

---

**Compliments of www.mcew.com**
GAMBLE-SKOGMO INC.

VOLTAGES AT SOCKETS FOR 117 VOLT AC LINE

See Note Below Regarding Voltages when Operated on DC

Volume Control Maximum—Antenna Lead Grounded—Readings taken with 1000 Ohm-

per-volt Meter.

<table>
<thead>
<tr>
<th>TUBE</th>
<th>FUNCTION</th>
<th>Prong 1</th>
<th>Prong 2</th>
<th>Prong 3</th>
<th>Prong 4</th>
<th>Prong 5</th>
<th>Prong 6</th>
<th>Prong 7</th>
<th>Prong 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>6J7</td>
<td>1st Det. &amp; Osc.</td>
<td>6.3(1)</td>
<td>98</td>
<td>98</td>
<td>6.3(1)</td>
<td>6.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6J7</td>
<td>2nd Det.</td>
<td>6.3(1)</td>
<td>10</td>
<td>13</td>
<td>6.3(1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25L6G</td>
<td>Output</td>
<td>24(1)</td>
<td>92</td>
<td>98</td>
<td>24(1)</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25Z6G</td>
<td>Rectifier</td>
<td>24(1)</td>
<td>125</td>
<td>117(2)</td>
<td>24(1)</td>
<td>125</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>555B</td>
<td>Ballast</td>
<td>56.6(3)</td>
<td></td>
<td></td>
<td>56.6(3)</td>
<td>4.5(4)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(1) AC voltage across terminals 2 and 7.
(2) AC voltage to ground.
(3) AC voltage across terminals 3 and 7.
(4) AC voltage across terminals 7 and 8.

---

POWER CONSUMPTION: 48 watts at 117 volts AC supply.
POWER OUTPUT: 30 KC broad at 100 times signal.
SELECTIVITY: 590 to 1750 KC.
SIGNAL GENERATOR: 450 KC.
SIGNAL CONNECTION: Grid of 1st Det. at 100 ma.
TUNING RANGE: 1750 KC.
ANTENNA LOAD: 500 ohms.
ANTENNA: Grid of 1st Det. at 200 ma.
CONNECTOR: 200 ma.
CONTROL: Tuner to full scale.
ADJUST TRIMMERS FOR MAXIMUM SENSITIVITY.

Note: To obtain dual scale calibration, tune in an AC signal on 25L6G grid while adjusting the pointer on the meter. When the pointer is full scale, the meter should read 1000 ohms.

---

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Caution

On models having an On-Off indicator disk behind the front of the cabinet, it is necessary to take the following precautions, when removing the chassis: Pull the chassis away from the front of the cabinet until the control shafts are clear of the cabinet. Then tilt the rear of the chassis upward. At the same time, keep the front of the chassis base clear of the bottom of the cabinet to prevent breaking the On-Off indicator disk on the volume control shaft. Now carefully pull the chassis out of the cabinet.
ANTENNA

An outside antenna and ground are not required for this radio.

A loop antenna is built on the back cover of the cabinet. This makes the radio suitable for portable use.

If the radio is installed in a permanent location, an outside antenna is recommended. The antenna should be at least 20 feet from the radio to avoid signal interference.

ADJUSTING THE LOOPER

The following adjustments are required for optimal performance:

1. Adjust the trimmer for the best signal strength.
2. Adjust the trimmer for the best reception.
3. Adjust the trimmer for the best overall performance.

These adjustments should be made by a professional technician.

INTERMEDIATE FREQUENCY

Adjust the intermediate frequency for maximum signal strength.

ANTENNA TRIMMER

Adjust the antenna trimmer for maximum signal strength.

TUBES

The tube types and pin connections are shown in the diagram. A separate capacitor is used for each tube.

ANTENNA FOR OPTIMIZED PERFORMANCE

The antenna should be at least 20 feet from the radio to avoid signal interference.

POWER SUPPLY

The power supply for this radio is an external source.

The battery should be replaced every 6 months.

TUBES

The tubes are not replaceable. If a tube fails, the entire radio must be replaced.

ADJUSTING THE LOOPER

The following adjustments are required for optimal performance:

1. Adjust the trimmer for the best signal strength.
2. Adjust the trimmer for the best reception.
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FOR CONVENTIONAL ALIGNMENT
SEE SPECIAL SECTION OF
VOLUME V111

FOR SIMILAR TUNER ADJUSTMENTS SEE GAMBLE-SKOGMO MODEL 76A, PAGE 10-6.

FOR CONVENTIONAL ALIGNMENT SEE SPECIAL SECTION OF VOLUME V111.

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ALIGNMENT - Should the receiver require alignment proceed as follows. Remove the back. Remove the chassis from the cabinet. Set the test oscillator at 456KC and connect it to the grid of the 1A7G. The first I.F. Transformer is located on top of the chassis, the second I.F. is on the front apron, directly under the dial. All I.F. trimmers are aligned for maximum output.

The high frequency antenna trimmer is aligned at approximately 1500 KC. Replace chassis in cabinet, and put the back in place. Now tune in a station at approximately 600 KC and adjust the OSCILLATOR through the hole in the bottom of the cabinet for maximum signal, while rocking the dial back and forth.

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ALIGNMENT - Should the receiver require alignment, proceed as follows:
Remove the back. Remove the chassis from the cabinet. Set the test oscillator at 456 KC and connect oscillator output to the grid of the 1A7G. The I.F. transformers are located on the top of the chassis. All I.F. transformers shall be aligned for maximum output. The high frequency oscillator trimmer is aligned at approximately 1500 KC. Replace the chassis in the cabinet and put the loop back in place. Now set the signal generator at 600 KC and adjust the oscillator for maximum output while rocking the gang condenser. SEE DIAGRAM FOR LOCATION OF VARIOUS ADJUSTING SCREWS.

NOTE: When used in Electric operation, the line cord should be extended to its full length. If it is left closely folded while operating from the light line, the concentrated heat may damage the cord.
S - S2 - S3 - S4 ARE GANGED ON BAND SWITCH
TRIMMER LOCATIONS

Input IF Transformer is adjacent to the IF Tube.
Output Transformer is directly behind the gang condenser.
S.W.1 Antenna trimmer located under chassis on antenna coil.
L.W. Osc. Trimmer under chassis on L.W. condenser which is between the band switch and paddor condenser.
L.W. Padder under chassis on front apron adjacent to L.W. Oscillator coil.

FOR ALIGNMENT
SEE INDEX
Compliments of www.nucow.com

GAROD MODELS 389, 493, 495, 939, 1239.

If this procedure is not adhered to, all adjustments will appear very broad. This is due to the action of the automatic volume control.

I.F. ADJUSTMENT - The signal generator is set at 455 Kc and is connected to the grid of the converter tube (12AT7) through a 5 MF capacitor. Be sure to connect a resistor of approximately 25,000 OHMS between the converter grid and ground so that the grid circuit is at ground potential for D.C.

The Input I.F. Transformer trimmers - are both adjusted for maximum output as indicated by the output meter connected across either the voice coil or the primary coil of the loud speaker.

The Output I.F. Transformer trimmers - are adjusted for maximum output as indicated on the output meter. The Input I.F. should now be re-checked for maximum output.

SHORT-WAVE BAND #1 MODELS 493, 495, 939 (ONLY) - Set the band switch to the extreme left-hand position which is short-wave band #1. Set the generator at 15 MIC, turn the condenser until a response is indicated. The pointer should co-incide with the 15 MIC mark on the dial. Adjust the antenna trimmer for the short-wave band for maximum output while rocking the condenser gang from left to right.

SHORT-WAVE BAND #1 MODELS 389 (ONLY) - Set the band switch to the extreme right hand position which is short-wave band #1. Turn the dial control knob to the extreme high frequency end so that the condenser plates are entirely out of mesh. The signal generator is connected to the "short-antenna" lead through a dummy antenna, consisting of a 250 MF condenser and a 400 QM non-inductive resistor in series. Set the generator at 15 MIC, turn the condenser until a response is indicated. The pointer should co-incide with the 15 MIC mark on the dial. Adjust the antenna trimmer for the short-wave band located under the chassis near the band switch) for maximum output. Set the generator at 600 KC and turn the variable condenser control until a response is indicated. Adjust the broadcast oscillator paddler condenser (located on top of the chassis between the variable condenser and the output I.F. transformer) for maximum response while "rocking" the gang condenser.

The high frequency adjustments should now be re-checked.

BROADCAST BAND MODELS 389, 493, 495, 939. The dummy antenna for this band consists of only a 250 MF condenser. Set the Band Switch in the middle position and condenser plates completely out of mesh. Set the generator at 1550 KC. Turn the variable condenser until a response is indicated. The dial pointer should now co-incide with the 1550 KC mark on the dial. Adjust the 1550 KC Antenna trimmer (located under the chassis near the band switch) for maximum output. Set the generator at 600 KC and turn the variable condenser control until a response is indicated. Adjust the broadcast oscillator paddler condenser (located on top of the chassis between the variable condenser and the output I.F. transformer) for maximum response while "rocking" the gang condenser. The high frequency adjustments should now be re-checked.

SHORT-WAVE BANDS MODELS 389, 493, 939 - Set the band switch to the middle position. Turn the dial control knob to the extreme high frequency end so that the condenser plates are entirely out of mesh. The signal generator is left connected as for band #1. The generator is set at 6.25 MC and the Band #2 condenser trimmer is opened until a response is indicated at the lower capacity setting of the trimmer. Set the generator at 6 MIC and turn the variable condenser until a response is indicated. The pointer should now co-incide with the 6 MIC mark on the dial. The antenna trimmer is then adjusted for maximum output while the condenser gang is rocked from right to left. Set the generator at 2.4 MC and turn the variable condenser knob until a response is indicated. The paddler for this band is now adjusted for maximum output while rocking the condenser gang from left to right. The high frequency adjustments should then be rechecked.

LONG WAVE BAND MODELS 493, 1239, The band selector switch is set in position for operation on the long wave band (extreme right hand position). The receiver and generator are both tuned at 300 kc and the oscillator trimmer is adjusted for maximum response. The antenna and first detector trimmers are adjusted in the order named for maximum output. The signal generator is then set at 150 kc and the signal is tuned in. The long wave paddle condenser is adjusted for maximum response while the gang tuning condenser is rocked slightly to the left and right. The 300 kc adjustment should then be re-checked.

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Fig. 6. Dial Drive Stringing Diagram

Models H-73, H-77, H-78, and H-79 employ three-band a-c receivers of the superheterodyne type using seven General Electric Pre-tested Tubes. Features of design include the new "Alnico" dynapower speaker, nine Feather-touch Tuning keys, six of which may be set up for favorite stations, a television audio or phonograph key, VinuLux dial, iron-core I.F. transformers, iron-core oscillator trimmer coils for station keys and automatic volume control. In addition Model H-73 is equipped with the built-in "Beam-a-scope" while Models H-77, H-78, and H-79 are equipped with the built-in "Super Beam-a-scope."

Models H-78 and H-79 each contain a phonograph mechanism for reproducing records. Model H-78 phonograph manually plays 10-inch or 12-inch records. Model H-79 phonograph incorporates an automatic record-changer which will play either 10-inch or 12-inch records. Both mechanisms contain high-quality crystal pick-ups and constant speed, self-starting, silent electric motors.
GENERAL INFORMATION

Super Beam-a-scope

The Super Beam-a-scope is essentially a tuned coil antenna wound on a frame and shielded by a Faraday screen against electrostatic disturbances. This construction favors the desired signal over a local man-made noise source in three ways. First, since any noise source is composed of two components—electrostatic and electromagnetic fields—the Super Beam-a-scope may be revolved so that a null point is found where no voltage is produced from these two components. Due to the fact that this null point is very sharp, it is very unusual that any desired station will be in a direct line with the rejected noise signal and thereby have its signal strength reduced appreciably. In the second place, the Super Beam-a-scope eliminates local man-made noise sources is much the same way as a shielded antenna lead-in does in an ordinary antenna installation. In the third place the Super Beam-a-scope differentiates against the electrostatic component of an incoming wave in comparison with the electromagnetic component, because of the Faraday shield. Since the electrostatic component of a local noise source is a great deal larger than the electromagnetic component, this rejection property brings about an enormous increase in signal-to-noise ratio.

The above operation is only available on the broadcast band and in this position the Super Beam-a-scope is also the first tuned grid circuit. On the "C" and "D" bands, the Super Beam-a-scope is grounded at the grid end thus preventing absorption spots due to loop resonance.

Load-speaker

The voice coil is accurately and permanently centered at the factory and should seldom give trouble. In a case voice coil needs recentering it will be necessary to replace the entire cone and voice coil assembly.

Note.—In no case should the magnet be removed from the assembled position without remagnetizing before replacing it.

Coil System

L-1 is the Beam-A-Scope, T-1 is the "C" and "D" band antenna transformer while T-5 is the oscillator transformer for all bands. All band switch and coil terminals are numbered in Fig. 3 and 4 to facilitate in locating common points.

The following table shows the coils in use for the various positions of the band and manual-automatic switch:

<table>
<thead>
<tr>
<th>Band Switch Position</th>
<th>Antenna Primary</th>
<th>Antenna Secondary</th>
<th>Oscillator Grid</th>
<th>Oscillator Cathode</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Band &quot;B&quot; Manual Position</td>
<td>L-1</td>
<td>L-6</td>
<td>24 to Gnd. of L-6</td>
<td>C-1 tuning condenser in circuit</td>
<td></td>
</tr>
<tr>
<td>Band &quot;B&quot; Automatic Tuning</td>
<td>L-1</td>
<td>L-6</td>
<td>25 to Gnd. and L-5 trimmers of L-6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Band &quot;C&quot;</td>
<td>L-2</td>
<td>L-2</td>
<td>6 to Gnd. L-7</td>
<td>C-7 and L-5</td>
<td></td>
</tr>
<tr>
<td>Band &quot;D&quot;</td>
<td>L-3</td>
<td>L-3</td>
<td>7 to Gnd. of L-8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Phonograph or Television Audio Connections

These models are equipped with a phono-terminal (pin jack) to allow the convenient connection of record players or television audio channels. General Electric plug, Stock No. RP-114, fits the pin jack. Models H-73, H-77 and H-78 use the plug connection from phonograph to radio and this plug may be readily removed to allow use of other record players, sound equipment or television sound converters.

Note.—A suitable load consisting of a 100,000-ohm resistor in series with .01 mfd. capacitor should be connected across the pick-up leads when using a crystal-type unit.

Alignment Procedure

The alignment procedure is given in table form

Use a standard I.R.E. "dumy" antenna, Fig. 7, in making all R.F. alignments. The relative position of the Beam-a-Scope with respect to the chassis materially affects R.F. alignment on the "B" band; therefore, final alignment on "B" band should be made after the chassis and Beam-a-Scope are mounted in the cabinet.

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PHONOGRAPH MECHANISM (H-78)

The phonograph mechanism used in this receiver has been designed to be as simple as possible and give long and trouble-free performance. Under normal operating conditions service difficulties should be negligible. Occasionally, however, certain adjustments may be required.

Trip Mechanism

The trip mechanism is of simple design and consists of a latch bar connected to the motor switch and a trip lever. The latch is held closed by means of a spring between the latch bar and the trip lever. The motor switch is mechanically connected to the latch bar so that when the trip mechanism is released, the motor switch is in the "OFF" position. Be sure this latch bar mechanism works freely without binding.

The trip is actuated by an adjustable arm on the trip lever. When the eccentric groove in the record swings the tone arm back and forth, it pushes the latch out of engagement.

Crystal Pick-up

The crystal pick-up employs a crystal element which is coupled to a light needle chuck. The needle movement bends the crystal element thus generating voltage by the piezoelectric effect. The voltage developed is dependent upon the needle movement amplitude and the load resistance.

The crystal cartridge is a factory sealed unit and no adjustments are provided. The cartridge is held in the tone arm by means of two screws. The pick-up and tone-arm assembly should require very little servicing and if treated with reasonable care should perform its function without attention for long periods of time.

Special Service Information

The following information will be found very useful in servicing receivers if a vacuum tube voltmeter or similar voltage-measuring instrument is available.

1. Stage Gains
   (a) Antenna Post to Converter Grid
      Band "B"...6 to 9
      Band "C"...3 to 4
      Band "D"...1.5 to 3
   (b) Converter Grid to 6SQ7 Grid...45 at 455 K.C.
   (c) 6SQ7 Grid to 6H6 Det. Plate...45 at 455 K.C.

2. A 400-cycle signal of .04 volts across the volume control will drive 15 watts speaker output.† (Volume control turned to maximum)

3. Average d-c voltage developed across oscillator grid resistor (R-2)
   Band "B"...6 to 8 volts
   Band "C"...5 to 7 volts
   Band "D"...2.5 to 5 volts

† Variations of +10%, -20% permissible.

FOR RECORD CHANGER DATA SEE INDEX

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GENERAL ELECTRIC CO.

ALIGNMENT PROCEDURE

I. F. ALIGNMENT WITH OSCILLOSCOPE

<table>
<thead>
<tr>
<th>Band</th>
<th>Switch Setting</th>
<th>Input Freq.</th>
<th>Point of Input</th>
<th>Dummy Antenna</th>
<th>Trimmer</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Band &quot;B&quot;</td>
<td>455 K.C. Sweep</td>
<td>I.F. Grid</td>
<td>.06 Mfd. or Larger</td>
<td>2nd I.F. Sec.</td>
<td>2nd I.F. Pri. (T-7)</td>
</tr>
<tr>
<td>2.</td>
<td>Band &quot;B&quot;</td>
<td>455 K.C. Sweep</td>
<td>Converter Grid</td>
<td>.06 Mfd. or Larger</td>
<td>1st I.F. Sec.</td>
<td>1st I.F. Pri. (T-6)</td>
</tr>
</tbody>
</table>

I. F. ALIGNMENT WITH OUTPUT METER

<table>
<thead>
<tr>
<th>Band</th>
<th>Switch Setting</th>
<th>Input Freq.</th>
<th>Point of Input</th>
<th>Dummy Antenna</th>
<th>Trimmer</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Band &quot;B&quot;</td>
<td>455 K.C. Sweep</td>
<td>I.F. Grid</td>
<td>.06 Mfd. or Larger</td>
<td>2nd I.F. Sec.</td>
<td>2nd I.F. Pri. (T-7)</td>
</tr>
<tr>
<td>2.</td>
<td>Band &quot;B&quot;</td>
<td>455 K.C. Sweep</td>
<td>Converter Grid</td>
<td>.06 Mfd. or Larger</td>
<td>1st I.F. Sec.</td>
<td>1st I.F. Pri. (T-6)</td>
</tr>
</tbody>
</table>

R. F. ALIGNMENT

<table>
<thead>
<tr>
<th>Band</th>
<th>Switch Setting</th>
<th>Input Freq.</th>
<th>Point of Input</th>
<th>Dummy Antenna</th>
<th>Trimmer</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>Band &quot;D&quot;</td>
<td>21 M.C. with Modulation</td>
<td>Antenna Post</td>
<td>I.R.E.</td>
<td>Osc. (C-4)</td>
<td>Close gang plates—adjust pointer to first line at left end of tuning scale. Connect output meter across voice coil—tune on &quot;Base&quot; position. The image of any &quot;D&quot; band signal should be heard 910 K.C. below signal input when (C-4) is on proper peak. Example: 18 M.C. image 17.09 M.C. Peak (C-2) while rocking the gang condenser.</td>
</tr>
<tr>
<td>3.</td>
<td>Band &quot;C&quot;</td>
<td>6 M.C. with Modulation</td>
<td>Antenna Post</td>
<td>I.R.E.</td>
<td>Ant. (C-3)</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Band &quot;B&quot;</td>
<td>1500 K.C. with Modulation</td>
<td>Antenna Post</td>
<td>I.R.E.</td>
<td>Osc. (C-6)</td>
<td>Peak trimmer for maximum output while rocking the gang condenser.</td>
</tr>
</tbody>
</table>

Stock No. | Description | List Price |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>PHONOGRAPH ASSEMBLY (H-78)</td>
<td>Tone Arm Assembly</td>
<td></td>
</tr>
<tr>
<td>RA-414</td>
<td>ARM—Tone arm</td>
<td>$1.20</td>
</tr>
<tr>
<td>RC-8132</td>
<td>CORD—Tone arm lamp cord</td>
<td>.40</td>
</tr>
<tr>
<td>RP-503</td>
<td>PICKUP—Crystal cartridge</td>
<td>$6.00</td>
</tr>
<tr>
<td>RP-508</td>
<td>PIVOT—Tone arm pivot</td>
<td>$1.20</td>
</tr>
<tr>
<td>RS-572</td>
<td>SOCKET—Lamp socket assembly</td>
<td>.50</td>
</tr>
<tr>
<td>RS-876</td>
<td>SCREW—Needle clamping screw (Pkg. 10)</td>
<td>.50</td>
</tr>
<tr>
<td>RT-915</td>
<td>TONE ARM—Tone arm assembly (complete)</td>
<td>$16.70</td>
</tr>
<tr>
<td>RX-069</td>
<td>ASSEMBLY—Pilot light connector assembly</td>
<td>$2.00</td>
</tr>
</tbody>
</table>

Automatic Stop Assembly

<table>
<thead>
<tr>
<th>Stock No.</th>
<th>Description</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>RA-411</td>
<td>ARM—Trip arm tension washer and screw assembly</td>
<td>.25</td>
</tr>
<tr>
<td>RS-469</td>
<td>SPRING—Automatic stop locking spring (Pkg. 3)</td>
<td>.35</td>
</tr>
<tr>
<td>RX-064</td>
<td>ASSEMBLY—Automatic stop assembly</td>
<td>1.85</td>
</tr>
</tbody>
</table>

Motor Turntable Assembly

<table>
<thead>
<tr>
<th>Stock No.</th>
<th>Description</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>RB-184</td>
<td>BRACKET—Turntable drive wheel bracket assembly</td>
<td>.15</td>
</tr>
<tr>
<td>RB-185</td>
<td>BRACKET—Lower motor bearing bracket assembly complete</td>
<td>.40</td>
</tr>
<tr>
<td>RF-502</td>
<td>FIELD—60-cycle field stator assembly complete</td>
<td>3.60</td>
</tr>
<tr>
<td>RF-503</td>
<td>FIELD—60-cycle field stator assembly complete</td>
<td>3.60</td>
</tr>
<tr>
<td>RP-504</td>
<td>FRAME—Upper motor frame assembly</td>
<td>.60</td>
</tr>
<tr>
<td>RM-127</td>
<td>MOTOR—60-cycle motor assembly complete less turntable</td>
<td>4.85</td>
</tr>
<tr>
<td>RN-10</td>
<td>NEEDLE CUP—Needle cup (Model H-78)</td>
<td>.10</td>
</tr>
<tr>
<td>RP-15</td>
<td>PLATE—Motor mounting plate assembly</td>
<td>.45</td>
</tr>
<tr>
<td>RP-152</td>
<td>PLUG—Phono motor power connector plug</td>
<td>.25</td>
</tr>
</tbody>
</table>

Fig. 1. Over-all I. F. Curve Taken on G-E Oscilloscope OFM-1

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GENERAL INFORMATION

The Model H-87 is a three-band a-c operated receiver employing eight General Electric Pre-tested Tubes in a superheterodyne circuit. This receiver is equipped with nine Passhetter Tuning Keys, six of which, may be set up for favorite stations. The three remaining keys allow power control, manual tuning and photograph or television audio reception. The new Super Beam-a-scope, which is a highly effective beam-controlled circuit, is standard equipment on this model. Other features of design include: "Albino" dyspraxic speaker, floodlighted station key finder, visuallux dimmer, three I.F. transformers, automatic tone compensation, automatic volume control and push-pull output.

SUPER BEAM-A-SCAPE

The Super Beam-a-scope is essentially a tuned coil antenna wound on a frame and shielded by a Faraday screen against electrostatic disturbances. This construction favors the desired signal over a local man-made noise source in three ways. First, since no noise source is composed of two components—electrostatic and electromagnetic—field, the Super Beam-a-scope may be resolved so that a null point is found where noise voltage is produced from these two components. Due to the fact that this null point is very sharp, it is very unusual that any desired station will be in a direct line with the rejected noise source and thereby have its signal strength reduced appreciably. In the second place the Super Beam-a-scope eliminates the external return path to ground present in the case of an unshielded antenna. This reduces or eliminates local man-made noise sources in much the same way as a shielded antenna lead is used in an ordinary antenna installation. In the third place the Super Beam-a-scope discriminates against the electrostatic component of an incoming wave in comparison with the electromagnetic component because of the Faraday shield. Since the electrostatic component of a local noise source is a great deal larger than the electromagnetic component, this rejection property brings about an enormous increase in signal-to-noise ratio.

The above operation is only available on the broadcast band and in this position the Super Beam-a-scope is also the first tuned grid circuits. On the "C" and "D" bands, the Super Beam-a-scope is grounded at the grid and thus preventing absorption spots due to loop resonance.

MODEL H-87

Model H-87 is the voice coil is accurately and permanently centered at the factory and should seldom give trouble. In case a voice coil needs replacing it will be necessary to replace the entire cone and voice-coil assembly.

NOTE—In no case should the magnet be removed from the assembled position without remagnetizing before replacing it.

Coil System Models H-87; HJ-1005

The "C" and "D" band antenna only are wound on a single coil form T-6 as shown in schematic. It is the collinear transformer for the "B", "C" and "D" bands. All switch points are numbered to facilitate in locating these switch points on the pictorial wiring diagram.

The following gives the calls in use for the various positions of the band switch.

ALIGNMENT PROCEDURE

Alignment Procedure Models H-87; HJ-1005

The alignment procedure is given in table form on the opposite page. In the designated "dummy" antennas in making each individual alignment, I.F. alignment may be performed with the chassis removed from the cabinet and the Beam-a-Scope disconnected. R.F. alignment on "C" and "D" bands should be performed with the Beam-a-Scope disconnected and a 70 µf, 600 Vdc capacitor between the signal generator and the point of input. R.F. alignment on "B" band should be performed with the chassis and Beam-a-Scope mounted in the cabinet and properly connected.

Fig. 3. I.F. Curve taken on GE Oscilloscope OFSM-1

Special Service Information

The following information will be found very useful in servicing receivers if a vacuum tube voltmeter or similar voltage measuring instrument is available.

(1) Stage Gain

(a) Antenna Post to Converter Grid

Band B: Beam-a-Scope connected—5 at 1000 K.C. Band C: Beam-a-Scope disconnected—5 at 4 M.C.

Band D: Beam-a-Scope disconnected—3 at 18 M.C.

(b) Converter Grid to 6SK7 Grid

65 at 450 K.C.

(c) 6637 Grid to 6SK7 Det. Plate—100 at 450 K.C.

(2) A 490-cycle signal of .06 volts across volume control will give 1-watt speaker output. (Volume Control turned to maximum.)

(3) Averaging DC voltage developed across oscillator grid resistor (R5) with gang closed.

Band B—0.5 volt Band C—0.4 volt

Use I.R.E. "dummy" antenna.

* The 70 µf, 600 Vdc capacitor between signal generator and antenna post with Beam-a-Scope disconnected.

† Variations of ±10%—30% permissible.

Fig. 7. Dial Drive Stringing Diagram

Fig. 2. I.R.E. Dummy Antenna
Coil System
The "C" and "D" band antenna coils, L2 and L3 are
wound on a single coil form as shown in Fig. 4. L, L-5 and
L-6 compose the oscillator transformer for the "B", "C" and
"D" bands. All switch points are numbered in Fig. 4 to
facilitate in locating these switch points on the pictorial wiring
diagram, Fig. 5.
The following table gives the coils in use for the various
positions of the band switch:

<table>
<thead>
<tr>
<th>Band</th>
<th>Antenna Primary</th>
<th>Antenna Secondary</th>
<th>Oscillator Primary</th>
<th>Oscillator Secondary</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;B&quot;</td>
<td>L3 Primary</td>
<td>L4 Primary</td>
<td>L3 Secondary</td>
<td>L4 Secondary</td>
</tr>
<tr>
<td>&quot;D&quot;</td>
<td>L2 Primary</td>
<td>L1 Primary</td>
<td>L2 Secondary</td>
<td>L1 Secondary</td>
</tr>
</tbody>
</table>

Fig. 5. Chassis Parts Layout

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**Adjustments**

There are three adjustments that can be made. All are correctly made at the factory, and ordinarily need never be altered. Should it become necessary to remake any of these adjustments, due to accident or tampering, proceed as follows:

A. **Adjusting Landing Position of Needle on Record Holder**
   - Adjustment is made with a screwdriver from above—does not require removing Record Changer from cabinet. If needle comes down too far from center of record, it will not start at the beginning. **Turn Needle-adjacent Screw very slightly counterclockwise.** If needle comes down too close to edge of record, needle may slip off edge of record. Turn the adjusting screw clockwise.

B. **Adjusting Distance from Record Pin at Which Trigger Will Trip and Change-Cycle Will Begin.**
   - Turn Trip Adjusting Screw 18, toward the trigger for earlier tripping, or away from it for later tripping. This Record Changer does not depend, for automatic tripping, on the records being provided with any special grooves at end; it trips whenever needle comes within a certain distance of Record Pin. The factory adjustment is for 1/4 in. from center of Record Pin. This is the most generally satisfactory distance; no modern record will then be cut off before playing is finished, and none will fail to trip at end. For certain records of early manufacture, it may not be possible to find an adjustment that will always trip and never cut off.

C. **Adjusting Height to Which Tone Arm Rises.**
   - The arm position is determined by the chord of the wave produced when the arm is raised. (This means that it must be adjusted by tilting the arm to a position where it is steady and does not wobble.)

To make this adjustment, loosen the lock nut on Pickup Slot 22, turn the arm in or out, and turn the sleeve to lengthen or shorten Pickup Plunger 21. When correct adjustment is found, tighten lock nut again.

**Motor Replacement**

The service mechanic may be called upon to adapt the Record Changer to a different power supply. For this purpose, the service mechanic will remove the entire Motor (with Record Pin and connecting gear drive) from the Record Changer, and replace it with a suitable new Motor. (In ordering a replacement Motor, specify the power supply.)

When mounting replacement Motor, it is most important to see that Record Pin is centered between the two posts of the Record Changer, that it stands perpendicular to Main Plate 53, and that it has not become bent so as to wobble. Even though the Posts are stout and not easy to bend, it is well to check them also, with a 12-in. combination square laid flat across the concave upper surface of Main Plate. When the new Motor has been attached, with three screws through Grommet Sleeves 51 (spacers) into its frame, and Record Pin is held in place without appreciable wobble (a wobble would indicate that it is not centered in transit—often from factory) the correct position of Pin midway between the Pickup Slot and Record. 12-in. record on the Record Holder, press "R" button, and turn turntable backward by hand. Immediately after the Record Holders open and let it fall, turn Turntable slightly backward, and with other hand support the record between the record Holders; it can then be readily seen whether Record Pin is off center. If it is, remove the record and turntable, and loosen slightly the screw or screws nearest the Record Holders to which record appears closest. This should improve evenness of operation. However, unless the unevenness was very slight, it will be necessary for a permanent repair to insert a screw of the three screws (or change shims from one screw to another). The screws are shaped like an ordinary washer, cut out at one side (see cut-Aabove the 12-in. record on Fig. 1). Insert a shim in place upon one of the Grommet Sleeves). Shims can be readily cut out of thin cardboard, or cardboard. They should be inserted, around proper screws (when screws have been sufficiently loosened) between Motor Frame and metal Grommet Sleeve. Do not insert shims on top of grommet. In wiring up, consult schematic diagram for particular installation. Use only Underwriters' approved wire.

**Trouble Shooting**

Cases of failure to operate satisfactorily will generally be found due either to neglect of proper lubrication, or to tampering with the mechanism after it leave the factory, or to injuries accidentally sustained by other vibration or by impact of some heavy object. In addition there is always the possibility that any kind of spring may "go dead" (cause to operate without any visible breakage) even though the most factory precautions are taken against it—or that setscrews may work loose due to some external vibration. Damage from tampering is likely to take the form of bent or broken parts; never bend any part during examination. Take care, especially, never to push upward from below on Cam connector, while mechanism is open and bending may result, and even slight bending here might interfere with correct timing of the cycle operations.

Among the principal troubles to which such causes may give rise, are the following:

1. **Mechanism Is Slow in Starting, or Stalls During a Cycle.**
   - Indicates trouble in Motor windings. The hand starts it again. May be caused by:
     a. Failure to lubricate properly. Oil thoroughly, per instructions.
     b. Loose setscrews.
     c. Weakness of drive: line voltage may be abnormally low, or motor windings damaged.

2. **Motor Fails to Run, Even When It Is Entirely Disconnected from Other Wiring and Proper Voltage Is Applied Directly to the Two Ends of Its Windings.**
   - Indicates trouble in Motor windings. Unless the damage is easily seen and repaired, replace Motor, as above described.

3. **Motor Is Slow in Starting.**
   - **Check oiling,** as directed above. It may not have been properly done; old oil may have become gummy.
   - **Changer may have been in a very cold place, and may not yet have reached room temperature.** Give it a fair chance to get warmed up, before believing that Motor is defective, and proceeding as in Paragraph 4.
   - **Squeaks or Other Noises, During Playing of Records.**
     a. **Check oiling,** as directed above. (If squeaks are heard, they will usually be found to come from the records—not from the mechanism.)
     b. **See that all setscrews are tight.**
     c. **Examine Motor windings; especially the shading coils which encircle a portion of each laminated pole and make the Motor self-starting.** If coils have been jarred loose at any point, they may be tightened accordingly.

Motor Stops Immoderately When Phonograph Is Turned Off During a Change-Cycle (instead of continuing to run, as it should, until needle is again upon a record, and then stopping). (See Paragraph 10.)

10. **Turning Phonograph Switch Off Fails to Stop Changer at All.**
   - Either of these two conditions would indicate failure of Switch 85. Should a slight increase in its tension be found necessary, this can be easily obtained by bending the lug, to which it is attached, down against Main Plate. If tendency then appears for needle to jump across record, check angle of needle (see Paragraph 6-5, above).

11. **Changer Fails to Repeat Last Record.** See Paragraph 6-5, above.

12. **Needle Lands Properly But Fails to Move Over into Record Groove.** Tone arm is normally impelled toward center of records by Leadscrew 85, why should short-circuit the manual Changer Switch (which may be located in position shown at 54, or elsewhere) during change-cycle only. Such damage to Cycle Switch (not likely to occur) would necessitate returning the entire Changer to factory.

11. **Changer Fails to Repeat Last Record.** See Paragraph 6-5, above.

12. **Needle Lands Properly But Fails to Move Over into Record Groove.** Tone arm is normally impelled toward center of records by Leadscrew 85, why should short-circuit the manual Changer Switch (which may be located in position shown at 54, or elsewhere) during change-cycle only. Such damage to Cycle Switch (not likely to occur) would necessitate returning the entire Changer to factory.

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12. **Needle Lands Properly But Fails to Move Over into Record Groove.** Tone arm is normally impelled toward center of records by Leadscrew 85, why should short-circuit the manual Changer Switch (which may be located in position shown at 54, or elsewhere) during change-cycle only. Such damage to Cycle Switch (not likely to occur) would necessitate returning the entire Changer to factory.
### Automatic Record-Changer Assembly

<table>
<thead>
<tr>
<th>Stock No.</th>
<th>Description</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>RA-412</td>
<td>ARM—Swivel guide arm assembly (13, 88)</td>
<td>.75</td>
</tr>
<tr>
<td>RB-189</td>
<td>BRACKET—Adjusting rod bracket (86)</td>
<td>.10</td>
</tr>
<tr>
<td>RB-190</td>
<td>BRACKET—Manual and clutch type rod spring bracket (76)</td>
<td>.10</td>
</tr>
<tr>
<td>RB-268</td>
<td>BUTTON—Switch push button (Pkg. of 4)</td>
<td>.10</td>
</tr>
<tr>
<td>RC-1999</td>
<td>CLAMP—Complete set of (Pkg. of 2)</td>
<td>.25</td>
</tr>
<tr>
<td>RC-2000</td>
<td>COLLAR—Rear changer shaft collar and spring (Pkg. of 4)</td>
<td>.60</td>
</tr>
<tr>
<td>RC-5056</td>
<td>CRYSTAL—Crystal cartridge assembly</td>
<td>.60</td>
</tr>
<tr>
<td>RG-8146</td>
<td>CABLE—Pick-up cable and plug</td>
<td>.85</td>
</tr>
<tr>
<td>RG-109</td>
<td>GUIDE—Lifter guide (Pkg. of 6)</td>
<td>.40</td>
</tr>
<tr>
<td>RG-303</td>
<td>GROMMET—Motor mounting grommet (Pkg. of 6)</td>
<td>.15</td>
</tr>
<tr>
<td>RG-707</td>
<td>GEAR—Cam gear assembly (11, 82)</td>
<td>.75</td>
</tr>
<tr>
<td>RG-708</td>
<td>GEAR—Drive pinion gear assembly (Pkg. of 3)</td>
<td>.10</td>
</tr>
<tr>
<td>RH-113</td>
<td>HINGE—Adjusting rod hinge on switch unit (Pkg. of 3)</td>
<td>.25</td>
</tr>
<tr>
<td>RK-069</td>
<td>KNOB—Changer post knob</td>
<td>.025</td>
</tr>
<tr>
<td>RM-130</td>
<td>MOTOR—Motor and record pin assembly with mounting accessories, 115 V., 60 cycles, 78 rpm (55)</td>
<td>1.50</td>
</tr>
<tr>
<td>RM-131</td>
<td>MOTOR—Motor and record pin assembly with mounting accessories, 115 V., 60 cycles, 78 rpm (55)</td>
<td>2.50</td>
</tr>
<tr>
<td>RM-132</td>
<td>MOTOR—Motor and record pin assembly with mounting accessories, 115 V., 60 cycles, 78 rpm (55)</td>
<td>3.50</td>
</tr>
<tr>
<td>RP-158</td>
<td>PLATE—Tone arm lift plate</td>
<td>.20</td>
</tr>
<tr>
<td>RP-159</td>
<td>PLATE—Lift arm assembly (14, 16, 17, 32, 34, 41, 42, 83)</td>
<td>.40</td>
</tr>
<tr>
<td>RG-711</td>
<td>GEAR—Idler gear and shoulder rivet assembly</td>
<td>.60</td>
</tr>
<tr>
<td>RS-886</td>
<td>SCREW—Lift shoulder screw and nut</td>
<td>.30</td>
</tr>
<tr>
<td>RP-160</td>
<td>PLATE—Selector plate (Record holder and release lever)</td>
<td>3.20</td>
</tr>
<tr>
<td>RP-405</td>
<td>PIN—Tone arm hinge pin (Pkg. of 6)</td>
<td>.30</td>
</tr>
<tr>
<td>RP-406</td>
<td>POST—Front or rear changer post with mounting washer and nut (71)</td>
<td>.75</td>
</tr>
<tr>
<td>RP-407</td>
<td>POST—Switch post with mounting washer and nut (71)</td>
<td>.75</td>
</tr>
<tr>
<td>RR-932</td>
<td>ROLLER—Rear post spring (61)</td>
<td>.10</td>
</tr>
<tr>
<td>RR-933</td>
<td>ROD—Manual key rod (77)</td>
<td>.10</td>
</tr>
<tr>
<td>RR-934</td>
<td>ROD—Rejection key rod (78)</td>
<td>.10</td>
</tr>
<tr>
<td>RR-935</td>
<td>ROD—Cam connecting rod assembly (31, 35, 37, 58, 59)</td>
<td>1.00</td>
</tr>
<tr>
<td>RR-936</td>
<td>ROD—Adjusting rod assembly (79, 81, 92, 94)</td>
<td>1.50</td>
</tr>
<tr>
<td>RR-937</td>
<td>ROD—Changer connecting rod assembly (57, 79)</td>
<td>2.20</td>
</tr>
<tr>
<td>RR-938</td>
<td>REST—Tone arm rest</td>
<td>.20</td>
</tr>
<tr>
<td>RS-473</td>
<td>SPRING—Selector plate spring (Pkg. of 5)</td>
<td>.10</td>
</tr>
<tr>
<td>RS-474</td>
<td>SPRING—Release trigger spring (10) (Pkg. of 3)</td>
<td>.25</td>
</tr>
<tr>
<td>RS-475</td>
<td>SPRING—Cam connecting rod lift spring (Pkg. of 3)</td>
<td>.25</td>
</tr>
<tr>
<td>RS-476</td>
<td>SPRING—Pawl or extension rod spring (38, 79) (Pkg. of 3)</td>
<td>.25</td>
</tr>
</tbody>
</table>

### FOR MODEL HJ-119

*Used on previous receivers.

### Prices subject to change without notice.
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**OVER-ALL DIMENSIONS**

- **Model**: HM-136
- **Height**: 40 inches
- **Width**: 22 7/8 inches
- **Depth**: 13 7/8 inches

**MANUAL TUNING DRIVE RATIO**: 7:1

**ELECTRICAL SPECIFICATIONS**

- 115 Volts AC, 60-60 cycles, 140 watts.

**TUNING FREQUENCY RANGE**

- **Frequency Modulation**: 39-44 MC
- **Short-wave**: 750-23,000 KC
- **Amateur**: 2,400-7,500 KC
- **Standard Broadcast**: 530-1700 KC

**INTERMEDIATE FREQUENCY**

- **Frequency Modulation**: 2100 KC
- "B", "C" and "D" Bands: 455 KC

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**ELECTRICAL POWER OUTPUT**

- **Undistorted**: 15 watts
- **Maximum**: 20 watts

**TONE CONTROL**: 5 position

**LOAD SPEAKER—"ALNICO" MAGNETIC DYNAMIC**

- **Type**: Curvilinear
- **Frame**: Curvilinear
- **Voice Coil Impedance**: 480 ohms

**TUBES**

- R.F. Amplifier: GE-6SK7
- I.F. Amplifier: GE-6SK7
- Noise Limiter: GE-6X7T
- Discriminator: GE-6A6
- Det., Aud, A.V.C.: GE-6S7Q
- Phase Inverter: GE-6S5G
- Power Output: (2) GE-6L6G
- Rectifier: (2) GE-5Y3G
- Tuning Indicator: GE-6U5
- Dial Lamp: (2) MARK No. 44

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**FREQUENCY MODULATION**

Frequency modulation marks another advancement in the field of radio transmission and reception. The remarkable realism and lack of noise which can be attained by this form of transmission has created widespread interest.

Present-day broadcasting stations superimpose sound programs on the radio frequency carrier signal by varying the carrier amplitude at the sound frequency rate. This is known as amplitude modulation.

Frequency modulated signals are obtained by varying the frequency of the carrier at the sound frequency rate.

The amount of carrier frequency is varied to represent the strength of the sound. The use of frequency variations as high as 60 or 70 KC positive and negative (120 or 140 over-all) requires the use of specially designed wide-band R.F. and I.F. amplifier stages. Such band widths preclude the use of carrier signals in the neighborhood of the broadcast band where 120 KC would cover a considerable portion of the band. Therefore, transmission frequencies have been established in the short-wave band between 20 and 44 MC.
GENERAL INFORMATION

The Model HM-136 is a combination frequency-modulation receiver and three-band radio using thirteen General Electric Pre-tested Tubes. Separate channels working into common tubes are employed for the detection and amplification of the frequency-modulated and amplitude-modulated R.F. and I.F. signals. An R.F. stage is employed in the frequency-modulated channel for increased sensitivity. Double interstage I.F. transformers are used with the frequency-modulated sections capacity-tuned and the amplitude-modulated sections inductively tuned. Other features of design include single-ended tubes in all stages except the converter-oscillator stage which uses a double section tube for increased stability, iron-core tuned oscillator coils for automatic station selection, noise limiter, discriminator, terminal board for conveniently connecting detector outputs to a public address system, “plug-in” type phono terminal, 10-inch purvilinear-type cone Dynapower speaker, and beam-power push-pull output.

ANTENNA

As a result of the high transmission frequencies the use of ordinary antennas for the reception of frequency-modulation signals is not satisfactory. General Electric builds a specially designed dipole antenna Model HT-9 for use with frequency-modulation receivers. For distances up to thirty miles from the transmitter a simple horizontal dipole with an over-all arm length of 10 feet 8 inches should give excellent results. The antenna should be located free of all obstructions and placed as high as is practicable. A noticeable gain in signal strength will be obtained as antenna height is increased. Generally best results will be obtained if the dipole arms are horizontal and at right angles to the direction of the frequency-modulation station. The lead-in transmission line may be of any length up to 100 feet and should consist of low-loss antenna lead-in wire.
**GENERAL ELECTRIC CO.**

**AMPLITUDE MODULATION**

**I.F. ALIGNMENT WITH OSCILLOSCOPE**

<table>
<thead>
<tr>
<th>Band-switch Setting</th>
<th>Input Frequency</th>
<th>Tone Control Position</th>
<th>Point of Input</th>
<th>In-core Trimmer</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Band B</td>
<td>455 K.C. and 30 K.C. sweep</td>
<td>Bass</td>
<td>2nd I.F. 6SK7 Grid</td>
<td>3rd I.F. Sec. 3rd I.F. Pri.</td>
<td>Condenser gang at minimum capacity—Manual key depressed—vertical input to ground and junction of R-4 and R-12. Adjust iron-core trimmers in order mentioned for a single curve of maximum amplitude. Since iron-core trimmers are at top and bottom of shield cans most effective alignment can be obtained by using two non-metallic screwsdrivers simultaneously.</td>
</tr>
</tbody>
</table>

**I.F. ALIGNMENT WITH OUTPUT METER**

<table>
<thead>
<tr>
<th>Band</th>
<th>Input Frequency</th>
<th>Tone Control Position</th>
<th>Point of Input</th>
<th>In-core Trimmer</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Band B</td>
<td>455 K.C. modulated</td>
<td>Bass</td>
<td>2nd I.F. 6SK7 Grid</td>
<td>3rd I.F. Sec. 3rd I.F. Pri.</td>
<td>Condenser gang at minimum capacity—Manual key depressed—output meter connected across voice coil—volume control at maximum—input at or low as practical. Adjust all trimmers in order listed for maximum output. Since iron-core trimmers are at top and bottom of shield cans most effective alignment can be obtained by using two non-metallic screwsdrivers simultaneously.</td>
</tr>
<tr>
<td>4. Band B</td>
<td>455 K.C. modulated</td>
<td>Bass</td>
<td>Converter Grid</td>
<td>All I.F. Trimmers</td>
<td></td>
</tr>
</tbody>
</table>

**R.F. ALIGNMENT**

<table>
<thead>
<tr>
<th>Band</th>
<th>Input Frequency</th>
<th>Tone Control Position</th>
<th>Point of Input</th>
<th>In-core Trimmer</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Band B</td>
<td>6 MC modulated</td>
<td>Bass</td>
<td>Antenna Post**</td>
<td>Osc. (C-10) Ant. (C-7)</td>
<td>Set pointer to 6 M.C., mark and align C-10, Peak C-7 for maximum output.</td>
</tr>
<tr>
<td>4. Band C</td>
<td>21 MC modulated</td>
<td>Bass</td>
<td>Antenna Post**</td>
<td>Osc. (C-11) Ant. (C-8)</td>
<td>Set pointer to 21 M.C., mark and align C-11. Peak C-8 while rocking the gang condenser. The image of any signal on the D band should be 910 K.C. below input signal. Example: 21 M.C., image 20.00 M.C.</td>
</tr>
</tbody>
</table>

* Use “dummy” antenna consisting of .06 mfd. capacitor between signal generator and point of input.  
** Use an I.R.E. “dummy” antenna as shown in Fig. 1 between the signal generator and the point of input.

<table>
<thead>
<tr>
<th>Stock No.</th>
<th>Description</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>*RC-008</td>
<td>BOARD—Terminal board (2 lug)</td>
<td>$0.10</td>
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<tr>
<td>*RC-040</td>
<td>BOARD—Antenna terminal board</td>
<td>.10</td>
</tr>
<tr>
<td>*RC-062</td>
<td>BOARD—Terminal board (6 lug)</td>
<td>.10</td>
</tr>
<tr>
<td>*RC-083</td>
<td>BOARD—Terminal board (6 lug)</td>
<td>.10</td>
</tr>
<tr>
<td>*RC-094</td>
<td>BOARD—Terminal board (7 lug)</td>
<td>.10</td>
</tr>
<tr>
<td>*RC-172</td>
<td>BRACKET—Volume control mounting bracket</td>
<td>.05</td>
</tr>
<tr>
<td>*RC-173</td>
<td>BRACKET—Tuning drum support bracket</td>
<td>.20</td>
</tr>
<tr>
<td>*RC-183</td>
<td>BRACKET—Small removable bracket for mounting tuning condenser</td>
<td>.05</td>
</tr>
<tr>
<td>*RB-1009</td>
<td>BOARD—Phono terminal board</td>
<td>.10</td>
</tr>
<tr>
<td>*RC-306</td>
<td>CAPACITOR—0.001 mfd. 600 V. paper (C-35)</td>
<td>.25</td>
</tr>
<tr>
<td>*RC-009</td>
<td>CAPACITOR—0.02 mfd. 600 V. paper (C-65)</td>
<td>.25</td>
</tr>
<tr>
<td>*RC-011</td>
<td>CAPACITOR—0.05 mfd. 600 V. paper (C-63)</td>
<td>.25</td>
</tr>
<tr>
<td>*RC-033</td>
<td>CAPACITOR—0.1 mfd. 600 V. paper (C-43, 52, 68)</td>
<td>.25</td>
</tr>
<tr>
<td>*RC-045</td>
<td>CAPACITOR—0.03 mfd. 600 V. paper (C-41)</td>
<td>.25</td>
</tr>
<tr>
<td>*RC-072</td>
<td>CAPACITOR—0.05 mfd. 200 V. paper (C-16, 33, 57, 62)</td>
<td>.25</td>
</tr>
</tbody>
</table>

*RC-096 CAPACITOR—0.05 mfd. 600 V. paper (C-34, 42, 45, 64) | .30 |
*RC-123 CAPACITOR—0.01 mfd. 400 V. paper (C-25, 32) | .15 |
*RC-147 CAPACITOR—0.02 mfd. 400 V. paper (C-48) | .35 |
*RC-191 CAPACITOR—0.002 mfd. 1500 V. paper (C-46) | .35 |
*RC-206 CAPACITOR—0.005 mfd. 600 V. paper (C-57, 49, 50) | .35 |
*RC-232 CAPACITOR—0.100 mfd. 600 V. paper (C-37, 49, 50) | .25 |
*RC-233 CAPACITOR—0.22 mfd. 600 V. paper (C-37, 49, 50) | .25 |
*RC-235 CAPACITOR—0.100 mfd. 600 V. paper (C-37, 49, 50) | .25 |
*RC-242 CAPACITOR—0.500 mfd. 600 V. paper (C-37, 49, 50) | .25 |
*RC-249 CAPACITOR—0.22 mfd. 600 V. paper (C-37, 49, 50) | .25 |
*RC-283 CAPACITOR—0.47 mfd. 600 V. paper (C-37, 49, 50) | .25 |
*RC-297 CAPACITOR—0.750 mfd. 600 V. paper (C-18) | .50 |
*RC-347 CAPACITOR—1.800 mfd. 600 V. paper (C-18) | .50 |
*RC-389 CAPACITOR—1.800 mfd. 600 V. paper (C-18) | .50 |
*RC-397 CAPACITOR—1.800 mfd. 600 V. paper (C-18) | .50 |
*RC-400 CAPACITOR—1.800 mfd. 600 V. paper (C-18) | .50 |
*RC-402 CAPACITOR—1.800 mfd. 600 V. paper (C-18) | .50 |
*RC-676 CAPACITOR—1.800 mfd. 600 V. paper (C-18) | .50 |
*RC-681 CAPACITOR—1.800 mfd. 600 V. paper (C-18) | .50 |
*RC-683 CABLE—Power cable | .65 |

(Prices subject to change without notice)

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Compliments of www.nucow.com
LOUD-SPEAKER

In order to realize the high fidelity inherent in a frequency-modulated system or present in a well-designed amplitude-modulated system, the audio amplifiers and loud-speakermust be the same as those that are used in conventional conical-type cone loud-speakers because of the sharp break in the diaphragm's cone. The throat tends to cut off the higher audio frequencies. The use of a curvilinear-type cone loud-speaker in the Model HM-136 eliminates this possible suppression of the higher audio tones and excellent frequency response from 30 to 10,000 cycles per second is obtainable.

To center the voice coil, loosen the two screws which clamp the speaker spider in position. These two screws are accessible from the rear of the speaker. Shift the spider around until the voice coil is centered, then tighten the screws in position.

Phonograph or Television Audio Connections

Each receiver is equipped with a phone terminal (pin jack) to allow the convenient connection of a record player or the detector output of a television converter. General Electric pin jack No. RP-145B fits the pin jack of all receivers. After the crystal type pick-up, a suitable load consisting of a 100,000 ohm resistor in series with a .01 mfd. capacitor should be connected across the pick-up leads.

Public Address System Connections

A terminal board is located on the back apron of the chassis permitting easy attachment of a public address system. The provision permits feeding programs from either type of transmission into an external amplifier and loud-speaker system. Three terminals are provided and are numbered 1, 2 and 3. To connect an external amplifier to his receiver remove the link connection between terminals No. 2 and No. 3 and insert between terminals No. 1 and No. 2. Connect the external amplifier between terminals No. 1 and No. 3, the ground side of the amplifier being connected to terminal No. 1. If an external amplifier input is not a high impedance type, an impedance matching network will have to be used to insure matching to the 2.0 megohm volume control.

Noise Limiter

The frequency-modulation noise limiter circuit which uses a 05F5 tube is essentially a fourth stage in the IF section. The tube operates at low plate voltage (60 volts DC) so that plate current is low. This occurs with relatively small grid bias. A small cathode resistor, R-34, which is developed in R-40 establishes the operating point at the center of the linear portion of the grid-voltage characteristic. The normal signal input will swing the grid voltage up and down about and below the linear portion of the curve. Negative peaks of the signal voltage will be clipped off by type cutoff. Positive peaks will be clipped off by grid bias limiting.

Since noise creates wiggles (variations) in the peaks of the carrier signal it can be eliminated by cutting off the carrier peaks. The inductor takes place in the noise limiter as described above, providing, of course that the carrier signal is sufficiently strong to cause grid voltage swing above and below the cut-off points.

Discriminator

The discriminator circuit is a frequency-modulated signal input must secure the audio distortion by operating on frequency variations. Referring to the schematic diagram, Fig. 3, the frequency-modulated (FM) signal, after passing through the 100,000 ohm plate winding of the detector transformer (T-12). The secondary is a center tapped winding with the outer ends connected to the 6H6 detector plates as shown. Two 100,000 ohm resistors (R-25 and R-26) are connected in series across the 6H6 cathodes and it is across these resistors that the audio signal appears. The detector transformer (T-12) is tuned to the intermediate frequency (2.1 MC). An I.F. signal of 2.1 MC which is not modulated will swing the detector plates positive an equal amount resulting in DC voltages appearing across diode resistors R-25 and R-26. Since these voltages are of opposite polarity the resultant voltage measured across the diode resistors will be zero. When the incoming I.F. signal is frequency modulated it will be swinging above and below the intermediate frequency amount proportional to the degree of modulation. As the modulated signal swings off the resonant frequency of 2.1 MC unequal voltages will be developed across the R-25 and R-26. The resultant voltage measured across both resistors will be equal to the difference between the voltage across R-25 and the voltage across R-26. This resultant voltage will vary in magnitude directly as the degree of modulation. The number of times per second the I.F. signal swings above and below the resonant point produces the audio signal. Hence, the voltage of an audio signal is transmitted as the magnitude of the frequency swing of a carrier. The frequency of an audio signal is transmitted as the rate at which the carrier frequency is swung.

ALIGNMENT PROCEDURE

Frequency Modulation

I.F. Alignment

Due to the good stability of components and the wide-band characteristics of the I.F. circuits, alignment should be unnecessary under normal operating conditions. Should I.F. alignment become necessary, it will require a cathode-ray oscilloscope and a 21 Mc. single cycle signal generator with a superimposed -400 MC sweep frequency. Many signal generators and mechanical frequency wobblers are available wherein the above requirements are fulfilled. As for example: GE Model TMV-97-C oscillator used in conjunction with the Frequency Modulator TMY-128 will give a 200-2000 MC sweep when operating on the 1550-3100 KC band of the test oscillator. To obtain the proper test oscillator mid-frequency (2.1 MC) the following procedure may be followed. Set "wobbler" condenser for about mid-capacity. Tune broadcast receiver to 2.1 MC. Adjust test oscillator tuning until signal is heard with maximum strength in the broadcast receiver. Connect the vertical plates of the oscilloscope across resistor R-36. A 100,000 ohm resistor should be connected in series with the high side of the oscilloscope. Using a .05 mfd. capacitor in series with the high side of the test oscillator output, insert the oscillator sweep signal into the receiver circuit first at the control grid of the 2nd I.F. 6SK7 and align transformer trimmers T-11. The resultant curve should be sharp on either side and quite broad and flat at the peak. Change the input signal to the 1st I.F. 6SK7 grid and align transformer trimmers T-10. The resultant curve should appear as the above stage only less broad at the peak. Align transformer trimmers T-9 with the signal input at the converter grid for sharpness and a flat peak. If peak will not flatten retouch the grid trimmer of transformer T-10. Do not retouch any other trimmers.

Leave the input of the oscillator sweep signal at the converter grid and connect the vertical oscilloscope plates across the resistors R-25 and R-26. Align transformer T-12 for an X-shaped crossover curve. Proper alignment of C-80 is indicated when the curve crosses about midway in the vertical plane. Proper alignment of C-79 is indicated when the sides of the curve near crossover are nearest to a straight line.

Note: Keep signal input high enough so that noise limiter is functioning. This point is indicated when an increase in signal input no longer changes the size of the curve.

R.F. Alignment

Make sure the dial pointer coincides with the first division on the low frequency end of the dial scale when the geng condenser is completely closed.

1. Connect a 0-50 or 0-100 microammeter in series with the low end of R-36. A high resistance 0-10 V., D.C. voltmeter may be used instead of the microphone. Connect the voltmeter across R-36 with a 100,000 ohm resistor in series with the high side of the geng condenser.

2. Apply an unmodulated signal in the region of 45 megacycles to one of the antenna terminals using a 50-ohm resistor in series with the high side of the signal generator output.

3. Adjust pointer so it is set to the scale mark of the signal used and peak trimmers C-12, C-8 and C-4 progressively for maximum meter reading.

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<table>
<thead>
<tr>
<th>Stock No.</th>
<th>Description</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>RC-992</td>
<td>CUSHION—Tuning condenser cushion (Pkg. 3)</td>
<td>.10</td>
</tr>
<tr>
<td>RC-1977</td>
<td>CLAMP—Tuning indicator clamp and thumb screw</td>
<td>.10</td>
</tr>
<tr>
<td>RC-1987</td>
<td>C Oprah—Ant-osc. coil clamp (Pkg. 2)</td>
<td>.05</td>
</tr>
<tr>
<td>RC-2001</td>
<td>CORE—Tuning coil tuning core</td>
<td>.15</td>
</tr>
<tr>
<td>RC-5141</td>
<td>CAPACITOR—40 mfd. 25 V., 20 mfd. .450 V., 20 mfd. 400 V. dry electrolytic (C-52a, 53b, 53c, 53d)</td>
<td>.15</td>
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<tr>
<td>RC-6519</td>
<td>CAPACITOR—PM antenna trimmer (C-4)</td>
<td>.20</td>
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<tr>
<td>RC-7015</td>
<td>CONDENSER—Tuning condenser (C-1, 2)</td>
<td>.25</td>
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<tr>
<td>RC-8127</td>
<td>CABLE—Tuning drive cable assembly</td>
<td>.40</td>
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<tr>
<td>RC-8137</td>
<td>CABLE—Tuning indicator cable</td>
<td>.25</td>
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<tr>
<td>RC-8501</td>
<td>CARD—Station letter card</td>
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<td>RC-8502</td>
<td>CARD—Key &quot;Off&quot; tab card (Pkg. 10)</td>
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<td>RC-8503</td>
<td>CARD—Key &quot;Manual&quot; tab card (Pkg. 10)</td>
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<td>RC-8504</td>
<td>CARD—Key &quot;Phono-Tele&quot; tab card (Pkg. 10)</td>
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<tr>
<td>RC-9021</td>
<td>CONE ASSEMBLY—10 inch speaker cone assembly</td>
<td>.60</td>
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<tr>
<td>RD-130</td>
<td>DIAL—Main dial scale</td>
<td>.325</td>
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<td>RD-409</td>
<td>DRUM—Tuning condenser drive drum assembly</td>
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<tr>
<td>RD-510</td>
<td>DIFFUSER—Large diffuser strip</td>
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<tr>
<td>RD-611</td>
<td>DIFFUSER—Small diffuser strip</td>
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<td>RE-062</td>
<td>ESCUTCHEON—Main dial escutcheon</td>
<td>.25</td>
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<tr>
<td>RE-200</td>
<td>ESCUTCHEON BAND—Tuning escutcheon key (Pkg. 5)</td>
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<tr>
<td>RE-201</td>
<td>ESCUTCHEON BAND—Volume escutcheon</td>
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<tr>
<td>RP-015</td>
<td>FINGER—Rubber foot on chassis</td>
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<tr>
<td>RG-016</td>
<td>GRID CLIP—8XK grid clip (Pkg. 5)</td>
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<tr>
<td>RG-756</td>
<td>GEAR—Band switch miter gear</td>
<td>.20</td>
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<tr>
<td>RG-007</td>
<td>HAIRPIN COTTER—Tuning shaft hanger cotter (Pkg. 10)</td>
<td>.05</td>
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<tr>
<td>RR-044</td>
<td>KNOB—Tone or band switch knob (Pkg. 2)</td>
<td>.10</td>
</tr>
<tr>
<td>RR-205</td>
<td>KEY—Feathertouch Tune key</td>
<td>.25</td>
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<tr>
<td>RL-093</td>
<td>COIL—B, C, D, band antenna coil (T-4)</td>
<td>.10</td>
</tr>
</tbody>
</table>

**NOTES:**

- *RL-603 COIL—Wave trap coil assembly (L-1, C-3)*
- *RL-201F COIL—B, C, D, oscillator coil (T-5)*
- *RL-9511 COIL—Selection condenser coil assembly (L-2, 3, 4, 5, 6, 7, 8, 9)*
- *RL-9513 COIL—Tuning trimmer coil (Range: 1200-5500 KC) (Code—none) (L-1, 2)*
- *RL-9514 COIL—Tuning trimmer coil (Range: 850-1400 KC) (Code—red) (L-4, 5, 6)*
- *RL-9515 COIL—Tuning trimmer coil (Range: 540-900 KC) (Code—blue) (L-7, 8, 9)*
- *RM-504 MASK—Black felt dial case mask*
- *RP-122 POINTERS—Drive cord pulleys (Pkg. 5)*
- *RP-503 PULLER—Drive cord pulley (Pkg. 2)*
- *RP-751 RESISTOR—150 ohm, 2 W. (R-34)*
- *RP-1215 RESISTOR—15 ohm, 1/2 W. (R-30)*
- *RQ-1229 RESISTOR—56 ohm, 1/2 W. (R-29)*
- *RQ-1243 RESISTOR—220 ohm, 1/2 W. (R-3, 4)*
- *RQ-1247 RESISTOR—330 ohm, 1/2 W. (R-17, 35)*
- *RQ-1259 RESISTOR—1000 ohm, 1/2 W. (R-5, 23, 24)*
- *RQ-1275 RESISTOR—4700 ohm, 1/2 W. (R-8)*
- *RQ-1277 RESISTOR—3500 ohm, 1/2 W. (R-8)*
- *RQ-1279 RESISTOR—6800 ohm, 1/2 W. (R-20)*
- *RQ-1299 RESISTOR—47,000 ohm, 1/2 W. (R-2, 3, 4)*
- *RQ-1303 RESISTOR—68,000 ohm, 1/2 W. (R-20)*
- *RQ-1307 RESISTOR—100,000 ohm, 1/2 W. (R-20, 25)*
- *RQ-1311 RESISTOR—150,000 ohm, 1/2 W. (R-11)*
- *RQ-1313 RESISTOR—180,000 ohm, 1/2 W. (R-11)*
- *RQ-1315 RESISTOR—220,000 ohm, 1/2 W. (R-13, 21, 22, 27)*

**NOTE:**

- *RESISTOR—270,000 ohm, 1/2 W. (R-18)*
- *RESISTOR—330,000 ohm, 1/2 W. (R-36)*
- *RESISTOR—1.0 megohm, 1/2 W. (R-41, 44)*
- *RESISTOR—2.2 megohm, 1/2 W. (R-1, 2)*
- *RESISTOR—3.3 megohm, 1/2 W. (R-1, 2)*
- *RESISTOR—3.4 megohm, 1/2 W. (R-1, 2)*
- *RESISTOR—4.7 megohm, 1/2 W. (R-1, 2)*
- *RESISTOR—5.6 megohm, 1/2 W. (R-1, 2)*
- *RESISTOR—47,000 ohm, 1 W. (R-32)*
- *RESISTOR—470 ohm, 10 W., 2000 ohm (R-32, 32)*
- *RESISTOR—10 ohm, 10 W. (R-32, 32)*
- *RESISTOR—Dia light socket assembly*
- *RESISTOR—Dia light base and switch assembly (S-1, 2, 2, 3)*
- *RESISTOR—Dia light base and switch assembly (S-1, 2, 3)*
- *RESISTOR—Dia light base and switch assembly (S-1, 2, 3)*
- *RESISTOR—Dia light base and switch assembly (S-1, 2, 3)*

**MODEL HM-136**

Insign on Genuine Factory-tested Parts, Available from Authorized Dealers

---

**Fig. 2. Trimmer Location**

**Model HM-136**

Insign on Genuine Factory-tested Parts, Available from Authorized Dealers

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**General Electric Co.**

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Compliments of www.nucow.com
**GENERAL INFORMATION**

Model H-406U is a compact four-tube AC-DC tuned radio frequency receiver that tunes the broadcast band of frequencies. This model has the full approval of the Underwriters' Laboratories.

When operating from a DC source of power, it is necessary to insert the power plug with the proper polarity; otherwise, the receiver will fail to function. If any hum is noticed when the receiver is used on AC, reverse the power plug in the receptacle.

**ALIGNMENT**

Connect the high side of the signal generator through a 250 mfd. condenser to the antenna terminal. The low side of the signal generator output should be connected to the receiver chassis through a .05 mfd. condenser. Connect a suitable output meter across the voice coil leads; then proceed as follows:

1. With gang condenser plates completely closed, the tuning pointer should be over the last mark on the dial.
2. Tune receiver to the 1500 KC point on the dial; then align trimmers on the gang condenser at 1500 KC for a maximum output meter reading.

**Electrical Power Output**

- Undistorted: 0.9 watts
- Maximum: 1.8 watts

**Load-speaker—"Alnico" Magnet Dynamic**

- Outside Cone Diameter: 4 inches
- Voice Coil Impedance (400 cycles): 3.5 ohms
Compliments of www.nucow.com

GENERAL ELECTRIC CO.

Sync Pulse Clipper

Sync pulses are taken off the plate of the clipper section of the clipper and video output tube. The video signals are separated by tube cut-off since the plate voltage is only about 12 volts.

Horizontal Oscillator-output

The clipper nets the horizontal multivibrator 6N7G directly, with plate-to-plate and negative sync pulses. C-46 blocks the flow of vertical sync pulses, into the horizontal multivibrator since they are of a low order of frequency. The horizontal sync pulses which are amplified by the first section of the 6N7G are coupled to the grid of the second section and drive the circuit into violent oscillation. Resulting plate and grid current flow sends the tube to cut-off. The sawtooth wave so generated is applied to the horizontal sweep amplifier one section of which is a phase inverter. This push-pull sweep is coupled to the horizontal deflection plates of the picture tube. Horizontal hold is controlled by varying the charging rate of the generator circuit, through (R-128). Compensating for high frequency loss adds a means of controlling horizontal linearity which is done through R-140. Width is varied by regulating the magnitude of the charge through R-140.

Vertical Oscillator-output

The sync pulses are also coupled into the vertical oscillator 6FGG where the circuits composed of C-73 and R-165 bypass the horizontal sync pulses. The vertical sync pulses are coupled into the vertical sweep generator and circuit causing violent oscillatory swings which result in sawtooth waves.

The height control (R-146) determines the magnitude of the charge before the next oscillation thus governing the height of the picture. R-146, the hold control, governs the rate of charging. The vertical linearity control (R-199) accomplishes results similar to the horizontal linearity control. The vertical sweep amplifier produces push-pull outputs by phase inversion and this output is applied to the vertical deflecting plates of the picture tube.

Low Voltage Rectifier

Low voltage power is obtained from a 3UC4 using only one stage of choke filtering and the remaining of the rectifier type.

High Voltage Rectifier

The anode voltage of the picture tube is obtained from a single half-wave rectifier with a protective resistor in series with the transformer plate lead.

Cassette Speaker

The voice coil is accurately and permanently centered at the factory and should seldom give trouble. In case a voice coil needs recentering it will be necessary to replace the entire frame and voice coil assembly.

Note—In no case should the magnet be removed from the assembled position without remagnetizing after replacing it.
## GENERAL ELECTRIC CO.

### GENERAL INFORMATION

General Electric: Picture Receiver and Sound Converter Model HM-171, is a table type, 17-tube, superheterodyne receiver equipped with a 3-kilocycle, electronically-deflected, picture tube. The receiver works in conjunction with any radio receiver, which is designed for phonograph reproduction, to reproduce the sound portion of the television broadcast.

General Electric Television Receiver, Model HM-185 is a console type, 18-tube, superheterodyne receiver with a complete sound channel and using a 3-kilocycle, electronically-deflected picture tube.

Additional design features include iron-core I.F. tuning, automatic tone compensation, automatic volume control and constant high-gain antennas coupling circuit.

### TELEVISION ALIGNMENT PROCEDURE

The problem of aligning the several circuits in a television receiver is much more involved and requires more specialized equipment than the alignment of conventional radio receivers. Fortunately, the use of stable components in carefully engineered circuits of wide-band characteristic reduces to a minimum the necessity for alignment under normal operating conditions. Should alignment become necessary, the following equipment will be needed:

(A) Pic-Vide I.F. Alignment

1. Cathode ray oscilloscope
2. Wide band sweep oscillator capable of sweeping from 7.5 to 15 MC.
3. Master circuit either provided in sweep oscillator or from separate signal generator for locating 12.75 and 17.5 MC points.

### VIDEO I.F. ALIGNMENT

**Input Freq.**

<table>
<thead>
<tr>
<th>Point of level</th>
<th>Adjustments</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Connect vertical input cable of cathode ray oscilloscope across re-tuner X-106 of 66G5 video detector. See Fig. 1, a or b (1).</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Control grid of 58 (sound I.F.)</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Connect output tap of video I.F. sweep oscillator to control grid of 1962 (66G5 I.F.) See Fig. 1, c. or d. (2).</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Connect output tap of video I.F. sweep oscillator to control grid of 1962 (66G5 I.F.) See Fig. 2, c. or d. (2).</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Connect output tap of video I.F. sweep oscillator to control grid of 1962 (66G5 I.F.) See Fig. 2, c. or d. (2).</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Iron core of detector transformer T-4</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Iron core of detector transformer T-5</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Iron core of detector transformer T-6</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Iron core of detector transformer T-7</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Iron core of detector transformer T-8</td>
<td></td>
</tr>
</tbody>
</table>

### INTERMEDIATE FREQUENCIES

**Television Tune (Picture)**

1. 12.75 MC
2. 17.5 MC

**Audio Tune**

1. 500 MC
2. 1000 MC
3. 1500 MC
4. 2000 MC

### ELECTRICAL SPECIFICATIONS

- **Model**
  - HM-171
  - HM-185
  - Power Supply (Volts)
    - 115-125 V
  - Frequency (Cycles per Second)
    - 60 Hz
  - Power Consumption (Watts)
    - 150 W

### TUNING FREQUENCY RANGES

<table>
<thead>
<tr>
<th>Band No.</th>
<th>Frequency Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A</td>
<td>460-600 MC</td>
</tr>
<tr>
<td>2A</td>
<td>500-600 MC</td>
</tr>
<tr>
<td>3A</td>
<td>500-625 MC</td>
</tr>
</tbody>
</table>

### INTERMEDIATE FREQUENCIES

1. Televison Tune (Picture)
   - 12.75 MC
   - 17.5 MC

2. Audio Tune
   - 500 MC
   - 1000 MC
   - 1500 MC
   - 2000 MC

### Fig. 6: Television Alignment Curves

**Signal Input**

<table>
<thead>
<tr>
<th>Point of Input</th>
<th>Adjustments</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Band with adjustment coupling condenser (C-78)</td>
<td>Turn condenser (C-78) in until tight, then open approximately 1/16 of a turn</td>
<td></td>
</tr>
<tr>
<td>2. Connect audio input to center between maximum horizontal sweep points</td>
<td>Adjust L-10 for centering between maximum horizontal sweep points above. Adjust C-70 and C-87 for maximum amplitude. See Fig. 6, curve 3.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Connect audio input to center between maximum horizontal sweep points</td>
<td>Adjust L-10 for centering between maximum horizontal sweep points above. Adjust C-70 and C-87 for maximum amplitude. See Fig. 6, curve 3.</td>
</tr>
<tr>
<td>4.</td>
<td>Connect audio input to center between maximum horizontal sweep points</td>
<td>Adjust L-10 for centering between maximum horizontal sweep points above. Adjust C-70 and C-87 for maximum amplitude. See Fig. 6, curve 3.</td>
</tr>
</tbody>
</table>

### WAVE TRAP ALIGNMENT

1. 1.1575 MC with 400 cycle modulation
2. 2.75 to 8.75 MC sweep
3. 7.5 to 8.75 MC sweep

### AUDIO I.F. ALIGNMENT

**Input Freq.**

<table>
<thead>
<tr>
<th>Point of Input</th>
<th>Adjustments</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Connect vertical input cable of cathode ray oscilloscope across R-128. See Fig. 1, a or b (4).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Connect output tap of video I.F. sweep oscillator to control grid of 1962 (66G5 I.F.) See Fig. 1, c. or d. (2).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Connect output tap of video I.F. sweep oscillator to control grid of 1962 (66G5 I.F.) See Fig. 2, c. or d. (2).</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Connect output tap of video I.F. sweep oscillator to control grid of 1962 (66G5 I.F.) See Fig. 2, c. or d. (2).</td>
<td></td>
</tr>
</tbody>
</table>

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ANTENNA
In general, the television antenna should be of the dipole type located as high as is practical and in an area where the horizon in the direction of the television transmitter is not obstructed by buildings or structures. A noticeable gain in signal strength will be obtained as antenna height is increased. Since television radiation reacts similarly to light waves, reflection problems arise which often modify otherwise ideal installation locations. Consideration must also be given to noise sources within buildings, or ignition noises from vehicles on adjacent streets. It is usually best to locate the dipole antenna on the side of the building away from the street thus allowing the building to shield the antenna from ignition noises.

The dipole should be erected with arms parallel to the ground and at right angles to the direction of the television station. If noise or reflection interference exist it may be better to point the dipole arms in the direction of the interference.

Noise interference and poor signal strength, may dictate the use of a reflector. A reflector will increase the signal strength appreciably as well as increase the horizontal directivity.

CAUTIONARY INSTRUCTIONS
Extremely high voltages (2500 volts or more) are used in the operation of this receiver; therefore, every precaution must be exercised to insure safety to the service engineer and to the customer.

The back cover while in place, protects the user and should never be removed except by a qualified television service engineer.

The power-cord plug should not be inserted in a power supply outlet until a good, solid ground connection has been properly made to the receiver chassis.

For safety, the following operations must be performed with the power plug disconnected before working on the receiver with the back cover removed:

1. Locate the 879/2X2 high voltage rectifier tube socket.
2. Unsolder the lead (color-coded brown and yellow and measuring 3300 ohms to chassis) which is connected to the 879/2X2 tube socket.
3. Thoroughly insulate the exposed end of this lead.

All adjustments not accessible with the back cover in place can be made without energizing the high-voltage circuits.

Servicing of the high-voltage circuits can be satisfactorily performed with the power-cord removed from any power supply outlet. A resistance check of the circuit components will indicate any trouble existing. (HIGH VOLTAGES SHOULD NEVER BE MEASURED.)

The "picture tube" is highly evacuated and is consequently subject to a very great air pressure. If it is broken, glass fragments will be violently expelled. Handle with care, using safety goggles and gloves.

The large end of the "picture tube" particularly that part at the rim of the viewing surface—must not be struck, scratched, or subjected to more than moderate pressure. DO NOT FORCE THE SOCKET ONTO THE TUBE OR STRAIN ANY EXTERNAL CONNECTIONS. If it fails to slip into place smoothly, investigate and remove the cause of the trouble.
REPLACEMENT PARTS LIST

Models HM-171 and HM-185

REPLACEMENT PARTS LIST (Continued)

<table>
<thead>
<tr>
<th>Stock No.</th>
<th>Description</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>RT-2000</td>
<td>RB-1000 10,000 ohm wire wound</td>
<td>1.00</td>
</tr>
<tr>
<td>RT-2001</td>
<td>RB-1100 10,000 ohm wire wound</td>
<td>1.00</td>
</tr>
<tr>
<td>RT-2002</td>
<td>RB-1200 10,000 ohm wire wound</td>
<td>1.00</td>
</tr>
<tr>
<td>RT-2003</td>
<td>RB-1300 10,000 ohm wire wound</td>
<td>1.00</td>
</tr>
<tr>
<td>RT-2004</td>
<td>RB-1400 10,000 ohm wire wound</td>
<td>1.00</td>
</tr>
<tr>
<td>RT-2005</td>
<td>RB-1500 10,000 ohm wire wound</td>
<td>1.00</td>
</tr>
<tr>
<td>RT-2006</td>
<td>RB-1600 10,000 ohm wire wound</td>
<td>1.00</td>
</tr>
<tr>
<td>RT-2007</td>
<td>RB-1700 10,000 ohm wire wound</td>
<td>1.00</td>
</tr>
<tr>
<td>RT-2008</td>
<td>RB-1800 10,000 ohm wire wound</td>
<td>1.00</td>
</tr>
<tr>
<td>RT-2009</td>
<td>RB-1900 10,000 ohm wire wound</td>
<td>1.00</td>
</tr>
<tr>
<td>RT-2010</td>
<td>RB-2000 10,000 ohm wire wound</td>
<td>1.00</td>
</tr>
<tr>
<td>RT-2011</td>
<td>RB-2100 10,000 ohm wire wound</td>
<td>1.00</td>
</tr>
<tr>
<td>RT-2012</td>
<td>RB-2200 10,000 ohm wire wound</td>
<td>1.00</td>
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<tr>
<td>RT-2013</td>
<td>RB-2300 10,000 ohm wire wound</td>
<td>1.00</td>
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<tr>
<td>RT-2014</td>
<td>RB-2400 10,000 ohm wire wound</td>
<td>1.00</td>
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<tr>
<td>RT-2015</td>
<td>RB-2500 10,000 ohm wire wound</td>
<td>1.00</td>
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<tr>
<td>RT-2016</td>
<td>RB-2600 10,000 ohm wire wound</td>
<td>1.00</td>
</tr>
<tr>
<td>RT-2017</td>
<td>RB-2700 10,000 ohm wire wound</td>
<td>1.00</td>
</tr>
<tr>
<td>RT-2018</td>
<td>RB-2800 10,000 ohm wire wound</td>
<td>1.00</td>
</tr>
<tr>
<td>RT-2019</td>
<td>RB-2900 10,000 ohm wire wound</td>
<td>1.00</td>
</tr>
<tr>
<td>RT-2020</td>
<td>RB-3000 10,000 ohm wire wound</td>
<td>1.00</td>
</tr>
</tbody>
</table>

* Used on previous revisions.

(Prices subject to change without notice)
Fig. 6. Television Schematic Diagram
Models HM-225 and HM-226-7A

NOTE

*USED ON 226 ONLY*

RESISTANCE OF VIDEO AND AUDIO I.F. TRANSFORMER WINDINGS APPROXIMATELY EQUAL TO ONE OHM.
## GENERAL ELECTRIC CO.

### ANTENNA

In general, the television antenna should be of the dipole type located as high as is practical and in an area where the horizon in the direction of the television transmitter is not obstructed by buildings or structures. A noticeable gain in signal strength will be obtained as antenna height is increased. Since television radiation is essentially light wave radiation, the results are similar to that of increasing illumination in an area of limited visibility. The antenna should be carefully located in areas near other structures and vehicles on adjacent streets. It is usually best to locate the dipole antenna on the side of the building away from the street thus allowing the building to shield the antenna from noise sources.

The dipole should be erected with arms parallel to the ground and at right angles to the direction of the television station. If noise or reflection interference exists it may be better to point the dipole arms in the direction of the interference.

Noise interference and poor signal strength may dictate the use of a reflector. A reflector will increase the signal strength appreciably as well as increase the horizontal directivity.

---

### SERVICE DATA

**Electrical Specifications**

<table>
<thead>
<tr>
<th>Model</th>
<th>Power Supply (Volts)</th>
<th>Frequency (Cycles per Second)</th>
<th>Power Consumption (Watts)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HM-225</td>
<td>110-125</td>
<td>60</td>
<td>300</td>
</tr>
<tr>
<td>HM-226-7A</td>
<td>110-120</td>
<td>60</td>
<td>200 (Television) 15 (Radio)</td>
</tr>
</tbody>
</table>

### Tubes

- **Television**
  - Conv. Oscillator: GE-6F8G
  - 1st Audio I.F. Amplifier: GE-6SK7
  - Audio Amplifier and Phase Inverter: GE-6BQ7
  - Audio Output Transformer: GE-6GS4
- **RCA Video Amplifier and Sync. Clipper:** GE-6F8G
- **2nd Video Amplifier:** GE-6H7G
- **Vertical Amplifier and Vertical Clipper:** GE-6F8G
- **Horizontal Amplifier and Sync. Amplifier:** GE-6BQ7
- **Vertical Output:** GE-6V9G
- **Horizontal Output:** GE-4A1G
- **Low Voltage Rectifier:** GE-6V4G
- **High Voltage Rectifier:** GE-6T22D
- **Picture Tube (HM-225):** GE-MW-22-3
- **Picture Tube (HM-226-7A):** GE-MW-31-3

### Intermediate Frequencies

- **Television** (Picture): 12.75 M.C.
- **Television Audio:** 350 K.C.
- **Radio:** 655 K.C.

### Maximum Electrical Output

- **Television Audio:** 10 Watts
- **Radio Audio:** 5 Watts

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### TELEVISION ALIGNMENT PROCEDURE

The problem of aligning the several circuits in a television receiver is much more involved and requires more specialized equipment than the alignment of conventional radio receivers. Fortunately, the use of stable components in carefully engineered circuits of wide-band characteristics reduces to a minimum the necessity for alignment under normal operating conditions. Should alignment become necessary the following equipment will be needed:

(A) For Video I.F. Alignment
   (1) Cathode ray oscilloscope
   (2) Wide-band sweep oscillator capable of sweeping from 7.5 to 15 MC.

(B) Sound I.F. Alignment
   (1) Cathode ray oscilloscope
   (2) Wide band sweep oscillator capable of sweeping from 7.5 to 8.75 MC.

(C) R.F. Alignment
   (1) Cathode ray oscilloscope
   (2) Wide-band sweep oscillator capable of sweeping the following bands:
       (a) 44 to 80
       (b) 50 to 86
       (c) 84 to 90
       (d) 78 to 84

### VIDEO I.F. ALIGNMENT

<table>
<thead>
<tr>
<th>Input Freq.</th>
<th>Point of Input</th>
<th>Adjustments</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
<td>Connect vertical input cable of cathode ray oscilloscope across resistor R-43 of 686 video detector. See Fig. 5, arrow one.</td>
</tr>
<tr>
<td>2. 7.5–15MC Sweep</td>
<td>Control grid of 1883 (2nd video I.F.)</td>
<td>Connect low output tap of video I.F. sweep oscillator to control grid of 1883 (2nd video I.F.). See Fig. 5, arrow two. Connect ground lead to chassis. Turn contrast control (R-07) to about half of maximum or to a point which gives satisfactory vertical deflection without overloading. Set horizontal centering and gain controls on oscilloscope to give suitable horizontal deflection. Adjust sweep phase to give curve similar to Fig. 8, curve 3.</td>
<td></td>
</tr>
<tr>
<td>3. Same as in No. 2 plus 12.75 MC</td>
<td>Same as in No. 2</td>
<td>Superimpose an accurately calibrated 12.75 MC signal in parallel with sweep signal. Signal will appear on sweep curve in oscilloscope as a wiggle, the center of which is a thin black line. With a pen or crayon mark this point on the screen of the oscilloscope. (Note: Hereafter the horizontal controls on the oscilloscope must not be touched.)</td>
<td></td>
</tr>
<tr>
<td>4. Same as in No. 2 plus 9.75 MC</td>
<td>Same as in No. 2</td>
<td>Superimpose an accurately calibrated 9.75 MC signal in parallel with sweep signal. Mark screen at point where signal appears on curve as in No. 3 above.</td>
<td></td>
</tr>
<tr>
<td>5. 7.5–15 MC Sweep</td>
<td>Control grid of 1852 (4th video I.F.)</td>
<td>Iron cores of detector transformer T-9</td>
<td>Connect high tap of video I.F. sweep oscillator to control grid of 1852 (4th video I.F.) See Fig. 5, arrow five. (Do not touch horizontal controls of oscilloscope.) Turn sweep phase to give as near a single curve as possible. Adjust iron cores of T-9 until curve appears similar to Fig. 8, curve 1, with relatively flat top, 12.75 MC mark half-way down one side and 9.75 MC mark at corner of other side. These conditions plus maximum amplitude insure correct alignment.</td>
</tr>
<tr>
<td>6. 7.5–15 MC Sweep</td>
<td>Control grid of 1883 (3rd video I.F.)</td>
<td>Iron cores of 4th video transformer T-8</td>
<td>Connect low tap of video I.F. sweep oscillator to control grid of 1883 (3rd video I.F.). See Fig. 5, arrow six. Adjust iron cores for maximum gain, flatness and proper centering between markers as described in step No. 5 and illustrated in Fig. 8, curve 2.</td>
</tr>
<tr>
<td>7. 7.5–15 MC Sweep</td>
<td>Control grid of 1883 (2nd video I.F.)</td>
<td>Iron cores of 3rd video transformer T-7</td>
<td>Connect low tap to grid. See Fig. 5, arrow two. Adjust primary and secondary iron cores for maximum gain, flatness and proper centering. Adjust series iron core for sharp cut-off on 9.75 MC side of curve. See Fig. 8, curve 3.</td>
</tr>
<tr>
<td>8. 7.5–15 MC Sweep</td>
<td>Control grid of 1852 (1st video I.F.)</td>
<td>Iron cores of 2nd video transformer T-6</td>
<td>Connect low tap to grid. See Fig. 5, arrow eight. Adjust primary and secondary iron cores for maximum gain, flatness and proper centering. Adjust series iron core for sharp cut-off on 12.75 MC side of curve. See Fig. 8, curve 4.</td>
</tr>
<tr>
<td>9. 7.5–15 MC Sweep</td>
<td>Converter Grid, 6P8G</td>
<td>Iron cores of 1st video transformer T-11</td>
<td>Connect low tap to grid. Adjust iron cores for maximum gain flatness and proper centering.</td>
</tr>
<tr>
<td>10. 14.25 MC</td>
<td>Converter Grid, 6P8G</td>
<td>Series iron core of 2nd video transformer T-6</td>
<td>To check alignment of 14.25 MC trap proceed as follows: Connect low tap to grid. Reduce horizontal gain of oscilloscope to minimum. Adjust iron core for minimum line length.</td>
</tr>
<tr>
<td>11. 8.25 MC</td>
<td>Converter Grid, 6P8G</td>
<td>Series iron core of 3rd video transformer T-7</td>
<td>To check alignment of 8.25 MC trap proceed as follows: Connect low tap to grid. Reduce horizontal gain of oscilloscope to minimum. Adjust iron core for minimum line length.</td>
</tr>
</tbody>
</table>

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### R. F. ALIGNMENT

<table>
<thead>
<tr>
<th>Signal Input</th>
<th>Point of Input</th>
<th>Adjustments</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td>Band width adjustment coupling condenser</td>
<td>Turn (C-2) in until tight, then open approximately 1/4 of a turn.</td>
</tr>
<tr>
<td>2. 44 to 50 MC sweep</td>
<td>Antenna terminals</td>
<td>(L-10), (C-3), (C-8)</td>
<td>Depress band No. 1 push button. Set tuning control to mid-rotation. Adjust L-10 until curve is centered between maximum horizontal sweep points. Adjust C-3 and C-8 for maximum amplitude. See Fig. 8, curve 5.</td>
</tr>
<tr>
<td>3. 50 to 56 MC sweep</td>
<td>Antenna terminals</td>
<td>(L-11), (C-4), (C-9)</td>
<td>Depress band No. 2 push button. Leave tuning control at mid-rotation point. Adjust L-11 for centering; C-4 and C-9 for maximum amplitude. See Fig. 8, curve 5.</td>
</tr>
<tr>
<td>4. 66 to 72 MC sweep</td>
<td>Antenna terminals</td>
<td>(L-12), (C-5), (C-10)</td>
<td>Depress band No. 3 push button. Adjust L-12 for centering; C-5 and C-10 for maximum amplitude. See Fig. 8, curve 5.</td>
</tr>
<tr>
<td>5. 75 to 84 MC sweep</td>
<td>Antenna terminals</td>
<td>(L-15), (C-83), (C-19)</td>
<td>Depress band No. 4 push button. Adjust L-13 for centering; C-83 and C-19 for maximum amplitude. See Fig. 8, curve 5.</td>
</tr>
<tr>
<td>6. 84 to 90 MC sweep</td>
<td>Antenna terminals</td>
<td>(L-14), (C-84), (C-20)</td>
<td>Depress band No. 5 push button. Adjust L-14 for centering; C-84 and C-20 for maximum amplitude. See Fig. 8, curve 5.</td>
</tr>
</tbody>
</table>

### WAVE TRAP ALIGNMENT

<table>
<thead>
<tr>
<th>Signal Input</th>
<th>Point of Input</th>
<th>Adjustments</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 11.75 MC</td>
<td>Antenna terminals</td>
<td>Wave trap trimmer, C-88</td>
<td>Adjust for maximum dip in oscilloscope curve.</td>
</tr>
</tbody>
</table>

### AUDIO I. F. ALIGNMENT

<table>
<thead>
<tr>
<th>Input Freq.</th>
<th>Point of Input</th>
<th>Adjustments</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td>Connect vertical input cable of cathode ray oscilloscope between junction of R-4 and C-29 and chassis. See Fig. 5, arrow ten.</td>
<td></td>
</tr>
<tr>
<td>2. 7.75 to 8.75 MC sweep</td>
<td>Control grid of 6B8</td>
<td>Iron cores of 4th audio I.F. transformer T-4</td>
<td>Align for maximum amplitude. See Fig. 8, curve 6.</td>
</tr>
<tr>
<td>3. 7.75 to 8.75</td>
<td>Control grid of 6SK7</td>
<td>Iron cores of 3rd audio I.F. transformer T-3</td>
<td>Align for maximum amplitude. See Fig. 8, curve 6.</td>
</tr>
<tr>
<td>4. 7.75 to 8.75</td>
<td>Converter grid of 6F8G</td>
<td>Iron cores of 2nd audio I.F. transformer T-2</td>
<td>Align for maximum amplitude. See Fig. 8, curve 7.</td>
</tr>
</tbody>
</table>

![Fig. 8. Television Alignment Curves](image-url)
<table>
<thead>
<tr>
<th>Stock No.</th>
<th>Description</th>
<th>List Price</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>R9-006</td>
<td>BOARD---Terminal board (2 lug)</td>
<td>$0.10</td>
<td>RQ-1239</td>
</tr>
<tr>
<td>R9-913</td>
<td>BOARD---Terminal board (2 lug)</td>
<td>$0.10</td>
<td>RQ-1283</td>
</tr>
<tr>
<td>R9-923</td>
<td>BOARD---Terminal board (2 lug)</td>
<td>$0.10</td>
<td>RQ-1287</td>
</tr>
<tr>
<td>R9-940</td>
<td>BOARD---Ant. gnd. terminal board</td>
<td>$0.10</td>
<td>RQ-1299</td>
</tr>
<tr>
<td>R9-951</td>
<td>BEZEL---Pilot light bezel</td>
<td>$0.20</td>
<td>RQ-1327</td>
</tr>
<tr>
<td>RQ-006</td>
<td>RESISTOR---100 ohms 1/4 W. (C-10)</td>
<td>$0.25</td>
<td>RQ-1343</td>
</tr>
<tr>
<td>RQ-012</td>
<td>RESISTOR---200 ohms 1/4 W. (C-10)</td>
<td>$0.30</td>
<td>RQ-1355</td>
</tr>
<tr>
<td>RQ-023</td>
<td>CAPACITOR---150 mfd. 250 V. paper (C-10)</td>
<td>$0.30</td>
<td>RQ-1358</td>
</tr>
<tr>
<td>RQ-027</td>
<td>CAPACITOR---100 mfd. 630 V. paper (C-10)</td>
<td>$0.30</td>
<td>RQ-1368</td>
</tr>
<tr>
<td>RQ-065</td>
<td>CAPACITOR---250 mfd. 250 V. paper (C-10)</td>
<td>$0.30</td>
<td>RQ-1371</td>
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<tr>
<td>RQ-071</td>
<td>CAPACITOR---1,500 mfd. 100 V. paper (C-10)</td>
<td>$0.30</td>
<td>RQ-1375</td>
</tr>
<tr>
<td>RQ-082</td>
<td>CAPACITOR---2,500 mfd. 100 V. paper (C-10)</td>
<td>$0.30</td>
<td>RQ-1379</td>
</tr>
<tr>
<td>RQ-090</td>
<td>CAPACITOR---4,700 mfd. 100 V. paper (C-10)</td>
<td>$0.30</td>
<td>RQ-1382</td>
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<tr>
<td>RQ-104</td>
<td>CAPACITOR---6,800 mfd. 100 V. paper (C-10)</td>
<td>$0.30</td>
<td>RQ-1384</td>
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<tr>
<td>RQ-110</td>
<td>CAPACITOR---10,000 mfd. 100 V. paper (C-10)</td>
<td>$0.30</td>
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<tr>
<td>RQ-120</td>
<td>CAPACITOR---20,000 mfd. 100 V. paper (C-10)</td>
<td>$0.30</td>
<td>RQ-1386</td>
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<tr>
<td>RQ-126</td>
<td>CAPACITOR---30,000 mfd. 100 V. paper (C-10)</td>
<td>$0.30</td>
<td>RQ-1387</td>
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<tr>
<td>RQ-132</td>
<td>CAPACITOR---40,000 mfd. 100 V. paper (C-10)</td>
<td>$0.30</td>
<td>RQ-1388</td>
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<tr>
<td>RQ-138</td>
<td>CAPACITOR---50,000 mfd. 100 V. paper (C-10)</td>
<td>$0.30</td>
<td>RQ-1389</td>
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<tr>
<td>RQ-140</td>
<td>CAPACITOR---60,000 mfd. 100 V. paper (C-10)</td>
<td>$0.30</td>
<td>RQ-1390</td>
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<tr>
<td>RQ-144</td>
<td>CAPACITOR---70,000 mfd. 100 V. paper (C-10)</td>
<td>$0.30</td>
<td>RQ-1391</td>
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<tr>
<td>RQ-149</td>
<td>CAPACITOR---80,000 mfd. 100 V. paper (C-10)</td>
<td>$0.30</td>
<td>RQ-1392</td>
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<tr>
<td>RQ-155</td>
<td>CAPACITOR---100,000 mfd. 100 V. paper (C-10)</td>
<td>$0.30</td>
<td>RQ-1393</td>
</tr>
<tr>
<td>RQ-161</td>
<td>CAPACITOR---150,000 mfd. 100 V. paper (C-10)</td>
<td>$0.30</td>
<td>RQ-1394</td>
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<tr>
<td>RQ-165</td>
<td>CAPACITOR---200,000 mfd. 100 V. paper (C-10)</td>
<td>$0.30</td>
<td>RQ-1395</td>
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<tr>
<td>RQ-170</td>
<td>CAPACITOR---250,000 mfd. 100 V. paper (C-10)</td>
<td>$0.30</td>
<td>RQ-1396</td>
</tr>
<tr>
<td>RQ-175</td>
<td>CAPACITOR---300,000 mfd. 100 V. paper (C-10)</td>
<td>$0.30</td>
<td>RQ-1397</td>
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<tr>
<td>RQ-180</td>
<td>CAPACITOR---350,000 mfd. 100 V. paper (C-10)</td>
<td>$0.30</td>
<td>RQ-1398</td>
</tr>
<tr>
<td>RQ-185</td>
<td>CAPACITOR---400,000 mfd. 100 V. paper (C-10)</td>
<td>$0.30</td>
<td>RQ-1399</td>
</tr>
</tbody>
</table>

Television Chassis Parts Used in Television Only

<table>
<thead>
<tr>
<th>Stock No.</th>
<th>Description</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>T8-100</td>
<td>KEY---Station selector key</td>
<td>$0.15</td>
</tr>
<tr>
<td>T8-101</td>
<td>BACK COVER---Cardboard back cover for model HM-225</td>
<td>$0.10</td>
</tr>
<tr>
<td>T8-1503</td>
<td>BACK COVER---Cardboard back cover for model HM-225A</td>
<td>$0.20</td>
</tr>
<tr>
<td>T8-2001</td>
<td>FOCUS---R.F. tuning bushing</td>
<td>$0.15</td>
</tr>
<tr>
<td>T8-250</td>
<td>BRACKET---Right R.F. unit support assembly</td>
<td>$0.15</td>
</tr>
<tr>
<td>T8-251</td>
<td>BRACKET---Left R.F. unit support assembly</td>
<td>$0.15</td>
</tr>
<tr>
<td>T8-1002</td>
<td>TRIMMER STRIP---Front station selector trimmer strip</td>
<td>$0.15</td>
</tr>
<tr>
<td>T8-1003</td>
<td>TRIMMER STRIP---Top station selector trimmer strip</td>
<td>$0.15</td>
</tr>
<tr>
<td>T8-2000</td>
<td>CONTROL---60 mfd. 4000 V. paper (C-17, 78)</td>
<td>$0.15</td>
</tr>
<tr>
<td>T8-2023</td>
<td>CONTROL---25 V. 60 mfd. 450 V. dry electrolytic (C-26, 27)</td>
<td>$0.15</td>
</tr>
<tr>
<td>T8-2024</td>
<td>CONTROL---Station 25 V. dry electrolytic (C-26, 27)</td>
<td>$0.15</td>
</tr>
<tr>
<td>T8-2025</td>
<td>CONTROL---250 ohms vertical linearity or size control (R-27, 35)</td>
<td>$0.15</td>
</tr>
<tr>
<td>T8-2026</td>
<td>CONTROL---500 ohms vertical speed control (R-27, 35)</td>
<td>$0.15</td>
</tr>
<tr>
<td>T8-2027</td>
<td>CONTROL---1000 ohms horizontal size control (R-27, 35)</td>
<td>$0.15</td>
</tr>
<tr>
<td>T8-2028</td>
<td>CONTROL---2000 ohms W. focus control (R-75)</td>
<td>$0.15</td>
</tr>
<tr>
<td>T8-2029</td>
<td>CONTROL---1000 ohms horizontal size control (R-60)</td>
<td>$0.15</td>
</tr>
<tr>
<td>T8-2030</td>
<td>CONTROL---1000 ohms horizontal size control (R-60)</td>
<td>$0.15</td>
</tr>
</tbody>
</table>

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GENERAL ELECTRIC CO.

MODELS HM225, HM226-7A
Circuit Data

Parts list continued.

<table>
<thead>
<tr>
<th>Part</th>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>RTI-3001</td>
<td>TRANSFORMER—1st video I.F. transformer (T-3)</td>
<td>4.15</td>
</tr>
<tr>
<td>RTI-3001</td>
<td>TRANSFORMER—2nd video I.F. transformer (T-9)</td>
<td>4.15</td>
</tr>
<tr>
<td>RTI-3001</td>
<td>TRANSFORMER—3rd video I.F. transformer (T-7)</td>
<td>4.15</td>
</tr>
<tr>
<td>RTI-3001</td>
<td>TRANSFORMER—4th video I.F. transformer (T-8)</td>
<td>4.15</td>
</tr>
<tr>
<td>RTI-3001</td>
<td>TRANSFORMER—5th video I.F. transformer (T-9)</td>
<td>4.15</td>
</tr>
<tr>
<td>RTI-3600</td>
<td>TRANSFORMER—Hexagonal inductor (T-10)</td>
<td>4.15</td>
</tr>
<tr>
<td>RTI-3670</td>
<td>TRANSFORMER—Vertical output transformer (T-8)</td>
<td>4.15</td>
</tr>
<tr>
<td>RTI-3700</td>
<td>TRANSFORMER—1st audio I.F. transformer (T-2)</td>
<td>4.15</td>
</tr>
<tr>
<td>RTI-3700</td>
<td>TRANSFORMER—2nd audio I.F. transformer (T-2)</td>
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<tr>
<td>RTI-3800</td>
<td>TRANSFORMER—3rd audio I.F. transformer (T-9)</td>
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<td>RTI-9900</td>
<td>TRANSFORMER—Vertical oscillator transformer (T-9)</td>
<td>4.15</td>
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<tr>
<td>RTI-3650</td>
<td>TRANSFORMER—Audio output transformer (T-5)</td>
<td>4.15</td>
</tr>
<tr>
<td>RTI-7200</td>
<td>FILTER—Power capacitor 1 mfd (P-8)</td>
<td>4.15</td>
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<tr>
<td>RTI-7300</td>
<td>WINDOW—Safety glass window for Model HM-225</td>
<td>4.30</td>
</tr>
<tr>
<td>RTI-7400</td>
<td>WINDOW—Safety glass window for Model HM-226-7A</td>
<td>3.50</td>
</tr>
<tr>
<td>RTI-1001</td>
<td>ASSEMBLY—Wave trap assembly (L-2, 3, 4, 5, 6, 7, 11, 13)</td>
<td>3.00</td>
</tr>
<tr>
<td>RTI-1003</td>
<td>ASSEMBLY—Wave trap assembly (L-15, C-88)</td>
<td>0.30</td>
</tr>
<tr>
<td>RTI-3600</td>
<td>ASSEMBLY—Chassis mounting assembly</td>
<td>0.20</td>
</tr>
</tbody>
</table>

* Used on previous radio receivers.

(Prices Subject to Change without Notice)

CAUTIONARY INSTRUCTIONS

All adjustments not accessible with the back cover in place can be made without energizing the high-voltage circuits. Servicing of the high-voltage circuits can be satisfactorily performed after the power-cord plug has been removed from any power supply outlet. A resistance check of the circuit components will indicate any trouble existing. HIGH VOLTAGES SHOULD NEVER BE MEASURED.

The “picture tube” is highly evacuated and is consequently subject to a very great air pressure. If it is broken, glass fragments will be violently expelled. Handle with care, using safety goggles and gloves.

The large end of the “picture tube”—particularly that part at the rim of the viewing surface—must not be struck, scratched or subjected to more than moderate pressure. DO NOT TOUCH THE OUTSIDE OF THE TUBE OR STRAIN ANY EXTERNAL CONNECTIONS. If it fails to slip into place smoothly, investigate and remove the cause of the trouble.

Extremely high voltages (4000 volts or more) are used in the operation of this receiver; therefore, every precaution must be exercised to insure safety to the service engineer and to the customer.

The back cover, while in place, protects the user and should never be removed except by a qualified television service engineer.

The power-cord plug should not be inserted in a power supply outlet until a good, solid ground connection has been properly made to the receiver chassis.

For safety, the following operations must be performed with power plug disconnected before working on the receiver with the back cover removed:

1. Remove 879/2X2 tube from socket.
2. Detach top cap lead of 879/2X2 tube and insulate the contact end of this cap lead.
3. Ground the receiver chassis.

TELEVISION RECEIVER CIRCUITS

The television receiver circuits are divided into the following sections:

1. R.F. Unit
2. Converter-Oscillator and Amplifier
3. Audio Unit
4. Video Unit
5. Sync Pulse Clipper—Amplifier
6. Horizontal Oscillator—Output
7. Vertical Oscillator—Output
8. Low Voltage Rectifier
9. High Voltage Rectifier

R. F. Unit

This unit, comprising all circuits between the antenna terminal posts and the converter grid, consists of a high pass filter input, a series tuned antenna coil primary, a shunt capacity coupled secondary (C-2) and a video I.F. wave trap (C-10). The wave trap is broadly tuned at 11.75 M.C. to prevent I.F. interference. Any one of the five tuned circuits for each of the five television transmission bands can be connected into the secondary by pressing the appropriate button. The secondary circuit trimmers when properly tuned give a broad, flat response curve.

Converter-Oscillator and Amplifier

A plate-tuned oscillator is used with vernier tuning permitted from the front control panel through trimmer C-17. The resultant video I.F. signal of 12.75 M.C. and the audio I.F. signal of 8.25 M.C. developed in the converter-oscillator tube circuit is coupled through transformer T-11 to the 1852 amplifier tube.

Audio Unit

The audio unit is a conventional-type superheterodyne sound receiver with the I.F. stages tuned to 8.25 M.C. The audio I.F. signal is taken off through the suppressor of the 1st video I.F. tube.

Video Unit

This unit includes all the video I.F. amplifier stages, the video detector, two stages of video amplification and the picture tube input. Three wave traps are provided in this unit; one at T-6 for rejecting the audio I.F. of the adjacent television band, one at T-7 for rejecting the audio I.F. of the band concerned, and one in the cathode circuit of the 1st video, 686G, comprising L-18 and C-52, for removing the 12.75 M.C. video I.F. from the detected signal amplifier stages. A sensitivity control, known as contrast control, (R-67), is provided in the AVC circuits of the 6H6 video detector for varying the grid bias on the 2nd and 3rd video I.F. tubes.

D.C. reinsertion (automatic background control) is accomplished in the 2nd-video 6F6G tube circuit by using part of the varying screen voltage developed across R-93 to control the picture tube grid voltage. A high impedance voltage divider, R-94 and R-95, is used and the coupling condenser, C-38, is made small to prevent low frequency variations in the plate supply from getting to the picture tube grid.

Sync-pulse Clipper—Amplifier

Sync-pulses are taken off the plate of the right section of the 1st video and clipper tube, 6F6G. The video signals are separated by tube cut-off since the plate voltage is only about 10 volts. The sync pulses are then amplified in the sync amplifier tube and coupled through a high-pass filter to the grid of the horizontal oscillator.

Horizontal Oscillator—Output

The horizontal oscillator is a multi-vibrator controlled by varying the small positive grid voltage through R-69. The horizontal pulses are passed through proper wave shaping and amplifier circuits to the horizontal deflection coils of the picture tube. Horizontal linearity is adjustable by varying R-91. Horizontal sweep size is controlled by R-60 in the cathode circuit of the 6AL6G. The degeneration resistor R-22 and series circuit across the secondary of the 6AL6G output transformer damps the output transient. Damping is adjustable through R-100.

Vertical Oscillator—Output

Vertical sync-pulses are separated from the horizontal pulses in the vertical clipper right section of 6F6G and are fed to the vertical oscillator. This oscillator is of the blocking type, transformer coupled. The generated sawtooth wave across C-70 is shaped by the vertical linearity control, R-93. The speed of the oscillator is controlled by R-79 and the length of sweep (size) is adjustable through R-68. The output is amplified and coupled to the vertical deflection coils of the picture tube.

Low-voltage Rectifier

Two 5U4G rectifiers are necessary to supply plate current which is over 300 ma. A combination of choke and resistance filters is used so that the audio and oscillator plate supplies will be free from video and sweep signals.

High-voltage Rectifier

The high voltage rectifier uses a resistance filter. The bleeder is connected across the filter input to reduce ripple. R-10S is inserted in the plate lead for protection.

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Compliments of www.nucow.com
MODEL HM-226-7A
Radio Chassis Wiring
Phono, Data, Power Chassis

Fig. 10. Power Chassis Parts Layout

LOUD SPEAKER

To center the voice coil, loosen the two screws which clamp the speaker spider in position. These two screws are available from the rear of the speaker. Shift the spider around until the voice coil is centered, then tighten the screws in position.

Fig. 14. Dial Drive Stringing Diagram

PHONOGRAPH CONNECTIONS

Model HM-226-7A radio receiver is equipped with a phono-terminal (pin jack) to allow the convenient connection of a record player. General Electric plug, Stock No. RP-148, fits the pin jack.

Note—A suitable load consisting of a 100,000 ohm resistor in series with a .01 mfd, capacitor should be connected across the pick-up leads when using a crystal-type unit.

Fig. 15. Radio Chassis Parts Layout
(Model HM-226-7A only)
Compliments of www.nucow.com


MODEL H508
Schematic, Socket, Trimmers, Alignment

GENEAL ELECTRIC CO.

Symbol | Description | Symbol | Description | Symbol | Description
--- | --- | --- | --- | --- | ---
C-1 | .002 mfd. paper capacitor | C-17 | 40 mfd. 150 V. dry electrolytic | R-4 | 500,000 ohms volume control
C-2a | Antenna section tuning condenser | C-17c | 20 mfd. 25 V. dry electrolytic | R-5 | 15 megohms carbon resistor
C-3b | Oscillator section tuning condenser | C-18 | .01 mfd. paper capacitor | R-6 | 470,000 ohms carbon resistor
C-4 | 47 mfd. mica capacitor | C-19 | .02 mfd. paper capacitor | R-7 | 470,000 ohms carbon resistor
C-9 | 470 mfd. mica capacitor | C-20 | .001 mfd. paper capacitor | R-8 | 150 ohms carbon resistor
C-10 | .05 mfd. paper capacitor | L-1 | Beam-a-Scope | R-9 | 1200 ohms carbon resistor
C-13 | B band pad | L-3 | Oscillator coil | R-10 | 100 ohms wire wound resistor
C-14 | .015 mfd. paper capacitor | L-4 | 1st I.F. transformer | R-11 | 16 ohms carbon resistor
C-15 | 800 mfd. mica capacitor | P-1 | 2nd I.F. transformer | S-1 | Power switch (on Volume Control)
C-16 | .01 mfd. paper capacitor | R-1 | Dial Lamp Mazda No. 47 | S-2 | Radio-Phono switch
C-17 | .03 mfd. paper capacitor | R-2 | 33,000 ohms carbon resistor | T-1 | Output transformer
C-17a | 30 mfd. 150 V. dry electrolytic | R-3 | 2.1 megohms carbon resistor | - | -

SERVICE DATA

Over-all Dimensions
Height—10 1/2 inches. Width—15 1/2 inches. Depth—13 1/2 inches.

Tubes
Converter-Oscillator.............. GE-12SA7GT
I. F. Amplifier.................... GE-12B7
Det., Aud. AVC..................... GE-12Q7GT
Power Output...................... GE-35L6GT
Rectifier........................ GE-35Z5GT
Dial Lamp......................... Mazda No. 47

Tuning Frequency Range........... 540-1600 KC

Electrical Specifications
Rating Power Supply Frequency Power Consumption (volts) (cycles) (watts)
A-6 115 60 55
A-5 115 50 55
C-2 115 25 55

Electrical Power Output (115-line volts)
Undistorted....................... 1.2 watts
Maximum.......................... 2.0 watts

Loud-speaker—“Alnico” Magnetic Dynamic
Outside Cone Diameter............ 4 inches
Voice Coil Impedance (400 cycles).... 3.5 ohms

I.F. Alignment
Connect an output meter across the voice coil. Turn the volume control to maximum. Set test oscillator to 455 KC and keep the oscillator output as low as a readable meter reading will permit.
Apply this signal to the grid of the 12B7 through a .05 mfd. capacitor and align the 2nd I.F. transformer. Repeat the procedure, applying the 455 KC signal to the control grid of the 12SA7GT and aligning the 1st I.F. transformer. Do not remove grid leads from the tubes. Finish alignment by over-all adjustments.

R.F. Alignment
Apply a 1500 KC signal either through a standard I.R.E. dummy to the antenna terminal or through an additional loop connected to the generator output which can be magnetically coupled to the receiver Beam-a-Scope. Align (C-2b) at 1500 KC and peak (C-2a) for maximum output. Change signal to 580 KC and tune receiver to signal. Peak (C-11) on the 580 KC signal by rocking the gang condenser. Retrim at 1500 KC.

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GENERAL INFORMATION

Model HB-412 is a portable, four-tube, superheterodyne receiver designed to operate on any one of three types of power supply as listed under electrical specifications. Features of design include automatic power selector switch, built-in Beam-a-Scope, 4-inch Dynapower speaker, and automatic volume control.

The automatic power selector switch operates as follows: Inside the small door on the left side of the cabinet is the power selector lever. To operate radio on batteries see that the plugs on the power cord plug are inserted in the lever holes and the plug pushed in until it wedges between the cabinet wall and the lever. Place the rest of the power cord in the compartment and close the door. To operate radio on an AC or DC power supply merely remove the power cord plug from the compartment and insert in a convenience outlet.

Note: Do not press in on power selector lever while power cord is in convenience outlet.

When operating from a DC source of power, it is necessary to insert the power plug with the proper polarity; otherwise the receiver will fail to function. If any hum is noticed when the receiver is used on AC, reverse the power plug in the receptacle.

When the receiver is operating on batteries it will perform as soon as it is turned on. However, when operating from an AC or DC power supply, sufficient time must be allowed for the tubes to become heated.

Audio power output is obtained from the 1T56GT on battery operation, and from the pentode section of the 117L7GT on AC or DC, 115-volt operation. The driving grids of the two tubes are in parallel. On battery operation the 117L7GT is dead due to no filament voltage, as is the case of the 1T56GT on AC-DC, 115-volt operation. A tapped primary output transformer is used to insure matching to the different load impedances of the two output tubes. If the receiver does not operate on low line voltage check 117L7GT for low plate current since its plate current energizes the 3AG7 and 1A7GT filaments; also check 1A7GT for low emission.

Precaution:

Model HB-412 when used on an AC power supply will have one side of the chassis connected directly to the line. In order to prevent injury to alignment equipment or shock to the serviceman, use an isolating transformer between the convenience outlet and the receiver power cord.

Tubes

Converter-Oscillator .................................. GE-1A7GT
I.F.—Det.—Aud.—AVC ................................. GE-3AT7GT
Battery Power Output ................................... GE-1T56GT
AC-DC Power Output—Rectifier ........................ GE-111L7GT

SERVICE DATA

1. AC or DC Power Supply
110–120 Volts, 25–60 cycles on AC, 25 watts

2. Battery Power Supply
6-volt "A" supply, 90-volt "B" supply.

Recommended batteries for long life.
(a) "A" supply—Eveready No. 747 or equivalent
(b) "B" supply—two Eveready No. 482 or equivalent

Load-speaker—"Alinco" Magnetic Dynamic
Outside Cone Diameter .................................. 4 inches
Voice Coil Impedance (400 cycles) .................. 3.5 ohms

Max. Power Output
Battery Operation ........................................ 275 milliwatts
AC or DC Operation .................................... 2 watts

Tuning Frequency Range ................................. 550–1600 KC
Intermediate Frequency ................................. 455 KC

Fig. 3. Schematic Diagram
ALIGNMENT PROCEDURE

Alignment Frequencies

I.F. ........................................... 455 KC
R.F. ........................................... 1500 and 580 KC

The location of all trimmers is shown in Fig. 1.

General Alignment Notes

This receiver must be removed from the carrying case in order to perform the alignment. Special care must be exercised to place the batteries, Beam-a-Scope and chassis in the same relative positions with respect to one another as these components occupied in the case; otherwise, alignment will not be satisfactory.

I.F. Alignment

With batteries, Beam-a-Scope and chassis in position for alignment as mentioned above, and using an isolating transformer if operating from an AC power source (refer to precaution under "General Information"), set up and align as follows: Connect an output meter across the voice coil. Rotate the volume control to maximum. Set test oscillator to 455 KC and apply signal to the control grid of the 3AG7 tube through a 0.05 mfd. capacitor. Align the 2nd I.F. transformer trimmers. Next apply signal to the control grid of the 1A7GT through the same 0.05 mfd. capacitor and align the 1st I.F. transformer trimmers. Retouch the 2nd I.F. transformer trimmers while applying signal to the 1A7GT tube. Do not remove the grid leads from the tubes when applying the oscillator signal and keep the test oscillator output as low as a readable meter reading will permit.

R.F. Alignment

Place a one turn coupling loop not closer than six inches from the receiver Beam-a-Scope. Apply a 1500 KC signal to the coupling loop. Set pointer to 1500 KC and align the oscillator trimmer (C-1A). Peak (C-1B) for maximum output. Change test signal to 580 KC and with pointer in region of 580 KC peak (C-3) while rocking the gang condenser. Retrim at 1500 KC.

The Beam-a-Scope leads should be dressed the same after the components are mounted in the cabinet as during alignment.

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GENERAL ELECTRIC CO.

MODELS H500U, H510U (W, X) Early, Late Schematics Changes
MODEL H520U (W, X) Schematic

Intermediate Frequency
455 KC

Fig. 5. Schematic Diagram
(Model H-500U and H-510U)
(W and X Models Included)

* Refer to Production Changes for circuits with 12A8GT tube and 2.0 megohm volume control. Lettered points indicate break-points for insertion of circuits shown in Figs. 3 and 4.

PRODUCTION CHANGES

Conversion changes from H-591 and H-511 to H-500U and H-510U were made progressively; hence, there are H-500U and H-510U receivers with 12A8GT converter-oscillator tube circuits (see Fig. 3). If such is the case insert the 2.0 megohm volume control circuit in place of the 500,000 ohm volume control circuit shown in the schematic diagram (Figs. 5 and 6). When ordering replacement parts for the 12A8GT circuit be sure to refer to the special replacement parts list.

Similarly there will be found receivers of Model H-500U, H-510U and H-520U which have a 2.0 megohm volume control circuit (see Fig. 3). If such is the case insert the 2.0 megohm volume control circuit in place of the 500,000 ohm volume control circuit shown in the schematic diagram (Figs. 5 and 6). When ordering replacement parts for the 2.0 megohm volume control circuit be sure to refer to the special replacement parts list.

Capacitor (C-12) was .002 mfd. in all early production receivers. It was later changed to .03 mfd. to improve performance.

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Fig. 3. 2.0 Megohm Volume Control Circuit
(Refer to Production Changes)

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GENERAL ELECTRIC CO.

Dial Lamp ............ MAZDA No. 47

Electrical Power Output (115-line volts)

Undistorted ........... 0.9
Maximum ............... 1.8

Load-speaker—"Alnico" Magnetic Dynamic

Outside Cone Diameter .......... 4 inches
Voice Coil Impedance (400 cycles) ... 3.5 ohms

Electrical Specifications

<table>
<thead>
<tr>
<th>Power Supply (Volts)</th>
<th>Frequency (Cycles on AC)</th>
<th>Power Consumption (Watts)</th>
</tr>
</thead>
<tbody>
<tr>
<td>115 Volts AC or DC</td>
<td>25-60</td>
<td>30</td>
</tr>
</tbody>
</table>

Fig. 1. Trimmer Location
† GE-12A8GT used on early production Model H-500U and H-510U.

Fig. 7. Chassis Parts Layout

Special Service Information

The following information will be found very useful in servicing receivers if a vacuum tube voltmeter or similar voltage measuring instrument is available.

1. Stage Gains Gain
   - Antenna to 12SA7GT .................. 3 to 4 at 1900 KC
   - 12SA7GT to 12SK7 grid ............. 42 at 455 KC
   - 12SK7 grid to 12SQ7 detector plate ............................................. 70 at 455 KC

2. 0.1 volt, 400 cycle signal across volume control will give 3½ watt speaker output.† (Volume turned to maximum.)

3. Average DC voltage developed across oscillator grid resistor (R-1)—12 volts.
† Variation of +10% to -20% permissible.

Bottom View of Chassis

Line volts—115. No signal input. When operated on a d-c power supply, voltages are about 15% lower. Use a high resistance voltmeter.
* Measured on 300 volt scale of 1000 ohms per volt meter.

Fig. 2. Socket Voltages

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Voltage(Socket, Chassis Wiring) Gain Parts List

H-500, 501, 510, 511, 520, 521...... Oak Plastic

<table>
<thead>
<tr>
<th>Stock No.</th>
<th>Description</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>RL-391</td>
<td>COIL—Oscillator coil for Models H-520 and H-521 (W &amp; X inc.) (L-2)</td>
<td>$0.50</td>
</tr>
<tr>
<td>RL-346</td>
<td>CHOKES—RF choke for Models H-520 and H-521 (W &amp; X inc.) (L-2)</td>
<td>$0.30</td>
</tr>
<tr>
<td>RL-510</td>
<td>LOOP—Beam-a-Scope assembly for Models H-500 and H-521 (W &amp; X inc.) (L-2)</td>
<td>$0.70</td>
</tr>
<tr>
<td>RL-937</td>
<td>LUG—Key pin binding lug (Pkg. 10)</td>
<td>$0.10</td>
</tr>
<tr>
<td>RF-134</td>
<td>PIN—Key pin for Models H-510, 511, 520, 521, (W &amp; X inc.) (Pkg. 10)</td>
<td>$0.05</td>
</tr>
<tr>
<td>R*Q-1215</td>
<td>RESISTOR—15 ohms, 3/4 W, carbon (R-14) (Pkg. 5)</td>
<td>$0.70</td>
</tr>
<tr>
<td>R*Q-1283</td>
<td>RESISTOR—10,000 ohms, 3/4 W, carbon (R-14) (Mod. H-520 and H-521 W &amp; X inc.) (Pkg. 5)</td>
<td>$0.70</td>
</tr>
<tr>
<td>RS-256</td>
<td>SOCKET—Electrolytic for Models H-510, 511, 521, (W &amp; X inc.)</td>
<td>$0.05</td>
</tr>
<tr>
<td>RS-257</td>
<td>SOCKET—Electrolytic for Models H-500, 510, 511, 520, 521 (W &amp; X inc.)</td>
<td>$0.05</td>
</tr>
<tr>
<td>RS-1015</td>
<td>SPEAKER— denominations for Models H-510, 511, 520, 521 (W &amp; X inc.) (L-5)</td>
<td>$3.50</td>
</tr>
<tr>
<td>RS-1017</td>
<td>SPEAKER—4-inch speaker for Models H-500, 510, 511, 520, (W &amp; X inc.) (L-5)</td>
<td>$3.25</td>
</tr>
<tr>
<td>RT-321</td>
<td>TRANSFORMER—1st IF transformer (L-5) for Models H-520 and H-521 (W &amp; X inc.)</td>
<td>$0.95</td>
</tr>
<tr>
<td>RT-323</td>
<td>TRANSFORMER—1st IF transformer for Models H-500, H-510, H-511, H-520, H-521 (W &amp; X inc.) (Pkg. 25)</td>
<td>$0.90</td>
</tr>
<tr>
<td>RW-039</td>
<td>WINDOW—Cellloid station letter window for Models H-510, 511, 520, 521 (W &amp; X inc.)</td>
<td>$0.10</td>
</tr>
<tr>
<td>RB-013</td>
<td>BOARD—Terminal board (2 lug) for Models H-500, 510, 511, 520, 521 (W &amp; X inc.)</td>
<td>$0.10</td>
</tr>
<tr>
<td>RB-070</td>
<td>BOARD—Terminal board (3 lug) for Models H-520 and H-521 (W &amp; X inc.)</td>
<td>$0.10</td>
</tr>
<tr>
<td>RB-179</td>
<td>BRACKET—Bracket for Station Set frame for Models H-520 and H-521 (W &amp; X inc.)</td>
<td>$0.10</td>
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<tr>
<td>RC-036</td>
<td>CAPACITOR—200 V, paper (C11)</td>
<td>$0.25</td>
</tr>
<tr>
<td>RC-060</td>
<td>CAPACITOR—600 V, paper (C19)</td>
<td>$0.25</td>
</tr>
<tr>
<td>RC-130</td>
<td>CAPACITOR—2000 mfd., 200 V, paper (C19)</td>
<td>$0.30</td>
</tr>
<tr>
<td>RC-348</td>
<td>CAPACITOR—1600 mfd., 200 V, paper (C20)</td>
<td>$0.35</td>
</tr>
<tr>
<td>RC-390</td>
<td>CAPACITOR—3000 mfd., mica for Models H-520 and H-521 (W &amp; X inc.) (C21)</td>
<td>$0.35</td>
</tr>
<tr>
<td>RC-1990</td>
<td>CLAMP—Antenna clamp for Models H-500, 510, 511, 520, 521 (W &amp; X inc.) (Pkg. 5)</td>
<td>$0.10</td>
</tr>
<tr>
<td>RC-7012</td>
<td>CONDENSER—Tuning condenser for Models H-510, 511, 520, 521 (W &amp; X inc.) (C-2a, 2b)</td>
<td>$4.00</td>
</tr>
<tr>
<td>RC-7013</td>
<td>CONDENSER—Tuning condenser for Models H-500, 501, 510, 511, 520, 521 (W &amp; X inc.) (C-2a, 2b)</td>
<td>$2.00</td>
</tr>
<tr>
<td>RC-8508</td>
<td>CARDS—Station letter cards for Models H-500, 510, 520, 521 (W &amp; X inc.) (C-2a, 2b)</td>
<td>$0.20</td>
</tr>
<tr>
<td>RD-111</td>
<td>DIAL—Dial scale for Models H-500, 510, 511, 520, 521 (W &amp; X inc.)</td>
<td>$0.20</td>
</tr>
<tr>
<td>RD-112</td>
<td>DIAL—Dial scale for Models H-500, 510, 511, 520, 521 (W &amp; X inc.)</td>
<td>$0.20</td>
</tr>
<tr>
<td>RD-411</td>
<td>DRUM—Tuning condenser drive drum assembly for all models (W &amp; X inc.)</td>
<td>$0.60</td>
</tr>
<tr>
<td>RD-414</td>
<td>DRUM—Tuning condenser drive drum assembly for all models in onyx</td>
<td>$0.60</td>
</tr>
<tr>
<td>RH-007</td>
<td>HANK—Antenna hank for Models H-500, 510, 511, 520, 521 (W &amp; X inc.)</td>
<td>$0.20</td>
</tr>
<tr>
<td>RK-048</td>
<td>KNOB—Control knob for all models in ivory</td>
<td>$0.15</td>
</tr>
<tr>
<td>RK-051</td>
<td>KNOB—Control knob in brown</td>
<td>$0.15</td>
</tr>
<tr>
<td>RK-056</td>
<td>KNOB—Control knob for all models in onyx</td>
<td>$0.15</td>
</tr>
<tr>
<td>RK-206</td>
<td>KEY—Station selector key for Models H-510, 511, 520, 521, 510W, 511W, 520W, 521W (Pkg. 5)</td>
<td>$0.50</td>
</tr>
<tr>
<td>RK-208</td>
<td>KEY—Station selector key for Models H-510X, H-511X, H-520X, H-521X (Pkg. 5)</td>
<td>$0.70</td>
</tr>
<tr>
<td>RL-085</td>
<td>COIL—Antenna coil for Models H-500, 510, 511, 520, 521 (W &amp; X inc.)</td>
<td>$0.50</td>
</tr>
<tr>
<td>RL-290</td>
<td>COIL—Oscillator coil for Models H-500, 510, 511, 520, 521 (W &amp; X inc.) (L-1)</td>
<td>$0.50</td>
</tr>
</tbody>
</table>

*Used on previous receivers 
Prices subject to change without notice
(When ordering drums, knobs, or keys, specify color)

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Compliments of www.nucow.com
**MODEL HJ514**

**Schematic, Gain, Voltage**

**GENERAL ELECTRIC CO.**

**Socket, Alignment, Trimmers**

**Intermediate Frequency 455 KC**

"A" rated receivers have "X" connected to "Y" and R-10 is omitted

"C" rated receivers have "X" connected to "Z"

**Special Service Information**

The following information will be found very useful in servicing receivers if a vacuum tube voltmeter or similar voltage measuring instrument is available.

1. **Stage Gains**
   - Gain
     - Antenna to 12SAT7 grid...3 to 3.5 at 1000 KC
     - 12SAT7 grid to 12SK77 grid...50 at 455 KC
     - 12SK77 grid to 12SQ77 detector plate...50 at 455 KC

   Gain readings in the first two stages do not contain the conversion gain which amounts to 1.1 at 1000 KC.

2. **0.15 volt, 400 cycle signal across the volume control will give 3/4 watt output speaker. (Volume control turned to maximum.)**

3. **Average DC voltage developed across oscillator grid leak...15 volts**

† Variations of +10% to -20% permissible.

The glass tubes used in the 1st amplifier and 2nd detector stages are interchangeable with metal tubes.

**Stock No.**

<table>
<thead>
<tr>
<th>Stock No.</th>
<th>Description</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>RS-018</td>
<td>BOARD—Terminal board (2 lug)</td>
<td>$0.10</td>
</tr>
<tr>
<td>RS-116</td>
<td>BRACKET—Cabinet back chassis mounting bracket</td>
<td>$0.10</td>
</tr>
<tr>
<td>RS-115</td>
<td>BUSHING—Turning shaft bushing</td>
<td>$0.10</td>
</tr>
<tr>
<td>RS-114</td>
<td>TERMINAL—Turning terminal (1 lug)</td>
<td>$0.10</td>
</tr>
<tr>
<td>RS-091</td>
<td>CAPACITOR—01 µfd. 600 V. paper</td>
<td>$0.10</td>
</tr>
<tr>
<td>RS-090</td>
<td>CAPACITOR—02 µfd. 600 V. paper</td>
<td>$0.10</td>
</tr>
<tr>
<td>RS-072</td>
<td>CAPACITOR—05 µfd. 200 V. paper</td>
<td>$0.10</td>
</tr>
<tr>
<td>RS-092</td>
<td>CAPACITOR—05 µfd. 600 V. paper</td>
<td>$0.10</td>
</tr>
<tr>
<td>RS-127</td>
<td>CAPACITOR—330 µfd. mica (4-4)</td>
<td>$0.11</td>
</tr>
<tr>
<td>RS-274</td>
<td>CAPACITOR—470 mmf. mica (C-9)</td>
<td>$0.15</td>
</tr>
<tr>
<td>RS-274</td>
<td>CAPACITOR—500 mmf. mica (C-9)</td>
<td>$0.15</td>
</tr>
<tr>
<td>RS-515</td>
<td>CAPACITOR—500 µfd. 150 V; 40 µfd. 150 V; dry electrolytic (C-17, 17b)</td>
<td>$0.10</td>
</tr>
<tr>
<td>RS-703</td>
<td>CONDENSER—Turning condenser (C-2A, 2B)</td>
<td>$0.10</td>
</tr>
<tr>
<td>RS-616</td>
<td>CABLE—Turning condenser cable</td>
<td>$0.10</td>
</tr>
<tr>
<td>RS-915</td>
<td>ASSEMBLY—Turning condenser (C-2A, 2B)</td>
<td>$0.10</td>
</tr>
<tr>
<td>RD-147</td>
<td>DIODE—Ala-scale</td>
<td>$0.10</td>
</tr>
<tr>
<td>RD-145</td>
<td>HAIRPIN COTTER—Sewing machine cotter</td>
<td>$0.10</td>
</tr>
<tr>
<td>RS-074</td>
<td>KNOB—Volume and tuning knobs</td>
<td>$0.10</td>
</tr>
<tr>
<td>RL-625</td>
<td>BEAM-ASCOPE—Cabinet back and Beam-a-Scopes assembly (L-1)</td>
<td>$0.10</td>
</tr>
<tr>
<td>RL-2055</td>
<td>COIL—Oscillator coil</td>
<td>$0.10</td>
</tr>
<tr>
<td>RT-165</td>
<td>TUNING—Choke and tuning control pul nut</td>
<td>$0.10</td>
</tr>
<tr>
<td>RP-173</td>
<td>POINTER—Dial pointer</td>
<td>$0.10</td>
</tr>
<tr>
<td>RQ-1214</td>
<td>RESISTOR—13 ohms, 1/4 W. carbon (R-10) (Pkg. 5)</td>
<td>$0.10</td>
</tr>
<tr>
<td>RQ-1253</td>
<td>RESISTOR—51 ohms, 1/4 W. carbon (R-5) (Pkg. 5)</td>
<td>$0.10</td>
</tr>
<tr>
<td>RQ-1209</td>
<td>RESISTOR—510 ohms, 1/4 W. carbon (R-5)</td>
<td>$0.10</td>
</tr>
<tr>
<td>RQ-1223</td>
<td>RESISTOR—470,000 ohms, 1/4 W. carbon (R-5)</td>
<td>$0.10</td>
</tr>
<tr>
<td>RQ-1233</td>
<td>RESISTOR—15 ohms, 1/4 W. carbon (R-10)</td>
<td>$0.10</td>
</tr>
<tr>
<td>RQ-1234</td>
<td>RESISTOR—150 ohms, 1/4 W. carbon (R-5)</td>
<td>$0.10</td>
</tr>
<tr>
<td>RQ-1246</td>
<td>RESISTOR—1,200 ohms, 1/4 W. carbon (R-5)</td>
<td>$0.10</td>
</tr>
<tr>
<td>RS-238</td>
<td>SOCKET—Octal tube socket</td>
<td>$0.10</td>
</tr>
<tr>
<td>RS-498</td>
<td>SOCKET—Dummy lamp socket assembly</td>
<td>$0.10</td>
</tr>
<tr>
<td>RS-954</td>
<td>SPACER—Electrical spacing (Pkg. 5)</td>
<td>$0.10</td>
</tr>
<tr>
<td>RS-1590</td>
<td>SPEAKER—4-inch Dynagophone speaker (Complete with output transformer)</td>
<td>$3.25</td>
</tr>
<tr>
<td>RS-4002</td>
<td>SPRING—Dial scale retaining spring (Pkg. 3)</td>
<td>$0.10</td>
</tr>
<tr>
<td>RS-9000</td>
<td>SHAFT—Sewing machine shaft</td>
<td>$0.10</td>
</tr>
<tr>
<td>RT-332</td>
<td>TRANSFORMER—1st I.F. transformer (L-3)</td>
<td>$0.10</td>
</tr>
<tr>
<td>RT-333</td>
<td>TRANSFORMER—2nd I.F. transformer (L-4)</td>
<td>$0.10</td>
</tr>
<tr>
<td>RT-487</td>
<td>TRANSFORMER—Output transformer (T-1)</td>
<td>$0.10</td>
</tr>
<tr>
<td>RT-957</td>
<td>TERMINAL—4 golf ball or ground terminal (Pkg. 5)</td>
<td>$0.10</td>
</tr>
<tr>
<td>RV-691</td>
<td>VOLUME CONTROL—0.6 megohm volume control</td>
<td>$0.10</td>
</tr>
<tr>
<td>RV-692</td>
<td>VOLUME CONTROL—0.6 megohm volume control</td>
<td>$0.10</td>
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<tr>
<td>RV-692</td>
<td>VOLUME CONTROL—0.6 megohm volume control</td>
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<tr>
<td>RV-691</td>
<td>VOLUME CONTROL—0.6 megohm volume control</td>
<td>$0.10</td>
</tr>
<tr>
<td>RV-604</td>
<td>WINDOW—Dial scale window (Pkg. 5)</td>
<td>$0.10</td>
</tr>
<tr>
<td>RW-121</td>
<td>WASHER—Pointed flat washer (Pkg. 10)</td>
<td>$0.10</td>
</tr>
</tbody>
</table>

* Used on previous receivers. (Prices subject to change without notice.)

---

**ALIGNMENT**

**I.F. Connect an output meter across the voice coil. Turn the volume control to maximum. Set test oscillator to 455 KC and keep the oscillator output as low as a readable meter reading will permit.**

**Apply signal to the converter grid of the 152A7G through a 0.05 mfd. capacitor and align progressively the trimmers in the second and the first I.F. transformer cans. Do not remove the grid lead from the 12S7G.**

**R.F.** To insert the R.F. signal use either a standard I.R.E. dummy antenna for R.F. alignment. The lead from the signal generator to the receiver ground post should be omitted.

With the gang condenser wide open, align oscillator trimmer (C-2A) to 1500 KC. Change generator signal to 1500 KC, tune receiver to the signal and peak antenna trimmer (C-2A) for maximum output.

---

**Precautions**

If the signal generator is AC operated use an isolating transformer between the power supply and the radio receiver power input.

- **Rating**
- **Power Supply (Volts)**
- **Frequency (Cycles on AC)**
- **Power Consumption (Watts)**

<table>
<thead>
<tr>
<th>Power Supply (Volts)</th>
<th>Frequency (Cycles on AC)</th>
<th>Power Consumption (Watts)</th>
</tr>
</thead>
<tbody>
<tr>
<td>115-AC or DC</td>
<td>40-60</td>
<td>30</td>
</tr>
<tr>
<td>115-AC or DC</td>
<td>25</td>
<td>30</td>
</tr>
</tbody>
</table>

**Electrical Power Output (117-line volts)**

- **Undistorted**
- **Maximum**

**Load-speaker—"Amico" Magnetic Dynamic**

- **Outside Cone Diameter**
- **Voice Coil Impedance (400 cycles)**
- **3.5 ohms**

**FRONT OF CHASSIS**

---

**VOLTAGES MEASURED BETWEEN**

**SOCKET TERMINALS AND—**

**0 VOLS AC.**

**MEASURED ON 200 VOLT SCALE OF 1000 OHMS PER VOLT METER**

---

**BOTTOM VIEW OF CHASSIS**

---

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Compliments of www.nucow.com
**Coil Resistance Chart**

<table>
<thead>
<tr>
<th>Coil</th>
<th>Section</th>
<th>Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oscillator Coil</td>
<td>Between C-11 and -B</td>
<td>5 ohms</td>
</tr>
<tr>
<td>1st I.F. Transformer</td>
<td>Primary</td>
<td>29 ohms</td>
</tr>
<tr>
<td></td>
<td>Secondary</td>
<td>29 ohms</td>
</tr>
<tr>
<td>2nd I.F. Transformer</td>
<td>Primary</td>
<td>30 ohms</td>
</tr>
<tr>
<td></td>
<td>Secondary</td>
<td>30 ohms</td>
</tr>
<tr>
<td>Output Transformer</td>
<td>Primary</td>
<td>115 ohms</td>
</tr>
<tr>
<td></td>
<td>Secondary</td>
<td>0.4 ohms</td>
</tr>
</tbody>
</table>

**Special Service Information**

The following data will be very useful to servicemen equipped with vacuum tube voltimeters or similar voltage measuring instruments.

1. **Stage Gains**
   - Antenna to Converter Grid: 3 to 4 at 1000 KC
   - Converter Grid to 12B7 Grid: 45 at 485 KC
   - 12B7 Grid to 12Q7GT Grid: 80 at 456 KC
2. A 0.1 volt, 400 cycle signal across volume control will give 1/2 watt speaker output. (Volume Control turned to Maximum).
3. Average DC voltage developed across oscillator grid resistor (R-1) - 12 volts.
   - Variations of ±10%, ±20%, permissible.

**Socket Voltages**

- **35L6GT**: 350 volts
- **12Q7GT**: 1200 volts
- **3525GT**: 350 volts

**Loud-speaker “Alnico” Magnetic Dynamic**

- Outside Cone Diameter: 4 inches
- Voice Coil Impedance (40A cycles): 3.5 ohms

**Intermediate Frequency**

455 KC

---

**General Electric Co.**

**Model H-502**

**Fig. 5. Schematic Diagram Model H-502**

**General Information**

These Models are compact superheterodyne receivers using five General Electric Pre-tested Tubes. Operation is permitted on either a DC or AC source of power. Features of design include the new “Alnico” Dynapower speaker, single-ended tubes in the detector circuits, high-filament voltage tubes which eliminate line dropping resistors, and full approval of the Underwriters’ Laboratories.

**Model | Power Supply (Volts) | Frequency (Cycles on A-C) | Power Consumption (Watts)***
---|---|---|---
H-502 | 115 Volts AC or DC | 25-60 | 30
H-503, 550, 551, 552 | 115 Volts AC or DC | 40-60 | 30

**Electrical Power Output (115-line volts)**

- Undistorted: 1.2 watts
- Maximum: 2.3 watts

**Alignment Procedure**

**I.F.** Connect an output meter across the voice coil. Turn the Volume Control to maximum. Set oscillator to 455 K.C. and keep the oscillator output as low as a readable meter reading will permit.

- Apply this signal to the grid of the 12B7 through a .05 mfd. capacitor and align the 2nd I.F. transformer. Repeat the procedure, applying the 455 K.C. signal to the control grid of the 12SA7GT and aligning the 1st I.F. transformer. Do not remove grid leads from the tubes. Finish alignment by overall adjustments.

**R.F.** Apply a 1500 K.C. signal either through a standard I.R.E. dummy to the antenna terminal or through an additional loop connected to the generator output which can be magnetically coupled to the receiver Bemi-8cope. Align (C-2b) at 1500 K.C. and peak (C-2a) for maximum output. Change signal to 580 K.C. and tune receiver to signal. Peak (C-11) on the 580 K.C. signal by rocking the gang condenser. Retrím at 1500 K.C.
Precaution: The Model HB-504 when used on an AC power supply will have one side of the chassis connected directly to the line. In order to prevent injury to the signal generator, if AC operated, or shock to the serviceman, use an isolating transformer between the convenience outlet and the receiver power cord.

Tubes
- Converter and Oscillator: GE-1A7GT
- I.F. Amplifier: GE-1N6GT
- Det., Aud., AVC: GE-1H5GT
- Power Output: GE-1T8GT
- Rectifier: GE-3524GT

SERVICE DATA

Physical Dimensions
- Models: HB-504 and HB-505
- Height: 91½ inches
- Width: 13¼ inches
- Depth: 6½ inches
- Wt. with batteries: 10½ lbs

Tuning Control Drive Ratio: 5:1

Electrical Specifications
1. AC or DC Power Supply 105-125 Volts, 40-60 cycles on AC.
2. Battery Power Supply 1.5 volt "A" supply, 90-volt "B" supply. Recommended batteries for 300-hour life:
   (a) "A" supply—Eveready No. 718 or equivalent.
   (b) "B" supply—Eveready No. 762 or equivalent.

Tuning Frequency Range: 540-1600 KC
Intermediate Frequency: 455 KC
Maximum Power Output: 175 milliwatts

Load-speaker—"Alnico" Magnet Dynamic
- Outside Cone Diameter: 5 inches
- Voice Coil Impedance: 400 cycles 4.6 ohms

The Models HB-504 and HB-505 are portable, five-tube, superheterodyne receivers which are designed to operate on any one of three types of power supplies as listed under electrical specifications. Features of design include automatic power selector switch, built-in Beam-a-scope, 5-inch "Alnico" magnet dynapower speaker and automatic volume control.

The automatic power selector switch operates as follows: When the door-cover at the side of the case is opened for the purpose of connecting the power cord to a convenience outlet, all batteries are automatically disconnected from the circuit. When the power cord is replaced and the door-cover is closed the radio is automatically returned to battery operation.

When operating from a DC source of power, it is necessary to insert the power plug with proper polarity; otherwise the receiver will fail to function. If any hum is noticed when the receiver is used on AC, reverse the power plug in the receptacle.

ALIGNMENT PROCEDURE

Alignment Frequencies
- I.F. — 455 KC
- Broadcast — 1500 and 600 KC

The location of all trimmers is shown in Fig. 1.

General Alignment Notes

This receiver must be removed from the carrying case in order to perform the alignment. Special care must be exercised to place the batteries, Beam-a-scope and chassis in the same relative positions with respect to one another as these components occupied in the case, otherwise, alignment will not be satisfactory.

I.F. Alignment

With batteries, Beam-a-scope and chassis in position for alignment as mentioned above, connect an output meter across the voice coil. Rotate the volume control to maximum. Set test oscillator to 455 KC and apply signal to the control grid of the 1A7GT tube through a .05 mfd. capacitor. Do not remove the grid lead from the 1A7GT. Keep the test oscillator output as low as a readable meter reading will permit. Adjust all I.F. trimmers for maximum output.

R.F. Alignment

Place a coupling loop six inches from the receiver Beam-a-scope. Apply a 1500 KC signal to the coupling loop. Set pointer to 1500 KC and align the oscillator trimmer (C-1a). Peak (C-1b) for maximum output. Change test signal to 900 KC and with pointer in region of 600 KC peak (C-17) while rocking the gang condenser.

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Special Service Information

The following data will be very useful to servicemen equipped with vacuum tube voltmeters or similar voltage measuring instruments.

1. Stage Gains:
   - Gain: Antenna to Converter Grid: 2.7 at 1000 K.C.
   - Converter Grid to 6SK7 Grid: 28 at 455 K.C.
   - 6SK7 Grid to 6SH7 Diode Plate: 87 at 455 K.C.

1 Variations of ±10%, ±20% permissible.

2. Audio Gain: 0.65 volts, 400 cycle signal across volume control with control set to maximum will give approximately 1/2 watt output at speaker.

3. DC voltage developed across oscillator grid leak averages 13 volts.

Power Consumption is 55 watts at 115 volts AC or DC. AC frequency 25 - 60 cycles.

Power Output at 117 volts line:
- Undistorted: 1.4 watt
- Maximum: 2.5 watt

VALUE OF C16 is .02 MFD. ON FINAL RECEIVERS.

C23 is added between C10 and S1 in series with the ground with ground on final receivers.
PARTS LIST

Compliments of www.nucow.com

GENERAL INFORMATION

The Model HJ-612 is a compact 6-tube AC-DC superhetodyne receiver employing General Electric Pre-tested Tubes. Features of design include built-in Beam-a-Scope, airplane-type dial, broadcast and police-amateur-aircraft coverage, and automatic volume control.

When operating from a DC source of power it is necessary to insert the power plug with the proper polarity; otherwise, the receiver will fail to function. If excessive hum is noticed when the receiver is operated on AC, reverse the power plug in the receptacle.

TUNING PROCEDURE

I.F. Connect an output meter across the voice coil. Rotate the volume control to maximum. Completely close the gang condenser plates and set the dial pointer to the first dial mark, at the low end of the scale. Throw the band switch to "BC" (up).

Set test oscillator to 455 KC and apply signal to the control grid of the 6SA7 tube through a .005 mfd. capacitor. Do not remove the 6SA7 grid lead. Keep the test oscillator output as low as a readable meter reading will permit. Adjust all I.F. trimmers for maximum meter reading.

R.F. Apply a 1500 KC signal either through a standard I.R.E. dummy to the antenna terminal or through an additional loop connected to the signal generator output which can be magnetically coupled to the receiver Beam-a-Scope. When using an I.R.E. dummy antenna for R.F. alignment do not connect a ground lead between the signal generator and the receiver. Align (C-9) at 1500 KC and peak (C-11) for maximum output. Change signal to 800 KV and tune receiver to signal. Peak C-11) on the 580 KC signal by rocking the gang condenser. Retain at 1500 KC.

Throw the band switch to "SW" band. Peak (C-16) on 2500 KC.

The following data will be very useful to servicemen equipped with vacuum-tube voltmeters or similar voltage measuring instruments.

SPECIAL SERVICE INFORMATION

1. Stage Gains

Gain

Antenna Post to Converter Grid: 2.7 at 1000 KC
Converter Grid to 6SK7 Grid: 28 at 455 KC
6SK7 Grid to 6Q7GT Diode Plate: 87 at 455 KC

2. A 400-cycle signal of .05 volts across volume control will give approximately 1/4-watt speaker output. (Volume control turned to maximum.)

3. DC voltage developed across oscillator grid resistor (R-1) averages 13 volts at 1000 KC. ± Variation of +10% - 20% permissible. 1-40
TUBE CHANGES

The 6HA7GT, 6SK7GT, 607GT and 6HJ20GT can be replaced with equivalent metal tubes. When changing detector or L.F. tubes the receiver should be realigned.

Converter-Oscillator ... GE-68A7GT
L.F. Amplifier ... GE-68K7GT
Det., Aud., AVC ... GE-607GT
2nd Audio Amplifier ... GE-61J7GT
Power Output ... GE-25L6GT
Rectifier ... GE-25Z26GT
Dial Lamp ... MAZDA No. 44

GENERAL INFORMATION

Models HJ-618 AC and HJ-618 DC are compact, table-model, phonograph combinations using six General Electric Pre-tested Tubes in a superheterodyne circuit. Model HJ-618 AC is designed to operate on a 60-cycle source of power as shown under electrical specifications. Model HJ-618 DC incorporates the same chassis and phonograph as the Model HJ-618 AC but includes in addition an inverter unit which will allow operation on a DC source of power.

Phonograph

Type Pick-up ... Crystal
Turntable Speed ... 78 R.P.M.

Special Service Information

The following data will be very useful to servicemen equipped with vacuum-tube voltmeters or similar voltage-measuring instruments.

1. Stage Gains
   - Antenna Post to Converter Grid—4 at 1000 KC
   - Converter Grid to 6SK7GT Grid—50 at 455 KC
   - 6SK7GT Grid to 607GT Det. Plate—100 at 455 KC

2. Audio Gains
   - .06 volts, 400 cycles signal across volume control with control set to maximum will give approximately 3.5 watt speaker output.

3. DC voltage developed across oscillator grid resistor
   (R-1) averages 12 volts.

† Variations of + 10%, —20% permissible.

FRONT OF CHASSIS

Socket Voltages

<table>
<thead>
<tr>
<th>Socket</th>
<th>Voltage</th>
</tr>
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<tbody>
<tr>
<td>607GT</td>
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<tr>
<td>6J5GT</td>
<td>455 kV</td>
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<tr>
<td>25Z6GT</td>
<td>455 kV</td>
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<td>25L6GT</td>
<td>455 kV</td>
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<td>6SK7GT</td>
<td>455 kV</td>
</tr>
<tr>
<td>6SA7GT</td>
<td>455 kV</td>
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</table>

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### GENERAL ELECTRIC CO.

#### MODELS HJ-624 AND HJ-628 SERVICE DATA

#### Electrical Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>Rating</th>
<th>Power Supply (Volts)</th>
<th>Frequency (Cycles on AC)</th>
<th>Power Consumption (Watts)</th>
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<td>A6</td>
<td>115-125</td>
<td>25-60</td>
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<td>A5</td>
<td>115-125</td>
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<td>75</td>
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<td></td>
<td>C2</td>
<td>115-125</td>
<td>25</td>
<td>90</td>
</tr>
</tbody>
</table>

#### Electrical Power Output

Undistorted: 2.0 watts
Maximum: 2.5 watts

#### Phonograph

**Model:** HJ-628
**Type Pick-up:** Crystal
**Turntable Speed:** 78 R.P.M.

** Loud-speaker**

The voice coil is accurately and permanently centered at the factory and should seldom give trouble. In case a voice coil needs centering it will be necessary to replace the entire cone and voice coil assembly.

Note: In no case should the magnet be removed from the assembled position without remagnetizing after replacing it.

#### MODELS HJ-618 AC AND HJ-618 DC

<table>
<thead>
<tr>
<th>Stock No.</th>
<th>Description</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>HJ-639 AC AND HJ-639 DC</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### CHASSIS ASSEMBLY

- **RC-008:** BOARD—Terminals board (2 lag) $0.10
- **RC-046:** BOARD—Terminal board (5 lug) $0.15
- **RS-166:** BRACKET—Voltage control bracket $0.10
- **RC-031:** CAPACITOR—0.06 mfd 600 V. paper (C-6, 7) $0.25
- **RC-033:** CAPACITOR—0.01 mfd 600 V. paper (C-8) $0.25
- **RC-000:** CAPACITOR—0.03 mfd 600 V. paper (C-10) $0.25
- **RC-092:** CAPACITOR—0.05 mfd 600 V. paper (C-4) $0.25
- **RC-010:** CAPACITOR—0.005 mfd 600 V. paper (C-9) $0.15
- **RC-012:** CAPACITOR—0.1 mfd 600 V. paper (C-17) $0.35
- **RC-190:** CAPACITOR—0.02 mfd 400 V. paper (C-15) $0.25
- **RC-316:** CAPACITOR—0.01 mfd 400 V. paper (C-15) $0.15
- **RC-220:** CAPACITOR—0.02 mfd 400 V. paper (C-16) $0.15
- **RC-233:** CAPACITOR—0.005 mfd 400 V. paper (C-14) $0.05
- **RC-220:** CAPACITOR—0.02 mfd 400 V. paper (C-15) $0.15
- **RC-095:** CLAMP—Cone clamp (Pkg. 9) $0.15
- **RC-514:** CLAMP—Cone clamp 30 mfd 180 V. 80 mfd 180 V. (dry electrolytic) $0.25
- **RC-615:** CLAMP—B” band paddle (C-5) $0.10
- **RC-024:** Antenna trimmer (Model HJ-624) $0.25
- **RC-011:** CONE ASSEMBLY—11-inch speaker cone assembly (Model HJ-624) $0.95
- **RC-010:** CONE ASSEMBLY—Speaker cone assembly (Model HJ-624, HJ-639AC, HJ-639DC) $0.90
- **RC-028:** CONE ASSEMBLY—Speaker cone assembly (Models HJ-618 AC and HJ-618 DC) $0.90
- **RC-028:** ESCUTCION—Dial scale escutcheon $0.05
- **RC-072:** ESCUTCION—Station letter escutcheon (Model HJ-620) $0.05
- **RC-016:** GRID CLIP—Tube control grid clip (Pkg. 5) $0.10
- **RC-318:** LOOP—Beam-a-Scope assembly (L-1) (Model HJ-628) $0.90
- **RC-528:** LOOP—Beam-a-Scope and cabinet back assembly (L-1) $1.00
- **RL-1016:** COIL—Oscillator coil (L-2) $0.25
- **RL-1029:** NECKLE CUP—Phonograph needle cup $0.10
- **RL-230:** RESISTOR—50 ohms ½ W. carbon (R-10) (Pkg. 5) $0.15
- **RL-271:** RESISTOR—3300 ohms ½ W. carbon (R-7) (Pkg. 5) $0.70
- **RL-297:** RESISTOR—7000 ohms ½ W. carbon (R-8) (Pkg. 5) $0.70
- **RL-397:** RESISTOR—10,000 ohms ½ W. carbon (R-11) (Pkg. 5) $0.20
- **RL-251:** RESISTOR—1000 ohms ½ W. carbon (R-11) (Pkg. 5) $0.20
- **RL-052:** RESISTOR—4700 ohms ½ W. carbon (R-6, 9, 12) (Pkg. 5) $0.70
- **RL-064:** RESISTOR—10,000 ohms ½ W. carbon (R-6, 9, 12) (Pkg. 5) $0.70
- **RL-067:** RESISTOR—10,000 ohms ½ W. carbon (R-6, 9, 12) (Pkg. 5) $0.70
- **RL-154:** RESISTOR—1000 ohms ½ W. carbon (R-11) (Pkg. 5) $0.20
- **RL-273:** RESISTOR—4700 ohms ½ W. carbon (R-6, 9, 12) (Pkg. 5) $0.70
- **RS-239:** SOCKET—Octal tube socket $0.15
- **RS-261:** SOCKET—Pilot lamp socket assembly $0.20
- **RS-1014:** SPEAKER—14-inch Alinco magnet dynamic speaker (Model HJ-624) $6.00
- **RT-341:** TRANSFORMER—1 F. transformer (L-3) $0.50
- **RT-342:** TRANSFORMER—1 F. transformer (L-4) $1.00
- **RT-954:** TERMINAL—Speaker terminal contact (Pkg. 10) $0.10
- **RT-976:** TONE CONTROL—Alinco volume control (R-3) $10.00
- **RT-002:** SPEAKER MOUNTING—Speaker mounting assembly $10.00

#### CONDENSER AND DIAL SCALE

- **RC-017:** CONDENSER—Tuning condenser and reflector assembly (C-1, 2) $5.00
- **RD-415:** DRUM—Tuning $5.00
- **RP-702:** FASTENER—Dial and window snap fastener (Pkg. 25) $0.10
- **RK-209:** KEY—Peakertouch tuning key for extreme left station selector $0.15
- **RK-214:** KEY—Peakertouch tuning key for all station selectors except one on left $0.10
- **RK-937:** BINDING LUG—Station pin binding lug (Pkg. 10) $0.10
- **RP-154:** PIN—Station key adjusting pin (Pkg. 10) $0.10
- **RP-155:** POINT—Dial scale pointer $0.15
- **RP-156:** PLATE—Reflector plate $0.10
- **RP-313:** PULLEY—Wooden idler pulley $0.15
- **RP-316:** PULLEY—Pulley drive pulley and “C” washer $0.15
- **RS-244:** SPRING—Drum tension spring (Pkg. 10) $0.10
- **RS-470:** SPRING—Drum idler spring tension spring $0.05
- **RW-043:** WINDOW—Dial scale window $0.15

#### TONE ARM AND SWITCH ASSEMBLY

- **Except Model HJ-624**
- **RC-213:** CAPACITOR—0.1 mfd 400 V. paper (C-17) $0.25
- **RC-214:** PICKUP—Crystal pickup and leads $0.40
- **RC-1907:** RESISTOR—100,000 ohms ½ W. carbon (R-13) (Pkg. 5) $0.70
- **RC-1915:** RESISTOR—220,000 ohms ½ W. carbon (R-15) (Pkg. 5) $0.70
- **RC-1411:** SNAP RING—Tone arm snap ring $0.10
- **RS-854:** SCRIB—Motor power switch set screw (Pkg. 10) $0.25
- **RS-876:** SCRIB—Needle clamping screw $0.25
- **RS-1810:** SHEILD—Phonotonic power switch shield $0.15
- **RS-3051:** SWITCH—Motor power switch and set screw assembly $0.60
- **RS-3052:** SWITCH—Motor power switch and set screw assembly $0.60
- **RT-917:** TONE ARM—Tone arm and pivot assembly $2.15

(continued)

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Compliments of www.nucow.com
Motor Turntable Assembly

Model No. 1

_Models HJ-618 AC, HJ-618 DC, H-639 AC AND H-639 DC_

**Motor Turntable Assembly**

**Model No. 2**

_Models HJ-618 AC, HJ-618 DC, H-639 AC AND H-639 DC_

**Motor Turntable Assembly**

**Model No. 3**

_HJ-618 AC AND HJ-618 DC, H-639 AC AND H-639 DC_

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**NOTE:**

When ordering motor-turntable assembly parts, refer to correct model list.

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**PRODUCTION CHANGES**

Several hundred early production Model H-622 receivers were built with the antenna terminal connected as shown in Fig. 3. The remainder of these receivers were connected as shown in the schematic diagram, Fig. 5. The only difference between the two circuits is in the connection between the lower side of C-25 capacitor and the antenna circuit. Early production circuits had C-25 connected between L-1 and C-10. If hum is experienced when an outside antenna is used on these early production models with Fig. 3 antenna circuit, reverse the power plug in the power supply outlet. Should this procedure fail to attain the required results, remove C-25 to the circuit as shown in the schematic diagram, Fig. 5.

**Intermediate Frequency**

- **Power Supply**
  - Volts: 115
  - AC or DC: 50
- **Electrical Power Output** (117 Line Volts)
  - Undistorted: 1.4 watts
  - Maximum: 2.5 watts
- **Loud-speaker- "Alnico" Magnet Dynamic**
  - Outside Core Diameters: 0.6¼ inches
  - Voice Coil Impedance (400 cycles): 3½ ohms

**Special Service Information**

The following data will be very useful to servicemen equipped with vacuum-tube voltmeters or similar voltage-measuring instruments.

1. **Stage Gains**
   - Gain of Antenna Post to Converter Grid: 2.7 at 1000 KC
   - Gain of Converter Grid to 6SK7 Grid: 28 at 455 KC
   - 6SK7 Grid to 6507 Diode Plate: 87 at 455 KC

2. **Audio Gain**
   - A 400 cycle signal of .05 volts across volume control will give approximately ½ watt speaker output.
   - (Volume control turned to maximum.)

3. **DC voltage developed across oscillator grid resistor**
   - (R-1) averages 15 volts at 1000 KC.

**Variation of +10%, -20% permissible.**

**ALIGNMENT PROCEDURE**

1. **I.F.** Connect an output meter across the voice coil. Kotate the volume control to maximum. Completely close the gang condenser plates and set the dial pointer to the first dial mark at the low end of the scale. Turn the band switch to "B" band (counterclockwise).

2. Set test oscillator to 455 KC and apply signal to the control grid of the 6SK7 tube through a .05 mfd. capacitor. Do not remove the 6SK7 grid lead. Keep the test oscillator output as low as a readable meter reading will permit. Adjust all I.F. trimmers for maximum meter reading.

3. **R.F.** Apply a 1500 KC signal through a standard I.R.E. dummy to the antenna terminal or through an additional loop connected to the signal generator output which can be magnetically coupled to the receiver Beam-a-Scope. Align (C-21) at 1500 KC and peak (C-9) for maximum output. Change signal to 580 KC and tune receiver to signal. Peak (C-3) on the 580 KC signal by rocking the gang condenser. Retrain at 1500 KC.

   Turn the band switch to "D" band. Align (C-6) at 18 MC using an 18 MC signal. Peak (C-6) while rocking the gang condenser. The image of the 18 MC signal should be heard at 17.09 MC when (C-6) is on the proper peak.
Fig. 1. Trimmer Location

Special Service Information

The following data will be very useful to servicemen equipped with vacuum tube voltmeters or similar voltage measuring instruments.

1. Stage Gains
   Antenna Post to Converter Grid—4 at 1000 KC
   Converter Grid to 6SK7GT Grid—30 at 455 KC
   6SK7GT Grid to 9Q7GT Det. Plate—100 at 455 KC

2. Audio Gains
   0.06 volts, 400 cycles signal across volume control with control set to maximum will give approximately 1/2 watt speaker output.

3. DC voltage developed across oscillator grid resistor (R-1) averages 12 volts.

† Variations of +10%, -20% permissible

TUBE CHANGES

The 6SA7GT, 6SK7GT, 6Q7GT and 6AP6GT can be replaced with metal tubes if the receiver is re-aligned.

*pNote: All Model HJ-628 receivers are manufactured for use on A.C. power supplies only; hence, are not equipped with the inverter unit. Special cases have arisen where inverter units have been added by dealers or distributors to provide operation on D.C. power supplies. The method of connecting the inverter unit into the circuit is shown above.

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H630U, H632U (Early)
Schematics, Gain

Type Cabinet
Model H-625 ........................................... Console
Models H-630, 631, 632, 633 ............... Table Model

Tuning Control Drive Ratio ....................... 4:1

Electrical Specifications

<table>
<thead>
<tr>
<th>Power Supply</th>
<th>Frequency (Cycles on AC)</th>
<th>Power Consumption (Watts)</th>
</tr>
</thead>
<tbody>
<tr>
<td>115 AC or DC</td>
<td>25–60</td>
<td>50</td>
</tr>
</tbody>
</table>

Tubes
Converter and Oscillator .................. GE-6SA7
I.F. Amplifier ................................ GE-6SK7
Det., Aud., A.V.C. ......................... GE-6SQ7
2nd Audio Amplifier ....................... GE-6J5GT
Power Output ................................ GE-25L6GT
Rectifier ..................................... GE-28Z6GT
Pilot Lamp ...................................... MAZDA No. 44

Electrical Power Output (117 Line Volts)
Undistorted .............................. 1.4 watts
Maximum .................................. 2.5 watts*

*Tests made on Model H-625 indicate that the sound output from this receiver is approximately equal to that of an AC receiver using a conventional wound-field loud-speaker rated at 8 watts.

Special Service Information
The following data will be very useful to servicemen equipped with vacuum-tube voltmeters or similar voltage-measuring instruments.

(1) Stage Gains
Gain ........................................... Gain +
Antenna Post to Converter Grid .............. 2.7 at 1000 KC
Converter Grid to 6SK7 Grid .................. 28 at 455 KC
6SK7 Grid to 6SQ7 Diode Plate ............... 87 at 455 KC

(2) Audio Gain
A 400 cycle signal of .05 volts across volume control will give approximately .5 watt speaker output. (Volume control turned to maximum.)

(3) DC voltage developed across oscillator grid resistor (R-1) averages 13 volts at 1000 KC.

Intermediate Frequency .................. 455 KC

Loud-speaker—“Alnico” Magnet Dynamic
Model ............ H-625 ... H-630, 631, 632, 633
Outside Cone Diameter—12 in ............. 5 in.
Voice Coil Impedance (400 cycles) ........... 3½ ohms

Tuning Frequency Range
Band “B” ........................................... 550–1600 KC
Band “D” ........................................... 5800–18,000 KC

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When operating from a DC source of power, it is necessary to insert a No. 12 fuse in the Fused Tube Socket of the model H-629 when the receiver is used on AC. Reverse the power plug in the receptacle.

Fig. 3. Socket Voltages
Model H-629 and 631, 632, 633.

Fig. 4. Socket Voltages
Model H-625.

Fig. 5. Chassis Parts Layout
Model H-630, 631, 632, 633, 634, 635 (Top View).
GENERAL ELECTRIC CO.

ALIGNMENT PROCEDURE

Alignment Frequencies

I.F. ........................................ 455 KC
Band "B" .................................. 1800 and 580 KC
Band "D", .................................. 18,000 KC

The location of trimmers for the above models are shown in their respective diagrams, Figs. 1 and 2.

I.F. Alignment

Connect an output meter across the voice coil. Rotate the volume control to maximum. Completely close the gang condenser plates and set the dial pointer to the first dial mark at the low end of the scale. Turn the band switch to "B" band (counterclockwise).

Set test oscillator to 455 KC and apply signal to the control grid of the 6SA7 tube through a .05 mfd. capacitor. Do not remove the 6SA7 grid leak. Keep the test oscillator output as low as a readable meter reading will permit. Adjust all I.F. trimmers for maximum meter reading.

R.F. Alignment

(1) Models H-620, 621, 622, 623: Apply a 1800 KC signal either through a standard I.R.E. dummy to the antenna terminal or through an additional loop connected to the signal generator output which can be magnetically coupled to the receiver Beam-a-Scope. Align (C-2) at 1500 KC and peak (C-1) for maximum output. Change signal to 580 KC and tune receiver to signal. Peak (C-3) on the 580 KC signal by rocking the gang condenser. Retrim at 1500 KC.

Turn the band switch to "D" band. Align (C-6) at 18 MC using an 18 MC signal. Peak (C-5) while rocking the gang condenser. The image of the 18 MC signal should be heard at 17.09 MC when (C-6) is on the proper peak.

(2) Model H-625: The same alignment procedure as above may be followed for this model excepting that final R.F. alignment on "B" band should be made after the chassis and Beam-a-Scope are properly mounted in the cabinet and interconnected. The location of the Beam-a-Scope with respect to the chassis materially affects alignment.

Note.—A change exists in the "B" band trimmer arrangement on late production models. "B" band antenna trimmer (C-1) is eliminated. "B" band oscillator trimmer (C-2) is moved from the top of the gang condenser to the chassis deck and renumbered (C-21) (see Fig. 2). In aligning the late production Model H-625 apply 1500 KC signal as described for H-630. Set dial pointer to 1500 KC and align (C-21) for maximum output by rocking the gang condenser. Return to 580 KC and peak (C-3) on 580 KC signal by rocking gang condenser. Repeat at 1500 KC.

Alignment on "D" band is the same as described for Model H-630.

PRODUCTION CHANGES

Late production models of the H-625 have certain trimmer and coil changes incorporated which should be noted when ordering replacement parts.

1. "B" band trimmers (C-1) and (C-2) on top of gang condenser are removed. (C-1) antenna trimmer is completely eliminated. (C-2) oscillator trimmer is renumbered (C-21) and mounted on chassis deck (see Fig. 2).


Fig. 1. Trimmer Location
Models H-623 (Early), -630, -631, -632, -633

Fig. 9. Dial Drive Stringing Diagram

REPLACEMENT PARTS LIST

<table>
<thead>
<tr>
<th>Stock No.</th>
<th>Description</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>RA-314</td>
<td>CONDENSER ASSEMBLY—Tuning condenser and drive unit complete with pointer (Models H-630, 631, -632, -633).</td>
<td>$5.70</td>
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<tr>
<td>RA-315</td>
<td>CONDENSER ASSEMBLY—Tuning condenser and drive unit complete (Model H-625).</td>
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<tr>
<td>RB-023</td>
<td>BOARD—Terminal board (4 legs)</td>
<td>.10</td>
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<tr>
<td>RB-041</td>
<td>BOARD—Terminal board (2 legs)</td>
<td>.10</td>
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<tr>
<td>RB-182</td>
<td>BRACKET—Beam-a-Scope bracket (Models H-630, -631, -632, -633).</td>
<td>.16</td>
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<tr>
<td>RB-921</td>
<td>BACK COVER—Cardboard cabinet back (Models H-630, -631).</td>
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<tr>
<td>RB-922</td>
<td>BACK COVER—Cardboard cabinet back (Models H-632, -633).</td>
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<tr>
<td>RB-924</td>
<td>BACK COVER—Cardboard cabinet back (Model H-625).</td>
<td>.30</td>
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Compliments of www.nucow.com
<table>
<thead>
<tr>
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<th>Description</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>RB-1018</td>
<td>BOARD—Antenna terminal board (Model H-65)</td>
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<tr>
<td>RC-1020</td>
<td>BOARD—Beam-a-Scope terminal board (Model H-65)</td>
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<tr>
<td>*RC-011</td>
<td>CAPACITOR—0.02 mfd. 600 V. paper (C-18, 19)</td>
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<tr>
<td>*RC-023</td>
<td>CAPACITOR—0.05 mfd. 600 V. paper (C-18, 19)</td>
<td>.25</td>
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<tr>
<td>*RC-039</td>
<td>CAPACITOR—0.1 mfd. 600 V. paper (C-18, 19)</td>
<td>.25</td>
</tr>
<tr>
<td>*RC-048</td>
<td>CAPACITOR—0.2 mfd. 600 V. paper (C-18, 19)</td>
<td>.30</td>
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<tr>
<td>*RC-092</td>
<td>CAPACITOR—0.05 mfd. 600 V. paper (C-7, 24)</td>
<td>.30</td>
</tr>
<tr>
<td>*RC-123</td>
<td>CAPACITOR—0.1 mfd. 600 V. paper (C-7, 24)</td>
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<tr>
<td>*RC-216</td>
<td>CAPACITOR—47 mmf. mica (C-26)</td>
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</tr>
<tr>
<td>*RC-220</td>
<td>CAPACITOR—6 mmf. mica (C-27 on Model H-652) (C-28 on remainder of Models)</td>
<td>.35</td>
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<tr>
<td>*RC-250</td>
<td>CAPACITOR—220 mmf. mica (C-17 on Model H-625) (C-31 on Model H-652)</td>
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<tr>
<td>*RC-293</td>
<td>CAPACITOR—470 mmf. mica (C-13 also C-17 on Models H-630, 631, 632, 633)</td>
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<tr>
<td>*RC-390</td>
<td>CAPACITOR—3900 mmf. mica (C-4 also C-9 on Models H-630, 631, 632, 633)</td>
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<td>*RC-645</td>
<td>CAPACITOR—&quot;B&quot; band osc. trimmer (C-21 on late Model H-625)</td>
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<tr>
<td>*RC-676</td>
<td>CAPACITOR—&quot;B&quot; band padde (C-3 on Models H-630, 631, 632, and 633)</td>
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<tr>
<td>*RC-749</td>
<td>CONDENSER Tuning condenser (C-1, 2)</td>
<td>.15</td>
</tr>
<tr>
<td>*RC-863</td>
<td>CORD Power cord</td>
<td>.05</td>
</tr>
<tr>
<td>*RC-995</td>
<td>CLAMP Oscillator coil clamp (Pkg. 5)</td>
<td>.10</td>
</tr>
<tr>
<td>*RC-5136</td>
<td>CAPACITOR—50 mfd. 150 V. paper electrolytic (C-22a, 22b)</td>
<td>.15</td>
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<tr>
<td>*RC-6516</td>
<td>CAPACITOR—&quot;B&quot; band padde (C-3 on Model H-625)</td>
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<tr>
<td>*RC-6517</td>
<td>CAPACITOR—&quot;D&quot; band ant. and osc. trimmers (C-5, 6)</td>
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<tr>
<td>RC-8190</td>
<td>CABLE Tuning drive cable assembly</td>
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<tr>
<td>RC-8906</td>
<td>CABLE—Stator letter card (1 set)</td>
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<tr>
<td>RD-115</td>
<td>DIAl—Dial scale (Models H-630, 631, 632, 633)</td>
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<tr>
<td>RD-116</td>
<td>DIAL—Dial scale (Model H-625)</td>
<td>1.00</td>
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<tr>
<td>RG-302</td>
<td>GROMMET Tuning shaft drive cord grommet (Pkg. 10)</td>
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<tr>
<td>RK-065</td>
<td>KNOB—Light oak control knob (Pkg. 5)</td>
<td>.50</td>
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<tr>
<td>RK-074</td>
<td>KNOB—Light tan control knob (Model H-625) (Pkg. 5)</td>
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<tr>
<td>RK-209</td>
<td>KNOB—Light oak station selector key (Models H-630, 631, 632, 633)</td>
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<tr>
<td>RK-210</td>
<td>KEY—Light oak station selector key (Model H-625)</td>
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<tr>
<td>RK-215</td>
<td>KEY—Light tan station selector key (Model H-625)</td>
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<tr>
<td>RL-088</td>
<td>COIL—&quot;D&quot; band antenna coil (Code-Orange) (L-2)</td>
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<tr>
<td>RL-098</td>
<td>COIL—&quot;D&quot; band antenna coil (Code-Red) (L-2)</td>
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<tr>
<td>RL-295</td>
<td>COIL-Oscillator coil (L-7 on Models H-630, 631, 632, 633)</td>
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<tr>
<td>RL-296</td>
<td>COIL—Oscillator coil (L-8 on Model H-625)</td>
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<tr>
<td>RL-346</td>
<td>CHOOSE—Antenna choke (L-8)</td>
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<tr>
<td>RL-511</td>
<td>BEAM-A-SCOPE Beam-A-Scope antenna (L-1 on Models H-630, 631, 632, 633)</td>
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<tr>
<td>RL-512</td>
<td>BEAM-A-SCOPE Beam-A-Scope antenna (L-1 on Model H-625)</td>
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<tr>
<td>RL-937</td>
<td>LUG—Key pin binding lug (Pkg. 10)</td>
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<tr>
<td>RM-503</td>
<td>MASK—Dial scale mask (Model H-625)</td>
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<tr>
<td>RN-200</td>
<td>NAMEPLATE Dial scale metal nameplate (Model H-625)</td>
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<tr>
<td>RP-134</td>
<td>PIN—Station selector key pin (Pkg. 10)</td>
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<tr>
<td>RP-145</td>
<td>POINT—Dial scale pointer (Models H-625, 630, 631, 632, 633)</td>
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<tr>
<td>RP-144</td>
<td>POINT—Dial scale pointer (Models H-625, 630, 631, 632, 633)</td>
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<tr>
<td>RP-307</td>
<td>PULLEY—Condenser drive cord pulley (Pkg. 5)</td>
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<tr>
<td>RP-308</td>
<td>PULLEY—¹⁄₂ inch drive cord idler pulley (Pkg. 5)</td>
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</tr>
<tr>
<td>RP-309</td>
<td>PULLEY—¹⁄₄ inch drive cord idler pulley (Pkg. 5)</td>
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<table>
<thead>
<tr>
<th>Stock No.</th>
<th>Description</th>
<th>List Price</th>
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<tbody>
<tr>
<td>*RQ-1235</td>
<td>RESISTOR—100 ohms, ½ W. carbon (R-10) (Pkg. 5)</td>
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<tr>
<td>*RQ-1239</td>
<td>RESISTOR—150 ohms, ½ W. carbon (R-12) (Pkg. 5)</td>
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<tr>
<td>*RQ-1299</td>
<td>RESISTOR—1000 ohms, ½ W. carbon (R-22) (Pkg. 5)</td>
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<tr>
<td>*RQ-1271</td>
<td>RESISTOR—3800 ohms, ½ W. carbon (R-9) (Pkg. 5)</td>
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<tr>
<td>*RQ-1295</td>
<td>RESISTOR—33,000 ohms, ½ W. carbon (R-11) (Pkg. 5)</td>
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<tr>
<td>*RQ-1297</td>
<td>RESISTOR—39,000 ohms, ½ W. carbon (R-10) (Pkg. 5)</td>
<td>.70</td>
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<tr>
<td>*RQ-1323</td>
<td>RESISTOR—470,000 ohms, ½ W. carbon (R-3, 5, 7, 11, 15) (Pkg. 5)</td>
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<tr>
<td>*RQ-1331</td>
<td>RESISTOR—1-0 megohm, ½ W. carbon (R-8) (Pkg. 5)</td>
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<tr>
<td>*RQ-1339</td>
<td>RESISTOR—2.2 megohms, ½ W. carbon (R-2) (Pkg. 5)</td>
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<tr>
<td>*RQ-1365</td>
<td>RESISTOR—15 megohms, ½ W. carbon (R-6) (Pkg. 5)</td>
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<tr>
<td>RR-772</td>
<td>RESISTOR—BL42B ballast resistor (R-14) (Model H-625)</td>
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<tr>
<td>RR-773</td>
<td>RESISTOR—BL42B ballast resistor (R-14) (Models H-630, 631, 632, 633)</td>
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<tr>
<td>RR-930</td>
<td>REFLECTOR—Dial scale reflector (Models H-630, 631, 632, 633)</td>
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</tr>
<tr>
<td>RR-941</td>
<td>REFLECTOR—Dial scale reflector (Model H-625)</td>
<td>.30</td>
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<tr>
<td>RS-300</td>
<td>SOCKET—Octal tube socket (Pkg. 5)</td>
<td>.75</td>
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<tr>
<td>RS-256</td>
<td>SOCKET—Electrolytic mounting socket (Pkg. 5)</td>
<td>.25</td>
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<tr>
<td>RS-261</td>
<td>SOCKET—Pilot lamp socket (Pkg. 5)</td>
<td>.20</td>
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<tr>
<td>RS-426</td>
<td>TURNING—Condenser drive cord spring (Pkg. 5)</td>
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<tr>
<td>RS-510</td>
<td>SPACER—Station key spacer (Pkg. 10)</td>
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</tr>
<tr>
<td>RS-511</td>
<td>SLEEVE—Condenser bracket sleeve (Pkg. 10)</td>
<td>.15</td>
</tr>
<tr>
<td>RS-529</td>
<td>SHAFT—Tuning shaft</td>
<td>.00</td>
</tr>
<tr>
<td>RS-5036</td>
<td>SWITCH—Band change switch</td>
<td>.60</td>
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<tr>
<td>RT-328</td>
<td>TRANSFORMER—1st I.F. transformer (L-5)</td>
<td>1.00</td>
</tr>
<tr>
<td>RT-329</td>
<td>TRANSFORMER—2nd I.F. transformer (L-6)</td>
<td>1.20</td>
</tr>
<tr>
<td>RT-468</td>
<td>TRANSFORMER—Output transformer (T-1) (Models H-630, 632)</td>
<td>.95</td>
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<tr>
<td>RT-469</td>
<td>TRANSFORMER—Output transformer (T-1) (Models H-630, 631, 633)</td>
<td>1.25</td>
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<tr>
<td>RT-952</td>
<td>TERMINAL—Loop lead contact terminal (Pkg. 10)</td>
<td>.05</td>
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<tr>
<td>RT-964</td>
<td>TERMINAL—Speaker lead terminal (Pkg. 10)</td>
<td>.05</td>
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<tr>
<td>RV-072</td>
<td>VOLUME CONTROL—20 megohm volume control (R-4) (Model H-625)</td>
<td>.80</td>
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<tr>
<td>RW-039</td>
<td>WINDOW—Celluloid station letter window (Pkg. 5)</td>
<td>.10</td>
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<tr>
<td>RW-101</td>
<td>WASHER—Control shaft felt washer (Pkg. 5)</td>
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<tr>
<td>*RX-035</td>
<td>ASSEMBLY—Condenser mounting foot assembly</td>
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</tr>
<tr>
<td>RX-061</td>
<td>ASSEMBLY—Chassis mounting assembly</td>
<td>.10</td>
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</tbody>
</table>

*Slightly used on previous receivers.

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Fig. 7. I.R.E. Dummy Antenna

20 MH

INPUT

200

M MF

400

R

OUTPUT

400

R

M MF

* Volt A.C.
Volts measured on 20,000 ohms per volt-voltmeter.

Fig. 5. Socket Voltage

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### General Electric Co.

#### Models H634, H638, H640

**Gain, Coils, Notes**

**Electrical Power Output**
- Undistorted: 1.75 watts
- Maximum: 2.7 watts

**Tone Control**
- 2-position

**Load-speaker—"Alnicco" Magnet Dynamic**
- Model: H-634
- Outside Cone Diameter: 5 in.
- Voice Coil Impedance: 3.5 ohms at 400 cycles

### Phonograph

- Type: Pick-up
- Crystal Turntable Speed: 78 rpm

### Tubes

- Converter and Oscillator: GE-6SA7
- I.F. Amplifier: GE-6SK7
- Audio Driver: GE-6186G
- Output: GE-2516G
- Rectifier: GE-2526G
- Pilot Lamp: (2) Mazda No. 44

### General Information

Models H-634, H-638 and H-640 employ three-band AC-DC receivers of the superheterodyne type using six General Electric Pre-tested Tubes. Features of design include the built-in “Beam-a-Scope,” the new “Alnicco” dyna-power speaker, seven “Featheriouch Tuning” keys, a Visualux dial, iron core oscillator trimmer coils for station keys and automatic volume control.

In addition to the above features, the Model H-638 incorporates a phonograph mechanism for reproducing recordings. The phonograph plays 10-inch or 12-inch records and is manually operated. A constant speed, self-starting, silent electric motor and high-quality crystal pick-up insure realistic reproductions.

### Coil System

L-1 is the Beam-a-Scope. On “B” band, L-1 operates as a loop antenna. On “C” and “D” bands, the grid end of L-1 is effectively grounded preventing absorption spots due to loop resonance. T-3 is the “C” and “D” antenna transformer while T-4 is the oscillator transformer for all bands. All band switch and coil terminals are numbered in Fig. 3 and Fig. 4 to facilitate in locating common points.

The following table shows the coils in use for various positions of the band and manual-automatic switch:

<table>
<thead>
<tr>
<th>Band-switch Position</th>
<th>Antenna Primary</th>
<th>Antenna Secondary</th>
<th>Oscillator Grid</th>
<th>Oscillator Cathode</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual Tuning Band “B”</td>
<td>L-1</td>
<td>L-4</td>
<td>Section 3 to 22 of L-4</td>
<td>C-3a and C-3b tuning condenser in circuit</td>
<td></td>
</tr>
<tr>
<td>Automatic Tuning Band “D”</td>
<td>L-1</td>
<td>L-4</td>
<td>Section 3 to 28 of L-4</td>
<td>C-2 and L-7 trimmers and coils in circuit</td>
<td></td>
</tr>
<tr>
<td>Band “C”</td>
<td>L-2</td>
<td>L-2</td>
<td>Section 3 to 6 of L-5</td>
<td>L-1 and L-4 effectively grounded through C-14 and C-4 respectively</td>
<td></td>
</tr>
<tr>
<td>Band “D”</td>
<td>L-3</td>
<td>L-3</td>
<td>Section 3 to 7 of L-4</td>
<td>L-1, L-2 secondary grounded through C-14, L-4, L-5 grounded through C-6 and C-5 respectively</td>
<td></td>
</tr>
</tbody>
</table>

**Special Service Information**

The following information will be found very useful in servicing receivers if a vacuum-tube voltmeter or similar voltage-measuring instrument is available.

1. Stage Gains
   - (a) Antenna Post to Converter Grid
     - Band “B”: 3.5 to 4.0
     - Band “C”: 3.0 to 3.5
     - Band “D”: 1.3 to 3.0
   - (b) Converter Grid to 6SK7 Det. Plate: 60 at 455 K.C.;
   - (c) 6SK7 Grid to 6S97 Det. Plate: .35 at 455 K.C.

2. A 400-cycle signal of .05 volts across the volume control will give 1/2 watt speaker output. (Volume control turned to maximum.)

3. Average DC voltage developed across oscillator grid resistor (R1):
   - Band “B”: 6 to 8 volts
   - Band “C”: 5 to 10 volts
   - Band “D”: 2 to 5 volts

† Variations of +10%, -20% permissible.
ALLOCATION PROCEDURE

I.F. Alignment with Oscilloscope

<table>
<thead>
<tr>
<th>Band Switch Setting</th>
<th>Input Freq.</th>
<th>Point of Input</th>
<th>Dummy Antenna</th>
<th>Trimmer</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Band “B”</td>
<td>455 K.C. Sweep</td>
<td>I.F. Grid and Minus B</td>
<td>.05 mfd. or Larger</td>
<td>2nd I.F. Sec. (C-13b) 2nd I.F. Pri. (C-13a)</td>
<td>Gang condenser plates closed—“manual” key depressed—connect audio input of oscilloscope to minus B and to the junction of R-4 and R-18. Adjust trimmers in order mentioned for a single symmetrical curve of maximum amplitude. The resultant curve is shown in Fig. 1.</td>
</tr>
<tr>
<td>2. Band “B”</td>
<td>455 K.C. Sweep</td>
<td>Converter Grid and Minus B</td>
<td>.05 mfd. or Larger</td>
<td>1st I.F. Sec. (C-12b) 1st I.F. Pri. (C-12a)</td>
<td></td>
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</table>

I.F. Alignment with Output Meter

<table>
<thead>
<tr>
<th>Band Switch Setting</th>
<th>Input Freq.</th>
<th>Point of Input</th>
<th>Dummy Antenna</th>
<th>Trimmer</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Band “B”</td>
<td>455 K.C. with Modulation</td>
<td>I.F. Grid and Minus B</td>
<td>.05 mfd. or Larger</td>
<td>2nd I.F. Sec. (C-12b) 2nd I.F. Pri. (C-13a)</td>
<td>Gang condenser plates closed—connect output meter across voice coil—keep input signal low and volume control on as far as possible. Adjust all trimmers for maximum output.</td>
</tr>
<tr>
<td>2. Band “B”</td>
<td>455 K.C. with Modulation</td>
<td>Converter Grid and Minus B</td>
<td>.05 mfd. or Larger</td>
<td>1st I.F. Sec. (C-12b) 1st I.F. Pri. (C-12a)</td>
<td></td>
</tr>
</tbody>
</table>

R.F. Alignment

<table>
<thead>
<tr>
<th>Band Switch Setting</th>
<th>Input Freq.</th>
<th>Point of Input</th>
<th>Dummy Antenna</th>
<th>Trimmer</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Band “B”</td>
<td>580 K.C. with Modulation</td>
<td>Antenna Post</td>
<td>I.R.E.</td>
<td>Osc. (C-7)</td>
<td>Set dial pointer to 580 K.C. and tune in signal with (C-4)</td>
</tr>
<tr>
<td>3. Band “B”</td>
<td>1500 K.C. with Modulation</td>
<td>Antenna Post</td>
<td>I.R.E.</td>
<td>Osc. Padder (C-4)</td>
<td>Peak trimmer for maximum output while rocking the gang condenser</td>
</tr>
<tr>
<td>4. Band “B”</td>
<td>580 K.C. with Modulation</td>
<td>Antenna Post</td>
<td>I.R.E.</td>
<td>Osc. (C-1c)</td>
<td>Retrim for maximum output with a low input signal rocking gang condenser</td>
</tr>
<tr>
<td>5. Band “C”</td>
<td>6 M.C. with Modulation</td>
<td>Antenna Post</td>
<td>I.R.E.</td>
<td>Ant. (C-1c)</td>
<td>Peak for maximum output with a low input signal</td>
</tr>
<tr>
<td>6. Band “D”</td>
<td>21 M.C. with Modulation</td>
<td>Antenna Post</td>
<td>I.R.E.</td>
<td>Osc. (C-1a) Ant. (C-1b)</td>
<td>The image of any “D” band signal should be heard 910 K.C. below signal input when (C-1a) is on proper peak. Example: 15 M.C. image—14.09 M.C. Peak (C-1b) while rocking the gang condenser</td>
</tr>
</tbody>
</table>

PHONOGRAPH MECHANISM (H-638)

The phonograph mechanism used in this receiver has been designed to be as simple as possible and give long and trouble-free performance. Under normal operating conditions service difficulties should be negligible. Occasionally, however, certain adjustments may be required.

Trip Mechanism

The trip mechanism is of simple design and consists of a latch bar connected to the motor switch and a trip lever. The latch is held closed by means of a spring between the latch bar and the trip lever. The motor switch is mechanically connected to the latch bar so that when the trip mechanism is released, the motor switch is in the “Off” position. Be sure this latch bar mechanism works freely without binding.

The trip is actuated by an adjustable arm on the trip lever. When the eccentric groove in the record swings the tone arm back and forth, it pushes the latch out of engagement.

Crystal Pick-up

The crystal pick-up employs a crystal element which is coupled to a light needle chuck. The needle movement bends the crystal element thus generating voltage by the piezoelectric effect. The voltage developed is dependent upon the needle movement amplitude and the load resistance.

The crystal cartridge is a factory-sealed unit and no adjustments are provided. The cartridge is held in the tone arm by means of two screws. The pick-up and tone-arm assembly should require very little servicing and if treated with reasonable care should perform its function without attention for long periods of time.
GENERAL INFORMATION

Models H-736 and H-708 employ two-band AC receivers of the superheterodyne type using seven General Electric Pre-tested Tubes. Features of design include the voltage doubler rectifier circuits, 12-inch Dynapower speaker, built-in Beam-a-Scope, "plug-in" type terminal for connecting-a record player or television sound channel, six mechanical type "Feather-touch Tuning" keys and beam power output.

Model H-708 also contains an automatic-record-changing phonograph mechanism. High-quality reproduction is assured with a crystal pick-up and constant-speed, self-starting, silent electric motor.

Voltage Doubler

The voltage doubler circuit used in Models H-736 and H-708 operates in the following manner; refer to Schematic Diagram Fig. 5. When the B minus side of the power line is positive the right-hand 2526GT rectifier will conduct charging up electrolytic capacitor (C-15) to near line voltage. On the reverse cycle when the B minus side of the power line is negative, the line voltage will add to the charge on (C-15) and will charge up electrolytic capacitor (C-22a) through the left-hand 2526GT rectifier to nearly twice line voltage. The series resistor (R-20) is inserted as a protective device for both rectifier tubes.

Phonograph or Television Sound Connections

These receivers are equipped with a phono-terminal (pin jack) to allow the convenient connection of a record player or television sound channel. General Electric plug, Stock No. RP-145, fits the pin jack. The Model H-708 uses the plug connection from pick-up to radio and this plug may be readily removed to allow use of another record player or a television sound converter.

NOTE: When using a crystal pick-up other than the one supplied with the Model H-708, a suitable load consisting of a 47,000-ohm resistor in series with a .0072-mfd. capacitor should be connected across the pick-up leads.

ALIGNMENT PROCEDURE

Alignment Frequencies

I.F. 455 KC
"B" Band 1500 and 580 KC
"D" Band 18,000 KC

The location of trimmers for the above models is shown in Fig. 1.

I.F. Alignment

Connect an output meter across the voice coil. Rotate the volume control to maximum. Completely close the gang condenser plates and set the dial pointer to the first dial mark on the left-hand end of the broadcast scale. Turn the band switch to "B" band (counterclockwise) and the tone control to "Radio-Bass" (extreme counterclockwise).

Set test oscillator to 455 KC and apply signal to the control grid of the 6SA7GT tube through a .05 mfd. capacitor. Do not remove the 6SA7GT grid lead. Keep the test oscillator output as low as a readable meter reading will permit. Adjust all I.F. trimmers (C-11 and C-12) for maximum meter reading.

R.F. Alignment

Apply R.F. signals through a standard I.R.E. dummy antenna to the antenna post on the rear apron of the chassis. The Beam-a-Scope must be connected for R.F. alignment and since its relative position with respect to the chassis materially affects the alignment on "B" band, it is advisable to perform the alignment when the chassis and Beam-a-Scope are properly mounted in the cabinet.

Align (C-3) 3080 KC when gang condenser is turned to the 580 KC dial mark. Peak (C-7) on 1500 KC while rocking gang condenser. Repeal (C-3) on 580 KC while rocking gang condenser.

Turn band switch to "D" band and turn gang condenser to 18 MC dial mark. Align (C-6) on 18 MC and peak (C-5) while rocking the gang condenser. The image of any "D" band signal should be heard 910 KC below the input signal when (C-6) is on the proper peak. Example: 18 MC image—17.09 MC.

Special Service Information

The following information will be found very useful in servicing receivers if a vacuum-tube voltmeter or similar voltage-measuring instrument is available:

1. Stage Gains
   a. Antenna Post to Converter Grid—10 at 1000 KC
   b. Converter Grid to 6SK7 Grid—30 at 455 KC
   c. 6SK7 Grid to 6Q7 Det. Plate—77 at 455 KC

2. A 400-cycle signal of .06 volts across the volume control will give 15 watt speaker output. (Volume turned to maximum.)

3. Average DC voltage developed across oscillator grid resistor (R-1)—6 volts.

† Variations of ±10%, ±20% permissible.

Fig. 3. Drive Cord Arrangement

LOUD-SPEAKER—"Alnico" Magnetic Dynamic

Cone Diameter: 12 inches
Voice Coil Impedance (400 cycles): 3.8 ohms

The voice coil is accurately and permanently centered at the factory and should seldom give trouble. In case a voice coil needs recentering, it will be necessary to replace the entire cone and voice coil assembly.

NOTE: In no case should the magnet be removed from the assembled position without remagnetizing after replacing it.

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ALIGNMENT PROCEDURE

I.F. Alignment

Connect an output meter across the voice coil. Rotate the volume control to maximum. Completely close the gang condenser plates and set the dial pointer to the first dial mark on the left-hand end of the broad band scale. Turn the band switch to "B" band (counterclockwise) and the tone control to "Normal."

Set test oscillator to 455 KC and apply signal to the control grid of the 12SA7 tube through a .06 mfd. capacitor. Do not remove the 125A7 grid lead. Keep the test oscillator output as low as a readable meter reading will permit. Adjust all I.F. trimmers (C-12 and C-13) for maximum meter reading.

R.F. Alignment

Apply R.F. signals through a standard I.R.E. dummy antenna to the antenna post on the rear apron of the chassis. The Beam-a-Scope must be connected for R.F. alignment and since its relative position with respect to the chassis materially affects the alignment on "B" band, it is advisable to perform the alignment when the chassis and Beam-a-Scope are properly mounted in the cabinet.

Align (C-4) on 580 KC when gang condenser is turned to the 580 KC dial mark. Peak (C-7) on 1500 KC while rocking gang condenser. Repeat (C-4) on 580 KC while rocking gang condenser.

Turn band switch to "D" band and turn gang condenser to 21 MC dial mark. Align (C-1A) on 21 MC and peak (C-1B) while rocking the gang condenser. The image of any "D" band signal should be heard 810 KC below the input signal when (C-1A) is on the proper peak. Example: 21 MC image —20.89 MC.

Turn band switch to "C" band and set pointer at 6 MC dial mark. Align (C-1C) on 6 MC while rocking the gang condenser.

Special Service Information

The following information will be found very useful in servicing receivers if a vacuum-tube voltmeter or similar voltage-measuring instrument is available:

Fig. 2. Socket Voltages

Tuning Frequency Range

Broadcast 550-1600 KC
Short-wave 2300-29,000 KC

Fig. 3. Drive Cord Arrangement

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Compliments of www.nucow.com
FREQUENCY ADJUSTMENT

To adjust the frequency of the oscillator turn the tuning trimmer which is accessible through a hole in the bottom cover near the power control knob. This is a screwdriver control. Clockwise rotation of the trimmer raises the frequency while counterclockwise rotation lowers the frequency. Since the electrical capacity of the hand may detune the transmitter somewhat if rested on the record player during adjustment, it is best to rest the record player on the edge of a table or bench with the tuning trimmer side of the record player just far enough out from the edge to allow screwdriver adjustment of the tuning trimmer.

MODELS HJ-905, HJ-908

GENERAL INFORMATION

Models HJ-905 and HJ-908 employ three-band AC receivers of the superhet type using nine General Electric Pre-tested Tubes. Features of design include the voltage doubler rectifier circuit, 4-inch Dynapower speaker, built-in Super Beam-a-scope plug-in type terminal for connecting a record player or television sound channel, seven "Feathertouch Tuning" keys and beam power output.

Model HJ-908 also contains an automatic record-changing phonograph mechanism. High-quality reproduction is assured with a crystal pick-up and constant-speed, self-starting, silent electric motor.

Model HJ-908B is the same as Model HJ-908 except in bleached mahogany cabinet.

Voltage Doubling

The voltage doubler circuit used in Models HJ-905 and HJ-908 operates in the following manner: refer to Schematic Diagram Fig. 5. When the B minus side of the power line is positive the right-hand 252ZGT rectifier will conduct charging up electrolytic capacitor (C-24) to near line voltage. On the reverse cycle when the B minus side of the power line is negative the line voltage will add to the charge on (C-24) and the right-hand 252ZGT rectifier will conduct near twice line voltage. The series resistor (R-23) is inserted as a protective device for both rectifier tubes.

Phonograph or Television Sound Connections

These receivers are equipped with a phono-terminal (pin jack) to allow the convenient connections of a record player or television sound channel. General Electric plug, Stock No. RP-146, fits the pin jack. The Model HJ-908 uses the plug connection from pick-up to radio and this plug may be readily removed to allow use of another record player or a television sound converter.

FEATHERTOUCH TUNING ADJUSTMENTS

While peaking the antenna trimmer of either of the first two left-hand station keys must be exerted by open trimmer so far that tuning to the oscillator frequency results. If this occurs the tuning indicator shadow sector will vanish and true indication of tuning.
PRODUCTION CHANGES

Early production receivers had a .002 mfd. 600 V. paper capacitor in series with the high side of (L1) primary, and the lower side was connected to the chassis. The 6847GT, 68K7GT, 6Q7GT and 6J5GT can be replaced with metal tubes if the receiver is reinstalled.

Phonograph

Models: H-639 AC and H-639 DC
Type Speed: 78 R.P.M.

Special Service Information

The following data will be very useful to servicemen equipped with vacuum tube voltmeters or similar voltage measuring instruments:

1. Stage Gains
   - Antenna Pot to Converter Grid—4 at 1000 Kc,
   - Converter Grid to 6DK7GT Grid—50 at 455 Kc,
   - 6DK7GT Grid to 6Q7GT Det. Plate—100 at 455 Kc

2. Audio Gains
   - 0.05 volts, 400 cycles signal across volume control with control set to maximum will give approximately 1 watt speaker output.

3. DC voltage developed across oscillator grid resistor
   - (R1) averages 12 volts.
   - Variations of +10%, -20% permissible.

Electric Power Output

<table>
<thead>
<tr>
<th>Model</th>
<th>Power Supply (Volts)</th>
<th>Frequency (Cycles on AC)</th>
<th>Power Consumption (Watts)</th>
</tr>
</thead>
<tbody>
<tr>
<td>H-639 AC</td>
<td>115 AC</td>
<td>60</td>
<td>75</td>
</tr>
<tr>
<td>H-839 DC</td>
<td>115 DC</td>
<td>85</td>
<td>85</td>
</tr>
</tbody>
</table>

Loadspeaker-"Alnico" Magnetic Dynamic

Outside Cone Diameter: 6.5 inches
Voice Coil Impedance: 400 cycles, 3.8 ohms

The voice coil is accurately and permanently centered at the factory and should seldom give trouble. In case a voice coil needs recentering it will be necessary to replace the entire cone and voice coil assembly.

Note—In no case should the magnet be removed from the assembled position without remagnetizing after replacing it.

ALIGNMENT PROCEDURE

I.F. Connect an output meter across the voice coil. Turn the volume control to maximum. Set test oscillator to 455 Kc and keep the oscillator output as low as a readable meter reading will permit.

Apply signal to the grid of the 6DK7GT through a .005 mfd. capacitor and align the 2nd I.F. transformer. Repeat the procedure, applying the 455 Kc signal to the control grid of the 6SA7GT and aligning the 1st I.F. transformer. Finish by over-all adjustments.

R.F. With gang condenser plates completely closed, set dial pointer to the first mark at the left end of the scale. Apply a 1500 Kc signal either through a standard I.R.E. dummy to the antenna terminal or through an additional loop connected to the generator output which can be magnetically coupled to the receiver Beam-A-Scope. Align (C-2) at 1500 Kc and peak (C-1) for maximum output. Peak (C-3) on 580 Kc while rocking the gang condenser. Retrim at 1500 Kc.

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GOODYEAR TIRE & RUBBER CO., INC.

MODEL 522
Schematic, Voltage
Socket, Trimmers
Alignment

No. Part No. Description

RESISTORS
R1 130-17 10M Ohm - ½ Watt - 20% - Carbon
R2 130-52 50M Ohm - ½ Watt - 20% - Carbon
R3 130-17 10M Ohm - ½ Watt - 20% - Carbon
R4 130-38 2 Meg Ohm - ½ Watt - 20% - 100 Volt - Carbon
R5 101-43 1 Meg Ohm Volume Control and Switch
R6 130-52 50M Ohm - ½ Watt - 20% - 10 Volt - Carbon
R7 130-19 1 Meg Ohm - ½ Watt - 20% - 100 Volt - Carbon

RESISTORS
R8 130-9 200M Ohm - ½ Watt - 20% - 20 Volt - Carbon
R9 130-19 1 Meg Ohm - ½ Watt - 20% - 100 Volt - Carbon
R10 130-52 480 Ohm - ½ Watt - 10% - 10 Volt - Carbon
R11 101-44 4.75 Ohms - Rheostat
R12 130-52 50M Ohm - ½ Watt - 20% - 10 Volt - Carbon

CONDENSERS
C1 100-11 .01 x 400 Volt - 25%
C2 100-22 .05 x 240 Volt - 25%
C3 129-12 .00025 Mica - MT - 25%
C4 124-14 Series Pad
C5 100-9 .05 x 200 Volt - 25%
C6 129-5 .0001 Mica - MT - 25%
C7 100-6 .05 x 200 Volt
C8 100-9 .05 x 200 Volt - 25%
C9 129-2 .0005 Mica - MT - 25%
C10 100-11 .01 x 400 Volt - 25%
C11 100-11 .01 x 400 Volt - 25%
C12 119-82 10.0 Mfd. x 25 Volts - Working Voltage

PARTS
T1 111-46 Antenna Coil
T2 110-36 Oscillator Coil
T3 108-87 Input I.F. Coil 465 K.C.
T4 108-68 Output I.F. Coil 465 K.C.
T5 102-29 Two Gang Condenser
L 194-19 Six Inch Magnetic Speaker

ALIGNING I.F. TRANSFORMERS: (465 K.C.)
1. With volume control full on and with variable condenser at its minimum capacity position, plates entirely out of mesh, and with external oscillator set at 465 K.C. connected in series with a .1 mfd. condenser, to the grid of the 1A6 tube (cap at top of tube), adjust I.F. transformers, parts number 108-67 and 108-68, to resonance. Both of these transformers have two (2) adjustments each, they are accessible from the top of the cans (for location see top view).

2. Use as a reference point an output meter connected across the outside terminals of the speaker or by means of an adapter to the plate and screen of the type 950 output tube. Maximum deflection of the volt meter indicates resonance.

3. Use only enough signal to get a readily readable output. A low range output meter or the low scale of a multi-range meter should be used.

BROADCAST BAND ALIGNMENT:
1. Set external oscillator to 1720 K.C. and connect it in series with a 200 mfd. condenser to the antenna and ground posts.

(a) With variable condenser in its minimum capacity position, plates entirely out of mesh, adjust oscillator trimmer (rear section of variable condenser) to resonance.

(b) Re-set external oscillator to 1400 K.C. Rotate variable condenser, pick up signal and adjust antenna trimmer (front section of variable condenser) to resonance.

(c) Re-set external oscillator to 600 K.C., move dial pointer to 600 K.C., and adjust series pad, part number 124-14 (see top view), to resonance. While making this adjustment, slowly rock variable condenser to and fro until maximum output is obtained.

(d) Check for sensitivity at 1400, 1000, 600 K.C. DO NOT BEND PLATES.

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MODELS 685, 686 Runs 1 and 2.

TUBE COMPLEMENT

consists of the latest "Metal-Glass" tubes which are interchange-
able with metal-tube models. It includes the following:
- 1-Type 6L7 Pentagrid Mixer, First Detector.
- 1-Type 6G2 Cathode Cut-off Pentode, I.F. Amplifier.
- (465 K.C.)
- 1-Type 6Q7 Duplex Diode Triode Second Detector, A.V.C. and 2nd Audio Freq. Amplifier.
- 1-Type 6F1 Pentode Output Amplifier.
- 1-Type 5Y3 or 5W4 High Vacuum Rectifier.
- (Note: 5Y3 available in "Metal-Glass" only.)
- 1-Type 5G5 Cathode-Ray Tuning Indicator.
- (Note: 5G5 available in "Metal-Glass" only.)
The tube complement of the model 686 is as follows:
- 1-Type 6L7 Pentagrid Mixer, First Detector.
- 1-Type 6G2 Cathode Cut-off Pentode, I.F. Amplifier.
- (465 K.C.)
- 1-Type 6Q7 Duplex Diode Triode Second Detector, A.V.C. and First Audio.
- 1-Type 6F6G Pentode Output Amplifier.
- 1-Type 5Y3 High Vacuum Rectifier.

SERVICE NOTES:

Voltages 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 hav-
ing a resistance of 1500 ohms per volt.

All voltages as indicated on diagram are measured with 110 volts on the primary of the power transformer.

Resistance of coil windings are indicated in ohms on the schematic circuit diagram.

To check for open by-pass condensers, shunt each con-
denser with another condenser of the same capacity and voltage rating, which is known to be good, until the defect-
ive unit is located.

Should the hum, sputtering, low volume and a reduction in all D.C. voltages is usually caused by a shorted electro-
luminescent panel by-passes frequently cause oscillation and distorted tone.

ALIGNING INSTRUCTIONS:

CAUTION: No aligning adjustments should be at-
ttempted without thoroughly checking over all other pos-
sible causes of trouble, such as poor installations, open
or grounded antenna circuits, low voltage, defective tubes, condensers and resistors. In order to properly align this chassis, an oscillator (generator) is absolutely necessary.

No aligning adjustments should be made in the chassis while it is in the cabinet. Remove the knobs and the four bolts which are used to fasten the chassis, and remix the external oscillator.

All adjustments should be made with a non-metallc screw driver.

DUMMY ANTENNAS

The following dummy antennas are used in aligning and are referred to in the following alignment instructions as 1. 2. 3.

1. Dummy 1 (I.F.): Consists of a .1 mfnd condenser connected in series with the external oscillator.
2. Dummy 2 (Broadcast): Consists of a 320 mfnd condenser and a 20 ohm resistor in series with each other and in series with the external oscillator.
3. Dummy 3 (Medium and Short Wave): Consists of a .1 mfnd condenser and a 400 ohm resistor connected in series with each other and in series with the external oscillator.

ALIGNING I.F. TRANSFORMER (Model 686 K.C.):

Part No. 156-75 Output I.F. Transformer.
Part No. 156-74 Input I.F. Transformer.
The above mentioned transformers, both of which are adjustable from the top of chassis (see top view).

1. Connect external oscillator set at 456 kilocycles. (With "Dummy 3" to the output leads, and with the reverberation trimmer at 1400 kilocycles, and with the variable condenser set approximately 1400 kilocycles, connect the following adjustments:
(a) Connect external oscillator set at 456 kilocycles, in series with "Dummy 3", to the input leads, and adjust the output I.F. transformer (No. 156-76) to resonance.
(b) With "Dummy 1" still connected, move oscillator output dial from 456 to 1400 kilocycles and adjust input I.F. transformer (No. 108-T7) to resonance.
(c) With oscillator still connected to 6L7, readjust output I.F. transformer (108-T6) for necessary.

2. With band changing switch in the broadcast position, extreme left of its rotation, and with gang condenser in its minimum capacity position, plate entirely out of mesh, and with external oscillator connected in series with "Dummy 1" through an antenna lead and black ground lead, make following adjustments:
(a) Set external oscillator to 1770 K.C. and adjust broadcast oscillator trimmer to resonance (adjustment number 11; see bottom view of coil assembly. Fig. 5.)
(b) Bypass external oscillator to 1500 K.C., rotate vari-
able gang condenser and pick up signal. Adjust broadcast oscillator trimmer (Adjustment number 4) to resonance; also adjust predetector trimmer which is mounted on the top of the rear panel of the three gang variable tuning condenser to resonance. (See top view of chassis, Fig. 1, for location of this adjustment.)
(c) Re-set external oscillator to 600 K.C. and adjust broadcast series pad to resonance by rotating con-
denser to approximately 400 K.C., rocking it slowly-
to and fro until with adjusting series pad output is attained. This adjustment is located on the bottom of the chassis directly under the variable gang condenser. (See bottom view of chassis, Fig. 1.)
(d) Repeat adjustments "a" and "b" until sensitivity is at its maximum.
(e) Check for tuning and sensitivity at 1000 kilocycles. Under no circumstances, should variable condenser sections be shorted or over-tuned.

BROADCAST BAND ALIGNMENT:

535 to 1720 Kilocycles

1. With band changing switch in the broadcast position, extreme right of its rotation, and with gang condenser in its minimum capacity position, plate entirely out of mesh, and with external oscillator connected in series with "Dummy 1" through an antenna lead and black ground lead, make following adjustments:
(a) Set external oscillator to 1770 K.C. and adjust broadcast oscillator trimmer to resonance (adjustment number 11; see bottom view of coil assembly. Fig. 5.)
(b) Bypass external oscillator to 1500 K.C., rotate vari-
able gang condenser and pick up signal. Adjust broadcast oscillator trimmer (Adjustment number 4) to resonance; also adjust predetector trimmer which is mounted on the top of the rear panel of the three gang variable tuning condenser to resonance. (See top view of chassis, Fig. 1, for location of this adjustment.)
(c) Re-set external oscillator to 600 K.C. and adjust broadcast series pad to resonance by rotating con-
denser to approximately 400 K.C., rocking it slowly-
to and fro until with adjusting series pad output is attained. This adjustment is located on the bottom of the chassis directly under the variable gang condenser. (See bottom view of chassis, Fig. 1.)
(d) Repeat adjustments "a" and "b" until sensitivity is at its maximum.
(e) Check for tuning and sensitivity at 1000 kilocycles. Under no circumstances, should variable condenser sections be shorted or over-tuned.

SHORT WAVE BAND ALIGNMENT:

5.2 to 18.3 Megacycles

1. With band changing switch in the short wave position, extreme right of its rotation, and with gang condenser in its minimum capacity position, plate entirely out of mesh, and with external oscillator connected in series with "Dummy 1" through an antenna lead and black ground lead, make the following adjustments:
(a) Move dial pointer to 178 megacycles and adjust short wave oscillator (Adjustment number 3) and short wave antenna (Adjustment) together.
(b) Re-set external oscillator to 6 megacycles and adjust broadcast series pad to resonance by rotating variable condenser and check sensitivity.
(c) Re-set external oscilator and check set at 18.1
megacycles and 5.3 megacycles for band coverage.

NOTE: It is extremely necessary in making all of these
alignments that the fundamental oscillator signal be tuned in and not the image frequency, which will fall be-
low the fundamental. An example of this is an image of a fundamental 18.1 megacycles which appears near 17.4
megacycles.

MIDDLE WAVE BAND ALIGNMENT:

1695 to 5500 Kilocycles

1. With band changing switch in the middle wave position, extreme right of its rotation, and with gang condenser in its minimum capacity position, plate entirely out of mesh, and with external oscillator connected in series with "Dummy 1" through an antenna lead and black ground lead, make the following adjustments:
(a) Move dial pointer to 5500 kilocycles and adjust middle wave oscillator (Adjustment number 3) and middle wave antenna (Adjustment number 6) to resonance.
(b) Re-set external oscillator to 6 megacycles and adjust broadcast series pad to resonance by rotating variable condenser and check sensitivity.
(c) Re-set external oscillator and check set at 5400 kilocycles and 1700 kilocycles for band coverage.
LIST OF REPAIR PARTS
(Serial No. 6E248475 and up)

<table>
<thead>
<tr>
<th>Schematic</th>
<th>Description</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>100-6</td>
<td>C-12: C-6</td>
<td>.02 x 200 Volt Tantalum Without Bracket</td>
</tr>
<tr>
<td>100-10</td>
<td>C-10: C-7</td>
<td>.01 x 200 Volt Tantalum</td>
</tr>
<tr>
<td>100-11</td>
<td>C-9: C-11</td>
<td>.002 x 200 Volt Tantalum</td>
</tr>
<tr>
<td>100-26</td>
<td>C-5: C-2</td>
<td>.05 x 200 Volt Tantalum</td>
</tr>
<tr>
<td>100-13</td>
<td>C-1: C-13</td>
<td>.05 x 200 Volt Tantalum</td>
</tr>
<tr>
<td>100-14</td>
<td>C-14: C-14</td>
<td>.05 x 200 Volt Tantalum</td>
</tr>
<tr>
<td>120-9</td>
<td>C-4: C-4</td>
<td>.00015 Mica Type C 10%</td>
</tr>
<tr>
<td>120-12</td>
<td>C-3: C-3</td>
<td>.00005 Mica Type C 10%</td>
</tr>
<tr>
<td>120-13</td>
<td>C-1: C-1</td>
<td>.00005 Mica Type C 10%</td>
</tr>
<tr>
<td>106-26</td>
<td>R-11: R-12</td>
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<td>130-12</td>
<td>R-2: R-2</td>
<td>500 Ohm 1/3 Watt 20% V. Carbon</td>
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<td>R-5: R-5</td>
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I.F. FREQUENCY
465 K.C.

CONVENTIONAL ALIGNMENT
SEE SPECIAL SECTION VOL.VIII.

ALIGNMENT FREQUENCIES

S.W. Osc: 6-6 MC (I.F.) Dummy Adjust S.W. Osc.
B.C. Ant: 1560 KC (B.C.) Dummy B.C.Ant.
S.W. Ant: 600 KC Series Pad.
S.W. Ant: 6 MC (S.W.) Dummy S.W.Ant (On rear section of variable).

DUMMY ANTENNAS:
(I.F.)—Consists of a .1 mfd condenser connected in series with the external oscillator.
(Broadcast)—Consists of a 200 mfd condenser and a 20 ohm resistor connected in series with each other and in series with the external oscillator.
(Short Wave)—Consists of a .1 mfd condenser and a 400 ohm resistor connected in series with each other and in series with the external oscillator.
Compliments of www.nucow.com
**GOODYEAR TIRE & RUBBER CO., INC.**

**MODELS 665, 686, Run 1/2**

**Schematic, Voltage, Socket, Trimmers**

---

**FOR ALIGNMENT SEE INDEX**

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**FOR PEAK 465 KC**

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**CONDENSERS**

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**TUNING INDICATOR. NOT USED WITH SOME SETS**

**CHASSIS LAYOUT**

**MODEL 665 Run 1.**

**NOTE:**
Model 665 does not have tone control or tuning indicator and uses 2 metal and four glass tubes.

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Compliments of www.nucow.com
GOODYEAR TIRE & RUBBER CO., INC.

MODEL 778, RUN 12
Alignment, Trimmers
Socket, Notes

DESCRIPTION

The tube complement of this chassis is as follows:
1. Type 6K7 Remote cut-off pentode R.F. amplifier
2. Type 6J7—pentode first detector.
3. Type 6C5 Oscillator
4. Type 6K7 Remote cut-off pentode I.F. amplifier (465 K.C.)
5. Type 6Q7 duplex diode pentode second detector, A.V.C. and audio.
6. Type 6F6—pentode output amplifier.
7. Type 6T3 or 5W4—high vacuum rectifier.

Transformers are available and chassis are sometimes equipped with universal transformers for operation on 60 and 60 cycles and with primary taps for 108, 127, 150, 225 and 260 volts (see instructions) and also sometimes equipped with 25 cycle transformers with 105-115 volt or 220 volt primaries, not universals.

SERVICE NOTES

All voltages are to be measured with 119 volts on the primary of the power transformer.

Resistance of coils and transformer windings are indicated in ohms on schematic circuit diagrams.

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.

Excessive hum, stuttering, low volume and a reduction in all D.C. voltages is usually caused by a shorted electrolytic condenser, open by-pass condensers frequently cause oscillation and distorted tone.

Voltages 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 1000 ohms per volt. These voltages are clearly indicated on the circuit diagram.

IN ORDER TO PREVENT SIGNAL FROM ACTING UPON AVC AND AFFECTING ACCURACY OF VOLTAGE MEASUREMENTS, AERIAL AND GROUND LEADS SHOULD BE SHORT CIRCUITED WHILE MAKING MEASUREMENTS.

RUN 1 ONLY

Note. Chassis with serial numbers from 63229300 to 63262726 were equipped with a fuse in the primary circuit of the power transformer and supplied with a type 5Z4 rectifier tube.

This fuse is made accessible for replacement by removing fuse cover located on back flange of chassis, replace only with a 2 ampere fuse. If replacement fuse blows out, check tubes, particularly 5Z4 rectifier) circuit, repair or replace defective tubes or parts.

NEVER ATTEMPT TO REPLACE FUSE WITHOUT FIRST DISCONNECTING POWER.

NEVER REPLACE WITH FUSE OTHER THAN 2 AMPERE RATING.
Unless otherwise specified the S20R Receiver operates on 100-125 volt 50-60 cycle current. A universal model is available on special order for operation on 110-250 volt, 25-60 cycle current.

**Tube Line-up**

**Sky-Champion Model - S20-R**

- 6SK7 R.F. Amplifier
- 6X6 1st Detector-Mixer H.F. Oscillator
- 6SK7 1st I.F. Amplifier
- 6SK7 2nd I.F. Amplifier
- 6SK7 2nd Detector, A.V.O. 1st stage of audio
- 6PS6 2nd audio output stage
- 6R6 Automatic Noise Limiter
- 6J5GT Best Frequency Oscillator
- 80 Rectifier

The Model S20R Receiver draws 65 watts at 115 volts 60 cycle alternating current.

**Batteries**

**D.C. Operation**

Connections to "PWR" socket after removal of shorting plug.
THE HALLICRAFTERS INC.

ANTENNA

The Sky Champion has an antenna input circuit which will allow the use of either a doublet or Marconi (inverted "L") antenna. The approximate antenna input impedance of the S20R is 400 ohms.

A very serviceable antenna will be the inverted "L", or Marconi type. This antenna should be approximately 75 feet long overall, including the lead-in to the set. Satisfactory operation of the Sky Champion is obtained throughout its tuning range with this type of antenna and because of that fact as well as its ease of construction it is highly recommended.

With the inverted "L" type of antenna A2 must remain connected to G for best operation. While a ground connection is usually not necessary it might prove to be helpful in reducing noise. A cold water pipe or 6' foot rod driven in moist soil will be a very satisfactory ground when connected to the G terminal on the receiver. Connections to a radiator or gas piping are not recommended.

Should a doublet antenna be used it is suggested that a transmission line of 400 ohms value of impedance be constructed so that a most efficient transfer of energy is obtained. The commercially available all wave doublet antennas are usually provided with a coupling transformer which matches the transmission line to the receiver. This transformer connects to the A1 and A2 terminals on the antenna strip. The half-wave length-doublet antenna cut for a particular frequency can be computed by the following formula.

\[
\text{Length in feet} = \frac{463}{\text{Frequency in megacycles}} \quad \text{or for example, a half wave 20 meter or 14 megacycle antenna would be}
\]

\[
\frac{463}{14} = 33.7 \text{ feet long overall}
\]

This type of antenna is broken in the center with an insulator and has the transmission line connected to each resulting quarter wave section at that point. This antenna is a very good performer, in a direction broadside to its length, only on the relatively narrow group of frequencies for which it was cut. It does not function well on harmonic frequencies.

When using either type of doublet antennas the transmission line should be connected to A1 and A2 binding posts. The wire connecting the A2 to ground or G can be left connected if the performance of the receiver is improved.

ALIGNMENT PROCEDURE

Have the controls set as follows:
AF and RF gain controls for maximum volume. Set band switch to #2 band.
Set main dial to 2 megacycles, band spread to zero.
Remove 6K8 grid cap and connect the hot side of your 455 KC generator to this tube. Connect the ground terminal of the signal generator to the chassis of the receiver. Now feed a 455 KC signal into the receiver. Adjust all I.F. transformer trimmers on T1, T2, T3, for maximum gain.

R. F. ALIGNMENT

Re-connect the grid cap to the 6K8 tube. Connect the hot side of the generator to the A1 antenna terminal on the rear of the chassis through a 400 ohm resistor. Be sure a jumper is connected to A2 and G. Leave signal generator ground connected to the chassis of the receiver.

The location of the following trimmers and padders can be determined by referring to the top and bottom chassis views. All pad adjustments are for the low frequency end of each band while the trimmers are for the high frequency ends.

In order to get at the RF trimmers the guarantee card can be removed by placing a knife under the small snap fasteners holding it in place. So that most satisfactory adjustment of the trimmers and padders can be made, it is advisable to "Rock" the condenser gang across the signal being delivered by the generator until that particular circuit has been accurately peaked at all frequencies except 1400 KC and 4 MC.

<table>
<thead>
<tr>
<th>Bands</th>
<th>Trim at</th>
<th>Pad at</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1400 KC</td>
<td>600 KC</td>
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<tr>
<td></td>
<td>Adjust C1, C2, C3</td>
<td>Adjust Pad Band 1</td>
</tr>
<tr>
<td>2</td>
<td>4 MC</td>
<td>2 MC</td>
</tr>
<tr>
<td></td>
<td>Adjust C4, C5, C6</td>
<td>Adjust Pad Band 2 (Top Chassis)</td>
</tr>
<tr>
<td>3</td>
<td>14 MC</td>
<td>7 MC</td>
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<tr>
<td></td>
<td>Adjust C7, C8, C9</td>
<td>Adjust Pad Band 3</td>
</tr>
<tr>
<td>4</td>
<td>34 MC</td>
<td>17 MC</td>
</tr>
<tr>
<td></td>
<td>Adjust C10, C11, C12</td>
<td>No pad on this Band</td>
</tr>
</tbody>
</table>

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THE HALLCRAFTERS INC.

FREQUENCY METER TUNING

Around the outer edge of the main tuning dial the amateur bands for which "Frequency Meter Tuning" is available are marked with the red numerals; 10 - 20 - 40 and 80. Set the red line beneath these numerals directly opposite the hair-line on the window and switch to the correct band. The band spread scale will indicate correct frequency within the limits of the accuracy of the setting and calibration.

The band spread dial of the SX25 Model is calibrated so that the operator may determine quite closely the frequency of the signal to which he is listening on the 10 to 60 meter amateur bands inclusive. The outer edge of this dial is marked off in 100 divisions for additional ease in logging and locating stations.

BAND 3B -- Special reference is called to this position of the Band Switch so that no confusion will be experienced. Band 3B is the same as Band 3 and is used in order to have the band spreading of the 10 meter band accomplished through approximately the same number of degrees on the Band Spread Scale as occupied by the other amateur bands for which calibration appears. When the Band Switch is placed in position 3B another section of the band spread condenser is paralleled in the circuit. Band 3 main scale calibration will read somewhat high when the Band Switch is set on 3B.

Note: The accuracy of the main dial calibration will hold only if the BAND SPREAD condenser is set at minimum capacity, or the position indicated by 100 on the Band Spread dial which has been approached by turning the Band Spread Knob in a counterclockwise direction, or to the right, as far as it will go.

### RESISTORS

<table>
<thead>
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<th>WATTAGE</th>
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<td>32</td>
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<tr>
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<td>33</td>
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<tr>
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<tr>
<td>10</td>
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<td>42</td>
</tr>
<tr>
<td>11</td>
<td>250,000</td>
<td>43</td>
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</tbody>
</table>

### ANTENNA

SEE ANTENNA DATA FOR MODEL S20-R

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Compliments of www.nucow.com
When the R.F. gain control is advanced until a switch is heard to operate, a light will appear behind the translucent scale of the meter itself. Only when this light is on will the meter indicate in "S" units. When so adjusted the meter can be used as a resonance indicator. With the R.F. gain control backed off from maximum the meter is still in the circuit but will not indicate carrier level accurately. On the rear apron of the chassis is the "S" meter adjustment screw. To set the "S" meter, disconnect the antenna and have the R.F. Gain Control on full and the selectivity switch in the "I.F. SHARP A.V.C. ON" position. Now, adjust this knurled knob until the meter reads zero. Reconnecting the antenna and tuning in a station will show its relative carrier intensity.

The 500 and 5000 ohm terminals are for connections to a loud speaker or other load of those impedance values. The matching S2E5 speaker should be connected to the 5000 ohm strip. When headphones are plugged into the phone jack the 5000 ohm speaker connection is automatically disconnected.

The "EXT. SWITCH" terminal strip is for external switch provisions should the receiver be controlled by a remote switch or relay. The SEND-REC switch on the panel must be in the Send Position when an external relay is used for stand-by operation.

Unless otherwise specified the S2E5 Receiver operates on 100-125 volt 50-60 cycle current. A universal model is available on special order for operation on 110-230 volt, 50-60 cycle current.

**ALIGNMENT PROCEDURE**

455 KC, Intermediate-Frequency Alignment.

- Set band switch to #2 band.
- Set main dial to 2 megacycles, band spread to 100.
- Selectivity switch in "AVC OFF" xtal phone position.

Remove the 6E8 tube grid cap. Connect a 1 megohm resistor between grid cap and grid of 6E8 tube. Now connect the hot side of the signal generator to the grid of the 6E8 tube through a .1 MFD condenser. Connect the ground terminal of the signal generator to the chassis of the receiver. Remove modulation from generator and feed a 455 KC signal into the receiver and set the pitch control to give a beat note of approximately 1000 cycles. Adjust all I.F. transformer trimmers for maximum gain with the exception of the secondary trimmer on transformer TL. Identified on top chassis view as T15. In adjusting this trimmer it will be noted that the output reaches a maximum goes through a dip and then back to maximum again. Wobulote the IF frequency and align the dip between the two maximum points. A distinct change in the crystal note sounding like an apparent broadening of the crystal action will be noted when the correct adjustment has been reached. At this point in the alignment it is necessary to make an adjustment on the phasing control as follows: Tune the signal generator so that its signal will go through zero beat and then to the other side of zero beat until a signal of approximately 5000 cycles is heard in the speaker or headphones. Now carefully adjust the "PHASING CONTROL" until this signal is reduced in volume to a minimum. Repeat the signal generator to its original frequency and recheck the adjustment of T15. Now repeat carefully the other trimmers on I.F. transformers for maximum gain. Place the selectivity switch in the "CW. XTL" position leaving all controls on the receiver as previously adjusted. Again wobulate the frequency of the signal generator carefully through the very narrow range of the crystal peak. Adjust small trimmer through hole in the bottom plate marked "TX5" until the sharp crystal peak reaches maximum output. At this point the crystal is extremely sharp and maximum output is possible. If this setting gives too sharp crystal filter action this "TX5" trimmer can be adjusted counter-clockwise for broader crystal response to suit the operator.

**B.F.O. ADJUSTMENT**

In the center of the "PITCH CONTROL" shaft, after the knob has been removed, you will find a recessed screw for adjustment of the Frequency Oscillator.

Before rotating this screw with a suitable screwdriver loosen the set screw on this shaft. This set screw can be reached through a hole in the bottom plate directly under the B.F.O. Assembly marked "BFA".

Now tune in a signal on the receiver with the BFO off. Exact resonance can be determined with the controls so adjusted that the "S" meter will indicate. After you have assured yourself that you have the signal properly tuned in place the selectivity switch is anyone of the three "AVC OFF" positions. Turn the BFO switch to the "ON" position. You now can adjust the screw in the center of the pitch control shaft until a best note is heard. Tighten the set screw through the bottom plate, replace the knob and the BFO adjustment is completed.

**R.F. ALIGNMENT**

Re-connect the grid cap to the 6E8 tubes. Connect the hot side of the generator to the A1 antenna terminal on the rear of the chassis. Be sure a jumper is connected to A2 and G. Leave signal generator ground connected to the chassis of the receiver.

The location of the following trimmers and padders can be determined by referring to the top and bottom chassis views. All pad adjustments are for the low frequency end of each band while the trimmers are for the high frequency ends.

In order to get at the RF trimmers the guardcase card can be removed by placing a knife under the small snap fasteners holding it in place. So that most satisfactory adjustment of the trimmers and padders can be made, it is advisable to "Rock" the condenser gang across the signal being delivered by the generator until that particular circuit has been accurately peaked.

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Compliments of www.nucow.com
SIX BUTTON AUTOMATIC TUNER

NOTE: THE ADJUSTMENT SWITCH AND I.F. CONNECTIONS WERE ELIMINATED FROM THIS CIRCUIT, THEREFORE, OMIT ANYTHING PERTAINING TO THEM.

This six button assembly is for convenience and rapidity in the selection of favorite stations, the number of trimmers used for any one station within its range.

In most cases this should accommodate the six most popular stations. Occasionally three stations might be desired in one frequency group. Since there are only two buttons available, the least important station will have to be tuned in by the manual control. The chosen stations should be lined up on the buttons in the order of their frequency with the lowest frequency on the left hand side, the next higher frequency to the right of it and so on. All the highest frequency stations are on the right hand button. Remove the two small wood screws and take off the front escutcheon. Insert in the correct position and in the correct window, the station call letters desired behind the little celluloid window.

ADJUSTMENT FOR A PARTICULAR BUTTON: Each button is wired up to a particular trimmer set in the back. The trimmer adjustment is approximately directly behind the button. The last button nearest one end of the cabinet is adjusted by the last trimmer nearest that same end of the cabinet. Again, the third button from one end of the cabinet is adjusted by the third set of trimmer screws from that same end.

INTERNAL CONNECTIONS: Designated the station desired, the button for it and the trimmer screws behind the button. The next step is adjustment of the trimmers to actually receive the desired station. Turn the switch to ADJUSTMENT position. Tune in manually the desired station and leave there. Turn the front automatic button switch to right or automatic position (left button will line up). Turn bottom screw of trimmer (oscillator) until desired station is heard. Switch back and forth between manual and automatic positions for easy identification of the desired station. Turn volume control up.

CAUTION: It is usually necessary at the beginning to arbitrarily screw trimmer in fairly tight to right, sometimes a little "atering" or oscillation will be heard as lower, oscillator, screw is turned. When this happens, turn as above, then continue adjusting the oscillator until desired station is heard. The actual reading of the station will always first have to be accompanied by the oscillator trimmer.

After the station is heard, tune upper trimmer for maximum response. Continue to the next button and adjust its bottom and top trimmers behind it.

After all trimmers have been adjusted, note that button switch in operation position and leave there in that position henceforth.

The receiver is now ready for use, the remote button switch will instantly permit use of either automatic or manual tuning without any interaction or dependence of one upon the other.
The two drawings on this page show the proper method of connecting the receiver, power supply, and speaker together. The drawing above shows a standard installation, while the diagram below indicates receiver connections when batteries furnish the power. Protective covers are furnished for all important terminal strips and they should always be in place.

Drawing below provides voltage readings at the various terminals on either the receiver or power supply when the two are connected together.
MODEL 200 Series
Notes, Parts

HAMMamlund MFG. CO. INC.

ANTENNA REQUIREMENTS

The input of the Series 200 "Super-Pro" is approximately 112 ohms. This means that for best results, the antenna should be coupled to the receiver by means of a low impedance transmission line. The doublet type antenna produces best results. Any well known low impedance lead-in cable can be used with satisfactory results. The use of low impedance lead-ins provides less chance for the lead-in itself to pick up extraneous noise. The low impedance lead-in, together with the electrostatic shield built into the antenna of the receiver, reduces noise to a minimum. It must be remembered that every antenna has a period of resonance and works best at that frequency. When erecting a doublet antenna, it is advisable to arrange its physical dimensions so that it will resonate in the band of frequencies where most sensitivity is desired. Care taken in selecting and erecting an antenna will pay for itself many times in superior results.

DESIGN

The general design of the new "Super-Pro" outlets over five years of extensive research and experimentation. Individual components in the majority of cases have been specially designed for this receiver. The tuning inductors employed in the tuning unit are individually wound on low-loss form. There are 20 in this group. Each coil has its own form and is mounted on an insulating base. The base also accommodates the variable trimming capacitor. All oscillator trimmers are of the air dielectric type and add considerably to the overall stability of the receiver. High stability miss trimmers are employed in the R.F. circuits.

The band change switch is especially designed for the "Super-Pro" and is unlike any other switch used for this purpose. The compression-shaped knob contacts stationary fingers and completes the circuit. Thus, no spring part carries current to cause noise or stray coupling. All contacts are silver-plated and will provide years of reliable service. The contacts are designed and placed so that the capacity between them is negligible in amount. This eliminates faradic effect due to change in dielectric constant during temperature rise. The I.F. transformers in the "Super-Pro" are designed particularly for this receiver. Each coil is wound on an insulating form and the coupling between them is mechanically variable to provide control of selectivity. Air dielectric trimmers are employed for maximum stability. Each grid coil to the I.F. unit is tapped near the low potential end so that changes in tubes will not affect the alignment of the receiver. This method also permits the use of a large number of stages operating at a maximum degree of selectivity without instability that might exist with a small number of stages operating at maximum gain.

SUPER-PRO MODELS AND PRICES

<table>
<thead>
<tr>
<th>Code</th>
<th>Type</th>
<th>Tuning Range</th>
<th>Speaker</th>
<th>List Price</th>
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<tr>
<td>SP-210-X</td>
<td>Crystal</td>
<td>15-560 Meters</td>
<td>Jensen 10&quot; Dynamic</td>
<td>$465.00</td>
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<td>SPR-210-X</td>
<td>Crystal Rock</td>
<td>15-560 Meters</td>
<td>Jensen 10&quot; Dynamic</td>
<td>$482.50</td>
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<tr>
<td>SPR-210-X</td>
<td>Crystal</td>
<td>15-560 Meters</td>
<td>Jensen 12&quot; High Field</td>
<td>$498.00</td>
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<tr>
<td>SPR-220-X</td>
<td>Crystal</td>
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<td>Jensen 12&quot; High Field</td>
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<td>SPR-210-X</td>
<td>Crystal</td>
<td>715-240 Meters</td>
<td>Jensen 10&quot; Dynamic</td>
<td>$465.00</td>
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<tr>
<td>SPR-210-X</td>
<td>Crystal</td>
<td>715-240 Meters</td>
<td>Jensen 12&quot; High Field</td>
<td>$498.00</td>
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<tr>
<td>SPR-220-X</td>
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<td>SPR-210-X</td>
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<td>SPR-220-X</td>
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<td>SPR-210-X</td>
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<td>Jensen 12&quot; High Field</td>
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<tr>
<td>PGC-10</td>
<td>Speaker cabinet finished to match receiver</td>
<td></td>
<td>$8.50</td>
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</table>

Above prices cover 110-115-125 volts, 50 to 60 cycle models with tubes, crystal, and speaker. Receiver and power supply enclosed in wrinkle finished molding type cabinets. Special models for 50-60 cycles with universal type power supply are also available at no increase in price. Twenty-five cycle models, $280.00 additional.

- * In the models, the 9000 to 20000 meter band is substituted for the 60 to 120 meter band.

Receiver in cabinet measures 211/2" wide, 13/4" deep, and 121/4" high. Power output is 15 watts or 150 watts when the tubes are driven at maximum. Each model for standard 1/4" relay racks. Shipping weight approximately 110 pounds.

(Prices subject to change without notice)

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When adjusting this pad, move the tuning band back and forth and adjust padding until the peak of greatest intensity is obtained.


**POWER OUTPUT** (MAX.) = 360 MW up to 180 MW

**SERVICE NOTES**
- It is necessary that the final tube be shielded. Use that the shield is firmly in place around the bottom portion of the tube.
- The intermediate frequency of this receiver is 465 NO.
- The trimmers and padding-condenser adjustments are accessible through bottom of cabinet.
- Color code of battery leads: Red B400; Black A-; Brown A-; Blue A + 1½ V.

**RECOMMEND BATTERY KITS**

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<tbody>
<tr>
<td>1½ V. &quot;A&quot; 1 Required</td>
<td>740 20-F</td>
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<tr>
<td>45 V. &quot;B&quot; 2 Required</td>
<td>749 660</td>
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<tr>
<td>Combination &quot;A&quot; and</td>
<td>746 170060 Use Adaptor</td>
</tr>
<tr>
<td>&quot;B&quot; Single Unit.</td>
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</tr>
</tbody>
</table>
300 Series Dial Mechanism

The tuning control
To provide smooth push button tuning with a minimum amount of effort the tuning shaft has a spring return which disengages the rubber friction drive from the large drive pulley after the tuning knob has been held down while tuning the set manually. There is no adjustment required on this mechanism.

Lack of smoothness in dial operation may be due to:
- Too much tension on dial string.
- Incorrect adjustment with release action causing draw. (See adjustment A)
- Fly wheel will rub on cabinet shelf if the rubber tension is not in place beneath chassis.
- See that dial light sockets do not touch top edge of tuning hand as it moves across dial plate.
- Do not adjust the belt to a greater tension than is necessary.
- Slipping of the dial mechanism may be due to poor tension in the wire or lack of sufficient cord friction which in turn may be due to weak tension in tension spring S (Fig. 1) or a tight bearing at this point.

Setting-Up the push buttons
300 Series
1. Leave the set tuned at least 15 minutes. Set for making settings.
2. Decide upon the six stations that you want to tune in automatically.
3. Tune the station with the regular tuning knob, making certain the station is exactly in line, then with the fingers loosen the push button with a twist to the left of about one half turn, now push the button all the way in.
4. Repeat procedure for the other five stations and insert station.plug in position for each button.

The push buttons will only operate correctly when they are operated with a firm, quick thrust, keeping finger on button until dial pointer comes to a stop.

500 Series Dial Mechanism

The drive string running from one pulley across the dial plate to the other pulley may be slightly higher at its point of mounting to the tuning hand, this will maintain a slight downward pull on the hand to avoid wobble. Another cause of wobble would be caused by gripping the hose of hand around the string in such a manner that the string would be out of line.

A slight amount of petroleum jelly along the top edge of the dial will provide a smoother travel of the hand. Arrange the long section of the hand straight and with sufficient clearance from the dial plate to avoid scratching the enamels.

The string tension of the drive string is maintained by the coil spring mounted on the large drive pulley. Too much tension will cause an extra load in tuning, lack of tension will naturally cause backlash.

See that dial light sockets do not touch top edge of tuning hand as it moves across dial plate.

Since the pull against the large pulley is quite great, see that the set screw in the pulley hub to the condenser shaft are tight to avoid slipping.

The push buttons must extend straight outward. If a chassis is removed, see that the push-button screw shank is not bent so as to bind against the openings in the cabinet panel.
INSTALLATION AND OPERATING INSTRUCTIONS
AUTOMATIC PHONOGRAPH COMBINATION

INSTALLATION
PREPARING FOR OPERATION - Remove the bracket "A" securing the pickup and needle mechanism. This bracket is shown in place in Figure 1, it is held to the motorboard by means of a screw "B". Remove the screw, lift off the bracket and replace screw in motorboard to cover hole. Then remove red bolts "C" and "D" which hold the motorboard secure during shipment. These are also shown in Figure 1. When brackets are removed it will allow the wood strips to be taken out. "E" and "F"
The two record holder posts (See Figure 6) are covered with paper held in place by rubber bands as is also the paper covering. The post that holds the radio chassis are loosened just enough to allow the wood strips (used in shipment) to be removed. CAUTION: ONLY A SMALL AMOUNT OF TURNING OF THE WIND SPROCKET IS NECESSARY. IF THEY ARE TOO LOOSE THE CHASSIS WILL DROP OUT OF POSITION AND THE PUSH BUTTONS WILL NOT OPERATE PROPERLY.
LOCATION: The instrument should be located near an electric outlet and on a level surface. The cabinet should not be located near a source of heat such as a radiator or register. If the cabinet is placed parallel to a wall, at least 1 1/2 inch space should exist between the back of the cabinet and the wall, for heat zone clarity. The instrument must be installed in a level position for proper operation of the phonograph. Motor speed regulation since the design of the motor is for a constant speed, is similar to an electric clock. He consulting the available frequency is the same as specified on the motor frame, the standard models being 78 cycle.

POWER SUPPLY: Unless otherwise specified on the chassis and on the power transformer, the standard rating of the instrument is 110 to 120 volts, 60 cycle. MOTOR SPEED REGULATION: There are no adjustments on the Phonograph Motor for speed regulation since the design of the motor is for a constant speed, similar to an electric clock. The available frequency is the same as specified on the motor frame, the standard models being 78 cycle.

PHONOGRAPH INSTRUCTIONS
CAUTION - NEVER USE FORCE TO START OR STOP THE RECORD CHANGING MECHANISM OR PICKUP ARM.
1. USE ONLY RECORDS WHICH HAVEgages THROUGHOUT THE RECORD. DO NOT USE STICKY RECORDS OR RECORDS WITH MARKS ALONG THE RECORDING EDGE. WHEN USING IN DUSTY ROOMS THE RECORDS WILL JAM AND MAY DAMAGE THE MECHANISM TO A DEGREE AND UNDER THE INSTRUCTIONS. RECORDS WHICH HAVE RECORD JAMMED WILL SLIDE ON ONE ANOTHER WHEN PLAYING, RESULTING IN UNSATISFACTORY REPRODUCTION.
2. THIS INSTRUMENT IS NOT RECOMMENDED FOR PLAYING 10-INCH AND 12-INCH RECORDS IN MIXED SEQUENCE. IF THE USER DESIRES THIS SERVICE HE MUST BE PERSISTENT THAT ALL RECORDS ARE PERFECTLY CLEAN AND FREE FROM DUST. THE INDEX AND RECORD REJECT LEVERS MUST BE SET AT "10" AND APPLIED. REMOVE THE LAST RECORD FROM THE RECORD HOLDER AND SET THE PLAYING OF THIS LAST RECORD ON A 10-INCH DIAMETER UNLESS THE TURNABLE SWITCH IS TURNED OFF. ANY JAMMING OF THE MECHANISM UNDER THESE CONDITIONS IS UNCOMMON. IF THE RECORDS USED ARE NOT PERFECTLY CLEAN AND FREE FROM DUSTING, THE RECORD APRSEPARATION IN DROPPING EACH RECORD IN SEQUENCE ON THE TURNTABLE WILL BE REQUIRED.
3. DO NOT LEAVE RECORD ON THE RECORD HOLDER POSTS, AS THE RECORD WILL JAM AND MAY DAMAGE THE MECHANISM TO A DEGREE. KEEP YOUR RECORDS IN A RECORD FILE (JURY OF CAGE) WHEN NOT IN USE. IF ANY RECORD SHOULD JAMMED, PLACE THEM ON A PLAIN SURFACE OR PLAIN EASY ARTICLE, SUCH AS A LARGE BOOK, ON TOP AND LEAVE THEM IN THIS POSITION FOR A FEW MINUTES. ONLY LOAD ONE RECORD ON THE RECORD HOLDER SHELF AFTER THE TURNTABLE IS IN ITS REST POSITION AND THE TURNTABLE STOPPED WITH THE TURNTABLE SWITCH AT "OFF".

TURNTABLE SWITCHE: The TURNTABLE Switch is a toggle type located in the front of the index plate on the motorboard. (See Figure 6). It is used to start and stop the motor.
INDEX LEVER: The index lever moves in a small arc in the slot in the index plate. (See Figure 6). The plate is labeled for four positions of the lever - "Manual", "10", "12" and "Reject". If a single record is to be played the automatic record-changing feature will not be used and the Index Lever should be set on "10". If either 10 or 12-inch records are to be played automatically the Index Lever must be moved to the position indicating the size records that are to be played. If 10-inch records are to be played, the Index Lever must be set at "10" and if 12-inch records are to be played, the Index Lever must be set at "12". To begin with the index lever, set the Index Lever for the size record desired and then turn the TURNTABLE Switch to "OFF". This will turn off the motor and the record will be automatically played.

Before operating the phonograph, either automatically or manually, be sure that the Pickup Arm is down at playing level and can be easily moved by hand. If not, the Index Lever will be in either "10" or "12" and a record cycle must be completed to bring the arm down. Do this, turn the TURNTABLE Switch to "OFF", then turn the TURNTABLE Switch to "ON". The Pickup Arm will start to move and the cycle of motion of the pickup arm will be repeated. When the Pickup Arm comes down, turn off the TURNTABLE Switch.

OPERATING THE PHONOGRAPH: To play records, set the radio Power switch to the "ON" position. With the Index Lever at Manual and the pickup resting on the support over the needle gauge plate, arm in groove, loosen the needle screw and drop a needle, point first, through the head hole (See Figure 6). The needle will be stopped in the right position by the needle gauge plate. Press gently on top of pickup to seat it squarely on the gauge plate. Then tighten the needle screw with your fingers.

Lift the Record Holder shelf, Figure 6, with the fingers underneath and off to clear the record circle, also push back the lever sticking up adjacent to the rear record holder post. Now have clear access to the turntable. Place the first record upon the turntable with the spindle protruding through the center of the record.

Swing the shelves back into position, in place and load up. For automatic operation seven 10-inch records or six 12-inch records may be stacked on the record holder shelves. It is not recommended to mix 10 and 12-inch records for automatic operation. Records should never be stacked higher than the spindle.

STEP BY STEP PROCEDURE FOR OPERATING PHONOGRAPH
A. TO PLAY 10" OR 12" RECORDS INDIVIDUALLY:
1. Move Index Lever to "Manual" position. See Figure 6.
2. Make sure the pickup arm is resting in 10-inch groove with pickup over used needle hole. See Figure 1 and 6.
3. Lift the record holder shelf and off of record. See Figure 6.
4. Push back the vertical lever near the rear record holder post.
5. Place single record on turntable.
6. Turn power on and receiver, and switch to "Phono" position.
7. Turn on turntable switch. See Figure 6. The turntable will start revolving. Wait till it has reached its normal speed.
8. Lift pickup arm and carefully place needle in first groove of record.
9. Adjust "Volume" and " Tone" as for radio. The same controls are used.
The phonograph will not shut off until the turntable switch (Figure 6) is in the OFF position. To remove the selection on records with the center changing groove, set index lever to the 10" or 12" position depending upon which size record is being played.

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B. TO PLAY 10" OR 12" RECORDS SO THAT RECORDS WILL CHANGE AUTOMATICALLY AFTER EACH SELECTION.

1. Move index lever to "Manual" position. Fig. 6.
2. Make sure the pickup arm is resting in groove with pickup over reject needle cup. Figs. 1 and 6.
3. Place first record on turntable as for individual playing.
4. Swing the record holder shaper inward into place down on their posts and extending over the turntable. Fig. 6.
5. Stack any amount up to seven 10-inch records on the record holder shelves.
6. Turn power on to receiver, and switch to "Phone" position.
7. Turn on turntable switch. Fig. 6.
8. With index lever still in the "Manual" position lift pickup arm and lower to first groove of record.
9. Move index lever to 10" or 12" inch position depending on the size records being played.
10. Adjust volume and tone as for radio.

Records with center changing grooves will change automatically at the end of each selection until the end of the last record is reached. The last record will repeat itself until the Turntable Switch or Power-Tone control is turned off. Do not turn on another record at any time during playing of series, such the index lever, Fig. 6 to "Reject" and let go. Being back to "10"".

C. IF YOU ARE PLAYING 12-INCH RECORDS.

CAUTION: DO NOT STOP THE TURNTABLE WITH TURNTABLE SWITCH OR POWER-TONE KNOB UNTIL THE PICKUP IS DOWN AT THE END OF A CYCLE.

TO CHANGE NEEDLE: To change needle, place the pickup over the needle gauge plate, with the pickup arm resting in the support groove. Loosen the Needle Screw, press down the Needle Electrode Tab to drop the needle into the steel needle box (Figs. 1 and 6). Allow the needle plate to return to its normal position. Drop a new needle point first, into the needle hole, press gently on pickup to seat it squarely on gauge plate and tighten the needle screw with your fingers.

DISCOURAGED: Good needles are essential to best reproduction. It is advisable to use medium-tone needles and these may be purchased from a retail store. Do not reinsert a used needle in the pickup. Change your needles frequently, worn needles distort reproduction and may damage the records. A rack for holding needle boxes will be found at the back of the compartment under the lid. Do not use needles from the needle box, lift the pickup and move to left out of the way, then tilt up used needle box at front and lift out of the hole in the motorboard. Press the ejector tab to open the lid, to replace, slide the box on the back into its groove in the motorboard and press the box into plate.

REMEMBER: Needle your phonograph records carefully. It is advisable to purchase your records from a retail store where you may have them played over an instrument of this type. Keep your records in a record album or lay them flat when not in use. Never leave them in the record-player shelves. Electrically transcribed records are best. Worn poorly transcribed records result in distortion. Records with the eccentric or spiral center groove are necessary for automatic operation, either change or repeat.

LUBRICATION: Petroleum jelly should be applied to arm, main gear, spindle pinion gear, and gear of record posts. Light machine oil should be used in the tone arm vertical bearing, record post bearings, and all other bearings of various levers on underside of motorboard.

Apply a few drops of light machine oil to the motor spindle bearing. The oil hole has a screw plug. Do not allow oil or grease to come in contact with rubber mounting of tone arm base. FOR SERVICE REFERENCE THE FUNDAMENTAL RADIO-PHONOGRAPH ELECTRICAL CIRCUIT IS SHOWN BELOW.

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Compliments of www.nucow.com
Compliments of www.nucow.com
HOWARD RADIO CO.

Converter 6D8G  I F Amp. 6S7G  Dat. 677G  Audio 6L5G  Rectifier 6ZYG

See Notice on power pack specifying 6V. or 12V. Models.

12 VOLT SYSTEM

POWER SUPPLY - (Standard Models) = 6 Volt & 12 Volt

DRAIN 2.4 Amps. With 6V. Models and 1.4 Amps. With 12V. Models

POWER OUTPUT - (MAX.) = 2W.

SPEAKER = Permanent Magnet  SIZE = 6" & 8"

V.C., IMP. (4000P) = 6 Ohms  FIELD - FM

NOTES

1. Each step of the alignment should be repeated in the original order for greater accuracy. Keep output from signal generator low. L.F. trimmers are reached through the two holes or the top of each L.F. cond.

2. When aligning the short wave bands, do not adjust to the NMSS frequency. For example, if the adjustment is correctly made at 50 KC, then a weaker image will be heard at 51,000 KC less 950 KC, or about 20,070 KC on the dial.

3. When adjusting this pad, move the tuning hand back and forth and adjust pad until the peak of greatest intensity is obtained.

4. See that the tuning hand is set exactly on the last line above 540 when the condenser is at maximum capacity.

5. The following dummy antenna circuit is recommended, since it is adaptable for any frequency range. The grid cap should remain in place during alignment.

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**ALIGNMENT PROCEDURE**

**THIS MATERIAL APPLIES TO BOTH MODELS SA-39 AND DB-39 UNLESS OTHERWISE INDICATED BY NOTES BELOW.**

TO PROPERLY ALIGN THESE RECEIVERS IT IS ESSENTIAL THAT YOU FOLLOW THIS PROCEDURE EXACTLY.

BEFORE ALIGNING THE I.F. TRANSFORMERS TRANSFER THE GREEN-WHITE JUMPER LOCATED UNDER THE FIRST I.F. TRANSFORMER MUST BE CONNECTED AS SHOWN IN FIGURES 2 AND 4. OTHERWISE ALIGNMENT MUST BE INCORRECT.

AFTER ALIGNING THE I.F. TRANSFORMERS TRANSFER THE GREEN-WHITE JUMPER LOCATED UNDER THE FIRST I.F. TRANSFORMER TO ITS ORIGINAL POSITION.

---

### Table: Trimmer Location Charts for Model SA-39

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<thead>
<tr>
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<tbody>
<tr>
<td><strong>R.F.</strong></td>
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<td><strong>ANT.</strong></td>
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<tr>
<td><strong>262 Kc.</strong></td>
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<td><strong>3</strong></td>
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<td><strong>6X5G</strong></td>
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<tr>
<td><strong>6K60</strong></td>
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<tr>
<td><strong>6</strong></td>
</tr>
<tr>
<td><strong>262 Kc.</strong></td>
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### Table: Trimmer Location for Model DB-39

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<tr>
<td><strong>ANT.</strong></td>
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<tr>
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<tr>
<td><strong>6</strong></td>
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<tr>
<td><strong>262 Kc.</strong></td>
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</tbody>
</table>

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**Important**

BEFORE ALIGNING THE I.F. TRANSFORMERS THE GREEN-WHITE JUMPER SHOULD BE CONNECTED BETWEEN TERMINALS A AND B.

AFTER THE I.F. ALIGNMENT IS COMPLETE AND BEFORE ALIGNING THE R.F. TRANSFORMER THE GREEN-WHITE JUMPER SHOULD BE CONNECTED BETWEEN TERMINAL A TO TERMINAL C.

LEAVE THE JUMPER CONNECTING TERMINAL A AND C AFTER ALIGNMENT IS COMPLETED.

---

**Bottom View of Chassis**

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**Top View of Chassis**

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**Diagram: Model DB-39**

---

**Diagram: Model SA-39**

---

**Alignment Trimmer 8**

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**Notes:**

- With the trimmer in full set, turn the potentiometer to the end of the calibration slot on the low frequency end of the dial scale. This can be done by loosening the set screw in the dial card drive drum. See Figure 2, page 111, holding the potentiometer in full set and turning the drive drum until the potentiometer is correctly set. Then tighten the set screw in the dial drum.

---

**Figs. 1, 2, 3, 4**

---

**After the set is installed in the car, tune in a fairly weak station near 600 kc. and adjust trimmer 8 for maximum output.**

---

*Compliments of www.nucow.com*
ADDITIONAL SERVICE DATA

HOW TO REPLACE THE DIAL POINTER DRIVE CORD

1. Tie a knot near one end of 28" of special pointer drive cord (Part Number 113176).
2. Thread the free end of the cord through hole A in drum B (threading from the inside of the drum out). See Fig. 6.
3. After pulling the cord through hole A, make one half turn around the drum B in a counterclockwise direction (when viewed from flange side of drum).
4. Continuing, draw the cord over to the back of pulley C and around to pulley D. From this point continue across to pulley E and around to pulley F.
5. Go around pulley F and up to the top of drum B to hole G.
6. Draw the cord through hole G and tie it to the end of tension spring H in such a manner that when the spring is clipped to lug J, the spring will be extended to approximately 7/8 inch.

HOW TO SET UP THE PUSH BUTTONS.

To set up the push buttons, proceed as follows:

1. Turn on the set and allow it to operate for at least one-quarter hour before attempting to set up the push buttons.
2. Select the five stations to which the buttons are to be set. Be sure to select nearby, powerful stations, since weak signals will generally give better results when tuned in manually. Any button may be set to any desired station.
3. Grasp the tuning knob and pull it out (outward movement is slight, about 1/8 inch) so that the drive pinion engages the cone gear and the set may be tuned manually.
4. Tune in the station to which you wish to set the particular button. Be sure to tune in the station correctly by setting the VOL. control to the point where the volume is at its greatest.
5. Grasp the push button being set up, and turn it to the left (counter-clockwise) about one whole turn.
6. Push this button all the way in, and keep it pushed in, turn right (clockwise) until reasonably tight.
7. Set up the remaining four buttons in a similar manner.
8. Label each button with the call letters of the stations you have selected, using the call letter tab and celluloid covers packed with your receiver. Insert the call letter tab in the recess in the push button, and cover it with the celluloid tab.
9. To use your push button tuner, first push in the tuning knob. Then push in the button labeled with the call letters of the desired station. Be sure to push the button all the way in.

INCORRECT TUNING OF PUSH BUTTONS

Occasionally a receiver may be found which will not tune-in stations accurately when push button tuning is used. The causes and remedies for this are as follows:

1. Button incorrectly set up. Remedy: Reset the button to the desired station being sure to tune in the station carefully.
2. Extreme sharpness of tuning of the receiver. Remedy: The green-white jumper wire on the bottom of the 1st I.F. transformer may be improperly connected. The correct connection for all installations of the receiver is shown in Fig. 1 (Terminals A and C should be connected together)

LOW SENSITIVITY

Low sensitivity may be due to improper adjustment of the antenna compensator, trimmer #6 (see alignment procedure page). This trimmer is accessible without removing the set from the car. When the readjustment of the compensator is necessary, care should be taken that the antenna, if of the under-shield type, is clean and free of accumulation of mud or slush which would alter its capacity and lower its resistance. In such cases, the antenna should be washed, and preferably, allowed to dry before making adjustment. Doing this sharpens the tuning of the compensator and makes possible an accurate setting.

FAILURE OF RECEIVER TO OPERATE

Failure of the receiver to operate may be due to one or more causes. When a receiver is found in such condition, its parts should be checked as follows:

1. FUSE
   The fuse may be burned out or making poor contact. In cases of burnout, replace with another 15 Ampere fuse. If second fuse fails, remove receiver from car and investigate condition of vibrators and receiver circuits. Do not use a higher rating fuse.

2. TUBES
   Unfasten the trunk clamps holding the speaker case cover. This will enable you to reach the tubes. Check to see that all tubes are in their proper sockets. One or more tubes may be defective. To detect their condition, remove them from the receiver and test with a tube tester, or if a tube tester is not available, replace the tubes, one at a time, with tubes known to be good, until the defective tube is located.

3. VIBRATOR
   Improper operation of the vibrator is usually evidenced by one of the following symptoms: Receiver blows fuses, receiver is dead or weak, reception is intermittent, reception is noisy and unsteady. To check the vibrator, replace the suspected unit with a new vibrator. Do not attempt to adjust the defective unit.

4. CIRCUIT
   Failures within the basic circuits of the receiver may be isolated by a systematic test procedure. The receiver should be removed from the car and placed where it will be readily accessible. The top cover and speaker case cover should be removed from the case. The test in the receiver can then be isolated by means of continuity, voltage, or stage analysis, using a signal generator. When checking the receiver, using a signal generator, a signal is fed progressively into the F.R. stages of the receiver, until the defective stage is located, and a continuity or voltage check may then be given to that stage to isolate the defective unit or circuit.

ADJUSTMENT OF IRON CORES IN COILS.

The Antenna, R.F., and Oscillator coils have adjustable iron cores. Any adjustment of these cores will necessarily change the inductance of the coils and therefore extreme caution must be exercised when adjustment becomes necessary. The core of the Oscillator coil must not be adjusted at any time. The correct method of adjusting the R.F. and antenna coil cores is adequately covered under "Alignment Instructions"
Current drain with push button depressed — 13.5 amps at 6.0 Volts
LOW SENSITIVITY
In cases of low sensitivity not traceable to weak tubes or defective parts, check the setting of the antenna trimmer. If the set has been aligned using any dummy antenna other than the 80 mm. condenser, recompress, the setting of this condenser will be all to considerably.

In all cases, the trimmer should be adjusted to the receiver trimmer. Install on the instrument panel and connect it to its antenna. Do not mount the control unit, but place it in some accessible place; in a weak signal condition, causing a mist between the antenna trimmer from the case, and adjust this trimmer for maximum volume.

Another possible cause of low sensitivity is mis-alignment of the 1. F. transmitters caused by the lower and upper units being aligned at different times, since only 1. F. transmitters are adjusted. To correct this, re-align both units, as described in the "Alignment Procedure.

REPLACING TUBES IN CONTROL HEAD
1. Remove the two Phillips screws at the bottom of the instrument panel grille. Lift up the grille.
2. Remove the four machine screws holding the speaker in place.
3. Insert a screwdriver blade in the slot at the front of the chrome panel near the lower cover. This will give access to the 6AS6 and 6SK7 tubes.

HUM
A possible source of hum difficult to trace is caused when the lower end of the volume control is accidentally grounded. It may be caused by a leaky radio unit. Removing the accidental ground in the control head will cure this difficulty.

IGNITION NOISE
If ignition noise is excessive, first make sure the installation time has performed all the operations described in paragraph 28 of this Section 2.

Additional boom grounding strips (Stewart-Warner Part No. 11861. Hudson Part No. 18-15417) may be helpful in further reducing ignition interference. The best location for these may be determined by grounding the hood to the body by various points, and checking for loudness. If the grounding strip is located at a point 109 inches from the center of the car, install an additional strip at a point 256 inches from the center as shown in Fig. B.

A change has been incorporated in the ride rail now being built to reduce ignition noise. This change can be made in the field by a radio service man if excessive noise is still encountered after following all previous instructions.

One antenna motor noise checks (Stewart-Warner Part No. 18-15416. Hudson Part No. 18-15418) is in the field and can be seen in the field by a radio service man if excessive noise is still encountered after following all previous instructions.

INSTALLATION OF ANTENNA CHOKE
The antenna choke (Stewart-Warner Part No. 119236. Hudson Part No. 18-15410) is a single large choke made of copper tubing and wound on an insulated resistor. It is to be installed inside the control unit in place of the resistor connected in series with the antenna lead on early sets. Later sets already have the choke. Remove the cover of the control unit. Check whether a resistor or small choke connects to the blue antenna lead. If it has been already removed, the choke has already been made. If you find a photo on the chassis side, the choke to which the blue wire from the antenna socket is connected, proceed with the change. This resistor is a value of 1.5 micro-ohms and can be identified by its blue body, grey end and black dot.

1. Remove the resistor.
2. Insert a new resistor between the two terminals A and B, and connect the antenna trimmer to the control grid of the 6SK7 tube.

ALIGNMENT PROCEDURE
For alignment an output meter and accurately calibrated signal generator are required. Connect the output meter across the voice coil or between the plates of the output tube and chassis in series with a 1. M. condenser. The more sensitive type of signal generator should be connected across the voice coil.

1. Turn on the control unit. Install the unit in the car and connect it to the antenna. Do not mount the control unit, but place it in some accessible place; in a weak signal condition, causing a mist between the antenna trimmer from the case, and adjust this trimmer for maximum volume.

Another possible cause of low sensitivity is mis-alignment of the 1. F. transmitters caused by the lower and upper units being aligned at different times, since only 1. F. transmitters are adjusted. To correct this, re-align both units, as described in the "Alignment Procedure.

2. Remove the top cover of the lower unit and the bottom cover of the control unit.
3. Connect the ground lead of the signal generator to the receiver chassis and leave it connected in this manner through the entire alignment procedure.
4. Turn the volume control to maximum volume position and leave it throughout the entire alignment procedure.

MODEL 8A-40
MODEL DB-40

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After the set has been tested in the car, tune it to a strong station near 1400 Kc. and adjust trimmer No. 6 under the plug on the end of the control head until maximum volume is obtained.

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MODEL DB-40

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How repeat adjustments made on the trimmer number 5, 6 and 7.

After the set has been tested in the car, tune it to a strong station near 1400 Kc. and adjust trimmer No. 6 under the plug on the end of the control head until maximum volume is obtained.

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TUNER TROUBLES AND REMEDIES

SET TUNER IMPROVEMENTS
If the set will not tune in stations, although the plunger tends to move, make sure that the brass headed screw set in the remaining collar is tight. This is the collar which is attached to the wiper arm, with the antenna in it. A loose set screw may cause the unit frame, holding the plunger to stick in either position.

If the set will not tune properly, and the dial stop or different stations are heard on different sections of the dial the mechanism may not be properly locked up. You should check this by loosening the tuning and wiper mechanism. The first step is to "Loosening". This trouble may also occur if the pulling force of the antenna is not sufficient, i.e., to-the-plunger and the point of the mechanism assembly. On later sets the gap can be adjusted upward as described in paragraphs 5 and 8 of "Replacing and STICKING MAGNET PLUNGERS"

MECHANISM WHERE TUNING CONTROL FAILS TO STOP DURING LOCKING
This is probably due to the shearing off of the "C" washer on the clutch end of the set unit (See Fig. 4). The mechanism may be loose, and the spring assembly will be too tight. The spring assembly should be removed and the mechanism adjusted to the proper tension. If the setting goes too far, or if the ends of the set unit are not properly locked up, they may interfere with the mechanism, and may cause the plunger to stick or to pull the material in the spring assembly. To adjust the mechanism, the circuit should be turned off, and the set unit should be removed from the set. Then, using a small screwdriver, turn the set unit until the material is tight, and the spring assembly is properly seated. If the gap is too large, or if the ends of the set unit are not properly locked up, they may interfere with the mechanism, and may cause the plunger to stick or to pull the material in the spring assembly. To adjust the mechanism, the circuit should be turned off, and the set unit should be removed from the set. Then, using a small screwdriver, turn the set unit until the material is tight, and the spring assembly is properly seated.

OLD TYPE

NEW TYPE

PORTIONS SHOWN SHADED TO BE CUT AWAY

FIG. 5. Illustration Showing Method of Cutting Light Diffusing Plate

REPLACING MAGNET COIL ASSEMBLY
(Stewart-Warner Part No. 118717)

To replace a magnet coil assembly, proceed as follows:

1. Remove top and bottom covers of tuning unit. Shoulder red and black magnet wires from pins in which they are attached to the tuning windings. Two steps must be taken to release the magnet coil assembly:

   a. Disconnect the plunger from the plunger set rod by removing the nut and the set screw from the plunger set rod. Then lift up the plunger set rod and remove it from the plunger assembly.

   b. Disconnect the plunger from the plunger set rod by removing the nut and the set screw from the plunger set rod. Then lift up the plunger set rod and remove it from the plunger assembly.

2. Lift out the two round bosses through the lower section of the tuning unit, and replace them by the new ones. Then, using a small screwdriver, turn the set unit until the material is tight, and the spring assembly is properly seated.

3. When the set unit is locked properly, pull the plunger set rod out of the plunger assembly. Then, using a small screwdriver, turn the set unit until the material is tight, and the spring assembly is properly seated.

4. Replace the magnet coil assembly by sliding the new one into the plunger set rod and replacing the nut and set screw. Then, using a small screwdriver, turn the set unit until the material is tight, and the spring assembly is properly seated.

5. Replace the plunger set rod by sliding it into the plunger assembly, and replace the nut and set screw. Then, using a small screwdriver, turn the set unit until the material is tight, and the spring assembly is properly seated.

6. Replace the two round bosses through the lower section of the tuning unit, and replace them by the new ones. Then, using a small screwdriver, turn the set unit until the material is tight, and the spring assembly is properly seated.
HOW TO REPLACE THE DIAL DRIVE CORD

Three dial drive systems are illustrated here. The method marked “Second Type” (Fig. 13) can be used in sets originally using the “Early Type” (Fig. 12). The second type is preferable to the early type.

The method marked “Latest Type” (Fig. 14) is the best but uses a different Dial Drive Pulley. Therefore early type or second type drives cannot be restrung as shown for latest type unless a new Dial Drive Pulley (Stewart-Warner Part No. 118176, Hudson Part No. BO-161591) is installed.

The dial cord in the latest type dial drive can be replaced as follows:

1. Remove chassis from case as described on this page.
2. Remove the antenna coil shield by removing the two nuts holding it to the chassis. This will give access to the dial drive drum.
3. Refer to Fig. 11. Rotate the dial so the word “UNLOCK” is directly in line with the reference notch in the right hand dial support bracket. Block the dial in this position using a small block of rubber or other soft material which will not mar or damage the dial.
4. Rotate the gang condenser so its plates are fully meshed. (See Fig. 14.) Keep the gang in this position until the dial cord has been replaced.
5. About 26 inches of dial drive cord (Stewart-Warner Part No. 113178, Hudson Part No. BO-158201) are required. Tie a large knot in the center of this dial cord.
6. Pass both ends of the cord outward through hole A in the roller dial drum. (Fig. 14.)
7. Pass one end of the dial drive cord clockwise around the roller dial drum, through the hole in the support bracket and through hole B in the dial drive pulley.
8. Pass the other end of the cord counter-clockwise around the roller dial drum, counter-clockwise around the dial drive pulley and inward through hole B in the dial drive pulley.
9. At this point, make sure that the gang is fully meshed and the counter-weight is in the proper position, and the dial is in the position shown in Fig. 11. Otherwise calibration will be incorrect.
10. Tie a spring to the ends of the dial drive cord inside the dial drive pulley so that the cord extends about 3/4 inch inside the pulley when the cord is pulled taut. See Fig. 14. This illustration shows the recommended method of fastening the spring using an eyelet. Fasten the other end of the spring to the tab D on the pulley. The spring should be stretched only very slightly when in place. Too much spring tension may cause binding.
11. Remove the material used to hold the dial in position as described in Step 2. If the above procedure has been followed, the calibration of the dial will be correct when the unit is replaced in the case.
Set the signal generator for 175 K.C. Connect the signal lead from the signal generator to the grid of the 1st detector tube through a .05 mfd condenser. Turn the tuning condenser rotor until the plates are completely out. The ground lead from the signal generator goes to the ground lead of the receiver. Then adjust the four intermediate frequency condensers for maximum output. The adjusting screws for these condensers are reached from the bottom of the chassis.

Next set the signal generator for a signal of exactly 1400 K.C. The antenna lead from the signal generator is, in this instance, connected to the antenna lead of the receiver. Set the dial pointer on the 1400 K.C. mark on the dial scale and adjust the three trimmer condensers on the gang tuning condenser for maximum output, adjusting the oscillator trimmer first.

Next set the signal generator for a signal of 600 K.C. and adjust the oscillator 600 K.C. trimmer. The adjusting screw for this condenser is reached from the top of the chassis and is between the I.F. and oscillator coil cans.

### Voltages at Sockets

**Line Voltage, 115 — Antenna Lead Shorted to Ground**

<table>
<thead>
<tr>
<th>Type of Tube</th>
<th>Function</th>
<th>Access</th>
<th>Plate to Cathode</th>
<th>Screen to Cathode</th>
<th>Grid to Cathode</th>
<th>Normal Plate M.A.</th>
</tr>
</thead>
<tbody>
<tr>
<td>58 R.F.</td>
<td>2.4</td>
<td>275</td>
<td>100</td>
<td>4.2</td>
<td>5.2</td>
<td></td>
</tr>
<tr>
<td>57 1st Det.</td>
<td>2.4</td>
<td>265</td>
<td>99</td>
<td>5.4</td>
<td>.9</td>
<td></td>
</tr>
<tr>
<td>56 Osc.</td>
<td>2.4</td>
<td>28</td>
<td>0</td>
<td>8.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>58 1st I.F.</td>
<td>2.4</td>
<td>275</td>
<td>100</td>
<td>4.2</td>
<td>5.2</td>
<td></td>
</tr>
<tr>
<td>58 2nd I.F.</td>
<td>2.4</td>
<td>275</td>
<td>102</td>
<td>3.0</td>
<td>8.5</td>
<td></td>
</tr>
<tr>
<td>56 2nd Det.</td>
<td>2.4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>57 1st Audio</td>
<td>2.4</td>
<td>12</td>
<td>102</td>
<td>3.0</td>
<td>1.8</td>
<td></td>
</tr>
<tr>
<td>47 Output</td>
<td>2.4</td>
<td>265</td>
<td>280</td>
<td>18.5(2)</td>
<td>30.0</td>
<td></td>
</tr>
<tr>
<td>80 Rect.</td>
<td>4.9</td>
<td></td>
<td>55.0</td>
<td></td>
<td></td>
<td>per plate</td>
</tr>
</tbody>
</table>

(1) Measured from cathode to ground.
(2) Measured across Resistor R6.
Voltagés at Sockets

Antenna lead connected to ground lead (not external ground) — Volume Control at Maximum.

CAUTION — Do not put chassis on any grounded surface or let chassis touch any ground.

<table>
<thead>
<tr>
<th>A.C. Line Voltage —115</th>
<th>D.C. Line Voltage —110</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type of Tube</strong></td>
<td><strong>Function</strong></td>
</tr>
<tr>
<td>77</td>
<td>1st Det. Osc.</td>
</tr>
<tr>
<td>78</td>
<td>I.F.</td>
</tr>
<tr>
<td>77</td>
<td>2nd Det.</td>
</tr>
<tr>
<td>43</td>
<td>Output</td>
</tr>
<tr>
<td>25Z5</td>
<td>Rect.</td>
</tr>
</tbody>
</table>

(1) Cathode to Ground.
(2) With 2,000,000 ohm meter — reading will be lower with lower resistance meter.
(3) Cathode to ground — read with 10,000 ohm meter.
(4) Read across filter choke.
(5) Readings from plate to two cathodes with 250,000 ohm meter.

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First set the signal generator at approximately 262 K.C. Connect the antenna lead from the generator to the control grid of the I.F. 78 tube, through a .05 mfd. condenser. The ground lead of the generator goes to the ground of the receiver. Turn the rotor plates of the tuning condenser completely out and keep the signal weak enough to prevent A.V.C. action. Note from Fig. 10 that the second I.F. transformer is self-tuned and cannot be adjusted. Adjust the frequency of the signal generator until the output meter shows maximum output. The intermediate frequency setting of the generator is then correct, although it may be a very small percentage higher or lower than 262 K.C.

Next connect the signal lead from the signal generator to the grid of the 1st detector tube through a .05 mfd. condenser. Then adjust the two intermediate frequency condensers for maximum output. One of the I.F. condenser screws is reached through the hole on the top of the 1st I.F. assembly can. The other I.F. condenser screw is reached from the bottom of the sub-panel through a hole at the bottom of this assembly.

Now set the signal generator for a signal of exactly 1400 K.C. The antenna lead from the generator is, in this instance, connected to the antenna lead of the receiver. Connect the flexible drive shaft to the chassis if it has been disconnected. As explained previously, the dial scale should be at the low frequency end stop when the rotor is completely in mesh. Then turn the station selector knob until the dial scale is at 1400 K.C.

Then adjust the three trimmer condensers on the gang tuning condenser for maximum output, adjusting the oscillator section first.

Next, set the signal generator for a signal of 600 K.C. and adjust the oscillator 600 K.C. trimmer. The adjusting screw for this condenser is reached through a hole in the back wall of the sub-panel.

A non-metallic screwdriver is necessary for this adjustment. Turn the tuning condenser rotor until maximum output is obtained. Then turn the rotor slowly back and forth over this setting, at the same time adjusting the 600 K.C. trimmer screw until the highest output is obtained.

Then set the signal generator again for a signal of 1400 K.C. and check the adjustment of the tuning condenser trimmers at this frequency for maximum output.

### Trying Out the Set and Adjusting

After the wiring has all been completed and before the chassis is permanently installed, try out the set and adjust the antenna trimmer. The location of the tubes is shown in Fig. 8. To adjust the antenna trimmer, tune in a weak signal between 1200 and 1400 K.C. with the volume control about three-fourths up. On one end of the chassis box are two small metal plates. Remove the smaller of these two plates. Directly under the hole in the chassis box is the antenna trimmer condenser screw. Turn this adjusting screw up or down until maximum output is obtained.
The I.F. Amplifier is aligned in the usual manner. Connect a service oscillator between the chassis and the grid of the 6AB tube, using a condenser .0005 mfd. to .05 mfd. between the grid and the high side of the generator output. Do not remove the grid clip for this operation. The Range Switch should be turned to the broadcast band and the dial set near 600 Kc; then proceed with alignment at 456 Kc.

Turn the audio Volume Control and Sensitivity Controls on full. Increase the output of the service oscillator until a signal is just audible. Adjust each I.F. trimmer so that maximum volume is obtained. It is best to repeat this procedure two or three times on each trimmer to obtain the most accurate adjustment. These trimmers are adjusted with a small screw driver through the openings in the top of the shield on each I.F. transformer.

The service oscillator should now be connected to the antenna and ground terminals of the receiver, through the proper dummy antenna.

Close the gang condenser and see that the dial pointer position coincides with the last line at the low-frequency end of the dial. If this condition does not obtain, loosen the set-screw on the dial drum, make the necessary correction, and firmly tighten the screw.

Turn the range switch to the Short-Wave (extreme clockwise) position, set the dial and the service oscillator to 17 Kc, connect a 400 ohm resistor between the service oscillator and the antenna binding post as a dummy antenna, turn the output of the service oscillator up to maximum, tighten the top trimmer in the oscillator coil until just snug, then loosen it four turns and then as the trimmer is tightened, set it to the position of maximum response, reducing the output of the service oscillator as alignment proceeds. (If two responses are found of nearly equal intensity, adjust for the one with the trimmer farthest open). Align the top trimmers in the RF coil, but since the RF adjustment has some effect on the oscillator frequency it will be necessary to lock the dial slightly to keep the signal tuned in. Having aligned the oscillator and RF circuits adjust the top trimmer in the Antenna coil for maximum sensitivity, reducing the output of the service oscillator as the receiver becomes progressively more sensitive. If the receiver tends to "motor-boat", turn down the service oscillator output until the trouble stops. Some service oscillators, however, leak through enough signal that even with the output control set at zero, the receiver is still overloaded, in which case it is necessary to turn down the Sensitivity and Audio Controls until the receiver behaves properly.

Turn the Range Switch to the "Police" or middle range and set the service oscillator and dial at 4.8 Kc. Align first the oscillator, then the RF coil and trimmers on all three coils, in a manner similar to that used on the Short Wave band. Both the Short Wave and Police band ranges have fixed padding condensers.

Turn the Range Switch to the Broadcast position, substitute a 200 mfd. condenser for the 400 ohm resistor as a dummy antenna, set the dial and the service oscillator to 1400 Kc., and align the circuits again (middle trimmer) in the same manner as described above. Having done this, set the service oscillator to 400 Kc. and tune the receiver dial for maximum response in the neighborhood of 600 Kc. Next, rock the dial back and forth across the signal, at the same time adjusting the padding condenser, turning continuously in one direction until the output of the receiver, as it is rocked across the signal, becomes maximum. If the padding is turned too far, the output will drop off again. After several minutes with this operation will show more than a length description. Having completed the padding operation, return the receiver and the generator to 1400 Kc. and realign as before, this completes the alignment of the Broadcast band and of the receiver.
CR-134 — Used in Concerto Combination.
CR-144 — Used in Chairside and Modern American Combinations, same as CR-134 with addition of tuning eye.

CONVENTIONAL ALIGNMENT
SEE SPECIAL SECTION
VOLUME VIII

SPECIFICATIONS
Speaker: 14.5 in. membrane, 150 ohms.
Power output: 90 watts.
Circuit: Superhet with two tuned circuits; volume control, A.F.; bass control, pitch-bend control; phone input.
Primary voltage: 117 V.
Secondary frequency range: 57 — 1570 KC.
Transformer: Full wave, 660 ohms.
Power consumption: 150 watts.
Transformer: 6X5G, 6E6, 6SH2A, 6L6G, 6E8C, 6BQ5, 655XC.
6L6G Power Transformer.

[Diagram with circuit elements and parts listed above]
CONVENTIONAL ALIGNMENT
SEE SPECIAL SECTION VOLUME VIII
SPECIFICATIONS

"A" Battery voltage..............1.5 volt;
"B" Battery voltage..............90 volt;
"A" Battery drain................0.25 amp.;
"B" Battery drain.................13.5 m.A.;
Power output....................0.2 watt;
Intermediate frequency..........455 K.C.;
Tuning frequency range:
540 -- 1650 K.C.;
Speaker transformer.............3000 ohms;
Type circuit:.............Superheterodyne;

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Since the first production of this model was released, several circuit changes have been made to improve the fidelity and volume of phonograph reproduction. These changes were made at two different times and are shown in Figures B and C. Figure A shows the original circuit. It is possible to check the phonograph input circuit on this radio without removing the chassis from the cabinet by the use of an ohmmeter, according to instructions shown.

**TURN WAVE SWITCH TO PHONO POSITION, REMOVE PICKUP PLUG AND CONNECT OHMMETER TO PICKUP SOCKET** — **MEASURE RESISTANCE WITH VOLUME CONTROL OFF AND FULL ON.**

**VOLUME CONTROL**
- OFF
- ON
- 1 MEG
- 157,000~
- 1,250,000~
- 332,500~
- 356,000~
- 200,000~

__IF IT IS FOUND THAT CIRCUIT "A" OR "B" IS USED, CHANGE TO CIRCUIT "C".__

**IO K.C. FILTER ADJUSTMENT**


With the tone control set for maximum treble response and the Band Expander set in the High Fidelity position (accomplished by rotating the treble control to the right as far as possible), tune the receiver to a point between two stations of about the same signal strength on adjacent channels. If a 10,000 cycle heterodyne is heard as the beat note between the two carriers, it may be eliminated by retuning the 10 KC output filter by means of the 10 KC trimmer condenser at the rear center of the chassis. In the absence of such a signal source in the daytime, an ACCURATE audio oscillator may be used to feed a 10 KC into the volume control.


With the tone control set for maximum treble response, tune the receiver to a point between two stations of about the same signal strength on adjacent channels. If a 10,000 cycle heterodyne is heard as the beat note between the two carriers, it may be eliminated by retuning the 10 KC output filter by means of the 10 KC trimmer condenser at the rear center of the chassis.

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Circuit: Superheterodyne with three tuning ranges, treble and bass controls, I.F. band expansion, A.V.C., bass compensation control for phonograph pickup.

CONVENTIONAL ALIGNMENT
SEE SPECIAL SECTION

VOLUME VIII
SPECIFICATIONS

Primary voltage...117 V. AC;
Power consumption...134 watts;
Power output...... 20 watts;
Speaker (12C131):
Field Coil... 250 ohms;
Transformer... NONE
Speaker (302):
Field Coil... 250 ohms;
Transformer... 5M ohms;
(for dual speakers)
Intermediate frequency...55 KC;
Tuning range: 535 - 1730 KC;
1.65 - 5.8 MC;
5.6 - 18.2 MC;

ALIGNMENT NOTE:
KEEP BAND EXPANDER SWITCH IN "SHARP TONE" POSITION DURING ALL ADJUSTMENTS.

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THE MAGNAVOX CO. INC.

CHASSIS CR140, CR150, CR151
Schematic, Voltage

VOLTAGE TABLE
NOTE: MEASURE HEATER AND FILAMENT VOLTAGES DIRECTLY ACROSS SOCKET TERMINALS.
ALL OTHER VolTAGES MEASURED FROM SOCKET TERMINALS TO GROUND WITH A 1000 OHM/VOLT VOM/VMETER.
LINE VOLTAGE 117V.A.C.

MEASURE CATHODES ON 30V SCALE
ALL OTHERS ON 6V SCALE

SPECIFICATIONS
Primary voltage...117 V, 50-60 cycle AC; Power consumption........ 100 watts;
Intermediate frequency....455 Kc; Power output.............. 12 watts;
Tuning frequency range: 359 - 1677 Kc;
5.7 - 105.1 Kc;
Circuit: Superheterodyne with two tuning ranges, treble control, A/V, base compensation in volume control
for phonograph pickup, push-button condenser-type tuner, television input receptacle.
SPECIFICATIONS

Primary voltage......117 V. AC; Speaker:
Power consumption...82 watts; Field coil......1000 ohms;
Power output........6 watts; Transformer......8000 ohms;

Intermediate frequency...........155 KC;
Tuning frequency range......535-1730 KC;
Circuit: Superheterodyne with treble control; push-button condenser type
 tuner; A.V.C.; bass compensation in
 volume control for phonograph pickup;
television input receptacle.

CR-141 — Used in Concerto Combination
Used in Modern Table Combination
Used in Sheraton Table Combination
CONVENTIONAL ALIGNMENT
SEE SPECIAL SECTION
VOLUME VIII
Primary voltage........117 V. AC-DC;
Power consumption.......... 85 watts;
Speaker:
Field Coil............... 1800 ohms;
Transformer............. 3000 ohms;
Intermediate frequency........ 455 KC;
Tuning frequency range: 535 - 1730 KC;
5.7 - 18.1 KC;

Circuit: Superheterodyne with two tuning ranges, treble control; A.V.C.; bass compensation in volume control for phonograph pickup; push-button condenser-type tuner.

CONVENTIONAL ALIGNMENT SEE SPECIAL SECTION VOLUME VIII
SPECIFICATIONS

Speaker (120131):
  Field Coil .... 250 ohms;
  Transformer .... NONE

Speaker (302):
  Field Coil .... 250 ohms;
  Transformer .... 5M ohms;

CONVENTIONAL ALIGNMENT SEE SPECIAL SECTION VOLUME VIII

Intermediate frequency .............. 455 KC;
Tuning frequency range: 535 - 1750 KC;
              5.6 - 18.2 MC;
              1.65 - 5.8 MC;

Circuit: Superheterodyne with three tuning ranges, treble and bass controls, I.F. band expansion, A.V.C., bass compensation in volume control for phonograph pickup, variable selectivity.
CR-148 — Used in Belvedere Combination

Speaker (120131):
- Field Coil: 250 Ohms;
- Transformer: None

Power consumption: 160 watts;
Power output: 20 watts;
Primary voltage: 117 V. AC;
Intermediate frequency: 455 KC;
Tuning frequency range: 535 - 1730 KC;
5.6 - 18.2 MC;

Circuit: Superheterodyne with three tuning ranges, treble and bass controls, I.F. band expansion, A.V.C., bass compensation in volume control for phonograph pickup, variably selectivity.

CR148 595192

Conventional Alignment see Special Section Vol. VIII
CONVENTIONAL ALIGNMENT
SEE SPECIAL SECTION VOLUME VIII

The tubes used are:

- **1-6A7**: Frequency converter
- **1-8D6**: Intermediate frequency amplifier
- **1-75**: 2nd Detector, A.V.C. and audio driver
- **1-41**: Power output
- **1-80**: Rectifier

**Model 1A50-A**

**Model 1A50-F**

**Model 1A50-H**

**Model P-1A50**

**Model 1A50-A-B**

**Model 1A50-F-B**

**Model 1A50-H-B**

**Model P-1A50-B**

**MODEL 1D50-MB**

**PUSH-BUTTONS**: Unscrew the push-button on which you desire to receive a certain station. Tune in this station manually. Push in the push button and screw it tightly while holding it in. Repeat for other stations.

Insert station tabs in the correct place by snapping them in place. Pushing in any button will cause the desired station to be heard.

The tubes used are:

- **1-6A5G**: Converter
- **1-6U7G**: I.F. Amplifier
- **1-6Q7G**: 2nd Detector
- **1-25L6G**: Beam Output
- **1-28Z6G**: Rectifier
- **1-L49B**: Plug-in Ballast Resistor

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Compliments of www.nucow.com
The tubes used are:
- 1-6A7 Frequency converter
- 1-6D6 Intermediate frequency amplifier
- 1-75 2nd detector, AVC, and A.F. Amplifier
- 1-2S6G Power output
- 1-2S5 Rectifier
- 1-L49B Plug-in Ballast Resistor

The bands covered are:
(A) 538 to 1750 Kilocycles.
(B) 2.3 to 6.8 Megacycles.

CONVENTIONAL
ALIGNMENT
SEE SPECIAL
SECTION
VOLUME VIII.

IF PEAK 455 KC

ADJUSTMENTS OF PUSH BUTTONS

These push-buttons are adjusted so as to come within three (3) frequency ranges. The first button from the left is for stations lying between 1200 and 1600 kilocycles. The second (2) button is for stations lying between 800 and 1350 kilocycles. The third (3) and fourth (4) buttons are for stations lying between 540 and 1100 kilocycles. To set up these buttons, determine which four (4) stations you wish to receive most frequently. Ascertain their frequencies and determine on which button they should be set up. Push in the button on which a particular station is to be set up and, with a screwdriver, turn the screw at the rear of the chassis corresponding to this push-button, until the station you desire to hear is received with best quality and tone. Go to the top rear of the chassis and adjust the corresponding trimmer condenser until that station is heard with maximum volume. Repeat for the other push-buttons. The location of these adjustment points is shown in figure 1.
Compliments of www.nucow.com

IF PEAK 455 KC

CONVENTIONAL ALIGNMENT SEE SPECIAL SECTION VOLUME VIII.

MODELS 1M40-W, 1M40-I, 1M40-R

<table>
<thead>
<tr>
<th>Location</th>
<th>Part No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>C-15752</td>
<td>.05—200 V Tubular Condenser</td>
</tr>
<tr>
<td>C4</td>
<td>C-15756</td>
<td>.05—400 V Tubular Condenser</td>
</tr>
<tr>
<td>C5</td>
<td>C-15757</td>
<td>.1—400 V Tubular Condenser</td>
</tr>
<tr>
<td>C10</td>
<td>C-15774</td>
<td>.002—400 V Tubular Condenser</td>
</tr>
<tr>
<td>C12</td>
<td>C-15754</td>
<td>.01—400 V Tubular Condenser</td>
</tr>
<tr>
<td>C15</td>
<td>C-15751</td>
<td>.25—200 V Tubular Condenser</td>
</tr>
<tr>
<td>C16</td>
<td>C-15760</td>
<td>.02—400 V Tubular Condenser</td>
</tr>
<tr>
<td>C3</td>
<td>CM-29</td>
<td>50 mmfd. 30% Mica Condenser</td>
</tr>
<tr>
<td>C9</td>
<td>CM-30</td>
<td>250 mmfd. 30% Mica Condenser</td>
</tr>
<tr>
<td>C11</td>
<td>CM-31</td>
<td>100 mmfd. 30% Mica Condenser</td>
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<tr>
<td>C2, C17</td>
<td>Y-CV-48</td>
<td>Variable Condenser</td>
</tr>
<tr>
<td>C13, C14</td>
<td>Y-CE-50</td>
<td>Electrolytic Condenser</td>
</tr>
<tr>
<td>R1</td>
<td>R-15510</td>
<td>20K ohm 1/4 W 20% Carbon Resistor</td>
</tr>
<tr>
<td>R2</td>
<td>R-15512</td>
<td>250K ohm 1/4 W 20% Carbon Resistor</td>
</tr>
<tr>
<td>R3</td>
<td>R-15520</td>
<td>500K ohm 1/4 W 20% Carbon Resistor</td>
</tr>
<tr>
<td>R4</td>
<td>R-106</td>
<td>150 ohm 1/4 W 20% Carbon Resistor</td>
</tr>
<tr>
<td>R5</td>
<td>R-86</td>
<td>70 ohm 2 W Flexible Resistor</td>
</tr>
<tr>
<td>R6</td>
<td>Y-VC-40</td>
<td>500K ohm Volume Control</td>
</tr>
<tr>
<td>R7</td>
<td>R-107</td>
<td>7 megohm 1/4 W 20% Carbon Resistor</td>
</tr>
<tr>
<td>R8</td>
<td>R-15500</td>
<td>2 megohm 1/4 W 20% Carbon Resistor</td>
</tr>
</tbody>
</table>

To          Y-CR-44     Loop Antenna
T1          Y-CS-113    Oscillator Coil
T2          Y-IFA-7     1st I.F. Transformer
T3          Y-CI-32     2nd I.F. Transformer
T4          Speaker Output Transformer
PUSH BUTTON TUNING

Six buttons on this set are provided to allow you to select your favorite station in the broadcast band instantaneously without any operation except that of pushing a button. These buttons start from the fourth from the left to the fourth from the right, inclusive, and numbering them from the left to the right, as 1, 2, 3, 4, 5, and 6.

The buttons numbered 1, 2, and 3 are designed to cover the frequency range from 1700 to 800 Kc. Buttons number 4, 5, and 6 are designed to cover the range from 1200 to 540 Kc. To set up these buttons it is only necessary to select one of the buttons which includes the frequency of the station which you wish to receive, and depress that button. Select the corresponding screw in the back of the receiver and with a small screw driver adjust it by turning the screw in or out until the station is being received as well as possible. Then, using the same screw driver, adjust the corresponding trimmer from the top of the chassis until maximum volume is obtained on that station. The other buttons may be adjusted in exactly the same fashion to different stations. Every time a button is adjusted for a certain station, remove the call letter tab from the sheet of call letters furnished with the receiver, and insert it through the small slit in the side of the knob so that the call letters show through the top of the knob. After the buttons have been once adjusted in this fashion, it is only necessary to press the button marked with the call letters of the station you wish to receive, whereupon it will be heard instantaneously.

MODELS 5BDA, 5BEA

PUSH BUTTONS: Looking at the front of the set counting from left to right, the first four push buttons are for setting up stations.

- Button number 1 is for stations lying between 975 and 1550 Kilocycles
- Button number 2 is for stations lying between 850 and 1350 Kilocycles
- Button number 3 is for stations lying between 540 and 1100 Kilocycles
- Button number 4 is for stations lying between 540 and 1100 Kilocycles
- Button number A is for Broadcast Band
- Button number B is for Short Wave Band

Determine on which button a desired station is to be set up. Push that button in. Going to the rear of the receiver, adjust the coil corresponding to the chosen push button until the desired station is heard with maximum volume and best tone. Adjust the trimmer corresponding to the chosen button until that station is heard with maximum volume. Repeat for other push buttons.
PUSH BUTTONS

Looking at the front of the set counting from left to right, the first four push buttons are for setting up stations. Button number 1 is for stations lying between 915 and 1550 Kilocycles. Button number 2 is for stations lying between 850 and 1350 Kilocycles. Button number 3 is for stations lying between 540 and 1100 Kilocycles. Button number 4 is for stations lying between 560 and 1100 Kilocycles. Button number A is for Broadcast Band. Button number B is for Short Wave Band.

Determine on which button a desired station is to be set up. Push that button in. Going to the rear of the receiver, adjust the coil corresponding to the chosen push button until the desired station is heard with maximum volume and best tone. Adjust the trimmer corresponding to the chosen button until that station is heard with maximum volume. Repeat for other push buttons.

CONVENTIONAL ALIGNMENT
SEE SPECIAL SECTION VOLUME VIII

TUBE LAYOUT MODEL 2A50

(See Figure No. 1)
REPLACEMENT PARTS LIST FOR MODELS 2A50-F, 2A50-F-B, 2A50-F-M, 2A50-F-M-B

Schematic Location Part Number Description
R1 R-15511 50K ohm 1/2 W 20% Carbon Resistor
R2 R-15601 100 ohm 1/2 W 20% Carbon Resistor
R3 R-1544 15K ohm 1 W 20% Carbon Resistor
R4 R-15500 2 megohm 1/2 W 20% Carbon Resistor
R5 R-15517 1 megohm 1/2 W 20% Carbon Resistor
R6, R9 Y-VC-33 Volume and Tone Control
R7 R-15512 250K ohm 1/4 W 20% Carbon Resistor
R10 R-2 5000 ohm 1/4 W 20% Carbon Resistor
R11 R-82 3K ohm 1/4 W 20% Carbon Resistor
R12 R-46 120 ohm 1/2 W 10% Carbon Resistor
T1 Y-CS-100 Loop Antenna
T2 Y-CS-102 Oscillator Coil
T3 Y-Cl-40 1st L.F. Transformer
T4 Y-Cl-42 2nd L.F. Transformer
C2, C14 C-15754 .01 mfd. 400 V Tubular Condenser
C3, C25 C-15765 .05 mfd. 400 V Tubular Condenser
C16 C-30 .001 mfd. 400 V Tubular Condenser
C18, C17 C-35 .006 mfd. 400 V Tubular Condenser
C16, C18 C-15751 .05 mfd. 200 V Tubular Condenser
C26 C-18 .01 mfd. 400 V 20% Tubular Ceramic
C7 CM-29 50 mfd. 30% Mica Condenser
C9 CM-31 100 mfd. 30% Mica Condenser
C22 CM-33 250 mfd. 5% Mica Condenser
C21 CM-34 150 mfd. 5% Mica Condenser
C3, C4, C5, C6 Y-CT-308 Trimmer Strip
C23, C24, C27 Y-CE-43 Electrolytic Condenser

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Compliments of www.nucow.com
The receiver operates with the following tubes:

- 1-6SA7: Single ended frequency converter
- 1-6SK7: Single ended intermediate frequency amplifier
- 1-6Q7G: 2nd detector, A. V. C. and A. F. driver
- 1-76: Output tube driver
- 1-6AC5G: Dynamically coupled output stage
- 1-5Y3G: Rectifier
- 1-6U5: Tuning indicator (Model 3C70 only)

### SETTING UP OF PUSH—BUTTONS

Button No. 1 is for stations lying between 1100 and 1550 KC's.

- No. 2 is for stations lying between 950 and 1450 KC's.
- No. 3 is for stations lying between 600 and 1200 KC's.
- No. 4 is for stations lying between 620 and 930 KC's.
- No. 5 is for stations lying between 620 and 950 KC's.
- No. 6 is for stations lying between 540 and 800 KC's.

1. Select the stations that you wish to set up on the push-buttons.
2. Determine on which push-buttons these stations should be set up, according to the above table.
3. Push the button on which you should set up a particular station.
4. Using a screw driver, adjust the coil corresponding to the proper push-button until the desired station is heard with maximum volume and best tone.
5. Adjust the trimmer condenser corresponding to the proper push-button until the desired station is heard with maximum volume.
6. Repeat for other push-buttons.
Model 4-PWO is a Wireless Record Player. The tubes used are:

- 12Q7GT: Pre Amplifier
- 50L6GT: Beam power output
- 12SA7GT: Modulator oscillator
- 3S25GT: Rectifier

Model 4PWO operates on 105-130 volts, 60 cycles, AC. It can be made to operate on 50-cycles AC by changing a bushing on the motor shaft.

Model 6UL51:

455 Kc IF peak
This is a 5-tube, 2-band receiver, operating on alternating current of 110-115 Volts, 60 Cycles for Model SBDA, and 50-60 Cycles for Model SBEA. The tuning range for the broadcast band is from 535 to 1720 Kilocycles. The tuning range for the short wave band is from 2.3 to 6.5 Megacycles.

CONVENTIONAL ALIGNMENT
SEE SPECIAL SECTION VOLUME VIII

The tubes used are:
1-6A7 Frequency converter
1-6D6 Intermediate frequency amplifier
1-75 Second detector, AVC, and Audio frequency amplifier
1-41 Output
1-40 Rectifier
MAJESTIC RADIO & TELEV. CORP.

Schematics, Socket, Trimmers, Alignment

This is a 5-Tube superheterodyne receiver, operating on alternating current of 60 cycles only, at 105 to 130 volts. It tunes from 538 to 1750 kilocycles.

The tubes used are:

**MODELS 5T—5TO**

<table>
<thead>
<tr>
<th>Schematic Location</th>
<th>Part No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>R-15531</td>
<td>Carbon res. 10K ohm 2W 20%</td>
</tr>
<tr>
<td>E2</td>
<td>R-15510</td>
<td>Carbon res. 20K ohm 2W 20%</td>
</tr>
<tr>
<td>E3</td>
<td>R-15565</td>
<td>Carbon resistor 2meg 2W 20%</td>
</tr>
<tr>
<td>R4</td>
<td>YVC-21</td>
<td>Volume Control</td>
</tr>
<tr>
<td>R5</td>
<td>R-80</td>
<td>Carbon resistor 5meg 2W 20%</td>
</tr>
<tr>
<td>R6</td>
<td>R-15512</td>
<td>Carbon res. 250K ohm 2W 20%</td>
</tr>
<tr>
<td>R7</td>
<td>R-15580</td>
<td>Carbon res. 500K ohm 2W 20%</td>
</tr>
<tr>
<td>R8</td>
<td>R-90</td>
<td>Carbon res. 110K ohm 2W 20%</td>
</tr>
<tr>
<td>R9</td>
<td>R-15515</td>
<td>Carbon res. 100K ohm 2W 20%</td>
</tr>
</tbody>
</table>

**MODELS 140, 148**

This set is a one band, 4-tube superheterodyne receiver equipped with a Majestic High Q loop. This set will operate on 105-125 volts AC or DC current and will receive stations lying between 540 and 1720 Kc. This includes standard broadcast and most police stations.

The tubes used are:

**1-12SA7GT** Frequency Converter and Osc.

**1-12X7GT** I. F. Amplifier

<table>
<thead>
<tr>
<th>Schematic Location</th>
<th>Part No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>C3</td>
<td>C-15762</td>
<td>Tubular cond. .05 mil 200V</td>
</tr>
<tr>
<td>C6</td>
<td>C-15765</td>
<td>Tubular cond. .002 mil 600V</td>
</tr>
<tr>
<td>C1</td>
<td>C-15760</td>
<td>Tubular cond. .02 mil 400V</td>
</tr>
<tr>
<td>C11</td>
<td>C-15766</td>
<td>Tubular cond. .001 mil 400V</td>
</tr>
<tr>
<td>C12</td>
<td>C-15754</td>
<td>Tubular cond. .01 mil 400V</td>
</tr>
<tr>
<td>C5, C10</td>
<td>YCV-13</td>
<td>Variable Condenser</td>
</tr>
<tr>
<td>C4</td>
<td>CM-39</td>
<td>Mica cond. 50 mil</td>
</tr>
<tr>
<td>C4, C7</td>
<td>CM-30</td>
<td>Mica cond. 200 mil</td>
</tr>
</tbody>
</table>

**1-12Q7GT** 2nd Detector, A.V.C., First Audio

**1-70A7GT** Output and Rectifier

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MAJESTIC PAGE 11-13

MAJESTIC RADIO & TELEV. CORP.

MODELS 130, 130U
MODEL 150L
Schematics, Socket Alignment, Trimmers

MODEL 150-L

The tubes used are:
1-12SA7-GT Frequency converter
1-12K7-GT Intermediate frequency amplifier
1-12Q7-GT Second Detector, Automatic Volume, and Audio Driver
1-3S6-GT Beam power output
1-3S4-GT Rectifier

Convention Alignment

SEE SPECIAL SECTION VOLUME VIII

To change the "A" battery, remove the old one from its bracket. Remove the wrapping or tube from the new battery and snap it in position as shown in Figure 1, making certain that the small center contact of the battery makes a good connection to the spring contact as shown in Figure 1.

To change the "B" battery, slide the old one from underneath the chassis. Remove the plug from this battery. Insert the plug into the new battery and replace the new battery.

The tuning range is from 540 to 1750 kilocycles.

The tubes used are:
1—1A7GT Combined oscillator and 1st detector.
1—INS-GT Intermediate frequency amplifier.
1—1D8GT Combined second detector, Audio driver, and Power output.

MODEL 130

B1 No. 9 Majestic Battery No. 9 1.5V
B2 No. 3A40P Majestic Battery No. 3A40P 60V

MODEL 130U

1—P-94A Majestic Battery No. P-94A 1.5V
2—P-503 Majestic Battery No. P-503 45V

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MODEL 310UL

IF PEAK 455 KC

Schematic, Socket Trimmers, Alignment

MODEL 310UL
1—1A7GT

The tubes used are:
1—1NSGT
1—1D8GT

Combined oscillator and 1st detector.
Intermediate frequency amplifier.
Combined second detector, Audio driver, and Power output.

Schematic Location | Part No. | Description
--- | --- | ---
C1, C3 | C-45 | Tubular cond. .05 mfd. 200V R1
C1, C3 | Y-CV-46 | Variable Condenser R2
C4 | CM-31 | Mica cond. 100 mfd. R3, R5
C5, C11 | C-48 | Tubular cond. .01 mfd. 400V R8
C6, C7 | CT-1 | Trimmer condenser R6
C8 | CT-32 | Trimmer condenser R9, R10, R12
C14, C14 | CM-30 | Mica cond. 250 mfd. R13
C10 | CE-68 | 5 mfd. 100V Electrolytic B1
C12, C13 | C-47 | Tubular cond. .004 mfd. 400V B2
R-105 | Carbon res. 5K ohm
R-101 | Carbon res. 1 meg.
R-1531 | Carbon res. 2 meg.
R-15515 | Carbon res. 100K ohm
R-103 | Carbon res. 600 ohm

CONVENTIONAL ALIGNMENT
SEE SPECIAL SECTION
VOLUME VIII.

Model 419-B
Model 420
Model 420-PL
Model 421
Model 421-PL

The tubes used are:
1—1A7G Converter
1—1NSG Intermediate frequency amplifier
1—1H5G 2nd detector, AVC, and 1st audio frequency amplifier
1—1C5G Output tube

Schematic Location | Part No. | Description
--- | --- | ---
C4, C5 | C-11752 | .05 mfd. 200V R1
C10, C12, C14, C16 | C-11763 | .01 mfd. 200V R2
C12, C13 | C-66 | .006 mfd. 400V R3
C3, C11, C13, CM-1918 | 100 mfd. Type "O" Mica R4
C1, C2 | Y-CV-26 | Variable Condenser R5
C17, C19, C9, C14 | L.P. Trimmer Condenser R6
C18 | CE-35 | 8 mfd. 150V Electrolytic R7
R9 | R-5520 | 5000W 4W 20%
R10 | R-5517 | 1 meg. 4W 20%
R6 | R-72 | 600 ohms 4W 20%
R2 | R-5532 | 500W 4W 20%
R5 | R-5559 | 3 meg. 4W 20%
R3 | R-5559 | 10kW 4W 20%
R4 | R-5559 | 2.5kW 4W 20%
R1 | R-5559 | 500W 4W 20%
R1 | Y-CV-26 | Volume Control

CONVENTIONAL ALIGNMENT
SEE SPECIAL SECTION
VOLUME VIII.

This receiver is designed to operate on the following dry batteries.
1. 1½ volt A-battery — Eveready 742A — RAY-O-VAC P-94A or the equivalent.
2. 45 volt B-batteries — Eveready 762 — RAY-O-VAC P-5303 or the equivalent.

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MODEL 699-P

Model 699-P is a six tube radio phonograph combination operating on a 110 volts 50-60 cycles. The receiver tunes to three bands; these are:

A—Broadcast band 538 to 1750 kilocycles.
B—Police and airplanes 1.75 to 5.8 M.C.
C—American and foreign short wave receptions 5.8 to 18.6 M.C.

The receiver is equipped with automatic volume control, inverse feedback, inverse feedback tone control, base compensation, and mechanical push button tuning.

CONVENTIONAL ALIGNMENT SEE SPECIAL SECTION VOLUME VIII.

The tubes used are:

1—6A7 First detector
1—6J5 Oscillator
1—6D6 I. F. Amplifier
1—75 Second detector, automatic volume control and first audio amplifier
1—41 Power output
1—80 Rectifier

Operations For Setting Up Of Buttons

(1) Decide which station you desire to hear on any one button.
(2) Loosen this button by turning it to the left.
(3) Tune in your desired station manually until it is heard with best quality.
(4) Push in the button while holding the manual tuning knob fixed on the station.
(5) Tighten the button by turning it to the right while the button is pushed all the way in, as tightly as possible. Allow the button to come out and tighten still more. It is of the utmost importance that the buttons be logged as tightly as possible.
(6) Repeat this procedure to set up the other buttons.

IT IS IMPORTANT THAT ALL THE BUTTONS BE LOGGED ON STATIONS LYING BETWEEN 550 AND 1700 KILOCYCLES AND THAT THESE BUTTONS BE SCREWED TIGHTLY. IF THIS IS NOT DONE THE CAMS OPERATING THE PUSH BUTTON UNIT MAY WANDER AND IAM THE WHOLE UNIT.

If there are not enough stations in your locality to log all six buttons, the unused buttons should be logged somewhere between 550 and 1700 kilocycles.

To change any one setting at any time repeat the above procedure. After that, to get this station, push the desired button with an even firm push until it has reached the end of its travel. After the push buttons are adjusted to your desired station, cut out the proper station call letters from the enclosed station call letter sheet, and snap this tab into the rectangular opening above the push buttons. Cover them with the small transparent celluloid tabs supplied with the call letters. These openings are shown in Fig. 1 as No. 1, No. 2, No. 3, No. 4, No. 5 and No. 6.
General Adjustments

Adjusting Switch

The motor On-Off switch is at the upper right side of the panel from back of unit. If this switch is not adjusted properly, the motor may not start when the touch timing button is depressed or in the circuits shown above. The mechanism may be damaged, or the magnet in the center of the motor magnet off the button. To adjust this switch, remove the motor from the 12 volt solenoid unit. To check this switch, remove the motor cover by taking out the screws which hold the motor cover in place. Then, adjust the motor to the highest position of the lever and the switch will open.

Replacing Compound Gear

Remove belt and idler pulley - See Fig. 8. Refer to the compound gear assembly on the drive panel for instructions on replacing the compound gear assembly on the drive panel. Reinstall the compound gear assembly on the drive panel and add the necessary washers and screws. Remove the necessary washers and screws.
Replacing Main Drive Cable

(No. 2 and Later Issue Panels)

The main drive cable is the steel cable which has the turnbuckle take-up. A change was made in this cable and the method of straining it early in production.

Later models with the new cable can be identified by the numeral 2 stamped on the header under the roller-Off switch and also by the heavy drop of metal adjacent to one of the sets screws which hold the top pulley of this cable in place.

EARLY MODEL - CABLE - Should cable breakage or any kind of major cable trouble be experienced which would require restringing of this cable in the early models, do not attempt to restore this cable. Instead, order a new electric drive panel assembly from Wells-Barker and Co. (except in case of early V-type sets).

LATER MODEL - CABLE - Should cable restringing be required in the case of the later model, this can readily be accomplished by creating a new drive cable. From it is necessary, and putting it on in accordance with the following instructions:

1. Remove the old drive cable.
2. It will have to be unsecured at pulleys B and E. See Fig. 11. Turn electric manual lever to manual position.

Check for take-up on gear B. Approximately 1/2 inch of the fixed gear (bottom) will show through slot in top gear - See Fig. 6.

Reassemble motor to frame, pushing tension spring under motor shaft. Be sure to use the same screws to mount the motor to the frame that were taken off. Care must be taken that the motor gear in the motor meshes properly with the teeth of gear No. 1. If these two gears appear to be a close together that they bind, pull the motor away from gear No. 1 before tightening the mounting screws.

Replace belt and idler pulley.

Reassemble electric drive panel on chassis.

From the rear of the panel, turn manual tension knob to the right (clockwise) as far as it will go. This will bring the arm on the drive gear to the left (from back of panel) - See Fig. 9.

New support the panel so that it is held firmly in position. Check gear meshing against the operator. The bottom of the casting can be grasped at two points in a counterclockwise manner - care should be taken not to distort the casting.

Referring to the new drive cable, it will be noted that one end has a round knurled set fitting and the other end has a round knurled not fitting. These two fittings together with the hex nut and lock washer comprise the turnbuckle take-up.

With screw end E (Fig. 7) hanging down, place the cable into the vertical slot at the back of pulley C with the bolt inside of the opening at point D.

Then wind the screw end of the cable on pulley E in a clockwise direction one turn, passing over the portion of this cable which is in slot H.

Bring the screw end of the cable over to pulley A and hold it in back position. This can be done by fastening a weight to the other end of this cord and let the weight hang over the top of the pulley. Instead of a stout cord, a round knurled nut and old cable can be secured to the screw end of the new cable.

Now refer to the portion of the cable that is in the slot at pulley E. Using a heavy wooden pencil, bend this cable and bring it back over pulley D at groove J. CAUTION: Do not use a metal rod as this may damage the cable. It is important that the cable at groove J be kept close to the front flange of pulley B (flange nearest panel) while the portion of the cable which extends downward from point H be kept close to the back flange of this pulley so that the cable from pulley A will ride freely in the center of pulley B - as shown in Fig. 11.

Then from groove K bring the cable in a counterclockwise direction 3/4 turn around pulley E, over to pulley C, 3/4 turn around pulley C, and over to the bottom of pulley D at the right. Be sure the cable is well down into slot E, pulley B.

Wind the cable loosely one and one-half turns around this shaft, progressing toward the left as shown in Fig. 8.

Rotate the setting discs until pulley E is approximately in the position shown in Fig. 9. Using a wooden pencil, bend the cable and bring it back over pulley E at the point shown in the figure. Be sure the cable is well down into slot E - See Fig. 9.

Rotate the setting discs 3/4 of a complete revolution in such a direction that the top of the discs move toward the front of the panel. Bring the round knurled nut under the loop of the cable as shown in Fig. 10.
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25 Cycle Electric Drive Panel

The 25 cycle electric drive panel assembly is identical to the 60 cycle assembly except that a 31 cycle motor and a different gear No. 1 (see Fig. 6) are used.

The pinion gear in the 25 and 60 cycle motors are not the same. If, therefore, one of these pinions is ordered, the type of motor must be specified. (Both 25 and 60 cycle motors are furnished with pinion included.)

Movie Dial Adjustments and Replacements

Replacing and Positioning the Dial Lamp

Caution—If a new lamp is required, use only a No. 81 lamp, Wards catalogue No. 61-8204.

Turn the radio off and turn the band switch to the standard wave position.

Remove the lamp housing by unscrewing and removing the two screws which hold this housing in place—See Fig. 1.

Remove the lamp from the housing. It will be necessary to depress the contact plug retaining spring which will be seen in the narrow slot near the upper end of the housing and pull the plug out a slight amount from the housing, in order to remove the lamp. Replace the lamp and push the plug down until the locking spring snaps into place.

Replace the lamp housing by means of the two screws, but do not tighten these screws yet.

Turn the radio on.

Then grasp the top of the lamp housing assembly and move it up or down until the image on the screen is clearest and the lines are horizontal. The effect of having the lamp assembly too high or low is shown in the illustration in the instruction book. Tighten the two screws.

Replacing Film

Turn the band switch to the standard wave position. Then remove the lamp housing (See article "Replacing and Positioning the Dial Lamp").

Unscrew and take out the six screws spaced around the edge of the film drum casting. Then carefully lift the edge of the film near the back of the chassis. At the same time, lower the opposite edge of the film and slide it in toward the center of the film drum casting. (On two band radios, it will be necessary to lift the lens assembly as high as it will go while removing the film.) When the film clears the lens, it may be lifted out.

To replace the film, reverse the above procedure. Make certain that the entire lower edge of the film rests on the shoulder near the bottom inside the film drum. The radio is calibrated as described in the article under that name in this manual.

Calibrating the Radio

To calibrate the electric drive movie dial radios, tune in a station of known frequency between 510 and 900 KC. In the early models loosen the two set screws in the hub of the film drum pulley. Turn the film drum until it is at the correct kilocycle mark on the dial scale and then tighten the pulley set screws.

In the case of later models, the film drum is held in position by a friction washer which will be seen under the drum. In these models, the film drum can be turned without loosening the set screws.

Place cable from pulley D on pulley E as left flange (from back of panel). Now holding cable from pulley B, rotate setting disk in such a direction that the top of the disk move away from the front of the panel. Note the disk approximately 3/4 of a turn or until the slack in the cable from pulley V is taken up. Pulley E and the cable will then be in the position shown in Fig. 11. The cable will be hanging down from pulley E and must be held in tension.

The next step is to connect the two portions of the turckle together. Before doing this, see that the cable is on all of the pulleys as shown in Fig. 11. Tension should still be applied to both ends of the cable.
Recessing Film Drum Cable

Remove the electric drive panel from the chassis as explained in the article "Replacing Electric Drive Panel on Chassis" in Manual 124, and lay it facedown in front of the chassis. It is unnecessary to unsolder motor or clutch switch connections or to disconnect tone and volume control collars.

Remove the old film drum cable, unsoldering it from pulley "E" at point "S" on early models, or from the pin on later models—See Fig. 2.

Glass the gang conditioner completely and arrange to hold it in this position while replacing the cable.

Now insert one end of the new cable to hole "B" of condenser drive drum "A" which will be in the position shown in Fig. 2. Bring the cable down and around ¥/3 turn in the groove in the drum, progressing in a clockwise direction, passing it over pulley "C".

Extend the cable horizontally to the back of the chassis pasting it through the groove on the left side of pulley "D" and through the groove on the right side of pulley "E". (See Fig. 2, view from front.)

Place pulley "F" in the position shown in the back view in Fig. 2, with the slot "H" nearly parallel with the back of the chassis. Continue the cable from pulley "E" to the slot on the right side (from back) of pulley "F" keeping the cable in the upper part of the slot. The cable should rest on about 3/4 inch of the pulley surface before entering slots "G".

Insert the cable in slot "G" and continue down and out through slot "H" at point "K." If pulley "F" is the latter type, wrap the cable once around the pin as shown in Fig. 2.

Wind the cable one complete turn around pulley "F" keeping it below the cable on the right side and above the cable on the left side. Now extend the cable horizontally to pulley "L" and down to the grooves in condenser drive drum "A". Insert end of cable in slot "M".

Now solder the cable to the pin on pulley "F" on late models, or solder the cable to the pulley at point "S" on early models.

Replace the electric drive panel on the chassis and calibrate the dial as explained in the article "Calibrating the Radios."

Adjusting Height of Image on Screen

The image height should be so adjusted that the complete image for each band will appear on the screen.

If any portion of the image on any band is cut off, turn the radio on and turn the band switch to the 2nd short wave (green) position. Loosen the two set screws of the lever arm on the band switch shaft. This lever arm is connected to the bakelite strip which in turns moves the lamp assembly height mechanism.

Turn the tuning knobs until the high frequency end (210 MC) of the band is reached. Move the lever arm until the megacycle line is lined up with the letter "W" of the word "West" at either side of the glass screen. Tighten the set screws.

The image height should then be correct for the other two bands.
Circuit

This model is a three band AC operated radio with a tuning range as shown in the specifications above.

Referring to the schematic circuit diagram, Fig. 2, T1 and T3 are the antennas and interstage R.F. transformer assemblies and T3 is the oscillator coil assembly. The standard wave, 1st and 2nd short wave coils in each assembly are indicated by the letters B, C and D respectively.

The band switch complete connections to the coils in the band switch sections are designated in the schematic as section 1 and section 2.

The antenna transformer with tuned secondary feeds into a type 6K7 R.F. amplifier tube. The output of this tube is fed through the interstage R.F. transformer with tuned secondary into a 6J7 tube which functions as the 1st detector.

A separate type 6C3 tube is employed in the oscillator circuit. The oscillating circuit is always resonant at 456 kc above the frequency of which the R.F. amplifier is tuned.

One stage of I.F. amplification is employed using a 6G5 tube. The primaries and secondaries of the 1st and 2nd I.F. transformers are tuned by small trimmer condensers.

Referring to Fig. 2, it will be noted that there is a coupling winding connected in series with the secondary of I.F. transformer T4. When the selectivity control is in the sharp position, the coupling winding is open circuited and the loose coupling which exists between the primary and secondary of this transformer results in high selectivity.

When the selectivity control is in the broad position, the coupling winding which is wound under the primary is connected in series with the secondary. This provides overcoupling which results in a greatly widened resonance curve. Passage of a wide range of audio frequencies is thus obtained.

A 6H6 tube functions as a diode 2nd detector. AVC voltage is applied to the control grid circuits of the R.F. and I.F. tubes.

Across the volume control resistor R15 is a filter composed of condensers C52 and C53 and resistor R46. At high volume settings, the filter is not effective. At low volume settings, the action of this filter results in an increase of high and low frequency amplitudes relative to the other frequency amplitudes.

A 6G5 triode tube functions as the first audio amplifier while the output stage uses a 6G6 output pentode tube. A dynamic reproducer is employed.

The power unit uses a SY3G full wave rectifier. A 6G5 tuning indicator tube is employed.

VOLTAGES AT SOCKETS

Line Voltage: 117—Volume Control: Maximum Readings taken with 1000 Ohm-meter voltmeter Antenna Shorted to Ground Position of Band Switch: Standard Wave

<table>
<thead>
<tr>
<th>TUBE</th>
<th>FUNCTION</th>
<th>PRONG No. 1</th>
<th>PRONG No. 2</th>
<th>PRONG No. 3</th>
<th>PRONG No. 4</th>
<th>PRONG No. 5</th>
<th>PRONG No. 6</th>
<th>PRONG No. 7</th>
<th>PRONG No. 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>6E7</td>
<td>R.F.</td>
<td>0</td>
<td>6</td>
<td>245</td>
<td>118</td>
<td>2.8</td>
<td>6.2 (1)</td>
<td>6.2 (1)</td>
<td>0</td>
</tr>
<tr>
<td>6E7</td>
<td>1st Det.</td>
<td>0</td>
<td>6</td>
<td>245</td>
<td>114</td>
<td>0</td>
<td>6.2 (1)</td>
<td>6.2 (1)</td>
<td>6.2 (1)</td>
</tr>
<tr>
<td>6C6</td>
<td>Osc.</td>
<td>0</td>
<td>6</td>
<td>245</td>
<td>114</td>
<td>0</td>
<td>6.2 (1)</td>
<td>6.2 (1)</td>
<td>0</td>
</tr>
<tr>
<td>6E7</td>
<td>L.F.</td>
<td>0</td>
<td>6</td>
<td>245</td>
<td>118</td>
<td>2.8</td>
<td>6.2 (1)</td>
<td>6.2 (1)</td>
<td>0</td>
</tr>
<tr>
<td>6F5</td>
<td>2nd Det.</td>
<td>0</td>
<td>6</td>
<td>156</td>
<td>0</td>
<td>6.2 (1)</td>
<td>6.2 (1)</td>
<td>6.2 (1)</td>
<td>0</td>
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<tr>
<td>6F5</td>
<td>1st A.F.</td>
<td>0</td>
<td>6</td>
<td>156</td>
<td>0</td>
<td>6.2 (1)</td>
<td>6.2 (1)</td>
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<tr>
<td>6G5</td>
<td>Power.</td>
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<td>6</td>
<td>230</td>
<td>245</td>
<td>16 (1)</td>
<td>6.2 (1)</td>
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<tr>
<td>SY3G</td>
<td>Rectifier</td>
<td>0</td>
<td>5</td>
<td>608 (1)</td>
<td>608 (1)</td>
<td>5.6 (1)</td>
<td>6.2 (1)</td>
<td>6.2 (1)</td>
<td>0.2 (1)</td>
</tr>
</tbody>
</table>

(1) A.C. voltage as read across heater terminals 2 and 7.
(2) Bias (1.5 volts) as read across rectifier 2A6.
(3) Bias (16 volts) as read across rectifier 2A6 and 21.

Phonograph Connections

Phonograph connections are made as shown in Fig. 3. The front panel of the chassis is a round knock-out 1½ inch in diameter. An octal base socket is mounted in this knock-out opening and wired as illustrated.

A phono cable assembly may then be purchased (see parts list). On one end of this cable is an octal plug and on the other end is a phonograph radio switch and double tip jack.

Dial and Drive Assembly

SEE INDEX.
### ALIGNMENT PROCEDURE

The following equipment 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 Electrode.
- Dummy Antennas — 1 m, 200 mm, and 400 ohms.

#### TRIMMERS ADJUSTED

- See illustrations
- Initial steps
- Adjustment

#### PROCEDURE

<table>
<thead>
<tr>
<th>STEP</th>
<th>BAND SWITCH SETTINGS</th>
<th>SIGNAL GENERATOR</th>
<th>FREQUENCY SETTINGS</th>
<th>ANTENNA LEAD</th>
<th>CONNECTION AT RADIO</th>
<th>TRIMMERS ADJUSTED</th>
<th>INITIAL STEPS</th>
<th>ADJUSTMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1F</td>
<td>2nd LF Adj.</td>
<td>1st LF Adj.</td>
<td>456 KC</td>
<td>Grid of LF Tube</td>
<td>Turn Rotor to Full Open</td>
<td>Adjust to Maximum Output</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Range B</td>
<td>Range B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Range C</td>
<td>Range C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Range D</td>
<td>Range D</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>400</td>
<td>Range B</td>
<td>Range B</td>
<td>400 Ohm</td>
<td>Antenna Lead</td>
<td>Ant. Range B (C1)</td>
<td>Turn Rotor to Full Open</td>
<td>Adjust to Maximum Output</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Range C</td>
<td>Range C</td>
<td></td>
<td></td>
<td>Ant. Range C (C2)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Range D</td>
<td>Range D</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>600</td>
<td>Range B</td>
<td>Range B</td>
<td>600 Ohm</td>
<td>Antenna Lead</td>
<td>Ant. Range B (C3)</td>
<td>Turn Rotor to Full Open</td>
<td>Adjust to Maximum Output</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Range C</td>
<td>Range C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Range D</td>
<td>Range D</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>700</td>
<td>Range B</td>
<td>Range B</td>
<td>700 Ohm</td>
<td>Antenna Lead</td>
<td>Ant. Range B (C4)</td>
<td>Turn Rotor to Full Open</td>
<td>Adjust to Maximum Output</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Range C</td>
<td>Range C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Range D</td>
<td>Range D</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Alternate the signals from the signal generator to prevent the loading-off action of the AVC.**

After each range is completed, repeat the procedure as a final check.

1. Adjust the 1st and 2nd antenna settings to the intermediate maximum output, the 3rd antenna setting to approximately 500 KC on the dial. After the antenna is tuned, adjust the position of the signal drum, then tune the vertical line on the scope.

2. Set the signal generator for exactly 1500 KC. Balance the signal generator, then adjust the signal generator for maximum output. (See Note 1.)

3. Adjust the 1st and 2nd antenna settings to the intermediate maximum output, the 3rd antenna setting to approximately 500 KC on the dial. After the antenna is tuned, adjust the position of the signal drum, then tune the vertical line on the scope.

4. Check the 600 KC adjustment for maximum output.

Calibration should now be complete and the correct calibration can be used to adjust the signal generator for maximum output.

**NOTE:**
- For 1st antenna setting, adjust the position of the signal drum as a check on the alignment.
- For 2nd antenna setting, adjust the position of the signal drum as a check on the alignment.
- For 3rd antenna setting, adjust the position of the signal drum as a check on the alignment.

**Special Note on Calibration:**
- If the signal generator is not adjusted within the limits specified, the test procedure must be repeated.
LIST OF REPAIR PARTS (Serial No. 7E607720 and up)

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
<th>No. Used in Set</th>
</tr>
</thead>
<tbody>
<tr>
<td>BE100-11</td>
<td>C14, C17 .01 x 400 Volt Tubular</td>
<td>2</td>
</tr>
<tr>
<td>BE100-14</td>
<td>C21 .1 x 200 Volt Tubular</td>
<td>1</td>
</tr>
<tr>
<td>BE100-20</td>
<td>C11, C4, C19 .1 x 200 Volt Tubular</td>
<td>7</td>
</tr>
<tr>
<td>BE100-25</td>
<td>C19, C20 .02 x 60 Volt Tubular</td>
<td>2</td>
</tr>
<tr>
<td>BE100-26</td>
<td>C16, C18 .02 x 400 Volt Tubular</td>
<td>2</td>
</tr>
<tr>
<td>BE100-34</td>
<td>C12 .02 x 1200 Volt Tubular</td>
<td>1</td>
</tr>
<tr>
<td>BE100-35</td>
<td>C23, C24 .2 x 200 Volt (Oval Type)</td>
<td>2</td>
</tr>
<tr>
<td>BE119-41</td>
<td>C27, C28 60 uF, 200 W, V, Lyric Filter Board</td>
<td>1</td>
</tr>
<tr>
<td>BE119-42</td>
<td>C29, C30 60 uF, 200 W, V, Lyric Filter Board</td>
<td>1</td>
</tr>
<tr>
<td>BE124-30</td>
<td>Dual Ceramic Padder Condenser</td>
<td>2</td>
</tr>
<tr>
<td>BE129-5</td>
<td>C13 .0001 Mica — Type MT — 20%</td>
<td>1</td>
</tr>
<tr>
<td>BE129-12</td>
<td>C14 .00001 Mica — Type MT — 20%</td>
<td>1</td>
</tr>
<tr>
<td>BE129-39</td>
<td>C7 .00001 Mica — Type MT — 20%</td>
<td>1</td>
</tr>
<tr>
<td>BE129-54</td>
<td>C9 .003 Mica — Type MW — 2 1/2%</td>
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</tr>
<tr>
<td>BE139-12</td>
<td>R2 500 Ohm—1/3 Watt—20%—Carbon</td>
<td>1</td>
</tr>
<tr>
<td>BE139-19</td>
<td>R10, R16 1 Meg Ohm—1/3 Watt—20%—Carbon</td>
<td>2</td>
</tr>
<tr>
<td>BE139-20</td>
<td>R11, R12 100M Ohm—1/3 Watt—20%—Carbon</td>
<td>2</td>
</tr>
<tr>
<td>BE139-31</td>
<td>R4, R6 1500 Ohm—1/3 Watt—20%—Carbon</td>
<td>2</td>
</tr>
<tr>
<td>BE139-38</td>
<td>R7, R13 2 Meg Ohm—1/3 Watt—20%—Carbon</td>
<td>2</td>
</tr>
</tbody>
</table>

RESISTORS

CONVENTIONAL ALIGNMENT
SEE SPECIAL SECTION VOLUME VIII

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Circuit

This model is a three band AC operated radio with a tuning range as shown in the specifications above.

Referring to the schematic circuit diagram, Fig. 2, T1 and T2 are the antenna and interstage R.F. transformer assemblies and T3 is the oscillator coil assembly. The standard wave, 1st and 2nd short wave coils in each assembly are indicated by the letters B, C, and D respectively.

The band switch completes connection to the coils in use. The band switch sections are designated at the bottom as shown in Fig. 2 and section 1, 2, 3, 4, etc.

The antenna transformer with tuned secondary feeds into a type 687 R.F. amplifier tube. The output of this tube is fed through the interstage R.F. transformer with tuned secondary into a 6J7 tube circuit which functions as the 1st detector.

A separate type 6D6 tube is employed in the oscillator circuit. The oscillating circuit is always resonant at 455 Kc per frequency to which the R.F. amplifier is tuned.

A stage of I.F. amplification is employed using a 6SK7 tube. The primaries and secondaries of the 1st and 2nd I.F. transformers are tuned by small trimmer condensers.

Referring to the 1st and 2nd I.F. transformers T4 and T5 in Fig. 2, it will be noted that there is a coupling winding shown below the primary of T4 and below the secondary of T5.

When the selectivity control is in the sharp position, the coupling winding which is wound under the primary in the case of T4 is connected in series with the secondary. In the case of T5, the coupling winding which is wound under the secondary in series with the primary. This provides balancing which results in a greatly widened resistance curve. Passage of a wide range of audio frequencies is thus obtained.

A 6H6 tube functions as a diode 2st detector. AVC voltage is applied to the control grid circuits of the R.F. and I.F. tubes.

Across the volume control resistor R15 is a filter composed of condensers C34 and C35 and resistor R13. As high volume settings, the filter is not effective. At low volume settings, the action of this filter results in an increase of high and low frequency amplitudes relative to the other frequency amplitudes.

The output of the 2nd detector is applied to the 6J7 1st A.F. tube. The output of this tube is fed through resistance coupling into the 6G6 output tube shown nearest to it in the schematic.

A portion of the voltage developed across the output tube grid resistor is applied to the output grid of the 6G5 balancing exciter tube. This tube functions as a phase inverter and applies the audio voltage of proper phase and amplitude to the other 6G6 output tube. The two output tubes operate as a stage of Class A push-pull amplifier. The balancing exciter tube thus replaces a push-pull input transformer. A dynamic reproducer is employed.

The power unit uses a 175Q full wave rectifier. A 605 tuning indicator tube is employed.

Twenty-five Cycle Models

The twenty-five cycle receiver differs from the sixty cycle receiver only in the circuit variations and electric drive motor used. Ordinarily, a twenty-five cycle receiver may be operated on a sixty cycle power supply. However, the electric drive motors cannot be operated in this manner because the twenty-five cycle motor will not operate properly on a sixty cycle power supply.

The sixty cycle receiver may be operated from a twenty-five cycle power supply.


117-234 Volt Power Transformer

A 117-234 volt 60 cycle power transformer is also available for this model. It is important that these sets be operated on a 60 cycle power supply only.

Ordinarily, radios equipped with a 117-234 volt universal transformer may be operated on a 40 to 60 cycle power supply. However, the 60 cycle motor in the electric drive group of this model will not operate satisfactorily at any frequency other than 60 cycles. Consequently, if one of these radios is to be used on a 40 cycle power supply, it will be necessary to change the motor. The motor regularly supplied with the 23 cycle model is used for this purpose.

Connections for the 117-234 volt transformer are shown in Fig. 2. The 23 cycle transformer is the one which may be removed to permit installation of a special octal socket.

A plug which goes with this socket may then be inserted for either the 117 volt or 234 volt conversion.

Phonograph Connections

Phonograph connections are made as shown in Fig. 2. On the front panel of the chassis base is a round knob 1½ inch in diameter. An octal base socket is mounted in this knob opening and wired as illustrated.

A phonograph assembly may then be purchased. One end of this cable is an octal plug and on the other end is a phonograph-radio switch and double tip jack.

Dial and Drive Assembly

VOLTAGES AT SOCKETS

Line Voltage: 117—Volume Control: Maximum

<table>
<thead>
<tr>
<th>Line Voltage: 117—Volume Control: Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antenna绍ck to Ground</td>
</tr>
<tr>
<td>------------------------</td>
</tr>
<tr>
<td>TUBE</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>6K7</td>
</tr>
<tr>
<td>677</td>
</tr>
<tr>
<td>666</td>
</tr>
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<td>667</td>
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<td>666</td>
</tr>
<tr>
<td>677</td>
</tr>
<tr>
<td>5700</td>
</tr>
<tr>
<td>605</td>
</tr>
</tbody>
</table>

Notes:

(1) A.C. voltage as read across booster terminals 2 and 7.
(2) A.C. voltage as read across rectifier terminals 8 and 9.
(3) A.C. voltage as read across a.c. booster 3 and 10.
(4) A.C. voltage as read across rectifier terminals 8 and 9.
(5) A.C. voltage as read across terminals 6 and 11.
Circuit

This model is a two band AC operated radio with a tuning range as shown in the specifications above.

Referring to the schematic circuit diagram, Fig. 2, T1 and T2 are the antenna coil assemblies and T3 is the oscillator coil assembly. The standard wave and short wave coils in each assembly are indicated by the letters B and D respectively.

The band switch completes connections to the coils in use. When it is in the Range B position, a double tuned antenna R.F. stage is used where for the D range, a single tuned secondary is used.

A type 6J7 tube functions as the 1st detector.

A separate type 6C5 tube is employed in the oscillator circuit. The oscillating circuit is always resonant at 456 KC above the frequency to which the R.F. amplifier is tuned.

One stage of I.F. amplification is employed using a 6K7 tube. The primaries and secondaries of the 1st and 2nd I.F. transformers are tuned by small trimmer condensers.

Referring to Fig. 2, it will be noted that there is a coupling winding connected in series with the secondary of I.F. transformer T4. When the selectivity control is in the sharp position, the coupling winding is open circuited and the loose coupling which exists between the primary and secondary of this transformer results in high selectivity.

When the selectivity control is in the broad position, the coupling winding which is wound under the primary is connected in series with the secondary. This provides overcoupling which results in a greatly widened resonance curve. Passage of audio frequencies is thus obtained.

A type 6Q7 duode-cadode triode functions as the 2nd detector and a one stage audio amplifier. A.V.C. voltage is applied to the 1st detector and I.F. tubes.

Resistance coupling is used between the 1st audio stage and the output stage which employs a type 6F6 output pentode tube. A dynamic reproducer is used.

The power unit uses a 5Y8G full wave rectifier. A 6G5 tuning indicator tube is employed.

Ordinarily, radios equipped with a 117-234 volt universal transformer may be operated on a 40 to 60 cycle power supply. However, the 60 cycle motor in the electric drive panel of this model will not operate satisfactorily at any frequency other than 60 cycles. Consequently, if one of these radios is to be used on a 40 cycle power supply, it will be necessary to change the motor. The motor regularly supplied with the 25 cycle model is used for this purpose.

Connections for the 117-234 volt transformer are shown in Fig. 2. There is a 1 ¼ inch round knockout in the back panel of the chassis which may be removed to permit installation of a special octal socket. A plug which goes with this socket may then be inserted for either the 117 volt or 234 volt connection.

Phonograph Connections

Phonograph connections are made as shown in Fig. 7. On the side panel of the chassis base is a round knockout 1 3/16 inch in diameter. An octal base socket is mounted in this knockout opening and wired as illustrated.

117-234 Volt Power Transformer

A 117-234 volt 60 cycle power transformer is also available for this model. It is important that these sets be operated on a 60 cycle power supply only.

Dial and Drive Assembly

See Index

General Service Data

Twenty-Five Cycle Models

The twenty-five cycle receiver differs from the sixty cycle receiver only in the fact that a different power transformer and electric drive motor are used.

Ordinarily, a twenty-five cycle receiver may be operated from a sixty cycle power supply. However, the electric drive motor cannot be operated in this manner because the twenty-five cycle motor will not operate properly on a sixty cycle power supply.

The sixty cycle receiver cannot be operated from a twenty-five cycle power supply.

Phone cable assembly may then be purchased.

On one end of this cable is an octal plug and on the other end is a phonograph radio switch and double tip jack.

VOLTAGES AT SOCKETS

<table>
<thead>
<tr>
<th>TUBE</th>
<th>FUNCTION</th>
<th>Prong No. 1</th>
<th>Prong No. 2</th>
<th>Prong No. 3</th>
<th>Prong No. 4</th>
<th>Prong No. 5</th>
<th>Prong No. 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>6J7</td>
<td>1st Det.</td>
<td>0</td>
<td>6.2(7)</td>
<td>145</td>
<td>9.5</td>
<td>6.2(7)</td>
<td>9.5</td>
</tr>
<tr>
<td>6K7</td>
<td>I.F.</td>
<td>0</td>
<td>6.2(7)</td>
<td>100</td>
<td>5.0</td>
<td>6.2(7)</td>
<td>5.0</td>
</tr>
<tr>
<td>6C5</td>
<td>Cond.</td>
<td>0</td>
<td>6.2(7)</td>
<td>140</td>
<td>0</td>
<td>6.2(7)</td>
<td>0</td>
</tr>
<tr>
<td>6Q7</td>
<td>1st Audio &amp; I.F.</td>
<td>0</td>
<td>6.2(7)</td>
<td>100</td>
<td>6.2(7)</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>6F6</td>
<td>Power Amp.</td>
<td>0</td>
<td>6.2(7)</td>
<td>230</td>
<td>6.2(7)</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>575G</td>
<td>R.C.</td>
<td>0</td>
<td>6.2(7)</td>
<td>230</td>
<td>6.2(7)</td>
<td>0</td>
<td>6.2 A.C.</td>
</tr>
</tbody>
</table>

A.C. voltage as read across heater terminals 2 and 7.

Biss (14 volts) as read across resistors R15 and R16.

Biss (15 volts) as read across resistors R15 and R16.
ALIGNMENT FREQUENCIES

IF 465 KC
SHORT WAVE BAND 23 MC
   Align S.W. Osc. (C15), Ant. (C2), RF (C12)
MEDIUM WAVE BAND 6.5 MC
   Align M Osc. (C16), Ant. (C3), RF (C13)
BROADCAST BAND
   Align Osc. (C18) at 2000 KC,
   Align Ant. (C4), RF (C11) at 1800 KC,
   Align Osc. Series Pad (C20) at 550 KC.

THE ALIGNMENT IS CONVENTIONAL
SEE SPECIAL SECTION VOLUME VIII.

BATTERY AND POWER SUPPLY:

This radio obtains its power entirely from a six volt storage battery—no other batteries are required.

1. For 6 volt storage battery operation:
   (a) Connect the lead (containing the fuse receptacle) marked A positive (+) to the positive (+) post of the storage battery.
   (b) Connect the lead marked A negative (−) to the negative (−) post of the storage battery.

2. For 100-250 volts, 60 cycle operation; see Fig. 2.

Installing the Model 62-381X Power Unit

(For 100-250 Volt 60 Cycle A. C. Operation)

To install the Model 62-381X A.C. power unit proceed as follows:

1. Remove the chassis from the cabinet, by removing the four chassis mounting bolts from the bottom of the cabinet.

2. Referring to Fig. 1, note that the 6-volt power unit is fastened to the top of the radio chassis with eight copper head screws, (six on top of chassis, and two on rear flange of chassis).

3. Remove the eight copper head screws.

4. Disconnect the four flexible leads of the power unit from the chassis connector strip. These leads clip into pin jacks. Note that the color of each flexible lead matches the color dot on the chassis pin jack connector strip.

5. Place the model 62-381X A.C. power unit (see Fig. 2) on the top of the radio chassis and plug the four flexible leads into the pin jacks on the chassis connector strip.
   (a) The red lead should be plugged into the pin jack which is marked with a red dot.
   (b) The green lead connects to the pin jack which is marked with a green dot.
   (c) The yellow lead connects to the pin jack which is marked with a yellow dot.
   (d) The black lead connects to the pin jack which is marked with a black dot.

6. Mount the power unit to the chassis using the eight copper head screws.

IMPORTANT:

After the A.C. power unit has been installed check the connections again to make sure you have followed the instructions correctly. Set the switch on the top of the power transformer to the proper voltage.

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SERVICE NOTES:

Voltage taken from different points of circuit to chassis are measured with volume control at minimum, all tubes in their sockets and speaker connected, with a volt meter having a resistance of 1000 ohms per volt.

IN ORDER TO PREVENT SIGNAL FROM ACTING UPON AVC AND AFFECTING ACCURACY OF VOLTAGE MEASUREMENTS, AERIAL AND GROUND LEADS SHOULD BE SHORT CIRCUITED WHILE MAKING MEASUREMENTS.

All voltages as indicated on the voltage chart are measured with a fully charged 6 volt storage battery or from 117 volt A. C. line if the Model 62-381X A.C. power unit is installed in place of the 6 volt power unit.
### ALIGNMENT PROCEDURE

#### Models No. 93BR-402A, 93BR-421A, 93BR-423B, SBRB-4658 and 93BR-401B Models No. 93BR-420A and 93BR-421A

- Volume control—Maximize all adjustments.
- Connect No radio chassis to ground post of signal generator with a short heavy lead.
- Connect dummy antenna in series with generator output lead.
- Connect output meter across primary of output transformer.
- Allow chassis and signal generator to "heat up" for several minutes.

#### Models 93BR-461A, 462A.

- Volume control—Maximize all adjustments.
- Connect radio chassis to ground post of signal generator with a short heavy lead.
- Connect dummy antenna in series with generator output lead.
- Connect output meter across primary of output transformer.
- Allow chassis and signal generator to "heat up" for several minutes.

#### Models 93BR-462A.

- Volume control—Maximize all adjustments.
- Connect radio chassis to ground post of signal generator with a short heavy lead.
- Connect dummy antenna in series with generator output lead.
- Connect output meter across primary of output transformer.
- Allow chassis and signal generator to "heat up" for several minutes.

#### Models 93BR-461A, 462A.

- Volume control—Maximize all adjustments.
- Connect radio chassis to ground post of signal generator with a short heavy lead.
- Connect dummy antenna in series with generator output lead.
- Connect output meter across primary of output transformer.
- Allow chassis and signal generator to "heat up" for several minutes.

#### Specifications

<table>
<thead>
<tr>
<th>Model No. 93BR-714B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Consumption</td>
</tr>
<tr>
<td>65 Watts</td>
</tr>
<tr>
<td>Power Output</td>
</tr>
<tr>
<td>2.5 Watts Unidirectional</td>
</tr>
<tr>
<td>Sensitivity (for .5 Watts Output)</td>
</tr>
<tr>
<td>-25 Microvolts Average</td>
</tr>
<tr>
<td>Shortwave Band—25 Microvolts Average</td>
</tr>
<tr>
<td>Selectivity</td>
</tr>
<tr>
<td>45 KC Broad at 1000</td>
</tr>
<tr>
<td>Time Signal at 1000 KC</td>
</tr>
</tbody>
</table>

---

**Installing the Model 62-381 Power Unit**

For 105-120 Volt 50/60 Cycle A.C. Operation

**MODEL 93BR-655A and 93BR-655A SERIES A**

To install the Model 62-381 A.C. power unit proceed as follows:

1. Remove the chassis from the cabinet, by removing the four chassis mounting bolts from the bottom of the cabinet.
2. Referring to Fig. 1, page 1, note that the 6-volt power unit is fastened to the top of the radio chassis with eight copper head screws, (six on top of chassis, and two on rear flange of chassis).
3. Remove the eight copper head screws.
4. Disconnect the four flexible leads of the power unit from the chassis connector strip. These leads clip into pin jacks. Note that the color of each flexible lead matches the color dot on the chassis pin jack connector strip.
5. Place the model 62-381 A.C. power unit on the top of the radio chassis and plug the four flexible leads into the pin jacks on the chassis connector strip.
   a. The red lead should be plugged into the pin jack which is marked with a red dot.
   b. The green lead connects to the pin jack which is marked with a green dot.
   c. The yellow lead connects to the pin jack which is marked with a yellow dot.
   d. The black lead connects to the pin jack which is marked with a black dot.
6. Mount the power unit to the chassis using the eight copper head screws.

**IMPORTANT:** After the A.C. power unit has been installed check the connections again to make sure you have followed the instructions correctly.
Specifications

**Model No. 93BR-461A**

- Power Consumption: 1.5 Volts B Battery: 200 MA; "B" Battery: 8.15 MA
- Power Output: 100 Milliwatts
- Sensitivity (for .05 Watts): 60 Microvolts Average
- Selectivity: 52 Kc. Broad at 1000 Times Signal at 1000 Kc.

**Model No. 93BR-462A**

- Power Consumption: 1.5 Volts B Battery: 200 MA; "B" Battery: 8.15 MA
- Power Output: 100 Milliwatts
- Sensitivity (for .05 Watts): 75 Microvolts Average
- Selectivity: 52 Kc. Broad at 1000 Times Signal at 1000 Kc.
ADJUSTING THE ANTENNA:

IMPORTANT: MODEL 93BR-462A

After the batteries have been installed and the radio placed in operation, tune in a weak station around 1400 Kc on the dial.

On the back of the cabinet a small adjustment screw is provided, (see C2, Fig. 2). Very carefully turn this adjustment screw in or out until the station is as clear and loud as it can be made.

NOTE: The “A” battery should be placed in the cabinet. This adjustment should be made in any case whether the so that the plug-in socket on the top of the battery is radio is used with an outside antenna and ground or whether nearer to the side of the cabinet which is faced down than only the built-in loop antenna is used.

NEXT:—Tune in a station around 600 Kc on the dial and adjust adjustment screw (See A, Fig. 2). Both these adjustments are very important for best reception.

REAR VIEW

©John F. Rider, Publisher
MONTGOMERY WARD & CO. 1st I. F. Amplifier &2nd I. F. Amplifier
First Detector-oscillator A.V.C., 1st Audio Output

Selectivity - 35 Kc. Broad at 1000 Times Signal at 1000 Kc.
Sensitivity (for .05 Watts) Broadcast – 10 Microvolts Average
Short Wave – 20 Microvolts Average

CONVENTIONAL ALIGNMENT
SEE SPECIAL SECTION VOLUME VIII

A" Battery 300 MA; B" Battery 11 MA.

Output - - - - - - 180 Milliwatts, Undistorted

PARTS

TRIMMERS ON FRONT OF CHASSIS

©John F. Rider, Publisher
The type and function of each tube is as follows:

1—1#4 volt "A" Battery.
2—45 volt "B" Batteries.
3—Type 1P5G R. F. Amplifier.
4—Type 1A7G Mixer, First Detector-oscillator.
5—Type 1N5G Remote Cut-Off Pentode, 1st I. F. Amplifier (465 K.C.)
6—Type 1N5G Remote Cut-Off Pentode, 2nd I. F. Amplifier (465 K.C.)
7—Type 1H5G Second Detector, A. V. C., 1st Audio.
8—Type 1Q5G Output Amplifier.

Compliments of www.nucow.com
### Alignment, Trimmers

<table>
<thead>
<tr>
<th>BAND</th>
<th>SHORT WAVE</th>
<th>MIDDLE WAVE</th>
<th>BROADCAST</th>
<th>SHORT WAVE</th>
<th>MIDDLE WAVE</th>
<th>BROADCAST</th>
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</thead>
<tbody>
<tr>
<td>L.F.</td>
<td>465 Kc.</td>
<td>21 Mc.</td>
<td>120 Mc.</td>
<td>465 Kc.</td>
<td>21 Mc.</td>
<td>120 Mc.</td>
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<tr>
<td>Short Wave</td>
<td>Short Wave</td>
<td>Short Wave</td>
<td>Short Wave</td>
<td>Short Wave</td>
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<td>Short Wave</td>
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<tr>
<td>400 mhos</td>
<td>400 mhos</td>
<td>400 mhos</td>
<td>400 mhos</td>
<td>400 mhos</td>
<td>400 mhos</td>
<td>400 mhos</td>
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<tr>
<td>Antenna lead</td>
<td>Antenna lead</td>
<td>Antenna lead</td>
<td>Antenna lead</td>
<td>Antenna lead</td>
<td>Antenna lead</td>
<td>Antenna lead</td>
</tr>
<tr>
<td>6 Mc.</td>
<td>21 Mc.</td>
<td>21 Mc.</td>
<td>6 Mc.</td>
<td>21 Mc.</td>
<td>21 Mc.</td>
<td>6 Mc.</td>
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<tr>
<td>Short Wave</td>
<td>Short Wave</td>
<td>Short Wave</td>
<td>Short Wave</td>
<td>Short Wave</td>
<td>Short Wave</td>
<td>Short Wave</td>
</tr>
<tr>
<td>6 Mc.</td>
<td>21 Mc.</td>
<td>21 Mc.</td>
<td>6 Mc.</td>
<td>21 Mc.</td>
<td>21 Mc.</td>
<td>6 Mc.</td>
</tr>
<tr>
<td>Short Wave</td>
<td>Short Wave</td>
<td>Short Wave</td>
<td>Short Wave</td>
<td>Short Wave</td>
<td>Short Wave</td>
<td>Short Wave</td>
</tr>
<tr>
<td>6 Mc.</td>
<td>21 Mc.</td>
<td>21 Mc.</td>
<td>6 Mc.</td>
<td>21 Mc.</td>
<td>21 Mc.</td>
<td>6 Mc.</td>
</tr>
<tr>
<td>Short Wave</td>
<td>Short Wave</td>
<td>Short Wave</td>
<td>Short Wave</td>
<td>Short Wave</td>
<td>Short Wave</td>
<td>Short Wave</td>
</tr>
<tr>
<td>6 Mc.</td>
<td>21 Mc.</td>
<td>21 Mc.</td>
<td>6 Mc.</td>
<td>21 Mc.</td>
<td>21 Mc.</td>
<td>6 Mc.</td>
</tr>
<tr>
<td>Short Wave</td>
<td>Short Wave</td>
<td>Short Wave</td>
<td>Short Wave</td>
<td>Short Wave</td>
<td>Short Wave</td>
<td>Short Wave</td>
</tr>
</tbody>
</table>

### Voltage, Socket Sensitivity

- **Power Consumption:** 165 Watts
- **Output:** 21 Watts Undistorted
- **Broadcast Band:** 10 Microwatts Average
- **Medium Wave Band:** 8 Microwatts Average
- **Short Wave Band:** 6 Microwatts Average

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Compliments of www.nucow.com
IMPORTANT—Read carefully before setting the automatic push buttons.

There are six push buttons by means of which six stations may be selected. (See "A." Fig. 2). Make a list of local stations or stations you want to hear, in order, and number each one up to and including six.

On the front of each automatic push button an opening is provided for inserting the call letter tabs. (See "B." Fig. 2). Insert the call letter tabs in the rectangular openings at the bottom of each of the automatic push buttons. One of the small celluloid tabs should be inserted in place over each of the station call letter tabs.

NOW, PROCEED AS FOLLOWS:

1. Remove the screw from the bottom of the station call letter tabs. (See "C." Fig. 2). If the station button will not come out easily, use a screwdriver or a knife, being careful not to mar the finish on the celluloid plate.

2. Unlock the tuner mechanism by inserting a screwdriver through the hole in the panel. Press in and loosen the locking screw by turning it to the left half a turn. (See "D." Fig. 2). You will note that as the locking screw is turned it will move easily in and out. When the locking screw is turned to the left, the station letter tabs will move out easily. Then a slight amount of force will be required to start unlocking the tuner mechanism. Beyond this point, the locking screw will turn quite easily again until the tuner mechanism is completely unlocked. At this point do not force the locking screw any further. The tuner mechanism is now unlocked.

3. Make a list of six stations you tune in regularly. They are six push buttons on the front of the radio by means of which six stations may be tuned automatically. (See "E." Fig. 3).

4. Punch out the call letter tabs of the stations you have selected from the set of station call letter tabs supplied.

5. On the front of each automatic push button an opening is provided for inserting the call letter tabs. (See "A." Fig. 3). Insert the call letter tabs in the rectangular openings in each of the automatic push buttons. One of the small celluloid tabs should be inserted in place over each of the station call letter tabs.

6. Stations may be set up in any sequence desired.

NOW, PROCEED AS FOLLOWS:

1. Pull the "Reset" button all the way up (see control No. 6, Fig. 3). and rotate the button to the left (counterclockwise) until it cannot be turned any further. You will notice that as the button is rotated it will turn easily until the pointer reaches the end of the dial scale and then a slight amount of force will be required to start unlocking the tuner mechanism. Beyond this point the button will turn quite easily again until the tuner mechanism is completely unlocked. At this point do not force the button any further. The tuner mechanism is now unlocked.

(Note) Automatic tuner mechanism is locked when radium is applied on the factory.

2. Push in all the way any of the push buttons and at the same time turn the dial tuning knob. Both the dial tuning knob and the push button should be pushed hard enough to make them stay latched in.

3. You may find it necessary to rotate the dial tuning knob slightly when putting in to make certain that the gears mesh properly.

4. Both the pushbutton and the Dial Tuning knob are now latched in. Do not hold the pushbutton in hand while tuning in a station. Tune in by means of the dial tuning knob. It is important to lock in the station by rotating the tuning knob until the station is clear. The station will then be accurately tuned in.

5. Push in all the way any other push button, at the same time push the dial tuning knob so that both the push button and the dial tuning knob is latched in together. Tune in the station indicated on the call letter tab on this push button.

6. Follow this procedure until you have tuned in all of your favorite stations.

(Note) If the dial mechanism works hard when setting up a new station, pull the "Reset" button all the way out and rotate the button to the left (counterclockwise) until it cannot be turned any further. The dial mechanism should work freely with a slight push button latched-in.

7. After you have selected the new station, pull the "Reset" button all the way out and rotate the button to the right (clockwise) to lock the tuner mechanism. Be sure the button is turned until it will not turn further.

The automatic tuner buttons are now set up for quick tuning.
Procedure for Setting the Station Buttons

For models 3900-322, 3900A-725, 3900-764, 7-755, 3900-600, 800, and 1000 (Loops Models)

Selecting the Stations to be Set

There are 6 buttons on the automatic tuning dial by means of which 6 stations may be set for quick tuning.

Make a list of your favorite stations, those which you tune immediately. There may be any number up to and including 6 in this list.

It is best to set the station with the lowest kilocycle number first, the station with the next higher kilocycle number next, and so on.

Any button may be used for any station that you can receive, although it will be more convenient to set the stations so that the kilocycle numbers increase from left to right.

Setting a Station Button

Turn the manual tuning control to prevent it from turning and with the other hand, push one of the station buttons shown in the illustration all the way to the right. It is better to start with button No. 1.

Hold this button all the way in. With the other hand, see whether or not this station is still accurately tuned in by moving the tuning control a slight amount back and forth while observing the tuning eye. Be sure to hold the buttons all the way in.

Release the button slowly after the station is tuned.

Caution—Do not touch this button again while the mechanism is unlocked or the setting may be altered.

Carefully tune in the second station on your list. Then hold the tuning control and push the second button slowly and firmly all the way in.

Proceed in the same manner in setting any additional stations on your list on the remaining station buttons.

Volume Control—Maximum. Antenna Switched to Ground.

Readings taken with 1000-ohm voltmeter. Plate and screen voltages are read on 500 volt scale.

Caution

The metal chassis is connected to one side of the line through the 55-ohm resistor. Both AC and DC power lines are grounded on one side. If the AC line not connected to the chassis through this condenser is grounded, the metal chassis comes in contact with some external ground, the condenser will be connected across the line and there will be as much as 400 volts on the chassis.

Therefore, in any special work on the chassis, keep it on a wooden or other insulated surface contact with ground. The point uninsulated on the set should not contact any metal.
CONVENTIONAL ALIGNMENT
SEE SPECIAL SECTION
VOLUME VIII

FOR DRIVE CORD
DATA SEE INDEX

I.F. 456 KC.

NOTE—Connect a loop approximately one foot in diameter across the antenna and ground posts of the signal generator. Place radio approximately 3 feet from loop so as to pick up signal. Radio should not be in proximity to any metal (metal bench, etc.).

Use ONLY a No. 51 dial lamp.

WG & C SERIES 5A38

ANTENNA TRIMMER 1500 KC
See Note

FRONT OF CHASSIS

2ND I.F. TRANS.

256 KC

-1 mE

TOP VIEW

Schematic for model 859G-510

5" Dynamic

Power - 28 Watts (At 117 volts AC Supply)
Consumption 43 Watts (Phonograph Operating)
Power Output - .8 Watt Undistorted
Selectivity 50 KC Broad at 1000 times Signal
Tuning Frequency Range 528 to 1730 KC
Sensitivity 50 Microvolts per Meter Average
(For .85 Watt Output)
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.

**SIGNAL GENERATOR**  
**FREQUENCY** | **CONNECTION** | **DUMMY AT RADIO ANTENNA** | **CONDENSER SETTINGS** | **ADJUST TRIMMERS TO MAXIMUM**
---|---|---|---|---
456 KC | Signal Grid | .1 mf. | Turn rotor to full open | 1st I.F. (C6 & C7) 2nd I.F. (C11 & C12)
1600 KC | Signal Grid | .1 mf. | Turn rotor to full open | Oscillator (C2)
1500 KC | None—See Note A | Turn rotor to max. output Antenna (C1)

**NOTE A**—Chassis must be in cabinet. Connect a loop approximately one foot in diameter across the antenna and ground posts of the signal generator. The back of the cabinet must be in place. Place radio approximately 3 feet from loop so as to pick up signal. Radio should not be in proximity to any metal (metal bench, etc.).

**CALIBRATION** (For models with pointer in front of dial scale)—To obtain dial scale calibration, tune in an 900 KC signal. The pointer should be at the 800 KC mark on the dial. If it is not, hold the pulley at the back of the dial, loosen the pointer screw, set the pointer at the 800 KC mark, and retighten the pointer screw.
Power Consumption - 1.60 Amperes at 36 Volts DC
Power Output - .17 Watt Undistorted, .40 Watt Maximum
Selectivity - 30 KC Broad at 1000 times Signal
Sensitivity - (.05 watt output)
  A Range - 528 to 1750 KC, 10.0 Microvolts Average
  B Range - 5750 to 18300 KC, 8.0 Microvolts Average

Line Voltage Range

The radio will operate satisfactorily within a line voltage range of 25 to 42 volts. If the line voltage is higher than 42, it will be necessary to use a series resistor to cut it down. If the voltage varies, a variable resistor may be required.
**ALIGNMENT PROCEDURE MODELS 959G-600, 901, 902, 905 (EARLY AND LOOP MODELS)**

**Volume Control—Maximum All Adjustments**

Allow Chassis and Signal Generator to "Heat Up" for several minutes.

**Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.**

**Signal Generator FREQUENCY CONNECTION AT RADIO**

<table>
<thead>
<tr>
<th>FREQUENCY</th>
<th>CONNECTION AT RADIO</th>
</tr>
</thead>
<tbody>
<tr>
<td>455 KC</td>
<td>Grid of Int. Det.</td>
</tr>
<tr>
<td>1750 KC</td>
<td>R Range Ext. Ant.</td>
</tr>
<tr>
<td>1500 KC</td>
<td>R Range Ext. Ant.</td>
</tr>
<tr>
<td>600 KC</td>
<td>R Range Ext. Ant.</td>
</tr>
<tr>
<td>2750 KC</td>
<td>A Range Ext. Ant.</td>
</tr>
<tr>
<td>18,300 KC</td>
<td>D Range Ext. Ant.</td>
</tr>
</tbody>
</table>

**Band Switch Setting CONDENSER SETTING ADJUST TRIMMERS TO MAXIMUM**

<table>
<thead>
<tr>
<th>L.F.</th>
<th>455 KC Grid of Int. Det.</th>
<th>1 mf.</th>
<th>B Range</th>
<th>Turn Rotor to Full Open</th>
</tr>
</thead>
<tbody>
<tr>
<td>D.F.</td>
<td>2750 KC Antenna Lead</td>
<td>200 mf.</td>
<td>B Range</td>
<td>Ext. Ant.</td>
</tr>
<tr>
<td>D.F.</td>
<td>18,300 KC Antenna Lead</td>
<td>200 mf.</td>
<td>B Range</td>
<td>Ext. Ant.</td>
</tr>
</tbody>
</table>

**Range B**


**Range C**


**Range D**


**Loop Range B (Loop Models Only)**


**Loop Range C (Loop Models Only)**


**Loop Range D (Loop Models Only)**


**Drive Cord Replacement MODELS 959G-541-542-500**

- Use a new drive cord approximately 12 inches in length. The end of drive cord to transmission spring. Thread the other end of cord, starting from inside of large pulley, through hole in groove of pulley. Do not secure spring to hook on pulley.
- Turn gang control to completely closed position.
- Rotate tuning control drum so that the hole in groove of small pulley is on top. Wind cord around pulley, out of chuck at (front of chassis) and into drive pulley. Turn should start at right side (from front of chassis) of pulley groove and progress toward the left. Thread cord through hole in groove.

**Voltage at Sockets**

The voltages at sockets are shown on the schematic diagram. Unless otherwise specified, the voltage indicated is between the jacket terminal and ground.

- **Line Voltage:** 117 VAC
- **Volume Control:** Maximum
- **Local Distance Switch:** 50 VAC
- **Antenna Shorted to Ground:** 500 VAC

Readings taken with 1000 ohm meter. Plate and screen voltages are read on 500 volt scale.
PARTS USED ON MODEL 93WG-565A ARE USED ON THIS MODEL EXCEPT AS FOLLOWS:

The following NEW PARTS not shown on MODEL 93WG-565A ARE USED

<table>
<thead>
<tr>
<th>Bin No.</th>
<th>Part No.</th>
<th>Code</th>
<th>Description</th>
<th>Selling Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>9A161</td>
<td>4X3351</td>
<td></td>
<td>Radio-Phono Switch</td>
<td>$0.16</td>
</tr>
<tr>
<td></td>
<td>17A1311</td>
<td>C1</td>
<td>Escutcheon for Phono-Radio Switch</td>
<td>.12</td>
</tr>
<tr>
<td></td>
<td>1A4115</td>
<td></td>
<td>1-12 mmf. Trimmer Condenser</td>
<td>.10</td>
</tr>
<tr>
<td></td>
<td>18A194</td>
<td>R14</td>
<td>2 Section Gang Condenser complete with Tuning Control Shaft</td>
<td>2.05</td>
</tr>
<tr>
<td></td>
<td>8A5104</td>
<td></td>
<td>100,000 Ohm 0.2 Watt Carbon Resistor</td>
<td>.06</td>
</tr>
<tr>
<td></td>
<td>28A3</td>
<td></td>
<td>Needle Cup</td>
<td>.06</td>
</tr>
<tr>
<td></td>
<td>28A7</td>
<td></td>
<td>Cover for Needle Cup</td>
<td>.06</td>
</tr>
<tr>
<td></td>
<td>9A1618</td>
<td></td>
<td>Loading Coil for Loop Antenna</td>
<td>.18</td>
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The following parts shown on MODEL 93WG-565A ARE NOT USED

<table>
<thead>
<tr>
<th>Bin No.</th>
<th>Part No.</th>
<th>Code</th>
<th>Description</th>
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<tbody>
<tr>
<td>9A1191</td>
<td>4A139</td>
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<td>Loop Antenna Assembly</td>
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<tr>
<td></td>
<td>17A110</td>
<td>C1</td>
<td>Fibre Strip (Loop Antenna Leads)</td>
<td>.04</td>
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<td></td>
<td>1A4114</td>
<td></td>
<td>2-55 mmf. Loop Antenna Trimmer Condenser</td>
<td>.06</td>
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<tr>
<td></td>
<td>W 0 &amp; C Series 589</td>
<td></td>
<td>Prices Subject to Change Without Notice</td>
<td>1.20</td>
</tr>
</tbody>
</table>
NOBLITT-SPARKS INDUSTRIES, INC.

MODEL 71
Chassis RE-43
Schematic, Voltage
Alignment, Sensitivity

NOTE: All voltages taken to chassis base. Allowable voltage variation plus or minus 20% from values shown.

IF PEAK 455 KC

BALANCING INSTRUCTIONS

No. Oscillator to Frequency No. Setting No.

1. * 6A8 Grid 455 1,2, 3 & 4 550 kc 75 mv.

2. Ant. Lead Through 200 uuf. 1720 5 1720 kc


* I.F. Sensitivity should be 150 microvolts minimum for 200 milliwatts output

RESISTORS

<table>
<thead>
<tr>
<th>Ref. No.</th>
<th>Part No.</th>
<th>Description</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>R5</td>
<td>17-2070</td>
<td>500,000 ohms 1/4 watt</td>
<td>.20</td>
</tr>
<tr>
<td>R7</td>
<td>17-2072</td>
<td>20,000 ohms 1/2 watt</td>
<td>.20</td>
</tr>
<tr>
<td>R9</td>
<td>17-2080</td>
<td>1,000,000 ohms 1/4 watt</td>
<td>.20</td>
</tr>
<tr>
<td>R27</td>
<td>17-4788</td>
<td>2,000,000 ohms 1/4 watt</td>
<td>.20</td>
</tr>
<tr>
<td>R31</td>
<td>17-2066</td>
<td>260 ohms 1/2 watt</td>
<td>.20</td>
</tr>
<tr>
<td>R99</td>
<td>17-14051</td>
<td>300,000 ohms 1/4 watt</td>
<td>.20</td>
</tr>
<tr>
<td>R117</td>
<td>17-14281</td>
<td>40,000 ohms 1/4 watt</td>
<td>.20</td>
</tr>
<tr>
<td>R168</td>
<td>17-16166</td>
<td>50,000 ohms volume control</td>
<td>.75</td>
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<tr>
<td>R169</td>
<td>17-14282</td>
<td>150,000 ohms 1/4 watt</td>
<td>.20</td>
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<tr>
<td>R26</td>
<td>17-4781</td>
<td>600 ohms 1/4 watt</td>
<td>.20</td>
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COILS AND TRANSFORMERS

<table>
<thead>
<tr>
<th>Ref. No.</th>
<th>Part No.</th>
<th>Description</th>
<th>Price</th>
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</thead>
<tbody>
<tr>
<td>T1</td>
<td>00-16121</td>
<td>Antenna Coil</td>
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<tr>
<td>T2</td>
<td>00-16142</td>
<td>Oscillator coil</td>
<td>.50</td>
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<tr>
<td>T3</td>
<td>00-16161</td>
<td>First I.F. Transformer</td>
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<tr>
<td>T4</td>
<td>00-16162</td>
<td>Second I.F. Transformer</td>
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</tr>
<tr>
<td>T5</td>
<td>00-16160</td>
<td>Output transformer</td>
<td>1.50</td>
</tr>
<tr>
<td>T6</td>
<td>00-16140</td>
<td>Power transformer</td>
<td>3.00</td>
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ELECTRICAL AND MECHANICAL SPECIFICATIONS

TUBES: 6A8—1st Detector Oscillator
6K7—L.F. Amplifier
6Q7G—2nd Detector, A.V.C. Audio Amplifier
6K6G—Power output Amplifier
5J2G—Rectifier

Dial Light: Made #44
Frequency Range: 1725 to 540 K.C.
Power Output: 1.2 watts
Speaker: 5" Electro Dynamic, 3 ohm voice coil
1600 ohms field.
Voltage & Frequency: 117 V. 60 cycles AC only
 Watts Power Consumption: 45 Watts
Sensitivity: 50 microvolts for 200 milliwatts output

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Compliments of www.nucow.com
The receiver is designed for operation on 115 volts AC or DC. Power consumption is 25 watts.

@ John F. Rider, Publisher
D. C. Operation: If the set fails to function, REVERSE THE LINE PLUG.
It is designed for operation on 115 volts AC or DC. Power consumption is 30 watts.

<table>
<thead>
<tr>
<th>RESISTORS</th>
<th>CONDENSERS</th>
<th>TRANSFORMERS</th>
<th>MISCELLANEOUS UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>R OHM W</td>
<td>C CAPACITY</td>
<td>T TYPE</td>
<td>SYMBOL</td>
</tr>
<tr>
<td>500K</td>
<td>1/4 17-2070</td>
<td>1 TWO-GANG</td>
<td>DIAL LIGHT BULB</td>
</tr>
<tr>
<td>2K</td>
<td>1/2 17-4728</td>
<td>2 VARIAC E</td>
<td>MAZDA NO. 91</td>
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<tr>
<td>10M</td>
<td>1/4 17-1482</td>
<td>3 FIRST L.F. COIL</td>
<td>LINE CORD &amp; PLUG ASSEMBLY</td>
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<tr>
<td>100K</td>
<td>1/4 17-4802</td>
<td>4 SECOND L.F. COIL</td>
<td>SPEAKER ASSEMBLY</td>
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<tr>
<td>100K</td>
<td>1/4 17-4802</td>
<td>5 OUTPUT TRANS.</td>
<td>LINE SWITCH</td>
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</table>

I.F. PEAK 455 K.C.
BALANCE 1400 K.C. - CHECK AT 600 K.C.
NOBLITT-SPARKS INDUSTRIES, INC., COLUMBUS, INDIANA
Model 610 PUSH BUTTON ADJUSTMENT:

Any button may be set to any station desired. First, tune in the desired station by means of the thumb wheel. Second, turn the push button counterclockwise two full turns. Then depress this button the full length of its stroke, and while depressed, tighten the button again by turning it clockwise. The button may now be released. To check the correct setting for this button, turn the thumb wheel to some other point and depress the push button. This will return the tuning mechanism to the station just set up. If it does not, repeat the foregoing sequence of operations more carefully. Each of the remaining buttons may be set to other stations in a like manner.

 BALANCING INSTRUCTIONS:

All sensitivities given for 1/2 watt output = 1.4 V. across Voice Coil

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
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<tr>
<td>1</td>
<td>6A8 Grid</td>
<td>455</td>
<td>1, 2, 3 &amp; 4</td>
<td>5</td>
<td>50 uv</td>
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<tr>
<td>2</td>
<td>Ant. Coupler Through 20 uuf</td>
<td>1400</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>3</td>
<td></td>
<td>1400</td>
<td>6</td>
<td>1,000</td>
<td>10 uv</td>
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</tbody>
</table>

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MODEL 602,602A CHASSIS RE-53.

D. C. Operation:
If the set fails to function, REVERSE THE LINE PLUG.
It is designed for operation on 115 volts AC or DC.
Power consumption is 30 watts.
MODEL 702 CHASSIS RE-56.

I.F. PEAK 455 K.C.
BALANCE 1400 K.C. - CHECK AT 600 K.C.
Power consumption is 30 watts.

Push Button Adjustment:
Any button may be set up for any station desired. First, tune in the desired station by means of the manual tuning control. Second, turn the push button counter-clockwise two full turns. Then depress this button the full length of its stroke, and while depressed, tighten the button again by turning it clockwise. The button may now be released. To check the correct setting for this button, turn the manual control to some other point and depress the push button. This will return the tuning mechanism to the station just set up. If it does not, repeat the foregoing sequence of operations more carefully. Each of the remaining buttons may be set to other stations in a like manner.
The Arvin Model 802 is a five-tube Portable Radio Receiver designed to receive its operating power from either the self contained batteries in the receiver or a 115 volt AC or DC circuit.

All sensitivities given for 50 milliwatts output = .4 volts across Voice Coil.

**Balancing Instructions**

<table>
<thead>
<tr>
<th>Operation No.</th>
<th>Connect Bal. Oscillator to</th>
<th>Balance Oscillator Frequency</th>
<th>Adjust</th>
<th>Dial Setting</th>
</tr>
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<tr>
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<td>1st &amp; 2nd</td>
<td>550 kc</td>
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<td>2</td>
<td>Ant Post</td>
<td>1400 kc</td>
<td>Osc. Trimmer</td>
<td>1400 kc</td>
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<tr>
<td></td>
<td>Through 20 uuf</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Ant Post</td>
<td>1400 kc</td>
<td>Ant Trimmer</td>
<td>1400 kc</td>
</tr>
<tr>
<td></td>
<td>Through 20 uuf</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
I.F. PEAK 455 K.C.
BALANCE 1400 K.C. - CHECK AT 600 K.C.
NOBLITT-SPARKS INDUSTRIES, INC.,
COLUMBUS, INDIANA.

BALANCING INSTRUCTIONS

All sensitivities given for 50 milliwatts output = .4 volts across Voice Coil.

<table>
<thead>
<tr>
<th>Operation No.</th>
<th>Connect Bal. Oscillator to</th>
<th>Balance Oscillator Frequency</th>
<th>Adjust</th>
<th>Dial Setting</th>
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<td>1st 3.2nd</td>
<td>I.F. Trimmers</td>
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<td>2</td>
<td>Ant Post</td>
<td>1400 kc</td>
<td>Osc. Trimmer</td>
<td>1400 kc</td>
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<tr>
<td></td>
<td>Through 20 uaf</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Ant Post</td>
<td>1400 kc</td>
<td>Ant Trimmer</td>
<td>1400 kc</td>
</tr>
<tr>
<td></td>
<td>Through 20 uaf</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CIRCUIT ALIGNMENT

1. Set the volume control to the maximum position.
2. Connect the signal lead of the test oscillator to terminal X which is the grid prong of the VT1 tube through a .1 mfd. condenser.
3. Connect the ground lead of the test oscillator to the chassis frame.
4. Connect the output meter across the speaker voice coil at the terminal board mounted on the speaker.
5. Set the test oscillator to exactly 260 kilocycles.
7. Leave the test oscillator leads connected as for aligning the I-F circuits.
8. Turn the rotor plates of the gang condenser all the way out and against the high frequency stop.
9. Set the test oscillator to 1520 kilocycles.
10. Adjust the condenser "F" (Fig. 2) for maximum output. (It is very important that this frequency be set accurately as a slightly improper setting will cause the receiver to be out of tune over the high frequency end of the dial).
11. Leave the test oscillator leads connected the same as before.
12. Turn the rotor plates of the gang condenser all the way into mesh so that they rest against the low frequency stop.
13. Set the test oscillator to 540 kilocycles.
14. Adjust the oscillator padding condenser "G" (Fig. 2) for maximum output. (This adjustment sets the low frequency tuning range of the receiver to 540 Kc).
15. Remove the signal lead of the test oscillator from the grid terminal of the VT7 tube (Terminal marked X, Fig. 2) and connect to the antenna receptacle of the receiver THROUGH a .0005 mfd. Mica condenser connected in place of the .1 mfd. condenser previously connected. It is very important that a .0005 mfd. mica condenser be used when aligning the antenna range of this receiver in order that the circuit can be made to track properly.
16. Set the test oscillator to 1600 kilocycles.
17. Turn the condenser rotor plates until this frequency is tuned in with maximum output.
18. Adjust the r-f parallel trimmer "H" (Fig. 2) on the gang condenser and the antenna compensating condenser "I".
19. Set the test oscillator at 600 Kc.
20. Turn the condenser rotor plates until the signal from the test oscillator is tuned in with maximum output.
21. Maintain a low output signal from the test oscillator and readjust the oscillator tracking condenser "J" (Fig. 2) while rocking the variable condenser gang tuning shaft back and forth through the signal.
22. This operation should be continued until no further increase in output can be obtained.

6. Adjusting Receiver to Car Antenna

When the receiver leaves the factory the antenna circuit is closely aligned to match the capacity of the car antenna. However, due to variations in antenna capacity, it will be necessary with set installed in the car, to adjust the antenna trimmer to match the car antenna. This should be done as follows:

[a] Be sure the antenna is fully extended (all the way out).
[b] Adjust the antenna trimmer to match the car antenna. Do not disturb the oscillator or the r-f trimmers in making this adjustment.

NOTE: If the entire alignment procedure has been accomplished accurately, the receiver should be very nearly uniformly sensitive over the entire frequency range.
CIRCUIT ALIGNMENT

An accurately calibrated test oscillator or signal generator and an output meter must be used to align the receiver circuits correctly. To make all alignment adjustments, the back cover must be removed. All trimmers except the oscillator series trimmer are readily accessible (see "A", "B", "C", "D", "F", Fig. 2). The oscillator series trimmer ("E" Fig. 3) is adjusted through a hole in the side of the case.

1. 1-F Alignment at 260 Kilocycles.
   (a) Connect an output meter across the speaker field coil, leaving speaker connected.
   (b) Connect the signal lead of the test oscillator to the gang condenser terminals to which condenser No. 25 is connected (Fig. 5).
   (c) With the test oscillator set at exactly 260 K.C., adjust the I-F trimmers "A", "B", "C", and "D" until a maximum output is obtained. Re-check alignment several times with oscillator output signal low as possible for suitable output readings.

2. Alignment at 1560 Kilocycles.
   (a) Connect the test lead of the test oscillator to the receiver antenna connection through a .00005 mfd. condenser.
   (b) Turn the rotor plates of the gang condenser all the way out against the high frequency stop.
   (c) Set the test oscillator to 1560 K.C.
   (d) Adjust the oscillator trimmer "E" (Fig. 2) until a maximum output is obtained.

3. Alignment at 1400 Kilocycles.
   (a) Leave the test oscillator leads connected the same as for alignment at 1560 Kilocycles. Set the test oscillator frequency at 1400 Kilocycles.
   (b) Tune the set to this signal.
   (c) Adjust the R-F trimmer "F" and the antenna trimmer "G" (Fig. 2) for maximum output.

4. Alignment at 600 Kilocycles.
   (a) Leave the test oscillator leads connected the same as for alignment at 1400 K.C. Set the test oscillator frequency at 600 K.C.
   (b) Tune set to this signal.
   (c) Adjust the oscillator series trimmer "H" (Fig. 3) through the side of the case for maximum output, while rocking the tuning dial back and forth through the signal.

5. Re-Alignment at 1560 and 1400 Kilocycles.

Repeat alignment of R-F and antenna sections of the gang condenser as outlined under paragraphs 2 and 3.

6. Adjusting Receiver to Car Antenna.

When the receiver leaves the factory the antenna circuit is closely aligned to match the capacity of the car antenna. However, due to variations in antenna capacity, it will be necessary with one installed in car, to adjust the antenna trimmer to match the car antenna. This should be done as follows:
   (a) Make sure antenna lead is connected properly.
   (b) Be sure the antenna is fully extended (all the way out).
   (c) Turn set on and tune in a very weak station between 120 and 150 (near 120). Adjust the antenna trimmer "F" for maximum volume. Do not disturb the oscillator or the R-F trimmers in making this adjustment.
ALIGNMENT DATA

INTERMEDIATE FREQUENCY: Set oscillator to 465 KC. Feed this to the grid of the pentagrid (6AB7) converter tube. Adjust trimmers on the intermediate frequency transformers for peak readings as indicated on the output meter which is to be placed across the output transformer.

BROADCAST BAND: Adjust oscillator to 1400 KC and connect the output meter across the output transformer. Set the volume control to maximum and turn the oscillator trimmers for maximum signal. Turn the oscillator trimmers about 600 KC, and adjust the output meter until maximum readings are obtained. Repeat this procedure for the 1800, 2200, and 2600 KC positions. Adjust the broadcast grid condenser for maximum readings on the output meter. Re-check the alignment at 600 KC and turn the output meter a slight distance from the original position.

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RADIO

To record radio programs set "PhonoRadio Switch" so that number "5" is opposite brass marker above the knob. Set volume control for loud and clear reception. Then set switch so that number "3" is opposite the marker and record the program. Do not allow needle to cut disc when it reaches the inner label. Do not allow the fine threads which form to collect under the needle, brush lightly with a soft cloth or brush towards the center of the disc.

MICROPHONE

For microphone recording set switch so that number 1 is opposite marker and test for operation. Then turn switch so that number "2" is opposite the marker. Turn volume control fully to the right. In speaking use normal voice with microphone at least six inches from the mouth.

NOTE: Be sure needle is firmly in place and that the flat side points towards the rear of the cabinet. Check that the small pin projects through one of the three holes on the blank to prevent the disc from slipping.
CONVENTIONAL ALIGNMENT
SEE SPECIAL SECTION VOLUME VIII

AUTOMATIC TUNING: There are four push buttons on the front panel which can be set so that by simply pushing the button marked with a station's call letters, any of four different stations may be received.

Allow the receiver to warm up for 20 minutes before making the station adjustments.

Decide on the station you wish to receive.

Tune to this station as accurately as possible with the selector knob.

Next, push in this button as far as possible, being careful not to disturb the station setting on the dial.

Turn this push button knob about one turn to the left, or until it starts to unscrew easily.

Holding the button at the "IN" position, screw the push button knob to the right until it is tight.

Cut out name of station from list supplied and insert in face of button.

Insert celluloid disk.

This completes the adjustments for one station. The three other buttons may be set in a similar manner.
PHILCO MODEL "L" RECORD CHANGER

OPERATING INSTRUCTIONS

The Model "L" Record Changer plays seven 1⁄4- or eight 16-ounce records automatically. If the last record remains on the turntable and repeats as long as the Record Changer is in operation. Records may be repeated as often as desired by raising the record removing arm at A Fig. 1 to the upright position. To reject a record and play the next record below it, pull the latch lever at J Fig. 1 forward.

To adjust the record removing arm to handle 16-records set the record removing arm changer lever at D Fig. 1 opposite the number 16 stamped on the base plate. For 12-inch records set the lever opposite the number 12. To adjust the pickup to play 10-inch records, push the pickup stop at K Fig. 1 back. (Away from the pickup needle). For 12-inch records pull the stop forward (toward the needle) as far as it goes.

Some units are equipped with two speed motors, and others with 78 RPM motors. When the two speed motor is used change from one speed to the other by simply moving lever at Y Fig. 1 to position desired.

To start motor, throw switch at N Fig. 1 on the "on" position.

FIG. 1

MOTOR SPEED

The motor speed is adjusted by means of a lever at C Fig. 1 which is mounted on the turntable. The direction of swing is fast or slow is indicated by the legends F and S on the base plate.

33-1⁄3 RPM — 78 RPM SHIFT

(Two-speed motors only)

Move the speed change lever at P Fig. 1 as far as it goes in the direction of swing indicated by the legends 33-1⁄3 and 78 on the base plate.

If adjustment of the speed change lever is required for any reason, proceed as follows: First loosen the screw which clamps the lever to the motor shaft. This shaft is provided with a screw-driver slot in the end. Next, using a screwdriver, turn the shaft in a clockwise direction until you feel it strike the stop. The motor is now in the 33-1⁄3 RPM position. Now set the lever against the lug provided in the base plate and opposite the legend 33-1⁄3 and tighten the clamp screw. This places the lever in the correct position on the motor shaft. The final step is the adjustment of the eccentric bushing at G Fig. 1 which limits the throw of the lever. First loosen the screw which holds the eccentric bushing. Next, throw the speed changer lever to its farthest 78 RPM position, (using care that the lever does not slip on the motor shaft). Then turn the eccentric bushing around until it touches the side of the lever, and tighten it in place with the screw provided.

TRIP MECHANISM

The trip mechanism is the trigger that sets the Record Changer in motion. This is done by allowing the latch bar at O Fig. 1 to drop in front of, and be actuated by the cam at P Fig. 1. The latch bar should move in and out as long as the motor is running. If this mechanism does not operate smoothly, the precautions outlined in paragraphs should be observed.

First of all, make sure that the square pin in the latch lever at U Fig. 1 latches properly in the notch in the lift lever at F Fig. 1. When latched, the notch should be engaged at one-half the depth. The depth of engagement is adjusted by means of the eccentric washer and locking screw at G Fig. 2. Next run the Record Changer through its cycle. If the square pin fails to engage the notch in the lift lever, first check the tension of the latch spring at H Fig. 2 to insure that the notch can engage the pin. Next check the tension of the reset spring at E Fig. 1. This reset spring should not be under tension when the latch bar is latched but should have enough tension when the latch bar drops back off of the cam to cause the square pin to over travel the notch in the lift lever.

IMPORTANT — Before attempting to change the tension of any spring, be sure that the parts involved work freely without any tendency to bind, as of course any binding condition would prevent proper operation.

The Record Changer is adjusted at the factory to trip on a spiral groove record when the phonograph needle is 1⁄8" from the edge of the hole in the center of the record.

FIG. 2

MOTOR LUBRICATION

The motor installed in the Record Changer is governor controlled, with gearing enclosed, and leaves the factory lubricated for proper operation. For maximum satisfaction, lubricate the motor at regular intervals with EAE No. 10 oil. Please do not use any other grade of oil.

The governor is a felt felt with a ring of band felt. This felt is impregnated with a lubricating solution sufficient for proper operation under ordinary conditions and in both rain and normal conditions. It may be necessary, however, if the motor shows a tendency to chatter or waver, to apply a drop or two of oil to this felt ring.

When eccentric or oscillating trip groove records are used, tripping is effected by means of the hardened steel pin in the end of tone arm lift crank as at K Fig. 2, engaging the serrated block on the play between the end of the pin and the block, when with a short needle, (9⁄16" Minimum Length) the pickup is resting on one record on the turntable. If the pressure of the pin on the block is not sufficient to insure operation, check the pressure spring which is located up under the pickup.

The oval head pivot screw at R Fig. 1 is adjusted for the lift lever at L Fig. 1. This screw should allow the lift lever to be raised by the latch bar to its maximum height without binding but also without any additional play.

If the Record Changer fails to trip, see if the phonograph needle is jumping out of a worn record trip groove. Next make sure that all parts of the mechanism work freely and smoothly. If it is found that the latch bar at Q Fig. 1 is not dropping in far enough to engage the cam at P Fig. 1, then check the tension of the trip spring at B Fig. 1.

FIG. 3

RECORD REMOVING MECHANISM

The Record Changer is adjusted so that it will always leave one record on the turntable. This is done to prevent the phonograph needle from damaging the covering on the turntable.

In case the Record Removing Mechanism fails to operate smoothly, proceed as follows: First make certain that all parts work freely with no binding in pivot or bearings, and that the record removing arm assembly rests on the stop screw at Q Fig. 3. Next make certain that the latch bar is in such a position that the latch bar at Q Fig. 1 can swing by and clear the cam at P Fig. 1. Place just one record on the turntable and measure from the top of this record down to the base plate. This distance should be one inch. Now by pulling the release lever at J Fig. 1, first, it will be found possible to swing the record removing finger at Y Fig. 2 over to where it just touches the edge of the record. If the adjustment is correct, the record removing finger should just barely rise over the edge of the first record. If adjustment is required it can be made by means of the stop screw at Q Fig. 3. In the event the record removing arm raises the record from the turntable and drops it back in place without removing it, check the lift adjustment at V Fig. 1. This adjustment consists of an eccentric stud which is provided with a lock nut, and is made by loosening the lock nut and turning the eccentric stud. The lift adjustment should be set so that the hole in the center of the record just clears turntable spindle when the Record Changer is in operation.

FIG. 3

PICKUP LOWERING MECHANISM

The pickup lowering mechanism has two functions. First, it lowers the phonograph needle gently to the surface of the record. Second, it feeds the needle toward the center of the record so that it will enter the playing groove.

If the pickup descends too fast or too slow, adjust the speed of descent by turning the knurled thumb nut on the dashpot sleeve at V Fig. 1.

The unit is adjusted at the factory so that the needle will be set down approximately 3⁄4" in from the edge of the record. An adjusting screw is provided on the side of the pickup at M Fig. 2. If the needle is being lowered onto the playing surface of the record, and the adjusting screw at M Fig. 2 fails to correct the condition proceed as follows: First stop the record changer, with the pickup in the maximum raised position and check the clearance between the underside of the pickup shell at A Fig. 2 and the tip of the dashpot. This clearance should be very small as otherwise the pickup will tend to bounce as it is lowered. There must be sufficient clearance however to prevent the pickup from hitting the record. If the clearance is not sufficient, the height of the dashpot may be regulated by loosening the nuts at the bottom of the lift lever stud at X Fig. 4 and changing their position on the stud. To raise the dashpot turn the nuts clockwise to lower the dashpot turn the nuts counter-clockwise. Be sure to lock the nuts tightly together after the adjustment is made.

FIG. 4
MODEL TH-1
Schematic
Alignment

PHILCO RADIO & TELEV. CORP.

IF PEAK 470 KC

FOR OTHER DATA SEE INDEX

REPLACEMENT PARTS

TRANSITONE HOME RADIO MODEL TH-1

<table>
<thead>
<tr>
<th>Schem. No.</th>
<th>Description</th>
<th>Philco Schem. No.</th>
<th>Description</th>
<th>Philco Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Condenser (.008 mfd. 200 V)</td>
<td>32104</td>
<td>Output Transformer</td>
<td>43118</td>
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<tr>
<td>2</td>
<td>Ant. Transformer</td>
<td>40188</td>
<td>Speaker</td>
<td>60110</td>
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<td>3</td>
<td>Tuning Condenser</td>
<td>33100</td>
<td>Field Coil</td>
<td>Part of Sprk. Unit</td>
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<td>Condenser .05 mfd. 200 V</td>
<td>32100</td>
<td>Condenser .05 mfd. 400 V</td>
<td>32101</td>
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<td>5</td>
<td>Volume Control</td>
<td>49116</td>
<td>Clip (Drive Cord)</td>
<td>80154</td>
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<td>Drive Pulley &amp; Screw</td>
<td>21102</td>
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<td>Knob Assembly</td>
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<td>32100</td>
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<td>Resistor 15,000 ohms</td>
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<td>Socket 6C3</td>
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<td>Socket 43</td>
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<td>Socket 855B</td>
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<td>Socket Assembly (Pilot Lamp)</td>
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<td>Spring (Drive Cord)</td>
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<tr>
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<td>Resistor 600 ohms</td>
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<td>Speaker Cone</td>
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<td>21</td>
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<td>Washer <em>C</em> Type Drive Shaft</td>
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<td>22</td>
<td>Resistor 6000 ohms</td>
<td>47105</td>
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</tbody>
</table>

ALIGNMENT OF THE COMPENSATORS
In order to align the R.F. circuit of the receiver, an output meter, and signal generator will be required. With these instruments, the compensators should be adjusted as given below.

1. Connect an output meter to the plate and cathode terminals of the 43 tube.
2. The signal generator output lead is now connected to the aerial wire of the receiver through a 100 mfd. condenser and the generator ground to a good ground connection. Then, turn the volume control to a full volume position.
3. Adjust the dial pointer as follows: Turn the tuning condenser to maximum capacity position. With the condenser in this position, the dial pointer should be 4 inch below the 650 K.C. mark of the dial and horizontal with the chassis.
4. Set the signal generator and receiver dial for 1500 K.C. and adjust padders 3A and 3B for maximum reading on the output meter.

MODEL TH-1 is a 5 tube receiver designed for operation on alternating current (A.C.) or direct current (D.C.) 115 volts and covers a frequency range of 540 to 1720 kilocycles.

An indoor aerial 20 feet in length is attached to the receiver for average receiving conditions. In remote localities where signal strength is weak, a regular outdoor aerial is recommended, such as Philco aerial Part No. 40-6363. For hotels and apartment house installations, Philco Utility Aerial Part No. 40-6364 should be used.

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MODEL TH-3 is a 5 tube superheterodyne receiver covering a frequency range from 540 to 1720 kilocycles and designed for operation on 115 volts alternating current (A.C.). The tubes used in this model are indicated on the schematic diagram shown below.

REPLACEMENT PARTS

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<tr>
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<td>3 Tuning Condenser</td>
<td>31-2235</td>
<td>Electrolytic Condenser (12 mf.)</td>
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<td>4 Resistor (70,000 ohms, 1/2 watt)</td>
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<td>5 Condenser (110 mmf. micro)</td>
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<td>Field Coil</td>
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<tr>
<td>6 Oscillator Transformer</td>
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<td>Part of Speaker</td>
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<tr>
<td>7 1st I.F. Transformer</td>
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<td>Resistor (70 ohms, 1/2 watt)</td>
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<tr>
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<td>Pilot Lamp</td>
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<tr>
<td>10 Condenser (.06 mf. tubular)</td>
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<td>11 End I.F. Transformer</td>
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<td>Bezel Window</td>
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<td>13 Volume Control</td>
<td>33-5264</td>
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<td>14 Condenser (.01 mf. tubular)</td>
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<td>36-4095</td>
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<td>15 Resistor (4.0 meg., 1/2 watt)</td>
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<td>Dial &amp; Scale Assembly</td>
<td>31-2351</td>
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<td>Drive Cord 10/15&quot;</td>
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<td>18 Condenser (260 mlf. micro)</td>
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<td>Drive Shaft</td>
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<td>Socket (6 prong)</td>
<td>27-6035</td>
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<td>For Speaker 36-1461-2</td>
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<td>Socket (6 prong)</td>
<td>27-6036</td>
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<tr>
<td>22 Speaker Cone and Voice Coil Assembly</td>
<td>Part of Speaker 36-1461</td>
<td>Socket (7 prong)</td>
<td>27-6037</td>
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</tbody>
</table>

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# GENERAL ALIGNING INSTRUCTIONS

## Models TH-3, TH-4, TP-4, TH-5, TP-5, TP-10, TP-11, TP-12

The same general procedure is followed in aligning the compensating condensers in any of the above listed models.

## EQUIPMENT REQUIRED

**Signal Generator** Philco Model 077 or 177 should be used.

**Aligning Indicator** Philco Model 027 and Model 028 circuit testers which contain an audio output meter and vacuum tube voltmeter. Either of the vacuum tube voltmeter or the audio output meters may be used as an aligning indicator and are connected as given under “Connecting Aligning Instruments”.

**Tools:** Fibre handle aligning screw driver, Philco Part No. 45-2610.

## CONNECTING ALIGNING INSTRUMENTS

Audio Output Meter: If an aligning indicator of this type is used, connect it to the plate and screen terminals of the output tube.

Vacuum Tube Voltmeter: To use the vacuum tube voltmeter as an aligning indicator, make the following connections:

1. Attach the negative terminal of the voltmeter to any point in the circuit where the A.V.C. voltage can be obtained.
2. Connect the positive terminal to the ground connection of the receiver. In AC-DC sets, the negative terminal of the vacuum tube voltmeter should be connected to (B—) of the receiver. (Cathode 7C6.)

For aligning receivers with loktal type tubes, an aligning adaptor, Philco Part No. 45-2767 may be used with the vacuum tube voltmeter. To use the adaptor, remove the second detector tube from its socket and insert the aligning adaptor in the socket, then replace the tube in the adaptor. Connect the negative terminal of the vacuum tube voltmeter to the light colored wire which protrudes from the side of the adaptor.

Attach the positive terminal of the vacuum tube voltmeter to the black wire of the adaptor.

**Signal Generator:** When adjusting the I.F. padders, the high side of the signal generator is connected through a 0.04 mfd. condenser to the antenna section of the tuning condenser. Connect the ground or low side of the generator to the chassis. It may be necessary when adjusting AC-DC models to reverse the power plug to eliminate hum.

The R.F. and oscillator padders are aligned with the high side of the signal generator connected to the antenna of the receiver through a 100 mmdf. condenser.

After connecting the aligning instruments, adjust the compensators on all models in the order as shown in the tabulation below. The first and second I.F. transformers in all models are located on the top and bottom sections of the chassis, respectively. The antenna and oscillator padders are located on the tuning condenser.

### Operating Instructions

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<th>RECEIVER</th>
<th>SPECIAL INSTRUCTIONS</th>
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<td>Dial Setting</td>
<td>Dial Setting</td>
<td>Control Setting</td>
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<tr>
<td>1</td>
<td>Ant. Section of Tuning Cond.</td>
<td>470 K.C.</td>
<td>540 K.C. Tuning Cond. closed</td>
</tr>
</tbody>
</table>

### NOTE A — DIAL CALIBRATION:

With the exception of Models TP-10 and TP-12, the dial pointers are adjusted by closing the tuning condenser (plates fully meshed) and setting the pointers on the dot below 55 on the dial.

### NOTE B — The alignment procedure for the I.F. padders in Models TP-10 and TP-11 is the same as that given above. The antenna and oscillator padders of these models, however, are adjusted as follows:

1. Turn the tuning condenser to the extreme high frequency position (all plates out of mesh).
2. Insert a .004" gauge between the stationary and rotor plates of the oscillator condenser. If the gauge is not handy, a piece of bond writing paper can be used. After inserting gauge, turn rotor toward the low frequency end so that the gauge will be held in position.
3. Set signal generator at 1720 K.C. and tune oscillator padder for maximum reading on the output meter.
4. Remove gauge and set signal generator to 1500 K.C. and tune tuning condenser for maximum reading on this signal, then adjust the antenna paddler for maximum output.
5. Place set in cabinet so that the tuning arm on the tuning condenser engages the dial on the cabinet. After placing receiver in the cabinet and it is found that the dial does not track properly with station signals, the dial can be calibrated as follows: Set the signal generator to a low frequency signal (600 K.C.) and tune receiver until signal shows maximum reading on the output meter. The dial is then set to this signal by inserting a 6-32 Phillips screw driver to the adjustment screw on the tuning condenser pulley. Loosen screw and slightly turn dial so that it reads 600 K.C. then retighten screw. When doing this, however, precaution should be taken so that the tuning condenser is not disturbed while dial is being adjusted and screw is being tightened or loosened.

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**Wireless Record Player - Model RP-3**

Model RP-3 is a wireless record player, designed to operate through the entire R.F. and audio system of a radio receiver. No connections are required between the wireless record player and the radio. The sound from the record is converted into a radio signal (540 K.C.) and broadcasted to the aerial of the radio set.

This model is equipped with a semi-automatic crystal pickup mechanism which will play either ten inch or twelve inch records. The pickup mechanism automatically places the pickup on the record when the lid of the cabinet is closed. Records can also be repeated by simply opening and closing the lid.

The player is operated from a 115 Volt, 60 cycle A.C. power supply. A volume control is also provided for adjusting the output of the player.

**Changing Operating Frequency**

When the record player leaves the factory it is adjusted to operate at approximately 540 K.C. If interference from broadcasting stations is encountered, the frequency of the unit can be changed to any other frequency between 530 K.C. and 550 K.C. by removing snap button and adjusting small screw indicated in diagram. Turning screw clockwise lowers the frequency, counter-clockwise raises the frequency. This adjustment is best made while the unit is in operation.

No definite rule can be established for the relative location of the record player to a radio; individual trial will establish the best location. However, in general, satisfactory operation may be obtained up to a distance of fifty (50) feet provided local noise conditions are not too severe.

If hum is experienced it may be necessary to reverse the power plug of the record player, the radio, or both. In some cases it may be advisable to use the same receptacle for record player and radio.

**Model RP-3 Wireless Record Player**

<table>
<thead>
<tr>
<th>Schem. No.</th>
<th>Description</th>
<th>Philips Part No.</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Motor Switch</td>
<td>42-1503</td>
</tr>
<tr>
<td>2</td>
<td>Master Switch</td>
<td>42-1406-2</td>
</tr>
<tr>
<td>3</td>
<td>Power Transformer</td>
<td>33-8843</td>
</tr>
<tr>
<td>4</td>
<td>Line Condenser (.01 mf. 60 m. 600 v.)</td>
<td>3993 DC</td>
</tr>
<tr>
<td>5</td>
<td>Motor</td>
<td>35-5021</td>
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<tr>
<td>6</td>
<td>Crystal Pickup</td>
<td>35-5028</td>
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<tr>
<td>7</td>
<td>Crystal Cartridge</td>
<td>415-1027</td>
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<tr>
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<td>Filter Resistor (10,000 ohms., ½ watt.)</td>
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<td>Oscillator Grid Cond. (110 m.m.f.)</td>
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<td>Oscillator Grid Resistor</td>
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<td>11</td>
<td>Comp. Resistor (51,000 ohms., ½ watt.)</td>
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<td>Comp. Condenser (.006 mf., 200 v.)</td>
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<td>13</td>
<td>Electrolyte Condenser</td>
<td>(6 mf. 6 M.F., 150 v.)</td>
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<td>Volume Control</td>
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<td>15</td>
<td>Cathode Bias Resistor</td>
<td>(1,000 ohms., ½ watt.)</td>
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<td>16</td>
<td>Screen By-Pass (.1 mf., 200 v.)</td>
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<td>17</td>
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<td>18</td>
<td>Oscillator Coil</td>
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<td>(400 m.m.f.)</td>
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PHILCO RADIO & TELEV. CORP.

TRANISTONE HOME RADIO MODEL TH-4

<table>
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<th>Philco Schem. No.</th>
<th>Part No.</th>
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<td>Tubular Condenser (.02 mf., 400v.)</td>
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<tr>
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<td>29</td>
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<tr>
<td>1st I.F. Transformer</td>
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<tr>
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<td>30-1032</td>
<td>33</td>
<td>Drive Cord Assy</td>
<td>31-2355</td>
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<tr>
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<td>34</td>
<td>Drive Shaft Assy</td>
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<td>Pilot Lamp Socket</td>
<td>36-6225</td>
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<td>27-4891</td>
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<td>30-45568</td>
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<td>27-8130</td>
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<td>30-45568</td>
<td>40</td>
<td>Spring (Drive Cord)</td>
<td>27-8954</td>
</tr>
</tbody>
</table>

MODEL TH-4T IVORY

Cardboard Back                        | 27-9511        | Cardboard Back                        | 27-9545 |
Dial Window                           | 27-5472        | Knob Assembly                         | 27-4810 |
Grille Cloth                          | 44-1387        |                                |
Knob Assy                             | 27-4809        |                                |

MODEL TH-4 is a 5 tube superheterodyne receiver covering a frequency range of 540 to 1720 kilocycles and designed for operation on either alternating current (A.C.) or direct current (D.C.) 115 volts.

An indoor aerial 20 feet in length is attached to the receiver for average receiving conditions; however in apartment houses, hotels, or steel reinforced buildings, the Philco Utility Aerial Part No. 40-6384 is recommended.

NOTE: If no sound is heard after connecting the receiver to the power supply and sufficient time has been allowed for the tubes to heat, reverse the electric plug in the outlet. The same procedure should be observed on A.C. power supplies when a slight hum is heard with the volume turned low.

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REPLACEMENT PARTS

TRANSITONE HOME RADIO MODEL TP-4

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<td>30-45658</td>
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<td>For Speaker 36-1469-9</td>
<td>32-6115</td>
</tr>
<tr>
<td>3</td>
<td>Tuning Condenser</td>
<td>31-2334</td>
<td></td>
<td>For Speaker 36-1469-1</td>
<td>32-6115</td>
</tr>
<tr>
<td>4</td>
<td>Switch</td>
<td>42-1408</td>
<td></td>
<td>For Speaker 36-1469-8</td>
<td>32-6113</td>
</tr>
<tr>
<td>5</td>
<td>Tubular Condenser (.05 mfi, 200V)</td>
<td>30-45198</td>
<td>28</td>
<td>Tubular Condenser (.03 mfi, 400V)</td>
<td>30-44488</td>
</tr>
<tr>
<td>6</td>
<td>Tubular Condenser (.15 mfi, 400V)</td>
<td>32-45056</td>
<td></td>
<td>Electrolytic Condenser (20, 20 mfi, 150V)</td>
<td>30-2382</td>
</tr>
<tr>
<td>7</td>
<td>Resistor (60,000 ohms, 1/3 watt)</td>
<td>33-360944</td>
<td></td>
<td>Field Coil</td>
<td>30-1031</td>
</tr>
<tr>
<td>8</td>
<td>Mica Condenser (110 mfi)</td>
<td>30-3158</td>
<td>28</td>
<td>Pilot Lamp</td>
<td>34-2056</td>
</tr>
<tr>
<td>9</td>
<td>Oscillator Transformer</td>
<td>30-45198</td>
<td></td>
<td>Part of Speaker, Part No 36-1469</td>
<td>30-1031</td>
</tr>
<tr>
<td>10</td>
<td>Tubular Condenser (.05 mfi, 200V)</td>
<td>32-3149</td>
<td>29</td>
<td>Line Resistor</td>
<td>33-3367</td>
</tr>
<tr>
<td>11</td>
<td>1st I.F. Transformer</td>
<td>32-3150</td>
<td>30</td>
<td>Cardboard Back</td>
<td>27-9571</td>
</tr>
<tr>
<td>12</td>
<td>2nd I.F. Transformer</td>
<td>32-3150</td>
<td></td>
<td>Dial Window</td>
<td>27-6472</td>
</tr>
<tr>
<td>13</td>
<td>Resistor (2 meg., 1/3 watt)</td>
<td>33-360944</td>
<td></td>
<td>Drive Cord Assembly</td>
<td>31-2356</td>
</tr>
<tr>
<td>14</td>
<td>Mica Condenser (.25 mfi)</td>
<td>30-1031</td>
<td></td>
<td>Drive Shaft Assembly</td>
<td>31-2356</td>
</tr>
<tr>
<td>15</td>
<td>Resistor (20,000 ohms, 1/3 watt)</td>
<td>33-360944</td>
<td></td>
<td>Drive Drum</td>
<td>28-5652</td>
</tr>
<tr>
<td>16</td>
<td>Volume Control (600,000 ohms)</td>
<td>33-360944</td>
<td></td>
<td>Grille Cloth</td>
<td>44-1387</td>
</tr>
<tr>
<td>17</td>
<td>Tubular Condenser (.01 mfi, 200V)</td>
<td>30-45768</td>
<td>31</td>
<td>Knob Assembly</td>
<td>27-4810</td>
</tr>
<tr>
<td>18</td>
<td>Resistor (4 meg., 1/3 watt)</td>
<td>33-360944</td>
<td></td>
<td>Pointer</td>
<td>27-4810</td>
</tr>
<tr>
<td>19</td>
<td>Resistor (250,000 ohms, 1/3 watt)</td>
<td>33-360944</td>
<td></td>
<td>Scale</td>
<td>27-5656</td>
</tr>
<tr>
<td>20</td>
<td>Tubular Condenser (.01 mfi, 200V)</td>
<td>30-45768</td>
<td></td>
<td>Sockets</td>
<td>27-6130</td>
</tr>
<tr>
<td>21</td>
<td>Resistor (600,000 ohms, 1/3 watt)</td>
<td>33-450244</td>
<td></td>
<td>Speaker</td>
<td>36-1469</td>
</tr>
<tr>
<td>22</td>
<td>Resistor (150 ohms, 1/3 watt)</td>
<td>33-13538</td>
<td></td>
<td>Spring (Drive Cord)</td>
<td>28-5866</td>
</tr>
<tr>
<td>23</td>
<td>Tubular Condenser (.02 mfi, 400V)</td>
<td>30-45198</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>Output Transformer</td>
<td>32-6047</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

TP-4 IVORY

Cardboard Back: 27-9545
Knob Assembly: 27-4810

MODELS TP-4 and TP-4-I are 5 tube superheterodyne receivers having 2 tuning ranges covering from 540 to 1740 kilocycles on the broadcast band and a frequency range from 0.3 to 2.8 megacycles (M.C.) on the police band. This model is designed to operate on either alternating (A.C.) or direct current (D.C.) 110 volts. These models are identical with the exception of cabinets.

An indoor aerial 20 feet in length is attached to the receiver for average receiving conditions; however, in apartment houses, hotels or steel re-inforced buildings, the Philco Utility Aerial Part No. 40-6304 is recommended.

NOTE: If no sound is heard after connecting the receiver to the power supply and sufficient time has been allowed for the tubes to heat, reverse the electric plug in the outlet. The same procedure should be observed on A.C. power supplies when a slight hum is heard with the volume turned low.

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MODEL TH-5T IVORY

REPLACEMENT PARTS

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Philco Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Antenna Transformer</td>
<td>32-3156</td>
</tr>
<tr>
<td>2</td>
<td>Tubular Condenser (.0016 mf. 200v)</td>
<td>32-4666</td>
</tr>
<tr>
<td>3</td>
<td>Tuning Condenser</td>
<td>32-2465</td>
</tr>
<tr>
<td>4</td>
<td>Tubular Condenser (.06 mf. 275v)</td>
<td>32-4540</td>
</tr>
<tr>
<td>5</td>
<td>Tubular Condenser (.16 mf. 400v)</td>
<td>32-4508</td>
</tr>
<tr>
<td>6</td>
<td>Resistor (50,000 ohms, 1/5 watt)</td>
<td>32-4508</td>
</tr>
<tr>
<td>7</td>
<td>Micro Condenser (110 mmf.)</td>
<td>32-1031</td>
</tr>
<tr>
<td>8</td>
<td>Oscillator Transformer</td>
<td>32-3187</td>
</tr>
<tr>
<td>9</td>
<td>Tubular Condenser (.06 mf. 200v)</td>
<td>32-4508</td>
</tr>
<tr>
<td>10</td>
<td>1st I.F. Transformer</td>
<td>32-3149</td>
</tr>
<tr>
<td>11</td>
<td>2nd I.F. Transformer</td>
<td>32-3150</td>
</tr>
<tr>
<td>12</td>
<td>Resistor (2 meg., 1/3 watt)</td>
<td>32-4500</td>
</tr>
<tr>
<td>13</td>
<td>Micro Condenser (250 mmf.)</td>
<td>32-1032</td>
</tr>
<tr>
<td>14</td>
<td>Resistor (20,000 ohms, 1/5 watt)</td>
<td>32-4508</td>
</tr>
<tr>
<td>15</td>
<td>Volume Control (500,000 ohms)</td>
<td>32-4508</td>
</tr>
<tr>
<td>16</td>
<td>Tubular Condenser (.01 mf. 200v)</td>
<td>32-4540</td>
</tr>
<tr>
<td>17</td>
<td>Resistor (4 meg. 1/3 watt)</td>
<td>32-4500</td>
</tr>
<tr>
<td>18</td>
<td>Resistor (250,000 ohms, 1/3 watt)</td>
<td>32-4508</td>
</tr>
<tr>
<td>19</td>
<td>Tubular Condenser (.01 mf. 400v)</td>
<td>32-45728</td>
</tr>
<tr>
<td>20</td>
<td>Resistor (500,000 ohms, 1/3 watt)</td>
<td>32-45024</td>
</tr>
<tr>
<td>21</td>
<td>Resistor (150 ohms, 1/2 watt)</td>
<td>32-45728</td>
</tr>
</tbody>
</table>

MODEL TH-5 is a 5 tube super heterodyne receiver covering a frequency range of 540 to 1720 kilocycles and designed for operation on either alternating current (A.C.) or direct current (D.C.) 115 volts.

This model is equipped with 6 electric push-buttons for automatically selecting stations in addition to dial tuning. Five push-buttons are used for the stations and one push button for selecting dial tuning. The push-buttons cover a frequency range as follows:

<table>
<thead>
<tr>
<th>Paddles (right to left from rear)</th>
<th>Circuit</th>
<th>Frequency Range</th>
<th>Paddles (right to left from rear)</th>
<th>Circuit</th>
<th>Frequency Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ant.</td>
<td>1</td>
<td>540 to 1040 kilocycles</td>
<td>Ant.</td>
<td>4</td>
<td>900 to 1470 kilocycles</td>
</tr>
<tr>
<td>Ant.</td>
<td>2</td>
<td>640 to 1160 kilocycles</td>
<td>Ant.</td>
<td>5</td>
<td>1160 to 1660 kilocycles</td>
</tr>
<tr>
<td>Ant.</td>
<td>3</td>
<td>740 to 1240 kilocycles</td>
<td>Manual</td>
<td>6</td>
<td>Manual</td>
</tr>
</tbody>
</table>

An indoor aerial 20 feet in length is attached to the receiver for average receiving conditions; however in apartment houses, hotels or steel re-inforced buildings, the Philco Utility Aerial Part No. 30-2544 is recommended.

NOTE: If no sound is heard after connecting the receiver to the power supply and sufficient time has been allowed for the tubes to heat, reverse the electric plug in the outlet. The same procedure should be observed on A.C. power supplies when a slight hum is heard with the volume turned low.

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Compliments of www.nucow.com
PHILCO RADIO & TELEV. CORP.

MODELS TP-5, TP-5-I

Schematic, Tuner

IF PEAK 470 KC

FOR OTHER DATA SEE INDEX

MODEL TP-5T WALNUT

Cardboard Back................. 27-9314
Dial Window.................... 27-5472
Grille Cloth.................... 44-1288
Knob Assembly................. 27-8419
Knob Assembly (Push Button) 27-4623
Spring Push-Button Knob...... 29-6866

MODEL TP-5T IVORY

Cardboard Back............... 27-9322
Knob Assy. (Push Button)...... 27-4630
Knob Assy. (Tuning, Volume) 27-4610

MODEL TP-5

Schematic

REPLACEMENT PARTS

<table>
<thead>
<tr>
<th>Schem. No.</th>
<th>Description</th>
<th>Philips Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Antenna Transformer</td>
<td>32-3118</td>
</tr>
<tr>
<td>2</td>
<td>Tubular Condenser (.0015 mf., 220V)</td>
<td>30-4555S</td>
</tr>
<tr>
<td>3</td>
<td>Tuning Condenser</td>
<td>31-2365</td>
</tr>
<tr>
<td>4</td>
<td>Switch</td>
<td>42-1403</td>
</tr>
<tr>
<td>5</td>
<td>Tubular Condenser (.05 mf., 220V)</td>
<td>30-46195</td>
</tr>
<tr>
<td>6</td>
<td>Tubular Condenser (.15 mf., 220V)</td>
<td>30-46086</td>
</tr>
<tr>
<td>7</td>
<td>Resistor (1000 ohms, 1/2 watt)</td>
<td>33-35244</td>
</tr>
<tr>
<td>8</td>
<td>Micro Condenser (10 mm)</td>
<td>30-1031</td>
</tr>
<tr>
<td>9</td>
<td>Oscillator Transformer</td>
<td>32-3167</td>
</tr>
<tr>
<td>10</td>
<td>Tubular Resistor (.25 ohm, 220V)</td>
<td>30-46009</td>
</tr>
<tr>
<td>11</td>
<td>1st I.F. Transformer</td>
<td>32-3149</td>
</tr>
<tr>
<td>12</td>
<td>2nd I.F. Transformer</td>
<td>32-3150</td>
</tr>
<tr>
<td>13</td>
<td>Resistor (2 meg, 1/3 watt)</td>
<td>33-25024</td>
</tr>
<tr>
<td>14</td>
<td>Micro Condenser (250 mm)</td>
<td>30-1030</td>
</tr>
<tr>
<td>15</td>
<td>Resistor (20,000 ohms, 1/3 watt)</td>
<td>33-32024</td>
</tr>
<tr>
<td>16</td>
<td>Volume Control (600,000 ohms)</td>
<td>33-52024</td>
</tr>
<tr>
<td>17</td>
<td>Tubular Condenser (.1 mf., 220V)</td>
<td>30-44798</td>
</tr>
<tr>
<td>18</td>
<td>Resistor (4 meg., 1/3 watt)</td>
<td>33-45224</td>
</tr>
<tr>
<td>19</td>
<td>Tubular Condenser (.01 ohm, 220V)</td>
<td>30-45228</td>
</tr>
<tr>
<td>20</td>
<td>Resistor (500,000 ohms, 1/3 watt)</td>
<td>33-12025</td>
</tr>
<tr>
<td>22</td>
<td>Resistor (120 ohms, 1/2 watt)</td>
<td>33-11025</td>
</tr>
</tbody>
</table>

MODELS TP-5 and TP-5-I are 5 tube superheterodyne receivers having 2 tuning ranges covering from 540 to 1720 kilocycles on the broadcast band and from 2.3 to 2.5 megacycles (M.C.) on the police band. This model is designed for operation on alternating current (A.C.) or direct current (D.C.) 115 volts. These models are identical with the exception of cabinets.

The set is equipped with 5 electric push-buttons for automatically selecting stations in addition to dial tuning. Five push-buttons are used for the stations and one push-button for selecting dial tuning. The push-buttons cover a frequency range as follows:

<table>
<thead>
<tr>
<th>Paddes (right to left from rear)</th>
<th>Circuit</th>
<th>Buttons (left to right from front)</th>
<th>Frequency Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>540 to 1640 kilocycles</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>850 to 1100 kilocycles</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>740 to 1240 kilocycles</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>900 to 1470 kilocycles</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>1160 to 1600 kilocycles</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>Manual</td>
<td>6</td>
</tr>
</tbody>
</table>

An indoor aerial 20 feet length is attached to the receiver for average receiving conditions; however, in apartment houses, hotels or steel reinforced buildings, the Philco Utility Aerial Part No. 40-8354 is recommended.

NOTE: If no sound is heard after connecting the receiver to the power supply and sufficient time has been allowed for the tubes to heat, reverse the electric plug in the outlet. The same procedure should be observed on A.C. power supplies when a slight hum is heard with the volume turned low.

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Compliments of www.nucow.com
SETTING AND OPERATING ELECTRIC PUSH BUTTON TUNING

Models TP-5, TP-11, TH-5

Select five of your favorite nearby broadcast stations and remove their call letters from the station call letter tab sheets supplied. Place the call letters in the windows above the buttons, making sure that each respective button covers the frequency of the station for which it is to be used. The frequency of the popular stations in your vicinity may be found by consulting any station list. The frequency range of the buttons is as follows:

<table>
<thead>
<tr>
<th>Paddles (right to left from rear)</th>
<th>Buttons (left to right from front)</th>
<th>Frequency Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Ant (1)</td>
<td>1</td>
<td>540 to 1030 kilocycles</td>
</tr>
<tr>
<td>2 Ant (2)</td>
<td>2</td>
<td>610 to 1100 kilocycles</td>
</tr>
<tr>
<td>3 Ant (3)</td>
<td>3</td>
<td>740 to 1240 kilocycles</td>
</tr>
<tr>
<td>4 Ant (4)</td>
<td>4</td>
<td>900 to 1470 kilocycles</td>
</tr>
<tr>
<td>5 Ant (5)</td>
<td>5</td>
<td>1160 to 1900 kilocycles</td>
</tr>
<tr>
<td>6 Ant (6)</td>
<td>6</td>
<td>Dial</td>
</tr>
</tbody>
</table>

The left-hand button looking at the front of the cabinet corresponds to the two right-hand screws looking at the rear and covers the lowest frequency range.

With the “Manual” button depressed, tune in the station whose call letters appear above the left-hand button. Then depressing the left-hand button, tune in this station by rotating the “OSC” screw of No. 1 pair (at the right end of the unit looking at the rear of the chassis). Turn the screw slowly and listen carefully or the station may be passed without noticing it. After the “OSC” screw has been adjusted for maximum volume, the corresponding “ANT” screw should be adjusted for maximum. For some stations, it may be necessary to re-adjust the “OSC” screw after the “ANT” screw has been set. Switching from the “Manual” to the automatic push button will enable you to make sure you have the correct station tuned in. When the first station has been set, the same procedure should be followed for the remaining buttons, first tuning in the desired station by means of the “Manual” control.

To tune the receiver with the “Push-Buttons,” simply press in the button which is under the call letters of the desired station. Your station will be received instantly. The volume of the program may be controlled with the manual volume control.

While the above procedure is satisfactory in setting up push buttons for stations, a very accurate adjustment can be obtained with a vacuum tube voltmeter.

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Model 39-8

ALIGNMENT OF COMPENSATORS

EQUIPMENT REQUIRED:

1. Signal Generator: Philco Model 077 Signal Generator which has a fundamental frequency range from 115 to 26,000 K.C. is the correct instrument for this purpose.
2. Output Meter, Philco Model 027 Circuit Tester, incorporates a sensitive output meter and is recommended.
3. Philco Fiber Handle Screw Driver, Part No. 45-2610 and Fiber Wrench, Part No. 3164.

OUTPUT METER:

The Philco 027 Output Meter is connected to the plate and screen terminals of the type 43 tube and adjusted for the 0 to 30 A.C. scale. After connecting the output meter, adjust the compensators in the order as shown in the tabulation below. Locations of the compensators are shown on Fig. 2. If the output meter pointer goes off scale when adjusting the compensators, reduce the strength of the signal from the generator.

<table>
<thead>
<tr>
<th>Operation In Order</th>
<th>Output Connections to Receiver</th>
<th>Dummy Antenna (Note A)</th>
<th>Dial Setting</th>
<th>Control Setting</th>
<th>Adjust Compensators in Order</th>
<th>Special Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8A7 Grid Cap</td>
<td>.1 mf.</td>
<td>470 K.C.</td>
<td>580 K.C.</td>
<td>Vol. Cont. Max.</td>
<td>12A, 10B, 10A</td>
</tr>
</tbody>
</table>

NOTE A—The "Dummy Antenna" consists of a condenser connected in series with the signal generator output lead (high side). Use the capacity as specified in each step of the above procedure.

NOTE B—DIAL CALIBRATION: With the tuning condenser in the "maximum capacity" position (plates fully spaced), set the dial pointer between the two horizontal lines at the low frequency end of the scale (550 K.C.).

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REPLACEMENT PARTS

TRANSITONE HOME RADIO MODEL TP-10

<table>
<thead>
<tr>
<th>Schem. No.</th>
<th>Description</th>
<th>Philco Schem. Part No.</th>
<th>Description</th>
<th>Philco Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Antenna Transformer</td>
<td>32-3184</td>
<td>For Speaker 36-1469-1</td>
<td>32-8044</td>
</tr>
<tr>
<td>2</td>
<td>Tubular Condenser (.0015 mf., 200V)</td>
<td>30-45568</td>
<td>25 Cone Assembly</td>
<td>36-4115</td>
</tr>
<tr>
<td>3</td>
<td>Tuning Condenser</td>
<td>31-2384</td>
<td>For Speaker 36-1469-9</td>
<td>36-4113</td>
</tr>
<tr>
<td>4</td>
<td>Switch</td>
<td>42-1466</td>
<td>Electrolytic Condenser (20-30 mf., 100 V.)</td>
<td>30-2382</td>
</tr>
<tr>
<td>5</td>
<td>Tubular Condenser (.08 mf., 300V)</td>
<td>30-46188</td>
<td>26 Field Coil Part of Speaker No.</td>
<td>36-1469</td>
</tr>
<tr>
<td>6</td>
<td>Tubular Condenser (.15 mf., 400V)</td>
<td>30-46506</td>
<td>27 Pilot Lamp</td>
<td>34-2056</td>
</tr>
<tr>
<td>7</td>
<td>Resistor (50,000 ohms, 1/3 watt)</td>
<td>35-35044</td>
<td>28 Line Resistor</td>
<td>35-5567</td>
</tr>
<tr>
<td>8</td>
<td>Mica Condenser (110 mmf.)</td>
<td>30-1031</td>
<td>29 Tubular Condenser (.005 mf., 400V)</td>
<td>30-44042</td>
</tr>
<tr>
<td>9</td>
<td>Oscillator Transformer</td>
<td>30-35180</td>
<td>30 Cabinet</td>
<td>10367-A</td>
</tr>
<tr>
<td>10</td>
<td>Tubular Condenser (.02 mf., 400V)</td>
<td>30-45188</td>
<td>31 Cardboard Back</td>
<td>27-9360</td>
</tr>
<tr>
<td>11</td>
<td>Ist I.F. Transformer</td>
<td>30-3149</td>
<td>Disc Feet</td>
<td>27-9376</td>
</tr>
<tr>
<td>12</td>
<td>2nd I.F. Transformer</td>
<td>30-3150</td>
<td>Drive Cord Assembly</td>
<td>31-2356</td>
</tr>
<tr>
<td>13</td>
<td>Resistor (2 meg., 1/3 watt)</td>
<td>33-520244</td>
<td>Drive Drum</td>
<td>50-6033</td>
</tr>
<tr>
<td>14</td>
<td>Mica Condenser (250 mmf.)</td>
<td>35-1032</td>
<td>Driving Arm (Pointer Drive)</td>
<td>60-1376</td>
</tr>
<tr>
<td>15</td>
<td>Resistor (20,000 ohms, 1/3 watt)</td>
<td>35-320244</td>
<td>Driving Shaft Assy.</td>
<td>31-2366</td>
</tr>
<tr>
<td>16</td>
<td>Volume Control (500,000 ohms)</td>
<td>35-5306</td>
<td>Grille Silk &amp; Gasket</td>
<td>40-6452</td>
</tr>
<tr>
<td>17</td>
<td>Tubular Condenser (.01 mf., 400V)</td>
<td>30-44768</td>
<td>Knob Assembly</td>
<td>27-4615</td>
</tr>
<tr>
<td>18</td>
<td>Resistor (4 meg., 1/3 watt)</td>
<td>35-540244</td>
<td>Pilot Lamp Socket Assembly</td>
<td>36-9828</td>
</tr>
<tr>
<td>19</td>
<td>Resistor (250,000 ohms, 1/3 watt)</td>
<td>35-425244</td>
<td>Power Cord</td>
<td>1-3199</td>
</tr>
<tr>
<td>20</td>
<td>Tubular Condenser (.01 mf., 400V)</td>
<td>30-45728</td>
<td>Sockets</td>
<td>27-9334</td>
</tr>
<tr>
<td>21</td>
<td>Resistor (500,000 ohms, 1/3 watt)</td>
<td>35-460244</td>
<td>Rubber Tubing Driving Arm</td>
<td>27-9334</td>
</tr>
<tr>
<td>22</td>
<td>Tubular Condenser (.02 mf., 400V)</td>
<td>35-11336</td>
<td>Speaker Assembly</td>
<td>36-1469</td>
</tr>
<tr>
<td>23</td>
<td>Resistor (150 ohms, 1/2 watt)</td>
<td>32-45168</td>
<td>Spring</td>
<td>28-9781</td>
</tr>
</tbody>
</table>

MODEL TP-10 is a 5 tube superheterodyne receiver having 2 tuning ranges covering from 540 to 1720 kilocycles (K.C.) on the broadcast band and 2.5 to 2.6 megacycles (M.C.) on the police band. This model is designed for operation on either alternating current (A.C.) or direct current (D.C.) 115 volts. The receiver is assembled in a streamlined, 2 toned plastic cabinet.

An indoor aerial 20 feet in length is attached to the receiver for average receiving conditions; however in apartment houses, hotels or steel reinforced buildings, the Philco Utility Aerial Part No. 40-856 is recommended.

Note: If no sound is heard after connecting the receiver to the power supply and sufficient time has been allowed for the tubes to heat, reverse the electric plug in the outlet. The same procedure should be observed on A.C. power supplies when a slight hum is heard with the volume turned low.

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MODEL TP-11
Schematic, Tuner

PHILCO RADIO & TELEV. CORP.

IF PEAK 470 KC

FOR OTHER DATA SEE INDEX

MISCELLANEOUS PARTS
SAME AS TP-10 WITH EXCEPTION

Cabinet.......................... 10388-A
Disc Feet.......................... 27-9387
Knob Assembly (Pushbutton)...... 27-4824
Knob Assembly (Tuning)........... 27-4815
Padder Strip....................... 31-6293
Push Button Switch............... 42-1485
Wave Switch....................... 45-1408

REPLACEMENT PARTS

Schem. No. Description Phileco Part No.
1 Antenna Transformer.............. 32-3168
2 Tubular Condenser (.0015 mf., 200V) 30-16555
3 Tuning Condenser.................. 31-2565
4 Switch.......................... 48-1408
5 Tubular Condenser (.05 mf., 200V) 30-45198
6 Tubular Condenser (.1 mf., 400V) 30-46063
7 Resistor (50,000 ohms, 1/2 watt) 33-45024
8 Mica Condenser (110 mf.)........... 30-1031
9 Oscillator Transformer.......... 32-3107
10 Tubular Condenser (.05 mf., 200V) 30-45198
11 1st I.F. Transformer............. 32-3149
12 2nd I.F. Transformer............. 32-3150
13 Resistor (2 meg., 1/2 watt)...... 33-62004
14 Mica Condenser (250 mf.)....... 30-1032
15 Resistor (20,000 ohms, 1/2 watt) 33-38024
16 Volume Control (500,000 ohms) 32-5306

MODEL TP-11 is a 5 tube superheterodyne receiver having 2 tuning ranges covering from 640 to 1720 kilocycles (K.C.) on the broadcast band and from 4.5 to 2.6 megacycles (M.C.) on the police band. This model is assembled in a 2 toned, streamlined plastic cabinet.

This model is equipped with 6 electric push-buttons for automatically selecting stations in addition to dial tuning. Five push-buttons are used for the stations and one push-button for selecting dial tuning. The push-buttons cover a frequency range as follows:

<table>
<thead>
<tr>
<th>Padders (right to left)</th>
<th>Buttons (left to right)</th>
<th>Frequency Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Ant.</td>
<td>1 Osc.</td>
<td>340 to 1030 kilocycles</td>
</tr>
<tr>
<td>2 Ant.</td>
<td>2 Osc.</td>
<td>650 to 1100 kilocycles</td>
</tr>
<tr>
<td>3 Ant.</td>
<td>3 Osc.</td>
<td>740 to 1240 kilocycles</td>
</tr>
<tr>
<td>4 Ant.</td>
<td>4 Osc.</td>
<td>900 to 1740 kilocycles</td>
</tr>
<tr>
<td>5 Ant.</td>
<td>5 Osc.</td>
<td>1160 to 1600 kilocycles</td>
</tr>
<tr>
<td>6 Ant.</td>
<td>Manual</td>
<td></td>
</tr>
</tbody>
</table>

An indoor aerial 20 feet in length is attached to the receiver for average receiving conditions; however in apartment houses, hotels or steel re-inforced buildings, the Philco Utility Aerial Part No. 40-6204 is recommended.

NOTE: If no sound is heard after connecting the receiver to the power supply and sufficient time has been allowed for the tubes to heat, reverse the electric plug in the outlet. The same procedure should be observed on A.C. power supplies when a slight hum is heard with the volume turned low.

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REPLACEMENT PARTS
TRANSITONE HOME RADIO MODEL TP-12

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Philco Schem. Part No.</th>
<th>Description</th>
<th>Philco Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Antenna Transformer.</td>
<td>32-3164</td>
<td>For Speaker 36-1469-1.</td>
<td>36-4115</td>
</tr>
<tr>
<td>2</td>
<td>Tubular Condenser (.0015 mF., 200V)</td>
<td>30-4566</td>
<td>Cone Assembly</td>
<td>32-9044</td>
</tr>
<tr>
<td>3</td>
<td>Tuning Condenser.</td>
<td>31-2554</td>
<td>For Speaker 36-1469-1.</td>
<td>36-4115</td>
</tr>
<tr>
<td>4</td>
<td>Switch.</td>
<td>42-1406</td>
<td>For Speaker 36-1469-1.</td>
<td>36-4115</td>
</tr>
<tr>
<td>5</td>
<td>Tubular Condenser (.05 mF., 200V).</td>
<td>30-45198</td>
<td>Electrolytic Condenser</td>
<td>30-2362</td>
</tr>
<tr>
<td>6</td>
<td>Tubular Condenser (.15 mF., 400V).</td>
<td>30-45056</td>
<td>(20-20 mF., 150V).</td>
<td>30-2362</td>
</tr>
<tr>
<td>7</td>
<td>Resistor (50,000 ohms, 1/3 watt).</td>
<td>33-358244</td>
<td>Field Coil... Part of Speaker No. 36-1469</td>
<td>30-2362</td>
</tr>
<tr>
<td>8</td>
<td>Mica Condenser (100 mF.).</td>
<td>30-1031</td>
<td>'Pilot Lamp.'</td>
<td>34-2068</td>
</tr>
<tr>
<td>9</td>
<td>Oscillator Transformer.</td>
<td>32-3162</td>
<td>Line Resistor.</td>
<td>33-3387</td>
</tr>
<tr>
<td>10</td>
<td>Tubular Condenser (.05 mF., 200V).</td>
<td>30-45198</td>
<td>Tubular Condenser (.05 mF., 400V).</td>
<td>30-44498</td>
</tr>
<tr>
<td>11</td>
<td>1st I.F. Transformer.</td>
<td>30-3149</td>
<td>Cardboard</td>
<td>27-9299</td>
</tr>
<tr>
<td>12</td>
<td>2nd I.F. Transformer.</td>
<td>32-3150</td>
<td>Cabinet</td>
<td>10874</td>
</tr>
<tr>
<td>13</td>
<td>Resistor (2 meg., 1/3 watt).</td>
<td>33-520244</td>
<td>Cable (Power).</td>
<td>L-3163</td>
</tr>
<tr>
<td>14</td>
<td>Mica Condenser (250 mF.).</td>
<td>30-1032</td>
<td>Dial Scale</td>
<td>27-5469</td>
</tr>
<tr>
<td>15</td>
<td>Resistor (20,000 ohms, 1/3 watt).</td>
<td>33-320244</td>
<td>Drive Drum</td>
<td>28-6662</td>
</tr>
<tr>
<td>16</td>
<td>Volume Control (500,000 ohms).</td>
<td>33-52034</td>
<td>Drive Shaft Assembly.</td>
<td>31-2355</td>
</tr>
<tr>
<td>17</td>
<td>Tubular Condenser (.01 mF., 200V).</td>
<td>30-44798</td>
<td>Drive Cord Assembly.</td>
<td>31-2355</td>
</tr>
<tr>
<td>18</td>
<td>Resistor (4 meg., 1/3 watt).</td>
<td>33-540244</td>
<td>Knob Assembly.</td>
<td>27-4820</td>
</tr>
<tr>
<td>19</td>
<td>Resistor (250,000 ohms, 1/3 watt).</td>
<td>33-425244</td>
<td>Pointer Dial.</td>
<td>56-1028</td>
</tr>
<tr>
<td>20</td>
<td>Tubular Condenser (.01 mF., 400V).</td>
<td>30-45725</td>
<td>Spring (Drive Cord)</td>
<td>28-9761</td>
</tr>
<tr>
<td>21</td>
<td>Resistor (500,000 ohms, 1/3 watt).</td>
<td>33-450244</td>
<td>Speaker</td>
<td>36-1469</td>
</tr>
<tr>
<td>22</td>
<td>Resistor (130 ohms, 1/3 watt).</td>
<td>33-113336</td>
<td>Socket Assembly (Pilot Lamp).</td>
<td>38-9828</td>
</tr>
<tr>
<td>23</td>
<td>Tubular Condenser (.02 mF., 400V).</td>
<td>30-45168</td>
<td>Sockets</td>
<td>27-6128</td>
</tr>
<tr>
<td>24</td>
<td>Output Transformer.</td>
<td>32-8047</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

MODEL TP-12 is a 5 tube superheterodyne receiver having 2 tuning ranges covering from 540 to 1720 kilocycles (K.C.) on the broadcast band and from 2.3 to 2.5 megacycles (M.C.) on the police band. This model is designed to operate on either alternating (A.C.) or direct current (D.C.) 115 volts. This model is assembled in a walnut cabinet with contrasting maple inlays.

An indoor aerial 20 feet in length is attached to the receiver for average receiving conditions; however, in apartment houses, hotels or steel reinforced buildings, the Philco Utility Aerial Part No. 40-626 is recommended.

NOTE: If no sound is heard after connecting the receiver to the power supply and sufficient time has been allowed for the tubes to heat, reverse the electric plug in the outlet. The same procedure should be observed on A.C. power supplies when a slight hum is heard with the volume turned low.

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The wiring of the earlier and later production models 12-TP were different. The complete circuit diagram of the early production receiver is shown above. The later production receivers used a Model 39-6 chassis.

The Phonograph connections as used with Model 39-6 is shown below. Refer to index for Model 39-6.

**MODEL 39-12TP**

"EARLY TYPE"

<table>
<thead>
<tr>
<th>Schem. No.</th>
<th>Description</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>31</td>
<td>Motor (115 Volts)</td>
<td>35-1174</td>
</tr>
<tr>
<td>32</td>
<td>Condenser (.05 mfd., 200 V.)</td>
<td>30-4591</td>
</tr>
<tr>
<td>33</td>
<td>Cable</td>
<td>415-1027</td>
</tr>
<tr>
<td>34</td>
<td>Resistor (32,000 ohms)</td>
<td>33-332359</td>
</tr>
<tr>
<td>35</td>
<td>Condenser (.006 mfd., 400 V.)</td>
<td>30-4591</td>
</tr>
<tr>
<td>36</td>
<td>Crystal Cartridge</td>
<td>415-1027</td>
</tr>
<tr>
<td>37</td>
<td>Resistor (32,000 ohms)</td>
<td>33-332359</td>
</tr>
<tr>
<td>38</td>
<td>Switch (Radio-Phono)</td>
<td>33-410359</td>
</tr>
<tr>
<td>39</td>
<td>Motor (Power Switch)</td>
<td>42-1498</td>
</tr>
<tr>
<td>40</td>
<td>Condenser (.006 mfd., 400 V.)</td>
<td>35-2027</td>
</tr>
<tr>
<td>41</td>
<td>Tone Control. Pickup Complete</td>
<td>35-4591</td>
</tr>
</tbody>
</table>

**MODEL 39-12TP**

"LATER PRODUCTION MODELS"

<table>
<thead>
<tr>
<th>Schem. No.</th>
<th>Description</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>34</td>
<td>Condenser (.006 mfd., 400 V.)</td>
<td>30-4591</td>
</tr>
<tr>
<td>35</td>
<td>Tone Control.</td>
<td>35-4591</td>
</tr>
<tr>
<td>36</td>
<td>Crystal Cartridge (Pickup)</td>
<td>415-1027</td>
</tr>
<tr>
<td>37</td>
<td>Resistor (30,000 ohms)</td>
<td>33-332359</td>
</tr>
<tr>
<td>38</td>
<td>Resistor (100,000 ohms)</td>
<td>33-410359</td>
</tr>
<tr>
<td>39</td>
<td>Switch (Radio-Phono)</td>
<td>42-1498</td>
</tr>
<tr>
<td>40</td>
<td>Cable</td>
<td>35-2027</td>
</tr>
<tr>
<td>41</td>
<td>Condenser (.05 mfd., 200 V.)</td>
<td>30-4591</td>
</tr>
<tr>
<td>42</td>
<td>Pickup Complete</td>
<td>35-4591</td>
</tr>
<tr>
<td>43</td>
<td>Motor (115 Volt A.C. 60 cycle)</td>
<td>35-1174</td>
</tr>
<tr>
<td>44</td>
<td>Power Switch (Motor)</td>
<td>42-1498</td>
</tr>
</tbody>
</table>

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PHILCO RADIO PHONOGRAPHER

MODEL 12-TP

SPECIFICATIONS

TYPE OF CIRCUIT: Model 39-12 TP is a table model combination semi-automatic phonograph and superheterodyne radio receiver. The phonograph mechanism automatically places the pickup on the record when the lid is closed and will play 10 or 12 inch records.

A.C. operated, superheterodyne with automatic volume control, pentode audio output, and covers the standard broadcast and state police frequencies.

POWER SUPPLY:

Frequency: 60 cycles
Voltage: 115-50 to 60

INTERMEDIATE FREQUENCY: 470 K.C.

R.F. TUNING RANGE: 540 to 1720 K.C.

AUDIO OUTPUT: 2 watts.

PHILCO TUBES USED: Five: One 5A7, Det. Osc.; One 78, I.F.; One 75, 2nd Det., 1st Audio; One 41, Output, and 12A6, Rectifier.

TUNING MECHANISM: 8 to 1 Ratio using pulley and cord.

ALIGNMENT OF COMPENSATORS

The 470 K.C. intermediate frequency is connected to the plate and cathode terminals of the 41 tube. Adjust the meter to use the (0.02) coil scale and advance the attenuator control of the generator until a readable indication is noted on the output meter after signal is applied.

DIAL CALIBRATION:

1. Turn the tuning condenser to maximum capacity position (plates fully retracted).
2. Holding the tuning condenser in this position, turn the pointer until it is 1/16 of an inch below the three lines of the scale at the 850 K.C. end. This is the correct position of pointer at maximum capacity of tuning condenser.

<table>
<thead>
<tr>
<th>OPERATIONS IN ORDER</th>
<th>STAGE GENERATOR</th>
<th>RECEIVER</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output Connections to Receiver</td>
<td>Dummy Antenna</td>
<td>Dial Setting</td>
<td>Dial Setting</td>
</tr>
<tr>
<td>1</td>
<td>5A7 Grid</td>
<td>.1 mfd</td>
<td>470 K.C.</td>
</tr>
<tr>
<td>2</td>
<td>Aerial (White Wire)</td>
<td>100 mfd</td>
<td>1500 K.C.</td>
</tr>
</tbody>
</table>

REPLACEMENT PARTS

MODEL 39-12 TP

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OPERATION

AUTOMATIC POSITION:
To load the mechanism lift the record removing arm at (A) Fig. 1 to the upward position. To adjust the pickup, automatically push the pickup stop at (K) Fig. 1 back away from the pickup. To play 10° records manually, pull the stop forward as far as it will go, place records on turntable. Throw switch at (N) Fig. 1 to the "ON" position. Mechanism will now operate and reject each record after it has been played through. To reject a record and play the next record below it, pull the latch lever at (L) Fig. 1 forward.

MANUAL POSITION:
To operate the mechanism in the manual position, lift the record removing arm at (A) Fig. 1 to the upward position. 10° or 12° records can then be played by pushing the pickup stop at (K) Fig. 1. To play 12° records manually, push the pickup stop at (K) Fig. 1 back away from the pickup needle. Under no circumstances use oil heavier than an SAE 10 or any oil containing mixtures of animal or vegetable oil.

MOTOR LUBRICATION
The motor installed in this record changer is governor controlled, with all gearing enclosed and leaves the factory lubricated for proper operation. For best results, lubricate the motor at regular intervals with a pure mineral oil as light as obtainable. Under no circumstances use any oil heavier than an SAE 10 or any oil containing mixtures of animal or vegetable oil.

The governor disc engages with a felt brake. This felt is impregnated with a lubricating solution sufficient for proper operation for approximately six months. An oil hole is provided in the top of the governor housing for re-lubricating the brake felt.

MOTOR SPEED
The motor speed is adjusted by means of a slotted post (C) Fig. 1 which is located under the turntable. To change motor speed rotate this post slightly by means of a screwdriver.

TRIP MECHANISM
The trip mechanism is the trigger that sets the Record Changer in motion. This is done by allowing the latch bar to drop in front of the notch in the lift lever at (J) Fig. 1. This reset is actuated by the cam at (F) Fig. 1. This cam is driven by the motor and is in motion as long as the motor is running. The purpose of this mechanism is to operate smoothly, the precautions outlined in succeeding paragraphs should be observed.

First of all, make sure that the square pin in the latch lever at (J) Fig. 1. When the square pin is properly in the notches of the latch lever, the latch bar should be engaged approximately one half of its depth of engagement is adjusted by means of the eccentric washer and locking screw at (J) Fig. 1. Now run the record changer through its cycle. This square pin will engage the notch in the lift lever, first check the tension of the latch spring at (H) Fig. 1 to insure that the latch can engage the pin. Next check the tension of the latch spring at (H) Fig. 1 to make sure that the latch spring should not be under tension when the latch bar is latched but should have enough tension when the latch bar drops back off of the cam to cause the square pin to over travel the notch in the lift lever.

IMPORTANT: — Before attempting to change the tension of the latch spring, be sure that the parts involved work freely without any tendency to bind, as of course any binding condition would preclude proper operation.

The Record Changer is adjusted at the factory to trip the record groove when the phonograph needle is 1-5/64" from the edge of the hole in the center of the record.

When eccentric or oscillating trip groove records are used, tripping is effected by means of the

hardened steel pin in the end of tone arm lift crank at (8) Fig. 2 and the serrated block on the trip lever at (7) Fig. 2. There must be a minimum of 1/32" play between the end of the pin and the block, when with a short length (8) the pickup is resting on one record on the turntable. If the pressure of the pin on the block is not sufficient to trip, check the pressure spring which is located up under the pickup.

The oval head pivot screw at (B) Fig. 1 serves as a pivot for the lift lever at (Q) Fig. 1. This screw should allow the lift lever to be raised by the latch bar to its maximum height without binding but also without any additional play.

If the Record Changer fails to trip, see if the phonograph needle is jumping out of a worn record trip groove. Next make certain that all parts of the mechanism work freely. If it is found that the latch bar at (O) Fig. 1 is not dropping in far enough to engage the cam at (P) Fig. 1 then check the tension of the trip spring at (B) Fig. 1.

RECORD REMOVING MECHANISM
The record Changer is adjusted so that it will always leave one record on the turntable. This is done to prevent the phonograph needle from damaging the covering on the turntable.

In case the Record Removing Mechanism fails to operate smoothly, proceed as follows: make certain that all parts are free and that the pickup assembly rests on the stop screw at (Q) Fig. 5. Next stop the motor in such a position that the pickup assembly at (O) Fig. 1 can swing by and clear the cam at (P) Fig. 1. Place just one record on the turntable and measure from the top of this record down to the base plate. This distance should be one inch. Now by pulling the reject lever at (L) Fig. 1, first, it will be found possible to reset the record changer finger at (Y) Fig. 2 over to where it just touches the edge of the record. If the adjustment is correct, the record removing finger should just barely rise over the edge of the first record. If adjustment is required it can be made by means of the stop screw at (Q) Fig. 5. In the event the record removing arm raises the record from the turntable and drops it back in place without removing it, check the lift adjustment at (P) Fig. 1. This adjustment consists of an eccentric stud which is provided with a lock nut, and is made by loosening the lock nut and turning the eccentric stud. The lift adjustment should be set so that the hole in the center of the record just clears turntable spindle when the Record Changer is in operation.

PICKUP LOWERING MECHANISM
The pickup lowering mechanism has two functions. First, it lowers the phonograph needle gently to the surface of the record. Second, it raises the needle toward the center of the record so that it will enter the playing groove.

If the pickup descends too fast or too slow, adjust the speed of descent by turning the knurled thumb nut on the dashpot sleeve at (W) Fig. 2. The unit is adjusted at the factory so that the needle will be set down approximately 3/32" in from the edge of the record. An adjusting screw is provided on the side of the pickup at (M) Fig. 2. If the needle is being lowered onto the playing surface of the record, and the adjusting screw at (M) Fig. 2 fails to correct the condition proceed as follows: First stop the record changer, with the pickup in the maximum raised position and check the clearance between the underside of the pickup shelf at (Z) Fig. 2 and the tip of the dashpot. This clearance should be very small and the shock of the pickup should tend to bounce as it is lowered. There must be sufficient clearance however to prevent the pickup shelf from rubbing on the tip of the dashpot, or the pickup will not swing out far enough to allow the adjustable stop at (K) Fig. 2 to come to rest against the dashpot. Check this clearance in both 10° and 12° record position. If additional clearance is required, the height of the dashpot may be regulated by loosening the nuts on the bottom of the lift lever at (X) Fig. 4 and the up and down position on the stud. To raise the dashpot turn the nuts clockwise, to lower the dashpot turn the nuts counter-clockwise. Be sure to lock the nuts tightly together after the adjustment is made.
REMOVING MOTOR TRANSMISSION

In removing the motor transmission, the following parts should be disassembled first:
1. Remove turntable shaft. (See paragraph — Removing Turntable Shaft Assembly.)
2. Un solder pickup wires.
3. Loosen the two set screws which hold the tone arm lever and the tone arm shaft and remove tone arm and shaft.
4. Remove the mounting screws which hold the tone arm post to the panel. Un solder electric tone arm reject switch wire from the terminal strip and remove tone arm post.
5. Remove "C" washer from the drive link pin — this will allow the drive link to be removed from the transmission and then remove the six mounting screws holding the transmission to the panel and take out the transmission.
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TONE ARM ELECTRIC REJECT SWITCH WILL NOT OPERATE

(When no record is on turntable)

The tone arm electric reject switch operates when the mechanism is first loaded and no records are on the turntable or no records are on the record support arms. This switch is closed when the pick-up needle is clamped into a groove provided in the turntable, allowing the tone arm to go to a lower level and causing switch contact to close. Adjustment of this switch is as follows:

1. Adjust screw (9) Fig. 1 located in the tone arm directly above the end of the tone arm shaft. Turn this screw in the direction necessary to obtain a clearance of 1/4" between the bottom of the groove in the turntable and the bottom end of the needle.

2. With a record on the turntable and the needle resting on the record, a clearance of 1/4" between the top and bottom contacts of the tone arm electric reject switch should be obtained. Bend the moving contact spring upward or downward to obtain the necessary clearance.

3. Also check the electric magnet (19) Fig. 3 and associated wiring for continuity.

4. Check the small metal rod connecting the trip trigger (18) Fig. 3 and lever of electric magnet.

MECHANISM WILL NOT REJECT AT THE END OF RECORDS

The tone arm is designed to reject records with an oscillating or spiral groove. This mechanism will give satisfactory adjustments for either type of records, proceed as follows:

1. See that the screw (10) Fig. 1 which clamps the tone arm swirl brace is tight. Make sure that the set screws holding the tone arm lever (12) Fig. 3 to the tone arm shaft are tight.

2. Oscillating Groove Records

Records with an oscillating reject groove are rejected by the trip dog located on the end of the tone arm lever (12) Fig. 3 engaging the saw teeth of the trip trigger (13) Fig. 3. When the mechanism will reject an oscillating groove record, either the screws mentioned in paragraph 1 above or the trip dog trigger (15) Fig. 3 or springs (15) Fig. 3 are tight. When it is found that these parts have become worn or weak, they should be replaced.

3. Spiral Groove Records

Records with spiral reject grooves are rejected by the trip shoe (14) Fig. 3 located on the end of the tone arm lever (12) Fig. 3. This trip shoe (14) Fig. 3 hits the pin on the trip trigger (13) Fig. 3 engaging the clutch throwback (29) Fig. 3. This should occur when the pick-up needle has traveled to within a distance of 1/8" from the center of the turntable surface. Adjust the mechanism to this type of record as follows: If the pick-up does not reject the mechanism after traveling to within 1/8" from the center of the turntable spindle (or 1/8" from the center of the first groove in the turntable) loosen the knurled nut holding trip shoe (14) Fig. 3 to the tone arm lever (12) Fig. 3. Move trip shoe forward or away from the pin on the trip trigger (13) Fig. 3 until the trip shoe operates the mechanism properly. When this point is found, the knurled nut should be well tightened.

TEN AND TWELVE INCH RECORDS DO NOT SEPARATE PROPERLY IN A MIXED LOADING

Ten and twelve inch records in a mixed loading are separated by lifter clips (20) Fig. 1 located on the record support arms (6) (16) Fig. 1. These come up when the next record to be selected by the mechanism is 10" and are designed to lift a 12" record when one is located directly above the 10" record. This allows the selector blades (5) Fig. 1 and guide arms (4) Fig. 1 to slide under the 12" record so that a 10" record can be placed on the turntable. The lifter clips (20) Fig. 1 are caused to operate by the 10" record hitting the end of the cam. Check the following parts when mechanism does not operate properly:

1. The lifter cam link (20) Fig. 1 should be approximately 3/4" above the surface of the record support arms (6) (16) Fig. 1 when record arm is in the rest position. This link is held in this position by the small return spring found under (20) Fig. 1 underneath the support arms (6) (16) Fig. 1. If this link is not above the surface of the support arms (6) (16) Fig. 1, check for loose spring; replace spring if necessary.

2. The selector blades (5) Fig. 1 should have a slight downward pressure on the guide groove of the select arm (6) Fig. 1 when in their return position ready for next selection.

3. In their full return position after a record has been played on the turntable there may be a small amount of play on the guide arm link pin (22) Fig. 1 so that the selector blades will carry the guide arm toward the edge of a record when making the next selection. If any of the blades do not return close enough to clear the guide arm link pin (22) Fig. 1, the blade should be adjusted as given in paragraph "RECORD SELECTORS DO NOT OPERATE IN SYNCHRONISM."
SELECTOR BLADE (5) FIG. 1 FAILS TO SEPARATE BOTTOM RECORD FROM STACK

This is due either to a badly warped condition of the record, or to its being of a thickness considerably different from those now in standard use. The design of both selector blade and record support arms is such as to accommodate a maximum variation in thickness and flatness of records, but certain records may be found which are so far out as to be unfit for use in the automatic changer.

RECORD SELECTORS DO NOT OPERATE IN SYNCHRONISM

If the record selector blades (5) Fig. 1 do not operate in synchronism proceed as follows:

1. Select knob (1) Fig. 2 to “automatic” position. See page 1 “Automatic and Manual Positions”. (Turn knob to the left until it snaps up). Place one 10” record on selector blades (5) Fig. 1 and record has been dropped to record supports, pull lower plug and rotate turntable by hand until the selector blades are close to the edge of record. At this point all selector blades should be as nearly as possible the same distance from the spindle. If the selector blades are not as nearly as possible the same distance from the spindle due to replacement of gears, etc., the blades are resynchronized as follows:

2. When in the same condition as outlined in paragraph 1, remove the “C” washer from segment arms (23) or (27) Fig. 3 depending on which of these selector blades are out of time. Pull segment arm down so that gears are disengaged, then move selector blade (5) Fig. 1 in direction necessary to align it with other blades. When this position is found, mesh gears and replace “C” washer.

MECHANISM DOES NOT RETURN SELECTOR BLADES TO LOADING POSITION

If the selector blades will not return to the loading position (pointed toward spindle) after a record has been played on the turntable:

1. Look for trouble in the parallel cam switch (6) Fig. 3. The effect of this switch should be in a closed position, at the time a record is being played.

2. When the selector blades are in the proper loading position, disconnect switch (6) Fig. 1. Fig. 3. To place the mechanism in the loading position, turn changer switch (8) Fig. 1 off. After the switch is off the changer should be rotated until the next record is selected and dropped on the turntable. When the record is dropped on the turntable, cam (27) Fig. 3 should open parallel switch (6) Fig. 3. If the turntable starts rotating the selector blades should be pointed toward spindle.

3. To adjust cam (27) Fig. 3 loosen the two set screws and rotate the mechanism on the shaft until proper position is obtained. Retighten set screws.

If the top record slips when pick-up is in the playing position, check the following parts:

1. Check for excessively warped records. Records warped too badly should be replaced and not used in the changes.

2. Check for worn grooves in record, particularly old records. After the grooves of the records lose their gloss, the pick-up does not glide through them easily. This condition has a tendency to cause pick-up needle to drag resulting in the top record slipping.

3. Check record friction spring (16) Fig. 2 for tension. This spring should protrude far enough from the shaft to hold the top record from slipping when in the playing position. This spring when adjusted properly to hold a record, should also allow a 10” record to fall freely onto the turntable.

4. If the spring is in need of adjustment, see heading “Removing Turntable Shaft Assembly”, Paragraph 4.

OILING AND GREASING MOTOR AND MECHANISM

The motor and mechanism should be oiled and greased every six months with a good grade of S. A. E. 10 oil.

Parts to Lubricate:
1. All bearings of the mechanism.
2. All sliding surfaces such as, cams, etc., should be lubricated with a very light grease.
3. Motor bearings and governor felt.

TURNTABLE SPEED ADJUSTMENT

If motor runs too fast or slow, the governor adjustment screw (27) Fig. 2 on the top side of the governor should be screwed in or out slightly as required. To do this, loosen the lock nut and turn screw, then retighten lock nut.

REMOVING TURNTABLE SHAFT ASSEMBLY

To remove the turntable shaft assembly, proceed as follows:

1. Loosen the two set screws holding the motor coupling (21) Fig. 2 to the turntable shaft.

2. Loosen the two screws holding the turntable drive worm (23) Fig. 2 to the turntable shaft, then lift out turntable and shaft.

3. To remove the turntable from the shaft, remove the three screws and nuts which hold it to the hub.

4. The record friction spring (16) Fig. 2 on the turntable shaft can be removed by pushing the hub downward toward the heavy end of the turntable—spring can then be removed. If it is desired to increase the record friction on spring, bend upward the lower portion of the spring which contacts with the bottom surface of the hub. To decrease the record friction against the spring, bend the spring downward.

The motor is removed as follows:

1. Remove the three 5/16” machine screws which hold the motor to the motor mounting bracket. Three 5/16” spurs will also be found which space the motor from the mounting plate.

2. There are two screw bracket locating pins on the underside of the changer base panel which pass through rubber grommets located in the motor mounting bracket. These are provided to keep the mounting panel and motor bracket in proper alignment.

MECHANISM AND CHASSIS MOUNTING

The mechanism is mounted in the cabinet as follows: 4 mounting studs are located in the bottom surface of the panel each threaded to take 4/32” No. 20 machine screws. The mounting panel rests on four tapered coil springs. The small end of each spring is pressed over a mounting stud and the large end of each spring fits into a screw in the top surface of the mounting shaft in the cabinet. Four spacing blocks 1/8” thick and with a 5/32” hole are fastened to the lower side of the cabinet motor board. The 5/32” hole in each block is centered with the 1/8” screw clearance hole. These are provided and located on the lower side of the cabinet motor board into which each of the lower mounting springs are to fit. The 4/32” No. 20 machine screws are turned through the four wing nuts until the head of each screw is against the head of the bottom side of each wing nut. The four lower springs are of smaller diameter than the upper springs. These lower springs are slipped over the nuts to each of the 4/32” No. 20 machine screws and the smaller end toward the head and resting on the wing nuts.

The 4/32” No. 20 machine screws are pushed through the 1/8” clearance hole and tightly screwed. Wing nuts should be backed down on head of 4/32” No. 20 bolt to place changer in operation.
NO REPRODUCTION WHEN NEEDLE IS OPERATING ON RECORD

A muting switch (177 Fig. 3, the purpose of which is to short the pick-up during the change cycle. This switch is mounted on the transmission frame, and is operated from the clutch throw-out (29) Fig. 3. When a record is on the turntable and the needle is in playing position, the contact of this switch should be in the open position.

AUTOMATIC CLUTCH DOES NOT COMPLETELY DISENGAGE AT THE END OF THE CYCLE

This trouble is identified by a steady thumping or clicking sound when the pick-up is in the playing position and is caused by the clutch not properly disengaging at the end of the automatic cycle. In most cases, this trouble is due to the clutch clearance adjusting plate not being in the proper position on the tone arm brake (9) Fig. 3. To eliminate this trouble, make the following adjustments:

1. Loosen the two screws that hold the clutch clearance adjusting plate to the tone arm brake lever (8) Fig. 3. Advance the adjusting plate until the clutch housing (30) Fig. 3 clears the clutch sprocket.
2. If the clutch disengages before the pin on the drive drum (10) Fig. 3 reaches the inclined surface of the adjusting plate, the plate should then be retarded until the drive drum pin passes over the humps and slides down inclined surface.

FAILURE OF UNIVERSAL DRIVE COUPLING

The Universal drive coupling consists of four strips of rubber held together by a frame having ears projecting into slots in the rubber.

If excessive strain is placed on the coupling, the projecting ears may slip out of the slots in the rubber, thus disconnecting the drive. In order to hold the coupling together more firmly, the outer end of these ears projecting through the rubber may be bent outward at right angles to form a hook which will hold the rubber firmly in place. Do not make bend any more than 90° from end of ear. See Fig. 4.

Automatic Record Changer

Part No. 35-1180

PHILCO AUTOMATIC RECORD CHANGER Part No. 35-1180 automatically changes either twelve 10" or ten 12" records. The service information contained in this bulletin covers the operation, care, and adjustments that may be necessary if the mechanism ceases to function properly.

When ordering parts for this mechanism, refer to the part number of the entire mechanism in addition to the number and names of the parts shown in the figures of this bulletin.

CHANGER OPERATION

Setting for Record Size

This changer plays up to twelve 10-inch records or ten 12-inch records at one loading.

On each post you will see two plates. The lower one, on which the record rests, is the shelf plate. The upper one is the selector blade which selects the next record to be played from the bottom of the stack.

To set for record size, (1) Clasp one of the posts just underneath the shelf plate, with thumb and finger of left hand. With right hand, lift knob and turn selector plate until the figure 10 or 12 (whichever size you want to play) is opposite the pointer. Do the same with the other post. Both selector plates must be in 10 or 12 positions. (2) Push button marked 10 or 12, as required (see Figure 1).
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TONE ARM SLIDES INWARD ACROSS RECORD
This is caused by the guide arms stud (12) not releasing from the grooves in the upper side of the large cam gear (11). This may be due to friction at the shoulder screw (20) or the coil spring lifting the arm may be weak.
If the coil spring appears to be weak, it may be strengthened by shortening. If there is binding at the bearing, a little oil will help; also, a few movements by hand under considerable pressure will relieve the binding. If the binding is caused by the arcing being twisted out of line, the trouble can be sure by straightening up the parts.

ADJUSTING THE RISING HEIGHT OF PICK-UP ARM
The pick-up arm should rise high enough during the change cycle so that the top of the tone arm clears the record resting on the support arms by 1/4. When the maximum load of records are on the turntable, the needle should clear the top record, if not adjust as follows:
Loosen the lock nut in pick-up sleeve (22). Turn the sleeve in the direction necessary to lengthen or shorten the pick-up plunger (21). After correct adjustment is found, tighten lock nut.

ADJUSTING DISTANCE FROM TURNTABLE SPINDLE AT WHICH REJECT WILL OPERATE AND CYCLE WILL BEGIN
The mechanism is designed to reject records of all types whether they are provided with special grooves or not. The mechanism is adjusted to operate 1/2" from the center of the record spindle; this distance has been found to be the most satisfactory point for all modern records so that they will be rejected after they have been played through. To adjust the reject mechanism for this distance or any distance that may be desired, a trip adjusting screw (18) is provided. By turning this screw toward the trip trigger (16), the mechanism is caused to operate at a closer distance from the spindle. Turning the adjusting screw (18) away from the trip trigger, operates the reject closer to the turntable spindle.
It may be found on some records of very early manufacture that it will not be possible to obtain a satisfactory adjustment that will always operate the changer mechanism.

REJECT BUTTON "R" WILL NOT OPERATE MECHANISM
If the "R" button does not cause the mechanism to go through a change cycle check the following parts:
a. Examine key control unit (75) for parts that have become out of shape or any obstruction that will prevent the "R" button from moving to its maximum length of travel.
b. Inspect reject rod (78). If this rod does not trip the mechanism even when properly rewound by complete depressing of "R" button, the rod has probably been bent out of shape. Replace the rod or reshape it to its former position.
c. If trigger (16) is properly actuated but without starting a change cycle see instructions as given under "Mechanism Will Not Reject at End of Record" paragraph 2.

PRESSING "M" BUTTON DOES NOT CHANGE MECHANISM FROM AUTOMATIC TO MANUAL POSITIONS
Observe action of "M" button. Button should travel far enough down when depressed to cause the manual rod (77) to actuate the key control unit. The key control unit (75) should also be checked for parts which have become out of shape or any foreign obstruction.

MOTOR STOPS IMMEDIATELY WHEN CHANGER SWITCH IS TURNED OFF DURING A CHANGE CYCLE
The normal action of the mechanism when the changer switch is turned off during a change cycle is to continue to operate until the needle is again on record. The mechanism should then stop. This action is caused by the cycling switch (88) short circuiting the manual changer switch during a change cycle. The switch should be changed when the above mentioned trouble develops.
MECHANISM DOES NOT REPEAT THE LAST RECORD

If the mechanism does not repeat the last record, any one of the parts listed under "Mechanism Will Not Reject at End of Records" may be causing the trouble.

RECORDS FALL UNEVENLY ON THE TURNTABLE

Records falling unevenly on the turntable is generally due to the turntable spindle not being correctly centered between the record loading posts. To correct this trouble, see "Replacing Motor."

LAST RECORD DROPS ON ONE SIDE

This trouble is due in most cases to the loading posts being bent out of perpendicular to the main plate. To check for this trouble, test the posts with a steel square as directed under "Replacing Motor". Replace or adjust post so that it will be perpendicular to the main plate.

CHANGER CONTINUES CYCLING

If the mechanism continues to change records constantly, it indicates trouble in the lift (37). Failure of this lift to disengage with the cam gear (11), Fig. 2, will cause the trouble. Check the various points at which motion occurs to find a point where friction or binding is interfering with freedom of motion. The cam lever (39), Fig. 2, should also be checked for too much friction. Oil this part if necessary.

SELECTOR BLADE FAILS TO SEPARATE BOTTOM RECORD FROM STACK

This is due either to a badly warped record or to its being of a thickness considerably different from records now in standard use. The selector blade and shelf blades are designed to accommodate a maximum variation in thickness and flatness of records now in standard use. There are certain records, however, that may be found which vary in thickness so much as to be impracticable for use in the automatic changers.

SELECTOR BLADES JAM INTO EDGE OF RECORD

This is generally caused by too small a spacing between the selector plate and the spacing between the selector plate and the shelf plate. This space should never be less than .050 inch when selector plate is in 10° position. Another cause of jamming is too sharp an edge on the selector plate. To eliminate this trouble, check spacing of plates. Bend the selector plate slightly, if necessary. Smooth up the edge of the selector plate by means of a piece of fine emery cloth.

MECHANISM SLOW IN STARTING OR STALLS DURING A CHANGE OF CYCLE

Trouble is probably due to:

a. Motor mechanism is not thoroughly lubricated. See heading "Lubrication".

b. Check for loose set screws.

c. Line voltage may be abnormally low or motor windings damaged. If the windings of the motor are damaged, replace motor. To remove motor, see heading "Replacing Motor."

REPLACING MOTOR

Replacing the motor necessitates extreme care in aligning and correctly mounting the new motor. The procedure listed below should be followed closely. When replacing a new motor or ordering a new one from your distributor, specify the power supply from which the motor is to be operated. The motor electrical wiring is shown in Fig. 4.

When mounting replacement motor, it is most important to see that record pin is centered between the two posts of the changer, that it stands perpendicular to main plate (53), and that it has not become bent so as to wobble. Even though the posts are stout and not easy to bend, it is well to check them also, with a 12" combination square laid clear across the concave upper surface of main plate. When the new motor has been attached, with three screws through grommet sleeves (51) (spacers) into its frame, and record pin is seen to revolve without appreciable wobble, the correct position of the record pin between the record-mounting posts can be accurately checked as follows: Place a single 12" record on the shelf plate, press "R" button, and turn turntable forward by hand. Immediately after the shelf plates open and allows the record to fall, turn turntable slightly backward, and with other hand support the record between the shelf plates; it can then be readily seen whether record pin is off center. If the record pin is found to be off center, remove the record and turntable, and loosen slightly the motor mounting screw or screws nearest the shelf plate to which record appeared closest. This should improve evenness of operation. However, unless the unevenness was very slight, it will be necessary for a permanent repair to insert a shim or two on one or more of the three screws (or change shims from one screw to another). The shims used are shaped like an ordinary washer, cut out at one side (see cut-away view at 52 on photo, showing a shim in place upon one of the grommet sleeves). Shims can readily be cut out with shears and punch from thin metal or cardboard—or an assortment of shims of different thicknesses can be had from your distributor. (Order "Assortment of Part No. 45-2757"). They should be inserted; around proper screws (when screws have been sufficiently loosened) between motor frame and the metal grommet sleeve. Do not insert shims next to rubber grommet.

TURNING CHANGER SWITCH OFF FAILS TO STOP MECHANISM

If after turning the changer switch off the mechanism continues to operate it indicates trouble in the cycling switch (85). Replace the switch when this trouble develops.

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MECHANISM WILL NOT REJECT AT THE END OF RECORDS

There are several parts that will cause the mechanism to fail in the operation of rejecting of records. These items are listed as follows:

1. Examine swivel spring (96) for stretching. This spring is attached to the lug at the end of the swivel spreaders (90) (91). The purpose of this spring is to keep the swivel spreaders (90) (91) closed, so that the trip trigger can be actuated. Increasing the tension of the spring (96) will prevent the swivel spreaders from opening after the trip trigger is actuated.

2. After increasing the tension of the spring (96) it is found that the needle jumps across the record, it may be necessary to adjust the horizontal level of the pickup. Sometimes the pickup leans toward the center of the record. To remedy this condition, the pickup mounting post should be examined for proper mounting position or the pickup arm may be twisted out of shape. In either of these cases the pickup arm should be replaced or adjusted to its original position. When the pickup arm is properly adjusted, it should lean slightly in an outward direction (toward the edge of the record).

3. After it is found that the trip trigger (16) is operating properly, trouble may be found due to the cam lever (29) binding against sub-Plate (41). In this case, look for some obstruction or foreign material on these two parts. Also see that the rivets are operating freely. If lever (29) engages cam lever panel (28) so that lift (97) forces its rollers up into the groove on cam gear (28) and if the set screws are tight, the change cycle should go into motion as the cam gear (28) turns.

4. Sometimes friction between the trigger (16) and trigger catch (17) due to burrs or rough surfaces may also prevent the reject from operating. If the trigger unlatches but the cam lever (29) does not move, it indicates binding between sliding surfaces. This may be caused by above mentioned burrs or by the cam lever being slightly warped.

To eliminate this condition, locate the position where there is excessive friction. If it is found that the parts are out of shape due to being bent, new parts should be added or the old ones straightened. When it is found that trouble is due to a burr on the edge of the metal parts, burrs should be removed with a very fine file or scraper. After eliminating this trouble, a small amount of oil should be applied to the sliding surfaces.

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PHILCO Model 39-3-31 PA

Model 39-3-31 PA is a combination automatic record changer, phonograph and electric push-button tuning superheterodyne radio. This model is identical to the Model 39-31 Code 121 with the exception of the automatic record changer.

The automatic record changer plays seven 12" or eight 10" records automatically. The last record remains on the turntable and repeats as long as the record changer is in operation. The electric pick-up is a crystal type.

The specifications for the radio receiver, alignment of compensators and adjustments of push-buttons for reception of stations is covered under the Model 39-31 Code 121. Connections for the phonograph pick-up as connected to the Model 39-31 Code 121 receiver are shown below. The circle numbers of this diagram correspond to the circle numbers of the Model 39-31 Schematic.

For automatic record changer Model "L" used with this set, see index.

replacement Parts — Model 39-3-31 PA

Models 39-31XF and 39-31XX are identical to Model 39-31, Code 121 with the exception of cabinets.

The Model 39-35, code 121 specifications, diagram and replacement parts apply to Models 39-31XF and XX.

See Philco pages 10-13 through 10-16.

PHILCO Models 39-40 PCX and 2-40 PC

Models 39-40 PCX and 2-40 PC are combination automatic record changer phonograph and electric push-button tuning superheterodyne radio receivers. These models are identical to the Model 39-40 Code 121 with the exception of the phonograph mechanism. The phonograph contains an automatic record changer which plays ten records either 10 or 12 inches repeating the last selection until the records are re-stacked or the set is turned off.

The radio receiver specifications, aligning instructions and adjustments for electric push-button tuning are covered under Model 39-40 Code 121. The cabinet size and power consumption, however, differ on the Models 39-40 PCX and 2-40 PC and are listed below.

The phonograph connections diagram shown below indicates the connections to the radio receiver of the Model 39-40 Code 121. The circle numbers of the diagram correspond to the circle numbers of the Model 39-40 Code 121 diagram.

CABINET DIMENSIONS:
Height, 37¾". Width, 39½". Depth, 17¾".

replacement Parts — Models 39-40 PCX and 2-40 PC

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**SPECIFICATIONS**

**TYPE OF CIRCUIT:** Model 39-8T is a 5 tube superheterodyne receiver designed for operation on AC or DC current in a frequency range from 20 to 100 cycles. In addition, other features of design are: Automatic Volume Control and Pentode Audio Output.

**PHILCO TUBES USED:** 6A7, First Detector, Oscillator; 78, I.F. Amplifier; 75, Second Detector, A.V.C., First Audio; 42, Audio Output and 2525, Rectifier.

**POWER SUPPLY:** 100 to 125 volts AC
22 to 60 cycles or D.C.

**POWER CONSUMPTION:** 30 watts.

**AUDIO OUTPUT:** One (1) watt.

**FREQUENCY RANGE:** 530 to 1720 K.C.

**INTERMEDIATE FREQUENCY:** 470 K.C.

**REPLACEMENT PARTS**

**MODEL 39-8**

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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Resistor (25,000 ohms, 1/2 watt)</td>
<td>33-352539</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Volume Control (.5 meg.)</td>
<td>33-5254</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Tubular Cond. (.01 mfd.)</td>
<td>30-4479</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Resistor (4.0 meg., 1/2 watt)</td>
<td>33-540539</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Resistor (490,000 ohms, 1/2 watt)</td>
<td>33-449539</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>19</td>
<td>Resistor (120,000 ohms, 1/2 watt)</td>
<td>33-412399</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>20</td>
<td>Tubular Cond. (.01 mfd.)</td>
<td>30-4479</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Tubular Cond. (.01 mfd.)</td>
<td>30-4215</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Output Transformer</td>
<td>32-7874</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**MISCELLANEOUS PARTS**

<table>
<thead>
<tr>
<th>Description</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bezel &amp; Glass Assembly</td>
<td>13105</td>
</tr>
<tr>
<td>Bezel Clamp</td>
<td>20162</td>
</tr>
<tr>
<td>Dial Scale</td>
<td>161047</td>
</tr>
<tr>
<td>Drive Drum &amp; Set Screw</td>
<td>31-1283</td>
</tr>
<tr>
<td>Drive Shaft Assembly</td>
<td>31-2140</td>
</tr>
<tr>
<td>Drive Cord Assembly</td>
<td>90325</td>
</tr>
<tr>
<td>Output Transformer</td>
<td>32-7874</td>
</tr>
<tr>
<td>Pointer (Dial)</td>
<td>32-5468</td>
</tr>
<tr>
<td>Spring Drive Cord</td>
<td>32-8761</td>
</tr>
<tr>
<td>Speaker</td>
<td>35-1362-1</td>
</tr>
<tr>
<td>Socket (7 prong)</td>
<td>27-6037</td>
</tr>
<tr>
<td>Socket (6 prong)</td>
<td>27-6038</td>
</tr>
<tr>
<td>Socket (8 prong)</td>
<td>27-6033</td>
</tr>
</tbody>
</table>

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Alignment of Compensators

EQUIPMENT REQUIRED:
(1) Philco Model 077 Signal Generator which has a fundamental frequency range from 115 to 36,000 KC is the correct instrument for this purpose.
(2) Output Meter. Philco Model 027 Circuit Tester, incorporates a sensitive output meter and is recommended.

<table>
<thead>
<tr>
<th>Operation in Order</th>
<th>Signal Generator</th>
<th>Receiver</th>
<th>Adjust Compensation in Order</th>
<th>Special Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output Source to Receiver</td>
<td>Dummy Antenna (Note A)</td>
<td>Dial Setting</td>
<td>Control Settings</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>IA7G Grid</td>
<td>.1 mf</td>
<td>470 KC</td>
<td>Vol. Cont. max. (20A) (19B) (19A)</td>
</tr>
<tr>
<td>2</td>
<td>Ant. Lead (white)</td>
<td>400 ohms</td>
<td>18.0 MC</td>
<td>Vol. Cont. max.</td>
</tr>
<tr>
<td>3</td>
<td>Ant. Lead (white)</td>
<td>225 mmf</td>
<td>1550 KC</td>
<td>Vol. Cont. max.</td>
</tr>
<tr>
<td>4</td>
<td>Ant. Lead (white)</td>
<td>225 mmf</td>
<td>580 KC</td>
<td>Vol. Cont. max.</td>
</tr>
<tr>
<td>5</td>
<td>Ant. Lead (white)</td>
<td>225 mmf</td>
<td>1550 KC</td>
<td>Vol. Cont. max.</td>
</tr>
</tbody>
</table>

NOTE A—The “Dummy Antenna” consists of a condenser or resistor connected in series with the signal generator output lead (high side). Use the capacity or resistance as specified in each step of the above procedure.

Specifications

TYPE OF CIRCUIT: Four tube, battery operated superheterodyne circuit, two tuning ranges, Automatic Volume Control, and Pentode Output.

TUNING RANGES: Range 1, 540 to 1720 KC; Range 2, 5.6 to 18.0 MC.

INTERMEDIATE FREQUENCY: 470 KC.

PHILCO TUBES USED: 1-IA7G, 1st Detector and Oscillator; 1-1NE5, I. F. Amplifier; 1-1H5G, 2nd Detector, 1st Audio, and Automatic Volume Control; and 1-IA5G, Output.


CABINETS: Types “B” and “XF.”


SETTING AND OPERATING AUTOMATIC TUNING


For best results follow these instructions carefully.

Select six of your favorite nearby broadcast stations and remove their call letters from the station call letter tab sheets supplied. Insert these call letters in the escutcheon directly in front of the buttons at the top of the cabinet.

Hold the “Station Selector” knob to prevent it from rotating while you insert a large coin in the screw head at the center of the knob, (see figure) and loosen by turning counter-clockwise about one turn. Press down any one of the six buttons. Holding it down, tune in with the “Station Selector” the station corresponding to the call letters in front of the button. With the volume low, turn the “Station Selector” knob slowly back and forth until the signal is clearest. The station is then tuned in correctly.

Release the button and press another button all the way down. Follow the above instructions, tuning in the station accurately with the button held down. In the same way continue to set all the buttons.

After all buttons are set and the last one is released, hold the “Station Selector” knob to prevent it from turning while you tighten the screw at the center of the knob. When the screw is tightened the unit is ready to operate.

If it is ever desired to substitute a station received well in your locality for a station already set, follow the same procedure, setting up only the desired station.

To tune your receiver automatically simply press down the button in the rear of the desired station call letters. Be sure that you press the button all the way down until a distinct stop is heard.

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**Phono Connections**

**Models 39-19 PA, 39-19 PF, 39-19 PCS, 39-19 PT**

Model 39-19 PA is a combination automatic record changer phonograph and automatic push-button tuning superheterodyne radio receiver. The radio receiver of this model is identical to the Model 39-19 Code 122 with the exception of the automatic phonograph connections. The automatic record changer plays eight 10-inch or 12-inch records automatically.

The specificaions of this model with the exception of the cabinet dimensions and power consumption and automatic record changer are the same as Model 39-19 Code 122. The connections for the phonograph pickup-as-connected in the Model 39-19 Code 122 are shown below. The circle numbers of this diagram correspond to the circle numbers of the Model 39-19 Code 122.

The alignment of compensators will also be found under Model 39-19 Code 122 (see index).

For record changer 35-1169 see index.


The phonograph section of these models consists of a semi-automatic pick-up that plays itself automatically when the lid is closed and plays either 10- or 12-inch records.

The specifications of this model with the exception of cabinet dimensions, power consumption and semi-automatic pick-up are the same as Model 39-19 Code 122. The connections for the phonograph pick-up-as-connected in Model 39-19 Code 122 are shown below. The circle numbers of this diagram correspond to the circle numbers of the Model 39-19 Code 122.

The alignment of the compensators will also be found under Model 39-19 Code 121, 122 (see index).

### Replacement Parts — Model 39-19 PA

- Condenser (1,000 mfd., 400 V)...
- Tone Control...
- Crystal Cartridge...
- Condenser (1,000 mfd., 300 V)...
- Resistor (120,000 ohms)...
- Switch (Radio-Phono)...

### MISCELLANEOUS PARTS

- Automatic Record Changer Complete...
- Governor (Brush)...
- Grille and Back...
- T-Bar Arm Complete with Crystal...

### Replacement Parts — Models 39-19 PF, 39-19 PCS, 39-19 PT

- Condenser (1,000 mfd., 400 V)...
- Tone Control...
- Crystal Cartridge...
- Condenser (1,000 mfd., 300 V)...
- Resistor (120,000 ohms)...
- Switch (Radio-Phono)...

### MISCELLANEOUS PARTS

- Governor (Brush)...
- Grille and Back...
- T-Bar Arm Complete with Crystal...

---

**PHILCO Model 39-30 PCX**

Model 39-30 PCX is a combination automatic record changer phonograph and electric push-button tuning superheterodyne radio receiver. This model is identical to the Model 39-30 Code 121 with the exception of the automatic record changer.

The automatic record changer plays ten records either 10 or 12 inches in diameter and can be set for reception of stations covered under Model 39-30 Code 121. The connections for the phonograph pickup-as-connected in Model 39-30 Code 121 receiver are shown below. The circle numbers of this diagram correspond to the circle numbers of the Model 39-30 Code 121 schematic.

### Replacement Parts — Model 39-30 PCX

- Tone Arm and Pick-up (Less Base)...
- Cabinet...

### MISCELLANEOUS PART

- Tone Arm and Pick-up Complete...

---

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Replacement Parts

Model 39-85, Code 121

Schem. No. Description Part No.

1 Antenna Transformer, Range 2 (Inc. No. 3) .......... 32-3092
2 Antenna Transformer, Range 1 32-3084
3 Condenser (19 mmf) (part of No. 3) ................ 30-1090
4 Condenser (.05 mf tubular) 30-4519
5 Resistor (2.0 megohms, ½ watt) 33-520339
6 Tuning Condenser Assembly 31-2306
7 Oscillator Transformer, Range 1 32-3082
8 Oscillator Transformer, Range 2 32-3085
9 Compensator (two sections) .......... 31-6100
10 Resistor (70,000 ohms, ½ watt) 33-370339
11 Condenser (.05 mf tubular) 30-4444
12 Condenser (4500 mmf mica) 30-1109
13 Resistor (190,000 ohms, ½ watt) 33-419339
14 Condenser (5000 mmf mica) .......... 30-1114
15 Resistor (5000 ohms, ½ watt) 33-250339
16 Electrolytic Condenser (6 mf—3 mf) 30-2348
17 Resistor (5000 ohms, ½ watt) 33-250339
18 Resistor (2.0 megohms) 33-520339
19 1st I. F. Transformer Assembly 32-2841
20 2nd I. F. Transformer Assembly 32-3081
21 Resistor (51,000 ohms, ½ watt) 33-511139
22 Resistor (490,000 ohms, ½ watt) 33-449339
23 Condenser (.01 mf tubular) 30-4572
24 Condenser (150 mmf mica) 30-1033
25 Resistor (99,000 ohms, ½ watt) 33-399339
26 Condenser (.003 mf tubular) 30-4580
27 Volume Control and On-Off Switch 33-5288
28 Resistor (800 ohms, ½ watt) 33-180339
29 Resistor (2.0 megohms, ½ watt) 33-520339
30 2nd resistor (1.0 megohm, ½ watt) 33-510339
31 Condenser (.01 mf tubular) 30-4572
32 Condenser (.0005 mf mica) 30-1114
33 Output Transformer 32-7984
34 Cone & Voice Coil Assembly for Speaker (Part No. 36-1430) 36-4093
34 Cone & Voice Coil Assembly for Speaker (Part No. 36-1430) 36-4093
35 Condenser (250 mmf, silver plated mica) 30-1104
36 Condenser (420 mmf, silver plated mica) ........ 30-1116

Fig. 2. Schematic Diagram

For Other Data See Index

Replacement Parts

Fig. 3. Part locations, underside of chassis

Replacement Parts

CONTINUED

Schem. No. Description Part No.

37 Oscillator Coil Assem. (High freq. No. 1 and 2) .......... 32-2941
38 Oscillator Coil Assem. (Low freq. No. 1 and 2) .......... 32-2942
39 Oscillator Coil Assem. (Low frequency No. 3 and 4) 32-2943
40 Compensator (two sections) (Nos. 5 and 6) .......... 31-6244
41 Compensator (two sections) (Nos. 1 and 2) .......... 31-6247
42 Compensator (two sections) (Nos. 3 and 4) .......... 31-6248
43 Push-Button Switch 42-1471
44 Wave Switch 42-1466

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Model 39-116 PCX is a combination phonograph and 14 tube radio receiver employing a superheterodyne circuit with three tuning ranges for reception of standard and short-wave broadcast stations. Incorporated in this receiver is Philco mystery control for electric automatic tuning of eight standard broadcast stations from a remote point. The phonograph section contains an automatic record changer which plays ten records either 10- or 12-inch size automatically repeating the last record until the records are restacked or the switch turned off.

This model with the exception of the phonograph mechanism is identical to the Model 39-116 RX. The same specifications for the Model 39-116 RX apply to this model except the cabinet size and power consumption which are listed below.

**Cabinet Dimensions:**
- Height, 37 1/4".
- Width, 44 1/6".
- Depth, 17 1/8".

The adjustment of the mystery control circuit for reception of stations and alignment of compensators is also covered under Model 39-116 RX. The phonograph connections are shown below as connected in the Model 39-116 RX circuit diagram. The circle numbers of this phonograph diagram correspond to the circle numbers of the Model 39-116 RX diagram.

**PHONOGRAPH CONNECTIONS FOR MODEL 39-116 PCX**

**Replacement Parts — Model 39-116 PCX**

<table>
<thead>
<tr>
<th>SCH. No.</th>
<th>DESCRIPTION</th>
<th>PART No.</th>
<th>SCH. No.</th>
<th>DESCRIPTION</th>
<th>PART No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>131</td>
<td>Condenser (.08 mfd, 200 V)</td>
<td>30-4810</td>
<td>132</td>
<td>Crystal Cartridge (Pick-up)</td>
<td>35-3030</td>
</tr>
<tr>
<td>133</td>
<td>Resistor (1,000 ohms)</td>
<td>33-361339</td>
<td>134</td>
<td>Resistor (5,000 ohms)</td>
<td>33-361339</td>
</tr>
<tr>
<td>135</td>
<td>Switch (Microphone)</td>
<td>32-1083</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>136</td>
<td>Cable</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**MISCELLANEOUS PARTS**
- Automatic Record Changer (Complete)   35-1178
- Motor 110 volts, 60 cycles           35-1187
- Motor 110 volts, 50 cycles           35-1186
- Governor (motor)                     35-1166

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### Alignment of Compensators

**EQUIPMENT REQUIRED:**

1. **Signal Generator:** Philco Model 077 Signal Generator, which has a fundamental frequency range from 115 to 38,000 K.C., is the correct instrument for this purpose.
2. **Output Meter:** Philco model 027 Vacuum Tube Voltmeter and Circuit Tester incorporates a sensitive output meter and is recommended.
3. **Philco Fiber Handle Screw Driver, Part No. 27-7059, and Fiber Wrench, Part No. 3154.**
4. **Philco Set Transformer, Part No. 32-2763.**

**OUTPUT METER:**

Two indicating devices for aligning the receiver can be used: either an audio output meter or a vacuum tube voltmeter. The method of connecting the audio output meter is given in the next paragraph. The procedure for connecting the vacuum tube voltmeter as an aligning indicator will be found on page 5. Where greater accuracy of the various tuned circuits is desired, the vacuum tube voltmeter is recommended as an aligning device.

The Philco 027 Output Meter is connected to the plate and cathode terminals of the tubes in Model 39-117 and 118 and to the plate and cathode terminals of the tube in Model 39-118. Set the meter to use the 0-30 volt scale.

**Procedure—Model 39-117**

<table>
<thead>
<tr>
<th>Operations in Order</th>
<th>SIGNAL GENERATOR</th>
<th>RECEIVER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dial Setting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>6A7 Grid</td>
<td>580 K.C.</td>
</tr>
<tr>
<td></td>
<td>.1 mfd.</td>
<td>470 K.C.</td>
</tr>
<tr>
<td>2</td>
<td>Ant. Ter.</td>
<td>1550 K.C.</td>
</tr>
<tr>
<td></td>
<td>200 m.mdf.</td>
<td></td>
</tr>
</tbody>
</table>

**Procedure—Model 39-118**

<table>
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<tr>
<th>Operations in Order</th>
<th>SIGNAL GENERATOR</th>
<th>RECEIVER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dial Setting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>6A7 Grid</td>
<td>580 K.C.</td>
</tr>
<tr>
<td></td>
<td>.1 mfd.</td>
<td>470 K.C.</td>
</tr>
<tr>
<td>2</td>
<td>Ant. and Gnd.</td>
<td>1550 K.C.</td>
</tr>
<tr>
<td></td>
<td>200 m.mdf.</td>
<td></td>
</tr>
</tbody>
</table>

**Procedure—Model 39-119**

<table>
<thead>
<tr>
<th>Operations in Order</th>
<th>SIGNAL GENERATOR</th>
<th>RECEIVER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dial Setting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>6A7 Grid</td>
<td>580 K.C.</td>
</tr>
<tr>
<td></td>
<td>.1 mfd.</td>
<td>470 K.C.</td>
</tr>
<tr>
<td>2</td>
<td>Ant. and Gnd.</td>
<td>1550 K.C.</td>
</tr>
<tr>
<td></td>
<td>200 m.mdf.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Ant. and Gnd.</td>
<td>1550 K.C.</td>
</tr>
<tr>
<td></td>
<td>200 m.mdf.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Ant. and Gnd.</td>
<td>580 K.C.</td>
</tr>
<tr>
<td></td>
<td>200 m.mdf.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Ant. and Gnd.</td>
<td>1550 K.C.</td>
</tr>
<tr>
<td></td>
<td>200 m.mdf.</td>
<td></td>
</tr>
</tbody>
</table>

**A:** The "Dummy Antenna" consists of a condenser or resistance connected in series with the signal generator output lead (high side). Use the capacity or resistance as specified in each step of the above procedure.

**B:** Dial Calibration: In order to adjust the receiver correctly, the dial must be aligned to track properly with the tuning condenser. To do this, proceed as follows: Turn the tuning condenser to the maximum capacity position (plates fully meshed). With the condenser in this position, the tuning pointer is set on the first index line at the low frequency end of the scale (450 K.C.).

**C:** Insert the signal generator output lead into the "Med" jack and the ground lead into the "Gnd" jack of the signal generator. Connect the other end of the output lead to terminal No. 1 of the Set Transformer. Part No. 32-2763, and the cable ground to terminal No. 2. Nos. 3 and 4 terminals of the Set Transformer are then connected to the chassis and 6A7 grid respectively of the receiver with short pieces of wire. Insert the .1 mfd. in series with the No. 4 lead which connects to the grid. D—Insert the signal generator output lead into the "Med" jack and the ground lead into the "Gnd" jack of the signal generator. Connect the other end of the output lead to terminal No. 1 of the Set Transformer. Nos. 3 and 4 terminals of the Set Transformer are then connected to the chassis and 6A7 grid respectively of the receiver with short pieces of wire. Insert the .1 mfd. in series with the No. 4 lead which connects to the grid.

**Fig. 3—Part Locations, Model 39-119**

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PHILCO RADIO & TELEV. CORP.

SCHEMATIC DIAGRAM MODEL 39-119

VOLTAGES MEASURED FROM SOCKET CONTACTS TO CHASSIS

PRODUCTION CHANGES

MODEL 39-119EZ, CODE 121-122

©John F. Rider, Publisher
Schematic, Voltage

SPECIFICATIONS

INTERMEDIATE FREQUENCY: 470 K.C.

PHILCO TUBES:
- One 1470, First Detector and Oscillator:
- One 1AG6, Second Detector:
- First Audio and Automatic Volume Control, and one 1CG6 Pentode Output.


BATTERY DRAIN:
- "A" (250 W.A.)
- "B" (82 W.A.)

AERIAL AND GROUND: In order to obtain the highest amount of sensitivity from these receivers the Philco Farm Radio aerial, Part No. 49-6252 should be used. This aerial is accurately designed to match the tuned antenna circuit in the receiver so that maximum performance will be obtained.

A good ground connection to the nearest water pipe or any other good ground source is also required.

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### Replacement Parts Model 39-711

<table>
<thead>
<tr>
<th>Schem. No.</th>
<th>Description</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tubular Cond. (0.001 mfd, 1000 V)</td>
<td>30-4417</td>
</tr>
<tr>
<td>2</td>
<td>Tubular Cond. (0.1 mfd, 400 V)</td>
<td>30-4417</td>
</tr>
<tr>
<td>3</td>
<td>Tubular Cond. (0.01 mfd, 400 V)</td>
<td>30-4417</td>
</tr>
<tr>
<td>4</td>
<td>Ant. Trans. (1.5 mfd, 25 volt)</td>
<td>30-5435</td>
</tr>
<tr>
<td>5</td>
<td>Ant. Trans. (1.5 mfd, 63 volts)</td>
<td>30-5435</td>
</tr>
<tr>
<td>6</td>
<td>Compensator</td>
<td>30-6427</td>
</tr>
<tr>
<td>7</td>
<td>Tubular Cond. (1 mfd, 200 V)</td>
<td>30-5419</td>
</tr>
<tr>
<td>8</td>
<td>Tubular Cond. (1 mfd, 600 V)</td>
<td>30-5419</td>
</tr>
<tr>
<td>9</td>
<td>Resist (50,000 ohms, 1 watt)</td>
<td>33-5424</td>
</tr>
<tr>
<td>10</td>
<td>Resist (100,000 ohms, 1 watt)</td>
<td>33-5424</td>
</tr>
<tr>
<td>11</td>
<td>Resist (50,000 ohms, 0.1 watt)</td>
<td>33-5424</td>
</tr>
<tr>
<td>12</td>
<td>Tubular Cond. (1 mfd, 120 V)</td>
<td>30-5419</td>
</tr>
<tr>
<td>13</td>
<td>Resist (100,000 ohms, 1 watt)</td>
<td>33-5424</td>
</tr>
<tr>
<td>14</td>
<td>Resist (50,000 ohms, 1 watt)</td>
<td>33-5424</td>
</tr>
<tr>
<td>15</td>
<td>Tubular Cond. (1 mfd, 120 V)</td>
<td>30-5419</td>
</tr>
<tr>
<td>16</td>
<td>Resist (100,000 ohms, 1 watt)</td>
<td>33-5424</td>
</tr>
<tr>
<td>17</td>
<td>Mica Cond. (1250 mfd)</td>
<td>30-5597</td>
</tr>
<tr>
<td>18</td>
<td>Resist (3300 ohms, 1 watt)</td>
<td>33-2243</td>
</tr>
<tr>
<td>19</td>
<td>Mica Cond. (250 mfd)</td>
<td>30-5597</td>
</tr>
<tr>
<td>20</td>
<td>Resist (2500 ohms, 1 watt)</td>
<td>33-2243</td>
</tr>
<tr>
<td>21</td>
<td>Resist (2500 ohms, 1 watt)</td>
<td>33-2243</td>
</tr>
<tr>
<td>22</td>
<td>Resist (2500 ohms, 1 watt)</td>
<td>33-2243</td>
</tr>
<tr>
<td>23</td>
<td>Tube Cond. (1 mfd, 200 V)</td>
<td>30-4586</td>
</tr>
<tr>
<td>24</td>
<td>Tube Cond. (0.5 mfd, 600 V)</td>
<td>30-4586</td>
</tr>
<tr>
<td>25</td>
<td>Resist (50,000 ohms, 1 watt)</td>
<td>33-5419</td>
</tr>
<tr>
<td>26</td>
<td>Resist (100,000 ohms, 1 watt)</td>
<td>33-5419</td>
</tr>
<tr>
<td>27</td>
<td>Tube Cond. (0.5 mfd, 120 V)</td>
<td>30-4586</td>
</tr>
<tr>
<td>28</td>
<td>Tube Cond. (1 mfd, 120 V)</td>
<td>30-5419</td>
</tr>
<tr>
<td>29</td>
<td>Tube Cond. (1 mfd, 600 V)</td>
<td>30-5419</td>
</tr>
<tr>
<td>30</td>
<td>Tube Cond. (1 mfd, 120 V)</td>
<td>30-5419</td>
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<td>31</td>
<td>Tube Cond. (1 mfd, 600 V)</td>
<td>30-5419</td>
</tr>
<tr>
<td>32</td>
<td>Tube Cond. (1 mfd, 120 V)</td>
<td>30-5419</td>
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<tr>
<td>33</td>
<td>Tube Cond. (1 mfd, 600 V)</td>
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<td>Tube Cond. (1 mfd, 120 V)</td>
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<td>35</td>
<td>Tube Cond. (1 mfd, 600 V)</td>
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<tr>
<td>36</td>
<td>Resist (150 ohms, 5 watt)</td>
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</tr>
</tbody>
</table>

### Replacement Parts Model 39-751

<table>
<thead>
<tr>
<th>Schem. No.</th>
<th>Description</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tubular Cond. (0.05 mfd)</td>
<td>30-4151</td>
</tr>
<tr>
<td>2</td>
<td>Tubular Cond. (0.1 mfd)</td>
<td>30-4151</td>
</tr>
<tr>
<td>3</td>
<td>Ant. Trans. (1.5 mfd)</td>
<td>30-4151</td>
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<tr>
<td>4</td>
<td>Ant. Trans. (1.5 mfd)</td>
<td>30-4151</td>
</tr>
<tr>
<td>5</td>
<td>Compensator</td>
<td>30-6427</td>
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<tr>
<td>6</td>
<td>Tubular Cond. (1 mfd)</td>
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<td>7</td>
<td>Tubular Cond. (1 mfd)</td>
<td>30-4151</td>
</tr>
<tr>
<td>8</td>
<td>Resist (100,000 ohms)</td>
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<td>9</td>
<td>Resist (50,000 ohms)</td>
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<td>Resist (50,000 ohms)</td>
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<tr>
<td>11</td>
<td>Resist (50,000 ohms)</td>
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<tr>
<td>12</td>
<td>Tube Cond. (1 mfd)</td>
<td>30-4151</td>
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<td>13</td>
<td>Tube Cond. (1 mfd)</td>
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<td>14</td>
<td>Resist (7500 ohms)</td>
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<td>15</td>
<td>Tube Cond. (1 mfd)</td>
<td>30-4151</td>
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<td>16</td>
<td>Tube Cond. (1 mfd)</td>
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<tr>
<td>17</td>
<td>Resist (50,000 ohms)</td>
<td>33-5419</td>
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<tr>
<td>18</td>
<td>Resist (50,000 ohms)</td>
<td>33-5419</td>
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<tr>
<td>19</td>
<td>Mica Cond. (5 mfd)</td>
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<tr>
<td>20</td>
<td>Mica Cond. (250 mfd)</td>
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<td>21</td>
<td>Resist (150 ohms)</td>
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<td>Resist (150 ohms)</td>
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<td>28</td>
<td>Resist (150 ohms)</td>
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<td>29</td>
<td>Resist (150 ohms)</td>
<td>33-5419</td>
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<tr>
<td>30</td>
<td>Resist (150 ohms)</td>
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<tr>
<td>31</td>
<td>Resistor (100,000 ohms)</td>
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<td>32</td>
<td>Resistor (50,000 ohms)</td>
<td>33-5419</td>
</tr>
<tr>
<td>33</td>
<td>Resistor (50,000 ohms)</td>
<td>33-5419</td>
</tr>
<tr>
<td>34</td>
<td>Resistor (50,000 ohms)</td>
<td>33-5419</td>
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### Miscellaneous Parts

<table>
<thead>
<tr>
<th>Description</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cord (Wave Band Indicator)</td>
<td>37-9251</td>
</tr>
<tr>
<td>Cord (Pointing Observations)</td>
<td>37-5409</td>
</tr>
<tr>
<td>Dial</td>
<td>37-5409</td>
</tr>
<tr>
<td>Indicator (Wave Band)</td>
<td>37-1057</td>
</tr>
<tr>
<td>Knob (4 used)</td>
<td>37-1237</td>
</tr>
<tr>
<td>Pointer (Single)</td>
<td>37-1237</td>
</tr>
<tr>
<td>Socket (Pilot Lamp)</td>
<td>37-6835</td>
</tr>
<tr>
<td>Socket (600, type 29S &amp; Bellied tube)</td>
<td>37-6835</td>
</tr>
<tr>
<td>Socket (600, type 29S &amp; Bellied tube)</td>
<td>37-6835</td>
</tr>
<tr>
<td>Socket (600, type 29S &amp; Bellied tube)</td>
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<tr>
<td>Socket (600, type 29S &amp; Bellied tube)</td>
<td>37-6835</td>
</tr>
<tr>
<td>Socket (600, type 29S &amp; Bellied tube)</td>
<td>37-6835</td>
</tr>
<tr>
<td>Spring (Pilot Lamp Inductor)</td>
<td>28-8913</td>
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<tr>
<td>Spring (Wave Band Indicator)</td>
<td>37-9251</td>
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<tr>
<td>Spring (Wave Band Indicator)</td>
<td>37-8659</td>
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</tbody>
</table>

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Compliments of www.nucow.com
# Alignment of Compensators

**EQUIPMENT REQUIRED:**

2. Output Meter: Philco Model 027 Circuit Tester.

**OUTPUT METER:**

The indicating devices for aligning the receiver can be used: either an audio output meter or a vacuum tube voltmeter. The method of connecting the audio output meter is given in the next paragraph. The procedure for connecting the vacuum tube voltmeter as an aligning indicator will be found on page 5. Where greater accuracy of the various tuned circuits is desired, the vacuum tube voltmeter is recommended as an aligning device.

The Philco 027 Output Meter is connected to the plate and grid terminals of the type 25L60 tube (use one tube in Model 39-711) and adjusted for the 0 to 20 VAC scale. After connecting the output meter, adjust the compensators in the order shown in the tabulation below. Locations of the compensators are shown in Fig. 3, Model 39-711, and Fig. 4, Model 39-751. If the output meter pointer goes off scale when adjusting the compensators, reduce the strength of the signal from the generator.

---

## MODEL 38-711

<table>
<thead>
<tr>
<th>Operations in Order</th>
<th>Output Connections to Receiver</th>
<th>Dummy Antenna Note A</th>
<th>Dial Setting</th>
<th>Control Settings</th>
<th>Adjust Compensators</th>
<th>Special Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6J8EG</td>
<td>.1 mfd.</td>
<td>470 K.C.</td>
<td>Vol. Max. Tone-</td>
<td>22A, 21B, 21A</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Sw. Bredt.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Ant. &amp; Grnd.</td>
<td>200 mwd.</td>
<td>1500 K.C.</td>
<td>Vol. Max. Tone-</td>
<td>14, 11A</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>treble Sw. Bredt.</td>
<td></td>
<td>Note B</td>
</tr>
<tr>
<td>3</td>
<td>Ant. &amp; Grnd.</td>
<td>400 ohms</td>
<td>7.0 M.C.</td>
<td>Vol. Max. Tone-</td>
<td>16</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>treble Sw. Bredt.</td>
<td></td>
<td>Roll gang repeat oper. 2</td>
</tr>
<tr>
<td>4</td>
<td>Ant. &amp; Grnd.</td>
<td>400 ohms</td>
<td>20 M.C.</td>
<td>Vol. Max. Tone-</td>
<td>14A</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>treble Sw. Polic.</td>
<td></td>
<td>Roll gang</td>
</tr>
<tr>
<td>5</td>
<td>Ant. &amp; Grnd.</td>
<td>400 ohms</td>
<td>20 M.C.</td>
<td>Range Sw. S. W.</td>
<td>6A, 6</td>
<td></td>
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</tbody>
</table>

## MODEL 39-751

<table>
<thead>
<tr>
<th>Operations in Order</th>
<th>Output Connections to Receiver</th>
<th>Dummy Antenna Note A</th>
<th>Dial Setting</th>
<th>Control Settings</th>
<th>Adjust Compensators</th>
<th>Special Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6J8G Grid and Ground</td>
<td>.1 mfd.</td>
<td>470 K.C.</td>
<td>Vol. Max. Tone-</td>
<td>44B, 44A, 43B, 45A</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Sw. Bredt.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Sw. Bredt.</td>
<td></td>
<td>Note B</td>
</tr>
<tr>
<td>3</td>
<td>Ant. and Grd.</td>
<td>400 ohms</td>
<td>6.0 M.C.</td>
<td>Vol. Max. Tone-</td>
<td>31</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>treble Range Sw.</td>
<td></td>
<td>Roll gang repeat oper. 2</td>
</tr>
<tr>
<td>4</td>
<td>Ant. and Grd.</td>
<td>400 ohms</td>
<td>20 M.C.</td>
<td>Vol. Max. Tone-</td>
<td>30A</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>treble Range Sw. S. W.</td>
<td></td>
<td>Roll gang</td>
</tr>
<tr>
<td>5</td>
<td>Ant. and Grd.</td>
<td>400 ohms</td>
<td>20 M.C.</td>
<td>Vol. Max. Tone-</td>
<td>35, 15, 6</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>treble Range Sw. S. W.</td>
<td></td>
<td>Note C</td>
</tr>
</tbody>
</table>

**NOTE A** — The "Dummy Antenna" consists of a condenser or resistance connected in series with the signal generator output lead (high side). Use the capacity or resistance as specified in each step of the above procedure.

**NOTE B** — Dial Calibration: In order to adjust the receiver correctly the dial must be aligned to track properly with the tuning condenser. To adjust the dial, proceed as follows: With the tuning condenser closed (maximum capacity), set the dial pointer on the first mark on the left edge (low frequency end) of the broadcast scale.

**NOTE C** — When adjusting compensator (23) model 39-711 and (44) model 39-711 be sure to tune in the fundamental signal (20 M.C.) instead of the image signal. If the compensator is correctly adjusted, the image signal will be found by turning dial 940 K.C. below the fundamental signal, which will be 19,060 M.C.

The Philco-Tropic radio is particularly recommended for locations where super reception of short wave is necessary and where the radio and the cabinet are exposed to extreme conditions. The receiver is especially constructed to withstand decay, spoilage and deterioration caused by extreme conditions of humidity, heat, salt air and cold; and to stand up under the most severe tropic weather conditions.

The chassis is heavily plated, making it impervious to salt air, rust and corrosion.

The various parts, such as coils, condensers, chokes and transformers, are treated with special wax that will withstand very high temperatures. In addition the wax is treated with chemicals which repel rodents and insects.

The cabinet is treated with a special sealing compound which protects it against moisture and heat.

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Alignment of Compensators

**EQUIPMENT REQUIRED:**
(1) Signal Generator; Philco Model 077 A.C. operated or Model 177 Battery operated.
(2) Output Meter, Philco Model 027 Circuit Tester.
(3) Philco Fiber Handle Screw Driver, Part No. 27-7059, and Fiber Wrench, Part No. 3164.

**OUTPUT METER:** The Philco 027 Output Meter is connected to the plate and cathode terminals of one of the type 49 tubes and adjusted for the 0 to 30 V.A.C. scale. After connecting the output meter, adjust the compensators in the order as shown in the tabulation below. Locations of the compensators are shown in Fig. 1. If the output meter pointer goes off scale when adjusting the compensators, reduce the strength of the signal from the generator.

### Alignment of Compensators

**Order**

<table>
<thead>
<tr>
<th>SIGNAL GENERATOR</th>
<th>Dial Setting</th>
<th>Receiver</th>
<th>Adjust</th>
<th>Special Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Ant. and Grd.</td>
<td>200 m.mfd</td>
<td>1500 K.C.</td>
<td>19, 7B, 7A</td>
</tr>
<tr>
<td>3</td>
<td>Ant. and Grd.</td>
<td>200 m.mfd</td>
<td>580 K.C.</td>
<td>20</td>
</tr>
<tr>
<td>4</td>
<td>Ant. and Grd.</td>
<td>400 ohms</td>
<td>6.0 M.C.</td>
<td>19A</td>
</tr>
<tr>
<td>5</td>
<td>Ant. and Grd.</td>
<td>400 ohms</td>
<td>20 M.C.</td>
<td>23, 12, 4</td>
</tr>
</tbody>
</table>

A—The "Dummy Antenna" consists of a .1 mfd capacitor in series with the receiver correctly tuned to a frequency close to the fundamental signal (128) the signal generator output lead (high side), to track properly with the tuning condenser. To M.C.—second signal from tight position of the dial. Proceed as specified in each step of the above procedure.

B—Dial Calibration: In order to adjust each step of the above procedure, proceed as specified in each step of the above procedure.

C—When adjusting compensator (23) be sure that the receiver correctly tuned to the fundamental signal (128) signal generator output lead (high side), to track properly with the tuning condenser. To M.C.—second signal from tight position of the dial, proceed as specified in each step of the above procedure.

Dial Capacitor must be aligned with the fundamental signal (128) signal generator output lead (high side), to track properly with the tuning condenser. To M.C.—second signal from tight position of the dial, proceed as specified in each step of the above procedure.

E—When adjusting compensator (23) be sure that the receiver correctly tuned to the fundamental signal (128) signal generator output lead (high side), to track properly with the tuning condenser. To M.C.—second signal from tight position of the dial, proceed as specified in each step of the above procedure.

F—When adjusting compensator (23) be sure that the receiver correctly tuned to the fundamental signal (128) signal generator output lead (high side), to track properly with the tuning condenser. To M.C.—second signal from tight position of the dial, proceed as specified in each step of the above procedure.

G—When adjusting compensator (23) be sure that the receiver correctly tuned to the fundamental signal (128) signal generator output lead (high side), to track properly with the tuning condenser. To M.C.—second signal from tight position of the dial, proceed as specified in each step of the above procedure.

H—When adjusting compensator (23) be sure that the receiver correctly tuned to the fundamental signal (128) signal generator output lead (high side), to track properly with the tuning condenser. To M.C.—second signal from tight position of the dial, proceed as specified in each step of the above procedure.

I—When adjusting compensator (23) be sure that the receiver correctly tuned to the fundamental signal (128) signal generator output lead (high side), to track properly with the tuning condenser. To M.C.—second signal from tight position of the dial, proceed as specified in each step of the above procedure.

J—When adjusting compensator (23) be sure that the receiver correctly tuned to the fundamental signal (128) signal generator output lead (high side), to track properly with the tuning condenser. To M.C.—second signal from tight position of the dial, proceed as specified in each step of the above procedure.

K—When adjusting compensator (23) be sure that the receiver correctly tuned to the fundamental signal (128) signal generator output lead (high side), to track properly with the tuning condenser. To M.C.—second signal from tight position of the dial, proceed as specified in each step of the above procedure.

L—When adjusting compensator (23) be sure that the receiver correctly tuned to the fundamental signal (128) signal generator output lead (high side), to track properly with the tuning condenser. To M.C.—second signal from tight position of the dial, proceed as specified in each step of the above procedure.

M—When adjusting compensator (23) be sure that the receiver correctly tuned to the fundamental signal (128) signal generator output lead (high side), to track properly with the tuning condenser. To M.C.—second signal from tight position of the dial, proceed as specified in each step of the above procedure.

N—When adjusting compensator (23) be sure that the receiver correctly tuned to the fundamental signal (128) signal generator output lead (high side), to track properly with the tuning condenser. To M.C.—second signal from tight position of the dial, proceed as specified in each step of the above procedure.

O—When adjusting compensator (23) be sure that the receiver correctly tuned to the fundamental signal (128) signal generator output lead (high side), to track properly with the tuning condenser. To M.C.—second signal from tight position of the dial, proceed as specified in each step of the above procedure.

P—When adjusting compensator (23) be sure that the receiver correctly tuned to the fundamental signal (128) signal generator output lead (high side), to track properly with the tuning condenser. To M.C.—second signal from tight position of the dial, proceed as specified in each step of the above procedure.

Q—When adjusting compensator (23) be sure that the receiver correctly tuned to the fundamental signal (128) signal generator output lead (high side), to track properly with the tuning condenser. To M.C.—second signal from tight position of the dial, proceed as specified in each step of the above procedure.

R—When adjusting compensator (23) be sure that the receiver correctly tuned to the fundamental signal (128) signal generator output lead (high side), to track properly with the tuning condenser. To M.C.—second signal from tight position of the dial, proceed as specified in each step of the above procedure.

S—When adjusting compensator (23) be sure that the receiver correctly tuned to the fundamental signal (128) signal generator output lead (high side), to track properly with the tuning condenser. To M.C.—second signal from tight position of the dial, proceed as specified in each step of the above procedure.

T—When adjusting compensator (23) be sure that the receiver correctly tuned to the fundamental signal (128) signal generator output lead (high side), to track properly with the tuning condenser. To M.C.—second signal from tight position of the dial, proceed as specified in each step of the above procedure.

U—When adjusting compensator (23) be sure that the receiver correctly tuned to the fundamental signal (128) signal generator output lead (high side), to track properly with the tuning condenser. To M.C.—second signal from tight position of the dial, proceed as specified in each step of the above procedure.

V—When adjusting compensator (23) be sure that the receiver correctly tuned to the fundamental signal (128) signal generator output lead (high side), to track properly with the tuning condenser. To M.C.—second signal from tight position of the dial, proceed as specified in each step of the above procedure.

W—When adjusting compensator (23) be sure that the receiver correctly tuned to the fundamental signal (128) signal generator output lead (high side), to track properly with the tuning condenser. To M.C.—second signal from tight position of the dial, proceed as specified in each step of the above procedure.

X—When adjusting compensator (23) be sure that the receiver correctly tuned to the fundamental signal (128) signal generator output lead (high side), to track properly with the tuning condenser. To M.C.—second signal from tight position of the dial, proceed as specified in each step of the above procedure.

Y—When adjusting compensator (23) be sure that the receiver correctly tuned to the fundamental signal (128) signal generator output lead (high side), to track properly with the tuning condenser. To M.C.—second signal from tight position of the dial, proceed as specified in each step of the above procedure.

Z—When adjusting compensator (23) be sure that the receiver correctly tuned to the fundamental signal (128) signal generator output lead (high side), to track properly with the tuning condenser. To M.C.—second signal from tight position of the dial, proceed as specified in each step of the above procedure.
**TYPE CIRCUIT:** Model 39-770 is an eleven (11) tube A.C. operated superheterodyne circuit with four (4) tuning ranges covering the frequency listed below. Provisions are also provided for connecting high impedance phonograph pick-up. In addition other features of design are: Tuning Light Indicator; Continuously Variable Tone Control with Variable Bass Compensation; Amplified Automatic Volume Control; Push-Pull Pentode Audio Output; and Special Compensation in all circuits to prevent frequency drift.

**POWER SUPPLY:** 115 or 220 V. 50 to 60 Cycle A.C. 115 Watts. To operate the receiver on either of the above voltages, insert the plug on top of power transformer as indicated on the transformer. Special Power Transformers for operation on 25 cycle current are available.

**TUNING RANGES:** 530 to 1720 K.C.; 1.7 M.C. to 5.6 M.C.; 5.5 M.C. to 11.6 M.C.; 11.6 M.C. to 22.0 M.C.

**AUDIO OUTPUT:** 7.5 Watts

**AERIAL AND GROUND:** To obtain maximum performance from this receiver, the Philco Safety Aerial, Part No. 40-6370, should be used together with a good ground connection to the nearest water pipe or any other good ground source.

**CABINET DIMENSIONS:**

<table>
<thead>
<tr>
<th>Type</th>
<th>Height</th>
<th>Width</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>T</td>
<td>18¾</td>
<td>23¾</td>
<td>12¾</td>
</tr>
<tr>
<td>XX</td>
<td>36¾</td>
<td>34¾</td>
<td>14¾</td>
</tr>
</tbody>
</table>
### Alignment of Compensators

<table>
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<th>Operations</th>
<th>SIGNAL GENERATOR</th>
<th>RECEIVER</th>
<th>Adjust Compensators</th>
<th>Special Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output Dummy Control Range Switch</td>
<td>470 K.C.</td>
<td>Tone-Treble</td>
<td>35B, 35A, 34C, 34A</td>
<td>Turn 34B <strong>&quot;L&quot;</strong> knob</td>
</tr>
<tr>
<td>to Receiver</td>
<td>Dummy Antenna</td>
<td>Vol. - Max.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Setting</td>
<td>Range Switch</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>580 K.C.</td>
<td>&quot;Remed.&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>470 K.C.</td>
<td>Tone-Treble</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>580 K.C.</td>
<td>Vol. - Max.</td>
<td>Range Switch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1500 K.C.</td>
<td>Tone-Treble</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1500 K.C.</td>
<td>Vol. - Max.</td>
<td>Range Switch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>200 mfd.</td>
<td>Tone-Treble</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>200 mfd.</td>
<td>Vol. - Max.</td>
<td>Range Switch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>500 mfd.</td>
<td>Tone-Treble</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>500 mfd.</td>
<td>Vol. - Max.</td>
<td>Range Switch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 M.C.</td>
<td>Tone-Treble</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 M.C.</td>
<td>Vol. - Max.</td>
<td>Range Switch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.0 M.C.</td>
<td>Tone-Treble</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.0 M.C.</td>
<td>Vol. - Max.</td>
<td>Range Switch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20.0 M.C.</td>
<td>Tone-Treble</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20.0 M.C.</td>
<td>Vol. - Max.</td>
<td>Range Switch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.0 M.C.</td>
<td>Tone-Treble</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.0 M.C.</td>
<td>Vol. - Max.</td>
<td>Range Switch</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTE A**—The "Dummy Antenna" consists of a condenser or resistance connected in series with the signal generator output lead (high side). Use the capacity or resistance as specified in each step of the above procedure.

**NOTE B**—Dial Calibration: In order to adjust the receiver correctly, the dial must be aligned to track properly with the tuning condenser. To adjust the dial pointer on the extreme left index line at the lowest frequency end of the broadcast scale.

The arrangement of the drive cable with condenser and pointing is shown in this position is shown.

**NOTE C**—Compressor (17A) should be peaked to the fundamental which is the second (2) signal from the bridge (maximum capacity) position. If the compressor is correctly peaked, the "image" signal should be found by turning the receiver dial 940 K.C. below 5.5 M.C.

<table>
<thead>
<tr>
<th>Schem. No.</th>
<th>Description</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ant. Trans. (Berdon)</td>
<td>32-2158</td>
</tr>
<tr>
<td>2</td>
<td>Ant. Trans. (S.W. C)</td>
<td>32-3105</td>
</tr>
<tr>
<td>3</td>
<td>Ant. (S.W. B)</td>
<td>32-3108</td>
</tr>
<tr>
<td>4</td>
<td>Ant. Trans. (S.W. A)</td>
<td>33-1111</td>
</tr>
<tr>
<td>5</td>
<td>Mica Cond. (5 mfd.)</td>
<td>30-1120</td>
</tr>
<tr>
<td>6</td>
<td>Compensators (4 section)</td>
<td>31-6281</td>
</tr>
<tr>
<td>7</td>
<td>R.F. Trans. (Berdon)</td>
<td>32-2279</td>
</tr>
<tr>
<td>8</td>
<td>R.F. Trans. (S.W. C)</td>
<td>32-3106</td>
</tr>
<tr>
<td>9</td>
<td>R.F. Trans. (S.W. B)</td>
<td>32-3109</td>
</tr>
<tr>
<td>10</td>
<td>R.F. Trans. (S.W. A)</td>
<td>32-3112</td>
</tr>
<tr>
<td>11</td>
<td>Resistor (10,000 ohms, 1 watt)</td>
<td>33-351459</td>
</tr>
<tr>
<td>12</td>
<td>Mica Cond. (250 mfd.)</td>
<td>30-1119</td>
</tr>
<tr>
<td>13</td>
<td>Resistor (1.0 megohm, 1 watt)</td>
<td>33-510459</td>
</tr>
<tr>
<td>14</td>
<td>Compensators (4 section)</td>
<td>31-6284</td>
</tr>
<tr>
<td>15</td>
<td>Tubular Cond. (1 mfd.)</td>
<td>30-4527</td>
</tr>
<tr>
<td>16</td>
<td>Resistor (5000 ohms, 1 watt)</td>
<td>33-259439</td>
</tr>
<tr>
<td>17</td>
<td>Mica Cond. (150 mfd.)</td>
<td>30-3119</td>
</tr>
<tr>
<td>18</td>
<td>Resistor (1.0 megohm)</td>
<td>33-510459</td>
</tr>
<tr>
<td>19</td>
<td>Tubular Cond. (25 mfd.)</td>
<td>30-4588</td>
</tr>
<tr>
<td>20</td>
<td>Semi-Fixed (1250 mfd.)</td>
<td>30-4588</td>
</tr>
<tr>
<td>21</td>
<td>Tubular Cond. (25 mfd.)</td>
<td>30-4588</td>
</tr>
<tr>
<td>22</td>
<td>Resistor (12,000 ohms, 1 watt)</td>
<td>33-312120</td>
</tr>
<tr>
<td>23</td>
<td>Osc. Trans. (Berdon)</td>
<td>32-2157</td>
</tr>
<tr>
<td>24</td>
<td>Osc. Trans. (S.W. C)</td>
<td>32-3107</td>
</tr>
<tr>
<td>25</td>
<td>Osc. Trans. (S.W. B)</td>
<td>32-3110</td>
</tr>
<tr>
<td>26</td>
<td>Osc. Trans. (S.W. A)</td>
<td>32-3113</td>
</tr>
<tr>
<td>27</td>
<td>Compensator</td>
<td>31-6288</td>
</tr>
<tr>
<td>28</td>
<td>Compensator</td>
<td>31-6289</td>
</tr>
<tr>
<td>29</td>
<td>Semi-Fixed (1250 mfd.)</td>
<td>30-1119</td>
</tr>
<tr>
<td>30</td>
<td>Compensators (4 section)</td>
<td>31-6285</td>
</tr>
<tr>
<td>31</td>
<td>Mica Cond. (250 mfd.)</td>
<td>30-1119</td>
</tr>
<tr>
<td>32</td>
<td>Resistor (3500 ohms, 1 watt)</td>
<td>33-320459</td>
</tr>
<tr>
<td>33</td>
<td>Tubular Cond. (25 mfd.)</td>
<td>30-4589</td>
</tr>
<tr>
<td>34</td>
<td>Resistors (10,000 ohms, 1 watt)</td>
<td>33-320459</td>
</tr>
<tr>
<td>35</td>
<td>2nd I.F. Trans. Assem.</td>
<td>32-3115</td>
</tr>
<tr>
<td>36</td>
<td>Resistor (20,000 ohms, 1 watt)</td>
<td>33-320459</td>
</tr>
<tr>
<td>37</td>
<td>Tubular Cond. (0.5 mfd.)</td>
<td>30-4519</td>
</tr>
<tr>
<td>38</td>
<td>Resistor (15,000 ohms, 2 watt)</td>
<td>33-315559</td>
</tr>
<tr>
<td>39</td>
<td>Mica Cond. (110 mfd.)</td>
<td>30-1118</td>
</tr>
<tr>
<td>40</td>
<td>Resistor (49000 ohms, 1 watt)</td>
<td>33-449439</td>
</tr>
<tr>
<td>41</td>
<td>Tubular Cond. (5 mfd.)</td>
<td>30-4590</td>
</tr>
<tr>
<td>42</td>
<td>Resistor (99,000 ohms, 1 watt)</td>
<td>33-399459</td>
</tr>
<tr>
<td>43</td>
<td>Tubular Cond. (2 mfd.)</td>
<td>30-4587</td>
</tr>
</tbody>
</table>

The dial pointer on the extreme left index line at the lowest frequency end of the broadcast scale.

**NOTE D**—Compressors of shortwave ranges "A" and "B" should be peaked to the first signal from the bridge (maximum capacity) position. If the compressors are correctly peaked, the "image" signal should be found by turning the receiver dial 940 K.C. above the frequencies being used.

Example: 11.8 M.C. (Image 19.945).

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**SPECIFICATIONS**

Model 39-2770 is an eleven (11) tube A. C. operated superheterodyne circuit with four tuning ranges covering—long wave, 140 to 390 K. C.; standard broadcasts, 540 to 1720 K. C.; short wave (A) 8.7 to 11.5 M. C.; short wave (B) 11.5 to 22 M. C. Other than the tuning range coverage Model 39-2770 is similar in design to the Model 39-770.

Service information for Model 39-2770 is the same as that given for Model 39-770 with the exception of the "Alignment of Compensator" procedure and some parts in the R. F. section.

These differences are listed below:

1—Add a 2200 mfd. condenser, Part No. 30-1125, from contact C1 on Range Switch to ground.
2—Add a 5 mfd. condenser, Part No. 30-1120, from contact C2 on Range Switch to ground.
3—Add a 110 mfd. condenser, Part No. 30-1118 in place of the 51,000 ohm resistor, Part No. 33-351439, now used in the Model 39-770.
4—Add a 5 mfd. condenser, Part No. 30-1120 from contact C2 on Range Switch to ground.
5—Add a compensator, Part No. 31-6297, from contact A1 on Wave Switch to ground. (The 1330 mfd. semi-fixed condenser, Part No. 31-6286, used in Model 39-770 is removed from Model 39-2770.)

**ALIGNMENT OF COMPENSATORS**

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<tr>
<th>SIGNAL GENERATOR</th>
<th>RECEIVER</th>
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<tr>
<td><strong>Operations</strong></td>
<td><strong>Output Connections to Receiver</strong></td>
</tr>
<tr>
<td>2</td>
<td>2XBG Grid</td>
</tr>
<tr>
<td>7</td>
<td>Ant. &amp; Gnd. Panel</td>
</tr>
<tr>
<td>8</td>
<td>Ant. &amp; Gnd. Panel</td>
</tr>
<tr>
<td>9</td>
<td>Ant. &amp; Gnd. Panel</td>
</tr>
<tr>
<td>10</td>
<td>Ant. &amp; Gnd. Panel</td>
</tr>
</tbody>
</table>

**COILS SHOWN BELOW**

The numbers on coil connections shown, correspond to same numbers on coil connections for Model 39-770.

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Specifications

Type of Circuit: Model 40-110 is a four tube battery operated superheterodyne receiver with electric push-button tuning. In addition other features of design are: Low current drain tubes, new high sound output speaker, specially designed tone chamber, two tuning ranges, automatic volume control, and pentode audio output.

The receiver is equipped with six electric tuning push-buttons for automatically selecting stations. Five of the push-buttons are used for broadcast stations and one for selecting dial tuning. The procedure for adjusting the push-buttons will be found in the instructions supplied with each set.

Tuning Ranges: 540 to 1630 K.C. 5.4 to 18.0 M.C.

Intermediate Frequency: 455 K.C.

Philco Tubes Used: One 1A7G, Converter; one 1N5G, L.F. Amplifier; one 1H5G, 2nd Detector, A.V.C. 1st Audio; one 1A5G, Audio Output.

Philco Batteries: One Type P-66D-11L.

Battery Drain: “A” 200 M.A. “B” 7.2 M.A.

Cabinet Dimensions: Height Width Depth
40-110K .......................... 37½ 26% 11½
40-110B .......................... 17½ 17½ 9½

Aerial and Ground: To obtain maximum operating performance with this model, Philco Farm Radio Aerial Part No. 40-6383 is recommended and a good ground source such as a water pipe.

Alignment of Compensators

Equipment Required

Signal Generator covering a frequency range of 115 K.C. to 36 M.C. such as Philco Model 077.

Aligning Indicator: A vacuum tube voltmeter or audio output meter such as contained in Philco Models 027 and 028 circuit testers. Either of these meters can be used to align the receiver and are connected as given below.

Tools: Aligning screw driver Part No. 45-2610.

Connecting Aligning Meters

Audio Output Meter: The audio output meter is connected to the plate and screen terminals of the 1A5G tube. Adjust the meter for the 0 to 30 volt A.C. scale.

Vacuum Tube Voltmeter: To use the vacuum tube voltmeter as an aligning indicator it should be connected to the A.V.C. circuit as follows: Connect the negative (—) terminal of the voltmeter through a 2 meg. resistor to any point in the A.V.C. circuit where voltage can be obtained. The positive (+) terminal is connected to the receiver chassis.

After connecting the aligning meter, adjust the compensators in the order as shown in the tabulation below.

<table>
<thead>
<tr>
<th>Operations in Order</th>
<th>Output Connections to Receiver</th>
<th>Dummy Antenna</th>
<th>Dial Setting</th>
<th>Dial Setting</th>
<th>Control Setting</th>
<th>Adjust Paddles</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Aerial</td>
<td>400 ohms</td>
<td>18 M.C.</td>
<td>18 M.C.</td>
<td>Val. Max. Range Switch “B. W.”</td>
<td>4A Note B</td>
</tr>
<tr>
<td>3</td>
<td>Aerial</td>
<td>220 mmfd.</td>
<td>1500 K.C.</td>
<td>1500 K.C.</td>
<td>Range Switch “Brdcet”</td>
<td>7 screw, 4B Note E</td>
</tr>
<tr>
<td>4</td>
<td>Aerial</td>
<td>225 mmfd.</td>
<td>580 K.C.</td>
<td>580 K.C.</td>
<td>Range Switch “Brdcet”</td>
<td>7A (nut) Roll Tuning Condenser</td>
</tr>
<tr>
<td>5</td>
<td>Aerial</td>
<td>400 ohms</td>
<td>1500 K.C.</td>
<td>1500 K.C.</td>
<td>Range Switch “Brdcet”</td>
<td>7 screw</td>
</tr>
</tbody>
</table>

Note A — The “Dummy Antenna” consists of a condenser connected in series with the signal generator output lead (High side). Use the capacity or resistance as specified in each step of the above procedure.

Note B — Dial Calibration: In order to adjust the receiver correctly, the dial must be aligned to track properly with the tuning condenser. To do this, proceed as follows: Turn the tuning condenser to the maximum capacity position (plates fully meshed). With the condenser in this position, the tuning pointer is set horizontal at the low frequency end of the scale (550 K.C.).
Philco Radio & Telev. Corp.

Models 40-115, 40-124

Code 121

Schematic, Voltage Chassis, Trimmers Alignment

Output 33A

I.F. = 455 KC.

September, 1939

Compliments of www.nucow.com


Special Instructions

Operations in Order

Output Connections to Receiver

<table>
<thead>
<tr>
<th>Operation</th>
<th>Dummy Antenna</th>
<th>Dial Setting</th>
<th>Dial Setting</th>
<th>Control Setting</th>
<th>Adjust Padders</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>7A8 Grid</td>
<td>.004</td>
<td>455 K.C.</td>
<td>580 K.C.</td>
<td>Manual Pushbutton &quot;IN&quot; Model 40-124</td>
</tr>
<tr>
<td>2</td>
<td>Aerial</td>
<td>100 mfd.</td>
<td>1500 K.C.</td>
<td>1586 K.C.</td>
<td>Range Switch &quot;Brdcst&quot; (2B)</td>
</tr>
<tr>
<td>3</td>
<td>Aerial</td>
<td>100 mfd.</td>
<td>1500 K.C.</td>
<td>1500 K.C.</td>
<td>Range Switch &quot;Brdcst&quot; (2A)</td>
</tr>
</tbody>
</table>

NOTE B — DIAL CALIBRATION: In order to adjust the receiver correctly, the dial must be aligned to the tuning condenser. To do this, proceed as follows: Turn the tuning condenser to the maximum capacity position (plates fully meshed). With the condenser in this position, the tuning pointer is set horizontal at the low frequency end of the scale (580 K.C.).

NOTE C — Compensators 2A and 2B are on top of the Tuning Condenser. 2A at the front, 2B at the rear.

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Compliments of www.nucow.com
Models 40-140, 40-145, 40-507

ALIGNMENT OF COMPENSATORS

EQUIPMENT REQUIRED

1. Signal Generator with a frequency range from 115 to 36,000 K. C. such as Philco Model 017.
2. Aligining Indicator, Philco Model 027 or 028, vacuum tube voltmeter and circuit tester incorporates sensitive audio output meters and vacuum tube voltmeters. Either of these instruments can be used as an aligning indicator.
3. Fiber Handle Screw Driver, Philco Part No. 45-2410. When using the vacuum tube voltmeter for aligning the receiver, an aligning adaptor Part No. 45-2971 is required.

CONNECTING ALIGNING METERS

1. Audio Output Meters: If the Philco Models 027 and 028 audio output meters are used, they are connected to the antenna voice coil terminals or the plate and screen terminals of the TBS tube. Adjust the meter to the 0 to 10 volt A.C. scale.
2. Vacuum Tube Voltmeter: To use the vacuum tube voltmeter as an aligning indicator make the following connections:
   - Adjusting L. F. Circuit: Remove the 1222 R. F. tube from its socket and insert the aligning adaptor, then replace the tube in the adaptor. Connect the negative terminal of the vacuum tube voltmeter to the light colored wire which protrudes from the side of the adaptor. Attach the positive terminal of the vacuum tube voltmeter to the black wire of the adaptor.
   - Adjusting R. F. Circuit: To adjust the R. F. circuit, the aligning adaptor is inserted in the TCS second detector tube socket. The vacuum tube voltmeter remains connected to the adaptor as given in the paragraph above. With the voltmeter connected in this manner, a very sensitive indication of the A. V. C. voltage is obtained when the paddles are adjusted.
   - After connecting the aligning adaptors, adjust the compensators as shown in the tabulation below. Locations of the compensators are shown in Schematic Diagram. If the aligning meter pointer goes off scale when adjusting the compensators, reduce the strength of the signal from the generator.

<table>
<thead>
<tr>
<th>OPERATIONS</th>
<th>SIGNAL GENERATOR</th>
<th>RECEIVER</th>
<th>SPECIAL INSTRUCTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>In Order</td>
<td>Output Connections</td>
<td>Dial Setting</td>
<td>Dial Setting</td>
</tr>
<tr>
<td>1</td>
<td>No. 1 Ter. on Loop Panel Note B</td>
<td>455 K. C.</td>
<td>500 K. C.</td>
</tr>
<tr>
<td>2</td>
<td>Use Loop, Note C</td>
<td>18.0 M. C.</td>
<td>18.0 M. C.</td>
</tr>
<tr>
<td>3</td>
<td>Use Loop, Note C</td>
<td>1500 K. C.</td>
<td>1500 K. C.</td>
</tr>
<tr>
<td>4</td>
<td>Use Loop, Note C</td>
<td>580 K. C.</td>
<td>580 K. C.</td>
</tr>
<tr>
<td>5</td>
<td>Use Loop, Note C</td>
<td>1500 K. C.</td>
<td>1500 K. C.</td>
</tr>
<tr>
<td>6</td>
<td>Use Loop, Note C</td>
<td>18.0 M. C.</td>
<td>18.0 M. C.</td>
</tr>
</tbody>
</table>

NOTE A — DIAL CALIBRATION: In order to adjust the receiver correctly, the dial must be aligned to track properly with the tuning condenser. To do this, proceed as follows: Turn the tuning condenser to the maximum capacity position (plates fully meshed). With the condenser in this position, set the tuning pointer on the extreme left index line at the low frequency end of the broadcast scale.

NOTE B — When adjusting the L. F. paddle the high side of the signal generator output is connected through a .1 mfd. condenser to terminal No. 1 of the loop terminal panel at the rear of the chassis. The ground or low side of the generator is connected to the chassis of the receiver.

NOTE C — When aligning the R. F. Circuits a loop is made from a few turns of wire and connected to the generator output terminals; the signal generator is then placed two or three feet from the loop in the cabinet.

NOTE D — S. W. Oscillator compensator (27a) is located top of the tuning condenser. Antenna compensators (1a) and (2a) are located on the loop. When adjusting the “Ant” compensators, the receiver loop should be held in place against the back of the cabinet.

Models 40-81, Codes 121, 122

<table>
<thead>
<tr>
<th>OPERATIONS</th>
<th>SIGNAL GENERATOR</th>
<th>RECEIVER</th>
<th>SPECIAL INSTRUCTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>In Order</td>
<td>Output Connections to Receiver</td>
<td>Dial Setting</td>
<td>Dial Setting</td>
</tr>
<tr>
<td>1</td>
<td>See Signal Generator Paragraph above</td>
<td>455 K. C.</td>
<td>500 K. C.</td>
</tr>
<tr>
<td>2</td>
<td>Use Loop on Generator</td>
<td>1500 K. C.</td>
<td>1500 K. C.</td>
</tr>
</tbody>
</table>

Model 40-88, Code 121

<table>
<thead>
<tr>
<th>OPERATIONS</th>
<th>SIGNAL GENERATOR</th>
<th>RECEIVER</th>
<th>SPECIAL INSTRUCTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>In Order</td>
<td>Output Connections</td>
<td>Dial Setting</td>
<td>Dial Setting</td>
</tr>
<tr>
<td>1</td>
<td>See Signal Generator Paragraph above</td>
<td>455 K. C.</td>
<td>500 K. C.</td>
</tr>
<tr>
<td>2</td>
<td>Use Loop on Generator</td>
<td>18 K. C.</td>
<td>18 K. C.</td>
</tr>
<tr>
<td>3</td>
<td>Use Loop</td>
<td>1400 K. C.</td>
<td>1400 K. C.</td>
</tr>
<tr>
<td>4</td>
<td>Use Loop</td>
<td>580 K. C.</td>
<td>580 K. C.</td>
</tr>
<tr>
<td>5</td>
<td>Use Loop</td>
<td>1400 K. C.</td>
<td>1400 K. C.</td>
</tr>
<tr>
<td>6</td>
<td>Use Loop</td>
<td>18 M. C.</td>
<td>18 M. C.</td>
</tr>
</tbody>
</table>

NOTE A — DIAL CALIBRATION: Before adjusting the R. F. paddles the dial must be aligned to track properly with the tuning condenser. To adjust the dial proceed as follows: With the tuning condenser in the closed position (maximum capacity) set the dial pointer on the small dot below 550 K. C.

BATTERY CURRENT: “A” Battery, 250 M. A. Model 40-81

BATTERY CURRENT: “B” Battery, 250 M. A. Model 40-88

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PHILCO RADIO & TELEV. CORP.

MODELS 40-503, 40-506,
MODEL 40-525
Chassis, Tuner

PHILCO RADIO & TELEV. CORP.

MODELS 40-130, 40-135
Chassis, Trimmers

JUNE, 1939.

Replacement Parts — Models 40-130 and 40-135

FIG. 1. PART LOCATIONS, UNDERSIDE OF CHASSIS.

MISCELLANEOUS PARTS

Model 40-130 is dial tuned and assembled in cabinet type "T".

Model 40-135 is equipped with six electric push buttons for automatically selecting stations in addition to dial tuning. Five push buttons are used for stations one of which can be used in combination with special type PHILCO TELEVISION receivers for reception of television sound programs. The sixth push button selects dial tuning. The push buttons in this model cover frequency ranges as follows:

540 to 1050 K. C.
880 to 1100 K. C.
1160 to 1600 K. C.

NOTE: Push button data and tuning ranges apply for Models 40-503, 40-506 and 40-525 also.

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The procedure for adjusting the push buttons for reception of stations is similar to the method described in volume ten, the only difference being that the frequency range of each button is different.

Philo television sets and record players contain instructions for setting up and adjusting the push-button in model 40-135.

TUNING RANGE: 540 to 1550 K. C., 1.5 to 3.3 M. C.
INTERMEDIATE FREQUENCY: 455 K. C.
POWER Supplies: 115 volts A. C., 60 cycles.
POWER CONSUMPTION: 35 watts.

See Philco

page 10-16.
COMPLIMENTS OF www.nucow.com

MODEL 40-130, 40-135, 40-503, 40-506, 40-130, 40-135, 40-525

ALIGNMENT OF COMPENSATORS

EQUIPMENT REQUIRED

1. Signal Generator: Philco Model 977 Signal Generator which has a fundamental frequency range from 114 to 28,000 K. C. is the correct instrument for this purpose.

2. Aligning Indicator: Philco Models 927 or 928 Vacuum Tube Voltmeter.

3. Voltmeters and Circuit Testers: Instruments giving sensitive vacuum tube voltmeters and audio output meters and are recommended.

4. F. Circuit: To adjust the R. F. circuit, the aligning indicator is inserted in the 780 second detector tube socket. The vacuum tube voltmeter remains connected to the adapter as given in the paragraph above. With the voltmeter connected as shown in this manner a very sensitive indication of the A. V. C. voltage is obtained when the paddles are adjusted.

Audio Output Meter: Philco Model 927 or 928 Audio Output Meters is connected to the voice coil terminals of the speaker or the plate and screen of the 125 tube and adjusted for the 0 to 10 volt A. C. scale.

Vacuum Tube Voltmeter: To use the Vacuum Tube Voltmeter as an alignment indicator make the following connections:

1. Connect the L. F. Circuit: Remove the 775 R. F. tube from its socket and insert the aligning adapter. Then, replace the tube in the adapter. Connect the negative terminal of the vacuum tube voltmeter to the light colored wire which protrudes from the side of the adapter. Attach the positive terminal of the vacuum tube voltmeter to the black wire of the adapter.

2. Adjusting R. F. Circuit: To adjust the R. F. circuit, the aligning adapter is inserted in the 780 second detector tube socket. The vacuum tube voltmeter remains connected to the adapter as given in the paragraph above. With the voltmeter connected in this manner a very sensitive indication of the A. V. C. voltage is obtained when the paddles are adjusted.

After connecting the alignment adapter, adjust the compensators as shown in the tabulation below. Locations of the compensators are shown in Fig. 1. If the output meter pointer goes off scale when adjusting the compensator, reduce the strength of the signal from the generator.

<table>
<thead>
<tr>
<th>Operations in Order</th>
<th>Output Connections to Receiver</th>
<th>Dial Setting</th>
<th>Dial Setting</th>
<th>Control Settings</th>
<th>Adjust Compensators in Order</th>
<th>Special Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Loop, Note C</td>
<td>1500 K. C.</td>
<td>1500 K. C.</td>
<td>Val. Cont. Max.</td>
<td>9A, 1A</td>
<td>Note A</td>
</tr>
</tbody>
</table>

NOTE A — DIAL CALIBRATION: In order to adjust the receiver correctly, the dial must be aligned so that the tuning condenser to the maximum capacity position (plates fully meshed). With the condenser in this position, set the tuning pointer on the extreme left index line at the low frequency end of the broadcast scale.

NOTE B — When adjusting the L. F. paddles, hold the high side of the signal generator output connected through a .1 mfd., condenser to terminal No. 2 of the loop terminal panel at the rear of the cabinet. When the ground or low side of the generator is connected to the chassis of the receiver.

The ground or low side of the generator is connected to the chassis of the receiver.

NOTE C — When aligning the L. F. paddles, the high side of the signal generator is connected through a .1 mfd., condenser to terminal No. 1 of the loop terminal panel at the rear of the cabinet. When the ground or low side of the signal generator is connected to the chassis of the receiver.

When aligning the R. F. paddles a loop antenna is made from a few turns of wire and connected to the signal generator output terminals; the signal generator is then placed two or three feet from the loop in the cabinet.

1. When adjusting the "ANT" compensators the receiver loop should be held in place against the back of the cabinet.

Model 40-165

Signal Generator: When adjusting the L. F. paddles, the high side of the signal generator is connected through a .1 mfd., condenser to terminal No. 1 of the loop terminal panel at the rear of the cabinet. When the ground or low side of the signal generator is connected to the chassis of the receiver.

When the receiver Tuning Condenser is adjusted (rotated) to the right, the receiver tuning compensator positioned at the rear of the chassis controls the frequency range of the broadcast band, the arrangement of the drive gauge in this position is shown in the Schematic Diagram.

NOTE B — Turn loop paddler to closed position (maximum capacity), then adjust the first signal peak from this position; at the same time rotate the tuning condenser. See Note C.

NOTE C — When adjusting the low frequency compensator of Range One (broadcast) or the range compensator of the low frequency tuning ranges; the receiver Tuning Condenser must be adjusted (rotated) to the left. With the tuning condenser in the position shown in the Schematic Diagram, the receiver tuning compensator in the direction that gives greatest signal and again vary the receiver tuning compensator for maximum output. This procedure for first setting the compensator and then varying the tuning condenser is continued until there is no further gain in output reading.

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PHILCO BUILT-IN SUPER AERIAL SYSTEM:

In the built-in super aerial system, a statically shielded loop for broadcast band reception and a short wave receiving loop. The feature of the built-in broadcast band statically shielded loop is that its closer turned to the position in which it picks up a minimum amount of interference, or if the loop is present, the loop may be set in the position where best reception is obtained.

POWER SUPPLY: 115 Volts, 25 and 60 cycle A.C.

POWER CONSUMPTION: 65 watts.

FREQUENCY TUNING RANGES: (Three)

840 to 1550 K.C.  1.5 to 8.5 M. C.  16 to 18.0 M. C.

INTERMEDIATE FREQUENCY: 455 K. C.

AUDIO OUTPUT: 2 watts.


CABINET DIMENSIONS: Type F: Height, 27"; Width, 23 3/4"; Depth, 9 3/4".

ADJUSTING ELECTRIC PUSH-BUTTON TUNING:

The procedure for adjusting the electric tuning push-buttons in this model is covered in vol.5, Philco page 10-16.
PHILCO RADIO & TELEV. CORP.  
Models 40-205, 40-216  
and MODELS 40-510, 40-516.

Model 40-205, 510.

TYPE CIRCUIT: Model 40-205, code 121, is a 12-tube wireless remote control and dial tuned receiver employing a super-heterodyne circuit for reception of standard broadcast stations. Eight broadcast bands can be automatically tuned in from the remote control unit. The wireless remote control unit is also incorporated. The auxiliary receiver is also included. Tuning of the announcer can be controlled by the dial in the control unit, and thus presents no problems to the announcer. The dial in the control unit is designed to receive the sound of the television program tuned in by Philco Television sets.  

PHILCO BUILT-IN SUPER AERIAL SYSTEM:  
A new type aerial which eliminates an outside aerial is also incorporated in this model. Included in the built-in super aerial, in this new type aerial system with ample space for baffle action. The feature of the built-in broadcast band statically shielded loop is that it is a perfect loop for any position where best reception is obtained.

In addition, other features of design are automatic volume control, continuous variable tone control, base compensation, degenerated push pull pentode audio output.  

POWER SUPPLY: 115 Volts, 50 to 60 Cycles, A. C.  
POWER CONSUMPTION: 180 watts. (Model 40-205 only)  
TUNING RANGES: 540 to 1600 K.C.  
L. F. FREQUENCY: 470 K.C.  
Wireless Remote Control Unit—One type 3G.  

AUDIO OUTPUT: 10 watts. (Model 40-205 only)  
CABINET DIMENSIONS: Height Width Depth  
Console: 30 18 18  
Wireless Remote Control: 8.9 7.4 9.4  

Model 40-510 is a radio-phonograph combination assembled in a console cabinet consisting of a 12 tube, wireless remote control super-heterodyne radio receiver and a Deluxe Inter-Mix Record Changer.

ADJUSTMENT OF WIRELESS REMOTE CONTROL CIRCUITS  
Models 40-205, 40-216 and 40-510, 40-516.

ADJUSTING CONTROL FREQUENCY AMPLIFIER  
The wireless remote control models are shipped with 5 different control frequencies which range from 360 to 400 K. C. These frequencies are identified by code numbers appearing on the serial number ticket and on the rear of the chassis. The code numbers and frequencies are as follows:  
Code 5—355 K. C.  
Code 7—375 K. C.  
Code 6—367 K. C.  
Code 8—388 K. C.  
Code 9—395 K. C.  
The purpose of the different control frequencies is to prevent interaction between two or more wireless remote control models which are on the same floor or exceptionally close together. When several wireless remote control models are to be located close together, it will be necessary to use different control frequencies. These frequencies should be 20 K. C. apart. For example, if three models are to be operated at the same time and are closely situated, it will be advisable to adjust the control frequency of the first set to 355 K. C., the second set to 375 K. C., and the third set to 395 K. C.  

In order to realign or change the control frequency of these models, the following equipment is required:  
1. Philco Model 077 signal generator with a loop attached to the output terminal. (A few turns of wire 12 inch in diameter.)  
2. Philco wireless remote control aligning adapter. Part No. 45-2799.  
3. Philco aligning screw driver, Part No. 45-2615.  

With this apparatus the control frequency is adjusted as follows:  
1. Remove the 2A4G control tube from its socket and replace with the aligning adapter. Connect the red lead of the aligning adapter to the positive terminal of the vacuum tube voltmeter. The black lead of the adapter is connected to the negative terminal of the vacuum tube voltmeter.  
2. Remove the 78 control amplifier tube, its shield and the shield of the output of the 78 tube. Apply power to the set and turn the range selector disc to "remote."  
3. Attach the "high" side of the signal generator output to the grid of the 6J3G tube. Set the generator modulation control to "mod on" and turn the attenuator control about one-fourth on.  
4. The control frequency to which the control amplifier is tuned can now be determined by tuning the signal generator between 350 and 400 K. C. When the signal generator is tuned to the control frequency, the vacuum tube voltmeter will show maximum deflection. If this frequency is to be used, leave the signal generator at this point or turn the indicator to any other frequency desired between 350 and 400 K. C.  
5. After the control frequency has been found or changed, compensate (105A), (105B) Model 40-216; and (74A), (74B) Model 40-516. This is accomplished by adjusting or maximum indication on the vacuum tube voltmeter.  
6. After adjusting this circuit, replace the 78 tube and shields in their sockets and replace the signal generator lead from the grid of the 6J7G tube.  
7. Place the small loop mentioned above into the "high" and "ground" of the signal generator output terminals and place the signal generator near the secondary inductor loop in the bottom of the cabinet. When doing this, do not disturb the setting of the signal generator indicator. Turn the sensitivity control located on the right rear of the chassis toward the position marked "extreme" then adjust compensators (105A), (105B), (74A), (74B), (90), (85) Models 40-205 for maximum reading on the vacuum tube voltmeter.  
8. Next adjust the secondary inductor loop compensator (90) in the Model 216 and (95) in the Model 516 on the bottom of the cabinet. This compensator is encased in a cardboard container that is attached to one corner of a loop. Extreme care should be used in adjusting the secondary inductor loop. This loop is of resonance as the secondary inductor is a very sharply tuned circuit.  
9. If the vacuum tube voltmeter pointer goes off scale when adjusting the compensators, turn the attenuator control of the signal generator toward the "off" position. After these compensators are adjusted to maximum, the control amplifier is tuned to the frequency selected.

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ALIGNING OF COMPENSATING CONDENSERS

(1) Signal Generator. In order to properly adjust this receiver a calibrated signal generator such as Philco Model 071 is required. This signal generator covers a frequency range of 540 to 34,000 K.C.

(2) Indicating Device. To obtain maximum signal strength and accurate adjustment of the paddles a vacuum tube voltmeter is required and circuit tester such as Philco Models 027 and 028 is recommended. These testers also contain an audio output meter which may be used as an indicating device.

CONNECTING ALIGNING INSTRUMENTS

VACUUM TUBE VOLTOMETER: To use the vacuum tube voltmeter as an aligning indicator it should be connected to the A. V. C. circuit as follows:
1. Connect the negative (—) terminal of the voltmeter through a 1 meg. resistor to the converter grid (6E8G) Model 209; (6A4G) Model 214. The resistor must be connected directly to the grid of the tube and the voltmeter wire attached to the resistor.
2. Connect the positive (+) terminal to the chassis ground terminal.

AUDIO OUTPUT METER: If this type of meter is used as an aligning indicator, it should be connected to the plate terminals of the 42 tubes. Adjust the meter for the 0 to 90 volt A. C. scale. After connecting the aligning meter, adjust the compensators in the order as shown in the table below.

<table>
<thead>
<tr>
<th>Operation</th>
<th>SIGNAL GENERATOR</th>
<th>RECEIVER</th>
<th>SPECIAL INSTRUCTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Output Connections to Receiver</td>
<td>Dial Setting</td>
<td>Dial Setting</td>
</tr>
<tr>
<td>1</td>
<td>78 ± 1 F. Grid</td>
<td>470 K.C.</td>
<td>880 K.C.</td>
</tr>
<tr>
<td>3</td>
<td>Use Loop on Generator</td>
<td>18.0 M.C.</td>
<td>18.0 M.C.</td>
</tr>
<tr>
<td>4</td>
<td>Use Loop on Generator</td>
<td>1500 K.C.</td>
<td>1500 K.C.</td>
</tr>
<tr>
<td>5</td>
<td>Use Loop on Generator</td>
<td>880 K.C.</td>
<td>880 K.C.</td>
</tr>
<tr>
<td>6</td>
<td>Use Loop on Generator</td>
<td>1500 K.C.</td>
<td>1500 K.C.</td>
</tr>
<tr>
<td>7</td>
<td>Use Loop on Generator</td>
<td>3.5 M.C.</td>
<td>3.5 M.C.</td>
</tr>
</tbody>
</table>

NOTE A — Dial Calibration: In order to adjust the receiver properly the dial must be aligned to track properly with the tuning condenser. To adjust the dial proceed as follows: With the tuning condenser closed (maximum capacity), set the dial pointer on the extreme left index line at the low frequency end of the broadcast scale. The arrangement of the drive cable and dial pointer is shown in Fig. 5.


ADJUSTING WIRELESS REMOTE CONTROL UNIT

The wireless remote control unit is now adjusted to the control frequency of the amplifier as follows:
1. Turn off the signal generator, then dial any one of the stations indicated on the remote control unit by pulling the selector to the stop position; release the selector and at the same time press the stop down and hold it in this position.
2. Now bring the wireless remote control unit close to the receiver. Using a padding wrench, Philco Part No. 3164, tune the compensator (127) Fig. 3, located on the bottom of the remote control unit until a maximum voltage reading is indicated on the vacuum tube voltmeter. When tuning this compensator, it should be done very slowly as not to pass over the frequency to which the control amplifier is tuned.
3. After adjusting the compensator with the sensitivity control in the "extreme" position, the remote control unit is adjusted for maximum sensitivity by setting the sensitivity control in the "near" position and placing the remote control unit a few feet away from the receiver. The compensator (127) Fig. 3, is then adjusted again for maximum voltage reading of the vacuum tube voltmeter.
4. After making these adjustments, remove the aligning adapter from the socket and replace the 2A4G tube. The wireless remote control unit should now be adjusted to the same frequency as the control frequency in the receiver.

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Adjusting Wireless Remote Control for Reception of Stations

1. In Model 40-510 No. 8 position is used for photograph. This position is already connected and will not need adjustment.

2. The adjustments are similar to the procedure in setting up the wireless remote control unit. The receiver is turned to the station number desired, and the control unit is turned on. The remote control unit is turned on and the volume control turned up to maximum.

3. The suction control is then turned to the remote control unit. The remote control unit is then turned to the station number desired, and the volume control turned up to maximum.

4. The suction control is then turned to the remote control unit. The remote control unit is then turned to the station number desired, and the volume control turned up to maximum.

5. The suction control is then turned to the remote control unit. The remote control unit is then turned to the station number desired, and the volume control turned up to maximum.

6. The suction control is then turned to the remote control unit. The remote control unit is then turned to the station number desired, and the volume control turned up to maximum.

7. The suction control is then turned to the remote control unit. The remote control unit is then turned to the station number desired, and the volume control turned up to maximum.

8. The suction control is then turned to the remote control unit. The remote control unit is then turned to the station number desired, and the volume control turned up to maximum.

9. The suction control is then turned to the remote control unit. The remote control unit is then turned to the station number desired, and the volume control turned up to maximum.
Model 40-503 is assembled in a table model cabinet and consists of a semi-automatic crystal pickup mechanism which will play 10" or 12" records. The pickup is placed on the record automatically when the lid is closed.

Model 40-506 is assembled in a console type cabinet and consists of a manually operated crystal pickup and will play 10" or 12" records. An automatic switch is provided on this model that starts the phonograph motor when the pickup is lifted from the mounting.
### Replacement Parts — Models 40-503 and 40-506

<table>
<thead>
<tr>
<th>SCHE. No.</th>
<th>PART</th>
<th>DESCRIPTION</th>
<th>SCHE. No.</th>
<th>DESCRIPTION</th>
<th>SCHE. No.</th>
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</tbody>
</table>

### Replacement Parts — Models 40-526

<table>
<thead>
<tr>
<th>SCHE. No.</th>
<th>PART</th>
<th>DESCRIPTION</th>
<th>SCHE. No.</th>
<th>DESCRIPTION</th>
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<th>DESCRIPTION</th>
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<td>20</td>
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</tr>
</tbody>
</table>
SCHEMATIC DIAGRAM MODEL 40-510

VOLTAGES INDICATED AT TUBE ELEMENTS WERE MEASURED WITH A PHILCO MODEL 027 CIRCUIT TESTER AND VACUUM TUBE VOLTMETER. OCTOBER, 1939.

POWER CONSUMPTION: 220 Watts.
CABINET DIMENSIONS: 38-1/2" High • 40-1/2" Wide: 21" Deep.

FOR OTHER DATA, SEE INDEX

The Deluxe Inter-Mix Record Changer plays fourteen 10" and 12" records intermixed, fifteen 10" or thirteen 12" records at one loading. The record changer can be operated manually or from the wireless remote control circuit of the radio receiver. When using the wireless remote control to operate the phonograph, the Inter-Mix Record Changer can be started and stopped, records rejected and volume adjusted, from the remote control unit. The automatic record changer is selected by dialing "PHONO" position. This operates relay (112) which pulls "Radio-Phone" switch (139) to the "PHONO" position. Records are also rejected by dialing the "PHONO" position on the wireless remote control unit. Phone relay (112) is connected to No. 8 contact of the pilot lamp section of rotary switch (55).
PHILCO RADIO & TELEV. CORP.

Replacement Parts — Model 40-510

| SERS No. | DESCRIPTION | PART No. | SCHE.
|----------|-------------|----------|------
| 1        | Resistor (1.0 meg., 1/2 watt) | 35-503330 | 600 |
| 2        | Resistor (1.0 meg., 1/2 watt) | 35-503330 | 600 |
| 3        | Mace Cond. (200 volts) | 35-503370 | 600 |
| 4        | Mace Cond. (500 volts) | 35-503370 | 600 |
| 5        | Resistor (200,000 ohms, 1/2 watt) | 35-503320 | 600 |
| 6        | Resistor (200,000 ohms, 1/2 watt) | 35-503320 | 600 |
| 7        | Mace Cond. (500 volts) | 35-503370 | 600 |
| 8        | 135-volt V. (50 ma.) | 35-512190 | 600 |
| 9        | Mace Cond. (200 volts) | 35-503370 | 600 |
| 10       | Mace Cond. (500 volts) | 35-503370 | 600 |
| 11       | Cond. (x 100) | 35-511000 | 600 |
| 12       | Cond. (x 1000) | 35-511000 | 600 |
| 13       | Mace Cond. (200 volts) | 35-503370 | 600 |
| 14       | Mace Cond. (500 volts) | 35-503370 | 600 |
| 15       | Cond. (x 100) | 35-511000 | 600 |
| 16       | Cond. (x 1000) | 35-511000 | 600 |
| 17       | Cond. (x 100) | 35-511000 | 600 |
| 18       | Cond. (x 1000) | 35-511000 | 600 |
| 19       | Cond. (x 100) | 35-511000 | 600 |
| 20       | Cond. (x 1000) | 35-511000 | 600 |
| 21       | Cond. (x 100) | 35-511000 | 600 |
| 22       | Cond. (x 1000) | 35-511000 | 600 |
| 23       | Cond. (x 100) | 35-511000 | 600 |
| 24       | Cond. (x 1000) | 35-511000 | 600 |
| 25       | Cond. (x 100) | 35-511000 | 600 |
| 26       | Cond. (x 1000) | 35-511000 | 600 |
| 27       | Cond. (x 100) | 35-511000 | 600 |
| 28       | Cond. (x 1000) | 35-511000 | 600 |
| 29       | Cond. (x 100) | 35-511000 | 600 |
| 30       | Cond. (x 1000) | 35-511000 | 600 |
| 31       | Cond. (x 100) | 35-511000 | 600 |
| 32       | Cond. (x 1000) | 35-511000 | 600 |
| 33       | Cond. (x 100) | 35-511000 | 600 |
| 34       | Cond. (x 1000) | 35-511000 | 600 |
| 35       | Cond. (x 100) | 35-511000 | 600 |
| 36       | Cond. (x 1000) | 35-511000 | 600 |

Replacement Parts — Model 40-516

| SERS No. | DESCRIPTION | PART No. | SCHE.
|----------|-------------|----------|------
| 1        | Resistor (100,000 ohms, 1/2 watt) | 35-503330 | 600 |
| 2        | Resistor (100,000 ohms, 1/2 watt) | 35-503330 | 600 |
| 3        | Mace Cond. (200 volts) | 35-503370 | 600 |
| 4        | Mace Cond. (500 volts) | 35-503370 | 600 |
| 5        | Resistor (200,000 ohms, 1/2 watt) | 35-503320 | 600 |
| 6        | Resistor (200,000 ohms, 1/2 watt) | 35-503320 | 600 |
| 7        | Mace Cond. (500 volts) | 35-503370 | 600 |
| 8        | 135-volt V. (50 ma.) | 35-512190 | 600 |
| 9        | Mace Cond. (200 volts) | 35-503370 | 600 |
| 10       | Mace Cond. (500 volts) | 35-503370 | 600 |
| 11       | Cond. (x 100) | 35-511000 | 600 |
| 12       | Cond. (x 1000) | 35-511000 | 600 |
| 13       | Mace Cond. (200 volts) | 35-503370 | 600 |
| 14       | Mace Cond. (500 volts) | 35-503370 | 600 |
| 15       | Cond. (x 100) | 35-511000 | 600 |
| 16       | Cond. (x 1000) | 35-511000 | 600 |
| 17       | Cond. (x 100) | 35-511000 | 600 |
| 18       | Cond. (x 1000) | 35-511000 | 600 |
| 19       | Cond. (x 100) | 35-511000 | 600 |
| 20       | Cond. (x 1000) | 35-511000 | 600 |
| 21       | Cond. (x 100) | 35-511000 | 600 |
| 22       | Cond. (x 1000) | 35-511000 | 600 |
| 23       | Cond. (x 100) | 35-511000 | 600 |
| 24       | Cond. (x 1000) | 35-511000 | 600 |
| 25       | Cond. (x 100) | 35-511000 | 600 |
| 26       | Cond. (x 1000) | 35-511000 | 600 |
| 27       | Cond. (x 100) | 35-511000 | 600 |
| 28       | Cond. (x 1000) | 35-511000 | 600 |
| 29       | Cond. (x 100) | 35-511000 | 600 |
| 30       | Cond. (x 1000) | 35-511000 | 600 |
| 31       | Cond. (x 100) | 35-511000 | 600 |
| 32       | Cond. (x 1000) | 35-511000 | 600 |
| 33       | Cond. (x 100) | 35-511000 | 600 |
| 34       | Cond. (x 1000) | 35-511000 | 600 |
| 35       | Cond. (x 100) | 35-511000 | 600 |
| 36       | Cond. (x 1000) | 35-511000 | 600 |

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**MODEL 40-710**

**Connecting Aligning Instruments**

Vacuum Tube Voltmeters: To use the vacuum tube voltmeter as an aligning tool, it should be connected to the A. V. C. circuit with the Philco aligning adapter, Part No. 45-2747, as follows:

1. Remove the 7CS tube from its socket and insert the aligning adapter in the socket, then replace the tube in the adapter.
2. Connect the negative terminal of the vacuum tube voltmeter to the light colored wire which protrudes from the side of the adapter. Attach the positive terminal of the voltmeter to the black wire.

**Audio Output Meter:** If this type of meter is used as an aligning indicator, it should be connected to the plate and screen terminals of the 35A6 tube. Adjust the meter for the 0 to 30 volt A. C. scale.

After connecting the aligning meter, adjust the compensators in the order as shown in the tabulation below. Locations of the compensators are shown in Fig. 2. If the output meter pointer goes off scale when adjusting the compensators, reduce the strength of the signal from the generator.

**MODEL 40-715**

**Connecting Aligning Instruments**

Vacuum Tube Voltmeter: To use the vacuum tube voltmeter as an aligning indicator it should be connected to the A. V. C. circuit as follows:

1. Connect the negative (−) terminal of the voltmeter through a 2 meg. resistor to the converter grid (628G). The resistor must be connected directly to the grid of the tube and the voltmeter wire attached to the resistor.
2. Connect the positive (+) terminal to the chassis ground terminal.

**Audio Output Meter:** If this type of meter is used as an aligning indicator, it should be connected to the plate and screen terminals of the 41 tube. Adjust the meter for the 0 to 36 volt A. C. scale.

### SIGNAL GENERATOR

<table>
<thead>
<tr>
<th>Operations in Order</th>
<th>Output Connections to Receiver</th>
<th>Dummy Antenna Note A</th>
<th>Dial Setting</th>
<th>Control Settings</th>
<th>Adjust Compensators</th>
<th>SPECIAL INSTRUCTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6J8EG</td>
<td>.1 mfd</td>
<td>455 K. C.</td>
<td>Val. Max.</td>
<td>24, 16B, 16A</td>
<td>Conductor closed (maximum capacity), set the dial pointer on the first mark on the left edge (low frequency end) of the broadcast scale.</td>
</tr>
<tr>
<td>2</td>
<td>Ant. &amp; Grnd.</td>
<td>200 mmfd</td>
<td>1500 K. C.</td>
<td>Range Switch &quot;800&quot;</td>
<td>9A, 18A</td>
<td>Note B</td>
</tr>
<tr>
<td>3</td>
<td>Ant. &amp; Grnd.</td>
<td>200 mmfd</td>
<td>580 K. C.</td>
<td>Range Switch &quot;800&quot;</td>
<td>11</td>
<td>Roll Gang Repeat Operation 2</td>
</tr>
<tr>
<td>4</td>
<td>Ant. &amp; Grnd.</td>
<td>400 ohms</td>
<td>700 K. C.</td>
<td>Range Switch &quot;Police&quot;</td>
<td>9</td>
<td>Roll Gang</td>
</tr>
<tr>
<td>5</td>
<td>Ant. &amp; Grnd.</td>
<td>400 ohms</td>
<td>200 K. C.</td>
<td>Range Switch &quot;S.W.&quot;</td>
<td>5A, 5</td>
<td>Note C</td>
</tr>
</tbody>
</table>

**Special Instructions**

**PHILCO RADIO & TELEV. CORP.**

**ALIGNMENT MODELS 40-710, 40-715**

(1) **Signal Generators.** In order to properly adjust this receiver, a calibrated signal generator such as Philco Model 977 A. C. or Model 177 battery operated are required. These signal generators cover a frequency range of 540 to 36,000 K. C.

(2) **Indicating Device.** To obtain maximum signal strength and accurate adjustment of the padders a vacuum tube volt-

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PHILCO RADIO & TELEV. CORP

MODEL 40-715(121)

Schematic, Voltage, Chassis

Trimmers

*TUBES WHERE SPECIFIED

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I.F. = 455 Kc. JULY, 1939.

Replacement Parts — Model 40-715

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SPECIFICATIONS

TYPE CIRCUIT: Model 40-715, code 121, is a five (5) tube A. C. operated radio employing a superheterodyne circuit with three tuning ranges for reception of Standard, Police and Shortwave Broadcast Stations. Connections are also provided for the use of a high impedance Electric Phonograph pick-up. In addition other features of design are: Automatic Volume Control, Tone Control, Variable Volume Control: and special temperature and humidity-proof compensators for reducing frequency drift to a minimum.

FOR ALIGNMENT SEE INDEX

POWER SUPPLY: 100-120 or 200-240 volts A.C. The voltage ranges are selected by inserting the changeover plug as indicated on top of the power transformer.

POWER CONSUMPTION: 40 watts.

TUNING RANGES: 530 to 1750 K. C. 2.3 to 7.4 M. C. 7.3 to 22 M. C.

I.F. FREQUENCY: 455 K.C.


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Philco-Iotropic Models

MODEL 40-725, code 121
MODEL 40-755, code 121

SPECIFICATIONS

Model 40-725

TYPE CIRCUIT: Model 40-725, code 121, is a six (6) tube A.C. operated receiver employing a superheterodyne circuit with three tuning ranges for reception of Station, Police, and Shortwave Broadcast Stations. Connections are also provided for attaching a high impedance Electric Phonograph pick-up. In addition other features of design are: Automatic Volume Control; Continuously Variable Tone Control; Base Compensation; and special compensation for reducing frequency drift to a minimum.

POWER SUPPLY: 100-120 or 200-260 volt, 50 to 60 cycle, 60 watts. The voltage ranges are selected by inserting the plug as indicated on top of the power transformer.

TUNING RANGES: 580 to 1720 K.C. 2.3 to 7.4 M.C. 7.3 to 33 M.C.

I.F. FREQUENCY: 455 K.C.

PHILCO TUBES: 7TE, B.F. Amplifier; 632EG, Converter-Oscillator; 78E, I.F. Amplifier; 7S, Second Detector, First Audio, and A, V.C.; 41E, Pentode Audio Output; 84, Rectifier.

AUDIO OUTPUT: 2.5 watts.

AERIAL AND GROUND: To obtain maximum performance from this receiver, the Philco Safety Aerial, Part No. 40-678 should be used and a good ground connection to the nearest water pipe or any other good ground.

CABINET DIMENSIONS: Height, 14 1/4". Width, 22 3/4". Depth, 10 1/4".

ALIGNING COMPENSATING CONDENSERS

(1) Signal Generator. In order to properly adjust this receiver, a calibrated signal generator such as Philco Model 227 A.C. or Model 117 Battery operated are required. These signal generators cover a frequency range of 400 to 30,000 K.C.

(2) Indicating Devices. To obtain maximum signal strength and accurate adjustment of the paddles a vacuum tube voltmeter and circuit tester such as Philco Models 027 and 028 is recommended. These testers also contain an audio output meter which may be used as an aligning device.

Connecting Aligning Instruments

Vacuum Tube Voltmeter! To use the vacuum tube voltmeter as an aligning indicator it should be connected to the A.V.C. circuit as follows:

1. Connect the negative (→) terminal of the voltmeter through a 2000 ohm resistor to the converter grid (632EG). The resistor must be connected directly to the grid of the tube and the voltmeter wire attached to the resistor.

2. Connect the positive (+) terminal to the chassis ground terminal.

Audio Output Meter: For this type of meter is used as an aligning indicator it should be connected to the plate and screen terminals of the 41 tube. Adjust the meter for 0 to 30 volt A.C. scale.

After connecting the aligning meter, adjust the compensators in the order as shown in the tabulation below. Locations of the compensators are shown in Fig. 1. If the output meter pointer goes off scale when adjusting the compensators, reduce the strength of the signal from the generator.

NOTE: — DIAL CALIBRATION. In order to adjust the receiver correctly the dial must be aligned to track properly with the tuning condenser. To adjust the dial, proceed as follows: With the tuning condenser closed (maximum capacity), set the dial pointer on the first mark on the left edge (low frequency end) of the broadcast scale.

NOTE C: — When adjusting compensator (29) be sure to tune in the fundamental signal (20 M.C.) instead of the image signal. If the compensator is correctly adjusted, the image signal will be 910 K.C. below the fundamental signal, which will be 19,000 M.C.
PHILCO RADIO & TELEV. CORP.

PHILCO - TROPIC MODEL 40-748, CODE 121

SPECIFICATIONS

TYPE CIRCUIT: Model 40-748, code 121 is a 7 tube battery operated radio receiver employing a superheterodyne circuit with 2 tuning ranges for reception of standard, police, and short-wave broadcast stations. Connections are also provided for attaching an external high impedance electronic phonograph pick-up. In addition other features of design are automatic volume control, continuously variable tone control, BASS compensation, and a push pull pentode audio output circuit. A vibrator is used for supplying the "B" voltage from the 6 volt storage battery.

POWER SUPPLY: 6 volt storage battery.

TUNING RANGES: 530-1720 K. C. 2.3-7.4 M. C. 7.3-22 M. C.

INTERMEDIATE FREQUENCY: 455 K. C.


AUDIO OUTPUT: 2.5 watts.

AERIAL & GROUND: To obtain maximum performance from this receiver, the Philco Safety aerial, Part No. 40-6210 should be used. A good ground source to the nearest water pipe or any other grounding connection should be used.

CABINET DIMENSIONS: Height, 14½"; Width, 20"; Depth, 10½".

MISCELLANEOUS PARTS

INSTALLATION OF DRIVE CORD.

FIG. 1. PART LOCATIONS—UNDERSIDE OF CHASSIS.

ALIGNMENT OF COMPENSATORS

<table>
<thead>
<tr>
<th>Operations in Order</th>
<th>Output Connections to Receiver</th>
<th>Dummy Antenna Note A</th>
<th>Dial Setting</th>
<th>Control Settings</th>
<th>Adjust Compensators</th>
<th>SPECIAL INSTRUCTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6DEG Grid and Ground .1 mfd.</td>
<td>455 K. C.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Ant. &amp; Grd. 200 mfd.</td>
<td>1500 K. C.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Ant. &amp; Grd. 200 mfd.</td>
<td>580 K. C.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Ant. &amp; Grd. 200 mfd.</td>
<td>1500 K. C.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Ant. &amp; Grd. 400 ohms.</td>
<td>6.0 M. C.</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>6</td>
<td>Ant. &amp; Grd. 400 ohms.</td>
<td>21 M. C.</td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

NOTE A — The "Dummy Antenna" consists of a condenser or resistance connected in series with the signal generator output lead (high side). Use the capacity or resistance as specified in each step of the above procedure.

NOTE B — DIAL CALIBRATION: In order to adjust the receiver correctly the dial must be adjusted to track properly with the tuning condenser. To adjust the dial, proceed as follows: With the tuning condenser closed (maximum capacity), set the dial pointer on the first mark on the left edge (low frequency end) of the broadcast scale.

NOTE C — When adjusting compensator (26) be sure to tune in the fundamental signal (21 M. C.—second signal from tight position of paddle) instead of the image signal. If the compensator is correctly adjusted, the image signal will be found by turning the receiver dial 910 K. C. below the fundamental signal.

MODEL S-1722

SETTING UP THE RECEIVER FOR AUTOMATIC TUNING

1 — Turn the Receiver on and allow it to operate for TWENTY minutes. Remove the cover plate over the automatic tuning adjusting screws. This plate is on the front of the Receiver and is removed by removing two screws.

2 — Push the Automatic Station Selector button until the word "DIAL" appears in the indicator window. Tune in the station whose call letters are in the first position on the dial (the highest frequency station) and note the program. Push the Automatic Selector button once and this station's call letters will appear at the indicator window.

3 — With a small screwdriver, turn the No. 1 adjusting screw (see Fig. 3) in the lower column, to the right or left until this station is tuned in. Now adjust the corresponding screw in the upper column until maximum volume is obtained. Make these adjustments carefully, as it may be easy to pass, by the lodest point on some stations.

When adjusting for Automatic Tuning on strong local stations the antenna rod should be all the way down and the adjustments made with the ear in a shielded area, such as in a steel constructed building or under a viaduct. This is necessary in order to obtain a weak signal so the adjustments can be accurately made.

4 — Press the Automatic Station Selector button until "DIAL" appears again in the indicator window and tune in the station whose call letters are in the second position on the automatic dial (the next lower frequency). Press the automatic button two times and adjust the number-2 set of adjusting screws.

Repeat this procedure until each of the five pairs of adjusting screws has been tuned to its respective station.

IT IS NECESSARY THAT THE SETTING OF THE ADJUSTING SCREWS BE REPEATED TO BE SURE THEY ARE PROPERLY SET SO THAT MAXIMUM PERFORMANCE MAY BE HAD.

Make all adjustments for maximum reading on the output meter.

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TYPE OF CIRCUIT:
Model 107, code 121 is a combination Automatic Record Changer, Phonograph and Electric push-button tuning radio receiver.

The record changer plays eight 10" records automatically and 12" records manually and employs a crystal pick-up.

The Radio Receiver employs a five tube A.C. operated superheterodyne circuit, covering standard broadcast frequencies: 550 to 1750 K.C., Automatic Volume Control, and Pentode Audio Output. Six Electric Automatic Push-Buttons are provided; five push-buttons are used for selecting any of the five stations in the standard broadcast range, and one push-button for changing to manual tuning. The procedure for adjusting the push-buttons for reception of stations will be found in the instructions supplied with each set.

INTERMEDIATE FREQUENCY: 470 K.C.

PHILCO TUBES USED:
6A7 First Detector Oscillator; 78, I.F. Amplifier; 78, Second Detector, A.C.V., First Audio; 41 Audio Output and 84, Rectifier.

POWER SUPPLY: 115 V., 60 to 60 cycle A.C.

Power Transformers are available for operation on 115 V., 20 to 20 cycle A.C.

POWER CONSUMPTION: 57 watts

AUDIO OUTPUT: One (1) watt
Compensating condensers will be found under the Schem. No. Description (See Philco page 10-2) Schem. No. Description Part No.

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MODEL 933

ADJUSTMENTS

All padding adjustments are carefully made at the factory and ordinarily no readjustments are necessary. However, when readjustments are required, the procedure given below must be followed in detail.

Equipment — Fully charged heavy duty storage battery or 6-volt power pack, 077 or 177 Philco Signal Generator, 027 Philco vacuum tube voltmeter and circuit tester and a 27-7159 Padding screwdriver.

General — The vacuum tube voltmeter can be used as a “wireless” output meter as a convenient method for obtaining maximum output reading. Solder one end of a piece of wire to a strip of phosphor bronze approximately 1” wide, 6” long and .02” thick. Coil this strip so that it can be slipped over the top of the type 7G5 output tube, and make a fairly tight contact. Connect the other end of the wire to the “high” terminal of the vacuum tube voltmeter. Then connect a wire from the radio chassis to the “plus” terminal of the vacuum tube voltmeter.

With the Radio and signal generator set up for operation at the prescribed frequency, turn the Volume control on full and set the signal generator attenuator so that a half scale reading is obtained on the output meter. The signal in the speaker should be audible but not loud.

The shielding on the generator output lead must be connected to the Radio housing.

<table>
<thead>
<tr>
<th>OPERATION</th>
<th>SIGNAL GENERATOR FREQUENCY</th>
<th>CONNECTION</th>
<th>DUMMY CAPACITY</th>
<th>SPECIAL INSTRUCTIONS</th>
<th>ADJUST PADDERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Press the Automatic Station Selector button until “DIAL” appears in the window. Stations can be tuned in by Manual Tuning.</td>
<td>470 K.C.</td>
<td>To Antenna Receptacle on Radio</td>
<td>30 Mmfd. See Note 1</td>
<td>Turn Tuning Condenser Plates Out of Mesh as Far as They Will Go.</td>
</tr>
<tr>
<td>2</td>
<td>470 K.C.</td>
<td>To Antenna Receptacle on Radio</td>
<td>30 Mmfd. See Note 1</td>
<td>Set Tuning Condenser at 1580 K.C.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>1580 K.C.</td>
<td>To Antenna Receptacle on Radio</td>
<td>30 Mmfd. See Note 1</td>
<td>Set Tuning Condenser at 1500 K.C. Note 2</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>1500 K.C.</td>
<td>To Antenna Receptacle on Radio</td>
<td>30 Mmfd. See Note 1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Make all adjustments for maximum reading on the output meter.

NOTE 1 Connect the antenna lead, Part No. 41-3191, to the antenna receptacle in the radio. Connect a 30 Mmfd. Condenser in series between the signal generator and the antenna lead.

NOTE 2 When the antenna stage adjustment is made with the Radio installed in the car, the Radio antenna lead must be connected to the car antenna in the usual manner. Connect the signal generator output lead to a wire placed near the car antenna but not connected to it. Also adjust the antenna compensator 0 for maximum on a weak signal at approximately 1400 K.C.
PHILCO AUTO RADIO

INSTALLING THE DIAL CORD ON THE
Chrysler Model C-1708  Lincoln Models L-1760, L-1761
Ford Model F-1740  Studebaker Models S-1722, S-1726

When installing new dial cords on the custom built radios, follow the procedure given below:

CHRYSLER MODEL C-1708

1. Remove the top cover, bottom cover and front housing.
2. Turn the radio upside down with the control shafts in front.
3. Turn the tuning control shaft CLOCKWISE to the stop position.
4. Hook the spring on one end of the cord.
5. Hook a paper clip through the eyestall of the cord to which the spring is attached and fasten the clip to the dial mounting bracket.
6. Place the long end of the cord over the rear wooden pulley. Wrap the cord around the back portion of the tuning shaft. Pass the cord through the slot in the collar of the shaft and wrap about ½ of a turn CLOCKWISE around the shaft in front of the collar. Run the cord over the front wooden pulley and fasten the other end of the cord to the spring. Then force the cord over the metal pulley at the top of the scale bracket.
7. Place the pointer on the dial and slide it to the first line above the 1500 mark.
8. Remove the paper clip and recheck the pointer setting using a broadcast signal or a Philco Signal Generator. Slide the pointer along the dial cord to the correct frequency.
9. Replace the front housing and top and bottom covers.

FORD MODEL F-1740 — LINCOLN MODELS L-1760 and L-1761

1. Remove the condenser assembly from the front casting of the radio.
2. Remove the dial and shaft assembly from the tuning condenser bracket.
3. Remove the dial drum from the knob and shaft assembly.
4. Place the tuning condenser unit on the bracket with the back and the metal pulley facing up. The tuning condenser plates must be in mesh.
5. Connect one end of the cord to the link and hook the other end on the right tab on the outside of the pulley. Feed the cord through the slot in the pulley and wrap one turn of cord CLOCKWISE around the shaft in front of the collar, keeping the cord to the right of the guide pin on the tuning condenser.
6. Hold the dial drum with the left hand and wrap two turns of cord COUNTER-CLOCKWISE around the slot in the pulley, keeping the cord to the left of the pin in the eyelet. Loop one turn of cord around the pin. Then wrap one turn COUNTER-CLOCKWISE around the slot in the pulley, keeping the cord to the right of the pin in the eyelet.
7. Place the knob and shaft on the pulley, with the knob next to the pulley, and move the whole pulley and the thin washer on the left side of the knob and the thick washer on the right side. Place the shaft in the grooves on the tuning condenser bracket.
8. Bring the cord COUNTER-CLOCKWISE around the idler pulley on the bracket and wrap five turns of cord CLOCKWISE around the shaft. Be sure the washer is against the end of the bracket.
9. Bring the cord CLOCKWISE around the pulley on the tuning condenser and connect the end of the cord to the link on the drum.
10. Hook the closed end of the tension spring to the tab on the left side of the pulley and hook the other end to both ends of the cord where it enters the pulley.
11. Replace the tuning condenser assembly.

STUDEBAKER MODEL S-1722

1. Remove the chassis from the housing.
2. Place the receiver on the bench right side up with the shafts to the front.
3. Turn the tuning condenser plates in mesh.
4. Feed the loop on the short end of the cord through the hole in the back of the tuning shaft and pass the free end of the loop through the loop of the cord. Pull the cord tight.
5. Wrap 1½ turns of cord CLOCKWISE around the end of the tuning shaft and then ¼ of the turn CLOCKWISE around the tuning condenser drum.
6. Fasten the end loop of the cord to one end of the spring and fasten the other end so the spring in the hole in the drum.
7. Pass the long end of the cord around the idler pulley and through the hole in the sub-base.
8. Hold the cord and turn the radio over with the wiring side showing.
9. Wrap one turn of cord CLOCKWISE around the tuning dial drum.
10. Hold the cord with one hand, turn the tuning shaft CLOCKWISE until the stop position is reached.
11. Wrap ¼ turn of cord COUNTER-CLOCKWISE, around the turning shaft in back of the front range.
12. Feed the loop of the cord through the hole in the shaft and pass the free end of cord through the eyelet. The cord must have tension after it is assembled.
13. Assemble the receiver in the housing.

STUDEBAKER MODEL S-1726

1. Remove the top cover, bottom cover and front housing.
2. Place the receiver on the bench right side up with the control knobs in front.
3. Turn the tuning shaft clockwise as far as it will go.
4. Loosen the two set screws on the tuning shaft coupling, so that it will turn freely.
5. Place the small "U" spring in the slot at the back of the tuning shaft.
6. Hold one of the knurled ends of the small "U" spring and turn the shaft clockwise until there are eight turns of cord on the shaft between the spring and the front shaft bracket.
7. Hook the remaining end of the cord to the other hook on the spring and turn the shaft counter-clockwise until one turn is wound on the back end of the shaft.
8. Hold the tuning shaft so that it does not turn and place the cord COUNTER-CLOCKWISE over the two pulleys.
9. Bring the cord under the pointer with the front end of the cord in front of the guide bracket and the back end of the cord in back of the guide bracket.
10. Slide the pointers over to the right end of the guide bracket and place the large "U" spring under the pointer and through the slot, with the hook to the back.
11. With a short piece of wire as a hook, feed the front end of the cord through the hole in the pointer from the bottom and fasten this loop to the hook on the "U" spring on the pointer.
12. Pull the cord tight, and loop it over the pulley on the left end of the pointer guide bracket. Tighten the set screw on the tuning shaft coupling.
13. Pull the pointer can be adjusted to the proper frequency by holding the tuning shaft and sliding the pointer along the guide bracket.
14. Replace the front housing and top and bottom covers.

October, 1939
### Model C - 1708

#### Adjustments

All padding adjustments are carefully made at the factory and ordinarily no readjustments are necessary. However, when readjustments are required, the procedure given below must be followed in detail.

**Equipment** — Fully charged heavy duty storage battery or 6-volt power pack, 077 or 177 Philco Signal Generator, 027 Philco vacuum tube voltmeter and circuit tester and a 27-1159 Padding screw driver.

**General** — The vacuum tube voltmeter can be used as a “wireless” output meter as a convenient method for obtaining maximum output reading. Solder one end of a piece of wire to a strip of phosphor bronze approximately 1” wide, 6” long and .02” thick. Coil this strip so that it can be slipped over the top of the type 7B5 output tube, and make a fairly tight contact. Connect the other end of the wire to the “high” terminal of the vacuum tube voltmeter. Then connect a wire from the radio chassis to the “plus” terminal of the vacuum tube voltmeter.

With the Radio and signal generator set up for operation at the prescribed frequency, turn the Radio volume control on full and set the signal generator attenuator so that a half scale reading is obtained on the output meter. The signal in the speaker should be audible but not loud.

The shielding on the generator output lead must be connected to the Radio housing.

<table>
<thead>
<tr>
<th>Operations</th>
<th>SIGNAL GENERATOR</th>
<th>Dummy Capacity</th>
<th>Special Instructions</th>
<th>Adjust Padder</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>Connection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>455 K. C.</td>
<td>To Antenna Receptacle on Radio</td>
<td>.1 mfd.</td>
<td>Note 1</td>
</tr>
<tr>
<td>2</td>
<td>455 K. C.</td>
<td>To Antenna Receptacle on Radio</td>
<td>.1 mfd.</td>
<td>Note 1</td>
</tr>
<tr>
<td>3</td>
<td>1400 K. C.</td>
<td>To Antenna Receptacle on Radio</td>
<td>20 mmd, Note 2</td>
<td>Set tuning condenser at 1400 K. C.</td>
</tr>
<tr>
<td>4</td>
<td>580 K. C.</td>
<td>To Antenna Receptacle on Radio</td>
<td>20 mmd, Note 2</td>
<td>Set tuning condenser at 580 K. C.</td>
</tr>
<tr>
<td>5</td>
<td>1400 K. C.</td>
<td>To Antenna Receptacle on Radio</td>
<td>20 mmd, Note 2</td>
<td>Set tuning condenser at 1400 K. C.</td>
</tr>
</tbody>
</table>

Make all adjustments for maximum reading on the output meter unless otherwise specified.

**NOTE 1** — Turn the tuning control knob clockwise as far as it will go.

**NOTE 2** — Connect the Chrysler Antenna lead, Part No. 95-0109, to the antenna receptacle on the Radio. Connect a 20 mmd condenser in series between the signal generator and the antenna lead.

**NOTE 3** — Rotate the tuning control when adjusting the Low Frequency screw @. Tune to the signal and adjust the screw for maximum output. Turn the tuning control knob slightly, first one way then the other, for maximum output. Repeat this procedure until no further improvement is noticed.

**NOTE 4** — When the Antenna Stage adjustment is made with the Radio installed in the car, the Radio Antenna lead must be connected to the Cowl Antenna in the usual manner. Connect the signal generator output lead to a wire placed near the car antenna lead but not connected to it and adjust padder @ for maximum signal at 1400 K. C.

### Alignment for Model S-1722

<table>
<thead>
<tr>
<th>Operations</th>
<th>SIGNAL GENERATOR</th>
<th>Dummy Capacity</th>
<th>Special Instructions</th>
<th>Adjust Padder</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>Connection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Press the Automatic Station Selector button until “DIAL” appears in the window and stations can be tuned in by Manual Tuning.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>470 K. C.</td>
<td>To Grid of 78 I. F. Tube</td>
<td>.5 mfd.</td>
<td>Note 2</td>
</tr>
<tr>
<td>3</td>
<td>1500 K. C.</td>
<td>To Antenna Receptacle on Radio</td>
<td>35 mmd, See Note 1</td>
<td>Note 2</td>
</tr>
<tr>
<td>4</td>
<td>1300 K. C.</td>
<td>To Antenna Receptacle on Radio</td>
<td>35 mmd, See Note 1</td>
<td>Set tuning condenser at 1300 K. C.</td>
</tr>
</tbody>
</table>

**NOTE 1** — Connect the antenna lead, Part No. L-2765, to the antenna receptacle in the radio. Connect a 35 mmd condenser in series between the signal generator and the antenna lead.

**NOTE 2** — Turn the condenser rotor plates completely out of mesh as far as they will go.

**NOTE 3** — When the antenna stage adjustment is made with the Radio installed in the car, the Radio antenna lead must be connected to the car antenna in the usual manner. Connect the signal generator output lead to a wire placed near the car antenna but not connected to it.
**PHILCO RADIO & TELEV. CORP.**

**PARTS LIST**

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Part No.</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Antenna Choke</td>
<td>65-2923</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Antenna Choke</td>
<td>65-2922</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Antenna Choke</td>
<td>65-2932</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Antenna Transformer</td>
<td>65-8034</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Condenser (45 mfd.)</td>
<td>61-8064</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Resistor (100 ohms)</td>
<td>62-438334</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Sensitivity Control</td>
<td>67-5229</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>I. F. Wave Trap, Part of</td>
<td>63-31304</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Condenser (25 mfd.)</td>
<td>65-2527</td>
<td></td>
</tr>
</tbody>
</table>

**Adjustments**

All padding adjustments are carefully made at the factory and ordinarily no readjustments are necessary. However, when readjustments are required, the procedure given below must be followed in detail.

**Equipment** — Fully charged heavy duty storage battery or 6-volt power pack, 077 or 177 Philco Signal Generator, 027 Philco vacuum tube voltmeter and circuit tester and a 27-7059 Paddling screwdriver.

**General** — The vacuum tube voltmeter can be used as an output meter, as a convenient method for obtaining maximum output reading. Connect one end of the test lead to the "high" terminal of the vacuum tube voltmeter and the other end to the jumper on the bottom of the radio. Then connect one end of the other test lead, from the "plus" terminal of the vacuum tube voltmeter to the radio chassis.

With the radio and signal generator set up for operation at the prescribed frequency, turn the radio volume control on full and set the signal generator attenuator so that a half scale reading is obtained on the output meter. The signal in the speaker should sound audible but not loud.

All cover plates must be in place on the radio and screwed to the housing before attempting to adjust the radio.

<table>
<thead>
<tr>
<th>OPERATIONS</th>
<th>SIGNAL GENERATOR</th>
<th>DUMMY CAPACITY</th>
<th>SPECIAL INSTRUCTIONS</th>
<th>ADJUST PADDERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Press the Automatic Station Selector button until &quot;DIAL&quot; appears in the window and stations can be tuned in by Manual Tuning.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>455 K. C.</td>
<td>To Antenna Receptacle on Radio</td>
<td>.1 mfd.</td>
<td>Note 2</td>
</tr>
<tr>
<td>2</td>
<td>455 K. C.</td>
<td>To Antenna Receptacle on Radio</td>
<td>.1 mfd.</td>
<td>Note 2</td>
</tr>
<tr>
<td>3</td>
<td>1530 K. C.</td>
<td>To Antenna Receptacle on Radio</td>
<td>See Note 1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>1400 K. C.</td>
<td>To Antenna Receptacle on Radio</td>
<td>See Note 1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>580 K. C.</td>
<td>To Antenna Receptacle on Radio</td>
<td>See Note 1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>1500 K. C.</td>
<td>To Antenna Receptacle on Radio</td>
<td>See Note 1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>1400 K. C.</td>
<td>To Antenna Receptacle on Radio</td>
<td>See Note 1</td>
<td></td>
</tr>
</tbody>
</table>

**Adjustable Controls**

Adjust as follows:

1. Turn the radio on and allow it to operate for at least twenty minutes before starting any adjustments. All adjustments must be made with the antenna fully extended.

2. Press the Rotary button until the world "DIAL" appears on the Rotomatic indicator. Tune in a weak station on the manual dial between 1380 and 1400 kilocycles. Adjust the antenna paddler (Fig. 3) until maximum volume is obtained. NOTE: This adjustment must be made first before any Rotomatic adjustments are made; otherwise, mistuning will result.

3. Select five stations within the frequency range; shown under each, set of adjustment screws in Fig. 3, and identify the program.

4. With Rotomatic button set to "DIAL" showing on the Rotomatic indicator, manually tune the station to be set up on position No. 1 and identify the program.

5. Press the Rotary button until No. 1 appears on the Rotomatic indicator. Now adjust the top screw at position No. 1 until the station selected is brought in with maximum volume. Then adjust the tapped screw at the bottom until maximum volume is obtained; Stations of higher frequencies are tuned in by turning the screws to the left or counter-clockwise. Lower frequencies are tuned in by turning to the right or clockwise.

6. Proceed with setting up the remaining four stations in the same manner as described under Paragraph 4 and 5.

7. Because there is some detuning of the coils due to the movements of the components in the receiver, these last adjustments again, going back from Position No. 5 to No. 1 and again re-checking from No. 1 to No. 5. This permits the reception while driving at a distance from the broadcasting stations.

8. This final re-checking of adjustments should be made in an area of low signal strength in your service station or in some "dead" spot where signals can just barely be heard.

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PILOT RADIO CORP.

MODEL T-101
Schematic, Socket Trimmers, Alignment

Compliments of www.nucow.com

TUNING RANGE

Broadcast Band 525 to 1720 kc.; or 561 to 174 meters
Short Wave Band 5.6 to 19.8 kc.; or 53.6 to 15.2 meters

ANTENNA

While this receiver is equipped with the new "Pile-tenna" for the reception of local stations with good tone quality, it is recommended that a good outside antenna of the doublet type be installed for short wave or distant broadcast band reception and for the reduction of interfering noises due to other electrical devices.

When using a doublet antenna, connect one lead-in wire to terminal "A" at the rear of the chassis, and the other lead-in wire to terminal "D". Remove the connecting link from terminals "D" and "G" and connect terminal "G" to a ground such as a cold water pipe or radiator. If an ordinary single wire antenna is used, connect the lead-in wire to Terminal "A" on the rear of the chassis. Leave the link between "D" and "G" terminals and connect a ground wire under terminal "G".

SERVICE NOTES

The location of all adjustments used in re-aligning this receiver, and the frequencies at which these adjustments should be made, are shown in the accompanying diagram.

When aligning the I. F. amplifier, the generator must be connected to the grid of the 125A7 tube through a .1 mfd condenser. When aligning the receiver on the Broadcast Band, connect the generator to the Antenna wire through a .0002 mfd condenser, and on the Short wave band use a 400 ohm carbon resistor.

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MODEL T-102
Schematic, Socket
Alignment, Trimmers

ALL RESISTORS ARE 1/4 WATT UNLESS OTHERWISE SPECIFIED. 1 F 450 Kc.

ALL FILAMENTS

Broadcast Band 555 to 1720 kc; or 561 to 1740 meters
Short Wave Band 5.6 to 19.8 mc; or 53.6 to 15.2 meters

SERVICE NOTES

The location of all adjustments used in re-aligning this receiver, and the frequencies at which these adjustments should be made, are shown in the accompanying diagram.

When aligning the I. F. amplifier, the generator must be connected to the grid of the 6SA7 tube through a .1 mfd condenser. When aligning the receiver on the Broadcast Band, connect the generator to the Antenna wire through a .0002 mfd condenser, and on the short wave band use a 400 ohm carbon resistor.

ANTENNA

While this receiver is equipped with the new "Pils-tenna" for the reception of local stations with good tone quality, it is recommended that a good outside antenna of the doublet type be installed for short wave or distant broadcast band reception and for the reduction of interfering noises due to other electrical devices.

When using a doublet antenna, connect one lead-in wire to terminal "A" at the rear of the cabinet, and the other lead-in wire to terminal "D". Remove the connecting link from terminals "D" and "G" and connect terminal "G" to a ground such as a cold water pipe or radiator. If an ordinary single wire antenna is used, connect the lead-in wire to Terminal "A" on the rear of the cabinet. Leave the link between "D" and "G" terminals and connect a ground wire under terminal "G".

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PILOT RADIO CORP.

MODEL T-121

MODEL T-122

Schematics

IF PEAK 455 KC

5 BAND SWITCH 84673
& BAND CONDENSER 84668
P. PIN JACKS PHONO & TELEVISION 84304-2C

T-121...RANGE

535 to 1720 kc.
5.6 to 19.8 kc.

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Compliments of www.nucow.com
MODEL T-121
MODEL T-122
Alignment, Trimmers

PILOT RADIO CORP.

12SK7
12SK7

CABINET
DIAL

BOTTOM VIEW
OF CABINET

MODEL T/21

ANTENNA

MODEL T/22

When using a doublet antenna, connect one lead-in wire to terminal "A" at the rear of the chassis, and the other lead-in wire to terminal "D". Remove the connecting link from terminals "D" and "G" and connect terminal "G" to a ground such as a cold water pipe or radiator. If an ordinary single wire antenna is used, connect the lead-in wire to Terminal "A" on the rear of the chassis. Leave the link between "D" and "G" terminals and connect a ground wire under terminal "G".

SERVICE NOTES

The location of all adjustments used in re-aligning this receiver, and the frequencies at which these adjustments should be made, are shown in the accompanying diagram.

When aligning the I. F. amplifier, the generator must be connected to the grid of the 128A7 tube through a .1 mfd condenser. When aligning the receiver on the Broadcast Band, connect the generator to the Antenna wire through a .002 mfd condenser, and on the short wave band use a 400 ohm carbon resistor.

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PUSH BUTTON CONTROLS:

The purpose of the topmost button (No. 1) is to shut off the power of the receiver. The following 6 push buttons are available for any 6 stations on the broadcast band in the tuning ranges designated below. The lowest button (No. 8) is to be pressed when you wish to operate the manual tuning control.

To set the 6 station buttons (No. 2 to 7) to various stations of the broadcast band, the operations noted below should be followed.

1. Remove the two screws above and below the push buttons in the wooden cover plate and lift off the plate. This will disclose the adjusting screws.

2. With a screw driver inserted in the larger of the two screws opposite the buttons, turn either right or left until the desired station is tuned in. Then make the final adjustment with the small screw.

The limiting wave lengths between which the various buttons can be adjusted are as follows: (buttons numbered from top to bottom).

Button No. 1—“OFF” power switch
Button No. 2—from 1620 kc. to 890 kc. and “ON” power switch
Button No. 3—from 1355 kc. to 620 kc. and “ON” power switch
Button No. 4—from 1355 kc. to 620 kc. and “ON” power switch
Button No. 5—from 1355 kc. to 620 kc. and “ON” power switch
Button No. 6—from 540 kc. to 527 kc. and “ON” power switch
Button No. 7—from 540 kc. to 527 kc. and “ON” power switch
Button No. 8—Manual Tuning and “ON” power switch

3. In the instruction envelope you will find a card with perforated call letters for most of the broadcasting stations.

Remove the desired one and insert it in the head of the push button whose shaft is next to the screw which has been adjusted to that station.

4. After all push buttons have been set, replace the front wooden plate.

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**RCA MFG. CO., INC.**

**Model 4QB Alignment Procedure**

<table>
<thead>
<tr>
<th>Steps</th>
<th>Connect the high side of the test-osc. to—</th>
<th>Tune test-osc. to—</th>
<th>Turn radio dial to—</th>
<th>Adjust the following for maximum peak output—</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1N5-G 1-F grid cap, in series with .01 mfd.</td>
<td>455 kc</td>
<td>&quot;A&quot; band, point at high-frequency end</td>
<td>L14 and L13 (2nd I-F Trans.)</td>
</tr>
<tr>
<td>2</td>
<td>1A7-G 1st-Det. grid cap, in series with .01 mfd.</td>
<td>1,500 kc</td>
<td>&quot;A&quot; band, point at high-frequency end</td>
<td>L12 and L11 (1st I-F Trans.)</td>
</tr>
<tr>
<td>3</td>
<td>1,500 kc</td>
<td>1,500 kc</td>
<td>&quot;A&quot; band, point at high-frequency end</td>
<td>L6 (osc.)**</td>
</tr>
<tr>
<td>4</td>
<td>600 kc</td>
<td>600 kc</td>
<td>&quot;A&quot; band, point at high-frequency end</td>
<td>L6 (osc.)**</td>
</tr>
<tr>
<td>5</td>
<td>Repeat steps 3 and 4</td>
<td>Repeat steps 3 and 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>6.1 mc (151°)</td>
<td>6.1 mc (151°)</td>
<td>&quot;A&quot; band, point at high-frequency end</td>
<td>L8 (osc.)**</td>
</tr>
<tr>
<td>7</td>
<td>2.5 mc (30.5°)</td>
<td>2.5 mc (30.5°)</td>
<td>&quot;A&quot; band, point at high-frequency end</td>
<td>L8 (osc.)**</td>
</tr>
<tr>
<td>8</td>
<td>Repeat steps 6 and 7</td>
<td>Repeat steps 6 and 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Antenna lead, in series with 300 mfd.</td>
<td>15.2 mc</td>
<td>&quot;A&quot; band, point at high-frequency end</td>
<td>L10 (osc.)</td>
</tr>
<tr>
<td>10</td>
<td>15.2 mc</td>
<td>15.2 mc</td>
<td>&quot;A&quot; band, point at high-frequency end</td>
<td>C25 (ant.)†† Rock gang</td>
</tr>
<tr>
<td>11</td>
<td>Antenna lead, in series with 300 mfd.</td>
<td>1,500 kc</td>
<td>&quot;A&quot; band, point at high-frequency end</td>
<td>C23 (osc.)</td>
</tr>
</tbody>
</table>

*Use minimum capacity peak if two peaks can be obtained.*

**Rock gang slightly for peak output.**

†Do not adjust L13 or L14 when test-osc. is applied to 1A7-G grid.

††Use maximum capacity peak if two peaks can be obtained.

---

**Compliments of www.nucow.com**
General Alignment Data for Models 4QB and 4QB4

(Refer to specific "Alignment Procedure" for each model)

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the chassis drawing.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the ground terminal, and keep the output as low as possible to avoid a-c action.

Calibration Scale on Indicator-Drive-Cord Drum.—The tuning dial is fastened in the cabinet and cannot be used for reference during alignment, therefore a calibration scale is attached to the rear of the drum which is mounted on the shaft of the gang condenser. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency is given in the alignment table.

As the first step in r-f alignment, check the position of the drum. The 45 degree mark on drum scale should be in an approximately horizontal position when the plates are fully meshed. The distance from the edge of the chassis to the drum must not exceed 1-inch. The drum is held to the shaft by means of a set screw, which must be tightened securely when the drum is in the correct position.

Pointer for Calibration Scale.—Improvis a pointer for the calibration scale by fastening a piece of wire to the gang condenser frame, and bend the wire so that it points to the "0" mark on the calibration scale when the plates are fully meshed.

Dial-Indicator Adjustment.—After fastening the chassis in the calibration, attach the dial indicator to the drive cable with indicator at the 530 kc mark, (last mark at end of "A") scale and gang condenser fully meshed. The indicator has a spring clip for attachment to the cable.

CV-111 A-C POWER SUPPLY UNIT

Power Rating: 105-125/200-250 volts, 50-60 cycles, 65 watts
Rectifier Tube: RCA 5T4
Ballast Resistor Tube: Type 86695-A
Dial Lamp: Mazda 44, 6.6 volts, 0.25 amp.
Dimensions (Oversizes): 3 x 3 x 4
Net Weight: 8 lbs.

Miscellaneous Data

Battery Connections:
A four-wire cable with a plug at each end is provided for making connection from the 8-pong connector on chassis to a plug-in 13-90 volt "A-B" battery pack.

When separate "A" and "B" batteries are used, it is necessary to use an adapter cable with a socket on one end and three plugs on the other end, connected as shown in the accompanying sketch.

With separate "A" and "B" batteries that have terminals instead of plug-in connectors, remove the three plugs on the adapter cable and connect the leads to the battery terminals, following the color code shown in the schematic diagram.

Victrola Attachment:
A jack is provided on the rear of chassis for connecting a Victrola Attachment into the audio-amplifying circuit. The cable from the Victrola Attachment should be terminated in a Stock No. 31040 plug to fit the jack.

Models 4QB and 4QB4 may be operated on 105-125/200-250 volts, 50-60 cycle a-c power supply, by installing a CV-111 power supply unit on the chassis, as follows:

1. Remove the battery cable plug from the power plug on chassis.
2. Set the line power switch (one side of CV-111) to the correct position for the a-c voltage that is to be used.
3. Place the CV-111 on top of the radio chassis as shown in dotted lines in the top view. Press the dial light clip on the projection at low-frequency end of dial assembly. Insert the 8-pong socket (on cable from CV-111) into the power plug on chassis.
4. Fasten the power unit to the chassis. The front of the unit has two projections which fit into slots on the front of the chassis. Two projections on the rear of the unit have holes for fastening to the rear of the chassis with self-tapping screws.
5. Caution: Before connecting the a-c supply, make certain that all tubes are firmly seated in their sockets. Always disconnect the a-c supply before removing or replacing tubes.
6. Reverse the a-c power plug for minimum hum.

Socket Voltages, with CV-111 Power Supply Unit
(Line Supply Voltage, 117, or 234 volts)

<table>
<thead>
<tr>
<th>Tube</th>
<th>1A7-G</th>
<th>1N5-G</th>
<th>1H5-G</th>
<th>1C5-G</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filament Voltage</td>
<td>1.8</td>
<td>1.3</td>
<td>1.3</td>
<td>1.8</td>
</tr>
<tr>
<td>Plate Voltage</td>
<td>95</td>
<td>95</td>
<td>95</td>
<td>60**</td>
</tr>
<tr>
<td>Screen Voltage</td>
<td>45</td>
<td>95</td>
<td>95</td>
<td>95</td>
</tr>
<tr>
<td>Plate Mils.</td>
<td>0.4</td>
<td>1.5</td>
<td>1.5</td>
<td>0.3</td>
</tr>
<tr>
<td>Screen Mils.</td>
<td>.7</td>
<td>.5</td>
<td>.5</td>
<td>.5</td>
</tr>
<tr>
<td>Bias</td>
<td>6.1</td>
<td>6.1</td>
<td>6.1</td>
<td>6.1</td>
</tr>
</tbody>
</table>

Total "B" current, 15 mls. Total filament current, 146 mls.

**With 750,000 ohm voltmeter.

Compliments of www.nucow.com
Compliments of www.nucow.com

Precautionary Lead Dress:
1. Dress C3 (100 mmfd.) edgewise to chassis.
2. Dress the 1A7-G grid cap lead clear of chassis.
3. Dress green wire from C2 (antenna section of gang) to range switch away from chassis and other wires.
4. Dress blue lead from terminal "E" of 2nd I-F transformer around terminal "D" away from the 1H5-G and 1C5-G sockets, and close to the chassis.
5. Dress C16 (1,000 mmfd.) from grid of 1H5-G tube to volume control, and the green lead to the 1H5-G grid cap away from other wires.
6. Dress the red wire from the power plug to the power switch on the volume control away from the 1H5-G socket.
7. Blue lead from "C" band oscillator coil to 1A7-G No. 6 contact must be dressed away from chassis.
8. All tube shields must be tight.

IF PEAK 455 KC

Standard Broadcast ("A" Band)...... 540-1,720 kc (555-174 m)
Short Wave ("C" Band).............. 5.8-18 mc (51.7-166 m)
Long Wave ("X" Band).............. 145-385 kc (2068-779 m)

Model 4QB4 Schematic Diagram
### Model 4QB4 Alignment Procedure

<table>
<thead>
<tr>
<th>Steps</th>
<th>Connect the high side of the test-osc. to—</th>
<th>Tune test-osc. to—</th>
<th>Turn radio dial to—</th>
<th>Adjust the following for maximum peak voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1N5-G L-F grid cap, in series with .01 mfd.</td>
<td>400 kc</td>
<td>&quot;A&quot; Band, Quiet Point at high-frequency end</td>
<td>L14 and L13 (2nd I-F Trans.)</td>
</tr>
<tr>
<td>2</td>
<td>1A7-G 1st-DET. grid cap, in series with .01 mfd.</td>
<td>1,500 kc (500 m)</td>
<td>1,500 kc (150°) &quot;A&quot; Band</td>
<td>L12 and L11 (1st I-F Trans.)†</td>
</tr>
<tr>
<td>3</td>
<td>Antenna lead, in series with 200 mfd.</td>
<td>600 kc (90°)</td>
<td>600 kc (33°)</td>
<td>L10 (osc.)**</td>
</tr>
<tr>
<td>4</td>
<td>Antenna lead, in series with 300 ohms</td>
<td>175 kc (1,710 m)</td>
<td>175 kc (65°) &quot;X&quot; Band</td>
<td>L8 (osc.)**</td>
</tr>
<tr>
<td>5</td>
<td>Antenna lead, in series with 200 mfd.</td>
<td>1,500 kc (200 m)</td>
<td>1,500 kc (159°) &quot;A&quot; Band</td>
<td>C24 (osc.)</td>
</tr>
</tbody>
</table>

*Use minimum capacity peak if two peaks can be obtained.
**Rock gang slightly for peak output.
†Do not readjust L13 or L14 when test-osc. is applied to 1A7-G grid.
††Use maximum capacity peak if two peaks can be obtained.

### Model 4QB4 Top View

![Model 4QB4 Top View Diagram](attachment:image)

### Bottom View—Rear of Chassis

![Bottom View—Rear of Chassis Diagram](attachment:image)

©John F. Rider, Publisher
This receiver uses a three-band superheterodyne circuit in
a table-type cabinet. Features of design include magneti-
core adjusted transformers and low frequency "A" oscil-
lator tracking automatic volume control; phonograph ter-
minal board; aural-compensated volume control; continuously
variable tone control; dustproof electrodynamic loudspeaker
and an edge-illuminated, straight-line dial.

Loudspeaker.—Centering of the loudspeaker voice coil is
made in the usual manner with three narrow celluloid or
paper feelers after first removing the front dust cover. This
may be removed by softening its cement with a light applica-
tion of acetone, using care not to allow the acetone to flow
into the air gap. A dust cover should be cemented in place
with ambroid upon completion of adjustment.

With the gang tuning-condenser plates in full-mesh posi-
tion, adjust the pointer to the low-frequency (end) calibra-
tion mark on the dial scale. The pointer is centered in place
on the drive cable.

Perform alignment in proper order, tabulated below, start-
ing with No. 1, and following all operations across, then No.
2, etc. Adjustment locations are shown on figures 1 and 4.
Cathode-ray alignment is preferable, the connections to
the chassis are shown on figure 3. If no output indicator is
used, connect it across the loudspeaker voice-coil and
advance the receiver volume control to full-volume position.
Connect the "low" output terminal of the test oscillator to

<table>
<thead>
<tr>
<th>Order of</th>
<th>Test Oscillator</th>
<th>Dummy Antenna</th>
<th>Frequency Setting</th>
<th>Range Selector</th>
<th>Receiver Dial Setting</th>
<th>Circuit to Adjust</th>
<th>Adjustment Symbols</th>
<th>Adjust to Obtain</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Ant. Term.</td>
<td>200 Ohms</td>
<td>6,000 kc.</td>
<td>&quot;B&quot; Center</td>
<td>6,000 kc.</td>
<td>&quot;B&quot; Osc.</td>
<td>C11</td>
<td>Max. (peak)*</td>
</tr>
<tr>
<td>4</td>
<td>Ant. Term.</td>
<td>200 Ohms</td>
<td>6,000 kc.</td>
<td>&quot;B&quot;</td>
<td>6,000 kc.</td>
<td>&quot;B&quot; Ant.</td>
<td>C2</td>
<td>Max. (peak)†</td>
</tr>
<tr>
<td>5</td>
<td>Ant. Term.</td>
<td>200 Ohms</td>
<td>20,000 kc.</td>
<td>&quot;C&quot; Right</td>
<td>20,000 kc.</td>
<td>&quot;C&quot; Osc.</td>
<td>C7</td>
<td>Max. (peak)†‡</td>
</tr>
</tbody>
</table>

* Use minimum capacity peak if two peaks can be obtained.
† After this adjustment, check for image signal by shifting receiver dial to 5,000 mc.
‡ Use maximum capacity peak if two peaks can be obtained. After this adjustment, check for image signal
by shifting receiver dial to 20,910 mc.

Note that the heterodyne oscillator tracks above the signal frequency on bands "A" and "B," and below
the signal frequency on band "C".
Schematic, Voltage Chassis Wiring

RCA MFG. CO., INC.

MODEL 5Q2
Chassis RC325C

IF PEAK 455 KC

PILOT LAMPS (2) Madza 46, 6.3 volts, 0.25 amp

BOTTOM VIEW - REAR OF CHASSIS

Measurements made to chassis unless otherwise indicated, with set tuned to quiet point and volume control at minimum. Values should hold within ±20% with 115-volt a-c supply.

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*NOTE: Values with star (*) are operating voltages in circuits with high series resistance. The actual measured voltages will be lower, depending on the voltmeter loading.
Alignment Procedure

Test-Oscillator—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the output as low as possible to prevent a-c action.

Pre-setting Dial.—With the gang condenser in full mesh, the dial pointer should be in line with the left-hand end of the dial scales. The pointer is soldered to the drive cable.

Miscellaneous Service Data

Victrola. The connections for this switch are as follows:

1. Connect the yellow lead in the switch cable to terminal No. 1.
2. Connect the green lead in the switch cable to terminal No. 2.
3. Connect the shielding of the cable to terminal No. 3.
4. Tape the ends of the blue and the red leads separately.
5. Connect the Victrola Attachment to the two clip-type connectors on the switch.

Connections of Universal Power Transformer

Primary for 220 and 110 Volts

© John F. Rider, Publisher
RCA MFG. CO., INC.
MODEL 502X, Ch. RC325D
Schematic, Voltage
Chassis Wiring

I.F. = 455 KC

Pilot Lamps (2) .......... Mazda 47, 6.3 volts, 0.15 amp.

IF PEAK 455 KC

R-F Wiring Diagram and Socket Voltages

©John F. Rider, Publisher
Precautionary Lead Dress—
1. Leads on C20 (C" band tracking condenser) must be as short as possible.
2. Dress blue lead from oscillator plate away from all parts.
3. Dress speaker cable away from ballast tube.

Compliments of www.nucow.com

RCA MFG. CO. INC.

CAUTION: The chassis is connected to one side of the power supply. Avoid contact of chassis or parts to external ground when servicing.

Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the chassis drawing.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

<table>
<thead>
<tr>
<th>Steps</th>
<th>Connect the high side of test-osc to—</th>
<th>Tune test-osc to—</th>
<th>Turn radio dial to—</th>
<th>Adjust the following for max. peak output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6K7 1-F grid cap, in series with .01 mf.</td>
<td>455 kc</td>
<td>&quot;A&quot; band, Quiet Point between 550-750 kc</td>
<td>L8 and L9 (2nd 1-F Trans.)</td>
</tr>
<tr>
<td>2</td>
<td>6K8 det. grid cap, in series with .01 mf.</td>
<td>455 kc</td>
<td></td>
<td>L6 and L7 (1st 1-F Trans.)</td>
</tr>
<tr>
<td>3</td>
<td>Antenna Terminal in series with 300 ohms</td>
<td>6 mc</td>
<td>6 mc &quot;B&quot; band</td>
<td>C12 (osc.)* C3 (ant.)†</td>
</tr>
<tr>
<td>4</td>
<td>Antenna Terminal in series with 300 ohms</td>
<td>20 mc</td>
<td>20 mc &quot;C&quot; band</td>
<td>C11 (osc.)** (Rock In)</td>
</tr>
<tr>
<td>5</td>
<td>Antenna Terminal in series with 500 mmf.</td>
<td>600 kc</td>
<td>600 kc &quot;A&quot; band</td>
<td>L14 (osc.)</td>
</tr>
<tr>
<td>6</td>
<td>Antenna Terminal in series with 500 mmf.</td>
<td>1,500 kc</td>
<td>1,500 kc &quot;A&quot; band</td>
<td>C14 (osc.) (Rock In)</td>
</tr>
<tr>
<td>7</td>
<td>Repeat steps 5 and 6.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Use minimum capacity peak if two peaks can be obtained.
† After adjusting C3, check to determine that C12 has been adjusted to the correct peak by tuning the receiver to approximately 5.09 mc where a weaker signal should be received.

** Use maximum capacity peak if two peaks can be obtained. Check to determine that C11 has been adjusted to the correct peak by tuning the receiver to approximately 20.91 mc, where a weaker signal should be received.

NOTE: The oscillator tracks 455 kc above the signal on "A" and "B" bands, and 455 kc below the signal on "C" band.

Test-Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the ground terminal, and keep the output as low as possible to avoid a-c action.

Pre-setting Dial.—With the gang condenser in full mesh, the dial pointer should be in line with the left-hand end of the dial scales. The pointer is soldered to the drive cable.

Loudspeaker.—To center the loudspeaker voice coil, first remove the front dust cover, then loosen the spider screws, insert three narrow feelers at equal distances in the gap, and tighten the spider screws. Remove the feelers, and fasten a dust cover in place with loudspeaker cement.

At Right—Connections and Colors of Speaker and Cable

© John F. Rider, Publisher
Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the chassis drawing.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Steps | Connect the high side of test-osc to | Tune test-osc to | Turn radio dial to | Adjust the following to obtain maximum output
--- | --- | --- | --- | ---
1 | 6K7 I-F grid cap in series with .01 mfd. | 455 kc | L21 and L22 (2nd I-F transformer) | 
2 | 6K5 det. grid cap in series with .01 mfd. | 455 kc | L19 and L20 (1st I-F transformer) | 
3 | Antenna Terminal in series with 200 mfd. | 455 kc | C40 (wave trap) MINIMUM OUTPUT | 
4 | Antenna Terminal in series with 300 ohms. | 6 mc | C26 (osc.) use MINIMUM capacity peak C36 (antenna) use MAXIMUM capacity peak* | 
5 | Antenna Terminal in series with 300 ohms. | 20 mc | C26 (osc.) use MINIMUM capacity peak C36 (antenna) use MAXIMUM capacity peak* | 
6 | 600 kc “A” band | L16 (osc.) Rock Gang | 
7 | 1,500 kc “A” band | C27 (oscillator) C26 (antenna) | 
8 | Antenna Terminal in series with 200 mfd. | 600 kc | L16 (osc.) Rock Gang | 
9 | 175 kc “X” band | L18 (osc.) Rock Gang | 
10 | 350 kc “X” band | C26 (oscillator) C36 (1st det.) C13 (antenna) | 
11 | 175 kc “X” band | L18 (osc.) Rock Gang | 

* Check to determine that trimmer has been adjusted to correct peak by tuning receiver approximately 910 kc lower, where a weaker signal should be heard.

Note: Oscillator tracks above the signal on all bands.

Precautionary Lead Dress:
1. Dress blue lead from L7 to terminal 1 on range switch S2 clear of coils and other wires.
2. Dress bus from L12 to contact 4 on range switch S2 clear of other wiring.
3. Dress leads on C29 from gang to range switch short and clear of bus wires.
4. Dress leads from X and A band antenna coil close to underside of chassis.
5. Dress all plus B leads to terminal board under electrolytic between the board and the rear apron.
6. Dress blue lead from 6Q7-G plate to terminal 6 on 6K5-G close to chassis and in front of terminal board (under electrolytic).
7. Dress blue lead from antenna terminal close to top of chassis and clear of gang rotor.
8. Twisted leads from volume control must be dressed clear of self-tapping screws in corners of chassis.

Victrola Attachment (Record Player).—Terminals are provided on the rear of the chassis for convenient connection to a Victrola Attachment (record player) such as the RCA R-93 and R-94 series. A stock No. 9234 switch may be used to change from radio to record player as shown at right.
RCA MFG. CO., INC.

MODELS 5Q5, 5Q6A to 5Q6E incl.
5Q55, 5Q56. Chassis RC-396
6Q7 Chassis RC-414A

Schematic, Voltages
Chassis Wiring
Lead Dress

Pilot Lamp (1) Mazda 44, 6.3 volts, 0.25 amp.

Precautionary Lead Dress
1. Lead from 2nd I.F. (E) to volume control should be kept close to chassis.
2. R.F. coil leads should be kept short and away from coil.
3. Leads to 6,000 mmf. (C10) should be as short as possible and condenser dressed away from chassis, bearing against 10 ohm (R10) resistor.

Victrola Attachment.—A jack is provided on the rear of chassis for connection to a Victrola Attachment. The cable of the attachment should be terminated in a Stock No. 314 plug to fit the jack.

Loudspeaker.—To center the loudspeaker voice coil, first remove the front dust cover, then loosen the screws holding the spider assembly. Insert three narrow feelers into the air gap, and tighten the spider screws. Remove the feelers and fasten a dust cover in place with loudspeaker cement.

R-F Wiring Diagram and Socket Voltages

Measurements made to chassis unless otherwise indicated, with set tuned to quiet point and volume control at minimum. Values should hold within ±10% with 117-volt a-c supply.

*NOTE: Values in star (*) are operating voltages in circuits with high series resistance.

The actual measured voltages will be lower, depending on the voltmeter loading.

©John F. Rider, Publisher
**Alignment Procedure**

- **Cathode-Ray Alignment** is the preferable method. Connections for the oscilloscope are shown in the chassis drawing.
- **Output Meter Alignment** — If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.
- **Test-Oscillator** — For all alignment operations, connect the low side of the test-oscillator to the ground terminal, and keep the output as low as possible to avoid a-c action.
- **Calibration Scale on Indicator-Drive-Cord Drum** — The tuning dial is fastened in the cabinet and cannot be used for reference during alignment. Therefore, a calibration scale is attached to the rear of the drum which is mounted on the shaft of the gang condenser. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency is given in the alignment table.

As the first step in r-f alignment, check the position of the drum. The 45 degree mark on the drum scale (see "Drum Drive and Indicator Cord Assembly" drawings) must be in a horizontal position when the plates are adjusted. The distance from the edge of the chassis to the drum must exceed 1 inch. The drum is held to the shaft by means of a set screw, which must be tightened securely when the drum is in the correct position.

- **Pointer for Calibration Scale** — Improves a pointer for the calibration scale by fastening a piece of wire to the gang-condenser frame, and bend the wire so that it points to the "0" mark on the calibration scale when the plates are fully meshed.
- **Dial-Indicator Adjustment** — After fastening the chassis in the cabinet, attach the dial indicator to the drive cable with indicator at the 90 kc mark, and gang condenser fully meshed. The indicator has a spring clip for attachment to the cable.

**Table: Alignment, Trimmers, Socket, Drive Cords, Notes**

<table>
<thead>
<tr>
<th>Steps</th>
<th>Connect the high side of test-osc. to</th>
<th>Tune test-osc. to</th>
<th>Turn radio dial to</th>
<th>Adjust the following for max. peak output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6K7 1.2 grid cap. in series with .01 mfd.</td>
<td>455 kc</td>
<td>L10 and L11</td>
<td>2nd I.F. trans.</td>
</tr>
<tr>
<td>2</td>
<td>Tuning condenser (osc.) in series with .01 mfd.</td>
<td>455 kc</td>
<td>L8 and L9</td>
<td>1st I.F. trans.</td>
</tr>
<tr>
<td>3</td>
<td>Antenna lead (blue) in series with 200 mmd.</td>
<td>600 kc</td>
<td>1,500 kc</td>
<td>C2 (ant.)</td>
</tr>
<tr>
<td>4</td>
<td>Repeat steps 3 and 4</td>
<td>1,500 kc</td>
<td>C8 (osc.)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Antenna lead (blue) in series with 400 ohms</td>
<td>20 mc</td>
<td>C6 (osc.)</td>
<td>C30 (osc.)</td>
</tr>
<tr>
<td>7</td>
<td>Antenna lead (blue) in series with 300 mmd.</td>
<td>6 mc</td>
<td>C6 (osc.)</td>
<td>C27 (ant.)</td>
</tr>
<tr>
<td>8</td>
<td>Antenna lead (blue) in series with 200 mmd.</td>
<td>1,500 kc</td>
<td>C8 (osc.)</td>
<td></td>
</tr>
</tbody>
</table>

* Use minimum capacity peak if two peaks can be obtained.
† Rock gang condenser slightly while adjusting L7.
** Make test-oscillator connection to lug on tuning condenser (oscillator section) in series with .01 mfd. condenser.

- **Power Supply Ratings**
  - Rating A: 105-125 volts, 60-60 cycles, 70 watts
  - Rating B: 105-125 volts, 25-60 cycles, 70 watts
  - Rating C: 105-125 volts, 200-250 volts, 50-60 cycles, 70 watts

- **Connections and Colors of Speaker and Cable**

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First Edition
1939

General Description

Model SQ6 is a three-band, table-type superheterodyne receiver housed in a plastic cabinet. It is designed for operation on 110-250 volts, 50-60 cycles AC, or 200-250 volts DC.

Features of design include: New type single-ended tubes (6SA7 and 6SK7); magnetite core I-F transformers; magnetite core oscillators for "A" band; automatic volume control; hum, low-frequency tone control; straight-line dial; horizontal tuning control; streamline moulded cabinet.

Power Supply Polarity:
For operation on d-c, the power plug must be inserted in the outlet for correct polarity. If the set does not function, reverse the plug. On a-c, a similar reversal of the plug may reduce hum.

Tube Complement:
(1) RCA-6SA7
(2) RCA-6SK7
(3) RCA-6SK7
(4) RCA-25L6-G
(5) RCA-2526-G

Detector-Oscillator
J-F Amplifier
2nd I-F Amplifier, A.V.C., and A-F Amplifier
Rectifier

Cathode Currents

<table>
<thead>
<tr>
<th>Tube</th>
<th>500 mA</th>
<th>1.0 mA</th>
</tr>
</thead>
<tbody>
<tr>
<td>6SA7</td>
<td>10.0 mA</td>
<td>14.1 mA</td>
</tr>
<tr>
<td>6SK7</td>
<td>2.7 mA</td>
<td>10.0 mA</td>
</tr>
<tr>
<td>25L6-G</td>
<td>3.7 mA</td>
<td>3.7 mA</td>
</tr>
<tr>
<td>Total B-Current</td>
<td>80.0 mA</td>
<td></td>
</tr>
</tbody>
</table>

Pilot Lamp
Mazda No. 47, 6.3 volts, 0.15 amp.

Ballast Tube
RCA Stock No. 32849 for 210-250 volt operation.

Power Output Ratings

<table>
<thead>
<tr>
<th>Power Output Rating</th>
<th>210-250 Volt Operation</th>
<th>210-250 volts, 50-60 cycles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Undistorted</td>
<td>1.5 watts</td>
<td>125 watts</td>
</tr>
<tr>
<td>Maximum</td>
<td>2.7 watts</td>
<td>125 watts</td>
</tr>
</tbody>
</table>

Power Supply Ratings

<table>
<thead>
<tr>
<th>Power Supply Rating</th>
<th>210-250 volts, 50-60 cycles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Undistorted</td>
<td>125 watts</td>
</tr>
<tr>
<td>Maximum</td>
<td>125 watts</td>
</tr>
</tbody>
</table>

Type

V. C. Impedance: 5-inch 2.2 ohms at 400 cycles
Alignment Procedure

530 kc mark, and gang condenser fully meshed. The indicator has a spring clip for attachment to the cable.

Steps | Connect the high side of test-osc. to | Turn test-osc. to | Turn radio dial to | Adjust the following for max. peak output
--- | --- | --- | --- | ---
1 | 6K7 L-F grid cap, in series with .01 mfd. | 455 kc | L10 and L11 (2nd L-F. trans.)
2 | Tuning condenser stator (osc.) in series with .01 mfd. ** | 455 kc | L6 and L7 (1st L-F. trans.)
3 | Antenna lead in series with 200 mmf. | 600 kc | L7†
4 | 1,500 kc | C8 (ant.) C8 (osc.)
5 | Repeat steps 3 and 4 |
6 | Antenna lead in series with 400 ohms | 20 mc | C6 (osc.) C6 (ant.)
7 | 6 mc | C6 (osc.) C7 (ant.)
8 | Antenna lead in series with 200 mmf. | 1,500 kc | C8 (osc.)

* Use minimum capacity peak if two peaks can be obtained.
† Rock gang condenser slightly while adjusting L7.
** Make test-oscillator connection to grid on tuning condenser stator (oscillator section) in series with .01 mfd. condenser.

Note—Oscillator tracks 405 kc above signal on all bands.

Calibration Scale

The corresponding position of the dial indicator for any setting of the calibration scale can be determined by drawing a line from this point on the bottom calibration scale to the same point on the top calibration scale. For example: 38° on the calibration scale corresponds to approximately 7.9 mc on "C" band, and 400 kc on "A" band, etc. Read instructions under "Alignment Procedure."
Chassis Wiring, Lead Dress  

RCA MFG. CO. INC.  

MODEL 5Q8, Chassis RC-396B  

Schematic, Voltage  

**Frequency Ranges**  
- **Long Wave (X)**: 145-405 kc (2060-740 m)  
- **Medium Wave (A)**: 540-1720 kc (555-174 m)  
- **Short Wave (C)**: 5.8-18 mc (31.7-16.6 m)  

**Intermediate Frequency**: 455 kc  
(5) RCA-25Z6-G  
Rectifier Ballast Tubes: RCA Stock No. 32544 for 105-125 volt operation; RCA Stock No. 32580 for 210-230 volt operation.  
Type: 5-inch V.C. Impedance: 3.0 ohms at 400 cycles

**Power Supply Ratings**  
- 105-125 volts, AC-DC: 65 watts  
- 210-230 volts, AC-DC: 125 watts

**Pilot Lamp**: Mazda No. 47, 6.3 volts, 0.15 amp.

**Power Output Rating**  
- (210-250 Volt Operation)  
  - Undistorted: 1.5 watts  
  - Maximum: 2.7 watts  
- (105-125 Volt Operation)  
  - Undistorted: 1.7 watts  
  - Maximum: 2.9 watts

**Precautionary Lead Dress:**  
1. Lead from 2nd I-F transformer to volume control should be kept close to the chassis and dressed against front apron.  
2. C-10 should be dressed away from the antenna section of the variable condenser (C-1).

**R-F Wiring Diagram and Socket Voltages**  

*NOTE: Values with star (*) are operating voltages in circuits with high series resistance. The actual measured voltages will be lower, depending on the voltmeter loading.*

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MODEL 5Q8, Chassis RC-396B
Alignment, Trimmers
Drive Cord, Socket

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RCA MFG. CO., INC.

Tube and Trimmer Locations

Arrangement of Drive Cords for Tuning Condenser and Dial Indicator

Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the chassis drawing.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test Oscillator.—For all alignment operations, connect the low side of the test oscillator to the receiver chassis, and keep the output as low as possible to avoid a-v-c action.

Calibration Scale on Indicator-Drive-Cord Drum.—The tuning dial is fastened in the cabinet and cannot be used for reference during alignment; therefore, a calibration scale is attached to the rear of the drum which is mounted on the front shaft of the gang condenser. The setting of the gang condenser is read on this scale, which is calibrated in degrees.

The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

As the first step in r-f alignment, check the position of the drum. The 135° mark on the drum scale must be vertical, and directly under the center of the gang-condenser shaft when the plates are fully meshed. The drum is held to the shaft by means of one set screw, which must be tightened securely when the drum is in the correct position.

Pointer for Calibration Scale.—Improvise a pointer for the calibration scale by fastening a piece of wire to the gang condenser frame, and bend the wire so that it points to the 0° mark on the calibration scale when the plates are fully meshed.

<table>
<thead>
<tr>
<th>Steps</th>
<th>Connect the high side of the test-osc. to—</th>
<th>Tune test-osc. to—</th>
<th>Turn radio dial to—</th>
<th>Adjust the following for max. peak output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6K7 1-F grid cap in series with .01 mfd.</td>
<td>456 kc</td>
<td>“A” Band Quiet Point between 560-750 kc</td>
<td>L10 and L11 (1st I-F Trans.)</td>
</tr>
<tr>
<td>2</td>
<td>6SA7 det. grid in series with .01 mfd.</td>
<td>456 kc</td>
<td>1,500 kc (162.4°) “A” Band</td>
<td>C6 (osc.)</td>
</tr>
<tr>
<td>3</td>
<td>Ant. terminal in series with 300 mmf.</td>
<td>1,500 kc</td>
<td>600 kc (35°) “A” Band</td>
<td>L8 (osc.)</td>
</tr>
<tr>
<td>4</td>
<td>Ant. terminal in series with 300 mmf.</td>
<td>600 kc</td>
<td>600 kc (35°) “A” Band</td>
<td>C2 (ant.)</td>
</tr>
<tr>
<td>5</td>
<td>Repeat steps 3 and 4</td>
<td></td>
<td></td>
<td>C8 (osc.)</td>
</tr>
<tr>
<td>6</td>
<td>Ant. terminal in series with 300 mmf.</td>
<td>360 kc</td>
<td>360 kc (162°) “X” Band</td>
<td>C8 (osc.)</td>
</tr>
<tr>
<td>7</td>
<td>Ant. terminal in series with 300 mmf.</td>
<td>175 kc</td>
<td>175 kc (53.3°) “X” Band</td>
<td>L9 (osc.)</td>
</tr>
<tr>
<td>8</td>
<td>Repeat steps 6 and 7</td>
<td></td>
<td></td>
<td>C26 (ant.)</td>
</tr>
<tr>
<td>9</td>
<td>Ant. terminal in series with 300 ohms</td>
<td>16.2 mc</td>
<td>15.2 mc (147.8°) “C” Band</td>
<td>C5 (osc.)</td>
</tr>
<tr>
<td>10</td>
<td>Ant. terminal in series with 300 mmf.</td>
<td>360 kc</td>
<td>360 kc (162°) “X” Band</td>
<td>C8 (osc.)</td>
</tr>
<tr>
<td>11</td>
<td>Ant. terminal in series with 300 mmf.</td>
<td>1,500 kc</td>
<td>1,500 kc (162°) “A” Band</td>
<td>C6 (osc.)</td>
</tr>
</tbody>
</table>

*Use minimum capacity peak if two can be obtained. Check to determine that C5 is adjusted to correct peak by tuning receiver to approximately 14.29 mc where a weaker signal should be received.

NOTE: Oscillator tracks above signal on all bands.

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Precautionary Lead Dress:
1. Dress yellow lead from antenna coil to first section of range switch away from adjoining wires.
2. Dress green lead from middle section of range and green lead from 6SA7 to the rear section of the range switch away from chassis, ground leads, other wires and capacitors.
3. Dress brown lead from detector coil to rear section of the range switch away from the detector coil; loop brown lead toward rear apron.
4. Dress black lead from 2nd I.F. transformer "B" to 6SQ7 socket against chassis.
5. Twist power leads together, and dress away from 6SQ7 socket.
6. Dress blue lead from 6SK7 (R-F) socket to detector coil away from chassis, ground shields and other wires.
7. Dress black lead from antenna trimmer (C1) to antenna coil away from range switch link action.
8. Dress black speaker lead around output socket toward power transformer against base.
9. Keep green lead of 6SK7 R-F grid circuit away from blue antenna lead.
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RCA MFG. CO., INC.

MODEL 6Q1, Chassis RC-441
Alignment, Trimmers, Socket
Drive Cord and Controls

Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the chassis drawing.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the output as low as possible to avoid a-v-c action.

Calibration Scale on Indicator-Drive-Cord Drum.—The tuning dial is fastened in the cabinet and cannot be used for reference during alignment; therefore, a calibration scale is attached to the rear of the drum which is mounted on the front shaft of the gang condenser. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

As the first step in r-f alignment, check the position of the drum. The 180° mark on the drum scale must be vertical, and directly over the center of the gang-condenser shaft when the plates are fully meshed. The drum is held to the shaft by means of two set screws, which must be tightened securely when the drum is in the correct position.

Pointer for Calibration Scale.—Improvise a pointer for the calibration scale by fastening a piece of wire to the gang-condenser frame, and bend the wire so that it points to the 180° mark on the calibration scale when the plates are fully meshed.

Dial-Indicator Adjustment.—After fastening the chassis in the cabinet, attach the dial indicator to the drive cable with indicator at the 530 kc mark, and gang condenser fully meshed.

<table>
<thead>
<tr>
<th>Steps</th>
<th>Connect the high side of the test-osc. to</th>
<th>Tune test-osc. to</th>
<th>Turn radio dial to</th>
<th>Adjust the following for maximum peak output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6SK7 T-F grid in series with .01 mfd.</td>
<td>455 kc</td>
<td>&quot;A&quot; Band Quiet point between 550-750 kc</td>
<td>L14 and L15 (2nd I-F trans.)</td>
</tr>
<tr>
<td>2</td>
<td>6SA7 grid in series with .01 mfd.</td>
<td></td>
<td></td>
<td>L12 and L13 (1st I-F trans.)</td>
</tr>
<tr>
<td>3</td>
<td>Ant. terminal in series with 200 mmfd.</td>
<td>600 kc</td>
<td>&quot;A&quot; Band</td>
<td>L11 (osc.) Rock gang</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>1,500 kc</td>
<td>&quot;A&quot; Band</td>
<td>C15 (osc.) Rock gang</td>
</tr>
<tr>
<td>5</td>
<td>Repeat steps 3 and 4.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Ant. terminal in series with 300 ohms</td>
<td>6 mc (31°)</td>
<td>&quot;B&quot; Band</td>
<td>C13 (osc.)* C8 (det.) C9 (ant.)</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>20 mc (35°)</td>
<td>&quot;C&quot; Band</td>
<td>C11 (osc.)** C7 (det.) C1 (ant.)</td>
</tr>
</tbody>
</table>

* Use minimum capacity peak if two can be obtained. Check to determine that C13 has been adjusted to the correct peak by tuning receiver to approximately 3.09 mc where a weaker signal should be received.

** Use minimum capacity peak if two can be obtained. Check to determine that C11 has been adjusted to the correct peak by tuning the receiver to approximately 19.09 mc where a weaker signal should be received.

Note.—Oscillator tracks above signal on all bands.

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**Alignment Procedure**

**Drive Cord, Socket**

- **Cathode-Ray Alignment** is the preferable method. Connections for the oscilloscope are shown in the chassis drawing.

- **Output Meter Alignment**—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

- **Test-oscillator**—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the output as low as possible to avoid a-v-c action.

- **Calibration Scale on 'Indicator-Drive-Cord Drum**—The tuning dial is fastened in the cabinet and cannot be used for reference during alignment; therefore, a calibration scale is attached to the rear of the drum which is mounted on the front shaft of the gang condenser. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

- **As the first step in r-f alignment, check the position of the drum. The 180° mark on the drum scale must be vertical, and directly over the center of the gang-condenser shaft when the plates are fully meshed.**

- **Pointer for Calibration Scale**—Improvise a pointer for the calibration scale by fastening a piece of wire to the gang-condenser frame, and bend the wire so that it points to the 180° mark on the calibration scale when the plates are fully meshed.

- **Dial-Indicator Adjustment**—After fastening the chassis in the cabinet, attach the dial indicator to the drive cable with indicator at the 530 kc mark, and gang condenser fully meshed.

---

<table>
<thead>
<tr>
<th>Steps</th>
<th>Connect the high side of test-osc. to—</th>
<th>Tune test-osc. to</th>
<th>Turn radio dial to—</th>
<th>Adjust the following for maximum peak output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Turn tone control to 3rd position (sharp) from maximum counter-clockwise.</td>
<td>360 kc (315°)</td>
<td><strong>A</strong> BandQuiet point between 550-750 kc</td>
<td><strong>L18 and L19</strong> (2nd I-F trans.)</td>
</tr>
<tr>
<td>2</td>
<td>6SK7 I-F grid in series with .01 mfd.</td>
<td>455 kc</td>
<td><strong>L16 and L17</strong> (1st I-F trans.)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>6SA7 grid in series with .01 mfd.</td>
<td>1,500 kc (28°)</td>
<td><strong>A</strong> Band</td>
<td><strong>C12</strong> (osc.)†</td>
</tr>
<tr>
<td>4</td>
<td>Turn tone control to 4th position (broad) from maximum counter-clockwise and check I-F response which should be a slightly double-peaked curve. Leave tone control in 3rd position (sharp) for the following steps.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Ant. terminal in series with 300 mfd.</td>
<td>600 kc (148°)</td>
<td><strong>A</strong> Band</td>
<td><strong>L9</strong> (osc.) Rock gang</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>360 kc (31.5°)</td>
<td><strong>X</strong> Band</td>
<td><strong>C15</strong> (osc.)†</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>175 kc (127.2°)</td>
<td><strong>X</strong> Band</td>
<td><strong>C21</strong> (det.)</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>1,500 kc</td>
<td><strong>A</strong> Band</td>
<td><strong>C44</strong> (ant.)</td>
</tr>
<tr>
<td>9</td>
<td>Repeat steps 5, 6, 7, and 8.</td>
<td>500 kc</td>
<td><strong>A</strong> Band</td>
<td><strong>C11</strong> (osc.)*</td>
</tr>
<tr>
<td>10</td>
<td>Ant. terminal in series with 300 ohms</td>
<td>20 mc</td>
<td><strong>B</strong> Band</td>
<td><strong>C19</strong> (det.)</td>
</tr>
<tr>
<td>11</td>
<td></td>
<td>20 mc</td>
<td><strong>C</strong> Band</td>
<td><strong>C2</strong> (ant.)</td>
</tr>
</tbody>
</table>

* Use minimum capacity peak if two can be obtained. Check to determine that C11 has been adjusted to the correct peak by tuning receiver to approximately 5.09 mc where a weaker signal should be received.

** Use minimum capacity peak if two can be obtained. Check to determine that C9 has been adjusted to the correct peak by tuning receiver to approximately 19.09 mc where a weaker signal should be received.

† Reset L10 core approximately 1/2-inch out before adjusting C15.

†† Reset L9 core screw flush with apron before adjusting C12.

Note—Oscillator tracks above signal on all bands.

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Power Supply Ratings:
105-125 volts, 40-100 cycles; or DC
160-190 volts, 40-100 cycles; or DC
210-250 volts, 40-100 cycles; or DC

Power Consumption:
105-125 volts .......... 60 watts
210-250 volts .......... 130 watts

Power Supply Polarity:
For operation on d-c, the power plug must be inserted in the outlet for correct polarity. If the set does not function, reverse the plug. On a-c, a similar reversal of the plug may reduce hum.

Phonograph Operation:
A jack is provided on the rear of the chassis for connection to a Victrola Attachment. The cable from the Victrola Attachment should be terminated in a Stock No. 31048 plug to fit the jack.
The attachment must be designed to operate on the particular voltage and frequency of the power supply line. (Most attachments are for alternating current only, and cannot be used on direct current.)
RCA MFG. CO., INC.

Alignment Procedure

**Steps**

<table>
<thead>
<tr>
<th>Connect the high side of test-osc. to</th>
<th>Tune test-osc. to</th>
<th>Turn radio dial to</th>
<th>Adjust the following for maximum peak output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Turn tone control to 3rd position (sharp) from maximum counter-clockwise.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>6SK7 I-F grid in series with .01 mf.</td>
<td>455 kc</td>
<td>“A” Band Quiet point between 550-750 kc</td>
</tr>
<tr>
<td>3</td>
<td>6SA7 grid in series with .01 mf.</td>
<td>455 kc</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Turn tone control to 4th position (broad) from maximum counter-clockwise and check I-F response which should be a slightly double-peaked curve. Leave tone control in 3rd position (sharp) for the following steps.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Ant. terminal in series with 200 mmf.</td>
<td>360 kc</td>
<td>360 kc (31.5&quot;) &quot;X&quot; Band</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>175 kc</td>
<td>175 kc (127.2&quot;) &quot;X&quot; Band</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>1,500 kc</td>
<td>1,500 kc (25&quot;) &quot;A&quot; Band</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>600 kc</td>
<td>600 kc (148&quot;) &quot;A&quot; Band</td>
</tr>
<tr>
<td>9</td>
<td>Repeat steps 5, 6, 7, and 8.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Ant. terminal in series with 300 ohms</td>
<td>6 mc</td>
<td>6 mc (30&quot;) &quot;B&quot; Band</td>
</tr>
<tr>
<td>11</td>
<td></td>
<td>20 mc</td>
<td>20 mc (23&quot;) &quot;C&quot; Band</td>
</tr>
</tbody>
</table>

* Use minimum capacity peak if two can be obtained. Check to determine that C11 has been adjusted to the correct peak by tuning receiver to approximately 5.09 mc where a weaker signal should be received.

** Use minimum capacity peak if two can be obtained. Check to determine that C9 has been adjusted to the correct peak by tuning receiver to approximately 19.09 mc where a weaker signal should be received.

‡ Preset L10 core approximately 1/4-inch out before adjusting C15.

†† Preset L9 core screw flush with apron before adjusting C12.

Note.—Oscillator tracks above signal on all bands.

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Alignment Procedure

For Victrola Attachment

See Page 11-40

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Pilot Lamp .......... Mazda No. 44, 6.3 volts, 0.25 amp.

Power Output Rating
(105-125 Volt Operation)
Undistorted .................. 1.5 watts
Maximum .................. 3.3 watts

Precautionary Lead Dress:
1. Lead from 2nd L-F transformer to volume control should be kept close to the chassis and dressed against front apron.

2. C-10 should be dressed away from the antenna section of the variable condenser (C-1).

Measurements made to chassis unless otherwise indicated, with set tuned to quiet point and volume control at minimum. Values should hold within ±20% with 117-volt a-c supply.

*NOTE: Values with star (*) are operating voltages in circuits with high series resistance. The actual measured voltages will be lower, depending on the voltmeter loading.
Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the chassis drawing.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the output as low as possible to avoid a-v-c action.

Calibration Scale on Indicator-Drive-Cord Drum.—The tuning dial is fastened in the cabinet and cannot be used for reference during alignment; therefore, a calibration scale is attached to the rear of the drum which is mounted on the front shaft of the gang condenser. The setting of the gang condenser is read on this scale, which is calibrated in degrees.

<table>
<thead>
<tr>
<th>Steps</th>
<th>Connect the high side of the test-osc. to—</th>
<th>Tune test-osc. to—</th>
<th>Turn radio dial to—</th>
<th>Adjust the following for max. peak output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6K7 I-F grid cap in series with .01 mfd.</td>
<td>455 kc</td>
<td>“A” Band</td>
<td>L12 and L13 (2nd I-F Trans.)</td>
</tr>
<tr>
<td>2</td>
<td>6SA7 det. grid in series with .01 mfd.</td>
<td>455 kc</td>
<td>Quiet Point</td>
<td>L10 and L11 (1st I-F Trans.)</td>
</tr>
<tr>
<td>3</td>
<td>Ant. terminal in series with 200 mmf.</td>
<td>1,500 kc</td>
<td>1,600 kc</td>
<td>C6 (osc.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(152.4”)</td>
<td>C2 (ant.)</td>
</tr>
<tr>
<td>4</td>
<td>Ant. terminal in series with 200 mmf.</td>
<td>600 kc</td>
<td>600 kc</td>
<td>L8 (osc.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(38”)</td>
<td>Rock Gang</td>
</tr>
<tr>
<td>5</td>
<td>Repeat steps 3 and 4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Ant. terminal in series with 200 mmf.</td>
<td>360 kc</td>
<td>360 kc</td>
<td>C8 (osc.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(161.5”)</td>
<td>C26 (ant.)</td>
</tr>
<tr>
<td>7</td>
<td>Ant. terminal in series with 200 mmf.</td>
<td>175 kc</td>
<td>175 kc</td>
<td>L9 (osc.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(63.3”)</td>
<td>Rock Gang</td>
</tr>
<tr>
<td>8</td>
<td>Repeat steps 6 and 7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Ant. terminal in series with 300 ohms</td>
<td>15.2 mc</td>
<td>15.9 mc</td>
<td>C5 (osc.)*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(147.9”)</td>
<td>C27 (ant.)</td>
</tr>
<tr>
<td>10</td>
<td>Ant. terminal in series with 200 mmf.</td>
<td>360 kc</td>
<td>360 kc</td>
<td>C8 (osc.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(161.5”)</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Ant. terminal in series with 200 mmf.</td>
<td>1,500 kc</td>
<td>1,600 kc</td>
<td>C8 (osc.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(152.4”)</td>
<td></td>
</tr>
</tbody>
</table>

*Use minimum capacity peak if two can be obtained. Check to determine that C5 is adjusted to correct peak by tuning receiver to approximately 14.29 mc where a weaker signal should be received.

NOTE: Oscillator tracks above signal on all bands.

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Above—
Bottom View of D-C Power Unit

At Left—
Top View of D-C Power Unit

Below—
Schematic Diagram
PSU 8E and 10E D-C Power Supply Units

Each d-c unit is equipped with an 18-inch 7-wire cable, with a 7-contact female receptacle which plugs into a 7-probe male connec- tor on the receiver chassis. The d-c power cord (double conductor) is 6-feet long and is provided with a fused plug. The units are approximately 141/2 inches long, 94 inches wide, and 81/2 inches high.

**GOOD GROUND IS ESSENTIAL.** It is necessary to provide a good ground connection to the receiver chassis. The ground lead should be heavy wire, as short as possible, connected to a water pipe by means of an approved ground clamp. If a water pipe ground is not available, a buried metal plate or screen may be used. This should have an area of approximately 20 square feet and should be buried one or two feet in moist ground. The connection to the plate should be electrically good, mechanically solid, and permanent.

Grounding Power Supply Unit.---A flexible metal braid is connected from the PSU chassis to the case of the unit, and another length of braid extends from the case for connection to the receiver chassis. Loosen one of the self-tapping screws on the rear of the chassis, and attach the braid under this screw. It is important to see that these connections are made correctly at the time of installation.

Magic Wave Antenna Recommended.---In cases where the line or vibrator interference is found to be objectionable, the use of an RCA Magic Wave Antenna (Stock No. 98412) is recommended in conjunction with a good ground as specified above.

Link Board for Changing from 117 to 234 Volts.---A link board is mounted under the chassis of the PSU for making connections to permit operation on 102-126 volts d-c or on 210-262 volts d-c. The correct position of the links for each voltage range is shown in the schematic diagram. The links must be arranged correctly in the link board for the particular voltage range on which the unit is to be operated, otherwise damage to the receiver may result.

Vibrator Plug.---The heater windings on the power transformer are tapped and connected to a six-contact socket on the rear of the PSU chassis. A plug fits into this socket in two positions only. An arrow on the plug points to markings "NEW" or "OLD" on the case of the unit. When the vibrator is new, the plug is inserted with the arrow pointing to "NEW." In the course of time, when the vibrator is worn to an extent where the dial lights burn dull or red instead of with their usual brilliancy, the plug should be removed and re-inserted with the arrow pointing to "OLD." (In this position, all the turns of the heater windings are connected, thus bringing the heater voltage up to normal.)

The number of operating hours to the time when it is necessary to turn the plug to "OLD" is not an indication of the ultimate life of the vibrator: For example, with high line voltage, the plug may usually be left at "NEW" for practically the entire useful life of the vibrator; but with low line voltage, it may be necessary to turn the plug to "OLD" after a time corresponding to a small fraction of the total life of the vibrator.

Testing.---The simplest way to check PSU 8E or 10E is to plug it into a receiver for which it is designed. (First check the position of the links for the particular line voltage.) Note whether the dial lamps in the receiver light with normal brilliancy, and measure the rectified "B" voltage at the receiver to determine whether it is normal.

If a receiver is not available, dummy loads may be connected to the unit as specified in the table below. (The supply current must be measured with a d-c ammeter, not a meter of the ac-dc type, inasmuch as the r.m.s. value of the current is considerably higher than the average value. The heater voltage must be measured with an r.m.s. meter (thermo-coupled), not with an average meter (rectifier type), on account of the square wave shape. An accurate thermo-coupled meter is not available, the heater voltage may be checked by observing the brilliancy of the dial lamps in the receiver. They will glow dull or red if the heater voltage is low.

Precautionary Lead Dress.---(1) Dress all leads on the power transformer primary and the buffer capacitors away from the line chokes. (2) Leads to C19 must be as short as possible. (3) The rectifier filament leads should be run close to each other, and dressed away from the filter chokes. (4) D-C power cord must not touch power transformer. (5) Keep antenna and ground leads away from PSU and PSU cable.

---

**Replacement Parts**

*Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.*

<table>
<thead>
<tr>
<th>STOCK No.</th>
<th>DESCRIPTION</th>
<th>Unit Lot Price</th>
<th>STOCK No.</th>
<th>DESCRIPTION</th>
<th>Unit Lot Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>12052</td>
<td>Capacitor—330 mfd. (C16)</td>
<td>.35</td>
<td>32053</td>
<td>Coil—Choke coil (L8)</td>
<td>.60</td>
</tr>
<tr>
<td>4097</td>
<td>Capacitor—100 mfd. (C9, C16)</td>
<td>.25</td>
<td>3140</td>
<td>Fuse—5 amp. fuse</td>
<td>.10</td>
</tr>
<tr>
<td>4089</td>
<td>Capacitor—27 mfd. (C15, C17)</td>
<td>.20</td>
<td>30052</td>
<td>Plug—Fused plug sets and fuse—power cord</td>
<td>.50</td>
</tr>
<tr>
<td>4089</td>
<td>Capacitor—0.95 mfd. (C1, C3, C5, C7, C9, C11)</td>
<td>.30</td>
<td>30052</td>
<td>Plug—d-c contact power change plug</td>
<td>.30</td>
</tr>
<tr>
<td>30049</td>
<td>Capacitor—Comprising two sections of 6 mfd. each (C11, C15)</td>
<td>.45</td>
<td>31004</td>
<td>Resistor—0.47 ohms, flexible type (R3, R4)</td>
<td>.15</td>
</tr>
<tr>
<td>30048</td>
<td>Capacitor—6 mfd. (C7)</td>
<td>.45</td>
<td>11768</td>
<td>Resistor—1,000 ohms, 2 watt (R1)</td>
<td>.25</td>
</tr>
<tr>
<td>30048</td>
<td>Capacitor—Comprising one section 10 mfd. and one section 6 mfd. (C9, C11)</td>
<td>.60</td>
<td>30206</td>
<td>Resistor—1,000 ohms, 2 watt (R2)</td>
<td>.25</td>
</tr>
<tr>
<td>30045</td>
<td>Capacitor—15 mfd. (C16)</td>
<td>.70</td>
<td>30201</td>
<td>Socket—6 contact power change socket</td>
<td>.20</td>
</tr>
<tr>
<td>30048</td>
<td>Col—Choke coil (L1, L2, L3, L4, L5, L6)</td>
<td>.80</td>
<td>31001</td>
<td>Socket—Tube socket</td>
<td>.25</td>
</tr>
<tr>
<td>31794</td>
<td>Col—Choke coil (L7)</td>
<td>.80</td>
<td>14312</td>
<td>Socket—Vibrator socket</td>
<td>.25</td>
</tr>
<tr>
<td>32055</td>
<td>Transformer—Power transformer (PSU-10E) only</td>
<td>11.90</td>
<td>32065</td>
<td>Transformer—Low-voltage (PSU-10E)</td>
<td>18.50</td>
</tr>
</tbody>
</table>

**ALL PRICES ARE SUBJECT TO CHANGE OR WITHDRAWAL WITHOUT NOTICE.**

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### 2nd Production
#### Schematic, Socket, Voltage Alignment, Trimmers

**RCA MFG. CO., INC.**

**MODELS 9TX-50, 9TX-5CM**

**Chassis RC454; 40X-52, 40X-55, Ch. RC-453**

---

**TUBE AND TRIMMER LOCATIONS**

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
<th>Unit Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tuning Condenser stator (ant.) in series with .1 mfd.</td>
<td>3.50</td>
</tr>
<tr>
<td>2</td>
<td>Radiation Loop consisting of 2 turns of wire 18 in. diameter located 4 to 6 feet from receiver</td>
<td>1.60</td>
</tr>
<tr>
<td>3</td>
<td>600 kc Resonance on 600 kc signal</td>
<td>L1 (Loop inductance)</td>
</tr>
<tr>
<td>4</td>
<td>1,400 kc Resonance on 30 kc signal</td>
<td>C2 (Antenna)</td>
</tr>
</tbody>
</table>

---

**Precautionary Lead Dress:**

1. Green and blue leads from 1st I.F. transformer must be kept separated.

2. Dress yellow lead from loudspeaker under green lead from hum bucking coil to prevent it from touching the 505GT.

**POWER SUPPLY RATINGS**

- A-C Rating: 165-125 volts, 50-60 cycles, 30 watts
- D-C Rating: 105-125 volts, direct current, 30 watts

**POWER OUTPUT** (125 volt, 60 cycle supply)

- Undistorted: .6 watts
- Maximum: 2.0 watts

**LOUDSPEAKER**

- Type: 5-inch Electrodynamic

---

**STOCK No.**

<table>
<thead>
<tr>
<th>Chassis Assemblies (RC-454, RC-455)</th>
</tr>
</thead>
<tbody>
<tr>
<td>34444</td>
</tr>
<tr>
<td>34447</td>
</tr>
<tr>
<td>34437</td>
</tr>
<tr>
<td>49348</td>
</tr>
<tr>
<td>4937</td>
</tr>
<tr>
<td>11316</td>
</tr>
<tr>
<td>34427</td>
</tr>
<tr>
<td>12484</td>
</tr>
<tr>
<td>34597</td>
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<tr>
<td>34592</td>
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<tr>
<td>34443</td>
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<tr>
<td>34448</td>
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<tr>
<td>34440</td>
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<td>32545</td>
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<td>32913</td>
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<td>34694</td>
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</tr>
<tr>
<td>14628</td>
</tr>
<tr>
<td>15268</td>
</tr>
<tr>
<td>14528</td>
</tr>
</tbody>
</table>

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Compliments of www.nucow.com
Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the chassis drawing.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For all alignment connections, connect the low side of the test-oscillator to the receiver ground terminal (G), and keep the output as low as possible to avoid a-c action.

Calibration Scale on Indicator-Drive-Cord drum. —The tuning dial is fastened in the cabinet and cannot be used for reference during alignment; therefore, a calibration scale is attached to the rear of the drum which is mounted on the front shaft of the gang condenser. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

As the first step in r-f alignment, check the position of the drum. The 180° mark on the drum scale must be vertical, and directly over the center of the gang-condenser shaft when the plates are fully meshed. The surface of the drum must be flush with the end of the gang-condenser shaft. The drum is held to the shaft by means of two set screws, which must be tightened securely when the drum is in the correct position.

Pointer for Calibration Scale.—Improvise a pointer for the calibration scale by fastening a piece of wire to the gang-condenser frame, and bend the wire so that it points to the 180°" mark on the calibration scale when the plates are fully meshed.

Dial-Indicator Adjustment.—After fastening the chassis in the cabinet, attach the dial indicator to the drive cable with indicator at the left-hand end marked on the dial scales, and gang-condenser fully meshed. The indicator has a spring clip for attachment to the cable.

<table>
<thead>
<tr>
<th>Steps</th>
<th>Connect the high side of test-osc. to</th>
<th>Tune test-osc. to</th>
<th>Turn radio dial to</th>
<th>Adjust the following for max. peak output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>688 2nd I-F grid cap, in series with .01 mfd.</td>
<td>455 kc</td>
<td>&quot;C&quot; band Quiet Point.</td>
<td>L16 and L17 (3rd I-F Trans.)</td>
</tr>
<tr>
<td>2</td>
<td>6K7 1st I-F grid cap, in series with .01 mfd.</td>
<td>6.1 mc</td>
<td>6.1 mc (29°) &quot;B&quot; band</td>
<td>L14 and L15 (2nd I-F Trans.)</td>
</tr>
<tr>
<td>3</td>
<td>6L7 1st Det. grid cap, in series with .01 mfd.</td>
<td>20 mc</td>
<td>20 mc (23.5°) &quot;C&quot; band</td>
<td>L12 and L13 (1st I-F Trans.)</td>
</tr>
<tr>
<td>4</td>
<td>Antenna Terminal, in series with 900 ohms</td>
<td>1,500 kc</td>
<td>1,500 kc (31°) &quot;A&quot; band</td>
<td>C9 (osc.)</td>
</tr>
<tr>
<td>5</td>
<td>Antenna Terminal, in series with 300 mmf.</td>
<td>600 kc</td>
<td>600 kc (144.5°) &quot;A&quot; band</td>
<td>L7 (osc.)</td>
</tr>
</tbody>
</table>

* Use minimum capacity peak if two peaks can be obtained.
† Rock the gang condenser slightly, and use the maximum capacity peak if two peaks can be obtained with trimmer C14. Check to determine that C5 has been adjusted to the correct peak by turning the receiver to 5.10 mc (60°), where a weaker signal should be received.
‡ Use minimum capacity peak if two peaks can be obtained. Check to determine that C5 has been adjusted to the correct peak by turning the receiver dial to 10.09 mc (39.5°), where a weaker signal should be received.
‡ Rock gang condenser slightly while peaking L7 for maximum output.

NOTE: Oscillator tracks 455 kc above the signal on all bands.

USED ALSO WITH MODEL 8Q1
 Victrola Attachment (Record Player).—Terminals are provided on the rear of the chassis for convenient connection to a Victrola Attachment (record player) such as the RCA R93 and R94 series. A stock No. 9824 switch may be used to change from radio to record player. The connections of this switch are shown. In the event that a No. 9824 switch is not available, a double-pole double-throw toggle switch may be used.
Adjustments for Push-Button Tuning

The push-buttons should be adjusted for six favorite stations after the receiver has been operating for a brief warm-up period. Each button may be set up for any standard broadcast station. The preferable arrangement is to adjust the stations in the order of frequency, from low to high. Proceed as follows:

1. Pull off the push-buttons and loosen the push-button rod with a screwdriver.
2. Turn the accessory switch to "Radio" position and accurately tune in the station for which the first button is to be set.
3. Press the push-button rod No. 1 (left) with the screwdriver, as far as it will go without undue pressure, hold in, return station with manual control if necessary for best reception, and then carefully tighten up the rod. Do not tighten more than 1 turn after the rod begins to grip or damage to the mechanism may result.
4. Replace the push-button on its shaft.
5. Proceed in the same manner for the remainder of the push-buttons.
6. Insert the station marker tabs in the recesses above the push-buttons...

POWER OUTPUT RATING

Undistorted: 2.5 watts
Maximum: 4.5 watts

POWER SUPPLY RATING

A: 5...205-125 volts, 60 cycles
B: 5...105-125 volts, 50 cycles
C: 5...105-125, 200-250 volts, 60 cycles
C: 5...105-125, 200-250 volts, 50 cycles

POWER CONSUMPTION: 100 watts

Compliments of www.nucow.com
PRECAUTIONARY LEAD DRESS.—

1. Power cord leads must be dressed up away from 6SQ7 socket, and toward, end of chassis.
2. Green lead 2nd I.F. to 6SQ7 must be dressed against base.
3. Red lead 2nd I.F. to 6SK7 must be dressed close to base.
4. Green and blue leads from 1st I.F. transformer must be dressed close to base.
5. Red lead from “I” terminal on antenna board to 6Y3G socket must be dressed against base.
6. Green lead from gang to 6SA7 socket must be dressed toward side apron away from other parts.

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**Cathode-Ray Alignment** is the preferable method. Connections for the oscillograph are shown in the chassis drawing.

**Output Meter Alignment**—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

**Test-Oscillator.**—For all alignment operations, connect the low side of the test-oscillator to the receiver ground terminal (G), and keep the output as low as possible to avoid a-v-c action.

**Calibration Scale on Indicator-Drive-Cord Drum.**—The tuning dial is fastened in the cabinet and cannot be used for reference during alignment; therefore, a calibration scale is attached to the rear of the drum which is mounted on the front shaft of the gang condenser. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

As the first step in r-f alignment, check the position of the drum. The 0° mark on the drum scale must be vertical, and directly over the center of the gang-condenser shaft when the plates are fully meshed. The surface of the drum must be flush with the end of the gang-condenser shaft. The drum is held to the shaft by means of two set screws, which must be tightened securely when the drum is in the correct position.

**Pointer for Calibration Scale.**—Improvise a pointer for the calibration scale by fastening a piece of wire to the gang-condenser frame, and bend the wire so that it points to the "0" mark on the calibration scale when the plates are fully meshed.

**Steps** | **Connect the high side of test-osc. to** | **Turn test-osc. to** | **Turn radio dial to** | **Adjust the following to obtain maximum output**
--- | --- | --- | --- | ---
1. | Turn fidelity control counter-clockwise (sharp), and sensitivity switch at minimum (open). | | | |
2. | 6K7 2nd I-F grid cap in series with .01 mfd. | 455 kc | “A” band, Quiet Point between 550-750 kc | L22 and L23 (3rd I-F Trans.)
3. | 6K7 1st I-F grid cap in series with .01 mfd. | | | L19 and L20 (2nd I-F Trans.)
4. | 6L7 1st-det. grid cap in series with .01 mfd. | | | L16 and L17 (1st I-F Trans.)
5. | Turn fidelity switch clockwise (broad) and check I-F response which should be a double-peaked curve. Leave fidelity counter-clockwise (sharp) for all of the following steps. | | | |
6. | Antenna Terminal in series with 300 ohms | 2.5 mc | 2.5 mc ("B") 244° | L8 (osc.)
7. | | 6.0 mc | 6.0 mc ("B") 147° | C14 (osc.) Use minimum capacity peak C27 (det.) Use maximum capacity peak C4 (ant.) Use maximum capacity peak*
8. | | 9.5 mc | 9.5 mc ("C") 55° | L7 (osc.)
9. | | 20 mc | 20 mc ("C") 153° | C7 (osc.) Use minimum capacity peak*
10. | Antenna Terminal in series with 200 mmf. | 600 kc | 600 kc ("A") 244° | L9 (osc.) Rock gang
11. | | 1,500 kc | 1,500 kc ("A") 1514° | C16 (osc.)
12. | Repeat steps 10 and 11. | | | |
13. | Antenna Terminal in series with 200 mmf. | 175 kc | 175 kc ("X") 534° | L10 (osc.)
14. | | 350 kc | 350 kc ("X") 1484° | C17 (osc.) C23 (det.)
15. | Repeat steps 13 and 14. | | | |

* Check to determine that the oscillator trimmer has been adjusted to the correct peak by tuning the receiver approximately 910 kc lower, where a weaker signal should be received.

**NOTE:** The oscillator tracks 455 kc above the signal on all bands.
Electric Tuning Mechanism

The circuit of the electric tuning mechanism is shown in the schematic diagram, and the dimensional details are illustrated below.

The action can be understood by following a cycle of operation.

When a station button is pushed in, it completes the 24-volt circuit through the corresponding motor-setting contact and the miniature of the brass selector disc, which is connected to one side of the motor field coil. This energizes the motor, and the rotor is pulled forward, engaging the gear train that drives the tuning condenser and selector disc. The condenser and disc rotate until the insulation line comes under the particular station-setting contact, and the motor circuit is broken. Insert covers the insulation line past the station-setting contact which then makes contact to the other half of the disc. This completes the circuit to the other side of the motor field coil, reversing the motion of the motor. The tuning flywheel is still turning in the original direction and therefore down does not affect the reversal of the motor.

Oscillation on Certain Buttons Only

1. Check contact tip of selector assembly for loose fit in body. See that none of contact is not bruised nor disarranged out of correct shape. Replace tip if necessary; do not attempt to file the tip.

2. Clean the insulating gap of selector disc, being sure to remove all metal particles and metallic fragments from beveled edges of the brush. Each contact should be checked to assure that clearance exists.

Lubrication

Motor bearings and gear bearings: use light machine oil.
Gear faces: use "Pure Oil No. 611" or petroleum jelly.
Selector pulleys and rails: use "Castoroil" or petroleum jelly.
Selector disc: apply thin film of petroleum jelly.
Felt bushing on flywheel: apply "castor-foot" oil. When replacing leather, mark it for at least 24 hours in castor-foot oil, and insert in flywheel while dripping.

Mutating Circuit

When the electric tuning mechanism is in action, the motor-syphon valve is fed by a double rectifier circuit which applies a voltage in the direct-current amplifier. This rectifier and audio amplifier and makes the station set or "mute" while the mechanism is operating.

Armchair Control Unit

When a Model GRA Armchair Control is connected to the receiver, it duplicates the action of the push-button on the front panel when No. 1 button is pressed. The black lead from push-button No. 1 is considered from No. 1 station-setting contact and soldered to a terminal block which is to be mounted on the face of selector mechanism. If desired, one of the other seven station buttons on the set may be used in place of No. 1 button. This arrangement allows the use of only seven of the station buttons when tuning in stations at the set, but it provides the use of the entire eight buttons on the Armchair Control. In operating the GRA Armchair Control the push-button must be held down until the station has been tuned in. Care must be taken not to hold two of the station buttons down at one time as both the station buttons may be engaged simultaneously causing the motor to be inoperative and overheated.

Component Parts of Station Setting Contact

ADJUSTMENTS FOR ELECTRIC TUNING

1. Make a list of the desired station numbers, arranged in order from low to high frequencies.
2. Turn range selector to "A" band, turn power on, and allow a few minutes for warming up.
3. Press down the "slant-turning" (right-hand) button.
4. Musically tune in the first station on the list, using the "Magic Eye" for accurate tuning.
5. Hold down the "slant-turning" button, and press down station button No. 1 (second from left). Both buttons will stay down. Move adjusting pin No. 1 to the insulating line on the disc at rear edge of the pin. When the pin is properly centered on the insulating line, the central dial lamp will go completely out.
6. Press down any other button in order to release the slant-turning button and station buttons No. 2 and down station button No. 1 again. The electric tuning mechanism will function to tune in the station, and the central dial lamp will stay on.
7. Repeat this process for the remaining stations.
Exception for the changes shown above, the schematic and wiring diagrams for Models 12Q4 and 12QK also apply to Model 12QU.
RCA MFG. CO., INC.

Lead Dress

1. The following leads should be dressed away from other parts and chassis.
   a. Yellow lead from pin No. 10 on S4 to dummy lug on terminal board.
   b. Yellow lead from pin No. 8 on 670 oscillator coil.
   c. Yellow, red and green leads from other parts.
   d. Yellow, black, and blue leads should be dressed away from coil windings.

2. Dress all leads away from chassis. The brown, black, and blue leads in back of the oscillator should be dressed away from coil windings.

3. R13 and C4 must be dressed away from terminal No. 7 of 615.

4. The following leads should be dressed away from other parts:
   a. Yellow lead from pin No. 10 on S4 to dummy lug on terminal board.
   b. Yellow lead from pin No. 8 on 670 oscillator coil.
   c. Yellow, red, and green leads from other parts.

Precautionary Lead Dress

Connections of Leadwire and Cables

• NOTE: Values with (*) are operating voltages, the actual measured in circuits with different load resistances. The actual measured values with set tuned to quiet point, sensitivity switch at minimum, volume control held within approximately 25% of 7W. All values are applicable.
Specifications

FOR POWER SUPPLY DATA SEE INDEX

SPECIFICATIONS

FREQUENCY RANGES

<table>
<thead>
<tr>
<th>Band</th>
<th>Frequency Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long Wave</td>
<td>150-400 kc (2,000-7,500 m)</td>
</tr>
<tr>
<td>Medium Wave</td>
<td>330-1,625 kc (560-1864.6 m)</td>
</tr>
<tr>
<td>Short Wave 1</td>
<td>2.3-7.0 mc (110-42.8 m)</td>
</tr>
<tr>
<td>Short Wave 2</td>
<td>7.0-22 mc (42.8-13.6 m)</td>
</tr>
</tbody>
</table>

INTERMEDIATE FREQUENCY

PHONOGRAPH (Model 12QU only)

<table>
<thead>
<tr>
<th>Type</th>
<th>Crystal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turntable Speed</td>
<td>78 r.p.m. (adjustable)</td>
</tr>
<tr>
<td>Type Pickup</td>
<td>Eight 10-inch or seven 12-inch</td>
</tr>
<tr>
<td>Pickup Impedance</td>
<td>100,000 ohms at 1,000 cycles</td>
</tr>
</tbody>
</table>

PILOT LAMPS

<table>
<thead>
<tr>
<th>Models</th>
<th>Output Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>12Q4 and 12QK</td>
<td>6.3-volt, 0.15-amp, Mazda No. 47</td>
</tr>
<tr>
<td>12QU</td>
<td>6.3-volt, 0.15-amp, Mazda No. 44</td>
</tr>
<tr>
<td>12QU*</td>
<td>6.3-volt, 0.25-amp, Mazda No. 44</td>
</tr>
</tbody>
</table>

POWER OUTPUT RATINGS

<table>
<thead>
<tr>
<th>Type</th>
<th>12-inch Electrodynamic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voice Coil Impedance</td>
<td>2.2 ohms at 400 cycles</td>
</tr>
</tbody>
</table>

POWER SUPPLY RATINGS

A-C Ratings

<table>
<thead>
<tr>
<th>With PSU</th>
<th>Voltage</th>
<th>Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>10A</td>
<td>105-125 volts, 50-60 cycles</td>
<td>125 volts, 125 watts, 150 watts</td>
</tr>
<tr>
<td>10B</td>
<td>105-125 volts, 25-60 cycles</td>
<td>125 watts, 125 watts, 150 watts</td>
</tr>
<tr>
<td>10C</td>
<td>105-130 volts, 140-160, 200-250 volts, 50-60 cycles</td>
<td>125 watts, 125 watts, 150 watts</td>
</tr>
</tbody>
</table>

D-C Ratings

<table>
<thead>
<tr>
<th>With PSU</th>
<th>Voltage</th>
<th>Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>10E</td>
<td>105-125 volts, 210-250 volts D-C</td>
<td>125 volts, 125 watts, 150 watts</td>
</tr>
</tbody>
</table>

*Model 12QU may be used with PSU 10A or 10C only.

Power Supply Units

Models 12Q4, 12QK, and 12QU have seven-prong connectors for connection to a separate power supply unit. Units are available in different ratings for a.c. and d.c. operation, as listed under "Power Supply Ratings" in the electrical specifications. It should be noted, however, that Model 12QU may be used with a.c. units PSU 10A or 10C only.

When Model 12Q4 or Model 12QK is used with a d.c. Power Supply Unit, the measured current drain is 0.7 amperes from a 234 volt supply, and 1.4 amperes from a 117 volt supply. These current values may vary as much as 30% when measured by various types of ammeters, due to the rectangular wave-shape of the vibrator current.

Service data, diagrams, and replacement parts lists for the power supply units are printed in separate service data sheets which should be referred to for further information.

Location of Controls, Models 12Q4 and 12QK

Location of Controls, Model 12QU
Purpose and Function of Fidelity Control

<table>
<thead>
<tr>
<th>MODELS 120Q AND 124Q</th>
<th>MODELS 12Q</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Position</strong></td>
<td><strong>Position</strong></td>
</tr>
<tr>
<td><strong>1</strong> (Extreme Counter clockwise)</td>
<td><strong>1</strong> (Extreme Counter clockwise)</td>
</tr>
<tr>
<td><strong>Record Player</strong></td>
<td><strong>Victrada</strong></td>
</tr>
<tr>
<td><strong>Record Player</strong></td>
<td><strong>Victrada</strong></td>
</tr>
<tr>
<td><strong>Record Player</strong></td>
<td><strong>Medium No. 2</strong></td>
</tr>
<tr>
<td><strong>Distances Stations</strong></td>
<td><strong>Shade</strong></td>
</tr>
<tr>
<td><strong>Distances Stations</strong></td>
<td><strong>Victrada</strong></td>
</tr>
<tr>
<td><strong>Local and Medium</strong></td>
<td><strong>Distances Stations</strong></td>
</tr>
<tr>
<td><strong>Distances Stations</strong></td>
<td><strong>Medium No. 2</strong></td>
</tr>
<tr>
<td><strong>6</strong> (Extreme Clockwise)</td>
<td><strong>Local Stations</strong></td>
</tr>
<tr>
<td><strong>Local Stations</strong></td>
<td><strong>Broad Max. highs</strong></td>
</tr>
</tbody>
</table>

Miscellaneous Service Data

Plug for Extension Loudspeaker: A non-contact female socket equipped with a male plug, is connected across the output circuit on the loudspeaker to facilitate the connection of an extension loudspeaker if desired. A permanent-magnet dynamic speaker, with voice-coil impedance of not less than 8 ohms, is recommended. With a 2-ohm voice coil, the extension speaker will create approximately half the power output of the receiver, with a higher-impedance voice coil, the percentage of power delivered to the extension speaker will be decreased.

The RCA M-6218-6 inch diameter Alnico permanent-magnet dynamic loudspeaker, which has a 4-ohm voice coil, and a power-handling capacity of 3 watts, is recommended. This speaker may be housed in the RCA M-6329-6 slinger-front, wall-mounted loudspeaker housing.

The voice coil of the extension speaker should be connected to the same means of modulation, such as a single electrical appliance, to the male plug. The cable may be of any desired length, but with a long run, when using a low-impedance extension speaker, it is advisable to use heavy cable.

A high-impedance magnetic-type speaker may be used in combination with a suitable coupling transformer such as RCA Stock No. 17813.

Victrada Attachments (record player): A jack located on the top nearest the front of the chassis is provided for connecting a Victrada Attachment (record player) into the audio amplifying circuit on Models 120Q and 124Q. The cable running from the Victrada Attachment should be terminated in a Stock No. 31048 plug to fit the jack.

Alignment procedure:

Alignment using the cathode-ray oscillograph is much the preferable method because of the variable selectivity features of the oscillograph. The curves shown illustrate the general shape of the file selectivity curves for different settings of the selectivity controls when 12F channel is properly aligned. Connections for the oscillograph are shown on the bottom view of the receiver chassis. Use short, unshielded leads to oscillograph, and well-shielded leads from test oscillator. If possible, use 50 or 40 kHz sweep frequency for if alignment.

OutputMeter Alignment:—If this method is used, connect meter across voice coil, and turn receiver volume control to maximum. Disregard steps 3 and 5 of alignment procedures. However, a listening check should be made to check operation of fidelity control, after receiver has been aligned.

Test Oscillator:—For all alignment operations connect the "GND" side of test oscillator to chassis, the high side as indicated in table, and keep output as low as possible to avoid saturation.

Calibration Scale on Indicator-Drive-Cord Drum:—The turn the knob as indicated and cannot be used as reference during alignment, therefore a calibration scale is as indicated in the use of the indicator-referred drive is used for this operation. The scale is not the same as the gain condenser in the drum. The correct setting of the gain condenser is read on the scale, which is calibrated in degrees. The correct setting of the gain condenser, when alignment here, is given in the alignment scale, table.

To determine the corresponding frequency for any setting of the calibration scale, refer to the accompanying drawing which shows the calibration curve. Note that the curves are linear from top and bottom.

To determine the corresponding frequency for any setting of the calibration scale, refer to the accompanying drawing which shows the calibration curve. Note that the curves are linear from top and bottom.

Gain Control or Gain Control Scale:—Improvers for matching the scale for automatic change of tone is to move the pointer on the gain condenser, and bend the tone control until the "GND" mark on the chart scale when the plates are full of video for operation.

Dial-Indicator Adjustment:—After fastening the chassis in the cabinet, attach the dial indicator to the drive cable with indicator of the Videotact and calibration marks on the dial scale, and gang condenser fully turned. The indicator has a 100 and 150 kHz sweep frequency for alignment. With the leads reversed as in the case where the noise level is high enough, to prevent reception of the two modulated frequencies, the receiver may be used for alignment, but an extremely high degree of accuracy is required in the frequency settings of the oscillator, as a slight error will produce considerable inaccuracy on the signal.

Slow-Band Alignment:—The most satisfactory method of aligning the crystal oscillator is to position the crystal oscillator, and adjust the frequency of the crystal oscillator, until the oscillographic patterns are as shown in the following steps:

1. Determine the exact dialed settings of the slow oscillator for frequencies at or close to the specified alignment frequencies setting 1 the slow oscillator against short-wave stations of known frequency.
2. Use harmonics of the modulated-band range of a slow oscillator, fast checking the frequency settings on the range by means of a crystal calibrator (RCA Stock No. 9753), or by zero-beating against standard broadcast signals.

The oscillographic patterns are as shown in the following steps:

1. Determine the exact dialed settings of the slow oscillator for frequencies at or close to the specified alignment frequencies setting 1 the slow oscillator against short-wave stations of known frequency.
2. Use harmonics of the modulated-band range of a slow oscillator, fast checking the frequency settings on the range by means of a crystal calibrator (RCA Stock No. 9753), or by zero-beating against standard broadcast signals.
PHONOGRAPh MECHANISM.—

The phonograph motor is self-starting and operates the turntable through friction drive between the motor spindle and the rubber tire on the underside of the turntable. The rubber driving tire on the turntable should never be removed once it is ground in to be concentric with the spindle. If replacement is required, the entire turntable should be replaced.

The speed regulator raises and lowers the motor. This changes the driving ratio between the motor and the turntable due to the motor spindle being conical in shape. It is important to adjust this regulator for a turntable speed of 78 r.p.m. while playing a 10-inch record with the needle approximately one inch from the outer edge of the record.

Lubrication.—The motor should be lubricated as follows: Place a few drops of S.A.E. 20 (or equivalent) on the turntable spindle and saturate the oil retaining felt pads on the motor shaft with S.A.E. 10 oil. This oiling process should be repeated once or twice a year. CAUTION—THE MOTOR DRIVE SPINDLE AND RUBBER DRIVE TIRE ON THE TURNTABLE MUST BE KEPT CLEAN AND ENTIRELY FREE FROM OIL AND GREASE AT ALL TIMES.

Alignment Procedure

Output Meter Alignment.—Connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test Oscillator.—Connect the low side of the test oscillator to the receiver chassis through a 0.01 mfd capacitor, and keep the output as low as possible.

Pre-Setting Dial.—With gang condenser in full mesh, the pointer should coincide with the left hand mark stamped in the dial backplate.

Antenna.—This set is equipped with a built-in loop antenna. If an outdoor antenna is used, it may be connected to the green antenna lead, stapled to the base of the cabinet. The antenna should not be longer than 100 feet including the lead-in. If it is longer, connect a 100 mfd capacitor in series with the lead-in.

<table>
<thead>
<tr>
<th>Steps</th>
<th>Connect the high side of test oscillator to—</th>
<th>Tune test osc. to—</th>
<th>Turn radio dial to—</th>
<th>Adjust the following for max. output—</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tuning Cond. (det.) in series with 0.01 mfd.</td>
<td>455 kc</td>
<td>Quiet Point at 1,400 kc end of dial</td>
<td>C24, C25, C26 (1st and 2nd I-F transformers)</td>
</tr>
<tr>
<td>2</td>
<td>Antenna lead (green) in series with 100 mfd.</td>
<td>1,720 kc</td>
<td>Full Clockwise (out of mesh)</td>
<td>C26 (osc.)</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>1,500 kc</td>
<td>Resonance or 1,500 kc signal</td>
<td>C21 (ant.)</td>
</tr>
</tbody>
</table>

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CHASSIS ASSEMBLIES

<table>
<thead>
<tr>
<th>Chassis Assembly</th>
<th>Description</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>33897</td>
<td>Base-Motor base and ball assembled</td>
<td>.80</td>
</tr>
<tr>
<td>33898</td>
<td>Motor-Complete 70-120, 9F cage (M1)</td>
<td>3.70</td>
</tr>
<tr>
<td>33899</td>
<td>Mounting-Bracket and retainer</td>
<td>1.40</td>
</tr>
</tbody>
</table>

SPEAKER ASSEMBLIES

<table>
<thead>
<tr>
<th>Speaker Assembly</th>
<th>Description</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>32607</td>
<td>Cap-Dust cap</td>
<td>.02</td>
</tr>
<tr>
<td>32608</td>
<td>Coil-Field coil (L1)</td>
<td>.02</td>
</tr>
<tr>
<td>32609</td>
<td>Cone-Neutralising coil (L1)</td>
<td>.15</td>
</tr>
<tr>
<td>32610</td>
<td>Cone-Cone complete with voice coil, center suspension and damper clips</td>
<td>1.65</td>
</tr>
<tr>
<td>32611</td>
<td>Plug-4-prong speaker plug</td>
<td>.30</td>
</tr>
<tr>
<td>32612</td>
<td>Transformer-Output transformer (T2)</td>
<td>1.35</td>
</tr>
</tbody>
</table>

AUTOMATIC SWITCH ASSEMBLIES

<table>
<thead>
<tr>
<th>Switch Assembly</th>
<th>Description</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>32633</td>
<td>Cam-Cam assembly comprising main and auxiliary cam, hub and set screws</td>
<td>.75</td>
</tr>
<tr>
<td>32634</td>
<td>Lever-Lever actuating lever and auxiliary switch clip</td>
<td>.30</td>
</tr>
<tr>
<td>32635</td>
<td>Washer-&quot;C&quot; washer for holding actuating lever</td>
<td>.05</td>
</tr>
</tbody>
</table>

PICKUP ASSEMBLIES

<table>
<thead>
<tr>
<th>Pickup Assembly</th>
<th>Description</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>33008</td>
<td>Arm-Pickup arm</td>
<td>.45</td>
</tr>
<tr>
<td>33009</td>
<td>Slop-Pickup arm base and retainer</td>
<td>.45</td>
</tr>
<tr>
<td>33010</td>
<td>Crystal-Pickup crystal</td>
<td>.25</td>
</tr>
<tr>
<td>33011</td>
<td>Support-Pickup arm complete less bracket</td>
<td>.80</td>
</tr>
</tbody>
</table>

MICROPHONE ASSEMBLIES

<table>
<thead>
<tr>
<th>Microphone Assembly</th>
<th>Description</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>33731</td>
<td>Button-Push button assembly</td>
<td>.15</td>
</tr>
<tr>
<td>33732</td>
<td>Cover-15 protective covers for push button</td>
<td>.30</td>
</tr>
<tr>
<td>33733</td>
<td>Cup-11 cup for push button</td>
<td>.30</td>
</tr>
<tr>
<td>33734</td>
<td>Needle-Needle cup</td>
<td>.30</td>
</tr>
<tr>
<td>33735</td>
<td>Diaphragm-Diaphragm</td>
<td>.30</td>
</tr>
<tr>
<td>33736</td>
<td>Diaphragm-Diaphragm</td>
<td>.30</td>
</tr>
<tr>
<td>33737</td>
<td>Diaphragm-Diaphragm</td>
<td>.30</td>
</tr>
<tr>
<td>33738</td>
<td>Diaphragm-Diaphragm</td>
<td>.30</td>
</tr>
<tr>
<td>33739</td>
<td>Diaphragm-Diaphragm</td>
<td>.30</td>
</tr>
</tbody>
</table>

DIAL MECHANISM AND CALIBRATION MARKS

Dial Indicator Adjustment: With the gang condenser in full mesh, the indicator should point to the mark at the extreme left (low frequency) end of the dial scale.

ALL PRICES ARE SUBJECT TO CHANGE OR WITHDRAWAL WITHOUT NOTICE.

Note: Oscillator tracks above signal on both bands.
Replacement Parts

**Alignment Procedure**

Before proceeding with alignment the following lead down should be carefully checked.

1. Drain AC switch leads away from EFM tube socket.
2. Do not make loop leads together or around each other. Spacing between loop leads should be about an inch.
3. Power switch leads should be away from chassis to prevent overloading of EFM tube socket.
4. Drain C6 and G3 away from each other.
5. Drain C11 away from power switch leads.

**Cobbed-Ray Alignment** is the preferable method. Controls and connections for the cobbed-ray are shown on the chassis schematic.

**Steps**

1. Connect test-tone signal to output terminal.
2. Tune test-tone generator to frequency of tone for each step.
3. Turn radio dial to the maximum output on each frequency.
4. Adjust the following for the maximum peak output:
   - 12 lead through 0.1 micrometer capacitor and ground
   - 0.01 lead through 0.01 micrometer capacitor and ground
   - 0.01 lead through 0.01 micrometer capacitor and ground
   - 0.01 lead through 0.01 micrometer capacitor and ground

When making adjustments 1 to 4 inclusive the chassis must be in the cabinet, both loops connected, and all leads in their normal positions. When removing chassis in cabinet or recalibrating marks on dial plates do not line up with scale marked on cabinet since pointer may be in any position.

**Phonograph Information**

The phonograph motor has its bearing filled with oil and sealed so that the bearing requires no service during the life of the motor. It should have its bearings lubricated occasionally with L.A.O oil. Care should be taken not to get any oil, grease, or other foreign matter on the bearing. These motors and the motor switch should be cleaned annually with soap and water.

The drive spindle bearing should be lubricated with oil. For information regarding the operation and condition of the motor refer to service note No. 41 covering these mechanisms.

**Antennas**

Each of these receivers is equipped with two loop antennas (C) upward and (D) forward. During installation the "A" lead should be connected to the position giving maximum signal strength and free from noise. If it appears to acquire nothing and noise, the loop should be reversed and connected to the other position. The loop antenna should be kept clear of metal objects and placed away from loudspeakers and other electrical equipment.

**Carting Loudspeaker Cone**

The loudspeaker cone is mounted on the speaker cone. The cone is made to the specification of the manufacturer. The cone is sealed with cloth and adhesive. The cone is sealed with cloth and adhesive. The cone is sealed with cloth and adhesive.
For Tuner Data

see Model U-10 U-42

Note:—Some U-42 instruments employ 6F6G output tubes. Both types are interchangeable. On some Models U-42, R18 is 27,000 ohms.
### CHASSIS ASSEMBLIES (REA-508-B)

<table>
<thead>
<tr>
<th>Stock No.</th>
<th>Description</th>
<th>Unit Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>31465</td>
<td>Transformer—Power transformer 105-150 volts, 90 cycles, 7.5 watts</td>
<td>7.50</td>
</tr>
<tr>
<td>31464</td>
<td>Transformer—Power transformer 105-150/60 cycles, 7.5 watts</td>
<td>7.50</td>
</tr>
<tr>
<td>31454</td>
<td>Transformer—Power transformer 105-150/60 cycles, 15 watts</td>
<td>15.00</td>
</tr>
<tr>
<td>31453</td>
<td>Transformer—Power transformer 105-150/60 cycles, 30 watts</td>
<td>30.00</td>
</tr>
</tbody>
</table>

### OPERATING MECHANISM

<table>
<thead>
<tr>
<th>Stock No.</th>
<th>Description</th>
<th>Unit Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>31854</td>
<td>Motor—Cone and gear assembly (2)</td>
<td>2.25</td>
</tr>
<tr>
<td>31856</td>
<td>Motor—Cone and gear assembly (3)</td>
<td>3.00</td>
</tr>
<tr>
<td>31858</td>
<td>Motor—Cone and gear assembly (4)</td>
<td>4.00</td>
</tr>
</tbody>
</table>

### PICKUP AND ARM ASSEMBLIES

<table>
<thead>
<tr>
<th>Stock No.</th>
<th>Description</th>
<th>Unit Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>31870</td>
<td>Arm—Pickup arm, tube end and cable</td>
<td>3.50</td>
</tr>
<tr>
<td>31872</td>
<td>Arm—Pickup arm, tube end and cable</td>
<td>3.50</td>
</tr>
<tr>
<td>31874</td>
<td>Arm—Pickup arm, tube end and cable</td>
<td>3.50</td>
</tr>
<tr>
<td>31876</td>
<td>Arm—Pickup arm, tube end and cable</td>
<td>3.50</td>
</tr>
</tbody>
</table>

### SPEAKER ASSEMBLIES

<table>
<thead>
<tr>
<th>Stock No.</th>
<th>Description</th>
<th>Unit Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>31890</td>
<td>Speaker—Cone for speaker 2.50</td>
<td></td>
</tr>
<tr>
<td>31892</td>
<td>Speaker—Cone for speaker 2.50</td>
<td></td>
</tr>
<tr>
<td>31894</td>
<td>Speaker—Cone for speaker 2.50</td>
<td></td>
</tr>
<tr>
<td>31896</td>
<td>Speaker—Cone for speaker 2.50</td>
<td></td>
</tr>
</tbody>
</table>

### MISCellanEOUS ASSEMBLIES

<table>
<thead>
<tr>
<th>Stock No.</th>
<th>Description</th>
<th>Unit Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>31910</td>
<td>Horn—Radiator for speaker</td>
<td>1.00</td>
</tr>
<tr>
<td>31912</td>
<td>Horn—Radiator for speaker</td>
<td>1.00</td>
</tr>
<tr>
<td>31914</td>
<td>Horn—Radiator for speaker</td>
<td>1.00</td>
</tr>
<tr>
<td>31916</td>
<td>Horn—Radiator for speaker</td>
<td>1.00</td>
</tr>
</tbody>
</table>

### MOTOREBOARDS ASSEMBLIES

<table>
<thead>
<tr>
<th>Stock No.</th>
<th>Description</th>
<th>Unit Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>31930</td>
<td>Board—Pickup arm, tube end and cable</td>
<td>3.50</td>
</tr>
<tr>
<td>31932</td>
<td>Board—Pickup arm, tube end and cable</td>
<td>3.50</td>
</tr>
<tr>
<td>31934</td>
<td>Board—Pickup arm, tube end and cable</td>
<td>3.50</td>
</tr>
<tr>
<td>31936</td>
<td>Board—Pickup arm, tube end and cable</td>
<td>3.50</td>
</tr>
</tbody>
</table>

### MOTOR ASSEMBLIES

<table>
<thead>
<tr>
<th>Stock No.</th>
<th>Description</th>
<th>Unit Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>31950</td>
<td>Field—Complete unit for 40 cycle motor</td>
<td>9.50</td>
</tr>
<tr>
<td>31952</td>
<td>Field—Complete unit for 40 cycle motor</td>
<td>9.50</td>
</tr>
<tr>
<td>31954</td>
<td>Field—Complete unit for 40 cycle motor</td>
<td>9.50</td>
</tr>
</tbody>
</table>

### ALL PRICES ARE SUBJECT TO CHANGE OR WITHDRAWAL WITHOUT NOTICE.
Adjustments for Electric Tuning

These models have eight push buttons. The left-hand button is a Victrola switch. The right-hand button connects the gang condenser for manual tuning. The other six buttons are for electric tuning of six different stations in the standard broadcast range. The station buttons connect to separate magnetite core oscillator coils and separate antenna trimmers which must be adjusted for the desired stations. Use an insulated screwdriver or alignment tool such as RCA Stock No. 335. Allow at least five minutes warm-up period before making adjustments.

The procedure is as follows:
1. Make a list of the desired six stations, arranged in order from lowest to highest frequencies.
2. Push in the dial tuning button, and manually tune in the first station on the list.
3. Push in station button No. 1 (second from left) and adjust No. 1 antenna trimmer (L37) to receive this station. Screw the core all the way in, to lowest frequency, and then unscrew slowly until station is received.
4. Adjust No. 3 antenna trimmer (C96) for maximum output on this station.
5. Adjust for each of the remaining five stations in the same manner.
6. Make a final careful adjustment of the oscillator cores and antenna trimmers.

Precautionary Lead Dress:
1. Dress red leads from power transformer to power switch (S9), in corner of chassis and away from volume control terminals.
2. Dress green lead from push-button switch to gang over end of switch, and away from C27 and bus between 55 and range switch.
3. Leads to C27 must be as short as possible.
4. Blue lead from range switch to oscillator coil must be as short as possible and dressed away from other leads. All leads should be dressed away from antenna coil.
5. Leads across back of chassis must be dressed under electrolytic away from Victrola jack.
6. Parts and leads should be dressed away from R22-R14 as it becomes heated.
7. Leads from oscillator coil to trimmers must be dressed away from coil.
8. Green lead from S4 to range switch must be clear of other leads and away from front edge of chassis.
FOR PHONOGRAPH DATA SEE RCA PAGES 10-51 AND 10-52 in VOLUME X
Installation, Operation
Lead Dress, Parts

Specifications OSC-22 — 1939 No. 28 — First Edition

Wireless Oscillator

FREQUENCY RANGE .......................... Approx. 580-625 kc
TUBE COMPLEMENT
(1) RCA-6S7A — Modulator — Oscillator
(2) RCA-2526-G — Half-Wave Rectifier
(3) Type B-88-A — Ballast Resistor

POWER SUPPLY RATINGS
A-C Rating ........................................ 105-125 volts, 25-60 cycles, 35 watts
D-C Rating ........................................ 105-125 volts, 35 watts

DIMENSIONS
Chassis Base ................................. 73-in. x 43-in. x 23-in.

Precautionary Lead Dress
1. Keep 110-volt leads away from oscillator coil.
2. Leads to oscillator coil must be short and direct.

The RCA Victor Wireless Oscillator is an adapter unit used to convert your Victrola Attachment, such as the RCA Victor Model VA-22, into a wireless record player. This permits you to play phonograph records through your radio receiver without any connecting wires from the Victrola Attachment to the Radio Receiver.

INSTALLATION

Certain RCA Victor Attachments such as the VA-22 are provided with a side shelf inside the cabinet for mounting the wireless oscillator. Three holes are drilled in the shelf correctly spaced for the oscillator mounting bolts to go through and screw into the chassis in the OSC-22 chassis base. To install the OSC-22 first detach the VA-22 power cord from the electric outlet.

1. Look in the back of the VA-22 or similar Victrola cabinet and locate the connection from the back panel to the volume control on the side of the cabinet. This is a length of wire with a connector plug on each end. Disconnect the plug from the bayonet socket and then loosen the set screw and remove the rubber band and the volume control on the other end of the wire, together with the wire, from the VA-22 cabinet. It is attached to the cabinet by a nut and washer.

2. Mount the OSC-22 on the cabinet shelf with the three mounting screws and washers provided.

3. Mount the OSC-22 Power Switch and Volume Control unit in the location from which the VA-22 volume control was removed, using the washer and nut taken from the VA-22 volume control. Be sure that the locating pin on the new control is in the connecting socket. Attaching knob on shaft of Power Switch and Volume Control unit and tighten up the set screw.

4. Insert the pickup plug into the connector on the cable of the newly installed Volume Control of the OSC-22.

5. Insert the plug on the end of the VA-22 power cord into the power receptacle on the OSC-22 chassis base.

6. Insert the plug on the end of the OSC-22 power cord into the electric outlet.

OPERATION

CONTROLS AND MOVING MECHANISM

In order to obtain best reproduction, the newly installed Volume Control should first be turned on about 2-3 full and adjust the Volume Control on your radio receiver turned to the point that gives the greatest volume you are likely to require. Then all control of volume may be made with the knob on the Wireless Victrola Attachment. In particular the locations may be preferable to set the Volume Control of the Wireless Victrola Attachment at about 2-3 full and regulate with the volume control knob on the receiver.

The Victrola Adjustment. — On the back of the OSC-22 chassis is a small adjusting rod to give reproduction at the most sensitive point on your radio receiver dial. With your radio receiver in operation, set the Tuning Control to bring the pointer of the standard broadcast band to scale to a point at the low frequency end between 530 and about 630 kilocycles, 530 is preferable, at which no station can be obtained. Then set your Wireless Victrola Attachment in operation and tune the adjusting rod on the OSC-22 slowly and carefully until the record reproduction is heard at its best.

Antenna Modification. — If, due to your particular special conditions, insufficient volume or excessive noise interference affects record reproduction, a simple remedy is to connect a wire from the Wireless Victrola Attachment to your radio antenna lead. This is easily accomplished by means of a length of wire to cover the distance between the Victrola Attachment and Receiver. One end of this should be wound 3 or 4 turns around the outside of the short wire projecting from the OSC-22 plug on the power cord. The other end of the wire should be wound 3 or 4 turns around the outside of the receiver antenna lead. When an RCA Master Antenna is used, the wire should be wound around the counterpoise lead where it is attached to the A-3 terminal of your radio receiver antenna terminal board.

PLAYING

Plug the power cord from the OSC-22 into a convenient house outlet, then to play records proceed as follows:

1. Turn on the power to your radio receiver.
2. Set the tuning knob in your new "Victrola" station (530-630 kilocycles) or if you have specially adjusted a push button, press it.
3. Turn in power to the Wireless Victrola Attachment.
4. Make the set-up for playing records in accordance with the original instructions accompanying the Victrola Attachment.
5. Turn the Wireless Victrola Volume Control about 2-3/4 fully clockwise.
6. Set radio receiver Tuning knob to accurately tune in the phonograph selection.
7. Turn Radio Receiver Volume Control to give the maximum reproduction you are likely to require.
8. Adjust the Wireless Victrola Volume Control to suit.
9. Adjust radio receiver Tone Control if desirable.

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Compliments of www.nucow.com
**Alignment Procedure**

Output Meter Alignment.—Connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—Connect the low side of the test-oscillator to the receiver chassis, through a .01 mfd. capacitor, and keep the output as low as possible.

Presetting Diz.—With gang condenser in full mesh, the pointers should be horizontal.

Antenna.—The set is equipped with a built-in loop antenna. If an outdoor antenna is used, it may be connected to the “ANT.” terminal on rear of cabinet. It should not be longer than 100 feet, including lead-in. If it is longer, connect a 100 to 200 mfnf capacitor in series with the lead-in.

Power-Supply Polarity.—For operation on d-c, the power plug must be inserted in the socket for correct polarity. If the set does not function, reverse the plug. On a-c, reversal of the plug may reduce hum.

Victrola Attachment.—A jack is provided on the rear of cabinet for connecting a Victrola Attachment into the audio-amplifying circuit. The cable from the Victrola Attachment should be terminated in a stock No. 81048 plug to fit the jack.

---

**Precautionary Lead Dress**

1. Dress 2nd I-F green lead close to chassis and under other parts.
2. Dress lead from gang condenser to grid of 12SA7 close to chassis and away from 12SQ7 socket.
3. Dress blue 1st I-F lead under volume control close to chassis.
4. Dress blue 2nd I-F lead close to chassis and behind 12SK7 socket.
Alignment, Trimmers
Socket, Lead Dress

RCA MFG. CO., INC

MODELS 40X-50 to 40X-57

Chassis RC-436

Schematic, Voltage

NOTE: Output cathode resistor is 120 ohm when 50L6GT tube is used.

Pre-setting Dial—With gang condenser in full mesh, the pointer should be horizontal.

Antenna.—The set is equipped with a built-in loop antenna. If an outdoor antenna is used, it may be connected to the "ANT" terminal on rear of cabinet. It should not be longer than 100 feet, including lead-in. If it is longer, connect a 100 to 200 mmdm. capacitor in series with the lead-in.

STOCK No.

DESCRIPTION

CHASSIS ASSEMBLIES (RC-436)

33745 Cable—Phone, cable .................................... .30
13057 Capacitor—60 mmdm. .................................. .35
12488 Capacitor—80 mmdm. .................................. .35
12952 Capacitor—100 mmdm. ................................ .35
4538 Capacitor—635 mfd. .................................. .20
4570 Capacitor—855 mfd. .................................. .20
32787 Capacitor—65 mfd. .................................. .20
4839 Capacitor—1 mfd. ................................... .30
12444 Capacitor—25 mfd. .................................. .30
32576 Capacitor—Electrolytic, 20-12 mfd. ............... .90
32968 Capacitor—Variable tuning .......................... 2.25
32969 Coil—Oscillator coil ................................ .60
3283 Cord—Drive cord .................................... .20
32743 Drum—Drive drum ................................... .20
31489 Lamp—Pilot lamp ................................... .20
33663 Loop—Complete antenna loop ....................... 1.20
33558 Resistor—46 ohms .................................. .30
13071 Resistor—120 ohms, 1 watt ......................... .20
13429 Resistor—150 ohms, 1 watt ......................... .20
14561 Resistor—220 ohms, 1 watt ......................... .20
13998 Resistor—22,000 ohms, 1 watt .................... .20
12418 Resistor—22,000 ohms, 1 watt .................... .20
12264 Resistor—220,000 ohms, 1 watt .................. .20
13225 Resistor—470,000 ohms, 1 watt .................. .20
12679 Resistor—2.5 meg., 1 watt ......................... .20
13601 Resistor—10 meg., 1 watt ......................... .20
32061 Shaft—Drive shaft ................................ .96
30585 Spring—Drive cord spring .......................... .20
33537 Socket—Dial light socket .......................... .20
32532 Socket—Tube socket ................................ .20
32966 Transformer—1-F input transformer ............. 1.25

ALL PRICES ARE SUBJECT TO CHANGE OR WITHDRAWAL WITHOUT NOTICE.

Precautionary Lead Dress

Steps Connect the high side of test oscillator to— Tune test-osc. to— Turn radio dial to— Adjust the following for max. peak output—

1. Tuning condenser ratio (osc.) in series with 0.01 mfd. 455 kc Quiet point at 1,600 kc end of dial C1, C2, C3, C4 (1st and 2nd 1-F transformers)

2. Antenna term. of ant. loop in series with 100 mmdm. 1,200 kc Full clockwise (out of mesh) C5 (oscillator)

3. 1,000 kc Resonance on 1,500 kc signal C6 (antenna)

Power Supply Ratings
A-C Rating ................................................. 105-125 volts, 50-60 cycles, 30 watts
D-C Rating ................................................. 105-125 volts, direct current, 30 watts

Power Output (125 volt, 60 cycle supply)
Undistorted Maximum ................................. .6 watts 2.0 watts

STOCK No.

DESCRIPTION

Transformer—1-F output transformer .......................... 1.05
Volume control .................................................. 1.50
Speaker Assembly .............................................. 3.95
Transformer—Output transformer .............................. 1.25

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Compliments of www.nucow.com
**Precautionary Lead Dress**

1. Red lead from second 1F transformer to screen terminal of 1N5-G must be dressed close to and along edge of chassis.
2. Twisted green wire from antenna coil to gang must be 9 turns and kept clear of rotor.
3. Blue and green leads to volume control must be dressed close to chassis and between gang coil and front apron.
4. The opening in the shield of the 1N5-G should be turned away from the chassis and the 1F transformers.
5. Antenna and ground wires should be twisted together.

**CV-40**

- **Rectifier**: RCA-5U4-G
- **Plug-in Resistor**: WW48, Stock No. 54563
- **Power Output (Battery Operation)**: Unaltered
  - Maximum watt: 0.25 watt
- **Transformer Type**: Permanent Magnet Dynamic Diameter: BK41, 8 inches; BT41, 5 inches
- **Voice Coil Impedance**: BK41, 4 ohms; BT41, 5 ohms at 400 cycles

**Battery Required**

- Combination 11 volt-90 volt A-B Pack

**Current Consumption**

- "A" at 1.4 volts, 0.25 amp.
- "B" at 9 volts, 0.4 ma.

**A-C Operation**

- Use of power unit CV-40 with either Model BK41 or BT41 adapts receiver for A-C operation.

**Schematic Diagram—Model CV-40**

- **Steps**
  - Connect the high side of oscillator to...
  - **Turn ratio dial to...**
  - Adjust the following for max. peak output
  - **1** 1N5-G I-F grid cap, in series with 0.01 mfd.
  - **2** 1AT-G det. grid cap in series with 0.01 mfd.
  - **3** Antenna lead, in series with 500 mfd.
  - **4** Antenna lead, in series with 500 mfd.

- **Trimmer C16 on gang condenser should be unscrewed one complete turn from tight, before adjusting C15.**

- **Cathode-ray Alignment** is the preferable method. Connections for the oscillograph are as follows: Vertical "Hi" to E on the 2nd I-F transformer, Vertical "O" to chassis.

- **Output Meter Alignment**—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

- **Pre-setting Dial**—With gang condenser in full mesh, the pointer should be horizontal.
RCA MFG. CO., INC.

MODEL BT42, Chassis RC406A
Schematic, Voltage, Socket Alignment, Trimmers Lead Dress

--- 1939 No. 32 ---

General Description

The RCA Victor Model BT-42 is a table type battery operated radio receiver.

Features of design include: On and off "Economy" Blinker; 4 RCA 1.4 volt low drain tubes; large horizontal dial; magnetite core transformers; automatic volume control; 15 to 1 tuning ratio; 5" permanent magnet speaker, and an available converter unit (CV40) to convert the receiver to 110 volt AC operation.

Electrical and Mechanical Specifications

Frequency Range: 540-1720 kc
Intermediate Frequency: 465 kc
RCA Tube Complement:
(1) RCA-1AT-G
(2) RCA-1HS-G
(3) RCA-1IS-G
(4) RCA-1QS-G

Alignment Procedure

Output Meter Alignment—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test Oscillator—For all alignment operations, keep the output as low as possible to avoid a-c v-c action.

Presetting Dial—With the gang condenser fully out of mesh, the indicator should point to the extreme right (high frequency) mark on the dial scale.

CAUTION—When ready to install or replace batteries or tubes or to make any repairs or changes, be sure to turn off power switch.

<table>
<thead>
<tr>
<th>Steps</th>
<th>Connect the high side of test oscillator to</th>
<th>Tune test-osc. to</th>
<th>Turn radio dial to</th>
<th>Adjust the following for max. peak output</th>
<th>BATTERIES REQUIRED: 1 &quot;A&quot;—&quot;B&quot; Pack (Eveready No. 748 or equivalent).</th>
<th>CURRENT CONSUMPTION: &quot;A&quot; 0.24 ampere—&quot;B&quot; 10 miliamperes.</th>
<th>POWER OUTPUT: Undistorted 0.15 watt, Maximum 0.25 watt</th>
<th>LOUDSPEAKER: 5-inch permanent-magnet dynamic Voice-coil Impedance 3.3 ohms at 400 cycles</th>
<th>Cabinet Dimensions (inches): Height 92, Width 173, Depth 92</th>
<th>Weight: Shipping weight 16 pounds</th>
<th>Tuning Drive Ratio: 15 to 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1A7G 1st-Det. grid condenser series with .01 mfd.</td>
<td>465 kc</td>
<td>Quiet point at End of Dial</td>
<td>C5, C9, C10, C11, C8 (1st and 2nd I-F transformers)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Antenna lead (blue) to series with 100 mfd.</td>
<td>600 kc</td>
<td>C5 (oscillator)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Antenna lead (blue) to series with 100 mfd.</td>
<td>1,500 kc</td>
<td>L1 (antenna)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Antenna lead (blue) to series with 100 mfd.</td>
<td>1,500 kc</td>
<td>C8 (antenna)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* When adjusting L1 (antenna), trimmer C3 should be in a minimum capacity position (unscrewed).

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**General Description**

The crystal pickup in Model VA-20 is connected through a volume control to grid No. 1 in an RCA-6A8 tube which functions as a modulated-rc oscillator. The oscillator frequency can be adjusted from 550 to 625 kc by means of a magnetic core in the oscillator transformer, L1-L2. (This is a screwdriver adjustment at the rear of the cabinet.) An output wire is connected to the grid circuit of the oscillator, and it is run parallel with the power cable. The output is sufficient to permit operation within approximately 20 feet of the valve.

**Electrical and Mechanical Specifications**

**FREQUENCY RANGE**
- 550-625 kc

**TUBE COMPLEMENT**
- RCA-6A8
- 12Al, 12AU7, 12AX7

**POWER SUPPLY RATINGS**
- A, 105-125 volts, 60 cycles, 50 watts
- B, 105-125 volts, 50 cycles, 50 watts

**Motor**
- Synchronous (Manual Starting)
- Turntable Speed: 78 r.p.m.

**Pickup**
- Crystal
- Pickup Impedance: 100,000 ohms at 1000 cycles
- Average Output Voltage: 0.05 volts at 1000 cycles with 250,000 ohm load.

**Cabinet Dimensions**
- Height: 32 inches
- Width: 18 inches
- Depth: 16 inches
- Over-all Height: 18 inches
- Turntable Diameter: 7 inches
- Weight: 91 lbs.

**Set-Up Procedure**

1. Insert plug in power supply outlet, and turn the power-switch—volume control knob on top of VA-20 to full clockwise position. Start record on the VA-20. The motor is a synchronous manual-starting type, and requires a clockwise spin to start.
2. Tune the radio receiving set to a quiet point between 550, 625 kc.
3. Adjust the radio volume control for the highest volume that is likely to be required, and then use the VA-20 volume control for further adjustment.
4. In noisy locations, it may be desirable to leave the VA-20 volume control turned full clockwise, and regulate the volume control for the desired level.
5. If there is insufficient volume, or excessive noise, the remedy is to couple the VA-20 to the radio receiver, by running a piece of insulated wire between the two units; Wrap one end of (three or four turns) around the sphere lead to the radio, and wrap the other end (three or four turns) around the short wire that projects from the plug on the power cord or VA-20. With an RCA Master Antenna, wrap the wire around the counter-poise lead where it attaches to the receiver (terminal A) or to the coupling unit (terminal B).
6. If the radio receiver has push-button tuning, one of the buttons may be set up to tune in the VA-20 oscillator frequency. This button should be marked "Record Player."

**Motor Data**

Smooth starting and running will be insured by keeping the bearings well cleaned and oiled.

Hum and Vibration—A small amount of hum when starting, decreasing to negligible amount when running, is normal. If excessive vibration occurs, it may be due to:
- Insufficient lubrication, or any failure that will cause binding.
- Leaether washer not oiled. (Check to make sure that the leather washer is below the steel washer.)
- Motor not properly supported from motor board.
- Burns on poles of rotor or stator. Remove with fine emery cloth.

The damper spring must fit without binding or chattering in the slot in the stator. The stator must be free to deflect in either direction between the limits of the damper spring. The damper spring must exert approximately equal force in restoring the stator to its mid-position when the stator is deflected manually in either direction.

**Precautionary Lead Dress**

1. The power supply cord must be dressed between chassis and top of cabinet, away from grid of 6A8, and entirely away from 2526-G.
2. All leads to oscillator coil must be as short as possible.
3. All motor leads must be dressed away from rotor.
4. Pickup leads must be dressed away from the top grid of 6A8, and kept away from the 2526-G.

**50-Cycle Motor Coil Assembly and Connections**

D-C resistance of each coil:
- 105-125 volts, 60 cycles: 30 ohms
- 105-125 volts, 50 cycles: 40 ohms
Alignment Procedure

Output Meter Alignment. — If this method is used, connect the output meter across the voice coil, and turn the receiver volume control to maximum.

Test Oscillator. — For all alignment operations, keep the oscillator output as low as possible to avoid a-c action.

Calibration Marks. — The tuning dial is fastened in the cabinet and cannot be used for reference during alignment. Therefore calibration marks have been stamped in the plate on the front of the chassis as shown in the accompanying drawing. These marks are used for reference during alignment.

Dial Indicator Adjustment. — With the gang condenser in full mesh, the indicator should point to the extreme left (low frequency) mark on the dial scale.

<table>
<thead>
<tr>
<th>Steps</th>
<th>Connect test-osc. output to</th>
<th>Tune test-osc. to</th>
<th>Turn radio dial to</th>
<th>Adjust the following for maximum peak output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1-F grid through 0.1 mfd capacitor and ground</td>
<td>455 kc</td>
<td>Quiet point between 1,720-1,500 kc</td>
<td>L5 and L6 (2nd 1-F trans.)</td>
</tr>
<tr>
<td>2</td>
<td>1st det. grid through 0.1 mfd capacitor and ground</td>
<td>15.2 mc</td>
<td>15.2 mc</td>
<td>L3 and L4 (1st 1-F trans.)</td>
</tr>
<tr>
<td>3</td>
<td>15.2 mc</td>
<td>Rock at 16.5 mc</td>
<td>C-5 antenna while rocking*</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>6.1 mc</td>
<td>6.1 mc</td>
<td>Spacing between leads from &quot;C&quot; band loop to chassis</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Radiation loop consisting of two turns of wire 18 inches in diameter located 4 to 6 feet from receiver</td>
<td>15.2 mc</td>
<td>Rock at 15.2 mc</td>
<td>C-3 antenna while rocking</td>
</tr>
<tr>
<td>6</td>
<td>1,500 kc</td>
<td>1,500 kc</td>
<td>C-34 antenna</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>600 kc</td>
<td>Rock at 600 kc</td>
<td>C-28 oscillator</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>1,500 kc</td>
<td>1,500 kc</td>
<td>C-34 antenna</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>600 kc</td>
<td>1,500 kc</td>
<td>C-28 oscillator</td>
<td></td>
</tr>
</tbody>
</table>

When making adjustments 4 to 9 inclusive the chassis must be in the cabinet, both loops connected, and all leads in their normal positions. When mounting chassis in cabinet if calibration marks on dial plate do not line up with dial scale mounted on cabinet move pointer to agree with dial scale on cabinet.

* Oscillator should track on high frequency side of signal. If two peaks are obtained use high frequency (minimum capacity) peak.

† If two peaks can be obtained use low frequency (maximum capacity) peak.

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Specifications

**Power Output Rating**
- Undistorted: 10 watts
- Maximum: 12 watts

**Loudspeaker (RL-70K-3)**
- Type: 12-inch electrodynamic
- V.C. Impedance: 2.2 ohms at 400 cycles

**Power Supply Ratings (U-20)**
- A-6: 105-125 volts, 60 cycles, 137 watts
- A-5: 105-125 volts, 50 cycles, 137 watts
- B-2: 105-125 volts, 25 cycles, 137 watts
- C-6: 105-130/140-160/200-250 volts, 60 cycles, 137 watts
- C-5: 105-130/140-160/200-250 volts, 50 cycles, 137 watts

**Phonograph**
- Type: Automatic
- Record Capacity: Eight 10-inch or seven 12-inch

**Frequency Ranges**
- Standard Broadcast: 540-1,550 kc
- Medium Wave: 1,540.0 mc
- Short Wave: 5,8-18.0 mc
- Intermediate Frequency: 455 kc
Adjustments for Push-Button Tuning

The push-buttons should be adjusted for six favorite stations after the receiver has been operating for a brief warm-up period. Each button may be set up to any standard broadcast station. The preferable arrangement is to adjust for stations in the order of frequency, from low to high. Proceed as follows:

1. Remove station marker tabs; reach through tab holes in escutcheon with small screwdriver and loosen push-button rods.
2. Set the radio-phono-televison switch to "radio" position and accurately tune in the station for which the first button is to be set.
3. Press in push-button rod No. 1 with the screwdriver, as far as it will go without undue pressure, hold in, retune station with manual control if necessary for best reception, and then carefully tighten up the rod. Do not tighten more than 1/4 turn after the rod begins to grip or damage to the mechanism may result.
4. Proceed in a similar manner for the remainder of the push-buttons.
5. Insert the station marker tabs in the recesses adjacent to the push-buttons.
Antennas

This receiver is equipped with two loop antennas ("C" band horizontal and fixed, and "A" and "B" band vertical, shielded, and rotatable). During installation the "A" and "B" band loop should be rotated to the position giving maximum signal strength and freedom from noise. If desired, an outside antenna and ground can be connected to the terminals provided and when this is done the link between these terminals must be opened. However, for loop operation this link must be closed. If such an antenna is used it should be approximately 100 feet long.

Alignment Procedure

Before proceeding with alignment the following lead dress should be carefully checked:
1. A.C. leads at volume control dressed away from audio leads.
2. C-29 dressed close to chassis.
3. C-48 dressed under volume control.
4. Dress C-44 and 6P6 plate leads away from antenna leads.
5. Leads to phono and television jacks dressed close to end of chassis.
6. Red lead from R.F. coil to range switch short and direct as possible.
7. Leads to loop sockets dressed away from chassis and other leads.
8. Green lead from volume control arm to A.F. grid close to chassis.

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the chassis wiring drawing.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For all alignment operations, keep the six steps in alignment the low side of the test-oscillator should output as low as possible to avoid a-c action. For the first step, the signal must be radiated (see alignment table).

Calibration Scale on Indicator-Drive-Cord Drum.—The tuning dial is fastened in the cabinet and cannot be used for reference during alignment; therefore, a calibration scale is attached to the tuning drum. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

As the first step in alignment, check the position of the drum. The 240° mark on the drum scale must be vertical and directly above the center of the shaft of the tuning drum when the plates are fully meshed. The drum is held to the shaft by means of two set-screws, which must be tightened securely when the drum is in the correct position.

On the inner side of the tuning drum are two projections which serve as stops to prevent extreme rotation of the gang condenser. The tuning drum should be set so that the stop limiting clockwise movement of the drum takes effect just as the gang condenser plates are becoming fully meshed, thus preventing stress on the gang due to extreme rotation.

Point for Calibration Scale.—Improve a pointer for the calibration scale by fastening a piece of wire to the chassis, and bend the wire so that it points to the 240° mark on the calibration scale when the plates are fully meshed.

<table>
<thead>
<tr>
<th>Steps</th>
<th>Connect the high side of the test-osc to—</th>
<th>Tune test-osc to—</th>
<th>Turn radio dial to—</th>
<th>Adjust the following for maximum peak output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6SK7 1-F grid in series with .01 mfd.</td>
<td>455 kc</td>
<td>&quot;A&quot; band Quiet point near 600 kc</td>
<td>L10 and L11 (2nd 1-F trans.)</td>
</tr>
<tr>
<td>2</td>
<td>6SA7 det. grid in series with .01 mfd.</td>
<td></td>
<td>15.2 mc</td>
<td>L8 and L9 (1st 1-F trans.)</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td>15.2 mc (47&quot;)</td>
<td>C14 (osc.)*** C11 (det.)*</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td>3.44 mc (57&quot;)</td>
<td>C16 (osc.)** C7 (det.)</td>
</tr>
<tr>
<td>5</td>
<td>6SK7 R-F grid in series with .01 mfd.</td>
<td>600 kc</td>
<td>600 kc (300&quot;)</td>
<td>L7 (osc.) Rock gang</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td>1,500 kc (28&quot;)</td>
<td>C18 (osc.) C8 (det.)</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td>15.2 mc</td>
<td>C4 (ant.)</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td>6.1 mc</td>
<td>Inductance of &quot;C&quot; band loop†</td>
</tr>
<tr>
<td>9</td>
<td>Radiation loop consisting of two turns of wire 18 inches in diameter located 4 to 6 feet from receiver</td>
<td>Repeat step 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>3.44 mc</td>
<td>3.44 mc</td>
<td>C2 (ant.)</td>
</tr>
<tr>
<td>11</td>
<td></td>
<td>1,500 kc</td>
<td>1,500 kc</td>
<td>C3 (ant.)</td>
</tr>
<tr>
<td>12</td>
<td></td>
<td>600 kc</td>
<td>600 kc</td>
<td>L7 (osc.) Rock gang</td>
</tr>
<tr>
<td>13</td>
<td></td>
<td>1,500 kc</td>
<td>1,500 kc</td>
<td>C18 (osc.) C8 (det.)</td>
</tr>
</tbody>
</table>

Note.—For steps 7 to 13 inclusive the chassis must be in the cabinet, all loop leads connected and in their normal positions. The dual indicator pointer must be fastened to the drive cord in such a position that it is at the 330 kc mark on "A" scale when the gang condenser plates are fully meshed.

* Use maximum capacity peak if two can be obtained. Check to determine that C14 has been adjusted to the correct peak by tuning the receiver to approximately 14.29 mc where a weaker signal should be received.

** Use minimum capacity peak if two can be obtained. Check to determine that C16 has been adjusted to the correct peak by tuning the receiver to approximately 2.53 mc where a weaker signal should be received.

*** Use maximum capacity peak if two peaks can be obtained and rock gang condenser while adjusting.

† Adjust the inductance of "C" band loop by varying the spacing between the leads of the loop. Moving the leads closer together decreases the inductance and tunes the loop to a higher frequency; moving the leads farther apart increases the inductance and tunes the loop to a lower frequency.

Important.—The oscillator tracks above the signal on all bands.

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Adjustments for Push-Button Tuning

The push-buttons should be adjusted for six favorite stations after the receiver has been operating for a brief warm-up period. Each button may be set up to any standard broadcast station. The preferable arrangement is to adjust for stations in the order of frequency, from low to high. Proceed as follows:

1. Remove station marker tabs; reach through tab holes in escutcheon with small screwdriver and loosen push-button rods.

2. Set the radio-phono switch to “radio” position and accurately tune in the station for which the first button is to be set.

3. Press in push-button rod No. 1 with the screwdriver, as far as it will go without undue pressure, hold in, return station with manual control if necessary for best reception, and then carefully tighten up the rod. Do not tighten more than 1/4 turn after the rod begins to grip or damage to the mechanism may result.

4. Proceed in a similar manner for the remainder of the push-buttons.

5. Insert the station marker tabs in the recesses adjacent to the push-buttons.

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Alignment Procedure

As the first step in rf alignment, check the position of the drum. The 240° mark on the drum scale must be vertical and directly above the center of the shaft of the tuning drum when the plates are fully meshed. The drum is held to the shaft by means of two set-screws, which must be tightened securely when the drum is in the correct position.

On the inner side of the tuning drum are two projections which serve as stops to prevent extreme rotation of the gang condenser. The tuning drum should be set so that the stop limiting clockwise movement of the drum takes effect just as the gang condenser plates are becoming fully meshed, thus preventing stress on the gang due to extreme rotation.

Pointing for Calibration Scale.—Improvise a pointer for the calibration scale by fastening a piece of wire to the chassis, and bend the wire so that it points to the 240° mark on the calibration scale when the plates are fully meshed.

Controls

Cathode-Ray Alignment is the preferable method. Connections for theoscillograph are shown in the chassis wiring drawing.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For all alignment operations, keep the output as low as possible to avoid a-c action. For the first six steps in alignment the low side of the test-oscillator should be connected to the receiver chassis. Following step 6, the signal must be radiated (see alignment table).

Calibration Scale on Indicator-Drive Cord Drum. —The tuning dial is fastened in the cabinet and cannot be used for reference during alignment; therefore, a calibration scale is attached to the tuning drum. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

<table>
<thead>
<tr>
<th>Steps</th>
<th>Connect the high side of the test-osc. to—</th>
<th>Tune test-osc. to—</th>
<th>Turn radio dial to—</th>
<th>Adjust the following for maximum peak output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6SK7 I-F grid in series with .01 mfd.</td>
<td>466 kc</td>
<td>&quot;A&quot; band</td>
<td>L10 and L11 (2nd I-F trans.)</td>
</tr>
<tr>
<td>2</td>
<td>6SK7 det. grid in series with .01 mfd.</td>
<td></td>
<td>Quiet point near 600 kc</td>
<td>L8 and L9 (1st I-F trans.)</td>
</tr>
<tr>
<td>3</td>
<td>6SK7 R-F grid in series with .01 mfd.</td>
<td>15.2 mc</td>
<td>&quot;C&quot; band</td>
<td>C14 (osc.)***</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>15.2 mc (47°)</td>
<td>&quot;C&quot; band</td>
<td>C11 (det.)***</td>
</tr>
<tr>
<td>5</td>
<td>3.44 mc</td>
<td>3.44 mc (57°)</td>
<td>&quot;B&quot; band</td>
<td>C16 (osc.)**</td>
</tr>
<tr>
<td>6</td>
<td>600 kc</td>
<td>600 kc (200°)</td>
<td>&quot;A&quot; band</td>
<td>C7 (det.)</td>
</tr>
<tr>
<td>7</td>
<td>1,500 kc</td>
<td>1,500 kc (22°)</td>
<td>&quot;A&quot; band</td>
<td>L7 (osc.) Rock gang</td>
</tr>
<tr>
<td>8</td>
<td>6.1 mc</td>
<td>6.1 mc</td>
<td>&quot;C&quot; band</td>
<td>C18 (osc.)</td>
</tr>
<tr>
<td>9</td>
<td>Radiation loop consisting of two turns of wire 18 inches in diameter located 4 to 6 feet from receiver</td>
<td>15.2 mc</td>
<td>&quot;C&quot; band</td>
<td>C8 (det.)</td>
</tr>
<tr>
<td>10</td>
<td>Repeat step 7</td>
<td>3.44 mc</td>
<td>&quot;B&quot; band</td>
<td>C2 (ant.)</td>
</tr>
<tr>
<td>11</td>
<td>1,500 kc</td>
<td>1,500 kc</td>
<td>&quot;A&quot; band</td>
<td>C3 (ant.)</td>
</tr>
<tr>
<td>12</td>
<td>600 kc</td>
<td>600 kc</td>
<td>&quot;A&quot; band</td>
<td>L7 (osc.) Rock gang</td>
</tr>
<tr>
<td>13</td>
<td>1,500 kc</td>
<td>1,500 kc</td>
<td>&quot;A&quot; band</td>
<td>C18 (osc.)</td>
</tr>
</tbody>
</table>

Note.—For steps 7 to 13 inclusive the chassis must be in the cabinet, all loop leads connected and in their normal positions. The dial indicator pointer must be fastened to the drive cord in such a position that it is at the 530 kc mark on "A" scale when the gang condenser plates are fully meshed.

* Use minimum capacity peak if two can be obtained. Check to determine that C14 has been adjusted to the correct peak by tuning the receiver to approximately 14.29 mc where a weak signal should be received.

** Use minimum capacity peak if two can be obtained. Check to determine that C16 has been adjusted to the correct peak by tuning the receiver to approximately 2.53 mc where a weaker signal should be received.

*** Use maximum capacity peak if two peaks can be obtained and rock gang condenser while adjusting.

† Adjust the inductance of "C" band loop by varying the spacing between the leads of the loop. Moving the leads closer together decreases the inductance and tunes the loop to a higher frequency; moving the leads farther apart increases the inductance and tunes the loop to a lower frequency.

Important.—The oscillator tracks above the signal on all bands.

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Features of design include: New Type single-ended tube (125A7, 125K7, and 125Q7); edge-lighted dial; dust proof electrodynamic loudspeaker; and Beam Power Output.

Electrical and Mechanical Specifications

**FREQUENCY RANGE**

540-1,600 kc

Intermediate Frequency

455 kc

**TUBES COMPLEMENT**

1. RCA-125A7 - 1st-Detector-Oscillator
2. RCA-125K7 - 2nd-Detector, 1st A-F., and A.V.C.
3. RCA-50L6GT - Power Output
4. RCA-85ZSTG - Half-Wave Rectifier

**Dial Lamp** (1) - Mazda 51, 7.5 volts, 0.2 amp.

**POWER SUPPLY RATINGS**

A.C. Rating - 105-125 volts, 50-60 cycles, 30 watts

D.C. Rating - 105-125 volts, direct current, 30 watts

**POWER OUTPUT** (125 volt, 60 cycle supply)

Undistorted - 1.0 watts

Maximum - 1.25 watts

**LOUDSPEAKER**

Type - 4-inch Electrodynamic

Cabinet Dimensions (inches) - Height 8-1/16, Width 8-1/4, Depth 4-1

Weight (net) - 4 pounds

**Alignment Procedure**

Output Meter Alignment - Connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator - For I.F. alignment, connect the low side of the test-oscillator to the receiver chassis through a .01 mfd. capacitor, and keep the output as low as possible.

Pre-Setting Dial - With gang condenser in full mesh, the pointer should be adjusted so that it is vertical.

Antenna - The set is equipped with length of antenna wire. Do not connect the antenna to ground. If an outdoor antenna is used, it should not be longer than 100 feet, including lead-in. If it is longer, connect a 100 to 300 mmd. capacitor in series with the lead-in.

Power-Supply Polarity - For operation on d-c, the power plug must be inserted in the outlet for correct polarity. If the set does not function, reverse the plug. On a-c, reversal of the plug may reduce hum.

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RCA MFG. CO., INC.

Alignment, Trimmers
Socket, Lead Dress

Pre-Setting Dial—With ganged condenser in full mesh, the pointer should be adjusted so that pointer is vertical.

Antenna—The set is equipped with a built-in loop antenna. If an outdoor antenna is used, it may be connected to the "ANT" terminal on rear of cabinet. It should not be longer than 100 feet, including lead-in. If it is longer, connect a 100 to 200 mfd. capacitor in series with the lead-in.

Power-Supply Polarity—For operation on d-c, the power plug must be inserted in the outlet for correct polarity. If the set does not function, reverse the plug. On a-c, reversal of the plug may reduce hum.

<table>
<thead>
<tr>
<th>Steps</th>
<th>Connect the high side of test oscillator to</th>
<th>Tune test oscillator to</th>
<th>Turn radio dial to</th>
<th>Adjust the following for max. peak output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>12S07 (1-P) grid in series with .01 mfd.</td>
<td>455 kc</td>
<td>C8, C9 (2nd 1-P trans.)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Tuning condenser (ant.) in series with .01 mfd.</td>
<td></td>
<td>C6, C7 (1st 1-P trans.)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Radiation loop consisting of two turns of wire 15 inches in diameter</td>
<td>1,600 kc</td>
<td>C3 (oscillator)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>1,400 kc</td>
<td>C1 (antenna)</td>
<td></td>
</tr>
</tbody>
</table>

Power Supply Ratings:
- A-C Rating: 105-125 volts, 60 cycles, 30 watts
- D-C Rating: 105-125 volts, direct current, 5 watts

Power Output (125 volt, 60 cycle supply)
- Undistorted: 1.0 watts
- Maximum: 1.5 watts

Precautionary Lead Dress

1. Audio coupling capacitor to volume control must be dressed under the terminal board and down against the corner of the chassis.
2. The voice coil leads from the output transformer to the speaker must be dressed away from the terminal on the terminal-board to which the voice coil is connected.
3. The output tube bypass condenser must be dressed away from the 12S07 tube.

SPEAKER ASSEMBLIES (39022-5)
- Cone—Cone complete with voice coil
- Transformer—Output transformer

SPEAKER ASSEMBLIES (KL 86-2)
- Cone—Cone complete with voice coil
- Speaker—5-inch dynamic speaker complete with cone and voice coil less output transformer

Compliments of www.nucow.com
R-F Wiring Diagram and Socket Voltages

LOUDSPEAKER (RL-76B-5)
Type ........................................ 12-inch electrodynamics
V.C. Impedance .......................... 11.5 ohms at 400 cycles

POWER SUPPLY RATINGS K-130 (U-46, 50 watts additional)
Rating A ................................... 105-125 volts, 50-60 cycles, 200 watts
Rating B ................................... 105-125 volts, 25-60 cycles, 200 watts
Rating C ................................... 105-130, 140-160, 200-250 volts,
                                    40-60 cycles, 200 watts

PILOT LAMPS .......................... Mazda No. 44, 6.3 volts, 0.25 amp.
                                Mazda No. 47, 6.3 volts, 0.15 amp.

POWER OUTPUT RATING
Undistorted .......................... 20 watts
Maximum ................................ 22 watts

PHONOGRAPH (Model U-46 only)
Type ........................................ Automatic
Record Capacity ......................... Eight 10-inch or Seven 12-inch
Turntable Speed ......................... 78 r.p.m. (Adjustable)
Type Pickup .......................... Crystal
Pickup Impedance ..................... 100,000 ohms at 1,000 cycles
Compliments of www.nucow.com
FOR ADJUSTMENTS, NOTES AND SERVICE DATA, SEE MODEL RP-139-A

Details of Record Shelf Posts and Lever Assemblies

Motor Data and Coupling

Bottom View of Automatic Record Changer

NOTE: Numbers refer to parts—letters refer to adjustments.
Features of design include: New type single-ended tubes (12SK7, 12SKT, and 12SQ7); clock-type dial; dust-proofed electrolytic loudspeaker; "Magic Loop"; and Beam Power Output.

Electrical and Mechanical Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>Weight (shipping)</th>
<th>Description</th>
<th>Cabinet Dimensions (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>45X111</td>
<td>8.1 lbs</td>
<td>Mahogany plastic finish</td>
<td>6 19/32 x 9 25/32 x 5 1/2</td>
</tr>
<tr>
<td>45X112</td>
<td>8.1 lbs</td>
<td>Antique-ivory plastic finish</td>
<td>5 19/32 x 9 25/32 x 5 1/2</td>
</tr>
<tr>
<td>45X118</td>
<td>10 lbs</td>
<td>Walnut finish</td>
<td>6 1/4 x 10 1/2 x 6 5/16</td>
</tr>
</tbody>
</table>

Alignment Procedure

Output Meter Alignment.—Connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For I-F alignment, connect the low side of the test-oscillator to the receiver chassis through a .01 mfd. capacitor, and keep the output as low as possible.

Pre-Setting Dial.—With gang condenser in full mesh, the pointer should be adjusted so that it is vertical.

Antenna.—The set is equipped with a built-in loop antenna. If an outdoor antenna is used, it may be connected to the "ANT" terminal on rear of cabinet. It should not be longer than 100 feet, including lead-in. If it is longer, connect a 100 to 200 mfd. capacitor in series with the lead-in.

Power-Supply Polarity.—For operation on d-c, the power plug must be inserted in the outlet for correct polarity. If the set does not function, reverse the plug. On a-c, reversal of the plug may reduce hum.
Schematic, Voltage, Socket Trimmers, Alignment

Lead Dress

Pre-Setting Dial.—With gang condenser in full mesh, the pointer should be adjusted so that it is vertical.

Antenna.—The set is equipped with a built-in loop antenna. If an outdoor antenna is used, it may be connected to the "ANT" terminal on rear of cabinet. It should not be longer than 300 feet, including lead-in. If it is longer, connect a 100 to 200 memf. capacitor in series with the lead-in.

STOCK No. | DESCRIPTION | Unit List Price
--- | --- | ---
35065 | Cone—Cone complete with voice coil | 1.20
34174 | Transformer—Output transformer | 1.25
32907 | Cap—Dust cap | 0.02
35086 | Cone—Cone complete with voice coil | 1.30
34450 | Speaker 5" dynamic speaker complete with voice coil less output transformer | 3.25
35000 | Ballast—Ballast tube resistor | 0.80
13507 | Capacitor—68 memf. (C5) | 0.35
13694 | Capacitor—220 memf. (C11, C18) | 0.25
49077 | Capacitor—0.005 memf. (C14) | 0.25
11316 | Capacitor—0.15 memf. (C17) | 0.20
30938 | Capacitor—0.05 memf. (C17) | 0.20
30939 | Capacitor—0.05 memf. (C14, C18) | 0.20
34055 | 0.3 memf. | 0.30
12484 | Capacitor—0.25 memf. (C6) | 0.30
34443 | Electrolytic comprising 1 section of 20 memf. and 1 section of 12 memf. | 0.70
34443 | Condenser—Variable tuning condenser less drive drum | 2.00
35057 | Control—Control volume control and power switch | 1.00
32624 | Cord—Tuning condenser drive cord | 0.10
35053 | Condenser—Tuning condenser drive drum | 0.50
35082 | Indicator—Station selector indicator | 0.20

Precautionary Lead Dress

1. Dress grid lead of 12SK7 close to chassis under condenser (C15).
2. Dress green and blue leads from i-f transformers close to chassis and away from each other.
3. Dress leads from terminal board on loop support away from loop.

STOCK No. | DESCRIPTION | Unit List Price
--- | --- | ---
31480 | Lamp—Dial lamp | 0.30
35061 | Loop—Antenna loop complete | 1.95
12071 | Resistor—120 ohms, 1/2 watt (R13) | 0.30
32535 | Resistor—120 ohms, 1 watt (R9) | 0.30
12998 | Resistor—20,000 ohms, 1 watt (R1) | 0.20
5342 | Resistor—47,000 ohms, 1 watt (R3) | 0.20
12981 | Resistor—100,000 ohms, 1/2 watt (R16) | 0.15
12644 | Resistor—220,000 ohms, 1/2 watt (R2) | 0.20
12645 | Resistor—220,000 ohms, 1 watt (R3) | 0.20
12679 | Resistor—5.2 megohms, 1/2 watt (R4) | 0.20
13601 | Resistor—10 megohms, 1/4 watt (R6) | 0.20
33504 | Resistor—Ballast tube resistor | 0.60
35060 | Scale—Dial scale | 0.65
31058 | Shaft—Tuning condenser drive shaft | 0.10
14449 | Socket—Dial lamp socket | 0.30
31319 | Socket—Tube socket | 0.25
35068 | Spring—‘Drive and spring | 0.06
35006 | Transformer—Output transformer | 1.30
35054 | Transformer—1st I.F. transformer | 1.75
35055 | Transformer—2nd I.F. transformer | 1.75
35000 | Tube—Ballast tube resistor | 0.80

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MODEL 6X21, 46X21, 46X24.

RCA MFG. CO., INC.

Chassis RC461
Schematic, Voltage Alignment, Trimmers
Socket lead Dress

-1940 No. 6-

Specifications

Frequency Ranges: 550-1,550 kc and 6-18 mc

**PUSH BUTTON RANGES (Model 46X24 only)**

1. Approximately 840-945 kc
2. Approximately 880-1,020 kc
3. Approximately 900-1,120 kc
4. Approximately 760-1,440 kc
5. Approximately 990-1,980 kc

Intermediate Frequency: 455 kc

**POWER OUTPUT RATING**

Undistorted: 1.1 watts
Maximum: 1.4 watts

** Loudspeaker (RL81A1)**

Type: 5-inch permanent magnet dynamic Voice Coil Impedance at 400 cycles: 45 ohms

**POWER SUPPLY RATINGS**

A-C Rating: 105-125 volts, 50-60 cycles, 50 watts
D-C Rating: 105-125 volts, direct current, 50 watts

Adjustments for Electric Tuning:

1. List five desired stations in order of the push button ranges.
2. Push in the push tuning (right hand) button and manually tune the first station on the list.
3. Press button No. 1. Turn A-F screw half way in; next turn the oscillator screw entirely in and then gradually back out until the station is heard.
4. Adjust the R-F trimmer for maximum output.
   (Clockwise adjustment of oscillator and R-F trimmers tunes the circuits to lower frequencies.)
5. By turning the set to a position in which reception is weak a final more accurate adjustment may be made.
6. Adjust for each of the remaining stations in a similar manner and place corresponding station tabs in recess above buttons. A "Dial Tuning" tab should be above button No. 6.

Precautionary Lead Dress:

1. Dress all leads away from oscillator and antenna coils.
2. Dress cathode resistor (R4) and B+ lead across 12SK7 socket between plate and grid terminals.
3. (46X24 only) Dress leads to push button switch straight up and parallel so that they do not touch each other.
4. Dress black lead from 1st F transformer over green lead.
5. Keep plate-cathode bias (C43) of rectifier tube away from volume control.

Alignment Procedure

**Output Meter Alignment.** Connect the meter across the voice coil, and turn the receiver volume control to maximum.

**Test-Oscillator.** Connect the low side of the test-oscillator to the receiver chassis through a .01 mfd. capacitor, and keep the output as low as possible.

**Pre-Setting Point.** With gang condenser in full mesh, the pointer should be adjusted to a horizontal position.

**Antenna.** The set is equipped with a built-in loop antenna. If the loop antenna is used, the antenna terminal board link should be closed. This link should be open when an external antenna is used. Connect the external antenna to terminal 1. If the antenna longer than 100 feet (including lead-in) is used, connect a 100 to 200 mfd. capacitor in series with the lead-in.

**Power-Supply Polarity.** For operation on d-c, the power plug must be inserted in the outlet for correct polarity. If the set does not operate, reverse the plug. On a-c, reversal of the plug may reduce hum.

<table>
<thead>
<tr>
<th>Step</th>
<th>Connect high side of test oscillator to</th>
<th>Tune test oscillator to</th>
<th>Turn radio dial to</th>
<th>Adjust following for max. output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Grid 12SK7 in series with 0.01 mfd.</td>
<td>450 kc</td>
<td>&quot;A&quot; Band Quiet Point at 1,550 kc end of dial</td>
<td>C19 and C29 (2nd 1-F Trans.)</td>
</tr>
<tr>
<td>2</td>
<td>Grid 12SA7 in series with 0.31 mfd.</td>
<td>600 kc</td>
<td>&quot;A&quot; Band 600 kc</td>
<td>C15 (osc.)</td>
</tr>
<tr>
<td>3</td>
<td>Antenna in series with 200 mfd.</td>
<td>1,400 kc</td>
<td>&quot;A&quot; Band Full Clockwise</td>
<td>C8 (osc.)</td>
</tr>
<tr>
<td>5</td>
<td>Antenna in series with 300 ohms</td>
<td>1,400 kc</td>
<td>&quot;A&quot; Band 1,400 kc</td>
<td>C6 (ant.)</td>
</tr>
<tr>
<td>6</td>
<td>Repeat steps 3 (rock in), 4 and 5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Antenna in series with 300 ohms</td>
<td>18.5 kc</td>
<td>&quot;C&quot; Band Full Clockwise</td>
<td>C17 (osc.)*</td>
</tr>
<tr>
<td>8</td>
<td>Antenna in series with 300 ohms</td>
<td>17.8 kc</td>
<td>&quot;C&quot; Band Resonance on 17.8 kc Signal</td>
<td>C3 (ant.)</td>
</tr>
<tr>
<td>9</td>
<td>Repeat steps 7 and 8</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Use minimum capacity peak if two can be obtained.

Note: Oscillator tracks above signal on all bands.

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Precautionary Lead Dress—
1. Power cord leads must be dressed up away from 6SQ7 socket, and toward end of chassis.

2. Green lead 2nd I.F. to 6SQ7 must be dressed against base.

3. Blue lead 2nd I.F. to 6SK7 must be dressed close to base.

4. Green and blue leads from 1st I.F. transformer must be dressed close to base.

5. Capacitor from volume control center tap to 6SQ7 socket must be dressed so that its body is between AC terminal on control and opening in chassis for gang condenser.

6. Red lead from “L” terminal on antenna board to 5Y3G socket must be dressed against base.

7. Green lead from gang to 65A7 socket must be dressed toward side apron away from other parts.

ALL PRICES ARE SUBJECT TO CHANGE OR WITHDRAWAL WITHOUT NOTICE.

Steps | Connect the high side of the test-osc. to— | Tune test osc. to— | Turn radio dial to | Adjust the following for maximum peak output
--- | --- | --- | --- | ---
1 | Antenna terminal | 655 kc | Quiet point between 2,700-1,500 kc | C10 and C11 (2nd I.F. trans.)
2 | Antenna terminal | | | C6 and C7 (1st I.F. trans.)
3 | Ant. terminal in series with 909 mfd. | 1,500 kc | 1,500 kc calibration mark | C5 (osc.)
4 | | 500 kc | 600 kc calibration mark | L1 (osc.)
5 | Repeat step 3 | | | Rock in

Note.—Oscillator tracks above signal.

To center the loudspeaker voice coil, first remove the front dust cover then loosen the speaker screws, insert three narrow feelers in the gap, and tighten the speaker screws. Remove the feelers and fasten a dust cover in place with loudspeaker cement.

Dial Indicator Adjustment.—With the gang condenser in full mesh, the indicator should point to the extreme left (low frequency) mark on the dial scale.

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Alignment Procedure

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the volume control to maximum.

Test-oscillator.—For all alignment operations, keep the output as low as possible to avoid a-v-c action.

<table>
<thead>
<tr>
<th>Steps</th>
<th>Correct the high side of test-oscillator to—</th>
<th>Tune test-osc. to—</th>
<th>Turn radio dial to—</th>
<th>Adjust the following for max. peak output—</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1A7GT 1st-Det. grid cap, in series with</td>
<td>455 kc</td>
<td></td>
<td>L2, L3, L4, L7 (1st and 2nd I-F transformers)</td>
</tr>
<tr>
<td>2</td>
<td>.01 mfd.</td>
<td>1,600 kc</td>
<td>1,600 kc</td>
<td>C4 osc.</td>
</tr>
<tr>
<td>3</td>
<td>radiated signal near 800 kc</td>
<td>signal frequency</td>
<td>L1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>radiated signal near 1,400 kc</td>
<td>signal frequency</td>
<td>C3</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>radiated signal near 600 kc</td>
<td>signal frequency</td>
<td>L1</td>
<td></td>
</tr>
</tbody>
</table>

For steps 3, 4, and 5 the chassis must be in the cabinet and the batteries in place and connected. L-1 is then replaced through the small hole in the cabinet which is normally covered by a small plug located farther away from C3 and C-1 is replaced through an eyepin in the speaker-grille. If a broadcast signal is received it should be weak to avoid a-v-c action. Turning loop to minimum pickup....
Note: On some receivers the following circuit modifications are in effect:
1. R11 is 4.700 ohms, and C18 is .05 mfd.
2. C1 is 470 mfd.
3. There are three types of 2nd L-F transformers in use.
a. The first type (Stock No. 14308) has C33 and R5 mounted inside the case, and is connected exactly as shown above.
b. In the second type R5 is omitted and the lead from S4 connects to C instead of E. E is not used.

c. In the third type R5 is omitted and C33 is connected externally from C to ground. E is not used. The lead from the diode plate connects to A instead of B. When replacing this transformer with Stock No. 14308, remove the external C33 and connect the replacement transformer as shown in the above diagram.

Power Output Rating
Undistorted . 2.5 watts
Maximum . . 4.5 watts

Loudspeaker (RL-70H-6)
Type ............... 12-inch electrodynamic
V.C. Impedance ........ 2.2 ohms at 400 cycles

Volts should hold within ± 20% with 17V AC supply. Stopped voltages are operating voltages in circuits with high series resistance. The actual measured voltages will be lower, depending on the voltmeter loading.

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Compliments of www.nucow.com
MODEL K60, Chassis RC415
MODEL K60A, Chassis RC415A
Alignment, Trimmers

Socket

Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscillographs are shown in the chassis drawing.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the output as low as possible to avoid a-c action.

Calibration Scale on Indicator-Drive-Cord-Drum.—The tuning dial is fastened in the cabinet and cannot be used for reference during alignment; therefore, a calibration scale is attached to the tuning drum. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

As the first step in r-f alignment, check the position of the drum. The 180° mark on the drum scale must be vertical and directly under the center of the shaft of the tuning drum when the plates are fully meshed. The drum is held to the shaft by means of two set-screws, which must be tightened securely when the drum is in the correct position.

On the inner side of the tuning drum are two projections which serve as stops to prevent extreme rotation of the gang condenser. The tuning drum should be set so that the stop limiting clockwise movement of the drum takes effect just as the gang condenser plates are becoming fully meshed, thus preventing stress on the gang due to extreme rotation.

Pointer for Calibration Scale.—Improvise a pointer for the calibration scale by fastening a piece of wire to the chassis, and bend the wire so that it rests on the 0° mark on the calibration scale when the plates are fully meshed.

Calibration Scale

Receiver Dial Scales, and Corresponding 0-240° Calibration Scales

The corresponding position of the dial indicator for any setting of the calibration scale can be determined by drawing a line from this point on the bottom calibration scale to the same point on the top calibration scale. For example 39.75° on the calibration scale corresponds to 600 kc on "A" band. Read instructions under "Alignment Procedure."

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### CHASSIS ASSEMBLIES

<table>
<thead>
<tr>
<th>STOCK No.</th>
<th>DESCRIPTION</th>
<th>Unit List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>33620</td>
<td>Arm—Push arm and cam assembly on tuning unit—less lock screw</td>
<td>.35</td>
</tr>
<tr>
<td>33432</td>
<td>Arm—Trip arm and set screw located on range switch shaft</td>
<td>.15</td>
</tr>
<tr>
<td>30744</td>
<td>Cap—Rubber cap for Magic Eye—Model K 60 only</td>
<td>.50</td>
</tr>
<tr>
<td>13714</td>
<td>Capacitor—Air-trimmer, 5-12 mmfd. (C10)</td>
<td>.50</td>
</tr>
<tr>
<td>33429</td>
<td>Capacitor—Trimmer capacitor, 5, 5-50 mmfd. and 3 sections 5-50 mmfd. (C5, C6, C7, C11)</td>
<td>.50</td>
</tr>
<tr>
<td>31971</td>
<td>Capacitor—20 mmfd. (C2)</td>
<td>.50</td>
</tr>
<tr>
<td>13729</td>
<td>Capacitor—66 mmfd. (C12)</td>
<td>.50</td>
</tr>
<tr>
<td>50504</td>
<td>Capacitor—100 mmfd. (C13, C14)</td>
<td>.50</td>
</tr>
<tr>
<td>13446</td>
<td>Capacitor—150 mmfd. (C13, C14, C21)</td>
<td>.50</td>
</tr>
<tr>
<td>13725</td>
<td>Capacitor—180 mmfd. (C23)</td>
<td>.50</td>
</tr>
<tr>
<td>50232</td>
<td>Capacitor—220 mmfd. (C14)</td>
<td>.50</td>
</tr>
<tr>
<td>50505</td>
<td>Capacitor—330 mmfd. (C14)</td>
<td>.50</td>
</tr>
<tr>
<td>21463</td>
<td>Capacitor—550 mmfd. (C7)</td>
<td>.50</td>
</tr>
<tr>
<td>12037</td>
<td>Capacitor—660 mmfd. (C22)</td>
<td>.50</td>
</tr>
<tr>
<td>50405</td>
<td>Capacitor—840 mmfd. (C8)</td>
<td>.50</td>
</tr>
<tr>
<td>31002</td>
<td>Capacitor—1,000 mmfd. (C18)</td>
<td>.50</td>
</tr>
<tr>
<td>50107</td>
<td>Capacitor—2,000 mmfd. (C25)</td>
<td>.50</td>
</tr>
<tr>
<td>48002</td>
<td>Capacitor—4,000 mmfd. (C24, C26, C28, C30, C37)</td>
<td>.50</td>
</tr>
<tr>
<td>4937</td>
<td>Capacitor—0.01 mf. (C38)</td>
<td>.25</td>
</tr>
<tr>
<td>32767</td>
<td>Capacitor—0.02 mf. 400 V. (C17, C34)</td>
<td>.25</td>
</tr>
<tr>
<td>33014</td>
<td>Capacitor—Electrolytic, 3 sections 10 mmfd. one section 50 mmfd. (C16, C17, C18, C31)</td>
<td>.25</td>
</tr>
<tr>
<td>34026</td>
<td>Coil—Antenna coil (L1, L2, L3, L4)</td>
<td>.75</td>
</tr>
<tr>
<td>34024</td>
<td>Coil—Universal coil (L5, L6, L7)</td>
<td>.75</td>
</tr>
<tr>
<td>34044</td>
<td>Control—Volume control, switch (R5, B4)</td>
<td>.25</td>
</tr>
<tr>
<td>33425</td>
<td>Control—Volume control and power switch (R8, R9)</td>
<td>.25</td>
</tr>
<tr>
<td>35935</td>
<td>Cord—Condenser cord</td>
<td>.10</td>
</tr>
<tr>
<td>35934</td>
<td>Cord—Drive cord</td>
<td>.10</td>
</tr>
<tr>
<td>32713</td>
<td>Core—Adjustable core and stud for oscillator coil</td>
<td>.35</td>
</tr>
<tr>
<td>33527</td>
<td>Drum—Condenser drive drum</td>
<td>.35</td>
</tr>
<tr>
<td>33174</td>
<td>Drum—Drive cord drum with set screws and calibrator dial</td>
<td>.45</td>
</tr>
<tr>
<td>11891</td>
<td>Lamp—Dial lamp</td>
<td>.17</td>
</tr>
<tr>
<td>32026</td>
<td>Lamp—Front guide plate for push button</td>
<td>.50</td>
</tr>
<tr>
<td>3669</td>
<td>Plug—Contact female for speaker cable</td>
<td>.35</td>
</tr>
<tr>
<td>35138</td>
<td>Push—Drive cord pulley and mounting bracket</td>
<td>.75</td>
</tr>
<tr>
<td>35138</td>
<td>Pulley—Drive pulley—less brushless drive cord</td>
<td>.25</td>
</tr>
<tr>
<td>14429</td>
<td>Resistor—100 ohms, 1 watt (R10)</td>
<td>.25</td>
</tr>
<tr>
<td>37795</td>
<td>Resistor—500 ohms, 1 watt (R8)</td>
<td>.35</td>
</tr>
<tr>
<td>12035</td>
<td>Resistor—5,000 ohms, 1 watt (R11)</td>
<td>.50</td>
</tr>
<tr>
<td>34849</td>
<td>Resistor—10,000 ohms, 2.5 watt (R3)</td>
<td>.25</td>
</tr>
<tr>
<td>12454</td>
<td>Resistor—45,000 ohms, 1 watt (R5)</td>
<td>.25</td>
</tr>
<tr>
<td>12454</td>
<td>Resistor—32,000 ohms, 1 watt (R6)</td>
<td>.25</td>
</tr>
<tr>
<td>12454</td>
<td>Resistor—20,000 ohms, 1 watt (R8, R10, R14, R19)</td>
<td>.25</td>
</tr>
<tr>
<td>12454</td>
<td>Resistor—2,000 ohms, 1 watt (R10)</td>
<td>.25</td>
</tr>
</tbody>
</table>

**NOTE:** Above Parts List applies to both Model K-60 and K-60 except for items noted. Items on the right apply only to Model K-60.

**Compliments of www.nucow.com**
Power Line Antenna

Each of these models is equipped with a built-in power line antenna. To use this antenna, the link on the antenna terminal board should be connected between "A" and "L", thus connecting the antenna input of the receiver through a capacitor to the powerline. If an outside antenna is used, it should be connected to "A", a ground connection made to "G", and the link removed.

LOUDSPEAKER (T-60, RL-78-6; T-62, RL-79A-4)
Type ............... T-60, 5-inch electrodynamic; T-62, 6-inch electrodynamic
V. C. Impedance .......... 3.4 ohms at 400 cycles
Power Supply Ratings
Rating A ........... 105-125 volts, 50-60 cycles, 80 watts
Rating B ........... 105-125 volts, 25-60 cycles, 80 watts
Rating C ........... 100-130, 140-160, 195-250 volts, 40-60 cycles, 80 watts
Pilot Lamp (1) ....... Mazda No. 51, 6.3 volts, 0.20 amp.

Frequency Ranges
Standard Broadcast ......................... 540-1720 kc
Short Wave .................. 3.6-20 mc
Intermediate Frequency .................. 455 kc
Power Output Rating
Undistorted .................. 2.2 watts
Maximum .................. 4.2 watts
Precautionary Lead Dress—
1. Dress the Power Line Antenna lead close to the chassis base and near the back flange.
2. Power switch leads should be dressed around the 6SQ7 socket.
Alignment, Trimmers, Socket, Tuner, Dial Data

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the chassis drawing.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and tune the receiver volume control to maximum.

Test-Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the output as low as possible to avoid A.V.C. action.

Calibration Marks.—The tuning dial is fastened in the cabinet and can not be used for reference during alignment. Therefore calibration marks corresponding to dial readings of 600 kc, 1,500 kc, 6.1 mc, and 20 mc have been stamped in the plate on the front of the chassis as shown in the accompanying drawing. These marks are used for reference during alignment.

Dial Indicator Adjustment.—With the gang condenser in full mesh, the indicator should point to the mark at the extreme left (low frequency) end of the dial scale.

<table>
<thead>
<tr>
<th>Steps</th>
<th>Connect the high side of the test osc. to</th>
<th>Tune test osc. to</th>
<th>Turn radio dial to</th>
<th>Adjust the following for maximum peak output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Antenna terminal</td>
<td>455 kc</td>
<td>&quot;A&quot; Band Quiet point between 650-750 kc</td>
<td>C14 and C15 (2nd I-F trans.)</td>
</tr>
<tr>
<td>2</td>
<td>Antenna terminal in series with 300 ohms</td>
<td>20 mc</td>
<td>&quot;C&quot; Band 20 mc calibration mark</td>
<td>C11 and C12 (1st I-F trans.)</td>
</tr>
<tr>
<td>3</td>
<td>Antenna terminal in series with 200 mnf.</td>
<td>1,500 kc</td>
<td>&quot;A&quot; Band 1,500 kc calibration mark</td>
<td>C9 (osc.)</td>
</tr>
<tr>
<td>4</td>
<td>Antenna terminal in series with 200 mnf.</td>
<td>600 kc</td>
<td>&quot;A&quot; Band 600 kc calibration mark</td>
<td>C10 (osc.) Rock gang</td>
</tr>
</tbody>
</table>

* Use minimum peak if two can be obtained. Check to determine that C4 has been adjusted properly by tuning receiver to approximately 19.09 mc where a weaker signal should be received.

Note: Oscillator tracks above signal on both bands.

Adjustments for Push-Button Tuning

The push-buttons should be adjusted for six favorite stations after the receiver has been operating for a brief warm-up period. Each button may be set up to any standard broadcast station. The preferable arrangement is to adjust for stations in the order of frequency, from low to high. Proceed as follows:

1. Pull off the push-buttons and loosen the push-button rods with a small screwdriver.
2. Turn the accessory switch on the back apron of the chassis to "Radio" position and accurately tune in the station for which the first button is to be set.
3. Press in the first push-button rod (left) with the screwdriver, as far as it will go without undue pressure, hold in, retune station with manual control if necessary for best reception, and then carefully tighten up the rod. Do not tighten more than 1/4 turn after the rod begins to grip or damage to the mechanism may result.
4. Replace the push-button on its shaft.
5. Proceed in a similar manner for the remainder of the push-buttons.
6. Insert the station marker tabs in the recesses above the push-buttons.

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**Power Output Ratings**

**Undistorted** 2.5 watts

**Maximum** 4.5 watts

**Power Supply Ratings**

**Rating A** 105-125 volts, 50-60 cycles, 75 watts

**Rating B** 105-125 volts, 25-60 cycles, 75 watts

**Rating C** 105-125 volts, 200-250 volts, 50-60 cycles, 75 watts

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**FOR TUNER SEE INDEX**

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**Precautionary Lead Dress**

1. Dress AC switch leads away from 6SF5 tube socket.
2. Do not twist loop leads together or around each other.
3. "High side" leads from loop sockets, range switch, oscillator coil, and trimmers must be dressed away from chassis and each other.
4. Dress C-6 and C-33 away from each other.
5. Dress C-17 away from power switch leads.

---

**Frequency Ranges**

- **Standard Broadcast** 540 to 1,560 kc.
- **Short-Wave** 5.8 to 18 mc

---

**LOUDSPEAKER** (RL 70 H 6) 6.3 volts, 0.20 amp.

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**Model KE1 Chassis BC498**

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Compliments of www.nucow.com
Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown on the chassis schematic.

Output Meter Alignment.—If this method is used, connect the output meter across the voice coil, and turn the receiver volume control to maximum.

Test Oscillator.—For all alignment operations, keep the oscillator output as low as possible to avoid a-c action.

Calibration Marks.—The tuning dial is fastened in the cabinet and cannot be used for reference during alignment. Therefore calibration marks have been stamped in the plate on the front of the chassis as shown in the accompanying drawing. These marks are used for reference during alignment.

Dial Indicator Adjustment.—With the gang condenser in full mesh, the indicator should point to the extreme left (low frequency) mark on the dial scale.

<table>
<thead>
<tr>
<th>Steps</th>
<th>Connect test-osc. output to</th>
<th>Tune test-osc. to</th>
<th>Turn radio dial to</th>
<th>Adjust the following for maximum peak output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I-F grid through 0.1 mfd capacitor and ground</td>
<td>455 kc</td>
<td>Quiet point between 1,720-1,500 kc</td>
<td>L3 and L6 (2nd I-F trans.)</td>
</tr>
<tr>
<td>2</td>
<td>1st det. grid through 0.1 mfd capacitor and ground</td>
<td>15.2 mc</td>
<td>15.2 mc</td>
<td>L3 and L4 (1st I-F trans.)</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Rock at 15.2 mc</td>
<td>C-2 antenna* while rocking</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Rock at 15.2 mc</td>
<td>C-2 antenna† while rocking</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>6.1 mc</td>
<td>Spacing between leads from &quot;C&quot; band loop to chassis</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Radiation loop consisting of two turns of wire 18 inches in diameter located 4 to 6 feet from receiver</td>
<td>15.2 mc</td>
<td>1,500 kc</td>
<td>C-34 antenna</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>1,500 kc</td>
<td>C-34 antenna</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>600 kc</td>
<td>L-2 oscillator while rocking</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>1,500 kc</td>
<td>C-34 antenna</td>
<td></td>
</tr>
</tbody>
</table>

When making adjustments 4 to 9 inclusive the chassis must be in the cabinet, both loops connected, and all leads in their normal positions. When mounting chassis in cabinet if calibration marks on dial plate do not line up with dial scale mounted on cabinet move pointer to agree with dial scale on cabinet.

* Oscillator should track on high frequency side of signal. If two peaks are obtained use high frequency (minimum capacity) peak.

† If two peaks can be obtained use low frequency (maximum capacity) peak.

Antennas

This receiver is equipped with two loop antennas ("C" band horizontal and fixed, and "A" band vertical and rotatable). During operation the "A" band loop should be rotated to the position giving maximum signal strength and freedom from noise. If desired, an outside antenna and ground can be connected to the terminals provided and when this is done the loop between these terminals must be opened. However, for loop operation this link must be closed.

Compliments of www.nucow.com
MODEL T63, Ch. 472F
ALIGNMENT, TRIMMERS
SOCKET, DIAL DATA
Tuner

POWER OUTPUT RATING
Undistorted .......... 2.5 watts
Maximum .............. 4.5 watts

LOUDSPEAKER (RL 79 A 4)

Type .................... 6 inch Electrodynamic
Voice Coil Impedance at 400 Cycles .......... 3.4 ohms

POWER SUPPLY RATINGS
Rating A .......... 105-125 volts, 50-60 cycles, 75 watts
Rating B .......... 105-125 volts, 25-60 cycles, 75 watts
Rating C ........ 105-125, 200-250 volts, 50-60 cycles, 75 watts

Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the schematic drawing.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For all alignment operations, keep the output as low as possible to avoid a-v-c action. The low side of the test-oscillator should be connected to the receiver chassis.

Calibration Scale on Indicator-Drive-Cord Drum.—The tuning dial is fastened in the cabinet and cannot be used for reference during alignment; therefore, a calibration scale is attached to the tuning drum. The setting of the gang condenser is read on this scale which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

Pointer for Calibration Scale.—Improve a pointer for the calibration scale by fastening a piece of wire to the chassis, and bend the wire so that it points to the 0° mark on the calibration scale when the plates are fully meshed.

Dial-Indicator Adjustment.—After fastening the chassis in the cabinet, adjust the dial indicator along the drive cable to the 940 kc mark, gang condenser fully meshed. The indicator has a clip for attachment to the cable.

Precautionary Lead Dress:
(1) Dress C8 (oscillator coil to range switch) and its leads away from surrounding wires and chassis.
(2) Dress R2 (screen to B+) away from surrounding wires and parts.
(3) Dress power switch leads away from 6SQ7 and 6F6G tube sockets.

Steps Connect high side of test-oct. to—Tune test oct. to—Turn radio Dial to—Adjusting the fol- lowing for max., peak output
1 Grid of 6K7 through 0.01 mfd. 655 kc "A" band Quiet point 500-750 kc L5 and L6 (2nd I-F trans.)
2 Grid of 6SA7 through 0.01 mfd. 655 kc "A" band Quiet point 500-750 kc L5 and L6 (1st I-F trans.)
3 Antenna terminal through 300 ohms 16 mc "C" band 15 mc 55° C46 ant.**
4 Antenna terminal through 200 mfd. 600 kc "A" band 600 kc (23.5°) L2 osc. (Rock in)
5 Antenna terminal through 200 mfd. 1,500 kc "A" band 1,500 kc (156.5°) C9 ant. C28 ant.
6 Repeat Steps 4 and 5

* Use minimum capacity peak if two can be obtained.
** Use maximum capacity peak if two can be obtained.

NOTE: Oscillator tracks above signal on all bands.

Adjustments for Push-Button Tuning

The push-buttons should be adjusted for six favorite stations after the receiver has been operating for a brief warm-up period. Each button may be set up for any standard broadcast station. The preferable arrangement is to adjust for stations in the order of frequency, from low to high. Proceed as follows:

1. Pull off the push-buttons and loosen the push-button rods with a small screwdriver.
2. Set the receiver for "Radio" operation, range selector on "Broadcast", and accurately tune in the station for which the first button is to be set.

ANTENNAS

This receiver is equipped with a loop antenna for "A" and "C" bands. Both loops are fixed in position being mounted vertically from the rear of the chassis. For best performance the receiver should be turned to a position giving maximum signal strength and freedom from noise. The loop connections are shown in a separate diagram. If desired, an external ant enna and ground can be connected to the terminals provided. In this case the link between these terminals must be opened; however, for loop operation this link must be closed.

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Compliments of www.nucow.com
The Victrola Model R-60 consists of a crystal pickup, a two-stage audio amplifier, a six-inch electrodynamic speaker, and a rim-drive motor turntable mechanism with automatic mercury switch for starting and stopping—all housed in a wood cabinet of modern design and appearance.

The phonograph motor is a self-starting, constant-speed induction type. It should be lubricated every six months by applying a few drops of light machine oil to the top and bottom motor spindle bearings, to the turntable spindle, and to the turntable drive wheel bearing.

CAUTION: Keep oil away from drive bushing on top of motor spindle and from rubber driving tire on turntable drive wheel.

The motor switch is automatic for both starting and stopping, and when properly adjusted, will turn the motor on as the pick-up is moved from the pickup rest toward the turntable. The switch should be adjusted so that it will snap into the "off" position when the pickup needle is 1/4 inches from the center line of the spindle. The motor may be shut off at any time by placing the pickup on the pickup rest.

**Specifications**

**Power Supply Ratings**
- A-6: 105-125 volts, 60 cycles, 90 watts
- A-5: 105-125 volts, 50 cycles, 90 watts

**Loudspeaker (RL-79-2)**
- Type: 6-inch electrodynamic
- V. C. Impedance at 400 cycles: 34 ohms

**Tube Complement**
1. RCA—6SF5: A-F Amplifier
2. RCA—6P6-G: Output
3. RCA—5Y3-G: Rectifier

**Pickup**
- Type: Crystal
- Impedance: 100,000 ohms at 400 cycles
- Average Output: 1/2 volts at 1,000 cycles with 250,000 ohms load
- Height: 8 3/8, Width: 14, Depth: 9 3/4
- Chassis Base Dimensions (inches): 2 1/4, 7 3/4, 4 1/4
- Overall Chassis Height: 6 1/2 inches
- Weight: 20 lbs. (shipping)

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**Model R60, Chassis RS91B**

**Victrola Schematic, Voltage, Chassis Wiring, Assembly**

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©John F. Rider, Publisher
## STOCK No. DESCRIPTION S6000 33620 Arm—Push arm and cam assembly on tuning unit—Back screen 0.25 33248 Board—Antenna and ground terminal board 0.25 33538 Capacitor—Tuning condenser drive shaft and washer 0.15 32547 Capacitor—Tuning knob shaft with rubber drive roller and pulley assembled 0.60 33545 Shield—Dial lamp shield 0.05 33546 Switch—Range switch (B1) 1.05 33551 Tone Control, Television and Phone switch (S3, S4) 1.10 33552 Transformer—First id transformer (L6, L10, C19, C20) 1.85 33553 Transformer—Secondary id transformer (L11, L18, C12, C22, C23, R5) 2.00 33554 Transformer—Power transformer 105-120 volts, 25-60 cycles (T1) 6.40 33555 Transformer—Power transformer 105-120 volts, 50-60 cycles (T1) 4.30 33556 Transformer—Power transformer—Universal—50 cycle (T1) 6.40 33557 Volume control and power switch (R6, SB) 2.00 33558 Washer—C washer for spring and pin 0.02 33559 Washer—C washer for tuning shaft 0.02

### SPEAKER ASSEMBLIES

AC-920 Assembly—Speaker cone and voice coil 1.60 AC-921 Assembly—Speaker cone and voice coil 1.60 AC-922 Assembly—Speaker cone and voice coil 1.60

### MISCELLANEOUS ASSEMBLIES

AC-923 Assembly—Speaker cone and voice coil 1.60 AC-924 Assembly—Speaker cone and voice coil 1.60

**NOTE:** Above Parts List applies to both Models T-64 and T-80, except for the items noted. Items on the right apply only to Model T-80.
RCA MFG. CO., INC.

MODEL T64, T65, CH. RC416
Schematic, Voltage
Chassis Wiring, Changes

Note: On some receivers the following circuit changes are in effect:
1. C1 is 470 mfd.
2. There are three types of 2nd, I-F transformers in use.
   a. The first type (Stock No. 14308) has C23 and R5 mounted inside the case, and is connected exactly as shown below.
   b. The second type R5 is omitted and the lead from S4 connects to C instead of E. E is not used.
   c. In the third type R5 is omitted and C23 is connected externally from C to ground. E is not used. The lead from the diode plate connects to A instead of B. When replacing this transformer with Stock No. 14308, remove the external C23 and connect the replacement transformer as shown in the schematic diagram.

Important: Stock No. 14308 is used as replacement for all three of the above types, and should be connected as shown in the schematic diagram.

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**POWER SUPPLY RATINGS**

<table>
<thead>
<tr>
<th>Rating</th>
<th>Volts</th>
<th>Cycles</th>
<th>Watts</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>105-125</td>
<td>50-60</td>
<td>75</td>
</tr>
<tr>
<td>B</td>
<td>105-125</td>
<td>25-60</td>
<td>75</td>
</tr>
<tr>
<td>C</td>
<td>100-130, 140-160, 195-250</td>
<td>40-60</td>
<td>75</td>
</tr>
</tbody>
</table>

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the chassis drawing.

**Output Meter Alignment**—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

**Test-Oscillator**—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the output as low as possible to avoid a-c action.

**Calibration Scale on Indicator-Drive-Cord-Drum.**—The tuning dial is fastened in the cabinet and cannot be used for reference during alignment; therefore, a calibration scale is attached to the tuning drum. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

As the first step in r-f alignment, check the position of the drum. The 340° mark on the drum scale must be vertical and directly above the center of the shaft of the tuning drum when the plates are fully meshed. The drum is held to the shaft by means of two set-screws, which must be tightened securely when the drum is in the correct position.

On the inner side of the tuning drum are two projections which serve as stops to prevent extreme rotation of the gang condenser. The tuning drum should be set so that the stop limiting clockwise movement of the drum takes effect just as the gang condenser plates are becoming fully meshed, thus preventing stress on the gang due to extreme rotation.

<table>
<thead>
<tr>
<th>Steps</th>
<th>Connect the high side of the test-osc. to</th>
<th>Tune test osc. to</th>
<th>Turn radio dial to</th>
<th>Adjust the following for maximum peak output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6SK7 grid in series with .01 mfd.</td>
<td>455 kc</td>
<td>&quot;A&quot; Band Quiet Point between 550-750 kc</td>
<td>L11 and L12 (2nd I-F Trans.)</td>
</tr>
<tr>
<td>2</td>
<td>6SA7 grid in series with .01 mfd.</td>
<td>20 mc</td>
<td>20 mc (40°)</td>
<td>L9 and L10 (1st I-F Trans.)</td>
</tr>
<tr>
<td>3</td>
<td>Ant. terminal in series with 300 ohms</td>
<td></td>
<td></td>
<td>C6 (osc.)* C5 (ant.)</td>
</tr>
<tr>
<td>4</td>
<td>Ant. terminal in series with 300 ohms</td>
<td>600 kc</td>
<td>600 kc (200.55°)</td>
<td>C4 (osc.)** C3 (ant.)</td>
</tr>
<tr>
<td>5</td>
<td>Ant. terminal in series with 200 mmd.</td>
<td></td>
<td></td>
<td>L7 (osc.) C3 (ant.)</td>
</tr>
<tr>
<td>6</td>
<td>Repeat step 5.</td>
<td></td>
<td></td>
<td>Rock Gang</td>
</tr>
</tbody>
</table>

* Use minimum capacity peak if two can be obtained. Check to determine that C9 has been adjusted to correct peak by tuning receiver to approximately 19.00 mc where a weaker signal should be received.

**LOUDSPEAKER (RL-79-4)**

Type: 6-inch Electrodynamic
V.C. Impedance: 3.4 ohms at 400 cycles

**POINTER FOR CALIBRATION SCALE**—Improvise a pointer for the calibration scale by fastening a piece of wire to the chassis, and bend the wire so that it points to the 240° mark on the calibration scale when the plates are fully meshed.

**RCA MFG. CO., INC.**
Note: On some receivers the following circuit modifications are in effect:
1. R11 is 5,600 ohms, and C18 is 0.1 mfd.
2. C1 is 470 mfd.; R15 is 2,700 ohms and is connected from cathode of 6SN7 Inverter to ground; R17 is 15,000 ohms; and C33 is omitted.
3. There are three types of 2nd IF transformers in use.
   a. The first type (Stock No. 14908) has C33 and R5 mounted inside the case, and is connected exactly as shown below.
   b. In the second type R5 is omitted and the lead from S4 connects to C instead of E. E is not used.

c. In the third type R6 is omitted and C38 is connected externally from C to ground. E is not used. The lead from the diode plate connects to A instead of B. When replacing this transformer with Stock No. 14908, remove the external C38 and connect the replacement transformer as shown in the schematic diagram.

Important: Stock No. 14908 is used as replacement for all three of the above types, and should be connected as shown in the schematic diagram.

**Power Output Rating**

- Undistorted: 5.0 watts
- Maximum: 5.5 watts

**Loudspeaker (RL-79-5)**

- Type: 6-inch electrodynamic
- V.C. Impedance: 3.4 ohms at 400 cycles
**MODEL 91XLIW**

**Chassis RC-345F**

**Schematics, Voltage, Socket Trimmers, Chassis Wiring**

**Lead Dress**

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**RCA MFG. CO., INC.**

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**6J7-DET.**

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**2516-G OUTPUT**

---

**Power Supply Ratings**

<table>
<thead>
<tr>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-C Rating</td>
<td>105-125 volts, 25-60 cycles, 50 watts</td>
</tr>
<tr>
<td>D-C Rating</td>
<td>105-125 volts, 50 watts</td>
</tr>
</tbody>
</table>

**Frequency Ranges**

<table>
<thead>
<tr>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long Wave (X)</td>
<td>150-850 kc</td>
</tr>
<tr>
<td>Standard Broadcast (A)</td>
<td>580-1,500 kc</td>
</tr>
</tbody>
</table>

**Alignment Procedure**

**CAUTION:** The chassis is connected to one side of the power line. Avoid contact of chassis or parts to external ground when servicing.

Turn pointer, while holding tuning knob, so that the pointer is horizontal and pointing to low frequency end when the gang condenser is at maximum.

Reel up the antenna wire, and connect the high side of test-oscillator through an 80 ohm resistor to the antenna terminal on the antenna transformer. Connect low side of oscillator to receiver chassis through a 0.1 capacitor. Keep antenna roll and lead clear of chassis during alignment.

---

**Note:** Values with (*) are operating voltages.

Values not starred are actual measured voltages.

Measurements made to chassis unless otherwise indicated.

Measurements made at points tuned to quiet point, volume control at minimum, using 1,000-ohm-per-volt meter, having ranges of 10, 50, and 250 volts. (Use nearest range above the specified measured voltage.)

Values should hold within approximately ± 5% for 117-volt 60-cycle ac supply. At 120-volt d-c, voltages are approximately 10% lower, except heaters, which remain the same.

---

**Precautionary Lead Dress**

1. Dress power cord away from yellow lead to volume control.
2. Dress all leads away from antenna coil.
3. Green lead from gang to detector coil must be dressed under switch shaft and over detector coil (looking from bottom of chassis).
4. Yellow lead from volume control to 6K7 cathode must be dressed down against rear apron of chassis.
5. Green lead from switch to volume control must be dressed away from all other wires.
6. All leads to detector coil, except green lead in No. 3 (above) must be dressed down against the chassis base.

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Compliments of www.nucow.com
Precautionary Lead Dress—

1. Blue, green, and black leads to the volume control should be dressed away from the 6K6-G socket and from leads to this socket.
2. Leads to the power transformer should be dressed toward the end of the chassis and away from wires to the push button assembly.
3. Power cord lead should be dressed toward the end of the chassis.

Measurements made to chassis unless otherwise indicated, with set tuned to quiet point and volume control at minimum. Values should hold within approximately ±20% with 117-volt a-c supply.

*NOTE: Values with stir (•) are operating voltages in circuits with high series-resistance. The actual measured voltages will be lower, depending on the voltmeter loading.
Adjustments for Electric Tuning

Push Button Ranges:
Two stations between approximately 150-300 kc
One station between approximately 550-600 kc
One station between approximately 650-1080 kc
One station between approximately 850-1,500 kc

This model has six push buttons. The right-hand button connects the gang condenser for dial tuning. The other five buttons are for electric tuning of five different stations. The station buttons connect to separate magnetite-core coils and trimmers and to the antenna trimmers which must be adjusted for the desired stations. Use an insulated screwdriver or alignment tool such as RCA Stock No. 31031. Allow at least five minutes warm-up period before making adjustments. Use a regular antenna for preliminary adjustments.

The procedure is as follows:
1. Make a list of the desired stations, arranged in the order of the push button ranges shown on the schematic diagram.
2. To adjust buttons Nos. 1 and 2, best results are obtained by using a test-oscillator. Using a separate receiver, tune in the desired station for button No. 1 and use a test-oscillator against the carrier of this station. Then, keeping the same setting on the test-oscillator, connect its output to the antenna of the 9ST/1W. Adjust the antenna and oscillator trimmers of button No. 1 for maximum output. Proceed in a similar fashion for button No. 2.
3. To adjust buttons Nos. 3, 4 and 5, proceed as follows:
   a. Push in the dial-tuning (right-hand) button, and manually tune in the third station on the list.
   b. Press in station-button No. 3 and adjust No. 1 oscillator core (L14) to receive this station. Screw the core all the way in, to lowest frequency, and then unscrew slowly until the station is received.
   c. Adjust No. 3 antenna trimmer (C22) for maximum output on this station.
   d. Adjust for each of the remaining stations in a similar manner.
   (Close adjustment of oscillator and antenna trimmers tunes the circuits to lower frequencies.)
   e. Make a final careful adjustment of the oscillator and antenna trimmers, using one or two feet of wire as an antenna to insure sharp peaking.

Power Supply Ratings
Rating A: 105-125 volts, 50-60 cycles, 50 watts
Rating C: 100-120, 200-240 volts, 50-60 cycles, 50 watts

Output
Undistorted: 1.0 watt
Maximum: 1.5 watts

Alignment Procedure
Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the chassis drawing. Turn the receiver volume control to maximum.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the output low as possible to avoid a-v voltage.

Calibration Marks.—The tuning dial is fastened in the cabinet and cannot be used for reference during alignment. Therefore calibration marks corresponding to dial readings of 600 kc and 1,500 kc have been stamped in the plate on the front of the chassis, as shown in the accompanying drawing. These marks are used for reference during alignment.

Drum and Dial Indicator Adjustment.—As the first step in r-f alignment, check the position of the drum on the front shaft of the gang condenser. With the gang at maximum (full mesh) the drum set-screw should be pointing directly down as shown in the drawing. With the drum in this position, and the gang at maximum, move the dial indicator along the drive cord to coincide with the left-hand line as shown. The indicator is held to the drive cord by means of spring clips.

After completion of alignment, and after the chassis has been fastened in the cabinet, turn the gang to maximum and note whether the dial indicator is at the left-hand end mark on the dial; if it is not, loosen the drum set-screw (which is accessible through a slot in the bottom of the cabinet), turn the drum slightly so that the indicator is at this mark, and then tighten the set-screw.

After completion of alignment, seal the r-f core-adjustment screws with household cement.

<table>
<thead>
<tr>
<th>Steps</th>
<th>Connect the high side of test-osc. to</th>
<th>Tune test-osc. to</th>
<th>Turn radio dial to</th>
<th>Adjust the following for max. peak output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6K7 I-F grid cap, in series with .01 mfd.</td>
<td>455 kc</td>
<td>Quiet point between 650-750 kc</td>
<td>L7 and L6 (2nd I-F Trans.)</td>
</tr>
<tr>
<td>2</td>
<td>6A8-G grid cap, in series with .01 mfd.</td>
<td>455 kc</td>
<td></td>
<td>L5 and L6 (1st I-F Trans.)</td>
</tr>
<tr>
<td>3</td>
<td>Antenna lead (blue) in series with 200 mfd.</td>
<td>1,500 kc</td>
<td>1,500 kc calibration mark</td>
<td>C6 (osc.)* C3 (ant.)</td>
</tr>
<tr>
<td>4</td>
<td>Follow “Adjustments for Electric Tuning.”</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*The oscillator section of the gang condenser has two trimmers, one on top, accessible through a hole in the chassis, and the other on bottom. It may be necessary to adjust both of these trimmers to secure a peak on 1,500 kc.

Diode-Indicator and Drive Mechanism
Refer to “Alignment Procedure” for explanation of the “calibration marks” shown in this drawing.
At Left—Tube and Trimmer Locations

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Compliments of www.nucow.com
Alignment Procedure

Test-Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the receiver ground terminal (G), and keep the output as low as possible to avoid a-c action.

Calibration Scale on Indicator-Drive-Cord Drum.—The tuning dial is fastened in the cabinet and cannot be used for reference during alignment; therefore, a calibration scale is attached to the rear of the drum which is mounted on the front shaft of the gang condenser. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

As the first step in r-f alignment, check the position of the drum. The 180° mark on the drum scale must be vertical, and directly over the center of the gang-condenser shaft when the plates are fully meshed. The distance from the front of the chassis to the drum must not exceed 3 inch. The drum is held in the shaft by means of two set screws, which must be tightened securely when the drum is in the correct position.

Pointer for Calibration Scale.—Improve a pointer for the calibration scale by fastening a piece of wire to the gang-condenser frame, and bend the wire so that it points to the "180°" mark on the calibration scale when the plates are fully meshed.

Steps   | Connect the high side of test-osc. to   | Tune test-osc. to   | Turn radio-dial to   | Adjust the following max. peak output
---  | ---  | ---  | ---  | ---
1    | 6X7 I-F grid cap, in series with .01 mfd. | 455 kc | "A" band, Quiet Point between 550-750 kc | L12 and L13 (2nd I-F Transformer)
2    | 6X3 dot. grid cap, in series with .01 mfd. | 455 kc |  | L10 and L11 (1st I-F Transformer)
3    | Antenna Terminal, in series with 300 mmd. | 600 kc | 600 kc (150-500) "A" Band | L0
4    | 1,600 kc | 1,600 kc (295) "A" Band | C25 (osc.)
5    | Repeat steps 3 and 4. | | | |
6    | Antenna Terminal, in series with 400 mmd. | 6 mc | 6 mc (265-50) "B" Band | C28 (osc.)
7    | 20 mc | 20 mc (292) "C" Band | C21 (osc.)
8    | Follow "Adjustments for Electric Tuning." | | | |

*Use minimum capacity peak if two peaks can be obtained, and rock gang condenser slightly while adjusting C28 and C29.

Note.—Oscillator tracks 455 kc above signal on all bands.

Dial-Indicator Adjustment.—After fastening the chassis in the cabinet, move the dial indicator on the drive cable to the left-hand end mark on dial with gang condenser fully meshed.

Adjustments for Electric Tuning

These models have eight push buttons. The left-hand button is a Victrola switch. The right-hand button connects the gang condenser for manual tuning. The other six buttons are for electric tuning of six different stations in the standard-broadcast range. The station buttons connect to separate multi-turn coil and separate antenna trimmers which must be adjusted for the desired stations. Use an insulated screwdriver or alignment tool such as RCA Stock No. 21031. Allow at least five minutes warm-up period before making adjustments.

The procedure is as follows:
1. Make a list of the desired six stations, arranged in order from low to high frequencies.
2. Push in the dial-tuning button, and manually tune in the first station on the list.
3. Push in station button No. 1 (second from left) and adjust No. 1 oscillator core (L37) to receive this station. Screw the core all the way in, to lowest frequency, and then unscrew slowly until station is received.
4. Adjust No. 1 antenna trimmer (C36) for maximum output on this station.
5. Clockwise adjustment of cores and trimmers tunes the circuits to lower frequencies.
6. Adjust for each of the remaining five stations in the same manner.
7. Make a careful adjustment of the oscillator cores and antenna trimmers.
Miscellaneous Service Notes

Bias Cell.—The bias cell provides approximately 1-volt bias for the first audio grid. The cell should never be shorted, not measured with ordinary voltmeter or other instrument. The cell may be checked by measuring the first audio-cathode current with the new 6F7 tube in the socket. The current should be approximately 1 milliamperc. If it is appreciably greater than 1 milliamperc, install the bias cell.

Victrola Attachment.—Two screw-type terminals, numbered 1 and 2, are provided on the rear panel of the chassis for connection to a Victrola Attachment, such as the R-99, R-995, etc. (When A.C. supply is available.)

Care must be taken that these terminals are never connected in any way to the chassis, otherwise injury will result to the bias cell. To safeguard against this possibility, the following precautions should be observed in connecting the Victrola Attachment to the receiver.

Victrola Attachment with shielded cables.—If the shielded cable has a ground connection, connect the shield to terminal 1, and connect the lead (inside the shield) to terminal 2. Tape the shield for a sufficient distance to prevent the possibility of it shorting against the chassis.

Victrola Attachment with twisted-pair cable.—Connect the low-side of the Attachment to terminal No. 1, and the high-side of the Attachment to terminal No. 2. (In some Attachments, the lead from the low-side is black, and the lead from the high-side is black-brown.)

Power-Supply Polarities.—For operation on d-c, the power plug must be inserted in the outlet for correct polarity. If the set does not function, reverse the position of the plug. For operation on a-c, a similar reversal of the plug may reduce hum.

REPLACEMENT PARTS

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

<table>
<thead>
<tr>
<th>STOCK No.</th>
<th>DESCRIPTION</th>
<th>Unit List Price</th>
<th>Description</th>
<th>Unit List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>31377</td>
<td>Ballast—Ballast resistor tube (R23, R27)</td>
<td>.05</td>
<td>31377</td>
<td>Pulley—Drive cord pulley</td>
</tr>
<tr>
<td>31376</td>
<td>Board—Antenna-ground terminal board</td>
<td></td>
<td>30680</td>
<td>Resistor—150 ohms, 1 watt (R15)</td>
</tr>
<tr>
<td>31579</td>
<td>Board—Phone-photograph terminal board</td>
<td></td>
<td>30685</td>
<td>Resistor—3,000 ohms, 1 watt (R15)</td>
</tr>
<tr>
<td>30752</td>
<td>Bracket—Bracket for holding Magic Eye tube</td>
<td></td>
<td>30751</td>
<td>Resistor—100 ohms, 1 watt (R15)</td>
</tr>
<tr>
<td>14388</td>
<td>Bushing—Variable condenser mounting bushing and screw</td>
<td></td>
<td>12454</td>
<td>Resistor—22,000 ohms, 1 watt (R15)</td>
</tr>
<tr>
<td>30766</td>
<td>Cap—Cap for Magic Eye</td>
<td>.15</td>
<td>13780</td>
<td>Resistor—1 meg, 1/10 watt (R16)</td>
</tr>
<tr>
<td>34484</td>
<td>Capacitor—Adjustable trimmer capacitor, two sections 2-10 mfd., and one section 3-50 mfd. (C21, C23, C25)</td>
<td>.50</td>
<td>15013</td>
<td>Capacitor—1,000 mfd, 1/10 watt (R16)</td>
</tr>
<tr>
<td>32848</td>
<td>Capacitor—Variable, 20-470 mfd. (C31, C32, C33, C34, C35, C36)</td>
<td></td>
<td>14367</td>
<td>Capacitor—800 mfd, 1/2 watt (R16)</td>
</tr>
<tr>
<td>32648</td>
<td>Capacitor—33 mfd. (C3)</td>
<td></td>
<td>14383</td>
<td>Capacitor—220 mfd, 1 watt (R16)</td>
</tr>
<tr>
<td>12733</td>
<td>19 mfd. (C1, C2)</td>
<td></td>
<td>14550</td>
<td>Capacitor—2-10 mfd. (C18, C19)</td>
</tr>
<tr>
<td>12748</td>
<td>100 mfd. (C49)</td>
<td></td>
<td>14555</td>
<td>Capacitor—220 mfd, 1 watt (R16)</td>
</tr>
<tr>
<td>12665</td>
<td>100 mfd. (C50)</td>
<td></td>
<td>14670</td>
<td>Capacitor—2,000 mfd. (C17, C18)</td>
</tr>
<tr>
<td>12637</td>
<td>100 mfd. (C50)</td>
<td></td>
<td>15052</td>
<td>Condenser—2-10 mfd. (C29, C30, C31)</td>
</tr>
<tr>
<td>31455</td>
<td>600 mfd. (C32)</td>
<td></td>
<td>15119</td>
<td>Connector—3-contact female connector plug for reproducer cable</td>
</tr>
<tr>
<td>32493</td>
<td>Coil—Antenna coil (L1, L2, L3, L4)</td>
<td></td>
<td>15283</td>
<td>Control—Excellent, 3-contact male plug for speaker</td>
</tr>
<tr>
<td>31951</td>
<td>Coil—100 ohms, 1 watt (R15)</td>
<td></td>
<td>15345</td>
<td>Transformer—Output transformer (T)</td>
</tr>
<tr>
<td>31385</td>
<td>Condenser—2-10 mfd. (C12, C13, C14)</td>
<td></td>
<td>15375</td>
<td>Transformer—Output transformer (T)</td>
</tr>
<tr>
<td>31388</td>
<td>Condenser—2-10 mfd. (C12, C13, C14)</td>
<td></td>
<td>15385</td>
<td>Transformer—Output transformer (T)</td>
</tr>
<tr>
<td>31389</td>
<td>Condenser—2-10 mfd. (C12, C13, C14)</td>
<td></td>
<td>15395</td>
<td>Transformer—Output transformer (T)</td>
</tr>
<tr>
<td>31386</td>
<td>Condenser—2-10 mfd. (C12, C13, C14)</td>
<td></td>
<td>15400</td>
<td>Transformer—Output transformer (T)</td>
</tr>
<tr>
<td>5111</td>
<td>Connector—3-contact female connector plug for reproducer cable</td>
<td>.25</td>
<td>31372</td>
<td>D12—Variable condenser driving cord (R12, L12)</td>
</tr>
<tr>
<td>26688</td>
<td>Control—Volume control, tone control, and on-off switch (R5, R13, R2)</td>
<td></td>
<td>26688</td>
<td>Control—Variable condenser driving cord cord (R12, L12)</td>
</tr>
<tr>
<td>26534</td>
<td>Cord—Drum drive cord</td>
<td></td>
<td>26534</td>
<td>Control—Variable condenser driving cord (R12, L12)</td>
</tr>
<tr>
<td>26659</td>
<td>Cord—Indicator pointer drive cord</td>
<td>.25</td>
<td>26659</td>
<td>Control—Variable condenser driving cord (R12, L12)</td>
</tr>
<tr>
<td>31382</td>
<td>Connector—4-contact male plug for speaker</td>
<td>.25</td>
<td>31382</td>
<td>Control—Variable condenser driving cord (R12, L12)</td>
</tr>
<tr>
<td>26688</td>
<td>Control—Volume control, tone control, and on-off switch (R5, R13, R2)</td>
<td></td>
<td>31382</td>
<td>Control—Variable condenser driving cord (R12, L12)</td>
</tr>
<tr>
<td>26634</td>
<td>Control—Volume control, tone control, and on-off switch (R5, R13, R2)</td>
<td></td>
<td>31382</td>
<td>Control—Variable condenser driving cord (R12, L12)</td>
</tr>
<tr>
<td>31372</td>
<td>Drum—Variable condenser driving cord drum and collars</td>
<td>.15</td>
<td>31382</td>
<td>Control—Variable condenser driving cord (R12, L12)</td>
</tr>
<tr>
<td>31387</td>
<td>Holder—Bias cell holder</td>
<td>.15</td>
<td>31382</td>
<td>Control—Variable condenser driving cord (R12, L12)</td>
</tr>
<tr>
<td>26688</td>
<td>Indicator—Indicator pointer</td>
<td></td>
<td>31382</td>
<td>Control—Variable condenser driving cord (R12, L12)</td>
</tr>
<tr>
<td>31380</td>
<td>Indicator—Indicator pointer</td>
<td></td>
<td>31382</td>
<td>Control—Variable condenser driving cord (R12, L12)</td>
</tr>
<tr>
<td>31480</td>
<td>Lamp—Lamp lamp (Mazda No. 47)</td>
<td>.20</td>
<td>31382</td>
<td>Control—Variable condenser driving cord (R12, L12)</td>
</tr>
<tr>
<td>30670</td>
<td>Plate—Dia color plate, pointer slide, and lamp</td>
<td>.75</td>
<td>31382</td>
<td>Control—Variable condenser driving cord (R12, L12)</td>
</tr>
</tbody>
</table>

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Lubrication and Adjustment.

To assure normal and satisfactory operation, every motor requiring service should be lubricated and adjusted as follows:

1. Remove motor end brackets, bottom cover containing lower spindle bearing, and governor. Slide vertical spindle downward, remove C-washer; then push upward to disengage governor. Slide rotor and shaft from motor.

2. Clean rotor bearings and rotor shaft thoroughly with “Carbena” or “benzine.” Brush oil reservoirs I and II with the same solvent, preferably after removing oil wicks.

3. Remove governor felt friction pad V. Replace this pad with revised type Stock No. 34058, being certain to saturate thoroughly with oil.

4. Put slight amount of oil in each rotor bearing, and reinsert rotor shaft. See that shaft revolves freely when in position.

5. Oil bearing IV, grease gear VI, and re-install bottom cover; checking to assure that vertical spindle revolves freely and worm is properly meshed after cover is in place and screws tightened. Do not misplaced small disc of bottom thrust bearing.

6. Inspect governor to see that springs move freely under retaining washers, and that governor is otherwise in good condition. Install on rotor shaft, checking for possible bind of sleeve on the shaft.

7. Replace end brackets containing thrust screws “A” and “B”.

8. Adjust thrust screw “A” so that one steel lamination of rotor shows beyond the motor laminations as illustrated. This positions rotor at the electrical center of the stator, for maximum torque.

9. Adjust thrust screw “B” to provide 1/16 inch clearance from end of rotor shaft.

10. Fill both wells I and II with oil. At least 30-50 drops are required. Also oil bearing III.

11. Position governor so that when it is fully contracted (closed), the friction disc is aligned with outer edge of oil guard. Tighten set screw “D”.

12. Connect motor to source of power, and adjust screw “C” to give 78 R.P.M. After allowing motor to run a short time, to compress felt pad. It may be necessary to recheck position of governor to give sufficient range of speed adjustment.

13. Test motor, after allowing it to reach operating temperature, by grasping spindle and noting relative amount of force required to cause governor to contract. Also stall motor, and release, to see that governor has “snappy” response.

Special Notes

1. Do not interchange parts of different motors, especially bearings, shafts, or gears.

2. Where a new rotor or turntable spindle is installed, allow motor to run-in for eight hours, preferably under load.

3. The motor should not be tested or used at temperatures below 65 degrees Fahrenheit.

4. Where thrust bearing screw “A” is badly worn or does not have a fibre insert, replace with RCA Stock No. 31616.

5. Governor motors should be thoroughly lubricated after approximately 300-500 hours of operation. This is equivalent to 1-2 years usage in the average home.

Lubricant Specifications

Only mineral base oils and greases should be used.

1. For points requiring oil, use a type having a high viscosity index (with a viscosity rating of SAE 20-30), such as “Esso Motor Oil, Uniflo No. 3.”

2. For points requiring grease, a light gear grease having good clinging properties, such as “Cities Service No. 7035-A1” or “Koolmotor Universal Trojan No. 1”, should be used.

Governor Waver—Causes

Drifting of motor speed at a slow rate, or erratic shift to other than normal speed, is generally caused by (1) binding of rotor or spindle bearings due to lack of lubrication, (2) scored shafts or bearings, (3) binding due to tight adjustment of thrust bearing “B”, (4) binding of turntable spindle bearing on motor board (where used), (5) improper centering of motor with respect to turntable spindle.

Governor Chatter—Causes

When the governor rattles or flutters rapidly, accompanied by excessive mechanical noise, the likely source of trouble is (1) glazed felt friction pad due to lack of lubrication, (2) rotor not centrally positioned in stator, (3) thrust bearing “A” worn, (4) mis-aligned or rough governor disc.

Heavy Duty Motor

A heavy duty motor Stock No. 31153 is available for replacement of the Stock No. 31157 type used in Models U115, U116, U118, U132, U134, etc., at a nominal exchange price. The larger motor has a higher torque specification, will operate normally over greater ranges of voltage and frequency, and gives increased life before relubrication is required.
### Alignment Procedure

Compliments of www.nucow.com

**Calibration Alignment**

- The Correlation Method is the preferred method. Certain corrections for the oscillograph are shown in the chassis drawings.

**Output Meter Alignment**

- If this method is used, connect the meter across the voice coil, and turn the receiver volume control to minimum.

**Tune-Oscillators**

- For all alignment operations, keep the output as low as possible to avoid voice coil action. For the first six steps in alignment, the low side of the tone-oscillator should be connected to the receiver chassis. Following step 6, the signal must be radiated (see note under alignment table).

**Calibration Scale on Oscilloscope Drum**

- The tuning dial is fastened in the cabinet and cannot be used for reference during the first six steps of alignment; therefore, a calibration scale is attached to the tuning drum. The setting of the tuning condenser is read on this scale, which is calibrated in degrees. The correct setting of the gap in degrees, for each alignment frequency, is given in the alignment table.

---

<table>
<thead>
<tr>
<th>Steps</th>
<th>Connect the high side of the low-side, 0-Ω.</th>
<th>Tune next, 0-Ω.</th>
<th>Turn radio dial to-</th>
<th>Adjust the following for maximum output peak or L and L1 (2nd L-F trans.)</th>
<th>L1 and L2 (1st L-F trans.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>607T T-F grid in series with 0.15 mfd.</td>
<td>465 kc</td>
<td>&quot;B&quot; band</td>
<td>10 L1 and L2</td>
<td>10 L1 and L2</td>
</tr>
<tr>
<td>2</td>
<td>607T det. grid in series with 0.15 mfd.</td>
<td>100 mfd (100Ω)</td>
<td>&quot;C&quot; band</td>
<td>10 L1 and L2</td>
<td>10 L1 and L2</td>
</tr>
<tr>
<td>3</td>
<td>607T T-F grid in series with 0.15 mfd.</td>
<td>3.64 mΩ (1Ω)</td>
<td>&quot;B&quot; band</td>
<td>10 L1 and L2</td>
<td>10 L1 and L2</td>
</tr>
<tr>
<td>4</td>
<td>607T det. grid in series with 0.15 mfd.</td>
<td>600 kc</td>
<td>&quot;B&quot; band</td>
<td>10 L1 and L2</td>
<td>10 L1 and L2</td>
</tr>
<tr>
<td>5</td>
<td>1,300 mΩ (2Ω)</td>
<td>10 L1 and L2</td>
<td>&quot;B&quot; band</td>
<td>10 L1 and L2</td>
<td>10 L1 and L2</td>
</tr>
<tr>
<td>6</td>
<td>600 mΩ (1Ω)</td>
<td>10 L1 and L2</td>
<td>&quot;C&quot; band</td>
<td>10 L1 and L2</td>
<td>10 L1 and L2</td>
</tr>
<tr>
<td>7</td>
<td>600 mΩ (1Ω)</td>
<td>10 L1 and L2</td>
<td>&quot;C&quot; band</td>
<td>10 L1 and L2</td>
<td>10 L1 and L2</td>
</tr>
<tr>
<td>8</td>
<td>600 mΩ (1Ω)</td>
<td>10 L1 and L2</td>
<td>&quot;C&quot; band</td>
<td>10 L1 and L2</td>
<td>10 L1 and L2</td>
</tr>
<tr>
<td>9</td>
<td>600 mΩ (1Ω)</td>
<td>10 L1 and L2</td>
<td>&quot;C&quot; band</td>
<td>10 L1 and L2</td>
<td>10 L1 and L2</td>
</tr>
<tr>
<td>10</td>
<td>Repeat steps 7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>3.64 mΩ (1Ω)</td>
<td>10 L1 and L2</td>
<td>&quot;C&quot; band</td>
<td>10 L1 and L2</td>
<td>10 L1 and L2</td>
</tr>
<tr>
<td>12</td>
<td>1,000 mΩ (2Ω)</td>
<td>10 L1 and L2</td>
<td>&quot;C&quot; band</td>
<td>10 L1 and L2</td>
<td>10 L1 and L2</td>
</tr>
<tr>
<td>13</td>
<td>1,000 mΩ (2Ω)</td>
<td>10 L1 and L2</td>
<td>&quot;C&quot; band</td>
<td>10 L1 and L2</td>
<td>10 L1 and L2</td>
</tr>
</tbody>
</table>

---

### RECOMMENDED PARTS

**CHASSIS ASSEMBLIES (RC/4/6)**

- **Stock No.**
- **Description**
- **Unit/Lot Price**
- **Stock No.**
- **Description**
- **Unit/Lot Price**

**SPEAKER ASSEMBLIES (AL-4/5)**

- **Stock No.**
- **Description**
- **Unit/Lot Price**

**MICROELECTRONIC ASSEMBLIES**

- **Stock No.**
- **Description**
- **Unit/Lot Price**

---

**Note:** Following step 6, a radiated signal must be used for the remainder of the alignment. One or two turns of wire forming a loop approximately 18 inches in diameter inserted across the output of a transformer, such as RCA Model 1C3, or Stock No. 9573 (TV-97), etc., will be suitable. For the alignment using the radiated signal, the chassis must be placed in the cabinet and the receiver volume control turned up to provide same signal strength for alignment.

* Use minimum capacity peak if no wavc can be obtained. Check to determine that C18 has been adjusted to the correct peak by tuning the receiver to approximately 14.20 mc where a voice signal can be received.

**Use minimum capacity peak if no wavc can be obtained. Check to determine that C18 has been adjusted to the correct peak** by tuning the receiver to approximately 2.53 mc where a voice signal should be received.

**Adjust the inductance of "C" band loop by varying the spacing between the leads of the loop. Moving the leads closer together decreases the inductance and tunes the loop to a higher frequency; moving the leads further apart increases the inductance and tunes the loop to a lower frequency.**

**Important:** The oscillator tracks on the signal on all bands.

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**All prices are subject to change or withdrawal without notice.**
MODEL 5066
Alignment, Trimmers
Socket.

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the schematic.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil and turn the receiver volume control to maximum.

Test Oscillator.—For all alignment operations, connect the low side of the test oscillator to the receiver ground lead (black), and keep the output as low as possible to avoid a.c. action.

Calibration Scale on Indicates Drive Cord—The tuning dial is fastened to the cabinet and cannot be used for reference during alignment; therefore, a calibration scale is attached to the rear of the drum which is mounted on the front shaft of the gang condenser. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

As the first step in r-f alignment, check the position of the drum. The 135° mark on the drum scale must be vertical, and directly under the center of the gang-condenser shaft when the plates are fully meshed. The drum is held to the shaft by means of a set screw, which must be tightened securely when the drum is in the correct position.

Pointed for Calibration Scale.—Improvise a pointer for the calibration scale by fastening a piece of wire to the gang-condenser frame, and bend the wire so that it points to the 0° mark on the calibration scale when the plates are fully meshed.

Dial Indicator Adjustment.—After fastening the chassis in the cabinet, attach the dial indicator to the drive cable with indicator at the 500 kc mark, and gang condenser fully meshed. The indicator has a spring clip for attachment to the cable.

<table>
<thead>
<tr>
<th>Steps</th>
<th>Connect collector high side of test osc.</th>
<th>Tune test osc. to</th>
<th>Turn radio dial to</th>
<th>Adjust the following for max. peak output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>12SK7 L-F grid in series with 0.1 mfd</td>
<td>455 kc</td>
<td>“A” Band</td>
<td>L10 and L11 (2nd I.F.)</td>
</tr>
<tr>
<td>2</td>
<td>Tuning condenser stator (sec.) in series with 0.1 mfd</td>
<td>455 kc</td>
<td>600 kc (36°)</td>
<td>L7 and L9 (1st I.F.)</td>
</tr>
<tr>
<td>3</td>
<td>Antenna lead in series with 260 mmd</td>
<td>1,500 kc</td>
<td>“A” Band</td>
<td>C2 (ant.)</td>
</tr>
<tr>
<td>4</td>
<td>Repeat steps 3 and 4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Antenna lead in series with 600 ohm</td>
<td>20 mc (1504°)</td>
<td>“A” Band</td>
<td>C3 (ant.)</td>
</tr>
<tr>
<td>6</td>
<td>Antenna lead in series with 600 ohm</td>
<td>6 mc (168°)</td>
<td>“B” Band</td>
<td>C6 (ant.)</td>
</tr>
<tr>
<td>7</td>
<td>Antenna lead in series with 260 mmd</td>
<td>1,500 kc</td>
<td>“A” Band</td>
<td>C8 (ant.)</td>
</tr>
</tbody>
</table>

* Use minimum capacity condenser if two peaks can be obtained.

** Make test-oscillator connection to lug on tuning condenser (stator sections) in series with 0.1 mfd condenser.

Note.—Oscillator tracks 450 kc above signal on all bands.

Above—Top View

At Right—Dial Mechanism

Calibration Scale

| 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 | 160 | 170 | 180 |
|---|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| A | 550| 600| 700| 800| 1000| 1200| 1400| 1700| 1900| 2100| 2300| 2500| 2700| 3000| 3200| 3400| 3600| 3800| 4000|

Reduced Reproduction of Receiver Dial, and Corresponding 0-180° Calibration Scales

The corresponding position of the dial indicator for any setting of the calibration scale can be determined by drawing a line from this point on the calibration scale to the point on the top calibration scale. For example, 32° on the calibration scale corresponds to approximately 7.9 on "C" band, and 600 kc on "A" band, etc. Read instructions under "Alignment Procedure."
Phonograph Operation:

A jack is provided on the rear of the chassis for connection to a phonograph attachment. The cable from the phonograph attachment should be terminated in a Stock No. 31048 plug to fit the jack.

The attachment must be designed to operate on the particular voltage and frequency of the power supply line. (Most attachments are for alternating current only, and cannot be used on direct current.)

Precautionary Lead Dress:

1. Dress the black diode lead running between the 12SQ7 and terminal G on the 2nd I-F transformer, directly against the chassis.

2. Dress the brown lead from terminal E on the 2nd I-F transformer to terminal 11 on S8 against the chassis.

3. Dress the phono lead from phono jack to switch along the side of the chassis.

4. Dress the filament lead from No. 8 of the 12SQ7 to 12SK7 R.F. behind the 12SQ7 socket and away from diode and plate.

5. Dress C-34 and R-11 along chassis above volume control.

Caution!

Before replacing ballast resistor, check rectifier and plate circuits to be sure that there are no shorts which would cause the ballast to burn out.

RCA Tube Complement

(1) RCA-12SK7. . . . . . . . . . . . . . . . . . . . . . . . . . R-F Amplifier
(2) RCA-12SA7 . . . . . . . . . . . . . . . . . . . . . . . . . 1st Detector, Oscillator
(3) RCA-12SK7 . . . . . . . . . . . . . . . . . . . . . . . . . 1-F Amplifier
(4) RCA-12SQ7 . . . 2nd Detector, A.V.C., Audio Amplifier
(5) RCA-50L6GT . . . . . . . . . . . . . . . . . . . . . . . . . Output
(6) RCA-32Z3GT . . . . . . . . . . . . . . . . . . . . . . . . . Rectifier
(7) RCA-6N5 . . . . . . . . . . . . . . . . . . . . . . . . . . . Tuning Indicator
RCA MFG. CO., INC.
Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the chassis drawing.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the black lead and keep the output as low as possible to avoid a-c-c action.

Calibration Scale on Indicator-Drive-Cord Drum.—The tuning dial is fastened in the cabinet and cannot be used for reference during alignment; therefore, a calibration scale is attached to the rear of the drum which is mounted on the front shaft of the gang condenser. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

As the first step in r-f alignment, check the position of the drum. The 0° mark on the drum scale must be vertical, and directly over the center of the gang-condenser shaft when the plates are fully meshed. The drum is held to the shaft by means of two set screws, which must be tightened securely when the drum is in the correct position.

As the second step in r-f alignment, check the position of the drum. The 0° mark on the drum scale must be vertical, and directly over the center of the gang-condenser shaft when the plates are fully meshed. The drum is held to the shaft by means of two set screws, which must be tightened securely when the drum is in the correct position.

<table>
<thead>
<tr>
<th>Steps</th>
<th>Connect the high side of test-osc to—</th>
<th>Tune test-osc to—</th>
<th>Turn radio dial to—</th>
<th>Adjust the following for maximum peak output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Turn tone control to 3rd position (sharp) from maximum counter-clockwise.</td>
<td>360 kc (149°) &quot;X&quot; band</td>
<td>C15 (osc.)†</td>
<td>C11 (osc.)* C19 (det.) C2 (ant.)</td>
</tr>
<tr>
<td>2</td>
<td>12SK7 I-F grid in series with .01 mfd.</td>
<td>360 kc (149°) &quot;X&quot; band</td>
<td>C21 (det.) C44 (ant.)</td>
<td>175 kc (53°) &quot;X&quot; band</td>
</tr>
<tr>
<td>3</td>
<td>12SA7 grid in series with .01 mfd.</td>
<td>1,500 kc (152°) &quot;A&quot; band</td>
<td>C18 (det.) C3 (ant.)</td>
<td>600 kc (32°) &quot;A&quot; band</td>
</tr>
<tr>
<td>4</td>
<td>Turn tone control to 4th position (broad) from maximum counter-clockwise and check I-F response which should be a slightly double-peaked curve. Leave tone control in 3rd position (sharp) for the following steps.</td>
<td>360 kc (149°) &quot;X&quot; band</td>
<td>C15 (osc.)†</td>
<td>C11 (osc.)* C19 (det.) C2 (ant.)</td>
</tr>
<tr>
<td>5</td>
<td>360 kc (149°) &quot;X&quot; band</td>
<td>175 kc (53°) &quot;X&quot; band</td>
<td>L10 (osc.) Rock gang</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>600 kc (32°) &quot;A&quot; band</td>
<td>1,500 kc (152°) &quot;A&quot; band</td>
<td>C18 (det.) C3 (ant.)</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>C10 (osc.)†</td>
<td>Ant. lead in series with 200 mmfd.</td>
<td>1,500 kc (152°) &quot;A&quot; band</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>L9 (osc.) Rock gang</td>
<td>600 kc (32°) &quot;A&quot; band</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Repeat steps 5, 6, 7, and 8.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Ant. lead in series with 300 ohms</td>
<td>6 mc (149°) &quot;B&quot; band</td>
<td>C10 (osc.)** C20 (det.) C1 (ant.)</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>20 mc (157°) &quot;C&quot; band</td>
<td>6 mc (149°) &quot;B&quot; band</td>
<td>C11 (osc.)* C19 (det.) C2 (ant.)</td>
<td></td>
</tr>
</tbody>
</table>

* Use minimum capacity peak if two can be obtained. Check to determine that C11 has been adjusted to the correct peak by tuning receiver to approximately 5.90 mc where a weaker signal should be received.

** Use minimum capacity peak if two can be obtained. Check to determine that C9 has been adjusted to the correct peak by tuning receiver to approximately 19.09 mc where a weaker signal should be received.

† Preset L10 core approximately ½-inch out before adjusting C15.

‡ Preset L9 core screw flush with apron before adjusting C12.

Note.—Oscillator tracks above signal on all bands.
## Alignment Procedure

**Cathode-Ray Alignment** is the preferable method. Connections for the oscillograph are shown in the chassis drawing.

**Output Meter Alignment.**—If this method is used, connect the meter across the voice coil and turn the receiver volume control to maximum.

**Test-Oscillator.**—For all alignment operations, connect the low side of the test-oscillator to the receiver ground terminal (G), and keep the output as low as possible to avoid a-v action.

**Calibration Scale on Indicator-Drive-Cord Drum.**—The tuning dial is fastened in the cabinet and cannot be used for reference during alignment; therefore, a calibration scale is attached to the rear of the drum which is mounted on the front shaft of the gang condenser. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

As the first step in r-f alignment, check the position of the drum. The 180° mark on the drum scale must be vertical, and directly over the center of the gang-condenser shaft when the plates are fully meshed. The surface of the drum must be flush with the end of the gang-condenser shaft. The drum is held to the shaft by means of two set screws, which must be tightened securely when the drum is in the correct position.

**Pointer for Calibration Scale.**—Improve a pointer for the calibration scale by fastening a piece of wire to the gang-condenser frame, and bend the wire so that it points to the 180° mark on the calibration scale when the plates are fully meshed.

**Dial-Indicator Adjustment.**—After fastening the chassis in the cabinet, attach the dial indicator to the drive cable with indicator at the left-hand end mark on the dial scales and gang condenser fully meshed. The indicator has a spring clip for attachment to the cable.

<table>
<thead>
<tr>
<th>Steps</th>
<th>Connect the high side of test-osc. to</th>
<th>Tune test-osc. to</th>
<th>Turn radio dial to</th>
<th>Adjust the following for max. peak output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6S7-G 2nd-I.F. grid cap, in series with .01 mfd.</td>
<td>456 kc</td>
<td>“B” band, quiet point.</td>
<td>L13-and L14 (3rd I-F Trans.)</td>
</tr>
<tr>
<td>2</td>
<td>6S7-G 1st-I.F. grid cap, in series with .01 mfd.</td>
<td>6.1 mc</td>
<td>6.1 mc (20°) “B” band</td>
<td>C33 (osc.)* C8 (dec.)† C30 (ant.)</td>
</tr>
<tr>
<td>3</td>
<td>6DS-G 1st-det. grid cap, in series with .01 mfd.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Antenna Terminal, in series with 300 ohms</td>
<td>6.1 mc</td>
<td>6.1 mc (20°) “B” band</td>
<td>C33 (osc.)* C8 (dec.)† C30 (ant.)</td>
</tr>
<tr>
<td>4A</td>
<td>Check to determine that C33 has been adjusted to correct peak by turning radio to 5.19 mc (50°), where a weaker signal should be received.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Antenna Terminal, in series with 300 ohms</td>
<td>20 mc</td>
<td>20 mc (23.5°) “C” band</td>
<td>C31 (osc.)*</td>
</tr>
<tr>
<td>5A</td>
<td>Check to determine that C31 has been adjusted to correct peak by turning radio to 10.08 mc (23.5°), where a weaker signal should be received.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Antenna Terminal, in series with 300 ohms</td>
<td>1,500 kc</td>
<td>1,500 kc (31°) “A” band</td>
<td>C34 (osc.)*</td>
</tr>
<tr>
<td>7</td>
<td>Antenna Terminal in series with 300 mmf.</td>
<td>500 kc</td>
<td>600 kc (144.5°) “A” band</td>
<td>L17 (osc.)††</td>
</tr>
<tr>
<td>8</td>
<td>Repeat Step No. 6.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Use minimum capacity peak (plunger out) if two peaks can be obtained.
† Rock the gang condenser slightly while adjusting C8, and use maximum capacity peak if two peaks can be obtained.
†† Rock the gang condenser slightly while adjusting L17 for maximum output.

**NOTE:** The oscillator tracks 455 kc above the signal on all bands.
POWER OUTPUT RATING
Maximum..............  2.8 watts
Undistorted........  2.0 watts

Power Supply Rating
D-C Rating (with vibrator-type power supply unit)—
6.3 volts, 3.5 amps.
A-C Rating (with CV-110 A-C power supply unit)—

Precautionary Lead Dress—
1. Dress the leads from 1st-detector coil to range switch away from trimmer C8.
2. Dress all leads away from the tap on the volume control.
3. Dress the blue lead from the antenna terminal to the range switch close to chassis.
4. Grid-can connectors must not ground to tube shields.
5. Dress black lead from terminal 7 on power connector into corner and close to side of chassis.

Victrora Attachment (Record Player)
(See Model 72B)

Loudspeaker (Permanent-Magnet Dynamic)
Voice-coil impedance at 400 cycles................... 2.2 ohms

IF PEAK 486 KC

Pilot Lamps (2) — Mazda No. 44, 6.3 volts, 0.25 amp.

Arrangement of Drive Cords for Tuning Condenser and Dial Indicator

Record Player Connections, Using a Double-Pole, Double-Throw Toggle Switch

Compliments of www.nucow.com
INTERMEDIATE FREQUENCY

Crystal Pickup
Impedance ............... 100,000 ohms at 1,000 c.p.s.
Average Output ........... 1.5 volts at 1,000 c.p.s. across 500,000 ohms load

Pilot Lamps (3) .......... 2-Mazda No. 46, 6.3 volts, 0.25 amp.; 1-Mazda No. 47, 6.3 volts, 0.15 amp

Power Output Rating
Undistorted .............. 4.5 watts
Maximum .................. 5.5 watts

Loudspeaker (RL-63J-6)
Type ....................... 8-inch electrodynamic
V.C. Impedance ............ 2.2 ohms at 400 c.p.s.

Phonograph Motor .......... self-starting, constant-speed, induction type

Alignment

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the chassis drawing.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis and keep the output as low as possible to avoid a-v-c action.

Calibration Scale on Indicator-Drive Cord Drum.—The tuning dial is fastened in the cabinet and cannot be used for reference during alignment; therefore, a calibration scale is attached to the rear of the drum which is mounted on the front shaft of the gang condenser. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

As the first step in the alignment, check the position of the drum. The 180° mark on the drum scale must be vertical, and directly over the center of the gang-condenser shaft when the plates are fully meshed. The drum is held to the shaft by means of two set screws, which must be tightened securely when the drum is in the correct position.

Procedure

For all alignment operations, connect the low side of the test-oscillator to the receiver chassis and keep the output as low as possible to avoid a-v-c action.

Calibration Scale on Indicator-Drive Cord Drum.—The tuning dial is fastened in the cabinet and cannot be used for reference during alignment; therefore, a calibration scale is attached to the rear of the drum which is mounted on the front shaft of the gang condenser. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

As the first step in the alignment, check the position of the drum. The 180° mark on the drum scale must be vertical, and directly over the center of the gang-condenser shaft when the plates are fully meshed. The drum is held to the shaft by means of two set screws, which must be tightened securely when the drum is in the correct position.

Alignment

RCA MFG. CO., INC.

Specifications

Magnetic Pickup
Impedance ............... 96 ohms at 1,000 c.p.s.
Average Output ........... 0.14 volts at 400 c.p.s. across open circuit

Power Supply Ratings

SQ2:
Rating A .................. 105-125 volts, 50-60 cycles, 75 watts
Rating B .................. 105-125 volts, 25-60 cycles, 75 watts
Rating C .................. 100-130, 140-160, 195-230 volts, 40-60 cycles, 75 watts

SQUSC and SQUSM:
Rating A5 .................. 105-125 volts, 50 cycles, 105 watts
Rating A6 ................. 105-125 volts, 60 cycles, 105 watts
Rating C5 .................. 105-125; 200-250 volts, 50 cycles, 105 watts
Rating C6 .................. 105-125; 200-250 volts, 60 cycles, 105 watts

Procedure

Caution: The receiver must be turned off before making any adjustments.

1. Connect the high side of the test-oscillator to the receiver chassis.
2. Tune the test-oscillator to 455 kHz.
3. Turn the radio dial to L14 and L15 (2nd I-F Trans.)
4. Connect the high side of the test-oscillator to the receiver chassis.
5. Connect the high side of the test-oscillator to the receiver chassis.
6. Tune the test-oscillator to 600 kHz.
7. Connect the high side of the test-oscillator to the receiver chassis.
8. Connect the high side of the test-oscillator to the receiver chassis.
9. Connect the high side of the test-oscillator to the receiver chassis.
10. Connect the high side of the test-oscillator to the receiver chassis.
11. Connect the high side of the test-oscillator to the receiver chassis.

* Use maximum capacity peak if two peaks can be obtained.
† Use maximum capacity peak if two peaks can be obtained.

Calibration Scale

Reduced Reproduction of Receiver Dial, and Corresponding 0-180° Calibration Scale

The corresponding position of the dial indicator for any setting of the calibration scale can be determined by drawing a line from this point on the bottom calibration scale to the same point on the top calibration scale. For example: 33° on the calibration scale corresponds to approximately 7.9 mc on "A" band, and 600 mc on "A" band etc. Read instructions under "Alignment Procedure."

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Victrola Data

The 8QUSM is equipped with a magnetic pickup, and the 8QUSC with a crystal pickup. The output of the crystal pickup is fed directly into the Victrola jack at the rear of the chassis. On instruments using a magnetic pickup, a transformer and compensating circuit are used between the pickup and the Victrola jack (see schematic diagram). The transformer has two jacks, the larger one (primary) for input from the pickup and the smaller one (secondary) for output to the compensating circuit. The components of the compensating circuit are mounted externally to the chassis on a terminal board in the rear of the cabinet.

The phonograph motor is a self-starting, constant-speed induction type. It should be lubricated very six months by applying a few drops of light machine oil to the spindle bearing and oil hole.

The motor spindle is tapered, and a conical rubber piece fits snugly on the spindle. The hole in the turntable bushing is tapered to fit the rubber. This provides an excellent self-centering floating mounting.

A metal washer is placed on the spindle under the rubber piece. The washer has ears on the under side which fit over a pin that projects from the spindle.

The motor switch is automatic for both starting and stopping, and when properly adjusted, will turn the motor on as the pickup is moved from the pickup rest toward the turntable. The switch should be adjusted so that it will snap into the "off" position when the pickup needle is 1⁄8 inches from the center line of the spindle shaft. The motor may be shut off at any time by placing the pickup on the pickup rest.

Crystal Pickup:

The crystal pickup is sealed in a metal case; if failure occurs, do not attempt to repair the unit, but install a new crystal unit.

Magnetic Pickup:

The magnetic pickup is sealed in a metal case; if failure occurs, do not attempt to repair the unit, but install a new crystal unit.

Centering Armature.—Refer to the figure showing the pickup inner structure. The armature is shown in its proper relation to the magnetic pole pieces, i.e., exactly centered. Whenever this centering adjustment has been disturbed it will be necessary to remove the pickup mechanism from the tone arm for readjustment. Unsolder the two leads from the tags on the terminal board at the rear of the pickup.

Damping Block.—The viscoloid damping block which is attached to the front end of the armature shank serves to reduce undesirable resonances and to cause the frequency response to be uniform. Should it be necessary to replace this damping block, the pickup mechanism should be removed from the tone arm. Remove screw D and the damping block from the pickup assembly. Make sure that the shaft of the armature which contacts the viscoloid is clean. Then insert the new damping block so that it occupies the same position as that of the original block, and is in correct vertical alignment with the armature. The hole in the block is somewhat smaller than the diameter of the armature in order to permit a snug fit. With the damping block properly aligned on the armature screw D with its washer should then be replaced. Heat should be applied to the armature (viscoloid side) so that the damping block will fuse at the point of contact and become rigidly attached to the armature. A small soldering iron, constructed as shown, will be found very useful in performing this operation. The iron should be applied only long enough to slightly melt the block, causing a small bulge on both sides.

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**RCA MFG. CO., INC.**

**MODELS SQ2, SQUSC, SQUSW**

**MODEL SQ4**

**MODEL ST51W**

**Parts Lists**

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**REPLACEMENT PARTS**

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### Alignment Procedure

**Dial-Indicator Adjustment**—After fastening the chassis in the cabinet, attach the dial indicator to the drive cable with indicator at the left-hand marks on the dial scale, and gang condenser fully meshed. The indicator has a spring clip for attachment to the cable.

<table>
<thead>
<tr>
<th>Steps</th>
<th>Connect the high side of test-osc. to</th>
<th>Tune test-osc. to</th>
<th>Turn radio dial to</th>
<th>Adjust the following for max. peak output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6K7 I-F grid cap, with 300 ohm resistor from cap to chassis</td>
<td></td>
<td>455 kc</td>
<td>L17 and L18* (3rd I-F Trans.)</td>
</tr>
<tr>
<td>2</td>
<td>6L7 1st-Det. grid cap, with 300 ohm resistor from cap to chassis, regular grid lead removed from cap</td>
<td></td>
<td>455 kc</td>
<td>L23 and L22 (2nd I-F Trans.) and L16 and L15** (1st I-F Trans.)</td>
</tr>
<tr>
<td>3</td>
<td>Antenna terminal (A), in series with 300 ohms</td>
<td>6.1 mc</td>
<td>6.1 mc (28.2°) &quot;B&quot; band</td>
<td>C37 (osc.)*** C10 (det.)† C5 (ant.)</td>
</tr>
<tr>
<td>4</td>
<td>Antenna terminal, in series with 300 ohms</td>
<td>20 mc</td>
<td>20 mc (22.5°) &quot;C&quot; band</td>
<td>C35 (osc.)††</td>
</tr>
<tr>
<td>5</td>
<td>Antenna terminal, in series with 200 mmf.</td>
<td>1,500 kc</td>
<td>1,500 kc (32°) &quot;A&quot; band</td>
<td>C38 (osc.)</td>
</tr>
<tr>
<td>6</td>
<td>Antenna terminal, in series with 200 mmf.</td>
<td>600 kc</td>
<td>600 kc (143.8°) &quot;A&quot; band</td>
<td>L13 (osc.)</td>
</tr>
<tr>
<td>7</td>
<td>Repeat steps 5 and 6.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Adjust C39 so that it projects approximately 15/16-inch above top of chassis.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Antenna terminal, in series with 200 mmf.</td>
<td>175 kc</td>
<td>175 kc (121.3°) &quot;X&quot; band</td>
<td>L14 (osc.)</td>
</tr>
<tr>
<td>10</td>
<td>Antenna terminal, in series with 200 mmf.</td>
<td>360 kc</td>
<td>360 kc (30.2°) &quot;X&quot; band</td>
<td>C39 (osc.) C11 (det.) C1 (ant.)</td>
</tr>
<tr>
<td>11</td>
<td>Repeat oscillator adjustments in steps 9 and 10.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

* Adjust for coincident response curves when using oscillograph.

** Readjust L23, L12, L16, and L15 several times to secure coincident curves. Turn fidelity control full clockwise (broad) and check response, which should be symmetrical, and with greater gain than on sharp.

*** Use minimum capacity peak if two peaks can be obtained with C37.

† Rock the gang condenser slightly and use maximum capacity peak if two peaks can be obtained with C10. Check to determine that C37 has been adjusted to the correct peak by turning receiver to 5.19 mc (50°) where a weaker signal should be received.

†† Use minimum capacity peak if two peaks can be obtained, and check to determine that C35 has been adjusted to the correct peak by turning the receiver to 19.09 mc (27½°) where a weaker signal should be received.

**NOTE:** The oscillator tracks 455 kc above the signal on all bands.

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First Edition

Pilot Lamps (2) Mazda No. 44, 6.3 volts, 25 amp.

Frequency Ranges
Long Wave ("X" Band) 150-400 kc (2,000-750 m)
Standard Broadcast ("A" Band) 530-1,720 kc (556-174 m)
Medium Wave ("B" Band) 2.1-7.0 mc (130-42.8 m)
Short Wave ("C" Band) 7.0-22 mc (42.8-13.6 m)

Precautionary Lead Dress
1. Dress leads and wiring parts away from 6J7 oscillator grid.
2. Twist together the two leads from the 1st i-f transformer to the fidelity switch. Also the two leads from the 2nd i-f transformer.
3. Dress all leads away from the detector coil.
4. Dress leads from the detector coil to the range switch (contacts 7 and 8 on detector section of switch) away from the detector trimmer C10.

In the event that a Stock No. 9824 switch is not available, a double-pole—double-throw toggle switch may be used, connecting it as shown above.

The radio volume control may be used to regulate the volume of the record player.

Connections of Loudspeaker and Cable

Victrola Attachment (Record Player)—Terminals are provided on the rear of the chassis for convenient connection to a Victrola Attachment (record player) such as the RCA R-93 and R-94 series. A stock No. 9824 switch may be used to change from radio to record player as shown above.
Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the chassis drawing.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the output as low as possible to avoid a-c voltage action.

Calibration Scale on Indicator-Drive-Cord Drum.—The tuning dial is fastened in the cabinet and cannot be used for reference during alignment, therefore a calibration scale is attached to the indicator-drive-cord drum which is mounted on the shaft of the gang condenser. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

As the first step in r-f alignment, check the position of the drum. The “0” mark on the drum scale must be vertical, and directly over the center of the gang-condenser shaft when the plates are fully meshed. The drum is held to the shaft by means of two set screws, which must be tightened securely when the drum is in the correct position.

To determine the corresponding frequency for any setting of the calibration scales, refer to the accompanying drawing which shows the dial with 0° and 180° calibration scales drawn at top and bottom.

Pointer for Calibration Scale.—Improvise a pointer for the calibration scale by fastening a piece of wire to the gang-condenser frame, and bend the wire so that it points to the “0” mark on the calibration scale when the plates are fully meshed.

Dial-Indicator Adjustment.—After fastening the chassis in the cabinet, attach the dial indicator to the drive cable with indicator at the 530 kc mark, and gang condenser fully meshed. The indicator has a spring clip for attachment to the cable.

Spread-Band Alignment.—The most satisfactory method of aligning or checking the spread-band ranges is on actual reception of short-wave stations of known frequency, by adjusting the magnetite-core oscillator coil for each band so that these stations come in at the correct points on the dial.

In exceptional cases, when the set is being serviced in a location where the noise level is high enough to prevent reception of short-wave stations, a test-oscillator may be used for alignment, but an extremely high degree of accuracy is required in the frequency settings of the test-oscillator, as a slight error will produce considerable inaccuracy in the spread-band dial. The frequency settings of the test-oscillator may be checked by one or both of the following methods:

1. Determine the exact dial settings of the test-oscillator (for frequencies at or close to the specified alignment frequencies) by zero-beating the test-oscillator against a short-wave station of known frequency.

2. Use harmonics of the standard-broadcast range of a test-oscillator, first checking the frequency settings on this range by means of a crystal calibrating (RCA Stock No. 9572), or by zero-beating against standard broadcast stations.

When a test oscillator is employed for spread-band alignment, a final check should be made on actual reception of short-wave stations of known frequencies and the magnetite-core oscillator coil for each band should be re-adjusted so that the stations come in at the correct points on the dial.

<table>
<thead>
<tr>
<th>Steps</th>
<th>Connect the high side of test-osc. to</th>
<th>Tune test-osc. to</th>
<th>Range switch</th>
<th>Turn radio dial to</th>
<th>Adjust the following for max. peak output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6BB 1-F Grid in series with .01 mfd.</td>
<td>455 kc</td>
<td>A</td>
<td>Quiet Point</td>
<td>L29 and L28 (2nd I.F. Trans.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Near 0°</td>
<td>L27 and L26 (1st I.F. Trans.)</td>
</tr>
<tr>
<td>2</td>
<td>8SA7 1st Detector Grid in series with .01 mfd.</td>
<td>9.5 mc</td>
<td>31M</td>
<td>20°</td>
<td>L13 (osc.<em>)</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>C24 (det.)*†</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>C2 (ant.)†</td>
</tr>
<tr>
<td>4</td>
<td>11.7 mc</td>
<td></td>
<td></td>
<td>171°</td>
<td>C16 (osc.<em>)</em></td>
</tr>
<tr>
<td>4A</td>
<td>Antenna Terminal in series with 300 ohms</td>
<td></td>
<td></td>
<td></td>
<td>C1 (osc.<em>)</em></td>
</tr>
<tr>
<td>5</td>
<td>9.5 mc</td>
<td></td>
<td></td>
<td>180°</td>
<td>C1 (osc.<em>)</em></td>
</tr>
<tr>
<td>5A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>C1 (osc.<em>)</em></td>
</tr>
<tr>
<td>6</td>
<td>3.0 mc</td>
<td></td>
<td></td>
<td>0°</td>
<td>L12 (osc.<em>)</em> (Rock Gang)</td>
</tr>
<tr>
<td>7</td>
<td>Antenna Terminal in series with 200 mfd.</td>
<td>1,500 kc</td>
<td>A</td>
<td>149°</td>
<td>C10 (osc.)</td>
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<tr>
<td>8</td>
<td>600 kc</td>
<td></td>
<td></td>
<td>27°</td>
<td>L11 (osc.) (Rock Gang)</td>
</tr>
<tr>
<td>8A</td>
<td>Repeat steps 7 and 8.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>11.8 mc</td>
<td></td>
<td>25M</td>
<td>33°</td>
<td>L14 (osc.<em>)</em></td>
</tr>
<tr>
<td>10</td>
<td>15.2 mc</td>
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<td>19M</td>
<td>37°</td>
<td>L15 (osc.<em>)</em></td>
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<tr>
<td>11</td>
<td>17.75 mc</td>
<td></td>
<td>16M</td>
<td>40°</td>
<td>L16 (osc.*)**</td>
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<tr>
<td>12</td>
<td>21.5 mc</td>
<td></td>
<td>13M</td>
<td>56°</td>
<td>L17 (osc.*)**</td>
</tr>
</tbody>
</table>

* Use peak with plunger out if two peaks can be obtained. ** Use peak with plunger in if two peaks can be obtained.
† Rock gang condenser slightly while peaking. Use maximum capacity peak if two peaks can be obtained.
FREQUENCY RANGES

Long Wave ("X" Band) .................................................. 145-405 kc (2,069-740 m)
Standard Broadcast ("A" Band) ..................................... 540-1,720 kc (555-174 m)
Medium Wave ("B" Band) ............................................. 2.3-7.0 mc (130-42.8 m)
Short Wave ("C" Band) .................................................. 7.0-22.6 mc (42.8-13.6 m)

Precautionary Lead Dress:
1. Dress black lead from L11 to C20 away from other leads.
2. Dress the green lead from the middle section of the gang away from any other leads, parts, or chassis.
3. Dress the black diode lead running between the 6SQ7 and terminal G on the 2nd I-F transformer, directly against the chassis.
4. Twist the power leads together and dress them away from the 6SQ7 socket, and also away from the yellow phono input lead.
5. Keep green lead of 6SK7 R-F grid circuit away from blue antenna lead.

Drive Cord and Band Indicator Arrangement
## RCA MFG. CO., INC.

### Alignment Procedure

**Cathode-Ray Alignment** is the preferable method. Connections for the oscillograph are shown in the chassis drawing.

**Output Meter Alignment**—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

**Test-Oscillator**—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the output as low as possible to avoid a-v-c action.

**Calibration Scale on Indicator-Drive-Cord Drum.** The tuning dial is fastened in the cabinet and cannot be used for reference during alignment; therefore, a calibration scale is attached to the rear of the drum which is mounted on the front shaft of the gang condenser. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

As the first step in r-f alignment, check the position of the drum. The 0° mark on the drum scale must be vertical, and directly over the center of the gang-condenser shaft when the plates are fully meshed. The drum is held to the shaft by means of two set screws, which must be tightened securely when the drum is in the correct position.

**Pointer for Calibration Scale**—Improvise a pointer for the calibration scale by fastening a piece of wire to the gang-condenser frame, and bend the wire so that it points to the 0° mark on the calibration scale when the plates are fully meshed.

**Dial-Indicator Adjustment**—After fastening the chassis in the cabinet, attach the dial indicator to the drive cable with indicator at the 530 kc mark, and gang condenser fully meshed.

<table>
<thead>
<tr>
<th>Steps</th>
<th>Connect the high side of test-osc. to</th>
<th>Tune test-osc. to</th>
<th>Turn radio dial to</th>
<th>Adjust the following for maximum peak output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>6SK7 I-F grid in series with .01 mfd.</td>
<td>656 kc</td>
<td>“A” Band quiet point between 550-750 kc</td>
<td>L18 and L19 (2nd I-F trans.)</td>
</tr>
<tr>
<td>3</td>
<td>6SA7 grid in series with .01 mfd.</td>
<td></td>
<td></td>
<td>L16 and L17 (1st I-F trans.)</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>175 kc</td>
<td>“X” Band</td>
<td>L16 (osc.) Rock gang</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>360 kc</td>
<td>“X” Band</td>
<td>C15 (osc.) C21 (det.) C44 (ant.)</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>600 kc</td>
<td>“A” Band</td>
<td>L9 (osc.) Rock gang</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>1,500 kc</td>
<td>“A” Band</td>
<td>C12 (osc.) C18 (det.) C3 (ant.)</td>
</tr>
<tr>
<td>9</td>
<td>Repeat steps 5, 6, 7, and 8.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>6.1 mc</td>
<td>“B” Band</td>
<td>C11 (osc.) C19 (det.) C2 (ant.)</td>
</tr>
<tr>
<td>11</td>
<td></td>
<td>20 mc</td>
<td>“C” Band</td>
<td>C9 (osc.) C20 (det.) C1 (ant.)</td>
</tr>
</tbody>
</table>

* Use minimum capacity peak if two can be obtained. Check to determine that C11 has been adjusted to the correct peak by tuning receiver to approximately 5.19 mc where a weaker signal should be received.

** Use minimum capacity peak if two can be obtained. Check to determine that C9 has been adjusted to the correct peak by tuning receiver to approximately 19.09 mc where a weaker signal should be received.

Note.—Oscillator tracks above signal on all bands.

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General Description

The crystal pickup in Model VA-21 is connected through a volume control to grid No. 1 in an RCA 6A8 tube which functions as a modulated r-f oscillator. The oscillator frequency can be adjusted from 500 to 625 kc by means of a magentic core in the oscillator transformer, L1-L2. This is a screwdriver adjustment at the rear of the cabinet. An output wire is connected to the grid circuit of the oscillator, and is run parallel with the power cable. The output is sufficient to permit operation within approximately 25 feet of a radio receiver.

Set-Up Procedure

1. Insert plug in power supply outlet, and turn the power switch—volume control knob on top of VA-21 to full clockwise position. Start a record on the VA-21. The motor is a synchronous manual-starting type, and requires a clockwise spin to start.
2. Tune the radio receiving set to a quiet point between 580-625 kc.
3. Tune the oscillator in the VA-21 to this frequency by adjusting the button on the rear of the VA-21 cabinet to obtain peak output on the receiver. Clockwise rotation decreases the frequency; counter-clockwise rotation increases the frequency.
4. Adjust the volume control for the highest volume that is likely to be required, and then use the VA-21 volume control for further adjustment.
5. In noisy locations, it may be desirable to leave the VA-21 volume control turned full clockwise, and regulate the radio volume control for the desired level.
6. If there is insufficient volume, or excessive noise, the remedy is to couple the VA-21 to the radio receiver, by running a piece of insulated wire between the two units. Wrap one end (three or four turns) around the antenna lead-in on the radio, and wrap the other end (three or four turns) around the short wire that projects from the plug on the power cord of the VA-21. With an RCA Master Antenna, wrap the wire around the counter-poise lead where it attaches to the rotor. (Terminal A3) or to the coupling unit. (Terminal B). With a loop receiver, place the end of the wire close to the loop.
7. If the radio receiver has push-button tuning, one of the buttons may be set up to tune in the VA-21 oscillator frequency. This button should be marked "Record Player."

Precautionary Lead Dress

1. The power supply cord must be dressed between chassis and top of cabinet, away from grid of 6A8, and entirely away from 25Z6-G.
2. All leads to oscillator coil must be as short as possible.
3. All motor leads must be dressed away from rotor.
4. Pickup leads must be dressed away from the top grid of 6A8, and kept away from the 25Z6-G.

Motor Data

Smooth starting and running will be insured by keeping the bearings well cleaned and oiled.

Hum and Vibration.—A small amount of hum when starting decreasing to a negligible amount when running, is normal. If excessive vibration occurs it may be due to:
1. Insufficient lubrication, or any failure that will cause binding.
2. Leaseh washer not oiled. (Check to make certain that the leaseh washer is above the steel washer.)
3. Motor not properly supported from motor board.
4. Burns on poles of rotor or stator. Remove with file emery cloth.

The damper spring must fit without binding or chattering in the slot in the stator. The stator must be free to deflect in either direction between the limits of the damper spring. The damper spring must exert approximately equal force in restoring the stator to its mid-position when the stator is deflected manually in each direction.

Removing Rotor.—The rotor and turntable assembly simply rests on the ball bearing at bottom of vertical bearing. Remove by lifting upward.

Rotor Adjustment.—Remove motor from cabinet. Loosen the three screws that hold the rotor to the turntable, insert three 16-mil shims at equal distance around the gap between the rotor and stator, and then carefully tighten the three screws. The top of rotor must be flush with top of stator; add additional steel washers beneath the stator if necessary.
Alignment Procedure

Output Meter Alignment. Connect the meter across the voice coil, and turn the receiver volume control to maximum:

Test Oscillator. Connect the low side of the test oscillator to the receiver chassis through a 0.01 mfd capacitor, and keep the output as low as possible.

Pre-Setting Dial. With gang condenser in full mesh, the pointer should coincide with the left hand mark stamped in the dial backplate.

Antenna. This set is equipped with a built-in loop antenna. If an outdoor antenna is used, it may be connected to the green antenna lead, stapled to the base of the cabinet. The antenna should not be longer than 100 feet including the lead-in. If it is longer, connect a 100 muf, capacitor in series with the lead-in.

<table>
<thead>
<tr>
<th>Steps</th>
<th>Connect the high side of test oscillator to</th>
<th>Tune test osc. to</th>
<th>Turn radio dial to</th>
<th>Adjust the following for max. output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tuning Cond. stator (det.) in series with 0.01 mfd</td>
<td>455 kc</td>
<td>Quiet Point at 1,000 kc end of dial</td>
<td>C96, C98, C99 (1st and last IF transformers)</td>
</tr>
<tr>
<td>2</td>
<td>Antenna lead (green) in series with 100 muf</td>
<td>1,720 kc</td>
<td>Full Clockwise (out of mesh)</td>
<td>C92 (osc.)</td>
</tr>
<tr>
<td>3</td>
<td>Antenna lead (green) in series with 100 muf</td>
<td>1,500 kc</td>
<td>Resonance on 1,500 kc signal</td>
<td>C91 (ant.)</td>
</tr>
</tbody>
</table>

LEAD:
- black-high side of AC line
- blue and brown leads from phono switch
- green converter lead
- green diode lead

DRESS:
- Away from R10, C9, R7 and C15; against side of chassis
- Up away from chassis
- Against base and away from diode lead
- Tape to shielded cable away from phone switch black leads

bearers:
- C7, C9, C19, C14, R6, R7, R10, Shield Cable (green and yellow)

Compliments of www.nucow.com
PHONOGRAPH MECHANISM

The phonograph motor is self-starting and operates the turntable through friction drive between the motor spindle and the rubber tire on the underside of the turntable.

The rubber driving tire on the turntable should never be removed since it is ground in to be concentric with the spindle. If replacement is required, the entire turntable must be replaced.

The speed regulator raises and lowers the motor. This changes the driving ratio between the motor and the turntable due to the motor spindle being eccentric. It is important to adjust this regulator for a turntable speed of 78 r.p.m. while playing a 12-inch record with the needle approximately one inch from the outer edge of the record.

Lubrication. The motor should be lubricated as follows: Pour a few drops of SAE 0 (or equivalent) on the turntable spindle and saturate the oil retaining felt pads on the motor shaft with SAE 10 oil. This oiling process should be done every year. CAUTION — THE MOTOR DRIVE SPINDLE AND RUBBER DRIVING TIRE ON THE TURNTABLE MUST BE KEPT CLEAN AND ENTIRELY FREE FROM OIL AND GREASE AT ALL TIMES.

FREQUENCY RANGES

Standard Broadcast and one Police Band: 540-1,720 kc

INTERMEDIATE FREQUENCY: 455 kc

TUBE COMPLEMENT:

(1) RCA-15SA7 1st Detector—Oscillator
(2) RCA-15SK7 1st F. Amplifier
(3) RCA-15SA7 2nd Detector, A.V.C., A.F.
(4) RCA-50L6GT Power Output
(5) RCA-5S5ZGT Rectifier

PILOT LAMP (1) Mazda No. 11, 7.5 volts, 0.2 amp.

REPLACEMENT PARTS

Chassis Assemblies (RC-482C)

55961 Ball-Ball for turntable bearing
55962 Base-Motor base and ball assembled
55963 Motor-Complete motor 100-125 volts, 60 cycle
55964 Motor-Complete motor (115 volt)
55965 Mounting-Motor cradle mounting and hardware
55966 Pickup—Pickup arm and shaft

Pickup—Pickup arm and shaft

61000 Pickup—Pickup arm and shaft

Motor Assemblies

55907 Cap—Dust cap
55908 Cone—Cone complete with voice coil
55909 Plug—Sprung male plug for speaker

Speaker Assemblies (RL-813A)

Cap—Dust cap

55907 Cap—Dust cap
55908 Cone—Cone complete with voice coil
55909 Plug—Sprung male plug for speaker

Miscellaneous Assemblies

Compliments of www.nucow.com
RCA MFG. CO., INC.
MODELS 14BT1, 14BT2, 14BY
Ch., RC-525, RC-525A, RC-525B
Schematic, Gain, Voltage
Alignment, Trimmers, Socket Lead Dress, Batt. Connection

**TUBE AND TRIMMER LOCATIONS**

First Edition — 1940 No. 16 —

**Frequency Range**
540-1,720 kc

**Intermediate Frequency**
465 kc

**Type**
Permanent-magnet Dynamic

**Diameter (14BT1, 14BT2)**
5 in. (14BK) 6 in. (14BN)

**Voice Coil Impedance (14BT1, 14BT2)**
4 ohms (14BK) 3.4 ohms

**Output Meter Alignment**
If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

**Alignment Procedure**

**Power Output**
Switch at 
"Battery Saver"
Switch at 
"Music" or 
"Speech"

**Undistorted**
.065 watts
.140 watts

**Maximum**
.300 watts
.750 watts

**Batteries Required**
1 "A" — "B" Pack (Burgess Type 17GD60 or equivalent).

**Current Consumption**
"A" 0.25 ampere
"B" 7.3 mA (at "Battery Saver" position),
11.5 mA (at "Music" or "Speech" position).

**Precautionary Lead Dress**
1. The phono input leads should be dressed away from 9Q5GT output leads.
2. C31 should be dressed away from the 3Q5GT output leads.
3. The lead from the 9Q5GT plate to output transformer should be dressed under clip and away from audio input plate leads.

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## Models 14BT1, 14BT2, and 14BK

**Chassis No.**: RC-355, S25A, S25B

### Replacement Parts

<table>
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<tr>
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<th>Description</th>
<th>Unit Price</th>
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</thead>
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<td>.10</td>
</tr>
</tbody>
</table>

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## Models 16K, 16T2, and 16T3

**Chassis No.**: RC-509C, RC-509B, RC-509A

### Replacement Parts

<table>
<thead>
<tr>
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<th>Description</th>
<th>Unit Price</th>
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</tr>
<tr>
<td>24725</td>
<td>Board...</td>
<td>.20</td>
</tr>
<tr>
<td>24726</td>
<td>Board...</td>
<td>.20</td>
</tr>
<tr>
<td>24727</td>
<td>Board...</td>
<td>.20</td>
</tr>
<tr>
<td>24728</td>
<td>Board...</td>
<td>.20</td>
</tr>
<tr>
<td>24729</td>
<td>Board...</td>
<td>.20</td>
</tr>
<tr>
<td>24730</td>
<td>Board...</td>
<td>.20</td>
</tr>
</tbody>
</table>

---

**ALL PRICES ARE SUBJECT TO CHANGE OR WITHDRAWAL WITHOUT NOTICE.**

**XX—Price upon application to your local RCA Victor Parts Distributor.**

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### Calibration Scale

- The glass tuning dial may be easily removed from the cabinet and temporarily attached to the chassis for quick reference during alignment. In the event that only the chassis is returned for service, and the cabinet with its tuning dial is left in the customer's home, the calibration scale printed in this service note can be used in conjunction with an ordinary 12-inch ruler as an accurate and convenient substitute for the regular dial. Each method is described below.

#### Using Tuning Dial

1. Slide out the flat spring clamp at each end of the dial, and remove the glass dial from the cabinet.
2. With gang in full mesh, move the dial pointer to the reference mark at the left-hand end of the dial backing plate.
3. Place the glass dial under the pointer so that the extreme left scale graduations coincide with the pointer. Use Scotch tape to hold the glass dial in this position.
4. After completion of alignment, replace the glass dial in cabinet, taking care that the fibre light shields are in correct position at ends of scales.

#### Using Calibration Scale

1. With gang in full mesh, move the dial pointer to the reference mark at the left-hand end of the dial backing plate.
2. Place a flat 12-inch ruler on the dial backing plate so that the left end of ruler is at the reference mark at left end of backing plate. Temporarily fasten the ruler with Scotch tape to the backing plate.
3. Refer to calibration scale printed in this service note. This is a reduced reproduction of the dial with an inch-scale drawn at top and bottom. To find the correct pointer position in inches for any desired frequency, draw a vertical line through this frequency on the calibration scale. For example, 1,500 kHz is approximately 4 inches from the reference mark.

#### Dial-Pointer Adjustment

- After the chassis is replaced in cabinet, move the dial pointer (if necessary) so that it is at the left-hand graduation on the dial with the gang in full mesh.

<table>
<thead>
<tr>
<th>Steps</th>
<th>Connect the high side of the test-oct to</th>
<th>Tune test-oct to</th>
<th>Turn radio dial to</th>
<th>Adjust the following for maximum peak output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I-F grid, in series with .01 mfd.</td>
<td>450 kc</td>
<td>“A” band, Quiet Point at 1,500 kc end of dial</td>
<td>L7 and L8 (2nd I.F. Trans.)</td>
</tr>
<tr>
<td>2</td>
<td>1st det. grid, in series with .01 mfd.</td>
<td></td>
<td></td>
<td>L5 and L6 (1st I.F. Trans.)</td>
</tr>
<tr>
<td>3</td>
<td>Antenna terminal, in series with 300 ohms (link open)</td>
<td>15.2 mc</td>
<td>15.2 mc “C” band</td>
<td>C11 (osc.)</td>
</tr>
<tr>
<td>4</td>
<td>Antenna terminal, in series with 200 mmfd. (link open)</td>
<td>1,500 kc</td>
<td>1,500 kc “A” band</td>
<td>C29 (osc.)</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>600 kc</td>
<td>600 kc “A” band</td>
<td>L3 (in 16T2)</td>
</tr>
</tbody>
</table>

In case of instability during R-F alignment, connect a 27,000 ohm 1/2 watt resistor across “D” and “F” of 2nd I-F transformer.

* Use minimum capacity if two peaks can be obtained. Check to determine that the correct peak has been used, by tuning receiver to 14.39 mc, where a weaker signal should be received.

Note: Oscillator tracks above signal on both bands.
Push Button Adjustment (Models 16K and 16T3)

The push buttons connect to separate magnetite-core oscillator coils and separate loop circuit trimmers which must be adjusted for the desired stations. Use an insulated screwdriver or alignment tool such as RCA Stock No. 31031. Allow about five minutes warm-up period before making adjustments.

The procedure is as follows:
1. Make a list of the five desired stations, arranged in order from low to high frequencies.
2. Turn the range switch to the broadcast (BC) position and manually tune in the first station on the list.
3. Turn range switch to push-button (PB) position and press in the left-hand button.
4. Unscrew the push-button loop trimmers to minimum capacity.
5. Adjust L9 to receive the first station. To secure the best adjustment, rotate the set for least pickup, and adjust L9 for peak output.
6. Adjust C44 for peak output on the first station.
7. Proceed in the same manner to adjust for the remaining four stations.

Owing to the relatively high R-F gain, it may be found that there are several settings of each push-button magnetite core that will bring in any particular station. The procedure outlined above (backing the push-button loop trimmers to minimum capacity before adjusting the cores) will reduce this effect.

On the 880 to 1,560 kc push-button, the higher frequency stations may be received with L5 either in or out (oscillator frequency either 455 kc below or 455 kc above the station frequency). The adjustment with this core in its out position (oscillator frequency 455 kc above the station frequency) is the correct one.

NOTE: Clockwise adjustment of cores and trimmers tunes the circuits to lower frequencies.
MODEL 1674
Alignment, Trimmers, Socket Tuner, Loop Connections

RCA MFG. CO., INC.

Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the schematic diagrams.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For all alignment operations, connect the low side of the test oscillator to the receiver chassis, and keep the output as low as possible to avoid a-c-v action.

Electronic Voltmeter.—The electronic voltmeter in the Channelyst or Volt-Ompro provides an unexcelled output indicator. It should be connected to the AVC bus, and the test-oscillator output adjusted to produce several volts of AVC.

Calibration Scale.—The tuning dial may be easily removed from the cabinet and temporarily attached to the chassis for quick reference during alignment. Or, if necessary, the calibration scale printed in this service note can be used in conjunction with an ordinary 12-inch ruler as an accurate and convenient substitute for the regular dial.

Each method is described below.

Using Tuning Dial.—
1. Slide out the flat spring clamp at each end of the dial, and remove the glass dial from the cabinet.
2. With gang in full mesh, move the dial pointer to the reference mark at the left-hand end of the dial backing plate.
3. Place the glass dial under the pointer so that the extreme left scale graduations coincide with the pointer. Use Scotch tape to hold the glass dial in this position.
4. After completion of the alignment, replace the glass dial in position, taking care that the fibre light shields are in correct position at ends of dial.

Using Calibration Scale.—
1. With gang in full mesh, move the dial pointer to the reference mark at the left-hand end of the dial backing plate.

2. Place a flat 12-inch ruler on the dial backing plate so the left-hand end of ruler is at the reference mark at left-end of backing plate. Temporarily fasten the ruler with Scotch tape to the backing plate.
3. Refer to calibration scale printed in this service note. This is a reduced reproduction of the dial with an inch-scale drawn at top and bottom. To find the correct pointer position in inches for any desired frequency, draw a vertical line through this frequency on the calibration scale. For example, 1,500 kc is approximately 4 inches from the reference mark.

See Calibration Dial Model 16K

Dial-Pointer Adjustment.—After the chassis is replaced in cabinet, move the dial pointer (if necessary) so that it is at the left-hand graduation on the dial with the gang in full mesh.

Steps | Connect the high side of the test-osc. to— | Tune test-osc. to— | Turn radio dial to— | Adjust the following for maximum output—
--- | --- | --- | --- | ---
1 | 1-F grid, in series with 0.1 | 455 kc | “A” band, Quiet Point at 1,500 kc end of dial | L12 and L13 (2nd I.F. Trans.)
2 | 1st-Det. grid, in series with 0.1 | | | L10 and L11 (1st I.F. Trans.)
3 | Antenna terminal, in series with 300 ohms (link open) | 15.2 mc | | C11 (osc.)
4 | | 2.44 mc | | C34 (osc.)
5 | Antenna terminal, in series with 200 mmfd. (link open) | 1,500 kc | 1,500 kc | C29 (osc.)
6 | | 600 kc | | C3 (ant.)
7 | | 600 kc | | L4 Rock in

* Use minimum capacity peak if two peaks can be obtained. Check to determine that the correct peak has been used, by tuning receiver to 1429 mc, where a weaker signal should be received.

Note: Oscillator tracks above signal on all bands.

Push Button Adjustment

The push buttons connect to separate magnetite-core oscillator coils and separate antenna trimmers which must be adjusted for the desired stations. Use an insulated screwdriver or alignment tool such as RCA Stock No. 31095. Allow at least five minutes warm-up period before making adjustments.

In the event that the receiver is to be used with an external antenna use one or two feet of wire (as an antenna) to ensure sharp peaks for the final adjustment procedure. For loop operation, the link should be strapped across “A” and “G” terminals on back of set.

In either case the procedure is as follows:
1. Make a list of the desired stations, arranged in order from low to high frequencies.
2. Turn the range selector to “A” band, and manually tune in the first station on the list.
3. Turn range selector to “FR” position, push in station button left (L,9) to receive the station.
4. After oscillator core is adjusted properly, adjust C-44 for maximum output.
5. Owing to the relatively high RF gain, it may be found that there are several tunings of each push-button magnetite core that will bring in any particular station. In such cases it is advisable to unscrew the push-button loop trimmers to minimum capacity before adjusting the push-button magnetite push button.
6. Clockwise adjustment of cores and trimmers tunes the circuits to lower frequencies.
7. Adjust for each of the remaining stations in this same manner.
8. Make a final careful adjustment of the oscillator cores and antenna trimmers.

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Compliments of www.nucow.com
Model 17K
Alignment, Trimmers
Socket, Dial, Loop

RCA MFG. CO., INC.

Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the schematic diagram.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the output as low as possible to avoid a-v-c action.

Calibration for Alignment.—The proper dial calibration for alignment purposes can be set up in two ways:

1. The dial may be removed from the cabinet by sliding out the two spring pieces which clamp it in its mounting position. The condenser plates should then be turned into full mesh, the pointer adjusted to the scratch at the left end of the dial backing plate, and the dial slipped under the pointer so that its extreme left calibration mark coincides with the pointer. The dial may be held in place with Scotch tape. In this manner the actual receiver dial is used for alignment. When alignment is finished, the scale should be replaced including the fibre light shields which are folded under the ends of the glass scale.

2. A calibration scale is attached to the tuning drum. The correct setting of the gang, in degrees, for each alignment frequency is given in the alignment table. Check the position of the drum, making sure that the 0 degree scale mark is horizontal with the gang in full mesh.

Pointer for Calibration Scale.—If method (2) is used, improvise a pointer for the calibration scale by fastening a piece of wire to the chassis, and bend the wire so that it points to the 0 degree mark on the calibration scale when the plates are fully meshed.

<table>
<thead>
<tr>
<th>Steps</th>
<th>Connect high side of test oscillator to</th>
<th>Tune test osc. to</th>
<th>Turn radio dial to</th>
<th>Adjust the following for maximum peak output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6SK7 I-F grid in series with 0.01 mfd.</td>
<td>455 kc</td>
<td></td>
<td>L-21 and L-22 (2nd I-F Trans.)</td>
</tr>
<tr>
<td>2</td>
<td>6SK7 grid in series with 0.01 mfd.</td>
<td></td>
<td></td>
<td>L-15 and L-20 (1st I-F Trans.)</td>
</tr>
<tr>
<td>3</td>
<td>Antenna terminal in series with 47 mfd.</td>
<td>15.2 mc</td>
<td></td>
<td>C-24 (Osc.)* Rock gang</td>
</tr>
<tr>
<td>4</td>
<td>Antenna terminal in series with 200 mfd. (link open)</td>
<td>2.44 mc (97°)</td>
<td></td>
<td>C-27 (Osc.)</td>
</tr>
<tr>
<td>5</td>
<td>Antenna terminal in series with 200 mfd.</td>
<td>600 kc (30.6°)</td>
<td></td>
<td>L-28 (Rock in)</td>
</tr>
<tr>
<td>6</td>
<td>Antenna terminal in series with 200 mfd.</td>
<td>1,500 kc</td>
<td></td>
<td>C-28 (Osc.)</td>
</tr>
</tbody>
</table>

* Use minimum capacity peak if two can be obtained. Check to determine that C-24 has been adjusted to correct peak by tuning receiver to approximately 1429 mc where a weaker signal should be received.

Note.—Oscillator tracks above signal on all bands.
RCA PAGE 11-159

RCA MFG. CO., INC.

MODEL 17K
Tuner Data, Parts

Push Button Adjustment

The station push buttons connect to separate magnetoo-core oscillator coils and separate antenna trimmers which must be adjusted for the desired stations. Use an insulated screwdriver or alignment tool such as RCA Stock No. 31031. Allow at least five minutes warming period before making adjustments.

In the event that the receiver is to be used with an external antenna use one or two lengths of wire (as an antenna) to ensure sharp peaking during the final adjustment procedure. For loop operation, the loop should be strapped across terminals on back of set. In either case the procedure is as follows:

1. Make a list of the desired stations, arranged in order from low to high frequencies.
2. Turn the range selector to "A" band, and manually tune in the first station on the list.
3. After turning range selector to "PB" position, push in station button No. 2 (extreme left). Then adjust the No. 1 oscillator core (L-14) to receive the station.
4. After oscillator core is set correctly, adjust C-8 for maximum output.
5. Clockwise adjustment of cores and trimmers tunes the circuits to lower frequencies.
6. Adjust for each of the remaining stations in the same manner.
7. Make a final careful adjustment of the oscillator cores and antenna trimmers.

Owing to the relatively high r-f gain, it may be found that a given station can be tuned in at several different settings on the magnetoo-core oscillator push-button coils. In such cases, it is advisable to unscrew the loop push-button trimmers to minimum capacity before adjusting the magnetoo-core coil.

On the 880 to 1,550 kc push-button, the higher frequency stations may be received with L-9 either in or out (oscillator frequency either 455 kc below or 455 kc above the station frequency). The adjustment with this core in its out position (oscillator frequency 455 kc above the station frequency) is the correct one.

Replacement Parts

Insist on genuine factory-tested parts, which are readily identified and may be purchased from authorized dealers.

<table>
<thead>
<tr>
<th>STOCK No.</th>
<th>DESCRIPTION</th>
<th>Unit Price</th>
<th>STOCK No.</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>34095</td>
<td>Board—&quot;Antenna-Ground&quot; board.</td>
<td>.25</td>
<td>12454</td>
<td>Resistor—33,000 ohms, 1 watt.</td>
</tr>
<tr>
<td>35796</td>
<td>Calibrator—Drive drum calibrator.</td>
<td>.25</td>
<td>12412</td>
<td>Resistor—47,000 ohms, 1 watt.</td>
</tr>
<tr>
<td>35797</td>
<td>Calibrator—Trimmer comprising 2 sections of 3-80 mmfd. each.</td>
<td>.40</td>
<td>12264</td>
<td>Resistor—220,000 ohms, 1 watt.</td>
</tr>
<tr>
<td>35800</td>
<td>Calibrator—Mica trimmer comprising 3 sections of 8 oz. muf.</td>
<td>.50</td>
<td>12290</td>
<td>Resistor—270,000 ohms, 2 watts.</td>
</tr>
<tr>
<td>35801</td>
<td>Capacitor—10 mmfd.</td>
<td>.35</td>
<td>12679</td>
<td>Resistor—2.2 meg., 1 watt.</td>
</tr>
<tr>
<td>35804</td>
<td>Capacitor—Mica trimmer comprising 1 section of 10-160 mmfd., 2 sections of 25-210 mmfd., 2 sections of 50-400 mmfd., and 1 section of 1,000-540 mmfd.</td>
<td>1.15</td>
<td>12626</td>
<td>Resistor—10 meg., 1 watt.</td>
</tr>
<tr>
<td>35977</td>
<td>Capacitor—100 mmfd.</td>
<td>.35</td>
<td>35797</td>
<td>Shaft—Tuning shaft and pulley.</td>
</tr>
<tr>
<td>35978</td>
<td>Capacitor—180 mmfd.</td>
<td>.45</td>
<td>35772</td>
<td>Shield—Bottom end shield for power transformer.</td>
</tr>
<tr>
<td>35979</td>
<td>Capacitor—200 mmfd.</td>
<td>.50</td>
<td>35728</td>
<td>Shield—Top end shield for power transformer.</td>
</tr>
<tr>
<td>13295</td>
<td>Capacitor—640 mmfd.</td>
<td>.60</td>
<td>31344</td>
<td>Socket—Dial lamp socket.</td>
</tr>
<tr>
<td>35804</td>
<td>Capacitor—905 mmfd.</td>
<td>.65</td>
<td>31351</td>
<td>Socket—Dial lamp socket.</td>
</tr>
<tr>
<td>4937</td>
<td>Capacitor—0.1 mmfd.</td>
<td>.25</td>
<td>35118</td>
<td>Spring—Drive cord spring.</td>
</tr>
<tr>
<td>35805</td>
<td>Capacitor—0.5 mmfd.</td>
<td>.20</td>
<td>36025</td>
<td>Switch—Push button selector switch.</td>
</tr>
<tr>
<td>4829</td>
<td>Capacitor—0.1 mmfd.</td>
<td>.20</td>
<td>36024</td>
<td>Switch—Range switch.</td>
</tr>
<tr>
<td>35808</td>
<td>Capacitor—Electrolytic comprising 2 sections of 10 mfd. 400 volts each and 1 section of 12 mfd. 25 volts.</td>
<td>1.70</td>
<td>35636</td>
<td>Transformer—First I-P transformer.</td>
</tr>
<tr>
<td>35865</td>
<td>Coil—Antenna coil—C band.</td>
<td>.80</td>
<td>35790</td>
<td>Transformer—Second I-P transformer.</td>
</tr>
<tr>
<td>35876</td>
<td>Coil—Capacitor assembly.</td>
<td>.60</td>
<td>35588</td>
<td>Transformer—Power transformer—110 volts, 2.3 cycle.</td>
</tr>
<tr>
<td>36031</td>
<td>Coil—Loop loading coil.</td>
<td>.50</td>
<td>35591</td>
<td>Transformer—Power transformer, 110 volts, 60 cycle.</td>
</tr>
<tr>
<td>35789</td>
<td>Coil—Capacitor coil.</td>
<td>1.15</td>
<td>35969</td>
<td>Washer—C&quot; washer for tuning shaft.</td>
</tr>
<tr>
<td>35803</td>
<td>Coil—Push button switch oscillator coil.</td>
<td>.30</td>
<td>35968</td>
<td>Speaker—Dust cap.</td>
</tr>
<tr>
<td>35980</td>
<td>Condenser—Variable tuning condenser.</td>
<td>1.50</td>
<td>12079</td>
<td>Coil—Field coil—1,080 ohms.</td>
</tr>
<tr>
<td>35849</td>
<td>Control—Tone control.</td>
<td>.20</td>
<td>36145</td>
<td>Coil—Neutralizing coil.</td>
</tr>
<tr>
<td>36220</td>
<td>Control—Volume control and power switch.</td>
<td>2.60</td>
<td>36128</td>
<td>Cone—Cone complete with voice coil.</td>
</tr>
<tr>
<td>34682</td>
<td>Cord—Drive cord.</td>
<td>.20</td>
<td>51208</td>
<td>Plug—4-prong male speaker plug.</td>
</tr>
<tr>
<td>35788</td>
<td>Core—Adjusting core and stud for oscillator coil.</td>
<td>.15</td>
<td>31301</td>
<td>Transformer—Output transformer.</td>
</tr>
<tr>
<td>35871</td>
<td>Core—Adjusting core and stud for push button oscillator coil.</td>
<td>.50</td>
<td>36028</td>
<td>Capacitor—Dust cap.</td>
</tr>
<tr>
<td>35794</td>
<td>Drum—Tuning condenser drive drum—less calibrator.</td>
<td>.70</td>
<td>35914</td>
<td>Decalcomania—Control panel decal.</td>
</tr>
<tr>
<td>35799</td>
<td>Frame—Dial frame complete with lamp bracket and pulleys—less dial.</td>
<td>2.00</td>
<td>36206</td>
<td>Dial—Glass dial.</td>
</tr>
<tr>
<td>35798</td>
<td>Indicator—Station selector indicator and carriage.</td>
<td>.20</td>
<td>36026</td>
<td>Escutcheon—Dial scale escutcheon—less dial.</td>
</tr>
<tr>
<td>36090</td>
<td>Loop—Inductor, complete.</td>
<td>2.00</td>
<td>35814</td>
<td>Knob—Range switch or tone control knob—dark brown.</td>
</tr>
<tr>
<td>36030</td>
<td>Loop—Loop winding only.</td>
<td>.40</td>
<td>36299</td>
<td>Knob—Push button—light brown.</td>
</tr>
<tr>
<td>36070</td>
<td>Loop—Plug single plug—less loop cable.</td>
<td>.30</td>
<td>35914</td>
<td>Decalcomania—Control panel decal.</td>
</tr>
<tr>
<td>5119</td>
<td>Plug—3-contact female plug for speaker cable.</td>
<td>.20</td>
<td>36226</td>
<td>Dial—Glass dial.</td>
</tr>
<tr>
<td>5040</td>
<td>Plug—4-contact female plug for speaker cable.</td>
<td>.30</td>
<td>35969</td>
<td>Escutcheon—Dial scale escutcheon—less dial.</td>
</tr>
<tr>
<td>35937</td>
<td>Pulley—Drive cord pulley.</td>
<td>.08</td>
<td>35814</td>
<td>Knob—Range switch or tone control knob—light brown.</td>
</tr>
<tr>
<td>14720</td>
<td>Resistor—1,000 ohms, 1 watt.</td>
<td>.20</td>
<td>35775</td>
<td>Knob—Push button—light brown.</td>
</tr>
<tr>
<td>35644</td>
<td>Resistor—1,000 ohms, 1 watt.</td>
<td>.20</td>
<td>36288</td>
<td>Knob—Range switch or tone control knob—light brown.</td>
</tr>
<tr>
<td>35875</td>
<td>Resistor—10,000 ohms, 3 watts.</td>
<td>.50</td>
<td>35914</td>
<td>Decalcomania—Control panel decal.</td>
</tr>
<tr>
<td>130468</td>
<td>Resistor—10,000 ohms, 3 watts.</td>
<td>.50</td>
<td>35969</td>
<td>Escutcheon—Dial scale escutcheon—less dial.</td>
</tr>
<tr>
<td>130468</td>
<td>Resistor—22,000 ohms, 1 watt.</td>
<td>.20</td>
<td>35969</td>
<td>Escutcheon—Dial scale escutcheon—less dial.</td>
</tr>
</tbody>
</table>

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Push Button Adjustment

Six station push buttons connect to separate magnetite-core oscillator coils and separate antenna trimmers which must be adjusted for the desired stations. Use an insulated screwdriver or alignment tool such as RCA Stock No. 11031. Allow at least five minutes warm-up period before making adjustments.

In the event that the receiver is to be used with an external antenna, use one or two feet of wire (as an antenna) to ensure sharp peaking during the final adjustment procedure. For loop operation, the trimmer should be jumped across “A” and “G” terminals on back of set. In either case the procedure is as follows:
1. Make a list of the desired six stations, arranged in order from low to high frequencies.
2. Turn the range selector to “A” band, and manually tune in the first station on the list.
3. After turning range selector to “PB” position, push in station button No. 1 (extreme left). Then adjust the No. 1 oscillator core (L-14) to receive the station. It may be necessary to maintain approximate tracking between antenna and oscillator to recenter the image. Approximate tracking will be indicated by noise, when tuned off a station, which will disappear when the station is correctly tuned.
4. After oscillator core is adjusted properly, adjust C-8 for maximum output.
5. Clockwise adjustment of cores and trimmers tunes the circuits to lower frequencies.
6. Make a final careful adjustment of the oscillator cores and antenna trimmers.

Owing to the relatively high RF gain, it may be found that there are several settings of each push-button magnetite core that will bring in any particular station. In such cases, it is advisable to unscrew the push-button loop trimmers to minimum capacity before adjusting the push-button magnetite cores.

Replacement Parts


XX—Price upon application to your RCA Distributor.

ALL PRICES ARE SUBJECT TO CHANGE OR WITHDRAWAL WITHOUT NOTICE.
Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the chassis drawing.

Output Meter Alignment—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the output as low as possible to avoid a-c action.

Calibration for Alignment.—The proper dial calibration for alignment purposes can be set up in two ways:

1. The dial may be removed from the cabinet by sliding out the two spring pieces which clamp it in its mounting position. The condenser plates should then be turned into full mesh, the pointer adjusted to the scratch at the left end of the dial backing plate, and the dial slipped under the pointer so that its extreme left calibration mark coincides with the pointer. The dial may be held in place with Scotch tape. In this manner the actual receiver dial is used for alignment. When alignment is finished, the scale should be replaced including the fibre light shields which are folded under the end of the glass scale.

2. A calibration scale is attached to the tuning drum. The correct setting of the gang, in degrees, for each alignment frequency is given in the alignment table. Check the position of the drum, making sure that the 0 degree scale mark is horizontal with the gang in full mesh.

Pointer for Calibration Scale.—If method (3) is used, improvise a pointer for the calibration scale by fastening a piece of wire to the chassis, and bend the wire so that it points to the 0 degree mark on the calibration scale when the plates are fully meshed.

<table>
<thead>
<tr>
<th>Steps</th>
<th>Connect high side of test oscillator to</th>
<th>Tune test osc. to</th>
<th>Turn radio dial to</th>
<th>Adjust the following for maximum peak output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6SK7 I-F grid in series with 0.01 mfd.</td>
<td>455 kc</td>
<td>&quot;A&quot; band</td>
<td>L-91 and L-22 (2nd I-F Trans.)</td>
</tr>
<tr>
<td>2</td>
<td>6SA7 grid in series with 0.01 mfd.</td>
<td>15.2 mc</td>
<td>Quiet Point</td>
<td>C-24 (Osc.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>between 550 and 750 kc</td>
<td>C-15 (Det.)</td>
</tr>
<tr>
<td>3</td>
<td>Antenna terminal in series with 300 ohms</td>
<td>15.2 mc (143 mc)</td>
<td>Quiet Point</td>
<td>C-9 (R-F) Rock gang</td>
</tr>
<tr>
<td></td>
<td>(&quot;A&quot; antenna trimmer C-11, should be 90' turn out)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Antenna terminal in series with 200 mmd.</td>
<td>2.44 mc (91.5°)</td>
<td>Quiet Point</td>
<td>C-27 (Osc.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>C-27 (Det.)</td>
</tr>
<tr>
<td>5</td>
<td>Antenna terminal in series with 200 mmd.</td>
<td>600 mc (33.3°)</td>
<td>Quiet Point</td>
<td>L-28 Rock gang</td>
</tr>
<tr>
<td></td>
<td>(Present &quot;A&quot; antenna trimmer C-28, should be 90' turn out)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Antenna terminal in series with 200 mmd.</td>
<td>1,500 mc (143.4°)</td>
<td>Quiet Point</td>
<td>C-26 (Osc.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>C-20 (Det.)</td>
</tr>
<tr>
<td>7</td>
<td>Repeat steps 5, then 6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Antenna terminal in series with 300 ohms</td>
<td>15.2 mc (143.4°)</td>
<td>Quiet Point</td>
<td>C-1 (R-F) Rock gang</td>
</tr>
</tbody>
</table>

* Use minimum capacity peak if two can be obtained. Check to determine that C-24 has been adjusted to correct peak by tuning receiver to approximately 14.29 mc where a weaker signal should be received.

Note.—Oscillator tracks above signal on all bands.

To reduce sensitivity during RF Alignment connect a 15,000 ohm, ½ watt resistor across secondary of 1st IF transformer.

Tone Control

The tone control has four positions for radio, and four positions for Victrola or Television sound:

No. 1—Radio—maximum low—minimum high
No. 2—Radio—maximum high—reduced high
No. 3—Radio—maximum low—maximum high
No. 4—Radio—minimum low—maximum high
No. 5—Phono—maximum low—minimum high
No. 6—Phono—maximum low—reduced high
No. 7—Phono—maximum low—maximum high
No. 8—Phono—minimum low—maximum high

(No. 1 is full counter-clockwise, and No. 8 is full clockwise.)

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Adjustment for Electric Tuning

This model has six push buttons for electric tuning. The buttons are connected to separate magnet-core oscillators and separate antenna trimmers which must be adjusted for the desired stations. Use an insulated screwdriver for adjustment tools such as RCA Stock No. 31681. Allow at least five minutes warm-up period before making adjustments.

The procedure is as follows:

1. Make a list of the six desired stations, arranged in order from low to high frequencies.
2. Turn Range Control knob to "A" position, and manually tune in the first station on the list.
3. Turn Range Control knob to "PB" and press push button No. 1 and adjust No. 1 oscillator core to receive this station. Screw the core all the way in, to lowest frequency, and then unscrew slowly until station is received.
4. Adjust No. 1 antenna trimmer for maximum output on this station. Owing to the relatively high R.F. gain, it may be found that there are several settings of each push-button magnet core that will bring in any particular station. In such cases it is advisable to unscrew the push button; antenna trimmer to minimum capacity before adjusting the oscillator cores.
5. Clockwise adjustment of cores and trimmers tunes the circuits to lower frequencies.
6. After all six stations are tuned in on the buttons, turn the Loop Antenna to a position giving the best signal pickup and make a final careful adjustment of all core rods until best reception is obtained for each. Outdoor antenna should now be reconnected if used.

Push Button Adjustments

Turn the Loop Antenna to give minimum pickup of signal, no outside antenna should be used and link on antenna board should be closed.

Arrangement of Drive Cords for Tuning Condenser and Dial Indicator

All prices are subject to change or withdrawal without notice.
Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the schematic drawing.

Output Meter Alignment—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the output as low as possible to avoid A.V.C. action.

Calibration Scale on Indicator Drive Cord Drum—The tuning dial is fastened in the cabinet and cannot be used for reference during alignment, therefore, a calibration scale is attached to the indicator drive cord drum which is mounted on the shaft of the gang condenser. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

As the first step in r.f. alignment, check the position of the drum. The "90°" mark on the drum scale must be vertical, and directly under the center of the gang-condenser shaft when the plates are fully meshed. The drum is held to the shaft by means of two set screws, which must be tightened securely when the drum is in the correct position.

To determine the corresponding frequency for any setting of the calibration scale, refer to the accompanying drawing which shows the dial 90° calibration scale drawn at top and bottom.

Pointer for Calibration Scale—Improvise a pointer for the calibration scale by fastening a piece of wire to the gang-condenser frame, and bend the wire so that it points to the "90°" mark on the calibration scale when the plates are fully meshed.

Dial Indicator Adjustment.—After fastening the chassis in the cabinet, attach the dial indicator to the drive cable with indicator at the 90° mark, and gang condenser fully meshed. The indicator has a spring clip for attachment to the cable.

Precautionary Lead Dress—
1. Dress 2nd L.F. leads close to chassis.
2. Dress leads from volume control and tone switch away from filaments, diodes and power leads.
3. Dress .005 mfd. volume control condenser away from electrolytic.

<table>
<thead>
<tr>
<th>Steps</th>
<th>Connect the high side of test osc. to</th>
<th>Tune test osc. to</th>
<th>Range switch</th>
<th>Turn radio dial to</th>
<th>Adjust the following for max. peak output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6SK7 I-F grid in series with 0.1 mfd.</td>
<td>655 kc</td>
<td>&quot;A&quot;</td>
<td>Quiet Point near 180°</td>
<td>L3 and L4 (2nd I-F Trans.)</td>
</tr>
<tr>
<td>2</td>
<td>6SK7 1st Detector in series with 0.1 mfd.</td>
<td>15.2 mc</td>
<td>&quot;C&quot;</td>
<td>148.5°</td>
<td>C1 (ant.) C2 (osc.)</td>
</tr>
<tr>
<td>3</td>
<td>1,500 kc</td>
<td>2.44 mc</td>
<td>&quot;B&quot;</td>
<td>90°</td>
<td>C3 (osc.)</td>
</tr>
<tr>
<td>4</td>
<td>600 kc</td>
<td>1,500 kc</td>
<td>&quot;A&quot;</td>
<td>180°</td>
<td>C5 (osc.)</td>
</tr>
<tr>
<td>5</td>
<td>600 kc</td>
<td>600 kc</td>
<td>&quot;A&quot;</td>
<td>30°</td>
<td>L5 (osc.) (Rock gang)</td>
</tr>
</tbody>
</table>

Fasten chassis in cabinet. Connect loop, see that link is closed on the antenna board, attach dial indicator to drive cord, and indicator at 90° mark and gang at maximum capacity.

<table>
<thead>
<tr>
<th>Steps</th>
<th>Frequency</th>
<th>&quot;A&quot;</th>
<th>&quot;C&quot;</th>
<th>&quot;B&quot;</th>
<th>&quot;D&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1,500 kc</td>
<td>2.44 mc</td>
<td>15.2 mc</td>
<td>600 kc</td>
<td>655 kc</td>
</tr>
<tr>
<td>2</td>
<td>1,500 kc</td>
<td>180°</td>
<td>148.5°</td>
<td>90°</td>
<td>30°</td>
</tr>
</tbody>
</table>

* Use minimum capacity peak of two peaks can be obtained.

Note: Oscillator tracks above signal on all bands.

Tube and Trimmer Locations

Connections and Colors of Loudspeaker and Cable

Location of Controls

Tone Control and Phono-Radio Switch
General Description

Models Q20 and Q21 are two-band table type superheterodyne receivers. They are designed to cover the broadcast range of 540 to 1,800 kilocycles, and the short-wave range from 4.5 to 18 megacycles.

Features of design include: Magnetite-core I.F. transformers; magnetite-core "A" band oscillator coil; automatic volume control; tone control; illuminated dial; jack for phonograph attachment; 25 to 1 ratio vernier tuning, and dust-proofed permanent-magnet dynamic loudspeaker.

Phonograph Attachment—A jack is provided on the rear of chassis for connection to a phonograph attachment. The cable from the attachment should be terminated in a Stock No. 31048 plug to fit the jack.

Electrical Specifications

Pilot Lamp ................................ Matea 51, 7.5 volts, 0.2 amp.

Power Supply Ratings
Rating A .................. 105-125 volts, 50-60 cycles, 30 watts
Rating B .................. 105-125 volts, 25-60 cycles, 50 watts
Rating C .................. 105-125, 200-250 volts, 50-60 cycles, 50 watts

Power Output Rating
Undistorted .................. 1.5 watts
Maximum .................. 2.3 watts

Loudspeaker
Type (RL-81-A2) .... 5-inch permanent-magnet dynamic
Voice-coil Impedance .................. 4.5 ohms at 400 cycles

Frequency Ranges
Standard Broadcast (A) .......... 540-1,800 kc (355-165 m)
Short Wave (C) .................. 4.5-18 mc (66.7-16.6 m)
Intermediate Frequency ....... 455 kc

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Compliments of www.nucow.com
MODELS Q20 and Q21
Chassis No. RC-514

Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connection for the oscilloscope are shown in the schematic drawing.

Output Meter Alignment—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Ten-Oscillators.—For all alternate operations, connect the low side of the ten-oscillator to the «receiver chassis, and keep the output as low as possible to avoid v-v action.

Pre-Sorting Dial.—With gang condensers in full tank, the pointer should be horizontal.

Precautionary Lead—Draw:
1. Green lead from oscillator section of var. condenser should be dressed away from antenna leads.
2. 5,000 microfarad capacitor should be gassed away from electrolytic capacitor.
3. Dress blue I.F. lead against chassis.
4. 0.055 microfarad capacitor should be dressed away from output plate leads.

* Oscillator should track on high frequency side of signal. If two peaks are obtained, use high frequency (minimum capacity) peak.

† If two peaks can be obtained use low frequency (maximum capacity) peak.

GAIN DATA
(as taken with the RCA-Rider Channelist)

(A) R.F.—I.F Gain (R.F.—I.F. Channel) Approximate Output
1. Antenna to 65A7 grid—0.8 at 600 kc
2. 65A7 grid to plate (conversion 600 to 455 I.F. volts)—0.1
3. 65A7 plate to 6SK7 grid—0.1 at 455 kc
4. 6SK7 grid to plate—0.1 at 455 kc
5. 6SK7 plate to 6SK7 grid—0.1 at 455 kc

(B) A.F. Gain (A.F. Channel)
1. 68GR7 grid to plate—50 at 400 cycles
2. 6H8GT grid to plate—10 at 400 cycles

(C) Oscillator Grid (OG-65A7) Voltage (Electronic Volt. Meter)
1. Oscillator Voltage at 600 kc—0.1V
2. Oscillator Voltage at 1,500 kc—-12V
3. Oscillator Voltage at 4.5 mc—-5V
4. Oscillator Voltage at 15 mc—9V

(D) A.V.C. Voltage (Electronic Volt. Meter)
With 0.1V. input to antenna at 600 kc—-12V

Replacement Parts

<table>
<thead>
<tr>
<th>STOCK No.</th>
<th>DESCRIPTION</th>
<th>UNIT</th>
<th>PRICE</th>
<th>STOCK No.</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>113510</td>
<td>Speaker—15cm speaker</td>
<td>.50</td>
<td>.50</td>
<td>113511</td>
<td>Speaker—20cm speaker</td>
</tr>
<tr>
<td>113512</td>
<td>Speaker—25cm speaker</td>
<td>.50</td>
<td>.50</td>
<td>113513</td>
<td>Speaker—30cm speaker</td>
</tr>
<tr>
<td>113514</td>
<td>Speaker—35cm speaker</td>
<td>.50</td>
<td>.50</td>
<td>113515</td>
<td>Speaker—40cm speaker</td>
</tr>
</tbody>
</table>

ALL PRICES ARE SUBJECT TO CHANGE OR WITHDRAWAL WITHOUT NOTICE.

Models 45X-16, 45X-17
Chassis No. RC-459M

Replacement Parts

<table>
<thead>
<tr>
<th>STOCK No.</th>
<th>DESCRIPTION</th>
<th>UNIT</th>
<th>PRICE</th>
<th>STOCK No.</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>113516</td>
<td>Speaker—15cm speaker</td>
<td>.50</td>
<td>.50</td>
<td>113517</td>
<td>Speaker—20cm speaker</td>
</tr>
<tr>
<td>113518</td>
<td>Speaker—25cm speaker</td>
<td>.50</td>
<td>.50</td>
<td>113519</td>
<td>Speaker—30cm speaker</td>
</tr>
<tr>
<td>113520</td>
<td>Speaker—35cm speaker</td>
<td>.50</td>
<td>.50</td>
<td>113521</td>
<td>Speaker—40cm speaker</td>
</tr>
</tbody>
</table>

ALL PRICES ARE SUBJECT TO CHANGE OR WITHDRAWAL WITHOUT NOTICE.

Compliments of www.nucow.com
Alignment Procedure

Output Meter Alignment.—Connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For I.F. alignment, connect the low side of the test-oscillator to the receiver chassis through a .01 mfd. capacitor, and keep the output as low as possible.

Pre-Setting Dial.—With gage condenser in full mesh, the pointer should be adjusted so that it is vertical.

Antenna.—The set is equipped with a built-in loop antenna. If an outdoor antenna is used, it may be connected to the “ANT” terminal on rear of cabinet. It should not be longer than 100 feet, including lead-in. If it is longer, connect a 100 to 200 mmf. capacitor in series with the lead-in.

Power-Supply Polarity.—For operation on d-c, the power plug must be inserted in the outlet for correct polarity. If the set does not function, reverse the plug. On a-c, reversal of the plug may reduce hum.

<table>
<thead>
<tr>
<th>Steps</th>
<th>Connect the high side of test-oscillator to—</th>
<th>Tune test-osc.</th>
<th>Turn radio dial to—</th>
<th>Adjust the following for max. peak output—</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>15S37 I-F grid in series with .01 mfd.</td>
<td>455 kc</td>
<td>C9 and C10</td>
<td>(2nd I-F trans.)</td>
</tr>
<tr>
<td>2</td>
<td>Tuning condenser stator (osc.) in series with .01 mfd.</td>
<td>455 kc</td>
<td>Quiet point at 1,600 kc end of dial</td>
<td>C7 and C8 (1st I-F trans.)</td>
</tr>
<tr>
<td>3</td>
<td>Radiation loop consisting of two turns of wire 14 inches in diameter</td>
<td>1,600 kc</td>
<td>Full clockwise (out of mesh)</td>
<td>C3 (oscillator)</td>
</tr>
<tr>
<td>4</td>
<td>Resonance on .4 kc signal</td>
<td>1,400 kc</td>
<td>C1 (antenna)</td>
<td></td>
</tr>
</tbody>
</table>

First Edition
The power drawn from the batteries is very small—being .675 watts from the 90 volt "B" battery, represented by a current of 7.5 milliamperes; and a current from a 1.4 volt filament battery of 300 milliamperes.

RADIO MFG. ENGINEERS, INC.

"B" battery, represented by a current of 7.5 milliamperes; and a current from a 1.4 volt filament battery of 300 milliamperes.
The unit includes 6 tubes and is a superheterodyne type receiver, providing both manual and automatic volume control; coverage of the entire frequency range in three selective positions of the band switch, and an output of 100 milliwatts. The 100 milliwatt of audio power is also substantial to operate with monitors as we can hear the unit is primarily designed for headphone operation and a jack is provided on the rear apron of the chassis for the insertion of a standard headphone plug. The output impedance of this phone circuit can be set anywhere between 0 and 100,000 ohms, and is designed to supply a 2000 ohm load. If a loudspeaker is used, a suitable transformer should be used with it to match the output of the receiver.

The intermediate frequency used in the MS-14 receiver is 525 kilocycles. Alignment can be achieved by inserting a signal of 525 kilocycles. By connecting a test oscillator generating 525 kilocycles (modulated) to the grid of the first detector tube, the intermediate frequency transformers labeled No. 1, No. 2, and No. 3 (see Figure 3) can be adjusted to maximum reading on an audio output meter connected directly across the headphones, or across a special plug inserted in the headphone jack. Alignment is made on a given signal of 525 kilocycles for maximum reading on the output meter. It is essential that the input signal put into the first detector tube be not more than 200 millivolts, although the automatic volume control will hold all variations constant if the signal is of this order or higher. If it is impossible to cut down the energy delivered by the test oscillator, by means of adjustments on the test oscillator itself, the "Manual Gain" control may be of some assistance, although its range is small as controlling circuits behind the first detector is rather limited. About 10 volts of audio should be obtained for optimum adjustment purposes, and the output of the signal generator, or test oscillator, should be lowered to a point where about 10 volts are obtained for alignment at the optimum point adjustments. This, of course, means that the "Audio Gain" control should be set for maximum audio output. Distorted signals having a very broken and rough characteristic are usually due to the fact that the filament batteries are below their required voltage and needs replacement. The sensitivity of the instrument will, of course, fluctuate at the same time and the combination of the two conditions can be used as an indication that the filament battery has served its purpose.

**RADIO FREQUENCY ALIGNMENT**

All of the controls for radio frequency alignment, except the series padders for low frequency calibration of Band 3, are available from the bottom of the chassis. In Figure 3 it will be seen that the oscillator paddler, used for adjustment of the low frequency calibration of Band 3, is located near the center of the chassis between the "P" batteries and the last section of the variable condenser. The control of this condenser is increased with the clockwise rotation of the screw-driver with which it is adjusted. Counter-clockwise rotation decreases the frequency and clockwise rotation increases the frequency. For recalibrating the instrument it is only necessary to make sure that the pointer is set properly with respect to the rotor of the variable condenser, and this is done by setting the rotor at full mesh and having the pointer, at the same time, set to the horizontal line on the left end of the calibrated scale. Under these conditions and with frequencies of accurately known value the following alignment frequencies and their respective adjustments are listed as follows:

<table>
<thead>
<tr>
<th>Band</th>
<th>Frequency</th>
<th>Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>2000 kHz</td>
<td>1/3 (\mu F) resistor</td>
</tr>
<tr>
<td>3</td>
<td>2000 kHz</td>
<td>1/3 (\mu F) resistor</td>
</tr>
<tr>
<td>1</td>
<td>2000 kHz</td>
<td>1/3 (\mu F) resistor</td>
</tr>
<tr>
<td>2</td>
<td>1000 kHz</td>
<td>1/3 (\mu F) resistor</td>
</tr>
<tr>
<td>2</td>
<td>5000 kHz</td>
<td>1/3 (\mu F) resistor</td>
</tr>
<tr>
<td>3</td>
<td>5000 kHz</td>
<td>1/3 (\mu F) resistor</td>
</tr>
</tbody>
</table>

**TUNING CONDENSER**

2.31 .1 \(\mu F\), 400 volt paper condenser
2.32 .3 \(\mu F\), 400 volt paper condenser
2.33 .1 \(\mu F\), 400 volt paper condenser
2.34 .3 \(\mu F\), 400 volt paper condenser
2.35 Band 3 Series Oscillator pd. 1000 \(\mu F\)
2.36 Band 2 Series pd. 30 \(\mu F\)
2.37 Band 1 Series Oscillator pd. 129 \(\mu F\)
2.38 .01 \(\mu F\), 400 volt paper condenser
2.39 .01 \(\mu F\), 400 volt paper condenser
2.40 .01 \(\mu F\), 400 volt paper condenser
2.41 400 \(\mu F\), 400 volt paper condenser
2.42 400 \(\mu F\), 400 volt paper condenser
2.43 30 \(\mu F\), 400 volt paper condenser
2.44 30 \(\mu F\), 400 volt paper condenser
2.45 1 \(\mu F\), 400 volt paper condenser
2.46 .01 \(\mu F\), 400 volt paper condenser

**On-Off Switch connected in tandem with audio volume control**

2.31 1/3 \(\mu F\), 400 volt paper condenser
2.32 1/3 \(\mu F\), 400 volt paper condenser
2.33 1/3 \(\mu F\), 400 volt paper condenser
2.34 1/3 \(\mu F\), 400 volt paper condenser
2.35 1/3 \(\mu F\), 400 volt paper condenser
2.36 1/3 \(\mu F\), 400 volt paper condenser
2.37 1/3 \(\mu F\), 400 volt paper condenser
2.38 1/3 \(\mu F\), 400 volt paper condenser

**HEADPHONE JACK**

2.25 1/3 \(\mu F\), 400 volt paper condenser
2.25 1/3 \(\mu F\), 400 volt paper condenser
2.26 1/3 \(\mu F\), 400 volt paper condenser
2.27 1/3 \(\mu F\), 400 volt paper condenser
2.28 1/3 \(\mu F\), 400 volt paper condenser
2.29 1/3 \(\mu F\), 400 volt paper condenser
2.30 1/3 \(\mu F\), 400 volt paper condenser

**EXTERNAL BATTERY CABLE SOCKET**
Compliments of www.nucow.com
This unit is in effect a frequency converter and therefore acts as a radio frequency amplifier and mixer tube with its oscillator in an over-all super-heterodyne type of circuit. It must be used in connection with a regular receiver capable of tuning to a frequency of 1500 Kc. The associated receiver therefore acts as an intermediate frequency amplifier unit and a demodulator and audio amplifier in order to reproduce the output of the expander.

**PART CODE NUMBER**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>20 µfd. condenser</td>
</tr>
<tr>
<td>2.2</td>
<td>Tuning condenser</td>
</tr>
<tr>
<td>2.3</td>
<td>20 µfd. condenser</td>
</tr>
<tr>
<td>2.4</td>
<td>400 µfd. condenser</td>
</tr>
<tr>
<td>2.5</td>
<td>400 µfd. condenser</td>
</tr>
<tr>
<td>2.6</td>
<td>400 µfd. condenser</td>
</tr>
<tr>
<td>2.7</td>
<td>400 µfd. condenser</td>
</tr>
<tr>
<td>2.8</td>
<td>250 µfd. condenser</td>
</tr>
<tr>
<td>2.9</td>
<td>20 µfd. condenser</td>
</tr>
<tr>
<td>2.10</td>
<td>20 µfd. condenser</td>
</tr>
<tr>
<td>2.11</td>
<td>Tuning Condenser</td>
</tr>
<tr>
<td>2.12</td>
<td>400 µfd. condenser</td>
</tr>
<tr>
<td>2.13</td>
<td>400 µfd. condenser</td>
</tr>
<tr>
<td>2.14</td>
<td>400 µfd. condenser</td>
</tr>
<tr>
<td>2.15</td>
<td>50 µfd. condenser</td>
</tr>
<tr>
<td>2.16</td>
<td>30 µfd. condenser</td>
</tr>
<tr>
<td>2.17</td>
<td>10 µfd. condenser</td>
</tr>
<tr>
<td>2.18</td>
<td>400 µfd. condenser</td>
</tr>
<tr>
<td>2.19</td>
<td>100 µfd. condenser</td>
</tr>
<tr>
<td>2.20</td>
<td>Tuning condenser</td>
</tr>
<tr>
<td>2.21</td>
<td>15 µfd. condenser</td>
</tr>
<tr>
<td>2.22</td>
<td>15 µfd. condenser</td>
</tr>
<tr>
<td>2.23</td>
<td>400 µfd. mix condenser</td>
</tr>
<tr>
<td>2.24</td>
<td>15 µfd. condenser</td>
</tr>
<tr>
<td>2.25</td>
<td>10 µfd. condenser</td>
</tr>
<tr>
<td>2.26</td>
<td>10 µfd. condenser</td>
</tr>
<tr>
<td>2.27</td>
<td>50 µfd. condenser</td>
</tr>
<tr>
<td>2.28</td>
<td>0.002 µfd. mix condenser</td>
</tr>
</tbody>
</table>

**S.H.F. Switch**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1</td>
<td>S.H.F. Switch</td>
</tr>
<tr>
<td>3.2</td>
<td>4.P.D.T. Switch</td>
</tr>
</tbody>
</table>

**A,B,C,D,E,F,G,H**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>200 ohm, 1/3 watt resistor</td>
</tr>
<tr>
<td>1.2</td>
<td>35 ohm, 1/3 watt resistor</td>
</tr>
<tr>
<td>1.3</td>
<td>5000 ohm, 1/3 watt resistor</td>
</tr>
<tr>
<td>1.4</td>
<td>10,000 ohm, 1 watt resistor</td>
</tr>
<tr>
<td>1.5</td>
<td>5000 ohm, 1/3 watt resistor</td>
</tr>
<tr>
<td>1.6</td>
<td>15,000 ohm, 10 watts G.T.</td>
</tr>
<tr>
<td>1.7</td>
<td>35 ohm, 1/3 watt resistor</td>
</tr>
<tr>
<td>1.8</td>
<td>10,000 ohm, 1 watt resistor</td>
</tr>
<tr>
<td>1.9</td>
<td>5000 ohm, 1/3 watt resistor</td>
</tr>
<tr>
<td>1.10</td>
<td>1000 ohm, 1/3 watt resistor</td>
</tr>
</tbody>
</table>

**Power Transformer**

- L1: Band 2 R.F. coil
- L2: Band 1 R.F. coil
- L3: Band 2 Det. coil
- L4: Band 1 Det. coil
- L5: Band 3 Dec. coil
- L6: Band 1 Mic. coil
- L7: Output Coupling Transformer 850OC

**TEST VOLTAGES OF FM-10X**

- R.F. Amplifier, cathode to ground: 1 v - 1.5 v
- R.F. Amplifier, plate to ground: 210 v - 240 v
- R.F. Amplifier, screen to ground: 110 v - 125 v
- Detector, cathode to ground: 5 v - 6 v
- Detector, plate to ground: 210 v - 240 v
- Detector, screen to ground: 110 v - 125 v

*Oscillator, plate to ground (oscillating) 125 v - 140 v
Unosc., plate to ground (not oscillating) 110 v - 120 v

Note: This voltage must be measured at "B" plus end of plate coil to prevent application of voltmeter leads from affecting oscillator circuit.
The antenna input impedance to an RME-69 Receiver varies in the vicinity of 250 to 350 ohms. The antenna supply should therefore be of the Marconi type which is fed at current maximum to the receiver or of the twisted pair type where impedances of lines involved are in the vicinity of the 250 ohms previously mentioned. For maximum selectivity insofar as the input circuit is concerned, the value of this impedance should be taken into account. Antennas which are supplying signal to the receiver at a high potential point should not be used in conjunction with the RME-69 Receiver because of the great loss in voltage transfer encountered in such a combination. The half-wave doublet type of antenna providing a tuned antenna system for a certain range of frequencies has certain marked directional characteristics. These directions are evident in the fact that the greatest pick-up occurs in a direction at right angles to the axis of the antenna, forming in effect a figure 8 pattern in which the lobes are located off the sides of the antenna instead of off the ends.

C—Optimum condition when $A = \frac{1}{2}$

**Optimum condition**

Not satisfactory for wide range free. Excellent for any amateur band if $A = \frac{1}{2}$ is in the middle of the band. For example: For $A = \frac{1}{2}$, approximately 33 feet, directional at right angle from line of wire.

Jumper C can usually be omitted.

B—Optimum signal input to receiver when $A = \frac{1}{2}$; and feeder is tapped at proper distance from center.

This antenna works quite well usually on even harmonics also.'
RADIO MFG. ENGINEERS, INC.

TEST VOLTAGES OBTAINED AT VARIOUS POINTS IN THE RECEIVER CIRCUIT (Measurements made with voltmeter having internal resistance of 1,000 ohms per volt. Instruments with other internal resistances give entirely different readings) Note: Line voltage should be 115 v.

<table>
<thead>
<tr>
<th>PLACE TEST PRODS BETWEEN</th>
<th>CORRECT VOLTAGE (Switch &quot;H&quot; in toward panel)</th>
<th>CORRECT VOLTAGE (Switch &quot;H&quot; pulled outward fm. panel)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radio frequency amplifier plate and ground</td>
<td>240 volts</td>
<td>0 volts</td>
</tr>
<tr>
<td>Radio frequency amplifier screen and ground</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td>Radio frequency amplifier cathode and ground</td>
<td>3.2</td>
<td>0</td>
</tr>
<tr>
<td>First detector plates</td>
<td>240</td>
<td>0</td>
</tr>
<tr>
<td>First detector screen and ground</td>
<td>75</td>
<td>0</td>
</tr>
<tr>
<td>First detector cathode and ground</td>
<td>3.5</td>
<td>0</td>
</tr>
<tr>
<td>First intermediate frequency amplifier plate and ground</td>
<td>250</td>
<td>0</td>
</tr>
<tr>
<td>First intermediate frequency amplifier screen and ground</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td>Intermediate frequency amplifier cathode and ground</td>
<td>3.2</td>
<td>0</td>
</tr>
</tbody>
</table>

(The same voltages apply to the second intermediate frequency amplifier tube elements)

| | 115 | 145 |
| 6B7 plate and ground | 25 | 35 |
| 6B7 screen and ground | 244 | 280 |
| 42 plate and ground | 248 | 290 |
| 42 screen and ground | 16 | 18 |
| 80 rectifier filament and ground | 258 | 335 |
| Oscillator plate and ground | 248 | 0 |
| Oscillator screen and ground | 115 | 0 |
| Beat oscillator plate and ground | 180 | 210 |
| Beat oscillator screen and ground | 100 | 130 |
| The voltage across R-31 | 14 | 0 |

These voltages are subject to a fluctuation of plus or minus 15% without indication of material difficulties.

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TEST VOLTAGES OBTAINED AT VARIOUS POINTS IN THE RADIO CIRCUIT

(Measurements made with voltmeter having internal resistance of
1,000 ohms per volt. Instruments with other internal resistances
give entirely different readings. Note: Line voltage should be 115v.)

PLACE TEST PROBE BETWEEN

<table>
<thead>
<tr>
<th>CORRECT VOLTAGE</th>
<th>CORRECT VOLTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Switch marked Audio level and Standby in toward panel.)</td>
<td>(Switch marked Audio level and Standby out ward from panel.)</td>
</tr>
</tbody>
</table>

Audio frequency amplifier plate and ground 240 volts 0 volts
Audio frequency amplifier screen and ground 100 volts 0 volts
Audio frequency amplifier cathode and ground 3.2 volts 0 volts
First detector plates 240 volts 0 volts
First detector screen and ground 75 volts 0 volts
First detector cathode and ground 3.5 volts 0 volts
First intermediate frequency amplifier screen and ground 100 volts 0 volts
First intermediate frequency amplifier plate and ground 250 volts 0 volts
6L7 audio Amp. plate and ground 115 volts 0 volts
6L7 screen and ground 25 volts 0 volts
6P6 plate and ground 244 volts 0 volts
6P6 screen and ground 248 volts 0 volts
6P6 cathode and ground 16 volts 0 volts
30 rectifier filament and ground 238 volts 0 volts
Oscillator plate and ground 243 volts 0 volts
Oscillator screen and ground 115 volts 0 volts
Beat oscillator plate and ground 180 volts 0 volts
Beat oscillator screen and ground 100 volts 0 volts
The voltage across 1.32 14 volts 0 volts

<table>
<thead>
<tr>
<th>Resistors</th>
<th>Condensers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 50,000 ohm variable</td>
<td>2.17 .01 400 volt</td>
</tr>
<tr>
<td>1.2 150 ohm 1/2 watt</td>
<td>2.18 .01 400 volt</td>
</tr>
<tr>
<td>1.3 20,000 ohm 1 watt</td>
<td>2.19 .01 400 volt</td>
</tr>
<tr>
<td>1.4 1,000 ohm 1/2 watt</td>
<td>2.20 .01 400 volt</td>
</tr>
<tr>
<td>1.5 5,000 ohm 1/2 watt</td>
<td>2.21 .01 400 volt</td>
</tr>
<tr>
<td>1.6 1,000 ohm 1/2 watt</td>
<td>2.22 .01 400 volt</td>
</tr>
<tr>
<td>1.7 1 meqohm 1/2 watt</td>
<td>2.23 .01 400 volt</td>
</tr>
<tr>
<td>1.8 250 ohm 1/2 watt</td>
<td>2.24 .01 400 volt</td>
</tr>
<tr>
<td>1.9 100,000 ohm 1/2 watt</td>
<td>2.25 .01 400 volt</td>
</tr>
<tr>
<td>1.10 1 meqohm 1/2 watt</td>
<td>2.26 .01 400 volt</td>
</tr>
<tr>
<td>1.11 50,000 ohm 1/2 watt</td>
<td>2.27 .01 400 volt</td>
</tr>
<tr>
<td>1.12 1 meqohm 1/2 watt</td>
<td>2.28 .01 400 volt</td>
</tr>
<tr>
<td>1.13 5,000 ohm 1/2 watt</td>
<td>2.29 .01 400 volt</td>
</tr>
<tr>
<td>1.14 150 ohm 1/2 watt</td>
<td>2.30 .01 400 volt</td>
</tr>
<tr>
<td>1.15 50,000 ohm 1/2 watt</td>
<td>2.31 .01 400 volt</td>
</tr>
<tr>
<td>1.16 1 meqohm 1/2 watt</td>
<td>2.32 .01 400 volt</td>
</tr>
<tr>
<td>1.17 100,000 ohm 1/2 watt</td>
<td>2.33 .01 400 volt</td>
</tr>
<tr>
<td>1.18 250,000 ohm variable</td>
<td>2.34 .01 400 volt</td>
</tr>
<tr>
<td>1.19 50,000 ohm 1/2 watt</td>
<td>2.35 .01 400 volt</td>
</tr>
<tr>
<td>1.20 1 meqohm 1/2 watt</td>
<td>2.36 .01 400 volt</td>
</tr>
<tr>
<td>1.21 100,000 ohm 1/2 watt</td>
<td>2.37 .01 400 volt</td>
</tr>
<tr>
<td>1.22 250,000 ohm 1/2 watt</td>
<td>2.38 .01 400 volt</td>
</tr>
<tr>
<td>1.23 1 meqohm potentiometer</td>
<td>2.39 .01 400 volt</td>
</tr>
<tr>
<td>1.24 410 ohm section of J. Leider</td>
<td>2.40 .01 400 volt</td>
</tr>
<tr>
<td>1.25 5,000 ohm 1/2 watt</td>
<td>2.41 .01 400 volt</td>
</tr>
<tr>
<td>1.26 2,000 ohm 1/2 watt</td>
<td>2.42 .01 400 volt</td>
</tr>
<tr>
<td>1.27 9,000 ohm bleeder</td>
<td>2.43 .01 400 volt</td>
</tr>
<tr>
<td>1.28 6,000 ohm bleeder</td>
<td>2.44 .01 400 volt</td>
</tr>
<tr>
<td>1.29 2,000 ohm 1/2 watt</td>
<td>2.45 .01 400 volt</td>
</tr>
<tr>
<td>1.30 8,000 ohm 1/2 watt</td>
<td>2.46 .01 400 volt</td>
</tr>
<tr>
<td>1.31 2,000 ohm 1/2 watt</td>
<td>2.47 .01 400 volt</td>
</tr>
<tr>
<td>1.32 2,000 ohm 1/2 watt</td>
<td>2.48 .01 400 volt</td>
</tr>
<tr>
<td>1.33 8,000 ohm 1/2 watt</td>
<td>2.49 .01 400 volt</td>
</tr>
<tr>
<td>1.34 5,000 ohm 1/2 watt</td>
<td>2.50 .01 400 volt</td>
</tr>
<tr>
<td>1.35 50,000 ohm 1/2 watt</td>
<td>2.51 .01 400 volt</td>
</tr>
<tr>
<td>1.36 10,000 ohm 1/2 watt</td>
<td>2.52 .01 400 volt</td>
</tr>
<tr>
<td>1.37 100,000 ohm 1/2 watt</td>
<td>2.53 .01 400 volt</td>
</tr>
<tr>
<td>1.38 100,000 ohm 1/2 watt</td>
<td>2.54 .01 400 volt</td>
</tr>
</tbody>
</table>

These voltages are subject to a fluctuation of plus or minus 15% without indication of material difficulties.
MAY 6, 1938

NOTE: "F" BAND INCLUDED ONLY WITH MODELS 5710A, 5711A.

POWER OUTPUT:
105 - 120 Volts, 60 Cycle A.C. - 95 Watts
105 - 125 Volts, 25 Cycle A.C. - 95 Watts

LOUD SPEAKER:
Type: Permanent Magnet Dynamic
Size: Within Separate Case - 8 Inch

POWER OUTPUT:
Type: Single Output
Undistorted: 4 Watts
Maximum: 5 Watts

TUBES AND FUNCTIONS:
6E7: 1st IF
6L7: Translator
6750: Oscillator
6B7: IF Amplifier
6SU7: 2nd Detector, 1st AF
6B9: Single Output
6F0: Rectifier
675G: Seat Frequency Oscillator
6F6: Tuning Eye

FIG. 2.

FIG. 3.

Recommended Antenna Equipment:
Cat. 50567 The Doublet System,
Cat. 50510 Conventional System,
Cat. 50576 Conventional System,
Cat. 50532 Conventional System.
# Alignment and Trimmers

## Model 5710, 5711, 5710A

**SEARS, ROEBUCK & CO.**

### Color Code
- **Power**: Power leads are yellow.
- **Output Trans. Leads**: Yellow, blue, and red.

### Alignment, Trimmers

#### Alignment Procedures
1. **Remove Crystal**: Set crystal phasing condenser to almost minimum capacity and throw "ITAL" switch to "in" position.
2. **Adjust the 465 KC Signal**: Re-adjust the I.F. Trimmer C-46 - the one nearest the front panel of the receiver - by turning the screw counter-clockwise. The signal may now be slightly weaker than before and sound "off-side". This, however, is a normal condition.

#### Settings

<table>
<thead>
<tr>
<th>Position of Variable and Band No.</th>
<th>Generator Freq.</th>
<th>Generator Con.</th>
<th>Trimmer Location</th>
<th>Trimmer Adjustments in Order</th>
<th>Trimmer Function</th>
<th>Approx. Microvolts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Closed A Band</td>
<td>465 KC</td>
<td>6 LF Grid</td>
<td>SEE FIG. 1</td>
<td>C16, C17, C18</td>
<td>Osc.</td>
<td>Approx. 10</td>
</tr>
<tr>
<td>80 MC &quot;F&quot;</td>
<td>465 KC</td>
<td>A-G Ant. Term.</td>
<td>SEE FIG. 20</td>
<td>C14, C15, C16</td>
<td>Osc. Trans. Ant.</td>
<td>Approx. 3</td>
</tr>
<tr>
<td>40 MC &quot;F&quot;</td>
<td>465 KC</td>
<td>A-G Ant. Term.</td>
<td>SEE FIG. 20</td>
<td>C14, C15, C16</td>
<td>Osc. Trans. Ant.</td>
<td>Approx. 3</td>
</tr>
<tr>
<td>36 MC &quot;F&quot;</td>
<td>465 KC</td>
<td>A-G Ant. Term.</td>
<td>SEE FIG. 20</td>
<td>C14, C15, C16</td>
<td>Osc. Trans. Ant.</td>
<td>Approx. 3</td>
</tr>
<tr>
<td>16 MC &quot;D&quot;</td>
<td>465 KC</td>
<td>A-G Ant. Term.</td>
<td>SEE FIG. 20</td>
<td>C14, C15, C16</td>
<td>Osc. Trans. Ant.</td>
<td>Approx. 3</td>
</tr>
<tr>
<td>15 MC &quot;D&quot;</td>
<td>465 KC</td>
<td>A-G Ant. Term.</td>
<td>SEE FIG. 20</td>
<td>C14, C15, C16</td>
<td>Osc. Trans. Ant.</td>
<td>Approx. 3</td>
</tr>
<tr>
<td>8 MC &quot;D&quot;</td>
<td>465 KC</td>
<td>A-G Ant. Term.</td>
<td>SEE FIG. 20</td>
<td>C14, C15, C16</td>
<td>Osc. Trans. Ant.</td>
<td>Approx. 3</td>
</tr>
<tr>
<td>3 MC &quot;D&quot;</td>
<td>465 KC</td>
<td>A-G Ant. Term.</td>
<td>SEE FIG. 20</td>
<td>C14, C15, C16</td>
<td>Osc. Trans. Ant.</td>
<td>Approx. 3</td>
</tr>
<tr>
<td>2 MC &quot;D&quot;</td>
<td>465 KC</td>
<td>A-G Ant. Term.</td>
<td>SEE FIG. 20</td>
<td>C14, C15, C16</td>
<td>Osc. Trans. Ant.</td>
<td>Approx. 3</td>
</tr>
<tr>
<td>1 MC &quot;D&quot;</td>
<td>465 KC</td>
<td>A-G Ant. Term.</td>
<td>SEE FIG. 20</td>
<td>C14, C15, C16</td>
<td>Osc. Trans. Ant.</td>
<td>Approx. 3</td>
</tr>
<tr>
<td>0.6 MC &quot;D&quot;</td>
<td>465 KC</td>
<td>A-G Ant. Term.</td>
<td>SEE FIG. 20</td>
<td>C14, C15, C16</td>
<td>Osc. Trans. Ant.</td>
<td>Approx. 3</td>
</tr>
<tr>
<td>0.4 MC &quot;D&quot;</td>
<td>465 KC</td>
<td>A-G Ant. Term.</td>
<td>SEE FIG. 20</td>
<td>C14, C15, C16</td>
<td>Osc. Trans. Ant.</td>
<td>Approx. 3</td>
</tr>
<tr>
<td>0.3 MC &quot;D&quot;</td>
<td>465 KC</td>
<td>A-G Ant. Term.</td>
<td>SEE FIG. 20</td>
<td>C14, C15, C16</td>
<td>Osc. Trans. Ant.</td>
<td>Approx. 3</td>
</tr>
<tr>
<td>0.2 MC &quot;D&quot;</td>
<td>465 KC</td>
<td>A-G Ant. Term.</td>
<td>SEE FIG. 20</td>
<td>C14, C15, C16</td>
<td>Osc. Trans. Ant.</td>
<td>Approx. 3</td>
</tr>
<tr>
<td>0.1 MC &quot;D&quot;</td>
<td>465 KC</td>
<td>A-G Ant. Term.</td>
<td>SEE FIG. 20</td>
<td>C14, C15, C16</td>
<td>Osc. Trans. Ant.</td>
<td>Approx. 3</td>
</tr>
</tbody>
</table>

**Note**: Then use a CRYSTAL, set PHASING CONTROL to almost minimum capacity. See special alignment instructions below for Crystal.

### Alignment Instructions - For Receivers Equipped with Crystals

1. **Remove Crystal**: Set crystal phasing condenser to almost minimum capacity and throw "ITAL" switch to "in" position.
2. **Adjust the 465 KC Signal**: Re-adjust the I.F. Trimmer C-46 - the one nearest the front panel of the receiver - by turning the screw counter-clockwise. The signal may now be slightly weaker than before and sound "off-side". This, however, is a normal condition.
3. **Filtering Signal**: A very noticeable drop in signal strength may be noted, due to the filtering action of the crystal, and the frequency control of the signal generator must be "rocked" slowly back and forth, until the increase in signal strength indicates the exact frequency of the crystal being used. Now re-align the entire I.F. system to this frequency.
4. **Adjust Pitch**: For the lowest pitched notes possible and re-adjust signal generator frequency. Repeat and continue to repeat this alignment procedure until no further improvement in the alignment can be accomplished.

**Note**: If the "ITAL" switch should now be thrown to another position, an apparent rise in gain will be noticed, which is caused by the addition of higher frequencies and background noise, so do not mean that the sensitivity of the set is impaired in any way by use of the crystal.

**Note**: The Beat Frequency Oscillator is adjusted for the A, B, C, D. Bands with Trimmer C31 and C32. Set pitch control to half capacity. Recheck C31.
SEARS, ROEBUCK & CO.

MODELS 5727, 5728, 5750
Changes, Transformers Specifications

SUBJECT: MECHANICAL CHANGES WITH DIAL MECHANISM ON MODELS 5727, 5728 TO ACCOMPLISH A HORIZONTAL TYPE DIAL
MOUNTED IN A NEW CABINET, FINISHED GREY. THIS IS KNOWN AS MODEL 5750, FACTORY IDENTIFICATION NUMBER
107.4450-94.

TUBES AND CAPACITORS:
6BY7 ................. 1st RF
6A7 ............... Tuning Transformer
675G ................ Oscillator
6G7 .................. IF Amplifier
6QG .................. Second Detector, 1st AF
6G7 .................. IF Amplifier
675G .................. Phase Inverter
6V6G ................. P. P. Output
6V6G ................. P. P. Output
G0 .................. Rectifier
6750 ................ "6" Meter Voltage Amplifier
6370 ................ Beat Frequency Oscillator

POWER SUPPLY:
106 - 120 Volts, 60 Cycle A.C. - 125 Watts
106 - 135 Volts, 25 Cycle A.C. - 125 Watts

FREQUENCY RANGE - 6 BANDS:
<table>
<thead>
<tr>
<th>Band</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>550 to 1,200 Kc</td>
</tr>
<tr>
<td>B</td>
<td>1,200 to 2,000 Kc</td>
</tr>
<tr>
<td>C</td>
<td>2,000 to 2,800 Kc</td>
</tr>
<tr>
<td>D</td>
<td>2,800 to 6,000 Kc</td>
</tr>
<tr>
<td>E</td>
<td>6,550 to 16,000 Kc</td>
</tr>
<tr>
<td>F</td>
<td>16,000 to 40,000 Kc</td>
</tr>
</tbody>
</table>

INTERMEDIATE FREQUENCY = BANDS A, B, C, & D - 465 Kc

POWER OUTPUT:
Type .......................... Push Pull Output
Undistorted ......................... 9 Watts
Maximum .......................... 15 Watts

LOUD SPEAKER:
Type .......................... Permanent Magnet Dynamic
Size .......................... Within Separate Case 10 Inch

CHASSIS FEATURES:
SEND-RECEIVE terminals in rear of chassis
for break-in connection.
RF Stages .......................... Three Gang
VARIABLE CAPACITOR ............... Three Gang
ANTENNA JACK ....................... ON FRONT PANEL
HEADPHONE JACK ..................... Crystal Phaser.
Beat Frequency Oscillator, Pitch Control.
R.F.O. OFF-ON Switch with Injection Control.

Recommended Antenna Equipment:
Catalog # 5587 the Doublet System.
Catalog # 5510 Conventional System.
Catalog # 5579 Conventional System.
Catalog # 5528 Conventional System.

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COLOR CODE AND LEAD POSITION

POWER TRANS. 107046938

OUTPUT TRANS. 107139961

©Compliments of www.nucow.com
**SEARS, ROEBUCK & CO.**

**ALIGNMENTS**

This receiver is a 12 tube 6 band set designed especially for use on the short wave bands. The set was not designed for ordinary broadcast reception although it will cover this band.

The amateur receiver employs many features as outlined above. Attention must be noted to the Dual i.F. system, the use of the 1560 KC i.F. for use on the "P" and "F" bands to obtain a higher image response and prevent "pulling" of frequency-modulated signals on 5 meters. The 1560 KC i.F. assemblies are designed to give a broad band pass flat top response characteristic.

Note that two antenna systems must be used, one for the "I & F" Bands and one for the "A" or "C" & "D" Bands.

**PRELIMINARY**

Output meter connection

- Output meter reading to indicate .5 watt.
- Average sensitivity in microvolts for .5 watt output.
- Generator ground lead connection

---

**Position of volume control R.F. gain...** Full on

**Position of volume control A.F. gain...** Full on

**A.V.C. Switch...** On

**Band spread dial set at 100...** Min. Capacity

---

**NOTE 1** When aligning the two i.F. channels a condenser of .05 Mfd may be used in series with the generator lead. For the other bands the following circuit is shown with the values that make a universal dummy antenna system for all bands.

---

<table>
<thead>
<tr>
<th>POSITION OF VARIABLE AND BAND SET</th>
<th>GENERATOR FREQ.</th>
<th>GENERATOR CONNECTION</th>
<th>POSITION OF I.F. BAND Switch</th>
<th>TRIGGER ADJUSTMENTS IN ORDER</th>
<th>TRIGGER FUNCTION</th>
<th>APPROX. MICROVOLTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Closed &quot;A&quot; Band</td>
<td>465 KC</td>
<td>617 Grid</td>
<td>&quot;XTAL&quot;</td>
<td></td>
<td>I.F.</td>
<td>15</td>
</tr>
<tr>
<td>Closed &quot;A&quot; Band</td>
<td>1560 KC</td>
<td>617 Grid</td>
<td>&quot;F&quot; &amp; &quot;P&quot;</td>
<td></td>
<td>I.F.</td>
<td>15</td>
</tr>
<tr>
<td>60 MC &quot;P&quot;</td>
<td>60 MC</td>
<td>A-G Ant. Term.</td>
<td>&quot;F&quot; &amp; &quot;P&quot;</td>
<td>C16</td>
<td>Sec. Trans. Ant.</td>
<td>Approx. 10</td>
</tr>
<tr>
<td>40 MC &quot;P&quot;</td>
<td>40 MC</td>
<td>A-G Ant. Term.</td>
<td>&quot;F&quot; &amp; &quot;P&quot;</td>
<td>C22</td>
<td>Padder</td>
<td>Approx. 10</td>
</tr>
<tr>
<td>16 MC &quot;F&quot;</td>
<td>16</td>
<td>A-D-G Ant. Term.</td>
<td>&quot;F&quot; &amp; &quot;P&quot;</td>
<td>C31</td>
<td>Padder</td>
<td>Approx. 10</td>
</tr>
<tr>
<td>15 MC &quot;P&quot;</td>
<td>15 MC</td>
<td>A-D-G Ant. Term.</td>
<td>&quot;XTAL&quot; or &quot;Sharp&quot;</td>
<td>C14, 9, 4</td>
<td>Sec. Trans. Ant.</td>
<td>Approx. 1</td>
</tr>
<tr>
<td>7 MC &quot;F&quot;</td>
<td>7 MC</td>
<td>A-D-G Ant. Term.</td>
<td>&quot;XTAL&quot; or &quot;Sharp&quot;</td>
<td>C20</td>
<td>Padder</td>
<td>Approx. 1</td>
</tr>
<tr>
<td>6 MC &quot;F&quot;</td>
<td>6 MC</td>
<td>A-D-G Ant. Term.</td>
<td>&quot;XTAL&quot; or &quot;Sharp&quot;</td>
<td>C13, 8, 3</td>
<td>Sec. Trans. Ant.</td>
<td>Approx. 1</td>
</tr>
<tr>
<td>3 MC &quot;F&quot;</td>
<td>3 MC</td>
<td>A-D-G Ant. Term.</td>
<td>&quot;XTAL&quot; or &quot;Sharp&quot;</td>
<td>C19</td>
<td>Padder</td>
<td>Approx. 1</td>
</tr>
<tr>
<td>2.4 MC &quot;F&quot;</td>
<td>2.4</td>
<td>A-D-G Ant. Term.</td>
<td>&quot;XTAL&quot; or &quot;Sharp&quot;</td>
<td>C18</td>
<td>Sec. Trans. Ant.</td>
<td>Approx. 1</td>
</tr>
<tr>
<td>1.2 MC &quot;F&quot;</td>
<td>1.2</td>
<td>A-D-G Ant. Term.</td>
<td>&quot;XTAL&quot; or &quot;Sharp&quot;</td>
<td>C17</td>
<td>Padder</td>
<td>Approx. 1</td>
</tr>
<tr>
<td>1.1 MC &quot;A&quot;</td>
<td>1800 MC</td>
<td>A-D-G Ant. Term.</td>
<td>&quot;XTAL&quot; or &quot;Sharp&quot;</td>
<td>C11, 6, 1</td>
<td>Sec. Trans. Ant.</td>
<td>Approx. 1</td>
</tr>
<tr>
<td>.6 MC &quot;A&quot;</td>
<td>600 MC</td>
<td>A-D-G Ant. Term.</td>
<td>&quot;XTAL&quot; or &quot;Sharp&quot;</td>
<td>C17</td>
<td>Padder</td>
<td>Approx. 1</td>
</tr>
</tbody>
</table>

**NOTE 2:** When using a CRYSTAL, set PHASING CONTROL to almost minimum capacity. See special alignment instructions below for Crystal. Align set in "sharp" position if set is without crystal.

**ALIGNMENT INSTRUCTIONS - FOR RECEIVERS EQUIPPED WITH CRYSTALS**

(A) **REMOVAL CRYSTAL.** Set crystal phasing condenser to almost minimum capacity and throw IF switch to "XTAL" position.

(B) With the 465 KC signal, readjust the I.F. Trimmer C-46 - the one nearest the front panel of the receiver - by turning the screw counter-clockwise. The signal now may be slightly weaker than before and sound "off-side." This, however, is a normal condition.

(C) **REPLACE CRYSTAL.** A very noticeable drop in signal strength may be noted, due to the filtering action of the crystal, and the frequency control of the signal generator must be "locked" slowly back and forth; until the increase in signal strength indicates the exact frequency of the crystal being used. Now re-align the entire I.F. system to this frequency.

(D) *Adjust "XTAL" phasing condenser for the lowest pitched note possible and re-adjust signal generator frequency. Repeat and continue to repeat this alignment procedure until no further improvement in alignment can be accomplished.*

**NOTE:** If the IF switch should now be thrown to another position, an apparent rise in gain will be noticed, which is caused by the addition of higher frequencies and background noise, so it does not mean that the sensitivity of this set is impaired in any way by use of the crystal.

**NOTE 3:** THE BEAT FREQUENCY OSCILLATOR is adjusted for the A, B, C, D, Bands with Trimmer C31. With models having an "F" & "P" Band S.P.O. - Adjust C31 with dial at 1560 on Band D to 1560 KC. Recheck C31. Set pitch control to half capacity.
THE THREE TERMINALS - A, B, and C in the middle back of the chassis are for the antenna and ground connections. When using the conventional flat-top and lead-in type of antenna, CONNECT THE LEAD-IN TO THE TERMINAL MARKED "A", being sure that a wire jumper connects from D to G terminals. The G terminal is for the ground connection.

For any DUNITENge type of antenna, remove the shorting jumper from D to G and connect the two leads of the doublet system to A and B.

The "C" terminal is for the ground connection.
OPERATING FEATURES:

A.V.C. with ON-OFF Switch
Three-Gang Electrical Band Spread
AF Gain or Audio Level Control
RF Gain or Sensitivity Control
Tone Control
Best Frequency Osc. Pitch Control
B.F.O. Switch with Injection Control
Crystal Phaser
Send-Receive terminals in rear of Chassis
for break-in connection
IRON CORE IF Stages
Headphone Jack on Front Panel

ALIGNMENT FREQUENCIES

<table>
<thead>
<tr>
<th>Band</th>
<th>600 and 1300 KC</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1.5 and 2.6 MC</td>
</tr>
<tr>
<td>B</td>
<td>3.0 and 6.0 MC</td>
</tr>
<tr>
<td>C</td>
<td>7.0 and 15 MC</td>
</tr>
<tr>
<td>D</td>
<td>16 and 36 MC</td>
</tr>
</tbody>
</table>

ALIGNMENT PROCEDURE

PRELIMINARY:
Output meter connection...
...5,000 ohm or more copper oxide meter across 5 ohm terminals.
Shunt with meter.

Average sensitivity in microvolts for .5 watt output...See chart
Generator ground lead connection........Direct to chassis
 Dummy antenna value in series with generator output. See Note 1
Connection of generator output leads........See Chart
Generator modulation..................305, 400 cycles
Position of volume control A.F. gain........Pull on
Position of volume control R.F. gain........Pull on
A.V.C. Switch..........................Pull on
Band spread dial set at 100........Min. Capacity

NOTE 1: When aligning the I.F. channel a condenser of .05 MF may be used in series with the generator lead.
NOTE 2: When aligning the broadcast band, a 250 MF condenser may be used in series with the signal generator.
NOTE 3: When aligning the short wave bands a 400 ohm resistor may be used in series with the signal generator.

<table>
<thead>
<tr>
<th>POSITION OF VARIABLE AND BAND SW.</th>
<th>GENERATOR FREQ.</th>
<th>GENERATOR CONNECTION</th>
<th>TRIMMER LOCATION</th>
<th>TRIMMER ADJUSTMENTS IN ORDER</th>
<th>TRIMMER FUNCTION</th>
<th>APPROX. MICROVOLTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Closed &quot;A&quot; Band</td>
<td>465 KC</td>
<td>6LF Grid</td>
<td>SEE FIG.1</td>
<td>065, 55, 52, 51</td>
<td>I.F.</td>
<td>15</td>
</tr>
<tr>
<td>26 MC &quot;y&quot;</td>
<td>56 MC</td>
<td>A-D-G Ant. Term.</td>
<td>SEE FIG.2</td>
<td>C32, 12, 5, 5</td>
<td>Sec. Trans. Ant.</td>
<td>3</td>
</tr>
<tr>
<td>16 MC &quot;y&quot;</td>
<td>16</td>
<td>A-D-G Ant. Term.</td>
<td></td>
<td>C31</td>
<td>Padder</td>
<td>Approx. 5</td>
</tr>
<tr>
<td>15 MC &quot;y&quot;</td>
<td>15 MC</td>
<td>A-D-G Ant. Term.</td>
<td></td>
<td>C31</td>
<td>Sec. Trans. Ant.</td>
<td>3</td>
</tr>
<tr>
<td>7 MC &quot;y&quot;</td>
<td>7 MC</td>
<td>A-D-G Ant. Term.</td>
<td></td>
<td>C20</td>
<td>Padder</td>
<td>Approx. 1</td>
</tr>
<tr>
<td>5 MC &quot;y&quot;</td>
<td>5 MC</td>
<td>A-D-G Ant. Term.</td>
<td></td>
<td>C19</td>
<td></td>
<td>Approx. 1</td>
</tr>
<tr>
<td>3 MC &quot;y&quot;</td>
<td>3 MC</td>
<td>A-D-G Ant. Term.</td>
<td></td>
<td>C18</td>
<td></td>
<td>Approx. 1</td>
</tr>
<tr>
<td>2.6 MC &quot;y&quot;</td>
<td>2.6</td>
<td>A-D-G Ant. Term.</td>
<td></td>
<td>C18</td>
<td></td>
<td>Approx. 1</td>
</tr>
<tr>
<td>1.3 MC &quot;y&quot;</td>
<td>1.3</td>
<td>A-D-G Ant. Term.</td>
<td></td>
<td>C18</td>
<td></td>
<td>Approx. 1</td>
</tr>
<tr>
<td>1.2 MC &quot;y&quot;</td>
<td>1.2</td>
<td>A-D-G Ant. Term.</td>
<td></td>
<td>C18</td>
<td></td>
<td>Approx. 1</td>
</tr>
<tr>
<td>6 MC &quot;y&quot;</td>
<td>6 MC</td>
<td>A-D-G Ant. Term.</td>
<td></td>
<td>C18</td>
<td></td>
<td>Approx. 1</td>
</tr>
<tr>
<td>3 MC &quot;y&quot;</td>
<td>3 MC</td>
<td>A-D-G Ant. Term.</td>
<td></td>
<td>C18</td>
<td></td>
<td>Approx. 1</td>
</tr>
</tbody>
</table>

NOTE 4: When using a CRYSTAL, set PHASING CONTROL to almost minimum capacity. See special alignment instructions below for Crystal.

ALIGNMENT INSTRUCTIONS FOR RECEIVERS USING CRYSTALS

THE I.F. STAGES:

1. With the XTAL switch in the "OUT" position, align the I.F. stages to 465 KC, feeding signal into the grid of the 6L7.

2. For RECEIVERS EQUIPPED WITH CRYSTALS:

(a) Remove CRYSTAL, set crystal phasing condenser to almost minimum capacity and throw XTAL switch to "IN" position.

(b) With the 465 KC signal re-adjust the I.F. Trimmer - the one nearest the front panel of the receiver - by turning the screw counter-clockwise. The signal now may be slightly weaker than before, and sound "off-side". This, however, is a normal condition.

(c) Replace the CRYSTAL - A very noticeable drop in signal strength may be noted, due to the filtering action of the crystal and the frequency control of the signal generator must be "rocked" slowly back and forth, until the increase in signal strength indicates the exact frequency of the crystal being used. Now re-align the entire I.F. system to this frequency.

(d) Adjust XTAL phasing condenser for the lowest pitched note possible and re-adjust signal generator frequency. Repeat and continue to repeat this alignment procedure until no further improvement in the alignment can be accomplished.

NOTE: If the XTAL switch should now be thrown to the "OUT" position, an apparent rise in gain will be noticed which is caused by the addition of higher frequencies and background noise, so it does not mean that the sensitivity of this set is impaired in any way by use of the crystal.

NOTE 5: THE BEST FREQUENCY OSCILLATOR is adjusted with trimmers C31 and C32. Set pitch control to half capacity. Recheck C31.
**THE BIAS CELLS:**

- **Models 6261, 6262, 6263, 6264, 6265, 6266, 6267, 6268, 6269**
- **CHASSIS 101.564, 101.646, 101.655**

No attempt to test the bias cells with a voltmeter. Ordinarily these cells have an indefinitely long life and should not be the cause of any trouble. The cells must be in their holders in the proper direction so that the polarity of the bias applied to the tubes will be correct. The zinc shell of the cell is the negative terminal and must connect to the tube grids. If the cells are removed from their holders, be sure that the polarity will be correct. The Location of Parts diagram shows the correct positions of the cells.

**THE FILAMENT CIRCUIT:**

- **Models 6285, 6286, 6287, 6288, 6289, 6290, 6291, 6292, 6293, 6294, 6295, 6296, 6297, 6298, 6299**
- **CHASSIS 101.547, 101.546, 101.545**

All of the tube heaters are connected in series. Accordingly, if any one tube burns out, the others will not light. The filament voltage will appear across the heater terminals of the tube that is open.

Under certain conditions the chassis may be ground potential by an amount equal to the line voltage. Accordingly, appropriate precaution should be taken when working on the chassis, by insulating the chassis completely from ground, etc.

**PUSH BUTTON TUNING**

- **Models 6285, 6286, 6287, 6288, 6289, 6290, 6291, 6292, 6293, 6294, 6295, 6296, 6297, 6298, 6299**
- **CHASSIS 101.547, 101.546, 101.545**

**SETTING UP:**

Each of the push buttons should be set up in the following manner:

1. Make a list of the local stations desired to be set up on the push buttons.
2. Turn on the push button switch (the push button switch is on the front of the chassis).
3. Push the push button lever (the push button switch is on the front of the chassis).
4. Push the slider all the way in.
5. Switch the push button switch to the front of the push button lever, and cover the call letter with one of the clear celluloid discs supplied.
6. Push the slider back into place on the push button lever.
7. Follow the procedure as outlined in points 5 to 10, inclusive, for each of the remaining buttons.

**OPERATION:**

*Push button stations* will be tuned automatically by pushing the push button all the way to the station.

**NOTE:** Push buttons on Models 6290, 6291, and 6292 chassis are locked and unlocked by turning the button.

**ELIMINATING WHISTLE AT 910 KC:**

A whistle, due to a best between the second harmonics (910 kHz) of the 455 kHz IF and a 910 kHz signal may be experienced. In localities where the 910 kHz station is one pair is frequently listened to, it will be desirable to add to some other point where it will not be objectionable. This can be done by shifting the IF frequency of the receiver.

Detune at what point between 860 and 940 kHz the whistle will be least objectionable. By adding this frequency by a small amount or the receiver should be set to the new IF frequency, and then realign all the rest of the receiver as described under "ALIGNMENT PROCEDURE."
POWER SUPPLY:
105-125 volts, 60-60 cycle or 120 volts on 117 volt line.

POWER OUTPUT:
LOUD SPEAKER:
Type.................. Beam Power Dynamic
Undistorted........ 49 Watt 256 Watt
Maximum........... 1.35 Watts 450 Ohms

ALIGNMENT PROCEDURE
Either a signal generator or a broadcast signal between 1400 and 1600 kc. may be used.

If a signal generator is used, extend the antenna as described above, run a wire from the generator parallel to, but insulated from the antenna. Set the generator to 1750 kc. Turn the tuning condenser all the way to the right (Minimum capacity). Tune in the signal from the generator with the trimmer on the rear section of the tuning condenser. Set the generator at about 1400 kc. Tune in the signal and adjust the trimmer on the front section of the tuning condenser for maximum response.

<table>
<thead>
<tr>
<th>DEFECT</th>
<th>GENERALLY CAUSED BY</th>
<th>REMEDY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dead Receiver</td>
<td>No current at outlet</td>
<td>Check outlet for current and be sure power cord plug is making good contact</td>
</tr>
<tr>
<td></td>
<td>Open or short circuit in set</td>
<td>Repair or replace</td>
</tr>
<tr>
<td>Poor Sensitivity and Volume</td>
<td>Insufficient antenna pickup</td>
<td>Connect to outdoor antenna</td>
</tr>
<tr>
<td></td>
<td>Defective tube</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>Receiver out of alignment</td>
<td>Follow alignment procedure</td>
</tr>
<tr>
<td>Station Interference</td>
<td>Receiver located near powerful stations</td>
<td>Do not uncoil all of antennas</td>
</tr>
<tr>
<td>Poor tone</td>
<td>Overloading</td>
<td>Reduce volume control setting</td>
</tr>
<tr>
<td></td>
<td>Speaker out of adjustment</td>
<td>Repair or replace</td>
</tr>
<tr>
<td>Oscillation</td>
<td>Antenna lead coiled around or near set</td>
<td>Run antenna wire away from set</td>
</tr>
</tbody>
</table>
MODEL 6119, 6120, 6126, 6127
6200, 6250, 6120A, 6230, 6250A

SEARS, ROEBUCK & CO.

CHANGES

ADDITION OF TWO 50 OHM 2 WATT RESISTORS TO ELIMINATE FAILURE OF 25260 RECTIFIER TUBES AND IN SOME CASES SUBSEQUENT SHORTING OF THE FIRST SECTION OF THE ELECTROLYTIC FILTER CONDENSER.

NOTE: The resistors have been added at the factory when the identification number reads 101.546-1.

Remove the wire connecting pins #4 and #5 of the rectifier tube to pin #7 of the ballast tube. One 50 ohm 2 watt resistor is connected from pin #4 of the rectifier to pin #7 of the ballast tube. The other 50 ohm 2 watt resistor is connected from pin #6 of the rectifier to pin #7 of the ballast tube.

The 50 ohm 2 watt resistors, part number 1012214418, can be obtained from source 101.

Connections are shown on schematic diagram, Model 101.546-1.

CHECKING CONDITION OF FILTER ELECTROLYTICS AFTER 25260 RECTIFIER TUBE HAS FAILED.

Check the resistance, with the power disconnected from the set, of each filter electrolytic with a DC ohmmeter, reversing the terminals of the ohmmeter on each condenser. A shorted condenser will show very low resistance in both tests.

If, after the resistors are added and a new rectifier tube installed, the set has excessive hum, the voltage across each of the filter electrolytics should be checked. If the voltage across any one of them is more than 20% below the value shown on the schematic, the replacement of this electrolytic should correct the hum. The condenser used to replace the defective section of the electrolytic should be 1013019912. These condensers can be obtained direct from source 101.

Chassis identified by 101.546-1A are the same as 101.546-1 except for a change in the design and part number of the push buttons and call letter sheets.

ALIGNMENT PROCEDURE

PRELIMINARY:

Output meter connection . Across loud speaker voice coil
Output meter reading to indicate 500 milliwatts . .1.2 volts
Dummy antenna value to be in series with generator output . See chart below
Connection of generator output lead . . See chart below
Generator modulation . . . 30%, 400 cycles
Position of Volume Control . . . Fully clockwise
Position of Tone Control . . . . HF
Position of Dial Pointer with variable fully closed . Horizontal

WAVE BAND

SWITCH

POSITION

OF VARIABLE

GENERATOR FREQUENCY

DUMMY ANTENNA

GENERATOR CONNECTION

GENERATOR FUNCTION

TRIMMERS ADJUSTED

(IN ORDER SHOWN)

"AM" Closed 455 kG .1 mfd. 6J8G Grid T2, T1 IF Output
"AM" 600 kG 455 kG .0002 mfd. Ant. Lead C8 Wave Trap
"AM" 1400 kG 1400 kG .0002 mfd. Ant. Lead C5, C21 Oscillator Translator
"AM" 600 kG (rock) 600 kG :0003 mfd. Ant. Lead C6 Padder

IMPORTANT ALIGNMENT NOTES

* The generator should be adjusted for high output. The trimmer should be adjusted for minimum output meter reading instead of the usual maximum reading. If the frequency of an interfering station around 455 kG is known, the generator should be adjusted to the frequency of that station instead of to 455 kG.

Where indicated by the word, "Rock", the variable should be rocked back and forth a degree or two while making the adjustment.

The alignment procedure should be repeated stage by stage, in the original order, for greatest accuracy. Always keep the output from the test oscillator at its lowest possible value to make the AVG action of the receiver ineffective.

There are no trimmer adjustments for the short wave band.
DIFFERENCES BETWEEN 101.557 AND 101.557-1:

R13 and R15, 50 ohms each, have been added to the 35269 plate and cathode circuits of 101.557-1 chassis. (See schematic.) These resistors are to prevent failure of the 35269 tube and should be added to 101.557 chassis as described in Bulletin X5784 and X5795, dated December 31st 1938. Either filter condenser, C11 or C13, may be damaged by a defective 35269 tube and should be checked with an ohmmeter before replacing the tube. A normal condenser will show high resistance when the polarity of the ohmmeter terminals agrees with the polarity of the condenser and will show considerably lower resistance when the ohmmeter terminals are reversed. (Be sure power is off when checking.) If either C11 or C13 is found damaged, it is not necessary to replace the entire 3-section block. Instead, C11 should be replaced by a new single unit 13 mfd. condenser, part #1012019913. Remove the yellow lead of the original electrolytic and in its place connect the yellow lead of the new condenser. Connect the black lead of the new electrolytic to the same place in the circuit as the black lead of the original electrolytic. If the set has excessive hum, the capacity of C11 and C13 should be checked by shunting a #1012019913 condenser across each of them, observing correct polarity.

THE PUSH BUTTON TUNING MECHANISM:

Push buttons are locked and unlocked by tightening or loosening the slotted screw, made accessible when the push button knob is pulled off of its plunger. Stations are set up by holding the plunger all the way in and turning in the desired station. The setting then is held by securely tightening the slotted screw.

INTERMEDIATE FREQUENCY ............... 455 kHz

POWER SUPPLY:
All models available.
105-125 volts, 60 cycle, 60 watts

FREQUENCY RANGE:

<table>
<thead>
<tr>
<th>Band</th>
<th>Frequency Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;AM&quot;</td>
<td>540-1750 kHz</td>
</tr>
<tr>
<td>&quot;FM&quot;</td>
<td>5.95-10.55 kHz</td>
</tr>
</tbody>
</table>

ALIGNMENT FREQUENCIES:

<table>
<thead>
<tr>
<th>Band</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;AM&quot;</td>
<td>1400 kHz</td>
</tr>
<tr>
<td>&quot;FM&quot;</td>
<td>600 kHz</td>
</tr>
</tbody>
</table>

LOUD SPEAKER:
Dynamic
An-Trans. 0.6 W
Field coil resistance .850 ohms
App. field coil voltage drop 75 V

POWER OUTPUT:
Beam tube
Undistorted: 2 watts
Maximum: 3 watts
ALIGNMENT PROCEDURE

PRELIMINARY:
Output meter connection: Across loud speaker voice coil
Output meter reading to indicate 500 milliwatts: 1.2 volts
Average sensitivity in microvolts for 500 milliwatts output: See chart below
Dummy antenna value to be in series with generator output: See chart below
Connection of generator output lead: 300 cycles
Generator modulation: Fully clockwise
Position of Volume Control: HI
Position of Tone Control: Horizontal
Position of Dial Pointer with variable fully closed: Horizontal

<table>
<thead>
<tr>
<th>WAVE BAND</th>
<th>SWITCH POSITION</th>
<th>GENERATOR FREQUENCY</th>
<th>DUMMY ANTENNA</th>
<th>GENERATOR CONNECTION</th>
<th>TRIMMERS ADJUSTED (IN ORDER SHOWN)</th>
<th>TRIMMER FUNCTION</th>
<th>APPROXIMATE MICROVOLTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;AM&quot;</td>
<td>Closed</td>
<td>455 kc</td>
<td>.1 mfd.</td>
<td>6J8G Grid</td>
<td>T2, T1</td>
<td>IF Output</td>
<td>70</td>
</tr>
<tr>
<td>&quot;AM&quot;</td>
<td>600 kc</td>
<td>455 kc*</td>
<td>.0003 mfd. Ant. Lead</td>
<td>62*</td>
<td>Wave Trap</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>&quot;AM&quot;</td>
<td>1400 kc</td>
<td>1400 kc</td>
<td>.0003 mfd. Ant. Lead</td>
<td>65, 62*</td>
<td>Oscillator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot;AM&quot;</td>
<td>600 kc (rock)</td>
<td>600 kc</td>
<td>.0003 mfd. Ant. Lead</td>
<td>66</td>
<td>Translator</td>
<td>55</td>
<td></td>
</tr>
</tbody>
</table>

* The generator should be adjusted for high output. The trimmer should be adjusted for minimum output meter reading instead of the usual maximum reading. If the frequency of an interfering station around 455 kc is known, the generator should be adjusted to the frequency of that station instead of to 455 kc.

Where indicated by the word, "Rock", the variable should be rocked back and forth a degree or two while making the adjustment.

The alignment procedure should be repeated stage by stage, in the original order, for greatest accuracy. Always keep the output from the test oscillator at its lowest possible value to make the AVC action of the receiver ineffective.

There are no trimmer adjustments for the short wave band.

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CHASSIS 101.556 AND 101.556-1

ALIGNMENT PROCEDURE

PRELIMINARY:

Output meter connection... Across loud speaker voice coil
Output meter reading to indicate 50 millivolts... 0.035 volts
Average sensitivity in millivolts per 50 millivolts output

Generator modulation... 30%, 400 cycles

Position of Tone Control... Fully clockwise

Position of dial pointer with variable fully closed

To fall on block immediately above and between the letters "mc" and "ko".

LOCATION OF PARTS ON TOP OF CHASSIS

LOCATION OF PARTS UNDER CHASSIS

FOR ALIGNMENT SEE INDEX

12A8GT
CONVERTER

12Q7GT
1F

12Q7GT
NK-DET-AT

35L6GT
POWER OUTPUT

3524GT
RECTIFIER

1F455 KC.

SWITCH ON VOLUME CONTROL
VOLTAGES INDICATED AT SOCKET TERMINALS ARE MEASURED WITH
1000 OHM PER VOLT METER ON 117 VOLT LINE, WITH NO SIGNAL

APRIL 3, 1939

MODELS 6177A, 6178A, 6179A, 6180A (109.879-1) MODEL 6185A (209.879-2)

WAVE BAND

SWITCH POSITION OF VARIABLE GENERATOR DUMMY GENERATOR (IN ORDER SHOWN) TRIMMERS APPROXIMATE AMPLIFICATION

"AM" Closed 455 kc .1 mfd. 6800 Grid 73, 71 IF output 80

"AM" 500 kc 455 kc .0003 mfd. Ant. Term. 01 Wave Trap 90

"AM" Fully open 1750 kc .0003 mfd. Ant. Term. 03 Oscillator 100

"AM" 1400 kc 1400 kc .0003 mfd. Ant. Term. 02 Oscillator 50

"AM" 600 kc (rock) 600 kc .0003 mfd. Ant. Term. 06 Padder 35

IMPORTANT ALIGNMENT NOTES

- The generator should be adjusted for high output. The trimmer should be adjusted for minimum output meter reading instead of the usual maximum reading. If the frequency of an interfering station around 455 kc is known, the generator should be adjusted to the frequency of that station instead of 455 kc.

- Where indicated by the word, "rock", the variable should be rocked back and forth a degree or two while making the adjustment.

- The alignment procedure should be repeated stage by stage, in the original order, for greatest accuracy. Always keep the output from the test oscillator at its lowest possible value to make the AVG action of the receiver ineffective.

There are no trimmer adjustments for the short wave band.
POWER OUTPUT:
Type .......... Push pull beam tubes
Undistorted ........ 8 watts
Maximum ........... 10 watts

LOUD SPEAKER:
Type ............ Dynamic
Size ............ 10 and 12 inch
Field coil resistance .... 600 ohms
App. field voltage drop .... 75 volt

CIRCUIT CHANGES TO REDUCE HUM:
If there is complaint about objectionable hum, the following changes will result in reduction of hum.
Replace the 100W ohm resistor, R15, with a 90W ohm resistor.
Replace the 150W ohm resistor, R14, with a 200W ohm resistor.
Remove the ground wire that runs from the volume control to the ground lug on the volume control bracket. Disconnect the braiding of the shielded volume control cable from the ground lug on the volume control bracket. Connect an insulated wire from the ground lug on the volume control to the braiding of the shielded cable, taping this connection carefully to prevent it from shorting to the chassis.

RECOMMENDED ANTENNA EQUIPMENT
Catalog 5586 Doublet Antenna Kit
Catalog 5587 Conventional Antenna Kit

INTERMEDIATE FREQUENCY .......... 455 kc
Alignment Procedure:

For all Models and Chassises listed in tables below:

Output meter connection: Across loud speaker voice coil.

Output meter reading to indicate 500 milliwatts: 0.06 volt.

Generator ground lead connection: Receiver chassis.

Dummy antenna value to be in series with generator output: See chart below.

Connection of generator output lead: See chart below.

Generator modulation: 20%, 400 cycles.

Position of Volume Control: Fully clockwise.

Position of Tone Control: Position of Dial Pointed with variable fully closed. Center of block to left of 500 kHz calibration mark.

Models 6155, 6156, 6264 Chassises 101, 1549

<table>
<thead>
<tr>
<th>Wave Band</th>
<th>Position</th>
<th>Generator</th>
<th>Dummy</th>
<th>Generator Connection</th>
<th>Trimmer Adjusted (In Order)</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>AM/AM</td>
<td>Closed</td>
<td>450 kHz</td>
<td>.1 mfd.</td>
<td>GRAD Grid</td>
<td>T1, T2, T3</td>
<td>IF Output</td>
</tr>
<tr>
<td>AM</td>
<td>15 kHz (rock)</td>
<td>15 kHz</td>
<td>400 ohms</td>
<td>Ant. Term.</td>
<td>05</td>
<td>Translator</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.555 kHz</td>
<td>2.555 kHz</td>
<td>400 ohms</td>
<td>Ant. Term.</td>
<td>06</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1400 kHz</td>
<td>1400 kHz</td>
<td>.0003 mfd.</td>
<td>Ant. Term.</td>
<td>07, 08, 09</td>
</tr>
<tr>
<td></td>
<td></td>
<td>600 kHz (rock)</td>
<td>600 kHz</td>
<td>.0003 mfd.</td>
<td>Ant. Term.</td>
<td>010</td>
</tr>
</tbody>
</table>

Important Alignment Notes:

The alignment must be done in the order given.

*Two peaks can be had, one with the trimmer screwed further out than the other. The correct adjustment is with the trimmer screwed further out. The other peak is the image.*

Where indicated by the word, "Rock", the variable should be rocked back and forth a degree or two while making the adjustment.

The alignment procedure should be repeated stage by stage, in the original order, for greatest accuracy. Always keep the output from the test oscillator at its lowest possible value to make the AFC action of the receiver ineffective.

Models 6264, 6265 Chassises 101, 1561

Output meter reading to indicate 500 milliwatts: 0.06 volt.

Average sensitivity in microvolts for 50 milliwatts output: .04 volt.

Position of Tone Control: See chart below.

Position of Dial Pointer with variable fully closed: To fall in center of block to left of 500 kHz mark.

Wave Band | Position | Generator | Dummy | Generator Connection | Trimmer Adjusted (In Order) | Function |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>AM/AM</td>
<td>Closed</td>
<td>450 kHz</td>
<td>.1 mfd.</td>
<td>GRAD Grid</td>
<td>T1, T2, T3</td>
<td>IF Output</td>
</tr>
<tr>
<td>AM</td>
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<td>15 kHz</td>
<td>400 ohms</td>
<td>Ant. Term.</td>
<td>05</td>
<td>Translator</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.555 kHz</td>
<td>2.555 kHz</td>
<td>400 ohms</td>
<td>Ant. Term.</td>
<td>06</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1400 kHz</td>
<td>1400 kHz</td>
<td>.0003 mfd.</td>
<td>Ant. Term.</td>
<td>07, 08, 09</td>
</tr>
<tr>
<td></td>
<td></td>
<td>600 kHz (rock)</td>
<td>600 kHz</td>
<td>.0003 mfd.</td>
<td>Ant. Term.</td>
<td>010</td>
</tr>
</tbody>
</table>

Models 6266, 6436 Chassises 101, 574

Approximate microvolts input for 500 milliwatts output: .06 volt.

Wave Band | Position | Generator | Dummy | Generator Connection | Trimmer Adjusted (In Order) | Function |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>AM/AM</td>
<td>Closed</td>
<td>450 kHz</td>
<td>.1 mfd.</td>
<td>GRAD Grid</td>
<td>T1, T2, T3</td>
<td>IF Output</td>
</tr>
<tr>
<td>AM</td>
<td>15 kHz (rock)</td>
<td>15 kHz</td>
<td>400 ohms</td>
<td>Ant. Term.</td>
<td>05</td>
<td>Translator</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.555 kHz</td>
<td>2.555 kHz</td>
<td>400 ohms</td>
<td>Ant. Term.</td>
<td>06</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1400 kHz</td>
<td>1400 kHz</td>
<td>.0003 mfd.</td>
<td>Ant. Term.</td>
<td>07, 08, 09</td>
</tr>
<tr>
<td></td>
<td></td>
<td>600 kHz (rock)</td>
<td>600 kHz</td>
<td>.0003 mfd.</td>
<td>Ant. Term.</td>
<td>010</td>
</tr>
</tbody>
</table>

Important Alignment Notes:

The generator should be adjusted for high output. The trimmer should be adjusted for minimum output meter reading instead of the usual maximum reading. If the frequency of an interfering station around 450 kHz is known, the generator should be adjusted to the frequency that社会稳定 instead of 450 kHz.

Repeat the 01 and 02 adjustments until perfect alignment is obtained. This will require going back and forth in these adjustments several times.

If two peaks can be had, the correct one is with the trimmer screwed further out than the other peak is the image.

Where indicated by the word, "Rock", the variable should be rocked back and forth a degree or two while making the adjustment.

The alignment procedure should be repeated stage by stage, in the original order, for greatest accuracy. Always keep the output from the test oscillator at its lowest possible value to make the AFC action of the receiver ineffective.
DIFFERENCES BETWEEN 101.555 AND 101.555-1:

101.555 and 101.555-1 are the same electrically. The differences are in the design (and part numbers) of the escutcheons and knobs, as shown in the parts list. The push button escutcheon for Model 101.555 is removed by taking out the screws in buttons, made accessible when the volume and tuning knob are pulled off their shafts. The 101.555-1 push button escutcheon is removed by taking out the screws that hold it and the dial escutcheon.
SEARS, ROEBUCK & CO.

Schematic, Voltage
Socket, Trimmers
Alignment

POWER SUPPLY
105-125 Volts 50-60 cycles or D.C. ....... 45 watts on 117 volt line.

ON-OFF SWITCH VOLUME CONTROL

STATION SELECTOR

IF PEAK 455 KC

ALIGNMENT PROCEDURE
See Tube Layout Diagram For location of trimmers.

Connect the Signal Generator ground to the receiver chassis thru a .1 mfd. condenser.
Using a .05 mfd. condenser (SEE NOTE BELOW) in series with the high side of the generator,
apply a 455 Kc. signal to the grid of the 6K7 IF amplifier tube and align the 6K7 IF trans-
former. Repeat for the last IF transformer, applying the signal to the grid of the 6G8 tube.
Using an 8 to 100 mfd. condenser as a "dummy" antenna, turn the tuning condenser to
minimum capacity, apply a 1720 Kc. signal to the antenna and tune in the signal with the
oscillator trimmer, set the generator to 450 Kc. tune in the signal and adjust the antenna
trimmer. (The antenna and oscillator trimmers are located on top of the tuning condenser,
see the Tube Layout Diagram.)

NOTE:
If considerable hum appears when the generator is connected to the 6G7 or 6G8 tubes, use
a small condenser in series with the high side of the generator.
The "dummy antenna" used for aligning the oscillator and antenna should be connected to the
receiving end of the antenna.

Use a weak signal from the generator. Strong signals tend to cause improper adjustments.

ALIGNMENT FREQUENCIES
465 Kc., 1720 Kc., 1400 Kc.

LOUD SPEAKER
Type.................. Beam Power
Undistorted........... 1.2 watt
Maximum............... 2 watts

POWER CORD

ANTENNA LEAD

MECHANICAL SPECIFICATIONS

CONTROLS
Upper End................. Tuning
Lower End........ On-Off & Volume

CONTROLS OPERATION
Direct Drive
Turn right to turn power on and to increase volume.

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Compliments of www.nucow.com
PUSH BUTTON TUNING

SETTING UP:

Leave the radio turned on for about 15 minutes before adjusting the push buttons. This "warming up" period will insure permanent and accurate settings.

1. Make a list of the stations that you want to set up for push button tuning. It is advisable, but not necessary, to arrange the stations in the order of their frequency (kilocycles). That is, the station of lowest frequency will be #1, the station of next higher frequency #2, etc. The top left push button can be used for station #1, the lower left one for station #2, etc. If you wish, short wave stations that can be tuned in on a S.W. band can be set up for push button tuning. The stations selected must give strong and reliable reception.

2. Remove the four screws that hold the plate through which the push buttons protrude, and remove the plate. (This plate is called the "escutcheon"). If your radio is a table model, not a console, remove the snap-in button at the right side of the cabinet. See Fig. 1.

3. Push the snap-in knob and turn it so that the dial pointer comes to the right end of the dial. If your radio is a table model, a key illustrated in Fig. 2, will be found in the Instruction Leaflet envelope. Insert this key in the hole in the side of the cabinet from which the snap-in button was removed and engage the key with the slot at the end of the push button locking mechanism. Insert (turn counter-clockwise) the key a few turns, unlocking the mechanism. (A screwdriver can be used for unlocking the mechanism instead of the key supplied.)

4. Push the tuning knob in and turn it so that the dial pointer comes to the right end of the dial. If your radio is a console model, a key illustrated in Fig. 2, is not required. Insert the call letters in the celluloid tabs at the back of the escutcheon. Be as exact as possible in tuning your station since this will determine how accurately your station will be tuned whenever you use the push button. Then let go of the push button before turning the tuning knob again. If properly done, the tuning eye indication will not change when you let go of the push button.

5. Push in your #1 button. Hold it in firmly and tune in your #1 station accurately. Then let go of the push button, and then the tuning knob. Proceed in the same manner for the other stations on your list.

6. After the last station has been set up, lock the mechanism by pushing the slotted shaft in and securely tightening it (turn clockwise), using the small screwdriver supplied. (Pushing the slotted shaft in will release the last push button.) The dial pointer will move to the right end of the dial and the slotted shaft is turned.) Then remove the screwdriver. If the slotted shaft remains pushed in when the screwdriver is removed, turning it back and forth slightly will remove it.

7. After locking the mechanism, test the setting of each button by pushing it in. Then see if the station can be tuned still more accurately by using the tuning knob. Increased accuracy can be obtained by the knob will be indicated by a narrow shade of the tuning eye. If you find any stations that have not been correctly set up, unlock the mechanism, as described in Step 5, and readjust the setting. Be sure to lock the mechanism again before tuning any stations.

8. Push out the call letters of your desired station from the call letter sheets supplied. The call letters with the clear celluloid tabs supplied. Replace the escutcheon.

9. You may change your choice of stations at any time by unlocking the mechanism as described in Step 5 and adjusting the buttons to the new station, as described in Step 3. Then, relocked the mechanism as described in Step 6. The call letters of the new station should be inserted in the proper push button.

OPERATING:

PUSH BUTTON TUNING MECHANISM:

The adjustment for each push button is locked or unlocked by tightening or loosening the slotted screwhead. Make the adjustment for the push button knob tightly off of the plugger. Stations are set by unlocking the mechanism, tuning in the station, pushing in the plugger (being careful not to loosen the station), releasing the plugger, and then adjusting by holding the screwdriver lightly in the screw head, allowing the spring tension to hold the plugger against the screwdriver.
ALIGNMENT FOR CHASSIS 109.279, 109.279-1, 109.279-2

12A8GT CONVERTER
12K7GT I.F.
12Q7GT AV. DET-AR
35L6GT POWER OUTPUT

POWER SUPPLY
105-125 Volts 60-60 Cycle or D.C.
...26 watts on 117 volt line.

LOUD SPEAKER
Type: Dynamic
Size: 15-16 inch
Impedance: 4 ohms
Power: 1 watt
Maximum: 3 watts

FREQUENCY RANGE
Broadcast and other services 540 to 1700 Kc.

ALIGNMENT FREQUENCIES
650 Kc., 1260 Kc., 1400 Kc.

CONTROLS
Upper Knob: Tuning
Lower Knob: On/Off & Volume

CONTROL OPERATION
Direct Drive
Turn right to turn power on and to increase volume.

VOLTAGES INDICATED AT SOCKET TERMINALS ARE MEASURED WITH 1000 OHM PER VOLT METER ON 117 VOLT LINE, WITH NO SIGNAL

CHASSIS 109.279
109.279-1 AND 109.279-2

ALIGNMENT

NOTE: ALL MODELS
If considerable hum appears when the signal generator is connected to the receiver, use a smaller condenser in series with the generator. In some cases it will be necessary to connect the generator ground to B- (ground terminal of the 12B7GT socket) instead of to the chassis.

A weak signal from the generator, strong signals tend to cause improper adjust-
LOUDSPEAKER:
Type: Electrodynamic
Size: 5 inches
V.C. Impedance: 2.2 ohms at 400 cycles
Field Coil Resistance: 4 ohms

FREQUENCY RANGE: 550-1,550 kc
ALIGNMENT FREQUENCIES:
I-F: 260 kc
Ant.: 1,400 kc
Osc.: 600 kc
Det.: 1,400 kc

POWER OUTPUT:
Type: Pentode
Undistorted: 1.8 watts
Maximum: 3.7 watts

POWER SUPPLY:
A: 6.3 volt Auto Storage Battery
B: Non-Synchronous Vibrator
Current Drain: 6.7 amps
Fuse Protection: 15 amperes

The loudspeaker cone may be centered in the usual manner with three celluloid or paper feelers after gently cutting away the front dust cover. A new cover should be cemented in place upon completion of the adjustment.

JUNE 2, 1939

FIG. 5. DRIVE CORD HOOKUP
MODEL 6301
ALIGNMENT

Antenna Filter:
A filter is included in the antenna circuit. Being completely shielded, it prevents induced interference within the set to the possibility of picking up vehicle interference. As shown in Figure 4, the filter unit is mounted internally in the rear panel of the chassis. The shielded antenna lead makes contact with the filter unit where it is securely attached on both sides.

Noise Elimination:
The presence of noise is generally due to the high intensity of electrical disturbances from the car ignition system in relation to strength of desired station. The reduction of such noise can be carried out methodically by (a) increasing the distance to a stray pickup; (2) substituting the interference at its source, (3) shielding the distance of filter devices to prevent interference of the receiver circuit.

Position of Dial Pointers:

No signal 550-750 kc
No signal 550-750 kc
600 kc
1,400 kc
1,400 kc
1,400 kc

GAIN
GAIN
GAIN
GAIN
GAIN
GAIN

Antenna
Antenna
Antenna
Antenna
Antenna
Antenna

6A8 Grid L-14 L-8 L-9 L-7 L-8 L-14

Adjustment Symbol
Position of Volume Control

Circuit Adjusted
Approx. Microwatts

No Signal
1 mfd.
No Signal
1 mfd.
600 kc
100 mfd.*
1,400 kc
1,400 kc
1,400 kc

... (Continued on reverse side)
Model 553A is the same electrically as Model 553. The differences are in the style (and part numbers) of the dial, escutcheons, knobs, label letter sheets, and push button tuning unit. The push buttons on 101.563A chassis are locked and unlocked by turning the button. The buttons on 101.563A chassis are locked and unlocked by turning a slotted screw, made accessible by pulling the buttons off of the push button plunger.
SEARS-ROEBUCK & CO.

Schematic Diagram Chassis 133333

WIRELESS REMOTE CONTROL

MODEL 6225

ELECTRICAL SPECIFICATIONS

TUBES AND FUNCTIONS:

6K8 .......................................................... Oscillator-Mixer
6B8 .......................................................... IF-AVC
25Z6 .......................................................... Rectifier

ALIGNMENT FREQUENCY:
Each button is aligned to desired station.

INTERMEDIATE FREQUENCY: 1570 KC

OPERATING FEATURES:
Push Button Tuning Only (6 buttons)
Automatic Volume Control

POWER SUPPLY:
105-121 volts, AC or DC, 25-60 cycle, 46 watts.

FREQUENCY RANGE:
- Trimmer No. 1 550 - 1000 KC
- Trimmer No. 2 550 - 1000 KC
- Trimmer No. 3 600 - 1100 KC
- Trimmer No. 4 600 - 1100 KC
- Trimmer No. 5 800 - 1450 KC
- Trimmer No. 6 1150 - 1500 KC

CHASSIS FEATURES:
- Number IF Stages One
- Antenna Attached
- Special Push Button Switch with gauged trimmers for antenna and oscillator tuning.

MECHANICAL SPECIFICATIONS

OPERATING CONTROLS:
1. 6 Push Buttons
2. 1 Small Knob

CONTROL OPERATION:
1. Push to select station
2. Turn clockwise to turn on and to increase volume.

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DEC. 13, 1938
MODEL 6225, Wireless

Remote Control

Alignment Notes, Parts

The Receiver consists substantially of the mixer and IF stages only of a conventional radio. The mixer stage is conventional. The antenna and oscillator circuits are tuned by ganged trimmers which are selected and connected across the coils by means of a push button switch. There is no variable condenser. This mixer stage feeds into an IF transformer tuned to 1570 KC. The signal is further amplified by the pentode section of the 68B tube. The plate load of this tube is a large radiating coil, also tuned to 1570 KC. Signal voltage is taken off through a small condenser to feed the diodes and develop AVC voltage for both stages. Thus when the radio control is used it is tuned to 1570 KC it picks up the radiation from the plate coil of the 68B and reproduces the program in a normal manner. The volume control is in the cathode circuit of the 68B tube, thus controlling the gain of this tube and the RF in the radiating coil. A little current is bled through the volume control so that the tube will be completely cut off at the minimum setting.

Obviously the degree of performance depends not only on the signal fed into the Control but on getting the radio tuned to the exact output frequency of the Control and the amount of coupling between the Control output coil and the radio antenna circuit at a maximum. While under ordinary conditions practically any set-up will be satisfactory, in places where signals are weak or a great deal of noise interference exists, the Control will be much more satisfactory if a lead is brought from the antenna connection of the receiver close to the Control, thus increasing the coupling many times. Under noisy conditions any long outside antennas should be removed from the receiver as they will feed noise into the set top on the Control signal. An indoor antenna can be arranged in the home which will lie close to the control thus giving good operation and also be very satisfactory for normal use with the radio.

In extremely noisy localities the above method at times will not bring about normal noise-free reception. It then will be necessary to loop the wire that leads from the antenna binding post of the receiver, over the transmitting radiator or coil of the remote tuner. One turn is all that is necessary. After this turn is added, go through the alignment procedure on Page 3.

In some localities it is possible that some station or signal will come in on 1570 KC. This will be received simultaneously with the Control signal and a heterodyne or whistle will result. In such cases the IF system of the Remote Control should be re-aligned to the nearest frequency to 1570 KC where no trouble is experienced. (See paragraph on alignment.) These IF's can be aligned to any frequency from 1460 to 1700 KC. Also in cases where the radio will not tune as high as 1570 KC the Remote Control can be realigned to a lower frequency.

For best operation the Remote Control should be operated with the volume control near the full on position to insure a good signal strength.

ALIGNMENT PROCEDURE

For alignment the Control should be removed from the cabinet. First remove the four rubber feet which hold the fiber bottom cover in place. Remove the volume control knob but not the push buttons. Finally remove the four wood screws which hold the chassis to the cabinet blocks.

INTERMEDIATES:

Use a standard signal generator with a modulated signal. Set the signal generator to 1570 KC (or the special IF frequency for extraordinary conditions as described above in 'Special Helps'). The Control must be aligned in conjunction with a radio receiver as the Control has no audio. An output meter should be connected into this receiver to indicate resonance peaks. A short length of wire should be connected to the antenna post of the receiver. First feed the generator output directly to the radio receiver antenna and carefully tune the radio to this frequency. (Do not change the signal generator setting after the receiver has been tuned to it.) Connect the generator to the antenna of the Control at the end of the power cord and lay the short length of wire next to the large output coil on the Control. Turn the volume control on the Control on full. The volume control on the receiver should be adjusted as necessary to keep the output meter on scale. Keep the signal generator output level low to make the AVC ineffective. Now adjust the IF transformer trimmers to resonance. Finally adjust the output coil trimmer on the bottom of the chassis.

BROADCAST:

Now turn the signal generator to 540 KC. Depress button number one. Turn large trimmer number one in as far as is practical without getting it down so tight that it cannot be tuned accurately. Be careful not to force this screw as the coupling between trimmers can be sheared. With the trimmer in this position back the oscillator coil trimmer to the 540 KC signal. No further broadcast alignment is required as this is done when the buttons are set to their stations.

Schematic Part List

<table>
<thead>
<tr>
<th>Location Number</th>
<th>Description</th>
<th>Schematic Part List</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1 1332820851</td>
<td>Antenna coil</td>
<td>1332820851</td>
</tr>
<tr>
<td>L2 1333020851</td>
<td>Antenna choke</td>
<td>1333020851</td>
</tr>
<tr>
<td>L3 1332820852</td>
<td>Oscillator coil</td>
<td>13332030541</td>
</tr>
<tr>
<td>L4 13333203541</td>
<td>I.F. transformer</td>
<td></td>
</tr>
<tr>
<td>L5 13335203551</td>
<td>Output coil</td>
<td>13335203551</td>
</tr>
<tr>
<td>C1 .00005 mfd, mica condenser</td>
<td>13317012549</td>
<td>0.15</td>
</tr>
<tr>
<td>C2 .001 mfd, mica condenser</td>
<td>1331701546</td>
<td>0.15</td>
</tr>
<tr>
<td>C3 .00015 mfd, mica condenser</td>
<td>13317012549</td>
<td>0.15</td>
</tr>
<tr>
<td>C4 .00015 mfd, mica condenser</td>
<td>1331701546</td>
<td>0.15</td>
</tr>
<tr>
<td>C5 .0025 mfd, -25 volt</td>
<td>13317012549</td>
<td>0.15</td>
</tr>
<tr>
<td>C6 .001 mfd, -400 volt</td>
<td>1331701546</td>
<td>0.15</td>
</tr>
<tr>
<td>C7 .0005 mfd, -400 volt</td>
<td>13317012549</td>
<td>0.15</td>
</tr>
<tr>
<td>C8 .0005 mfd, -400 volt</td>
<td>1331701546</td>
<td>0.15</td>
</tr>
<tr>
<td>C9 1332001482</td>
<td>Condenser-electrolytic-30-30 mfd.</td>
<td>1332001482</td>
</tr>
<tr>
<td>R1 13324181003</td>
<td>Volume control and switch-550M</td>
<td>13324181003</td>
</tr>
<tr>
<td>R2 1332820851</td>
<td>Resistor-50M-1/3 watt</td>
<td>1332820851</td>
</tr>
<tr>
<td>R3 1332820851</td>
<td>Resistor-100 ohm-1/3 watt</td>
<td>1332820851</td>
</tr>
<tr>
<td>R4 1332820851</td>
<td>Resistor-250M-1/3 watt</td>
<td>1332820851</td>
</tr>
<tr>
<td>R5 1332820851</td>
<td>Resistor-200 ohm-1/3 watt</td>
<td>1332820851</td>
</tr>
<tr>
<td>R6 1332820851</td>
<td>Resistor-50M-1/3 watt</td>
<td>1332820851</td>
</tr>
<tr>
<td>R7 1332820851</td>
<td>Resistor-1000 ohm-1 watt</td>
<td>1332820851</td>
</tr>
<tr>
<td>R8 1332820851</td>
<td>Resistor-250M-1/3 watt</td>
<td>1332820851</td>
</tr>
</tbody>
</table>

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SETTING UP THE BUTTONS:

As the Control has no audio system it is necessary to use it in conjunction with a radio when setting push-buttons at any other alignment operations.

Before setting the push buttons it is necessary to tune the radio which is being used exactly to the resonant frequency of the IF channel in the Control. This can be accomplished by the following steps:

A. Place the Remote Control on or beside the radio with which it is to be used. Disconnect any aerials on the radio and connect a short length of wire which will reach the Remote Control and should be laid very close to the high end of the Remote Control Cabinet. Stretch out the antenna hank on the end of the power cord on the Remote Control.

B. Plug in the Remote Control and turn the volume control on fully clockwise and leave it in this position throughout the entire procedure. Turn on the receiver and turn up the volume until the noise between stations is audible. Allow the radio and the Remote Control to run for at least one quarter hour in order that they may become fully heated. All the buttons on the Remote Control should be released. Do this by slightly depressing any released button.

C. Tune the receiver to approximately 1570 KC on the broadcast band. Tune back and forth at this point and listen for a point of greatly increased noise level. This spot should be tuned in in the same manner you would tune in a station. You are actually tuning in the sensitivity noise of the Remote Control. In case the Control is also being realigned, a short cut is made possible by tuning the receiver to the signal generator output, without changing the setting at which the Control IF's are aligned.

HOW TO SET UP PUSH BUTTONS:

1. Make a list of station call letters of six nearby powerful broadcast stations that it is desired to set up on the buttons. Arrange the stations in the list in the order of their frequency. That is, the station of lowest frequency will be first; the next higher second, etc. After marking down the frequencies on the chart along side of the station call letters and arranging them in their proper order, number 1, 2, 3, 4, 5 and 6 respectively. Check each frequency with figure 1. A typical list appears below.

<table>
<thead>
<tr>
<th>Station Call Letters</th>
<th>Frequency</th>
<th>Button No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>WMAQ</td>
<td>670 KC</td>
<td>1</td>
</tr>
<tr>
<td>WLW</td>
<td>700 KC</td>
<td>2</td>
</tr>
<tr>
<td>WGN</td>
<td>720 KC</td>
<td>3</td>
</tr>
<tr>
<td>WENR-WLS</td>
<td>870 KC</td>
<td>4</td>
</tr>
<tr>
<td>WHO</td>
<td>1000 KC</td>
<td>5</td>
</tr>
<tr>
<td>WCKY</td>
<td>1490 KC</td>
<td>6</td>
</tr>
</tbody>
</table>

Remember that buttons No. 1 and No. 2 will tune only stations with frequencies from 550 to 1000 KC. Similarly buttons No. 3 and No. 4 will only tune stations with frequencies from 600 to 1100 KC. Button No. 5 from 800 to 1450 KC and No. 6 from 1150 to 1300 KC.

2. The Remote Control is shipped with the holes in the escutcheon open, exposing the trimmer adjusting screws. After completing the adjusting procedure, as outlined below, tear out the tabs bearing the proper call letters of the stations set up on each trimmer and button, from the sheet of tabs supplied. These tabs will slip into the recess around the trimmer holes and close them, giving the hole a neat appearance. The trimmers are more easily accessible if the two screws and escutcheons are removed.

3. With the manual dial knob on the receiver find station No. 1 on the list, noting its program.

4. Return the pointer to the control frequency setting near 1570 KC as outlined above.

5. Depress button No. 1 (see figure 1).

6. With a small screw driver turn large trimmer screw No. 1 in or out until the program previously heard is heard again. Tune this station accurately. This can be determined by ear. Rotate the trimmer screw back and forth across the station to find a setting where the tone is deepest and the noise level lowest.

7. Now adjust small screw No. 1, turning it to the right or left until the program is received with maximum volume. If the radio has a tuning eye, the correct setting for this screw is indicated when the sides of the shadow are closest together.

(FOR RECEIVERS WITH PUSH BUTTON TUNING ONLY)

When setting up the control in a home with a receiver with push buttons.

After determining the proper setting of the receiver dial, for Remote Control operation, set up this frequency on the proper push button as outlined in the operating instructions for the receiver. This will simplify the setup procedure for the remaining buttons of the Remote Control. Additionally it will simplify the location of the proper dial setting for Remote Control operation whenever the Remote Control is to be used.

8. Locate the second button on your list on the radio dial, noting its program.

9. Push button No. 1 and tune the radio to the preset frequency of about 1570 KC as outlined in paragraph (C), only this time use the station set on button No. 1 for the 1570 KC reference point, instead of noise.

10. Without changing radio dial press button No. 2 and use procedure outlined in points 6 and 7, only using trimmer screws No. 2.

11. Set up remaining buttons as outlined in points 8, 9, and 10, substituting in point 10 the number of the button and the trimmer screws to be adjusted.

It is best to set the buttons on the stations themselves rather than trying to duplicate their frequencies on a signal generator.

THE ANTENNA:

The antenna wire is supplied with the Control. It is connected through an extra wire in the power cord. It should be uncoiled and extended as far as possible from the Control. In locations remote from broadcasting stations additional pickup can be had by connecting the end of the antenna to a conventional outdoor antenna.

THE FILAMENT CIRCUIT AND POWER SUPPLY:

All of the tubes are connected in series. Accordingly, if any one tube burns out the others will not light. It is necessary to replace only the burned out tube; the others will then light. A resistor is built into the line cord to reduce the voltage for the tube filaments.

The line cord must not be shortened or altered in any way.

CAUTION:

Under no condition should a ground be attached to this Control, also no grounded object should be allowed to come in contact with the chassis.

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**General Information and Service Hints**

This Wireless Record Player is designed to operate in conjunction with any radio receiver having a frequency range which includes 530 to 625 kc.

The output of the crystal pickup, shunted by a 250,000 ohm volume control, a 560,000 ohm resistor and a 0.1 mfd. condenser, is connected to grid No. 1 of the 12A8GT modulator-oscillator tube. The 12A8GT tube acts as a modulated-oscillator producing a signal whose frequency may be adjusted from 530 to 625 kc by means of the screwdriver adjustment at the rear of the cabinet.

The antenna or output wire is connected thru a coupling condenser to the grid circuit of the oscillator, and run parallel with the power cord. The output is sufficient to permit operation within approximately 20 feet of the radio receiver.

**OPERATING PROCEDURE**

1. After inserting plug in power supply outlet, turn the power-switch-volume control knob on top of cabinet to full clockwise position. Place either 10 or 12 inch record on the turntable, starting the synchronous motor by a clockwise twirl with the hand.

2. Tune the radio receiver to a quiet point between 530-625 kc.

3. Tune the oscillator in the record player to the tuned frequency of the receiver by adjusting the button on the rear of the record player cabinet to obtain peak output on the receiver. Rotating the button to the right decreases the frequency; to the left increases the frequency.

**Phonograph Motor Service Data**

The synchronous motor used in this instrument is designed to be simple and foolproof. Among its many features are constancy of speed, low power consumption, single moving part, ease of starting, rubber damper, ease of repair, and long life. The parts that may require attention are plainly shown on "Motor Details." The motor is started by turning "on" the power switch and giving the turntable a clockwise spin with the hand. Smooth starting and running will be insured by keeping the bearings well cleaned and oiled.

**Rotor Adjustment**

Use three shims (22 mil for 60 cycle and 16 mil for 25 cycle motors), spaced equally around the gap between rotor and stator. When rotor is suitably adjusted, securely tighten the three screws which hold the rotor to the turntable. The centering operation is very similar to that done with a dynamic speaker.

**Model 6229 Only - Lubrication**

Both the rotor and stator have bearing surfaces about the center vertical axis. These bearings and the ball bearing at the bottom of the turntable's shaft should be oiled whenever player is serviced. The leather washer beneath the stator is to be pliable and soaked in light oil.

**Removing the Rotor from the Stator**

The rotor and turntable assembly simply rests on the ball bearing at the bottom of the vertical bearing, and may be removed by lifting out. Don't turn player upside down without holding turntable.

4. Adjust volume control on radio receiver to the highest volume that may be required, and then use the record player volume control for further adjustment.

5. In noisy locations, it may be desirable to leave the record player volume control turned full on, and regulate the radio receiver volume control for the desired level.

6. If there is insufficient volume, or excessive noise, the record player may be coupled to the receiver, by running a piece of insulated wire between the two units; wrap three or four turns of the coupling wire around the antenna lead-in on the radio receiver and connect the other end in the same way to the short wire that projects from the plug on the power cord of the record player.

**Hum and Vibration**

A small amount of hum when starting, decreasing to a negligible amount while running, is normal. If excessive vibration occurs either at starting or running, it may be due to one of the following:

1. Insufficient lubrication in outer bearing or any other failure that will cause the stator to bind.
2. Metal and leather washers in improper position, see "Motor Details".
3. Leather washer not oiled. When replacing the leather washer, make sure that it is thoroughly soaked in oil.
4. Motor not properly supported from motor board. Unless the motor is properly supported from the motor board, vibration will be excessive.
5. Burrs on poles of rotor or stator. They should be removed with fine emery cloth.
7. Improper horizontal alignment of the rotor and stator. Correct horizontal alignment is as shown in the motor assembly drawing.

The damper spring must fit without binding or chattering, in the slot in the stator. The stator must be free to deflect in either direction between the limits of the damper spring. Any binding in the washers or stator bearing which prevents the movement of the stator may cause speed variations in the motor. The damper spring must exert equal force in restoring the stator to its mid-position when the stator is deflected manually in either direction.

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MODEL 6229
Schematic, Voltage
Chassis Wiring

SPECIFICATIONS

TUBES AND FUNCTIONS:
6A8........................ Modulator—Oscillator
25Z6-G..................... Half-Wave Rectifier

DIAL LAMP................... Mazda 47, 6-8 volts, .15 amp.

FREQUENCY RANGE............ 530-625 kc

VOLUME CONTROL.............. 250,000 ohms—Power Switch—Volume

CRYSTAL PICKUP

Impedance............. 100,000 ohms at 1,000 cycles
Average Output Volts..... 1 1/2 volts at 1,000 cycles
with 250,000 ohm load

POWER SUPPLY

A-6.................. 105-116 volts, 60 cycles, 30 watts
A-5.................. 105-126 volts, 50 cycles, 50 watts

MOTOR.............. 78 r.p.m. Synchronous (manual starting)

JUNE 22, 1939

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IF ALIGNMENT

Connect the ground side of the signal generator to the chassis. Connect the high side of the generator to the grid of the 1A7 tube thru a .1 mf condenser. Connect an output meter or other resonance indicator to either speaker voice coil or plate of the output tube. Using a 455 kc signal and with the volume control full on so that only a very weak signal is necessary, adjust first the 45 and then the 45 IF transformer for maximum resonance indication.

HF ALIGNMENT

Using the same signal generator connections as for IF alignment, turn the tuning condenser to minimum capacity and adjust the oscillator to 1860 kc. (The oscillator trimmer is on the variable condenser.) Slide the shelf and chassis back in the cabinet and place the batteries in their proper position. Connect the signal generator leads to a single loop of wire about eight inches in diameter. Place this loop about one foot from the cabinet in the same plane as the front of the cabinet. Set the signal generator at 1400 kc, tune the receiver until this signal is heard and adjust the trimmer on the back of the variable condenser. The tuning condenser is of the out plate oscillator type and no adjustment is necessary at 600 kc.

ALWAYS USE A WEAK SIGNAL FROM THE GENERATOR. Strong signals tend to cause improper adjustments.

VOLTAGES MEASURED TO CHASSIS WITH 30 VB AND 1.5 VA. VOLUME CONTROL OPEN—NO SIGNAL

ALIGNMENT FREQUENCIES, 455-1680-1400 KC.

LOUD SPEAKER
Type..............P.M. Dynamic
Size.....................8 inch

POWER SUPPLY............Batteries
FREQUENCY RANGE..........640 to 1580 KC.

POWER OUTPUT
Type..................Pentode
Undistorted.............150 watt
Maximum..................20 watt

MAY 3, 1939
THE PUSH BUTTON TUNING MECHANISM:

The push button mechanism is locked or unlocked by tightening or loosening the wing nut at the end of the mechanism. A key, instead of the wing nut, is supplied with table models. Remove the snap-in button at the side of the cabinet and engage the key with the slot at the end of the push button mechanism. Stations are set up by unlocking the mechanism, holding the button all the way in, tuning to the desired station, and then releasing the button. After all of the buttons have been set, the mechanism should be locked by securely tightening the wing nut.

INTERMEDIATE FREQUENCY

455 kHz
FOR ALIGNMENT
SEE INDEX

LOUD SPEAKER:
Type:..............PM Dynamic
Size:..............6 and 8 inch

POWER OUTPUT:
Type:..............Class B
Undistorted:........0.4 watts
Maximum:..........0.7 watts
Chassis identified by 101.539-1A use a loop antenna that is wound directly on the back cover of the carrying case. The knob design and part number also have been changed.

Should the loop be disconnected from the receiver for any reason, be sure that the colored leads are re-connected to the same terminals as originally indicated by the paint spot on one of the terminals.

ALIGNMENT PROCEDURE

Output meter connections........................................ Across load speaker voice coil
Output meter reading to indicate 50 milliwatts.................. 500 kΩ
Connection of generator output lead.............................. See chart below
generator modulation.............................................. 200, 400 cycles
Position of Volume Control........................................ Fully on
Position of Dial Pointer with variable fully closed to fall on bar just below 500 kΩ calibration mark.

* - PART OF T2
TUBE SOCKETS ARE VIEWED FROM UNDER SIDE OF CHASSIS. VOLTAGE READINGS SHOWN AT SOCKET PHONES ARE TO CHASSIS, AND ARE TAKEN WITH NO SIGNAL. WHERE NO READING IS GIVEN, THE VOLTAGE IS ZERO OR TOO LOW TO READ.

POWER SUPPLY:
*A* Battery (4½ volt)........................................ 1 - #0651
Service rating - 300 Hours
*B* Batteries...................................................... 2 - #0659
Service rating - 300 Hours

LOAD SPEAKER:
Type: FM Dynamic
Size: 8 inch

ALIGNMENT FREQUENCIES:
Oscillator: 1000 kHz
Antenna-Trans.: 1500 kHz
Trimmer: 1500 kHz
Pedaler: 1500 kHz

FREQUENCY RANGE:
Broadcast: 560-1600 kc

FEB. 13, 1939
SEARS PAGE 11-49

SEARS, ROEBUCK & CO.

MODEL 6301, Ch. 126, 211
Schematic, Voltage, Dial
Assembly

FREQUENCY RANGE: .......... 150-1,550 kc

ALIGNMENT FREQUENCIES:

P.F. .......................... 160 kc
Ant. .......................... 1,400 kc
Oncl. ......................... 600 kc
Det. .......................... 1,400 kc

POWER OUTPUT:

Type ......................... Push-Pull Beam
Undistorted .................. 6 watts
Maximum ..................... 8 watts

POWER SUPPLY:

"A" .......................... 6.3 volt Auto Storage Battery
Non-Synchronous Vibrator
Current Drain ................ 8.7 amperes
Fuse Protection .............. 13 amperes

LOUDSPEAKER:

Type ......................... Electrodynamic
V.C. Impedance .............. 8 ohms at 400 cycles
Field Coil Resistance ...... 4 ohms

Manual Tuning Dial:

A tuning dial is provided so that additional en-
ties may be tuned in as desired. The tuning dial is
connected through a cord drive to a drum on the con-
denser shaft. This same cord drive the dial indicator by passing over
a pulley on the chassis. Figure shows the complete cord
drive assembly and the correct number of turns which the
cord should be wrapped around the drive shaft and conden-
sor drum.

TURN FREE GEARE CLOCKWISE
ONE TOOTH TO OBTAIN SCISSOR
ACTION BEFORE MESHING GEAR
SECTOR.

DRIVE CORD HOOKUP

LOUDSPEAKER:

The loudspeaker may be centered in the usual man-
ner with three collodion or paper binders after gently cutting
away the front dust cover. A new cover should be creased
in place upon completion of the adjustment.

MAY 3, 1939

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Compliments of www.nucow.com
INTERMEDIATE FREQUENCY
455 kc

POWER OUTPUT:
Type: Pentode
Undistorted: 3.3 watts
Maximum: 6 watts

FEBRUARY 22, 1940

IF PL AK 455 KC

PARTS IN
POWER SUPPLY

PRELIMINARY:
Output meter reading to indicate 1 watt...0.79 volts. Position of Tone Control...Brilliant.

ALIGNMENT PROCEDURE

TRIMMER
ADJUSTMENTS
(IN ORDER
SHOWN)

TRIMMER FUNCTION

APPROXIMATE
MICROVOLTS

CLOSED
455 kc
.1 mfd.
RF Grid
T3, T1
IF
--

OPEN
455 kc
.1 mfd.
RF Grid
C16*
IF Wave Trap
--

OPEN
1520 kc
Ant. Conn.
C11
Oscillator
--

OPEN
3430 kc
Ant. Conn.
C15*
Image Rejector
--

CLOSED
540 kc
Ant. Conn.
C12
Padder
10

OPEN
1520 kc
Ant. Conn.
C11
Oscillator
10

1400 kc
Ant. Conn.
C1
Antenna
10

OPEN
6000 kc (rock)
Ant. Conn.
C12
Padder
10

The receiver must be in its case during alignment (but the covers will be removed).

* The signal generator should be adjusted for high output and the trimmer should be adjusted for minimum response.

** The dummy antenna will consist of a 40 mfd. condenser connected in series between the generator and the receiver and another 40 mfd. condenser connected from the receiver antenna connection to the chassis.

The alignment procedure should be repeated in the original order, step by step, to insure greater accuracy.

Always keep the output power from the generator at its lowest possible value to prevent the AVC of the receiver from interfering with accurate alignment, except as noted by (*) above.

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For other data refer to original chassis number 101566.

Subject: Addition of suffix number -3 to chassis identification number 101566

Chassis identified by the addition of suffix number -3 use a 12SK7GT tube instead of the 12SK7. The revised schematic and top of chassis illustration are shown in this supplement. Changes in the parts:

1012842407 oscillator paddler and trimmer coil L3, retail price 34c, replaces 1012830932.

1012042405 20 mfd, 100 volt; 30 mfd, 150 volt; 10 mfd, 25 volt electrolytic condenser, C14, C15, C16, retail price 59c, replaces 1012030935.

A .03 mfd, 200 volt condenser, C17, retail price 7c, is added.

A 1M ohm, 1/10 watt resistor, R12, retail price 15c, is added.

FOR ALIGNMENT SEE INDEX

1013342406 IF input transformer, retail price 60c, replaces 1013320931.

1013542450 IF output transformer, retail price 60c, replaces 1013520910.

1012842409 loop, retail price 55c, is used for all the bakelite cabinet models.

1012842465 loop, retail price 69c, is used for all the wood cabinet models except 101.5566E.

1013441432 loop and cover assembly, retail price 75c, is used for 101.5566E assembly only.

Matching the antenna:

Before proceeding with this adjustment, the receiver should be left on for about 15 minutes to warm up.

An adjusting screw, accessible to a screwdriver through a hole in the bottom cover of the case, is provided to match the receiver to the car antenna. With the receiver adjusted for "DIAL" tuning, use the Station Selector knob to tune in a very weak station at about 1400 kilocycles, with the volume control fully on. Then turn the adjusting screw to the point affording maximum volume.

The push button tuning mechanism:

Preselction of push button tuned stations is accomplished by settings of the iron cores in the oscillator coils and settings of the trimmer condensers across the antenna coil. The proper coils are selected by a switch which is rotated one step at a time by means of a solenoid, controlled by the tuning push button. Pushing the button also mechanically rotates the station call letter drum.

Each button can be set only to a station within a certain frequency range as follows:

<table>
<thead>
<tr>
<th>Button</th>
<th>Frequency Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>540 to 980 kc</td>
</tr>
<tr>
<td>2</td>
<td>440 to 1070 kc</td>
</tr>
<tr>
<td>3</td>
<td>450 to 1500 kc</td>
</tr>
<tr>
<td>4</td>
<td>590 to 1570 kc</td>
</tr>
</tbody>
</table>

To set up the mechanism, insert the call letter tabs in their proper frequency order in the call letter drum. The drum is accessible by removing the snap-in button at the top of the push button unit before mounting the unit. One of the positions is for manual tuning. When this position is reached, the manual tuning dial will become illuminated and the receiver can be tuned manually.

Stations are set up by removing the front grille of the receiver, exposing the station tuning screws. The adjusting screws are labeled. The OBS. screw must be adjusted first; then the ANT. screw. Then repeat the two adjustments.

To synchronize the mechanism, push the tuning button until the manual tuning dial becomes illuminated. Remove the push button cable from its socket in the side of the receiver case and then push the button until the "DIAL" tab comes into view. Then reinset the cable plug.

Under certain conditions the mechanism may fall out of synchronism if the button is not pushed all the way in and completely released when operating it. The user should be instructed accordingly.

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Alignment, Noise Notes

SEARS, ROEBUCK & CO.

Alignment Procedure

PRELIMINARY:
Output meter connections
Primary readings to indicate 1 watt
Generator ground lead connections
Dummy antenna value to be in series with generator output
Connection of generator output lead
General test of antenna connections
Position of Volume Control

Across speaker voice coil
To chassis
See chart below
Fully clockwise

<table>
<thead>
<tr>
<th>Position of Dial Pointer</th>
<th>Generator Frequency</th>
<th>Dummy Antenna</th>
<th>Generator Connections</th>
<th>Adjustment Symbol</th>
<th>Circuit Adjusted</th>
<th>Approx. Microvolts</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Signal</td>
<td>550-1,750 kc</td>
<td>01 mfd.</td>
<td>5SK7 Grid (No. 4 pin)</td>
<td>C11, C12</td>
<td>2mF LF Trans.</td>
<td>2,400</td>
</tr>
<tr>
<td>600 kc Signal</td>
<td>600 kc</td>
<td>100 mfd.*</td>
<td>Antenna Connector</td>
<td>L2</td>
<td>Ant.</td>
<td>7</td>
</tr>
<tr>
<td>1,400 kc Signal</td>
<td>1,400 kc</td>
<td>100 mfd.*</td>
<td>Antenna Connector</td>
<td>C3</td>
<td>Ant.</td>
<td>2</td>
</tr>
<tr>
<td>600 kc Signal</td>
<td>600 kc</td>
<td>100 mfd.*</td>
<td>Antenna Connector</td>
<td>L2</td>
<td>Ant.</td>
<td>7</td>
</tr>
<tr>
<td>1,400 kc Signal</td>
<td>1,400 kc</td>
<td>100 mfd.*</td>
<td>Antenna Connector</td>
<td>C3</td>
<td>Ant**</td>
<td>2</td>
</tr>
</tbody>
</table>

* Make the generator connection through a 100 mfd. (.001 ffd) capacitor inserted at the antenna connector of the receiver. The lead from the signal generator to the 100 mfd. capacitor should be shielded if desired, but the shield should be opened at the antenna connector.

** Final adjustment of C3 must be made after the receiver has been installed and the antenna connected. See “Antenna Circuit!”

Each step of the alignment should be repeated in its original order for greater accuracy. Always keep the output from the generator at its lowest possible value, to prevent the A.C. action of the receiver from interfering with accurate alignment.

Always locate the top and bottom parts location views of chassis. Only the dummy antenna indicated in the chart for any particular frequency should be used.

Values shown under “Microvolts” are only approximate.

Noise Elimination:

The presence of noise is generally due to the high intensity of electrical disturbances from the car ignition system in relation to strength of desired station. The reduction of such noise should be carried out methodically by:

1. Increasing effectiveness of the antenna circuit and shielding for protection against stray pickup;
2. Subduing the interference at its source; and
3. Installation of filter devices to prevent transmission of interference into the receiver circuits.

Antenna—Should be located well away from engine compartment to avoid noise disturbance, and as close as possible from front wheels to eliminate “wheel static.” Lead-in should be completely shielded and shield grounded to frame of car at as many points as possible. It is very essential that the antenna be electrically “matched” to the receiver input—this is accomplished by adjustment of the antenna trimmer and the connections explained under “Antenna Circuit.”

Ignition—Radio frequency interference is created in the secondary and primary ignition circuits, usually at each point where a repeating contact, such as spark, is made. The most prominent sources on the average car are:

(a) Distributor—Add the suppressor-resistor in the center or common voltage lead; also, have points cleaned and adjusted, if necessary.
(b) Generator—Connect an 0.5 mfd. shielded capacitor directly across generator output; also see that commutator is smooth and brushes properly seated for minimum sparking.
(c) Gasoline Gauge—Wire having an electrical contact, an 0.5 mfd. shielded capacitor may be required between the terminal and car frame.
(d) Temperature Gauge—Where a contacting device is used, interference can be eliminated with an 0.5 mfd. capacitor connected between the circuit and car frame.
(e) Spark Plugs—Suppression in leads to spark plugs may possibly be required in extreme cases of interference on older cars, or in localities where signals are very weak; see that spark plugs are properly adjusted and are not leaky.
(f) Ammeter—the supply for the receiver is usually taken from this point; a 0.5 mfd. capacitor from the “hot” lead will prevent passage of interference into the set over this circuit.
(g) Dome Light—Adding to the dome light should be shielded.
(h) 6.5 mfd. capacitor attached between the circuit and car frame, preferably at the point where lead enters the corner post.
(i) Wiring—primary and secondary ignition wiring should be physically separated; possible points of poor insulation should be checked, and all connections must be secure.

Car Chassis—Bonds—Intermittent electrical connection between members of the car chassis, caused by vibration, will cause interference. Flexible binding connections to the frame will correct this condition. The best sources are:

(a) Transmission case:
(b) Motor
(c) Steering column
(d) Cylinder head
(e) Dash controls
(f) Rear springs
(g) Brake cables
(h) Body cover
(i) Receiver case

Wheel Static—Interference from this source generally originates in the front wheels, and is related to road surface composition, and atmospheric conditions. Spring devices are available for attachment to the wheels for making a permanent connection between the hub and axle; these should be installed where required. The wheel bearings should be checked for proper adjustment. Patches in tires will frequently cause wheel static; exchange front and rear wheels. Be sure antenna is well separated from wheels of car.

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MODEL 6320
Chassis, Socket, Trimmers
Notes, Tuner, Alignment

REMOVING THE CHASSIS FROM THE CABINET:

In addition to the two screws that hold the back of the chassis, there is also a screw that holds the speaker frame to the cabinet.

DIAL LIGHT REPLACEMENT:

The dial light socket is attached to a bracket at the rear of the chassis, held with a single screw.

COIL REPLACEMENT:

No regard need be paid to the colors of paint spots on coils or cores. Coils may be replaced individually; however, cores must be replaced in pairs to secure proper matching and are furnished in pairs for service. To replace a coil, cut away the cement from the old coil and remove the coil. Insert the new coil in the bracket and position it so that, when the tuning knob is turned to its low frequency limit, the core will extend exactly 1/16" beyond the end of the coil winding. A gauge, easily made of a piece of wire as illustrated, should be used for determining this dimension. Similarly, when replacing cores, the coil positions must be checked to see that there is exactly 1/16" overlap of the core beyond the end of the coil winding with the tuning knob in the low frequency limit. This is true for both oscillator and translator cores and coils. New coils can be cemented to the bracket with Major's, Du Pont, or equivalent cement.

ELIMINATING HUM MODULATION WHEN USING AN EXTERNAL ANTENNA:

As shown by the Schematic and by the Location of Parts diagram, there is a 2200 ohm resistor, connected from the external antenna clip to chassis. This resistor prevents hum modulation when using an external antenna. If such hum is experienced, examine the chassis to see if this resistor has been incorporated. (The resistor is mounted alongside of the loop antenna connection board as shown in the Location of Parts diagram. It was not incorporated in early production.) If necessary, addition of the resistor will eliminate the complaint.

PUSH BUTTON TUNING:

Each button is set up by loosening the screw (under the call letter tab), tuning in the station, depressing the button and then tightening the screw.

ALIGNMENT PROCEDURE

PRELIMINARY:

Output meter connection. Across loud speaker voice coil
Output meter to indicate 50 milliwatts. 0.36 volt
Dummy antenna value to be in series with generator output. See chart below
Connection of generator ground lead. To external ground
Position of Volume Control. Fully on

<table>
<thead>
<tr>
<th>POSITION OF DIAL POINTER</th>
<th>GENERATOR FREQUENCY</th>
<th>DUMMY ANTENNA</th>
<th>GENERATOR CONNECTION</th>
<th>TRIMMERS ADJUSTED (IN ORDER SHOWN)</th>
<th>TRIMMER FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>550 kc</td>
<td>455 kc</td>
<td>.1 mfd.</td>
<td>12A8GT Grid</td>
<td>T2, T1</td>
<td>IF</td>
</tr>
<tr>
<td>540 kc</td>
<td>440 kc</td>
<td>.0002 mfd.</td>
<td>Ant. Clip</td>
<td>C4</td>
<td>Oscillator</td>
</tr>
<tr>
<td>900 kc</td>
<td>900 kc</td>
<td>.0002 mfd.</td>
<td>Ant. Clip</td>
<td>C2</td>
<td>Translator</td>
</tr>
</tbody>
</table>

The alignment procedure should be repeated stage by stage, in the original order, for greatest accuracy. Always keep the output from the test oscillator at its lowest possible value to make the AVO action of the receiver ineffective.

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SEARS, ROEBUCK & CO.

WIRING DIAGRAM FOR SILVERTONE CHASSIS 101.572-1

ALIGNMENT NOTES

SWITCH POSITION OF VARIABLE FREQUENCY DUMMY ANTENNA CONNECTION (SHOWN) ADJUSTED TRIMMER FUNCTION APPROXIMATE MICROWATTS

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;A&quot;</td>
<td>Closed</td>
<td>455 kHz</td>
<td>.1 mfd.</td>
<td>6X80 Grid</td>
<td>T2, T1</td>
<td>IF</td>
<td>--</td>
</tr>
<tr>
<td>&quot;A&quot;</td>
<td>1600 kHz</td>
<td>1600 kHz</td>
<td>.0003 mfd.</td>
<td>Ant. Term.</td>
<td>C9</td>
<td>Oscillator</td>
<td>300</td>
</tr>
<tr>
<td>&quot;A&quot;</td>
<td>1400 kHz</td>
<td>1400 kHz</td>
<td>.0003 mfd.</td>
<td>Ant. Term.</td>
<td>C4</td>
<td>Translator</td>
<td>35</td>
</tr>
<tr>
<td>&quot;A&quot;</td>
<td>600 kHz</td>
<td>600 kHz</td>
<td>.0002 mfd.</td>
<td>Ant. Term.</td>
<td>C7</td>
<td>Padder</td>
<td>130</td>
</tr>
<tr>
<td>&quot;B&quot;</td>
<td>2.4 m</td>
<td>2.4 m</td>
<td>400 ohms</td>
<td>Ant. Term.</td>
<td>C3</td>
<td>Translator</td>
<td>320</td>
</tr>
<tr>
<td>&quot;H&quot;</td>
<td>15 m</td>
<td>15 m</td>
<td>400 ohms</td>
<td>Ant. Term.</td>
<td>C1</td>
<td>Translator</td>
<td>85</td>
</tr>
<tr>
<td>&quot;D&quot;</td>
<td>9.55 m</td>
<td>9.55 m</td>
<td>400 ohms</td>
<td>Ant. Term.</td>
<td>C14, C23</td>
<td>Osc. Trans.</td>
<td>150</td>
</tr>
</tbody>
</table>

Where indicated by the word "Rock", the variable should be rocked back and forth a degree or two while making the adjustment.

* If two peaks can be had, the correct adjustment is with the trimmer screw further out.

The other peak is the image.

The alignment procedure should be repeated stage by stage, in the original order, for greatest accuracy. Always keep the output from the test oscillator at its lowest possible value to make the AVG action of the receiver ineffective.

PUSH-BUTTON ADJUSTMENT:
Pull off push-button knob to locate slotted screwhead.

SETTING UP STATION:
Loosen screwhead; tune station; tighten screwhead, thus locking mechanism.

CHASSIS 101.572-1
Top frequency, variable completely open, is 1530 kc. Has wave-trap adjustment C37, to be made with variable at 600 kc and signal at 455 kc. Make this adjustment for min. output reading.

OCT. 2, 1939

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In cases where excessive hum is encountered, it may be reduced by either one of the following methods.

1. In many cases, heater to cathode leakage in the 12J5GT or 12F5GT tubes may be causing excessive hum. If replacing the faulty tubes does not materially reduce the hum, it will be necessary to proceed as follows.

2. Disconnect the plate resistors (R6 and R11) of the 12J5GT and the 12F5GT tubes from the plate supply at the points marked "X" in the circuit diagram and connect them to the filter network as shown in the filter network diagram. The filter network consists of a 1 mf 400 volt paper condenser and a 100,000 ohm 1/4 watt resistor.

A number of these sets were sent to the field without a shield on the 12F5GT tube. One should be on this tube in order to reduce the hum level. Currently produced models have this shield installed at the factory.
POWER SUPPLY:
All models available
... 110-125 volts, 25-60 cycle AC or DC, 30 watts

IF PEAK 455 KC

ALIGNMENT PROCEDURE
Across primary output transformer

Output meter connections.
Output meter reading to indicate 0.060 watt
for Weston type 571 output meter on 15 volt scale
Dummy antenna value in series with generator output
Connection of generator ground
Generator modulation
Position of volume control

PUSH BUTTON
SWITCH
POSITION
OF DIAL
POSITION
OF POINTER
Manual "IN"

GENERATOR
FREQUENCY
455 kc
1500 kc

GENERATOR
CONNECT
16K7G7, Grid
12A607, Grid

TRIMMERS
ADJUSTED
T6, T5, T7
T2, T1, T2

TRIMMER FUNCTION
I.F.
Osc., R.F.

IMPORTANT ALIGNMENT NOTES
FOR TUNER SEE INDEX

It is advisable to repeat the entire alignment procedure in the original order to insure greater accuracy.

Always keep the output from the test oscillator at its lowest possible value. As the sensitivity is increased by alignment, the generator output should be reduced correspondingly.

First time T5 is misaligned by loosening center screw one turn.

Short oscillator section of variable condenser. Second I.F. alignment must be done twice to secure flat top tuning.

Connect generator output to a separate radiating loop and pickup 1500 KC signal on receiver.

FEBRUARY 28, 1940
CHASSIS 101.573

TUBE SOCKETS ARE VIEWED FROM UNDER SIDE OF CHASSIS. VOLTAGE READINGS SHOWN AT SOCKET PRONGS ARE 70 - 80, AND ARE TAKEN WITH NO SIGNAL; WAVE SWITCH IN BROADCAST POSITION. LINE VOLTAGE AT 117 VOLS. WHERE NO READING IS GIVEN, THE VOLTAGE IS ZERO OR TOO LOW TO READ.

JUNE 19, 1939

INTERMEDIATE FREQUENCY ........................................ 455 kc

POWER SUPPLY:
All models available .............................................. 105-125 v., 50-60 cycles AC; 85 watts
All models available .............................................. 105-125 v., 50-60 cycles AC; 85 watts

POWER OUTPUT:
Type .......... Push-pull beam  LOUD SPEAKER:
Undistorted ........ 3 watts  Type .......... PM Dynamic
Maximum .......... 3.7 watts  Size .............. .6 and 10 inch

PUSH BUTTON TUNING MECHANISM:

The adjustment for each push button is locked or unlocked by tightening or loosening the slotted screwhead made accessible when the push button knob is pulled off its plunger. Stations are set up by unlocking the mechanism, holding the plunger all the way in and tuning to the desired station, and then securely locking the adjustment.
**Alignment Procedure**

**FOR CHASSIS 101L573-1**

| Wave Band | Switch Position | Generator Duty | Generator Frequency | Antenna | Generator Connections | TRIMMER ADJUSTED (IN ORDER) | TRIMMER Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate Approximate 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INTERMEDIATE FREQUENCY: 455 kc

POWER SUPPLY:
All models available: 105-125 volt AC; 25 and 50-60 cycle; 105 watts

LOUD SPEAKER:
Dynamic Type: Push-pull direct coupling
Size: 10 inch
Approx. field coil res.: 600 ohms
Approx. field coil voltage drop: 65 v.

POWER OUTPUT:
Undistorted: 4 watts
Maximum: 7 watts

GENERAL INFORMATION & SERVICE HINTS

FOR ALIGNMENT
SEE INDEX

JUNE 19, 1939

RECOMMENDED ANTENNA EQUIPMENT:
Catalog #5523: Greatest pickup and noise reduction.
Catalog #5522: Better effective pickup and noise reduction than Catalog #5523.
Catalog #5575: Conventional antenna.
CIRCUIT CHANGE TO IMPROVE TONE WHEN USING CATALOG 6237 RECORD PLAYER.

REDUCING MICROPHONICS.

Bass response can be increased and record reproduction tone improved when this receiver is used in conjunction with a Catalog 6237 record player, by inserting the network shown schematically below.

The 100M ohm resistor at present across the phono jack terminals is to be removed. As shown below, the lead going to the high side of the phono jack is to be broken and a 200M ohm resistor shunted by a .0005 mfd. mica condenser is to be inserted in series with it. The 100M ohm and the 1 megohm resistors and the .01 mfd. condenser are to be connected as shown.

Because of the increased bass response, there may be a greater tendency toward microphonic. For this reason, the record player should not be put directly on top of the receiver cabinet.

REDUCING MICROPHONICS:

1. Be sure that the two shipping bolts and the wood spacer strips have been removed.

2. See that knobs, control shafts, and dial lights or dial mechanism do not touch the cabinet.

3. See that the rubber bumpers at the rear of the chassis do not press on it more than enough to prevent shifting.

Although the foregoing three points are simple, and commonly known, very often insufficient attention is paid to them. It is very important that the points mentioned be very thoroughly checked.

4. Any means of reducing the signal input will help, such as using a shorter antenna or connecting a small mica condenser (.0001 to .0002 mfd.) in series with the antenna lead.

5. All but initial production cabinets have two bracing strips added under the chassis mounting shelf at its ends. A kit, part number 1018041718, can be obtained from source 101 and contains the necessary material and instructions for adding these reinforcing bracing strips.

6. If the predominant microphonic tone is of low frequency, improvement can be had by reducing the capacity of the coupling condenser in the audio amplifier. These are C27 and C29, which should be reduced from .01 mfd. to .006 mfd. 600 v. Both condensers must be changed to avoid unbalancing the push pull circuit. This change will reduce the low frequency response and is not recommended except for extreme cases.

INSTRUCTIONS FOR ADDING BRACING STRIPS, MENTIONED IN PARAGRAPH 5, PRECEDING:

Turn the cabinet upside down. (Be careful to protect the cabinet finish.)

Clamp one of the cleats along the under side-edge of the chassis shelf. The end of the cleat should be against the cabinet back rail.

Using the cleat as a template, drill three 9/32" holes in the chassis mounting shelf. Be careful that none of the dirt from drilling gets into the speaker or chassis.

In the same manner, drill three holes at the other end of the chassis mounting shelf.

Clean off any splinters and bolt the cleats tightly to the underside of the chassis mounting shelf, with the bolt heads on the top side of the shelf. The flat washers go under the nuts.

DIAL AND DRIVE HOOKUP: This is similar to that of Model 6335. In ordering parts use 1014140301 instead of 1014140183; 10154402051 instead of 10154402021 and 1014540331 instead of 1014516245.

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The alignment must be done in the order given.

<table>
<thead>
<tr>
<th>WAVE BAND</th>
<th>POSITION OF VARIABLE</th>
<th>FREQUENCY</th>
<th>DUMMY ANTENNA</th>
<th>GENERATOR CONNECTION</th>
<th>TRIMMERS ADJUSTED (IN ORDER SHOWN)</th>
<th>TRIMMER FUNCTION</th>
<th>APPROXIMATE MICROVOLTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>A*</td>
<td>Closed</td>
<td>455 kHz</td>
<td>.1 mfd.</td>
<td>6K8G Grid</td>
<td>T2, T1</td>
<td>IF</td>
<td>--</td>
</tr>
<tr>
<td>A*</td>
<td>Fully open</td>
<td>1720 kHz</td>
<td>.0002 mfd.</td>
<td>Ant. Term.</td>
<td>G14</td>
<td>Oscillator</td>
<td>--</td>
</tr>
<tr>
<td>A*</td>
<td>1400 kHz</td>
<td>1400 kHz</td>
<td>.0002 mfd.</td>
<td>Ant. Term.</td>
<td>G1, G9</td>
<td>RF, Transl.</td>
<td>25</td>
</tr>
<tr>
<td>A*</td>
<td>800 kHz (rock)</td>
<td>800 kHz</td>
<td>.0002 mfd.</td>
<td>Ant. Term.</td>
<td>G15</td>
<td>Padder</td>
<td>35</td>
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<tr>
<td>B*</td>
<td>5 m ohm</td>
<td>5 m ohm</td>
<td>400 ohms</td>
<td>Ant. Term.</td>
<td>G3*</td>
<td>Oscillator</td>
<td>--</td>
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<tr>
<td>B*</td>
<td>4 m ohm</td>
<td>4 m ohm</td>
<td>400 ohms</td>
<td>Ant. Term.</td>
<td>G30</td>
<td>Transl.</td>
<td>120</td>
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<tr>
<td>B*</td>
<td>1.8 m ohm (rock)</td>
<td>1.8 m ohm</td>
<td>400 ohms</td>
<td>Ant. Term.</td>
<td>G5</td>
<td>Padder</td>
<td>960</td>
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<tr>
<td>C*</td>
<td>15 m ohm</td>
<td>15 m ohm</td>
<td>400 ohms</td>
<td>Ant. Term.</td>
<td>G24, G23</td>
<td>Osc./Transl.</td>
<td>80</td>
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<tr>
<td>D*</td>
<td>6 m ohm</td>
<td>6 m ohm</td>
<td>400 ohms</td>
<td>Ant. Term.</td>
<td>G32*</td>
<td>Oscillator</td>
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<td>6.2 m ohm (rock)</td>
<td>6.2 m ohm</td>
<td>400 ohms</td>
<td>Ant. Term.</td>
<td>G19</td>
<td>Transl.</td>
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<td>E*</td>
<td>11.7 m ohm</td>
<td>11.7 m ohm</td>
<td>400 ohms</td>
<td>Ant. Term.</td>
<td>G28</td>
<td>Oscillator</td>
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<td>E*</td>
<td>12.1 m ohm</td>
<td>12.1 m ohm</td>
<td>400 ohms</td>
<td>Ant. Term.</td>
<td>G11</td>
<td>Padder</td>
<td>--</td>
</tr>
<tr>
<td>E*</td>
<td>9.6 m ohm</td>
<td>9.6 m ohm</td>
<td>400 ohms</td>
<td>Ant. Term.</td>
<td>G30</td>
<td>Oscillator</td>
<td>--</td>
</tr>
<tr>
<td>E*</td>
<td>9.4 m ohm (rock)</td>
<td>9.4 m ohm</td>
<td>400 ohms</td>
<td>Ant. Term.</td>
<td>G18</td>
<td>Transl.</td>
<td>145</td>
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<tr>
<td>G*</td>
<td>9.9 m ohm</td>
<td>9.9 m ohm</td>
<td>400 ohms</td>
<td>Ant. Term.</td>
<td>G6</td>
<td>Padder</td>
<td>--</td>
</tr>
<tr>
<td>G*</td>
<td>11.9 m ohm</td>
<td>11.9 m ohm</td>
<td>400 ohms</td>
<td>Ant. Term.</td>
<td>G16</td>
<td>Transl.</td>
<td>--</td>
</tr>
<tr>
<td>G*</td>
<td>15.1 m ohm</td>
<td>15.1 m ohm</td>
<td>400 ohms</td>
<td>Ant. Term.</td>
<td>G25, G17</td>
<td>Osc./Transl.</td>
<td>100</td>
</tr>
</tbody>
</table>

Where indicated by the word, "Rock", the variable should be rocked back and forth a degree or two while making the adjustment.

*If two peaks can be had, the correct adjustment is with the trimmer screw further out.

The other peak is the image.

The C30, C18, G8 adjustments will affect each other so that they must be repeated several times to secure proper alignment and calibration also C28 and G19 adjustments.

The alignment procedure should be repeated stage by stage, in the original order, for greatest accuracy. Always keep the output from the test oscillator at its lowest possible value to make the AVC action of the receiver ineffective.
CHASSIS IDENTIFIED BY 110.982-2 HAVE HAD A CIRCUIT CHANGE MADE TO DECREASE THE TENDENCY OF THE SET TO BECOME MICROSOMIC AT HIGH LEVELS OF PHONOGRAPH REPRODUCTION.

THE RESISTOR R12 HAS BEEN ADDED.

FOR ELECTRICAL AND MECHANICAL SPECIFICATIONS, GENERAL INFORMATION, ALIGNMENT PROCEDURE ETC.,
See Model 6345, Chassis 110.982.


FOR ELECTRICAL AND MECHANICAL SPECIFICATIONS, GENERAL INFORMATION, ALIGNMENT PROCEDURE, ETC.
See Model 6345, Chassis 110.982.

OCTOBER 6, 1939

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SEARS PAGE 11-71

SEARS. ROEBUCK & CO.

WIRING DIAGRAM FOR SILVERTONE CHASSIS 101.584-3

ADDITION OF SUFFIX NUMBERS:

Chassis 101.584-2 (catalog #6346A) is the same as chassis 101.584 except that it has a built-in loop antenna (in the cabinet) for broadcast reception and a short wave antenna plate for short wave reception (RAYNET Antenna System). Because of the antenna system change, the broadcast band frequency range extends to 1625 kc instead of 1750 kc.

Chassis 101.584-2 is the same as 101.584-1 except that it uses a different tone arm and pickup cartridge, not interchangeable with the ones used in 101.584 and 101.584-1. Accordingly, when ordering either a tone arm or a pickup cartridge, be sure the proper part number is used and the correct chassis number indicated in the order.

POWER SUPPLY:

All models available

105-125 volts, 60 cycle; 120 watts

POWER OUTPUT:

Type: Push pull direct coupling

Undistorted: 6 watts

Maximum: 10 watts

LOUD SPEAKER:

Type: Dynamic

Size: 12 inch

Approx. field coil resistance: 600 ohms

Approx. field coil voltage drop: 70 %

SEPTEMBER 27, 1939

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**Alignment Procedure**

**Preliminary:**
- Output meter connection
- Output meter reading to indicate 200 millivolts
- Average audio output to microvolts for 600 millivolts
- Connection of generator output leads
- Connection of generator ground lead
- Dummy antenna value to be in series with generator output

**Details:**
- Position of Volume Control
- Position of Tone Control
- Position of Dial Hster with variable fully clockwise
- On mark to left of
- 500 kc calibration

**Wave Band Switch Position Generator Dummy Network Generator (In Order) Trimmer Approximate Frequency**

<table>
<thead>
<tr>
<th>Mode</th>
<th>Position</th>
<th>Generator</th>
<th>Dummy Network</th>
<th>Generator (In Order)</th>
<th>Trimmer</th>
<th>Approximate Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Closed</td>
<td>600 Hz</td>
<td>1800 Hz</td>
<td>2000 Hz</td>
<td>1000 Hz</td>
<td>1000 Hz</td>
</tr>
<tr>
<td>A*</td>
<td>Open</td>
<td>1800 Hz</td>
<td>2000 Hz</td>
<td>3000 Hz</td>
<td>4000 Hz</td>
<td>4000 Hz</td>
</tr>
<tr>
<td>B*</td>
<td>Open</td>
<td>1200 Hz</td>
<td>1800 Hz</td>
<td>2400 Hz</td>
<td>3000 Hz</td>
<td>3000 Hz</td>
</tr>
<tr>
<td>C*</td>
<td>Open</td>
<td>2400 Hz</td>
<td>3000 Hz</td>
<td>4000 Hz</td>
<td>5000 Hz</td>
<td>5000 Hz</td>
</tr>
<tr>
<td>D*</td>
<td>Open</td>
<td>4800 Hz</td>
<td>6000 Hz</td>
<td>7200 Hz</td>
<td>8400 Hz</td>
<td>8400 Hz</td>
</tr>
</tbody>
</table>

**Important Alignment Notes:**

1. The alignment procedure for 101.5MHz-2 is the same as above except that the 800 adjustment is made with the generator at 1850 Hz. After the alignment has been completed, the CI and CL adjustments should be repeated, using a 1400 Hz broadcast signal.
2. Where indicated by the word, "hook", the variable should be rocked back and forth a degree or two while making the adjustment.
3. Two peaks can be had, the correct adjustment is with the trimmer screws further out.

The other peak is in the image.

**Dial and Drive System**

For models 6364, 6364A, 6446 Chassis 101-184, 101-2, 101-3.

AND FOR THE FOLLOWING EXCEPT THAT PART NO. 101414313 IS REPLACED BY PART NO. 101430301.


**Recommended Antenna Equipment:**

- Catalog No. 6823: Greatest pickup and noise reduction.
- Catalog No. 6824: Less effective pickup and noise reduction than Catalog No. 6823.
- Catalog No. 6871: Conventional antenna.
SUMMARY OF OPERATING INSTRUCTIONS:

The Changer plays twelve 10" or ten 12" records. To reload, roll over the two posts slightly between the shell plate and the bottom edge of the shell plate. Then roll both the upper and lower parts of the shell plate in and let them down against the tracks. To play, turn the lower plate until the record of the record is in the center of the shell plate. To play, turn the lower plate until the record is in the center of the shell plate. To play, turn the lower plate until the record is in the center of the shell plate.

REPLACING MOTOR:

The motor is replaced by turning it 180° and inserting it into the slots of the motor frame. It is then locked into place with the nuts provided. To remove the motor, proceed as follows:

1. Remove the motor from the motor frame.
2. Loosen the screws that hold the motor to the motor frame.
3. Remove the motor from the motor frame.
4. Insert the new motor into the motor frame and tighten the screws.
5. Replace the motor onto the motor frame.

TROUBLESHOOTING:

Cases of failure to operate satisfactorily will generally be found due to a lack of lubrication or to tampering with the mechanism after it leaves the factory, or to any unsuitable conditions under which the changer is operated. Troubleshooting should begin with the following:

1. MECHANISM IS SLOW IN STARTING, OR STALLS DURING A CHANGE CYCLE, OR A SLIGHT FORWARD PUSH WITH THE HAND STARTS IT. MAY BE CAUSED BY:
   a. Failure to lubricate properly. Oil thoroughly, per instructions above.
   b. Loose or worn parts.
   c. Weakness of motor; voltage may be abnormally low, or motor windings damaged. If windings are found damaged, replace motor and return it to factory for repair or replace- ment. See above: "Replacing Motor."

2. MOTOR FAILS TO RUN, EVEN WHEN IT IS ENTIRELY DISCONNECTED FROM OTHER WIRES AND POWER. VOLTAGE IS APPLIED INCORRECTLY TO THE END OF ITS WINDINGS. THIS INDICATES TRouble IN MOTOR WINDINGS. UNLESS THE DAMAGE IS EASILY REPAIRABLE, REPLACE MOTOR, AS ABOVE DESCRIBED.

3. MOTOR IS SLOW IN STARTING.
   a. Check wiring; as directed above. It may not have been properly connected at the battery.

4. CHANGER MAY HAVE BEEN IN A VERY COLD PLACE, AND MAY NOT HAVE YET RECEIVED PROPER TEMPERATURE. IT IS A FAIR CHANCE TO GET WATERED UP, BEFORE ASSEMBLING THE FACTORY. The motor is defective, and proceed as in Paragraph 3.

5. SQUEAKS OR OTHER NOISES, DURING PLAYING OF RECORDS.
   a. Check wiring; as directed previously. (If squeaks are heard, they will usually be found to be caused by the socket, not from the mechanism.)
   b. See that all screws are tight.

6. EXAMINE MOTOR windings; especially the shading coils, after wiring, for any cause. The motor, short-circuits portion of each laminated pole and the motor self-starting. If coils have been jarred loose at any point, they may be tightened accordingly.

7. CHANGER IS NOISY WHEN IN C.O.U.R., CHECK cO.LLS.
POWER SUPPLY:
All models available...
110-125 volts, 25-60 cycle AC or DC, 30 watts

FREQUENCY RANGE:
Broadcast...........535-1700 KC

ALIGNMENT PROCEDURE
IF PEAK 455 KC
Output meter connections....Across primary output transformer
Output meter reading to indicate 0.050 watt
for Weston type 571 output meter on 15 volt scale 15.0 Volts
Dummy antenna value in series with generator output....100 mmfd...
Connection of generator ground..............B- Bus
Generator modulation..............App. 50% @ 400 cycles
Position of volume control...........Fully clockwise

It is advisable to repeat the entire alignment procedure in the original order to insure greater accuracy.

Always keep the output from the test oscillator at its lowest possible value. As the sensitivity is increased by alignment, the generator output should be reduced correspondingly.

** Short oscillator section of variable condenser.
***Connect generator output to a separate radiating loop and pickup 1500 KC signal on receiver.

MARCH 20, 1940
POWER OUTPUT:
- Type: Undistorted
  - Class B: LOUD SPEAKER
  - Maximum: 0.4 watts
- Type: Dynamic
  - Size: 0.6 watts
  - 8 inch

PUSH BUTTON TUNING MECHANISM:
The adjustment for each push button is locked or unlocked by tightening or loosening the slotted screwhead made accessible when the push button knob is pulled off of its plunger. Stations are set up by unlocking the mechanism, holding the plunger all the way in and tuning to the desired station, and then securely locking the adjustment.

RECOMMENDED ANTENNA EQUIPMENT:
- Catalog #525: Greatest pickup and noise reduction.
- Catalog #527: Less effective pickup and noise reduction than Catalog #525.
- Catalog #575: Conventional antenna.

LOCATIONS OF PARTS ON TOP OF CHASSIS:
- IA7G
- IN5G
- IH5G
- IG4G
- IA7G
- IN5G
- IG4G
- IA7G
- IN5G
- IH5G
- IG4G

LOCATIONS OF PARTS UNDER CHASSIS:
- TP
- GI
- CS
- CT
- CN
- CB
- CA
- B
- A

POWER SUPPLY:
- #061: A-B block (1.4 v. "A", 90 v. "B")
- #734: 2 v. Storage "A"
- #5043: 45 v. "B" Battery
- #5073: Adaptor necessary with 2 v.
- Storage "B"

"A" Drain: 0.35 Amperes
"B" Drain: 12 ma

INTERMEDIATE FREQUENCY
455 kc
FOR ALIGNMENT SEE INDEX
JUNE 19, 1939
### ALIGNMENT PROCEDURE

**PURPOSE:** For all Models and Chassis listed in the tables below.

Output meter reading to indicate 50 milliwatts output. 
Across loud speaker voice coil.

<table>
<thead>
<tr>
<th>AM/FM</th>
<th>Output meter reading to indicate 50 milliwatts output.</th>
<th>Across loud speaker voice coil.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MODEL</strong></td>
<td><strong>6359, 6360, 6361, 6362, 6363, 6364</strong></td>
<td><strong>CHASSIS</strong> 101.579</td>
</tr>
</tbody>
</table>

**Wave Band**
- **SWITCH**
  - **POSITION**
  - **ANTENNA**
  - **CONNECTOR**

<table>
<thead>
<tr>
<th><strong>WAVE BAND</strong></th>
<th><strong>SWITCH</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AM</strong></td>
<td><strong>Closed</strong></td>
</tr>
<tr>
<td><strong>FM</strong></td>
<td><strong>Closed</strong></td>
</tr>
</tbody>
</table>

**Function**
- **Generator**
  - **In Order**
  - **Approximate Function**

<table>
<thead>
<tr>
<th><strong>FUNCTION</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MICROPHONE</strong></td>
</tr>
</tbody>
</table>

**Important Alignment Notes**
- The generator should be adjusted for high output. The trimmer should be adjusted for minimum output meter reading. Instead of the usual maximum reading, if the frequency of an interfering station around 455 kHz is known, the generator should be adjusted to the frequency of that station instead of 455 kHz.
- If two peaks can be had, the correct one is with the trimmer screw further out; the other peak is the image.
- Where indicated by the word, "peak," the variable should be rocked back and forth a degree or two while making the adjustment.
- Always keep the output from the test oscillator at its lowest possible value to make the AVC action of the receiver ineffective.

### ALIGNMENT PROCEDURE

**PURPOSE:** For all Models and Chassis listed in the tables below.

Output meter reading to indicate 500 milliwatts output. 
Across loud speaker voice coil.

<table>
<thead>
<tr>
<th>AM/FM</th>
<th>Output meter reading to indicate 500 milliwatts output.</th>
<th>Across loud speaker voice coil.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MODEL</strong></td>
<td><strong>6441</strong></td>
<td><strong>CHASSIS</strong> 101.599</td>
</tr>
</tbody>
</table>

**Wave Band**
- **SWITCH**
  - **POSITION**
  - **ANTENNA**
  - **CONNECTOR**

<table>
<thead>
<tr>
<th><strong>WAVE BAND</strong></th>
<th><strong>SWITCH</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AM</strong></td>
<td><strong>Closed</strong></td>
</tr>
</tbody>
</table>

**Function**
- **Generator**
  - **In Order**
  - **Approximate Function**

<table>
<thead>
<tr>
<th><strong>FUNCTION</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MICROPHONE</strong></td>
</tr>
</tbody>
</table>

**Important Alignment Notes**
- Where indicated by the word, "peak," the variable should be rocked back and forth a degree or two while making the adjustment.
- Always keep the output from the test oscillator at its lowest possible value to make the AVC action of the receiver ineffective.
- After the alignment has been completed, the C1 and C20 adjustments should be repeated, using a 1460 kHz broadcast signal.
SEARS, ROEBUCK & CO.

General Information and Service Hints

MODEL 7230 CHASSIS 124-206

Eliminating Whistle at 910 KC:

A whistle at 910 KC is caused by the tuned harmonic (910 kc) of the 455 kc or 275 kc signal being amplified in the detector. The frequency of this whistle may be reduced by increasing the amount of detector coupling or by the use of a 275 kc or 455 kc grid-leak circuit. These circuits are shown in the schematic diagram. The 910 kc signal will be reduced at 910 kc by increasing the detector coupling. The 910 kc signal will be reduced at 455 kc by decreasing the constant in the grid-leak circuit. The 455 kc signal will be reduced at 910 kc by decreasing the constant in the grid-leak circuit.

The LF amplifier should not be shifted to a frequency higher than 455 kc, nor lower than 275 kc, but should be as close to 455 kc as possible. Align the LF in the arc frequency and then realign the rest of the receiver as detailed under "ALIGNMENT PROCEDURE."
ADDITION OF SUFFIX NUMBERS -1 AND -2 TO CHASSIS IDENTIFICATION NUMBER:

In order to broaden the selectivity somewhat, chassis identified with the addition of suffix number, -1, have had the connections of the 1st I.F. Transformer reversed so that the blue wire goes to B5 and the red wire to the 12SK7GT plate. This decrease in selectivity improves the repeat accuracy of the push button setting. Some of these sets also have a 22M ohm resistor in place of the 47M ohm resistor, R2.

Chassis identified by the addition of suffix number, -2, have a different 1st I.F. Transformer, part number 1013421701, and a different 2nd I.F. Transformer, part number 101342171, giving a still greater decrease in selectivity and a still further improvement in repeat accuracy of the push button settings. The value of R2 in these chassis is 22M ohms.

SUBJECT: ADDITION OF SUFFIX NUMBER -3 TO CHASSIS IDENTIFICATION NUMBER:

Chassis identified by the addition of suffix number 3 (plus any suffix letter) to the identification number use a 12SQ7GT IF tube instead of a 12SK7GT. In addition, the positions of the 12SQ7GT Detector and 35L6GT Output tubes have been interchanged. The revised Wiring Diagram and Tube Layout are shown in this supplement.

Changes in the parts are as follows:

- Loop antenna changed to 1012843410; retail price 48c.
- Electrolytic condenser changed to 1013043405; retail price 59c.
- IF Input Transformer changed to 1013443406; retail price 60c.
- IF Output Transformer changed to 1013543476; retail price 60c.
- 1M ohm 1/3 watt Resistor, R13, added; retail price 15c.
- .05 mfd., 500 volt Condenser, C18, added; retail price 7c.

WIRING DIAGRAM FOR SILVERTONE CHASSIS 101567-3

DIAL LAMP TYPE # 47

POSITIONS OF TUBES, AND WIRES TO TOP OF TUBES

FOR ALIGNMENT SEE INDEX

FEB. 13, 1940
CHASSIS 101-583

POWER SUPPLY:
- All models available: 105-135 volts, 50-60 cycles; 105 watts
- All models available: 105-125 volts, 50-60 cycles; 110 watts

TUBE SOCKETS ARE VIEWED FROM UNDER SIDE OF CHASSIS. VOLTAGE READINGS SHOWN AT SOCKET PRONGS ARE TO CHASSIS, AND ARE TAKEN WITH NO SIGNAL; WAVE SWITCH IN BROADCAST POSITION. LINE VOLTAGE AT 117 VOLS. WHERE NO READING IS GIVEN, THE VOLTAGE IS ZERO OR TOO LOW TO READ.

POWER OUTPUT:
- Type: Push pull direct coupling
- Undistorted: 6 watts
- Maximum: 10 watts

INTERMEDIATE FREQUENCY: 455 kHz

JULY 21, 1939
Compliments of www.nucow.com

SEARS PAGE 11-91

SEARS, ROEBUCK & CO.

MODELS 6400, 6401, 6402
Ch. 101.565, 101.565-A, -B

MODELS 6400A, 6401A, 6402A
Ch. 101.593, 101.593-A, -B

SEPT. 22, 1939

LOCATIONS OF PARTS ON TOP OF CHASSIS

LOCATIONS OF PARTS UNDER CHASSIS

POWER SUPPLY:
All models available ........................................... 105-125 volts; AC-DC, 30 Watts

POWER OUTPUT:
Type .................................................. Beam Tube
Undistorted ........................................ 0.65 watts
Maximum ........................................... 0.85 watts

LOUD SPEAKER:
Type .................................................. Dynamic
Size .............................................. 3-1/2 inch
Field coil resistance ................................ 450 ohms
Field coil voltage drop ................................. 30 volts

ALIGNMENT PROCEDURE

Either a broadcast signal of about 1400 kc or a test oscillator signal may be used. If a broadcast signal is used, the antenna of the receiver should be extended as in a normal installation. If a test oscillator signal is used, a wire should be connected to the test oscillator output and run parallel to but insulated from the receiver's antenna wire.

Tune in the 1400 kc signal and adjust the trimmer of the variable for maximum loud speaker response. This can be done most accurately if the volume control setting is reduced to give low volume level. The variable should be rocked a degree or two during the adjustment.

SUFFIX LETTERS "A" & "B"

101.565 chassis is used in the black cabinet, Catalog #6400. Suffix letter "A" is added to the chassis identification, making it 101.565-A, for the ivory cabinet, Catalog #6401. Suffix letter "B" is added, making the chassis identification 101.565-B, for the walnut cabinet, Catalog #6403.

Chassis 101.593-A, -B is exactly the same as 101.565-A, -B described in RL 207, except that it uses a speaker having a higher inductance field to give more satisfactory operation on 25 cycle A.C. The field coil resistance is 550 ohms instead of 450 ohms as in the 101.565 speaker.

REDUCING 25 CYCLE DIAL LIGHT FLICKER:

Objectionable 25 cycle flicker of the dial light can be eliminated, at some sacrifice in illumination, by changing the connection of the 25 Ohm resistor, R4, to the other side of the dial light socket lead: i.e., change the R4 connection from prong #3 of the 3525GT tube to prong #2.

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Compliments of www.nucow.com
ADDITION OF SUFFIX NUMBERS:

Chassis 101.590-1 is the same as 101.590 except that it uses a different tone arm and pickup cartridge, not interchangeable with the ones used in 101.590. Accordingly, when ordering either a tone arm or a pickup cartridge, be sure the proper part number is used and the correct chassis number indicated in the order. 101.590-1 uses a two position tone control.

101.590-2 is the same as 101.590 except for changes in the antenna circuit, including the addition of an I.F. wave trap. A continuously variable tone control is used.

101.590-3 is the same as 101.590-2 except that it uses the same tone arm and pickup that are used in 101.590-1.

POWER SUPPLY:
All models available: 105-125 volts, 60 cycle, AC: 75 watts
All models available: 105-125 volts, 50 cycle, AC: 80 watts
All models available: 105-125 volts, 25 cycle, AC: 30 watts

INTERMEDIATE FREQUENCY: 455 kc

POWER OUTPUT:
Type: Direct coupled
Undistorted: 2-1/2 watts
Maximum: 4 watts

LOUD SPEAKER:
Type: Dynamic
Size: 10 inch
Approx. field coil resistance: 750 Ohms
Approx. field coil voltage drop: 50 v.

WIRING DIAGRAM FOR SILVETONE CHASSIS 101.590-1

WIRING DIAGRAM FOR SILVETONE CHASSIS 101.590-2, -3, -4, -5

OCTOBER 30, 1939

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### Alignment Procedure

**Preliminary:**
- Output meter connection: Across loud speaker voice coil
- Output meter reading to indicate 500 milliamps, 0.8 volts
- Approximately 100 millivolts input to indicate 500 milliamps output

**Connection of generator ground lead:** Receiver chassis ground connected.
- Frequency: 330, 400 cycles
- Position of volume control: Fully clockwise
- Position of tone control: Treble (R1)
- Position of dial pointer with variable fully closed

**Wave Band:**

<table>
<thead>
<tr>
<th>UNIT</th>
<th>POSITION OF VARIABLE</th>
<th>FREQUENCY</th>
<th>DUMMY GENERATOR</th>
<th>ANTENNA CONNECTION</th>
<th>TRIMMER</th>
<th>APPROXIMATE MICROVOLTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>AM</td>
<td>Closed</td>
<td>455 kHz</td>
<td>1 mfd. 6K8G Grid</td>
<td>T2, T1</td>
<td>IF</td>
<td>--</td>
</tr>
<tr>
<td>AM</td>
<td>Fully open</td>
<td>1500 kHz</td>
<td>0.0004 mfd. Ant. G1p</td>
<td>G1p</td>
<td>Oscillator</td>
<td>320</td>
</tr>
<tr>
<td>AM</td>
<td>3000 kHz</td>
<td>0.0004 mfd. Ant. G1p</td>
<td>G1p</td>
<td>Oscillator</td>
<td>320</td>
<td></td>
</tr>
<tr>
<td>AM</td>
<td>6000 kHz</td>
<td>0.0004 mfd. Ant. G1p</td>
<td>G1p</td>
<td>Transistor</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>AM</td>
<td>8000 kHz</td>
<td>0.0004 mfd. Ant. G1p</td>
<td>G1p</td>
<td>Transistor</td>
<td>35</td>
<td></td>
</tr>
</tbody>
</table>

**Important Alignment Notes:**
- In 101.590-2.1 only. The generator should be adjusted for highest output. The trimmer should be adjusted for minimum output meter reading instead of the usual maximum reading. If the frequency of an interfering station around 455 kHz is known, the generator should be adjusted to the frequency of that station instead of 460 kHz.
- In 101.590-1 only.
- 101.590-2.3 only.

When indicated by the word "rock", the variable should be rocked back and forth a degree or two while making the adjustment.

The alignment procedure should be repeated stage by stage, in the original order, for maximum accuracy. Always keep the output from the test oscillator at its lowest possible value to make the AVO action of the receiver ineffective.

After the alignment has been completed, the C1 adjustment should be repeated on a broadcast signal of about 1400 kHz with no external antenna connected to the antenna terminal.

### Locations of Parts Under Chassis 101.590-1

**Locations of Parts on Top of Chassis 101.590-2, 3, -1:**

- NCTE: 14, 26, and 27 shown above, are not used on Chassis 101.590-1

### Push Button Timing Procedure:

The adjustment for each push button is locked or unlocked by tightening or loosening the slotted screwhead made accessible when the push button knob is pulled off from its plunger. Stations are set up by unlocking the mechanism, tuning in the station, pushing in the plunger (being careful not to dent the station), releasing the plunger, then securely locking the adjustment by holding the screwdriver lightly in the screw head allowing the spring tension to hold the plunger against the screwdriver.

### Recommended Antenna Equipment:

- Catalog #6532: Greatest pickup and noise reduction.
- Catalog #6533: Less effective pickup and noise reduction than Catalog #6532.
- Catalog #6576: Conventional antenna.
INSTRUCTIONS FOR AUTOMATIC TUNING

Unscrew the wooden plaque through which the push buttons emerge, by removing the screws located at the top and bottom of the plaque.

From the figure shown, determine which pair of trimmer screws have a range including that frequency. For example: The station you wish to receive may have a transmitting frequency of 590 kc. Since the range of the button No. 1 is 540-600 kc., 590 kc. would be included in this range.

Push that button "IN"

If the frequency of the desired station is higher than that of the station to which it has already been tuned at the factory, turn the Antenna and R.F. trimmer screws to the LEFT slowly until the desired station is heard. If the frequency of the desired station is lower than that of the station to which the trimmers have been adjusted at the factory, turn the trimmer screws to the RIGHT until the station is heard.

Alternately adjust the R.F. and Antenna trimmers, each time giving screws about 1/8 turn, until maximum volume is obtained. This completes the adjustments for one station.

Note: In some cases, it may be desirable to readjust the trimmers slightly for maximum volume after the set has been unpacked. Rough handling in transportation may have disturbed the trimmer settings.

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IF PEAK 455 KC

POWER SUPPLY:
All models available
105-125 volts, 50-60 cycle or DC, 45 watts

POWER OUTPUT:
Type: Beam Power
Undistorted: 1.0
Maximum: 2.4

LOUD SPEAKER:
Type: Dynamic
Size: 5" in diameter
Field Resistance: 450 ohms

APRIL 26, 1939
Read the entire procedure through very carefully before attempting to set the push buttons.

1. Make a list of the stations and their frequencies (kilocycles) that you want to set up for push button tuning. It is advisable, but not necessary, to arrange the stations in the order of their frequency (kilocycles) and then set the station of the lowest frequency first by using button No. 1, the station of the next higher frequency by button No. 2, etc.

2. Refer to the diagram underneath the cabinet and see which set of adjustment screws will have the tuning range that includes the frequency of the first station you wish to adjust. The frequency ranges of the adjustment screws are divided into two groups, one group covering from 500 to 1100 kc, the other covering from 1600 to 2500 kc.

3. From the same diagram, after finding where the proper pair of adjustment screws are located, turn the dial to the station you want to adjust. When both the adjustment screws are turned in the same direction, the dial will be turned in the correct direction.

4. Push the button "UP".

5. Turn the volume control knob on the receiver and adjust the volume until you reach the point where the tone control is turned up to the maximum. Then turn the volume control knob on the speaker to the same position. When the tone control is turned up to the maximum, the volume control knob on the speaker should be turned down to the minimum position.

6. Adjust the screw marked "UP" for maximum volume, retarding the control and readjusting if necessary. This completes the adjustment for the particular station.

7. Out put the station name from the list supplied and insert into face of button.

8. Insert celluloid discs.

9. Proceed in the same manner to adjust the tuning screws for the other stations on your list.

Models 7250 Chassis 110.256-1 7251 Chassis 110.486 7227, 7245 Chassis 110.256

Alignment Procedure

Output meter connections: Across primary output transformer
Output meter reading: Indicate 0.000 watt
Input voltage: 9 volts
Average sensitivity in mw. for 0.000 watt
Duryant in series with generator output
Connection of generator ground

Note: In the following table A refers to Model 7250 Chassis 110.256-1 B refers to Model 7251 Chassis 110.486 and C refers to Models 7227, 7245 Chassis 110.256

Models 7207 Chassis 110.414

Automatic Tuning Control Adjustment

Tune the receiver dial to any desired station, choose the push button which you wish to control this station. Release the push button one full turn, then depress the button as far as it will go, release the button and turn slowly. The button should be readjusted by pressing this button.

Remove all letter discs from list supplied and insert in button.

Insert celluloid discs.

In the same manner select a station for each of the other buttons and make necessary adjustments for each station.

Preliminary Alignment Procedure

Output meter connections: Across lead speaker rectifier cell
Output meter reading to indicate 500 milliamperes
Generator ground lead connection
Power antenna valve in series with generator output
Connection of generator output lead
Generator modulation
Position of volume control
Position of tone control
Position of Dial Pointer with variable firstly closed

Models 7250 Chassis 110.256-1 7251 Chassis 110.486 7227, 7245 Chassis 110.256

Alignment Procedure

Output meter connections: Across primary output transformer
Output meter reading: Indicate 0.000 watt
Voltage: 9 volts
Average sensitivity in mw. for 0.000 watt
Duryant in series with generator output
Connection of generator ground

Note: In the following table A refers to Model 7250 Chassis 110.256-1 B refers to Model 7251 Chassis 110.486 and C refers to Models 7227, 7245 Chassis 110.256

Important Alignment Notes

It is advisable to repeat the entire alignment procedure in the original order to insure greater accuracy.

Always keep the output from the test oscillator at its lowest possible value. As the sensitivity is increased by alignment, the generator output should be reduced correspondingly.

* First time is misaligned by loosening center screw one turn.
POWER OUTPUT:
Type: Push-Pull Pentode
Output: 10 watts
Maximum: 12 watts

INTERMEDIATE FREQUENCY: 455 kc

LOUDSPEAKER:
Type: Electrodynamic
Size: 12 inches
Field Coil Resistance: 1,800 ohms
App. Field Coil Voltage Drop: 120 volts

PHONOGRAPH:
Type: Automatic-Manual
Record Capacity: Eight 10-inch or Seven 12-inch
Turntable Speed: 78 R.P.M., adjustable
Type of Pickup: Crystal
Pickup Impedance: 100,000 ohms at 1,000 cycles

DIAL DRIVE HOOKUP

DECEMBER 20, 1938
MODEL 7228
Record Changer

SEARS, ROEBUCK & CO.
Automatic Record Changer

GENERAL INFORMATION
Before servicing the automatic record changer, inspect the assembly to see that all levers, parts, gears, springs, etc., are in good order and are correctly assembled.

A bind or jam in the mechanism can usually be relieved by rotating the turntable in the direction of normal operation. The turntable, spindle, and pinion gear are assembled by means of a 3 inch straight line. The pinion may be removed by gently driving with a standard pin punch.

If the record changer or cabinet is not perfectly level, normal operation will likely be affected.

The 10 and 12 inch records must be absolutely flat for smooth operation when using a mixture of the two sizes.

A shorting switch, located in the pickup head, operates due to pressure when the pickup is placed on the pickup rest.

ADJUSTMENTS
A. Main Lever.—This lever is basically important in that it interlinks the various individual mechanisms which control needle landing, vertical tracking, etc. One adjustment is provided for the main lever. Rotate the turntable until the changer is out-of-cycle; and adjust rubber bumper bracket to make sure that the roller clears the nose of the cam plate by 1/16 inch.

B. Friction Clutch.—The motion of the tone arm toward the center of the turntable is transmitted to the trip pawl "22" by the trip lever "7" through a friction clutch "5." If the motion of the pickup is abruptly accelerated or becomes irregular due to swinging in the eccentric groove, the friction finger "7" moves the trip pawl "22" into engagement with the pawl on the main gear, and the change cycle is started. Proper adjustment of the friction clutch "5" occurs when movement of the tone arm does not cause movement of the trip pawl "22" without tendency of the clutch to slip. The friction should be just enough to prevent slippage, and is adjustable by means of screw "B." If adjustment is too tight, the needle will repeat grooves; if too loose, tripping will not occur at the end of the record.

C. Pickup to Cable Screw.—During the record change cycle, lever "15" is actuated by the main lever "15" so as to raise the tone arm clear of the record by means of the pickup lift cable. To adjust pickup for proper elevation, stop the changer "in cycle" at the point where pickup is raised to the maximum height above turntable plate, and has not moved outward; at this point adjust locknut "C" to obtain 1 inch spacing between needle point and turntable top surface.

D. & E. Needle Landing on Record.—The relation of coupling between the tone arm vertical shaft and lever "20" determines the landing position of the needle on a 10 inch record. Position of eccentric stud "E" governs the landing of the needle on 12 inch record; this, however, is dependent on the proper 10 inch adjustment. To adjust for needle landing, place 10 inch record on turntable; push needle indicator to position and return to the 10 inch position; see that pickup locating lever "17" is tilted fully toward turntable; rotate mechanism through cycle until needle is just ready to land on record; then see that pin "V" on lever "14" is in contact with "Step 1" on lever "17." The correct point of landing is 4 1/16 inches from the nearest side of the turntable spindle; loosen the two screws "D" and adjust horizontal position of tone arm to proper dimension, being careful not to disturb levers "14" and "17." Leave approximately 1/2 inch end play between hub of lever "20" and pickup base bearing, and sight the blunt nose screw "D"; run mechanism through several cycles as a check, then tighten cone pointed screw "D." After adjusting needle landing on 10 inch record, place 12 inch record on turntable; push needle indicator to reject and return to 12 inch position; rotate mechanism through cycle until needle is just ready to land on record; note correct point of landing is 5 1/16 inches from front of spindle. If the landing is incorrect, turn stud "E" until the eccentric end adjusts lever "14" to give correct needle landing. The eccentric stud is slotted toward the rear of the motor board, otherwise incorrect landing may occur with 10 inch records.

F. & G. Needle Knurled Key.—The upper plate (knife) "25" on each of the record posts serves to separate the lower record from the stack and to support the remaining records during the change cycle. It is essential that the spacing between the knife and the rotating record shelf "77" be accurately maintained. The spacing for the 10 inch record is nominally .056 inch, and for the 12 inch record is .072 inch.

To adjust, rotate the knife to the point of minimum vertical separation from the record shelf and turn screw and locknut "77" to give .056-.072 separation. Screws must not be depressed during this adjustment. After setting screw "F" adjust screw "G" so that when its tip is depressed flush with top of record shelf, the vertical spacing between the knife, in its lowest rotational position, and the shelf, is .072-.078 inch.

H. Record Support Shield.—The record shield revolves during the change cycle to allow the lower record to drop onto the turntable. Both posts are rotated simultaneously by a gear and rack coupled to the main lever "15," and it is necessary that adjustments be such that the record is released from both shelves at the same instant. To adjust, place a 12 inch record on the turntable, rotate mechanism into cycle to the point where tone arm is at maximum outward travel from turntable, lift record upward until it is in contact with both separating knives, then loosen screws "H" and shift record shelves so that the curved inner edges of the shelves are uniformly spaced at least .16 inch from record edge. Tighten the blunt nose screw "H," run mechanism through cycle several times to check action, then tighten cone pointed screw "H." If record shelves or knives are bent, or not perfectly horizontal, improper operation and jamming of mechanism will occur.

I. Tone Arm Rest Support (not shown).—When the changer is out-of-cycle, the front lower edge of the pickup head should be 5/16 inch above surface of motor board. This may be adjusted by bending the tone arm support bracket, which is associated with the tone arm mounting base, in the required direction.

K. Trip Pawl Stop Pin.—The position of the trip pawl stop pin "K" in relation to the main lever "15" governs the point at which the roller enters the cam. By bending the pin, support either toward or away from trip pawl bearing stud, the roller can be made to enter the cam later or earlier, respectively. This adjustment should be made so that the roller definitely clears the cam outer guide as well as the nose of the cam plate.

Lubrication.—Petroleum or petroleum jelly should be applied to cam, main gear, spindle pinion gear, and gears of record post.

Light machine oil should be used in the tone arm vertical bearing, record post bearing, and other bearings of various levers on underside of motor board.

The felt washer between the turntable and spindle bearing should be soaked in light engine oil whenever the turntable is removed, or as required for proper operation.

Do not allow oil or grease to come in contact with rubber mounting of tone arm base, rubber bumper, or flexible coupling of drive motor.

MISCELLANEOUS SERVICE HINTS
Incorrect adjustment of a particular mechanism of the changer is generally exhibited in a specific mode of improper operation. The following relations between effects on operation and the usual mis-adjustments will enable ready adjustment in most cases.

1. For any irregularity of operation, the adjustment of the main lever "15" should be checked first as in "A."

2. Needle does not land properly on 10 inch and 12 inch records—Make complete adjustments "D" and "E."

3. Needle does not land properly on 12 inch record but correct on 10 inch—Effect adjustment "B."

4. Failure to trip at end of record—Increase clutch "5" friction by means of screw "B." Also, see that levers "77" and "12" are free to move without touching each other.

5. Pickup strikes lower record of stack or drags across top of turntable—Adjust lift cable per adjustment "C."

6. Needle does not track after landing—Friction clutch "5" adjustment "B." May be too tight, band in tone arm vertical bearing; levers "77" and "12" fouled; or pickup output cable twisted.

7. Cycle commences before record is complete—Record is defective, or adjustment "B" of friction clutch "5" is too tight.

8. Wow in record reproduction—Record is defective; flexible coupling between motor and changer mechanism not correctly assembled; or instrument is not being operated at normal room temperature (65°F).

9. Record knives strike edge of records—Record is warped; record edges are rough; or knife adjustments "F" and "G" are incorrect.

10. Record not released properly—Adjust record shelf assemblies in respect to shaft by means of adjustment "H."

11. Needle lands in 10 inch position on 12 inch record or misses record when playing both types mixed—Increase tension of pickup locking lever spring "34."
SEARS. ROEBUCK & CO.
ALIGNMENT PROCEDURE

Preliminary:
Output meter connections. Across speaker voice coil
Output meter reading to indicate 1.0 watt output. 1.5 volts
Approximate average sensitivity in microvolts for 1.0 watt output. See chart below
Dummy antenna value to be inserted in series with generator output. See chart below
Connection of generator output lead. See chart below
Connection of generator ground lead. To chassis
Generator modulation. 30%, 400 cycles
Position of Volume Control. Fully clockwise
Position of Tone Control. Fully clockwise

Calibration Scale on Variable Condenser Drive Drum.—The tuning dial is fastened in the cabinet and cannot be used for reference during alignment when chassis is out of cabinet; therefore, a calibration scale is attached to the rear of the drum which is mounted on the front shaft of the gang condenser. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

As the first step in r-f alignment, check the position of the drum. The ° mark on the drum scale must be vertical, and directly over the center of the gang-condenser shaft when the plates are fully meshed. The surface of the drum must be flush with the end of the gang-condenser shaft. The drum is held to the shaft by means of two set screws, which must be tightened securely when the drum is in the correct position.

Pointer for Calibration Scale.—Improvis a pointer for the calibration scale by fastening a piece of wire to the gang-condenser frame, and bend the wire so that it points to the ° mark on the scale when the plates are fully closed.

Dial Indicator Adjustment.—After fastening the chassis in the cabinet, attach the dial pointer to the drive cable with variable condenser fully closed and pointer on last calibration mark at 540 kc end of Broadcast "A" band.

LOCATION OF PARTS AND ALIGNMENT ADJUSTMENTS ON TOP OF CHASSIS

<table>
<thead>
<tr>
<th>Wave-Band Switch Position</th>
<th>Position of Dial Pointer</th>
<th>Generator Frequency</th>
<th>Dummy Antenna</th>
<th>Generator Connection</th>
<th>Trimmers Adjusted (In order shown)</th>
<th>Trimmer Function</th>
<th>Approximate Microvolts</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;A&quot;</td>
<td>Low End</td>
<td>455 kc</td>
<td>.001 mfd.</td>
<td>6K7-G 1-F</td>
<td>L10, L11</td>
<td>2nd I-F Trans.</td>
<td>7,600</td>
</tr>
<tr>
<td>&quot;A&quot;</td>
<td>Low End</td>
<td>455 kc</td>
<td>.001 mfd.</td>
<td>6A8-G Grid</td>
<td>L8, L9</td>
<td>1st I-F Trans.</td>
<td>130</td>
</tr>
<tr>
<td>&quot;A&quot;</td>
<td>Low End</td>
<td>455 kc</td>
<td>.0002 mfd.</td>
<td>Ant.</td>
<td>L18</td>
<td>Wave Trap †</td>
<td>—</td>
</tr>
<tr>
<td>&quot;C&quot;</td>
<td>20 mc (146°)</td>
<td>20 mc</td>
<td>300 ohms</td>
<td>Ant.</td>
<td>C25</td>
<td>Osc. *</td>
<td>—</td>
</tr>
<tr>
<td>&quot;C&quot;</td>
<td>20 mc (146°) (rock)</td>
<td>20 mc</td>
<td>300 ohms</td>
<td>Ant.</td>
<td>C7</td>
<td>Det. **</td>
<td>50</td>
</tr>
<tr>
<td>&quot;B&quot;</td>
<td>6.1 mc (139°)</td>
<td>6.1 mc</td>
<td>300 ohms</td>
<td>Ant.</td>
<td>C24</td>
<td>Osc. *</td>
<td>30</td>
</tr>
<tr>
<td>&quot;A&quot;</td>
<td>1,500 kc (150.5°)</td>
<td>1,500 kc</td>
<td>.0002 mfd.</td>
<td>Ant.</td>
<td>C29, C3</td>
<td>Osc., Ant.</td>
<td>—</td>
</tr>
<tr>
<td>&quot;A&quot;</td>
<td>600 kc (31°) (rock)</td>
<td>600 kc</td>
<td>.0002 mfd.</td>
<td>Ant.</td>
<td>L17</td>
<td>Osc.</td>
<td>3</td>
</tr>
<tr>
<td>&quot;A&quot;</td>
<td>1,500 kc (150.5°)</td>
<td>1,500 kc</td>
<td>.0002 mfd.</td>
<td>Ant.</td>
<td>C29, C3</td>
<td>Osc., Ant.</td>
<td>5</td>
</tr>
</tbody>
</table>

† Adjust wave-trap for minimum output.
* Use minimum capacity peak if two peaks can be obtained.
** Use maximum capacity peak if two peaks can be obtained.

Where indicated by the word "Rock," the variable tuning condenser should be rocked back and forth a degree or two while making this adjustment.

Each step of the alignment should be repeated in its original order for greater accuracy. Always keep the output from the generator at its lowest possible value to prevent the a-v-c action of the set from interfering with accurate alignment.

Adjustment locations are shown on the top and bottom parts location views of chassis.

Only the dummy antenna indicated in the chart for any particular band should be used. Remove the dummy used for alignment in any other band. Grid cap leads should remain in place during alignment.

Values shown under, "Microvolts," are only approximate.

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Eliminating Whistle at 910 KC:

A whistle due to a beat between the second harmonic (910 KC) of the 455 kc i-f, and a 910 kc signal may be experienced. In localities where the 910 kc station is one that is frequently listened to, it will be desirable to shift the whistle to some other point where it will not be objectionable. This can be done by shifting the i-f frequency of the receiver. Determine at what point between 880 and 940 kc the whistle will be least objectionable. Deviating this frequency by two will give the new i-f frequencies to which the receiver should be adjusted. For example, if it is determined that a whistle at 920 kc would not be objectionable, the i-f should be realigned at 930/2 or 465 kc. Try to select the new i-f frequency as close as possible to 455 kc.

An interfering whistle may also be caused by two stations having a frequency difference equal to the i-f frequency (455 kc) of the receiver. This will be evidenced by a whistle appearing when the receiver is tuned to either of the stations. It may be further localized by tuning the receiver to each of these stations and then stopping the oscillator, in each case, by grounding the oscillator output section of the variable tuning condenser C22 (rear section) to chassis. If the whistle, in each case, still persists, it is being caused by the beat between these two stations and may be corrected by shifting the i-f frequency of the receiver to a frequency other than the difference frequency of the two local or strong signals (emissions). The i-f amplifier should not be shifted to a frequency higher than 470 kc, nor lower than 440 kc, but should be as close to 455 kc as possible.

Align the i-f at the new frequency and then realign the rest of the receiver as described under "ALIGNMENT PROCEDURE."

Unpacking:

Remove bracket "A" securing the pickup and needle mechanism, by removing screw "B." Also remove the red bands "C" and "D," the paper coverings on the record posts and pickup, and the cardboard strip in the rear of the chassis. The instruction booklets and call-letter markers and covers will be found in an envelope in the rear of the cabinet. The knobs are in an envelope in the rear of the chassis. The wooden slides which are bolted to the bottom of the cabinet should also be removed.
Adjustments for Electric Tuning

1. Make a list of the desired eight stations, arranged in order from low to high frequencies.
2. Turn band switch to "A" band, turn power on, and allow a few minutes for warming up.
3. Press down the " dial-turning " (right-hand) button.
4. Manually tune in the first station on the list, using the "Tuning Eye" for accurate tuning.
5. Hold down the " dial-turning " button, and press down station button No. 1 (second from left). Both buttons will stay down. Move adjusting pin No. 1 to the insulating line on the disc at rear of gang. When the pin is correctly centered on the insulating line, the central dial lamp will go out.
6. Press down any other button in order to release the dial-turning button and station button No. 1. Then press down station button No. 1 again. The electric tuning mechanism will function to tune in the station, and the central dial lamp will stay on.
7. Repeat this process for the remaining stations.
MODEL 7230
Alignment, Socket
Trimmers

SEARS, ROEBUCK & CO.

ALIGNMENT PROCEDURE

PRELIMINARY:
Output meter connections......................................................... Across speaker voice coil
Output meter reading to indicate 1.0 watt output.......................... 1.5 volts
Approximate average sensitivity in microvolts for 1.0 watt output........ See chart below
Dummy antenna value to be inserted in series with generator output...... See chart below
Connection of generator output lead......................................... To chassis
Connection of generator ground lead......................................... Fully clockwise
Generator modulation.............................................................. 30%, 400 cycles
Position of Volume Control...................................................... Fully clockwise
Position of Tone Control.......................................................... Fully clockwise
Position of Dial Pointer with variable tuning condenser fully closed.... To fall on last calibration mark at 540 kc end of "Broadcast" band.

<table>
<thead>
<tr>
<th>Wave-Band Switch Position</th>
<th>Position of Dial Pointer</th>
<th>Generator Frequency</th>
<th>Dummy Antenna</th>
<th>Generator Connection</th>
<th>Trimmers Adjusted (In order shown)</th>
<th>Trimmer Function</th>
<th>Approximate Microvolts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broadcast</td>
<td>Low End</td>
<td>455 kc</td>
<td>0.001 mfd.</td>
<td>6K7-G</td>
<td>L12, L13</td>
<td>2nd I-F Transformer</td>
<td>3,600</td>
</tr>
<tr>
<td>Broadcast</td>
<td>Low End</td>
<td>455 kc</td>
<td>0.001 mfd.</td>
<td>6K8 Grid</td>
<td>L10, L11</td>
<td>1st I-F Transformer</td>
<td>55</td>
</tr>
<tr>
<td>Broadcast</td>
<td>Low End</td>
<td>455 kc</td>
<td>0.0002 mfd.</td>
<td>Ant.</td>
<td>C1</td>
<td>Wave-Trap†</td>
<td>—</td>
</tr>
<tr>
<td>Short Wave</td>
<td>15.2 mc</td>
<td>15.2 mc</td>
<td>300 ohms</td>
<td>Ant.</td>
<td>C3</td>
<td>Osc.*</td>
<td>—</td>
</tr>
<tr>
<td>Short Wave</td>
<td>15.2 mc</td>
<td>15.2 mc</td>
<td>300 ohms</td>
<td>Ant.</td>
<td>C34</td>
<td>Ant.**</td>
<td>10</td>
</tr>
<tr>
<td>Broadcast</td>
<td>1,500 kc</td>
<td>1,500 kc</td>
<td>0.0002 mfd.</td>
<td>Ant.</td>
<td>C6</td>
<td>Osc.</td>
<td>10</td>
</tr>
<tr>
<td>Broadcast</td>
<td>600 kc</td>
<td>600 kc</td>
<td>0.0002 mfd.</td>
<td>Ant.</td>
<td>L9</td>
<td>Osc.</td>
<td>15</td>
</tr>
<tr>
<td>Broadcast</td>
<td>1,500 kc</td>
<td>1,500 kc</td>
<td>0.0002 mfd.</td>
<td>Ant.</td>
<td>C6</td>
<td>Osc.</td>
<td>15</td>
</tr>
</tbody>
</table>

IMPORTANT ALIGNMENT NOTES

† Adjust wave-trap for minimum output.
* Use minimum capacity peak if two peaks can be obtained.
** Use maximum capacity peak if two peaks can be obtained.

Where indicated by the word "Rock," the variable tuning condenser should be rocked back and forth a degree or two while making this adjustment.

Each step of the alignment should be repeated in its original order for greater accuracy. Always keep the output of the generator at its lowest possible value to prevent the AVC action of the set from interfering with accurate alignment.

Adjustment locations are shown on the top and bottom parts location views of chassis.

Only the dummy antenna indicated in the chart for any particular band should be used. Remove the dummy used for alignment in any other band. Grid cap leads should remain in place during alignment.

Values shown under "Microvolts" are only approximate.

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Adjustments for Push Button Tuning

Each of the six station push buttons connects to a separate magnetite-core oscillator coil and a separate antenna trimmer, both of which must be adjusted to select the desired station when this button is depressed. Use an insulated screw-driver or alignment tool, allowing at least five minutes warm-up period before making adjustments. The regular antenna should be used for the preliminary adjustments. Proceed as follows:

1. Make a list of the six desired stations, arranged in order from low to high frequencies.
2. Push in the dial-tuning (rear) push button, and manually tune in the first station on the list.
3. Push in station-button No. 1, and adjust No. 1 oscillator core (L41) to receive this station. Screw the core all the way in, to lowest frequency, and then unscrew slowly until the station is received.
4. Adjust No. 1 antenna trimmer (C40) for maximum output on this station.
5. Adjust for each of the remaining five stations in the same manner.
6. Make a final critical adjustment of the oscillator cores, using one or two feet of wire as an antenna to ensure sharp peaking.

(Note: Clockwise adjustment of the oscillator cores and antenna trimmers tunes the circuits to lower frequencies.)

Six Push-button Tuning Ranges:
- 550—1,500 kc
- Two stations between approximately 550—950 kc (Buttons 1 and 2)
- Two stations between approximately 690—1,253 kc (Buttons 3 and 4)
- Two stations between approximately 890—1,500 kc (Buttons 5 and 6)

ANTENNA TERMINAL BOARD
SEARS ROEBUCK & CO.

MODEL 7231, Ch. 105.6H
Schematic, Socket
Trimmers, Alignment

CONDENSERS

RESISTORS

25Z5

BALLAST

2586G

POWER OUTPUT

SWITCHES IN BROADCAST POSITION

IF PEAK 456 KC

POWER OUTPUT:
Type................. Pentode
Undistorted........... 1 watt
Maximum.............. 15 watts

FREQUENCY RANGES:
535 to 1750 KC
5600 to 18100 KC

IF ALIGNMENT - Generator at
456 KC, connected to the control grid of
the 6A7 tube, thru a
05 MFD condenser.
Adjust IF trimmers to
peak, they are located
above chassis, and
other on front apron
of chassis, is the left
hand sections.

MARCH 7, 1939

BROADCAST BAND ALIGNMENT - Generator at 1400 KC, connected to antenna lead of
receiver thru 100 MFD condenser. Dial at 1400 KC, adjust rear gang condenser trimmer (OSC)
to peak, then front section of gang condenser to peak.
Generator at 600 KC, receiver dial at approximately 600 KC, while rocking the
variable condenser across signal adjust oscillator pedder to maximum peak.
SHORTWAVE BAND - Generator at 600 KC, rotate condenser from high frequency end
until generator signal is heard, then peak trimmer on antenna coil. No other
shortwave band adjustments required on this receiver. Repeat all adjustments.

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Compliments of www.nucow.com
IF ALIGNMENT - Generator at 456 KC, and connected to the control grid of the 6A7 thru a .05 MFD condenser. Align the three IF trimmers to maximum peak. The three trimmers are located as follows: two are located in the IF cem on the top of the chassis, the third is located on the front apron of the chassis and is the left hand section.

BROADCAST - Generator at 1400 KC, connected to the antenna thru a 100 MMFD condenser. Dial set at 1400 KC, peak rear trimmer of gang condenser (OSC), then peak front trimmer. Shift generator and dial to 600 KC, while rocking gang condenser peak the oscillator padding condenser for maximum resonance.

LONG WAVE - Generator at 375 KC, peak oscillator trimmer, gang condenser completely open. Generator at 325 KC, peak the antenna trimmer, mounted on longwave antenna coil, after signal has been found by rotation condenser from high fre-end of dial. Pad the oscillator condenser at 160 KC while rocking condenser.

©John F. Rider, Publisher
FREQUENCY RANGES:
535 to 1730 KC
150 to 380 KC
5.5 to 15.1 MC

IF ALIGNMENT - Generator at 456 KC, connected to control grid of 6D8G thru a .06 MF condenser, then peak the IF transformer trimmers for maximum response.

BROADCAST BAND - Generator at 1730 KC, the gang condenser out of mesh, peak oscillator trimmer. Dial and generator at 1400 KC, peak antenna and pre-selector trimmers. Generator and dial at 600 KC, while rocking variable condenser across signal, peak the oscillator padders to maximum.

SHORTWAVE BAND - Generator to 15.1 MC, variable condenser at minimum, peak the S.W. oscillator trimmer. Generator and dial at 15 MC, peak antenna trimmer. No provisions for low frequency padding have been made in this band. Check response at 6 MC.

LONGWAVE BAND - Set gang condenser to minimum and generator to 380 KC, peak the longwave oscillator trimmer, then shift the generator signal to 325 KC, peak the antenna trimmer. Next set the generator to 150 KC, then peak the longwave oscillator padding condenser to maximum response while rocking variable condenser.
SEARS, ROEBUCK & CO.

INTERMEDIATE FREQUENCY:

<table>
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<tr>
<th>SWITCH POSITION</th>
<th>POSITION OF VARIABLE</th>
<th>GENERATOR FREQUENCY</th>
<th>DUMMY ANTENNA CONNECTION</th>
<th>TRIMMERS ADJUSTED</th>
<th>TRIMMER APPROXIMATE FUNCTION MICROVOLTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;AM&quot;</td>
<td>Fully closed</td>
<td>456 kc</td>
<td>.1 mfd 6A7 Grid</td>
<td>T 3</td>
<td>IF Output 45</td>
</tr>
<tr>
<td>&quot;AM&quot;</td>
<td>Fully open</td>
<td>1730 kc</td>
<td>.0002 mfd Ant. Lead</td>
<td>T2</td>
<td>IF Input</td>
</tr>
<tr>
<td>&quot;AM&quot;</td>
<td>1400 kc</td>
<td>1400 kc</td>
<td>.0002 mfd Ant. Lead</td>
<td>C14</td>
<td>Oscillator 10</td>
</tr>
<tr>
<td>&quot;AM&quot;</td>
<td>600 kc (rock)</td>
<td>600 kc</td>
<td>.0002 mfd Ant. Lead</td>
<td>C15</td>
<td>Presel. 16</td>
</tr>
<tr>
<td>&quot;SW&quot;</td>
<td>Fully open</td>
<td>18,1 mc</td>
<td>400 ohms Ant. Lead</td>
<td>C16</td>
<td>Antenna</td>
</tr>
<tr>
<td>&quot;SW&quot;</td>
<td>16 mc</td>
<td>16 mc</td>
<td>400 ohms Ant. Lead</td>
<td>C18</td>
<td>Oscillator 16</td>
</tr>
<tr>
<td>&quot;LW&quot;</td>
<td>Fully open</td>
<td>380-30 kc</td>
<td>.0002 mfd Ant. Lead</td>
<td>C19</td>
<td>Antenna 16</td>
</tr>
<tr>
<td>&quot;LW&quot;</td>
<td>920 meters</td>
<td>385 kc</td>
<td>.0002 mfd Ant. Lead</td>
<td>C20</td>
<td>Oscillator 8</td>
</tr>
<tr>
<td>&quot;LW&quot;</td>
<td>1875 meters (rock)</td>
<td>160 kc</td>
<td>.0002 mfd Ant. Lead</td>
<td>C21</td>
<td>Antenna 8</td>
</tr>
</tbody>
</table>

POWER SUPPLY: Tapped-105-125-150-230 volts, 60 cycles, 56 watts

FREQUENCY RANGES:
- Band "AM" ............... 535 kc-1730 kc
- Band "LW" ............... 150 kc-360 kc
- Band "SW" ............... 5.6 mc-16.1 mc

POWER OUTPUT:
- Type .................... Pentode
- Undistorted ............ 2.5 watts
- Maximum ............... 3.5 watts

UNIVERSAL TRANSFORMER is used. Removing 2 screws and a shield on top of power transformer exposes terminal plate and pin connector. Inserting pin into clip marked with voltage at which set is to be used, permits operation on 105, 125, 150 or 230 volts. For use on AC ONLY.

MARCH 7, 1939

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I.F. ALIGNMENT

With the wave switch in the Broadcast Band and the gang condenser set at minimum, adjust the test oscillator to 455 KC and connect the output to the grid of the first detector tube (6A7) through a .05 or .1 mfd condenser. The ground on the test oscillator can be connected to the chassis ground. Align all four I.F. trimmers to peak or maximum reading on the output meter.

BROADCAST BAND ALIGNMENT

Connect the output of the signal generator to the antenna lead (blue) through a .0002 mfd. mica condenser. Set the gang condenser to minimum and the oscillator to 1730 KC and adjust the “oscillator trimmer” to receive this signal. Make no other adjustments at this frequency. Then set the generator to 1400 KC and tune in this signal by rotating the gang to 1400 on the dial. Adjust the “preselector” and “antenna” trimmer to maximum signal. Set the signal generator to 600 KC and tune in the signal on the receiver. Note: approximately the same sensitivity should be noted at this point as was at 1400 KC. The signal strength may sometimes be improved by padding the circuits. This is done by slowly increasing or decreasing the oscillator padding condenser and, at the same time, continuously tuning back and forth across the signal with the receiver until the maximum reading is obtained on the output meter. This adjustment may seem a little complicated but is the easiest way to adjust the oscillator to the preselector of the R.F. section. Return to 1400 KC and again go over the adjustments of this frequency to be certain that they were not put slightly out of alignment when adjustment was made at 600 KC.

SHORT WAVE BAND ALIGNMENT

The short wave band is adjusted by setting the generator to 16,100 KC and with the gang at minimum, adjust the “short wave oscillator trimmer” to receive this signal. Set the generator at 16,000 KC, tune in the signal and adjust the “short wave antenna” trimmer to give maximum output. There is no variable low frequency padding condenser on this band; the sensitivity of the receiver should be checked at 6000 KC to determine whether the circuits are in line at this frequency. Should the receiver lack sensitivity at 6000 KC, the antenna and oscillator coils, as well as the .004 mica padding condenser, should be tested for defects as sometimes these components become subject to mechanical or electrical injuries, despite their rugged construction and liberal ratings.

LONG WAVE BAND ALIGNMENT

The long wave band is adjusted by connecting the output of the signal generator through a .0002 Mfd. mica condenser to the blue antenna lead. Then set the gang to minimum and the generator to 300 KC and adjust the long wave oscillator trimmer to receive this signal. Then set the generator to 325 KC and adjust the long wave antenna trimmer to give maximum output. Next set generator to 160 KC and pad the circuits to maximum output. Owing to the nature of the long wave band the trimmer and padding condensers react upon each other to quite a degree; consequently, several re-adjustments at the trimming and padding positions are required before the circuits are adjusted properly.

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Compliments of www.nucow.com
MODEL 7235 (CHASSIS 105.8KU); MODEL 7236 (CHASSIS 105.8TU)

THE AUTOMATIC TUNING DIAL

CHOOSING THE STATIONS TO BE USED

The telephone dial has 10 buttons located in a ring within the dial scale. Make a list of 10 of your favorite stations which are tuned in regularly. Shown in Fig. 1A is the approximate frequency range that each button will cover. Note: If 2 stations happen to fall within the range of one button, one station will necessarily have to be tuned in with the selector knob.

PROCEDURE FOR ADJUSTING THE TELEPHONE DIAL BUTTONS

1. Choose one of the stations out of the list of stations selected and by means of the station selector very carefully tune in this station, noting at the same time the exact pointer location on the dial.

2. Now select the proper button for the first station chosen by referring to Fig. 1A and noting the button into whose range the station falls. For example, station WCN with a frequency of 720 KC comes under the button whose frequency ranges from 670 to 755 KC. Usually the button nearest the tuning point or the bottom of the dial will be the proper button.

3. Loosen the button by unscrewing it and turn to the left. Now press the button in all the way and rock the dial back and forth a trifle until a click is heard. Do not release the button now but set it to its former location and with the dial in this position, be careful not to move it, proceed to tighten the button by turning it in the opposite direction (to the right). Make sure the button is very securely tightened as it may get out of adjustment.

4. From the station call sheet supplied remove the proper station disc and insert into the push button so that the wording is horizontal when the button is at the bottom, and then insert a clear epiluloid insert. Follow this same procedure for the remaining buttons.

5. If for any reason it is necessary to remove a station call letter disc, the use of a pen knife or any sharp pointed instrument will facilitate the removal.

MODEL 7425 CHASSIS 107.375

MECHANICAL ACTION OF THE PERM-A-MATIC TUNER

Fig. 1 shows one of the buttons depressed for a station. The trimmer panel assembly (for the antenna circuit) is designed with spring fingers "B" that make contact with cross bar "A" completing the ground circuit of the R.F. Trimmer.

When making the original set-up, the adjusting screw may indicate two positions for resonance. This is due to the possibility of the small amount of play in the screw thread and is of no concern as long as it is set to the exact resonance point.

The jumper contact "J" connects C1 contact to C2 contact with the button "IN". This completes the oscillator circuit for that particular button.

Fig. 2 shows the jumper position with the button "OUT".

Fig. 3 shows the manual OFF-ON button in the "OUT" position.

The "L" shaped sliding contact is the common cathode return circuit and alternates the bias on the 6Q8 for manual tuning or on the 6A7 for push button tuning.

Fig. 4 shows the iron core movement within the oscillator coil. Its position is held stationary by the small spring wire across the coil form. The position of this spring must be such that no spring action is apparent from the end of the adjustment stud due to pressure with a screwdriver. Otherwise, when the screwdriver is removed, the core will shift out of position.

The button is held down by action of the latch bar and is released when another key raises the latch bar on its way down.

If it is necessary to replace a coil, mount it in line with the other coils and cement it in place.
It is assumed that if an alignment procedure becomes necessary that the serviceman has an oscillator capable of accurately covering the range of the receiver and that a meter output indicator is used.

The I.F. stages are aligned in the usual manner by feeding a 465 KC signal into the grid of the 6L7 tube.

Follow Fig. 2 and Fig. 3 showing trimmer locations and alignment frequency.

Always adjust the oscillator first in any particular band.

Use as low an output as possible from the test oscillator in making the various adjustments.

After trimming at the high frequency end of the dial and adjusting the padding condenser at the other end, always recheck the settings of the trimmer at the high frequency end of the dial.

BEFORE STARTING ALIGNMENT CHECK POSITION OF TUNING HAND AND MAKE CERTAIN THAT IT IS EXACTLY STRAIGHT ACROSS ON THE FIRST CALIBRATION LINE WHEN THE CONDENSERS ARE AT MAXIMUM CAPACITY ROTATION.
**SEARS PAGE 11-115**

**Schematic, Voltage**

**Socket, Trimmers**

**Alignment**

---

**POWER SUPPLY:** 115 volts, 60 cycles, 45 watts

**FREQUENCY RANGES:**
- 540 to 1650 KC
- 1650 to 5400 KC
- 5250 to 16000 KC

**POWER OUTPUT:**
- Undistorted = 0.75 watts
- Maximum = 1.4 watts

**LOUD SPEAKER:** Type, Dynamic
- Size, 8-inch
- Field Resistance = 3000 ohms

**ALIGNMENT PROCEDURE**

Connect an output meter across the speaker voice coil. The volume control should be set a few degrees back of the maximum volume position. Use a weak signal from the generator. Strong signals tend to cause improper adjustments.

**IF.** Connect the generator ground to the receiver chassis. Using a 1 mfd condenser in series with the high side of the generator, apply a 455 KC signal to the grid of the 6DS IF amplifier tube and align the 2nd IF transformer. Repeat for the 1st IF transformer, applying the signal to the grid of the 6AS6 tube. (See tube layout diagram for location of trimmers.)

**RF.** Using a 250 maf condenser as a "dummy" antenna, turn the wave switch all the way to the left, apply 455 KC signal to the antenna and adjust the wave trap trimmer for minimum response. Turn the tuning condenser to minimum capacity, set the generator at 1660 KC and adjust the Broadcast Oscillator trimmer for top frequency. Set the generator at 1400 KC and align the Broadcast Antenna trimmer. Set the generator at 800 KC, tune the receiver to the signal and adjust the pad. The tuning condenser must be rocked back and forth through the signal while varying the pad in order to assure perfect alignment.

A 400 ohm resistor must be used as a "dummy" antenna for proper alignment of the two short wave bands. Set the wave switch in the center position, adjust the oscillator top frequency to 5400 KC, then align the antenna trimmer at about 5000 KC. Turn the Wave Switch to the extreme right hand position, adjust the oscillator top frequency to 16000 KC and align the antenna at 15000KC. In order to be sure that the top end of the last band is set properly it is best to screw the oscillator trimmer down tight, then unscrew to the second peak. The antenna trimmer should be screwed down tight then unscrewed to the first peak. This procedure should be followed in order that the oscillator and antenna circuits will be set in the correct relation to each other. It is best to rock the tuning condenser back and forth through the signal while making these adjustments at high frequencies.

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ELECTRIC AUTOMATIC TUNING INSTRUCTIONS

The tuning unit consists of three parts. (1) The MASTER SELECTOR. This includes the SELECTOR DRUM, and the SELECTOR PINS. These parts are located on the back of the variable condenser together with their associated brackets and wiring. (2) MOTOR and DRIVE. This assembly consists of an induction motor having a mechanical clutch with magnetic throw out, a train of gears operating directly onto the manual tuning shaft. (3) PUSH BUTTON ASSEMBLY. These buttons are located on the front of the chassis and extend through the escutcheon below the dial.

SETTING UP THE MASTER SELECTOR

List eight local or strong stations according to frequency. Setting up weak or distant stations is not recommended. Call the station nearest the left hand end of the dial (nearest 1600 KC.) the No. 1 Station. Number the other stations similarly going from left to right across the dial. On a blank card you will find the SELECTOR DRUM and the eight CONTACT PINS which determine the point at which the tuner will stop when the buttons are pressed. Figure 1 shows the general layout and relation of the drum and contacts. Figure 2 shows one of the contact pins in detail. Figure 3 shows the arrangement of the contact pins, each pin being numbered according to the system suggested for numbering the stations.

On the SELECTOR DRUM are two pairs of CONTACT RIBBONS. Note that there is a paint dot on the edge of the drum directly opposite the break in the ribbons on the upper half of the drum. This is for locating the approximate position at which a given CONTACT PIN should be set in order to have the DRUM STOP for a particular station.

IT IS IMPORTANT THAT THE FOLLOWING STEPS BE FOLLOWED EXACTLY AS OUTLINED:

1. Turn the wave switch to the "Broadcast" position. Turn the receiver ON and let it run for at least ten minutes to allow the tubes to reach their final operating temperature.

2. Using the MANUAL STATION SELECTOR, tune in the No. 1 station, that is the one nearest the 1600 KC. end of the dial. Watch the tuning tube closely, making certain that the station is tuned in perfectly.

3. Attach the SELECTOR LIGHT lead to the No. 1 pin. This lead has a spring clip at the end and will be found clipped to a ground post at the top of the selector bracket. Unless the pin happens to be set exactly the DIAL LIGHTS will glow when the light is touched to the pin.

4. Observe the position of the paint dot on the edge of the DRUM. Grasp the No. 1 pin firmly and slide it toward the paint dot. When the PIN is directly opposite the paint dot the lights will go out indicating that the pin is properly set. To insure the greatest accuracy slide the pin back and forth across the break in the ribbons, leaving it set half way between the points where the lights go out.

5. Using similar procedure set up the other seven stations, in each case using the pin bearing the same number as the station being set up.

6. Locate the CALL LETTERS of your stations on the printed sheets supplied with the receiver and insert them in the proper pockets above the buttons.

7. The only operations necessary to tune in any of the eight stations set up as outlined above are: Turn the receiver ON, allow an interval of time for the tubes to heat and press the button for the station desired. HOLDING THE BUTTON DOWN UNTIL THE POINTER STOPS MOVING. Then adjust the tone and volume.

Note that in Chassis 109.190, ten contact pins are provided.
For ELECTRIC AUTOMATIC TUNING, see Index.

POWER SUPPLY: 105-125 volts, 60 cycles 80 watts

FREQUENCY RANGES:
- 540 to 1650 KC
- 1650 to 5400 KC
- 5250 to 16000 KC

POWER OUTPUT:
- Undistorted = 3 watts
- Maximum = 5 watts

LOUD SPEAKER:
- Type: Dynamic
- Size: 8-inch
- Field Resistance = 900 ohms

JAN. 5, 1939

ALIGNMENT PROCEDURE

Connect an output meter across the speaker voice coil. The volume control should be set a few degrees back of the maximum volume position. Use a weak signal from the generator. Strong signals tend to cause improper adjustments.

IF. Connect the generator ground to the receiver chassis. Using a .1 mfd. condenser in series with the high side of the generator, apply a 460 KC signal to the grid of the 6S6 IF amplifier tube and align the 2nd IF transformer. Repeat for the 1st IF transformer, applying the signal to the grid of the 6A8G tube. (See tube layout diagram for location of trimmers.)

RF. Using a 200 muf condenser as a "dummy" antenna, turn the wave switch to the "broadcast" position and the tuning condenser to minimum capacity. Feed a 1650 KC signal to the antenna and adjust the broadcast oscillator trimmer for top frequency. Set the generator at about 1400 KC and adjust the broadcast antenna and RF trimmers. Set the generator for 600 KC, tune the receiver to the signal and adjust the pad. The tuning condenser should be rocked back and forth through the signal while varying the pad to assure perfect alignment.

A 400 ohm resistor must be used as a dummy antenna for proper alignment of the short wave bands. Set the wave switch in the center position, adjust the oscillator top frequency to 5400 KC. Then align the antenna trimmer at about 5000 KC. With the wave switch in the extreme right hand position adjust the oscillator top frequency of the high frequency band to 16000 KC, and align the antenna at about 15000 KC. In order to be sure that the top end of the last band is set properly, it is best to screw the oscillator trimmer down tight, then unscrew to the second peak. The antenna trimmer should be screwed down tight then unscrewed to the first peak. This procedure should be followed in order that the oscillator and antenna circuits will be set in the correct relation to each other. It is best to rock the tuning condenser back and forth through the signal while making these adjustments at high frequencies.

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Compliments of www.nucow.com
POWER SUPPLY:

All models available ..................... 105-125 volts, 60 cycle A.C. ........ 40 watts

FREQUENCY RANGE:

Broadcast ..................... 530-1730 KC

ALIGNMENT FREQUENCY

1500 KC

POWER OUTPUT:

LOUD SPEAKER:

Dynamic

Type ........................................ Beam Power Type ...................... Dynamic

Undistorted ..................... 1.25 watts  Srze ........ 5" 

Maximum ..................... 1.75 watts  Field Resistance .............. 450 Ohms

ALIGNMENT PROCEDURE

JAN. 12, 1939

Either a broadcast signal of about 1500 kc or a test oscillator signal may be used. If a broadcast signal is used, the antenna of the receiver should be extended as in a normal installation. If a test oscillator signal is used, a wire should be connected to the test oscillator output and run parallel to but insulated from the receiver's antenna wire. The generator ground connection should be connected to ground.

Tune in the 1500 kc signal and adjust the trimmers for maximum loud speaker response. This can be done most accurately if the Volume Control setting is reduced to give a low volume level. The location of this trimmer is shown in the tube socket location diagram.

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MODEL 7300

Chassis Wiring, Socket, Trimmers, Dial, Notes

Calibration Scale on Variable Condenser Drive Drum.—The tuning dial is fastened in the cabinet and cannot be used for reference during alignment when chassis is out of cabinet; therefore, a calibration scale is attached to the rear of the drum which is mounted on the shaft of the gang condenser. The setting of the gang condenser is readable on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

As the first step in r-f alignment, check the position of the drum. The 45° mark on the drum scale (see Dial Drive Drawing) must be in a horizontal position when the plates are fully meshed. The distance from the edge of the chassis to the drum must not exceed 1/8 inch. The drum is held to the shaft by means of two set screws, which must be tightened securely when the drum is in the correct position.

Pointer for Calibration Scale.—Improve a pointer for the calibration scale by fastening a piece of wire to the gang--condenser frame, and bend the wire so that it points to the "0°" mark on the calibration scale when the plates are fully meshed.

Dial-Indicator Adjustment.—After fastening the chassis in the cabinet, attach the dial pointer to the drive cable with variable condenser fully closed and pointer on last calibration mark at 550 kc end of Broadcast "A" band. The dial pointer has a spring clip for attachment to the cable.

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FIG. 1. TUBE, TRIMMER AND PARTS LOCATION

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FIG. 2. CONDENSER AND INDICATOR DRIVE CORD

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FIG. 3. SPEAKER AND CABLE CONNECTIONS

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FIG. 4. TUBE, TRIMMER AND PARTS LOCATION—BOTTOM VIEW

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SEARS, ROEBUCK & CO.

MODEL 7300

Alignment

ALIGNMENT PROCEDURE

PRELIMINARY:
Output meter connections .................................................. Across speaker voice coil
Output meter reading to indicate 1.0 watt output .................. 1.6 volts
Approximate average sensitivity in microvolts for 1.0 watt output ........................................ See chart below
Dummy antenna value to be inserted in series with generator output .................................................. See chart below
Connection of generator output lead ................................. See chart below
Connection of generator ground lead ................................. To chassis
Generator modulation ....................................................... 30%, 400 cycles
Position of Volume Control ................................................. Fully Clockwise
Position of Tone Control ................................................... Fully Clockwise

<table>
<thead>
<tr>
<th>Wave-Band Switch Position</th>
<th>Position of Dial Pointer</th>
<th>Generator Frequency</th>
<th>Dummy Antenna</th>
<th>Generator Connection</th>
<th>Trimmers Adjusted (In order shown)</th>
<th>Trimmer Function</th>
<th>Approximate Microvolts</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;A&quot;</td>
<td>Low End</td>
<td>455 kc</td>
<td>.001 mfd.</td>
<td>6K7 I-F</td>
<td>L10, L11</td>
<td>2nd I-F Trans.</td>
<td>3,500</td>
</tr>
<tr>
<td>&quot;A&quot;</td>
<td>Low End</td>
<td>455 kc</td>
<td>.001 mfd.</td>
<td>Tuning Condenser Stator (osc.)</td>
<td>L8, L9</td>
<td>1st I-F Trans.</td>
<td>85</td>
</tr>
<tr>
<td>&quot;A&quot;</td>
<td>600 kc (33°) (rock)</td>
<td>600 kc</td>
<td>.0002 mfd.</td>
<td>Ant.</td>
<td>L7</td>
<td>Osc.</td>
<td>15</td>
</tr>
<tr>
<td>&quot;A&quot;</td>
<td>1,500 kc (152.4°)</td>
<td>1,500 kc</td>
<td>.0002 mfd.</td>
<td>Ant.</td>
<td>C8, C2</td>
<td>Osc, Ant.</td>
<td>—</td>
</tr>
<tr>
<td>&quot;C&quot;</td>
<td>20 mc (155.4°)</td>
<td>20 mc</td>
<td>300 ohms</td>
<td>Ant.</td>
<td>C5</td>
<td>Osc.*</td>
<td>—</td>
</tr>
<tr>
<td>&quot;C&quot;</td>
<td>20 mc (155.4°) (rock)</td>
<td>20 mc</td>
<td>300 ohms</td>
<td>Ant.</td>
<td>C6</td>
<td>Ant.</td>
<td>95</td>
</tr>
<tr>
<td>&quot;B&quot;</td>
<td>6.0 mc (149°)</td>
<td>6.0 mc</td>
<td>300 ohms</td>
<td>Ant.</td>
<td>C6</td>
<td>Osc.*</td>
<td>15</td>
</tr>
<tr>
<td>&quot;B&quot;</td>
<td>6.0 mc (149°)</td>
<td>6.0 mc</td>
<td>300 ohms</td>
<td>Ant.</td>
<td>C27</td>
<td>Ant.</td>
<td>—</td>
</tr>
<tr>
<td>&quot;A&quot;</td>
<td>1,500 kc (150.5°)</td>
<td>1,500 kc</td>
<td>.0002 mfd.</td>
<td>Ant.</td>
<td>C29, C3</td>
<td>Osc, Ant.</td>
<td>15</td>
</tr>
</tbody>
</table>

IMPORTANT ALIGNMENT NOTES

*Use minimum capacity peak if two peaks can be obtained.
Where indicated by the word "Rock," the variable tuning condenser should be rocked back and forth a degree or two while making this adjustment.
Each step of the alignment should be repeated in its original order for greater accuracy. Always keep the output from the generator at its lowest possible value to prevent the a-v-c action of the set interfering with accurate alignment.
Adjustment locations are shown on the top and bottom parts location views of chassis.
Only the dummy antenna indicated in the chart for any particular band should be used. Remove the dummy used for alignment in any other band. Grid cap leads should remain in place during alignment.

Note.—Oscillator tracks 455 kc above signal on all bands.
Values shown under, "Microvolts," are only approximate.

Calibration Scale

Reduced Reproduction of Receiver Dial, and Corresponding 0-180° Calibration Scales

The corresponding position of the dial indicator for any setting of the calibration scale can be determined by drawing a line from this point on the bottom calibration scale to the same point on the top calibration scale. For example: 33° on the calibration scale corresponds to approximately 7.9 mc on "C" band, and 600 kc on "A" band, etc. Read instructions under "Alignment Procedure.

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Record Player:

A jack is provided on the rear of the chassis in Models 7305 and 7307 for connection to a No. 6227 Silvertone Record Player which is supplied only in 100-125 volts, 25, 50 or 60 cycle range. If receiver is to be used on 220 volts, it will be necessary to connect the Record Player power cord to the 110 V. primary section of the power transformer as shown in Figure 9.
Loudspeaker:
The loudspeaker cone may be centered in the usual manner with three celluloid or paper feelers after gently cutting away the front dust cover. A new cover should be cemented in place upon completion of the adjustment.

Calibration Scale on Variable Condenser Drive Drum.—The tuning dial is fastened in the cabinet and cannot be used for reference during alignment when chassis is out of cabinet; therefore, a calibration scale is attached to the rear of the drum which is mounted on the shaft of the gang condenser. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

As the first step in r-f alignment, check the position of the drum. The 180° mark on the drum scale (see "Dial Drive Drawing") must be in a vertical position when the plates are fully meshed. The drum is held to the shaft by means of two set screws, which must be tightened securely when the drum is in the correct position.

Pointer for Calibration Scale.—Improvise a pointer for the calibration scale by fastening a piece of wire to the gang-condenser frame, and bend the wire so that it points to the "180°" mark on the calibration scale when the plates are fully meshed.

Dial-Indicator Adjustment.—After fastening the chassis in the cabinet attach the dial pointer to the drive cable with variable condenser fully closed and pointer on last calibration mark at 550 kc end of Broadcast "A" band. The dial pointer has a spring clip for attachment to the cable.

FIG. 1. TUBE, TRIMMER AND PARTS LOCATION

FIG. 2. TUBE, TRIMMER AND PARTS LOCATION—BOTTOM VIEW

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Model 7305 (126-217) and Model 7307 (126-220) are the same except for the size of speaker. Model 7305 having a 6-inch and Model 7307 a 12-inch electrodynamic speaker.

Model 7306 (126-218) has an 8-inch electrodynamic speaker and is supplied as a radio-phonograph combination.

**POWER SUPPLY RATING:**
- Models 7305 and 7307: 100-130, 140-160, 195-250 volts, 40 to 60 cycles, 75 watts
- Models 7306: 100-130, 140-160, 195-250 volts, 40 to 60 cycles, 75 watts
- Phono Motor: 20 watts
- Total: 95 watts

**CHASSIS FEATURES:**
- Aural-Compensated Volume Control
- Magnetite-Core Adjusted I-F Transformers and Band "A" Low-Frequency Oscillator Tracking Jack and Switch for Phonoograph Attachment on Models 7305 and 7307

**FREQUENCY RANGES:**
- (A) Standard Broadcast: 540-1,720 kc (550-174 m)
- (B) Medium Wave: 2.3-7.0 mc (130-438 m)
- (C) Short Wave: 7.0-22.0 mc (420-13.6 m)

**INTERMEDIATE FREQUENCY:**
- POWER OUTPUT:
  - Type: Pentode
  - Undistorted: 2.5 watts
  - Maximum: 4.5 watts

**LOUDSPEAKER:**
- Type—Electrodynamic
- Voice Coil Impedance at 400 Cycles: 2.2 ohms
- Field Coil Resistance: 1,800 ohms
- Approx. Field Coil Voltage Drop: 130 volts

**PRELIMINARY:**
- Output meter connections: Across speaker voice coil
- Output meter reading to indicate 1.0 watt output: 1.6 volts
- Approximate average sensitivity in microvolts for 1.0 watt output: See chart below
- Dummy antenna value to be inserted in series with generator output: See chart below
- Connection of generator output lead: See chart below
- Connection of generator ground lead: To chassis
- Generator modulation: 30%, 400 cycles
- Position of Volume Control: Fully clockwise
- Position of Tone Control: Fully clockwise

**ALIGNMENT PROCEDURE**

**Wave-Band Switch Position** | **Position of Dial Pointer** | **Generator Frequency** | **Dummy Antenna** | **Generator Connection** | **Trimmer Adjusted (In order shown)** | **Trimmer Function** | **Approximate Microvolts**
--- | --- | --- | --- | --- | --- | --- | ---
"A" | Low End | 455 kc | .001 mfd. | 6SK7 I-F Grid | L14, L15 | 2nd I-F Trans. | 4,600
"A" | Low End | 455 kc | .001 mfd. | Tuning Condenser Stator (osc.) | L12, L13 | 1st i-F Trans. | 85
"A" | 600 kc (148°) (rock) | 600 kc | .0002 mfd. | Ant. | L11 | L11 | 2.8
"A" | 1,500 kc (28°) | 1,500 kc | .0002 mfd. | Ant. | C15, C9, C3 | Osc., Det., Ant. | 2.1
"B" | 6.0 mc (11°) | 6.0 mc | 300 ohms | Ant. | C13*, C8, C2 | Osc., Det., Ant. | 2.1
"C" | 20 mc (23°) | 20 mc | 300 ohms | Ant. | C11*, C7, C1 | Osc., Det., Ant. | 4.2

**IMPORTANT ALIGNMENT NOTES**

*Use minimum capacity peak if two peaks can be obtained.*

Where indicated by the word "Rock," the variable tuning condenser should be rocked back and forth a degree or two while making this adjustment.

Each step of the alignment should be repeated in its original order for greater accuracy. Always keep the output from the generator at its lowest possible value to prevent the a-v-c action of the set interfering with accurate alignment.

Adjustment locations are shown on the top and bottom parts location views of chassis.

Only the dummy antenna indicated in the chart for any particular band should be used. Remove the dummy used for alignment in any other band.

Note.—Oscillator tracks 455 kc above signal on all bands.

Values shown under, "Microvolts," are only approximate.
**FIG. 4. MERCURY SWITCH MECHANISM**

(Model 7306) Viewed from front—shown with pickup in rest position.

The motor switch is automatic for both starting and stopping, and when properly adjusted, will turn the motor on as the pickup is moved from the pickup rest toward the turntable. The switch should be adjusted so that it will snap into the "off" position when the pickup needle is 1/8 inch from the center line of the turntable shaft.

**FIG. 3. PHONOGRAPH MOTOR BOARD AND OPERATING CONTROLS (Model 7306)**

**FIG. 7. PLANETARY TUNING DRIVE ASS'Y**

**FIG. 12. SPEAKER AND CABLE CONNECTIONS**

**Fig. 9. RECORD PLAYER CONNECTIONS**

*Fig. 10. BOTTOM VIEW OF CONTROLS*

*Fig. 11. CONDENSER AND INDICATOR DRIVE CORDS*

**Calibration Scale**

Reduced Reproduction of Receiver Dial, and Corresponding 0-180° Calibration Scales.

The corresponding position of the dial indicator for any setting of the calibration scale can be determined by drawing a line from this point on the bottom calibration scale to the same point on the top calibration scale. For example: 32° on the calibration scale corresponds to approximately 7.9 inc on "C" band, and 600 kc on "A" band, etc. Read instructions under "Alignment Procedure."
General Information and Service Hints

Loudspeaker:
The loudspeaker cone may be centered in the usual manner with three celluloid or paper feelers after gently cutting away the front dust cover. A new cover should be cemented in place upon completion of the adjustment.

Tuning Dial:
The tuning shaft is connected through a cord drive to a drum on the condenser shaft. This same cord drives the dial indicator by passing over a pulley on the chassis. Figure 3 shows the complete cord drive assembly and the correct number of turns which the cord should be wrapped around the drive shaft and condenser drum.

Record Player:
A jack is provided on the rear of the chassis for connection to a No. 627 Silver Tone Record Player which is supplied only in 100-125 volts, 25, 50 or 60 cycle rating. If the receiver is to be used on 220 volts, it will be necessary to connect the Record Player power cord to the 110 V. primary section of the power transformer as shown in Figure 8.

---

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SEARS ROEBUCK & CO.

LOUDSPEAKER:

<table>
<thead>
<tr>
<th>Type</th>
<th>Model 7310</th>
<th>Model 7312</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrodynamic</td>
<td>8-inch</td>
<td>12-inch</td>
</tr>
<tr>
<td>Voice Coil Impedance at 400 Cycles</td>
<td>2.2 ohms</td>
<td>2.2 ohms</td>
</tr>
<tr>
<td>Field Coil Resistance</td>
<td>1,060 ohms</td>
<td>1,060 ohms</td>
</tr>
<tr>
<td>Approximate Field Coil Voltage Drop</td>
<td>70 volts</td>
<td>70 volts</td>
</tr>
</tbody>
</table>

Note.—The above models are identical except for the size of speaker. Model 7310 has an 8-inch and Model 7312 a 12-inch electrodynamic speaker.

POWER OUTPUT:

<table>
<thead>
<tr>
<th>Type</th>
<th>Push-Pull</th>
</tr>
</thead>
<tbody>
<tr>
<td>Undistorted</td>
<td>10.5 watts</td>
</tr>
<tr>
<td>Maximum</td>
<td>11.5 watts</td>
</tr>
</tbody>
</table>

INTERMEDIATE FREQUENCY: 455 kc

POWER SUPPLY RATING:

100-130, 140-160, 195-250 volts,
40 to 60 cycles, 95 watts

ALIGNMENT PROCEDURE

LOCATION OF PARTS AND ALIGNMENT ADJUSTMENTS ON TOP OF CHASSIS

<table>
<thead>
<tr>
<th>Wave-Band Switch Position</th>
<th>Generator Frequency</th>
<th>Dummy Antenna</th>
<th>Generator Connection</th>
<th>Trimmer Adjusted (In order shown)</th>
<th>Trimmer Function</th>
<th>Approximate Microvolts</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;A&quot; Low End</td>
<td>455 kc</td>
<td>.001 mfd.</td>
<td>6SK7 I-F Grid</td>
<td>L14, L15</td>
<td>2nd I-F Trans.</td>
<td>5,000</td>
</tr>
<tr>
<td>&quot;A&quot; Low End</td>
<td>455 kc</td>
<td>.001 mfd.</td>
<td>Tuning Condenser Stator (osc.)</td>
<td>L12, L13</td>
<td>1st I-F Trans.</td>
<td>100</td>
</tr>
<tr>
<td>&quot;A&quot; 1,500 kc (28°)</td>
<td>1,500 kc</td>
<td>.0001 mfd.</td>
<td>Ant.</td>
<td>C15, C9, C3</td>
<td>Osc., Det., Ant.</td>
<td>2</td>
</tr>
<tr>
<td>&quot;A&quot; 600 kc (148°) (rock)</td>
<td>600 kc</td>
<td>.0002 mfd.</td>
<td>Ant.</td>
<td>L11</td>
<td>Osc.</td>
<td>2</td>
</tr>
<tr>
<td>&quot;B&quot; 6.0 mc (31°)</td>
<td>6.0 mc</td>
<td>300 ohms</td>
<td>Ant.</td>
<td>C13, C8, C2</td>
<td>Osc., Det., Ant.</td>
<td>2</td>
</tr>
<tr>
<td>&quot;C&quot; 20 mc (23°)</td>
<td>20 mc</td>
<td>300 ohms</td>
<td>Ant.</td>
<td>C11, C7, C1</td>
<td>Osc., Det., Ant.</td>
<td>2.5</td>
</tr>
</tbody>
</table>

IMPORTANT ALIGNMENT NOTES

* Use minimum capacity peaks if two peaks can be obtained.

Where indicated by the word "Rock," the variable tuning condenser should be rocked back and forth a degree or two while making this adjustment.

Each step of the alignment should be repeated in its original order for greater accuracy. Always keep the output from the generator at its lowest possible value to prevent the a-v-c action of the set interfering with accurate alignment.

Adjustment locations are shown on the top and bottom parts location views of chassis. Only the dummy antenna indicated in the chart for any particular band should be used. Remove the dummy used for alignment in any other band.

Note.—Oscillator tracks 455 kc above signal on all bands. Values shown under, "Microvolts," are only approximate.

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Wave-Band | Position of Dial Pointer | Generator Frequency | Dummy Antenna | Generator Connection | Trimmers Adjusted (In order shown) | Trimmer Function
--- | --- | --- | --- | --- | --- | ---
Broadcast | Low End | 465 KC | .001 Mfd | 6D6 Grd | C13, C14 | 2nd IF
Broadcast | Low End | 465 KC | .001 Mfd | 696G Grd | C15, C16 | 1st IF
Shortwave | 21 MC | 21 MC | 300 Ohms Ant. | T21, T22 | Osc & Ant
Med. Wave | 6 MC | 6 MC | 300 Ohms Ant. | T23, T24 | Osc & Ant
Broadcast | 1400 KC | 1400 KC | .0002 Mfd Ant. | T25, T26 | Osc & Ant
Broadcast | 600 KC | 600 KC | .0002 Mfd Ant. | T27 | P27 & Pad
Broadcast | 1400 KC | 1400 KC | .0002 Mfd Ant. | T25, T26 | Osc & Ant

**IMPORTANT ALIGNMENT NOTES**

*Use minimum capacity peak if two peaks can be obtained.*

Where indicated by the word "Rock", the variable tuning condenser should be rocked back and forth a degree or two while making this adjustment. Each step of the alignment should be repeated in its original order for greater accuracy. Always keep the output from the generator at its lowest possible value to prevent the a-v-c action of the set from interfering with accurate alignment.

Only the dummy antenna indicated in the chart for any particular band should be used. Remove the dummy used for alignment in any other band. Grid cap leads should remain in place during alignment.

**SET-UP INSTRUCTIONS FOR PERMATIC AUTOMATIC TUNER**

*DO NOT ATTEMPT ANY ADJUSTMENTS UNTIL THE SET HAS BEEN Tuned ON AT LEAST 20 MINUTES*

1. Remove the push-button escutcheon by removing a screw at each end of the plate.
2. Depress any one of the selector-buttons. The correct adjustment screws are always to the right of the depressed button. Tune in the desired station by turning the black slotted stud (numbered 1 on the lid) in the desired direction. This varies the iron core position within the oscillator coil.
3. Adjust the screw with slotted head for maximum electric eye deflection. This adjustment is mentioned in 2 in illustration and always the one directly above the station selector adjustment mentioned in above paragraph. In electric eye overlap on one station, adjust for maximum overlap. When making the two adjustments it is possible to obtain a strong detection of the tuning eye apparently for a station and yet no station is present. THIS IS A NORMAL CONDITION and just means that the two adjustments are not close enough in relation to each other and can be corrected by varying the two adjustment screws.

**THERE IS NO FREQUENCY DISCRIMINATION BETWEEN BUTTONS. ANY ONE OF SELECTORS WILL TUNE THE ENTIRE BROADCAST BAND (1600-5400 KC).**

**NOTICE:** DO NOT FORCER ANY ADJUSTMENTS IF THEY TIGHTEN UP IN THE COURSE OF ADJUSTMENT, EITHER THE MAXIMUM OR MINIMUM HAS BEEN REACHED AND THE ADJUSTMENT SHOULD BE MADE IN OPPOSITE ROTATION.

**DIAL DRIVE HOOKUP**

It will be found easier to adjust if the low frequency stations are started on the right side and progress toward high frequency stations to left, in the same order as the tuning dial.

However, the above procedure is not absolutely necessary if there should be some preference for arranging stations otherwise.

**AFTER ALL ADJUSTMENTS HAVE BEEN MADE — GO OVER EACH ADJUSTMENT ONE MORE TIME TO MAKE CERTAIN THEY ARE CORRECT AND TO COMPENSATE FOR SUBSEQUENT ADJUSTMENTS.**

It is a big help to tune the desired station in on each dial while making adjustments, in order that the station can be quickly recognized by switching from manual back to button being adjusted.

It is not necessary to look at any of the adjustments as they are automatically locked.

Push out necessary station letter indicator from tab sheet, moisten back, and press into place above the correct button.

**NOTICE:** Turning station selector screw clockwise lowers the frequency. Best results will be had when band switch is in broadcast position when using automatic tuning.
ALIGNMENT PROCEDURE

Be sure to follow procedure carefully and in the order given—otherwise the receiver will be insensitive and the dial calibration incorrect. For alignment procedure read tabulations from left to right. If more than one adjustment is required on any one band, make the adjustment marked (1) first, (2) next, (3) third.

Before starting alignment:
(a) Check tuning dial adjustment by turning ganging 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) Have ground lead of test oscillator attached to chassis through .01 Mfd. condenser—if too much hum is encountered, leave unconnected.

<table>
<thead>
<tr>
<th>Set receiver dial to</th>
<th>Adjust test oscillator frequency to</th>
<th>Use dummy antenna in series with output of test oscillator consisting of</th>
<th>Attach output of test oscillator to</th>
<th>Refer to parts layout diagram for location of trimmers mentioned below:</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.F.</td>
<td>455 K. C.</td>
<td>.02 MFD condenser</td>
<td>High side to grid terminal of 12SA7 tube</td>
<td>Adjust the second I. F. transformer trimmers for maximum output then adjust each of the first I. F. trimmers for maximum output</td>
</tr>
<tr>
<td>Any point where no interfering signal is received</td>
<td>1730 K. C.</td>
<td>.00025 MFD condenser</td>
<td>Receiver “A1” post</td>
<td>Adjust 1730 K. C. oscillator trimmer for maximum output.</td>
</tr>
<tr>
<td>1</td>
<td>Exactly 1730 K. C.</td>
<td>.00025 MFD condenser</td>
<td>Receiver “A1” post</td>
<td>While rocking ganging condenser adjust 1400 K. C. antenna trimmer for maximum output.</td>
</tr>
<tr>
<td></td>
<td>2 Approx. 1400 K. C.</td>
<td>.00025 MFD condenser</td>
<td>Receiver “A1” post</td>
<td></td>
</tr>
</tbody>
</table>
ALIGNMENT PROCEDURE

Be sure to follow procedure carefully and in the order given—otherwise the receiver will be insensitive and the dial calibration incorrect. For alignment procedure read tabulations from left to right. If more than one adjustment is required on any one band, make the adjustment marked (1) first, (2) next, (3) third.

Before starting alignment:
(a) Check tuning dial adjustment by turning 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 same type of output measuring device.
(c) Have ground lead of test oscillator attached to chassis through .01 Mfd condenser—if too much hum is encountered, leave unconnected.

<table>
<thead>
<tr>
<th>TEST OSCILLATOR</th>
<th>Use dummy antenna in series with output of test oscillator consisting of:</th>
<th>Attach output of test oscillator to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set receiver dial to:</td>
<td>Adjust test oscillator frequency to:</td>
<td>Refer to parts layout diagram for location of trimmers mentioned below:</td>
</tr>
<tr>
<td>L.F.</td>
<td>455 K. C.</td>
<td>.02 MFD condenser</td>
</tr>
<tr>
<td>Any point where no interfering signal is received</td>
<td>1730 K. C.</td>
<td>.00025 MFD condenser</td>
</tr>
<tr>
<td>2</td>
<td>Approx. 1400 K. C.</td>
<td>.00025 MFD condenser</td>
</tr>
</tbody>
</table>
## ALIGNMENT PROCEDURE

Be sure to follow procedure carefully and in the order given—otherwise the receiver will be insensitive and the dial calibration in error. For alignment procedure read tabulations from left to right. If more than one adjustment is required on any one band, make the adjustment marked (1) first, (2) next, (3) third.

Before starting alignment:
(a) Check tuning dial adjustment by turning gang condenser until plates touch maximum capacitance 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.

IMPORTANT: BEFORE ALIGNING, PLACE LOOP ANTENNA IN THE SAME APPROXIMATE POSITION IN THE BACK OF CHASSIS IT WILL BE IN WHEN THE SET IS IN THE CABINET AND THE BACK ATTACHED.

When adjusting 1720 kilocycle oscillator trimmer and 1440 kilocycle antenna trimmer, do not connect test oscillator to loop.

Couple test oscillator to receiver loop by:
(a) Make a loop consisting of five to ten turns of No. 20 to 30 size wire wound on a three inch form and attach across output of test oscillator.
(b) Place test oscillator loop near set loop—BE SURE THAT NEITHER MOVES WHILE ALIGNING.

DO NOT ATTACH LOW SIDE OF TEST OSCILLATOR TO RECEIVER—LEAVE UNCONNECTED.

<table>
<thead>
<tr>
<th>Set receiver dial to:</th>
<th>Adjust test oscillator frequency to:</th>
<th>Use dummy antenna in series with output of test oscillator consisting of:</th>
<th>Attach output of test oscillator to:</th>
</tr>
</thead>
</table>
| I.F. Any point where no interfering signal is received | 455 K.C. | 0.02 MFD condenser | Refer to parts layout diagram for location of trimmers mentioned below—and:
| 1 | Exactly 1730 K.C. | Exactly 1730 K.C. | None | Adjust the second I.F. transformer trimmers for maximum output—then adjust each of the first I.F. trimmers for maximum output,
| 2 | Approx. 1400 K.C. | Exactly 1400 K.C. | None | Use small loop to couple test oscillator to receiver loop
| | | | | Adjust 1730 K.C. oscillator trimmer for maximum output

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## ALIGNMENT PROCEDURE

- Be sure to follow procedure carefully and in the order given—otherwise the receiver will be insensitive and the dial calibration incorrect. For alignment procedure read tabulations from left to right. If more than one adjustment is required on any one band, make the adjustment marked (1) first, (2) next, (3) third.

Before starting alignment:
- (a) Check tuning dial adjustment by turning 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 on the low frequency end of the dial calibration. If dial needle does not point exactly to last line move needle to correct position.
- (b) Use an accurately calibrated test oscillator with some type of output measuring device.
- (c) Have ground lead of test oscillator attached to chassis.

<table>
<thead>
<tr>
<th>Place band switch for operation on:</th>
<th>Set receiver dial to:</th>
<th>Adjust test oscillator frequency to:</th>
<th>Use dummy antenna in series with output of test oscillator consisting of:</th>
<th>Attach output of test oscillator to:</th>
<th>Refer to parts layout diagram for location of trimmers mentioned below:</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.F. Alignment use any band position</td>
<td>Any point where no interfering signal is received</td>
<td>Exactly 455 K.C.</td>
<td>.001 Mfd. condenser</td>
<td>High side to grid cap of 1A8 tube. Do not remove cap.</td>
<td>Adjust each of the second I.F. transformer trimmers for maximum output—then adjust each of the first I.F. transformer trimmers for maximum output.</td>
</tr>
<tr>
<td>1730 to 1840 K.C. Band</td>
<td>1</td>
<td>1730 K.C.</td>
<td>1730 K.C.</td>
<td>.00051 Mfd. condenser</td>
<td>Receiver blue antenna lead</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>1400 K.C.</td>
<td>1400 K.C.</td>
<td>.00051 Mfd. condenser</td>
<td>Receiver blue antenna lead</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>600 K.C.</td>
<td>600 K.C.</td>
<td>.00051 Mfd. condenser</td>
<td>Receiver blue antenna lead</td>
</tr>
<tr>
<td>5.5 to 10 M.C. Band</td>
<td>1</td>
<td>15 M.C.</td>
<td>15 M.C.</td>
<td>400 Ohm carbon resistor</td>
<td>Receiver blue antenna lead</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>15 M.C.</td>
<td>15 M.C.</td>
<td>400 Ohm carbon resistor</td>
<td>Receiver blue antenna lead</td>
</tr>
</tbody>
</table>
ALIGNMENT PROCEDURE

Be sure to follow procedure carefully and in the order given—otherwise the receiver will be insensitive and the dial calibration incorrect. For alignment procedure read tabulations from left to right. If more than one adjustment is required on any one band, make the adjustments 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) Have ground lead of test oscillator attached to chassis.

<table>
<thead>
<tr>
<th>TEST OSCILLATOR</th>
<th>Set receiver dial to:</th>
<th>Adjust test oscillator frequency to:</th>
<th>Use dummy antenna in series with output of test oscillator consisting of:</th>
<th>Attach output of test oscillator to:</th>
<th>Refer to parts layout diagram for location of trimmers mentioned below:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.F. Any point where no interfering signal is received</td>
<td>455 K. C.</td>
<td>.02 MFD. condenser</td>
<td>High side to grid terminal of 1A7G tube</td>
<td>Adjust each of the second I.F. transformer trimmers for maximum output—then adjust each of the first I.F. trimmers for maximum output.</td>
<td></td>
</tr>
</tbody>
</table>

1 Exactly 1730 K. C. | Exactly 1730 K. C. | .0020 MFD. condenser | Receiver blue antenna lead | Adjust 1730 K. C. oscillator trimmer for maximum output. |
2 Approx. 1400 K. C. | Exactly 1400 K. C. | .00025 MFD. condenser | Receiver blue antenna lead | While rocking gang condenser adjust 1400 K. C. antenna trimmer for maximum output. |

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### ALIGNMENT PROCEDURE

Be sure to follow procedure carefully and in the order given—otherwise the receiver will be insensitive and the dial calibration incorrect. For alignment procedure read tabulations from left to right. If more than one adjustment is required on any one band, make the adjustment marked (1) first, (2) next, (3) third.

Before starting alignment:

(a) Check tuning dial adjustment by turning 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 needle to correct position.

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

(c) Have ground lead of test oscillator attached to chassis.

| Place band switch for operation on: | 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:
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. F. Alignment use any band position Any point where no interfering signal is received</td>
<td>Exactly 455 K.C.</td>
<td>.02 Mfd. condenser</td>
<td>High Side to grid cap of 1AG tube. Do not remove cap.</td>
<td>Adjust each of the second I.F. transformer trimmers for maximum output.</td>
<td></td>
</tr>
<tr>
<td>1700 to 540 K.C. Band</td>
<td>1 Exactly 1730 K.C.</td>
<td>.0025 Mfd. condenser</td>
<td>Receiver blue antenna lead</td>
<td>Adjust 1730 K.C. oscillator trimmer for maximum output.</td>
<td></td>
</tr>
<tr>
<td>2 Approx. 1660 K.C.</td>
<td>Exactly 1660 K.C.</td>
<td>.0005 Mfd. condenser</td>
<td>Receiver blue antenna lead</td>
<td>While rocking gang condenser adjust 166 K.C. antenna trimmer for maximum output.</td>
<td></td>
</tr>
<tr>
<td>3 Approx. 600 K.C.</td>
<td>Exactly 600 K.C.</td>
<td>.0005 Mfd. condenser</td>
<td>Receiver blue antenna lead</td>
<td>While rocking gang condenser adjust 600 K.C. oscillator paddle for maximum output.</td>
<td></td>
</tr>
<tr>
<td>5.8 to 18 M.C. Band</td>
<td>1 Exactly 18 M.C.</td>
<td>400 Ohm carbon resistor</td>
<td>Receiver blue antenna lead</td>
<td>Adjust 18 M.C. oscillator trimmer for maximum output—be sure to use proper peak.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 Approx. 13 M.C.</td>
<td>400 Ohm carbon resistor</td>
<td>Receiver blue antenna lead</td>
<td>While rocking gang condenser adjust 13 M.C. antenna trimmer for maximum output.</td>
<td></td>
</tr>
</tbody>
</table>

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ALIGNMENT PROCEDURE

Follow procedure carefully and in the order given—read tabulations from left to right. If more than one adjustment is required on any one band, make the adjustment marked (1) first, (2) next, (3) third.

Before starting alignment, check tuning dial adjustment by: turn gang condenser until plates touch maximum capacity stop (completely in mesh) at which point the dial indicator 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 needle to correct position.

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

BEFORE ALIGNING, PLACE LOOP ANTENNA AND THE "A" AND "B" BATTERY-PACK IN THE SAME APPROXIMATE POSITION IN THE BACK OF CHASSIS THAT THEY WILL BE IN WHEN THE SET IS IN THE CABINET AND THE CABINET BACK CLOSED.

When adjusting 1790 kilocycle oscillator trimmer and 1400 kilocycle antenna trimmer, do not connect test oscillator to terminals on bottom of cabinet back.

couple test oscillator to receiver loop by:

a) Make a loop consisting of two to ten turns of No. 20 to 90 wire wound on a three-inch form and attach across output of test oscillator.

b) Place test oscillator loop near set loop—BE SURE THAT NEITHER MOVES WHILE ALIGNING.

<table>
<thead>
<tr>
<th>TEST OSCILLATOR</th>
<th>I.F.</th>
<th>Any point where no interfering signal is received</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set receiver dial to</td>
<td>455 K. C.</td>
<td>0.02 MFD condenser</td>
</tr>
<tr>
<td>Adjust test oscillator frequency to</td>
<td>High side to grid terminal of 1A5G tube</td>
<td></td>
</tr>
<tr>
<td>Use dummy antenna in series with output of test oscillator consisting of</td>
<td>Low side to chassis</td>
<td></td>
</tr>
<tr>
<td>Attach output of test oscillator to</td>
<td>DO NOT REMOVE CAP</td>
<td></td>
</tr>
</tbody>
</table>

Refer to parts layout diagram for location of trimmers mentioned below—and:

Adjust the second I.F. transformer trimmers for maximum output—then adjust each of the first I.F. trimmers for maximum output.

(1) Exactly 1790 K. C. None

Use small loop to couple test oscillator to receiver loop

Adjust 1790 K. C. oscillator trimmer for maximum output.

(2) Approx. 1400 K. C. Exactly 1400 K. C. None

Use small loop to couple test oscillator to receiver loop

Adjust 1400 K. C. antenna trimmer for maximum output.
**ALIGNMENT PROCEDURE**

Be sure to follow procedure carefully and in the order given—otherwise the receiver will be insensitive and the dial calibration incorrect. For alignment procedure read tabulations from left to right. If more than one adjustment is required on any one band, make the adjustment marked (1) first, (2) next, (3) third.

Before starting alignment:
(a) Check tuning dial adjustment by tuning I.F. 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) Have ground lead of test oscillator attached to chassis.

<table>
<thead>
<tr>
<th>TEST OSCILLATOR</th>
<th>Set receiver dial to:</th>
<th>Adjust test oscillator frequency to:</th>
<th>Use dummy antenna in series with output of test oscillator consisting of:</th>
<th>Attach output of test oscillator to:</th>
<th>Refer to parts layout diagram for location of trimmers mentioned below:</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.F. Any point where no interfering signal is received</td>
<td>455 K.C.</td>
<td>.02 MFD. condenser</td>
<td>High side to grid terminal of 1A7G tube DO NOT REMOVE CAP.</td>
<td>Adjust each of the second I.F. transformer trimmers for maximum output—then adjust each of the first I.F. trimmers for maximum output.</td>
<td></td>
</tr>
<tr>
<td>1 Exactly 1730 K.C.</td>
<td>Exactly 1730 K.C.</td>
<td>.00025 MFD. condenser</td>
<td>Receiver blue antenna lead</td>
<td>Adjust 1730 K.C. oscillator trimmer for maximum output.</td>
<td></td>
</tr>
<tr>
<td>2 Approx 1400 K.C.</td>
<td>Exactly 1400 K.C.</td>
<td>.00025 MFD. condenser</td>
<td>Receiver blue antenna lead</td>
<td>While rocking gang condenser adjust 1400 K.C. antenna trimmer for maximum output.</td>
<td></td>
</tr>
</tbody>
</table>

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ALIGNMENT PROCEDURE

Be sure to follow procedure carefully and in the order given—otherwise the receiver will be insensitive and the dial calibration incorrect. For alignment procedure read tabulations from left to right. If more than one adjustment is required on any one band, make the adjustment marked (1) first, (2) next, (3) third.

(a) Check tuning dial adjustment by turning 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 needle-to-correction position.

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

(c) Have ground lead of test oscillator attached to chassis.

<table>
<thead>
<tr>
<th>Place band switch for operation on:</th>
<th>Set receiver dial to:</th>
<th>Adjust test oscillator frequency to:</th>
<th>Use dummy antenna in series with output of test oscillator consisting of:</th>
<th>Attach output of test oscillator to:</th>
<th>Refer to parts layout diagram for location of trimmers mentioned below:</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.F. ALIGNMENT</td>
<td>Any point where no interfering signal is received.</td>
<td>Exactly 455 K.C.</td>
<td>0.02 Mfd. condenser</td>
<td>High side to grid cap of 12AR07 Do not remove cap</td>
<td>Adjust each of the second I.F. transformers trimmers for maximum output—then adjust each of the first I.F. transformer trimmers for maximum output.</td>
</tr>
<tr>
<td></td>
<td>2 Approx. 1400 K.C.</td>
<td>Approx. 1400 K.C.</td>
<td>0.00025 Mfd. condenser</td>
<td>Receiver antenna &quot;A&quot; post</td>
<td>While rocking gang condenser adjust 1400 K.C. antenna trimmer for maximum output.</td>
</tr>
<tr>
<td></td>
<td>3 Approx. 600 K.C.</td>
<td>Approx. 600 K.C.</td>
<td>0.00025 Mfd. condenser</td>
<td>Receiver antenna &quot;A&quot; post</td>
<td>While rocking gang condenser adjust 600 K.C. oscillator trimmer for maximum output.</td>
</tr>
<tr>
<td>2.5 TO 7.5 M.C. BAND</td>
<td>1 Exactly 7.5 M.C.</td>
<td>Exactly 7.5 M.C.</td>
<td>400 Ohm carbon resistor</td>
<td>Receiver antenna &quot;A&quot; post</td>
<td>Adjust 7.5 M.C. oscillator trimmer for maximum output.</td>
</tr>
<tr>
<td>7.5 TO 24 M.C. BAND</td>
<td>1 Exactly 24 M.C.</td>
<td>Exactly 24 M.C.</td>
<td>400 Ohm carbon resistor</td>
<td>Receiver antenna &quot;A&quot; post</td>
<td>Adjust 14 M.C. oscillator trimmer for maximum output—be sure to use proper peak. If more than one peak is noticed, back off trimmer to minimum capacity, then screw down trimmer (add capacity) until the second peak—which is the proper one to use—is tuned in.</td>
</tr>
<tr>
<td></td>
<td>2 Approx. 20 M.C.</td>
<td>Approx. 20 M.C.</td>
<td>400 Ohm carbon resistor</td>
<td>Receiver antenna &quot;A&quot; post</td>
<td>While rocking gang condenser adjust 20 M.C. antenna trimmer for maximum output.</td>
</tr>
</tbody>
</table>
**ALIGNMENT PROCEDURE**

Be sure to follow procedure carefully and in the order given—otherwise the receiver will be insensitive and the dial calibration incorrect. For alignment procedure read tabulations from left to right. If more than one adjustment is required on any one band, make the adjustment marked (1) first, (2) next, (3) third.

Before starting alignment:
(a) Check tuning dial adjustment by turning 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 needle to correct position.
(b) Use an accurately calibrated test oscillator with some type of output measuring device.
(c) Have ground lead of test oscillator attached to chassis.

<table>
<thead>
<tr>
<th>Place band switch for operation on:</th>
<th>Set receiver dial to:</th>
<th>Adjust test oscillator frequency to:</th>
<th>Use dummy antenna in series with output of test oscillator consisting of:</th>
<th>Attach output of test oscillator to:</th>
<th>Refer to parts layout diagram for location of trimmers mentioned below:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I.F. ALIGNMENT</strong> use any band position</td>
<td>Any point where no interfering signal is received.</td>
<td>Exactly 455 K.C.</td>
<td>0.02 Mfd. condenser</td>
<td>High side to grid cap of -6K3 tube. Do not remove cap.</td>
<td>Adjust each of the second I.F. transformer trimmers for maximum output—then adjust each of the first I.F. transformer trimmers for maximum output.</td>
</tr>
<tr>
<td>1730 TO 540 K.C. BAND</td>
<td>1 Exactly 1730 K.C.</td>
<td>Exactly 1730 K.C.</td>
<td>0.00025 Mfd. condenser</td>
<td>Receiver antenna &quot;A&quot; post</td>
<td>Adjust 1730 K.C. oscillator trimmer for maximum output.</td>
</tr>
<tr>
<td></td>
<td>2 Exactly 1400 K.C.</td>
<td>Exactly 1400 K.C.</td>
<td>0.00025 Mfd. condenser</td>
<td>Receiver antenna &quot;A&quot; post</td>
<td>While rocking gang condenser adjust 1400 K.C. antenna trimmer for maximum output.</td>
</tr>
<tr>
<td></td>
<td>3 Approx. 600 K.C.</td>
<td>Approx. 600 K.C.</td>
<td>0.00025 Mfd. condenser</td>
<td>Receiver antenna &quot;A&quot; post</td>
<td>While rocking gang condenser adjust 600 K.C. oscillator paddler for maximum output.</td>
</tr>
<tr>
<td>2.3 TO 7.5 M.C. BAND</td>
<td>1 Exactly 7.5 M.C.</td>
<td>Exactly 7.5 M.C.</td>
<td>40 Ohm carbon resistor</td>
<td>Receiver antenna &quot;A&quot; post</td>
<td>Adjust 7.5 M.C. oscillator trimmer for maximum output.</td>
</tr>
<tr>
<td>2.5 TO 24 M.C. BAND</td>
<td>1 Exactly 24 M.C.</td>
<td>Exactly 24 M.C.</td>
<td>40 Ohm carbon resistor</td>
<td>Receiver antenna &quot;A&quot; post</td>
<td>Adjust 24 M.C. oscillator trimmer for maximum output—be sure to use proper peak. If more than one peak is noticed, back off trimmer to minimum capacity, then screw down trimmer (add capacity) until second peak—which is the proper one to use—is tuned in.</td>
</tr>
<tr>
<td></td>
<td>2 Approx. 20 M.C.</td>
<td>Approx. 20 M.C.</td>
<td>40 Ohm carbon resistor</td>
<td>Receiver antenna &quot;A&quot; post</td>
<td>While rocking gang condenser adjust 20 M.C. antenna trimmer for maximum output.</td>
</tr>
</tbody>
</table>
TWO BAND—FIVE and SIX TUBE
6 Volt Battery Operated Superheterodyne Receiver

ALIGNMENT PROCEDURE

Be sure to follow procedure carefully and in the order given—otherwise the receiver will be insensitive and the dial calibration incorrect.

For alignment procedure read tabulations from left to right. If more than one adjustment is required on any one band, make the adjustment marked (1) first, (2) next, (3) third.

(a) Before starting alignment:

(1) Check tuning dial adjustment by turning gang condenser until plate current stops touching 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 needle to correct position.

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

(c) Have ground lead of test oscillator attached to chassis.

<table>
<thead>
<tr>
<th>Place band switch for operation on:</th>
<th>Set receiver dial to:</th>
<th>Adjust test oscillator frequency to:</th>
<th>Use dummy antenna in series with output of test oscillator consisting of</th>
<th>Attach output of test oscillator to:</th>
<th>Refer to parts layout diagram for location of trimmers mentioned below:</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.F. alignment use any band position</td>
<td>Any point where no interfering signal is received</td>
<td>Exactly 1730 K.C.</td>
<td>.02 Mfd. condenser</td>
<td>High side to grid cap of 696G tube. Do not remove cap.</td>
<td>Adjust each of the second I.F. transformer trimmers for maximum output—then adjust each of the first I.F. transformer trimmers for maximum output.</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Approx. 1400 K.C.</td>
<td>.0052 Mfd. condenser</td>
<td>Receiver &quot;A&quot; antenna post</td>
<td>While rocking gang condenser adjust 1400 K.C. antenna trimmer for maximum output.</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Approx. 600 K.C.</td>
<td>.0001 Mfd. condenser</td>
<td>Receiver &quot;A&quot; antenna post</td>
<td>While rocking gang condenser adjust 600 K.C. oscillator trimmer for maximum output.</td>
</tr>
<tr>
<td>5.8 to 18.5 M.C. Band</td>
<td>1</td>
<td>Exactly 18.3 M.C.</td>
<td>400 Ohm carbon resistor</td>
<td>Receiver &quot;A&quot; antenna post</td>
<td>Adjust 18.3 M.C. oscillator trimmer for maximum output—be sure to use proper peak. If more than one peak is noticed, back off trimmer to minimum capacity, then screw down trimmer (add capacity) until the second peak—which is the proper one to use—is tuned in.</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Approx. 15 M.C.</td>
<td>400 Ohm carbon resistor</td>
<td>Receiver &quot;A&quot; antenna post</td>
<td>While rocking gang condenser adjust 15 M.C. antenna trimmer for maximum output.</td>
</tr>
</tbody>
</table>

Television Connections—The audio amplifier and loud speaker of this receiver can be used to amplify the sound output of a television receiver not equipped with an audio amplifier and speaker—just connect the sound channel output of the television receiver (from the second detector) to the No. 3 and No. 4 terminals on back of receiver and attach a single pole double throw switch.

Phonograph Connections—Phonograph records may be electrically reproduced through the receiver loud speaker by connecting the leads of the phonograph pickup to the No. 3 and No. 4 terminals and using either an electrical or hand wound spring operated phonograph motor. The pickup should be of the high impedance type and a single pole double throw switch must be connected as shown in diagram. To operate—place switch in phone position—set pickup needle on record and adjust radio volume control to desired amount of volume.

When shipped from factory a jumper wire is attached to terminals 1 and 2. If receiver is not to be used for phonograph or television operation, leave the jumper wire in this position. When receiver is used for either phonograph or television sound operation, remove jumper wire.

SENTINEL MODELS 186B and 186BE

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ALIGNMENT PROCEDURE

Be sure to follow procedure carefully and in the order given—otherwise the receiver will be insensitive and the dial calibration incorrect. For alignment procedure read tabulations from left to right. If more than one adjustment is required on any one band, make the adjustment marked (1) first, (2) next, (3) third.

Before starting alignment:

(a) Check tuning dial adjustment by turning 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 needle to correct position.

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

(c) Have ground lead of test oscillator attached to "G" Post.

<table>
<thead>
<tr>
<th>Place band switch in operation on:</th>
<th>Set receiver dial to:</th>
<th>TEST OSCILLATOR</th>
<th>Refer to parts layout diagram for location of trimmers mentioned below:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Adjust test oscillator frequency to:</td>
<td>Attach output of test oscillator to:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Use mummy antenna in series with output of test oscillator connected at:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>.02 Mfd. condenser</td>
<td>Adjust each of the second I.F. transformer trimmers for maximum output—then adjust each of the first I.F. transformer trimmers for maximum output.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>High side to grid</td>
<td>Adjust 120 K.C. oscillator trimmer for maximum output.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>cap of 6K8 tube. Do not remove cap.</td>
<td>MAXIMUM OSCILLATOR GAIN CONTROL</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>J.F. alignment use any band position</td>
<td>Any point where no interfering signal is received</td>
<td>Exactly 455 K.C.</td>
<td>Receiver &quot;A&quot; antenna post</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.0005 Mfd. condenser</td>
<td>Adjust 120 K.C. oscillator trimmer for maximum output.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>receiver &quot;A&quot; antenna post</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1730 to 560 K.C. Band</td>
<td>Exactly 1730 K.C.</td>
<td>.0005 Mfd. condenser</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>receiver &quot;A&quot; antenna post</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Approx. 1600 K.C.</td>
<td>.0005 Mfd. condenser</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Approx. 600 K.C.</td>
<td>receiver &quot;A&quot; antenna post</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Approx. 600 K.C.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1730 to 560 K.C. Band</td>
<td>Exactly 1730 K.C.</td>
<td>.0005 Mfd. condenser</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>receiver &quot;A&quot; antenna post</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Approx. 1600 K.C.</td>
<td>.0005 Mfd. condenser</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Approx. 600 K.C.</td>
<td>receiver &quot;A&quot; antenna post</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Approx. 600 K.C.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.5 to 18.3 M.C. Band</td>
<td>Exactly 18.3 M.C.</td>
<td>400 Ohm carbon resistor</td>
<td>Receiver &quot;A&quot; antenna post</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Receiver &quot;A&quot; antenna post</td>
<td>Adjust 18.3 M.C. oscillator trimmer for maximum output—be sure to use proper peak. If more than one peak is noticed, back off trimmer to minimum capacity, then screw down trimmer (add capacity) until the second peak—which is the proper one to use—is tuned in.</td>
</tr>
<tr>
<td></td>
<td>Approx. 15 M.C.</td>
<td>400 Ohm carbon resistor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Receiver &quot;A&quot; antenna post</td>
<td></td>
</tr>
</tbody>
</table>

Television Connections:—The audio amplifier and loud speaker of this receiver can be used to amplify the sound output of a television receiver not equipped with an audio amplifier and speaker—just connect the sound channel output of the television receiver (from the second detector) to the No. 3 and No. 4 terminals on back of receiver and attach a single pole double throw switch.

Phonograph Connections:—Phonograph records may be electrically reproduced through the receiver loud speaker by connecting the leads of the phonograph pickup to the No. 3 and No. 4 terminals and using either an electrical or hand wound spring operated phonograph motor. The pickup should be of the high impedance type and a single pole double throw switch must be connected as shown in diagram. To operate—place switch in phonograph position—set pickup needle on record and adjust radio volume control to desired amount of volume.

When shipped from factory a jumper wire is attached to terminals 1 and 2. If receiver is not to be used for phonograph or television operation, leave the jumper wire in this position. When receiver is used for either phonograph or television sound operation, remove jumper wire.
ALIGNMENT PROCEDURE

Be sure to follow procedure carefully and in the order given—otherwise the receiver will be insensitive and the dial calibration incorrect. For alignment procedure read tabulations from left to right. If more than one adjustment is required on any one band, make the adjustment marked (1) first, (2) next, (3) third.

(a) Check tuning dial adjustment by turning 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 needle to correct position.

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

(c) Have ground lead of test oscillator attached to chassis.

<table>
<thead>
<tr>
<th>Placed band switch for operation on:</th>
<th>Set receiver dial to:</th>
<th>Adjust test oscillator frequency to:</th>
<th>Use dummy antenna in series with output of test oscillator: consisting of</th>
<th>Attach output of test oscillator to:</th>
<th>Refer to parts layout diagram for location of trimmers mentioned below:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I.F. ALIGNMENT use any band position</strong></td>
<td>Any point where no interfering signal is received</td>
<td>Exactly 455 K.C.</td>
<td>.02 Mfd. condenser</td>
<td>High side to grid tap of 6J5 tube. Do not remove cap</td>
<td>Adjust each of the second I.F. transformers for maximum output—then adjust each of the first I.F. transformers for maximum output.</td>
</tr>
<tr>
<td></td>
<td>3 Approx. 600 K.C.</td>
<td>Approx. 600 K.C.</td>
<td>.0025 Mfd. condenser</td>
<td>Receiver antenna &quot;A&quot; post</td>
<td>While rocking gang condenser adjust 600 K.C. oscillator trimmer for maximum output.</td>
</tr>
<tr>
<td><strong>2.2 TO 7.5 M.C. BAND</strong></td>
<td>1 Exactly 7.5 M.C.</td>
<td>Exactly 7.5 M.C.</td>
<td>400 Ohm carbon resistor</td>
<td>Receiver antenna &quot;A&quot; post</td>
<td>Adjust 7.5 M.C. oscillator trimmer for maximum output.</td>
</tr>
<tr>
<td><strong>7.5 TO 24 M.C. BAND</strong></td>
<td>1 Exactly 24 M.C.</td>
<td>Exactly 24 M.C.</td>
<td>400 Ohm carbon resistor</td>
<td>Receiver antenna &quot;A&quot; post</td>
<td>Adjust 24 M.C. oscillator trimmer for maximum output—be sure to use proper pac. If more than one peak is noticed, back off trimmer to minimum capacity, then screw down trimmer (add capacity) until the second peak—which is the proper one to use is tuned in.</td>
</tr>
<tr>
<td></td>
<td>2 Approx. 30 M.C.</td>
<td>Approx. 20 M.C.</td>
<td>400 Ohm carbon resistor</td>
<td>Receiver antenna &quot;A&quot; post</td>
<td>While rocking gang condenser adjust 20 M.C. antenna and R.F. trimmers for maximum output.</td>
</tr>
</tbody>
</table>

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ALIGNMENT PROCEDURE

Be sure to follow procedure carefully and in the order given—otherwise the receiver will be insensitive and the dial calibration incorrect. For alignment procedure read tabulations from left to right. If more than one adjustment is required on any one band, make the adjustment marked (1) first (2) next, (3) third.

Before starting alignment:
(a) Check tuning dial adjustment by turning 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 needle to correct position.
(b) Use an accurately calibrated test oscillator with some type of output measuring device.
(c) Have ground lead of test oscillator attached, to chassis.

| TEST OSCILLATOR | | | 
|---|---|---|---|
| I.F. ALIGNMENT use any band position | | | 
| Place band switch for operation on: | Set receiver dial to: | Adjust test oscillator frequency to: | Use dummy antenna in series with output of test oscillator: | Attach output to test oscillator: | Refer to parts layout diagram for location of trimmers mentioned below: | 
| Any point where no interfering signal is received | Exactly | .02 Mfd condenser | High side to grid cap of 6L8 tube. Do not remove cap | Adjust each of the second I.F. transformer trimmers for maximum output—then adjust each of the first I.F. transformer trimmers for maximum output. | 
| 1 1270 TO 540 K.C. BAND | Exactly 1270 K.C. | .005 Mfd condenser | Receiver antenna post | Adjust 1730 K.C. oscillator for maximum output. | 
| 3 Approximately 600 K.C. | Approximately 600 K.C. | .005 Mfd condenser | Receiver antenna post | While rocking gang condenser adjust 600 K.C. oscillator pad for maximum output. | 
| 1 5.2 TO 7.5 M.C. BAND | Exactly 7.5 M.C. | 400 Ohm carbon resistor | Receiver antenna post | Adjust 7.5 M.C. oscillator trimmer for maximum output. | 
| 2 Approximately 6. M.C. | Approximately 6 M.C. | 400 Ohm carbon resistor | Receiver antenna post | While rocking gang condenser adjust 6 M.C. antenna and I.F. trimmers for maximum output. | 
| 1 7.5 TO 24 M.C. BAND | Exactly 24 M.C. | 400 Ohm carbon resistor | Receiver antenna post | Adjust 24 M.C. oscillator trimmer for maximum output—be sure to use proper peak. If more than one peak is noticed, back off trimmer to minimum capacity, then screw down trimmer (add capacity) until second peak—which is the proper one to use—is tuned in. | 
| 2 Approximately 20 M.C. | Approximately 20 M.C. | 400 Ohm carbon resistor | Receiver antenna post | While rocking gang condenser adjust 20 M.C. antenna and I.F. trimmers for maximum output. |
Compliments of www.nucow.com
ALIGNMENT PROCEDURE

Be sure to follow procedure carefully and in the order given—otherwise the receiver will be insensitive and the dial calibration incorrect. For alignment procedure read tabulations from left to right. If more than one adjustment is required on any one band, make the adjustment marked (1) first, (2) next, (3) third.

Before starting alignment:
(a) Check tuning dial adjustment by turning 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 on 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) Have ground lead of test oscillator attached to gang condenser frame.

<table>
<thead>
<tr>
<th>Set receiver dial to</th>
<th>Adjust test oscillator to</th>
<th>Use dummy antenna in series with output of test oscillator consisting of</th>
<th>Attach output of test oscillator to</th>
<th>Refer to parts layout diagram for location of trimmers mentioned below:</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.F. Any point where no interfering signal is received</td>
<td>455 K.C.</td>
<td>.02 MFD condenser</td>
<td>High side to grid terminal of 12SA7 tube DO NOT REMOVE CAP</td>
<td>Adjust the second I.F. transformer trimmer for maximum output then adjust each of the first I.F. trimmers for maximum output</td>
</tr>
<tr>
<td>2 Approx. 1400 K.C.</td>
<td>Approx. 1400 K.C.</td>
<td>.00025 MFD condenser</td>
<td>Receiver “A” post</td>
<td>While shorting gang condenser adjust 1400 K.C. antenna trimmer for maximum output.</td>
</tr>
</tbody>
</table>
ALIGNMENT PROCEDURE

Be sure to follow procedure carefully and in the order given—otherwise the receiver will be insensitive and the dial calibration incorrect. For alignment procedure read tabulations from left to right. If more than one adjustment is required on any one band, make the adjustment marked (1) first, (2) next, (3) third.

Before starting alignment:
(a) Check tuning dial adjustment by turning gang condenser until plate 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.

IMPORTANT: BEFORE ALIGNING, PLACE LOOP ANTENNA IN THE SAME APPROXIMATE POSITION IN THE BACK OF CHASSIS. IT WILL BE IN WHEN THE SET IS IN THE CABINET AND THE BACK ATTACHED.

When adjusting 1730 kilocycle oscillator trimmer and 1400 kilocycle antenna trimmer, do not connect test oscillator to loop.

Couple test oscillator to receiver loop by:
(a) Make a loop consisting of five to ten turns of No. 20 to 30 size wire wound on a three inch form and attach across output of test oscillator.
(b) Place test oscillator loop near set loop—BE SURE THAT NEITHER MOVES WHILE ALIGNING.

DO NOT ATTACH LOW SIDE OF TEST OSCILLATOR TO RECEIVER—LEAVE UNCONNECTED.

| 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—and:
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>I.F.</td>
<td>465 K.C.</td>
<td>.02 MFD condenser</td>
<td>High side to grid terminal of 12SA7 tube DO NOT REMOVE CAP</td>
<td>Adjust the second I.F. transformer trimmers for maximum output—then adjust each of the first I.F. trimmers for maximum output.</td>
</tr>
<tr>
<td>Exact 1730 K.C.</td>
<td>Exact 1730 K.C.</td>
<td>None</td>
<td>Use small loop to couple test oscillator to receiver loop</td>
<td>Adjust 1730 K.C. oscillator trimmer for maximum output.</td>
</tr>
<tr>
<td>Approx. 1400 K.C.</td>
<td>Exact 1400 K.C.</td>
<td>None</td>
<td>Use small loop to couple test oscillator to receiver loop</td>
<td>Adjust 1400 K.C. antenna trimmer for maximum output.</td>
</tr>
</tbody>
</table>
ALIMENT PROCEDURE

Be sure to follow procedure carefully and in the order given—otherwise the receiver will be insensitive and the dial calibration incorrect. For alignment procedure read tabulations from left to right. If more than one adjustment is required on any one band, make the adjustment marked (1) first, (2) next, (3) third.

Before starting alignment:
1. Check tuning dial adjustment by turning gang condenser until plates touch maximum capacity stop (completely 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 needle to correct position.
2. Use an accurately calibrated test oscillator with some type of output measuring device.
3. Have ground lead of test oscillator attached to chassis.

<table>
<thead>
<tr>
<th>Place band switch for operation on:</th>
<th>Adjust test oscillator frequency to:</th>
<th>Attach output of test oscillator to:</th>
<th>Refer to parts layout diagram for location of trimmers mentioned below:</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.F. ALIGNMENT use any band position</td>
<td>Any point where interfering signal is received</td>
<td>.02 Mfd. condenser</td>
<td>Adjust each of the second I.F. transformer trimmers for maximum output—then adjust each of the first I.F. transformer trimmers for maximum output.</td>
</tr>
<tr>
<td>2</td>
<td>1400 K.C.</td>
<td>.0005 Mfd. condenser</td>
<td>While rocking gang condenser adjust 1400 K.C. antenna trimmer for maximum output.</td>
</tr>
<tr>
<td>3</td>
<td>600 K.C.</td>
<td>.0005 Mfd. condenser</td>
<td>While rocking gang condenser adjust 600 K.C. oscillator trimmer for maximum output.</td>
</tr>
<tr>
<td>2.5 TO 7.5 M.C. BAND</td>
<td>1 Exact 7.5 M.C.</td>
<td>400 Ohm carbon resistor</td>
<td>Adjust 7.5 M.C. oscillator trimmer for maximum output.</td>
</tr>
<tr>
<td>2</td>
<td>Approx. 6. M.C.</td>
<td>400 Ohm carbon resistor</td>
<td>While rocking gang condenser adjust 6 M.C. antenna trimmer for maximum output.</td>
</tr>
<tr>
<td>7.5 TO 25 M.C. BAND</td>
<td>1 Exact 24 M.C.</td>
<td>400 Ohm carbon resistor</td>
<td>Adjust 24 M.C. oscillator trimmer for maximum output—be sure to use proper peak. If more than one peak is noticed, back off trimmer to minimum capacity, then screw down trimmer (add capacity) until the second peak—which is the proper one to use—is tuned in.</td>
</tr>
<tr>
<td>2</td>
<td>Approx. 20 M.C.</td>
<td>400 Ohm carbon resistor</td>
<td>While rocking gang condenser adjust 20 M.C. antenna trimmer for maximum output.</td>
</tr>
</tbody>
</table>

THIS RECEIVER CAN BE OPERATED WITH A SIX VOLT STORAGE BATTERY OF FROM 115 TO 230 VOLT 50 TO 60 CYCLE CURRENT.

FOR AC OPERATION obtain from the Electric Supply Company the voltage and current rating of the local Electric Service and ——— remove top cover from power unit and insert metal tipped lead into proper terminal socket that will be found underneath top cover of power unit. Place voltage selector switch knob in “115-230” position and plug set power cord plug into house lighting outlet.

FOR SIX VOLT BATTERY OPERATION attach battery cable leads to six volt storage battery and place voltage selector switch knob to “6 V.”

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ALIGNMENT PROCEDURE

Be sure to follow procedure carefully and in the order given—otherwise the receiver will be insensitive and the dial calibration incorrect. For alignment procedure read tabulations from left to right. If more than one adjustment is required on any one band, make the adjustment marked (1) first, (2) next, (3) third. Before starting alignment:

(a) Check tuning dial adjustment by turning 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. IMPORTANT: BEFORE ALIGNING, PLACE LOOP ANTENNA IN THE SAME POSITION IT WILL BE IN WHEN THE SET IS IN THE CABINET.

When adjusting 1600 or 1600 kilocycle oscillator trimmer and 1400 kilocycle antenna trimmer, do not connect test oscillator to loop.

Couple test oscillator to receiver loop by:

(a) Make a loop consisting of five to ten turns of No. 20 to 30 size wire wound on a three inch form and attach across output of test oscillator.

(b) Place test oscillator loop near set loop—BE SURE THAT NEITHER MOVES WHILE ALIGNING.

<table>
<thead>
<tr>
<th>Place band switch for operation on:</th>
<th>Set receiver dial to:</th>
<th>Adjust test Oscillator frequency to:</th>
<th>Use dummy antennas in series with output of test oscillator consisting of:</th>
<th>Attach output of test oscillator to:</th>
<th>Refer to parts layout diagram for location of trimmers mentioned below:</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. F. alignment use any band position</td>
<td>Any point where no interfering signal is received</td>
<td>Exactly 455 K.C.</td>
<td>.02 Mfd. condenser</td>
<td>High side to grid cap of 6SA7 tube. Do not remove cap.</td>
<td>Adjust each of the second I.F. transformer trimmers for maximum output—then adjust each of the first I.F. transformer trimmers for maximum output.</td>
</tr>
<tr>
<td>1560 to 540 K.C. Band</td>
<td>1 Exactly 1500 K.C.</td>
<td>None</td>
<td></td>
<td></td>
<td>Adjust 1500 K.C. oscillator trimmer for maximum output</td>
</tr>
<tr>
<td></td>
<td>2 Approx. 1400 K.C. Table Model Only</td>
<td>Use Small Loop to couple test oscillator to receiver loop</td>
<td></td>
<td></td>
<td>While rocking gang condenser adjust 1400 K.C. antenna trimmer for maximum output</td>
</tr>
<tr>
<td></td>
<td>3 Approx. 600 K.C.</td>
<td>Use Small Loop to couple test oscillator to receiver loop</td>
<td></td>
<td></td>
<td>While rocking gang condenser adjust 600 K.C. oscillator trimmer for maximum output</td>
</tr>
<tr>
<td>5.7 to 18.3 M.C. Band</td>
<td>1 Exactly 18.3 M.C.</td>
<td>400 Ohm carbon resistor</td>
<td></td>
<td></td>
<td>Adjust 18.3 M.C. oscillator trimmer for maximum output—be sure to use proper peak. If more than one peak is noticed, back off trimmer to minimum capacity then screw down trimmer (add capacity) until the second peak—which is the proper one to use—is tuned in.</td>
</tr>
<tr>
<td></td>
<td>2 Approx. 15 M.C.</td>
<td>400 Ohm</td>
<td></td>
<td></td>
<td>While rocking gang condenser adjust 15 M.C. antenna trimmer for maximum output</td>
</tr>
</tbody>
</table>
ALIGNMENT PROCEDURE

Be sure to follow procedure carefully and in the order given—otherwise the receiver will be insensitive and the dial calibration incorrect. The alignment procedure will take up to 30 minutes from left to right. If more than one adjustment is required on one receiver, make the alignment procedure shown from left to right 90 minutes. If the dial calibration is incorrect, the alignment procedure must not be started from the left to right. If more than one alignment is required on one receiver, make the alignment procedure shown from left to right 90 minutes. If the dial calibration is incorrect, the alignment procedure must not be started from the left to right.

Before starting alignment:
(a) Check tuning dial adjustment by turning tuning control until pointer reads maximum capacitance trimmer (in series) or minimum capacitance trimmer (in parallel) at which point the dial needle must be exactly even with the last line of the dial calibration. If the dial needle does not point exactly to last line, move to correct position.
(b) Use a dial calibration test oscillator with some type of output measuring device.

IMPORTANT: BEFORE ALIGNING, PLACE LOOP ANTENNA IN THE SAME POSITION IT WILL BE IN WHEN THE SET IS IN THE CABINET.

When aligning 500 or 150 kilohertz loop oscillator trimmers and 140 kilohertz loop antenna trimmer, do not connect test oscillator to "A" point.
Cable test oscillator to receiver loop by:
(a) Make a loop consisting of two No. 20 to 25 wire wound on a three inch form and attach across output of test oscillator.
(b) Place test oscillator loop near set loop—BE SURE THAT NEITHER MOVES WHILE ALIGNING.
(c) Place band switch in next to minimum right hand position.

<table>
<thead>
<tr>
<th>Place band switch for section</th>
<th>Set receiver dial to</th>
<th>Adjust test oscillator frequency to</th>
<th>Use dummy antenna test oscillator to</th>
<th>Attach output of test oscillator to</th>
<th>Refer to parts layout diagram for location of trimmers mentioned below</th>
</tr>
</thead>
<tbody>
<tr>
<td>500 450 K.C.</td>
<td>1800 K.C.</td>
<td>1800 K.C.</td>
<td>None</td>
<td>1100 K.C.</td>
<td>oscillator trimmer for maximum output</td>
</tr>
<tr>
<td>2700 K.C.</td>
<td>1800 K.C.</td>
<td>1800 K.C.</td>
<td>None</td>
<td>1100 K.C.</td>
<td>oscillator trimmer for maximum output</td>
</tr>
<tr>
<td>5400 K.C.</td>
<td>1800 K.C.</td>
<td>1800 K.C.</td>
<td>None</td>
<td>1100 K.C.</td>
<td>oscillator trimmer for maximum output</td>
</tr>
<tr>
<td>11000 K.C.</td>
<td>1800 K.C.</td>
<td>1800 K.C.</td>
<td>None</td>
<td>1100 K.C.</td>
<td>oscillator trimmer for maximum output</td>
</tr>
<tr>
<td>18000 K.C.</td>
<td>1800 K.C.</td>
<td>1800 K.C.</td>
<td>None</td>
<td>1100 K.C.</td>
<td>oscillator trimmer for maximum output</td>
</tr>
</tbody>
</table>

13500 K.C. USING REGULAR AERIAL

<table>
<thead>
<tr>
<th>Place band switch for section</th>
<th>Set receiver dial to</th>
<th>Adjust test oscillator frequency to</th>
<th>Use dummy antenna test oscillator to</th>
<th>Attach output of test oscillator to</th>
<th>Refer to parts layout diagram for location of trimmers mentioned below</th>
</tr>
</thead>
<tbody>
<tr>
<td>500 450 K.C.</td>
<td>1800 K.C.</td>
<td>1800 K.C.</td>
<td>None</td>
<td>1100 K.C.</td>
<td>oscillator trimmer for maximum output</td>
</tr>
<tr>
<td>2700 K.C.</td>
<td>1800 K.C.</td>
<td>1800 K.C.</td>
<td>None</td>
<td>1100 K.C.</td>
<td>oscillator trimmer for maximum output</td>
</tr>
<tr>
<td>5400 K.C.</td>
<td>1800 K.C.</td>
<td>1800 K.C.</td>
<td>None</td>
<td>1100 K.C.</td>
<td>oscillator trimmer for maximum output</td>
</tr>
<tr>
<td>11000 K.C.</td>
<td>1800 K.C.</td>
<td>1800 K.C.</td>
<td>None</td>
<td>1100 K.C.</td>
<td>oscillator trimmer for maximum output</td>
</tr>
<tr>
<td>18000 K.C.</td>
<td>1800 K.C.</td>
<td>1800 K.C.</td>
<td>None</td>
<td>1100 K.C.</td>
<td>oscillator trimmer for maximum output</td>
</tr>
</tbody>
</table>

18000 K.C. USING REGULAR AERIAL

<table>
<thead>
<tr>
<th>Place band switch for section</th>
<th>Set receiver dial to</th>
<th>Adjust test oscillator frequency to</th>
<th>Use dummy antenna test oscillator to</th>
<th>Attach output of test oscillator to</th>
<th>Refer to parts layout diagram for location of trimmers mentioned below</th>
</tr>
</thead>
<tbody>
<tr>
<td>500 450 K.C.</td>
<td>1800 K.C.</td>
<td>1800 K.C.</td>
<td>None</td>
<td>1100 K.C.</td>
<td>oscillator trimmer for maximum output</td>
</tr>
<tr>
<td>2700 K.C.</td>
<td>1800 K.C.</td>
<td>1800 K.C.</td>
<td>None</td>
<td>1100 K.C.</td>
<td>oscillator trimmer for maximum output</td>
</tr>
<tr>
<td>5400 K.C.</td>
<td>1800 K.C.</td>
<td>1800 K.C.</td>
<td>None</td>
<td>1100 K.C.</td>
<td>oscillator trimmer for maximum output</td>
</tr>
<tr>
<td>11000 K.C.</td>
<td>1800 K.C.</td>
<td>1800 K.C.</td>
<td>None</td>
<td>1100 K.C.</td>
<td>oscillator trimmer for maximum output</td>
</tr>
<tr>
<td>18000 K.C.</td>
<td>1800 K.C.</td>
<td>1800 K.C.</td>
<td>None</td>
<td>1100 K.C.</td>
<td>oscillator trimmer for maximum output</td>
</tr>
</tbody>
</table>

3 TUBE PORTABLE

1 1/2 Volt Battery

<table>
<thead>
<tr>
<th>Place band switch for section</th>
<th>Set receiver dial to</th>
<th>Adjust test oscillator frequency to</th>
<th>Use dummy antenna test oscillator to</th>
<th>Attach output of test oscillator to</th>
<th>Refer to parts layout diagram for location of trimmers mentioned below</th>
</tr>
</thead>
<tbody>
<tr>
<td>500 450 K.C.</td>
<td>1800 K.C.</td>
<td>1800 K.C.</td>
<td>None</td>
<td>1100 K.C.</td>
<td>oscillator trimmer for maximum output</td>
</tr>
<tr>
<td>2700 K.C.</td>
<td>1800 K.C.</td>
<td>1800 K.C.</td>
<td>None</td>
<td>1100 K.C.</td>
<td>oscillator trimmer for maximum output</td>
</tr>
<tr>
<td>5400 K.C.</td>
<td>1800 K.C.</td>
<td>1800 K.C.</td>
<td>None</td>
<td>1100 K.C.</td>
<td>oscillator trimmer for maximum output</td>
</tr>
<tr>
<td>11000 K.C.</td>
<td>1800 K.C.</td>
<td>1800 K.C.</td>
<td>None</td>
<td>1100 K.C.</td>
<td>oscillator trimmer for maximum output</td>
</tr>
<tr>
<td>18000 K.C.</td>
<td>1800 K.C.</td>
<td>1800 K.C.</td>
<td>None</td>
<td>1100 K.C.</td>
<td>oscillator trimmer for maximum output</td>
</tr>
</tbody>
</table>

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**Five Tube - Two Band**

Battery or 110 Volts, DC-AC 50-60 Cycles

Superheterodyne Receiver

**ALIGNMENT PROCEDURE**

Be sure to follow procedure carefully and in the order given—otherwise the receiver will be insensitive and the dial calibration incorrect. For alignment procedure read tabulations from left to right. If more than one adjustment is required on any one band, make the adjustment marked (1) first, (2) next, (3) third.

Before starting alignment:
(a) Check tuning dial adjustment by turning gang condenser until plates touch maximum capacitance 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 needle to correct position.
(b) Use an accurately calibrated test oscillator with some type of output metering device.
(c) Have ground lead of test oscillator attached to chassis.

<table>
<thead>
<tr>
<th>Place band switch for operation on:</th>
<th>Set receiver dial to:</th>
<th>Adjust test oscillator frequency to:</th>
<th>Use dummy antenna in series with output of test oscillator consisting of:</th>
<th>Attach output of test oscillator to:</th>
<th>Refer to parts layout diagram for location of trimmers mentioned below:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. F. Alignment use any hand position</td>
<td>Any point where no interfering signal is received</td>
<td>Exactly 455 K.C.</td>
<td>.02 Mfd. condenser</td>
<td>High Side to grid cap of 1AVG tube, Do not remove cap</td>
<td>Adjust each of the second I.F. transformer trimmers for maximum output.</td>
</tr>
<tr>
<td>1770 to 549 K.C. Band</td>
<td>1730 K.C.</td>
<td>1730 K.C.</td>
<td>.0005 Mfd. condenser</td>
<td>Receiver blue antenna lead</td>
<td>Adjust 1730 K.C. oscillator trimmer for maximum output.</td>
</tr>
<tr>
<td></td>
<td>1450 K.C.</td>
<td>1450 K.C.</td>
<td>.0005 Mfd. condenser</td>
<td>Receiver blue antenna lead</td>
<td>While rocking gang condenser adjust 1450 K.C. antenna trimmer for maximum output.</td>
</tr>
<tr>
<td></td>
<td>650 K.C.</td>
<td>650 K.C.</td>
<td>.0005 Mfd. condenser</td>
<td>Receiver blue antenna lead</td>
<td>While rocking gang condenser adjust 650 K.C. oscillator paddle for maximum output.</td>
</tr>
<tr>
<td>5.8 to 18.1 M.C. Band</td>
<td>18.1 M.C.</td>
<td>18.1 M.C.</td>
<td>.40 Ohm carbon resistor</td>
<td>Receiver blue antenna lead</td>
<td>Adjust 18.1 M.C. oscillator trimmer for maximum output—be sure to use proper peak. If more than one peak is noticed, back off trimmer to minimum capacity, then screw down trimmer (add capacity) until the second peak—which is the proper one to use—is tuned.</td>
</tr>
<tr>
<td></td>
<td>15 M.C.</td>
<td>15 M.C.</td>
<td>.40 Ohm carbon resistor</td>
<td>Receiver blue antenna lead</td>
<td>While rocking gang condenser adjust 15 M.C. antenna trimmer for maximum output.</td>
</tr>
</tbody>
</table>

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Compliments of www.nucow.com
ALIGNMENT PROCEDURE

Be sure to follow procedure carefully and in the order given—otherwise receiver will be insensitive and the dial calibration incorrect. For alignment procedure read tabulations from left to right. If more than one adjustment is required on any one band, make the adjustment marked (1) first, 00 next, (3) third.

Before starting alignment:
(a) Check tuning dial adjustment by tuning qram 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 and of the dial calibration. If dial needle does not point exactly to last line move to correct position.
(b) Use a accurately calibrated test oscillator with some type of output measuring device.

IMPORTANT: BEFORE ALIGNING, PLACE LOOP ANTENNA IN THE SAME POSITION IT WILL BE IN WHEN THE SET IS IN THE CABINET.

When adjusting 1600 kilocycle oscillator trimmer and 1400 kilocycle antenna trimmer, do not connect test oscillator to loop.

Couple test oscillator to receiver loop by:
(a) Make a loop consisting of five to ten turns of No. 20 to 30 size wire wound on a three inch form and attach across output of test oscillator.
(b) Place test oscillator loop near set loop—BE SURE THAT NEITHER MOVES WHILE ALIGNING.

<table>
<thead>
<tr>
<th>TEST OSCILLATOR</th>
<th>Set receiver dial to:</th>
<th>Adjust test oscillator frequency to</th>
<th>Use dummy antenna in, arcs, with output of test oscillator at:</th>
<th>Attach output of test oscillator to:</th>
<th>Refer to parts layout diagram for location of trimmers mentioned below:</th>
</tr>
</thead>
<tbody>
<tr>
<td>L.F. alignment use any band position</td>
<td>Any point where no interfering signal is received</td>
<td>Exactly 455 K.C.</td>
<td>39 Mfd. condenser</td>
<td>High side to grid cap of 1A7 Q tube. Do not remove cap.</td>
<td>Adjust each of the first I.F. transformer trimmers for maximum output.</td>
</tr>
<tr>
<td>1600 to 540 K.C. Band</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 1600 K.C.</td>
<td>Exactly 1600 K.C.</td>
<td>None</td>
<td>Use Small Loop to couple test oscillator to receiver loop</td>
<td>Adjust 1600 K.C. oscillator trimmer for maximum output.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Approx. 1600 K.C.</td>
<td>Approx. 1600 K.C.</td>
<td>None</td>
<td>Use Small Loop to couple test oscillator to receiver loop</td>
<td>While rocking gang condenser adjust 1600 K.C. antenna trimmer for maximum output.</td>
</tr>
<tr>
<td>3</td>
<td>Approx. 600 K.C.</td>
<td>Approx. 600 K.C.</td>
<td>None</td>
<td>Use Small Loop to couple test oscillator to receiver loop</td>
<td>While rocking gang condenser adjust 600 K.C. oscillator trimmer for maximum output.</td>
</tr>
<tr>
<td>5.9 to 18 M.C. Band</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Exactly 18 M.C.</td>
<td>Exactly 18 M.C.</td>
<td>400 Ohm carbon resistor</td>
<td>High side to “Ext. Ant.” Log. Low side to “Ext. GND” Log</td>
<td>Adjust 18 M.C. oscillator trimmer for maximum output—be sure to use proper peak. If more than one peak is noticed, back off trimmer to minimum capacity, then screw down trimmer (add capacity) until the second peak—which is the proper one to use—is tuned in,</td>
</tr>
<tr>
<td>2</td>
<td>Approx. 15 M.C.</td>
<td>Approx. 15 M.C.</td>
<td>400 Ohm</td>
<td>High side to “Ext. Ant.” Log. Low side to “Ext. GND” Log</td>
<td>While rocking gang condenser adjust 15 M.C. antenna trimmer for maximum output.</td>
</tr>
</tbody>
</table>
ALIGNMENT PROCEDURE

Be sure to follow procedure carefully and in the order given—otherwise receiver will be insensitive and the dial calibration incorrect. For alignment procedure read tabulations from left to right. If more than one adjustment is required on any one band, make the adjustment marked (1) first, (2) next, (3) third.

Before starting alignment:
(a) Check tuning dial adjustment by turning 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. IMPORTANT: BEFORE ALIGNING, PLACE LOOP ANTENNA IN THE SAME POSITION IT WILL BE IN WHEN THE SET IS IN THE CABINET.

When adjusting trimmers, do not connect test oscillator to loop.
Couple test oscillator to receiver loop by:
(a) Make a loop consisting of five to ten turns of No. 20 to 30 size wire wound on a three inch form and attach across output of test oscillator.
(b) Place test oscillator loop near set loop—BE SURE THAT NEITHER MOVES WHILE ALIGNING.
BE SURE TO ALIGN 138-390 K.C. BAND FIRST—ALWAYS REALIGN 1600-540 K.C. BAND AFTERSWARDS.

<table>
<thead>
<tr>
<th>Place band switch for operation on:</th>
<th>Set receiver dial to:</th>
<th>Adjust test oscillator frequency to</th>
<th>Use dummy antenna in series with output of test oscillator</th>
<th>Attach output of test oscillator to:</th>
<th>Refer to parts layout diagram for location of trimmers mentioned below:</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. F. alignment use any band position</td>
<td>Any point where no interfering signal is received</td>
<td>Exactly 455 K.C.</td>
<td>.02 Mfd. condenser</td>
<td>High side to grid of 1ATG Tube Do not remove caps</td>
<td>Adjust each of the second I.F. transformer trimmers for maximum output—then adjust each of the first I.F. transformer trimmers for maximum output.</td>
</tr>
<tr>
<td>138 to 390 K.C. Band</td>
<td>1</td>
<td>Exactly 390 K.C.</td>
<td>None</td>
<td>Use Small Loop to couple test oscillator to receiver loop</td>
<td>Adjust 390 K.C. oscillator trimmer for maximum output.</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Approx. 350 K.C.</td>
<td>None</td>
<td>Use Small Loop to couple test oscillator to receiver loop</td>
<td>Adjust 350 K.C. antenna trimmer for maximum output.</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Approx. 150 K.C.</td>
<td>None</td>
<td>Use Small Loop to couple test oscillator to receiver loop</td>
<td>While rocking gang condenser adjust 150 K.C. oscillator pad for maximum response.</td>
</tr>
<tr>
<td>1600 to 540 K.C. Band</td>
<td>1</td>
<td>Exactly 1600 K.C.</td>
<td>None</td>
<td>Use Small Loop to couple test oscillator to receiver loop</td>
<td>Adjust 1600 K.C. oscillator trimmer for maximum output.</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Approx. 1400 K.C.</td>
<td>None</td>
<td>Use Small Loop to couple test oscillator to receiver loop</td>
<td>While rocking gang condenser adjust 1400 K.C. antenna trimmer for maximum output.</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Approx. 600 K.C.</td>
<td>None</td>
<td>Use Small Loop to couple test oscillator to receiver loop</td>
<td>While rocking gang condenser adjust 600 K.C. oscillator pad for maximum output.</td>
</tr>
</tbody>
</table>
ALIGNMENT PROCEDURE

Be sure to follow procedure carefully and in the order given—otherwise receiver will be insensitive and the dial calibration incorrect. For alignment procedure read tabulations from left to right. If more than one adjustment is required on any one band, make the adjustment marked (1) first, (2) next, (3) third.

Before starting alignment:
(a) Check tuning dial adjustment by turning 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 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.

IMPORTANT: Before aligning, place LOOP ANTENNA IN THE SAME POSITION IT WILL BE IN WHEN THE SET IS IN THE CABINET.

When adjusting 1600 kilocycle oscillator trimmer and 1400 kilocycle antenna trimmer, do not connect test oscillator to loop.

Couple test oscillator to receiver loop by:
(a) Make a loop consisting of five to ten turns of No. 20 to 20 30 size wire wound on a three inch form and attach across output of test oscillator.
(b) Place test oscillator loop near set loop—BE SURE THAT NEITHER MOVES WHILE ALIGNING.

<table>
<thead>
<tr>
<th>Place band switch for operation on:</th>
<th>Set receiver dial to:</th>
<th>Adjust test Oscillator frequency to:</th>
<th>Use dummy antenna in series with output of test oscillator consisting of:</th>
<th>Attach output of test oscillator to:</th>
<th>Refer to parts layout diagram for location of trimmers mentioned below:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 F.P. alignment use any band position</td>
<td>Any point where no interfering signal is received</td>
<td>Exactly 455 KC.</td>
<td>50 Mfd. condenser</td>
<td>High side to grid cap of 12SA7 tube. Do not remove cap.</td>
<td>Adjust each of the second I.F. transformer trimmers for maximum output.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1600 to 540 K.C. Band</th>
<th>1</th>
<th>Exactly 1600 K.C.</th>
<th>Exactly 1600 K.C.</th>
<th>None</th>
<th>Use Small Loop to couple test oscillator to receiver loop. Adjust 1600 K.C. oscillator trimmer for maximum output.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2</td>
<td>Approx. 1400 K.C.</td>
<td>Approx. 1400 K.C.</td>
<td>None</td>
<td>Use Small Loop to couple test oscillator to receiver loop. While rocking gang condenser adjust 1400 K.C. antenna trimmer for maximum output.</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Approx. 600 K.C.</td>
<td>Approx. 600 K.C.</td>
<td>None</td>
<td>Use Small Loop to couple test oscillator to receiver loop. While rocking gang condenser adjust 600 K.C. oscillator pad for maximum output.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>5.5 to 18.3 M.C. Band</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
</tbody>
</table>
5 and 6 tube A. C. Operated Superheterodyne Receiver

ALIGNMENT PROCEDURE

Be sure to follow procedure carefully and in the order given—otherwise the receiver will be insensitive and the dial calibration incorrect. For alignment procedure read tabulations from left to right. If more than one adjustment is required on any one band, make the adjustment marked (1) first, (2) next, (3) third.

Before starting alignment:
(a) Check tuning dial adjustment by turning 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) Have ground lead of test oscillator attached to gang condenser frame.

<table>
<thead>
<tr>
<th>Set receiver dial to:</th>
<th>TEST OSCILLATOR</th>
<th>Attach output of test oscillator to:</th>
<th>Refer to parts layout diagram for location of trimmers mentioned below:</th>
</tr>
</thead>
<tbody>
<tr>
<td>LF: 455 K. C.</td>
<td>Adjust test oscillator frequency to:</td>
<td>High side to grid terminal of 6SA7 tube DO NOT REMOVE CAP.</td>
<td>Adjust the second I. F. transformer trimmers for maximum output then adjust each of the first I. F. trimmers for maximum output.</td>
</tr>
<tr>
<td>Any point where no interfering signal is received</td>
<td>Use dummy antenna in series with output of test oscillator consisting of:</td>
<td>0.02 MFD condenser</td>
<td></td>
</tr>
<tr>
<td>1 Exactly 1730 K. C.</td>
<td>.00025 MFD condenser</td>
<td>Receiver “A” post</td>
<td></td>
</tr>
<tr>
<td>2 Approx. 1400 K. C.</td>
<td>.00025 MFD condenser</td>
<td>Receiver “A” post</td>
<td></td>
</tr>
</tbody>
</table>

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ALIGNMENT PROCEDURE

Be sure to follow procedure carefully and in the order given—otherwise the receiver will be insensitive and the dial calibration incorrect. For alignment procedure read tabulations from left to right. If more than one adjustment is required on any one band, make the adjustment marked (1) first, (2) next, (3) third.

Before starting alignment:
(a) Check tuning dial adjustment by turning 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.

IMPORTANT: BEFORE ALIGNING, PLACE LOOP ANTENNA IN THE SAME POSITION IN THE BACK OF CHASSIS IT WILL BE IN WHEN THE SET IS IN THE CABINET.

When adjusting 1720 kilocycle oscillator trimmer and 1400 kilocycle antenna trimmer, do not connect test oscillator to loop.

Couple test oscillator to receiver loop by:
(a) Make a loop consisting of five to ten turns of No. 20 to 30 size wire wound on a three inch form and attach across output of test oscillator.
(b) Place test oscillator loop near set loop—BE SURE THAT NEITHER MOVES WHILE ALIGNING.

<table>
<thead>
<tr>
<th>TEST OSCILLATOR</th>
<th>Set receiver dial to:</th>
<th>Adjust test oscillator frequency to:</th>
<th>Use dummy antenna in series with output of test oscillator consisting of</th>
<th>Attach output of test oscillator to:</th>
<th>Refer to parts layout diagram for location of trimmers mentioned below—and:</th>
</tr>
</thead>
<tbody>
<tr>
<td>L.F. Any point where no interfering signal is received</td>
<td>455 K.C.</td>
<td>.02 MFD condenser</td>
<td>High side to grid terminal of 1AVC tube DO NOT REMOVE CAP</td>
<td>Adjust the second I.F. transformer trimmers for maximum output—then adjust each of the first I.F. trimmers for maximum output.</td>
<td></td>
</tr>
<tr>
<td>1 Exact</td>
<td>1720 K.C.</td>
<td>None</td>
<td>Use small loop to couple test oscillator to receiver loop</td>
<td>Adjust 1720 K.C. oscillator trimmer for maximum output.</td>
<td></td>
</tr>
<tr>
<td>2 Approx.</td>
<td>1400 K.C.</td>
<td>None</td>
<td>Use small loop to couple test oscillator to receiver loop</td>
<td>Adjust 1400 K.C. antenna trimmer for maximum output.</td>
<td></td>
</tr>
</tbody>
</table>
ALIGNMENT PROCEDURE

Be sure to follow procedure carefully and in the order given—otherwise the receiver will be insensitive and the dial calibration incorrect. For alignment procedure read tabulations from left to right. If more than one adjustment is required on any one band, make the adjustment marked (1) first, (2) second, (3) third. Before starting alignment:

(a) Check tuning dial adjustment by turning 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 when set to zero position, the frequency cannot be measured accurately.

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

(c) Have ground lead of test oscillator attached to chassis.

| Place band switch for operation on: | 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:
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>I.F. alignment use any band position</td>
<td>Any point where no interfering signal is received</td>
<td>455 K.C.</td>
<td>.0005 Mfd. condenser</td>
<td>High side of grid cap of 5S87 tube. Do not remove cap.</td>
<td>Adjust each of the second I.F. transformer trimmers for maximum output. Then adjust each of the first I.F. transformer trimmers for maximum output.</td>
</tr>
<tr>
<td>2</td>
<td>Approx. 1400 K.C.</td>
<td>.0005 Mfd. condenser</td>
<td>Receiver &quot;B&quot; antenna post</td>
<td>While rocking gang condenser adjust 140 K.C. oscillator pad for maximum output.</td>
<td></td>
</tr>
</tbody>
</table>
| 3 | Approx. 600 K.C. | .0005 Mfd. condenser | Receiver "C" antenna post | Adjust 187 M.C. oscillator trimmer for maximum output. Be sure to use proper peak. If more than one peak is noticed, back off trimmer to maximum capacity; then screw down trimmer (add capacity) until the second peak—which is the proper one to use—isNotice:

Television Connections—The radio amplifier and loud speaker of this receiver can be used to amplify the sound output of a television receiver not equipped with an audio amplifier and speaker—just connect the sound channel output of the television receiver (from the sound detector) to the No. 1 and No. 4 terminals on back of receiver and attach a single pole double throw switch.

Photograph Connections—Photograph records may be electrically reproduced through the receiver loud speaker by connecting the leads of the phonograph pickup to the No. 3 and No. 4 terminals and using either an electrical or hand wound spring operated phonograph motor. The pickup should be of the high impedance type and a single pole double throw switch must be connected as shown diagram. To operate—place switch in phonograph position—set pickup needle on record and adjust radio volume control to desired amount of volume.

When shipped from factory a jumper wire is attached to terminals 1 and 2. If receiver is not to be used for phonograph or television operation, leave the jumper wire in this position. When receiver is used for either phonograph or television sound operation, remove jumper wire.

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Compliments of www.nucow.com
MOTOR NOISE ELIMINATION

1. Ground the antenna lead-in shield at one or more points to the cowl or any other metal surface in contact with the lead-in.

2. Move the battery lead around to a point of least noise pick-up and fasten in place with tying cord or tape.

3. Bond together the throttle rod, choke rod and any metal tubing with a piece of copper braid and ground to the firewall. This should be done on the engine side.

4. Bond steering post to firewall.

5. Bond hood, side panel and other protective covering for engine if it is not making a positive contact to the body.

In extreme cases, a distributor resistor and generator condenser will reduce noise interference to a minimum. These parts are available at your dealer.

From the standpoint of motor noise, the whip type antenna recommended has been found to be the most satisfactory. It is advisable to use this type antenna even if the car is equipped with a built-in antenna.

1. F. ALIGNMENT. With the gang condenser set at minimum, adjust the test oscillator to 456 KC and connect the output to the grid of the first detector tube (6A8G) through a .05 or .1 mfd condenser. The ground on the test oscillator should be connected to the chassis ground. Align all three trimmers to peak or maximum reading on the output meter.

ANT. AND OSC. ALIGNMENT. Connect the antenna to the generator through a 65 MMF dummy* and set the dial and generator at 1600 KC (gang at minimum capacity). Align the BC oscillator trimmer for maximum output. Set the test oscillator at 1400 KC and tune in the signal with the dial and adjust the antenna trimmer for maximum output. Next set the test oscillator at 500 KC and tune in the signal with the dial to check the sensitivity at this point.

*If the antenna is aligned using a whip antenna shielded lead use a 30 MMF dummy antenna.
This receiver is designed to operate over three tuning ranges. The broadcast band extends from 535 to 1720 Kilocycles (KC) (174 to 560 Meters); the European long wave band extends from 140 to 375 KC (800 to 2140 meters); the International Short Wave Band extends from 3.85 to 18.2 Megacycles (MC) (16.4 to 53 Meters).

<table>
<thead>
<tr>
<th>TUNING CONTROL</th>
<th>BAND SWITCH</th>
<th>VOLUME CONTROL</th>
<th>B. SW.</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 67</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tube Input N-2309</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

USE 100-MMF DUMMY FOR LONG-WAVE AND B.C. ALIGNMENT

SONORA RADIO & TELEVISION, CORP.
BROADCAST - 535 to 1720 KC
INTERMEDIATE - 2.2 to 7.5 MC
SHORT WAVE - 7.25 to 24.0 MC

USE 100-IMF DUMMY FOR BROADCAST ALIGNMENT

CONVENTIONAL ALIGNMENT SEE SPECIAL SECTION VOLUME VIII
The following combined "A" and "B" pack will give approximately 150 hours of life. The clamp arrangement is illustrated in Fig. 1. (The same clamp arrangement applies to either a pack or the type of "A" and "B" batteries illustrated.)

**SUPPLIER** Combined "A" and "B" battery in one unit

Ray-O-Vac A8694

The following batteries will give approximately 250 to 300 hours of life and are installed according to Figure 2. One "A" battery and two "B" batteries are required.

**SUPPLIER** 6 Volt "A" Battery (Approx. 3½" x 2½" x 4½")

Eveready 747

General Dry Battery 4F4

Marathon 496

Usable 638

Bond 4827

The following batteries will give approximately 250 to 300 hours life and are installed according to Figure 1. One "A" battery and two "B" batteries are required.

**SUPPLIER** 45 Volt "B" Battery (Approx. 3½" x 1⅜" x 4")

Eveready 407

The following batteries will give approximately 100 to 125 hours of life and are installed according to Figure 2. Use a third clamp to anchor the center battery. One "A" battery and two "B" batteries are required.

**SUPPLIER** 45 Volt "B" Battery (Approx. 3½" x 2¼" x 4½")

Burgress APFI

Ray-O-Vac 694A

General Dry Battery 4F4

Marathon 496

Usable 638

Bond 4827
SERVICE

If you have any problems, please do not hesitate to contact one of the local dealers or customers. To do so, call us at 1-800-123-4567.

WARNING: Do not expose the record to direct sunlight or heat sources. Keep records away from moisture and humidity. Keep records in a cool, dry place.

The ONLY

Motor Starting Switch and Automatic Turntable

Always read the instructions before using the product. Do not damage the product or turn it on if you are unsure how to use it.

Motor Starting Switch

The motor is a very important part of the product. It provides power to the turntable and motor.

NORTHERN ENGLAND:

The only...
CONVENTIONAL ALIGNMENT
SEE SPECIAL SECTION VOLUME VIII

DUMMY ANTENNA: 65 mm; with whip ant. shielded lead use 30 mm.

NOTE: 6S7G, 6SK7 and 6S9Q7 can be replaced by 6S4GT, 6SK7T and 6S9Q7T if tube shields are used.

FOR MOTOR NOISE ELIMINATION SEE INDEX

TUNING RANGE 535 to 1600 KC
4 TUBE - 6 VOLT
SUPERHETEROODYNE SINGLE BAND AUTO SET
DRN. 6X6APP. 10% BFM.
OPERATES ON 110-120 V., 50-60 Hz AC or DC
DO NOT CONNECT TO EXTERNAL GROUND.
TUNING RANGES: 535-1720 KC; 5.65-18.1 MC

DO NOT USE EXTERNAL GROUND CONNECTION

CONVENTIONAL ALIGNMENT
SEE SPECIAL SECTION
VOLUME VIII

7 TUBE A.C.-D.C.
SUPERHETEROODYNE
TWO BAND

FOR AUTOMATIC TUNING SEE INDEX
BATTERY

The unit used on this receiver is a 1½ volt and 90 volt AB dry battery pack. The following batteries are recommended:

<table>
<thead>
<tr>
<th>Supplier</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Dry Batteries</td>
<td>60A-2L</td>
</tr>
<tr>
<td>Burgess</td>
<td>5DA60</td>
</tr>
<tr>
<td>Burgess</td>
<td>6TA60</td>
</tr>
</tbody>
</table>

**INDIVIDUAL "A" AND "B" BATTERIES.**

A hook-up harness consisting of three plugs and a socket is required. This hook-up harness is not furnished with the receiver and should be purchased when obtaining separate A and B batteries.

- **1½ Volt A Battery**
- **45 Volt B Battery**

**SUPPLIER**

- Eveready: No. 742
- Burgess: No. 4FAP1
- Ray-O-Vac: No. P94A
- General Dry Battery: No. 4H1

Use one "A" battery and two "B" batteries with the hook-up harness. Clamp down the batteries with support strap.

**TUNING RANGE**

535 to 1720 KC

**CONNECT TO GENERATOR 2-TURN LOOP APPROX.**

1 FOOT IN DIAM. PLACE THIS PARALLEL TO RECEIVER LOOP ABOUT 6 INCHES AWAY FROM IT.

**CONVENTIONAL ALIGNMENT:**

SEE SPECIAL SECTION OF VOLUME VIII.

**Diagram:**

```
<table>
<thead>
<tr>
<th>DIAG</th>
<th>PART NO.</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>H-1804</td>
<td>LOOP ANTENNA</td>
</tr>
<tr>
<td>2</td>
<td>H-1452</td>
<td>OSCILLATOR COIL</td>
</tr>
<tr>
<td>3</td>
<td>H-1591</td>
<td>1ST I.F. TRANS.</td>
</tr>
<tr>
<td>4</td>
<td>H-1548</td>
<td>2ND I.F. TRANS.</td>
</tr>
<tr>
<td>5</td>
<td>H-1507</td>
<td>5&quot; P.M. SPEAKERS.</td>
</tr>
<tr>
<td>6</td>
<td>H-1453</td>
<td>TRIMMER COND. 2ND I.F.</td>
</tr>
<tr>
<td>7</td>
<td>H-1552</td>
<td>BATTERY CABLE</td>
</tr>
<tr>
<td>8</td>
<td>H-1435</td>
<td>TRIMMER COND. 2ND I.F.</td>
</tr>
<tr>
<td>9</td>
<td>R-1377</td>
<td>2 MEGOHM 20% 0.5W</td>
</tr>
<tr>
<td>10</td>
<td>R-1353</td>
<td>50,000 OHM 10%</td>
</tr>
<tr>
<td>11</td>
<td>R-1378</td>
<td>2 MEGOHM 20% 0.5W</td>
</tr>
<tr>
<td>12</td>
<td>R-1262</td>
<td>1 MEGOHM 10%</td>
</tr>
<tr>
<td>13</td>
<td>R-1392</td>
<td>65,000 OHM 10%</td>
</tr>
<tr>
<td>14</td>
<td>R-1779</td>
<td>150,000 OHM 20%</td>
</tr>
<tr>
<td>15</td>
<td>R-1385</td>
<td>300 OHM 10%</td>
</tr>
<tr>
<td>16</td>
<td>C1</td>
<td>.05 MFD 200V</td>
</tr>
<tr>
<td>17</td>
<td>C2</td>
<td>.05 MFD 200V</td>
</tr>
<tr>
<td>18</td>
<td>C3</td>
<td>.02 MFD 400V</td>
</tr>
<tr>
<td>19</td>
<td>C4</td>
<td>.02 MFD 400V</td>
</tr>
<tr>
<td>20</td>
<td>C5</td>
<td>.01 MFD 400V</td>
</tr>
<tr>
<td>21</td>
<td>C6</td>
<td>100 MFD 20%</td>
</tr>
<tr>
<td>22</td>
<td>C7</td>
<td>.006 MFD 600V</td>
</tr>
<tr>
<td>23</td>
<td>C8</td>
<td>6 MFD ELECTROLYTIC</td>
</tr>
<tr>
<td>24</td>
<td>C9</td>
<td>CAPACITY INCLUDED</td>
</tr>
</tbody>
</table>

```

**GANG COND. AT CONTROL**

```
<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANT.</td>
<td>OSC.</td>
</tr>
</tbody>
</table>

**VOLUME CONTROL**

- **"A"** NEAREST CHASSIS 1720 KC
- **"B"** NEAREST CHASSIS
CHANGES APPLYING TO SETS
RELEASED AFTER SEPTEMBER 1, 1939

ALL TUBES changed to "GT" type.
R9 changed to N-2590, 420 ohms.
C10 changed to N-1347, .006 mf.
5 changed to Part No. N-2588.

TUNING RANGE
535 to 1720 KC

CONVENTIONAL ALIGNMENT
SEE SPECIAL SECTION
VOLUME VIII
CONVENTIONAL ALIGNMENT
SEE SPECIAL SECTION
VOLUME VIII.
NOTE: Use a 100-μmf dummy for BC and LW alignment.
TELEVISION and PHONOGRAPH CONNECTOR: To use, remove link from terminals R and T. Connect leads from external source to T and G; connect shield (if any) to G. Consult instructions of manufacturer of television receiver or phonograph.

CONVENTIONAL ALIGNMENT
SEE SPECIAL SECTION
VOLUME VIII

TUNING RANGES
535 to 1720 KC
5.65 to 18.3 MC

6 TUBE AC-DC
SUPERHETERODYNE
TWO BAND
TELEVISION and PHONOGRAPH CONNECTOR: To use, remove link from terminals R and T. Connect leads from external source to T and G; connect shield (if any) to G. Consult instructions of manufacturer of television receiver or phonograph.
Line Voltage: 115 volts
Position of Volume Controls: Full with Antenna Disconnected
Voltage readings-allow 15% or less on all measurements.
Always use meter scale which will give greatest deflection within scale limits. All DC measurements made with 1000 ohms per volt voltmeter. All AC voltages measured with rectifier type voltmeter. Unless designated otherwise, voltages are + DC voltages.
# AC volts.

---

**INTERMEDIATE FREQUENCY 456 K.C.**

**TO TOP VIEWS OF ALL SOCKET CONNECTIONS**

---

**OPERATION ALIGNMENT OF GENERATOR CONNECTED TO Dummy GENERATOR INPUT TUNING TRIGGER SETTINGS**

<table>
<thead>
<tr>
<th>Operation</th>
<th>Alignment</th>
<th>Generator Connected To</th>
<th>Dummy Generator</th>
<th>Band Switch Setting</th>
<th>Trimmer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6J8G</td>
<td>-1 mf.</td>
<td>456 kc</td>
<td>Open</td>
<td>C3, A, B</td>
</tr>
<tr>
<td>2</td>
<td>I.F.</td>
<td>6J8G Grid</td>
<td>-1 mf.</td>
<td>456 kc</td>
<td>C2 A, B</td>
</tr>
<tr>
<td>3</td>
<td>Rejection</td>
<td>Ant.</td>
<td>200 mf.</td>
<td>456 kc</td>
<td>C4, A, B</td>
</tr>
<tr>
<td>4</td>
<td>Rejection</td>
<td>Ant.</td>
<td>200 mf.</td>
<td>1500 kc</td>
<td>C5, A, B</td>
</tr>
<tr>
<td>5</td>
<td>Rejection</td>
<td>Ant.</td>
<td>200 mf.</td>
<td>600 kc</td>
<td>C6, A, B</td>
</tr>
<tr>
<td>6</td>
<td>Rejection</td>
<td>Ant.</td>
<td>200 mf.</td>
<td>1500 kc</td>
<td>C7, A, B</td>
</tr>
<tr>
<td>7</td>
<td>Rejection</td>
<td>Ant.</td>
<td>200 mf.</td>
<td>600 kc</td>
<td>C8, A, B</td>
</tr>
<tr>
<td>8</td>
<td>Rejection</td>
<td>Ant.</td>
<td>200 mf.</td>
<td>600 kc</td>
<td>C9, A, B</td>
</tr>
<tr>
<td>9</td>
<td>Rejection</td>
<td>Ant.</td>
<td>200 mf.</td>
<td>1500 kc</td>
<td>C10, A, B</td>
</tr>
<tr>
<td>10</td>
<td>Rejection</td>
<td>Ant.</td>
<td>200 mf.</td>
<td>600 kc</td>
<td>C11, A, B</td>
</tr>
<tr>
<td>11</td>
<td>Rejection</td>
<td>Ant.</td>
<td>200 mf.</td>
<td>1500 kc</td>
<td>C12, A, B</td>
</tr>
</tbody>
</table>

**Remarks**

#100 ohms and 200 mf. in series.
**Rock variable condenser slightly while adjusting for maximum output. (Original) Effective June 30, 1939
(Original) Effective July 1, 1939

Early production sets of the SPARTON Model 590-1 employed the same circuit as shown except that a different filter and voltage reducing network was used.

The original circuit is shown below in Fig. 1 and the revised circuit in complete schematic.

Detailed instructions for making the circuit change which also involves the addition of a special resistor, are as follows:

1. Remove the chassis from the cabinet.
2. Locate the brown (5watt) resistor which connects to one of the socket terminals of the type 1A50 tube. Solder one lead of this special resistor to this same terminal and the other lead to the next terminal on this same socket, proceeding in a clockwise direction. (This socket terminal is grounded at the socket eyelet.)

3. Clip off excess (unused) wire from resistor leads and be sure resistor (and resistor leads) do not touch other wires or parts of chassis.

4. Locate the yellow and black wire which connects to the electrolytic condenser (20-200 ma.)

This circuit revision should be incorporated in any original Model 590-1 sets, as it will safeguard all of the 1.5 volt tubes in case the change-over (transfer) switch is raised while the set is being operated on AC, or in case tubes are changed while the set is being operated on AC.

5. Follow this wire to the point where it connects to the change-over (transfer) switch. Shoulder the yellow and black wire at this connection and connect it to the middle switch terminal. (The middle terminal already has another yellow and black wire as well as a condenser lead covered with black insulation connected to it. Do not disturb these connections.

6. All soldered connections should be made clearly and carefully. (First Revision)

VOLTAGE CHART

Receiver Operated on: AC Supply
Line Voltage: 117 Volts

<table>
<thead>
<tr>
<th>TUBE</th>
<th>FUNCTION</th>
<th>Voltage of Socket Prongs to Gnd. (See Prong Nos. on Schematic Diagram)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A7G</td>
<td>Converter</td>
<td>No.1</td>
</tr>
<tr>
<td>1R56</td>
<td>I. F. Amplifier</td>
<td>90</td>
</tr>
<tr>
<td>1R56</td>
<td>Det. AVC. Audio</td>
<td>0</td>
</tr>
<tr>
<td>1A56</td>
<td>P. A.</td>
<td>0</td>
</tr>
<tr>
<td>3525T</td>
<td>Rectifier</td>
<td>0</td>
</tr>
</tbody>
</table>

Notes: Voltage and resistance readings are for schematic diagram. Allow 15% + or - on all measurements. Always use meter scale which will give greatest deflection within scale limits. All measurements made with Weston Selective Analyzer No. 665, Type 2. (1000 ohm per volt)

*Cannot be measured with Weston Selective Analyzer No. 665, Type 2.

ALIGNMENT CHART

<table>
<thead>
<tr>
<th>OPERATION</th>
<th>ALIGNMENT OF</th>
<th>GENERATOR CONNECTED TO</th>
<th>DUMMY ANTENNA</th>
<th>GENERATOR FREQUENCY</th>
<th>TUNING CONDENSER SETTING</th>
<th>TRIMMER</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(Set pointer parallel with horizontal lines when condenser plates are flush)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>I. F.</td>
<td>1A7G Grid</td>
<td>.1 mf</td>
<td>456KC</td>
<td>Open</td>
<td>C 32 A &amp; B</td>
<td>2nd I. F.</td>
</tr>
<tr>
<td>3</td>
<td>Broadcast</td>
<td>Separate Loop*</td>
<td>*</td>
<td>1500KC</td>
<td>1500KC</td>
<td>C 2B Gac.</td>
<td>Peak Accurately*</td>
</tr>
<tr>
<td>4</td>
<td>(Repeat operation 3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>(Check calibration and sensitivity at 600 KC, 900 KC and 1500 KC)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>(Check operations 1 to 6 inclusive)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Preliminary alignment of antenna and oscillator adjustments may be made with chassis out of cabinet. Final alignment must be made with chassis installed in cabinet and with back cover snapped shut.

For final alignment it is recommended that an extra Model 590-1 Loop Antenna (Part No. C-3327) be obtained. Connect generator "Ant" to loop terminal marked "Grid" and generator "Gnd" to loop terminal marked "AVC". With back cover of set snapped shut, place the extra loop directly in back of the Model 590-1 being aligned so that it will be parallel with the loop inside the set and from one to three feet distant. The antenna trimmer, oscillator trimmer and oscillator padder can be reached by removing glove buttons in top of cabinet. (See chassis diagram.)

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SPARKS WITHINGTON CO.

SPARTON PAGE 11-9

MODEL 560X

Schematic, Voltage, Socket Alignment, Trimmers

Note: Voltage readings should be taken at idle or during normal operation. Always use a meter scale which will give greatest deflection within scale limit. All DC measurements are made with rectifier type voltmeter.


Alignment:
1. (Set dial pointer to end of scale with condenser board closed)
2. L-F, 647 Grid: 1st position
3. Band: 150 kHz
4. Band: 150 kHz
5. Band: 150 kHz
6. Adjust as necessary

Compliments of www.nucow.com
## Voltage Chart

### Tube Function
- **6K7G**: R-F Amp.
- **6J8G**: Osc. Converter
- **6K7G**: I. F. Amplifier
- **6C7G**: 2nd Det. AVC AF.
- **6F6G**: Power Amplifier
- **5T3G**: Rectifier
- **605**: Vista-Glo

### Voltage of Socket Prongs to Gnd. See Prong Nos. on Schematic Diagram

<table>
<thead>
<tr>
<th>Tube</th>
<th>No. 1</th>
<th>No. 2</th>
<th>No. 3</th>
<th>No. 4</th>
<th>No. 5</th>
<th>No. 6</th>
<th>No. 7</th>
<th>No. 8</th>
<th>Grid Cap</th>
</tr>
</thead>
<tbody>
<tr>
<td>6K7G</td>
<td>0</td>
<td>0</td>
<td>230</td>
<td>90</td>
<td>0</td>
<td>-</td>
<td>6.3*</td>
<td>0</td>
<td>.1</td>
</tr>
<tr>
<td>6J8G</td>
<td>0</td>
<td>0</td>
<td>275</td>
<td>90</td>
<td>.2</td>
<td>135</td>
<td>6.3*</td>
<td>0</td>
<td>1.25</td>
</tr>
<tr>
<td>6K7G</td>
<td>0</td>
<td>0</td>
<td>275</td>
<td>90</td>
<td>0</td>
<td>-</td>
<td>6.3*</td>
<td>0</td>
<td>1.25</td>
</tr>
<tr>
<td>6C7G</td>
<td>0</td>
<td>0</td>
<td>50</td>
<td>1</td>
<td>0</td>
<td>3</td>
<td>6.3*</td>
<td>3.5</td>
<td>3</td>
</tr>
<tr>
<td>6F6G</td>
<td>0</td>
<td>0</td>
<td>255</td>
<td>275</td>
<td>**</td>
<td>3.5</td>
<td>6.3*</td>
<td>20</td>
<td>-</td>
</tr>
<tr>
<td>5T3G</td>
<td>0</td>
<td>375</td>
<td>-</td>
<td>350*</td>
<td>-</td>
<td>350*</td>
<td>-</td>
<td>375</td>
<td>-</td>
</tr>
<tr>
<td>605</td>
<td>0</td>
<td>150</td>
<td>.5</td>
<td>300</td>
<td>4</td>
<td>6.3*</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

### Notes:
- Voltage readings are for schematic diagram. Allow 1% + or - on all measurements.
- Always use meter scale which will give greatest deflection within scale limits. All DC measurements made with 1000 ohms per volt voltmeter. AC voltages with rectifier type voltmeter.
- Unless designated otherwise, voltages in table are + DC voltages. *AC volts.*
- **Note:** Cannot test with Weston Analyzer No. 666 Type 2.

## Alignment Chart

<table>
<thead>
<tr>
<th>Operation</th>
<th>Alignment of Generator Connected to Dummy Antenna</th>
<th>Generator Frequency</th>
<th>Band Switch Setting</th>
<th>Tuning Cond. Setting</th>
<th>Trimmer</th>
<th>Adjust all Trimmers for Maximum Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(Set pointer even with last calibration mark when condenser plates are flush.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>I. F. 6J8G .1 mF 456 KC BC Open E20 A,B C20 A,B 2nd I. F. C19 A,B C19 A,B 1st I. F.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Broadcast Band Ant. 200 mF 1400 KC BC 1400KC C8 E30 E10 E30 BC Oscillator C5 5A C6 5A BC R.F. C2 5A C3 5A BC Antenna</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>600 KC BC 600KC C9 C12 BC Padder</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>(Repeat operation 3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>(Check operation and sensitivity at 600 KC, 900 KC and 1400 KC)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>1st SW Band Ant. 100 ohm 200 mF 100 series 6. MC 1 SW 6. MC C10 1SW Oscillator C6 1SW R-F C3 1SW Antenna</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>(Check calibration and sensitivity at 2.5 MC and 6.0 MC.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>2nd SW Band Ant. 100 ohm 200 mF series 21 MC 2 SW 21. MC C11 2SW Oscillator C7 2SW R-F C4 2SW Antenna</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>(Check calibration and sensitivity at 7.5 MC, 18 MC and 21 MC)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>(Check operation 1 to 10 inclusive.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Long Wave Band Ant. 200 mF 400KC LW 400KC C8 LW Oscillator C5 LW R-F C2 LW Antenna</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>(Repeat operation 7)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>(Check calibration and sensitivity at 400 KC, 300 KC and 150 KC)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Short Wave Band Ant. 100 ohm 200 mF series 18 MC SM 18 MC C11 SW Oscillator C7 SW R-F C4 SW Antenna</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>(Check calibration and sensitivity at 6. MC, 9. MC and 18. MC)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>(Check operation 1 to 12 inclusive.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Compliments of www.nucow.com
Spartan Superheterodyne Models 670-6S & 670-6L
Intermediate Frequency 456 K.C.
Top Views of All Socket Connections

Diagram with various components and connections labeled.

Notes:
Voltage readings, allow 15% + or - on all measurements. (Original) Effective June 30, 1939
Always use meter scale which will give greatest deflection within scale limits. All DC measurements made with 1000 ohms per volt voltmeter. All AC voltages made with rectifier type voltmeter. Unless designated otherwise, voltages in table are + DC voltages.
### 670-6S Alignment

<table>
<thead>
<tr>
<th>Operation</th>
<th>Alignment Of</th>
<th>Generator Connected To</th>
<th>Dummy Antenna</th>
<th>Generator Frequency</th>
<th>Band Switch Setting</th>
<th>Toning Cond. Setting</th>
<th>Trimmer</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Set dial pointer to last calibrated mark below 650 KC</td>
<td>6IGG Grid Cap</td>
<td>.1 mf.</td>
<td>446 KC</td>
<td>BC</td>
<td>(Open)</td>
<td>C16, AAB</td>
<td>3rd I.F.T.</td>
</tr>
<tr>
<td>2</td>
<td>I.F.</td>
<td>6IGG Grid Cap</td>
<td>.1 mf.</td>
<td>446 KC</td>
<td>BC</td>
<td>(Open)</td>
<td>C16, AAB</td>
<td>2nd I.F.T.</td>
</tr>
<tr>
<td>3</td>
<td>I.F.</td>
<td>6IGG Grid Cap</td>
<td>.1 mf.</td>
<td>446 KC</td>
<td>BC</td>
<td>(Open)</td>
<td>C24, AAB</td>
<td>1st I.F.T.</td>
</tr>
<tr>
<td>4</td>
<td>Rejector</td>
<td>Ant.</td>
<td>300 mf.</td>
<td>1500 KC</td>
<td>BC</td>
<td>1500 KC</td>
<td>C4, Obs.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>Ant.</td>
<td>300 mf.</td>
<td>1500 KC</td>
<td>BC</td>
<td>1500 KC</td>
<td>C5, Ant.</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>Band</td>
<td></td>
<td>600 KC</td>
<td>BC</td>
<td>600 KC</td>
<td>C8, Fed.</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>(Repeat operation 4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>(Check calibration and sensitivity at 600 KC, 1000 KC, and 1500 KC)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>1st short wave Band</td>
<td>Ant.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>C2, Obs.</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>2nd SW Band</td>
<td>Ant.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>C7, Ant.</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>(Check calibration and sensitivity at 7.0 KC, 15 KC &amp; 21 KC)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* 200 mf. condenser and 100 ohm non-inductive resistor in series.

If dial reading is off calibration, some adjustment may be made by moving the oscillator condenser lead toward or away from the chassis base plate.

### 670-6L Alignment

<table>
<thead>
<tr>
<th>Operation</th>
<th>Alignment Of</th>
<th>Generator Connected To</th>
<th>Dummy Antenna</th>
<th>Generator Frequency</th>
<th>Band Switch Setting</th>
<th>Toning Cond. Setting</th>
<th>Trimmer</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Set dial pointer to last calibrated mark below 650 KC</td>
<td>6IGG Grid Cap</td>
<td>.1 mf.</td>
<td>446 KC</td>
<td>BC</td>
<td>(Open)</td>
<td>C16, AAB</td>
<td>3rd I.F.T.</td>
</tr>
<tr>
<td>2</td>
<td>I.F.</td>
<td>6IGG Grid Cap</td>
<td>.1 mf.</td>
<td>446 KC</td>
<td>BC</td>
<td>(Open)</td>
<td>C16, AAB</td>
<td>2nd I.F.T.</td>
</tr>
<tr>
<td>3</td>
<td>I.F.</td>
<td>6IGG Grid Cap</td>
<td>.1 mf.</td>
<td>446 KC</td>
<td>BC</td>
<td>(Open)</td>
<td>C24, AAB</td>
<td>1st I.F.T.</td>
</tr>
<tr>
<td>4</td>
<td>Rejector</td>
<td>Ant.</td>
<td>300 mf.</td>
<td>1500 KC</td>
<td>BC</td>
<td>1500 KC</td>
<td>C8, Obs.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>Band</td>
<td></td>
<td>600 KC</td>
<td>BC</td>
<td>600 KC</td>
<td>C10, Fed.</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>(Repeat operation 4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>(Check calibration and sensitivity at 600 KC, 1000 KC, and 1500 KC)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Long-wave Band</td>
<td>Ant.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>C4, Obs.</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Band</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>C5, Ant.</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>(Repeat operation 8)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>(Repeat operations 8, 9 and 10 if necessary, to insure accurate alignment)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>(Check calibration and sensitivity at 1500 KC, 2500 KC and 4000 KC)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Short wave Band</td>
<td>Ant.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>C7, Obs.</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>(Check calibration and sensitivity at 6 MC, 15 MC and 21 MC)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* 100 µf. condenser and 100 ohm non-inductive resistor in series.
Voltage readings are for schematic diagram. Allow 15% + or - on all measurements.

Always use meter scale which will give greatest deflection within scale limits. All DC measurements made with 1000 ohms per volt voltmeter. All AC voltages made with rectifier type voltmeter.

Unless designated otherwise, voltages in table are + DC voltages.

ALIGNMENT CHART

<table>
<thead>
<tr>
<th>OPERATION</th>
<th>ALIGNMENT OF</th>
<th>GENERATOR CONNECTED TO</th>
<th>DUMMY ANTENNA</th>
<th>GENERATOR FREQUENCY</th>
<th>BAND SWITCH SETTING</th>
<th>TUNE COND. SETTING</th>
<th>TRIMMER</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>I.F.</td>
<td>G750</td>
<td>1 mΩ</td>
<td>455 KC</td>
<td>Open</td>
<td></td>
<td>C14 AAB 2nd I.F.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Rejection</td>
<td>Ant. 200 mΩ</td>
<td>455 KC</td>
<td>BC</td>
<td>Closed</td>
<td>C2</td>
<td>Adjust to minimum</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Broad cast</td>
<td>Ant. 200 mΩ</td>
<td>1500 KC</td>
<td>BC</td>
<td>1500 KC</td>
<td>C4</td>
<td>BC Osc. Trim.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Band</td>
<td>Ant. 200 mΩ</td>
<td>600 KC</td>
<td>BC</td>
<td>600 KC</td>
<td>C9</td>
<td>BC Osc. Padder**</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>(Repeat operation 4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>(Check calibration and sensitivity at 500 KC, 900 KC and 1500 KC)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Short Waves</td>
<td>Ant. 200 mΩ</td>
<td>13MC</td>
<td>SW</td>
<td>13MC</td>
<td>C6</td>
<td>SW Osc. Trim.</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>(Check calibration and sensitivity at 6MC, 9MC, and 18MC)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>(Check operations 1 to 9 inclusive)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* 100 ohms and 200 mΩ in series.
** Rock variable condenser for maximum output.
# Alignment Chart

<table>
<thead>
<tr>
<th>Operation</th>
<th>Alignment of</th>
<th>Dummy Antenna</th>
<th>Generator Frequency</th>
<th>Band Switch Setting</th>
<th>Tuning Cond. Setting</th>
<th>Trimmer</th>
<th>Adjust for Max. Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(Set dial pointer to dots at low frequency end of dial.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>I.F.</td>
<td>6K7G</td>
<td>.1mF</td>
<td>456 KC</td>
<td>BC</td>
<td>Open</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>C20 A &amp; B</td>
<td>2nd I. F.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>C19 A &amp; B</td>
<td>1st I. F.</td>
</tr>
<tr>
<td>3</td>
<td>I.F. Rej.</td>
<td>Ant.</td>
<td>200 mF</td>
<td>456 KC</td>
<td>BC**</td>
<td>Closed</td>
<td>G</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>C30</td>
<td>Adjust for Minimum</td>
</tr>
<tr>
<td>4</td>
<td>Broadcast Band</td>
<td>Ant.</td>
<td>200 mF</td>
<td>1500 KC</td>
<td>BC*</td>
<td>600 KC</td>
<td>C8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>C9</td>
<td>Osc. Padder</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>BC*</td>
<td>900 KC</td>
<td>C5</td>
</tr>
<tr>
<td>6</td>
<td>(Repeat operation 4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>(Repeat operation 4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>1st Short Wave Band</td>
<td>Ant.</td>
<td>200 mF, 100 ohm series</td>
<td>6.0 MHz</td>
<td>1 SW</td>
<td>6.0 MHz</td>
<td>C10</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>C6</td>
<td>RF Trimmer</td>
</tr>
<tr>
<td>9</td>
<td>(Check calibration and sensitivity at 6.0 MHz, 4.0 MHz and 2.5 MHz)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>C3</td>
<td>Ant. Trimmer</td>
</tr>
<tr>
<td>10</td>
<td>2nd Short Wave Band</td>
<td>Ant.</td>
<td>200 mF, 100 ohm series</td>
<td>21 MHz</td>
<td>2 SW</td>
<td>21 MHz</td>
<td>C11</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>C7</td>
<td>RF Trimmer</td>
</tr>
<tr>
<td>11</td>
<td>(Check calibration and sensitivity at 21.0 MHz, 15.0 MHz, 6.0 MHz)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>C4</td>
<td>Ant. Trimmer</td>
</tr>
<tr>
<td>12</td>
<td>(Check operation 1 to 11 inclusive)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Band switch must be turned for manual tuning of Broadcast Band.
**Band switch must be turned for automatic (Selectronne) tuning.
SPARKS WITHINGTON CO.

Schematic

INTERMEDIATE FREQUENCY 455 K.C.

TOP VIEW OF ALL SOCKET CONNECTIONS

©John F. Rider, Publisher
## VOLTAGE CHART

<table>
<thead>
<tr>
<th>Tube</th>
<th>Function</th>
<th>Voltage of Socket Prongs to Gnd. (See Prong Nos. on Schematic Diagram)</th>
<th>Band Switch - Broadcast</th>
</tr>
</thead>
<tbody>
<tr>
<td>6G7G</td>
<td>R.F.</td>
<td>-</td>
<td>No. 8 Grid Cap</td>
</tr>
<tr>
<td>6G8G</td>
<td>Converter</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>6K7G</td>
<td>I.F.</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>6N6G</td>
<td>2nd. Det. A.V.O.</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>6F5G</td>
<td>1st A.F.</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>6F6P</td>
<td>P.A.</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>6F6G</td>
<td>P.A.</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>6X7G</td>
<td>Rect.</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>6G9</td>
<td>Viso-Glo</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Notes: Voltage readings are for schematic diagram. Allow 15% or less on all measurements. Always use meter scale which will give greatest deflection within scale limits. All DC measurements made with 1000 ohms per volt voltmeter. All AC voltages made with rectifier type voltmeter. Unless designated otherwise, voltages in table are + DC voltages. *AC volts.

**Cannot be measured with 1000 ohms per volt voltmeter. Bias for 6N50G can be measured from B+ to Gnd.**

## ALIGNMENT CHART

<table>
<thead>
<tr>
<th>OPER.</th>
<th>ALIGNMENT OF</th>
<th>GENERATOR CONNECTED TO</th>
<th>DUMMY ANTENNA</th>
<th>GENERATOR FREQUENCY</th>
<th>BAND SWITCH</th>
<th>TUNING COND.</th>
<th>SECTIONS</th>
<th>TRIMMER</th>
<th>ADJUST FOR MAX. OUTPUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(Set pointer even with last calibration mark when condenser plates are flush.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>I.F.</td>
<td>6F6G</td>
<td>.1 mf.</td>
<td>456 KC</td>
<td>BC</td>
<td>C-25AB</td>
<td>2nd I.F.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Broadcast</td>
<td>Ant.</td>
<td>200 mf.</td>
<td>1500 KC</td>
<td>BC</td>
<td>C-14</td>
<td>I.F.</td>
<td>C-6</td>
<td>Osc. Trimmer</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Ant.</td>
<td>600 KC</td>
<td>600 KC</td>
<td>BC</td>
<td>C11</td>
<td>Osc. Pad</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>5</td>
<td>(Repeat operation 3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Short Wave</td>
<td>Ant.</td>
<td>200 mf.</td>
<td>400 KC</td>
<td>LW</td>
<td>C9</td>
<td>Osc. Trimmer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Wave Band</td>
<td>Ant.</td>
<td>350 KC</td>
<td>150 KC</td>
<td>LW</td>
<td>C11</td>
<td>Osc. Ped.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>(Repeat operation 6)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Short Wave</td>
<td>Ant.</td>
<td>100 ohm</td>
<td>140 KV</td>
<td>SW</td>
<td>C10</td>
<td>Osc. Trimmer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Wave Band</td>
<td>Ant.</td>
<td>200 mf.</td>
<td>1000 KC</td>
<td>SW</td>
<td>C7</td>
<td>RF Trimmer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>(Check calibration and sensitivity at 6. MC, 9 MC, and 18 MC.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Short Wave</td>
<td>Ant.</td>
<td>100 ohm</td>
<td>140 KV</td>
<td>SW</td>
<td>C10</td>
<td>Osc. Trimmer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Wave Band</td>
<td>Ant.</td>
<td>200 mf.</td>
<td>1500 KC</td>
<td>SW</td>
<td>C7</td>
<td>RF Trimmer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>(Check calibration and sensitivity at 7 MC and 2.5 MC.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Short Wave</td>
<td>Ant.</td>
<td>100 ohm</td>
<td>21 MC</td>
<td>SW</td>
<td>C10</td>
<td>Osc. Trimmer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Wave Band</td>
<td>Ant.</td>
<td>200 mf.</td>
<td>21 MC</td>
<td>SW</td>
<td>C7</td>
<td>RF Trimmer</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Rock dial while adjusting for maximum output.

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A good ground connection to a water pipe or other metallic conductor entering the ground for some distance is ESSENTIAL.

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ALIGNMENT PROCEDURE: The alignment of this receiver requires the use of a test oscillator that covers a frequency range from 540 to 4620 KC. For exact alignment an output meter should be connected across the output transformer on the speaker. A dummy load of approximately 180 ma. should be used and connected to correspond with aerial coil left unwound.

Adjust oscillator to 1400 KC. Turn knob controlling dial to 1400 on the dial. Rotate adjustment screws on tuning condenser until maximum output is produced. (with Volume Control at maximum). Reset oscillator to 1000 KC and finally to 660 KC and check. This receiver should check OK at these points for alignment. It is only necessary to re-adjust at one point on the dial due to the original alignment at the factory.
IF ALIGNMENT - Align at 456 KC thru .05 or .1 mf. cond. BC ALIGNMENT - Osc., RF and Pre-Selector gang cond. trimmers at 1400 KC. Osc. Padder at 600 KC. FOREIGN BAND - 19 to 49 meters - Osc. and Ant. trimmers alignment at 14000 KC. Start by Osc. trimmer being loose and Antenna trim. being tight, to prevent IMAGE frequency false alignment. POLICE - Adj. Antenna trimmer at 4000 KC. - No osc. adjustment.

SWITCH SHOWN IN BROADCAST POSITION

FOR CONVENTIONAL ALIGNMENT SEE SPECIAL SECTION VOLUME VII

IF PEAK 456 KC
CORRECT ALIGNMENT PROCEDURE

The intermediate frequency (IF) stage should be aligned properly as the first step. After the IF transformers have been properly adjusted and peaked, the Broadcast Band alignment should be the next procedure.

IF. ALIGNMENT

Adjust the test oscillator to 456 KC and connect the output to the grid of the first detector tube (6A7) through a .05 or .1 mfd. condenser. The ground on the test oscillator can be connected to the chassis ground. Align all three IF trimmers to peak or maximum reading on the output meter.

BROADCAST BAND ALIGNMENT

Adjust the oscillator to 1730 KC and connect the output to the antenna lead (Blue) through a .0002 mfd. mica condenser. Set the gang condenser to minimum capacity and adjust the gang condenser trimmer (oscillator) to receive this signal. After this has been carefully done, the next step is to set the generator to 1400 KC and after tuning in the signal adjust the antenna trimmer to peak. This is all that is necessary for the alignment unless the plates of the gang condenser have been bent out of shape. In case of bent plates, set the test oscillator and the receiver to 600 KC and bend the plates into the position for maximum output.

PROCEDURE FOR SETTING UP AND OPERATING AUTOMATIC PUSH BUTTONS

Select four strong local stations tuned in regularly. Now loosen Locking Screw (see chassis layout) several turns with a coin or a screwdriver and press in any one of the four push buttons. Holding the button down, tune in any one of the four selected stations by rotating the tuning knob (side knob) slowly back and forth until the signal is cleared.

Release the push button and press in another button and hold down, tuning in another favorite station with tuning knob. Follow the same procedure for the remaining stations. Now hold tuning knob (side knob) securely and with coin or screwdriver tighten locking screw. This screw holds all stations in adjustment.

In order to change any station already set up, to another, hold tuning knob securely, loosen locking screw and select the new station as explained above. Tear the correct station call letter tabs from the set of sheets supplied and push them into rectangular windows above each push button.

The automatic push button dial is now set up for quick tuning.
SERVICE NOTES for “AUTOMATIC-TUNE” WHEEL DIAL

While an “AUTOMATIC-TUNE” tab may be set for special weak stations, better results will be obtained if the station is tuned to the desired station on the dial. The automatic tune tab will thereafter be set to the desired station. However, the tab may be set to any desired station without affecting the accuracy of the dial. To set the automatic tune tab, insert the tab between the oval metal face plate and move the dial up or down until the oval metal face plate is at the desired station. Then set the tab to the desired station and move the dial up or down to the desired station. Repeat the process until the dial is set to the desired station.

INSERT CELLULOID ENVELOPE BETWEEN EDGE OF DIAL AND METAL FACE PLATE, THEN LIGHTLY PRESS NUT INTO SQUARE NOTCH FIG. 3

1. Insert celluleid envelope into metal tab frame (a) Hold celluleid envelope in place with metal tab framed tab holder and insert tab holder into celluleid envelope. (b) Gently push celluleid tab holder curved end of envelope number 2 of celluleid envelope tab frame. (c) Arrange tab to extend in numerical order according to station frequency.

2. Set the metal tab holders on dial by (a) Set the first metal tab holder for the station that broadcast on the lowest frequency. Then proceed to the next station tab for the selected station operating on the next lowest frequency, continuing in this way until all tabs are set for all of the stations.

3. Place each selected station tab holder inside of celluleid envelope by (a) Hold celluleid envelope in place with celluleid tab frame. (b) Place station tab holder between envelope and oval metal face plate, and slide tab holder along tab until it is in contact with the oval metal face plate. (c) Slide tab holder in such a way that it is in contact with the oval metal face plate.

4. Replace No. 4000 Dial Glass Scale Assembly

As it requires a special tool to properly set part No. 4005 shaft assembly on part No. 4000 glass scale—we will ship all orders for No. 4000 glass scales with the No. 4005 shaft assembly included.
TO INSTALL NO. 4013 SECONDARY DRIVE CORD:

The dial mechanism picture shows and refers to eye terminals on drive cord—these were used in early production. Loops made by knots in the cords are now used to attachcord to lugs in the No. 4009 die cast pulley and to the No. 4352 & 3452 tension springs.

(a) Looking at front of dial rotate dial scale COUNTER-CLOCKWISE until dial stop is reached.

(b) Loosen the two No. 2754 set screws in small die cast pulley No. 4009.

(c) Looking at front of dial turn small die cast pulley so that the cut out in pulley will be towards the left and approximately in line with the upper edge of the dial light bracket. This bracket which is only used in six volt battery and 110 volt AC models is shown mounted on the cadmium plated dial face plate bracket in dial mechanism picture.

(d) Hook No. 4352 tension spring in dial cord loop.

(e) Turn No. 4011 drum so that the hole in the No. 4012 large die cast pulley—which the secondary drive cord is pulled—towards the top of face plate. This will bring the hole approximately in line with the left hand edge (looking at back of dial) of face plate.

Compliments of www.nucow.com
ALIGNMENT PROCEDURE:

Lack of sensitivity, selectivity or poor tone quality may be due to any one or a combination of causes such as weak or defective tubes or speakers, open or grounded bias resistor, bypass capacitor, inadequate or excessively long antenna, etc. Never attempt to realign set until all other possible sources of trouble have been first thoroughly investigated and definitely proven not to be the cause.

NOTE: BE SURE TO FOLLOW PROCEDURE CAREFULLY. WHEN ALIGNING, OTHERWISE THE RECEIVER WILL BE INSENSITIVE AND THE DIAL CALIBRATION WILL BE INCORRECT.

IT IS ABSOLUTELY NECESSARY THAT AN ACCURATELY CALIBRATED TEST OSCILLATOR WITH SOME TYPE OF OUTPUT MEASURING DEVICE BE USED WHEN ALIGNING THE RECEIVER.

ALIGNING I.F. STAGE AT 465 KILOCYCLES:

(a) Connect the ground lead of the test oscillator to the chassis or set ground lead. Connect the other lead of the test oscillator to the grid cap of the 6A7 tube through a .02 Mfd. series condenser. DO NOT REMOVE GRID CLIP.

(b) Set test oscillator to EXACTLY 465 kilocycles and turn receiver volume control on full.

(c) Peak each of the second I.F. transformer trimmers.

(d) Peak each of the first I.F. transformer trimmers.

To assure most accurate trimming, setting repeat above adjustment several times always using lowest possible test oscillator output consistent with readable output meter scale deflection.

ALIGNING 1720-540 KILOCYCLE BAND:

(a) Remove test oscillator lead from grid of the 6A7 tube and attach it to the receiver antenna lead through a 0.002 Mfd. series condenser.

(b) Check tuning dial adjustment by turning gang condenser until plates reach maximum capacity step (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 the dial needle does not point exactly to the last line move needle to correct position.

(c) Set receiver dial and test oscillator frequency to EXACTLY 1720 kilocycles.

(d) Bring in 1720 KC test oscillator signal to maximum output by adjusting the trimmer condenser mounted on top of the oscillator section of the gang condenser. Looking at the front of the receiver the rear section of the gang condenser is the oscillator section.

(e) Tune receiver dial and set test oscillator frequency to EXACTLY 1400 kilocycles.

(f) Adjust trimmer on top of the front section gang condenser (antenna section) for maximum 1400 kilocycle test signal response.

(g) Tune receiver dial and set test oscillator frequency to approximate 600 kilocycles.

(h) While rocking the tuning condenser back and forth adjust 600 KC oscillator pad condenser which is accessible through the hole in the top of the chassis adjacent to the gang condenser for maximum 600 kilocycle signal response.

ALIGNING 2.3-4.3 MEGACYCLE BAND:

(a) Replace .00025 Mfd. Test oscillator antenna lead series condenser with a 400 ohm resistor.

(b) Adjust band selector switch for 2.3-4.3 megacycles band operation, turn receiver dial and set test oscillator frequency to EXACTLY 6.3 megacycles.

(c) Bring in 6.3 megacycle test oscillator signal to maximum output by adjusting 6.3 M.C. oscillator trimmer on top of coil located underneath chassis.

(d) Tune receiver dial and test oscillator frequency to EXACTLY 6 megacycles, and adjust 6 M.C. antenna trimmer which is mounted on coil located on top of chassis for maximum sensitivity.

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IF PEAK 456 KC

<table>
<thead>
<tr>
<th>PART NO.</th>
<th>DESCRIPTION</th>
<th>PART NO.</th>
<th>DESCRIPTION</th>
<th>PART NO.</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>41</td>
<td>1A4</td>
<td>6T76</td>
<td>IC6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

VOLTAGES MEASURED WITH 1000 OHM PER VOLT VOM.
ALL VOLTAGS EXCEPT HEATERS MEASURED TO GROUND.

F - FILAMENT
H - HEATER
K - GATHODE
SU - SUPPRESSOR
GS - SCREEN GRID
G1 - OSC. GRID
G2 - OSC. PLATE
G3 - CONTROL GRID
D - DIODE PLATE
P - PLATE

IF ALIGNMENT - Set test oscillator at 456 KC and adjust trimmers for maximum output.
BROADCAST ALIGNMENT - At 1730 KC, adjust BC oscillator for maximum output. At 1400 KC adjust Antenna trimmer for maximum output. At 600 KC, adjust BC oscillator for maximum output.
SHORT WAVE ALIGNMENT - Feed 6 MC signal to antenna thru .00025 MF and adjust SW trimmer at 6 MC. BC alignment is thru .00025 MF cond.

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ALIGNMENT OF IF STAGES - Align four IF trimmers to peak or max. reading at 456 KC, thru .05 or .1 mf condenser.

BROADCAST BAND - Set test osc. at 1400 KC and connect output to antenna post, thru a .0001 mf condenser. Set dial at 1400 KC and adjust Osc. trimmer to peak (located on rear gang condenser section). Then adjust center RF trimmer and front pre-selector trimmer to peak. Adjust Osc. padder at 600 KC to peak. Padder is located at left-hand end of chassis near 6D6 tube.

FOREIGN BAND - Band of 19 to 49 meters is adjusted by two trimmers on SW coil at top of chassis. Set Osc. at 14000 KC. Osc. is near 1st IF transformer and the antenna coil is in front of SW osc. coil. Adjust these two trimmers at 14000 KC for peak. NOTE: Always start by having the osc. coil trimmer loose and the antenna coil trimmer fairly tight (in all the way); other wise a false alignment of the IMAGE frequency is possible. Do not adjust gang condenser trimmers in aligning the Foreign or Police Bands, as this will throw the Broadcast Alignment out.

POLICE BAND - Dial and osc. at 4000 KC adjust antenna coil trimmer to resonance. No osc. adjustment necessary.
SPIEGEL PAGE 11-25

The frequency range covered by the receiver is as follows: Broadcast band 535 KC to 1730 KC. The shortwave band covers a range of 2.2 megacycles to 6.4 megacycles and either of these bands are selected at will by a flip of the band change switch. To the left for broadcast, to the right for short wave.

IFI 456 KC

SUPERHETEROODYNE

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SPIEGEL INC.

PAGE 11-26 SPIEGEL

MODEL 5500, 5505, 5505c
Chassis 701

A good ground materially aids in the reception of distant stations.

IFI PEAK 456 KC

ALIGNMENT PROCEDURE

The equipment required for re-aligning this receiver is an output meter and a modulated source of radio frequency (a signal generator or microvolter). This type of receiver requires a method of varying the output.

All alignments must be made with the volume control turned full on and with the signals input from the generator reduced to as low a value as possible while still giving a sufficient output to be easily read on the output meter.

Connect the output meter, through a 5 M.F. condenser and a resistance of such a value as to make the total meter resistance approximately 7000 ohms, to the two small pins of the speaker plug. The output meter remains connected during the entire alignment procedure.

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ALIGNMENT PROCEDURE FOR 01-SH CHASSIS

1. Connect the output meter across the output terminal of the radio being tested, then adjust the control to the maximum volume position and keep in this position throughout the entire alignment procedure.

2. Connect the output meter across the output terminal of the radio being tested, then adjust the control to the maximum volume position and keep in this position throughout the entire alignment procedure.

3. With the speaker connected to the test setup, adjust the controls to the maximum volume position and keep in this position throughout the entire alignment procedure.

4. Connect the output meter across the output terminal of the radio being tested, then adjust the control to the maximum volume position and keep in this position throughout the entire alignment procedure.

5. Connect the output meter across the output terminal of the radio being tested, then adjust the control to the maximum volume position and keep in this position throughout the entire alignment procedure.

ALIGNMENT EQUIPMENT & PROCEDURE

1. Connect the output meter across the output terminal of the radio being tested, then adjust the control to the maximum volume position and keep in this position throughout the entire alignment procedure.

2. Connect the output meter across the output terminal of the radio being tested, then adjust the control to the maximum volume position and keep in this position throughout the entire alignment procedure.

3. Connect the output meter across the output terminal of the radio being tested, then adjust the control to the maximum volume position and keep in this position throughout the entire alignment procedure.

4. Connect the output meter across the output terminal of the radio being tested, then adjust the control to the maximum volume position and keep in this position throughout the entire alignment procedure.

5. Connect the output meter across the output terminal of the radio being tested, then adjust the control to the maximum volume position and keep in this position throughout the entire alignment procedure.

6. Connect the output meter across the output terminal of the radio being tested, then adjust the control to the maximum volume position and keep in this position throughout the entire alignment procedure.

INSTALLATION OF BATTERIES

The following 1½ volt "A" batteries will fit the space provided: Eveready No. 746 or Boy-Gat No. 586.

"B" batteries of the proper size are Eveready No. 737 or No. 495 or Boy-Gat No. 6006. Where lamp life is desired, the Eveready No. 4922 is especially recommended.

To install the batteries, first slide the "B" batteries into place as shown in the drawing below, and connect these to the terminal marked "ANT." Then slide the "A" battery into place as shown and connect these to the terminal marked "ANT."

Inside the cabinet back, connect the wires to the proper terminals on the battery pack. When replacing the battery pack, be sure to connect the wires to the proper terminals on the battery pack.
### Alignment Equipment & Procedure

Alignment involves the correct setup of various components and procedures to ensure the proper functioning of the radio equipment. It's crucial to follow these steps carefully to achieve the desired performance.

### Dummy Ant in Series with Dip. Gen.

<table>
<thead>
<tr>
<th>Dummy Ant. in Series with Dip. Gen.</th>
<th>Signal Generator Frequency</th>
<th>Bandswitch Position</th>
<th>Setting</th>
<th>Trimmer Number</th>
<th>Trimmer Description</th>
<th>Type of Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>020 OHMS</td>
<td>455 KC</td>
<td>Broadband</td>
<td>1-2</td>
<td>Ind. L.F.</td>
<td>Adjusts for Minimum Output in Torch Frequency</td>
<td>Indicator L.F.</td>
</tr>
<tr>
<td>020 OHMS</td>
<td>455 KC</td>
<td>Broadband</td>
<td>3-4</td>
<td>1st L.F.</td>
<td>Adjusts for Maximum Output in Torch Frequency</td>
<td>1st L.F.</td>
</tr>
<tr>
<td>020 OHMS</td>
<td>1500 KC</td>
<td>Broadband</td>
<td>5</td>
<td>Wave Trap</td>
<td>Adjusts for Minimum Output in a Strong Station</td>
<td>Wave Trap</td>
</tr>
<tr>
<td>020 OHMS</td>
<td>1500 KC</td>
<td>Broadband</td>
<td>6</td>
<td>Broadcast</td>
<td>Adjusts for Minimum Output in a Strong Station</td>
<td>Broadcast</td>
</tr>
<tr>
<td>020 OHMS</td>
<td>600 KC</td>
<td>Broadband</td>
<td>7</td>
<td>Broadcast</td>
<td>Adjusts for Minimum Output in a Strong Station</td>
<td>Broadcast</td>
</tr>
<tr>
<td>020 OHMS</td>
<td>600 KC</td>
<td>Broadband</td>
<td>8</td>
<td>Broadcast</td>
<td>Adjusts for Minimum Output in a Strong Station</td>
<td>Broadcast</td>
</tr>
<tr>
<td>020 OHMS</td>
<td>6 MC</td>
<td>Intermediate</td>
<td>9</td>
<td>Interchangeable</td>
<td>Adjusts for Minimum Output in a Strong Station</td>
<td>Interchangeable</td>
</tr>
<tr>
<td>020 OHMS</td>
<td>6 MC</td>
<td>Intermediate</td>
<td>10</td>
<td>Interchangeable</td>
<td>Adjusts for Minimum Output in a Strong Station</td>
<td>Interchangeable</td>
</tr>
<tr>
<td>020 OHMS</td>
<td>20 MC</td>
<td>Foreign</td>
<td>11</td>
<td>Foreign</td>
<td>Adjusts for Minimum Output in a Strong Station</td>
<td>Foreign</td>
</tr>
<tr>
<td>020 OHMS</td>
<td>20 MC</td>
<td>Foreign</td>
<td>12</td>
<td>Foreign</td>
<td>Adjusts for Minimum Output in a Strong Station</td>
<td>Foreign</td>
</tr>
</tbody>
</table>

For transistor settings of these frequencies, see “Transistor Tests.”

### To Replace the Tuning Drive Cord

1. **To replace the tuning drive cord:**
   - Ensure the radio is switched off.
   - Unplug the power cord from the outlet.
   - Remove the tuning knob from the turntable.
   - Disconnect the tuning drive cord from the turntable.
   - Disconnect the tuning drive cord from the receiver.
   - Connect the new tuning drive cord to the turntable.
   - Connect the new tuning drive cord to the receiver.
   - Reconnect the power cord to the outlet.
   - Switch on the radio.

### Phonograph Pick-up Circuit Changes

Change the pick-up circuit connections as specified in the service manual. Replace any damaged or worn parts.

### Alignment Points

Alignment points are crucial for ensuring the correct functioning of the radio equipment.

### Controls Circuit Changes

- **Bottom View of Chassis:**
  - Check the battery for proper connections and correct polarity.
  - Ensure all terminals are securely fastened and free from corrosion.

- **Front View:**
  - Check the switch positions for correct operation.
  - Ensure all switch mechanisms are functioning properly.

### Setting Up Push Buttons

- **Setting the DIAL POINTER:**
  - Make sure the knobs are aligned with the proper settings as specified in the service manual.
  - Adjust the volume and tone controls for correct operation.
  - Check the antenna connections for proper alignment.

### Compliments of www.nucow.com
1. Connect the output meter across the voice coil or between the plate of the 6F6G output tube and ground in series with a .1 mf condenser, depending on the type of meter. (The more sensitive type should be connected across the voice coil.)

2. Connect the ground lead of the signal generator to the “G” terminal or the chassis. Note: Remove the connector from between the “A” and “X” terminals.

3. Turn the volume control to the maximum volume position and keep it in this position throughout the entire alignment procedure.

4. With the gang condenser in full mesh, set the pointer at a point 1½” from the left flange of the brown dial plate. This point corresponds to the last mark on the low frequency end of the dial scale. If the pointer is incorrectly set, it is only necessary to loosen the set screws on the dial drive drum and push the gang condenser in full mesh, with the pointer properly set, then retighten the set screws.

<table>
<thead>
<tr>
<th>Dummy Ant. in Series with Sig. Gen.</th>
<th>Connection of Sig. Generator Output To Receiver</th>
<th>Signal Generator Frequency</th>
<th>Band Switch Position</th>
<th>Receiver Dial Setting</th>
<th>Trimmer Number</th>
<th>Trimmer Description</th>
<th>Type of Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>.1 MF Condenser</td>
<td>Front Lug of Gang Condenser</td>
<td>455 KC</td>
<td>Broadcast</td>
<td>Any Point Where It Does Not Affect The Signal</td>
<td>1-2</td>
<td>2nd I.F.</td>
<td>Adjust for maximum output. Then repeat adjustment.</td>
</tr>
<tr>
<td>200 MMFD, Micro Condenser</td>
<td>“A” Terminal</td>
<td>455 KC</td>
<td>Broadcast</td>
<td>Any Point Where It Does Not Affect The Signal</td>
<td>3-4</td>
<td>1st I.F.</td>
<td></td>
</tr>
<tr>
<td>200 MMFD, Micro Condenser</td>
<td>“A” Terminal</td>
<td>1500 KC</td>
<td>Broadcast</td>
<td>1500 KC (21¾&quot;) from right Dial Plate end)</td>
<td>5</td>
<td>Wave Trap</td>
<td>Adjust for minimum output using a strong generator signal.</td>
</tr>
<tr>
<td>200 MMFD, Micro Condenser</td>
<td>“A” Terminal</td>
<td>1500 KC</td>
<td>Broadcast</td>
<td>1500 KC Generator Signal</td>
<td></td>
<td></td>
<td>Adjust for maximum output.</td>
</tr>
<tr>
<td>200 MMFD, Micro Condenser</td>
<td>“A” Terminal</td>
<td>600 KC</td>
<td>Broadcast</td>
<td>Tune to 600 KC Generator Signal</td>
<td>6</td>
<td>Broadcast Antenna</td>
<td>Adjust for maximum output.</td>
</tr>
<tr>
<td>400 OHM Carbon Resistor</td>
<td>“A” Terminal</td>
<td>14 MC</td>
<td>Foreign</td>
<td>14 MC (27-16&quot;) from right Dial Plate end)</td>
<td>7</td>
<td>Foreign Oscillator (Series Foul)</td>
<td>Adjust for maximum output. Try to increase output by detuning trimmer and retaining receiver dial until maximum output is obtained. Check to see if proper peak was obtained by tuning in image at approx. 131 MC. If image does not appear redial at 14 MC. With trimmer screw further out. Recheck image.</td>
</tr>
<tr>
<td>400 OHM Carbon Resistor</td>
<td>“A” Terminal</td>
<td>14 MC</td>
<td>Foreign</td>
<td>14 MC</td>
<td>8</td>
<td>Foreign Antenna</td>
<td>Adjust for maximum output.</td>
</tr>
</tbody>
</table>

SOCKET VOLTAGES

DIAL TUNED TO 540 KC
ANTENNA GROUNDED

BOTTOM VIEW OF CHASSIS

VOLTAGES MEASURED BETWEEN SOCKET TERMINALS AND CHASSIS
LINE VOLTAGE 117 VOLTS

REAR OF CHASSIS

VOLTAGE ACROSS SPEAKER FIELD 58 VOLTS

6SA7 1st DET & OSC 25 85 6 A.C.
6S6 6V6 A.C.
6SK7 6D6 A.C.
6H6 2nd DET & A.M.
6S07 6X7 A.C.

NOTE A: The bias on the control grid of the 6SA7 and 6SK7 tubes and on diode plate D, of the 6H6 and 6SK7 tubes is -3.7 volts, measured across resistor No. 5.

NOTE B: The bias on the control grid of the 6S07 tube is -17 volts measured across resistors No. 39 and 46.

NOTE C: The bias on the control grid of the 6S07 tube is -4 volts, measured across resistor No. 38.
Compliments of www.nucow.com

STEWART-WARNER CORP.

1. Connect the output meter across the voice coil or from the plate of the 6F6G output tube to ground through a .1 mfd. condenser. (The more sensitive type should be connected across the voice coil.)

2. Connect the ground lead of the signal generator to the receiver chassis AND REMOVE THE BLUE WIRE FROM THE CHASSIS TERMINAL.

3. Turn the volume control to the maximum position and keep it in this position throughout the alignment procedure.

4. Set the pointer 2½” from left end of brown dial plate with condenser gang in full mesh.

5. The loop must be connected as indicated in circuit diagram at all times, and must be in the same relative position it occupies when the set is in the cabinet.

<table>
<thead>
<tr>
<th>Dummy Ant. in Series with Sig. Gen.</th>
<th>Connection of Sig. Generator Output to Receiver</th>
<th>Signal Generator Frequency</th>
<th>Band Switch Position</th>
<th>Receiver Dial Setting</th>
<th>Trimmer Number</th>
<th>Trimmer Description</th>
<th>Type of Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>.1 MFD Condenser</td>
<td>Lug on Front of Gang Cond.</td>
<td>455 KC</td>
<td>Broadcast</td>
<td>Any Point Where It Does Not Affect the Signal</td>
<td>1-2</td>
<td>2nd I.F.</td>
<td>Adjust for Maximum Output. Then reposition Adjustment.</td>
</tr>
<tr>
<td>200 MMFD Mica Condenser</td>
<td>Black Loop Wire</td>
<td>1500 KC</td>
<td>Broadcast</td>
<td>1500 KC 2½” from right end of dial plate</td>
<td>3-4</td>
<td>1st I.F.</td>
<td>Adjust for Maximum Output.</td>
</tr>
<tr>
<td>200 MMFD Mica Condenser</td>
<td>Black Loop Wire</td>
<td>1500 KC</td>
<td>Broadcast</td>
<td>Tune to 1500 KC Generator Signal</td>
<td>5</td>
<td>Broadcast Oscillator (Shunt)</td>
<td>Adjust for Maximum Output.</td>
</tr>
<tr>
<td>200 MMFD Mica Condenser</td>
<td>Black Loop Wire</td>
<td>600 KC</td>
<td>Broadcast</td>
<td>Tune to 600 KC Generator Signal</td>
<td>6</td>
<td>Broadcast Antenna</td>
<td>Adjust for Maximum Output.</td>
</tr>
<tr>
<td>400 OHM Carbon Resistor</td>
<td>Black Loop Wire</td>
<td>5 MC</td>
<td>Intermediate</td>
<td>5 MC 1½/16” from right hand end of dial plate</td>
<td>7</td>
<td>Intermediate Oscillator (Series Pad)</td>
<td>Adjust for Maximum Output. Check to see if Proper Peak was Obtained by Tuning in Image at Approx. 4.1 MC. If Image does not appear, Readjust at 5 MC with Trimmer Screw farther out. Retune Image.</td>
</tr>
<tr>
<td>400 OHM Carbon Resistor</td>
<td>Black Loop Wire</td>
<td>5 MC</td>
<td>Intermediate</td>
<td>Tune to 5 MC Generator Signal</td>
<td>8</td>
<td>Intermediate Antenna</td>
<td>Adjust for Maximum Output.</td>
</tr>
<tr>
<td>400 OHM Carbon Resistor</td>
<td>Black Loop Wire</td>
<td>16 MC</td>
<td>Foreign</td>
<td>16 MC 2½/16” from right hand end of dial plate</td>
<td>9</td>
<td>Foreign Oscillator</td>
<td>Adjust for Maximum Output. Check to see if Proper Peak was Obtained by Tuning in Image at Approx. 15.1 MC. If Image does not appear, Readjust at 16 MC with Trimmer Screw farther out. Retune Image.</td>
</tr>
<tr>
<td>400 OHM Carbon Resistor</td>
<td>Black Loop Wire</td>
<td>16 MC</td>
<td>Foreign</td>
<td>Tune to 16 MC Generator Signal</td>
<td>10</td>
<td>Foreign Antenna</td>
<td>Adjust for Maximum Output. Try to increase Output by decreasing trimmer and retuning receiver dial until maximum output is obtained.</td>
</tr>
</tbody>
</table>

*NOTE: Redalign trimmer No. 6 after set is in cabinet by connecting blue wire to ground terminal, placing range switch in broadcast position, and adjusting for maximum output on a weak signal at approximately 1500 KC.

RADIO-PHONO SWITCH IN RADIO POSITION

- NO SIGNAL CONDITION

NOTE A: Bias on 6F6G output tube is — 18 volts measured across resistors 29, 3 and 6.

NOTE B: Bias on 6SQ7 grid is — .5 volts measured across resistor 6.

NOTE C: Bias on diode plates, 6SK7 I.F., 6SA7 DET., and 6SK7 R.F. is

Pos. — 3 volts measured across resistor 29.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>19317</td>
<td>Call letter tube and instruction sheets</td>
<td>$0.45</td>
</tr>
<tr>
<td>114855</td>
<td>Clip—coll mounting</td>
<td>.01</td>
</tr>
<tr>
<td>112745</td>
<td>Cable—diode drive (supplied in 2 foot lengths)</td>
<td>.15</td>
</tr>
<tr>
<td>112707</td>
<td>Cord—pointer drive (supplied in 6 foot lengths)</td>
<td>.18</td>
</tr>
<tr>
<td>112789</td>
<td>Drive drum and bushing</td>
<td>.20</td>
</tr>
<tr>
<td>88354</td>
<td>Eyebolts—-for dial cord</td>
<td>.05</td>
</tr>
<tr>
<td>113920</td>
<td>Escutcheons and dial (1) 6G4 &amp; 6G4-Z</td>
<td>.90</td>
</tr>
<tr>
<td>113975</td>
<td>Escutcheons and dial (1) 6G4 &amp; 6G4-Z</td>
<td>.90</td>
</tr>
<tr>
<td>113905</td>
<td>Escutcheons and dial (1) 6G6 &amp; 6G6-Z</td>
<td>.90</td>
</tr>
<tr>
<td>113905</td>
<td>Escutcheons and P. B. Assembly (1) 6G4 &amp; 1G4-Z</td>
<td>1.15</td>
</tr>
<tr>
<td>113955</td>
<td>Escutcheons and P. B. Assembly (1) 6G4 &amp; 1G4-Z</td>
<td>.90</td>
</tr>
<tr>
<td>113910</td>
<td>Escutcheons for push buttons (1) 6G2 &amp; 1G2-Z</td>
<td>.90</td>
</tr>
<tr>
<td>113989</td>
<td>Escutcheons for push buttons (1) 6G4 &amp; 6G4-Z</td>
<td>.90</td>
</tr>
<tr>
<td>113919</td>
<td>Knob (1) 6G6 &amp; 6G6-Z</td>
<td>1.00</td>
</tr>
<tr>
<td>113873</td>
<td>Knob (1) 6G4 &amp; 6G4-Z</td>
<td>.90</td>
</tr>
<tr>
<td>113873</td>
<td>Retaining ring—for drive shaft</td>
<td>.50</td>
</tr>
</tbody>
</table>

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Compliments of www.nucow.com
ALIGNMENT PROCEDURE FOR 01-6K AND 01-6M CHASSIS

1. Connect the output meter across the voice coil or between the plate of the 256G output tube and ground in series with a .1 mfd. condenser, depending on the type of meter. (The more sensitive type should be connected across the voice coil.)

2. If a dummy antenna is used, connect the ground lead of the signal generator to the chassis. The information in the table below assumes a dummy antenna will be used when aligning this receiver.

   If no dummy is to be used omit the connection from generator ground to the chassis. Then connect an unshielded lead to the output terminal of the signal generator and place the lead near the loops of the receiver, and make no connection to the antenna terminal on the rear of the cabinet.

3. Turn the volume control to the maximum clockwise position and keep it in this position throughout the entire alignment procedure.

4. With the gang condenser in full mesh, set the potentiometer so that its position is horizontal.

### Table: Alignment Setup

<table>
<thead>
<tr>
<th>Dummy Ant. in Series with Sig. Gen.</th>
<th>Connection of Sig. Generator Output to Receiver</th>
<th>Signal Generator Frequency</th>
<th>Band Switch Position</th>
<th>Receiver Dial Position</th>
<th>Trimmer Dial Position</th>
<th>Trimmer Description</th>
<th>Type of Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 MFD Condenser</td>
<td>Grid of 126Q7 R.F. Tube</td>
<td>455 KC</td>
<td>Broadcast</td>
<td>Any Point Where It Does Not Affect Signal</td>
<td>1-2</td>
<td>2nd L.F.</td>
<td>Adjust for maximum output. Then reduce adjustment.</td>
</tr>
<tr>
<td>200 MFD Micro Condenser</td>
<td>Antenna Terminal</td>
<td>1500 KC</td>
<td>Broadcast</td>
<td>1500 KC</td>
<td>3-4</td>
<td>1st L.F.</td>
<td>Adjust for maximum output.</td>
</tr>
<tr>
<td>200 MFD Micro Condenser</td>
<td>Antenna Terminal</td>
<td>1500 KC</td>
<td>Broadcast</td>
<td>Tune to 1500 KC Generator Signal</td>
<td>5</td>
<td>Broadcast Antenna</td>
<td>Place broadcast loop antenna in same position relative to chassis as it occupies when in cabinet. Adjust for maximum output.</td>
</tr>
<tr>
<td>200 MFD Micro Condenser</td>
<td>Antenna Terminal</td>
<td>600 KC</td>
<td>Broadcast</td>
<td>Tune to 600 KC Generator Signal</td>
<td>10</td>
<td>Broadcast Antenna</td>
<td>Place broadcast loop antenna in same position relative to chassis as it occupies when in cabinet. Adjust for maximum output.</td>
</tr>
<tr>
<td>400 OHM Carbon Resistor</td>
<td>Antenna Terminal</td>
<td>5 MC</td>
<td>Intermediate</td>
<td>5 MC</td>
<td>7</td>
<td>Intermediate Antenna</td>
<td>Adjust for maximum output. Check to see if proper peak is obtained by tuning in image at approx. 4.1 MC. If image does not appear redial at 5 MC with trimmer screw further out. Recheck image.</td>
</tr>
<tr>
<td>400 OHM Carbon Resistor</td>
<td>Antenna Terminal</td>
<td>16 MC</td>
<td>Foreign</td>
<td>16 MC</td>
<td>8</td>
<td>Foreign Antenna</td>
<td>Adjust for maximum output. Check to see if proper peak is obtained by tuning in image at approx. 15.1 MC. If image does not appear redial at 16 MC with trimmer screw further out. Recheck image.</td>
</tr>
</tbody>
</table>

Before making the following adjustments, install the chassis and both loops in the cabinet.

- 400 OHM Carbon Resistor
  - Antenna Terminal
    - 5 MC
      - Intermediate
    - Tune to 5 MC Generator Signal
    - 9
    - Intermediate Antenna
    - Adjust for maximum output. Try to increase output by detuning trimmer and returning receiver dial until maximum output is obtained.

- 200 MFD Micro Condenser
  - Antenna Terminal
    - 1500 KC
    - Broadcast
    - Tune to 1500 KC Generator Signal
    - 10
    - Broadcast Antenna
    - Place broadcast loop antenna in same position relative to chassis as it occupies when in cabinet. Adjust for maximum output. |

### DIAL AND MISCELLANEOUS PARTS

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>118904</td>
<td>Cabinet back (back only) Model 01-6K</td>
<td>$0.20</td>
</tr>
<tr>
<td>119621</td>
<td>Cabinet back (back only) Model 01-6M</td>
<td>$0.10</td>
</tr>
<tr>
<td>11717</td>
<td>Cable—for connecting motor (01-6K only)</td>
<td>$0.20</td>
</tr>
<tr>
<td>14409</td>
<td>Cloths—dial scale retainer</td>
<td>$0.10</td>
</tr>
<tr>
<td>12275</td>
<td>Clip—dial scale retainer</td>
<td>$0.05</td>
</tr>
<tr>
<td>118948</td>
<td>Cord—dial drive (supplied in/#); 18</td>
<td>$0.10</td>
</tr>
<tr>
<td>118910</td>
<td>Phone Pick-up arm (Model 01-6M only)</td>
<td>5.85</td>
</tr>
<tr>
<td>119274</td>
<td>Dial scale</td>
<td>$0.25</td>
</tr>
<tr>
<td>119255</td>
<td>Easychair—dial</td>
<td>$0.10</td>
</tr>
<tr>
<td>119296</td>
<td>Idler wheel with rubber rim (01-6M)</td>
<td>$0.20</td>
</tr>
<tr>
<td>119267</td>
<td>Knob</td>
<td>$0.10</td>
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<tr>
<td>94571</td>
<td>Needle cup (Model 01-6M)</td>
<td>$0.10</td>
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<tr>
<td>110486</td>
<td>Plug—4 prong—for speaker</td>
<td>$0.10</td>
</tr>
<tr>
<td>118929</td>
<td>Points</td>
<td>$0.10</td>
</tr>
<tr>
<td>81405</td>
<td>Retaining ring—for drive shaft. Per C</td>
<td>$0.05</td>
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<tr>
<td>119949</td>
<td>Rubber rim for idler wheel (01-6M)</td>
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<tr>
<td>83024</td>
<td>Screw—self tapping 8 x 1/4</td>
<td>$0.25</td>
</tr>
<tr>
<td>119274</td>
<td>Screw—No. 10 x 1/2 inch chassis mtg.</td>
<td>$0.25</td>
</tr>
<tr>
<td>118912</td>
<td>Screw for mounting easychair</td>
<td>$0.05</td>
</tr>
<tr>
<td>119054</td>
<td>Shaft-tuning</td>
<td>$0.25</td>
</tr>
<tr>
<td>118950</td>
<td>Socket—oval base (standard)</td>
<td>$0.25</td>
</tr>
<tr>
<td>11500</td>
<td>Socket—4 prong (for speaker)</td>
<td>$0.25</td>
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<tr>
<td>11320</td>
<td>Socket—dial lamp (ungrounded side)</td>
<td>$0.25</td>
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<tr>
<td>111090</td>
<td>Spacer—steel</td>
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<tr>
<td>114668</td>
<td>Spring—dial cord tension</td>
<td>$0.25</td>
</tr>
<tr>
<td>119729</td>
<td>Turntable (Model 01-6M)</td>
<td>$1.50</td>
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<tr>
<td>119767</td>
<td>Turntable shaft (01-6M)</td>
<td>$0.25</td>
</tr>
<tr>
<td>110893</td>
<td>Washer—flat steel, for mfg. chassis</td>
<td>$0.05</td>
</tr>
<tr>
<td>118530</td>
<td>Washer (paper) for back of knobs</td>
<td>$0.05</td>
</tr>
</tbody>
</table>

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ALIGNMENT PROCEDURE FOR 01-8A CHASSIS

1. Connect the output meter across the voice coil or use the plate of the 6VE6 output tube to ground through a .1 mfd. condenser. (This more sensitive type should be connected across the voice coil.)
2. Connect the ground lead of the signal generator to the receiver chassis and remove the connector from the 'A' and 'X' terminals.
3. Turn the volume control to the maximum volume position and keep it in this position throughout the alignment procedure.
4. Push in the 'Selectivity' button and keep it pushed in. Check the pointer to see that it is correctly set

Trimmer Value

<table>
<thead>
<tr>
<th>Dummy Att.</th>
<th>Connection of Sig. Generator Output to Receiver</th>
<th>Signal Generator Frequency</th>
<th>Trimmer Switch Position</th>
<th>Trimmer Value</th>
<th>Type of Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>2050 Ohm</td>
<td>in series with Big. Gen.</td>
<td>455 KC</td>
<td>Broadcast</td>
<td>1/2</td>
<td>Gain L F</td>
</tr>
<tr>
<td>100 MFH</td>
<td>Min. Condenser</td>
<td>-</td>
<td>Any point between 100 KC and 550 KC</td>
<td>5</td>
<td>Wave Trap</td>
</tr>
<tr>
<td>100 MFH</td>
<td>Min. Condenser</td>
<td>1500 KC</td>
<td>100 KC</td>
<td>Broadcast</td>
<td>6</td>
</tr>
<tr>
<td>100 MFH</td>
<td>Min. Condenser</td>
<td>1500 KC</td>
<td>Tone in 1000 to 1500 KC</td>
<td>7</td>
<td>Broadcast Oscillator Balanced</td>
</tr>
<tr>
<td>500 MFH</td>
<td>Min. Condenser</td>
<td>600 KC</td>
<td>Broadcast</td>
<td>8</td>
<td>Broadcast Oscillator Balanced</td>
</tr>
<tr>
<td>460 OHM</td>
<td>Carbon Resistor</td>
<td>6 MC</td>
<td>Intermediates 6 MC</td>
<td>9</td>
<td>Intermediates Oscillator Balanced</td>
</tr>
<tr>
<td>460 OHM</td>
<td>Carbon Resistor</td>
<td>6 MC</td>
<td>Intermediates 6 MC</td>
<td>11</td>
<td>Intermediates Oscillator Balanced</td>
</tr>
<tr>
<td>460 OHM</td>
<td>Carbon Resistor</td>
<td>20 MC</td>
<td>Foreign 20 MC</td>
<td>13</td>
<td>Foreign Balance</td>
</tr>
</tbody>
</table>

NOTE: Readjust trimmer No. 7 after set is in citizens by connecting 'A' and 'X' together, plugging range switch in broadcast position, and adjusting for maximum output on a weak signal at approximately 1000 KC.

ALIGNMENT PROCEDURE FOR 01-8B CHASSIS

1. Connect the output meter across the voice coil or use the plate of the 4424 output tube to ground through a .1 mfd. condenser. (This more sensitive type should be connected across the voice coil.)
2. Connect the ground lead of the signal generator to the receiver chassis and remove the connector from between the 'G' and 'X' terminals.
3. Turn the volume control to the maximum volume position and keep it in this position throughout the alignment procedure.
4. Push in the 'Selectivity' button and keep it pushed in. Check the pointer to see that it is correctly set.
5. The lamp must be connected as indicated in circuit diagram at all times.
### STEWART-WARNER CORP.

**Drive Cord Data**

1. Connect the output meter across the voice coil or from the plate of the 6F6G output tube to ground through a .1 mfd. condenser. (The more sensitive type should be connected across the voice coil.)
2. Connect the ground lead of the signal generator to the receiver chassis and REMOVE THE BLUE WIRE FROM THE CENTER SCREW ON ANTENNA TERMINAL STRIP.
3. Turn the volume control to the maximum position and keep it in this position throughout the alignment procedure.
4. Check the pointer to see that it is correctly set to 540 KC with ganged in full mesh.
5. The loop must be connected as indicated in circuit diagram at all times.
6. With some signal generators it may be found that reducing the input to a usable value is impossible using the dummy antennas recommended below. In such cases the signal generator may be disconnected entirely from the set and the F. lead of the signal generator placed in the vicinity of the loop. On the S. W. position the shield wire (black) may be disconnected from set input fed to center terminal.

<table>
<thead>
<tr>
<th>Dummy Ant in Series with Sig. Gen.</th>
<th>Connection of Sig. Generator Output to Receiver</th>
<th>Signal Generator Frequency</th>
<th>Band Switch Position</th>
<th>Receiver Dial Setting</th>
<th>Trimmer Number</th>
<th>Trimmer Description</th>
<th>Type of Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>.1 MFD. Condenser</td>
<td>Lug on Rear Section of Gang Cond.</td>
<td>455 KC</td>
<td>Broadcast</td>
<td>Any Point Where It Does Not Affect the Signal</td>
<td>1-2</td>
<td>2nd L.F.</td>
<td>Adjust for Maximum Output. Then Repeat Adjustment.</td>
</tr>
<tr>
<td>200 MMFD Condenser</td>
<td>Center Screw on Antenna Terminal Strip</td>
<td>1500 KC</td>
<td>Broadcast</td>
<td>1500 KC</td>
<td>5</td>
<td>Broadcast Oscillator (Shunt)</td>
<td>Adjust for Maximum Output.</td>
</tr>
<tr>
<td>200 MMFD Condenser</td>
<td>Center Screw on Antenna Terminal Strip</td>
<td>1500 KC</td>
<td>Broadcast</td>
<td>Tune to 1500 KC Generator Signal</td>
<td>6*</td>
<td>Broadcast Antenna</td>
<td>Adjust for Maximum Output.</td>
</tr>
<tr>
<td>200 MMFD Condenser</td>
<td>Center Screw on Antenna Terminal Strip</td>
<td>600 KC</td>
<td>Broadcast</td>
<td>Tune to 600 KC Generator Signal</td>
<td>7</td>
<td>Broadcast Oscillator (Series)</td>
<td>Adjust for Maximum Output. Try to Increase Output by Retuning Trimmer and Returning Receiver Dial until Maximum Output is Obtained.</td>
</tr>
<tr>
<td>400 OHM Carbon Resistor</td>
<td>Center Screw on Antenna Terminal Strip</td>
<td>16 MC</td>
<td>Foreign</td>
<td>16 MC</td>
<td>8</td>
<td>Foreign Oscillator</td>
<td>Adjust for Maximum Output. Check to see if Proper Peak was Obtained by Tuning into Image at Approx. 15.1 MC, if Image does not appear, Realign at 16 MC, with Trimmer Screw further out. Recheck Image.</td>
</tr>
<tr>
<td>400 OHM Carbon Resistor</td>
<td>Center Screw on Antenna Terminal Strip</td>
<td>16 MC</td>
<td>Foreign</td>
<td>Tune to 16 MC Generator Signal</td>
<td>9</td>
<td>Foreign Antenna</td>
<td>Adjust for Maximum Output. Try to Increase Output by Retuning Trimmer and Returning Receiver Dial until Maximum Output is Obtained.</td>
</tr>
</tbody>
</table>

*NOTE: Realign trimmer No. 6 after set is in cabinet by connecting blue wire to center screw on antenna terminal strip, placing range switch in broadcast position, and adjusting for maximum output on a weak signal at approximately 1500 KC.*

---

**POINTER CORD**

**DRIVE CORD TO REPLACE THE TUNING DRIVE CORD**

1. Make a loop in one end of the diei drive cord (Part No. 1170557 and fasten a spring (Part No. 111177) to this loop.
2. Fasten the spring to tab A and pass the cord through hole C in the rear of the drum.
3. Make one and one half turns of the cord about tuning shaft E.
4. Continue the cord around the drum through the other hole in the rear of the drum and form a loop at E. Fasten a spring (Part No. 113177) to the loop and adjust the loop to give the approximate dimension indicated.
5. Fasten the spring to tab F.

**TO REPLACE THE POINTER DRIVE CORD**

1. Fasten an eyelet (Part No. 88344) at a point one-half inch from one end of the cord (Part No. 116948) and pass the cord through hole G in the front of the drum.
2. Continue the cord around the drum and around pulley H.
3. Go from pulley H to pulley J and around the drum through hole K in the front of the drum.
4. Fasten a spring (Part No. 113177) at this point by forming a loop in the cord.
5. Adjust the loop so that the spring is extended to 2 inches.
6. Fasten the spring to tab L.

7. The condenser should be one quarter meshed (or at an angle of 45°) when the drum is in the indicated position.
8. Cement the pointer to the pointer drive cord so that it reads 540 KC with the ganged in full mesh.

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NOTES FOR 01-9A AND 01-9A-Z CHASSIS

For proper operation this chassis must never be fastened to the rubber cushions on which it is mounted. If this is not done the set will have an objectionable "booming" effect caused by any sudden changes in pressure while holding down the chassis and moving the two wood wings which support the chassis during alignment. Make sure that nothing制约 the control knobs. If the set will not operate properly the control mechanism does not align the front panel or the set will not work.

The speaker frame must be mounted on the chassis by the red wire. Black wire. (For trimmers) distance between the speaker and loop may be varied to obtain best performance.

TO SET POINTER

The pointer should be set so that 5 1/2 inches on the dial scale when the tuning control is full counterclockwise (count the number of dots on each end of the pointer) and allow or allow for proper steering.

TO SET DRUM ON CONDENSER SHAFT

With the drum in the normal jack position, the thumb in the drum should be at the top of the turntable drum. To prevent damage to drum, remove set screens.

REPLACING THE DRIVE CORDS

NOTE: In正常使用 this chassis, if the drive belt is damaged, a new belt must be used. The belt should be of the same size and shape as the original one. Be sure to check the belt for any loose or damaged parts before installing.

TO REPLACE DIAL DRIVE CORD

1. Remove the two rings from the dial cord slip (Part No. 1145 B) and insert a new dial cord slip (Part No. 1145 B) into the drum. This will prevent the dial cord from getting caught in the drum. Use a new dial cord slip (Part No. 1145 B) to replace the old one. The old dial cord slip will be damaged during removal.

2. Place the drum in the normal position and mount the new cord slip on the drum. Be sure not to overtighten the cord slip as this may damage the drum.

3. Secure the new cord slip to the drum with the same screws used on the old cord slip. Check the alignment of the new cord slip to ensure proper operation.

4. Replace the trimmers as necessary. Be sure to check for any loose or damaged parts before installing.

5. Check the alignment of the new cord slip to ensure proper operation.

6. Replace the trimmers as necessary. Be sure to check for any loose or damaged parts before installing.

7. Replace the trimmers as necessary. Be sure to check for any loose or damaged parts before installing.

8. Replace the trimmers as necessary. Be sure to check for any loose or damaged parts before installing.

9. Replace the trimmers as necessary. Be sure to check for any loose or damaged parts before installing.

10. Replace the trimmers as necessary. Be sure to check for any loose or damaged parts before installing.

11. Replace the trimmers as necessary. Be sure to check for any loose or damaged parts before installing.

12. Replace the trimmers as necessary. Be sure to check for any loose or damaged parts before installing.

13. Replace the trimmers as necessary. Be sure to check for any loose or damaged parts before installing.

14. Replace the trimmers as necessary. Be sure to check for any loose or damaged parts before installing.

15. Replace the trimmers as necessary. Be sure to check for any loose or damaged parts before installing.

16. Replace the trimmers as necessary. Be sure to check for any loose or damaged parts before installing.

17. Replace the trimmers as necessary. Be sure to check for any loose or damaged parts before installing.

18. Replace the trimmers as necessary. Be sure to check for any loose or damaged parts before installing.

19. Replace the trimmers as necessary. Be sure to check for any loose or damaged parts before installing.

20. Replace the trimmers as necessary. Be sure to check for any loose or damaged parts before installing.
**ELECTRICAL PARTS**

<table>
<thead>
<tr>
<th>Diagram Number</th>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>83559</td>
<td>Condenser—mica, 260 mfd.</td>
</tr>
<tr>
<td>2-3-4</td>
<td>85061</td>
<td>Condenser—mica, 51 mfd.</td>
</tr>
<tr>
<td>5</td>
<td>110552</td>
<td>Resistor—carbon, 47,000 ohms, ½ watt</td>
</tr>
<tr>
<td>6</td>
<td>110553</td>
<td>Resistor—carbon, 220,000 ohms, ¼ watt</td>
</tr>
<tr>
<td>7</td>
<td>110554</td>
<td>Resistor—carbon, 1 megohm, ½ watt</td>
</tr>
<tr>
<td>8-10</td>
<td>110570</td>
<td>Resistor—carbon, 2.2 meg., ½ watt</td>
</tr>
<tr>
<td>11</td>
<td>110580</td>
<td>Resistor—carbon, 3.3 meg., ½ watt</td>
</tr>
<tr>
<td>12</td>
<td>119935</td>
<td>Capacitor—Ceramic Tube, .006 mfd.</td>
</tr>
<tr>
<td>13</td>
<td>113118</td>
<td>Condenser—Electrolytic—8 mfd., 150 volt</td>
</tr>
<tr>
<td>14</td>
<td>U-115069</td>
<td>Speaker—P.M. Dynamic (4 in.)</td>
</tr>
<tr>
<td>15</td>
<td>116061</td>
<td>Resistor—600 ohm, ½ watt</td>
</tr>
<tr>
<td>16-17</td>
<td>116640</td>
<td>Condenser—01 mfd., 600 volt</td>
</tr>
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<td>18</td>
<td>116781</td>
<td>Trimmer Condenser</td>
</tr>
<tr>
<td>19-20</td>
<td>116819</td>
<td>Condenser—05 mfd., 600 volt</td>
</tr>
<tr>
<td>21A-21B-21C</td>
<td>117706</td>
<td>Volume Control—1 mfd., with switch</td>
</tr>
<tr>
<td>22A-22B</td>
<td>117707</td>
<td>Condenser—Tuning</td>
</tr>
<tr>
<td>23</td>
<td>117741</td>
<td>Coil—Oscillator</td>
</tr>
<tr>
<td>24</td>
<td>117742</td>
<td>Transformer—2nd I.F.</td>
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<td>25</td>
<td>117743</td>
<td>Transformer—1st I.F.</td>
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<tr>
<td>26</td>
<td>117782</td>
<td>Transformer—Output</td>
</tr>
<tr>
<td>27</td>
<td>U-118280</td>
<td>Cone &amp; Voice Coil Assembly for U-115068 Speaker</td>
</tr>
<tr>
<td>28</td>
<td>117914</td>
<td>Loop Antenna</td>
</tr>
</tbody>
</table>

**MISCELLANEOUS PARTS**

<table>
<thead>
<tr>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>Battery retaining Block</td>
</tr>
<tr>
<td>Button—&quot;OH&quot; Marker</td>
</tr>
<tr>
<td>Cable—for Batteries</td>
</tr>
<tr>
<td>Cabinet &amp; Back</td>
</tr>
<tr>
<td>Clip—Coil Mounting</td>
</tr>
<tr>
<td>Cord—Dial (Supplied in 4 ft. lengths)</td>
</tr>
<tr>
<td>Drive Drum and pointer assembly</td>
</tr>
<tr>
<td>Dial scale</td>
</tr>
<tr>
<td>Knob—volume</td>
</tr>
<tr>
<td>Knob—tuning</td>
</tr>
<tr>
<td>Loop terminal strip with trimmer &amp; contacts</td>
</tr>
<tr>
<td>Plug—2 prong Male</td>
</tr>
<tr>
<td>Plug—3 prong Male</td>
</tr>
<tr>
<td>Nut—8-32 Wing Nut</td>
</tr>
<tr>
<td>Retaining Ring—for drive shaft</td>
</tr>
<tr>
<td>Screw—No. 6 Hex. Rd.</td>
</tr>
<tr>
<td>Screw—Special No. 8-32 x 1½</td>
</tr>
<tr>
<td>Shield—Tube</td>
</tr>
<tr>
<td>Socket (actuator base) small</td>
</tr>
<tr>
<td>Spring—for dial cord tension</td>
</tr>
<tr>
<td>Tuning Shaft</td>
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**SOCKET VOLTAGES**

<table>
<thead>
<tr>
<th>DIAL TUNED TO 540 KC.</th>
</tr>
</thead>
<tbody>
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<td>L5</td>
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<tr>
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<td>83</td>
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**BOTTOM VIEW OF CHASSIS**

<table>
<thead>
<tr>
<th>VOLTAGES MEASURED BETWEEN SOCKET TERMINALS AND CHASSIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>L5—BATTERY = 90 VOLTS</td>
</tr>
</tbody>
</table>

**REAR OF CHASSIS**

**NOTE A:** The bias for the control grid of the 1C5GT tube is —7 volts measured across resistor R5.

**NOTE B:** Due to the high resistance of resistor 7, only a slight deflection will be obtained when using a meter having a resistance of 1000 ohms per volt.
SERVICE DATA for MODEL 03-5A CHASSIS

ALIGNMENT PROCEDURE

FOR ALIGNMENT: An output meter or an accurately calibrated signal generator are required.

1. Connect the output meter across the voice coils or, using a condenser in series, between the plates of the 120Ω output tubes and S as shown on the voltage chart. The more sensitive type should be connected across the voice coil.

2. Connect the sensitive part of the signal generator to the S bus shown on the voltage chart through a 220k ohm condenser and keep it connected to this bus throughout the entire alignment procedure. Failure of this may have adverse results on the oscillator stage. This bus may be the source of errors in the signal generator, or in the sensitivity of the oscilloscope. It may be the source of errors in the signal generator, or in the sensitivity of the oscilloscope.

3. Turn the volume control to the minimum volume position and leave it in this position throughout the entire alignment procedure.

4. To CALIBRATE THE 21A—Remove the chassis from the cabinet and set it on a flat surface (from the front). With the gap in full mesh, the test leads A (just below 150 on the lower frequency end) should be exactly 65.4 inches above the table surface. Next raise the potentiometer set to the position shown in the table. The 65.4 inch division on the ruler (when measured vertically from the upper edge) will be used as the standard for all calibration and alignment.

5. To CALIBRATE THE 21B—Remove the chassis from the cabinet and set it on a flat surface (from the front). With the gap in full mesh, the test leads A (just below 150 on the lower frequency end) should be exactly 65.4 inches above the table surface. Next raise the potentiometer set to the position shown in the table. The 65.4 inch division on the ruler (when measured vertically from the upper edge) will be used as the standard for all calibration and alignment.

6. With the gap in full mesh, the test leads C (just below 150 on the lower frequency end) should be exactly 65.4 inches above the table surface. Next raise the potentiometer set to the position shown in the table. The 65.4 inch division on the ruler (when measured vertically from the upper edge) will be used as the standard for all calibration and alignment.

7. Connect the output meter across the voice coils or, using a condenser in series, between the plates of the 120Ω output tubes and S as shown on the voltage chart. The more sensitive type should be connected across the voice coil.

8. Connect the ground lead of the signal generator to the chassis through a 220k ohm condenser.

9. Turn the "A.C.-D.C. Battery" switch to "A.C.-D.C. Battery" depending upon the source of power being used.

10. Turn the volume control to the minimum volume position and leave it in this position while aligning. The loop antenna must be connected.

11. With the gap in full mesh, the test leads B (just below 150 on the lower frequency end) should be exactly 65.4 inches above the table surface. Next raise the potentiometer set to the position shown in the table. The 65.4 inch division on the ruler (when measured vertically from the upper edge) will be used as the standard for all calibration and alignment.

12. With the gap in full mesh, the test leads C (just below 150 on the lower frequency end) should be exactly 65.4 inches above the table surface. Next raise the potentiometer set to the position shown in the table. The 65.4 inch division on the ruler (when measured vertically from the upper edge) will be used as the standard for all calibration and alignment.

13. With the gap in full mesh, the test leads A (just below 150 on the lower frequency end) should be exactly 65.4 inches above the table surface. Next raise the potentiometer set to the position shown in the table. The 65.4 inch division on the ruler (when measured vertically from the upper edge) will be used as the standard for all calibration and alignment.

14. With the gap in full mesh, the test leads A (just below 150 on the lower frequency end) should be exactly 65.4 inches above the table surface. Next raise the potentiometer set to the position shown in the table. The 65.4 inch division on the ruler (when measured vertically from the upper edge) will be used as the standard for all calibration and alignment.

15. With the gap in full mesh, the test leads B (just below 150 on the lower frequency end) should be exactly 65.4 inches above the table surface. Next raise the potentiometer set to the position shown in the table. The 65.4 inch division on the ruler (when measured vertically from the upper edge) will be used as the standard for all calibration and alignment.

16. With the gap in full mesh, the test leads C (just below 150 on the lower frequency end) should be exactly 65.4 inches above the table surface. Next raise the potentiometer set to the position shown in the table. The 65.4 inch division on the ruler (when measured vertically from the upper edge) will be used as the standard for all calibration and alignment.

17. With the gap in full mesh, the test leads A (just below 150 on the lower frequency end) should be exactly 65.4 inches above the table surface. Next raise the potentiometer set to the position shown in the table. The 65.4 inch division on the ruler (when measured vertically from the upper edge) will be used as the standard for all calibration and alignment.

18. With the gap in full mesh, the test leads B (just below 150 on the lower frequency end) should be exactly 65.4 inches above the table surface. Next raise the potentiometer set to the position shown in the table. The 65.4 inch division on the ruler (when measured vertically from the upper edge) will be used as the standard for all calibration and alignment.

19. With the gap in full mesh, the test leads C (just below 150 on the lower frequency end) should be exactly 65.4 inches above the table surface. Next raise the potentiometer set to the position shown in the table. The 65.4 inch division on the ruler (when measured vertically from the upper edge) will be used as the standard for all calibration and alignment.

20. With the gap in full mesh, the test leads A (just below 150 on the lower frequency end) should be exactly 65.4 inches above the table surface. Next raise the potentiometer set to the position shown in the table. The 65.4 inch division on the ruler (when measured vertically from the upper edge) will be used as the standard for all calibration and alignment.

21. With the gap in full mesh, the test leads B (just below 150 on the lower frequency end) should be exactly 65.4 inches above the table surface. Next raise the potentiometer set to the position shown in the table. The 65.4 inch division on the ruler (when measured vertically from the upper edge) will be used as the standard for all calibration and alignment.

22. With the gap in full mesh, the test leads C (just below 150 on the lower frequency end) should be exactly 65.4 inches above the table surface. Next raise the potentiometer set to the position shown in the table. The 65.4 inch division on the ruler (when measured vertically from the upper edge) will be used as the standard for all calibration and alignment.

23. With the gap in full mesh, the test leads A (just below 150 on the lower frequency end) should be exactly 65.4 inches above the table surface. Next raise the potentiometer set to the position shown in the table. The 65.4 inch division on the ruler (when measured vertically from the upper edge) will be used as the standard for all calibration and alignment.

24. With the gap in full mesh, the test leads B (just below 150 on the lower frequency end) should be exactly 65.4 inches above the table surface. Next raise the potentiometer set to the position shown in the table. The 65.4 inch division on the ruler (when measured vertically from the upper edge) will be used as the standard for all calibration and alignment.

25. With the gap in full mesh, the test leads C (just below 150 on the lower frequency end) should be exactly 65.4 inches above the table surface. Next raise the potentiometer set to the position shown in the table. The 65.4 inch division on the ruler (when measured vertically from the upper edge) will be used as the standard for all calibration and alignment.

26. With the gap in full mesh, the test leads A (just below 150 on the lower frequency end) should be exactly 65.4 inches above the table surface. Next raise the potentiometer set to the position shown in the table. The 65.4 inch division on the ruler (when measured vertically from the upper edge) will be used as the standard for all calibration and alignment.

27. With the gap in full mesh, the test leads B (just below 150 on the lower frequency end) should be exactly 65.4 inches above the table surface. Next raise the potentiometer set to the position shown in the table. The 65.4 inch division on the ruler (when measured vertically from the upper edge) will be used as the standard for all calibration and alignment.

28. With the gap in full mesh, the test leads C (just below 150 on the lower frequency end) should be exactly 65.4 inches above the table surface. Next raise the potentiometer set to the position shown in the table. The 65.4 inch division on the ruler (when measured vertically from the upper edge) will be used as the standard for all calibration and alignment.
03-SB CHASSIS: ALL GROUNDS MARKED "Z" ARE NOT CONNECTED DIRECTLY TO CHASSIS BUT ARE CONNECTED TOGETHER AND GROUNDED TO CHASSIS THROUGH A .2 MFD. CONDENSER (PART NO. 116766).

07-SB CHASSIS: GROUNDS MARKED "Z" CONNECTED DIRECTLY TO CHASSIS.

Not used on some sets, may be added to reduce hum when line buffer condenser is used in case several receivers use same antenna.

Diagram Number Part Number Description
--- --- ---------------
1-3 116745 Clip—coil mounting
4 85286 Condenser—Micro 280 mfd
5 85286 Lamp—dial 6 to 8 volt 25 ampe
6 85286 Condenser—Micro 510 mfd
6-7 80526 Condenser—paper .02 mfd 400 volt
8 80526 Condenser—paper .01 mfd 400 volt
9 80526 Condenser—paper .01 mfd 400 volt (03-SB only)
10 88189 Condenser—paper .05 mfd 00 volt
11 88189 Condenser .05 mfd 150 volt
12 88189 Condenser—paper .04 mfd 400 volt
13 88189 Condenser—paper .01 mfd 400 volt
14 10560 Resistor—carbon 100 ohms 1/4 watt
15 10560 Resistor—carbon 2200 ohms 1/4 watt
16 10560 Resistor—carbon 3.3 meg 1/4 watt
17 11252 Condenser—paper .05 mfd 400 volt
18 11252 Condenser—electrolytic 16 mfd 150 volt
19 11252 Resistor—insulated 470000 ohms
20 11252 /4 watt
21A & 21B 113472 Condenser—variable gangle
22 115055 Transformer—electro dynamic
23 116067 Speaker—8 ohms 1500 watts
24 116332 Transformer—B.F. Choke
25 116532 Resistor—100 ohms 15 watt W.W.
26 116532 Transformer—1st I.F.
27 116674 Transformer—2nd I.F.
28 116674 Transformer—3rd I.F.
29 116674 Transformer—output for U-115055 speaker
30A-30B 116691 Volume control with switch
31 116702 Resistor—140 ohms 1/2 watt W.W.
32 116704 Transformer—antenna
33 116704 Condenser—0.2—600 volts (03-SB only)
34 116704 resistor—33 ohms 1 volt W.W.
35 116732 Felt strip (Grey) behind push buttons

Refer to page 112-1 for table of parts, their numbers and descriptions.

REAR OF CHASSIS

Use a High Resistance Voltmeter of at least 1000 Ohms per Volt.
ALIGNMENT PROCEDURE

1. Connect the output meter across the voice coil or using a 1 mfd condenser in series, connect first the 35L6GT output tube plate to E— as shown on bottom view of chassis.

2. Connect the ground lead of the signal generator through a .05 mfd condenser to the B lug as shown on bottom view of chassis.

3. Turn the volume control to maximum position and push the "Broadcast" button in.

4. The pointer should be in a horizontal position when the gang condenser is in full mesh. If it is not, it will be necessary to remove the dial window by pushing out the clips holding it in place and setting the pointer to the correct position. Be sure that the dial face is in the correct position when this is done.

5. On the 03-SE chassis, remove connector between A and A2.

6. On the 03-SJ chassis, connect the loop making sure the wires are connected to their proper clips on the loop terminal strip and make sure A is connected to A2.

---

**Dummy Ant. in Series with Sig. Gen.**

| 200 MFD Micro-Condenser | Stator lug on large section of variable condenser | 455 KC | Any point where it does not affect signal | 1 | 2nd I.F. | Adjust for maximum output. Then repeat adjustment. |
| 200 MFD Micro Condenser | Antenna Terminal "A" | 455 KC | Any point where it does not affect signal | 3-4 | 1st I.F. |
| 200 MFD Micro Condenser | Antenna Terminal "A" | 1500 KC | Tune to 1500 KC Generator Signal | 7 | 03-SE and 03-SE-WT only | Adjust for maximum output. |

On the 03-SE and 03-SE-WT Chassis only, proceed with this step:

| 200 MFD Micro Condenser | Antenna Terminal "A" | 1500 KC | Tune to 1500 KC Generator Signal | 8 | 03-SJ only | Adjust for maximum output by ear. |

---

A built-in line antenna is incorporated in the 03-SJ chassis models. The 03-SJ uses a loop antenna, both sets have terminals so that an external antenna may be used. To connect an external antenna to one in the sets, remove the connector between A and A2 and connect the antenna to the terminal marked B. Do not make any connection to the terminal marked A2.

It should not be necessary to change the setting of the trimmer on the 03-SJ cabinet back when connecting or removing an external antenna if the set has been properly aligned.

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### ALIGNMENT PROCEDURE

1. Connect the output meter across the voice coil or, using a 0.1 mfd condenser in series, connect between the 35LGT plate and B—
terminal shown on voltage chart.

2. Connect the ground lead of the signal generator to the chassis of the receiver through a .25 mfd condenser and keep it connected in
this manner throughout the entire alignment procedure. Failure to do this may have serious results as one side of the power line may
be grounded in the signal generator. If oscillation or hum occurs, connect the ground lead of the signal generator through a .25
mfd condenser as shown on the Voltage Chart.

3. Remove the connector between terminals A and A, also turn the volume control to the maximum volume position and keep it in this
position throughout the entire alignment procedure.

4. Push the black sliding button on the rear of the chassis to the left (viewed from the rear). This is the position labeled "RADIO."

### MISCELLANEOUS PARTS

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>117460</td>
<td>Back—cabinet for 03-5K3</td>
<td>.08</td>
</tr>
<tr>
<td>117412</td>
<td>Back—cabinet for 03-5K1</td>
<td>.08</td>
</tr>
<tr>
<td>114850</td>
<td>Cabinet for 03-5K1 (Walnut)</td>
<td>1.00</td>
</tr>
<tr>
<td>116338</td>
<td>Cabinet for 03-5K3 (Ivory)</td>
<td>2.75</td>
</tr>
<tr>
<td>112745</td>
<td>Clip—coil mounting</td>
<td>.01</td>
</tr>
<tr>
<td>85231</td>
<td>Connector—for internal antenna</td>
<td>.01</td>
</tr>
<tr>
<td>11556</td>
<td>Decal—Stewart-Warner</td>
<td>.08</td>
</tr>
<tr>
<td>117414</td>
<td>Decal—Majestic</td>
<td>.06</td>
</tr>
<tr>
<td>116556</td>
<td>Insulator—pilot light</td>
<td>.10</td>
</tr>
<tr>
<td>114867</td>
<td>Knob—volume for 03-5K3 (Red)</td>
<td>.08</td>
</tr>
<tr>
<td>114973</td>
<td>Knob—tuning for 03-5K3 (Red)</td>
<td>.45</td>
</tr>
<tr>
<td>114953</td>
<td>Knob—volume for 03-5K1 (Walnut)</td>
<td>.12</td>
</tr>
<tr>
<td>114975</td>
<td>Knob—tuning for 03-5K1 (Walnut)</td>
<td>.45</td>
</tr>
<tr>
<td>116465</td>
<td>Pod—antennas</td>
<td>.03</td>
</tr>
<tr>
<td>85205</td>
<td>Screw—No. 6 Hex. H.d. P.G.</td>
<td>.25</td>
</tr>
<tr>
<td>85204</td>
<td>Screw—No. 8 Hex. H.d.</td>
<td>.01</td>
</tr>
<tr>
<td>116592</td>
<td>Shield—tube</td>
<td>.10</td>
</tr>
<tr>
<td>114876</td>
<td>Socket—octal base</td>
<td>.15</td>
</tr>
<tr>
<td>114882</td>
<td>Socket—for dial lamp</td>
<td>.20</td>
</tr>
<tr>
<td>137383</td>
<td>Terminal Strip (A.A., and Phono)</td>
<td>.20</td>
</tr>
<tr>
<td>174111</td>
<td>Trimout Stud.</td>
<td>.01</td>
</tr>
</tbody>
</table>

### SOCKET VOLTAGES

- **Antenna Grounded:**
  - 125Q7
  - Bottom View of Chassis

- **Socket View of Chassis:**
  - 125Q7
  - 2nd DET-4F-A MC

- **Line Voltage:**
  - 167 Volts
  - Voltage Across Speaker Field 25 Volts

### REMOTE OPERATION

The Stewart-Warner "Majestic," in addition to being a high grade radio receiver, can be used to control one or more radios in the home. This is accomplished by using the triode section of the 35LGT tube as a radio frequency oscillator and modulating the output of this oscillator with the audio frequency output of the 35LGT tube. The D. F. D. T. switch (diagram No. 15) located on the rear of the chassis, switches the output of the 35LGT to the speaker in the "REMOTE" position, and to the remote receiver in the "LOCAL" position.

The modulated radio frequency signal of the remote receiver is connected to the power line by means of the coil, diagram No. 16. Any radio receiver in the home, with a line antenna can tune in this signal. Any section tuned to the "Majestic" will be heard on the controlled receiver. The volume may be controlled with the volume control on the "Majestic." The volume control on the controlled receiver should be set to a position between one half and three quarters of the maximum volume position. Usually it should be turned up as far as possible without encountering excessive hum. Frequency control can be improved or hum or noise reduced by reversing the power line plugs of the "Majestic" or the controlled receiver.

The frequency of the remote oscillator can be varied from approximately 340 to 800 Kc. by means of the trimmer on the back of the chassis. This is fixed at 540 Kc. at the factory, but sometimes it may be desirable to change this slightly by adjusting the plug screw located on the back of the chassis. This adjustment must be changed if the controlled receiver does not tune to 540 Kc., or if there is a station you wish to hear near 440 or 1080 Kc. It is also useful for reducing whistles, although it is perfectly normal for the controlled receiver to whistle when the "Majestic" is tuned to its own control frequency or to a harmonic of that frequency.

Photograph operation may be had on either direct or remote operation by connecting the leads to a record player to the "PHONO" terminals, turning the volume control to minimum volume position with current on, and controlling the volume by means of the volume control on the record player.

### LINE ANTENNA ADAPTER

Any type of radio may be controlled by the "Majestic," but if it does not have a line antenna, a Stewart-Warner Line Antenna Attachment Unit (Part No. 117643) should be used. The Line Antenna Attachment Unit allows any standard receiver to operate either with or without an external antenna. The Line Antenna Attachment Unit is also used in inducting other radios which have a large buffer condenser and thus effectively short circuit the remote control signal on the power line. A Line Antenna Attachment Unit connected to each radio in the house will improve remote operation to a great extent.

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ALIGNMENT PROCEDURE FOR 03-5R and 07-5R CHASSIS

FOR ALIGNMENT: An output meter and an accurately calibrated signal generator with a tuning range from 455 KC to 7 MC are required.

1. Connect the output meter across the voice coil or, using a .1 mfd. condenser in series, connect as follows:
   MODEL 03-5R: Between the S6GT plate and B— terminal shown on voltage chart.
   MODEL 07-5R: Between the S6GT plate and chassis.

2. Connect the ground lead of the signal generator to the chassis of the receiver through a .25 mfd. condenser and keep it connected in this manner throughout the entire alignment procedure. Failure to do this may have serious results. On one side of the power line may be grounded in the signal generator. If oscillation or hum occurs in the model 03-5R, connect the ground lead of the signal generator through a .25 mfd. condenser to B—as shown on the Voltage Chart.

3. Turn the volume control to the maximum volume position and keep it in this position throughout the alignment procedure.

4. Be sure the loop is connected as shown below and that IT IS IN THE SAME RELATIVE POSITION IT OCCUPIES WHEN IN THE CABINET.

5. The pointer should be set to 540 KC with gang in full mesh.

<table>
<thead>
<tr>
<th>Dummy Ant. in Series with Sig. Gen.</th>
<th>Connection of Sig. Generator Output to Receiver</th>
<th>Signal Generator Frequency</th>
<th>Band Switch Position</th>
<th>Receiver Dial Setting</th>
<th>Trimmer Number</th>
<th>Trimmer Description</th>
<th>Type of Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>200 MMFD. Condenser</td>
<td>Log on Rear Section of Gang Cond.</td>
<td>455 KC</td>
<td>Broadcast</td>
<td>Any Point Where It Does Not Affect the Signal</td>
<td>1-2</td>
<td>2nd I.F.</td>
<td>Adjust for Maximum Output. Then Re-</td>
</tr>
<tr>
<td>400 OHM Carbon Resistor</td>
<td>External Aerial Terminal</td>
<td>6 MC</td>
<td>Foreign</td>
<td>6 MC</td>
<td>5</td>
<td>Foreign Oscillator</td>
<td>Adjust for Maximum Output. Check to see if Proper Peak was Obtained by Tuning in Image at Approx. 5.1 MC. If Image does not appear, Realign at 6 MC, with Trimmer Screw farther out. Redcheck Image.</td>
</tr>
<tr>
<td>400 OHM Carbon Resistor</td>
<td>External Aerial Terminal</td>
<td>6 MC</td>
<td>Foreign</td>
<td>Tune to 6 MC Generator Signal</td>
<td>6*</td>
<td>Foreign Antenna</td>
<td>Adjust for Maximum Output.</td>
</tr>
<tr>
<td>200 MMFD. Micro Condenser</td>
<td>External Aerial Terminal</td>
<td>1500 KC</td>
<td>Broadcast</td>
<td>1500 KC</td>
<td>7</td>
<td>Broadcast Oscillator (Shunt)</td>
<td>Adjust for Maximum Output.</td>
</tr>
<tr>
<td>200 MMFD. Micro Condenser</td>
<td>External Aerial Terminal</td>
<td>1500 KC</td>
<td>Broadcast</td>
<td>Tune to 1500 KC Generator Signal</td>
<td>8*</td>
<td>Broadcast Antenna</td>
<td>Adjust for Maximum Output.</td>
</tr>
<tr>
<td>200 MMFD. Micro Condenser</td>
<td>External Aerial Terminal</td>
<td>600 KC</td>
<td>Broadcast</td>
<td>Tune to 600 KC Generator Signal</td>
<td>9</td>
<td>Broadcast Oscillatet (Series)</td>
<td>Adjust for Maximum Output. Try to Increase Output by Detuning Trimmer and Retuning Receiver Dial until Maximum Output is Obtained.</td>
</tr>
</tbody>
</table>

*NOTE: After chassis and loop are in cabinet, realign trimmer No. 6 at 6 MC, then trimmer No 8 at 1500 KC. The generator lead placed near the loop will usually give sufficient signal.

FASTENING DIAL WINDOW

If the dial window on a plastic cabinet comes loose, it can easily be fastened in place with speaker cement after removing the chassis from cabinet.

Before fastening the window, it is advisable to roughen the surface of the cabinet with a file or rough sandpaper so that the cement will adhere properly.

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>112745</td>
<td>Clip—coil mounting</td>
<td>$0.01</td>
</tr>
<tr>
<td>116948</td>
<td>Cord—dial (supplied in 6 ft. lengths)</td>
<td>.18</td>
</tr>
<tr>
<td>116990</td>
<td>Dial scale (Chassis not stamped with letter on back)</td>
<td>.07</td>
</tr>
<tr>
<td>119771</td>
<td>Dial scale (Chassis stamped &quot;S&quot; on back)</td>
<td>.07</td>
</tr>
<tr>
<td>119047</td>
<td>Dial window</td>
<td>.15</td>
</tr>
<tr>
<td>119011</td>
<td>Pointer</td>
<td>.08</td>
</tr>
<tr>
<td>85040</td>
<td>Screw—self tapping 8x1/4</td>
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<tr>
<td>85040</td>
<td>Screw—No. 8 Hex. H.d.</td>
<td>.35</td>
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<tr>
<td>118533</td>
<td>Shunt—tuning</td>
<td>.15</td>
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<tr>
<td>116900</td>
<td>Socket—small octal base</td>
<td>.12</td>
</tr>
<tr>
<td>116008</td>
<td>Socket—pilot light</td>
<td>.22</td>
</tr>
<tr>
<td>111981</td>
<td>Spring—for dial cord tension</td>
<td>.53</td>
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</table>

CABINETS

<table>
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<th>Description</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>119036</td>
<td>Cabinet (walnut) complete with dial window (03-5R, 07-5R)</td>
<td>2.25</td>
</tr>
<tr>
<td>119038</td>
<td>Cabinet (ivory) complete with dial window (03-5R, 07-5R)</td>
<td>3.00</td>
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<tr>
<td>119150</td>
<td>Cabinet (03-5R, 07-5R)</td>
<td>7.20</td>
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<tr>
<td>119151</td>
<td>Cabinet (03-5R, 07-5R)</td>
<td>9.60</td>
</tr>
<tr>
<td>119152</td>
<td>Cabinet (03-5R, 07-5R)</td>
<td>9.60</td>
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CABINET BACKS

<table>
<thead>
<tr>
<th>Part No.</th>
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</tr>
</thead>
<tbody>
<tr>
<td>119384</td>
<td>Cabinet back (walnut) with ant. term. and trimmers (03-5R, 07-5R)</td>
<td>.90</td>
</tr>
<tr>
<td>119385</td>
<td>Cabinet back (walnut) with ant. term. and trimmers (03-5R, 07-5R)</td>
<td>1.30</td>
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<tr>
<td>119172</td>
<td>Cabinet back (03-5R, 07-5R)</td>
<td>1.30</td>
</tr>
<tr>
<td>119173</td>
<td>Cabinet back only (03-5R, 07-5R)</td>
<td>1.30</td>
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</table>

KNOBS

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
<th>List Price</th>
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</thead>
<tbody>
<tr>
<td>119013</td>
<td>Knob (walnut) (03-5R, 07-5R)</td>
<td>.10</td>
</tr>
<tr>
<td>119038</td>
<td>Knob (red) (03-5R, 07-5R)</td>
<td>.10</td>
</tr>
<tr>
<td>119058</td>
<td>Knob (tan) (03-5R, 07-5R)</td>
<td>.10</td>
</tr>
<tr>
<td>118175</td>
<td>(03-5R, 07-5R)</td>
<td>.10</td>
</tr>
</tbody>
</table>
ELECTRICAL PARTS

Diagram | Part Number | Description | List
--- | --- | --- | ---
27 | 119497 | Condenser—07 mfd. 600 volts | .12
26 | 118003 | Condenser—insulated 680 ohms ¼ watt | .15
29A | 119011 | Condenser—electrolytic—20-20 mfd. 150 volt | .75
30 | 119915 | Cabinet back and loop antenna complete (03-S51) | 1.65
31 | 118916 | Coil—oscillator | .50
32 | 118919 | Condenser—paddiing | .40
33A | 119820 | Trimmer strip (2 sect.) | .30
34 | 118985 | Transformer—output for R-115085 speaker | 1.00
35 | 118999 | Case & Voice coil for R-115085 speaker | 1.70
36 | 119042 | Transformer—1st I.F. | 1.10
37 | 119081 | Transformer—2nd I.F. | 1.00
38A | 119084 | Gong condenser & push button unit | 3.00
39A | 119085 | Range switch | .50
40A | 119086 | Volume control—1 meg. (wih switch) | 1.00
41A-41B | 119128 | Condenser—trimmer for loop antenna | .35
42 | 119055 | Condenser—220,000,000 ohms ¼ watt (on underwriten's approved sets only) | .12

SOCKET VOLTAGES

VOLUME ON FULL WITH NO SIGNAL

DIAL TUNED TO 540 KC

<table>
<thead>
<tr>
<th>Socket</th>
<th>Voltages Measured</th>
<th>Between Socket Terminals and B-Lug</th>
<th>Line Voltage 517 Volts</th>
</tr>
</thead>
<tbody>
<tr>
<td>50L6GT</td>
<td>25 watts</td>
<td>1/4 watt</td>
<td></td>
</tr>
<tr>
<td>12SA7</td>
<td>1/4 watt</td>
<td>100 ohms</td>
<td></td>
</tr>
<tr>
<td>12SK7</td>
<td>1/4 watt</td>
<td>100 ohms</td>
<td></td>
</tr>
</tbody>
</table>

BOTTOM VIEW OF CHASSIS

REAR OF CHASSIS

Use a High Resistance Voltmeter of at Least 1000 Ohms per Volt.

NOTE A: The reading on this plate will be small because of the high resistance of resistor No. 10.
ALIGNMENT PROCEDURE FOR 03-5S CHASSIS

1. Connect the output meter across the voice coil or from the plate of the 5614GT output tube to B— through a .1 mfd. condenser. (The more sensitive type should be connected across the voice coil.)
2. Connect the output lead of the signal generator to the receiver chassis through a .25 mfd. condenser.
3. Turn the volume control to the maximum volume position and keep it in this position throughout the alignment procedure.
4. Be sure the loop is properly connected at all times, AND THAT IT IS IN THE SAME RELATIVE POSITION TO THE CHASSIS AS WHEN IN THE CABINET.
5. Set the dial pointer to read 440 KC with the gang in full mesh.

<table>
<thead>
<tr>
<th>Dummy Ant. in Series with Sig. Gen.</th>
<th>Connection of Sig. Generator Output to Receiver</th>
<th>Signal Generator Frequency</th>
<th>Band Switch Position</th>
<th>Receiver Dial Setting</th>
<th>Trimmer Number</th>
<th>Trimmer Description</th>
<th>Type of Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>.1 MFD Condenser</td>
<td>Green Wire Lead to Loop</td>
<td>455 KC</td>
<td>Broadcast</td>
<td>Any Point Where It Does Not Affect the Signal</td>
<td>1-2</td>
<td>2nd I.F.</td>
<td>Adjust for Maximum Output. Then Repeat Adjustment.</td>
</tr>
<tr>
<td>400 OHM Carbon Resistor</td>
<td>Antenna Terminal on Cabinet Back</td>
<td>6 MC</td>
<td>Foreign</td>
<td>6MC</td>
<td>5</td>
<td>Foreign Oscillator</td>
<td>Adjust for Maximum Output. Check to see if Proper Peak was Obtained by turning in loop at Appox. 5.1 MC. If Image does not appear, realign at 6 MC, with Trimmed Screw farther out. Recheck images.</td>
</tr>
<tr>
<td>400 OHM Carbon Resistor</td>
<td>Antenna Terminal on Cabinet Back</td>
<td>6 MC</td>
<td>Foreign</td>
<td>Tuno to 6MC Generator Signal</td>
<td>6#</td>
<td>Foreign Antenna</td>
<td>Adjust for Maximum Output. Try to Increase Output by Detuning Trimmer and Retuning Receiver Dial until Maximum Output is Obtained.</td>
</tr>
<tr>
<td>200 MFD. Micro Condenser</td>
<td>Antenna Terminal on Cabinet Back</td>
<td>1500 KC</td>
<td>Broadcast</td>
<td>1500 KC</td>
<td>7</td>
<td>Broadcast Oscillator (Shunt)</td>
<td>Adjust for Maximum Output.</td>
</tr>
<tr>
<td>200 MFD. Micro Condenser</td>
<td>Antenna Terminal on Cabinet Back</td>
<td>1500 KC</td>
<td>Broadcast</td>
<td>Tune to 1500 KC Generator Signal</td>
<td>8#</td>
<td>Broadcast Antenna</td>
<td>Adjust for Maximum Output.</td>
</tr>
<tr>
<td>200 MFD. Micro Condenser</td>
<td>Antenna Terminal on Cabinet Back</td>
<td>600 KC</td>
<td>Broadcast</td>
<td>Tune to 600 KC Generator Signal</td>
<td>9</td>
<td>Broadcast Oscillator [Series End]</td>
<td>Adjust for Maximum Output. Try to Increase Output by Detuning Trimmer and Retuning Receiver Dial until Maximum Output is Obtained.</td>
</tr>
</tbody>
</table>

*After chassis and loop are in cabinet, realign trimmer No. 8 at 6 MC, then trimmer No. 9 at 1500 KC, using a weak signal. The signal generator lead placed near the loop will usually give sufficient signal.

MISCELANEOUS PARTS

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>118915</td>
<td>Cabinet Back assembly complete (03-SS)</td>
<td>$1.65</td>
</tr>
<tr>
<td>116465</td>
<td>Cabinet Back assembly complete (03-SS2)</td>
<td>$1.65</td>
</tr>
<tr>
<td>115129</td>
<td>Call tabs &amp; instruction sheets</td>
<td>.40</td>
</tr>
<tr>
<td>117245</td>
<td>Clip—coil mounting</td>
<td>.01</td>
</tr>
<tr>
<td>115794</td>
<td>Clip—dial scale retaining</td>
<td>.12</td>
</tr>
<tr>
<td>113178</td>
<td>Cord—dial—(supplied in 4 ft. length)</td>
<td>.30</td>
</tr>
<tr>
<td>119080</td>
<td>Dial scale</td>
<td>.12</td>
</tr>
<tr>
<td>119044</td>
<td>Escutcheon—push button</td>
<td>.38</td>
</tr>
<tr>
<td>118913</td>
<td>Knob—range switch, tuning, or volume</td>
<td>.10</td>
</tr>
<tr>
<td>118929</td>
<td>Pointer shaft &amp; pulley</td>
<td>.12</td>
</tr>
<tr>
<td>115069</td>
<td>Pointer</td>
<td>.12</td>
</tr>
<tr>
<td>119089</td>
<td>Push button</td>
<td>.12</td>
</tr>
<tr>
<td>84241</td>
<td>Retaining ring for shaft’s or dial drum</td>
<td>.02</td>
</tr>
<tr>
<td>81145</td>
<td>Retaining ring for drive shaft</td>
<td>.02</td>
</tr>
<tr>
<td>113672</td>
<td>Rubber grommet (on tuning shaft)</td>
<td>.50</td>
</tr>
<tr>
<td>83624</td>
<td>Screw—self tapping 8 x 1/4”</td>
<td>.01</td>
</tr>
<tr>
<td>85040</td>
<td>Screw—No. 6 Hex. Hd.</td>
<td>.35</td>
</tr>
<tr>
<td>114314</td>
<td>Screw for mounting escutcheon</td>
<td>.15</td>
</tr>
<tr>
<td>116696</td>
<td>Socket—small octal base</td>
<td>.12</td>
</tr>
<tr>
<td>115793</td>
<td>Socket—pilot light</td>
<td>.40</td>
</tr>
<tr>
<td>115177</td>
<td>Spring—dial cord tension</td>
<td>.09</td>
</tr>
<tr>
<td>119187</td>
<td>Spring for push button tuner</td>
<td>.05</td>
</tr>
<tr>
<td>119186</td>
<td>Strap (fabric, including rivets, and washers for push button tuner)</td>
<td>.09</td>
</tr>
<tr>
<td>84412</td>
<td>Terminal strip—(Phono-Tele.)</td>
<td>.03</td>
</tr>
<tr>
<td>118931</td>
<td>Tuning shaft</td>
<td>.15</td>
</tr>
<tr>
<td>111456</td>
<td>Washer—spring washer</td>
<td>.50</td>
</tr>
<tr>
<td>116550</td>
<td>Washer for back of knobs</td>
<td>.005</td>
</tr>
<tr>
<td>116414</td>
<td>Window for dial</td>
<td>.25</td>
</tr>
</tbody>
</table>

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Compliments of www.nucow.com
FOR ALIGNMENT: An output meter and an accurately calibrated signal generator are required.

1. Connect the output meter across the voice coil, or using a .1 mfd. condenser in series connect between the 25L6GT tube plate and B—as shown on the voltage chart.

2. Connect the ground lead of the signal generator through a .25 mfd. condenser to B—as shown on the voltage chart.

3. Connect the loop antenna to the radio, being sure to connect the wires to the proper receptacles on the loop antenna as shown in drawing below.

4. With the gang condenser in full mesh, the pointer should be in a horizontal position. If is not, it should be moved to this position before alignment.

<table>
<thead>
<tr>
<th>Dummy Ant.</th>
<th>Connection of Big. Generator</th>
<th>Signal Generator Frequency</th>
<th>Push Button Position</th>
<th>Receiver Dial Setting</th>
<th>Trimmer Number</th>
<th>Trimmer Description</th>
<th>Type of Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>in Series with</td>
<td>Output to Receiver</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>200 MMFD. Micro</td>
<td>Lug on Rear Section of Variable Condenser</td>
<td>455 KC</td>
<td>&quot;Broadcast&quot; button pushed in</td>
<td>Any point where it does not affect the signal</td>
<td>1-2</td>
<td>2nd I.F.</td>
<td>Adjust for Maximum Output. Then repeat adjustment.</td>
</tr>
<tr>
<td>Condenser</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>200 MMFD. Micro</td>
<td>External Aerial Terminal</td>
<td>6 MC</td>
<td>&quot;Short Wave&quot; button pushed in</td>
<td>6 MC</td>
<td>5</td>
<td>Short Wave Oscillator</td>
<td>Adjust for Maximum Output. Check to see if Proper Peak was obtained by tuning in image at approx. 5.1 MC. If image does not appear, readjust at 6 MC, with trimmer screw farther out. Retake image.</td>
</tr>
<tr>
<td>Condenser</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>200 MMFD. Micro</td>
<td>External Aerial Terminal</td>
<td>6 MC</td>
<td>&quot;Short Wave&quot; button pushed in</td>
<td>Tune to 6 MC generator signal</td>
<td>6*</td>
<td>Short Wave Antenna</td>
<td>Adjust for Maximum Output.</td>
</tr>
<tr>
<td>Condenser</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>200 MMFD. Micro</td>
<td>External Aerial Terminal</td>
<td>1500 KC</td>
<td>&quot;Broadcast&quot; button pushed in</td>
<td>1500 KC</td>
<td>7*</td>
<td>Broadcast Oscillator (Shunt)</td>
<td>Adjust for Maximum Output.</td>
</tr>
<tr>
<td>Condenser</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>200 MMFD. Micro</td>
<td>External Aerial Terminal</td>
<td>1500 KC</td>
<td>&quot;Broadcast&quot; button pushed in</td>
<td>Tune to 1500 KC generator signal</td>
<td>8</td>
<td>Broadcast Antenna</td>
<td>Adjust for Maximum Output.</td>
</tr>
<tr>
<td>Condenser</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>200 MMFD. Micro</td>
<td>External Aerial Terminal</td>
<td>600 KC</td>
<td>&quot;Broadcast&quot; button pushed in</td>
<td>Tune to 600 KC generator signal</td>
<td>9*</td>
<td>Broadcast Oscillator (Series)</td>
<td>Adjust for Maximum Output. Try to increase output by adjusting trimmer and retaining receiving dial until a maximum output is obtained.</td>
</tr>
<tr>
<td>Condenser</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*NOTE: When making these adjustments, the loop should be in the same relative position to the chassis as when mounted in the cabinet. Adjustments 6 & 8 should be repeated after the set and loop have been replaced in the cabinet.
ANTENNA COMPENSATOR ADJUSTMENT

The antenna compensator must be adjusted after the installation of the receiver has been completed in order to make the receiver to the antenna. If this adjustment is made for an old automobile, the aerial must be taken so that the aerial and the transistors are clean and free from mud or dust which would alter the capacity and resistance. A more accurate adjustment is possible if the aerial and its insulators are cleaned and are allowed to dry before making adjustment.

The adjustment is to be made as follows:
(a) Carefully tune the receiver to some steady weak signal between 500 and 900 Kc.
(b) Remove the trimmer knob adjacent to the antenna jack. (Covers trimmer No. 6).
(c) Adjust the antenna compensator, trimmer No. 6 for maximum output. Carefully tune the receiver to the signal, then again adjust the compensator.

REPLACING DIAL CORDS

01-6G & 01-6G-Z

Proper drum position with variable condenser fully meshed.

TO REPLACE THE TUNING DRIVE CORD

1. 25% inches of dial drive cord (part No. 117057) are required. Make a one-inch loop in each end of this cord, using a dial cord clip (part No. 114955) (See sketch above for detail of loop). A knot may be tied if a slightly smaller loop is made.
2. Fasten one end of a tension spring (part No. 111777) to the loop at point B and the other end of the spring to tab A.
3. Pass the other end of the dial cord through hole C in the outer drum.
4. Make one end of a half turn of the cord about tuning shaft D.
5. Continue the cord counter-clockwise about the outer drum and pass it through hole E.
6. Fasten a tension spring (part No. 111777) to the other loop of the cord at point F and fasten the spring to the tab G.

TO REPLACE THE POINTER DRIVE CORD

1. 34% inches of pointer drive cord (part No. 118944) are required. Fasten on eyelet (part No. 8644) at a point one-half inch from one end of this cord.
2. Pass the other end of the cord outward through hole H in the smaller drum.
3. Position a one-inch loop at outer end of the pointer cord (See detail of loop in illustration), using a dial cord clip (part No. 114955) or a tie a knot using a smaller loop.
4. Continue the cord clockwise around the smaller drum and around pulley I from the rear to the front.
5. Go from pulley I around the front of pulley J and clockwise around the smaller drum to hole M.
6. Pass the loop through hole M and fasten it to one end of a tension spring (part No. 112177) at point K, the other end of the spring then being fastened to point L.
7. Clip the dial pointer to the cord. With the drum in the position shown, and with the gang condenser in full mesh, fasten the pointer so that it is at a point 2½ inches from the left end of the brown dial plate.
STROMBERG-CARLSON TEL. MFG. CO.

MODELS 400H, 400HB, 400N, 400NB, 400S, 400SB
Schematic, Chassis Wiring

IDENTIFICATION TABLE

<table>
<thead>
<tr>
<th>Model</th>
<th>Input Power Frequency</th>
<th>Chassis</th>
<th>Cabinet</th>
<th>Speaker</th>
</tr>
</thead>
<tbody>
<tr>
<td>400-H</td>
<td>50-60 Cycles</td>
<td>30107</td>
<td>30109</td>
<td>30137</td>
</tr>
<tr>
<td>400-HB</td>
<td>25-60 Cycles</td>
<td>30108</td>
<td>30109</td>
<td>30137</td>
</tr>
<tr>
<td>400-N</td>
<td>50-60 Cycles</td>
<td>30107</td>
<td>30547</td>
<td>30137</td>
</tr>
<tr>
<td>400-NB</td>
<td>25-60 Cycles</td>
<td>30108</td>
<td>30547</td>
<td>30137</td>
</tr>
<tr>
<td>400-S</td>
<td>50-60 Cycles</td>
<td>30107</td>
<td>30548</td>
<td>30137</td>
</tr>
<tr>
<td>400-SB</td>
<td>25-60 Cycles</td>
<td>30108</td>
<td>30548</td>
<td>30137</td>
</tr>
</tbody>
</table>

Input Power Rating ............................................. 37 Watts
Intermediate Frequency ........................................... 455 Kilocycles
Speaker Voice Coil Impedance at 400 Cycles ..................... Approximately 5 Ohms
Speaker Field Coil Resistance ................................ 1800 Ohms

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Take all D.C. voltage readings on the 500 volt scale except where an asterisk appears. Take all readings with chassis operating and tuned to 1000 kc.—no signal. Use a line voltage of 120 volts or make allowance for the variation. Read from indicated socket terminals to chassis base. A.C. Voltages are indicated by italics.

<table>
<thead>
<tr>
<th>Tube</th>
<th>Circuit</th>
<th>Cap 1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>6AS8</td>
<td>Med.—Osc.</td>
<td>0</td>
<td>0</td>
<td>+175</td>
<td>+82</td>
<td>—</td>
<td>+100</td>
<td>6.3</td>
<td>+2*</td>
</tr>
<tr>
<td>6K7</td>
<td>I.F. Amp.</td>
<td>0</td>
<td>0</td>
<td>+175</td>
<td>+65</td>
<td>+2*</td>
<td>—</td>
<td>6.3</td>
<td>+2*</td>
</tr>
<tr>
<td>6SQ7</td>
<td>Dem.—A. V. C.</td>
<td>—</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>+75</td>
<td>6.3</td>
</tr>
<tr>
<td>6V6G</td>
<td>Output</td>
<td>—</td>
<td>0</td>
<td>0</td>
<td>+160</td>
<td>+175</td>
<td>0</td>
<td>+75</td>
<td>6.3</td>
</tr>
<tr>
<td>80</td>
<td>Rectifier</td>
<td>—</td>
<td>505</td>
<td>255</td>
<td>+205</td>
<td>—</td>
<td>5</td>
<td>—</td>
<td>1.4</td>
</tr>
</tbody>
</table>

*Read on lowest possible scale of voltmeter.

CONTINUITY TEST

CAUTION: Remove all tubes and disconnect the receiver from the power supply before making continuity test. Use a good meter capable of measuring accurately up to several megohms. The resistance given are often approximate, owing to Electrolytic Capacitors in the circuit. When this is the case, be sure to reverse the test leads and read the highest resistance. Read from indicated terminals to chassis base except when an asterisk appears.

### TERMINALS OF SOCKETS

<table>
<thead>
<tr>
<th>Tube</th>
<th>Circuit</th>
<th>Cap 1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>6AS8</td>
<td>Med.—Osc.</td>
<td>S</td>
<td>S</td>
<td>*1000</td>
<td>*2600</td>
<td>2200</td>
<td>2400</td>
<td>5</td>
<td>10F</td>
</tr>
<tr>
<td>6K7</td>
<td>I.F. Amp.</td>
<td>L1M</td>
<td>S</td>
<td>S</td>
<td>*10000</td>
<td>*120000</td>
<td>18000</td>
<td>1500</td>
<td>1.5M</td>
</tr>
<tr>
<td>6SQ7</td>
<td>Dem.—A. V. C.</td>
<td>—</td>
<td>S</td>
<td>10M</td>
<td>S</td>
<td>50000</td>
<td>50000</td>
<td>210000</td>
<td>S</td>
</tr>
<tr>
<td>6V6G</td>
<td>Output</td>
<td>S</td>
<td>S</td>
<td>*200000</td>
<td>*18000</td>
<td>30000</td>
<td>300000</td>
<td>52000</td>
<td>S</td>
</tr>
<tr>
<td>80</td>
<td>Rectifier</td>
<td>1M</td>
<td>2M</td>
<td>2M</td>
<td>2M</td>
<td>2M</td>
<td>2M</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*These readings are as follows: S—closed; L—megohm; S—short; O—open.

Other Tests Not Shown on Chart

Antenna terminal to chassis base: 70 ohms. Ground terminal to chassis base: "short". Between terminals of A.C. plug: "open" with A.C. switch open; 17 ohms with A.C. switch closed. R.F. coil tests, measured directly across R.F. coil terminals (see wiring diagram on Page 5 for location of R.F. coil terminals): 1.5—70 ohms; 1.5—4 ohms; 1.5—3 ohms; 4—1 ohms; 1.7—70 ohms.

ALIGNED INFORMATION

NEVER REALIGN UNLESS ABSOLUTELY NECESSARY.

Use a good modulated signal generator (test oscillator) with variable output voltage and a sensitive output meter across the voice coil of the speaker. Always align using the smallest possible input from the signal generator (except when wave trap adjustments are made). A strong signal makes adjustments inaccurate. Always have receiver volume control "full on". Never align with tone control in bass position.

See Location Chart for location of all the aligning adjustment screws.

### ALIGNING PROCEDURE (follow this order exactly)

1. Dial Pointer Adjustment.
   - With the plates of the gang tuning capacitor fully engaged, set the dial pointer directly on the upper black line at the low frequency end of the dial.
   - Intermediate Frequency Adjustments.
     1. Tune set to extreme low frequency position. (54 megacycles on dial scale).
     2. Connect the ground terminal of the signal generator to the ground binding post of the receiver.
     3. Introduce a modulated signal of 455 kilocycles, using a 0.1 microfarad capacitor in series with the lead from the signal generator to the grid cap of the 6AS8 tube. (Do not remove the grid clip from this tube.)
     4. Adjust the I.F. Attenuator for maximum output in the following order:
        b. Primary of Second I.F. Transformer.
        d. Primary of First I.F. Transformer.
   - Wave Trap Adjustment.
     1. Tune set to 1,000 kilocycles.
     2. Leave the ground terminal of the signal generator connected to the ground binding post of the receiver.
     3. Introduce a fairly strong modulated signal of 455 kilocycles to the antenna binding post using a 200 microfarad capacitor in series with the lead from the signal generator.
     4. Adjust the wave trap aligner for minimum signal.
   - Radio Frequency Adjustments.
     (Leave the signal generator connected in the same way as for the wave trap alignment.)
     1. Set the signal generator's frequency and the receiver's tuning dial to 0.6 megacycles.
     2. Adjust the iron core in the oscillator coil for maximum signal.
     3. Set the signal generator's frequency and the receiver's tuning dial to 1.5 megacycles.
     4. Adjust the two aligning capacitors on the variable capacitor for maximum signal.
     5. Reset both the signal generator's frequency and the receiver's tuning dial to 0.6 megacycles and repeat operation 2.
     6. Reset both the signal generator's frequency and the receiver's tuning dial to 1.5 megacycles and repeat operation 4.

NOTE: Operation 5 and 6 may be repeated as often as necessary to obtain maximum sensitivity.
### Continuity Test

**CAUTION:** Remove all tubes and disconnect the receiver from the batteries before making continuity test.

Use a good meter capable of measuring accurately up to several megohms.

The resistances given are often approximate, owing to Electrolytic Capacitors in the circuit. When this is the case, be sure to reverse the test leads and read the highest resistance.

Read from indicated terminals to chassis base except when an asterisk appears.

#### Terminal Voltages Between Heater Terminals

<table>
<thead>
<tr>
<th>Tube</th>
<th>Circuit</th>
<th>Cap</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>Volts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A7GT</td>
<td>Mod.—Osc.</td>
<td>0.6</td>
<td>0</td>
<td>0</td>
<td>1.4+</td>
<td>38+</td>
<td>35-</td>
<td>-3-</td>
<td>+58</td>
<td>0</td>
<td>2-7</td>
</tr>
<tr>
<td>1N5GT</td>
<td>I. F. Amp.</td>
<td>1.5</td>
<td>0</td>
<td>0</td>
<td>1.4+</td>
<td>38+</td>
<td>38</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2-7</td>
</tr>
<tr>
<td>1H5GT</td>
<td>Dem.—A. V. C.</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1.4+</td>
<td>38+</td>
<td>38</td>
<td>+5.5</td>
<td>0</td>
<td>0</td>
<td>2-7</td>
</tr>
<tr>
<td>1Q5GT</td>
<td>Output</td>
<td></td>
<td>0</td>
<td>0</td>
<td>1.4+</td>
<td>38+</td>
<td>38</td>
<td>+5.5</td>
<td>0</td>
<td>0</td>
<td>2-7</td>
</tr>
</tbody>
</table>

*Read on lowest possible scale of voltmeter.*

#### Terminal Voltages

<table>
<thead>
<tr>
<th>Tube</th>
<th>Circuit</th>
<th>Cap</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A7GT</td>
<td>Mod.—Osc.</td>
<td>4M</td>
<td>4M</td>
<td>4M</td>
<td>10M</td>
<td>1M</td>
<td>1M</td>
<td>22kΩ</td>
<td>1M</td>
<td>S</td>
</tr>
<tr>
<td>1N5GT</td>
<td>I. F. Amp.</td>
<td>1.5M</td>
<td>1M</td>
<td>1M</td>
<td>1M</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>S</td>
<td>O</td>
</tr>
<tr>
<td>1H5GT</td>
<td>Dem.—A. V. C.—Audio</td>
<td>10M</td>
<td>0</td>
<td>10M</td>
<td>1M</td>
<td>3M</td>
<td>10M</td>
<td>80kΩ</td>
<td>O</td>
<td>S</td>
</tr>
<tr>
<td>1Q5GT</td>
<td>Output</td>
<td></td>
<td>0</td>
<td>10M</td>
<td>1M</td>
<td>1M</td>
<td>2.2M</td>
<td>500Ω</td>
<td>O</td>
<td>S</td>
</tr>
</tbody>
</table>

**Symbols used are as follows:** Ω—ohms; M—megohms; S—short; O—open.

#### Other Tests Not Shown on Chart

- Antenna terminal to chassis base; "open".
- Ground terminal to chassis base; "short".
- R.F. coil tests, measured directly across R.F. coil terminals (see wiring diagram for location of R.F. coil terminals): L1—8 ohm; L2—7 ohm; L3—3 ohms.
SPECIAL INSTRUCTIONS

To connect an external antenna and ground or to examine or replace tubes, it is necessary to unscrew the thumb screw located at the right hand side of the loop antenna, and the loop can then be swung outward on its hinge.

Always screw the loop antenna in its proper position when operating the receiver.

For Tuner Data, see that of Model 420 which is the same with the exception of item 2. In the case of Model 405-H, this should read "The stations should be arranged according to frequency with the highest frequency at the top and the lowest frequency at the bottom."
A C Volatges are indicated by italics; when the receiver is operated from a D C power supply, D C voltages will be obtained in place of A C voltages shown.

looking at inside bottom of chassis

<table>
<thead>
<tr>
<th>Tube</th>
<th>Circuit</th>
<th>Cap</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>Volts A.C.</th>
</tr>
</thead>
<tbody>
<tr>
<td>12SA7</td>
<td>Mod.—Osc.</td>
<td>—</td>
<td>0</td>
<td>25</td>
<td>+110</td>
<td>+110</td>
<td>-30</td>
<td>0</td>
<td>38</td>
<td>0</td>
<td>2-7</td>
</tr>
<tr>
<td>12SK7</td>
<td>I. F. Amp.</td>
<td>—</td>
<td>0</td>
<td>12</td>
<td>+3*</td>
<td>0</td>
<td>+3*</td>
<td>+110</td>
<td>25</td>
<td>+110</td>
<td>2-7</td>
</tr>
<tr>
<td>12SQ7</td>
<td>Dem.—A. V. C.</td>
<td>—</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>+40</td>
<td>0</td>
<td>12</td>
<td>7-8</td>
<td>12</td>
</tr>
<tr>
<td>35L6GT</td>
<td>Output</td>
<td>—</td>
<td>0</td>
<td>75</td>
<td>+100</td>
<td>+110</td>
<td>0</td>
<td>38</td>
<td>+7*</td>
<td>2-7</td>
<td>35</td>
</tr>
<tr>
<td>35Z5GT</td>
<td>Rectifier</td>
<td>—</td>
<td>120</td>
<td>+115</td>
<td>+115</td>
<td>+85</td>
<td>+118</td>
<td>2-7</td>
<td>35</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CAUTION: Remove all tubes, disconnect the receiver from the power supply and short the high side of the C-1 Capacitor (Red, Red-white wires) and the heavy bus wire to the chassis base before making continuity test.

Use a good meter capable of measuring accurately up to several megohms.

The resistances given are often approximate, owing to Electrolytic Capacitors in the circuit. When this is the case, be sure to reverse the test leads and read the highest resistance.

Read from indicated terminals to chassis base except when an asterisk appears.

R. F. coil tests, measured directly across R. F. coil terminals (see wiring diagram for location of R. F. coil terminals): L1—1.5 ohms; L2—4 ohms; L3—3 ohms; L12—2 ohm; L13—3 ohm; L14—"short".

<table>
<thead>
<tr>
<th>Tube</th>
<th>Circuit</th>
<th>Cap</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>Volts A.C.</th>
</tr>
</thead>
<tbody>
<tr>
<td>12SA7</td>
<td>Mod.—Osc.</td>
<td>—</td>
<td>S</td>
<td>O</td>
<td>130</td>
<td>130</td>
<td>22000</td>
<td>S</td>
<td>O</td>
<td>1.5M</td>
<td></td>
</tr>
<tr>
<td>12SK7</td>
<td>I. F. Amp.</td>
<td>—</td>
<td>S</td>
<td>O</td>
<td>390</td>
<td>1.5M</td>
<td>390</td>
<td>390</td>
<td>O</td>
<td>150</td>
<td></td>
</tr>
<tr>
<td>12SQ7</td>
<td>Dem.—A. V. C.</td>
<td>—</td>
<td>S</td>
<td>10M</td>
<td>S</td>
<td>600000</td>
<td>600000</td>
<td>270000</td>
<td>S</td>
<td>O</td>
<td></td>
</tr>
<tr>
<td>35L6GT</td>
<td>Output</td>
<td>—</td>
<td>S</td>
<td>O</td>
<td>200</td>
<td>130</td>
<td>550000</td>
<td>1.5M</td>
<td>O</td>
<td>150</td>
<td></td>
</tr>
<tr>
<td>35Z5GT</td>
<td>Rectifier</td>
<td>—</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>130</td>
<td>O</td>
<td>S</td>
<td></td>
</tr>
</tbody>
</table>

Symbols used are as follows: 1—ohms; M—megohms; S—short; O—open.
NOTE: Model 411 is the same as Model 410 up to the input of the 6K7 at points A, B, C and D.

Input Power Rating ........................................... 52 Watts
Intermediate Frequency .................................. 455 Kilocycles
Speaker Voice Coil Impedance at 400 Cycles. Approximately 5 Ohms
Speaker Field Coil Resistance .......................... 1000 Ohms
To obtain the best quality of phonograph reproduction, a Stromberg-Carlson record player is recommended. They are designed for use with this receiver, and are all that is necessary to connect the record player to the single prong socket provided in the chassis; hence any receiver can be used. To control the volume of the receiver, the volume control at the receiver, or (if such is provided) with the volume control on the record player, must be placed between the phonograph pick-up and the chassis.
The dial on this receiver is edge lighted, and for proper illumination it is very important that the dial light be adjusted so that the filament is exactly opposite the edge of the glass.

To make this adjustment simply slide the pilot light socket back and forth on its mounting bracket until maximum illumination is obtained.
FOR ALIGNMENT
SEE INDEX

VOLUME.

OFF-ON-TONE

STATIONS

OSC.
6 MC.

FRONT.

LOOKING AT INSIDE
BOTTOM OF CHASSIS

6F6-G
OUTPUT

SSQ7
DEM. A.V.C.
AUDIO AMP

2MB I.F.
TRANSFORMER

6A8-G
MOD. OSC.

ANT.
6 MC.

ANT.
17 MC.

ANT.
6000 KC.

ANT.
15000 KC.

6K7 I.F.
TRANSFORMER

WAVE TRAP
465 KC.

BACK

80
RECT.

6K7 I.F. AMP

PHONO
JACK

Terminals of Sockets

<table>
<thead>
<tr>
<th>Tube</th>
<th>Circuit</th>
<th>Cap</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>Terminal Numbers</th>
<th>Heater Voltages Between heater terminals</th>
</tr>
</thead>
<tbody>
<tr>
<td>6A8G</td>
<td>Mod.—Osc.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>+260</td>
<td>+100</td>
<td>-</td>
<td>+180</td>
<td>6.5</td>
<td>+3*</td>
<td>2-7</td>
<td>6.5</td>
</tr>
<tr>
<td>6K7</td>
<td>I. F. Amp.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>+260</td>
<td>+100</td>
<td>+3*</td>
<td>+270</td>
<td>6.5</td>
<td>+3*</td>
<td>2-7</td>
<td>6.5</td>
</tr>
<tr>
<td>SSQ7</td>
<td>Dem.—A. V. C.</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>0</td>
<td>—</td>
<td>—</td>
<td>+100</td>
<td>6.5</td>
<td>0</td>
<td>7-8</td>
<td>6.5</td>
</tr>
<tr>
<td>6F6G</td>
<td>Output</td>
<td>—</td>
<td>—</td>
<td>0</td>
<td>+240</td>
<td>+260</td>
<td>—</td>
<td>—</td>
<td>6.5</td>
<td>+15</td>
<td>2-7</td>
<td>6.5</td>
</tr>
<tr>
<td>80</td>
<td>Rectifier</td>
<td>—</td>
<td>+330</td>
<td>315</td>
<td>315</td>
<td>330</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>1-4</td>
<td>5</td>
</tr>
</tbody>
</table>

*Read on lowest possible scale of voltmeter.

TERMINALS OF SOCKETS

<table>
<thead>
<tr>
<th>Tube</th>
<th>Circuit</th>
<th>Cap</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>Terminal Numbers</th>
<th>Heater Voltages Between heater terminals</th>
</tr>
</thead>
<tbody>
<tr>
<td>6A8G</td>
<td>Mod.—Osc.</td>
<td>1.5M</td>
<td>S</td>
<td>S</td>
<td>26,000</td>
<td>85,000</td>
<td>50,000</td>
<td>60,000</td>
<td>S</td>
<td>150%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6K7</td>
<td>I. F. Amp.</td>
<td>1.5M</td>
<td>S</td>
<td>S</td>
<td>25,000</td>
<td>110,000</td>
<td>150%</td>
<td>35,000</td>
<td>S</td>
<td>150%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SSQ7</td>
<td>Dem.—A. V. C.</td>
<td>—</td>
<td>S</td>
<td>10M</td>
<td>S</td>
<td>550,000</td>
<td>550,000</td>
<td>300,000</td>
<td>S</td>
<td>S</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6F6G</td>
<td>Output</td>
<td>—</td>
<td>S</td>
<td>S</td>
<td>25,000</td>
<td>25,000</td>
<td>1M</td>
<td>*</td>
<td>S</td>
<td>400%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>80</td>
<td>Rectifier</td>
<td>—</td>
<td>20,000</td>
<td>250</td>
<td>250</td>
<td>250</td>
<td>250</td>
<td>28,000</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td></td>
</tr>
</tbody>
</table>

Symbols used on chart are as follows: I—ohms; M—megohms; S—short; O—open.

* Tone control in “Treble” position—1 megohm.
Tone control in “Base” position—“short”.

Other Tests Not Shown on Chart
Antenna terminal to chassis base—70 ohms.
Ground terminal to chassis base—“short”.
Phono terminal to chassis base—500,000 ohms.
L3—3 ohms; L4—“short”; L5—“short”; L6—5 ohm; L7—4 ohms; L8—1 ohm; L9—“short”.

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Location Chart

NORMAL VOLTAGE READINGS
Take all readings with chassis operating and tuned to approximately 1000 Kc. — no signal.
Use a line voltage of 120 volts, or make allowance for any slight variation.
Use a good high resistance voltmeter having a resistance of at least 1000 ohms per volt.
Take all D. C. readings on the 500 volt scale except when an asterisk appears.
A. C. voltages are indicated by italics.

<table>
<thead>
<tr>
<th>Tube</th>
<th>Circuit</th>
<th>Cap</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>6A8</td>
<td>Modulator</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>+255</td>
<td>+90</td>
<td>-10</td>
<td>+90</td>
<td>6.3</td>
<td>+2.7</td>
</tr>
<tr>
<td>6J5</td>
<td>Oscillator</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>+155</td>
<td>-10</td>
<td>-6.3</td>
<td>0</td>
<td>2.7</td>
<td>6.3</td>
</tr>
<tr>
<td>6K7</td>
<td>L.F. Amp.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>+255</td>
<td>+100</td>
<td>+2*</td>
<td>-6.3</td>
<td>+2*</td>
<td>2.7</td>
</tr>
<tr>
<td>6F6B</td>
<td>Audio</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>+60</td>
<td>+15</td>
<td>6.3</td>
<td>0</td>
<td>2.7</td>
<td>6.3</td>
</tr>
<tr>
<td>6K6G</td>
<td>Output</td>
<td>—</td>
<td>0</td>
<td>0</td>
<td>+235</td>
<td>+255</td>
<td>-1</td>
<td>-6.3</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>80</td>
<td>Rectifier</td>
<td>—</td>
<td>0</td>
<td>0</td>
<td>+345</td>
<td>359</td>
<td>369</td>
<td>+345</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

*Read on lowest possible scale of voltmeter.
The No. 420-PR Receivers are equipped with a single record phonograph unit using a crystal pick-up in conjunction with a specially equalized circuit. The phonograph unit is designed to play the standard 10 or 12 inch 78 R.P.M. records.

The No. 420-PL Receivers are equipped with an automatic record changer using a crystal pick-up in conjunction with a specially equalized circuit. This record player shifts and plays 10 or 12 inch records.
NORMAL VOLTAGE READINGS

Take all readings with chassis operating and tuned manually to 1000 Kc.—no signal.
Use a line voltage of 120 volts, or make allowance for the variation.
Use a high resistance voltmeter having a resistance of at least 1000 ohms per volt.
Take all D. C. readings on the 50 volt scale except when an asterisk appears.
Read from indicated terminals to chassis base.
See location chart on Page 4 for position of terminals.
A. C. voltages are indicated by italics.
To measure voltages of 6AF6G tube remove the metal cover on the tuning indicator socket and read from indicated terminals.

<table>
<thead>
<tr>
<th>Terminals of Sockets</th>
<th>Heater Voltages Between Heater Terminals</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Tube</th>
<th>Circuit</th>
<th>Cap</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>6AG</td>
<td>Mod.—Osc.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>+255</td>
<td>+99</td>
<td>-175</td>
<td>6.3</td>
<td>+2.5*</td>
</tr>
<tr>
<td>6K7</td>
<td>L. F. Amp.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>+205</td>
<td>+85</td>
<td>-2.5*</td>
<td>+255</td>
<td>6.3</td>
</tr>
<tr>
<td>6H6</td>
<td>Dem.—A. V. C.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>-60</td>
<td>6.3</td>
<td>0</td>
<td>2.7</td>
<td>6.3</td>
</tr>
<tr>
<td>6SQ7</td>
<td>Audio Amp.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>+80</td>
<td>6.3</td>
<td>0</td>
<td>2.7</td>
<td>6.3</td>
</tr>
<tr>
<td>6F6G</td>
<td>Output</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>+295</td>
<td>+257</td>
<td>-313</td>
<td>0</td>
<td>7.8</td>
</tr>
<tr>
<td>6AF6G</td>
<td>Tuning Ind.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>80</td>
<td>+115</td>
<td>+280</td>
<td>-305</td>
<td>0</td>
</tr>
<tr>
<td>80</td>
<td>Rectifier</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>+205</td>
<td>0</td>
<td>0</td>
<td>2.7</td>
</tr>
</tbody>
</table>

*Read on lowest possible scale of voltmeter.

CONTINUITY TEST

CAUTION: Remove all tubes and disconnect the receiver from the power supply before making continuity test.

Use a good meter capable of measuring accurately up to several megohms.
The resistances given are approximate, owing to electrolytic capacitors in the circuit.
When this is the case, be sure to reverse the test leads and read the highest resistance.
Read from indicated terminals to chassis base unless otherwise specified.
See location chart on Page 4 for position and numbering of terminals.

<table>
<thead>
<tr>
<th>Terminals of Sockets</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Tube</th>
<th>Circuit</th>
<th>Cap</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>6AG</td>
<td>Mod.—Osc.</td>
<td>A</td>
<td>S</td>
<td>S</td>
<td>2000 ohm</td>
<td>B</td>
<td>5000 ohm</td>
<td>C</td>
<td>S</td>
<td>150 ohm</td>
</tr>
<tr>
<td>6K7</td>
<td>L. F. Amp.</td>
<td>D</td>
<td>S</td>
<td>S</td>
<td>1800 ohm</td>
<td>E</td>
<td>150 ohm</td>
<td>F</td>
<td>S</td>
<td>150 ohm</td>
</tr>
<tr>
<td>6H6</td>
<td>Dem.—A. V. C.</td>
<td>S</td>
<td>S</td>
<td>G</td>
<td>S</td>
<td>H</td>
<td>28000 ohm</td>
<td>S</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>6SQ7</td>
<td>Audio Amp.</td>
<td>S</td>
<td>10M</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6F6G</td>
<td>Output</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>1900 ohm</td>
<td>1500 ohm</td>
<td>1500 ohm</td>
<td>1500 ohm</td>
<td>O</td>
<td>S</td>
</tr>
<tr>
<td>6AF6G</td>
<td>Tuning Ind.</td>
<td>O</td>
<td>S</td>
<td>S</td>
<td>25000 ohm</td>
<td>190000 ohm</td>
<td>15000 ohm</td>
<td>O</td>
<td>S</td>
<td>6000 ohm</td>
</tr>
<tr>
<td>80</td>
<td>Rectifier</td>
<td>19000 ohm</td>
<td>150 ohm</td>
<td>150 ohm</td>
<td>190000 ohm</td>
<td>O</td>
<td>S</td>
<td>6000 ohm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>80</td>
<td>Speaker Socket</td>
<td>19000 ohm</td>
<td>S</td>
<td>S</td>
<td>80000 ohm</td>
<td>O</td>
<td>O</td>
<td>80000 ohm</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Symbols used on chart are as follows: T—ohms; M—megohms; S—short; O—open.

OTHER TESTS NOT SHOWN ON CHART

Radio-Phone Switch Set To

<table>
<thead>
<tr>
<th>Note</th>
<th>Radio Position</th>
<th>Phone Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1.8M</td>
<td>O</td>
</tr>
<tr>
<td>B</td>
<td>80,000 ohm</td>
<td>1M</td>
</tr>
<tr>
<td>C</td>
<td>50,000 ohm</td>
<td>1M</td>
</tr>
<tr>
<td>D</td>
<td>1.5M</td>
<td>O</td>
</tr>
<tr>
<td>E</td>
<td>100,000 ohm</td>
<td>1M</td>
</tr>
<tr>
<td>F</td>
<td>25,000 ohm</td>
<td>1M</td>
</tr>
<tr>
<td>G</td>
<td>550,000 ohm</td>
<td>O</td>
</tr>
<tr>
<td>H</td>
<td>550,000 ohm</td>
<td>O</td>
</tr>
</tbody>
</table>

Photograph jack terminal to chassis base.
Radio Phonograph switch in Radio position "open".
Antenna terminal to chassis base 70 ohms.
Ground terminal to chassis base "short".
Between terminals of A. C. plug "open" and C. A. switch open, 7 ohms with A. C. switch closed. Terminals of A. C. plug to chassis base "open".
Front terminal of Push Button Unit (orange-white wire) to chassis base.
Radio Phonograph switch in Radio position 1.8M.
Radio Phonograph switch in Phone position "open".
Rear terminal of Push Button Unit (orange wire) to chassis base Range switch in Push Button position "open".
Range switch in Standard Broadcast position (A Band) 120 ohms.
Range switch in Short Wave position (C Band) 120 ohms.


INSTRUCTIONS FOR SETTING UP PUSH BUTTONS

IMPORTANT: The stations selected should be the local or favorite stations which give good reception at all times.
Set up stations in the daytime to avoid unnecessary interference.
Always set the tuning to run for about twenty minutes before setting up stations.
When using the tuning indicator unit when setting up stations in order to determine when the station is exactly in tune.
1. Remove the push button escutcheon by removing the screws and pulling downward and outward.
2. Put the call letters of the selected stations in place above the push button. The stations should be arranged according to frequency with the highest frequency at the right and the lowest frequency at the left. Just as on the dial. (The call letters will be found inside the envelope stapled inside or underneath the cabinet.)
3. Tune in manually the highest frequency station to be set up and note carefully the program being transmitted.
4. Turn the range switch to the push button position and push the highest frequency button, then adjust the large screw over this button until the desired program is heard. (If the proper adjusting screw cannot be reached it will be necessary to turn the station selector control until the screw is accessible through one of the holes in the pulley.)
5. After the large screw is carefully adjusted, adjust the small vernier screw for maximum closing of the tuning indicator. (Be sure the large adjusting screw does not move while turning the vernier screw.)
6. Set up the other five stations in the same manner.
7. Recheck the adjustment of each adjusting screw.
5. Adjust the I.F. Aligners for maximum output in the following order:
   A. Secondary of second I.F. transformer.
   B. Primary of second I.F. transformer.
   D. Primary of first I.F. transformer.

III. Radio frequency adjustments.

Short Wave Range (C Band)
1. Replace the 0.1 microfarad capacitor in series with the output lead of the signal generator with a 200 micro-microfarad capacitor.
2. Set the range switch to the short-wave range position (C Band).
3. Set the signal generator frequency and the receiver tuning dial to 6 megacycles.
4. Adjust the 6 megacycles oscillator and antenna (iron cores) for maximum signal.
5. Set the signal generator frequency and the receiver tuning dial to 17 megacycles.
6. Adjust the 17 megacycles oscillator and antenna aligning capacitors for maximum signal.
7. Repeat operations three and four.
8. Repeat operations five and six.

Standard Broadcast Range (A Band)
1. Replace the 400 ohm carbon type resistor in series with the output lead from the signal generator with a 200 micro-microfarad capacitor.
2. Set the range switch to the Standard Broadcast Range (A Band).
3. Set the signal generator frequency and the receiver tuning dial to 600 Kc.
4. Adjust the 600 Kc. oscillator and antenna (iron cores) for maximum signal.
5. Set the signal generator frequency and the receiver tuning dial to 1500 Kc.
6. Adjust the 1500 Kc. oscillator and antenna aligning capacitors for maximum signal.
7. Repeat operation three and four.
8. Repeat operation five and six.

IV. Wave Trap Adjustment.
(Leave the receiver connected in the same manner as when adjusting the Standard Broadcast Range ("A" Band).)
1. Tune set to 1000 Kc.
2. Set the signal generator frequency to 405 Kc. and introduce a fairly strong modulated signal to the receiver.
3. Adjust the wave trap aligner for minimum signal.

ADJUSTING DIAL LAMP

The dial on this receiver is edge lighted, and for proper illumination it is very important that the dial light be adjusted so that the filament is exactly opposite the edge of the glass.

To make this adjustment simply slide the pilot light socket back and forth on its mounting bracket until maximum illumination is obtained.
NORMAL VOLTAGE READINGS

Take all readings with chassis operating and tuned manually to 1000 Kc.—no signal.

Use a line voltage of 120 volts, or make allowance for the variation.

Use a good high resistance voltmeter having a resistance of at least 1000 ohms per volt.

Take all D. C. readings on the 500 volt scale except when an asterisk appears.

Read from indicated terminals to chassis base.

See location chart for position of terminals.

A. Voltages are indicated by italics.

To measure voltages of 6AF6G tube remove the metal cover on the tuning indicator socket and read from indicated terminals.

### Terminals of Sockets

<table>
<thead>
<tr>
<th>Tube</th>
<th>Circuit</th>
<th>Cap</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>6A8</td>
<td>Mod.—Oct.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>+250</td>
<td>+120</td>
<td>6.5</td>
<td>+3*</td>
<td>2.2</td>
<td>6.5</td>
</tr>
<tr>
<td>6K7</td>
<td>I. F. Amp.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>+250</td>
<td>+120</td>
<td>6.5</td>
<td>+3*</td>
<td>2.2</td>
<td>6.5</td>
</tr>
<tr>
<td>6H6</td>
<td>Dem.—A. V. C.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>6.5</td>
<td>2.2</td>
<td>6.5</td>
<td></td>
</tr>
<tr>
<td>6SQ7</td>
<td>Audio Amp.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>+108</td>
<td>6.5</td>
<td>2.2</td>
<td>6.5</td>
</tr>
<tr>
<td>6SQ7</td>
<td>Audio Inv.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>+108</td>
<td>6.5</td>
<td>2.2</td>
<td>6.5</td>
</tr>
<tr>
<td>6V6G</td>
<td>Output</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>+250</td>
<td>+254</td>
<td>6.5</td>
<td>+14.5</td>
<td>2.2</td>
<td>6.5</td>
</tr>
<tr>
<td>6V6G</td>
<td>Output</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>+250</td>
<td>+254</td>
<td>6.5</td>
<td>+14.5</td>
<td>2.2</td>
<td>6.5</td>
</tr>
<tr>
<td>6AF6G</td>
<td>Tuning Ind.</td>
<td>+109</td>
<td>+110</td>
<td>+110</td>
<td>+110</td>
<td>6.5</td>
<td>2.2</td>
<td>6.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>80</td>
<td>Rectifier</td>
<td>+382</td>
<td>+382</td>
<td>+382</td>
<td>+382</td>
<td>6.5</td>
<td>2.2</td>
<td>6.5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Heater Voltages Between Heater Terminals**

<table>
<thead>
<tr>
<th>Section</th>
<th>Terminal</th>
<th>A.C.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Socket</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>6A8</td>
<td>+120</td>
<td>6.5</td>
</tr>
<tr>
<td>6K7</td>
<td>+120</td>
<td>6.5</td>
</tr>
<tr>
<td>6H6</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6SQ7</td>
<td>+108</td>
<td>6.5</td>
</tr>
<tr>
<td>6SQ7</td>
<td>+108</td>
<td>6.5</td>
</tr>
<tr>
<td>6V6G</td>
<td>+250</td>
<td>+254</td>
</tr>
<tr>
<td>6V6G</td>
<td>+250</td>
<td>+254</td>
</tr>
<tr>
<td>6AF6G</td>
<td>+100</td>
<td>+100</td>
</tr>
<tr>
<td>80</td>
<td>+382</td>
<td>+382</td>
</tr>
</tbody>
</table>

*Read on lowest possible scale of voltmeter.

### CONTINUITY TEST

**CAUTION:** Remove all tubes and disconnect the receiver from the power supply before making continuity test.

Use a good meter capable of measuring accurately up to several megohms.

The resistances given are often approximate, owing to electrolytic capacitors in the circuit.

When this is the case, be sure to reverse the test leads and read the highest resistance.

Read from indicated terminals to chassis base unless otherwise specified.

See location chart for position and numbering of terminals.

### TERMINALS OF SOCKETS

<table>
<thead>
<tr>
<th>Tube</th>
<th>Circuit</th>
<th>Cap</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>6A8</td>
<td>Mod.—Oct.</td>
<td>A</td>
<td>S</td>
<td>S</td>
<td>20000</td>
<td>B</td>
<td>40000</td>
<td>C</td>
<td>S</td>
<td>20000</td>
</tr>
<tr>
<td>6K7</td>
<td>I. F. Amp.</td>
<td>M</td>
<td>S</td>
<td>S</td>
<td>19000</td>
<td>D</td>
<td>39000</td>
<td>S</td>
<td>S</td>
<td>39000</td>
</tr>
<tr>
<td>6H6</td>
<td>Dem.—A. V. C.</td>
<td>—</td>
<td>S</td>
<td>S</td>
<td>50000</td>
<td>S</td>
<td>50000</td>
<td>S</td>
<td>50000</td>
<td></td>
</tr>
<tr>
<td>6SQ7</td>
<td>Audio Amp.</td>
<td>—</td>
<td>10M</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>30000</td>
<td>S</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>6SQ7</td>
<td>Audio Inv.</td>
<td>—</td>
<td>10M</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>30000</td>
<td>S</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>6V6G</td>
<td>Output</td>
<td>—</td>
<td>S</td>
<td>S</td>
<td>16000</td>
<td>16000</td>
<td>16000</td>
<td>16000</td>
<td>16000</td>
<td>16000</td>
</tr>
<tr>
<td>6V6</td>
<td>Output</td>
<td>—</td>
<td>S</td>
<td>S</td>
<td>16000</td>
<td>16000</td>
<td>16000</td>
<td>16000</td>
<td>16000</td>
<td>16000</td>
</tr>
<tr>
<td>80</td>
<td>Rectifier</td>
<td>19000</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>6AF6G</td>
<td>Tun. Ind.</td>
<td>—</td>
<td>O</td>
<td>S</td>
<td>27000</td>
<td>S</td>
<td>10000</td>
<td>S</td>
<td>10000</td>
<td>S</td>
</tr>
<tr>
<td>Speaker</td>
<td>Socket</td>
<td>—</td>
<td>10000</td>
<td>10000</td>
<td>10000</td>
<td>10000</td>
<td>10000</td>
<td>10000</td>
<td>10000</td>
<td></td>
</tr>
</tbody>
</table>

**Symbols used on chart are as follows:** E—ohms; M—megohms; S—short; O—open.
**NORMAL VOLTAGE READINGS**

Take all readings with chassis operating and tuned to approximately 43 megacycles—no signal. Use a line voltage of 120 volts, or make allowance for any slight difference.

Use a good high resistance voltmeter having a resistance of at least 1000 ohms per volt. Take all D.C. readings on the 500 volt scale except when an asterisk appears. Read from indicated terminals to chassis base. See location chart for position of terminals.

A. C. voltages are indicated by italics.

---

**SPECIFICATIONS**

- **Voltage Rating**: 105 to 125 Volts
- **Type of Circuit**: Frequency Modulation—Superheterodyne
- **Tuning Range**: 40 to 44 Megacycles (40,000 to 44,000 Kilocycles)
- **Input Power Rating (120 Volt line)**: 79 Watts
- **Intermediate Frequency**: 2.1 Megacycles (2100 Kilocycles)
- **Speaker Voice Coil Impedance at 400 Cycles**: Approximately 5 Ohms
- **Speaker Field Coil Resistance**: Approximately 550 Ohms

---

**Model** | **Input Power Frequency** | **Chassis** | **Cabinet** | **Speaker**
--- | --- | --- | --- | ---
425-H | 50-60 Cycles | 30315 | 31422 | 31451
425-HB | 25-60 Cycles | 30316 | 31422 | 31451

**TERMINALS OF SOCKETS**

<table>
<thead>
<tr>
<th>Tube</th>
<th>Circuit</th>
<th>Cap</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>6SA7</td>
<td>Osc. and Mod.</td>
<td>—</td>
<td>0</td>
<td>0</td>
<td>+240</td>
<td>+90</td>
<td>0</td>
<td>0</td>
<td>6.3</td>
<td>0</td>
</tr>
<tr>
<td>6AC7 (1852)</td>
<td>1st I. F. Amp.</td>
<td>—</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>+2*</td>
<td>+148</td>
<td>6.3</td>
<td>+230</td>
</tr>
<tr>
<td>6AC7 (1852)</td>
<td>2nd I. F. Amp.</td>
<td>—</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>+2*</td>
<td>+145</td>
<td>6.3</td>
<td>+230</td>
</tr>
<tr>
<td>6SJ7</td>
<td>Limiter</td>
<td>—</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>+50</td>
<td>6.3</td>
</tr>
<tr>
<td>6H6</td>
<td>Demod. (Discr.)</td>
<td>—</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>6.3</td>
<td>0</td>
</tr>
<tr>
<td>6SF5</td>
<td>Audio Amp.</td>
<td>—</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>+90</td>
<td>+245</td>
<td>6.3</td>
<td>0</td>
</tr>
<tr>
<td>6F6G</td>
<td>Output</td>
<td>—</td>
<td>0</td>
<td>0</td>
<td>+230</td>
<td>+245</td>
<td>0</td>
<td>0</td>
<td>6.3</td>
<td>+15*</td>
</tr>
<tr>
<td>80</td>
<td>Rectifier</td>
<td>—</td>
<td>+300</td>
<td>310</td>
<td>320</td>
<td>+300</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>1-4</td>
</tr>
</tbody>
</table>

*Read on lowest possible scale of voltmeter.
CONTINUITY TEST

CAUTION: Remove all tubes and disconnect the receiver from the power supply before making continuity test.

Use a good ohmmeter capable of measuring accurately up to several megohms.

The resistances given are often approximate, owing to Electrolytic Capacitors in the circuit. When this is the case, be sure to reverse the test leads and read the highest resistance.

Read from indicated terminals to chassis base.

<table>
<thead>
<tr>
<th>Tube</th>
<th>Circuit</th>
<th>Cap</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>6SA7</td>
<td>Osc. and Mod.</td>
<td>—</td>
<td>S</td>
<td>S</td>
<td>30000Ω</td>
<td>20000Ω</td>
<td>20000Ω</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>6AC7 (1852)</td>
<td>1st I. F. Amp.</td>
<td>—</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>2Ω</td>
<td>150Ω</td>
<td>27000Ω</td>
<td>S</td>
<td>30000Ω</td>
</tr>
<tr>
<td>6AC7 (1852)</td>
<td>2nd I. F. Amp.</td>
<td>—</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>50000Ω</td>
<td>150Ω</td>
<td>30000Ω</td>
<td>S</td>
<td>30000Ω</td>
</tr>
<tr>
<td>6SJ7</td>
<td>Limiter</td>
<td>—</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>20000Ω</td>
<td>S</td>
<td>18000Ω</td>
<td>S</td>
<td>18000Ω</td>
</tr>
<tr>
<td>6H6</td>
<td>Demod. (Discr.)</td>
<td>—</td>
<td>S</td>
<td>S</td>
<td>90000Ω</td>
<td>S</td>
<td>69000Ω</td>
<td>O</td>
<td>S</td>
<td>18000Ω</td>
</tr>
<tr>
<td>6SF5</td>
<td>Audio Amp.</td>
<td>—</td>
<td>S</td>
<td>10Ω</td>
<td>10M</td>
<td>S</td>
<td>30000Ω</td>
<td>30000Ω</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>6F6G</td>
<td>Output</td>
<td>—</td>
<td>S</td>
<td>S</td>
<td>3000Ω</td>
<td>3000Ω</td>
<td>1M</td>
<td>O</td>
<td>S</td>
<td>400Ω</td>
</tr>
<tr>
<td>80</td>
<td>Rectifier</td>
<td>—</td>
<td>100Ω</td>
<td>30000Ω</td>
<td>3000Ω</td>
<td>100Ω</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

Symbols used are as follows: S—ohms; M—megohms; S—short; O—open.

Other Tests Not Shown on Chart

Antenna terminal to chassis base........... “short”
Ground terminal to chassis base........... “short”
F. M. Sound Output Jack to chassis base 1 megohm

R. F. coil tests measured directly across R. F. coil terminals. (See wiring diagram for location of R. F. coil terminals.)


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MODEL 435M
Schematic (FM)
Chassis Wiring

Wiring and Schematic Diagram
Frequency Modulation

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Compliments of www.nucow.com
**IDENTIFICATION TABLE**

<table>
<thead>
<tr>
<th>Model</th>
<th>435-M</th>
<th>50-60 Cycles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chassis</td>
<td>21451 Amp. Mod.</td>
<td>31482 Freq. Mod.</td>
</tr>
<tr>
<td>Cabinet</td>
<td>31840</td>
<td>30359</td>
</tr>
<tr>
<td>Speaker</td>
<td>6S87 MOD.</td>
<td>45M</td>
</tr>
</tbody>
</table>

**SPECIFICATIONS**

- **Tuning Range**: 40 to 44 Mc. (40,000 to 44,000 kc.)
- **Voltage Rating**: 110 to 125 Volts
- **Type of Conversion**: Superheterodyne with Electric Tunning
- **Input Power Rating**: 140 Watts
- **Intermediate Frequency**: 455 Kilocycles (Amplitude Modulation)
- **Speaker Voice Coil Impedance at 400 Cycles**: Approximately 16 Ohms
- **Speaker Field Coil Resistance**: Approximately 1500 Ohms

**ACCESSORIES**

**ANTENNA**. For best results use a Stromberg-Carlson No. 6 Antenna. This antenna is designed to provide an improved pickup on both the amplitude and frequency modulation bands.

If it is desired, two ordinary antennas may be used, one for amplitude modulation, which should be a straight wire "L" type antenna about 35 feet long, and one for frequency modulation. This latter antenna may be a straight wire about 40 feet in length or of the dipole type with two arms approximately 5 feet in length. The dipole antenna will exhibit a marked directional effect and should be erected as high as possible above the ground and adjusted so as to face the desired frequency modulated stations with best results.

For average reception, a single straight wire antenna may be used for both amplitude and frequency modulation.

The various types of antennas should be connected to the No. 435 Receiver as follows:

1. **STROMBERG-CARLSON NO. 6**
2. **STROMBERG-CARLSON NO. 6**
3. **SEPARATE ANTENNAS**

**PLAYING RECORDS**. To obtain the best quality of phonograph reproduction, a Stromberg-Carlson record player is recommended. They are designed for use with this receiver and all that is necessary is to connect the record player to the single pin plug provided in the chassis, and operate the "Phono" switch located on the back of the chassis to "Phono" position. The volume may be controlled by the control knobs on the front of the receiver and the tone and balance may be controlled by the controls on the record player.

A low impedance pickup is required, but a matching transformer must be placed between the phonograph pickup and the chassis.

**HEADSET ATTACHMENT**. Headphones can be very simply attached to this receiver. Ask for No. 28307 Headset Package Assembly, which comes complete with headphones and installation instructions.

**CASE OF CABINET**. The back of Stromberg-Carlson Cabinets should be painted with the Stromberg-Carlson Cabinet Polish provided. It is available in pint cans, designated as No. 29001.

**NICKS AND SCRATCHES**. Most kinds of nicks and scratches can be repaired quickly and easily by proper use of the No. 29000 Touch-Up Kit. Complete instructions are provided with each kit.

**TOOLS**. Stromberg-Carlson can supply all the tools required for working on these sets. For example:

- SD-29 Phillips Head Screwdriver
- No. 24068 Aligning Tool
- Also pliers, cutters, screwdrivers, etc.

**Location Chart (Amplitude Modulation)**

**Location Chart (Frequency Modulation)**
GENERAL. All aligning adjustments are carefully made at the factory with special equipment which is designed for frequency modulation receivers. The limitations of commercial oscillographs and other ordinary test equipment are such that alignment should not be attempted in the field unless absolutely necessary.

If alignment is attempted, it will not be successful unless the receiver is disassembled and the frequency modulation range is made using an unmodulated signal.

Always have receiver volume control full on.

Important. Before proceeding to align the frequency modulation chassis of this receiver tune the receiver to the highest frequency in this range and mark this point with a pencil on the large pulley of the frequency modulation chassis. Carefully remove the drive cord from this pulley noting the relation of this point marked with the setting of the variable capacitor.

I. Discriminator Adjustment. (Frequency Modulation)

1. Tune the set to the extreme high frequency plate of variable capacitor all the way in.
2. Connect the center "O" microammeter with a short wire to series one half of the discriminator load from ground to the junction of the two 100,000 ohm resistors R-12 and R-13.
3. Connect the ground terminal of the signal generator to the ground terminal of the chassis.
4. Introduce an unmodulated signal of 2100 kilocycles to the grid (terminal No. 4) of the 6AS7 limiter tube using a 0.1 microfarad capacitor in series with the output lead of the signal generator. (Approximately one volt signal is necessary.)
5. Adjust the primary of the discriminator transformer for maximum reading of the microammeter.
6. Move the microammeter and the one megohm resistor from the junction of R-12 and R-13 resistors and connect them across the whole discriminator load (from the high plate to ground).
7. Adjust the secondary of the discriminator transformer for "O" reading of the microammeter.

II. Intermediate Frequency Adjustments. (Frequency Modulation)

Important: All intermediate frequency adjustments are made with the same unmodulated signal of 2100 kilocycles. Each I. F. stage must be adjusted independently and in the order given. Do not make any overall adjustments after each stage is adjusted.

1. Disconnect the jumper wire from the low side of the limiter grid resistor (R-10) and connect the microammeter directly to this wire without using the one megohm resistor.
2. Connect the output lead from the signal generator with the 0.1 microfarad capacitor in series to the grid of the 6AC7 second I. F. tube (Terminal No. 4).
3. Adjust the secondary of the third I. F. transformer for maximum reading of the microammeter.
4. Adjust the primary of the third I. F. transformer for maximum reading of the microammeter.
5. Connect the output lead from the signal generator with the 0.1 microfarad capacitor in series to the grid of the 6AC7 first I. F. tube (Terminal No. 4).
6. Adjust the secondary of the second I. F. transformer for maximum reading of the microammeter.
7. Adjust the primary of the second I. F. transformer for maximum reading of the microammeter.
8. Disconnect the black wire to the antenna coil from the terminal of the 6AS7 modulator tube (terminal No. B) and connect the output lead from the signal generator with a new 0.1 microfarad capacitor in series to this terminal.

10. Adjust the primary of the first I. F. transformer for maximum reading of the microammeter.

III. Radio Frequency Adjustments. (Frequency Modulation)

(Leave the signal generator connected to the grid of the 6AX7, which will be done in the same manner as when adjusting the first I. F. transformer.)
1. Set the signal generator frequency and the receiver tuning dial to 45 megacycles.
2. Adjust the oscillator aligning capacitor located on top of the gang capacitor unit for maximum reading of the microammeter.
3. Remove the output lead and the 0.1 microfarad capacitor in series with it from the grid of the 6GT7 tube and resistor in its original position and replace the microammeter wire which was removed from this terminal.
4. Replace the 0.1 microfarad capacitor in series with the output lead from the signal generator with a new 0.1 microfarad capacitor and connect it to the antenna terminal of the receiver.
5. Adjust the antenna aligning capacitor located on top of the gang capacitor unit for maximum reading of the microammeter and, at the same time, rotate the gang tuning capacitor back and forth through resonance to obtain maximum reading on the microammeter.

IMPORTANT: Do not go back and touch up any adjustments previously made. If the receiver is not in proper alignment after completing the adjustments outlined above, go back and start over again and follow the instructions through to the finish.

6. Re-solder the jumper wire to the low side of the limiter grid resistor (R-10).

IV. Intermediate Frequency Adjustments. (Amplitude Modulation)

1. Set the range switch to Standard Broadcast position.
2. Tune set to extreme low frequency end of the dial.
3. Connect the ground terminal of the signal generator to the ground terminal of the chassis.
4. Introduce a modulated signal of 455 kilocycles to the grid cap of the 6AS7 tube utilizing a 0.1 microfarad capacitor in series with the output lead of the signal generator. (Do not remove the grid clipping from this tube.)
5. Adjust the I. F. Amplifier for maximum output in the following order:
   A. Secondary of the first I. F. transformer.
   B. Primary of second I. F. transformer.
   C. Primary of first I. F. transformer.

V. Radio Frequency Adjustments. (Amplitude Modulation)

Short Wave Range (C Band)
1. Replace the 0.1 microfarad capacitor in series with the output lead from the signal generator with a 0.05 inch carbon type resistor, and connect it to the antenna terminal of the receiver.
2. Set the range switch to the short-wave range (C Band).
3. Set the signal generator frequency and the receiver tuning dial to 6 megacycles.
4. Adjust the 6 megacycles oscillator and antenna tuning (iron cores) for maximum signal.
5. Set the signal generator frequency and the receiver tuning dial to 12 megacycles.
6. Adjust the 12 megacycles oscillator and antenna aligning capacitors for maximum signal.

7. Repeat operations three and four.
8. Repeat operations five and six.

REMOVING THE CHASSIS FROM CABINET

Do not remove the chassis from the shelves; instead, remove the chassis and shelf assembly by taking out the six wood screws from the top shelf and the four wood screws from the bottom shelf, thus removing chassis and shelves as a unit.

ADJUSTING DIAL LAMP

The dial on this receiver is edge lit, and for proper illumination it is important that the facial label be adjusted so that the filament is exactly opposite the edge of the glass. To make this adjustment simply slide the pilot light back and forth until the bright spot on the printing bracket until maximum illumination is obtained.

STROMBERG-CARLSON TEL. MFG. CO.

ALIGNING INFORMATION
NEVER REALIGN UNLESS ABSOLUTELY NECESSARY

Standard Broadcast Range (A Band)
1. Replace the 0.05 inch carbon type resistor in series with the output lead from the signal generator with a 200 micro-microfarad capacitor.
2. Set the range switch to the Standard Broadcast Range (A Band).
3. Set the signal generator frequency and the receiver tuning dial to 600 Kc.
4. Adjust the 600 Kc. oscillator, Hi-Resistor and antenna (iron cores) for maximum signal.
5. Set the signal generator frequency and the receiver tuning dial to 1500 Kc.
6. Adjust the 1500 Kc. oscillator, Hi-Resistor and antenna aligning capacitors for maximum signal.
7. Repeat operations three and four.
8. Repeat operations five and six.

VI. Wave Trap Adjustment.

(Leave the receiver connected in the same manner as when adjusting the Standard Broadcast Range (A Band).
1. Tune set to 1000 Kc.
2. Set the signal generator frequency to 435 Kc. and introduce a fairly strong modulated signal to the receiver.
3. Adjust the wave trap aligner for minimum signal.

FEATURES

SPECIAL CIRCUITS. A tuning indicator having two indicators mounted in the front panel is employed and the station may be easily located by properly utilizing the centering adjusting screws provided. A special test lead identified as SD-70 Screwdriver will help materially in setting up the receiver to automatic tuning.

MANUAL TUNING. Important. When tuning stations manually in the Standard Broadcast or Short Wave range be sure that the push button designated "Prog. Mod." is not pushed in.

PHONOGRAPHER OPERATION. A hook is provided on the back of the chassis into which a record player may be plugged and a switch is provided next to it for switching from "Radio" to "Phonograph".

TELEVISION. Switching to phonograph also makes the audio amplifier and loud speaker available for use with television receivers designed for this type of sound reproduction.

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Compliments of www.nucow.com
INSTRUCTIONS FOR SETTING UP PUSH BUTTONS

IMPORTANT: The stations selected should be the local or favorite stations which give good reception on each service.

Set up stations in the daytime to avoid unnecessary interference.

Allow the set to run for about twenty minutes before setting up stations.

Always use the tuning indicator unit when setting up stations in order to determine when the station is exactly in tune.

1. Remove the dial escutcheon by removing the screws and pulling downward and outward.

2. Put the call letters of the selected stations in place above the push buttons. The stations should be spaced according to their frequency in the high-frequency area at the left and the lowest frequency area at the right. (Both letter calls will be found inside the envelope stapled inside or underneath the cabinet.)

NORMAL VOLTAGE READINGS

Take all readings with circuits operating and tuned manually to 100 kHz, or 43 Mc. — S signal.

Use a line voltage of 120 volts, or make allowance for the variation.

Use a high resistance voltmeter having a resistance of at least 1000 ohms per volt. Take all D.C. readings on the 500 volt scale except when an asterisk appears.

AMPLITUDE MODULATION CHASSIS

Read from indicated terminals to chassis base.

See location chart on Page 5 for position of terminals.

A. V.C. voltages are indicated by italics.

To measure voltages of 6AF6G tube remove the metal cover on the tuning indicator socket and read from indicated terminals.

CONTINUITY TEST

Remove all tubes and disconnect the receiver from the power supply before making continuity test.

Test speaker socket with speaker left out.

Leave speaker plug in socket for all other tests of the amplifier modulator chassis.

Use a good meter capable of measuring up to several tenths of microamperes.

Amplifier Modulation Chassis

<table>
<thead>
<tr>
<th>Terminals of sockets</th>
</tr>
</thead>
<tbody>
<tr>
<td>A 6A8 Mod. and Osc.</td>
</tr>
<tr>
<td>6K7 I.F. Amp.</td>
</tr>
<tr>
<td>6H6 Dem. and A. V. C.</td>
</tr>
<tr>
<td>6SQ7 Audio Amp.</td>
</tr>
<tr>
<td>6SQ7 Audio Inv.</td>
</tr>
<tr>
<td>6V6G Output</td>
</tr>
<tr>
<td>6V6G Output</td>
</tr>
<tr>
<td>6AF6G Tuning Indicator</td>
</tr>
<tr>
<td>60 Rectifier</td>
</tr>
</tbody>
</table>

Symbols used on chart are as follows: A—Amp; M—Megohm; S—Short; O—Open.

A. 6V6G tube socket nearest to the front of the chassis.

B. Radio-Phone switch in "Radio" position ___ 24,000 ohms

Other Tests Not Shown on Chart (Frequency Modulation Chassis)

Other Tests Not Shown on Chart (Amplitude Modulation Chassis)

Antennas terminals to chassis base... "open"
Ground terminal to chassis base... "open"
Audio connector plug socket to chassis base... "open"
Antennas terminal to chassis base... "open"
Ground terminal to chassis base... "open"
Audio connector plug to chassis base... "open"
Antennas terminals to chassis base... "open"
Ground terminal to chassis base... "open"
Audio connector plug socket to chassis base... "open"
Antennas terminals to chassis base... "open"
Ground terminal to chassis base... "open"
Audio connector plug socket to chassis base... "open"
Antennas terminals to chassis base... "open"
Ground terminal to chassis base... "open"
Audio connector plug socket to chassis base... "open"
Antennas terminals to chassis base... "open"
Ground terminal to chassis base... "open"
Audio connector plug socket to chassis base... "open"
Antennas terminals to chassis base... "open"
Ground terminal to chassis base... "open"
Audio connector plug socket to chassis base... "open"
Antennas terminals to chassis base... "open"
Ground terminal to chassis base... "open"
Audio connector plug socket to chassis base... "open"
Antennas terminals to chassis base... "open"
Ground terminal to chassis base... "open"
Audio connector plug socket to chassis base... "open"
Antennas terminals to chassis base... "open"
Ground terminal to chassis base... "open"
Audio connector plug socket to chassis base... "open"
Antennas terminals to chassis base... "open"
Ground terminal to chassis base... "open"
Audio connector plug socket to chassis base... "open"
Antennas terminals to chassis base... "open"
Ground terminal to chassis base... "open"
Audio connector plug socket to chassis base... "open"
Antennas terminals to chassis base... "open"
Ground terminal to chassis base... "open"
Audio connector plug socket to chassis base... "open"
NORMAL VOLTAGE READINGS

Take all readings with chassis operating and tuned manually to 1000 Kc.—no signal.
Use a line voltage of 120 volts, or make allowance for the variation.
Use a high resistance voltmeter having a resistance of at least 1000 ohms per volt.
Take all D. C. readings on the 500 volt scale except when an asterisk appears.
A. C. voltages are indicated by italics.
To measure voltages of 6AF6 tube remove the metal cover on the tuning indicator socket and
read from indicated terminals.

<table>
<thead>
<tr>
<th>Tube</th>
<th>Circuit</th>
<th>Cap</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>Socket Terminal Numbers</th>
<th>Volt A.C.</th>
</tr>
</thead>
<tbody>
<tr>
<td>6A8</td>
<td>Modulator</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>-290</td>
<td>-105</td>
<td>0</td>
<td>-105</td>
<td>6.5</td>
<td>4.5</td>
<td>-2.7</td>
<td>6.5</td>
</tr>
<tr>
<td>6B6</td>
<td>Oscillator</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>-290</td>
<td>-105</td>
<td>0</td>
<td>-105</td>
<td>6.5</td>
<td>4.5</td>
<td>2.7</td>
<td>6.5</td>
</tr>
<tr>
<td>6K7</td>
<td>I.F. Amp.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>-290</td>
<td>+35</td>
<td>0</td>
<td>-105</td>
<td>6.5</td>
<td>4.3</td>
<td>2.7</td>
<td>6.5</td>
</tr>
<tr>
<td>6F6</td>
<td>Dem.—A. V. C.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>-100</td>
<td>6.5</td>
<td>7.8</td>
<td>6.5</td>
<td></td>
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<tr>
<td>6S07</td>
<td>Audio Amp.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>-100</td>
<td>6.5</td>
<td>7.8</td>
<td>6.5</td>
<td></td>
</tr>
<tr>
<td>6SQ7</td>
<td>Audio Inv.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>-100</td>
<td>6.5</td>
<td>7.8</td>
<td>6.5</td>
<td></td>
</tr>
<tr>
<td>6V6</td>
<td>Output</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>-290</td>
<td>-100</td>
<td>0</td>
<td>-100</td>
<td>6.5</td>
<td>14</td>
<td>2.7</td>
<td>6.5</td>
</tr>
<tr>
<td>6C6</td>
<td>Output</td>
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<td>0</td>
<td>0</td>
<td>-290</td>
<td>-100</td>
<td>0</td>
<td>-100</td>
<td>6.5</td>
<td>14</td>
<td>2.7</td>
<td>6.5</td>
</tr>
<tr>
<td>6A6FG</td>
<td>Tun. Ind.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>-290</td>
<td>-100</td>
<td>0</td>
<td>-100</td>
<td>6.5</td>
<td>14</td>
<td>2.7</td>
<td>6.5</td>
</tr>
<tr>
<td>80</td>
<td>Rectifier</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2.7</td>
<td>6.3</td>
<td>2.7</td>
<td>6.3</td>
</tr>
</tbody>
</table>

*Read on lowest possible scale of voltmeter.

CONTINUITY TEST

CAUTION: Remove all tubes and disconnect the receiver from the power supply before making
continuity test.
Use a good meter capable of measuring accurately up to several megohms.
The resistances given are often approximate, owing to electrolytic capacitors in the circuit.
When this is the case, be sure to reverse the test leads and read the highest resistance.

<table>
<thead>
<tr>
<th>TERMINALS OF SOCKETS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tube</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>6A8</td>
</tr>
<tr>
<td>6B6</td>
</tr>
<tr>
<td>6K7</td>
</tr>
<tr>
<td>6F6</td>
</tr>
<tr>
<td>6S07</td>
</tr>
<tr>
<td>6SQ7</td>
</tr>
<tr>
<td>6V6</td>
</tr>
<tr>
<td>6C6</td>
</tr>
<tr>
<td>6A6FG</td>
</tr>
<tr>
<td>80</td>
</tr>
</tbody>
</table>

Symbols used are as follows: 1—ohm; M—megohm; S—short; O—open.

INSTRUCTIONS FOR SETTING UP PUSH BUTTONS
IMPORTANT: The stations selected should be the local or favorite stations which give good
receipt at all times.
Set up stations in the daytime to avoid unnecessary interference.
Allow the set to run for about twenty minutes before setting up stations.
Always use the tuning indicator unit when setting up stations in order to determine when the
station is exactly in tune.
1. Put the call letters of the selected stations in place above the push buttons. The stations
should be arranged according to frequency with the highest frequency at the right and the
lowest frequency at the left, just as on the dial. (The call letters will be found inside the
speaker and under the cabinet).
2. Set the "Tune" control in normal position.
3. Turn the set-up switch (located on the base just back of the brush and commutator
assembly) to the set-up position. (The slot in the screw should point toward "set-up").
4. Push the button of the highest frequency station to be set up (button No. 5) and then tune
in that station manually. Be sure the station is exactly in tune by tuning carefully and
watching the cathode ray indicator.
5. Slide the brush to which the blue wire is connected until it is over the slot in the commutator.
Then adjust it very carefully until the pilot light goes out. This indicates exact ad-
justment.
6. Repeat operations 4 and 5 for each station. Work from right to left or from the higher to
the lower frequencies in accordance with the table below:

<table>
<thead>
<tr>
<th>Push Button No.</th>
<th>Purpose</th>
<th>Color of wire on brush</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Remote</td>
<td>—</td>
</tr>
<tr>
<td>2</td>
<td>Highest frequency station</td>
<td>Blue</td>
</tr>
<tr>
<td>3</td>
<td>Next lower frequency station</td>
<td>Orange</td>
</tr>
<tr>
<td>4</td>
<td>Next lower frequency station</td>
<td>Green</td>
</tr>
<tr>
<td>5</td>
<td>Next lower frequency station</td>
<td>Brown</td>
</tr>
<tr>
<td>6</td>
<td>Next lower frequency station</td>
<td>Slate</td>
</tr>
<tr>
<td>7</td>
<td>Next lower frequency station</td>
<td>Red</td>
</tr>
<tr>
<td>8</td>
<td>Next lower frequency station</td>
<td>Black</td>
</tr>
<tr>
<td>9</td>
<td>Lowest frequency station</td>
<td>Blue White</td>
</tr>
<tr>
<td>10</td>
<td>Manual</td>
<td>—</td>
</tr>
<tr>
<td>11</td>
<td>Phonograph</td>
<td>—</td>
</tr>
<tr>
<td>12</td>
<td>Off</td>
<td>—</td>
</tr>
</tbody>
</table>

7. Turn the set-up switch back to the "Operate" position.
8. Check the operation of all the push buttons to be sure that each has been accurately set up.
If it is necessary to readjust any of the buttons, follow the procedure given above.

ADJUSTABLE STATION BRUSH

ANTENNA TERMINALS

Terminals of A.C. plug:
- Push "On" button to "open".
- Push "Manual" button to "open".
- Ground terminal to chassis base—70 ohms.
- Ground terminal to chassis base—"short".
- Test between terminals of A.C. plug.
- Test "On" button to "open".
- Test "Manual" button to "open".

R.F. coil tests measured directly across R.F. coil terminals with range switch set in standard
position (A Band).
ALIGNING INFORMATION

NEVER ALIGN UNLESS ABSOLUTELY NECESSARY.
Use a good modulated signal generator (test oscillator) with variable output voltage and a sensitive output meter across the voice coil of the speaker.
Always align using the smallest possible input from the signal generator. A strong signal makes adjustments inaccurate.
Always have receiver volume control full on.
Never align with tone control in "Bass" position.
See location chart above for location of all the aligning adjustment screws.

Aligning Procedure (follow this order exactly)
I. Dial points adjustment.
   With the plates of the gang tuning capacitor fully engaged, set the dial pointer directly on the vertical line located at the extreme low frequency end of the short-wave band.

II. Intermediate frequency adjustments.
   2. Set the range switch to Standard Broadcast position.
   3. Tune set to extreme low frequency end of the dial.
   4. Connect the ground terminal of the signal generator to the ground terminal of the chassis.
   5. Introduce a modulated signal of 455 Kilocycles to the grid cap of the 6A8G Tube, using a 0.1 microfarad capacitor in series with the output lead of the signal generator. (Do not remove the grid clip from this tube.)

6. Adjust the I. F. Aligners for maximum output in the following order:
   A. Secondary of second I. F. transformer.
   B. Primary of second I. F. transformer.
   D. Primary of first I. F. transformer.

III. Radio frequency adjustments.

   Short Wave Range (C Band)
   1. Replace the 0.1 microfarad capacitor in series with the output lead of the signal generator with a 400 ohm carbon type resistor, and connect it to the antenna terminal of the chassis.
   2. Set the range switch to the short-wave range position (C Band).
   3. Set the signal generator frequency and the receiver tuning dial to 8 megacycles.
   4. Adjust the 8 megacycle oscillator and antenna iron cores for maximum signal.
   5. Set the signal generator frequency and the receiver tuning dial to 20 megacycles.
   6. Adjust the 20 megacycle oscillator and antenna aligning capacitors for maximum signal.
   7. Repeat operations three and four.
   8. Repeat operations five and six.

   Medium Wave Range (B Band)
   1. Leave the receiver connected in the same manner as when adjusting the Short-Wave Range (C Band).
   2. Set the range switch to the medium wave range position (B Band).
   3. Set the signal generator frequency and the receiver tuning dial to 2.5 megacycles.
   4. Adjust the 2.5 megacycle oscillator and antenna iron cores for maximum signal.
   5. Set the signal generator frequency and the receiver tuning dial to 7.0 megacycles.
   6. Adjust the 7 megacycle oscillator and antenna aligning capacitors for maximum signal.
   7. Repeat operation three and four.
   8. Repeat operation five and six.

   Standard Broadcast Range (A Band)
   1. Replace the 400 ohm carbon type resistor in series with the output lead from the signal generator with a 300 micro-microfarad capacitor.
   2. Set the range switch to the Standard Broadcast Range (A Band).
   3. Set the signal generator frequency and the receiver tuning dial to 600 Kc.
   4. Adjust the 600 Kc. oscillator, b- resonator and antenna aligning capacitors for maximum signal.
   5. Set the signal generator frequency and the receiver tuning dial to 1500 Kc.
   6. Adjust the 1500 Kc. oscillator, b- resonator and antenna aligning capacitors for maximum signal.
   7. Repeat operation three and four.
   8. Repeat operation five and six.

ADJUSTING DIAL LAMP
The dial on this receiver is edge lighted, and for proper illumination it is very important that the dial light be adjusted so that the filament is exactly opposite the edge of the glass.
To make this adjustment simply slide the pilot light socket back and forth on its mounting bracket until maximum illumination is obtained.
ALIGNING INFORMATION
NEVER ALIGN UNTIL ABSOLUTELY NECESSARY.

All aligning adjustments are carefully made at the factory for excellent performance as designed. Alignment should not be attempted by anyone except a trained technician familiar with the broadcast receiver. The following instructions are for alignment purposes only. It is recommended that all aligning adjustments be made by a qualified technician.

The following adjustments will be required:
1. Standard signal generator and output meter.
2. Microammeter "0" to 300 microamperes.
3. Connect an "X" microammeter with a zero to 300 microampere range in the grid circuit (in series) with the output load of the signal generator. Approximate shift in grid current should be noted.
4. Connect a cathode follower in series with the output load of the signal generator. The zero current in the cathode follower should be noted.
5. Connect the grid circuit of the signal generator and the output load of the signal generator. The zero grid current should be noted.
6. Connect the output load of the signal generator and the output load of the signal generator. The zero grid current should be noted.
7. Connect the grid circuit of the signal generator and the output load of the signal generator. The zero grid current should be noted.
8. Connect the cathode follower in series with the output load of the signal generator. The zero current in the cathode follower should be noted.
9. Connect the grid circuit of the signal generator and the output load of the signal generator. The zero grid current should be noted.
10. Connect the output load of the signal generator and the output load of the signal generator. The zero grid current should be noted.

ALIGNING PROCEDURE (Follow this order exactly)
A. Discriminator adjustment (Frequency Modulation)
1. Tune up to the extreme high frequency end of the dial (44.5 megacycles).
2. Connect the center "X" microammeter with a zero to 300 microampere range in the grid circuit (in series) with the output load of the signal generator. Approximate shift in grid current should be noted.
3. Connect the grid circuit of the signal generator and the output load of the signal generator. The zero grid current should be noted.
4. Connect the cathode follower in series with the output load of the signal generator. The zero current in the cathode follower should be noted.
5. Connect the grid circuit of the signal generator and the output load of the signal generator. The zero grid current should be noted.
6. Connect the output load of the signal generator and the output load of the signal generator. The zero grid current should be noted.
7. Connect the grid circuit of the signal generator and the output load of the signal generator. The zero grid current should be noted.
8. Connect the cathode follower in series with the output load of the signal generator. The zero current in the cathode follower should be noted.
9. Connect the grid circuit of the signal generator and the output load of the signal generator. The zero grid current should be noted.
10. Connect the output load of the signal generator and the output load of the signal generator. The zero grid current should be noted.

B. Intermediate frequency adjustments (Amplitude Modulation)
1. Adjust the intermediate frequency transformer for maximum reading of the microammeter.
2. Connect the output load of the signal generator and the output load of the signal generator. The zero current in the cathode follower should be noted.
3. Connect the grid circuit of the signal generator and the output load of the signal generator. The zero grid current should be noted.
4. Connect the cathode follower in series with the output load of the signal generator. The zero current in the cathode follower should be noted.
5. Connect the grid circuit of the signal generator and the output load of the signal generator. The zero grid current should be noted.
6. Connect the output load of the signal generator and the output load of the signal generator. The zero grid current should be noted.
7. Connect the grid circuit of the signal generator and the output load of the signal generator. The zero grid current should be noted.
8. Connect the cathode follower in series with the output load of the signal generator. The zero current in the cathode follower should be noted.
9. Connect the grid circuit of the signal generator and the output load of the signal generator. The zero grid current should be noted.
10. Connect the output load of the signal generator and the output load of the signal generator. The zero grid current should be noted.

C. Radiophone frequency adjustments (Amplitude Modulation)
1. Set the signal generator frequency and the receiver tuning dial to 60 kc.
SPECSIFICATIONS

- Frequency Modulation: 40 to 44 Mc, (40,000 to 44,000 Kc).
- Short-wave: 6.5 to 8 Mc, (6,500,000 to 8,000,000 Kc).
- Standard Broadcast: 54 to 1.7 Mc, (540 to 1700 Kc).

INPUT POWER RATING:
- 30 Watts Radio Models only.
- 125 Watts Portable Model.
- 500 Kilocycles (Frequency Modulation).
- 125 Watts Interference Frequency Modulation.
- 618 Ohms Speaker Voice Circuit Impedance at 600 Cycles Approximation.

NORMAL VOLTAGE READINGS:
- Take all voltage readings with chassis operating and tuned to a station where there is no-noise.
- Use a line voltage of 120 volts and make allowance for any voltage drop.
- Use a high resistance voltmeter having a resistance of at least 1000 ohms per volt. Take all C. C. readings on the 500 volt scale except when an acrithic signal is present, in which case make the measurement at near by the full-scale deflection. See location chart for position of terminals.

A. C. voltages are indicated by italics.

**TERMINALS OF SOCKETS**

<table>
<thead>
<tr>
<th>Type</th>
<th>Color</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>6K7</td>
<td>Red</td>
<td>R. A.</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>DSAT</td>
<td>Blue</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6AC7</td>
<td>Black</td>
<td>I F. M.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6L6</td>
<td>Decad</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6L6N</td>
<td>Red</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6B6</td>
<td>Audio Amp.</td>
<td></td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6S6</td>
<td>Output</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6T6</td>
<td>Tuning Indicator</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>523</td>
<td>Rectifier</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speaker Socket</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Read on lowest possible scale of voltmeter

**FEATURES**

**SPECIAL CIRCUITS:** A tuning indicator having two spatters, one for strong signals and one for weak signals, can tell within seconds if there is a receiver or not. The spatters are connected with the primary, and the other with the normal, secondary, coil of the receiver, so that if the receiver is not connected to the grounds, one spatter will light, and the other will remain dark.

**AUTOMATIC TUNING:** A substitution capacitor type of tuning is employed, and stations may be easily tuned by turning the knob. The adjustment is made by turning the knob to a position where the set is in the best condition, and the tuning indicator will indicate the proper setting for the best reception.

**PHONOGRAPH OPERATION:** A selector is provided on the face of the chassis and a push button is provided on the front of the receiver for switching from "Radio" to "Phonograph".

**TELEVISION:** A jack is provided on the back of the chassis and a push button is provided on the front of the receiver for switching from "Radio" to "Phonograph".

**CONTINUITY TEST:**

- Remove all tubes and disconnect the receiver from the power supply before making continuity test.
- Leave speaker in socket for all tests.
- Use a good meter capable of measuring up to several megohms.
- The resistances given are approximate owing to the material of the circuit. In this case, be sure to test the leads and read the

- Range switch in push button position
- Range switch in standard broadcast position
- "Open"

**INSTRUCTIONS FOR SETTING UP PUSH BUTTONS**

- Remove the dial escutchion by removing the screws and putting downward and outward.
- The selector knob should be turned to the "Dial" position.
- Always use the tuning indicator when setting up stations in order to determine when the station is exactly in tune.
- After the large screw is carefully adjusted, adjust the small selector knobs for the highest frequency that the signal is passing through the receiver. Be sure the large adjusting nut is not touching the small selector knob.
- Set the switch to the center position and then to the "Off" position.
- Set the receiver up in the same manner.
- Recheck the adjustment when desired.
ANTENNA. For best results use a Stromberg-Carlson No. 6 Antenna. This antenna is designed to provide improved pick-up on both the amplitude and frequency modulation bands.

If it is desired, two ordinary antennas may be used, one for amplitude modulation, which should be a straight wire type antenna about 75 feet long, and one for frequency modulation. This latter antenna may be a straight wire about 40 feet in length or of the dipole type with two arms approximately 5 feet in length. The dipole antenna will exhibit a marked directional effect and should be erected as high as possible above the ground and adjusted so as to receive the desired frequency modulated stations with best results.

For average reception, a single straight wire antenna may be used for both amplitude and frequency modulation.

The various types of antennas should be connected to the No. 480 Receiver as follows:

PLAYING RECORDS. To obtain the best quality of phonograph reproduction a Stromberg-Carlson record player is recommended. They are designed for use with this receiver, and all that is necessary is to connect the record player to the single prong socket provided in the chassis and proceed to operate. The volume and tone may be controlled with the controls at the receiver, or (if such is provided) the volume control on the record player may be used.

A low impedance pick-up may also be used, but a matching transformer must be placed between the phonograph pick-up and the chassis.

HEADSET ATTACHMENT. Headphones can be very simply attached to this receiver. Ask for Pc. No. 2833 Headset Package Assembly, which comes complete with headphones and installation instructions.

CARE OF CABINET. The finish of Stromberg-Carlson Cabinet should be protected by using Stromberg-Carlson Cabinet Polish regularly. It is available in pint cans, designated as Pn. No. 28601.

Nicks and scratches of most kinds can be repaired quickly and easily by proper use of the Pn. No. 2962 Touch-Up Kit. Complete instructions are provided with each kit.

TOOLS. Stromberg-Carlson can supply all the tools required for working on these sets. For example:

SD-29 Phillips Head Screwdriver
No. 24806 Aligning Tool
Also pilers, cutters, screwdrivers, etc.
INSTRUCTIONS FOR SETTING UP PUSH BUTTONS

IMPORTANT: The stations selected should be local or favorite stations which give good reception at all times. Frequency Modulated Stations, as well as Amplitude Modulation Stations, may be set up on the push buttons by simply using the appropriate button determined by the position of the Frequency Modulated Station on the dial.

Set up stations in the daytime to avoid unnecessary interference.

Allow the set to run for about twenty minutes before setting up stations.

Always use the tuning indicator unit when setting up stations in order to determine when the station is exactly in tune.

Seven stations may be set up for push buttons located on the front of the receiver and eight stations may be set up on the remote control unit. The same seven stations which were set up for the buttons on the front of the receiver must also be used on the remote control unit and the eighth station which is chosen for the remote control unit must be of a lower frequency than any of the other stations which have been set up.

1. Put the call letters of the selected stations in place above the push buttons. The stations should be arranged according to frequency with the highest frequency at the right and the lowest frequency at the left, just as on the dial. (The call letters will be found inside the envelope stapled inside or underneath the cabinet).

2. Remove the metal escutcheon and transparent strip from the remote control unit. Put the station call letters in place so that the station having the highest frequency is nearest to the volume control buttons and then in successive order according to frequency. Replace the metal escutcheon, transparent strip and three screws. (The call letters for the remote control unit are included in the F-3124 Remote Control Package Assembly.)

3. Set the "Treble" control in normal position.

4. Turn the set-up switch (located on the base just back of the brush and commutator assembly) to the set-up position. (The slot in the screw should point toward "set-up").

5. Push the button of the highest frequency station to be set up (button No. 3) and then tune in that station manually. Be sure the station is exactly "in tune" by tuning carefully and watching the cathode ray indicator.

6. Slide the brush to which the blue wire is connected until it is over the slot in the commutator. Then adjust it very carefully until the pilot light goes out. This indicates exact adjustment.

7. Repeat operations 4 and 5 for each station. Work from right to left or from the higher to the lower frequencies in accordance with the table below:

8. Turn the set-up switch back to the "Operate" position.

9. Check the operation of all the push buttons to be sure that each has been accurately set up. If it is necessary to readjust any of the buttons, follow the procedure given above.

### Table: Push Button No., Purpose, Color of Wire on Brush

<table>
<thead>
<tr>
<th>No.</th>
<th>Push Button No.</th>
<th>Purpose</th>
<th>Color of wire on brush</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manual</td>
<td>-</td>
<td>Blue</td>
</tr>
<tr>
<td>2</td>
<td>Remote</td>
<td>-</td>
<td>Orange</td>
</tr>
<tr>
<td>3</td>
<td>Highest frequency station</td>
<td>-</td>
<td>Green</td>
</tr>
<tr>
<td>4</td>
<td>Next lower frequency station</td>
<td></td>
<td>Brown</td>
</tr>
<tr>
<td>5</td>
<td>Next lower frequency station</td>
<td></td>
<td>Slate</td>
</tr>
<tr>
<td>6</td>
<td>Next lower frequency station</td>
<td></td>
<td>Red</td>
</tr>
<tr>
<td>7</td>
<td>Next lower frequency station</td>
<td></td>
<td>Black</td>
</tr>
<tr>
<td>8</td>
<td>Next lower frequency station</td>
<td></td>
<td>Blue White</td>
</tr>
<tr>
<td>9</td>
<td>Lowest frequency station on receiver</td>
<td></td>
<td>See diagram of adjustable brushes and set-up switch.</td>
</tr>
<tr>
<td>10</td>
<td>Lowest frequency button on remote control unit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Phonograph</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Off</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

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Compliments of www.nucow.com
MODEL 7-Tube AC-DC  TRAV-LER RADIO & TELEVISION CORP.  MODEL 5-Tube TRF
Schematic

Alignment, Trimmers

FOR OTHER DATA
SEE INDEX

185R8

115 VOLTS AC. OR DC.

5 TUBE AC. DC. T.R.F.

6A7 606 75 2586-G

2575

IF PEAK 456 KC

7 TUBE AC. DC.

ALIGNMENT: I.F. at 456 KC, Using a .00025 condenser as a dummy antenna, adjust B.C. Osc. trimmer at 1700 KC, B.C. Ant. Trimmer at 1400 KC, Padder at 600 KC, Using a 400 ohm resistor as dummy, at 8 I.F. adjust SW Osc., and then SW Ant. trimmers to resonance.

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ALIGNMENT INSTRUCTIONS

1. Set variable condenser with rotor plates in open position. Set signal generator to 500 kHz, element condenser lead to ground of one of the antenna arms. Adjust IF trimmers for maximum output, reducing signal generator output as signal increases.

2. Set signal generator to 1500 kHz, connecting generator lead to antenna lead at one using a 50000 ohm resistor in series with antenna. Adjust oscillator trimmer to maximum output, reducing signal generator output as signal increases. Use variable condenser in place of tuning condenser. Adjust IF and antenna trimmers for maximum output, reducing generator output to zero signal. Reposition variable condenser to piling signal then adjust for maximum sensitivity by rotating oscillator padder while using variable condenser.

3. Recheck alignment adjustments at 1500 kHz and 1400 kHz.

4. When set is installed, antenna circuit may be traced to antenna by adjusting antenna padder located just below antenna condenser.

ASSEMBLY OF RADIO UNIT FOR EXHIBITION USE:

A later type of set may require less attention than one which is intended for body parts. An assembly of the generator, the control panel, and other components may be performed by means of a suitable frame and hanger. The set may be handled in such manner as to prevent damage to the set. The set is assembled on the back of the chassis and is mounted on a frame. The set may be mounted in the frame by means of heavy metal brackets.
**SCHEMATIC DIAGRAM**

**MODEL 455L (Loop), 455 LN**

IF PEAK 456 KC

IF 456 KC, RF (Use single loop of wire 5 or 6 inches in diameter about 8 inches from receiver loop) Adjust Osc. and Ant. trimmers at 1400 KC for Max. Output.

**MODEL 336**

ALIGNMENT

IF = 456 KC. Adjust B.C., Osc. at 1720 KC; B.C. R.F. and Ant. trimmers at 1400 KC, Pad at 600 KC; Check at 1400 KC. INT. Adjust P.B. Osc. at 6700; P.B. Ant. and R.F. trimmers at 6000 KC; Check at 2200 KC. S.W. Adjust S.W. Osc. at 24.5 MC, S.W. Ant. and R.F. trimmers at 22 MC.; Check at 8 MC. (Use a standard all wave dummy antenna if available.)

**MODELS 553, 554**

ALIGNMENT

IF = 456 KC. R.F. (Use a signal loop near and parallel to receiver loop. Receiver loop should be close to installed position) Adjust Osc. at 1720 KC, Ant. at 1400 KC and check at 800 KC.

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Compliments of www.nucow.com
PUSH BUTTON OPERATION


Six Push Button Station Selectors are incorporated in this receiver. Each button may be adjusted to select any station or frequency in the Broadcast Band. To adjust each button, perform the following operations:

1. Tune in a desired station with the Selector knob.
2. Twist the Push Button you want set up for this station, to the left about one full turn to loosen the mechanism.
3. Push this button in as far as it will go, while still holding the Selector knob firmly so the station will not be detuned.
4. With the button pressed all the way in, twist it to the right until it is tight and then release it.

Follow this procedure with the other five buttons, setting each for a different station.

Now, when any Push Button is pressed, the station for which that button is set, should appear perfectly tuned in. If it is not perfectly tuned, repeat the above procedure until satisfactory results are obtained.

Select the Call Letter Tabs to correspond to the stations the buttons are set for, and insert them in places provided above each button.
ANTENNA CONNECTION

The shielded antenna lead supplied with the radio is plugged into the receptacle provided in the underside of the radio. The other end is connected to the lead from the antenna terminal. The antenna lead must be connected to the shield, or any metal part of the car, if the automobile has a built-in antenna. The lead should be run with the dash, extending from the right or left-hand corner post. It is important that this lead be cut and connected to the shielded set lead as close to the corner post as possible, to eliminate antenna pickup of motor noise.

On cars where it is necessary to install an antenna, a "fish-pole" type, an "over-the-road" type, or a "under-the-running-board" type, may be used. Two antennas, one mounted under each running board, are recommended for the best reception, as the noise in the radio will increase as the size of the antenna decreases.

The lead from the antenna should be shielded, direct, and as short as, or practical. It should not be twisted around any part of the car, and should not lead thru the motor compartment. All connections should be clean, tight, soldered, and insulated with tape. The antenna must never touch any part of the car.

ANTENNA MATCHING ADJUSTMENT

As the sizes and types of antennas vary considerably, it is necessary to adjust the radio to "match" the antenna used. To do this, tune in a station, accurately, at roughly 600 kilocycles, reduce the volume of the set, put out the plug on the underside of the set, insert a screw driver, and turn for maximum output. Replace the plug when this has been accomplished, and the radio is ready to operate efficiently on any station.

MOTOR NOISE ELIMINATION

To eliminate motor noise, a condenser and a suppressor are supplied with the radio. The condenser is mounted on the generator with its lead connected to the terminal of the generator output on the generator side rather than on the battery side. The heavy insulated lead in the center of the distributor cap is pulled out, the suppressor inserted in its place, and the heavy lead inserted in the end of the suppressor.

This, with the antenna installed properly will eliminate motor noise in most cars. In some of the older cars it may be necessary to install a condenser similar to the generator condenser, bolted to the dash or a good ground, with the lead connected to the amplifier with the set battery lead. When a built-in antenna is used, a suppressor should be connected to the dome light lead where it passes through the right or left hand post of the roof. The condenser should be bolted to grounded metal.

PUSH BUTTON ADJUSTMENT

Six push button station selectors are incorporated in this receiver, and each may be set to select any frequency or station within the range of the set.

To adjust each button, follow these instructions:

1. With the set in operation, tune in any station the push button is to be set for, with the right hand tuning knob.
2. Keep a firm grip on the tuning knob of the station you have selected, turn the push button about one turn to the left loosens the mechanism. Press the button all the way in and turn it to the right until it is tight.
3. Repeat these operations with the other five buttons, setting each for a different station. Insert the correct call letter tab into the space provided in the panel just above the push buttons.
NOTE - In aligning highest frequency band use low range of oscillator. Intermedicate and Broadcast bands align normally.

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**Model 826**

The intermediate frequency stages are tuned to 465 Kc and have a sensitivity of about 27 microvolts. (For 50 milliwatt output)

The maximum output is rated at about 5 watts, and 3.5 watts undistorted.

**Model 857**

The intermediate frequency stages are tuned to 465 Kc and have a sensitivity of about 27 microvolts. (For 50 milliwatt output)

The maximum output is rated at about 4-1/2 watts, and 2.4 watts undistorted.

The three line voltage ranges are obtained by use of the resistance cord, an extra resistor within the chassis, and the pentode tube. See schematic diagram. The pentode tube also provides necessary voltage for the two pilot lights connected in series.

---

**NOTE:**

With certain models, the chassis is floated on cushion rubber. In alignment the chassis is tightened on corner wood strips. To release, loosen the four bottom screws, remove strips and let chassis float free.

---

**Alignment Models 826, 857**

No change should be made with the i.f. or r.f. adjustments unless it is certain that such adjustments are necessary.

The following instructions are given with the assumption that the service station has the proper generator, means of measuring the output and proper input connections. The following circuit is recommended for the input from the signal generator.

See that the dial band is straight across when the condenser is at full capacity.

After aligning the four trimmers of the IF system to 465 Kc, refer to Fig. 3 showing the position of the r.f. trimmer and the frequency to which they are to be adjusted. Although the dial is calibrated in meters, there will be found on the dial extra points representing the frequency in kilocycles corresponding to the trimmer adjustments as shown in Fig. 3.

**Notes:**

Always peak the oscillator circuit first and recheck after the antenna circuit is adjusted.

Do not allow the alignment to be made at an image frequency.

Seal trimmers after final adjustment.

The normal voltages are shown on the schematic circuit taken from the various points to ground.
GENERAL: The Delco Model R-1150 is a five tube table model AC-DC Superheterodyne receiver with permeability tuning and a 4" P.M. speaker.

ANTENNA: A capacity type plate antenna is used on this radio, which also serves as the back cover plate for the radio. For reception of local or powerful nearby stations no other antenna is usually required. This antenna is not directional, however, noise or weak reception will result if the back of the radio is placed against metal objects. A clip is provided for capacitively coupling an outside antenna to the receiver.
CIRCUIT ALIGNMENT  MODEL R1110

If realignment is found necessary, the circuits can be properly adjusted only by using a calibrated test oscillator or a signal generator and an output meter. The chassis should be removed from the cabinet for alignment.

1. Aligning I-F Stages at 465 Kilocycles
   (a) Connect the ground lead of the signal generator to 0.
   (b) Connect the signal lead of the signal generator to the antenna plate of the receiver through a .1 mfd. condenser.
   (c) Connect the output meter from plate to screen grid of the 35L6GT output tube.
   (d) Adjust the trimmers on the 2nd I-F coil and then the 1st I-F coil (Illus. C-D-B-F, Fig. 4) for maximum output.

2. Aligning at 1720 Kilocycles
   (a) Leave the signal generator leads connected as before.
   (b) Rotate the tuning control knob to the high frequency end of the dial. (Iron cores should extend 1 9/32 from edge of windings.)
   (c) Set the signal generator to exactly 1720 K.C.
   (d) Adjust the oscillator trimmer (Illus. E, Fig. 5) for maximum output.
   (e) Disconnect the signal lead of the signal generator from the back plate and connect to the antenna terminal of the receiver through a .0002 mfd. condenser.
   (f) Adjust the antenna trimmer (Illus. A, Fig. 5) for maximum output.

3. Aligning at 1400 Kilocycles
   (a) Set the signal generator to 1400 K.C.
   (b) Rotate the tuning control knob until this signal is tuned in with maximum output.
   (c) Adjust the position of the antenna coil (Fig. 2) until maximum output is obtained.

NOTE: (A.) To adjust the position of the antenna or oscillator coils, insert one edge of the blade of a screwdriver in the hole in the chassis plate and engage the blade in the gear teeth of the coil form (Fig. 2).
   (d) Repeat the adjustment of the antenna trimmer at 1720 K.C. and the antenna coil at 1400 K.C. until no further increase in output can be obtained.
GENERAL: The Delco Models R-1151 and R-1152 are five-tube, AC-DC superheterodyne receivers with mechanical push-button tuning and 5" P.M. speakers.

ANTENNA: A loop antenna is built inside the back cover of these radios. This type of antenna is somewhat directional, therefore, the radio should be tried in different positions to determine the position which will produce the best reception.
GENERAL: The Delco Models R-1154 and R-1155 are six-tube table models, AC-DC superheterodyne receivers with mechanical push-button tuning built-in loop antennas, and 5" P.M. speakers.

ANTENNA: A loop antenna is built inside the back cover of these radios. This type of antenna is somewhat directional, therefore, the radio should be tried in different positions to determine the position which will produce the best reception.
1. Aligning at 1450 Kilocycles:
   (a) Connect the ground lead of the signal generator to the B-terminal of the oscillator plate of the receiver through a 500K ohm resistor.
   (b) Adjust the trimmer on the signal generator to exactly 1450 Kc.

2. Aligning at 2000 Kilocycles:
   (a) Connect the trimmers on the second IF coil (Fig. C, Figs. 9, 10) for maximum output.
   (b) Adjust the trimmers on the second IF coil (Fig. C, Figs. 9, 10) for maximum output.

3. Aligning at 2500 Kilocycles:
   (a) Connect the trimmers on the second IF coil (Fig. C, Figs. 9, 10) for maximum output.
   (b) Adjust the trimmers on the second IF coil (Fig. C, Figs. 9, 10) for maximum output.

4. Aligning at 3000 Kilocycles:
   (a) Connect the trimmers on the second IF coil (Fig. C, Figs. 9, 10) for maximum output.
   (b) Adjust the trimmers on the second IF coil (Fig. C, Figs. 9, 10) for maximum output.

5. Aligning at 3500 Kilocycles:
   (a) Connect the trimmers on the second IF coil (Fig. C, Figs. 9, 10) for maximum output.
   (b) Adjust the trimmers on the second IF coil (Fig. C, Figs. 9, 10) for maximum output.

6. Aligning at 4000 Kilocycles:
   (a) Connect the trimmers on the second IF coil (Fig. C, Figs. 9, 10) for maximum output.
   (b) Adjust the trimmers on the second IF coil (Fig. C, Figs. 9, 10) for maximum output.

7. Aligning at 4500 Kilocycles:
   (a) Connect the trimmers on the second IF coil (Fig. C, Figs. 9, 10) for maximum output.
   (b) Adjust the trimmers on the second IF coil (Fig. C, Figs. 9, 10) for maximum output.

8. Aligning at 5000 Kilocycles:
   (a) Connect the trimmers on the second IF coil (Fig. C, Figs. 9, 10) for maximum output.
   (b) Adjust the trimmers on the second IF coil (Fig. C, Figs. 9, 10) for maximum output.

9. Aligning at 5500 Kilocycles:
   (a) Connect the trimmers on the second IF coil (Fig. C, Figs. 9, 10) for maximum output.
   (b) Adjust the trimmers on the second IF coil (Fig. C, Figs. 9, 10) for maximum output.

10. Aligning at 6000 Kilocycles:
    (a) Connect the trimmers on the second IF coil (Fig. C, Figs. 9, 10) for maximum output.
    (b) Adjust the trimmers on the second IF coil (Fig. C, Figs. 9, 10) for maximum output.

11. Aligning at 6500 Kilocycles:
    (a) Connect the trimmers on the second IF coil (Fig. C, Figs. 9, 10) for maximum output.
    (b) Adjust the trimmers on the second IF coil (Fig. C, Figs. 9, 10) for maximum output.

12. Aligning at 7000 Kilocycles:
    (a) Connect the trimmers on the second IF coil (Fig. C, Figs. 9, 10) for maximum output.
    (b) Adjust the trimmers on the second IF coil (Fig. C, Figs. 9, 10) for maximum output.

13. Aligning at 7500 Kilocycles:
    (a) Connect the trimmers on the second IF coil (Fig. C, Figs. 9, 10) for maximum output.
    (b) Adjust the trimmers on the second IF coil (Fig. C, Figs. 9, 10) for maximum output.

14. Aligning at 8000 Kilocycles:
    (a) Connect the trimmers on the second IF coil (Fig. C, Figs. 9, 10) for maximum output.
    (b) Adjust the trimmers on the second IF coil (Fig. C, Figs. 9, 10) for maximum output.

15. Aligning at 8500 Kilocycles:
    (a) Connect the trimmers on the second IF coil (Fig. C, Figs. 9, 10) for maximum output.
    (b) Adjust the trimmers on the second IF coil (Fig. C, Figs. 9, 10) for maximum output.

16. Aligning at 9000 Kilocycles:
    (a) Connect the trimmers on the second IF coil (Fig. C, Figs. 9, 10) for maximum output.
    (b) Adjust the trimmers on the second IF coil (Fig. C, Figs. 9, 10) for maximum output.

17. Aligning at 9500 Kilocycles:
    (a) Connect the trimmers on the second IF coil (Fig. C, Figs. 9, 10) for maximum output.
    (b) Adjust the trimmers on the second IF coil (Fig. C, Figs. 9, 10) for maximum output.

18. Aligning at 10000 Kilocycles:
    (a) Connect the trimmers on the second IF coil (Fig. C, Figs. 9, 10) for maximum output.
    (b) Adjust the trimmers on the second IF coil (Fig. C, Figs. 9, 10) for maximum output.

19. Aligning at 10500 Kilocycles:
    (a) Connect the trimmers on the second IF coil (Fig. C, Figs. 9, 10) for maximum output.
    (b) Adjust the trimmers on the second IF coil (Fig. C, Figs. 9, 10) for maximum output.

20. Aligning at 11000 Kilocycles:
    (a) Connect the trimmers on the second IF coil (Fig. C, Figs. 9, 10) for maximum output.
    (b) Adjust the trimmers on the second IF coil (Fig. C, Figs. 9, 10) for maximum output.
Setting up the push-buttons should be done as follows:

1. Pull the "reset" knob all the way out and rotate counter-clockwise until it cannot be turned any further, releasing the cams.

2. Push in on the button to be set and the manual tuning knob so that both stay latched in.

3. With knob and button held in, tune in the desired station carefully. Repeat with other buttons.

4. Pull out reset knob and turn clockwise to lock cams firmly.
### Chassis Electrical Parts

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<thead>
<tr>
<th>Illus. No.</th>
<th>Part No.</th>
<th>Description</th>
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<tr>
<td>1</td>
<td>1314023</td>
<td>Coil S.W., N.W. Antennas</td>
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<td>2</td>
<td>1314024</td>
<td>Coil N.W., N.W., B.C. Oscillator</td>
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<td>3</td>
<td>1314025</td>
<td>Antenna Loop</td>
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<td>4</td>
<td>1314026</td>
<td>Coll I-F Wave Trap</td>
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<td>5</td>
<td>1314027</td>
<td>Coll R-P</td>
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<td>Coll Assy. 1st I-F</td>
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<td>Coll Assy. 2nd I-F</td>
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<td>1314030</td>
<td>Condenser Electrolytic 12 mfd., 300 V.</td>
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<td>1314031</td>
<td>Condenser Electrolytic Section A 40 mfd., 25 V.</td>
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<td></td>
<td></td>
<td>Section B 16 mfd., 400 V.</td>
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<td>Section C 16 mfd., 450 V.</td>
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<td>1313886</td>
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<td>Resistor Insulated 5,000 ohm 1/2 watt</td>
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<td>Resistor Insulated 10,000 ohm 1/2 watt</td>
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<td>51</td>
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<td>Resistor Carbon 30 ohm 1/2 watt</td>
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**DUOMIT**
- Antenna Correct.
- Freq. Posit.
- Dial Set.
- Trimmer Descrip.
- Adjust.

**SIG. GEN.**
- Term. "M" 17 m.v. S.W. 17 m.v. D = S-W Cce. Max.
- Term. "M" 17 m.v. S.W. 17 m.v. A = S-W Ant. Max.

Note 1. Rotate tuning condenser to bring rotor plates of gang all the way out of mesh and against the high-frequency stop.
1. Aligning I-F Stages at 465 Kilocycles

Set the signal generator to exactly 465 K.C.

Adjust the I-F trimmers C-D-E-F (Illus. 4 and 5, Fig. 4) for maximum output, using the lowest output from the signal generator which will give a readable indication on the output meter, not to exceed 50 milliwatts.

2. Aligning at 1650 Kilocycles

(a) Leave all connections the same as for I-F alignment.

(b) Set the signal generator to exactly 1650 K.C.

(c) Adjust the oscillator trimmer condenser (Illus. B, Fig. 2), for maximum output.

3. Aligning at 1400 Kilocycles

NOTE: This adjustment MUST be made with set and loop mounted and firmly attached in cabinet.

(a) Remove the 1 megohm resistor and connect loop leads to the loop antenna. (Check these clips to make sure that contacts are clean and tight.)

(b) Remove signal lead of the signal generator from the grid of the 1A7G tube and place in a position where the signal can be picked up by the loop antenna. (The signal lead of the signal generator may be connected to the metal carrier pins of the case handle and the ground lead connected to the chassis mounting screw.)

(c) Set the signal generator to 1400 K.C.

(d) Adjust the loop trimmer (Illus. "A", Fig. 2) for maximum output.
1. Aligning i-f Stages at 465 Kilocycles-
   Set the signal generator to exactly 465 K.C.
   Adjust the i-f trimmers C-D-E-F (Illus. 3 and 4, Fig. 4) for maximum output, using the lowest output from the signal generator which will give a readable indication on the output meter, not to exceed 50 milliwatts.

2. Aligning at 1650 Kilocycles
   (a) Leave all connections the same as for i-f alignment.
   (b) Set the signal generator to exactly 1650 K.C.
   (c) Adjust the oscillator trimmer condenser (Illus. "B", Fig. 2), for maximum output.

3. Aligning at 1400 Kilocycles
   NOTE: This adjustment MUST be made with set and loop mounted and firmly attached in cabinet.
   (a) Remove the 1 megohm resistor and connect loop leads to the loop antenna. (Check these clips to make sure that contacts are clean and tight.)
   (b) Remove signal lead of the signal generator from the grid of the 1A7G tube and place in a position where the signal can be picked up by the loop antenna. (The signal lead of the signal generator may be connected to the metal carrier pins of the case handle and the ground lead connected to the chassis mounting screw.)
   (c) Set the signal generator to 1400 K.C.
   (d) Adjust the loop trimmer (Illus. "A", Fig. 2) for maximum output.
To balance set, remove chassis from cabinet then turn the condenser all the way up and adjust detector stage trimmer condenser to about 1720 kc and align RF stage for maximum gain.
WALGREEN CO.

MODEL 400 (LATE)
Schematic, Voltage
Socket, Trimmers

MODEL 502
Schematic, Socket
Alignment, Trimmers

CIRCUIT DIAGRAM MODEL 502
5 TUBE A.C. SUPERHETERODYNE
BROADCAST & POLICE BANDS

IF PEAK 456 KC
CONVENTIONAL ALIGNMENT
SEE SPECIAL SECTION
VOLUME VIII
TRIM OSC. AT 1500 KC
TRIM ANT. AT 1400 KC
NO POLICE-BAND ADJUSTMENT.

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INSTRUCTIONS FOR
SETTING UP PUSH BUTTONS

After receiver is installed and antenna and ground properly connected, plug line cord into a convenient outlet. These turn the volume control to about the center of rotation. This will turn the receiver on and put it in an operating condition. Time must be allowed for the tubes to heat up before stations can be tuned in. This time is approximately one-half minute.

The automatic tuning feature of your radio makes it possible to set up 6 favorite American broadcast stations and tune them quickly with the automatic tuner. Choose stations for push-button operation heard with good volume at all times.

Cut the call letters of your 6 selected stations from the list supplied with your receiver and slip them into the Tab Holder from the top, with the clear celluloid in front of the call letters to protect them. Arrange the call letters in the Tab Holder from right to left. Have the call letters of the lowest frequency station at the extreme right and work progressively to the left so that the highest frequency call letters will be at the extreme left.

Follow the procedure outlined below, in order to adjust the push-buttons properly:

1. By means of the Station Selector Knob turn in WITH THE RIGHT HAND AS ACCURATELY AS POSSIBLE the station having the lowest frequency—that is, your selected station which is tuned in at rest in the right-hand side of the dial.

2. After the station has been tuned in accurately with the right hand, continue to hold it in its exact position firmly, and with the left hand loosen the Push-Button to be set up for that station by unscrewing the Push-Button about one turn to the left (counter-clockwise).

3. Continuing to hold the Station Selector Knob in its exact position, PUSH THE PUSH-BUTTON IN ALL THE WAY with the left hand.

4. After the Push-Button has been depressed all the way, tighten it gently toward the right (clock-wise). Release Push-Button slowly and when in normal position grip button and tighten firmly.

The Push-Button tuning system is correctly set up for your first selected station of lowest frequency and the Call Letter Tab for this station should be at the extreme right of the Call Letter Holders.

Follow through with this same procedure, setting up the other 5 stations in order of their frequency—that is, the second station set up will be second lowest in frequency and the third station set up will be third lowest in frequency.

Carefully check each Push-Button for the accuracy of the setting. If, when tuning in any station with its Automatic Push-Button it does not have equal volume or clarity to that obtained with manual tuning, this may indicate the automatic adjustment for that station was not made accurately. Should there be any inaccuracy in any one of the Push-Button adjustments, correction can be made by repeating the above procedure for that button only. Do not reset those Push-Buttons that are accurately adjusted.

No further adjustments are necessary to operate your radio automatically or manually. To receive any one of your four selected stations for automatic operation, merely push in ALL THE WAY the button set up for that station.

This receiver is a 5 tube AC/DC current operated T.R.F.

CONVENTIONAL ALIGNMENT SEE SPEC. SECTION VOL. VIII

This receiver is made to cover from 1750K.C. to 535K.C.
THE I.F. STAGES

The I.F.'s are aligned by the usual system of adjusting the intermediate frequency of 455Kc into the grid of the 6AF7 tube.

The two trimmers in each of the I.F. cases should be very carefully adjusted to resonance, as they are very critical and will greatly affect the performance of the set. These are trimmers number T1, T2, T3, T4. (See pictorial diagram).

The sensitivity of the I.F. stages will be 50 microvolts or better.

Always use as low an output as possible from the test oscillator in making the various adjustments.

ALIGNMENT OF SHORTWAVE BAND 5.5 TO 18 M.C.

First check the position of the dial band by rotating the condenser shaft to the left to full capacity. At this point the dial and shaft should be straight across in line with the lines dividing the scale in half. If the dial is off position it can be lined up by removing dial glass and setting band with screw in center of dial.

1. Set the test oscillator to 17 megacycles.
2. Turn wave band switch all the way to right for highest S.W. band, and set dial band to 17 M.C.
3. Peak trimmer condenser TC of the oscillator coil (see pictorial) to resonance with 17 M.C. and trim to antenna.
4. Adjust antenna and RF coil trimmers T5 and T7 to same frequency after the above mentioned oscillator trimmer has been set.
5. Turn dial band to 6 M.C. on the same band and peak padding condenser P-1 to 6 M.C.

SHORTWAVE BAND 1.7 TO 5.5 M.C.

1. Set band switch to this band and dial band to 5 M.C.
2. Peak trimmer T2 to 5 M.C.
3. Peak antenna and RF trimmer to T9 and T10 to 5 M.C.
4. Rotate dial to 1.7 M.C. and adjust padding condenser P-2 to 1.7 M.C.

NOTE: After adjusting the two high bands at 17 megacycles and 5 megacycles the test oscillator input to antenna should be increased and receiver dial advanced to 1.7 megacycle lower and note if test oscillator signal is heard.

In case there is no response the oscillator trimmers have been pulled down too tightly. The trimmers should be released until this condition exists then go back to original point of alignment - reduce antenna input voltage and correct the trimmer adjustment.

EXAMPLE: The receiver has been adjusted to 17 megacycles. Tune receiver to approximately 16.9 M.C.

Increase oscillator signal by "opening up" the attenuator. Move the dial back and forth at 16.9 M.C.

If no signal is heard, set oscillator trimmer off until it is heard at 16.9 M.C.

Reduce signal voltage from generator, go back to 17 M.C. and slightly correct this last trimmer adjustment.

The same applies to the 5 M.C. adjustment.

IV THE BROADCAST BAND
1. Turn wave band switch all the way to left and dial band set to 1400 Kc (top scale).
2. Peak oscillator trimmer T11 to 1400 Kc and RF circuit trimmers T12 and T13 to same frequency.
3. Set dial band to 550 Kc and adjust oscillator padding condenser P-3 to 550 Kc.
4. Recheck dial at 1400 Kc as in number (1) and (2).
5. Points in the middle of the dial may be checked and if necessary the plate of the front section of variable condenser may be bent for alignment.

NOTES:
1. Seal all trimmers after their final adjustment.
2. Be sure that the settings are being made to the true fundamental signal from the oscillator and not on a harmonic or image frequency.
3. Refer to the schematic for the voltages at the tube sockets.
ALIGNMENT

To align receiver, proceed as follows:

1. Apply 456 KC note to control grid of 6A7 and peak IF transformers for maximum gain.
2. Apply 4000 KC note to antenna wire; set band switch to second band and align trimmer on oscillator section of variable condenser to track with 4000 KC on dial.
3. Turn band switch to broadcast band; apply 1500 KC note to antenna wire, adjust trimmer of RF section of variable condenser for maximum gain.
4. Apply 600 KC note to antenna, adjust padder condenser for maximum gain, swinging condenser back and forth across 600 KC signal.
5. Check 1400 KC signal for alignment.
6. Turn band switch to second band; check 4000 KC signal for alignment and adjust trimmer on antenna coil for greatest gain at 4000 KC.
7. Turn band switch to last band and adjust trimmer on antenna coil for greatest noise on 12 megacycles.

RANGES:

This receiver covers
540 - 1720 kilocycles
1720 - 5000 kilocycles
5.5 - 16 megacycles
MODEL 901
Schematic Alignment
Socket, Trimms

Ranges: 540 - 1720 KC
5.5 - 16 MC
IF PEAK 456 KC

CONVENTIONAL ALIGNMENT SEE SPECIAL SECTION
VOLUME VIII.

Check alignment at 1400 KC. To align short wave band, adjust trimmer underneath chassis for greatest noise level around the 25 meter band.

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PHONO-OSSILATOR
DESCRIPTION
This unit is a Two Tube Phone-Oscillator. The tubes used are a 6A7 as an oscillator and a 76 as a power rectifier.

This unit should be operated between 1500 K.C. and 1700 K.C. and is so designed that the playing of a record on the unit makes it possible that you receive this same recording from any radio set within a nearby vicinity.

ADJUSTING PUSH BUTTONS FOR MODELS 0-51, 0-70, 0-75, 0-80, and 10-70.

Cut the call letters of your four selected stations from the list supplied with your receiver and slip them into the top of the Push-Buttons, with the clear celluloid on top of the call letters to protect them. Arrange the call letters in the buttons from left to right, having the lowest frequency station (that is, the station closest to 600 K.C. at the left and work progressively towards the right, so that the highest frequency station is toward the right.

Follow the procedure outline below, in order to adjust the push-buttons properly:

1. By means of the tuning knob, tune in with the right hand as accurately as possible the desired station having the lowest frequency.

2. Continuing to hold the tuning control knob in its exact position with the right hand, loosen with the left hand the push-button to be set up for that station, (the one farthest toward the left) by unscrewing the push-button about one turn to the left (counter-clockwise).

3. Push the push-button in all the way, and then tighten it gently toward the right (clockwise). Release push-button slowly and when in normal position grip button and tighten firmly.

The push-button tuning system is now correctly set up for your first selected station of lowest frequency.

Follow through with this same procedure, setting up the other three stations in the order of their frequency, that is, the second station set up will be second lowest in frequency, etc.

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Model No. 0-53 radio receiver is a portable five (5) tube, 117 volt, 50-60 cycle A.C. or 117 volt D.C. or battery operated superheterodyne with self-contained loop antenna and batteries, designed to cover the standard broadcast band from 1620 to 555 K.C.

CONVENTIONAL ALIGNMENT SEE SPECIAL SECTION VOLUME VIII

FOR PUSHE BUTTON DATA SEE WARWICK PAGE 10-30.

TUNING RANGE
540 to 1720 KC
5.9 to 24 MD

LOCATION OF PARTS ON TOP OF CHASSIS
This model has been designed to cover the standard broadcast band and the first police band from 538 K.C. to 1720 K.C. The dial scale is calibrated directly in kilocycles (less the final 0). Standard broadcast stations are listed in kilocycles in most station lists.

CONVENTIONAL ALIGNMENT SEE SPECIAL SECTION VOLUME VIII.

Note: Adjust antenna trimmer to 1400KC, see schematic.

MODEL NO. 10-70

For push button data, see index.

CONVENTIONAL ALIGNMENT

SEE SPECIAL SECTION VOLUME VIII

This model has been designed to cover two separate frequency bands, a broadcast band from 540 K.C. to 1630 K.C. and a short wave band from 5.7 to 18 M.C. The dial scale has been calibrated directly in kilocycles (less the final 0) on the broadcast band, while the short wave band is calibrated directly in megacycles.
This model has been designed to cover the standard broadcast band and the first police band from 537 K.C. to 1730 K.C.

Model 0-70

This model has been designed to cover two separate frequency bands, a broadcast band from 540 K.C. to 1650 K.C. and a short wave band from 5.7 to 18.4 M.C.
R.F. TRIM. 1400 K.C.

ANT. TRIM. 1400 K.C.


SETTING PUSH-BUTTONS
1. By means of the Station Selector Knob, tune in WITH THE RIGHT HAND AS ACCURATELY AS POSSIBLE the station having the highest frequency—that is, your selected station which is tuned in nearest number 160 on the Station Selector Knob.
2. After the station has been tuned in accurately with the right-hand, continue to hold it in its exact position firmly, and with the left hand loosen the Push-Button to be set up for that station by unscrewing the Push-Button about one turn to the left (counter-clockwise).
3. Continuing to hold the Station Selector Knob in its exact position, PUSH THE PUSH-BUTTON IN ALL THE WAY with the left hand.
4. After the Push-Button has been depressed all the way, tighten it gently toward the right (clockwise). Release Push-Button slowly and when in normal position grip button and tighten firmly.

The Push-Button tuning system is now correctly set up for your first selected station of highest frequency and the Call Letter Tab for this station should be in the Push-button nearest the rear of the receiver.

Follow through with this same procedure, setting up the other 3 stations in the order of their frequency—that is, the second station set up will be the second highest in frequency and the third station set up will be the third highest in frequency.

Carefully check each Push-Button for the accuracy of its setting. If, when tuning in any station with its Automatic Push-Button it does not have equal volume or clarity to that obtained with manual tuning, this may indicate the automatic adjustment for that station was not made accurately. Should there be any inaccuracy in any one of the Push-Button adjustments, correction can be made by repeating the above procedure for that button only. Do not reset those Push-Buttons that are accurately adjusted.

No further adjustments are necessary to operate your radio automatically or manually. To receive any one of your selected stations for automatic operation, merely push in ALL THE WAY the Button set up for that station.

To receive all other stations in the regular manner turn the tuning knob to the frequency of the station desired.
FOR TUNER DATA, SEE INDEX

POWER SUPPLY

The receiver is designed for operation from 105-130 volt Alternating Current (A.C.) supply or a 105-130 volt Direct Current (D.C.) supply. Never connect the receiver to any supply having a higher voltage than that specified on the sticker. If you are not sure of the power supply voltage at your home, your Power Company will furnish the information.

When using a D.C. supply allow sufficient time for tubes to warm up (approximately 1½ minutes), and if at that time the receiver does not operate, remove the line cord plug from the socket and reverse. Replace plug in the reverse position and allow tubes to warm up, at which time the receiver will operate.

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** ALIGNMENT PROCEDURE **

**PRELIMINARY**

<table>
<thead>
<tr>
<th>Position of Variable</th>
<th>Generator Frequency</th>
<th>Dummy Antenna</th>
<th>Generator Connections</th>
<th>TRIMMER ADJUSTMENT</th>
<th>TRIMMER Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Closed</td>
<td>455 Kc</td>
<td>.1 mfd</td>
<td>6rz Grid</td>
<td>T3 T4</td>
<td>I.F.</td>
</tr>
<tr>
<td>Fully Open</td>
<td>1580 Kc</td>
<td>.02 mfd</td>
<td>Antenna Conn.</td>
<td>C15</td>
<td>Osc. Trimmer</td>
</tr>
<tr>
<td></td>
<td>1400 Kc</td>
<td>.002 mfd</td>
<td>Antenna Conn.</td>
<td>C14</td>
<td>Ant. Trimmer</td>
</tr>
<tr>
<td></td>
<td>600 Kc</td>
<td>.002 mfd</td>
<td>Antenna Conn.</td>
<td>C16</td>
<td>Antenna Padder</td>
</tr>
</tbody>
</table>

The variable condenser should be at 600 Kc for antenna adjustment.

The alignment procedure should be repeated in the original order, step by step, to insure greater accuracy. A final adjustment of antenna padder condenser C16 is always made after the receiver is installed in the car, in order to match the car antenna.

Always keep the output power from the generator at its lowest possible value to prevent the A.V.C. of the receiver from interfering with accurate alignment.

**THE AMMETER LEAD**

The ammeter cable (See "II" in Fig. 1) has a spring clip at one end and a fuse receptacle at the other. Compress the spring clip and slide it over the ammeter stud on the back of the car's ammeter. When the clip is released it will spring out and grip the stud securely. (See fig 1.) The cable clip may be connected to either stud of the ammeter. If connected to one stud, the current taken by the radio will register on the ammeter. If connected to the other stud, it will not register.) In a few cars such as the first models of the Ford V-8 the ammeter does not have terminals. In such cases the spring clip should be fastened to any available terminal behind the dash which is connected to the ungrounded side of the battery at all times. Some terminals will be so connected only when the ignition or light switches are turned "On." Insert the fibre sleeve and fuse (See "J" and "K" in Fig. 1) in the other end of the ammeter cable. The black wire coming from the radio receiver has a plug at its end which should be inserted into the fuse receptacle after the fuse sleeve and fuse have been inserted.

**THE GENERATOR CONDENSER**

The Generator Condenser should be mounted to the generator frame by means of any one of the generator assembly bolts. Scrap all dirt and paint away so that a clean metal to metal contact is made. The flexible lead from the Generator Condenser should be connected to the output terminal of the generator.

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ANTENNA

Insert the single prong of the antenna cable (See "G" in Fig. 1) into its receptacle located on the bottom of the receiver case and near the front left hand corner. Note that the other end of this cable has a white covered wire protruding from its end and a bright metal pigtail. The white covered inner-wire and the bright metal pigtail are to be connected to the car's antenna in the following manner:

If an antenna was located coming from the corner post of the car, it will probably have an inner wire covered with the metal braid. (If it has a plug at its end, cut off the plug.) Scrape clean and solder the white wire of the receiver's antenna lead to the inner wire of the car antenna lead. Be certain these inner wires do not at any time touch the shield. (See Fig. 5.)

After the connection is cleaned and connected, cover the joint carefully with tape. (See Fig. 6.)

Connect the pigtail of the receiver's antenna wire to the pigtail braid of the car's antenna lead-in. Wrap pigtail and solder together using rosin core solder. Important: Make certain when holding soldered pigtail ends to car that the section is scraped clean and a good chassis ground. (See Fig. 7.)

If the lead-in from the car antenna is not shielded, it is advisable to do so to overcome motor noise. Slip a shielded loom over the entire length of the antenna lead-in. In some cases where a roof antenna is used, the lead-in is brought down through a corner post of the car frame at the end of the windshield (See Figure 2). If the radio antenna cable is long enough to be inserted several inches into the corner post, connect antenna lead-in and the radio antenna cable as shown in Figures 5, 6 and 7, and after taping the splice and all the unshielded portion of the lead-in up into the corner post. If this cannot be done, this type of lead-in should be covered with a shielded loom several inches into the corner post. Connect the lead-in and shielding as illustrated in Figures 5, 6, and 7. The other end of the shielding at the car antenna should be grounded. To eliminate crackling and noisy reception due to antenna lead-in pick-up, the shielded antenna lead-in should be either insulated from chassis (or car body) or grounded at intervals, leading from the radio antenna cable to the car antenna. Be sure to use car chassis or grounded section of body only for grounding.

THE DISTRIBUTOR SUPPRESSOR

To install the distributor suppressor, cut the CENTER lead from the distributor cap in two, as close as possible to the distributor cap. Screw the Distributor Suppressor to one end of the cut cable and to the other end leading to the distributor cap.

SETTING PUSH-BUTTONS

1. By means of the Station Selector Knob, tune in WITH THE RIGHT HAND AS ACCURATELY AS POSSIBLE the station having the lowest frequency—that is, your selected station which is tuned in nearest the right-hand side of the dial.

2. After the station has been tuned in accurately with the right hand, continue to hold it in its exact position firmly, and with the left hand loosen the Push-Button to be set up for that station by unscrewing the Push-Button about one turn to the left (counter-clockwise).

3. Continuing to hold the Station Selector Knob in its exact position, PUSH THE PUSH-BUTTON IN ALL THE WAY with the left hand.

4. After the Push-Button has been depressed all the way, tighten it gently toward the right (clockwise). Release Push-Button slowly and when in normal position grip button and tighten firmly.

The Push-Button tuning system is now correctly set up for your first selected station of lowest frequency and the Call Letter Tab for this station should be at the extreme right of the Call Letter Holder.

Follow through with this same procedure, setting up the other 2 stations in the order of their frequency—that is, the second station set up will be second lowest in frequency and the third station set up will be third lowest in frequency.

Carefully check each Push-Button for the accuracy of its setting. If, when tuning in any station with its Automatic Push-Button, the station is not at its usual volume, or clarity of tone obtained, this may indicate the automatic adjustment for that station was not made accurately. Should there be any inaccuracy in any one of the Push-Button adjustments, correction can be made by repeating the above procedure for that button only. Do not reset those Push-BUTTONS that are accurately adjusted.

No further adjustments are necessary to operate your auto radio automatically or manually. To receive any one of your six selected stations for automatic operation, merely push in ALL THE WAY the Button set up for that station.

To receive all other stations in the regular manner, push in the Station Selector Knob and turn it to the frequency of the station desired.

IMPORTANT: ANTENNA ADJUSTMENT

The antenna adjustment control is located close to the antenna cable receptacle as shown in Figure 1. To make the adjustment first, remove plug from bottom of case by inserting a screwdriver between case and plug button, then tune in a weak station with full volume at or very close to 600 kilocycles (60) on the dial. Second, insert a small screwdriver into the antenna adjustment screw shown in Figure 2 and turn the screwdriver either to the left or right until the volume of the station is at its maximum point. While adjusting the antenna adjustment screw it is advisable to vary the station selector knob a degree or two to obtain the best adjustment. Now insert plug button into case. The receiver is now balanced and no further radio electrical adjustments are necessary.
### Voltages at Sockets

The voltages at sockets are shown on the schematic circuit diagram. Unless otherwise specified, the voltage indicated is between the socket terminal and ground. These voltages are read under the following conditions:

- **Line Voltage:** 117V.

### 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.

**IMPORTANT—Follow procedure in the order shown.**

<table>
<thead>
<tr>
<th>SIGNAL GENERATOR</th>
<th>FREQUENCY SETTINGS</th>
<th>CONNECTION AT RADIO</th>
<th>DUMMY ANTENNA</th>
<th>BAND SWITCH SETTING</th>
<th>CONDENSER SETTING</th>
<th>ADJUST TRIMMERS TO MAXIMUM</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>L.F.</strong></td>
<td>465 KC</td>
<td>Grid of 1st St.</td>
<td>400 Ohm</td>
<td>B Range</td>
<td>Turn Rotor to Full Open</td>
<td>2nd L.F. (C23) &amp; (C24)</td>
</tr>
<tr>
<td><strong>RANGE D</strong></td>
<td>18,300 KC</td>
<td>Antenna Lead</td>
<td>400 Ohm</td>
<td>D Range</td>
<td>Turn Rotor to Full Open</td>
<td>1st L.F. (C20) &amp; (C21)</td>
</tr>
<tr>
<td><strong>RANGE C</strong></td>
<td>15,000 KC</td>
<td>Antenna Lead</td>
<td>400 Ohm</td>
<td>C Range</td>
<td>Turn Rotor to Max. Output</td>
<td>Ant. Range D (C2)</td>
</tr>
<tr>
<td><strong>RANGE B</strong></td>
<td>1600 KC</td>
<td>Antenna Lead</td>
<td>200 mmf.</td>
<td>B Range</td>
<td>Turn Rotor to Full Open</td>
<td>Oscillator Range B (C12)</td>
</tr>
<tr>
<td><strong>RANGE A</strong></td>
<td>1400 KC</td>
<td>Antenna Lead</td>
<td>200 mmf.</td>
<td>B Range</td>
<td>Turn Rotor to Max. Output</td>
<td>Ant. Range B (C4)</td>
</tr>
<tr>
<td><strong>RANGE C</strong></td>
<td>600 KC</td>
<td>Antenna Lead</td>
<td>200 mmf.</td>
<td>B Range</td>
<td>Turn Rotor to Max. Output</td>
<td>600 KC (C13)</td>
</tr>
</tbody>
</table>

**Drive Cord Replacement**

Tie a knot with a small loop at one end of the new drive cord. Slide a 1½-inch length of fabric tubing on the cord. The free end of the drive cord should be tied to the tension spring in such a manner that there is a distance of 56 inches between the knots.

Turn the gang condenser to full open position.

Place the looped end of the drive cord over the hook on condenser drive drum A—See illustration. Bring the cord up through the slot in the drum rim and pass to the right (from back of chassis) and around pulley B. Then bring the cord to the left and over pulley C. See that the fabric tubing is now between pulleys B and C. Continue cord down to control shaft D and wind 3/4 turns counter-clockwise (from back of chassis) on shaft D. Bring cord up and over pulley E. Bring cord down to top of drive drum A and wind one turn clockwise around the drum rim.

Pass the remaining drive cord and tension spring through the slot in the drum. Place free end of spring over the hook on the condenser drive drum.

**ATTACHING DIAL POINTER**—Tune in a 1500 KC signal. Move the pointer to the 1500 KC mark on the dial and clamp it tightly over the fabric tubing on the cord.
Series 1A29 CHANGES MADE FOR "B" ISSUE SETS TO REDUCE HUM MODULATION. Sept. 8, 1939

In order to reduce hum modulation, the following circuit changes have been made. These changes are shown schematically on the back of this sheet. Models on which these changes have already been made can be identified by the chassis number 1A29-2B or 1A29-3B.

Resistor R1, 400,000 ohms, in series with the A/C connection to the antenna coil, has been removed from the circuit.

The A/C line is no longer connected to the antenna coil at terminal "D." Instead, this terminal is connected to ground. The bypass condenser 05, .05 mfd., formerly connected between the same terminal and ground, has been removed from the circuit.

The A/C line which formerly connected to the "D" terminal of the antenna coil and 05, is now connected through a 3 megohm resistor RG to 01 of the 6SK7 R.F. tube.

01 of the 6SK7 R.F. tube, which was formerly connected directly to the starter of the gang condenser, is now connected to this point through a .0005 mfd. condenser 059.

Series 1A29 CHANGES MADE FOR ISSUE "C" Sept. 26, 1939

In order to obtain Underwriters' approval, the issue letter will be advanced to "C" when the following changes are made:

A cardboard shield is used with the electrolytic condenser which is insulated from the chassis.

The tube socket clip tension is reduced.

A wiring change was made to remove high voltage from pin No. 1 on the 6G60 tube socket. A terminal strip has been added to eliminate the use of the pin connection for this purpose.

Series 1A29 CHANGES FOR "D" ISSUE October 27, 1939

The following changes are made in the "D" issue of this model:

Condenser C37 is changed from 250 muf. to 500 muf. to add high frequencies in the high fidelity position.

The noise gate switch has been eliminated so that the noise gate circuit functions all of the time.

The quiet switch, however, is still continued at the same position on the back panel of the chassis. When this switch is in the quiet position, two circuits are affected in the following manner:

The 6SK7 1st I.F. tube is biased with a 1500 ohm resistor connected between cathode and ground to reduce sensitivity.

A positive voltage secured from the B+ line through a 15 Megohm resistor is applied to the A/C diode circuit. Under no signal conditions, this loads the A/C diode circuit, effectively shorting both the signal and A/C secondaries of the 2nd I.F. transformer (T5 in schematic).

When a signal of predetermined intensity is received, the voltage developed in the A/C circuit offsets this positive voltage. The signal is amplified through the transformer and normal reception is obtained.

The effect of the circuits mentioned above, with the switch in the quiet position, is to reduce sensitivity and to "squelch" all signals, both noise and station, until a signal of a certain intensity or greater is received.

Series 1A29 DISTORTION February 21, 1940

Reference is made to a distortion in this model which manifests itself as a rasping sound and is heard on a signal of moderate volume. This may be an overload condition caused by a signal of high modulation.

It can be corrected by changing the signal diode load resistor, R19, from 250,000 ohms to 125,000 ohms.

Series 6A30 SERVICING AUTOMATIC RECORD CHANGER November 20, 1939

1P LANDING POSITION OF NEEDLE IS NOT CONSTANT OR PICKUP ARM CAN'T BE ADJUSTED TO SET NEEDLE DOWN IN STARTING GROOVE OF RECORD

In the first production of the automatic record changer, the pickup arm may display the following symptoms:

1. After the pickup arm has been set for the correct landing position, the needle does not lower consistently to the starting groove of a record during the playing of any one size of records.

2. The needle lowers so far away from the starting groove of the record that turning the needle landing adjusting screw does not bring the needle to the starting groove.

In early production, the pickup lead was permitted to hang down directly below the foot of the pickup. In such instances, the lead may become entangled with the rotating mechanism for the pickup arm. This will produce either one of the above actions.

To remedy the condition, clamp the pickup lead to the bracket - See Fig. 1, leaving enough slack in the lead to permit free action of the pickup arm. That portion of the lead under the clamp should be covered with tape.

The clamping arrangement consists of a small clamp, a No. 6 shakeproof lockwasher, and a 6-32 shakeproof self-tapping machine screw. On request, these items will be supplied free of charge by the factory.

IF PICKUP ARM DOES NOT SET NEEDLE DOWN IN STARTING GROOVE OF BOTH 10" AND 12" RECORDS

It may be found that any one setting of the needle landing adjusting screw will not cause the phonograph arm to set the needle down in the starting groove for both 10" and 12" records.

This condition may be remedied as follows: Set the automatic record changer for 10" record operation. Turn the needle landing adjusting screw so that the pickup arm sets the needle down in the starting groove of a 10" record.

Replace the 10" record with a 12" record and set the automatic record changer for 12" record operation. Start the mechanism. Note the landing position of the needle.
ALIGNMENT PROCEDURE

<table>
<thead>
<tr>
<th>SIGNAL GENERATOR</th>
<th>FREQUENCY SETTING</th>
<th>CONNECTION AT RADIO</th>
<th>DUMMY ANTENNA</th>
<th>BAND SWITCH SETTING</th>
<th>CONDENSER SETTING</th>
<th>ADJUST TRIMMERS TO MAXIMUM</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. F.</td>
<td>456 KC</td>
<td>Grid of 1st Det.</td>
<td>.1 mf.</td>
<td>B Range</td>
<td>Turn Rotor to Full Open</td>
<td>1st I.F. (C19) &amp; (C20)</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2nd I.F. (C24) &amp; (C25)</td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
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<td>3rd I.F. (C28) &amp; (C29)</td>
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<td></td>
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<td></td>
<td></td>
<td>1st I.F. (C17) &amp; (C18)</td>
</tr>
<tr>
<td>RANGE B</td>
<td>1730 KC</td>
<td>Antenna Lead</td>
<td>200 mmf.</td>
<td>B Range</td>
<td>Turn Rotor to Full Open</td>
<td>1st I.F. (C24) &amp; (C25)</td>
</tr>
<tr>
<td></td>
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<td>2nd I.F. (C28) &amp; (C29)</td>
</tr>
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<td>1500 KC</td>
<td>Antenna Lead</td>
<td>200 mmf.</td>
<td>B Range</td>
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<td>Ant. Range B (C4)</td>
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<tr>
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<td>Int. Range B (C9)</td>
</tr>
<tr>
<td></td>
<td>600 KC</td>
<td>Antenna Lead</td>
<td>200 mmf.</td>
<td>B Range</td>
<td>Turn Rotor to Max. Output</td>
<td>600 KC (C43) (16 on 1429)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Rock Rotor—See Note C</td>
</tr>
<tr>
<td>RANGE C</td>
<td>7000 KC</td>
<td>Antenna Lead</td>
<td>400 Ohm</td>
<td>C Range</td>
<td>Turn Rotor to Full Open</td>
<td>Antenna Range C (C14)</td>
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<tr>
<td></td>
<td>6000 KC</td>
<td>Antenna Lead</td>
<td>400 Ohm</td>
<td>C Range</td>
<td>Antenna Range C (C3)</td>
<td>Int. Range C (C6)</td>
</tr>
<tr>
<td>RANGE D</td>
<td>22,000 KC</td>
<td>Antenna Lead</td>
<td>400 Ohm</td>
<td>D Range</td>
<td>Turn Rotor to Full Open</td>
<td>Antenna Range D (C13)</td>
</tr>
<tr>
<td></td>
<td>21,000 KC</td>
<td>Antenna Lead</td>
<td>400 Ohm</td>
<td>D Range</td>
<td>Turn Rotor to Max. Output</td>
<td>Int. Range D (C7)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Rock Rotor—See Note C</td>
</tr>
</tbody>
</table>

LOOP RANGE B

| 1500 KC          | None—See Note D | B Range             | Turn Rotor to Max. Output | Loop Trimmer (C23) |
|                  |                  |                     |                            | See Note E         |

LOOP RANGE C

| 6000 KC          | None—See Note D | C Range             | Turn Rotor to Max. Output | Loop Trimmer (C22) |
|                  |                  |                     |                            | See Note E         |

LOOP RANGE D

| 21,000 KC        | None—See Note D | D Range             | Turn Rotor to Max. Output | Loop Trimmer (C21) |
|                  |                  |                     |                            | Rock Rotor—See Note C |

ATTENUATE THE SIGNAL FROM THE SIGNAL GENERATOR TO PREVENT THE LEVELING-OFF ACTION OF THE A.V.C.

After each range is completed, repeat the procedure at least three times for a final check.

NOTE A.—For all adjustments, with the exception of the 3 loop range adjustments, the pin tip should be in the external antenna hole of the Antenna Selection Socket.—See illustration on page one.

NOTE B.—If the pointer is not at 1500 KC on the dial remove pointer from drive cord. Tune in a 1500 KC signal. Set pointer at the 1500 KC mark on the dial scale. Attach pointer to drive cord.

NOTE C.—Turn the rotor back and forth and adjust the trimmer until the peak of greatest intensity is obtained.

NOTE D.—Re-install set in cabinet. Connect a loop approximately one foot in diameter across the antenna and ground posts of the signal generator. Place signal generator so that this loop is between 3 and 10 feet from loop in cabinet. Insert pin tip in loop antenna hole of Antenna Selection Socket.—See illustration on schematic page.

1500 KC mark on the dial scale. Attach pointer to drive cord.
Procedure for Setting the Station Buttons

ALL MODELS

There are 6 buttons on the automatic tuning dial by means of which 6 stations may be set for quick tuning.

It is better to list the station with the lowest kilocycle number first, the station with the next higher kilocycle number next, and on. Any button may be used for any station you can receive, although it will be more convenient to set the stations so that the kilocycle numbers decrease from left to right.

Setting a Station Button

6A26, 6A26S, 6A27, 6D1

At the right side of the cabinet (from the front) will be seen a cap which covers a hole in the cabinet—See illustration. Pry off this cap being careful not to scratch the cabinet. Removal of the cap will expose a large locking screw. Using a screwdriver, loosen the mechanism by turning this screw in a counter-clockwise direction. The screw will turn easily until the dial pointer stops moving. Then exert a slight amount of additional pressure and continue to turn the screw about one and one-half complete turns.

1A29 ONLY

Turn the tone and selectivity control to any of the sharp positions.

1A29, 8A30, 8A31

Turn the manual tuning knob so that the pointer moves toward 1700 KC until the stop is reached.

At the right side of the escutcheon (from the front) will be seen a cap which covers a hole in the escutcheon—See illustration. Pull off this cap. At the end of the tube in back of the hole in the escutcheon is the locking screw. Using a small handle screwdriver, unlock the mechanism by turning this screw several turns in a counter-clockwise direction.

ALL MODELS

Select the first station from the list you have prepared, and carefully tune in this station by means of the manual tuning knob using the tuning eye as a guide.

With one hand, hold the manual tuning knob to prevent it from turning and with the other hand, push one of the station buttons shown in the illustration all the way down. It will go down easily at first and then a firm gentle pressure must be applied to push it down the rest of the way. It is better to start with the left hand button.

Hold this button all the way down. With the other hand, see whether or not this station is still accurately tuned in by moving the tuning knob a slight amount back and forth while observing the tuning eye. Be sure to hold the button all the way down.

Release the button after the station is tuned in. Carefully tune in the second station on your list. Then hold the tuning knob and push the second button slowly and firmly all the way down. Check for accurate tuning.

Proceed in the same manner to set any additional stations on your list on the remaining station buttons.

6A26, 6A26S, 6A27, 6D1

After all the

will be necessary to lock the mechanism so that the settings will not change. Do this by turning the locking screw in a clockwise direction until it is tight. It will turn easily until the dial pointer stops moving. Then additional pressure must be exerted. Tighten firmly but not excessively. Replace the cap over the hole.

Remove the correct station call letter tab for this button from the sheet supplied by bending the sheet back and forth at the score marks. Place the call letter tab in front of the celluloid reinforcement tab and insert it in the slot. Push both tabs all the way in the button slot. Follow the same procedure for inserting the station call letter tabs in any other buttons.

ALL MODELS

if at any time you wish to change the setting of a button from one station to another, repeat the above procedure. Changing the setting of one button will not affect the setting of any of the other buttons.
**MODEL 1229 Issue D**

**Drive Cord Replacement**

Turn gang condenser to completely closed position. Remove 3X5G tube from socket. Remove guide arm from front of chassis—See illustration.

Use a drive cord approximately 70 inches in length. Tie a large knot with a small loop at one end of the new drive cord. Thread other end of cord up through hole in rim of condenser drive pulley. Pull cord through hole until large knot is flush against pulley rim.

Turn gang condenser to completely closed position. Remove guide arm from front of chassis—See illustration.

Wind 3/4 turn in a clockwise direction (from right side of chassis) around condenser drive pulley. Pass cord over pulleys A, B, and C as shown. Wind 1/2 turn in a clockwise direction (from front of chassis) around tension control shaft. Tension should progress toward the chassis.

Wind 1 1/2 turns in a clockwise direction (from right side of chassis) around condenser drive pulley. Pass cord through hole in pulley rim. Secure tension spring to cord loop on other end of cord to spring. Stretch spring and secure free end to hook on drive pulley. Replace guide arm.

**Drive Cord Replacement**

Remove dial lamp socket and bracket from dial mounting plate. Remove tension spring from pulley. Double new drive cord and knot both ends to same loop on tension spring. There should be a distance of 13 inches between knot and looped end of cord.

Secure other end of spring to hook on pulley. Thread looped end of cord, starting from inside of drive pulley, through hole in rim of drive pulley.

**Television Sound or Phonograph Connections**

For Models 1229, 1230, 1242, 1262, 1272, 1281, 1300, 1351.

If television programs ever become available in your community, the audio amplifier and speaker of this radio may be used to reproduce television sound in conjunction with any “Television Picture Receiver and Sound Converter.” Phonograph records may also be played through the radio.

On the back panel of the chassis base is a switch and a socket for a single shielded pin tip at which connections are made. The connector on the cable from a television receiver or from a photo pickup can be inserted in the socket. (The cable connector must be a single shielded pin tip type, Part No. M6B.)

When phonograph or television sound reproduction is desired, the switch should be moved to the “Phono-Television Sound” position. For radio reception, the switch should be in the “Radio” position.

*For Model 1229 Issue D use Part No. 6224.
HUM MODULATION ON WEAK SIGNALS MAY BE CORRECTED BY RETURNING CONDENSER C1 TO E (POINT X ON SCHEMATIC) INSTEAD OF TO CHASSIS GROUND.

Radios for 25 to 60 cycle AC operation are so marked.

NOTE: CHASSIS GROUND ONLY—NOT EXTERNAL.

VOLTAGES AT SOCKETS FOR 117 VOLT A.C. LINE.

ALL VOLTAGES EXCEPT HEATERS ARE BETWEEN SOCKET TERMINALS A & B (INDICATED BY X).

Power Consumption - 28 Watts (At 117 volts AC Supply)
Power Output - .8 Watt Undistorted
Selectivity - 60 KC Broad at 1000 times Signal
Intermediate Frequency - 456 KC
Speaker - 5" Electro Dynamic
Tuning Frequency Range - 528 to 1720 KC
Sensitivity - 35 Microvolts per Meter Average (For .05 Watt Output)
### ALIGNMENT PROCEDURE: 6A26, 6A26S

**Connect Ground Post of Signal Generator to B—(12SK7—Prong No. 3) in Chassis.**

<table>
<thead>
<tr>
<th>SIGNAL GENERATOR</th>
<th>FREQUENCY SETTING</th>
<th>CONNECTION AT RADIO</th>
<th>DUMMY ANTENNA</th>
<th>CONDENSER SETTING</th>
<th>ADJUST TRIMMERS TO MAXIMUM</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>456 KC</td>
<td>Signal Grid of 1st Det.</td>
<td>.1 mf.</td>
<td>Turn Rotor to full open</td>
<td>1st I.F. (C7) &amp; (C8)</td>
</tr>
<tr>
<td></td>
<td>1730 KC</td>
<td>Signal Grid of 1st Det.</td>
<td>.1 mf.</td>
<td>Turn Rotor to full open</td>
<td>2nd I.F. (C9) &amp; (C10)</td>
</tr>
<tr>
<td></td>
<td>1500 KC</td>
<td>None — See Note</td>
<td>.1 mf.</td>
<td>Turn Rotor to full open</td>
<td>Oscillator (C2)</td>
</tr>
</tbody>
</table>

**NOTE:** Connect a loop approximately one foot in diameter across the antenna and ground posts of the signal generator. Secure the back in place on the cabinet. Place radio approximately 3 feet from loop so as to pick up signal. Radio should not be in proximity to any metal (metal bench, etc.).

**CALIBRATION:** If it is necessary to calibrate the radio, remove the radio from the cabinet. Tune in an 800 KC signal. If the pointer is not at 800 KC on the dial, loosen the 2 clamps which hold the pointer assembly on the cord, move the pointer to the 800 KC mark, and tighten the clamps.

---

### ALIGNMENT PROCEDURE: 6A27, 6D1

**Remove Jumper on Loop Antenna for All Adjustments.**

**Connect Ground Post of Signal Generator to B—(12SK7—Prong No. 3) in Chassis.**

<table>
<thead>
<tr>
<th>SIGNAL GENERATOR</th>
<th>FREQUENCY SETTING</th>
<th>CONNECTION AT RADIO</th>
<th>dummy antenna</th>
<th>Band Switch Setting</th>
<th>CONDENSER SETTING</th>
<th>ADJUST TRIMMERS TO MAXIMUM</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I.F.</td>
<td>Signal Grid of 1st Det.</td>
<td>.1 mf.</td>
<td>B Range</td>
<td>Turn Rotor to full open</td>
<td>1st I.F. (C11) &amp; (C12)</td>
</tr>
<tr>
<td></td>
<td>456 KC</td>
<td>Signal Grid of 1st Det.</td>
<td>.1 mf.</td>
<td>B Range</td>
<td>Turn Rotor to full open</td>
<td>2nd I.F. (C13) &amp; (C14)</td>
</tr>
<tr>
<td></td>
<td>RANGE B</td>
<td>Signal Grid of 1st Det.</td>
<td>.1 mf.</td>
<td>B Range</td>
<td>Turn Rotor to full open</td>
<td>Oscillator Range B (C4)</td>
</tr>
<tr>
<td></td>
<td>1730 KC</td>
<td>Signal Grid of 1st Det.</td>
<td>.1 mf.</td>
<td>B Range</td>
<td>Turn Rotor to full open</td>
<td>Oscillator Range B (C6) — See Illustration Below</td>
</tr>
<tr>
<td></td>
<td>1500 KC</td>
<td>Red Antenna Screw at Back of Loop</td>
<td>.1 mf.</td>
<td>B Range</td>
<td>Turn Rotor to max. output</td>
<td>Antenna Range B (C8) — See Note A</td>
</tr>
<tr>
<td></td>
<td>RANGE C (6A27 ONLY)</td>
<td>Same as Above</td>
<td>.1 mf.</td>
<td>B Range</td>
<td>Turn Rotor to max. output</td>
<td>600 KC (C8) Rock Rotor — See Note A</td>
</tr>
<tr>
<td></td>
<td>6500 KC</td>
<td>Same as Above</td>
<td>.1 mf.</td>
<td>C Range</td>
<td>Turn Rotor to full open</td>
<td>Oscillator Range C (C5)</td>
</tr>
<tr>
<td></td>
<td>6000 KC</td>
<td>Same as Above</td>
<td>.1 mf.</td>
<td>C Range</td>
<td>Turn Rotor to max. output</td>
<td>Ant. Range C (C1) Rock Rotor — See Note A</td>
</tr>
<tr>
<td></td>
<td>RANGE D (6D1 ONLY)</td>
<td>Same as Above</td>
<td>.1 mf.</td>
<td>D Range</td>
<td>Turn Rotor to full open</td>
<td>Oscillator Range D (C3)</td>
</tr>
<tr>
<td></td>
<td>12,000 KC</td>
<td>Same as Above</td>
<td>.1 mf.</td>
<td>D Range</td>
<td>Turn Rotor to full open</td>
<td>Ant. Range D (C2) Rock Rotor — See Note A</td>
</tr>
<tr>
<td></td>
<td>11,000 KC</td>
<td>Same as Above</td>
<td>.1 mf.</td>
<td>D Range</td>
<td>Turn Rotor to max. output</td>
<td>Ant. Range D (C2) Rock Rotor — See Note A</td>
</tr>
</tbody>
</table>

**ATTENUATE THE SIGNAL FROM THE SIGNAL GENERATOR TO PREVENT THE LEVELING-OFF ACTION OF THE AVC.**

After each range is completed, repeat the procedure as a final check.

**NOTE A:** Turn the rotor back and forth and adjust the trimmer until the peak of greatest intensity is obtained.

**CAUTION:** When aligning the short wave bands be sure NOT to adjust at the image frequency.

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WELLS-GARDNER & CO., INC.

MODEL 6A27

Schematic, Voltage, Socket

Sensitivity

Power Consumption: 29 Watts (at 117 volts AC Supply)

Power Output: 0.25 Watt

Selectivity: 50 KC Band at 1000 Times Signal-to-Noise Ratio

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Removing Chassis from Cabinet

Take out the 2 screws, one on each side on the outside of the cabinet. Grasp the chassis shelf at each rear corner and edge it away from the cabinet front until the chassis shelf and cabinet sides slide easily out of the cabinet.

To remove the shelf from the chassis, take out the bolt and the 2 screws at the bottom of the shelf.

Using Radio Without Batteries—The radio may be operated without batteries when it is connected to A-C-D-C. If this is done, tape the prongs of the battery plugs to prevent them from accidentally touching each other, and place the plugs and cables in the battery compartment.

Caution

The metal chassis is connected to one side of the line through a .1 mfd. condenser. Both a-c and d-c power lines are generally grounded on one side. If the side of the line not connected to the metal chassis through the condenser is grounded and the metal chassis comes in contact with an external ground, this condenser will be connected across the line and there will be an increase in hum.

Therefore, in any service work on the chassis, keep it on a solid wood or other insulated surface to avoid contacts with ground. The ground working on the set should avoid getting in contact with any ground.

Series 6B7-3, 6B7-4 CHANGES MADE FOR ISSUE "B" March 11, 1940

To satisfy additional Underwriters requirements, the chassis has been insulated from the a-c-d-c line except for a connection through a .1 mfd. condenser. See schematic. On these models the battery wires are held by a clamp located under the chassis shelf. On previous issues this clamp was above the shelf. The battery compartment cardboard fittings have been made safer to clear the above mentioned clamp.

On chassis with the above changes incorporated, the issue letter becomes "B."

All voltages on this issue chassis except the heaters and dial lamp are measured between socket terminal and B- (indicated by "X")—See schematic.

ALIGNMENT PROCEDURE

Volume Control—Maximum A-F 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.

CALIBRATION

(For models with pointer in front of dial scale) To obtain dial scale calibration, tune in 800 Kc. signal. The pointer should be at the 800 Kc mark on the dial. If it is not, hold the pointer at the back of the dial and loosen the pointer screw, set the pointer at the 800 Kc mark. Hold the pointer and retighten the pointer screw.

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 Screened-Antenna—1 m.

SIGNAL GENERATOR

<p>| FREQUENCY |</p>
<table>
<thead>
<tr>
<th>SETTING</th>
<th>CONNECTION</th>
<th>ANTENNA</th>
</tr>
</thead>
<tbody>
<tr>
<td>45 Kc</td>
<td>Signal Grid of 1st De. (Top Cap)</td>
<td>.1 m.</td>
</tr>
<tr>
<td></td>
<td>Signal Grid of 1st De. (Top Cap)</td>
<td>.1 m.</td>
</tr>
<tr>
<td>1500 Kc</td>
<td>Set Electrostatic</td>
<td>.1 m.</td>
</tr>
<tr>
<td>1500 Kc</td>
<td>Set Electrostatic</td>
<td>.1 m.</td>
</tr>
</tbody>
</table>

CHANGES MADE FOR ISSUE "B" November 26, 1939

To satisfy Underwriters' requirements, the chassis issue will become "B" when several changes in the wiring and the arrangement of parts in the chassis have been made.

Chassis with these changes have had the 6 lug terminal strip A996 removed.

PROLONGING TUBE LIFE

CHANGES FOR NOTE 14.43 Jan. 9, 1940

To compensate for variations in tube characteristics as well as line voltages, the following changes have been made in the filament series circuit to reduce the voltages across the tube filaments to prolong tube life.

Resistor Rl, which is in series with the filament series, has been changed from 1500 ohms to 2000 ohms.

There was unequal emission from the 2 sections of the filament of the 3Q57 output tube. This caused unequal voltages across the 2 sections of the filament and shortened the tube life. There is now a 750 ohm resistor (R27) across one section which equalizes the currents through both ports.

The four 13 volt tube filaments were shunted with 1200 ohms—Resistors R19—800 ohms and R18—400 ohms (See old schematic). The connecting point between these 2 resistors established the grid (bias) voltage for the output tube. These 4 tubes are now shunted by one 1200 ohm resistor R26.

The 1A7GT 1st Deeter Filament is now shunted with a 1500 ohm resistor—R26.

The 1H5GT 2nd Deeter Filament is now shunted with 340 ohms—Resistors R24 and R25 in series. The connecting point between these 2 resistors establishes the grid (bias) voltage for the output tube.
Antenna and Ground

Two loop antennas are incorporated in the speaker chamber and may be used for broadcast band and short wave reception. For the reception of local or nearby stations, an outside antenna is usually not required. The use of the loop antennas may, in some locations, provide best broadcast band operation.

In general, however, more stations will be heard and noise will sometimes be reduced by using an outside antenna.

For best reception of short wave stations, an outside antenna is recommended.

A white wire will be found coming out of the chassis. Connect this wire to the outside antenna lead.

On the back panel of the chassis base is a screw (marked GND) under which the ground wire should be fastened.

ANTENNA SELECTION SOCKET
—At the right front corner of the chassis base (from back of cabinet) is a 2 hole pin tip socket—See illustration. If it is desired to operate the radio using the loop antennas, the pin tip should be inserted in the hole farthest from the side of the chassis. If it is desired to operate the radio using an external antenna, insert the pin tip in the hole nearest the side of the chassis. The socket may be reached after removing the four wing nuts holding the cover over the opening in the cabinet back.

SPECIFICATIONS

Power Consumption 21 Watts (At 17 volts, 80 cycles)
88 Watts (Voice Operation)

Power Output .......................... 4.0 Watts Undistorted
3.0 Watts Maximum

Selectivity ......................... 30 Kc at 1000 times Signal

Intermediate Frequency .............. 456 Kc

Speaker .................................. 10" Electro-Dynamic

Receivers of this model which are to be used on 26 cycle, 230 volt, or other service are so marked on label.

Tuning Frequency Range
B Range .................................. 525 to 1750 Kc
C Range .................................. 525 to 7000 Kc
D Range .................................. 7000 to 12,000 Kc

Sensitivity (For No Output) R Range .......................... 1.0 Microvolt Average C Range .......................... 1.5 Microvolt Average D Range .......................... 3.0 Microvolt Average

FOR OTHER DATA SEE INDEX

Important—A good antenna and ground are essential for best operation of this radio. Connections should be clean and tight. Do not use an old outside antenna as in most cases it will be unsatisfactory.

Voltages at Sockets

Coverings taken with 1000 ohm per volt meter. Plate and screen voltages are read on 500 volt scale.
ANTENNA SELECTION SOCKET

At the right front corner (from back of cabinet) of the chassis base is a 2 hole pin tip socket. See illustration. If it is desired to operate the radio using the loop antenna, the pin tip should be inserted in the hole farthest from the side of the chassis. If it is desired to operate the radio using an external antenna, insert the pin tip in the hole nearest the side of the chassis.

Power Consumption: 70 Watts (At 117 volts 60 cycles)
Power Output: 4.5 Watts Undistorted
5.5 Watts Maximum
Selectivity: 30 KC Broad at 1000 time Signal
Intermediate Frequency: 456 KC
Speaker: 8" or 10" Electro-Dynamic

TO REDUCE MODULATION-EMI:
Interchange 1st A-F tube with R-F and L-F tubes; select tube position which reduces hum. If appreciable hum remains, try several new 6SK7 1st A-F tubes and use the one which reduces hum to a minimum.

Dial Lamps

The dial lamps used are of the bayonet pin type (bulb No. 81). To replace any lamp, first turn the radio off. Then pull the clip off and replace the lamp.

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Automatic Record Changer
(Rewindine Feeding)

WELLS-GARDNER & CO.

For the Service Man

This Manual is designed for the use of the service man and is not intended to facilitate as far as possible his work for the Changer mechanism. Whether he is called in for the purpose of assuring its continued satisfactory operation, or to remedy some difficulty which has appeared.

For Operating Instructions, "Operating Instructions," supplied to the user by the factory, may be referred to as follows.

The Changer plays twelve 10" or ten 12" records. To make a record, place the new records on the Shelf Plate, and push "Start" in the "Changer Mechanism" position. To play the other side, turn the knob at the top of each side, then turn the other side. The first record will be played, and the other side will be played next.

Illustrations

The three photos illustrate all vital parts of the Changer. Letters are used alphabetically, to refer to parts on the photos. The motor horns are found by looking at the right side of Photo A (left side of Photo B) to locate AK. Reference letters must be used for ordering parts. The Changer mechanism contains no replaceable parts.

Oilings (reprinted from Operating Instructions)

The gene should be oil before any year, with a drop of oil in a good light machine oil at each of the following 6 points: All points may be changed from above, through the horns in the counting plate, and as follows:

1. Three oil holes on the motor housing. Three all three through two holes.
2. Four holes marked AL, drop the oil all over the fan as well as the blades. It will distribute itself upon the base of the fan. All oil holes mentioned, AL.
3. Through hole marked AK, see field wiring, and drop the oil directly upon it. All oil holes mentioned, AK.

To check Oilings:

If a squeak occurs, the squeak comes from the record and not a loud record; any squeak in motion is likely to appear a little against a pin through their center. The entire assembly is turned (as shown by photo A-1) to examine the record horn, including three 1/4" round holes in each side of the horn and a 1/4" round hole in the horn. Each record horn is thoroughly saturated (as it may be if insufficient oil has been used.) Any oil all over the record horn is thoroughly saturated with oil. It is necessary to make a check for oil flow (usually automatic) of the record horn and oil flow (usually automatic) of the horn of the horned horn. The horned horn is then, and, with replacing it, drop a little oil all over the holes. The gear of the Motor is passed with a semi-transparent film at the factory, and it should never be necessary to take it apart.

General Instructions of the Change Cycle:

An automatic record player for records of the form has three principal duties to perform. These duties are here performed by the mechanism, interconnected and built together but largely separate in their operation.

In the first, the record-changer mechanism is first to be activated: the record is played by the horn, as is shown in Photo B (A-2) to locate AK. The mechanism is then transferred to Bear Changer Shaft (at A) through Bear Clutch (C) and through Changer Connecting Rod to Front Changer Shaft. It is then in use for operating-automatically the horn of the horned horn. It is first thought into operation originally by the horned horn, as shown by the groove in (A-2) to locate AK. As Lever (A-2) to locate AK is forced out, it begins to operate the change function. It begins to operate the change function. The lift and force roller lift to the center (A-2) to locate AK. The energy is transferred to Bear Changer Shaft (at A) through Bear Clutch (C) and through Changer Connecting Rod to Front Changer Shaft.

Cutting-Oil-Operated Mechanism:

The factory's adjustment of needle loading is 1/8" in from center of record. Compare also Paragraph A below.

B. ADJUSTING DISTANCE FROM RECORD PIN AT WHICH TRIGGER WHEEL TURNS AND CHANGE CYCLE WILL BEGIN.

Turn screw head on Trip Adjustable Cam (C-2) clockwise for shorter distance, for longer distance, for shorter distance. (If it is not correct, the trip must be turned back.) The trigger is set up for the desired distance by the trigger setting. The factory adjustment of needle loading is 1/8" in from center of record. Compare also Paragraph A above.

The name of this Changer no hole will be found on the face plate at A. To make the adjustment on these Changers, screws must be removed. The adjustment of needle loading is 1/8" in from center of record. Instead of Cam C, there will be found a Trip Adjustment Cam only on the side of the trigger which is to be used. The new cam end strikes the trigger directly. For earlier each pin, turn both adjustment screws to be used for later trip. The adjustment will turn counter-clockwise.

The Changer does not depend for automatic trigging on the trigger being to any special grooves at even the trigger which enables all parts out of the grooves on the record. The factory adjustment is for 1/16" space between the horn and the record. This is the most critical satisfactory distance; no modern record will be played if it is 1/16" out before playing is finished, and none will fail to trip at end. For certain records of

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early manufacture, it may be impossible to find an adjustment that will always trip and never cut off, but there may always be played manually.

C. ADJUSTING HEIGHT TO WHICH PICKUP ARM RISES. The arm should rise, during the change cycle, high enough so that it clears by only 1/4 the record above it, next to the playing (be careful, before deciding that playback is insufficient, so that the record at bottom of stack is not a warped one.) To make this adjustment, loosen Locking Rod at 24, and turn Pickup Arm to location of Location Pin on Plunger Arm 25. However, if Pickup is made to rise too close to bottom record, Std or AE may never clear the groove in Cam Gear. In making this adjustment, therefore, care must be taken that the Pickup arm does not keep moving back and forth continuously (due to Std or AE remaining in engagement with groove). From correct adjustment is found, Tighten Lock Nut securely.

Resetting Motor

The service mechanism may be called upon to adjust the Changer to a different power supply. For this purpose, or in case of any service required by the Motor, move entire Motor Health at (24) and removing rear drive from the Changer, and replace it with a suitable new Motor. (In ordering a replacement Motor, specify the power supply and give model number at (24) also takes at (24) and model number of phonograph or other type of installation.)

When mounting replacement Motor, it is most important to see that Record Pin is centered between the two Posts of the Changer, that it stands perpendicular to Main Plate (24), and that it has not bent. When new Motor has been attached, with three screws through 8mm Screws (23) into its frame, and Record Pin is seen to work without appreciable wobble (a wobble would indicate that it has been bent in transit from factory) the correct position of Pin midway between the Posts can be accurately checked in this way: Place a scale IC record on the Main Plates (24), press the button, and turn slant forward by hand. Immediately after the Main Plates open and let it fall, turn assembly clockwise, its axis and then turn assembly counterclockwise. After this, it can then be readily seen whether Record Pin is off center and if it is, remove the record and turntable, and look at the pickup arm for screws of record (螺丝补救) on the Main Plates (25) which replace the record. This should improve evenness of operation. However, unless the turning efforts were slight, it will be necessary for a permanent repair to install a thin shaft or two or one on one or on one of the three screws (or change three to two, or one to two, or one to two) and cut out at one side (see cut-out view at (24), showing a shaft in place upon one of the thinnest Screws). Three screws can then be tightened (the same) so that the pickup arm can be cleared from the thin metal plates and then the pickup arm can be turned to the desired screw point. The pickup arm is then tightened (the same) and the pickup arm is then tightened (the same). The metal is then secured (the same).
Before tightening screws, drop drive pinion assembly back into block with filler gear (but not down far enough to block drive pin). Then with three screws tightened, lift pinion and filler still together and do not bind. In necessary, loosen screws again, and shift motor back into proper position. The clearance is obtained. Then tighten screws, and test, as shown in Figure 7.1. Centering of record pin between Changer Post B.

In wiring up, consult wiring diagram for proper connections. Use only Underwriters’ approved wire. See that Bake Frost is kept away from any hot or exposed parts, as shown in Figure 7.2. (See page 2).

Trouble Shooting
Failure of record to operate satisfactorily may be caused by lack of lubrication, or to some extent by the mechanism after it leaves the factory, or to inconsistencies caused by certain elements from the float or from severe vibration. In addition to these, there is always the possibility that any kind of spring may be damaged, (caused by operation under any violent breakage) even though the whole float mechanism is designed to be self-cleaning. The components are generally held in place by screws, and these should be checked for tightness. By observing the assembly, it will be seen that the mechanism can be damaged by severe vibration. The chart on page 7.2 shows the components and their attachment points.

1. Compliments of www.nucow.com
To rebalance the receiver does not require any equipment. The meter will indicate the exact resonance point of the I.F. trimmers and also the condenser ganging. Proceed as follows: Set band spread dial at "Q" then tune in a station on the high frequency end of the broadcast band (any station around 1400 K.C. is okay). Next, adjust the trimmer on the condenser section nearest the dial until the station reads exactly on its known K.C. Now, tune in a station in around 650 K.C. and be careful to be on the exact center of the carrier. All of the above operations must be made with the manual control in off position. Next, turn the sensitivity control toward extremum so that the meter reads about R-8. Now, adjust each of the eight I.F. trimmers very carefully until the meter swings the farthest to the right. You probably will not be able to increase the gain more than 1.5-R. It should not be necessary to turn any trimmer more than 1/4 of a turn.
Circuit

This receiver is designed to operate from a battery power supply the values of which are shown in Fig. 1. All of the tubes used are of the 2 volt type. The receiver is designed to operate at a very low current drain from the batteries and still have a very satisfactory quality of output.

The circuit has a preselector stage incorporating 2 tuned circuits for image rejection. This couples into the type 32 first detector-oscillator tube through a combination of inductance coupled to the detector in T1 and capacitance and inductive coupling through C3. In Fig. 1 the two coils to the right of the 32 1st detector tube are the primary and secondary of the 1st I.F. transformer while below this tube are the oscillator coils. The oscillating circuit is tuned by the oscillator section of the gang condenser and is always resonant at a frequency of 175 K.C. above the frequency to which the R.F. circuit is tuned.

Standing wave I.F. amplification is employed using a 34 tube. Fixed condensers tune the primary and secondary of the first I.F. transformer. A second I.F. unit of the impedance coupled type is provided in which the inductance L4 is tuned by a trimmer condenser C9. The volume control is of the variable antenna input and I.F. bias type. Referring to Fig 1 it will be noted that one end of the volume control strip is connected to the antenna and the other end is connected to resistor R2. Also note that the volume control strip is tapped. Bias voltage for the 34 I.F. tube is obtained from a potentiometer consisting of resistors R3, R10 and the 60,000 ohm section of the volume control which resistors are connected across the 22 0 volt "C" battery.

As the slider of the volume control is moved away from the antenna end, the signal input to the antenna is increased. The bias voltage of the I.F. tube is not affected until the tap is reached at which the diaphragm moves from this point to the end of the strip the I.F. bias is decreased, thus increasing the sensitivity. When this happens the plate current goes up and more battery current is drawn.

A 34 tube is used as the 2nd detector or demodulator. Demodulation takes place in the grid circuit of this tube.

Resistance coupling is used between the 2nd detector and the 1st audio stage which uses a 30 tube. The 1st audio transformer coupled to the output stage. Class "B" amplification is employed in the output stage which uses a type 19 tube. This consists of two output tubes in one envelope. A magnetic reproducer is used.

3 pole switch controls all three sources of battery supply.

Condenser Alignment

Misalignment or mistracking of condensers generally manifests itself as broad tuning and lack of volume at portions or all of the broadcast band. The receivers are all properly aligned at the factory with precision instruments and realignment should not be attempted unless all other possible causes of the faulty operation have first been investigated and unless the service technician has the proper equipment. A signal generator that will provide an accurately calibrated signal over the broadcast band and at the intermediate frequency, and an output meter are required for indicating the effect of adjustments.

First set the signal generator to a frequency of 175 K.C. Connect the antenna lead of the signal generator to the grid of the 1st detector thru a .05 mf condenser. The ground lead from the signal generator goes to the ground lead of the receiver. Adjust trimmer condenser C9 on the 3rd stage until maximum output is obtained. Then set the signal generator for 1730 K.C. Turn the rotor to the full open position. The antenna lead from the signal generator is in this instance connected to the antenna lead of the receiver. Adjust the trimmer of the 3rd stage until maximum output is obtained. The oscillator section is the one with the cut plate rotor.

Then set the signal generator for 1400 K.C. and turn the rotor until maximum output is obtained. Adjust the other two trimmers on the gang condenser for maximum output.

To obtain dial scale calibration tune in an 800 K.C. signal and set the dial pointer at that mark on the dial scale. Where calibrated in this manner, the setting will be approximately correct at both ends of the scale.

D. C. Resistance of Windings

Following are the D.C. resistances of the various windings in the chassis.

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Item</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>P-5168</td>
<td>Double Tuned Ant. Coil Pri.</td>
<td>T1 19.2</td>
</tr>
<tr>
<td>P-5199</td>
<td>Double Tuned Ant. Coil Sec. (Preselector)</td>
<td>T2 2.2</td>
</tr>
<tr>
<td>P-50506-D</td>
<td>Audio Input Trans. Pri.</td>
<td>T3 19.2</td>
</tr>
<tr>
<td>P-50506-C</td>
<td>Audio Input Trans. Sec. Cent. Tap.</td>
<td>T3 11.0</td>
</tr>
<tr>
<td>P-5121</td>
<td>Oscillator Coll. Grid Wind.</td>
<td>T4 1.1</td>
</tr>
<tr>
<td>P-5122</td>
<td>Oscillator Coll. Plate Wind.</td>
<td>T4 1.1</td>
</tr>
<tr>
<td>P-5125</td>
<td>Double Filament Reactor Assem.</td>
<td>L1 6.1</td>
</tr>
<tr>
<td>P-5126</td>
<td>Double Filament Reactor Assem.</td>
<td>L2 6.1</td>
</tr>
<tr>
<td>P-5127</td>
<td>1st L.F. Coil Pri.</td>
<td>T3 11.0</td>
</tr>
<tr>
<td>P-5128</td>
<td>1st L.F. Coil Sec.</td>
<td>T2 1.1</td>
</tr>
<tr>
<td>P-5129</td>
<td>1st L.F. Reactor Coll.</td>
<td>T4 1.1</td>
</tr>
<tr>
<td>P-5130</td>
<td>1st L.F. Reactor Resistor</td>
<td>L4 52.1</td>
</tr>
<tr>
<td>P-2124</td>
<td>6&quot; Magnetic Speaker, Center Tap</td>
<td>T3 27.2</td>
</tr>
<tr>
<td>P-2125</td>
<td>6&quot; Magnetic Speaker, Term Tap</td>
<td>T3 22.5</td>
</tr>
<tr>
<td>P-2126</td>
<td>6&quot; Magnetic Speaker, same as P-2124</td>
<td></td>
</tr>
</tbody>
</table>

VOLTAGES AT SOCKETS

<table>
<thead>
<tr>
<th>Type of Tube</th>
<th>Function</th>
<th>Across Filament</th>
<th>Plate to Cath.</th>
<th>Screen to Cath.</th>
<th>Grid to Cath.</th>
<th>Normal Plate M. A.</th>
</tr>
</thead>
<tbody>
<tr>
<td>32 1st Det. &amp; Osc.</td>
<td>2.0</td>
<td>135</td>
<td>67.5</td>
<td>7.5 (1) (2)</td>
<td>2.5</td>
<td>1.1</td>
</tr>
<tr>
<td>34 1st F.</td>
<td>2.0</td>
<td>135</td>
<td>67.5</td>
<td>2.5 (2)</td>
<td>2.8</td>
<td>1.1</td>
</tr>
<tr>
<td>34 2nd Det.</td>
<td>2.0</td>
<td>50</td>
<td>40 (1)</td>
<td>0</td>
<td>0</td>
<td>1.1</td>
</tr>
<tr>
<td>30 1st Audio</td>
<td>2.0</td>
<td>135</td>
<td>9 (4)</td>
<td>3.0</td>
<td>1.1</td>
<td></td>
</tr>
<tr>
<td>19 Output</td>
<td>2.0</td>
<td>135</td>
<td>6</td>
<td>1.8</td>
<td>1.1</td>
<td></td>
</tr>
</tbody>
</table>

VOLTAGES AT SOCKETS

Check the voltages at the sockets to see if correct values are being delivered to the tubes. The antenna and ground should be disconnected and the antenna and ground leads from the set connected together. The voltages are typical of the sets but will vary slightly with variations in individual receivers, tubes, test equipment used and battery voltages.
Replacing Drive Cord

Remove the chassis from the cabinet. Take off the short light assembly by lifting off the two sockets and spring clips. Detach the large pointer by removing the screw at the center of the dial.

Loosen the dial assembly by taking out the two screws which secure the bottom of this assembly to the chassis. Then lay the complete dial assembly face downward in front of the chassis. It is necessary to remove the volume control and tone control collets which hold the indicator cords of these two controls in position.

Turn the drive drum and open the opening in the drum as it was in position. Remove the tension spring and the old drive cord.

See that the eyelet is in the hole in the drive drum as shown in Fig. 4. Insert one end of the drive cord from the outside through the hole in the eyelet in the drive drum. Tie the end of the cord which has been looped in the hole to one end of the tension spring.

Wrap the cord in a clockwise direction (facing front of chassis) around the drive drum approximately one-half turn. Then tuck the cable up on its back and bring the cord mentioned in the previous paragraph down to the drive shaft. Wrap it two and one-half times around the drive shaft as shown in Fig. 4. Then bring it up from the drive shaft and wrap it around the drive drum approximately one and one fifth times. This will be tight enough to cover the screw to which it is fastened in the cabinet.

Change in Early Models

In the early models of this receiver the side of the tone control condenser C2 (which is shown in Fig. 1 as connected to the B+ side of the 3rd L. F. coil primary) was left disconnected. In the revised models this side of the tone control condenser is connected to the ground. As shown in Fig. 7B, the condenser is still connected to the B+ side of the 3rd L. F. coil primary. The B+ side of the 3rd L. F. coil is connected to the circuit as shown in Fig. 7A. The bypass condenser C2 is in the coil primary circuit as shown in Fig. 7A.
**Compliments of www.nucow.com**

**Input Voltages and Currents**
- **A Battery**: 2 Volts — 3 Amperes
- **B Battery**: 90 Volts — 11.5 to 15 mA
- **Power Output**: 135 Milliwatts Undistorted
- **Selectivity**: 40 KC Broad at 1000 Times Signal
- **Intermediate Frequency**: 456 KC
- **Speaker**: 6" Dynamic
- **Tuning Frequency Range**: 588 to 1730 KC
- **Sensitivity**: 40 Microvolts

**VOLTAGES AT SOCKETS**
- **Volume Control**: Maximum
- **Antenna Sockets**: Open Ground

<table>
<thead>
<tr>
<th>Tube</th>
<th>Position</th>
<th>Access</th>
<th>Plate to Ground</th>
<th>Screen to Ground</th>
<th>Control Grid</th>
</tr>
</thead>
<tbody>
<tr>
<td>IF5G</td>
<td>1st Det-Osc.</td>
<td>2.0</td>
<td>67</td>
<td>54</td>
<td>3.5 (2)</td>
</tr>
<tr>
<td>ID5G</td>
<td>I.F.</td>
<td>2.0</td>
<td>87</td>
<td>64</td>
<td>3.5 (2)</td>
</tr>
<tr>
<td>IH6G</td>
<td>2nd Det — 1st Audio</td>
<td>2.0</td>
<td>87</td>
<td>54</td>
<td>1.28 (4)</td>
</tr>
<tr>
<td>IF5G</td>
<td>Power</td>
<td>2.0</td>
<td>87</td>
<td>64</td>
<td>3.5 (2)</td>
</tr>
</tbody>
</table>

(1) Anode Grid (102) to grounded
(2) As read across R6 and R7
(3) As read on 100 volt scale (100 ohm per volt meter). Subject to variation.
(4) As read across R7

---

**Alignment Procedure**

**Fig. 1** — Schematic Circuit Diagram

<table>
<thead>
<tr>
<th>STEP</th>
<th>Dummy Antenna</th>
<th>Signal Generator Frequency Setting</th>
<th>Connection at Radio</th>
<th>Trimmers Adjusted to Illustration</th>
<th>Initial Steps</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.F.</td>
<td>.1 mF</td>
<td>456 KC</td>
<td>Grid of 1st Det.</td>
<td>2nd I.F. (C10) &amp; (C11)</td>
<td>1st I.F. (C4) &amp; (C7)</td>
<td>Turn rotor to full open</td>
</tr>
<tr>
<td>1730 KC Adj.</td>
<td>200 mF</td>
<td>1730 KC</td>
<td>Antenna Lead</td>
<td>Osc. (C4)</td>
<td>Turn rotor to full open</td>
<td>Adjust to Maximum Output</td>
</tr>
<tr>
<td>1500 KC Adj.</td>
<td>200 mF</td>
<td>1500 KC</td>
<td>Antenna Lead</td>
<td>Ant. (C3)</td>
<td>Turn Rotor to Max. Output</td>
<td>Adjust to Maximum Output</td>
</tr>
</tbody>
</table>

*Attenuate the signal from the signal generator to prevent the leveling-off action of the AVC.*

**NOTE** — To obtain dial scale calibration, tune in an 800 KC signal. The pointer should be at the 800 KC mark on the dial. If it is not, note the position of the pointer and remove the chassis from the cabinet. Loosen the pointer screw and set the pointer so that it will be at the 800 KC mark. Tighten the pointer screw and replace the chassis in the cabinet. If the pointer is not at the 800 KC mark another adjustment will be necessary.

---

**Fig. 2** — Tube Arrangement

**Fig. 3** — Trimmer Location
Standard and Short Wave Battery Radio

Tubes

The tubes used in this receiver are of the 2 volt series. All of them are of the filament or directly heated types. All of them have a 2 volt filament and should not be connected to a power supply not intended for this type of tube. Maximum filament voltage range is 1.8 to 2.0 volts. Operation of the tubes at under or over this value will be injurious to the tubes and may affect operation of the receiver.

### Voltages at sockets

<table>
<thead>
<tr>
<th>Type</th>
<th>Voltage</th>
<th>Function</th>
<th>Antenna to Ground</th>
<th>Power to Ground</th>
<th>Power to Ground</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC6</td>
<td>1.0</td>
<td>Ground 1</td>
<td>50 50</td>
<td>60 60</td>
<td>60 60</td>
</tr>
<tr>
<td>IC6</td>
<td>2.0</td>
<td>Ground 2</td>
<td>50 50</td>
<td>60 60</td>
<td>60 60</td>
</tr>
<tr>
<td>151</td>
<td>1.0</td>
<td>Ground 3</td>
<td>50 50</td>
<td>60 60</td>
<td>60 60</td>
</tr>
<tr>
<td>151</td>
<td>2.0</td>
<td>Ground 4</td>
<td>50 50</td>
<td>60 60</td>
<td>60 60</td>
</tr>
<tr>
<td>30</td>
<td>1.0</td>
<td>Ground 5</td>
<td>50 50</td>
<td>60 60</td>
<td>60 60</td>
</tr>
<tr>
<td>30</td>
<td>2.0</td>
<td>Ground 6</td>
<td>50 50</td>
<td>60 60</td>
<td>60 60</td>
</tr>
</tbody>
</table>

Alignment Procedure

Correct alignment is extremely important in connection with all wave receivers. The receivers are all properly aligned at the factory with precision instruments and re-alignment should not be attempted unless all other possible causes of the faulty operation have first been investigated and unless the service technician has the proper equipment.

A signal generator that will provide an accurately calibrated signal at 456, 1710, 1700, 600, 16,000, 15,000 and 6000 KC and an output indicating meter are required. It will be practically impossible to align the receiver if unsatisfactory apparatus is used.

Use a non-metallic screwdriver for the adjustments. The complete procedure is as follows:

1. F. Adjustment

Set the signal generator for a signal of 456 KC. Connect the output of the signal generator through a 1 mfd. condenser to the grid of the 1st detector. Connect the grounded lead of the radio to the ground posts of the signal generator. Turn the band switch to the Range B position (standard wave band). Turn the volume control to the maximum position. Attenuate the signal from the signal generator to prevent the brevelling-off action of the AVC. Then adjust the 1st F. trimmers until maximum output is obtained. The adjusting screws for these condensers are reached from the top of the chassis, and the location is shown in Fig. 7.

Range B Alignment

After the procedure for the alignment of each range, as explained above, is completed, it is advisable to repeat the procedure as a final check.

1730 KC Adjustment

Set the signal generator for 1730 KC. Turn the rotor of the tuning condenser to the full open position. Keep the band switch in the standard wave position. Connect the antenna lead of the radio through a 200 mfd. condenser to the output of the signal generator. For this and all subsequent adjustments keep the volume control at the maximum position and attenuate the signal from the signal generator to prevent AVC action. Adjust the oscillator Range B trimmer (C8) until maximum output is obtained. The location of this trimmer is shown in Fig. 7.

1500 KC Adjustment

Set the signal generator for 1500 KC. Turn the rotor of the tuning condenser carefully until maximum output is obtained. Loosen the pointer screw and set the pointer at the 1500 KC mark on the standard wave band scale. Retighten the screw. Adjust the antenna Range B trimmer (C2) to maximum.

Do not change the setting of the oscillator Range B trimmer.

6000 KC Adjustment

Set the signal generator for 6000 KC. Turn the tuning condenser rotor until maximum output is obtained. Turn the rotor slowly back and forth at the same time adjusting the 6000 KC trimmer (C9) until the peak of greatest intensity is obtained. See Fig. 7 for location of this trimmer.

Range D Alignment

CAUTION—When aligning the short wave band be sure NOT to adjust at the image frequency. This can be checked as follows: Let us say the signal generator is set for 15,000 KC. The signal will then be heard at 15,000 on the dial of the radio. The image signal, which is much weaker, will be heard at 15,000 less 912 KC, or 14,088 KC. It may be necessary to increase the input signal to hear the image.

16,000 KC Adjustment

Set the signal generator for 16,000 KC. Connect the antenna lead of the radio through a 400 ohm resistor to the output of the signal generator. Turn the rotor of the tuning condenser to the full open position. Turn the band switch to the Range D position (short wave band). Adjust the oscillator Range D trimmer (C7) until maximum output is obtained. See Fig. 7 for location of this trimmer.

15,000 KC Adjustment

Set the signal generator for 15,000 KC. Turn the rotor of the tuning condenser carefully until maximum output is obtained. Adjust the antenna Range D trimmer (C1) to maximum. When adjusting this trimmer, it will be necessary at the same time to turn the tuning condenser rotor slowly back and forth until the peak of greatest intensity is obtained.

Do not change the setting of the oscillator Range D trimmer.

6000 KC Adjustment

Set the signal generator for 6000 KC. Turn the tuning condenser rotor until maximum output is obtained. Turn the rotor slowly back and forth at the same time adjusting the 6000 KC (C6) trimmer until the peak of greatest intensity is obtained. See Fig. 7 for location of this trimmer.
The I.F. frequency of this receiver is 456 K.C. For realignment, use the following procedure.

It is necessary to use an accurately calibrated signal generator. Couple the signal generator to the grid of the 6A7 tube with a tenth microfarad condenser in series with the "high" lead of the signal generator. Connect the ground side of the signal generator to the chassis. Set the signal generator to 456 K.C. Be sure the wave switch of the set is in the broadcast position and the volume control set at maximum. Attenuate the signal generator so that the signal is just audible in the speaker. If an output meter is used, it should be connected across the voice coil terminals of the speaker. Use 1/2 volt as standard output.

Adjust the 2nd I.F. transformer first. Each screw should be adjusted for maximum output. After number two I.F. has been adjusted, number one I.F. should be adjusted for maximum output. After both transformers have been adjusted, it is necessary to recheck No. 2 transformer and then recheck No. 1.

See TUBE LAYOUT for location of I.F. and R.F. trimmers and paddles.

RF. (See above diagram for location of trimmers.) Using a 200 mmf condenser in series with the generator, feed 1660 kc to antenna lead and adjust broadcast oscillator trimmer for top frequency. Set generator to 1000 kc, tune receiver and adjust two antenna trimmers. Set generator to 600 kc, tune receiver to signal and adjust paddler. The tuning condenser should be rocked back and forth through the signal while the paddler is being set in order to secure perfect alignment.

Using 400 ohm resistor in series with generator, set band selector in center position, set generator to 5400 kc and adjust oscillator trimmer for top frequency. Set generator to 5000 kc, tune receiver to signal and adjust antenna trimmer.

Turn band selector to extreme clockwise position. Using a 400 ohm resistor in series with generator, set oscillator top frequency for 15,750 kc—screw trimmer down tight, then unscrew to second peak. Set generator to 15,000 kc, tune receiver to signal and adjust antenna trimmer—Screw trimmer down tight, then unscrew to first peak, rocking the tuning condenser back and forth through the signal while the adjustment is being made. Above procedure for alignment at 15,000 kc must be followed exactly to insure proper tracking. A dead spot at about 12,000 kc will result if antenna and oscillator circuits are not set in proper relation to each other.
Seven Tube Combination 6 Volt Battery and 110-120 Volt AC 60 Cycle Dual Wave Superheterodyne

ALIGNMENT:
FOLLOW PROCEDURE OF D709 (1939) BUT USE 18.100 AND 6000 KC FOR S.W.

This receiver requires a good ground.

This receiver is designed to operate over two tuning ranges; from 550 to 1700 Kilocycles (KC) (173.4 to 561 meters), and from 5500 to 18,100 Kilocycles (KC) (16.5 to 53 Meters).

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Compliments of www.nucow.com
Votages taken from different points of circuit to chassis are measured with voltmeter control full on, all tubes in their sockets and speaker connected, with a voltmeter having a resistance of 1000 ohms per volt.

All voltages as indicated on diagram are measured with 115 volts on the primary of the power transformer.

PROCEDURE FOR SETTING THE "PRESTO-MATIC" LEVERS:

There are six levers on the dial by means of which six stations may be selected.

Press down any one of the six "Presto-matic" levers. Holding it down, tune in by means of knob No. 3 any one of your favorite stations. Turn the tuning knob very slowly back and forth until the signal is clearest. The station will then be accurately tuned in.

Release the lever and press down any other "Presto-matic" lever and again hold it down, tune in by means of knob No. 3 another favorite station.

When you have selected all your favorite stations, hold tuning knob No. 3 securely and with a coin or a screwdriver, tighten the special locking screw ("D") in the center of the tuning knob, (See Fig. 1).

This screw will lock in place all the stations you have selected on the "Presto-matic" levers. (Note: Locking screw "D" is loose when radio is shipped from factory).

If you should desire to change any station you selected to another, hold tuning knob No. 3 securely, loosen locking screw ("D") and select the new station explained.

SPRAYER

Five Inch Dynamic Speaker
(Field 200 Ohm)

Miscellaneous

H1-19
R12
Tone Control (1 Meg Ohm)

H1-20
R13
Volume Control and Switch (2 Meg Ohms)

H1-21
R14
Two Gang Variable Condenser

H1-22
T1
Output Transformer (For Speaker)

H1-23
R1
Line Cord and Plug

H1-24
R2
Wood Knob (Creston Type)

H1-25
R3
Special Tuning Knob

CONDENSERS

(No. 76-50000 and up)

ALIASING I.F. TRANSFORMERS (465 K.C.)

R.F. ALIGNMENT

(5B5-1720 K.C.)

(c) Check sensitivity at 600 and 1000 kilocycles.

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Western Auto Supply Co.

Ranges
560 and 1000 K.C.
75 to 200 meters

Tubes
1. No. 6D6 R. F. Amplifier
2. No. 6C6 Detector
3. No. 43 Power Output
4. No. 25Z5 Rectifier

Model D729 (1937)
 If this receiver should fail to operate when connected to direct current, reverse the attachment plug in the light socket.

Model D730 (1938-1939)

Alignment Data and Servicing
Connect a signal generator to the antenna lead of the receiver through a 100 Mm. condenser. Set the dial pointer at 1400 KC. Set the generator at 1400 KC. Now adjust the antenna and RF trimmers of the gang condenser to maximum output.

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CONVENTIONAL ALIGNMENT

SEE SPECIAL SECTION VOLUME VIII

RESISTORS

<table>
<thead>
<tr>
<th>No.</th>
<th>Part No.</th>
<th>Value</th>
<th>Wattage</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>130-12</td>
<td>500 Ohm</td>
<td>1/4 Watt</td>
</tr>
<tr>
<td>R2</td>
<td>130-39</td>
<td>700 Ohm</td>
<td>1/4 Watt</td>
</tr>
<tr>
<td>R3</td>
<td>130-30</td>
<td>1000 Ohm</td>
<td>1/4 Watt</td>
</tr>
<tr>
<td>R4</td>
<td>130-44</td>
<td>33 Ohm</td>
<td>1/4 Watt</td>
</tr>
<tr>
<td>R5</td>
<td>130-45</td>
<td>15 Ohm</td>
<td>1/4 Watt</td>
</tr>
<tr>
<td>R6</td>
<td>130-13</td>
<td>22 Ohm</td>
<td>1/4 Watt</td>
</tr>
<tr>
<td>R7</td>
<td>130-12</td>
<td>8 Ohm</td>
<td>1/4 Watt</td>
</tr>
<tr>
<td>R8</td>
<td>130-9</td>
<td>150 Ohm</td>
<td>1/4 Watt</td>
</tr>
<tr>
<td>R9</td>
<td>101-18</td>
<td>5000 Ohm</td>
<td>1/4 Watt</td>
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<tr>
<td>R10</td>
<td>130-18</td>
<td>1 meg Ohm</td>
<td>1/4 Watt</td>
</tr>
<tr>
<td>R11</td>
<td>130-11</td>
<td>250 Ohm</td>
<td>1/4 Watt</td>
</tr>
<tr>
<td>R12</td>
<td>130-11</td>
<td>250 Ohm</td>
<td>1/4 Watt</td>
</tr>
<tr>
<td>R13</td>
<td>130-10</td>
<td>33 Ohm</td>
<td>1/4 Watt</td>
</tr>
<tr>
<td>R14</td>
<td>130-46</td>
<td>15 Ohm</td>
<td>1/4 Watt</td>
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<tr>
<td>R15</td>
<td>130-47</td>
<td>180 Ohm</td>
<td>1/4 Watt</td>
</tr>
<tr>
<td>R16</td>
<td>130-46</td>
<td>800 Ohm</td>
<td>1/4 Watt</td>
</tr>
</tbody>
</table>

CONDENSERS

| C1  | 129-23 | .002 Mica | 120 v. 5% |
| C2  | 100-20 | .001 Mica | 120 v. 5% |
| C3  | 129-3  | .002 Mica | 120 v. 5% |
| C4  | 129-20 | .002 Mica | 120 v. 5% |
| C5  | 129-24 | .002 Mica | 120 v. 5% |
| C6  | 100-1  | .001 Mica | 120 v. 5% |
| C7  | 118-1  | .001 Mica | 120 v. 5% |
| C8  | 118-1  | .001 Mica | 120 v. 5% |
| C9  | 118-1  | .001 Mica | 120 v. 5% |
| C10 | 129-51 | .0025 Mica | 120 v. 5% |
| C11 | 129-51 | .0025 Mica | 120 v. 5% |
| C12 | 100-22 | .0025 Mica | 120 v. 5% |
| C13 | 129-6  | .0025 Mica | 120 v. 5% |
| C14 | 100-11 | .0025 Mica | 120 v. 5% |
| C15 | 106-19 | .0025 Mica | 120 v. 5% |
| C16 | 118-1  | .0025 Mica | 120 v. 5% |
| C17 | 118-4  | .0025 Mica | 120 v. 5% |
| C18 | 100-3  | .0025 Mica | 120 v. 5% |
| C19 | 124-5  | .0025 Mica | 120 v. 5% |

MISCELLANEOUS

| T1  | 105-10 | Antenna Choke Cond. |
| T2  | 111-27 | Antenna Coil |
| T3  | 110-22 | Oscillator Coil |
| T4  | 108-38A| Input I.F. Transformer |
| T5  | 106-50 | Output I.F. Transformer |
| T6  | 102-12 | Two Gang Variable Cond. |
| S   | 125-4  | Wave Change Switch |
| L1  | 104-14A| Power Transformer 50/60 Cycle |
| L2  | 104-18 | Power Transformer 25 Cycle |
| L3  | 114-11 | Speaker Field Resistance 1550 Ohms |
| L4  | 134-17 | Power Trans Universal 50/60 Cycle |
| L5  | 104-40 | Power Trans Universal 25 Cycle |

ALIGNMENT FREQUENCIES

Intermediate Frequency 465 KC

Broadcast Band

Adjust trimmer number 6 at 1720 KC
Adjust trimmer number 3 at 1400 KC
Adjust series pad at 600 KC

Tracking and sensitivity check - 1000 KC

Short wave Band

Adjust trimmer number 4 at 18 MC
Adjust trimmer number 1 at 18 MC

Intermediate Band

Adjust trimmer number 5 at 7 MC
Adjust trimmer number 2 at 7 MC

Tracking and sensitivity check - 2.5 MC

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Western Auto Supply Co.

Frequency Range — 530 - 1720 Kilocycles

Conventional Alignment
See Special Section Volume VIII

List of Repair Parts (No. 175500 and up)

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Circuit Diagram Reference</th>
<th>Description</th>
<th>List Price Each</th>
</tr>
</thead>
<tbody>
<tr>
<td>1001</td>
<td>C5</td>
<td>.1 x 400 Volt Tubular Condenser</td>
<td>$.25</td>
</tr>
<tr>
<td>1009</td>
<td>C2, C4</td>
<td>.01 x 200 Volt Tubular Condenser</td>
<td>$.25</td>
</tr>
<tr>
<td>1011</td>
<td>C1, C13</td>
<td>.001 x 400 Volt Tubular Condenser</td>
<td>$.25</td>
</tr>
<tr>
<td>1020</td>
<td>C6</td>
<td>.1 x 200 Volt Tubular Condenser</td>
<td>$.25</td>
</tr>
<tr>
<td>1026</td>
<td>C4</td>
<td>.055 x 400 Volt Tubular Condenser</td>
<td>$.25</td>
</tr>
<tr>
<td>1103</td>
<td>C7, C8, C9</td>
<td>30uF-30MF-40uF-40MF Lytic Filter Condenser</td>
<td>$.50</td>
</tr>
<tr>
<td>1192</td>
<td>C10</td>
<td>.0005 Mica Type Condenser-20%</td>
<td>$.25</td>
</tr>
<tr>
<td>1253</td>
<td>C12</td>
<td>.0005 Mica Type Condenser-20%</td>
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Resistors

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Circuit Diagram Reference</th>
<th>Description</th>
<th>List Price Each</th>
</tr>
</thead>
<tbody>
<tr>
<td>1301</td>
<td>R11</td>
<td>250 Ohm-5/8 Watt Resistor-20%</td>
<td>$.20</td>
</tr>
<tr>
<td>13012</td>
<td>R2</td>
<td>50 Ohm-5/8 Watt Resistor-20%</td>
<td>$.20</td>
</tr>
<tr>
<td>13019</td>
<td>R6</td>
<td>1 Meg Ohm-5/8 Watt Resistor-20%</td>
<td>$.20</td>
</tr>
<tr>
<td>13026</td>
<td>R1</td>
<td>500 Ohm-5/8 Watt Resistor-20%</td>
<td>$.20</td>
</tr>
<tr>
<td>130100</td>
<td>R10</td>
<td>150 Ohm-5/8 Watt Resistor-20%</td>
<td>$.20</td>
</tr>
<tr>
<td>130419</td>
<td>R3</td>
<td>150 Ohm-5/8 Watt Resistor-20%</td>
<td>$.20</td>
</tr>
<tr>
<td>130270</td>
<td>R1</td>
<td>3 Meg Ohm-5/8 Watt Resistor-20%</td>
<td>$.20</td>
</tr>
<tr>
<td>130215</td>
<td>R8</td>
<td>5 Ohm-5/8 Watt Resistor-10%</td>
<td>$.20</td>
</tr>
<tr>
<td>130215</td>
<td>R8</td>
<td>5 Ohm-5/8 Watt Resistor-10%</td>
<td>$.20</td>
</tr>
</tbody>
</table>

Coils

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Circuit Diagram Reference</th>
<th>Description</th>
<th>List Price Each</th>
</tr>
</thead>
<tbody>
<tr>
<td>1002F</td>
<td>T4</td>
<td>Input L.F. Coil Assembly Complete with Can...</td>
<td>$.25</td>
</tr>
<tr>
<td>1083F</td>
<td>T3</td>
<td>Output L.F. Coil Assembly Complete with Can...</td>
<td>$.25</td>
</tr>
<tr>
<td>11032</td>
<td>T2</td>
<td>Oscillator Coil Assembly Complete</td>
<td>$.50</td>
</tr>
<tr>
<td>11192B</td>
<td>T1</td>
<td>Antenna Coil Assembly Complete</td>
<td>$.60</td>
</tr>
</tbody>
</table>

FIG. 2 — FRONT VIEW

For Setting Push Buttons
See Index

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WESTERN AUTO SUPPLY CO.

PROCEDURE FOR SETTING THE AUTOMATIC LEVERS:

There are four levers on the dial by means of which stations may be selected. (See "B" Fig. 2) See NOTE

Make a list of local stations you tune in regularly; any number up to and including four.

Punch out from the set of station call letter tabs supplied, the call letters of the stations you have selected.

Above each automatic tuner lever an opening in the cabinet is provided for inserting the call letter tabs. (See "A" Fig. 2)

Insert the call letter tabs in the rectangular openings in the cabinet above each of the automatic tuner levers. One of the small celluloid tabs supplied should be snapped into place over each of the station call letter tabs.

Press DOWN ALL THE WAY any one of the automatic tuner levers. Holding it down FIRMLY, tune in by means of the tuning knob (No. 2) the station indicated on the station call letter tab above this lever. Turn the tuning knob very slowly back and forth (while still holding lever in downward position) until the signal is clearest. The station will then be accurately tuned in. Release the lever.

Press down another automatic tuner lever. Holding it down FIRMLY, carefully tune in the station indicated on the call letter tab above this lever. Release this lever.

Follow this procedure until you have selected all of your favorite stations.

Now rotate the tuning knob (No. 2) to the right (clockwise) as far as it will turn, and with a coin (half dollar), tighten the special locking screw ("C") in the center of the tuning knob. (See Fig. 1).

It is VERY IMPORTANT that this locking screw is turned until it is ABSOLUTELY TIGHT.

This screw will lock in place all the stations you have selected on the automatic tuner levers. (Note: Locking screw "C" is loose when radio is shipped from factory).

If you should desire to change any station you selected to another, hold the tuning knob No. 2 securely and with a coin loosen the locking screw "C" one or two turns; select the new station as explained. Be sure to retighten the locking screw, otherwise the stations you have selected will not stay adjusted to the levers.

The automatic dial is now set up for quick tuning.

NOTE:

For arrangement of levers for 5 lever model see Fig. 2 on schematic page for 5 lever model.

DESCRIPTION:

The tube complement of this chassis consists of the following metal base glass tubes which are interchangeable with metal tubes.

The type and function of each tube is as follows:

1—Type 6A8G Pentagrid Mixer, First Detector-oscillator.
1—Type 6K7G Remote Cut-Off Pentode, I.F. Amplifier (700 K.C.)
1—Type 6Q7G Duplex-Diode Triode Second Detector, A.V.C. and First Audio.
1—Type 25L6G Beam Output Amplifier.
1—Type 25Z6G High Vacuum Rectifier.
1—Type 149B Ballast Tube.

SERVICE NOTES:

Voltages 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 1000 ohms per volt.

All voltages as indicated on diagram are measured with 117 volt A.C. or D.C. line.

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.

Excessive hum, stuttering, low volume and a reduction in all D.C. voltages is usually caused by a shorted electrolytic condenser; open by-pass condensers frequently cause oscillation and distorted tone.

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 line voltages, defective tubes, condensers and resistors. In order to properly align this chassis, an oscillator (generator) is absolutely necessary. No aligning adjustments should be attempted with the chassis in the cabinet.

All adjustments should be made with a non-metallic screw driver.

RESONANCE INDICATOR:

Use as a resonance indicator an output meter connected across the primary of the speaker input transformer or by means of an adapter between the plate and screen terminals of the type 25L6G output tube. Maximum deflection of the meter indicates resonance. Use only enough signal to get a readily readable output. A low range output meter or the low scale of a multi-range meter should be used.

ALIGNING I.F. TRANSFORMERS: (470 K.C.):

Part No. 108-83F Output I.F. Transformer
Part No. 108-82F Input I.F. Transformer

These I.F. transformers have two adjustments, both of which are accessible from the top of chassis (see Fig. 1).

1. With volume control full on (the extreme right of its rotation), and with the variable condenser set to approximately 1400 kilocycles, make the following adjustments:

(a) Connect external oscillator set at 470 kilocycles, in series with 1 mfd. condenser, to the control grid cap of the type 6K7G tube, and adjust the output I.F. transformer (No. 108-83F) to resonance.

(b) Move oscillator output clip from grid of 6K7G to grid of 6A8G and adjust input I.F. transformer (No. 108-82F) to resonance.

(c) With oscillator still connected to 6A8G, readjust output I.F. transformer (108-83F) if necessary.

R.F. ALIGNMENT: (530-1720 K.C.):

1. With gang condenser in its minimum capacity position, plates entirely out of mesh, connect an external oscillator in series with a 100 mfd. condenser to the antenna lead and chassis ground and make the following adjustments:

(a) With external oscillator set at 1720 kilocycles, adjust oscillator trimmer to resonance. This adjustment is on the top of rear section of variable gang condenser. (See Fig. 1).

(b) Re-set external oscillator to 1400 kilocycles, rotate condenser, pick up oscillator signal and adjust antenna trimmer to resonance. (Top of front section of gang condenser).

(c) Check sensitivity at 600 and 1000 kilocycles.

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D. C. Resistance of Windings

Following are the D. C. resistances of the various windings in the chassis. The values given below will vary slightly in different sets.

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Winding</th>
<th>Code</th>
<th>D. C. Resistance in Ohms</th>
</tr>
</thead>
<tbody>
<tr>
<td>P-9A443</td>
<td>Antenna Transformer</td>
<td></td>
<td>T1</td>
</tr>
<tr>
<td>P-9A449</td>
<td>Interstage Transformer</td>
<td></td>
<td>T2</td>
</tr>
<tr>
<td>P-9A441</td>
<td>1st I. F. Transformer</td>
<td></td>
<td>T3</td>
</tr>
<tr>
<td>P-9A43</td>
<td>2nd I. F. Transformer</td>
<td></td>
<td>T4</td>
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<tr>
<td>P-9A44</td>
<td>Primary Winding</td>
<td></td>
<td>8.7</td>
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<tr>
<td>P-9A49</td>
<td>Secondary Winding</td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>P-9A445</td>
<td>Secondary Winding</td>
<td></td>
<td>1.4</td>
</tr>
<tr>
<td>P-9A441</td>
<td>1st I. F. Transformer</td>
<td></td>
<td>91.5</td>
</tr>
<tr>
<td></td>
<td>Primary Winding</td>
<td></td>
<td>96.6</td>
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<td></td>
<td>Secondary Winding</td>
<td></td>
<td>44.1</td>
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<tr>
<td></td>
<td>Secondary Winding</td>
<td></td>
<td>49.4</td>
</tr>
</tbody>
</table>

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WESTERN AUTO SUPPLY CO.

**MODEL D737-C (1936)**

**Schematic, Socket, Trimmers**

Power Consumption: 7.0 Amperes at 6.0 Volts
Power Output: 3 Watts Undistorted
Sensitivity: 1.0 Microvolt Absolute
Selectivity: 45 KC Broad at 1000 Times Signal

Tuning Frequency Range: 530 to 1650 KC
Intermediate Frequency: 175 KC
Speaker: 6 inch Dynamic

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Compliments of www.nucow.com
D. C. Resistance of Windings

Following are the D. C. resistances of the various windings in the chassis. The values given below will vary slightly in different sets.

<table>
<thead>
<tr>
<th>Code</th>
<th>Antenna Transformer</th>
<th>Winding</th>
<th>D. C. Resistance in Ohms</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>Primary Winding</td>
<td></td>
<td>2.0</td>
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<tr>
<td></td>
<td>Short Portion</td>
<td></td>
<td>3.2</td>
</tr>
<tr>
<td></td>
<td>Secondary Winding</td>
<td></td>
<td>3.5</td>
</tr>
<tr>
<td>T2</td>
<td>Primary Winding</td>
<td></td>
<td>43.5</td>
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<tr>
<td></td>
<td>Secondary Winding</td>
<td></td>
<td>1.6</td>
</tr>
<tr>
<td>T3</td>
<td>Primary Winding</td>
<td></td>
<td>23.0</td>
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<td></td>
<td>Secondary Winding</td>
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<td>1.8</td>
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<tr>
<td>T4</td>
<td>Primary Winding</td>
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<td>12.0</td>
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<tr>
<td></td>
<td>Secondary Winding</td>
<td></td>
<td>1.4</td>
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VOLTAGES AT SOCKETS

<table>
<thead>
<tr>
<th>Type of Tube</th>
<th>Function</th>
<th>Across Heater</th>
<th>Plate to Ground</th>
<th>Screen to Ground</th>
<th>Cathode to Ground</th>
<th>Cathode Current M. A.</th>
</tr>
</thead>
<tbody>
<tr>
<td>6D6</td>
<td>R. F. Amp.</td>
<td>245</td>
<td>105</td>
<td>5.2</td>
<td>7.5</td>
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<tr>
<td>6C6</td>
<td>1st Det. Osc.</td>
<td>245</td>
<td>105</td>
<td>0</td>
<td>2.9</td>
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<tr>
<td>6D6</td>
<td>I. F. Amp.</td>
<td>245</td>
<td>105</td>
<td>5.2</td>
<td>7.5</td>
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<td>75</td>
<td>2nd Det.</td>
<td>120(1)</td>
<td>1.4</td>
<td>0.14</td>
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<td></td>
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<tr>
<td>41</td>
<td>Power</td>
<td>235</td>
<td>245</td>
<td>15.0(2)</td>
<td>30.0</td>
<td></td>
</tr>
<tr>
<td>84</td>
<td>Rectifier</td>
<td>58</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(1) With 250,000 Ohm Meter
(2) Read Across Filter Choke

IMPORTANT—If the car antenna is of high capacity (600 m.m.f. or higher) insert the antenna plug with the mark on the HC side—See Fig. 10. If it is a low capacity antenna, insert the plug with the mark on the LC side.

The General Motors cars have steel roofs, and a running board or other under car antenna must be used. These are low capacity antennas. The Chrysler motor cars (except Plymouth) have a steel roof separated from the body proper, which is used as an antenna. These are high capacity antennas. Other cars without steel roofs such as Ford and Plymouth have a built-in roof antenna which is of low capacity.

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Alignment and Calibration

Misalignment or miscalking of components generally manifests itself as broad tuning and lack of response over all or part of the standard wave band. The receivers are all properly aligned in the factory, but precision instruments and realignment should not be attempted unless all other possible causes of the fault have been investigated and eliminated. The technician has the proper equipment.

A signal generator that will provide accurately calibrated signals over the standard wave band and is adjustable in frequency, and whose output can be varied, is required for indicating the effect of adjustments. Use a non-metallic screwdriver for the adjustments.

The complete procedure is as follows:

1. F. Adjustment

Set the signal generator for a signal of 177 KC. Connect the antenna lead of the signal generator to the port of the 1st detector section of the tuning condenser. (See Fig. 2 for location of this section.) This can be done by making a wire or conductor between the plate strips of by extending an insulated wire through the hole in the shield over the gap and pushing the wire thru the hole in the plug which extends from the insulated terminal assembly.

Connect the ground lead of the signal generator to the chassis ground. Short out the oscillator section of the tuning condenser. Set the volume control at the maximum position. Antennae the signal from the signal generator to prevent the closing off action of the AVC.

Then adjust the three JF, trimmers until maximum output is obtained. The location of these trimmers is shown in Fig. 2.

1650 KC Adjustment

Set the signal generator for 1650 KC. Turn the rotor of the tuning condenser to the full-open position. If a low capacity antenna is used connect the shielded antenna cable from the condenser to the chassis ground. The two units mentioned below must be used in every case:

Distributor Suppressor—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. 13.) If this is not practical, put the high tension lead close to the distributor and use a wood screw end type distributor suppressor in this line.

Generator Condenser—The generator condenser is installed at the point shown in Fig. 11. The lead from the condenser goes to the terminal on the cut-out.

In some of the new cars the cut-out relay is on the front of the dash or in some other location. It will be necessary to position this generator condenser at the relay.

Withdraw Antenna Cable Plug

Turn on the receiver and start the engine. If motor noise is heard, proceed as follows:

mf. condenser to the antenna post of the signal generator. For this and all subsequent adjustments keep the distance constant and maximum position and attenuate the signal from the signal generator to prevent AVC action.

Adjust the trimmer of the oscillator section of the tuning condenser until maximum output is obtained. See Fig. 3. Then connect this to the trimmer.

1400 KC Adjustment

Set the signal generator for 1400 KC. Turn the rotor of the tuning condenser carefully until maximum output is obtained. Adjust the 1st detector and antenna trimmers for maximum output. Do not change the setting of the oscillator trimmer.

Adjusting Antenna Trimmer

After the receiver is installed and the ear trimmer is connected it will be necessary to adjust the antenna trimmer. Tune in a weak signal between 1300 and 1400 KC with the volume control about three-fourths on. Remove the cover of the chassis case. The antenna trimmer is on the center tuning condenser section—see Fig. 2. Turn the adjusting screw of this condenser up or down until maximum output is obtained. CAUTION—Do not turn any of the other trimmers or adjusting screws for this adjustment.

Calibrating the Receiver

To calibrate the receiver, tune in a station of known frequency. As the back of the control head is the calibration screw—remove the pilot lamp assembly. Insert a screwdriver and turn this screw until the pointer on the dial scale is at the frequency of the station being received. The knob must be held during this adjustment.

If the control head is inaccessible it may be calibrated by a method shown in Fig. 3. From this point connect the crystal by inserting a knife blade under the lower edge. Locate the pointer screw, set the pointer and retime.

Suppression of Ignition and Generator Noise

Shielding High Tension Lead—In some cases when the coil is mounted on the dash, the high tension lead from the center post to approximately four inches of the distributor must be covered with braided shielding and the shield grounded to the motor frame or block. For more details see Fig. 13. If this is not practical, put the high tension lead close to the distributor and use a wood screw end type distributor suppressor in this line.

Generator Condenser—The generator condenser is installed at the point shown in Fig. 11. The lead from the condenser goes to the terminal on the cut-out.

In some of the new cars the cut-out relay is on the front of the dash or in some other location. It will be necessary to position this generator condenser at the relay.

Withdraw Antenna Cable Plug

Turn on the receiver and start the engine. If motor noise is heard, proceed as follows:

High and Low Tension Leads—In some cases, the high and low tension leads between the coil and distributor set run close together. In cases where they are run close together, the lead must be shielded to prevent interference. If the motor noise is not serious, the shield should be grounded at the lower end. If the noise is serious, the shield should be grounded at the lower end. If the noise is serious, the shield should be grounded at the lower end. If the noise is serious, the shield should be grounded at the lower end.

Steering Column, Etc.—It is possible to have the steering column, foot pedals and the lever to carry interference to the back of the dash at which point it may affect the radio receiver. See if each of these items are well grounded to the frame of the car. By means of a file or a braided shielding lead, the shield may be cut between any of these items and the frame in order to determine whether such a ground will reduce the noise. A piece of one inch braided shielding should be used if such a ground is necessary and this shielding may be grounded under a screw head, nut or may be soldered in position.

Grounding Engine and Other Parts—The engine 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 this manner it may be necessary to check the grounding of the metal dash, instrument panel, radiator and hood to the frame of the automobile.

Cable—Try grounding to the dash cables and tubing which pass through it, such as oil lines, gas lines, etc. By means of a file, contact can be made between the cable and the dash, in order to determine whether such a ground would reduce the noise. Connect one of the leads to the dash, clean the point of contact, wrap a length of braided shielding around the cable and solder the connection. Then solder the end of the shielding to the dash or ground it under a screw head if one is convenient.

Sufficient plug should be left in the bonding wires so that the shielding will not lose this shielding from the dash.

Making Final Adjustments and Bolting Chassis in Place

Battery Cable

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 battery cable has a fuse receptacle; connect the fuse plug and fuse into the receptacle and connect it to the battery wiring. The connection in the end of the battery lead coming from the chassis case as shown in Fig. 11.

Fuse

A 20 ampere automobile fuse is used in the battery cable. This fuse is placed in an insulating shield and is in the receptacle provided for it in the chassis end of the battery cable. CAUTION—Be sure the fuse shield is on the fuse before the latter is inserted in the receptacle. Failure to do so, do not replace it without first investigating the cause.

Bolting Chassis in Place

Place the nuts and flat washers on the mounting bolts and put the chassis in place on the dash, extend-
ALIGNMENT

1. Connect output meter across voice coil of speaker.
2. Set volume control on full.
3. Set tone control to bass position.

(A) I. F. Adjustment

1. Connect a .1 mfd. condenser in series with antena lead of test oscillator.
2. Set test oscillator to 175 K. C.
3. Connect test oscillator to grid of 1st I. F. tube #6 (see Fig. #2) and adjust #7 to maximum output.
4. Connect test oscillator to grid of 1st Det. #12 and adjust condensers #4 and 5 to maximum output.
5. Repeat the above adjustments for accuracy.

(B) Oscillator Adjustment

1. Set test oscillator to 1500 K. C.
2. Connect test oscillator leads to grid of 1st Det. #12.
3. Set gang condenser to 1500 K. C. as follows:
   (a) Open gang to fullest extent.
   (b) Close slowly to the thickness of a thin cardboard strip or approximately .015 thousands of an inch.
4. Peak oscillator condenser #8 on end of gang.
DUMMY ANTENNAS:
The dummy antennas referred to in the following instructions are:
"I.F. Dummy"—A 1 mfd. condenser connected in series with the test oscillator output lead.
"Broadcast Dummy"—A 200 mmdf. condenser connected in series with the output lead of the test oscillator.

RESONANCE INDICATOR:
Use as a resonance indicator an output meter connected across the primary of the speaker input transformer, or by means of an adapter between the plate and the screen of the type 42 output tube. Maximum deflection of the meter indicates resonance, and only enough signal to get a readily readable output. A low range output meter or the low scale of a multi-range meter should be used.

I.F. ALIGNMENT:
1. With variable condenser in its minimum capacity position (plates entirely out of mesh) and with volume control full on, connect test oscillator set at 170 K.C. in series with I.F. dummy antenna, to the grid cap of the type 6AT tube.
2. Adjust trimmer condensers of both input (108-33) and output (108-35) I.F. transformers to resonance with oscillator. See top view for location of these transformers. There are two adjustments on each and they are accessible from the top of the transformer shield and should be adjusted with an insulated screw driver.

BROADCAST ALIGNMENT:
1. With variable condenser in its minimum capacity position, connect test oscillator set at 1550 K.C. and in series with broadcast dummy, to the antenna lead of receiver.
2. Adjust oscillator trimmer of variable condenser to resonance (the adjustment is on the end section of the three gang condenser—see top view).
3. Shift test oscillator to 1400 K.C. and pick up signal by rotating condenser and adjust R.F. (center) and antenna (front) trimmers to resonance, see top view.

REPAIR PARTS
Serial No. 60001 and up
When ordering parts, always specify part and model number as well as serial number of chassis.

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
<th>List Price Eq.</th>
</tr>
</thead>
<tbody>
<tr>
<td>105-12</td>
<td>&quot;A&quot; Choke - 28 Turns No. 12 Wire</td>
<td>.10</td>
</tr>
<tr>
<td>105-14</td>
<td>&quot;A&quot; Choke - 27 Turns No. 12 Wire</td>
<td>.10</td>
</tr>
<tr>
<td>106-14</td>
<td>Special Ford Ignition Coil Condenser</td>
<td>.20</td>
</tr>
<tr>
<td>108-34</td>
<td>Output I.F. Transformer Complete with Resistors and Condensers, Mounted in Shield</td>
<td>2.50</td>
</tr>
<tr>
<td>108-30</td>
<td>R.F. Coil Complete - Less Shield</td>
<td>1.00</td>
</tr>
<tr>
<td>110-17</td>
<td>Oscillator Coil Complete with Bracket</td>
<td>.75</td>
</tr>
<tr>
<td>111-22</td>
<td>Antenna Condenser Complete - Less Shield</td>
<td>1.00</td>
</tr>
<tr>
<td>111-32</td>
<td>Antenna Filter Assembly Complete with Shield and Antenna Cable</td>
<td>1.50</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
<th>List Price Eq.</th>
</tr>
</thead>
<tbody>
<tr>
<td>101-28</td>
<td>360 Ohm Filter Choke</td>
<td>.85</td>
</tr>
</tbody>
</table>

**TABLE OF TRANSFORMERS**
<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
<th>List Price Eq.</th>
</tr>
</thead>
<tbody>
<tr>
<td>104-4</td>
<td>Power Transformer</td>
<td>3.00</td>
</tr>
<tr>
<td>104-14</td>
<td>800 Ohm Filter Choke</td>
<td>.85</td>
</tr>
<tr>
<td>105-15</td>
<td>Output Audio Transformer</td>
<td>1.50</td>
</tr>
</tbody>
</table>

**MISCELLANEOUS**
<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
<th>List Price Eq.</th>
</tr>
</thead>
<tbody>
<tr>
<td>111-18</td>
<td>Volume Control with Switch</td>
<td>1.50</td>
</tr>
<tr>
<td>111-30</td>
<td>Two Lug Terminal Strip</td>
<td>6.00</td>
</tr>
<tr>
<td>117-30</td>
<td>Terminal Strip</td>
<td>.05</td>
</tr>
<tr>
<td>117-24</td>
<td>Antenna and R.F. Coil Shield</td>
<td>.15</td>
</tr>
<tr>
<td>114-21</td>
<td>Ceramic Chassis</td>
<td>.50</td>
</tr>
<tr>
<td>114-25</td>
<td>Ford Header speaker chassis only</td>
<td>5.00</td>
</tr>
<tr>
<td>120-15</td>
<td>Control Speaker Housing for 114-22 and 114-23</td>
<td>2.50</td>
</tr>
<tr>
<td>125-9</td>
<td>Ford speaker housing for 114-22</td>
<td>2.50</td>
</tr>
<tr>
<td>123-7</td>
<td>Set Case (less Cover)</td>
<td>.00</td>
</tr>
<tr>
<td>140-9</td>
<td>Covers for 114-23 and 114-24</td>
<td>1.25</td>
</tr>
<tr>
<td>141-9</td>
<td>Covers for 114-22 and 114-23</td>
<td>1.25</td>
</tr>
<tr>
<td>141-19</td>
<td>Flexible Cable Control Bushing</td>
<td>.10</td>
</tr>
<tr>
<td>152-3</td>
<td>10-14 Fuse Assembly</td>
<td>.03</td>
</tr>
<tr>
<td>152-2</td>
<td>30-25 Fuse Assembly</td>
<td>.03</td>
</tr>
<tr>
<td>152-8</td>
<td>Antenna Cable</td>
<td>.50</td>
</tr>
<tr>
<td>152-9</td>
<td>Special Ford Header speaker cable and plus</td>
<td>1.25</td>
</tr>
<tr>
<td>152-9</td>
<td>Special Ford Header speaker cable and plus</td>
<td>1.25</td>
</tr>
<tr>
<td>150-11</td>
<td>Mounting Studs Complete with Nut &amp; Washer</td>
<td>.05</td>
</tr>
<tr>
<td>150-1</td>
<td>15 Amp. Fuse (30A-15)</td>
<td>.05</td>
</tr>
</tbody>
</table>

(a) Check for sensitivity at 1000, 800 and 600 K.C. by setting test oscillator to these frequencies and picking up the signal by rotating variable condenser. Under no circumstances bend plates of oscillator section, bend R.F. and antenna plates only if absolutely necessary.

**SERVICE NOTES:**
Voltages taken from different points of circuit to chassis are measured with volume control full on, tubes in their sockets and speaker connected, with a volt meter having a resistance of 1000 ohms per volt. These voltages are clearly indicated on the circuit diagram.

In order to prevent signal from acting upon A.V.C. and affecting accuracy of voltage measurements, serial and ground leads should be short circuited while making measurements.

All voltages are to be measured with 6.3 volts input to receiver. Resistances of coils and transformer windings are indicated in ohms on 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 tubs, 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. If fuse blows out frequently and insulating sleeve has not been properly placed over fuse, the trouble is probably in the vibrator, it should be replaced. Do not attempt to make any adjustments on the vibrators.

**REPAIR PARTS**
Serial No. 60001 and up
When ordering parts, always specify part and model number as well as serial number of chassis.

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
<th>List Price Eq.</th>
</tr>
</thead>
<tbody>
<tr>
<td>152-1</td>
<td>Dome Light Filter</td>
<td>.90</td>
</tr>
</tbody>
</table>

**REMOTE CONTROL PARTS**

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
<th>List Price Eq.</th>
</tr>
</thead>
<tbody>
<tr>
<td>112-39</td>
<td>Selector Control Shaft</td>
<td>.20</td>
</tr>
<tr>
<td>112-41</td>
<td>Idler Gear</td>
<td>.05</td>
</tr>
<tr>
<td>112-42</td>
<td>Pointer Shaft</td>
<td>.05</td>
</tr>
<tr>
<td>112-43</td>
<td>Volume Control Shaft</td>
<td>.15</td>
</tr>
<tr>
<td>112-44</td>
<td>Bezel (Crystal Retainer)</td>
<td>.05</td>
</tr>
<tr>
<td>112-45</td>
<td>Celluloid Dial Crystal</td>
<td>.05</td>
</tr>
<tr>
<td>112-46</td>
<td>Pointer Shaft Gear</td>
<td>.05</td>
</tr>
<tr>
<td>112-47</td>
<td>Celluloid Dial</td>
<td>.05</td>
</tr>
<tr>
<td>112-48</td>
<td>6.6 Volt, 7.51 Bulb Bayonet Base</td>
<td>.10</td>
</tr>
<tr>
<td>112-49</td>
<td>6-6 volt 7-51 fatter size bayonet lamp</td>
<td>.45</td>
</tr>
<tr>
<td>112-50</td>
<td>Pilot Light Assembly</td>
<td>.05</td>
</tr>
<tr>
<td>112-51</td>
<td>Tone Control Assembly Unit Complete</td>
<td>.50</td>
</tr>
<tr>
<td>112-52</td>
<td>Black Bakelite Remote Control Knobs</td>
<td>.50</td>
</tr>
<tr>
<td>114-15</td>
<td>Die Cast Remote Control Mounting Bracket</td>
<td>.25</td>
</tr>
<tr>
<td>114-16</td>
<td>Steering Column Strap</td>
<td>.25</td>
</tr>
<tr>
<td>114-22</td>
<td>Mounting Bracket</td>
<td>.25</td>
</tr>
<tr>
<td>114-31</td>
<td>Selector Control Bushing for 112-39</td>
<td>.10</td>
</tr>
<tr>
<td>117-31</td>
<td>Volume Control Bushing for 112-39</td>
<td>.10</td>
</tr>
<tr>
<td>140-25</td>
<td>Flexible Volume Control Cable 24&quot;</td>
<td>1.50</td>
</tr>
<tr>
<td>140-26</td>
<td>Flexible Selector Control Cable 24&quot;</td>
<td>1.50</td>
</tr>
<tr>
<td>141-7</td>
<td>Remote Control Head complete with Steering Column Bracket</td>
<td>8.00</td>
</tr>
<tr>
<td>151-8</td>
<td>Special General Motors Control Head</td>
<td>7.00</td>
</tr>
<tr>
<td>151-9</td>
<td>Dash Mounting Kits for 1935 Chevrolet and Pontiac for use with 151-8 head</td>
<td>1.50</td>
</tr>
<tr>
<td>151-10</td>
<td>Dash Mounting Kits for 1935 Oldsmobile for use with 151-8 head</td>
<td>1.75</td>
</tr>
</tbody>
</table>

Vibrators can be reconditioned at a cost of $9.00 each, if the old unit is returned.

All vibrators are RMA color coded—specify value and/or resistor number (per schematic diagram) and model number.

When ordering vibrators, specify part number, model number and/or capacitor (per schematic diagram) and model number.

Mica condensers are coded with an additional dot indicating tolerance:

<table>
<thead>
<tr>
<th>Tolerance Percent</th>
<th>Color of Dot</th>
</tr>
</thead>
<tbody>
<tr>
<td>5%</td>
<td>5%</td>
</tr>
<tr>
<td>6%</td>
<td>6%</td>
</tr>
<tr>
<td>8%</td>
<td>8%</td>
</tr>
<tr>
<td>10%</td>
<td>10%</td>
</tr>
</tbody>
</table>

More Than 20% None

All prices quoted are list and are subject to the usual trade discounts. Shipments are W.O.B. our factory. When remitting in advance, please include postage.

WE CANNOT SUPPLY SPEAKER PARTS, CONES, TRANSFORMERS OR FIELDS SEPARATELY. WE CAN ONLY ORDER THESE WITH A DAMAGED SPEAKER FOR $2.00 NET. IF IT IS RETURNED TO OUR FACTORY TRANSPORTATION CHARGES PLUS $2.00 PAYMENT FOR SPEAKER SUBJECT TO CHANGE WITHOUT NOTICE.

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Compliments of www.nucow.com
Adjusting Antenna Trimmer

After the receiver is installed and the car antenna is connected it will be necessary to adjust the antenna trimmer. Tune in a weak signal between 1200 and 1400 KC, with the volume control about three-fourths on. Remove the cover of the chassis case. The antenna trimmer is the trimmer condenser closest to the terminal strip—see Fig. 2. Turn the adjusting screw of this condenser up or down, until maximum output is obtained. CAUTION—Do not turn any of the other trimmer adjusting screws for this adjustment.

Calibrating the Receiver

After installing the receiver in the car, it will be necessary to calibrate the control unit. Tune in a station of known frequency at about the center of the dial. At the back of the control unit is a calibration screw—see Fig. 4 in the installation manual enclosed with each receiver. Remove the pilot light assembly.

The calibration screw will be seen at the bottom of the receptacle from which the pilot light assembly is withdrawn. Insert a screwdriver and turn this screw until the pointer on the dial scale is at the frequency of the station being received. The knob must be held during this adjustment.

Voltages At Sockets

On the voltage chart are given the voltages at the sockets with all tubes in and the set in operating condition. The antenna should be disconnected.

The voltages can be read with the chassis in the case, by means of an analyzer plug.

If the chassis is taken out of the case all of the socket terminals can easily be reached under the chassis with test prods.

If the chassis is taken out, a jumper wire must be connected from the chassis base to the metal wall of the "B" power unit, in order to complete the ground circuit.

D. C. Resistance of Windings

Following are the D. C. resistances of the various windings in the chassis.

<table>
<thead>
<tr>
<th>Type of winding</th>
<th>D. C. Resistance in Ohms</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Part No.</td>
<td>ITEM</td>
</tr>
<tr>
<td>9A268-65</td>
<td>Antenna Trans. Primaries</td>
</tr>
<tr>
<td>9A269-65</td>
<td>Antenna Trans. Secondary</td>
</tr>
<tr>
<td>9A270-65</td>
<td>F. I. Interstage Trans.</td>
</tr>
<tr>
<td>9A272-65</td>
<td>(Center Tap to Inside)</td>
</tr>
<tr>
<td>9A273-65</td>
<td>1st I. F. Trans. Primaries</td>
</tr>
<tr>
<td>9A274-65</td>
<td>1st I. F. Trans. Secondary</td>
</tr>
<tr>
<td>9A275-65</td>
<td>Oscillator Cathode (Total)</td>
</tr>
<tr>
<td>9A276-65</td>
<td>Oscillator Plate Coil</td>
</tr>
<tr>
<td>9A277-65</td>
<td>2nd I. F. Trans. Primaries</td>
</tr>
<tr>
<td>9A278-65</td>
<td>2nd I. F. Trans. Secondary</td>
</tr>
<tr>
<td>9A279-65</td>
<td>Output Trans. Primaries</td>
</tr>
<tr>
<td>9A280-65</td>
<td>Output Trans. Sec. and Voice</td>
</tr>
<tr>
<td>9A281-65</td>
<td>Output Trans. in parallel</td>
</tr>
<tr>
<td>17X72-65</td>
<td>Power Trans. Primaries</td>
</tr>
<tr>
<td>12X27-65</td>
<td>Power Trans. Secondary</td>
</tr>
<tr>
<td>9A282-65</td>
<td>Filter Choke</td>
</tr>
<tr>
<td>9A283-65</td>
<td>Filament Reactor Small</td>
</tr>
<tr>
<td>9A284-65</td>
<td>&quot;R&quot; choke</td>
</tr>
<tr>
<td>9A285-65</td>
<td>Pilot Lights Choke Assembly</td>
</tr>
<tr>
<td>9A286-65</td>
<td>Speaker Field</td>
</tr>
<tr>
<td>9A287-65</td>
<td>Motor Name Choke Small</td>
</tr>
</tbody>
</table>

### Voltage at Sockets

<table>
<thead>
<tr>
<th>Type of Tube</th>
<th>Voltage at Battery</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-DO R.F.</td>
<td>5.8 218 100 5.8</td>
<td></td>
</tr>
<tr>
<td>6-6C 1st Det.</td>
<td>5.8 218 100 5.2</td>
<td></td>
</tr>
<tr>
<td>6-DO 1st F.</td>
<td>5.8 218 100 2.0</td>
<td></td>
</tr>
<tr>
<td>75 2nd Det.</td>
<td>5.8 160(3) 1.4 2.8</td>
<td></td>
</tr>
<tr>
<td>41 Output</td>
<td>5.8 216 220 16.0</td>
<td></td>
</tr>
<tr>
<td>84 Rectifier</td>
<td>5.8</td>
<td></td>
</tr>
</tbody>
</table>

(1) Measured on 1000 V. Scale (1000 Ohms per volt)
CONNECTIONS TO BATTERY

The battery cable, number 107-82, (red wire with fuse receptacle at one end and terminal lug at other end) must be connected to battery terminal of ammeter. At the same time connect ammeter capacitor, number 148-3, to battery terminal of ammeter, other end of condenser to any convenient grounded screw on back of instrument panel. Make certain that insulating sleeve is slipped over fuse when fuse is placed in receptacle, before connecting to short battery cable from receiver.

When connected properly, the discharge due to current drawn by the receiver should not indicate on the ammeter. This is important, since if improperly connected, as shown by the deflection of ammeter, additional motor interference may be encountered.

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RESONANCE INDICATOR

Use as a resonance indicator an output meter connected across the primary of the speaker input transformer, or by means of an adapter between the plate and screen terminals of the type 4L output tube. Maximum deflection of the meter indicates resonance. Use only enough signal to get a readily readable output. A low range output meter or the low scale of a multi-range meter should be used.

I.F. ALIGNMENT: (465 K.C.)

1. With variable condenser in its minimum capacity position (plates entirely out of mesh) and with volume control full on, connect test oscillator set at 465 K.C. in series with I.F. dummy antenna, to grid of 6K7 I.F. tube.
3. Move test oscillator connection to grid of 6A8 tube and adjust trimmer condensers of input I.F. transformer No. 108-96B to resonance with oscillator. See top view for location of these transformers. There are two adjustments on each and they are accessible from the top of the transformer shield and should be adjusted with an insulated screw driver.

BROADCAST ALIGNMENT

1. With variable condenser in its minimum capacity position, connect test oscillator set at 1550 K.C. in series with broadcast dummy to the antena lead of receiver.
2. Adjust oscillator trimmer of variable condenser to resonance. (This adjustment is on the middle section of the three-gang condenser—see top view, Fig. 2).
3. Shift test oscillator to 1400 K.C. and pick up signal by rotating condenser and adjust R.F. and antenna trimmers to resonance (see top view, Fig. 2).
4. Re-set test oscillator to 600 K.C. and rotate variable condenser to 600 K.C. Adjust series pad, rocking gang condenser to and fro, at the same time adjusting series pad for maximum gain. This adjustment is accessible from the top of chassis—see top view.
5. Go back and check 1400 K.C. If adjustment is made here, check 600 K.C. again.
6. Check for sensitivity at 1000 K.C. by setting test oscillator to this frequency and picking up the signal by rotating variable condenser. Under no circumstances bend plates of variable condenser sections to correct tracking.
NO SPARK PLUG SUPPRESSORS ARE REQUIRED

DESCRIPTION:
Model No. 666 is a six-tube superheterodyne receiver having a tuning range of 530 K.C. to 1550 K.C. operates from a 6.5 volt storage battery and uses the automotive type 6.5 volt tubes. The "B" supply is obtained from a vibrator with a tube rectifier.

The I.F. frequency used is 465 K.C. the R.F. end of the receiver consisting of a high gain iron core antenna coil which gives high signal to noise ratio and an R.F. stage especially designed to give high image rejection and high I.F. attenuation. The I.F. transformers are designed to give high gain and selectivity and yet to have a broad noise for ease of tuning and high fidelity response. They are of the air core type and wound with solid wire to give minimum drift and variation of gain due to climatic changes.

The receiver is so designed that it may be used as either a single or two unit installation. Taps are provided on the output transformer to pin jack terminal board, a red dot distinguishing dual speaker tap and green dot for single speaker operation.

For complete details see illustration and Header speaker data chart.

Dash kits for the remote control head are available for 1936 cars drilled for dash plates.

This receiver has been carefully designed to facilitate servicing, the top and bottom covers are both removable and are fastened in place by sprig clips, self tapping screws and trimout buttons.

All adjustments are accessible and any part replaceable without removing the chassis from the case.

TUBE COMPLEMENT
1-Type No. 6K7—Remote Cut-off Pentode as an R.F. Amplifier
2-Type No. 6AS—Pentagrid Converter (composite first detector and oscillator)
3-Type No. 6K7—Remote Cut-off Pentode as an I.F. Amplifier (465 K.C.)
4-Type No. 627—Duplex Diode Triode Second Detector, A.V.C. and First Audio
5-Type No. 6N6—Twin Triode Output Amplifier
6-Type No. 6X3—High Vacuum Rectifier

The tube complement consists of the latest "Metal-Glass" tubes which are interchangeable with metal tubes.

Cars with floating power must have the motor bonded to the bulkhead and back to the frame to provide a direct path for the high frequency interference developed in the ignition system. % cover should be necessary, SMAlL DIAMETER WIRE WILL NOT DO. Bond flexible shaft leads, such as free wheeling, choke leads, etc., which pick up motor noise and reradiate it into the car. Free wheeling cables should be grounded at the point at which they go through the fire wall of the car. In extreme cases it has been found necessary to ground the steering column.

I.F. ALIGNMENT
1. With variable condenser in its minimum capacity position (plates entirely out of mesh) and with volume control full on, connect test oscillator set at 465 K.C. in series with I.F. dummy antenna, to grid of 6K7 I.F. tube.
3. Move test oscillator connection to grid of 6AS tube and adjust trimmer condensers of input I.F. transformer No. 108-69 to resonance with oscillator. See top view for location of these transformers. There are two adjustments on each and they are accessible from the top of the transformer shield and should be adjusted with an insulated screw driver.

BROADCAST ALIGNMENT
1. With variable condenser in its minimum capacity position, connect test oscillator set at 1550 K.C. in series with broadcast dummy antenna lead of receiver.
2. Adjust oscillator trimmer of variable condenser to resonance. (This adjustment is on the middle section of the three-gang condenser—see top view).
3. Shift test oscillator to 1400 K.C. and pick up signal by rotating condenser and adjust R.F. and antenna trimmers to resonance (see top view).
4. Re-set test oscillator to 600 K.C. and rotate variable condenser to 600 K.C. Adjust series and rocking gang condenser to and fso at the same time adjusting series pad for maximum gain. This adjustment is accessible from the top of chassis (see top view).
5. Go back and check 1400 K.C. If adjustment is made here, check 600 K.C. again.
6. Check for sensitivity at 1000 K.C. by setting test oscillator to this frequency and picking up the signal by rotating variable condenser. Under no circumstances bend plates of variable condenser sections to correct tracking.

Make certain that the instrument panel has a ground connection to the frame of the car.

NOTE—Where ignition coils are mounted in motor compartments a # mild cord (145-1 or 145-3) connected between primary coil terminal and receiver mounting bolt will often reduce motor noise.
WESTERN AUTO SUPPLY CO.

CONNECTIONS TO BATTERY

The battery cable, number 107-82, (red wire with fuse receptacle at one end and terminal lug at other end) must be connected to battery terminal of ammeter. At the same time connect ammeter capacitor, number 146-3, to battery terminal of ammeter, other end of condenser to any convenient grounded screw on back of instrument panel. Make certain that insulating sleeve is slipped over fuse when fuse is placed in receptacle, before connecting to short battery cable from receiver.

When connected properly, the discharge due to current drawn by the receiver should not indicate on the ammeter. This is important, since if improperly connected, as shown by the deflection of ammeter, additional motor interference may be encountered.

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RESONANCE INDICATOR

Use as a resonance indicator an output meter connected across the primary of the speaker input transformer, or by means of an adapter between the plate and screen terminals of the type 6J6 output tube. Maximum deflection of the meter indicates resonance. Use only enough signal to get a readily readable output. A low range output meter or the low scale of a multi-range meter should be used.

I.F. ALIGNMENT: (262.5 K.C.)

1. With variable condenser in its minimum capacity position (plates entirely out of mesh) and with volume control full on, connect test oscillator set at 262.5 K.C. in series with I.F. dummy antenna, to grid of 6K7 I.F. tube.
3. Move test oscillator connection to grid of 6A8 tube and adjust trimmer condensers of input I.F. transformer No. 108-101 to resonance with oscillator. See top view for location of these transformers. There are two adjustments on each and they are accessible from the top of the transformer shield and should be adjusted with an insulated screwdriver.

BROADCAST ALIGNMENT

1. With variable condenser in its minimum capacity position, connect test oscillator set at 1550 K.C. in series with broadcast dummy to the antenna lead of receiver.
2. Adjust oscillator trimmer of variable condenser to resonance. (This adjustment is on the middle section of the three-gang condenser—see top view, Fig. 2.)
3. Shift test oscillator to 1400 K.C. and pick up signal by rotating condenser and adjust R.F. and antenna trimmers to resonance (see top view, Fig. 2).
4. Re-set test oscillator to 600 K.C. and rotate variable condenser to 600 K.C. Adjust series pad in the antenna circuit, rocking gang condenser to and fro at the same time adjusting series pad for maximum gain. This pad is mounted on the side of the antenna can.
5. Go back and check 1400 K.C. If adjustment is made here check 600 K.C. again.
6. Check for sensitivity at 1000 K.C. by setting test oscillator to this frequency and picking up the signal by rotating variable condenser. Under no circumstances bend plates of variable condenser sections to correct tracking.

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Compliments of www.nucow.com
6 Tube Synchronous Vibrator
Automobile Radio

VOLATGES AT SOCKETS

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I. F. Adjustment

Set the signal generator for a signal of 175 KC.

Connect the output of the signal generator through a 0.5 mf condenser to the input of the R.F. inter-stage section of the tuning condenser... (See Fig. 2 for location of this section.)

Connect the ground lead of the signal generator to the chassis ground.

Turn the variable control to the position shown in Fig. 3 for all adjustments.

Set the volume control at the maximum position.

Antennate the signal generator to prevent oscillation of the AVC circuit.

Then adjust the three I.F. trimmers until maximum output is obtained. The location of these trimmers is shown in Fig. 2.

1575 KC Adjustment

Set the signal generator for 1575 KC.

Turn the rotor of the tuning condenser to the full open position.

In a low capacity antenna is used, connect the shielded lead from the chassis through a 150 mf condenser to the antenna post of the signal generator. (If high capacity, use 1500 mf.) The antenna plug must be correctly inserted, depending on the capacity of the antenna used.

For this and all subsequent adjustments keep the volume control at the maximum position and attenuate the signal from the signal generator to prevent AVC action.

Adjust the trimmer of the oscillator section of the three gang condenser until maximum output is obtained—see Fig. 2 for location of this trimmer.

1400 KC Adjustment

Set the signal generator for 1400 KC.

Turn the rotor of the tuning condenser carefully until maximum output is obtained.

Adjust the R.F. inter-stage and antenna 1400 KC trimmers for maximum output.

Do not change the setting of the oscillator trimmer.

600 KC Adjustment

Set the signal generator for 600 KC.

Connect the output of the signal generator through a 0.05 mf condenser to the control grid of the 6SK7 R.F. tube.

Turn the tuning condenser rotor until maximum output is obtained. Then turn the tuning condenser rotor back and forth, at the same time adjusting the 600-KC pad (see Fig. 2) until the peak of greatest intensity is obtained.

Re-connect the output of the signal generator to the shielded lead through a 1500 mf condenser if the antenna is high capacity.

Adjust the 600 KC antenna trimmer to maximum. This trimmer is reached from the outside of the case.

Replacement Parts

There is a large letter on the chassis which identifies the set to be repaired. When ordering parts please be sure to mention the series number and this large letter.

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Adjusting Antenna 600 KC Trimmer

After the receiver is installed and the car antenna is connected, it will be necessary to adjust the antenna trimmer. Tune in a weak signal at approximately 600 KC with the volume control about three-fourths on. Turn the adjusting screw of the antenna 600 KC trimmer up or down until maximum output is obtained. See Fig. 3 for location of this trimmer.

As shown in the illustration, the antenna plug is inserted in one of two ways, depending on whether the car has a high or low capacity antenna. Full instructions are in the installation manual packed with each radio.

Calibrating the Radio

To calibrate the radio, tune in a station of known frequency. At the back of the control head is the calibration screw. Remove the pilot lamp assembly. Insert a fine blade screwdriver and turn this screw until the pointer on the dial scale is at the frequency of the station received. The knob must be held during this adjustment.

If the control head is inaccessible it may be calibrated by setting the pointer from the front. Remove the crystal by inserting a knife blade under the lower edge. Loosen the pointer screw, set the pointer and tighten.

Compliments of www.nucow.com
MODEL WRL20
Alignment Parts

WESTINGHOUSE ELEC. SUPPLY CO.

GENERAL DESCRIPTION

This model is a five-tube (plus a ballast tube), two stage heterodyne receiver - part of SA 10698 - designed to operate over the standard broadcast band, extending from 540 to 1500 KC., and a short wave band extending from 1600 to 3000 KC.

The receiver uses a type 6AS7 tube as a first detector-oscillator, a type 6V6G as an I.F. amplifier, a type 6G6 as a second detector, A.V.C., and first audio, a type 25A63 as an output, a type 25G2 as a rectifier and a 240C as a ballast tube.

LIKE-UP CAPACITOR ADJUSTMENTS

To properly align the circuits of this receiver, it is essential to use a high grade meter in which the output of which can be continuously varied and reduced sufficiently to prevent overload as the individual circuits of the receiver are brought into alignment. A conventional output meter should be connected across the terminals of the speaker voice coil to indicate when the individual circuits are correctly aligned. The sensitivity of the meter must be sufficient to give satisfactory reading with low input signals.

Before attempting to align the receiver, the service man should familiarize himself with the general layout of the chassis, location of the various tubes and alignment condensers.

ALIGNMENT OF I.F. (455 KC.)

1. Set the volume control to maximum position and wave-change switch to standard broadcast band.

2. Connect the output meter across the voice coil terminals of the speaker.

3. Set the test oscillator to 455 KC., and adjust its output to produce a measurable reading on the output meter when the test signal is applied to the grid of the type 6AS7 first detector-oscillator tube through a 0.5 mfd, blocking condenser.

4. Adjust the four trimmer condensers on the top of the two I.F. coils (square housings) to maximum output.

ALIGNMENT OF OSCILLATOR AND R.F.

1. Check the pointer setting to be sure that it is exactly horizontal when the tuning condenser is completely closed.

2. Set the test oscillator and dial indicator to 1400 KC., and adjust the oscillator trimmer condenser (rear section of knob) to maximum output.

3. Apply the test signal to coil end of the antenna cable through a 0.0001 mfd, blocking condenser and adjust trimmer condenser (front section of knob) to maximum output.

4. Check sensitivity over the band.

5. Turn wave-change switch to the short wave band and check the sensitivity over scale.

TRAP ALIGNMENT

This receiver is provided with a tuned trap which can be adjusted from the bottom without removing the receiver from the cabinet. This trimmer does not need to be adjusted unless there is code interference. In which case, adjustment is made to eliminate the undesired signal.

SERVICES PARTS LIST

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<td>19</td>
<td>HE 5943 590,000 ohm, 1/2 W. resistor</td>
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<td>HE 1003 100 ohm, 1/2 W. resistor</td>
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<td>21</td>
<td>HE 4733 47,000 ohm, 1/2 W. resistor</td>
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<td>CW 6-006 .005 mfd., 600 V. condenser</td>
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<td>23</td>
<td>SW 2976 Wave-change switch</td>
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<td>CH 9013 .0001 mfd. mix condenser</td>
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<td>25</td>
<td>CO 9121 Mix coil</td>
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<td>26</td>
<td>On-off switch - part of TR 9649</td>
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<td>27</td>
<td>LF 901 Dial lamp - 6-8 V.</td>
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<td>28</td>
<td>GE 9569 40 mfd., 150 V. electrolytic condenser</td>
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<td>GE 9569 40 mfd., 150 V. electrolytic condenser</td>
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<td>RE 6853 68,000 ohm, 1/2 W. resistor</td>
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MISCELLANEOUS

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<td>DN 9569 Celluloid dial scale</td>
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<td>FA 9119 Silk grill cloth - 470,000 ohm - part of IC 90107</td>
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<td>FP 101869 Felt foot (4 used)</td>
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<td>IS 95816 Rubber pulley on drive shaft</td>
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<td>MA 9231 Cabinet</td>
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<tr>
<td>KL 105344 &quot;Hank&quot; antenna cable</td>
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<td>KN 90127 Knob (assured)</td>
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<tr>
<td>MT 908 3/8&quot; Fl. nut for volume and switch</td>
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<tr>
<td>ML 9119 Dial supporting plate</td>
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<td>MB 106000 Cord for dial drive, condenser</td>
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<tr>
<td>MG 9592 Dial drive pulley assembly</td>
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<tr>
<td>SH 9171 Dial indicator pointer</td>
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<tr>
<td>SF 9501 Spring for dial drive cord</td>
<td>.05</td>
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<tr>
<td>SF 9553 Spring clip for celluloid dial cover</td>
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<tr>
<td>SG 9569 Dial base tube socket (6 used)</td>
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<td>SG 9569 Dial light socket assembly</td>
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<td>TG 9170 Insulation tube for electrolytic condenser</td>
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PRICES SUBJECT TO CHANGE

WITOUT NOTICE

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GENERAL DESCRIPTION

This model is a six-tube (plus ballast tube), A.C.-D.C., two-band superheterodyne receiver designed to operate over the standard broadcast band, extending from 530-1700 KC., and a short-wave band extending from 8500-17,500 KC.

LINE-UP CAPACITOR ADJUSTMENTS

To properly align the circuits of this receiver, it is essential to use a high-grade model that simulates the output of which can be continuously varied and reduced sufficiently to prevent overload as the individual circuits of the receiver are brought into alignment. A conventional output meter should be connected across the terminals of the voice coil to indicate when the individual circuits are correctly aligned. The sensitivity of the meter must be sufficient to give satisfactory readings with low input signals.

Before attempting to align the receiver, the service man should familiarize himself with the general layout of the chassis, the various tubes and alignment:

ALIGNMENT OF I.F. (455 KC.)

1. Set the volume control to maximum position and turn wave-change switch to standard broadcast band and the dial pointer to approximately 600 KC.

2. Connect the output meter across the voice coil terminals of the speaker.

3. Set the test oscillator to 455 KC., and adjust the four I.F. trimmer condensers for maximum output. An accurate meter reader on the output meter when the test

4. Adjust the four I.F. trimmer condensers underneath the chassis (under the square coil housings) to maximum output.

BROADBAND

1. Check the pointer setting to be sure that it is exactly horizontal when the tuning condenser is completely closed.

2. Set the test oscillator and dial indicator at 4500 KC., and adjust the oscillator trimmer (the trimmer on the coil fastened to the back plate of the chassis).

3. Set the test oscillator and dial pointer to 600 KC.

4. Adjust the oscillator trimmer and the trimmer on the coil fastened to the back plate of the chassis.

5. Reset test oscillator and dial pointer to 1800 KC., and check operation of set.

6. Connect the test oscillator to the blue antenna lead through a .0008 mfd. condenser and adjust the antenna trimmer (the bottom condenser on the coil on the top of the chassis).

7. Check sensitivity and calibration of the scale.

ALIGNMENT OF THE SHORT-WAVE BAND

1. Turn the wave-change switch to the short-wave position.

2. Set the test oscillator and dial pointer to 15,000 KC., and adjust the short-wave antenna trimmer (the trimmer on the inside end of the coil on the back plate of the chassis). Two positions may be found, both with the least capacity, that is, with the trimmer screw farthest out.

3. Adjust the short-wave antenna trimmer (the top condenser on the coil on the top of the chassis).

4. Check sensitivity and calibration of the scale.

TRAP ALIGNMENT

This receiver is provided with a tuned trap (the upright coil under the chassis) which is adjusted to eliminate a signal at the I.F. (455 KC.) frequency applied to the antenna. If there is code interference which is known to originate near the 455 KC. channel, this trimmer may be adjusted to minimize the undesired signal.

EN 96161 Knob - large (set screw type) .32 PL 66118 Escutcheon dial plate .50 PL 66118 Dial supporting plate .50 PR 97180 Dial drive screw for Yard .06 FY 98100 Dial drive pulley .40 SC 99235 Dial foot and mounting screw .06 SC 99235 Dial shaft .50 SC 99235 Dial with knob .30 SD 99235 Dials (for short-wave) .30 SD 99235 Dial socket (set screw type) .20 SD 99235 Dial with knob .30 SD 99235 Dial shaft .50 SD 99235 Dial with knob .30 SD 99235 Dial socket (set screw type) .20
CIRCUIT
This radio, popularly known as an AC-DC set, is, as the name implies, built to operate from either a 117 volt AC or DC power supply.

An R.F. transformer with tuned secondary feeds into a 6J7 tube which functions as the 1st detector and oscillator. The oscillating circuit is resonant at 456 KC above the frequency to which the R.F. transformer secondary is tuned.

The output of this tube is fed through an iron core I.F. transformer into another 6J7 tube which functions as the 2nd detector.

The volume control is of the variable antenna input and I.F. gain type.

Resistance coupling is used between the 2nd detector and the output stage which uses a 25L6G tube.

A 25L6G rectifier tube is used. For AC operation, the filter unit consists of the rectifier tube, filter condensors and the speaker field which serves as a choke. For RC operation, the rectifier tube acts as a low resistance series resistor.

The beater of the 4 tubes and the ballast tube are in series across the line. The dials lamp is in parallel with one section of the ballast tube resistance.

The person working on the set should avoid coming in contact with any ground.

The following equipment is required for alignment:

- A grid controlled signal generator which will provide an accurately calibrated signal at the test frequencies listed.
- A meter indicating meter, nonmagnetic, 500 volt AC/DC operation.
- Dummy antennas - 1 mil and 200 mil.

The voltages at sockets for 117 volt AC line are shown above. When operated on DC, the rectifier tube acts as a low resistance series resistor with a drop of approximately 6 volts between plate and cathode.

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**Electrical and Mechanical Specifications**

- **Frequency Range**
  - Intermediate: 455 kc
  - 530-1,720 kc

- **Power Supply Ratings**
  - A.C. Rating: 105-125 volts, 50-60 cycles, 50 watts
  - D.C. Rating: 105-125 volts, direct current, 50 watts

- **Power Output (125 volt, 60 cycle supply)**
  - Undistorted Maximum: 1.5 watts
  - Maximum: 2.0 watts

- **Loudspeaker**
  - Type: 4-inch Electrodynamic
  - Dial Lamp (1): Mazda 47, 6.3 volts, .15 amp.

**Alignment Procedure**

1. **Output Meter Alignment**
   - Connect the meter across the voice coil and turn the receiver volume control to maximum.

2. **Precautionary Lead Dress**
   - 1. Dress 1st I.F. plate and grid leads against chassis and away from each other. Dress plate lead from 6SK7 close to chassis.
   - 2. Dress electrolytic capacitor against rear apron.
   - 3. Keep leads away from adjusting screws to allow easy access.
   - 4. Dress output plate lead along front apron and away from 6A8.
   - 5. Dress parts at ends of chassis to clear cabinet bosses.

3. **Test Oscillator**
   - Connect the low side of the test-oscillator to the receiver chassis, through a .01 mfd. capacitor, and keep the output as low as possible. The antenna should be rolled up and kept at least one foot from chassis during alignment.

   - **Steps**
     - Connect the high side of test-oscillator to—
     - Tune test-osc. to—
     - Turn radio dial to—
     - Adjust the following for max. peak output—

     | Step | Connect the high side of test-oscillator to— | Tune test-osc. to— | Turn radio dial to— | Adjust the following for max. peak output— |
     |------|-----------------------------------------------|------------------|-------------------|-----------------------------------------------|
     | 1    | 6A8 1st-Det. grid cap. in series with .01 mfd. | 455 kc           | Quiet point at 1,600 kc end of dial | C1, C2, C3, C4 (1st and 2nd I.F. transformers) |
     | 2    | Antenna term. of ant. trans. in series with 100 mfd. | 1,720 kc         | Full clockwise (out of mesh) | C5 (oscillator) |
     | 3    |                                             | 1,600 kc         | Resistance on 1,500 kc signal. | C6 (antenna) |

4. **Power-Supply Polarity**
   - For operation on d-c, the power plug must be inserted in the outlet for correct polarity. If the set does not function, reverse the plug. On a-c, reversal of the plug may reduce hum.

**Resistor in Power Cord**

- The power cord contains a resistor which becomes warm during operation.

**Antenna**

- The set is equipped with length of antenna wire. Do not connect the antenna to ground. If an outdoor antenna is used, it should not be longer than 100 feet, including lead-in. If it is longer, connect a 100 to 200 mfd. capacitor in series with the lead-in.
MODEL - W R 152

Power Supply ........................................ 105—125 volts, DC or 50—60 cycles AC
Tuning Range ......................................... 540—1720 K.C.
Line up Frequencies ................................. 455 K.C., 1720 K.C., 1400 K.C.
Power Output ......................................... Two watts

MODEL WR-166A IF PEAK 455 KC

Frequency Range ........................................ 540-1720 kc
Intermediate Frequency ......................... 455 kc
Power Output (125 volt, 60 cycle supply) ........................ 0.5 watts
Undissoorted ......................................... 0.5 watts
Maximum .............................................. 1.25 watts
Loudspeaker Type ................................... 4-inch Electrodynamic

Dial Lamp (1) ......................................... Mazda 47.63 volts, .15 amp.

Power Supply Ratings
A-C Rating ........................................ 105.125 volts, 50-60 cycles, 10 watts
D-C Rating ........................................ 105-125 volts, direct current, 10 watts

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**Alignment Procedure**

Connect a high impedance AC voltmeter across the voice coil terminals of the loudspeaker. The volume control should be set a few degrees below maximum volume position. Always use a weak signal from the signal generator, strong signals tend to cause improper adjustment.

See Fig. 1 and 2 for location of all trimmers.

**L.F.:** Connect the generator ground to receiver chassis through a .1 mf condenser. Using a .1 mf condenser in series with the high side of the generator, apply a 455 K.C. signal to the grid of the 6K7G L.F. amplifier tube, and line transformer, trimmer No. 12 (Fig. 1) to maximum output. Next connect generator to the grid of the 6A8G tube and adjust both trimmers of transformer No. 1 (Fig. 2) for maximum output.

**R.F.:** Connect the high side of the generator to the antenna through a 100 muf condenser. Turn the variable condenser to minimum capacity, feed a 1720 K.C. signal in from the generator and adjust oscillator trimmer (Fig. 2) for top frequency. Next tune the receiver to about 1400 K.C., feed in signal from generator and adjust the antenna trimmer (Fig. 2) for maximum output.

---

**Diagram No. 2**

- Line Cord
- Trans.*2
- Antenna
- 25Z6G
- 25L6G
- 6076
- 6K7G
- 455KC
- BK42BG
- 6A8G
- Ant. Trim.
- Osc. Trim.

**Volume, On-Off Station Selector**

- 5491
- 455KC

---

**Compliments of**

[Company Logo]
### WESTINGHOUSE ELEC. SUPPLY CO.

#### Parts Lists

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<th>Part No.</th>
<th>Description of Parts</th>
<th>List Price</th>
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<td>110 MIA-MF Trimmer</td>
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<tr>
<td>D-553</td>
<td>270 MIA-MF Trimmer</td>
<td>$0.45</td>
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<tr>
<td>D-554</td>
<td>200,000 ohm 1/2 W Resistor</td>
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<td>100,000 ohm 1/2 W Resistor</td>
<td>$0.15</td>
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<td>500,000 ohm 1/2 W Resistor</td>
<td>$0.15</td>
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<tr>
<td>D-557</td>
<td>First LF Assembly</td>
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<td>D-557A</td>
<td>Second LF Assembly</td>
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<td>D-557B</td>
<td>Output Transformer</td>
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<td>D-557C</td>
<td>Ganged Speaker Plug</td>
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<td>D-557D</td>
<td>Push Button Oscillator Cells</td>
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<tr>
<td>D-557E</td>
<td>Push Button Assembly</td>
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#### Electrical Specifications

- **Power Supply**: 105-125 volts, 60 cycles A.C., unless otherwise specified.
- **Tuning Range**: 660 K.C. to 18,000 K.C. 10,000 K.C. to 18,000 K.C. 600 K.C. 600 K.C.
- **Line up Frequencies**: 18,000 K.C. 10,000 K.C. 600 K.C.
- **Power Output**: Three watts.

#### Diagram No. 1

<table>
<thead>
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<th>Part No.</th>
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<td>Variable Condenser</td>
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<td>C-2</td>
<td>D-552</td>
<td>110 MIA-MF Trimmer</td>
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<td>C-3</td>
<td>D-553</td>
<td>270 MIA-MF Trimmer</td>
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<td>C-4</td>
<td>D-554</td>
<td>200,000 ohm 1/2 W Resistor</td>
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<td>D-555</td>
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<td>D-557D</td>
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<td>C-12</td>
<td>D-557E</td>
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(These coils cannot be furnished separately.)

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IF PEAK 455 KC

Cabinet—Blue finish—Model WR-166B
Cabinet—Coral finish—Model WR-166C.
Cabinet—Green finish—Model WR-166G
Cabinet—Ivory finish—Model WR-166I
Cabinet—Red finish—Model WR-166R
Cabinet—Walnut finish—Model, WR-166W

Alignment Procedure

Output Meter Alignment.—Connect the meter across the voice coil, and turn the receiver volume control to maximum.

Precautionary Lead Dress

1. Dress 1st I-F plate and grid leads against chassis and away from each other. Dress plate lead from 12SK7 close to chassis.
2. Dress electrolytic capacitor against rear apron.

Test-Oscillator.—Connect the low side of the test-oscillator to the receiver chassis, through a .01 mfd. capacitor and keep the output as low as possible.

Steps Connect the high side of test-oscillator to— Tune test-osc. to— Turn radio dial to— Adjust the following for max. peak output—
1 Tuning condenser stator (osc.) in series with .01 mfd. 455 kc Quiet point at 1,600 kc end of dial C1, C2, C3, C4 (1st and 2nd I-F transformers)
2 Antenna term. of ant. trans. in series with 100 mmfd. 1,720 kc Full clockwise (out of mesh) C5 (oscillator)
3 1,500 kc Resonance on 1,500 kc signal C6 (antenna)

Electrical and Mechanical Specifications

FREQUENCY RANGE............................................. 530-1,720 kc

Dial Lamp (1).............................................. Mazda 47, 6.3 volts, .15 amp.

POWER SUPPLY RATINGS

A-C Rating.............................................. 105-125 volts, 50-60 cycles, 30 watts
D-C Rating.............................................. 105-125 volts, direct current, 30 watts

INTERMEDIATE FREQUENCY........................................ 455 kc

Power Output (125 volt, 60 cycle supply) Undistorted.......................................... 0.75 watts
Maximum................................................. 1.5 watts

LOUDSPEAKER

Type...................................................... 4-inch Electrodynaminc

Power-Supply Polarity.—For operation on d-c, the power plug must be inserted in the outlet for correct polarity. If the set does not function, reverse the plug. On a-c, reversal of the plug may reduce hum.

Antenna.—The set is equipped with a length of antenna wire. Do not connect the antenna to ground. If an outdoor antenna is used, it should not be longer than 100 feet, including lead-in. If it is longer, connect a 160 to 200 m FD capacitor in series with the lead-in.

TUBE AND TRIMMER LOCATIONS

NOTE: 35L6GT is used in No.4 socket in Model WR-166.
Models WR-168 and WR-168A are identical with the exception of the cabinet and dial scale.

**FREQUENCY RANGE** .................................................. 530-1,720 kc

**INTERMEDIATE FREQUENCY** ...................................... 455 kc

**Dial Lamp (1)** ......................................................... Mazda 51, 7.5 volts, 0.2 amp.

**POWER SUPPLY RATINGS** ........................................

A-C Rating .............................................................. 105-125 volts, 50-60 cycles, 30 watts

D-C Rating .............................................................. 105-125 volts, direct current 30 watts

**Alignment Procedure**

**Output Meter Alignment**—Connect the meter across the voice coil, and turn the receiver volume control to maximum.

**Test-Oscillator**—Connect the low side of the test-oscillator to the receiver chassis, through a .01 mfd. capacitor, and keep the output as low as possible.

**Antenna**—The set is equipped with a built-in loop antenna. If an outdoor antenna is used, it may be connected to the "ANT" terminal on rear of cabinet. It should not be longer than 100 feet, including lead-in. If it is longer, connect a 100 to 200 mmd. capacitor in series with the lead-in.

**Power-Supply Polarity**—For operation on d-c, the power plug must be inserted in the outlet for correct polarity. If the set does not function, reverse the plug. On a-c, reversal of the plug may reduce hum.

**Steps** | **Connect the high side of test-oscillator to** (in series with .01 mfd.) | **Tune test-osc. to** | **Turn radio dial to** | **Adjust the following for max. peak output**
---|---|---|---|---
1 | Tuning condenser (osc.) | 455 kc | Quiet point at 1,600 kc end of dial | C1, C2, C3, C4 (1st and 2nd I-F transformers)
2 | Antenna term. of ant. loop in series with 100 mmd. | 1,720 kc | Full clockwise (out of mesh) | C5 (oscillator)
3 | | 1,500 kc | 1,500 kc cal. mark | C6 (antenna)

**Precautionary Lead Dress**—1. The oscillator grid lead, R-F grid lead and diode plate lead should be kept separated as far as possible.

2. Dress blue 1st I-F lead under volume control close to chassis.

3. Dress blue 2nd I-F lead close to chassis and behind 12SK7 socket.
WESTINGHOUSE ELEC. SUPPLY CO.

MODEL WR168B
MODEL WR262

Schematics, Voltage
Sockel, Trimmers

For SPECIFICATIONS, ALIGNMENT, LEAD DRESS and DIAL DRIVE DATA, see MODEL WR-168.

MODEL — WR 262

FOR SPECIFICATIONS AND PARTS SEE INDEX
FOR STRINGING DRIVE DRUM SEE MODEL WR-162
CONVENTIONAL ALIGNMENT SEE SPECIAL SECTION
VOLUME VIII
IF PEAK 455 KC

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Compliments of www.nucow.com
POWER OUTPUT (125 volt, 60 cycle supply)  
Undistorted
Maximum

POWER SUPPLY RATINGS  
A-C Rating
D-C Rating

Tube Changing  
The tubes can be changed by removing the back and taking off the wing nuts which hold the loop antenna in place. The loop antenna may then be detached from the back of the chassis.

Alignment Procedure  
Output Meter Alignment—Connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test Oscillator  
Connect the lower side of the test oscillator to the binding post on the loop antenna marked "GND."  

<table>
<thead>
<tr>
<th>Steps</th>
<th>Connect high side of test-oscillator to</th>
<th>Tune test-osc to</th>
<th>Adjust dial pointer to</th>
<th>Adjust the following for max. peak output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Binding post</td>
<td>455 kc</td>
<td>Quiet point at 1,600 kc end of dial</td>
<td>C1, C2, C3, C4, 1st and 2nd 1-P transformers</td>
</tr>
<tr>
<td>2</td>
<td>&quot;marked&quot;</td>
<td>1,700 kc</td>
<td>Right end of scale (out of mesh)</td>
<td>C5 (oscillator)</td>
</tr>
<tr>
<td>3</td>
<td>&quot;ANT.&quot;</td>
<td>1,500 kc</td>
<td>Resonance on 1,500 kc signal</td>
<td>C6 (antenna)</td>
</tr>
</tbody>
</table>

Important  
When aligning the receiver, it is important to keep the loop antenna attached to the receiver by means of the wing nuts. Keep metallic objects away from the loop. Keep the output signal from the test-oscillator as low as possible during alignment of the receiver.

Compliments of www.nucow.com
**GENERAL DESCRIPTION**

This model is a five-tube, alternating current, two-band superheterodyne receiver designed to operate over the standard broadcast band, extending from 525 to 1760 KC. and a short-wave band, extending from 1800 to 27,000 KC.

**LINE-UP CAPACITOR ADJUSTMENTS**

To properly align the circuits of this receiver, it is essential to use a high grade modulated test oscillator, the output of which can be continuously varied and reduced sufficiently to prevent overload as the individual circuits of the receiver are brought into alignment. A conventional output meter should be connected across the terminals of the oscillator so that the individual circuits are correctly aligned. The sensitivity of the meter must be sufficient to give satisfactory readings with low input signals.

Before attempting to align the receiver, the service man should familiarize himself with the general layout of the chassis, location of the various tubes and alignment points.

**ALIGNMENT OF I.F. (455 KC.)**

1. Set the volume control to maximum position, the wave-change switch to standard broadcast band and the dial pointer to approximately 600 KC.

2. Connect the output meter across the secondary of the oscillator transformer (not the primary) and provide a measurable reading. When the test signal is applied to the grid of the first detector-oscillator tube through a 0.5-mf. blocking condenser.

3. Adjust the four I.F. trimmer condensers beneath the chassis (under the square coil housings) to maximum output.

**ALIGNMENT OF OSCILLATOR AND R.F.**

1. Check the pointer settings to be sure that it is exactly horizontal when the tuning condenser is completely closed.

**TRAP ALIGNMENT**

This receiver is provided with a tuned trap (the upright coil under the chassis) which is adjusted to eliminate a signal at the I.F. frequency (455 KC.) applied to the antenna. If there is any interference which is known to originate near the 455 KC. frequency, this trimmer may be adjusted to minimize the undesired signal.
General Description

Model WR-258 is a five-tube, a-c, superheterodyne receiver employing push-button tuning for five stations in the broadcast band. The tuning range covers standard broadcast and state police calls. Features of this receiver are: Automatic volume control, magnetically tuned i-f transformers, magnetically tuned oscillator coils for each push button, 6-to-1 ratio vernier tuning, illuminated slide-rule dial, and a 5-inch dust-proofed dynamic speaker.

Model WR-260 employs all features of the WR-238 and in addition has a tuning band covering from 1,550 to 3,500 kc for aviation and police reception. It also has a two-point tone control.

Electrical Specifications

**Frequency Range (Model WR-258)**

- Broadcast: 540-1,720 kc
- Five Electric Tuning Positions:
  - Runs A and B,
  - 1 station between approximately 550-980 kc
  - 2 stations between approximately 650-1,080 kc
  - 2 stations between approximately 850-1,500 kc

- Pilot Lamp (1) .............................

**Power Supply Ratings**

- Rating A
- Rating B

**Power Output**

- Undistorted .................. 1.0 watt
- Maximum ................... 1.5 watts

**Frequency Ranges (Model WR-260)**

- Broadcast ................... 540-1,550 kc
- Police ...................... 1,550-3,500 kc
- Mazda No. 44, 6.3 volts, 0.25 ampere

**Power Supply Ratings**

- 105-125 volts, 50-60 cycles, 50 watts
- 105-125 volts, 25-60 cycles, 50 watts

**Power Supply**

- Type: 5-inch Electrodynamic

- Voice Coil Impedance: 5426-5 4.0 ohms at 400 cycles
  - 5427-5 3.4 ohms at 400 cycles

**Loudspeaker**

- The loudspeaker voice-coil may be centered in the normal manner by using three narrow feelers to obtain equal spacing of the air-gap. The dust cover must be removed before centering, and may be done by gently cutting it free from the cone, being careful not to cut or damage the cone while doing so.

**WR-260 Loudspeaker Wiring**

**WR-258 Tube and Trimmer Locations**

Refer to "Alignment Procedure" for explanation of the "calibration marks" shown in this drawing.

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Precautionary Lead Dress (WR-260).

1. Dress green lead from antenna coil to push-button switch away from chassis and gang.
2. Dress green leads on push-button unit close to coils and away from adjustment screws.
3. Dress power cord and transformer primary leads toward left end of chassis.
4. Dress C27 close to chassis and clear of gang rotor.
5. Keep bus lead from oscillator coil to range switch as short and direct as possible.
6. Dress leads from range switch away from oscillator coil.
7. Dress R1 and C29 away from antenna coil.

Measurements made to chassis unless otherwise indicated, with set tuned to quiet point and volume control at minimum. Values should hold within approximately ±20% with 117-volt a-c supply.

*NOTE: Values with star (*) are operating voltages in circuits with high series-resistance. These voltages will be lower when measured with a voltmeter drawing current through the circuit. Exact voltage may be measured with a vacuum-tube voltmeter if desired. The other values will not be affected by measuring with an ordinary high-resistance voltmeter.
Adjustments for Electric Tuning

Nos. 1, 2—Approximately 550-980 kc.
No. 8—Approximately 850-1,080 kc.
Nos. 4, 5—Approximately 860-1,800 kc.

Push Button Adjustments

*NOTE*: On runs A and B, the range of No. 2 push button is approx. 650 to 1,080 kc. C21 is 70-290 mmfd. Use Part No. 31416 capacitor bank and Part No. 31384 coil (L13) for replacements. On runs C and above, the range of No. 2 push button is approx. 550 to 980 kc. C21 is 100-400 mmfd. Use Part No. 32066 capacitor bank and Part No. 31415 coil (L13) for replacements. The run letter is stamped on rear apron of chassis after code number—examples: 8T29B, 8023C, etc., also the letters “MOD” are stamped on rear apron of runs C or later.

These models have six push buttons. The right-hand button connects the gang condenser for dial tuning. The other five buttons are for electric tuning of five different stations in the standard-broadcast range. The station buttons connect to separate magnetically tuned oscillator coils and separate antenna trimmers which must be adjusted for the desired stations. Use an insulated screwdriver or alignment tool. Allow at least five minutes warm-up period before making adjustments. Use a regular antenna for the preliminary adjustments. The procedure is as follows:

**Alignment Procedure**

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the chassis drawing. Turn the receiver volume control to maximum.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the output as low as possible to avoid a-v-c.

Calibration Marks.—The tuning dial is fastened in the cabinet and cannot be used for reference during alignment. Therefore calibration marks corresponding to dial readings of 600 kc and 1,500 kc have been stamped in the plate on the front of the chassis, as shown in the accompanying drawing. These marks are used for reference during alignment.

Drum and Dial Indicator Adjustment.—As the first step in r-f alignment, check the position of the drum on the front shaft of the gang condenser. With the gang at maximum (full mesh) the drum set-screw should be pointing in the direction shown in the drawing. With the drum in this position, and the gang at maximum, move the dial indicator along the drive cord to coincide with the left-hand end mark on the dial; if it is not, loosen the drum set-screw (which is accessible through a slot in the bottom of the cabinet); turn the drum slightly so that the indicator is at this mark, and then tighten the set-screw.

After completion of alignment, seal the r-f core adjustment screws with household cement.

The dial tuning (right-hand) push button must be pushed in for steps 1 to 3, inclusive.

On Model WR-260, set range switch to “Broadcast” position (switch up) and tone control clockwise.

<table>
<thead>
<tr>
<th>Steps</th>
<th>Connect the high side of test-osc. to</th>
<th>Tune test-osc. to</th>
<th>Turn radio dial to</th>
<th>Adjust the following for max. peak output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6K7 I-F grid cap, in series with .01 mfd.</td>
<td>455 kc</td>
<td>L7 and L8 (2nd I-F Trans.)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>6A8-G grid cap, in series with .01 mfd.</td>
<td>455 kc</td>
<td>L5 and L6 (1st I-F Trans.)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Antenna lead (blue) in series with 200 mfd.</td>
<td>1,500 kc</td>
<td>1,500 kc calibration mark</td>
<td>C6 (osc.)†</td>
</tr>
<tr>
<td>4</td>
<td>Follow “Adjustments for Electric Tuning.”</td>
<td></td>
<td></td>
<td>C3 (ant.)</td>
</tr>
</tbody>
</table>

† The oscillator section of the gang condenser has two trimmers, one on top, accessible through a hole in the chassis, and the other on bottom. It may be necessary to adjust both of these trimmers to secure a peak on 1,500 kc.
IF PEAK 455 KC

CATHODE CURRENTS
(1) 65A7 ....... 6.6 MA.
(2) 6SK7 ....... 10.2 MA.
(3) 6GQ7 ....... 36 MA.
(4) 6G6E ....... 29.9 MA.
TOTAL "B" CURRENT .. 46.7 MA.

Oscilloscope Connections
VERTICAL "M" TO FIRST TERMINAL, VERTICAL "O" TO CHASSIS.

Dial Lamp
MAZDA No. 51, 7.5 volts, 0.2 amp.

Record Player Connections, Using a Double-Pole, Double-Throw Toggle Switch

Phonograph Terminal Board—A 3-terminal board is located on the rear of the chassis for connecting a phonograph pickup, or Record Player, into the audio amplifier of the receiver. The accompanying schematic shows connections for a high-impedance pickup with a switch for changing from radio to records. For low-impedance pickups, a suitable step-up transformer should be used to provide proper impedance matching, and should be connected between the pickup and radio-phono switch.

Antenna—The set is equipped with a built-in loop antenna. If an outdoor antenna is used, it may be connected to the "A" terminal on the rear of the chassis. The "G" terminal may be connected to a good ground such as a water pipe.

Phonograph or Television Attachment—A terminal board is provided on the rear of the chassis for connecting a record player or television, attachment into the audio-amplifying circuit. The cable from the attachment should be connected to terminals 1 and 3. The shielded or ground lead going to terminal 1. When using the attachment the connection link is disconnected and volume is controlled by the control on the phonograph or television attachment.
Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown on the schematic drawing.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

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-c v-c action.

Calibration Marks.—The tuning dial is fastened in the cabinet and can not be used for reference during alignment. Therefore calibration marks have been stumped in the plate on the front of the chassis as shown in the accompanying drawing. These marks are used for reference during alignment.

Dial Indicator Adjustment.—With the gang condenser in full mesh, the indicator should point to the extreme left (low frequency) mark on the dial scale.

<table>
<thead>
<tr>
<th>Steps</th>
<th>Connect the high side of the test-osc. to—</th>
<th>Tune test osc. to—</th>
<th>Turn radio dial to—</th>
<th>Adjust the following for maximum peak output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Antenna Terminal</td>
<td>455 kc</td>
<td>Quiet Point between 1,200-1,300 kc</td>
<td>C3 and C4 (2nd I.F. Trans.)</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td>C1 and C2 (1st I.F. Trans.)</td>
</tr>
<tr>
<td>3</td>
<td>Ant. terminal in series with 200 mmfd.</td>
<td>1,300 kc</td>
<td>1,300 kc calibration mark</td>
<td>C5 (osc.)</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>600 kc</td>
<td>600 kc calibration mark</td>
<td>C6 (ant.)</td>
</tr>
<tr>
<td>5</td>
<td>Repeat step 3.</td>
<td></td>
<td></td>
<td>L1 (osc.)</td>
</tr>
</tbody>
</table>

Note.—Oscillator tracks above signal.

PRECAUTIONARY LEAD DRESS.—
1. Power cord leads must be dressed away from 6SQ7 socket, and toward end of chassis.
2. Green lead 2nd I.F. to 6SQ7 must be dressed against base.

Adjustments for Push-Button Tuning

The push-buttons should be adjusted for six favorite stations after the receiver has been operating for a brief warm-up period. Each button may be set up to any standard broadcast station. The preferable arrangement is to adjust for stations in the order of frequency, from low to high. Proceed as follows:

1. Loosen the push buttons by turning counter-clockwise about one turn from their tight position so they turn freely.
2. Check to be sure the link connection on back of chassis is in “Radio” position (connected between terminals 2 and 3).
3. Press in push-button No. 1 (left) as far as it will go without undue pressure, hold in, retune station with manual control if necessary for best reception, and then carefully tighten up the button. Do not tighten more than 1/4 turn after the screw begins to grip or damage to the mechanism may result.
4. Proceed in a similar manner for the remainder of the push-buttons.
5. Insert the station marker tabs in the recesses above the push-buttons.

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WESTINGHOUSE ELEC. SUPPLY CO.

MODEL WR170

Schematic, Voltage Alignment, Trimmers
Socket, Phono, Data

IF PEAK 455 KC

POWER SUPPLY RATINGS:
A.C Rating, 105-125 volts, 50-60 cycles, 55 watts
D.C Rating, 105-125 volts, direct current, 55 watts

LOUDSPEAKER (8473-2)
Type, 6-inch permanent magnet dynamic
Voice Coil Impedance, 4 ohms at 400 cycles

FREQUENCY RANGE, 540-1,720 kc
INTERMEDIATE FREQUENCY, 455 kc

Mazda No. 51, 7.5 volt, 0.2 amp.

Power Output (125 volts, 60 cycle supply)
Undistorted, 0.8 watts
Maximum, 1.4 watts

Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown on the schematic drawing.

Output Meter Alignment.—If this method is used, connect the output meter across the voice coil, and turn the receiver volume control to maximum.

Test Oscillator.—For all alignment operations, connect the low side of the test oscillator to the receiver ground binding post, and keep the oscillator output as low as possible to avoid a-v-c action.

Calibration Marks.—The tuning dial is fastened in the cabinet and can not be used for reference during alignment. Therefore calibration marks have been stamped in the plate on the front of the chassis as shown in the accompanying drawing. These marks are used for reference during alignment.

Dial Indicator Adjustment.—With the gang condenser in full mesh, the indicator should be set 1/16 inch to the left of the extreme left (low frequency) mark on the dial scale.

Steps

1. Connect the high side of the test-osc. to —
2. Tune test osc. to —
3. Turn radio dial to —
4. Adjust the following for maximum peak output
5. Repeat step 3.

1. Ant. terminal
2. 455 kc
3. C3 and C4

2. Ant. terminal
2. 1,720-1,500 kc
2. C1 and C2

3. Ant. terminal in series with
2. 1,500 kc
2. C6 (osc.)

4. 600 kc
2. 800 kc
2. C6 (ant.)

5. L1 (osc.)
2. Rock in

NOTE.—Oscillator tracks above signal.
Precautionary Lead Dress.—

1. Leads from the oscillator section of the range switch to 3.
   the oscillator coils and mica trimmers should be kept as short as possible and dressed away from other parts and wiring.

2. The leads on C31 connecting between the range switch 4.
   and the oscillator section of the gang should be made as short as possible.

The leads from the power transformer and the power cord to the power switch (S4) should be twisted together and dressed away from other wiring.

The yellow lead connecting to the transformer motor winding at the rectifier socket should be dressed away from the phono terminals.
MODEL WR366
MODEL WR368
Socket, Trimmers
Drive Cord Data

**Electrical Specifications**

<table>
<thead>
<tr>
<th>Frequency Ranges</th>
<th>540-1,720 kc</th>
<th>2.3-7 mc</th>
<th>7.22 mc</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Standard Broadcast&quot; (A)</td>
<td>&quot;Medium Wave&quot; (B)</td>
<td>&quot;Short Wave&quot; (C)</td>
<td></td>
</tr>
</tbody>
</table>

**Intermediate Frequency**

<table>
<thead>
<tr>
<th>Tube Complement (WR-366)</th>
<th>R-F Amplifier</th>
<th>First Detector</th>
<th>Heterodyne Oscillator</th>
</tr>
</thead>
<tbody>
<tr>
<td>RCA-6K7</td>
<td>RCA-6A8</td>
<td>RCA-6J7</td>
<td></td>
</tr>
<tr>
<td>RCA-6Q7-G</td>
<td>1st A.F., A.V.C.</td>
<td>Power Output</td>
<td></td>
</tr>
<tr>
<td>RCA-6F6-G</td>
<td>Precision Eye</td>
<td>Rectifier</td>
<td></td>
</tr>
<tr>
<td>Pilot Lamps (3)</td>
<td>Center, Mazda No. 4, 6-8 V., 0.15 amp.; Sides, Mazda No. 44, 6.3 V., 0.25 amp.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Power Supply Ratings**

| Rating A | 105-125 volts, 50-60 cycles, 80 watts (WR-366), 120 watts (WR-368) |
| Rating B | 105-125 volts, 25-30 cycles, 80 watts (WR-366), 120 watts (WR-368) |

**Power Output**

| Undistorted | 2.5 watts | 10 watts |
| Maximum | 5 watts | 12 watts |

**General Description**

Model WR-366 is an eight-tube, three-band, superheterodyne receiver employing electric motor tuning for nine broadcast stations and a Precision Eye for precise manual tuning. The tuning ranges cover the standard broadcast band, Municipal and State Police bands, and the American and Foreign short-wave broadcast bands. Among its features are: Continuously variable tone control, illuminated slide-rule dial, automatic volume control, magnetically-tuned r-f transformers, r-f amplifier stage, phonograph terminal board, separate oscillator tube, and bass compensation.

The Model WR-368 is a six-tube, three-band, superheterodyne receiver with all of the features of the WR-366 and in addition employing push-pull output with a phase inverter and a power output of 12 watts.

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The circuit of the electric tuning mechanism is shown in the schematic diagram, and the mechanical details are illustrated.

The action can be understood by following a cycle of operation:
When a station button is pushed in, it completes the 24-volt circuit through the corresponding station-setting contact and one-half of the brass selector disc, which is connected to one side of the motor field coil. This energizes the motor, and the rotor is pulled forward, engaging with the gear train that drives the tuning condenser and selector disc. The condenser and disc rotate until the insulation line comes under the particular station-setting contact, and the motor circuit is broken. Inertia carries the insulation line past the station-setting contact which then makes contact to the other half of the disc. This completes the circuit to the other side of the motor field coil, causing the motor to reverse. The floating flywheel is still turning in the original direction and therefore slows down the reversal movement of the motor; as a result the selector disc is moved slowly back until the insulation line is under the station-setting contact, when the circuit is broken and the mechanism stops.

Oscillation of Tuning Mechanism
The principal of operation necessitates that the mechanism go through several quick reversals on arriving at the desired station frequency and before reaching a dead stop. Three of four reversals are normal. The number of reversals and consistency of operation depends mainly on the flywheel friction adjustment, however, in some cases the selector disc and station setting contacts are involved. The following suggestions may be helpful where excessive pointer oscillation is experienced.

Oscillation on Certain Buttons Only
(1) Check contact tip of selector assembly for loose fit in body. See that nose of contact is not burned nor distorted out of correct shape. Replace tip if necessary; do not attempt to file the tips.
(2) Clean the insulating gap of selector disc, being sure to remove all metal particles and metallic fragments from beveled edges of the brass. Each contact should be checked to assure that clearance exists (approx. .010-in) between it and the disc when stopped in position on the station.
(3) Inspect the insulating gap to see that it has not changed shape due to bending or warping. Replace the disc if cleaning and adjustment fail to give correct operation.

Oscillation On All Buttons
(1) Slow oscillation indicates friction adjustment of flywheel is too tight. Loosen set screw in flywheel slightly.
(2) Rapid oscillation indicates friction adjustment is too loose. Tighten set screw in flywheel slightly.

Motor and Gear Mechanism
There must be 1/32-inch clearance between the end of the engaging arm and the face of the intermediate gear when the motor is in its full forward position.

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Adjustment of Selector Disc

The brass selector disc is fastened to the rear shaft of the tuning condenser by means of two set-screws. When the condenser is at maximum (plater fully meshed) the insulation line should be horizontal, with the beveled operating-end at the left (viewed from rear). The selector disc should be set so that the contact tip plungers in the station-setting contacts project not more than 1/16-in. from the body of the contacts.

Muting Circuit

When the electric tuning mechanism is in action, the motor-supply voltage is fed into a diode rectifier circuit which applies a high bias to the first audio-amplifier. This prevents audio amplification and makes the set quiet or "mute" while the mechanism is operating.

Lubrication

Motor bearings and gear bearings: use light machine oil. Gear faces: use "Pure Oil No. 611" or petroleum jelly. Dial indicator pulleys and rails: use "Castordag" or petroleum jelly.

Selector disc: apply thin film of petroleum jelly.

Friction leathers on flywheel: apply "neats-foot" oil. When replacing leather, soak it for at least 24 hours in neats-foot oil, and insert in flywheel while dripping.

Push Button Adjustments

Push buttons which stick in the escutcheon may be corrected by centering the rubber retainer-bumper in the rear of the buttons and cementing the rubber in place with plasticine. If the buttons do not lock in place, the chassis may be too far back in the cabinet or the latch bar spring may be out of place.
ALIGNMENT PROCEDURE

Cathode-Ray Alignment is the preferable method. Connect vertical "Hi" input to terminal No. 2 on phono board and vertical "0" to terminal No. 3.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the output as low as possible to avoid a-c action.

Dialog-Indicator Adjustment.—Before aligning this receiver, it is essential to slide the indicator pointer along the drive cable until it points to the lowest frequency mark on "A" band, (520 kc) with the gang condenser fully meshed.

<table>
<thead>
<tr>
<th>Steps</th>
<th>Connect the high side of test-osc. to—</th>
<th>Tune test-osc. to—</th>
<th>Turn radio dial to—</th>
<th>Adjust the following for max. peak output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6K7 L-F grid cap, in series with .01 mfd.</td>
<td>455 kc</td>
<td>&quot;A&quot; band, Quiet Point between 550-750 kc</td>
<td>L10, L11 (2nd I-F Transformer)</td>
</tr>
<tr>
<td>2</td>
<td>6A8 det. grid cap, in series with .01 mfd.</td>
<td>455 kc</td>
<td>20 mc &quot;C&quot; band</td>
<td>L2, L9 (1st I-F Transformer)</td>
</tr>
<tr>
<td>3</td>
<td>Antenna Terminal in series with 300 ohms.</td>
<td>20 mc</td>
<td>20 mc &quot;C&quot; band</td>
<td>C26 (osc.)*</td>
</tr>
<tr>
<td>4</td>
<td>Antenna Terminal in series with 300 ohms.</td>
<td>6.1 mc</td>
<td>6.1 mc &quot;B&quot; band</td>
<td>C7 (det.)†</td>
</tr>
<tr>
<td>5</td>
<td>Antenna Terminal in series with 200 mff.</td>
<td>1,500 kc</td>
<td>1,500 kc &quot;A&quot; band</td>
<td>C24 (osc.)**</td>
</tr>
<tr>
<td>6</td>
<td>Antenna Terminal in series with 200 mff.</td>
<td>600 kc</td>
<td>600 kc &quot;A&quot; band</td>
<td>C3 (ant.)</td>
</tr>
<tr>
<td>7</td>
<td>Antenna Terminal in series with 200 mff.</td>
<td>1,500 kc</td>
<td>1,500 kc &quot;A&quot; band</td>
<td>C29 (osc.)</td>
</tr>
</tbody>
</table>

* Use minimum capacity peak if two peaks can be obtained. Check to determine that the correct peak has been used by turning to 19.09 mc, at which point a weaker signal should be received.

** Use minimum capacity peak if two peaks can be obtained. Check to determine that the correct peak has been used by turning to 5.19 mc, at which point a weaker signal should be received.

† Rock gang condenser and use maximum capacity peak if two peaks can be obtained with C7.

Note that oscillator tracks above (higher frequency) signal on all bands.

ADJUSTMENTS FOR ELECTRIC TUNING

Push buttons No. 1 to 9 are electric tuning station buttons.
The right hand push button is for dial tuning:
1. Make a list of the desired nine stations, arranged in order from low to high frequencies.
2. Turn range selector to "A" band, turn power on, and allow a few minutes for warming up.
3. Press down the "dial-tuning" (right-hand) button.†
4. Manually tune in the first station on the list, using the Precision Eye for accurate tuning.
5. Hold down the "dial-tuning" button, and press down station button No. 1 (left). Both buttons will stay down, central dial lamp will light brightly or dully, depending on which side of the disc the contact is located. Move station-setting contact No. 1 to the insulating line on the disc at rear of gang. When the contact is correctly centered on the insulating line, the central dial lamp will go out.
6. Press down any other button in order to release the dial-tuning button and station button No. 1. Then press down station button No. 1 again. The electric tuning mechanism will function to tune in the station, and the central dial lamp will stay on.
7. Repeat this process for the remaining stations.

*WR 370—Turn Fidelity Control maximum counter-clockwise.

Component Parts of Station-Setting Contact
Station-Setting Contacts and Selector Disc

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### Alignment, Trimmers

Cathode-Ray Alignment is the preferable method. Connect vertical "Hi" input to terminal No. 2 on phono board and vertical "O" to terminal No. 3.

**Output Meter Alignment.**—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

**Test-Oscillator.**—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the output as low as possible to avoid a-c-v-c action.

**Calibration Scale on Indicator-Drive-Cord Drum.**—The tuning dial is fastened in the cabinet and cannot be used for reference during alignment; therefore, a calibration scale is attached to the rear of the indicator-drive-cord drum which is mounted on the front shaft of the gang condenser. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

As the first step in r-f alignment, check the position of the drum. The "0" mark on the drum scale must be vertical, and directly over the center of the gang condenser shaft when the plates are fully meshed. The drum is held to the shaft by means of two set screws, which must be tightened securely when the drum is in the correct position.

To determine the corresponding frequency for any setting of the calibration scales, refer to the accompanying drawing which shows the dial with 0-180° calibration scales drawn at top and bottom.

**Point for Calibration Scale.**—Improvise a pointer for the calibration scale by fastening a piece of wire to the gang-condenser frame, and bend the wire so that it points to the "0" mark on the calibration scale when the plates are fully meshed.

**Dial-Indicator Adjustment.**—After fastening the chassis in the cabinet, attach the dial indicator to the drive cable with indicator at the 550 kc mark, and gang condenser fully meshed. The indicator has a spring clip for attachment to the cable.

**Spread-Band Alignment.**—The most satisfactory method of aligning or checking the spread-band ranges is on actual reception of short-wave stations of known frequency, by adjusting the core of the oscillator coil for each band so that these stations come in at the correct points on the dial.

### Table

<table>
<thead>
<tr>
<th>Steps</th>
<th>Connect the high side of test-oscillator to</th>
<th>Tune Test-Oscillator to</th>
<th>Range Selector</th>
<th>Set Tuning Gang to</th>
<th>Adjust the following for max. peak output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Turn Fidelity Control to Maximum Counter-clockwise position.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>6K7 2nd I-F grid cap in series with .01 mfd.</td>
<td>455 kc</td>
<td>&quot;A&quot;</td>
<td>Quiet Point</td>
<td>L26, L27 (3rd I-F transformer)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>between 550-750 kc</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>6K7 1st I-F grid cap in series with .01 mfd.</td>
<td>455 kc</td>
<td>&quot;A&quot;</td>
<td>Quiet Point</td>
<td>L17, L18 (2nd I-F transformer)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>between 550-750 kc</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>6A8 1st det. grid cap in series with .01 mfd.</td>
<td>455 kc</td>
<td>&quot;A&quot;</td>
<td></td>
<td>L14, L15 (1st I-F transformer)</td>
</tr>
<tr>
<td>5</td>
<td>Antenna Terminal in series with 200 mmf.</td>
<td>1,500 kc</td>
<td>&quot;A&quot;</td>
<td>1,500 kc</td>
<td>C30 (osc.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(151.5°)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Antenna Terminal in series with 200 mmf.</td>
<td>600 kc</td>
<td>&quot;A&quot;</td>
<td>600 kc</td>
<td>L25 (osc.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(180°)</td>
<td></td>
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<tr>
<td>7</td>
<td>Antenna Terminal in series with 200 mmf.</td>
<td>1,500 kc</td>
<td>&quot;A&quot;</td>
<td>1,500 kc</td>
<td>C39 (osc.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(181.5°)</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Antenna Terminal in series with 300 ohms.</td>
<td>6,100 kc</td>
<td>&quot;49M&quot;</td>
<td>6,100 kc</td>
<td>L24 (osc.)*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(101°)</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Antenna Terminal in series with 300 ohms.</td>
<td>9,600 kc</td>
<td>&quot;31M&quot;</td>
<td>9,600 kc</td>
<td>L23 (osc.)**</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(102°)</td>
<td>C10 (det.)</td>
</tr>
<tr>
<td>10</td>
<td>Antenna Terminal in series with 300 ohms.</td>
<td>11,800 kc</td>
<td>&quot;25M&quot;</td>
<td>11,800 kc</td>
<td>L22 (osc.)**</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(90°)</td>
<td>C6 (ant.)</td>
</tr>
<tr>
<td>11</td>
<td>Antenna Terminal in series with 300 ohms.</td>
<td>15,200 kc</td>
<td>&quot;19M&quot;</td>
<td>15,200 kc</td>
<td>L21 (osc.)**</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(78°)</td>
<td></td>
</tr>
</tbody>
</table>

* Use maximum inductance peak (plunger in) if two peaks can be obtained.

** Use minimum inductance peak (plunger out) if two peaks can be obtained.

Note that oscillator tracks above signal frequency on all bands except "49M," where it tracks below.

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Alignment Procedure

Output Meter Alignment.—Connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—Connect the low side of the test-oscillator to the receiver chassis, through a 0.1 mfd. capacitor, and keep the output as low as possible.

Cross Section of Motor Assembly

Phonograph Service Data

The motor is started by turning the radio-phonograph tone control to either 3rd or 4th position clockwise and giving the turntable a clockwise spin with the hand. Smooth starting and running will be insured by keeping the bearings well cleaned and oiled.

Hum and Vibration.—A small amount of hum when starting, decreasing to a negligible amount when running, is normal. If excessive vibration occurs it may be due to:

1. Insufficient lubrication, or any failure that will cause binding.
2. Leather washer not oiled. (Check to make certain that the leather and steel washers are in the proper position.)
3. Motor not properly supported from motor board.
4. Burrs on poles of rotor or stator. Remove with fine emery cloth.

Power Supply.—Although this model employs an ac-dc chassis, it is not suitable for use on dc, as this would damage the motor.

5. The damper spring must fit without binding or chattering in the slot in the stator. The stator must be free to deflect in either direction between the limits of the damper spring. The damper spring must exert approximately equal force in immersing the stator to its mid-position when the stator is deflected manually in each direction.

Removing Rotor.—The rotor and turntable assembly simply rests on the ball bearing at bottom of vertical bearing. Remove by lifting up.

Rotor Adjustment.—Loosen the three screws that hold the rotor to the turntable, insert three 1/16-in. shims at equal distances around the gap between the rotor and stator, and then carefully tighten the three screws.

Lubrication.—Oiling points are indicated in the diagram.

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ELECTRICAL SPECIFICATIONS

Type and Number of Tubes

*2 77's*, 1 *70's*, 1 *46's*, 1 *44's*

Total 6 Amperes

Input Rating

440 to 1500 K.C.

Maximum Power Output

2.5 Watts

Maximum Output

1.0 Watts, 1,500 K.C., 1,600 K.C., 1,600 K.C.

GENERAL DESCRIPTION

The Model WR 503 Car-Radio has been designed, manufactured, and tested with special regard to the requirements of the automobile radio. The electrical, mechanical, and acoustical features of the receiver have been chosen after exhaustive tests in automobiles to determine the proper requirements for greatest satisfaction.

The Model WR 503 receiver is a single-unit compact radio chassis, power pack, and speaker with a separate remote control. The set is contained in a cylindrical chassis, complete with all the features which result in improved tone quality, attractive appearance, mechanical stability, and desirable service features.

CIRCUIT DESCRIPTION

The circuits of the superheterodyne type, using a type 77 tube as an R.F. amplifier, a type 97 as a combined detector-oscillator, a type 46 as an i.f. amplifier, a type 44 as used as a combined second detector, a.c., and first audio amplifier, a type 44 as used as an a.c. amplifier, and a type 44 as a rectifier for the power supply.

The Model WR 503 is equipped with three spark gaps and a spark gap relay and spark trap in the battery circuit to assist in the suppression of ignition interference; an external spark trap, connected in series with the spark gap relay and a third spark gap relay, is connected in the antenna circuit. These spark gaps take the installation of auxiliary suppression equipment unnecessary in most cases.

SERVICE DATA

TROUBLES THAT CAN BE LOCATED AND REMEDIED WITHOUT REMOVING THE RECEIVER FROM THE HOUSING OR CAR

DIAL LIGHT DOES NOT LIGHT

Dial light may be loose in socket, broken or burned out. Removal of control head can be pulled straight out.

FUSE BLOWS

Check the fuse in the container on the receiver assembly feed lead.

SIRE INOPERATIVE AND TUBE DO NOT LIGHT

Remove the speaker cover and disconnect the speaker plug. Remove the vibrator, all the tubes, and connect the dial light cable from the chassis. Check with an ohmmeter from "hot" side of battery cable (male bayonet connector inside the fuse-container housing) to ground. Should this show an open circuit when the line switch is closed, replace the tube or the vibrator is shorted and these parts can be checked separately to determine which is defective. On the other hand, if the diode shows a closed circuit, the cause should be removed from the housing and checked.

INOPERATIVE OR WEAK

Check the car antenna for poor connections and grounds. Also check tubes and the receiver assembly feed leads.

INTERMITTENT RECEPTION

This is usually caused by a poor connection from the set antenna lead to the car antenna receptacle. It should be checked in all cases whenever reception occurs.

MISFIRE OR INTERMITTENT

Tap each tube lightly with a small piece of cotton to ascertain if trouble is in the tubes or if intermittent results, if defective.

LOW POWER OUTPUT

Check tubes and the vibrato. Usually caused by the latter.

RECEPTOR CUTS OFF AT CERTAIN SETTINGS OF DIAL-SCALE POINTER

This condition is usually caused by some foreign metallic substance shorting a section of the condenser gang. These particles are often too small to be seen but can be removed by blowing them out with an air pressure hose or by a long air hose. The pointer may not be destroyed if the thin microns insulators are assembled under the trimmers on top of the condenser gang.

FOUR TONE QUALITY

Foreign material is apt to become lodged between the speaker voice coil and the field core. This hampers the movement of the speaker diaphragm and the sound of the speaker is open, can be blown out cleanly, and the speaker can be re-lighted. All these actions should be held in place in the air ducting of the coil or cell case should be applied to hold the windings in place.

1. Check receiver for loose cover thumb screws, tube shield, and housing screws.

2. Check the speaker for loose parts in the bulkhead or dashboard of the car.

VIBRATOR NOISE

(See notes that are checked with the car stationary and the engine off and the telephone disconnected.) Check the spring contact on the receiver housing and particularly the vibrator top spring. Clean and adjust the vibrator according to the instructions given in another section of these notes.

SET INOPERATIVE TUBE LIGHTS OF TUBE BLOWS

A. Check the B voltage (approximately 240 volts) from the middle terminal of the electrolytic filter condenser to ground on the chassis. This point is easy to check with the speaker cover removed. If no voltage or low voltage is observed, test the vibrator and 44 rectifying tube. If voltage is still incorrect, the receiver should be removed from the housing.

B. With the speaker plugged in, remove the clip from one of the 76 tubes and touch the clip to the grid cap of the 76 tube several times in series. A clicking noise should be heard in the speaker. This is a practical test for the audio amplifier and speaker. If the clicking noise is not heard, the 76 and 44 tubes should be re-tested and the voltage checked at the plates of these tubes. The speaker should be checked on a 6-ohm ohmmeter by testing across the progs of the speaker plug. For continuing with this test, the cable should be moved back and forth to show up the intermittent open circuit in the speaker cable. After the speaker coil and field coil for resistance.

If the audio and speaker are still dead, the chassis should be removed from the housing.

If the audio and speaker are working correctly, test the remaining tubes and check the voltages at each socket.

LOCATING TROUBLE IN CHASSIS

To locate a short, open, or defective unit which causes low or no B voltage, isolate the power pack from the receiver section by disconnecting the two red leads (coming from the receiver). From the receiver, disconnect all external cables and the stabilizing units from the receiver. Remove the speaker cover and pull out the speaker plug. Remove the screws around the outside of the housing; it will pull the chassis straight out, being careful not to damage the antenna cable. The chassis can be removed in many cases in this manner without the necessity of unbolting the chassis housing from the car.

CONVERSELY, IF THE VOLTAGE READING PROVES TO BE CORRECT, THE TROUBLE IS IN THE RECEIVER SECTION AND ALL ITS PARTS SHOULD BE CHECKED.

In locating a short or open in the filament circuit, the power pack can be disconnected from the receiver section by removing the red wire to the top terminal of the "FNF" fuse, and connect the fuse to the 42 wire. This will connect only the power pack to the filament circuit, and in the short or open no longer exists, the trouble is in the receiver section.

WEAK OR INSUFFICIENT AFTER RE-ALIGNMENT

Check coils and associated circuits in the deficient "state" of the receiver for proper resistance values.

LOW POWER OUTPUT WITH B VOLTAGE CORRECT

Check the speaker field coil, voice coil and associated audio circuit for resistance continuity and defective condensers.

All riveted component parts can be removed by merely punching out the rivets with a small diamond straight side punch. Replacements are possible, and were secured with small machine screws and nuts.

In changing the power transformer, it is necessary only to remove the four large screws, two located directly over the resistor and condenser strip and the other two in back of the condenser gang on the power pack shield. In replacing the power transformer, be sure to tighten the screws securely and replace the shield braid bond or vibrator tubes will be present.

INSTRUCTIONS FOR ADJUSTING VIBRATOR

MODEL WR-503 ONLY

After the vibrator has been used for some time, it may refuse to start operating. This is an indication of worn, sunken contact points; but, since a reserve of Tungsten has been provided, a simple adjustment can be made to prolong the life of the vibrator.

1. Remove the vibrator unit from its housing by removing the two screws and a pair of round nosed pliers.

2. Remove the rubber bush, being careful not to bend the wires at the soldered connections.

3. Lay the vibrator on a piece of white paper so that when viewed from above it appears exactly as shown in Fig. 1.

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LINE-UP CAPACITOR ADJUSTMENTS

All the adjustable capacitors, commonly called trimmer condensers, are very accurately adjusted at the factory and will not need any further adjustment unless a coil or a contact is changed or the adjustments are tampered with in the field. The attempt to change the setting of any of the trimmer condensers unless it is known that adjustment is necessary, and a high grade modulated test oscillator is available, is a case proceed as follows, referring to Fig. 6.

1. Set test oscillator to 175 K.C.

2. Set condenser gang to approximately 300 K.C. This will be just where the condenser plates are nearly all in mesh.

3. Connect output meter across voice coil of speaker. This may be done by connecting one lead of the output meter to the blue lead of the speaker terminal strip and the other lead of the voice coil. The impedance of the output coil is 5 ohms.

4. Apply test signal to grid of 78 i.f. tube through a .001 microfarad condenser and adjust trimmer "A" to maximum output reducing output of test oscillator as required.

5. Apply test signal thru grid of 77 first detector-oscillator and adjust trimmers "B" and "C" to maximum output.

6. Set test oscillator to 1600 K.C. and rotate condenser gang until the plates are widest apart, (approximately .195" thick) between the rotor and stator plates at the bottom of the gang. This is the exact setting of the condenser gang for the range of 1600 K.C. and should be carefully set as the resonant frequency is directly dependent upon it.

7. Adjust trimmer "F" to maximum output and then remove the paper gauge.

8. Set test oscillator and condenser gang to 1400 K.C.

9. Apply test signal to grid of 78 i.f. tube and adjust trimmer "G" to maximum output.

10. Apply test signal to antenna lead thru .002 microfarad condenser and adjust trimmer "H" to maximum output.

11. Check sensitivity at several points.
### ELECTRICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type and Number of Tubes</td>
<td>1 NUV, 1 NUVK, 1 NUV26, 1 NUDP, 1 NUP4, 1 UG4 - Total 7</td>
</tr>
<tr>
<td>Battery Current (6.3 Volt Battery)</td>
<td>5.0 Amperes</td>
</tr>
<tr>
<td>Tuning or Part of</td>
<td>0.0062</td>
</tr>
<tr>
<td>Maximum Undistorted Output</td>
<td>3.0 Watts</td>
</tr>
<tr>
<td>Maximum Power Output</td>
<td>4.0 Watts</td>
</tr>
</tbody>
</table>

### GENERAL DESCRIPTION

The Model WR-605 Westinghouse Air-Port Tube Radio is a 6 tube superheterodyne receiver, which has been designed, manufactured, and tested to meet the requirements for automobile radio. The electrical, mechanical and acoustical features of this unit have been developed and tested after extensive tests in automobiles to determine the proper requirements for greatest satisfaction.

### CIRCUIT DESCRIPTION

The circuit is of the superheterodyne type, employing a type GP7 tube as a R.F. Amplifier, a type 6AY as a first detector-oscillator, a type 6BY as an I.F. Amplifier, a type 666 used as a combination second detector and A.C. Coupler, a type 692 as an output amplifier, and a type 594 as a rectifier in the power supply.

The Model WR-605 is equipped with a spark trap-an internal tuned spark trap in the power transformer circuit-in order to suppress ignition interference, and also as a protection for the receiver oscillator at 1600 K.C. and should be used only if the spark trap is provided in the antenna circuit. The use of these spark traps will make the installation of additional suppression equipment unnecessary in most cars.

### LINE-UP CAPACITOR ADJUSTMENTS

All the adjustable capacitors, commonly called trimmers, are accurately adjusted at the factory and will not need any further adjustment unless the 0.01 or I.F. transformer is changed or the adjustments are tampered with in the field. Therefore, do not attempt to change the setting of any of the trimmer condensers unless it is definitely known that an adjustment is necessary, and a high-grade modulated test oscillator and an output meter are available. When proceed as follows, referring to Figs. 1 and 2. BEFORE adjusting the trimmer condensers:

1. Set test oscillator to 175 K.C.
2. Set gang condenser to approximately 600 K.C. This will be at a point where the condenser plates are nearly all in.

### SERVICE DATA

**LOCATING TROUBLE IN CHASSIS**

SEE MODEL WR-605.

---

### TABLE

<table>
<thead>
<tr>
<th>Part #</th>
<th>Description</th>
<th>List Prices</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Antenna loading coil</td>
<td>$0.00 each</td>
</tr>
<tr>
<td>2</td>
<td>Receiver coil</td>
<td>$0.00 each</td>
</tr>
<tr>
<td>3</td>
<td>Pressurizer coil</td>
<td>$0.00 each</td>
</tr>
<tr>
<td>4</td>
<td>Variable condenser</td>
<td>$0.00 each</td>
</tr>
<tr>
<td>5</td>
<td>Oscillator coil</td>
<td>$0.00 each</td>
</tr>
<tr>
<td>6</td>
<td>1st I.F. coil</td>
<td>$0.00 each</td>
</tr>
<tr>
<td>7</td>
<td>2nd I.F. coil</td>
<td>$0.00 each</td>
</tr>
<tr>
<td>8</td>
<td>3rd I.F. coil</td>
<td>$0.00 each</td>
</tr>
<tr>
<td>9</td>
<td>4th I.F. coil</td>
<td>$0.00 each</td>
</tr>
</tbody>
</table>

---

**NOTICE:**

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

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Note: Values with star (*) are operating voltages. Values not starred are actual measured voltages. Measurements are made to chassis unless otherwise indicated, with set tuned to quiet point. Values should hold within approximately ± 20% with rated battery voltage.

Frequency Range.................. 550-1,720 kc
Batteries Required
"A," one 1.5 volt dry plug-type "A," 28-in. x 34-in. x 58-in.
(Everyday No. 741 or equivalent)
"B," two 45 volt dry plug-type "B," 23-in. x 4-in. x 51-in.
(Everyday No. 762 or equivalent)

Alignment Procedure
Output Meter Alignment—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-oscillator—For all alignment operations, keep the output as low as possible to avoid a-vc action. Connect low side of oscillator to ground terminal on bottom of set.

Pre-setting Dial—With gang condenser in full mesh, the pointer should be at calibration mark above "55" on dial.

<table>
<thead>
<tr>
<th>Steps</th>
<th>Connect the high side of test-oscillator to</th>
<th>Tune test-osc. to</th>
<th>Turn radio dial to</th>
<th>Adjust the following for max. output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1A7G 1st-Det. grid cap, in series with .01 mfd.</td>
<td>455 kc</td>
<td>Quiet point at 500 kc end of dial</td>
<td>C1, C3, C5, C4 (1st and 2nd I-F transformers)</td>
</tr>
<tr>
<td>2</td>
<td>Antenna terminal thru 220 mfd. capacitor</td>
<td>1,720 kc</td>
<td>Full clockwise (out of mesh)</td>
<td>C5 (oscillator)</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>1,500 kc</td>
<td>Resonance on 1,500 kc signal</td>
<td>C6 (antenna)</td>
</tr>
</tbody>
</table>

Current Consumption
"A," 0.24 ampere—"B," 9.0 milliamperes

Power Output
Undistorted........................................ 0.10 watt
Maximum........................................... 0.21 watt

Loadspeaker
Type.................................................. 5-inch permanent-magnet dynamic
Voice-coil Impedance.............................. 3.5 ohms at 400 cycles

Precautionary Lead Dress—The spiral shield on the I.F. grid lead should be brought as close as possible to the grid cap.

Antenna—An antenna and ground may be connected to "A" and "G" at bottom of cabinet. If total length of antenna and lead-in is more than 110 feet, connect a 300 mfd capacitor in series with lead-in.
**GENERAL DESCRIPTION**

This model 4 is a four-tube, three-band superhetrony receiver designed to be operated with only a 0.05 ampere, 220-80-volt battery. The receiver employs a type 6600 tube as a combiner-detector, a type 4450A oscillator and a 6AK7 tube as a second detector, A.V.C. output amplifier, and a type 6860 as an output amplifier. The power for this model is supplied by a 6600 volt-ampere battery. The plate voltage is supplied by a selenium rectifier built as part of the chassis.

**LINE-UP CAPACITOR ADJUSTMENTS**

To properly align this receiver, it is essential to use a high grade modulated test oscillator and a sensitive output meter. The A.V.C. signal fed into the receiver must be weak enough or the A.V.C. to function, making proper alignment difficult. The sensitivity of the output meter must be sufficient to give satisfactory reading with a low input signal. Before attempting to align the chassis, the service man should familiarize himself with the general layout of the chassis, the location of the tubes and the various alignment adjustments.

**I.F. ADJUSTMENTS (455 Kc.)**

1. Connect the receiver to the storage battery by connecting the red lead to the positive terminal and the black lead to the negative terminal of the battery. Set the volume control to the maximum position. Using the plug-in detector, switch to the desired band. Set the dial indicator to 600 KC.

2. Set the dial control to the position where the dial indicator reads approximately 600 Kc.

3. Set the oscillator control to the position where the dial indicates approximately 600 Kc.

4. Adjust the trimmer condenser to make the dial indicator to approximately 600 Kc.

5. Adjust the trimmer condenser to 27 MC (17,000 Kc).

6. Adjust the trimmer condenser to 27 MC (17,000 Kc). The trimmer condenser will be found. The one with the least capacity with the plate farthest out should be used.

7. Adjust the trimmer condenser to 27 MC (17,000 Kc). The trimmer condenser will be found. The one with the least capacity with the plate farthest out should be used.

**SHORT-WAVE BAND ADJUSTMENTS**

1. Turn the wave-change switch to the short-wave position.

2. Set the test oscillator and dial pointed to 17 MC (17,000 Kc).

3. Adjust the trimmer condenser to 27 MC (17,000 Kc). The trimmer condenser will be found. The one with the least capacity with the plate farthest out should be used.

4. Adjust the wave-change switch to the short-wave position.

**WAVE TRAP ADJUSTMENTS**

This receiver is provided with a wave trap and the trimmer condenser on this coil should be adjusted to minimize a 455 Kc. signal applied to the antenna.

Under actual operating conditions, this trimmer may be adjusted slightly to minimize interfering signals which are known to be on or near the 455 Kc. channel.

---

### Parts List

<table>
<thead>
<tr>
<th>Part</th>
<th>Description of Parts</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RC 65900 Presatellilt coil assembly</td>
<td>$1.75</td>
</tr>
<tr>
<td>3</td>
<td>CB 69599 Trimmer condenser 50-150 mc.</td>
<td>$0.20</td>
</tr>
<tr>
<td>5</td>
<td>CS 59599 Trimmer condenser 6K-36 mc.</td>
<td>$0.35</td>
</tr>
<tr>
<td>8</td>
<td>GM 59109 Variable condenser</td>
<td>$1.00</td>
</tr>
<tr>
<td>10</td>
<td>GM 59139 100 mc., mini condenser</td>
<td>$0.10</td>
</tr>
<tr>
<td>15</td>
<td>GM 59469 25,000 ohm, 1/12 W, resistor</td>
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<tr>
<td>20</td>
<td>GM 59839 4.6 ohm, 1/2 W, resistor</td>
<td>$1.20</td>
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<tr>
<td>25</td>
<td>GM 59859 150,000 ohm, 1/12 W, resistor</td>
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<tr>
<td>28</td>
<td>GM 59869 47,000 ohm, 1/12 W, resistor</td>
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<td>30</td>
<td>GM 59879 47,000 ohm, 1/12 W, resistor</td>
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<td>GM 59889 47,000 ohm, 1/12 W, resistor</td>
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<tr>
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<td>GM 59909 47,000 ohm, 1/12 W, resistor</td>
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<tr>
<td>45</td>
<td>GM 59919 47,000 ohm, 1/12 W, resistor</td>
<td>$0.35</td>
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<tr>
<td>50</td>
<td>GM 59929 47,000 ohm, 1/12 W, resistor</td>
<td>$0.35</td>
</tr>
<tr>
<td>55</td>
<td>GM 59939 47,000 ohm, 1/12 W, resistor</td>
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<tr>
<td>60</td>
<td>GM 59949 47,000 ohm, 1/12 W, resistor</td>
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<tr>
<td>65</td>
<td>GM 59959 47,000 ohm, 1/12 W, resistor</td>
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<td>70</td>
<td>GM 59969 47,000 ohm, 1/12 W, resistor</td>
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<td>75</td>
<td>GM 59979 47,000 ohm, 1/12 W, resistor</td>
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<td>80</td>
<td>GM 59989 47,000 ohm, 1/12 W, resistor</td>
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<td>85</td>
<td>GM 59999 47,000 ohm, 1/12 W, resistor</td>
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<tr>
<td>90</td>
<td>GM 60009 47,000 ohm, 1/12 W, resistor</td>
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</tr>
<tr>
<td>95</td>
<td>GM 60019 47,000 ohm, 1/12 W, resistor</td>
<td>$0.35</td>
</tr>
<tr>
<td>100</td>
<td>GM 60029 47,000 ohm, 1/12 W, resistor</td>
<td>$0.35</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$</strong></td>
<td><strong>$</strong></td>
</tr>
</tbody>
</table>
This is a battery operated superheterodyne receiver with full automatic volume control. It is designed to function with an "A" supply of 1.5 volts and a "B" supply of 90 volts. The broadcast range coverage is 550-1650 kilocycles. The battery recommended is the EVERYDAY #748, BURGESS #760D6, RAY-O-VAC #ABB82, or the equivalent. A permanent magnet dynamic speaker is used in this receiver.

TUBES

RCA - 1A7GT (1), RCA - IN5GT (1), RCA - 1H5GT (1), RCA - 1Q5GT (1).
See diagram on label under cabinet for location of tubes.
### MODEL 7J7 - 7K7

<table>
<thead>
<tr>
<th>TUBE</th>
<th>CIRCUIT</th>
<th>PLATE TO GROUND</th>
<th>SCREEN TO GROUND</th>
<th>CATHODE TO GROUND</th>
<th>2 PLATE TO GROUND</th>
<th>2 GRID TO GROUND</th>
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</thead>
<tbody>
<tr>
<td>78</td>
<td>R-F Amplifier</td>
<td>290</td>
<td>90</td>
<td>3.8</td>
<td>180</td>
<td>- 18</td>
</tr>
<tr>
<td>6A7</td>
<td>1st Det. &amp; Osc.</td>
<td>290</td>
<td>90</td>
<td>3.6</td>
<td>180</td>
<td>- 18</td>
</tr>
<tr>
<td>78</td>
<td>I-F Amplifier</td>
<td>290</td>
<td>90</td>
<td>3.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>78</td>
<td>I-F Amplifier</td>
<td>260</td>
<td>90</td>
<td>3.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>75</td>
<td>2nd Det. &amp; AVC</td>
<td>145</td>
<td>20</td>
<td>15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>42</td>
<td>Power Output</td>
<td>275</td>
<td>280</td>
<td>20</td>
<td></td>
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<tr>
<td>80</td>
<td>Rectifier</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

B+ Voltage 290 V. - Speaker Field Drop 85 V.  
Meter 1000 ohms per volt - 750 volt Scale

### SIGNAL GENERATOR

**CONNECTION** | **SIGNAL GENERATOR** | **DIAL** | **WAVE BAND SWITCH** | **TRIMMER** | **OUTPUT SIGNAL**
--- | --- | --- | --- | --- | ---
Control Grid of 6A7 | 450 KC | 1400 KC | Broadcast (Left) | 1 | Max.1
Discomm. 100,000 ohm resistor and DO NOT make any other adj. of I-F Amp. Comm. Grid Clip
Antennas & Ground Post | 1400 KC | 1400 KC | Broadcast (Left) | 7,9,13 | Max.

Volume Control in "Full On" position at all times.

NOTES: (1) Maintain a mid-scale reading on output meter across primary of output transformer by adjustment of the signal generator. (2) Repeat above procedure and critically trim each adjustment to absolute resonance to insure perfect alignment. The I.F. sensitivity should be from 15 to 25 microvolts. (3) Investigate ganging of trimmers No. 7, 8, 9 and 10 at 600 KC, 800 KC, 1000 KC, 1200 KC and 1400 KC and any discrepancy of ganging or scale tracking should be corrected by bending slotted side plates of the variable condenser. (4) Investigate ganging of trimmers 15, 16, and 17 at 10 MC and 6 MC to ascertain whether or not the circuits are tracked.

### MODEL 7G6 - 7GB5

<table>
<thead>
<tr>
<th>TUBE</th>
<th>CIRCUIT</th>
<th>PLATE TO GROUND</th>
<th>SCREEN TO GROUND</th>
<th>CATHODE TO GROUND</th>
<th>2 PLATE TO GROUND</th>
<th>2 GRID TO GROUND</th>
</tr>
</thead>
<tbody>
<tr>
<td>6A7</td>
<td>1st Det. &amp; Osc.</td>
<td>205</td>
<td>72</td>
<td>2.4</td>
<td>155</td>
<td>- 6.5</td>
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<tr>
<td>78</td>
<td>I-F Amplifier</td>
<td>205</td>
<td>72</td>
<td>2.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>75</td>
<td>2nd Det. &amp; AVC</td>
<td>72</td>
<td></td>
<td>1.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>42</td>
<td>Power Output</td>
<td>190</td>
<td>207</td>
<td>14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>80</td>
<td>Rectifier</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

B+ Voltage 207 V. - Speaker Field Voltage 70  
Line Voltage was 120 V - Meter 1000 ohms per volt

**CONNECTION** | **SIGNAL GENERATOR** | **DIAL** | **WAVE BAND SWITCH** | **TRIMMER** | **OUTPUT SIGNAL**
--- | --- | --- | --- | --- | ---
Remove Grid Clip from 6A7.
Control Grid of 6A7 | 175 KC | 1400 KC | Broadcast (Left) | 1,2,3,4 | Max.1
Connect Grid Clip to 6A7.
Antennas & Ground Post | 600 " | 600 " | " " | 5 | Max.1
| " " | 1400 " | 1400 " | " " | 6,7,8 | Max.1
| " " | 600 " | 600 " | " " | 5 | Max.1
| " " | 15 MC | 15 MC | Foreign (Right) | 9 | Max.1

© John F. Rider, Publisher
The radio receiver should be set on, and, first, it should be ascertained whether or not its output is within the assigned band of 500 kilocycles. If not, the scale reading of the radio receiver should be varied across the dial from 500 to 1500 kilocycles, and the volume and tone controls should be adjusted as needed.

To place the unit in operation, the master switch and volume control should be turned to its maximum position, and the antenna switch and tone control turned on so that the needle will rotate. The "Search-Phone" switch should then be turned to "Search" position, and the receiver tuned across the dial until the "Search-Phone" signal can be heard.

A new needle should be placed in the pickup arm, and the arm set gently on the outside of the record.

To the left of the master control knobs is a small metal cap. This should be placed with the screwdriver furnished for adjustment. The screwdriver should be removed first in a left-hand direction until the record is heard to play from the radio receiver, then slowly backed out until the needle is heard to rotate. The metal cap should be replaced at this point in the receiver.

The volume control should be operated only on the receiver, however, if it is more convenient to bring about this control at the record player, the right hand knob may be used, otherwise it should always be left in its position.

When it is desired to operate the record player when radio interference is extremely low, it may be necessary to connect a wire from the wire seen to the plug of the radio receiver. This will not make a metallic connection of this point, but it will provide sufficient signal intensity to overcome any static condition, and still in no way interfere with the normal operation of the radio receiver.

In case it is difficult to find a cleared channel, or if noise is present, the player may be moved closer to the radio set or the antenna to overcome these conditions.

Note: The record player should always be turned off before disconnecting the power supply, and the antenna should be disconnected before moving the record player.

*NOTES SIMILAR FOR MODEL A-61*
Models A70-A81-A82
Compliments of www.nucow.com
FOLLOWER ARM AND LATERAL FEED SCREW ADJUSTMENT

The follower arm assembly shown in FIGURE 7, consists of a steel channel, at one end of which is attached the pivot post, and at the other end a flat phosphor bronze spring, with a portion of the spring bent at a right angle to form the knife-edge tongue which engages the lateral feed screw.

The worm of the turn-table spindle engages the pinion at the end of the lateral feed screw within the gear housing, and as the feed screw revolves, the knife-edge tongue follows the spiral groove of the feed screw, causing the follower arm to be moved laterally toward the center of the assembly.

The recording arm assembly is mounted at the upper end of the follower arm pivot post, so that as the follower arm moves in a horizontal plane beneath the recorder assembly mounting plate, the recording arm is caused to move laterally above the mounting plate, in the same direction and at the same rate of travel.

The lateral movement of the recording arm, as related to the rotation of the turn-table is such that 109 grooves per inch are cut into the record surface.

ADJUSTMENT OF PIVOT POST HEIGHT

The recording arm assembly is mounted on the upper end of the pivot post, and held in correct position by means of the two hex-head set screws as illustrated in FIGURE 8.

The end of the pivot post should be flush with the bushing on the top side of the arm platform (FIGURES 4, 7, and 8) and when the recording arm is lowered to its horizontal position, a small gap should exist between the pivot post bushings X and Y, FIGURE 4. A few drops of light lubricating oil applied to the pivot post between the bushings will provide smooth movement in the raising and lowering of the recording arm.

FOLLOWER ARM HORIZONTAL ADJUSTMENT

Before tightening the hex-head set screws, note that the recording arm is in correct position with respect to the follower arm, so that as the follower arm touches the follower arm stop, the cutting stylus will rest on the outside black line near the center of the record. This will provide a maximum playing time of approximately 3-1/5 minutes for the 6½ inch disc, 3-1/2 minutes for the 8 inch, and 5 minutes for the 10 inch disc.

NOTE: Removal of the straddle plate will allow for greater ease in making the above adjustments.

In the event any adjustment is made which necessitates resetting the hex-head set screws, it is recommended that a check is made as to the height of the recording arm above the record surface and an adjustment of the arm height made if necessary.

FOLLOWER ARM VERTICAL ADJUSTMENT

With the recording arm lowered to a position so that the bottom of the nose of the arm is 2 inches above the turn-table, the tongue of the phosphor bronze spring should just clear the lateral feed screw.

The adjustment for this height may be accomplished by slightly bending up or down, as required, the flat part of the follower arm near the riveted end of the phosphor bronze spring.

PHOSPHOR BRONZE SPRING ADJUSTMENT

As the recording arm is lowered to recording position, it will be noted that the follower arm is also lowered, causing the phosphor bronze spring tongue to become firmly seated in the bottom of the spiral groove of the lateral feed screw.

The pressure of the phosphor bronze spring, bearing against the lateral feed screw should be sufficiently great so that the knife-edge tongue will not have a tendency to climb out of the grooves in the feed screw, which would result in unevenly spaced grooves cut into the record surface. In extreme cases of insufficient spring pressure bearing against the lateral feed screw, the cutting stylus may have a tendency to cut through into the adjacent previously cut groove.

The pressure should not be too great, however (caused by the follower arm being bent downward too far) that the phosphor bronze spring will be lifted away from the end of the adjusting screw, as the arm is lowered.

It can be seen from the preceding paragraphs covering the follower arm vertical adjustment and the phosphor bronze spring adjustment, that these two adjustments are somewhat interlocking that is - one adjustment slightly affects the other. An adjustment of the phosphor bronze spring screw, so that the phosphor bronze spring assumes the shape and position shown in FIGURE 7, is usually satisfactory, provided the vertical adjustment has been correctly made.

LATERAL FEED SCREW ADJUSTMENT

An adjustment is provided on the worm and gear housing, to take up the end play of the lateral feed screw. To make this adjustment, loosen the large hexagonal lock nut and turn the slotted screw slowly to the right until all end play of the feed screw is eliminated. Then back off the adjustment slightly and tighten the lock nut. A very slight amount of end play in the feed screw should be noticeable after the lock nut has been tightened.
ADJUSTMENT OF CUTTING ARM AND HEAD

When the RECORDIO leaves the factory, all adjustments have been correctly made. To assure this condition, a final check, by observing the over-all performance of the instrument in the making of recordings, is given each RECORDIO before being released for shipment.

It is realized, however, that during shipment, or due to improper handling after installation has been made, adjustments may become altered so that the instrument will not function properly without correction.

These bulletins have been prepared to serve as an aid to the service man in placing the equipment in proper operating condition, when necessary. Also instructive information is included, which may be passed on to other users of RECORDIO, to promote a better understanding of its operation and care.

DEPTH OF CUT

The depth of cut may be observed by holding the record in such a position that a light is reflected from the grooves. If the depth of cut is correct, the grooves will appear to be about as wide as the spaces between them.

The correct depth of cut will produce a thread cut from the record surface that is firm, neither coarse and stiff, nor light and "fluffy".

Provided a new cutting stylus, or one known to be in perfect condition, is being used, the correct depth of cut may be gauged by permitting the cuttings to remain upon the record until completed, then rolling the cuttings in to a hard ball. The size of the ball thus obtained should be approximately, 1/2 inch in diameter, for the 68 inch record.

EFFECT OF DULL CUTTING STYLUS

With proper care, the cutting stylus will cut dozens of records satisfactorily, before being dulled, so that replacement is necessary.

Many times it may be apparent from casual observation, that because an incorrect cut is being made, an adjustment is in order to bring about correct depth of cut, whereas the trouble may be due to the cutting stylus having become dulled, either accidentally, or through natural wear.

It is well to FIRST TRY A NEW CUTTING STYLUS before making any adjustments, to preclude the necessity for a complete readjustment. Adjustments made with a dulled cutting stylus being used, will have very little effect upon the depth of cut.

The point and cutting edges of the stylus are razor sharp, and it is obvious that if the cutting stylus should bump or scrape against the turn-table or other metal object, it would be dulled and rendered useless.

During periods of inoperation, the recording arm should always be returned to its normal horizontal position to the right of the turn-table.

THE CUTTING STYLUS SHOULD NEVER BE PERMITTED TO REST ON THE TURN-TABLE. Its point is infinitesimally small, and compared to its normal pressure of approximately 15 ounces against the record surface (equivalent to several hundred pounds per square inch) it can readily be realized that if this stylus pressure were exerted against a metal surface, its razor sharp point would be crushed or flattened. A magnifying glass is usually required to observe the damaged condition of the stylus point.

A study of FIGURE 1 will serve to stress the importance of careful adjustment of the depth of cut, and the necessity for using a sharp cutting stylus.

Line A represents radius of ballpoint play-back needle.

A and B = perfectly cut grooves.

C = shallow groove due to improper adjustment.

D = shallow imperfect groove due to dulled cutting stylus.

Note width of space between grooves as compared to width of grooves.

DEPT OF CUT ADJUSTMENT

The depth of cut is regulated by an adjustment of the flat head screw, FIGURE 2.

Turning the Screw to the right (clockwise) increases the depth of cut.

Turning the screw to the left (counter-clockwise) decreases the depth of cut.

An examination of the recording arm assembly will show the function of the coil spring attached to the cutting head, is to oppose the weight or pressure of the cutting stylus against the record surface, so as to allow cutting a groove of definite depth. For example, it will be seen that turning the screw to the right changes the angle on which the spring acts, so that the groove depth is increased. Turning the screw to the left changes the angle on which the spring acts, so that the groove depth is decreased. It will be seen that the actual spring tension remains very nearly the same and the angle of the axis on which it operates is changed to bring about the possibility of adjusting the depth of cut. (CONTINUED)
In some of the early ECONOMIC models, the adjusting screw was threaded throughout its full length, although only the lower portion of the screw over a span of approximately 3/8 inch contributes to the useful range of adjustment. If the adjusting screw is turned in a clockwise direction so as to raise the spring holding lug to the upper threaded portion of the screw, the adjustment will have passed through a "dead-center" position, which will cause a bobbing up-and-down movement of the cutting head.

If it is found that when using a new cutting stylus, the depth of cut is too shallow, and the adjusting screw has been turned to the full clockwise position in the later models, or to the upper limit of the useful range in the earlier models, this is an indication that the balance spring is too strong. Its tension may be decreased by spreading the coils of the spring with a pair of diagonal cutting pliers.

CAUTION: Care should be used in removing and replacing the cutting head, when occasion arises, so that the balance spring is not stretched to a length that will prevent its returning to normal length and tension.

When the cutting head is in proper adjustment, and the recording arm is raised to a position approximately 26 to 30 degrees from the vertical plane, the cutting head should float freely in its mounting, with equal up and down movement. The balance spring holding lug should be in a position on the adjusting screw approximately 1/4 inch from the shelf which holds the riveted end of the screw. (Fig. 7)

Observe that the links connecting to the cutting head are shaped to form an "S", FIGURE 5, and that these wires are kept in the clear— not touching the balance spring. Also, the wire leads should not be permitted to drop (arm horizontal) so that they will rub on the turn-table. Also observe that the holding tongues of the finger grips on the nose of the recording arm, are bent back sufficiently so as not to interfere with free movement of the cutting head.

HEIGHT OF RECORDING ARM ADJUSTMENT

The components of the recording arm assembly are positioned so that the cutting head is parallel, and the stylus is perpendicular to the record surface (FIGURE 7), which condition obtains only with the nose of the recording arm adjusted to the correct height of 1/4 inch above the record surface.

An adjustable stop (arm height adjusting screw, FIGURES 6 & 7) is mounted on the arm platform to provide a means for adjusting the height of the recording arm. With a blank record on the turn-table and a Wilcox-Gay cutting stylus inserted in the cutting head, the arm height adjustment should be made so that the bottom of the recording arm is 1/4 inch from the record surface as shown in FIG. 6 & 7.

The connecting wires from the cutting head should not be allowed to double up between the arm and arm platform, but should feed freely through the hole in the platform as the arm is lowered. Otherwise, the wires doubled up may prevent the arm from coming to rest on the head of the height adjusting screw.

There is little likelihood that the arm height adjusting screw will get out of adjustment due to the look nut becoming loosened. However, there is the possibility that the recording arm may be roughly handled by the operator. If the arm were to be forced downwards after having been raised to its vertical position, or if, while being lowered to its horizontal position to the right of the turn-table, the arm were dropped or forced downward, the plate on which all of the recording mechanism is mounted, may be bent or sprung slightly. This would destroy the 1/4 inch height adjustment, and readjustment of the arm height adjusting screw would be necessary to bring the nose of the recording arm to exactly 1/4 inch above the record surface.

Also, the straddle plate (FIGURES 4 and 7) may be bent down, which would affect the arm height adjustment. In this event, the straddle plate should be removed and straightened. This is most easily accomplished with the recording arm in the lowered position. Grasp the heel of the arm with the left hand and raise the arm horizontally at the same time removing the arm lift lever from the slots in the straddle plate. The straddle plate may now be removed by sliding it towards the rear.

The importance of the arm height adjustment may be judged by a study of FIGURE 7. Note that the balance spring serves to hold the knife-edge...
pivot of the cutting head mounting, fully seated in the "V" shape trunnion bearing of the cutting head mounting bracket. Also, that the "pull" of the spring is slightly downward, as well as horizontal.

The initial tension and length of the balance spring must be such that when adjusted to the proper tension to produce the correct depth of cut, the spring holding lug will be positioned on the adjusting screw as shown, to create a slight downward "pull" on the cutting head mounting.

As the stylus or the cutting head is raised and lowered slightly, when cutting records which are not perfectly flat, the cutting stylus varies from its perpendicular plane, and the angle of the cutting edges of the stylus also vary. This tends to produce a varying depth of cut which would place a varying load on the motor, resulting in a variation in the average pitch or tone of the recorded music or speech. This effect is commonly called "wow". However, the spring tension, and consequently the stylus pressure, also varies. This variation in stylus pressure opposes the effect of the varying stylus position, resulting in a substantially uniform depth of cut.

It can be seen that if the balance spring were adjusted to a horizontal position with respect to the plane of the cutting head —

(a) — the downward "pull" of the spring would be lost, resulting in a pronounced variation in the depth of cut when cutting a record having a slightly warped surface.

(b) — the cutting stylus would have a tendency to chatter or dig into the record, due to the "dead-center" position of the spring.

It can also be seen that if the arm were adjusted to an incorrect height above the record surface, the cutting stylus would not be perpendicular, and the tendency towards a greater variation in the depth of cut, which would be more pronounced, would not be fully compensated by the counteracting effect of the varying tension of the balance spring.

MODEL A70
Chassis Model 9W9

An OUTPUT METER or other indicating device should be used for accuracy in making ganaging adjustments.

If an output meter is not available, the magic eye (505) may be used as an output indicator as follows:

(a) Depress push-button No. 4 "To Recorder Radio".
(b) Disconnect cutting-head from chassis.
(c) Adjust volume control to near maximum.

FIG. 6

Connect signal generator to control grid of 6AS tube. Make connection to side of middle section, (CB) of condenser gang. (FIG. 6)

<table>
<thead>
<tr>
<th>SIGNAL GENERATOR</th>
<th>DIAL FREQUENCY</th>
<th>WAVE BAND SWITCH</th>
<th>TRIMMER</th>
<th>FIGURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>456 Kc.</td>
<td>1800 Kc.</td>
<td>Broadcast</td>
<td>2nd. I.F.-S</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&quot;</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&quot;</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&quot;</td>
<td>6</td>
</tr>
</tbody>
</table>

Connect signal generator to ANT. and GND. terminals.

Turn condenser gang to full maximum capacity and check position of dial pointer with reference line on scale, just to the right of 500 Kc. calibration.

| 600 Kc.          | 600 Kc.       | Broadcast        | L.F. Ped. (C=5) | 6      |
| 1400 Kc.         | 1400 Kc.      | "                | Osc. (C=3)      | 6      |
| 1400 Kc.         | 1400 Kc.      | "                | Det. (C=2)      | 6      |
| 1400 Kc.         | 1400 Kc.      | "                | Pre-Set. (C=1)  | 6      |

Not used. 15-16 Kc. Short Wave Pre-Set. (C=4) 6

*If the trimming condenser on the secondary of the second I.F. transformer is adjusted throughout its full range, two "peaks" will be observed. The correct peak is the one of lowest capacity in the adjustment of the trimmer. The I.F. trimming condensers when properly adjusted will rest at approximately one and one half turns from the fully closed position.

**Connect antenna to receiver, and adjust dial so that no station is received. Advance volume control until a fair volume of noise is received. Adjust trimmer for greatest noise.
**VOLTAGE CHART**

<table>
<thead>
<tr>
<th>Tube</th>
<th>Position</th>
<th>Plate</th>
<th>Screen</th>
<th>Cathode</th>
</tr>
</thead>
<tbody>
<tr>
<td>6J7</td>
<td>Mike Amp.</td>
<td>45*</td>
<td>40*</td>
<td>1.2</td>
</tr>
<tr>
<td>6Q7</td>
<td>Amp.-Vol.</td>
<td>72*</td>
<td></td>
<td>1.4</td>
</tr>
<tr>
<td></td>
<td>Ind. Rect.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6K6</td>
<td>Output</td>
<td>222</td>
<td>235</td>
<td>15.0</td>
</tr>
</tbody>
</table>

- Not actual voltages due to large values of resistance in the circuit between supply voltage and point of measurement.
- These voltage values may vary considerably, depending upon the resistance of voltmeter used.

**Line Voltage** 118  
**Volume Control at min.**

- C-14 to Gnd. 315  
- C-15 to Gnd. 235  
- C-15 to C-14 (spkr. field) 80 except as noted.

Compliments of www.nucow.com
VOLTAGE: Line Voltage, 115; C13 to GND, 113.5; C14 to GND, 60; C16 to GND, 5.6; C15 to GND, 90. Aerial disconnected. Vol. cont. at min. All volt. measurements made against ground (chassis).

<table>
<thead>
<tr>
<th>Tube</th>
<th>Position</th>
<th>Plate</th>
<th>Screen</th>
<th>Cathode*</th>
</tr>
</thead>
<tbody>
<tr>
<td>IA7</td>
<td>1st. Det.</td>
<td>68</td>
<td>45</td>
<td>1.4</td>
</tr>
<tr>
<td></td>
<td>Oscillator</td>
<td>88</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1N5</td>
<td>I.F.</td>
<td>88</td>
<td>90</td>
<td>4.2</td>
</tr>
<tr>
<td>1H5</td>
<td>2nd. Det.</td>
<td>32.5**</td>
<td>2.8</td>
<td></td>
</tr>
<tr>
<td>1A5</td>
<td>Output</td>
<td>83.5</td>
<td>90</td>
<td>5.6</td>
</tr>
<tr>
<td>45Z5</td>
<td>Rectifier</td>
<td></td>
<td></td>
<td>115.0</td>
</tr>
</tbody>
</table>

(*) Cath. volt. of all tubes with exception of 45Z5 is measured from filament prong #7 to ground.
(**) Not actual volt. due to large value of resistance in plate cir. May vary considerably due to resistance of voltmeter used.

(*) Cl-A trimmer is located on rear cover, and is connected across loop antenna. NOTE: An adj. of this trimmer should be made each time the receiver is changed from use with loop antenna to use with outside antenna, and vice versa. As resonance is approached by adj. of trims., sig. gen. attenuator should be adj. for min. sig. that will provide a low reading on the output indicator.
ALL RECORD PLAYERS
DATE 4-30-40

LUBRICATION OF ELECTRIC MOTORS
IN WILCOX-GAY RECORD PLAYERS AND PHONOGRAPHs

In record player and phonograph models in which the turn-table shaft is driven directly through a reduction worm gearing housed within the motor assembly -

1 - The motor should be demounted from the motor board.

2 - Remove the three screws surrounding the turn-table shaft.

3 - Remove the shaft and worm gear assembly, and clean the assembly by washing in kerosene or other grease solvent.

4 - Wash out the worm and gear housing of the motor assembly in a similar manner.

5 - Make an application of 600-W motor lubricant to both the worm and gear, and place a small quantity of the same lubricant in the gear housing.

NOTE: An oil hole is provided on some of the motors in these models, so that lubricant may be added, however it is better to follow the above procedure especially in cases where the increased power demand placed upon the motor, because of a "dried out" condition of the lubricant, has become great enough to cause a noticeable reduction in turn-table r.p.m.

Motors used in those models in which the turn-table is rim driven through an idler wheel, may be lubricated as follows:

1 - Remove turn-table.

2 - Apply several drops of electric motor oil to the side of the motor shaft, allowing the oil to run down into the upper bearing.

3 - Oil the idler wheel bearing, using only one or two drops of the oil so that it will not run out onto the rubber rim of the wheel.

4 - Oil the turn-table spindle bearing.

5 - The lower motor bearing may be lubricated by saturating the felt wick which surrounds the lower end of the motor shaft.

NOTE: Electric motor oil may be procured at any automobile service station.

AUDIO OSCILLATION
MODEL No. A-72
DATE 4-24-40

In some of the earlier model A-72 Portable Recordics, an audio oscillation may be noticed to occur with the volume control turned to near maximum position, when the 3-position switch is in the "CUT" position.

This oscillation manifests itself by a flickering of the magic eye (6U5) and will appear in the playback of records which have been cut under this condition, as a "motor-boating" sound of an intensity nearly equal to that of the recorded voice or music.

To correct this audio oscillation, disconnect the 500,000 ohm 6J7 screen grid resistor (R3) from the hum filter composed of C3 and R5, and connect it directly to B+.

Figure 9 shows the original circuit, and Figure 10 represents the circuit after the change has been made. It will be observed that this change has been incorporated in the schematic diagram appearing in Service Bulletin No. 10.
### Alignment Procedure

**For Chassis 5417, 5420 and 5556**

<table>
<thead>
<tr>
<th>Operation</th>
<th>Connect Test Oscillator to</th>
<th>Dummy Antenna</th>
<th>Input Signal Frequency</th>
<th>Bond</th>
<th>Set Dial At</th>
<th>Adjust Trimmers</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1A7 Grid</td>
<td>½ Mfd.</td>
<td>455 Kc.</td>
<td></td>
<td>600 Kc.</td>
<td>A, B, C, D</td>
<td>I.F. Alignment</td>
</tr>
<tr>
<td>2</td>
<td>Antenna</td>
<td>200 Mmf.</td>
<td>1500 Kc.</td>
<td>Broadcast</td>
<td>1500 Kc.</td>
<td>F</td>
<td>Set Oscillator to Scale</td>
</tr>
<tr>
<td>3</td>
<td>Antenna</td>
<td>200 Mmf.</td>
<td>1400 Kc.</td>
<td>Broadcast</td>
<td>1400 Kc.</td>
<td>G</td>
<td>Alignment of Scale</td>
</tr>
</tbody>
</table>

**Alignment Notes:**
- All voltages measured with a 1000 ohm per volt meter from chassis to socket contacts using a fresh Z28 battery pack.
- Antenna disconnected — volume control full on.

---

**Location of Tubes and Trimmers**

- **Converter:** 1A7G, IN5G, IC5G
- **PWR-AMP:** IC5G
- **DET-AMP:** 1H5G
- **I.F.:** IN5G, 1A7G, I1H5G

**Socket Voltages**

---

**NOTE**

- All voltages measured with a 1000 ohm per volt meter from chassis to socket contacts using a fresh Z28 battery pack.
- Antenna disconnected — volume control full on.
All voltages measured from point indicated to chassis using a 1000 ohm per volt meter.

Antenna disconnected — volume control at minimum and condenser plates in full mesh.

All voltages measured using Zenith No. 2659 battery pack.
ZENITH RADIO CORP.
MODELS 6D410, 6D411, 6D425
Chassis 5G65, 5G66
MODELS 6P410, 6P419, 6P428
6P429, 6P430, 6P447, 6P448
6P457
Chassis 5G62, 5G66
Schematics

MODEL SPEAKER
6D410 49-303 4"
6D411 49-323 4"
6D425 49-383 4"

I.F. FREQUENCY 455 KC.

FOR OTHER DATA
SEE INDEX

6 TUBE SUPERHETERODYNE
CHASSIS N°5659-5653ACGC

12A8G CONV
12K7G I.F.
12Q7G DET-AMP
35L6G PWR-AMP

ZENITH PAGE 11-7

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**NOTE**

Voltages measured from No. 7 pin on ballast tube to point indicated using a 1000 ohm per volt meter. Vol. control at minimum. Antenna disconnected.

All filament voltages measured across each respective tube, using a 0-50 A.C. voltmeter.

A. This lug is C.T. of fil. and is one side of pilot light supply line. Lug No. 7 is return for pilot light.

B. This lug (No. 8) has a 50 v. A.C. potential with respect to lug No. 5 and also a 117 v. A.C. potential with respect to line switch.

---

**FOR OTHER DATA SEE INDEX**

- **MODEL** 6P416
  - SPEAKER 49-303 5”
- **MODEL** 6P417
  - SPEAKER 49-303 5”
- **MODEL** 6P428
  - SPEAKER 49-303 5”

**I.F. FREQUENCY 455KC**

**CHASSIS 5661, 5665**

**35L6G OUTPUT**

**50Z7G-RECT.**

**12A8G-DET. OSC.**

---

**12Q7G-2ND DET.**

**12K7G-L.F.**

**100-79 BALLAST**

**FRONT OF CHASSIS 5661 & 5665, 5662 & 5666**
NOTE:
This receiver is equipped with a fixed-variable sensitivity control located on the side of the chassis as shown in FIG. 3B. The control is set at the factory to a position which gives sensitivity of 7 microvolts at one watt output. It is found advisable to keep the receiver at this level as any higher sensitivity may result in motor noise or excessive background noise. If laboratory equipment is available for measuring sensitivity, it is not advisable to change this setting.

MANUAL DIAL CALIBRATION:
The frequency of a station does not correspond with the dial reading, it may be corrected by holding the tuning control securely and turning the dial drum with the forefinger until it reads correctly.

ALIGNMENT:
The signal for the entire alignment procedure, both I.F. and R.F., is led through a special Zenith dummy, Part number S7832. The capacities in the Zenith dummy antenna as shown in FIG. 3 are identical with the standard Ford antenna. If the Zenith dummy is not available at your Zenith distributor, you can substitute the values shown.

CAUTION:
Core should be taken while making all adjustments on the receiver to have the volume control turned full on. The intensity of the signal should be reduced only at the signal generator.

R.F.:
The tuning condenser is fully meshed (540 K.C.). The word "dial" must appear in the Roto-matic window. The signal generator is set at 455 K.C. C and fed through the special Zenith antenna dummy to the receiver. The wave trap adjustment screw A, see FIG. 3A-3B, is adjusted for maximum response. The adjusting screws B, C, D, E are then adjusted in order for maximum response on the output meter. (See FIG. 3A-3B.)

Set the signal generator to 1400 K.C. and adjust the 1400 K.C. trimmer (see FIG. 5), for maximum response.

Reset the signal generator to 600 K.C. and rotate the tuning control until a signal is heard. The condenser gap is then rocked slightly while adjusting the 600 K.C. condenser (FIG. 4) to maximum reading on the output meter.

When shipping, the screws are adjusted to 500 780 1000 1200 1000 780 500. These frequencies give maximum performance and allow for the greatest performance. The above procedure should be repeated after the entire five stations are set. This is necessary to make sure that the adjustment screws are peaked for maximum performance. If difficulty is experienced in setting up the adjusting screws for a desired station, first turn the bottom adjustment screw down tight and then adjust the top screw to the station and follow with an adjustment of the bottom screw for greatest volume.
V.FREQUENCY 455 KC.

Voltages measured from line switch to point indicated using a 1000 ohm per volt meter. Vol. control at minimum. Antenna disconnected.

All filament voltages measured across each respective tube, using an A.C. volt-meter.

VOLTAGE DOUBLER A.C.
All voltages measured with a 1000 ohm per volt meter from chassis to socket contact indicated.

All voltages are positive D.C.

Volume control on full.

Line voltage 120 A.C.

I.F. FREQUENCY 455 KC.
8 TUBE SUPERHETERODYNE CHASSIS MODEL 8640-10.

ZENITH RADIO CORPORATION
CHICAGO, ILL.

MODEL SPEAKER
86432 49-301 6"
86432 49-303 6"
86449 49-301 6"
86450 49-316 6"
86462 49-310 6"
86459 49-310 6"
86460 49-311 10"
86461 49-312 10"
86461 49-311 10"
NOTE

All voltages measured with a 1000 ohm per volt meter from chassis to socket contact indicated.

All voltages are positive D.C. unless marked otherwise.

Volume control full on.

Line voltage 112 A.C.

Model 5679 Only

Battery conserver switch in NORMAL position.

Socket Voltages

Location of Tubes and Trimmers
Compliments of www.nucow.com

**MODELS See Below**

**Alignment, Trimmers, Socket**

**ZENITH RADIO CORP.**

---

## Table

<table>
<thead>
<tr>
<th>Operation</th>
<th>Current Test Oscillator to</th>
<th>Dynamic Antenna</th>
<th>Input Signal Frequency</th>
<th>Band</th>
<th>Set, Dial At</th>
<th>Adjoint Trimmers</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Antenna Post (On Loop)</td>
<td>200 Mid.</td>
<td>16000 Kc.</td>
<td>S.W.</td>
<td>18000 Kc.</td>
<td>I</td>
<td>Set Oscillator to Scale</td>
</tr>
<tr>
<td>3</td>
<td>Antenna Post (On Loop)</td>
<td>200 Med.</td>
<td>16000 Kc.</td>
<td>S.W.</td>
<td>18000 Kc.</td>
<td>M</td>
<td>Alignment of Antenna</td>
</tr>
<tr>
<td>4</td>
<td>Antenna Post (On Loop)</td>
<td>200 Med.</td>
<td>4500 Kc.</td>
<td>Police</td>
<td>4500 Kc.</td>
<td>N</td>
<td>Set Oscillator to Scale</td>
</tr>
<tr>
<td>5</td>
<td>Antenna Post (On Loop)</td>
<td>200 Mid.</td>
<td>4500 Kc.</td>
<td>Police</td>
<td>4500 Kc.</td>
<td>Q</td>
<td>Alignment of Antenna</td>
</tr>
<tr>
<td>6</td>
<td>Single Turn Coupled</td>
<td>1400 Kc.</td>
<td>Broadcast</td>
<td>Wave Magnet</td>
<td>1400 Kc.</td>
<td>C</td>
<td>Alignment of Loop</td>
</tr>
<tr>
<td>7</td>
<td>Loop Switch in Wave</td>
<td>1400 Kc.</td>
<td>Broadcast</td>
<td>Wave Magnet</td>
<td>1400 Kc.</td>
<td>G</td>
<td>Set Oscillator to Scale</td>
</tr>
</tbody>
</table>

---

**Chassis 1006, 1125, 5806**

<table>
<thead>
<tr>
<th>Operation</th>
<th>Current Test Oscillator to</th>
<th>Dynamic Antenna</th>
<th>Input Signal Frequency</th>
<th>Band</th>
<th>Set, Dial At</th>
<th>Adjoint Trimmers</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Antenna Post (On Loop)</td>
<td>200 Mid.</td>
<td>18000 Kc.</td>
<td>S.W.</td>
<td>18000 Kc.</td>
<td>I</td>
<td>Set Oscillator to Scale</td>
</tr>
<tr>
<td>3</td>
<td>Antenna Post (On Loop)</td>
<td>200 Med.</td>
<td>16000 Kc.</td>
<td>S.W.</td>
<td>18000 Kc.</td>
<td>L</td>
<td>Alignment of Antenna</td>
</tr>
<tr>
<td>4</td>
<td>Antenna Post (On Loop)</td>
<td>200 Med.</td>
<td>4500 Kc.</td>
<td>Police</td>
<td>4500 Kc.</td>
<td>N</td>
<td>Set Oscillator to Scale</td>
</tr>
<tr>
<td>5</td>
<td>Antenna Post (On Loop)</td>
<td>200 Med.</td>
<td>4500 Kc.</td>
<td>Police</td>
<td>4500 Kc.</td>
<td>Q</td>
<td>Alignment of Antenna</td>
</tr>
<tr>
<td>6</td>
<td>Single Turn Coupled</td>
<td>1400 Kc.</td>
<td>Broadcast</td>
<td>Wave Magnet</td>
<td>1400 Kc.</td>
<td>F</td>
<td>Set Oscillator to Scale</td>
</tr>
<tr>
<td>7</td>
<td>Single Turn Coupled</td>
<td>1400 Kc.</td>
<td>Broadcast</td>
<td>Wave Magnet</td>
<td>1400 Kc.</td>
<td>H</td>
<td>Alignment of Loop</td>
</tr>
<tr>
<td>8</td>
<td>Single Turn Coupled</td>
<td>1400 Kc.</td>
<td>Broadcast</td>
<td>Wave Magnet</td>
<td>1400 Kc.</td>
<td>G</td>
<td>Set Oscillator to Scale</td>
</tr>
</tbody>
</table>

---

**Chassis 1207, 1408**

<table>
<thead>
<tr>
<th>Operation</th>
<th>Current Test Oscillator to</th>
<th>Dynamic Antenna</th>
<th>Input Signal Frequency</th>
<th>Band</th>
<th>Set, Dial At</th>
<th>Adjoint Trimmers</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Jet Det. Grid</td>
<td>1/2 Mid.</td>
<td>455 Kc.</td>
<td></td>
<td>Broadcast</td>
<td>A, B, C, D</td>
<td>I.F. Alignment</td>
</tr>
<tr>
<td>2</td>
<td>Rec. Ant. Wave</td>
<td>400 ohms</td>
<td>18000 Kc.</td>
<td>S.W.</td>
<td>18000 Kc.</td>
<td>K</td>
<td>Set, Cac. to Scale</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>400 ohms</td>
<td>16000 Kc.</td>
<td>S.W.</td>
<td>18000 Kc.</td>
<td>L</td>
<td>Rock arm &amp; call. for max. output</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>400 ohms</td>
<td>600 Kc.</td>
<td>Police</td>
<td>800 Kc.</td>
<td>N</td>
<td>Rock arm &amp; call. for min. output</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>200 mil.</td>
<td>1400 Kc.</td>
<td></td>
<td>1400 Kc.</td>
<td>F</td>
<td>Rock shunt &amp; call. for max. output</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>200 mil.</td>
<td>600 Kc.</td>
<td></td>
<td>800 Kc.</td>
<td>I</td>
<td>Rock shunt &amp; call. for min. output</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>200 mil.</td>
<td>800 Kc.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Chassis 5559**

<table>
<thead>
<tr>
<th>Operation</th>
<th>Current Test Oscillator to</th>
<th>Dynamic Antenna</th>
<th>Input Signal Frequency</th>
<th>Band</th>
<th>Set, Dial At</th>
<th>Adjoint Trimmers</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>660 R, F, R, F</td>
<td>0.5 Mid.</td>
<td>455 Kc.</td>
<td>I.F.</td>
<td>600 Kc.</td>
<td>A, B, C, D</td>
<td>I.F. Alignment</td>
</tr>
<tr>
<td>2</td>
<td>Rec. Ant. Post</td>
<td>200 Mid.</td>
<td>1200 Kc.</td>
<td>Broadcast</td>
<td>1200 Kc.</td>
<td>F</td>
<td>Set Oscillator to Scale</td>
</tr>
<tr>
<td>3</td>
<td>Rec. Ant. Post</td>
<td>200 Mid.</td>
<td>1500 Kc.</td>
<td>Broadcast</td>
<td>1500 Kc.</td>
<td>F</td>
<td>Set Oscillator to Scale</td>
</tr>
<tr>
<td>4</td>
<td>Rec. Ant. Post</td>
<td>200 Mid.</td>
<td>600 Kc.</td>
<td>Broadcast</td>
<td>600 Kc.</td>
<td>F</td>
<td>Set Oscillator to Scale</td>
</tr>
<tr>
<td>5</td>
<td>Rec. Ant. Post</td>
<td>200 Mid.</td>
<td>Broadcast</td>
<td>F, G</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Rec. Ant. Post</td>
<td>400 Ohms</td>
<td>7000 Kc.</td>
<td>Police</td>
<td>8000 Kc.</td>
<td>N</td>
<td></td>
</tr>
</tbody>
</table>

---

**Chassis 5679**

<table>
<thead>
<tr>
<th>Operation</th>
<th>Current Test Oscillator to</th>
<th>Dynamic Antenna</th>
<th>Input Signal Frequency</th>
<th>Band</th>
<th>Set, Dial At</th>
<th>Adjoint Trimmers</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Single turn</td>
<td>1500</td>
<td>&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Single turn</td>
<td>1500</td>
<td>&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>1600 Kc.</td>
<td>&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>4500 Kc.</td>
<td>&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

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Compliments of www.nucow.com
GENERAL:
Each button and its associated tuning adjustment will tune over a portion of the broadcast band, and any station within its tuning range may be selected for automatic tuning on that button.
To adjust the automatic tuning proceed as follows:

PRELIMINARY OPERATIONS:

For Chassis 1005, 1103, 5679, 5808:
Remove the automatic cover plate by pressing the catch pin on the inner side and lifting away from the escutcheon.
Place sensitivity switch in LOCAL position.
Select a station within the range of the No. 1 button. See list of frequency ranges at right.
Turn the band switch to Broadcast and then tune in the selected station on the dial - then turn band switch to Automatic position.

For Chassis 1207, 1503:
Remove the automatic cover plate by pressing on latch pin and lifting away from escutcheon.
Select a station within the range of the No. 1 button. See list of frequency ranges at right.
Turn the band switch to Broadcast and then tune in the selected station on the dial - return band switch to Automatic position.

For Chassis 5559, 5678, 5719, 5721, 5724, 5725:
Remove the automatic cover plate by gently lifting it under one end.
Select a station within the range of the No. 1 button. See list of frequency ranges at right.
Turn the band switch to Broadcast and then tune in the selected station on the dial.

For Chassis 5660 & 5664, 5662 & 5666, 5672-P:
Remove the automatic cover plate by gently lifting it under one end.
Select a station within the range of the top or No. 1 button. See list of frequency ranges at right.
Press the lowest or "Dial" button, and then tune in the selected station on the dial.

ADJUSTMENT PROCEDURE - ALL Chassis:
Press the No. 1 button and tune in the same station on the adjacent automatic adjustments by using the special wrench furnished with the receiver. First, adjust the screw and then the hexagonal nut to the setting which gives the lowest and clearest reception on the desired station (See Fig. 2). Repeat the operation for greatest accuracy.
Select and remove the call letters of the station selected from call letter sheets in this booklet. Moisten the rear surface and place in position on the automatic cover plate opposite the corresponding button. Follow the above procedure in setting remaining buttons, always selecting a station within the range of the button being set.
GENERAL:

When initial alignment is made, check that all leads are properly connected to the chassis. All leads from the chassis to the parts are properly connected. Make sure that all leads are properly connected.

Noisy operation may be caused by improper connections or loose screws. Make sure all connections are tight and secure.

CHASSIS:

1. Noisy operation may be caused by improper connections or loose screws. Make sure all connections are tight and secure.

2. Noisy operation may be caused by improper connections or loose screws. Make sure all connections are tight and secure.

3. Noisy operation may be caused by improper connections or loose screws. Make sure all connections are tight and secure.

4. Noisy operation may be caused by improper connections or loose screws. Make sure all connections are tight and secure.

5. Noisy operation may be caused by improper connections or loose screws. Make sure all connections are tight and secure.

SERVICE NOTES:

Improper adjustment of the trimmer may cause excessive noise. The trimmer should be adjusted so that it is in the center of its travel. The trimmer should be adjusted so that it is in the center of its travel.

ALIGNMENT

NASH SPECIAL AC 3789

NASH SPECIAL AC 3789

We would suggest that the service man procure a 3/8" box wrench (small size) for removing the caps from the switch of the car. The switch is held by a screw that is accessible from the rear of the car. The switch should be removed to access the screw. After the switch is removed, the caps can be easily removed.

IMPORANT — Unless certain dummy antenna capacitors are wired in parallel with the antenna, the receiver will not respond. These capacitors are installed in parallel with the antenna on the chassis. If the capacitors are not installed, the receiver will not respond.

B.F. — The tuning control is located on the front panel of the receiver. It is a dial that is used to tune the frequency of the receiver. The tuning control is located on the front panel of the receiver. It is a dial that is used to tune the frequency of the receiver.

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ZEPHYR RADIO CO.

MODEL 155-5L

6A7 CONVERTER
6D6 IF AMP
75 DET.
2516 POWER OUTPUT

Pilot Light
L498 - BALLAST

SPEAKER FIELD
RECT. 25Z5

105-125V
60v AC
or DC

VOLTAGES: Line 115 v. AC; meter 1000 ohms per volt.

POWER CONSUMPTION: 44 watts.

CONVENTIONAL ALIGNMENT
TRIM OSC. = 1750 KC
TRIM ANT. = 1400 KC

VOLUME VIII
FOR SOCKET LAYOUT
SEE INDEX

NOTE: C2 used on model 5L only.
ON MODEL 5L POINT A IS CONNECTED TO CHASSIS GND.

MODEL 352-5R

12S4GT CONVERTER
12K7GT IF AMP
12S4GT DET. AMP.
50L6GT POWER OUTPUT

TRIM OSC. = 1730 KC
TRIM ANT. = 1400 KC

IF PEAK 455 KC
FOR OTHER DATA
SEE INDEX

RESISTORS
CAPACITORS

Conventional Alignment
SEE SPECIAL SECTION
VOLUME VIII

C10 and C14 used in model 5RL only.
On model 5R point "A" is connected to ground.

Voltages: From point indicated to "A"; line 115 v. AC; meter 1000 ohms per volt - 150-volt scale. Power consumption: 30 watts.

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Compliments of www.nucow.com
PROCEDURE FOR SETTING UP

PUSH BUTTONS

FOR MODELS 581 - 7M and 605 - 7C

There are six push buttons by means of which six stations may be selected (See Fig. 1). Make a list of six stations tuned in regularly. Push the tuning knob to the right until it clicks, this throws it out of engagement with the dial drum, thus when the push buttons are used the tuning knob does not turn. (A slight turn of the knob will automatically throw it back into engagement with the dial drum for manual tuning.)

Loosen one of the push buttons by turning the push button knob counter clockwise a turn or less and push it in; while holding the button in, tune in a desired station by means of the station selector wheel. Turn the selector very slowly back and forth until the signal is clearest. Now while holding the push button in, tighten it by turning clockwise. Release the push button and turn the station selector to one end of the dial; push the tuning knob to the right and then check the button by pushing it in and if the station is tuned to the center of the area on the dial covered by the station the adjustment is correct.

Release the push button and loosen another push button and repeat the above procedure, doing this for the remaining buttons.

If it is desired to change a station simply loosen the push button and re-set.

Punch the correct station call letter tabs from the set of sheets supplied and insert them into the recesses under the push buttons.

The dial is now set up for quick tuning and all that is necessary is to push the tuning knob to the right until it clicks and then push the button above the desired station all the way in and then release.
Models 381-7H and 605-7C: Schematics, Voltage, Alignment

Alignment Frequencies

**Model 381-7H**
- Broadcast Oscillator (BC Osc.) - 1550 KC
- Switched Oscillator (SW Osc.) - 18.1 MC
- Broadcast Antenna (BC Ant.) - 1400 KC
- Switched Antenna (SW Ant.) - 16.0 MC
- Broadcast Pad (BC Pad) - 600 KC

**Model 605-7C**
- Broadcast Oscillator (BC Osc.) - 1750 KC
- Switched Oscillator (SW Osc.) - 18.1 MC
- Broadcast Antenna (BC Ant.) - 1400 KC
- Switched Antenna (SW Ant.) - 16.0 MC
- Broadcast Pad (BC Pad) - 600 KC

**Power Consumption:** 60 watts.

Voltages: Taken from socket terminals to ground; 20,000 ohms-per-volt meter.

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Compliments of www.nucow.com
CONVENTIONAL ALIGNMENT
SEE SPECIAL SECTION
VOLUME VIII

ALIGNMENT FREQUENCIES
BC OSC ----- 1750 KC
BC ANT ------ 1400 KC

RESISTORS
R1 20,000 1\% 500 0.005 1\% 470 0.005 1\% 150 0.005 1\% 100 0.005 1\% 68 0.005 1\%
R2 2 MEG. 1\% 470 0.005 1\% 150 0.005 1\% 100 0.005 1\% 68 0.005 1\%
R3 250,000 1\% 1000 0.005 1\% 680 0.005 1\% 470 0.005 1\%
R4 & MEG. 1\%

CAPACITORS
C1, C2 0.001 MICA 470 0.005 1\% 150 0.005 1\% 100 0.005 1\% 68 0.005 1\%
C3 0.02 MICA 470 0.005 1\% 150 0.005 1\% 100 0.005 1\% 68 0.005 1\%
C4 0.047 MICA 470 0.005 1\% 150 0.005 1\% 100 0.005 1\% 68 0.005 1\%
C5 0.01 MICA 470 0.005 1\% 150 0.005 1\% 100 0.005 1\% 68 0.005 1\%
C6 0.02 MICA 470 0.005 1\% 150 0.005 1\% 100 0.005 1\% 68 0.005 1\%

TUBES SHOWN BOTTOM VIEW
C18 USED ON MODEL 576 ONLY. CT MODEL 597, POINT A IS CONNECTED TO CHASSIS.

IF PEAK 455 KC

VOLTAGES: Taken from socket terminals to point "A"; 115 v. line; AC power consumption
30 watts; volume control at maximum; antenna shorted to ground; using a
100 ohm per volt meter.

MODELS 352-5R; 576-5Q, 577-5Q.

PROCEDURE FOR SETTING UP PUSH BUTTONS

There are four push buttons located on the top by means of which four stations may be selected (See Fig. 1). Make a list of four stations tuned in regularly. Loosen one of the push buttons by turning the push button knob counter clockwise a turn or less and push it in; while holding the button in, tune in a desired station by means of the station selector. Turn the selector very slowly back and forth until the signal is clearest. Now while holding the push button in, tighten it by turning clockwise. Release the push button and turn the station selector to one end of the dial; then check the button by pushing it in and if the station is tuned to the center of the area on the dial covered by the station the adjustment is correct.

Release the push button and loosen another push button and repeat the above procedure, doing this for the remaining buttons.

If it is desired to change a button to a different station simply loosen the push button and re-set.
In model 6M only C3, C4, C18, R13 and the R.F. choke (RFC) are not used and points "A" are connected to chassis.

I.F. ALIGNMENT CONVENTIONAL
BROADCAST BAND
TRIM OSC 1650 KC
TRIM ANT 1400 KC

SEE SPECIAL SECTION
VOLUME VIII

MODELS 696-6M, 667-6M
(See Index for tube layout)

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PRE-ADJUSTMENTS FOR PUSH BUTTON OPERATION

1. Leave set turned on at least twenty minutes allowing receiver circuits to reach their normal operating condition before starting push button adjustment.

2. Remove screws holding escutcheon plate for push buttons.

3. Note the ranges shown on label above adjusting screws. For example: 700 to 540 KC means you should adjust this set of screws for any station having a frequency between 700 and 540 KC. This rule applies for the other five ranges. There is, of course, some overlapping of range coverage.

4. Select a station by manual tuning in the regular way. Assuming it is within the 700 to 540 KC range, turn Band Switch to "Push Button" position and push in on button covering the range.

As will be noted, the adjustments consist of two screws, one with a large head (A) and one with a small head (B).

(A) With a small screwdriver, turn screw "A" back and forth until you locate the station. It is suggested that you switch back to manual tuning if necessary to recognize the particular type program to help you find it when you again turn the adjusting screw.

(B) After the "A" Screw has been set to exact resonance by watching the tuning eye deflection, turn the small screw "B" for the maximum deflection of the tuning eye. Now recheck screw "B". When all six buttons have been set, repeat the "trimming" process for accuracy.

IT WILL BE OF IMPORTANCE TO NOTE THAT IF THE STATION CANNOT BE LOCATED BY MOVING SCREW "A" IN AND OUT, PERHAPS YOU WILL FIND ADJUSTMENT "B" TOO FAR IN OR TOO FAR OUT. In such a case, check its position by turning it in all the way (to the right) then reverse it about a turn or two and try screw "B" again.
**ALIGNMENT PROCEDURE**

**I.F. Frequency 455 KC.** Set Range 540-1600 KC.
Connect the test oscillator, or signal generator, to the set as follows: Connect the "hot" side of the signal generator to the grid of the 1A7GT tube, and the ground side to the terminal on the back of the chassis. An output meter should be connected across the voice coil leads of the speaker to indicate resonance. Align the I.F. trimmers at 455 KC for maximum meter reading.

Adjust the trimmer on the back of the variable condenser at or near 1400 KC at full volume on a weak broadcast signal. When aligning the set do not set the receiver on or near a metal work bench or other large metal object, as it will affect the tracking of the receiver.

**Kent Models**
- 9722 (Uses 50L6 Output tube)
- 9822 (Uses 25L6 Output tube)
The following are the approximate readings when using a 1000 ohms per volt voltmeter. Line voltage should be 117 volts.

<table>
<thead>
<tr>
<th>Voltmeter Scale</th>
<th>300 Volt Plate</th>
<th>300 Volt Screen</th>
<th>30 Volt Cathode</th>
</tr>
</thead>
<tbody>
<tr>
<td>12SA7</td>
<td>93</td>
<td>93</td>
<td></td>
</tr>
<tr>
<td>12SK7</td>
<td>93</td>
<td>93</td>
<td></td>
</tr>
<tr>
<td>12SQ7</td>
<td>93</td>
<td>93</td>
<td></td>
</tr>
<tr>
<td><strong>MODEL L-41</strong></td>
<td></td>
<td></td>
<td>5.3</td>
</tr>
</tbody>
</table>

The following are the approximate readings when using a 1000 ohms per volt voltmeter. Voltage across speaker field is approximately 30 volts. Line voltage 117 volts.

<table>
<thead>
<tr>
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<th>300 Volt Plate</th>
<th>300 Volt Screen</th>
<th>30 Volt Cathode</th>
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</thead>
<tbody>
<tr>
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<td>105</td>
<td>105</td>
<td></td>
</tr>
<tr>
<td>12SK7</td>
<td>105</td>
<td>105</td>
<td></td>
</tr>
<tr>
<td>12SQ7</td>
<td>49</td>
<td>105</td>
<td>6</td>
</tr>
<tr>
<td><strong>MODEL L-40</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Start clock by turning starting knob (at rear) in direction of arrow. Set clock by turning "Set" knob (at rear) in direction of arrow. Clock remains running regardless of any power switch position, including "OFF", and will continue to run as long as cord is plugged into a power supply outlet. Power current interruptions will stop the clock and it must be re-started.

For continuous operation on radio, throw toggle switch (at rear) to RADIO. Note this switch has three positions, "RADIO", "OFF" and "ALARM".

To pre-set a desired station: (1) Throw toggle switch to "RADIO". (2) Tune in station desired with selector knob. (3) Turn volume well up (volume control knob). (4) Turn "ALARM" setting knob, at rear, in direction of arrow until the desired time for radio to turn appears at the calibration mark in the alarm set window on the clock face. (5) Throw the toggle switch to "ALARM". (6) Radio will turn "ON" at the time thus set, and will continue to operate for about 1 1/2 hours—then turn off. (7) Do not pre-set more than ten hours prior to the time of desired program.

To pre-set radio to TURN OFF at a predetermined time: (1) With radio playing, place toggle switch at rear, at "ALARM" position. (2) Turn "ALARM" set-knob, at rear, in direction of arrow until the desired time to shut off is indicated by the small Roman numerals in the upper portion of the alarm set window on the clock face.

**NOTE**: Do not pre-set to turn off for longer than 1 1/2 hours.
VOLTAGE REFERENCE.

Voltage shown on the circuit diagram are from socket terminals to chassis base. In measuring voltages use a voltmeter having a resistance of at least 1000 ohms per volt. Allowances should be made for variations in line voltage.

POWER SUPPLY. This receiver is designed to operate on any alternating current supply (AC) ranging from 110 to 120 volts, 50 to 60 cycles; or on any direct current supply (DC) ranging from 110 to 120 volts.

LAMP USED. Show case reflector lamp 120 volt, 25 watts with medium screw base with spring contact. (Never use a lamp larger than 25 watts.)

ALIGNMENT PROCEDURE

GENERAL DATA. The alignment of this receiver requires the use of a test oscillator that will cover the frequencies of 456, 690, 1400 and 1720 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.

CORRECT ALIGNMENT PROCEDURE. The intermediate frequency (IF) stages should be aligned properly as the first step. After the IF transformers have been properly adjusted and peaked, the broadcast band should be adjusted.

I. F. ALIGNMENT. With the gang condenser set at minimum, adjust the test oscillator to 456 KC and connect the output to the grid of the first detector tube (12ABGT) through a .05 or .1 mfd. condenser. The ground on the test oscillator should be connected to the chassis ground. Align all three I.F. trimmers to peak or maximum reading on the output meter.

BROADCAST BAND ALIGNMENT. Remove chassis from cabinet and set it up on the bench. Care should be taken to have no iron or other metal near the loop. Do not make this set-up on a metal bench.

Connect the test oscillator to the antenna of the set through a 200 mfd. (0.002) condenser. With the gang condenser set at minimum capacity, set the test oscillator at 1720 KC, and adjust the oscillator (or 1720 KC trimmer) on gang condenser. Next—set the test oscillator at 1400 KC, and tune in the signal on the gang condenser. Adjust the antenna trimmer (or 1400 KC trimmer) for maximum signal. Next set the test oscillator at 600 KC, and tune in signal on condenser to check alignment of coils.

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Follow the procedure outlined below, in order to adjust the push-buttons properly:

1. By means of the Station Selector Knob tune in WITH THE RIGHT HAND AS ACCURately AS POSSIBly the station having the lowest frequency.

2. After the station has been tuned in accurately with the right hand, continue to hold it in its exact position firmly, and with the left hand loosen the Push-Button to be set up for that station by unscrewing the Push-Button about one turn to the left (counter-clockwise).

3. Continuing to hold the Station Selector Knob in its exact position, PUSH THE PUSH-BUTTON IN ALL THE WAY with the left hand.

4. After the Push-Button has been depressed all the way, tighten it gently toward the right (clockwise). Release Push-Button slowly and when in normal position grip button and tighten firmly.

The Push-Button tuning system is now correctly set up for your first selected station of lowest frequency and the Call Letter Tab for this station should be at the extreme right of the Call Letter Holders.

Follow through with this same procedure, setting up the other 3 stations in the order of their frequency—that is, the second station set up will be second lowest in frequency and the third station set up will be third lowest in frequency.
Andrea Television Model 1-F-5

Before carrying out any type of service work, remove the 2BY or 879 high-voltage rectifier tube from the socket. Be certain that the high-voltage cover plate is in place, and remove both sides of high-voltage transformer primary leads from the terminal strip connecting them to the input terminal board. No adjustments of any nature are attempted in this way, no danger from shock from the high-voltage supply, is possible.

Bear in mind that the high-voltage supply plays no part in your service work. Therefore, no need exists for this section of the receiver functioning during any work you may undertake. Should repairs be necessary on the receiver, all tests should be conducted accurately by resistive or continuity measurements to localize the difficulty without resorting to any voltage measurements.

Remember, first thoroughly investigate the nature of the complaint to determine if the effect is in the receiver before attempting adjustments.

Sound I-F System

See notes on high voltage. The 6J5 oscillator must be stopped by connecting 70 or 100 ohms from the junction of HC-114 and HC-117 to ground. Do not short the oscillator or remove tube. The schematic will be found on Andrea page 10-1, 2, in Rider's Volume E.

Connect the high side of signal generator through 4 mfd. 600 V. condenser to ground 4 of 1852 modulator tube See page 10-4 of Rider's Volume F for socket layout. Set signal generator frequency very accurately to 8.35 mc. (260 kc). Connect rectifier type a-c voltmeter across voice coil of sound amplifier. Allow receiver to warm up 15 minutes before making any alignment settings.

After carefully studying the above, adjust television sound trimmers for maximum Hi I-F reception. D. C. and B. located as shown in socket layout, maximum deflection on the rectifier output meter across the speaker voice coil.

Be certain your generator frequency and trimmer adjustments are accurate or poor sound reception will result.

This completes the television sound I-F alignment.

Video I-F System and 14.25-MC Adjacent Sound-Trip Adjustment

See notes on high voltage. The video intermediate frequency is 12.75 megacycles (12.75 kc) for the position of the video carrier and extends substantially flat, with no alignment required. No alignment adjustment, as all tuning is of a fixed type which will not develop misalignment. In order to signal-trace this circuit to locate any defective tubes or component parts, the following procedure may be used:

Remove video output cable from the 180SP4 tube. Connect a 5-mfd 660 V. condenser in series with one of a rectifier type d-c voltmeter (4-0-4 or 0-15 volts). Connect the side of rectifier meter containing the condenser to pin No. 10 of the picture tube cable socket; the other connection from meter to ground.

The 6J7 oscillator must be stopped by connecting 70 or 100 ohms from the junction of HC-114 and HC-147 to ground. Do not short the oscillator or remove tube.

Turn receiver on to maximum contrast. Connect the signal generator high lead in series with 4-mfd 660 V. condenser to pin No. 4 of modulator tube; ground side of generator to chassis and note the output reading on picture-tube output meter. If no signal results, replace generator connection to pin 4 of the 6J7-I-F tube. If a signal is obtained, trouble exists between modulator and 1st video I-F tube. Should no signal results, replace generator lead to pin No. 4 of 2nd video I-F tube. Use same reasoning as above. In this manner the video i-f continuity can be checked.

In the event no signal is obtained, a check of the video system itself can be made as follows:

Lease generator connected to pin No. 4 of 2nd video I-F tube and connect the circuit shown in Fig. 1. A reading on the VTVM will prove continuity of video detector system. Be sure in this test signal-generator output is on maximum. Also that the VTVM will read a minimum of 25 volt. If not, this method cannot be used.

To test the video system from video detector output to output of video output tube, connect a 15,000-ohm resistor in series, readying lug 4 of the 6J7-I-F tube circuit—from one side of 15,000-ohm resistor and ground, connect standard signal generator (Fig. 2) set for 300 or 500 kc and increase output attenuator until a signal is obtained on the output meter. Obviously, same signal indicates trouble in the associated parts proceeding or following the video output tube or the picture-tube connecting cable. Hence, test continuity for input and output of 6V6 video output tube along with checking output tube and voltages.

When the above test indicates an actual signal up to picture-tube pin No. 10 (grid), and trouble still exists, the difficulty is then in the picture tube.

14.25-MC Adjacent Sound Trops

With rectifier meter connected from pin No. 10 of picture-tube cable to ground, connect signal generator from pin No. 4 of the 1852 modulator tube and ground through a 4.5-0-4.5-0-15 volts. Connect generator accurately to 14.25 mc (14,250 kc). Use highest output of the signal generator and adjust 14.25-mc trimmers "A" and "B" (see tube layout) for maximum output. This test must be carried out accurately, or picture quality will be materially impaired.

Radio-Frequency Alignment

Since the r-f unit of this receiver is aligned with great precision at the factory, and because the design of the parts have been found exceedingly stable under all operating conditions, it is most unlikely that realignment will be necessary. However, in the case the adjustments are changed for any reason, realignment should be carried out in the following manner.

Note: These instructions apply to television channels 1 and 2. A, 2. 1, your set is equipped for receiving other channels, follow the special data supplied by the Andrea factory. Accurate realignment will be the chassis during alignment.

1. Because of the design of the r-f unit, band 2 must be aligned first, and band 1 last. Incorrect settings will be obtained if band 1 is aligned first.
2. Be sure that the sound i-f system has been adjusted accurately to 8.25 mc. Otherwise, the r-f alignment will not be correct.
3. Set sound sensitivity trimmer so that rotor plate is half maximum capacity (half-open).
4. Signal generator capable of generating accurately frequencies from 40 to 60 mc. (40,000 to 60,000 kc), 400 cycles modulated, is required for this alignment. Be certain in mind that accurate frequency setting is essential and any attempt to use harmonics will involve wide misalignment or poor or no results.
5. Connect ground side of signal generator in series with 70 0-70 0-15 volts to terminal "A" of antenna post. Connect high side of generator directly to other terminal "A" on antenna strip. Do not connect a ground to the receiver. Set generator accurately to 55.75 mc. (55,750 kc).
6. Turn channel switch to channel 2.
7. Connect a rectifier-type meter 0-1 volt across the voice coil of the loudspeaker.
8. Loosen the brass top cup locknut on oscillator condenser 2, tube layout, so that the plunger moves easily but is not loose. A tool with a small plunger to look into hole in plunger will provide more accurate adjustment.
9. Adjust the oscillator condenser 2 (tube layout) plunger for maximum output deflection on the meter across speaker voice coil. Tighten the brass top cup locknut part way. When the brass top cup locknut is nearly tight, readjust the plunger. Then tighten the brass top cup locknut firmly and watch output deflection on meter to see that tuning is not changed.
10. Complete a rectifier-type meter 0-1 volt from pin No. 10 on the picture-tube socket to ground through a 4.5-0-4.5-0-15 volts, 600 V. paper condenser.
11. Adjust the signal generator frequency to 25.3 mc (25,300 kc).
12. Turn the chassis on its side for ease of adjustment. Set antenna trimmer so plunger is all in (max. cap.) and slip a metal Spinitite wrench through the hole in the under shield cover of chassis so that end of metal spinitite passes over the tabular bottom end of antenna condenser 2, thereby detuning the circuit. Be certain that metal spinitite does not ground to chassis.

Note: If this is not carried out, no realignment can be made.

13. Leave metal spinitite as above and loosen the brass top cup locknut on grid condenser 2. Adjust the plunger for maximum output as indicated on the meter in the picture cable circuit. Then tighten the brass top cup locknut and readjust the plunger again, and tighten the brass top cup locknut firmly, noting that peak tuning is not reduced by tightening it so, readjust.
14. Remove the metal spinitite from antenna condenser 2, and put it on grid condenser 2.
15. Loosen the brass top cup locknut on antenna condenser 2 and adjust the plunger for maximum picture output, as indicated by the meter. Then tighten the brass top cup locknut as fast as you can, readjust the plunger, and tighten the brass top cup locknut firmly, noting that peak tuning is not reduced by tightening it so.
16. To align Band 1, carry out the same steps to 15 using 49.75 mc for the signal generator (step 3) and switch on channel 1 (step 6), and adjust oscillator condenser 1 (step 9).
17. Use 46.5 mc for the signal generator (step 11) and use antenna condenser 1 for step 12, and adjust grid 1 for step 13. For step 14 use grid condenser 1, and antenna 1 for step 15.
Philco 39-25

A few of the early production Model 39-25 Philco receivers had the bass-compensating condenser in the volume-control circuit improperly connected. The indication of such incorrect connection is a lack of high notes at low settings of the volume control. Above is shown the incorrect and the correct connections. The schematic of this receiver shown on page 10-9 of Rider's Volume X shows the correct connections.

Majestic 11056, 11057, 11058

Models 11056 and 11058 are found on pages 8-9 to 10-10 of Rider's Volume IX. The data given there also apply to Model 11057. A new electric tuning system has been incorporated in later runs of all these receivers, and is illustrated in Fig. 1. The procedure for indexing the tuning system for desired stations is as follows:

1. Set receiver to Standard Broadcast band.
2. Place "Manual-Electric" lever in "Manual" position, which is extreme counter-clockwise. Be sure the tone control is in the "Normal" position as shown by the indicator.

Philco 620

Certain oscillator trimmers are incorrectly numbered on pages 6-26 and 6-27 of Rider's Volume VI (early Model 620 Philco). In the parts list on page 6-26, the reference numbers should be changed as follows: Change 13 to 16; change 14 to 17; change 16 to 13; change 17 to 14. The same changes should be made on page 6-27 in Fig. 2 and in the alignment instructions located below this figure. These changes must be made so that the reference numbers will agree with those shown on the schematic which appears on page 6-25. Do NOT alter the numbers on the schematic.

These errors in numbering also appear in the parts list for the late Model 620 Philco. Therefore the reference numbers on page 7-90 of Rider's Volume VII must be changed as follows: Change 13 to 16; change 14 to 17; change 16 to 13; change 17 to 14.

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Remler 49, 171

The Remler Model 171 is identical with Model 49, shown on page 9-3 of Rider's Volume IX. The following additional information, not included on page 9-3, is now available.

The antenna-RF coil is located near the back of the chassis and is trimmed by the trimmer on the rear section of variable condenser. The detector coil is located under the chassis and is trimmed by the trimmer on the front section of the variable condenser.

The following table shows the d-c voltages to ground with no signal and the volume control at full volume.

<table>
<thead>
<tr>
<th>Tube</th>
<th>Plate</th>
<th>Screen</th>
<th>Cathode</th>
</tr>
</thead>
<tbody>
<tr>
<td>636</td>
<td>180</td>
<td>180</td>
<td>4.5</td>
</tr>
<tr>
<td>6C6</td>
<td>70</td>
<td>180</td>
<td>9.0</td>
</tr>
<tr>
<td>41</td>
<td>170</td>
<td>180</td>
<td>0</td>
</tr>
</tbody>
</table>

The d-c voltage of the bias supply for the 41 grid is a 15-volt drop across resistor (9) in the negative side of the power supply.

Airline 62-362 Issue B

Several changes are included in Issue B of the Model 62-362 Airline receiver (above serial number 8J285-200) as compared with the Model 62-362 shown on Montgomery-Ward pages 9-45 to 9-47 of Rider's Volume IX. Fig. 1 shows that condensers C1, C4, C5, C6, and C9 are mounted in the same unit in Model 62-362, Issue B. Fig. 1 of course corresponds to the layout shown in the upper-left-hand corner of page 9-45.

Fig. 2 shows the output end of the schematic for Issue B of Model 62-362. By comparing Fig. 2 with the corresponding portion of the schematic shown on page 9-45, you will notice the new position of the tone control consisting of R14 and C20, and also the two resistors R16 and R17 added across the winding of the phonograph pickup coil.

The accompanying table lists the part numbers and descriptions for Model 62-362 Issue B which are different from those listed on page 9-45.

<table>
<thead>
<tr>
<th>Schematic Part</th>
<th>Reference Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>BE12456</td>
<td>3.35 mmf adjustable trimmer</td>
</tr>
<tr>
<td>C4</td>
<td>BE12456</td>
<td>2.15 mmf</td>
</tr>
<tr>
<td>C5</td>
<td>BE12456</td>
<td>2.15 mmf</td>
</tr>
<tr>
<td>C6</td>
<td>BE12456</td>
<td>2.15 mmf</td>
</tr>
<tr>
<td>C9</td>
<td>BE12456</td>
<td>450 mmf working capacity, series pad</td>
</tr>
<tr>
<td>C20</td>
<td>BE1292</td>
<td>0.005 mfd, mica</td>
</tr>
<tr>
<td>C22</td>
<td>BE10092</td>
<td>0.001 mfd, 600 v</td>
</tr>
</tbody>
</table>

Philco 630, 630PF

Certain oscillator trimmers are incorrectly numbered on pages 6-32 and 6-33 of Rider's Volume VI (early model 630 Philco). In Fig. 2 and in the alignment instructions, both on page 6-32, the reference numbers should be changed as follows: Change 13 to 16; change 14 to 17; change 16 to 13; change 17 to 14. The same changes should be made in the parts list on page 6-33. These changes must be made so that the reference numbers will agree with those shown on the schematic which appears on page 6-31. Do NOT alter the numbers on the schematic.

These errors in numbering also appear in the parts list for the late Model 630 and the Model 630PF Philco. Therefore the reference numbers on page 7-98 of Rider's Volume VII must be changed as follows: Change 13 to 16; change 14 to 17; change 16 to 13; change 17 to 14.

Stromberg 160-L

Variations in new 6J7 tubes have occasionally caused distortion in the automatic tone-control circuit of the Stromberg Model 160-L receiver as first released. These tubes function correctly after "aging" a few hours.

By adding the wire indicated, distortion can be eliminated from the automatic tone control circuit of the Stromberg Model 160-L.

This possibility of distortion can also be eliminated by adding a wire as shown in the accompanying layout. This change stabilizes the screen voltage; it was put in effect at the factory in all 160-P and 180-L receivers, and in all 160-L receivers produced after October 23, 1936.

Philco 37-62

In order to eliminate oscillation, the screen resistor, No. 11, has been changed from 25,000 ohms to 32,000 ohms. See schematic on page R-19 in Rider's Volume VIII.

Fairbanks-Morse 12A

Refer to the schematic shown on page 9-11 of Rider's Volume VIII. During production, the 47,000-ohm resistor in the AVC line which was connected to the bottom of the antenna coil secondary, and the condenser (4) were removed. The r-f secondary was then grounded directly, thus removing AVC from the 6L7G mixer tube, and the bottom of the antenna coil secondary was connected directly to the resistor (16). The condenser (33) in the grid circuit of the 6CSG oscillator was changed from 50 mmf to 100 mmf to increase sensitivity on the u-h-f band.
Wells Gardner Tuning Indicators

It may happen in some 1938 and 1939 receivers in which is incorporated either a 6U5 or 6AB5 tuning indicator tube that distortion or overloading will result when strong signals are tuned in. Such troubles may be caused by grid current in the tuning indicator tube. An example of such receivers are those whose schematics appear on page 10-13 and 10-27 of Rider’s Volume X.

It will be noted that the control grid of the triode section of the 6U5 and 6AB5 tubes is connected to the r-f circuit and consequently any grid current that flows will affect the r-f voltage. It is suggested by the manufacturer that if such troubles occur, that one or more new tubes be tried and the results checked.

- RCA 9TX-31, -32, -33

In cases where repeated failure of the 24-ohm, dial lamp resistor, and the lamp itself have occurred, the following revisions are suggested:

Remove all the connections from terminals Nos. 2 and 4 of the terminal board—see Fig. 1—and from terminals Nos. 2, 5 and 6 of the 35Z4GT tube socket.

Resolder the pilot lamp lead, which was removed from the No. 4 terminal of the terminal board, and the power lead that was removed from No. 6 terminal of the tube socket, to the No. 2 terminal of the rectifier socket. See Fig. 2.

Resolder the pilot lamp lead that was removed from the No. 6 terminal of the socket, to the No. 3 terminal. Add a jumper between the Nos. 3 and 5 terminals of this same socket.

Resolder the 0.65-mf condenser lead that was removed from the No. 6 terminal to the No. 5 terminal of the same socket. The other side of this condenser remains connected to the No. 1 terminal of the terminal board.

Insert an 86-ohm resistor in the lead between the No. 7 terminal of the rectifier tube socket and the No. 2 terminal of the 35L6GT output tube socket.

Replace the 35Z4GT rectifier tube with a 35Z5GT and the No. 47 lamp with a No. 51.

The schematic of this receiver will be found on page 10-43 of Rider’s Volume X.

- Silverstone 6109, 6110, 6111

A later production run of these models, which is identified by the chassis No. 101,508-1, has had a new model number assigned, 6109. Please add that to your index and on page 10-78 of Rider’s Volume X.

The condenser, C9, in the cathode circuit of the detector, has been changed in this new chassis from 0.25 mf to 10 mf. This is a 10-volt electrolytic condenser, the part number being 101209144.

If trouble should be experienced from hum in the original chassis, 101,508, it can be corrected by connecting a 10-mf condenser across the 0.25-mf condenser, C9, mentioned above. The positive lead of the condenser should be connected to the cathode of the 6J7 detector tube and the negative lead to the chassis.

- Stromberg-Carlson 460-PF

The servicing data for the model 360 which appeared on pages 10-35 to 10-39 inclusive in Rider’s Volume X, apply to this new model with the following exceptions:

A volume-control motor is installed in these receivers and a remote control unit that is identified as P-31860 may be easily connected if so desired. This unit permits the operation of the receiver from a remote point.

An additional phonograph compensation is incorporated in the Stromberg-Carlson Model 460-PF as shown in the above partial schematics.

An automatic record changer is used in this receiver, which will automatically play up to eight records, 10 or 12 inch, in any order. Additional phonograph compensation has been added, as shown in the accompanying diagrams.

- Holson 40A1X

The same schematic applies to this model as applied to models 104, 106 which was published on page 8-4 in Rider’s Volume VIII, with the exception that a 6KB6 replaces the 6A7 first detector-oscillator tube.

The socket layout, which appears on the same page as the schematic, can be also applied to this new model if the following exceptions are taken into consideration: The positions of the 80 and 41 tubes are interchanged, i.e., the 80 is now immediately beside the power transformer. The 76 and 6F5 tubes are interchanged, i.e., the 76 is now at the rear of the chassis. The wave-trap trimmer is now reached from the back of the chassis—between the 6D6 tube socket and the first i.f. transformer—instead of the right side and the broadcast oscillator series trimmer is now located just to the left of the gang condenser on the top of the chassis, instead of the front.

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G.E. H-500, 501, 510, 511, 520, 521

The preliminary data on these receivers that were published in Rider’s Volume X, page 10-47, are the same as the final with the exception of the condenser, C-12, in the volume control circuit. This has been changed from 0.002 mf to 0.03 mf for the improvement of performance.

At the time Volume X went to press, the voltage data and the chassis wiring diagram were not available. These are reproduced in the accompanying illustrations. The special servicing information that is the subject of the article on page 1 of this issue applies to these receivers and should be used when checking over the circuits.

The following notations apply to the chassis wiring diagram. The parts shown in solid lines are those of Model 520. The same parts apply to Model 521 with the addition of R-11 and C-19, which are shown in dotted lines. For Models 500 and 510, the parts are the same as for Model 520 except that the Beamoscope parts and C-20 are omitted but C-1, shown in dotted lines, is included. Models 501 and 511 have the same parts as Model 521 with the exception of the Beamoscope and C-20, which are omitted, and the inclusion of C-1.

**Capehart 200-F**

The alignment procedure for Model 200-F is the same as that for Model 110-G, shown on page 10-4 of Rider’s Volume X, the only exception being that Model 200-F uses a 6L7 first detector instead of a 6A8. The accompanying simplified chassis layout shows where the trimmers are located in Model 200-F.

**G.E. GM-125**

A second method for aligning the frequency-modulated General Electric receiver Model GM-125, the service data for which appear on pages 10-34 to 10-36 inclusive in Rider’s Volume X, will be found below. This method of alignment does not require the special signal generator mentioned in the first published instructions.

To align the i-f amplifier, connect an electronic voltmeter (or any other d-c voltmeter which has a high input resistance) across R15. Feed a 3-mc signal to the grid of the third i-f tube. Temporarily shunt the secondary winding of T7 with a 10,000 or 15,000-ohm resistor and adjust C49 until the voltmeter reading is a maximum. Then remove the secondary shunting resistor and adjust C49 for maximum reading on the voltmeter. Then connect the shunting resistor across T6 secondary, feed the 3-mc signal to the second i-f grid and peak the trimmers of T6 in the same manner. Repeat this process for each of the i-f transformers in turn until all are aligned.

The frequency demodulator circuit may also be aligned with the voltmeter and signal generator. Feed a 3-mc signal to the input of the i-f amplifier and connect the voltmeter from the cathode connection of R18 to ground. A small voltage reading usually will be indicated if the circuit is slightly out of adjustment. If not, adjust C51 until a reading is secured. Then adjust C50 until the voltage reading is a maximum. After this is done, adjust C51 until the voltmeter reads zero.

The discriminator alignment is then complete.

The r-f and oscillator stages are aligned by feeding a 42.8 mc signal to the antenna terminals and, with the receiver tuned to this point on the dial scale, adjusting the oscillator trimmer C4 for maximum reading on the voltmeter, which should be connected across R15. Then peak the antenna and r-f trimmers (C2 and C3) in the same manner.

**RCA R-98**

If a complaint is received of excessive hum in this model, the schematic of which will be found on page 10-95 of Rider’s Volume X, the dress of the lead to the pilot light should be checked. This lead should be placed towards the rear of the chassis base, well away from the audio circuits.
Crosley 758

The alignment instructions for this receiver were released too late for publication in Rider's Volume X in which the schematic and chassis layouts will be found on page 10-43. It should be noted that two sets of i-f transformers are used; one set is tuned to 455 kc and the i-f peak of the other set is 3000 kc, the latter being designated as "H.F." in the layout.

The output meter is connected to the two plates of the 6N6 output tube with a 0.1-mf or larger (non-electrolytic) condenser in series with one of the leads.

I-F Alignment at 455 kc:

Connect the signal generator through a 0.02-mf condenser to the grid cap of the 6K8, leaving the grid clip in place and the ground lead to the black lead of the receiver. Keep the generator leads as far away as possible from the grid leads of the other screen grid tubes. Tuning condenser plates out of mesh. Volume control to right, "on." Band switch to broadcast. Signal generator set at 453 kc.

Adjust the two rear trimmers on top of the third i-f diode transformer for maximum output. Adjust both trimmers on top of the first B.C. i-f transformer for maximum output.

I-F Alignment at 3000 kc:

Connect signal generator set at 3000 kc to the grid of the 6SK7 tube through a 0.02-mf condenser. Clip on the green lead with spade lug soldered to the band switch. Condenser gang all the way open; band switch to H.F.

Open the front trimmer on the 2nd H.F. i-f transformer. Adjust the front trimmer on the 3rd i-f diode transformer and then the rear trimmer on the 2nd H.F. i-f transformer for maximum output. Align front trimmer on the 2nd H.F. i-f transformer for minimum output. Touch up the front trimmer only on the 3rd i-f (diode).

Transfer the signal generator to the top cap of the 6K8 tube, leaving grid cap in place. Align both trimmers on top of H.F. 1st i-f transformer for maximum output.

B.C. R-F Alignment:

Connect output lead of signal generator set to 1570 kc to blue lead of receiver through a 0.0002-mf condenser; ground lead to generator to black lead. Band switch to B.C. and gang condenser open full.

Adjust B.C. oscillator trimmer (second from end on rear chassis flange) for maximum output. Set generator to 1400 kc and adjust B.C. antenna trimmer (first from end on rear chassis flange) for maximum output.

H.F. R-F Alignment:

Connect signal generator set to 24 megacycles through a 250-ohm resistor to the blue antenna lead. Close gang condenser and open H.F. oscillator shunt trimmer (right trimmer on top of gang) ½ turn.

Peak 24-mc signal by adjusting the position of the insulated lead, fastened from oscillator trimmer to gang, with relation to the end of the coil.

Set generator to 47 mc and open gang condenser. Adjust H.F. oscillator shunt trimmer for maximum output.

Set generator to 45 mc and tune in this signal with gang condenser and then adjust antenna shunt trimmer (left on top of gang) for maximum output.

Set generator to 25 mc and tune in with gang. Repeat antenna circuit by adjusting position of wire from antenna trimmer to gang with relation to the end of the antenna coil. If this wire requires moving much, the antenna alignment at 45 mc should be checked.

Zenith 210-5, 211-5, 270-5, 510-5

Chassis 2046, used in Zenith Models 210-5, 211-5, 270-5 and 510-5, contains a few changes as compared with the schematic shown on page 3-1 and page 2729 of the Rider-Combination Manual. The only changes in the schematic are found in the oscillator circuit; the accompanying illustration shows these changes, including both the early and more recent designs. Note that a new part has been added, Part No. 22-179, a series pad; Part No. 22-120 has been removed. In the more recent design, the oscillator coil has been changed from Part No. S-2221 to Part No. S-2586, and the preselector coil has been changed from Part No. S-2222 to Part No. S-2587. Condenser Part No. 22-137, listed on pages 3-1 and 2729 as having a value of 0.5 mf, should be listed as 0.05 mf; please make this change in your Manual. Also note the additional model, Model 510-5, using Chassis 2046.

The following table of d-c voltages applies to Chassis 2046. All readings are taken from socket connections to ground, using a 1000 ohms-per-volt meter; the volume control is turned to the maximum position and the line voltage corresponding to these readings is 117 volts.

<table>
<thead>
<tr>
<th>Tube</th>
<th>Plate</th>
<th>Cath.</th>
<th>Screen</th>
<th>Supp.</th>
<th>Plate</th>
</tr>
</thead>
<tbody>
<tr>
<td>20A R.F.</td>
<td>260</td>
<td>5.3</td>
<td>120</td>
<td>3.5</td>
<td>9.2</td>
</tr>
<tr>
<td>24A 1st Det.</td>
<td>260</td>
<td>5.3</td>
<td>120</td>
<td>3.5</td>
<td>9.2</td>
</tr>
<tr>
<td>37 Cut</td>
<td>310</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>38 IF</td>
<td>260</td>
<td>3.5</td>
<td>120</td>
<td>3.5</td>
<td>8.4</td>
</tr>
<tr>
<td>47 2nd IF</td>
<td>260</td>
<td>10.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>47 Power</td>
<td>260</td>
<td></td>
<td>200</td>
<td></td>
<td></td>
</tr>
<tr>
<td>80 Reg.</td>
<td>120</td>
<td></td>
<td>120</td>
<td>80</td>
<td></td>
</tr>
</tbody>
</table>

The trimmers on the condenser gang should be adjusted at 1500 kc, the series oscillator pad at 600 kc.

Montgomery-Ward 62-403

If distortion occurs of a type which seems as if the receiver were being overloaded and which can not be accounted for in any other way, check the capacity of the 5-mmf coupling condenser, C-33, in the i-f circuit. If this can not be done, substitute another of the same capacity. This condenser has a tolerance of 5% and some cases have been encountered in which the capacity has been raised from 12 to 20 mmf due to an internal short circuit. The schematic diagram of this receiver will be found on page 9-59, 9-60 in Rider's Volume IX.

Wells-Gardner A-12

If mushy reproduction is encountered on a medium or strong signal after the receiver has been operating about ten minutes, it probably is due to grid current in the 6UG7 r-f and i-f tubes. Change the 4-megohm resistor, R-14, to a 2-megohm resistor. If this does not clear up the signals, replace either the 6UG7 r-f or i-f tubes or perhaps both of them. The schematic of this receiver will be found on page 9-35 of Rider's Volume IX.