

COMPLETE INDEX
for
PERPETUAL TROUBLE SHOOTER'S MANUAL
Volume XI
and
"HOW IT WORKS"
Special Section of Volume XI

by
John F. Rider

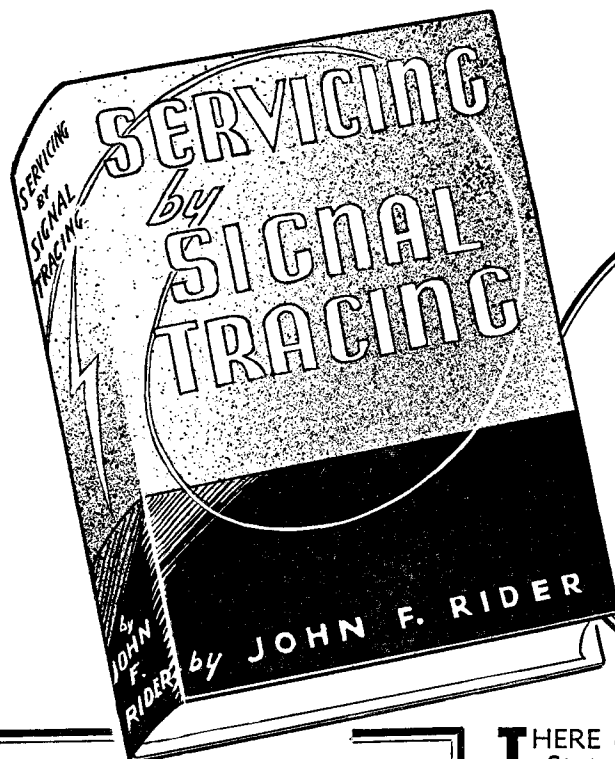
404 Fourth Avenue

New York City

Copyright 1940 by John F. Rider

Printed in the United States of America

A New Book by the Author of the System



Explains
the system of
servicing that will
gear your shop to
modern and future
requirements

Contents

- Chapter I—INTRODUCTION TO SIGNAL TRACING
- Chapter II—AMPLIFIER OPERATION AND THE SIGNAL
- Chapter III—DIODE DETECTOR TUBE SYSTEMS
- Chapter IV—MULTI-ELEMENT DETECTOR SYSTEMS
- Chapter V—OSCILLATOR TUBE SYSTEMS
- Chapter VI—MIXER TUBE SYSTEMS
- Chapter VII—CONTROL CIRCUITS AND VOLTAGES
- Chapter VIII—COUPLING DEVICES
- Chapter IX—THE T-R-F RECEIVER
- Chapter X—THE SUPERHETERODYNE RECEIVER
- Chapter XI—TELEVISION AND FACSIMILE RECEIVERS
- Chapter XII—PUBLIC ADDRESS SYSTEMS
- Chapter XIII—LOCALIZING DEFECTS BY SIGNAL TRACING
- Chapter XIV—SIGNAL TRACING IN RECEIVER DESIGN

THERE are about 40,000,000 receivers in the United States. Each and every one of these receivers comes within the capabilities of signal tracing as a means of locating defects with the greatest speed and efficiency. There is no man connected with the radio servicing industry who can afford to miss reading "Servicing By Signal Tracing" It means actual dollars in the pockets of every radio serviceman because it gives him an insight to radio receiver operation and servicing that has never before been accomplished by any single book or combination of books.

Signal Tracing is destined to become the universally adopted method of locating defects in communication systems, no matter what the nature of the system—whether it is a home broadcast receiver, auto-radio receiver, police receiver, commercial, marine, navy or army receiver. Every public address system, every centralized radio system comes within the capabilities of signal tracing. . . . Television receivers, facsimile receivers and other systems intended for special application can be serviced with equal ease. . . . Signal Tracing, founded upon the signal itself, is the most basic, most fundamental method of trouble shooting ever devised. . . . It is free of every limitation which in the past has hindered speedy service operations. . . . Service operation at a Profit!

You can't afford to be without this book. . . . We mean every word of this statement. . . . It is vital to your immediate welfare—to your future. . . . See your jobber about your copy today—NOW!

360 Pages — Hard Covers
188 Illustrations — Price \$2.00

FOREWORD

Volume XI is a continuation of the "Perpetual Trouble Shooter's Manual" series. In addition to this volume, Volumes I, II, III, IV, V, VI, VII, VIII, IX, and X have been published.

Inasmuch as owners of preceding volumes are familiar with the Manual and with the nature of its contents, an elaborate description is not required. However, it might be well to state that the information presented in Volume XI is condensed as much as possible in accordance with the requests of owners of previous volumes of this publication, but not at a sacrifice of any material. The attempt to condense the text is based purely upon an effort to include the maximum amount of data.

In a number of instances references are made to "conventional alignment." This term is used in conjunction with simple receivers which do not require elaborate alignment instructions. Such conventional alignment was described in the "How It Works" section of Volume VIII, and we feel that so many men are familiar with simple alignment operations that it would be a waste of space to include such alignment in conjunction with many of the receivers contained in this Volume XI.

You will also note that this index, in contrast to previous indexes, covers Volume XI only. This represents a new start, and it is our intention to combine, as the years pass, the various indexes for Volumes XI to XX. If, however, during the next five years, because of bulk, we find it necessary to start another index, it shall be done.

It is of interest, however, to note that some of the items listed in the index bear an asterisk designation. This simply denotes that the material referred to is associated with data printed in the preceding volumes of the Perpetual Trouble Shooter's Manual, and which will be found listed in preceding indexes.

HOW TO USE THIS INDEX

The Volume XI index differs somewhat from previous indexes to the Perpetual Trouble Shooter's Manual, Volumes I to X inclusive. This difference lies in the fact that certain page references associated with Manuals published between 1931 and 1934 are omitted; also in that the structure of the text on the page has been changed.

As to use, the Volume XI index is as simple as the previous indexes. The manufacturers are arranged alphabetically, and the page numbers are consecutive for each manufacturer, with a new series starting for each manufacturer.

An example of the use of this index is as follows:

AIR KING PRODUCTS CO., INC.

MODEL	Page	
4, 23X, 9722, 9822, 9822A, 9823, 9922 .. Schematics, socket, trimmers, volt- age	11-1	
914	Schematic	11-2
920	Schematic	11-2
X937	Schematic	11-3

This means that Model 920 of the Air King receiver is shown in schematic form on page 11-2, which means the second page in Volume XI in the Air King grouping of pages. The Air King receiver 9722 is to be found on page 1 in Volume XI in the Air King grouping of pages.

When seeking any page remember that the manufacturers' names are arranged alphabetically, and that the trade names are identified in conjunction with the selling organization responsible for that receiver. Every attempt is made in the construction of the Manual to list receivers of any one manufacturer in numerical order.

HOW IT WORKS

Special Section of Volume XI

RIDER'S MANUAL

by

John F. Rider



404 Fourth Avenue

New York City

Copyright 1940 by John F. Rider

Printed in the United States of America

HOW IT WORKS

LOOPS

One feature which is evident in the design of many of the newer receivers is the provision for loop operation to eliminate the need for an external antenna. Loops are now being used not only in small midgets but also in the larger multi-band receivers. In portables, a built-in loop is provided in practically all models.

In most instances, the loop is fixed in position within the receiver cabinet, but can be oriented by turning the receiver in the proper direction. An exception is the rotating loop employed in the RCA 46X1. In some, all the inductance is concentrated in the loop itself, while in others a loading coil is placed in series with the loop to build up the inductance to the required value for the range to be covered.

For operation on more than one band, the loop is either tapped, as exemplified by the Philco Model 40-510 shown in Fig. 1, or additional coils or loops are shunted across the main tuning loop to lower the inductance. Provision for using an external antenna and ground is usually made, either by tapping a portion of the loop inductance for connection of the antenna or by an additional winding inductively coupled to the main loop.

Philco 40-510 Loop

An example of a simple loop, tapped for use with an external antenna when such is used, is shown in Fig. 1. Note that the ground connection is made to the outer end of the loop. This is done in order to

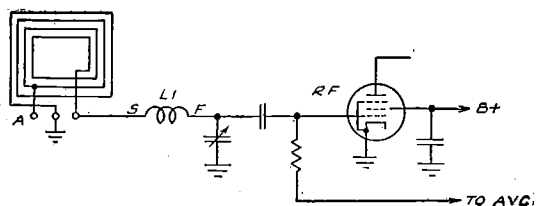


FIG. 1.—The loop used in the Philco Model 40-510 receiver. A tap is provided for use with an external antenna.

minimize variations in capacity to ground which otherwise might be appreciable if the grid were coupled to this point. In operation, the receiver may be moved close to grounded objects and thus additional capacity would be effectively shunted across the tuned circuit. When the grid is connected to the inner end of the loop, this capacity variation is minimized.

The loading coil $L1$ is connected in series aiding with the loop so as to add sufficient inductance to enable full coverage of the broadcast range. The designations S and F refer to the start and finish of the loading coil winding. This connection must be observed when servicing if the tuning range is to be covered.

Belmont 411

Loop operation on both long wave and broadcast bands is secured in the Belmont Model 411, shown in schematic form in Fig. 2, by a combination of loop and series inductances.

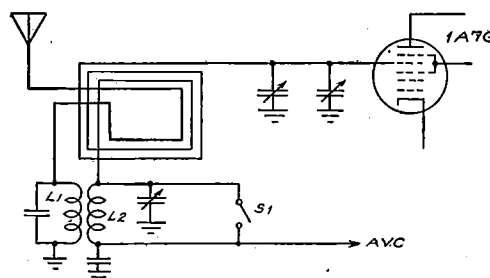


FIG. 2.—The loop employed in the Belmont 411 receiver covers the standard broadcast band and, when $S1$ is opened, the inductance of $L2$ is added so that long-wave operation is secured.

As shown, an antenna transformer is used in conjunction with the loop, the primary coil $L1$ of the antenna transformer being connected in series with the antenna winding of the loop. The secondary winding of the loop is correspondingly connected to $L2$. When operation on the standard broadcast band is desired, closing $S1$ serves to short out the secondary winding $L2$ and the main tuning condenser $C1$ then tunes the loop alone. The primary coil $L1$ remains in the circuit at all times.

Montgomery Ward 93WG-382

In the schematic shown in Fig. 3, two loops are employed in conjunction with a separate tuned coil to cover a frequency range from 528 to 22000 kc in three bands.

For band B, the larger loop is coupled through the band switch to the r-f amplifier grid and is shunted by the tuning condenser C . The auxiliary condenser directly across the loop is used for trimming. When the band switch is shifted to band C, the tuned $L1C1$ is placed in parallel with the loop circuit, reducing its inductance and enabling coverage of the 2200-7000-kc band. $C1$ is used for

trimming on this band. When the band switch is set for operation on band D, the small "D" loop and its associated tuned circuit $L2C2$ are placed in parallel with $L1C1$ and with the larger loop, reduc-

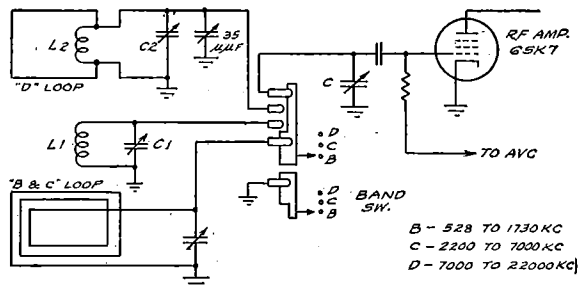


FIG. 3.—In the Montgomery Ward 93WG-382 receiver, shunting inductance across the main loop enables three bands to be covered.

ing the inductance of the circuit to the point where the highest frequency range may be covered.

The G-E Super Beam-a-scope

In the G-E Models H-77, H-78 and H-79 receivers, an electrostatically shielded loop is employed, as shown in Fig. 4. In this schematic, the loop is represented as $L1$ and operates over the broadcast band only, while L is an antenna choke which functions as a parallel feed to the antenna transformers used on short-wave bands.

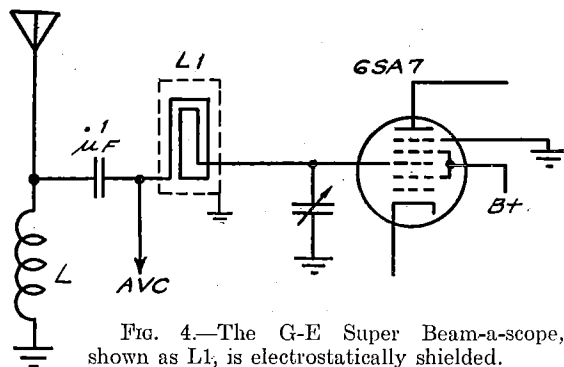


FIG. 4.—The G-E Super Beam-a-scope, shown as $L1$, is electrostatically shielded.

The Faraday shield around the loop acts as a screen against electrostatic disturbances and serves to improve the signal-to-noise ratio. Since noise voltages are composed of electrostatic and electromagnetic components, and the former predominates, by revolving the loop it is often possible to find a point where the voltages induced by these two components will cancel out. Under such conditions, the desired signal may be received without interference. This adjustment is based on the assumption that the noise arrives from a single source and that the desired signal is not in direct line with the noise source.

The Faraday shield itself consists of a number of closely spaced parallel wires which are joined together at one end only, so that no closed loop results.

Zenith Wavemagnet

In many Zenith receivers, an electrostatically shielded loop, called a Wavemagnet, is used. When the wavemagnet is employed with receivers covering more than one band, a switching arrangement as shown in Fig. 5, is used.

The loop is designated in the schematic as $L1$, and is surrounded by two shields. When the switch $S1$ is thrown to the wavemagnet position, these shields are connected together and are returned to ground through the low-impedance short-wave primary winding and a blocking condenser of .05 mf.

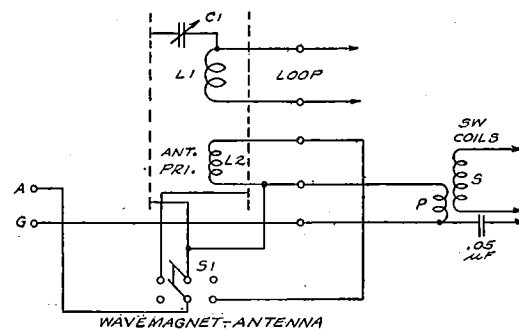


FIG. 5.—Another electrostatically shielded loop is the Zenith Wavemagnet, shown as $L1$ in the above diagram. The trimmer condenser $C1$ is used to compensate for variations in the distributed capacity between the shield and the loop winding and thus enables better tracking over the high-frequency portion of the standard broadcast band.

The loop is tuned only over the standard broadcast band; on short-wave bands, the loop assembly acts as a small antenna coupled to the short-wave input transformer primary winding.

When $S1$ is thrown to the Antenna position, the connection between the two shields is opened and the outer shield serves as a small antenna which is capacity coupled to the loop by $C1$. When an external antenna is employed, the coil $L2$ serves as a coupling means to the loop circuit. This coil functions only when an antenna is used.

A feature of special interest concerning the Wavemagnet loop is that it may be removed from the cabinet of portable receivers and can be fastened by means of vacuum cups to windows, sides of buildings, etc. This makes it possible to operate the receiver in shielded buildings, trains and other places where the signal pickup at the receiver itself is low, due to shielding.

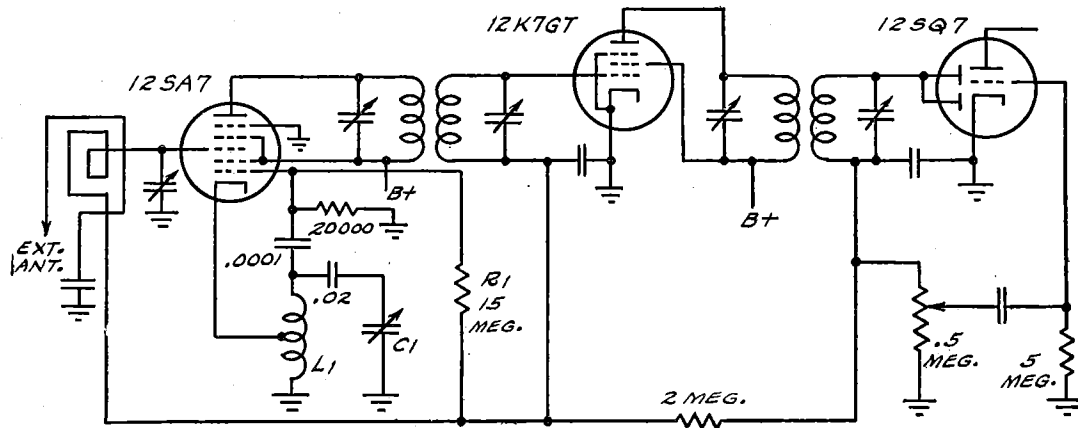


FIG. 6.—In the Farnsworth C1-1 receiver, a portion of the d-c voltage across the oscillator grid leak is used to provide delayed avc action.

OSCILLATOR VOLTAGE FOR BIAS CONTROL

A new method of obtaining a limiting bias on amplifier tubes is incorporated in the Farnsworth C1-1 receiver as shown in the schematic, Fig. 6. This is accomplished by feeding a portion of the rectified d-c voltage across the oscillator grid leak into the avc network. In this manner, sufficient control grid bias is applied to amplifier tubes so that the plate current does not become excessive when the signal level is so low that avc action is not present. This feature eliminates the need for cathode bias and provides an automotac control of sensitivity for variations in oscillator output over the operating range.

In the circuit shown, a negative voltage is normally developed across the 20,000-ohm oscillator grid resistor which varies with the strength of oscillation. This voltage is of the order of -10 to -30 volts in different receivers. As you will note, a portion of this voltage is applied to the avc bus through the resistor $R1$. The portion of this voltage so ap-

plied is approximately determined by the ratio of the resistance in the avc network to the total circuit resistance which includes $R1$. In this circuit, the avc network is composed of a 2-meg resistor and the diode load, a 0.5-meg volume control. The fraction of the total d-c voltage across the oscillator grid resistor which is present at the junction of the 2-meg and 15-meg resistors is therefore substantially equal to $2.5/15 + 2.5$ or $1/7$. If the voltage across the oscillator grid leak is -15 volts, then the actual voltage applied in this manner to the avc system is $1/7$ of -15 or about -2 volts. Actually, the voltage under these conditions will be slightly less than this due to the loading effect of the diode across the 0.5-meg volume control.

Since the oscillator voltage varies to some extent over the operating range, the voltage fed into the avc system in this manner will also vary accordingly. Since the conversion gain of the converter tube decreases if the oscillator voltage drops below a certain value, an automatic compensation for this decrease in gain is obtained. For, when the voltage

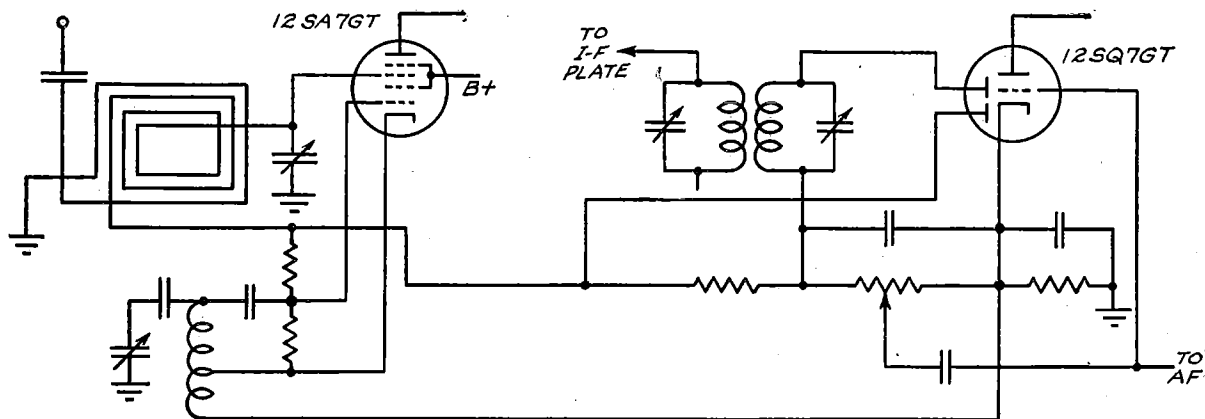


FIG. 7.—The circuit used in the Emerson CV264. This is another example of the application of a portion of d-c voltage across the oscillator grid leak for bias control.

across the oscillator grid leak decreases, the voltage fed into the avc system also decreases, thus increasing the gain of the controlled stages.

Delayed avc action also results from the use of this method. The negative voltage thus fed into the avc network is applied to the diode through the 2-meg resistor, preventing rectification until the signal voltage is greater than the negative voltage thus applied. The voltage which reaches the diode is lower than that applied to the avc bus due to the drop across the 2-meg resistor.

This feature is also incorporated in receivers of other manufacture, such as the Emerson Model CV264, Fig. 7.

POWER-SUPPLY FILTER SYSTEMS

In the past, the field coil of the usual electrodynamic speaker has often served as an inductance in the power-supply filter system. Now that the permanent-magnet dynamic speaker is becoming so widely used, in which no inductance is available for filtering purposes, resistance-capacity filters are becoming more common.

Since the current drain of all the tubes in a radio receiver amounts to an appreciable total, the values of the resistances used in power-supply systems cannot be high or the output voltage will drop. Consequently, to obtain sufficient filtration, the values of capacity are increased above those usually employed in choke-and-condenser filter systems. In addition, the heavy plate current drain of output power tubes is usually drawn from some section of the power-supply filter system where hum filtration

is less, since more hum can be tolerated in the amplifier output circuit than in a preceding stage because the hum will not be further amplified.

Montgomery Ward 93BR Series

A resistance-capacity filter in one of its simplest forms is shown in Fig. 8. This is the circuit em-

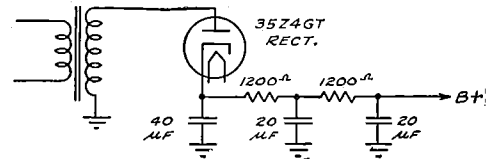


FIG. 8.—The power supply filter system of the Montgomery Ward 93BR series. Note that no filter chokes are employed.

ployed in the Montgomery Ward 93BR Series. Note the high values of capacities employed in this two-section filter. The resistance values are kept low and do not exceed materially the d-c resistance of many speaker field coils.

General Electric HM-136

A more elaborate resistance-capacity power-supply filter system is shown in Fig. 9. In this General Electric receiver, the high plate current drain of the two 6L6G output tubes is taken off the power supply ahead of the resistance elements of the circuit. While a high hum voltage is thus impressed on the output tube plates, the hum voltage on each plate of the push-pull output is equal and opposite in phase, therefore it is canceled out and does not appear in the speaker output.

Note that the screen supply is taken off the first section of the filter, thus providing a somewhat lower voltage and sufficient filtration. The second

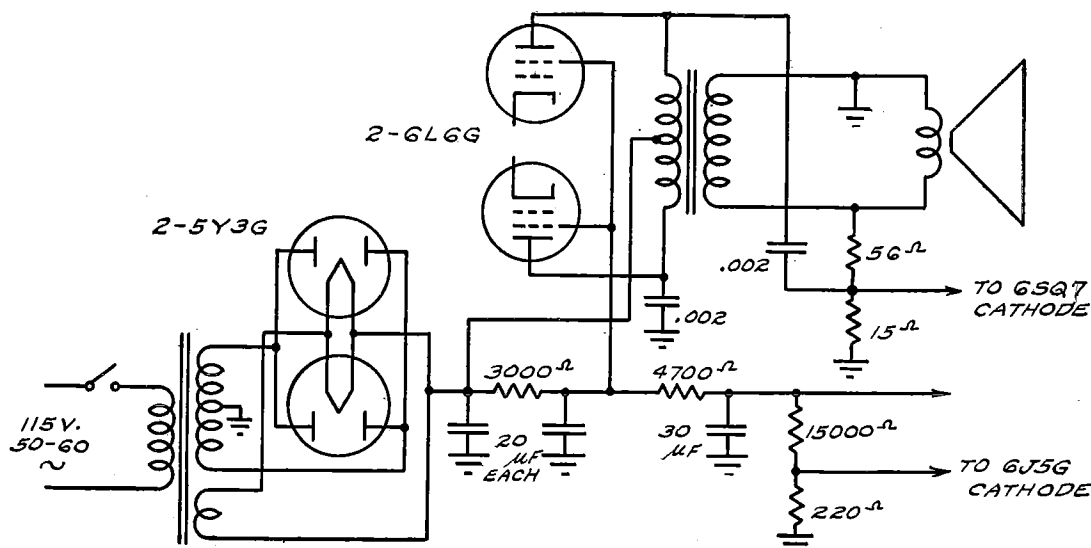


FIG. 9.—The resistance-capacity power-supply filter system employed in the General Electric HM-136 receiver.

section of the resistance-capacity filter employs somewhat higher values of resistance and capacity, since the filtration required for the amplifier tubes is greater. The 15,000 and 220-ohm resistors form a bleeder which prevents excessive voltage surges when the set is first turned on. Due to the fact that filament-type rectifier tubes are used in conjunction with heater-type amplifier tubes, the rectifier tubes will supply a high voltage before the amplifier tubes reach normal operating temperature and consequently before their plate current becomes normal.

RCA Model 46X21

An unusual power-supply filter system is employed in the RCA Model 46X21 receiver, a partial schematic of which is shown in Fig. 10. Note that

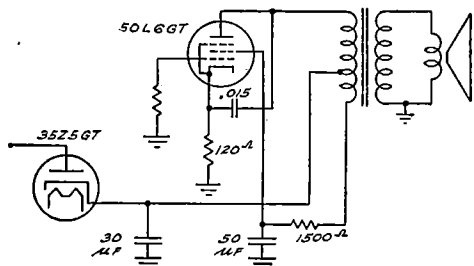


FIG. 10.—In the RCA 46X21 receiver, a portion of the output transformer primary is tapped to form a part of the power-supply filter system.

a portion of the output transformer primary winding is tapped to form a part of the filter network, in combination with a 1500-ohm resistor. The partly filtered power-supply voltage is fed to the

NEW NEGATIVE FEEDBACK CIRCUITS

Simplified inverse feedback circuits are employed in a number of receiver models of different manufacture. In its simplest form, negative feedback is obtained by omitting the usual cathode bypass condenser across the power tube cathode resistor, as shown in Fig. 12. This circuit is employed in many of the smaller receivers, and by employing a somewhat higher plate load impedance increased power output is obtained without excessive distortion. The customary value of cathode resistor remains unchanged.

The effect of this omission of the cathode bypass condenser is to raise slightly the effective plate resistance of the tube, whereas in other methods the action is to cause the tube to function as if the plate resistance were lower.

tap on the output transformer primary and thence to the plate of the 50L6GT. The hum voltage present at the plate is reduced by the degenerative action of the unbypassed cathode resistor. The screen supply is more completely filtered by the 1500-ohm series resistor and its associated 50 mf filter condenser.

Farnsworth C4-1 Series

In the diagram shown in Fig. 11, the power-supply filter system is somewhat conventional, except

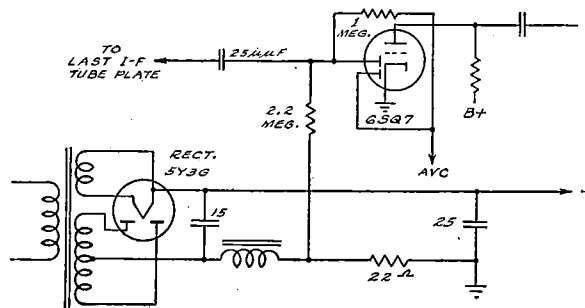


FIG. 11.—The avc delay voltage in the Farnsworth C4-1 series is applied through the 2.2-meg resistor.

that the choke and resistor are in the negative leg of the filter system. The feature here is that avc delay bias is taken off the junction of the filter choke and the 22-ohm resistor. This negative voltage is applied to the avc diode through the 2.2-meg series resistor. This high resistance is necessary in order to prevent any undue loading of the diode circuit.

In operation, the effective signal input to the tube is composed of the a-f signal applied from the preceding stage and that portion of the output signal developed across the cathode resistor. Since the latter voltage is out of phase with that of the incoming signal, it tends to oppose, and therefore reduce, the total signal voltage from grid to cathode.

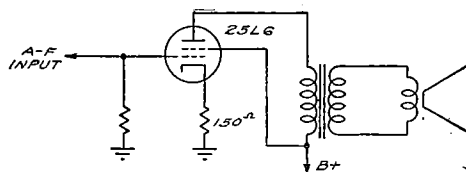


FIG. 12.—In the above circuit, negative feedback is obtained by simply omitting the cathode bypass condenser.

Since the harmonics thus fed back are also in phase opposition to those present in the input signal and are proportionately greater in magnitude, the action

is to reduce the harmonic components in the output signal and consequently the distortion.

Another simple method is employed in the Stromberg-Carlson 400-H series, shown in Fig. 13. The 1-meg resistor, joining the plate of the output tube to that of the preceding stage, serves to feed a por-

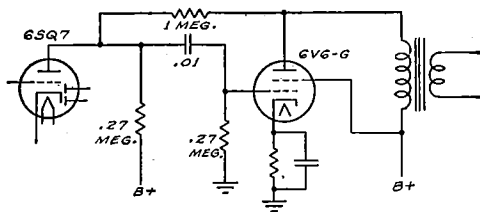


FIG. 13.—In the Stromberg-Carlson 400-H series, the feedback voltage is applied through the 1-meg resistor.

tion of the output signal voltage into the plate circuit of the preceding tube. Since the output signal voltage is positive at the instant when the signal at the 6SQ7 plate is negative, the feedback is in opposite phase.

The percentage feedback introduced in this manner amounts to about 12 percent. This is determined by the ratio of the value of the effective input load resistance of the 6V6-G to the sum of the input load resistance and the feedback resistance. The effective input load is composed of the .27-meg plate load resistor and the grid resistor of similar value, which may be considered to be in parallel. The parallel load thus becomes 135,000 ohms. The ratio of 135,000 to $135,000 + 1,000,000$ is about $\frac{1}{8}$; and $\frac{1}{8} \times 100\%$ equals about 12%.

In many of the newer receivers, negative feedback is introduced in the volume-control return cir-

cuit. When used in this manner, the percentage feedback is determined by the volume-control setting and is greater when the control is set near minimum.

One method of doing this is shown in Fig. 14 which is a partial schematic of the circuit employed in the Gamble 867A receiver. The volume control returns to ground through the voltage divider, $R1$ and $R2$, shunted across the output transformer secondary. Since $R2$ is 25 ohms and $R1$ is 100 ohms, the percentage feedback is equal to $25/100 + 25$ times 100% or 20%. This value represents the maximum percentage feedback.

The percentage feedback introduced into the first a-f grid circuit is dependent upon the volume-control setting, as illustrated in Fig. 15. In this diagram, you will note that the feedback voltage is divided by $R3$ and $R4$, representing the volume control and the first a-f grid resistor. When the volume control is near maximum, as shown, the

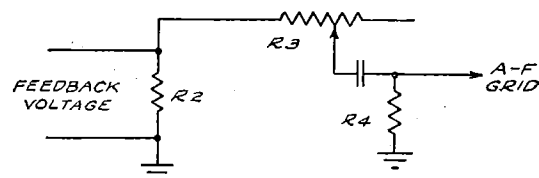


FIG. 15.—The amount of feedback voltage is dependent upon the volume control setting, as shown above.

feedback voltage is reduced by the voltage drop across $R3$. Under such conditions, since the feedback is less, the gain of the amplifier is greater. When the volume control is set near minimum, the amount of resistance in series with $R4$ is decreased

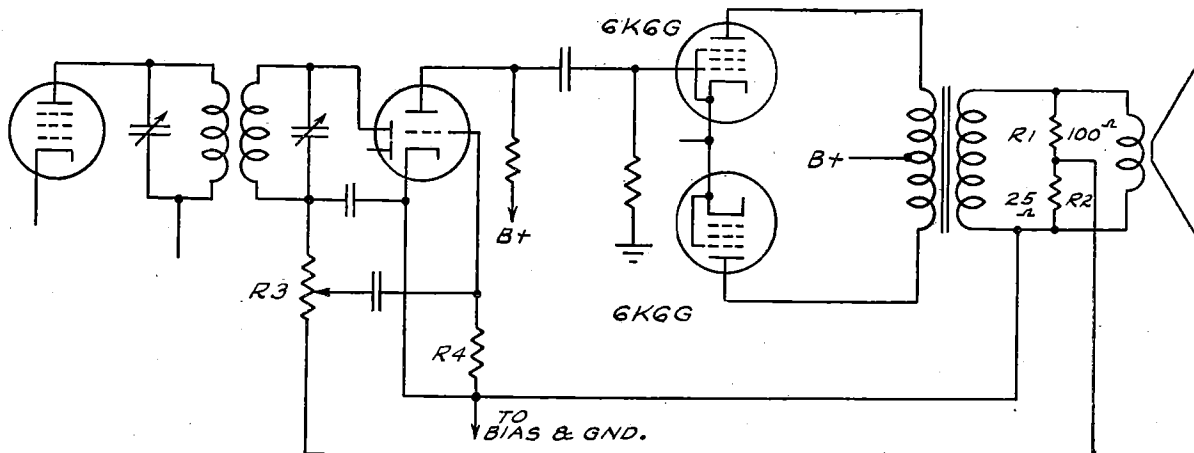


FIG. 14.—In the Gamble 867A receiver, negative feedback is introduced in the volume control circuit by returning the volume control to ground through a voltage divider network across the speaker voice coil.

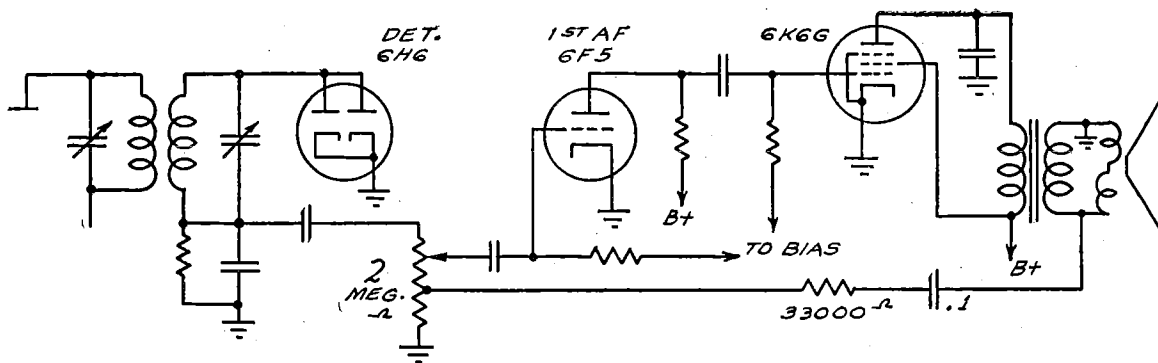


Fig. 16.—Another method of applying negative feedback to the volume control circuit is shown above. This circuit is used in the G-E G-75 receiver.

and consequently the feedback voltage is increased. This causes a decrease in output of the a-f amplifier beyond that contributed by the reduced volume-control setting. Also, since the negative feedback is increased, less distortion is present in the output.

This arrangement has the advantage that maximum feedback is available when most needed—on strong, local signals—while for weak signals maximum gain is obtained, which is the primary consideration under such conditions.

In the General Electric G-75, inverse feedback is obtained in the same manner as described above, though the circuit, as shown in Fig. 16, differs somewhat. The feedback voltage is fed to a tap on the volume control through a 33,000-ohm series resistor and an 0.1-mf condenser. The action, insofar as strong and weak signals are concerned, is similar to the system employed in the Gamble receiver previously described. In addition, the presence of the 0.1-mf condenser introduces another compensating effect. At low frequencies, when the reactance of the condenser is high, the feedback voltage is decreased, while at high frequencies the opposite effect results. Since the gain of the amplifier increases as the feedback decreases, the effect is an increase in gain at the lower frequencies which compensates to some extent for any falling

off in the normal response of the amplifier and speaker at low frequencies.

Power Sensitivity

Negative feedback reduces the power sensitivity of any amplifier. Power sensitivity is defined as the ratio of the output power in watts to the square of the input audio signal in volts (rms) as in the equation below:

$$\text{Power Sensitivity} = \frac{\text{Watts Output}}{(\text{Input Signal Volts})^2}$$

For example, if a 1/10 volt audio signal must be applied to the first audio grid of a two-stage audio amplifier to produce one watt output, the power sensitivity, expressed in mhos, is equal to $(1/0.1)^2$, or 1/.01 which equals 100 mhos. Most audio amplifiers in typical commercial receivers have a power sensitivity around this figure.

Since the gain is reduced when negative feedback is employed, the power sensitivity decreases also. In order to make up for this loss, it is customary to provide somewhat greater gain in amplifiers designed to be used with negative feedback. Alternatively, the feedback is so arranged as to have maximum effect over one portion of the a-f range and less over other portions.

NEW RADIO-FREQUENCY COUPLING CIRCUITS

In an number of the new receivers, the familiar tuned r-f transformer is no longer in evidence. Instead we find simpler circuits, circuits which require no tuning or, if tuning is used, the transformer design differs radically from those commonly employed. Resistance coupling, formerly employed only in a-f systems, now finds its way into the r-f stages of broadcast receivers. In some receivers,

resistance coupling is combined with shunt chokes to modify the frequency characteristic; in others, simple resistance-capacity coupling is employed.

Untuned transformers, formerly used in the earliest broadcast receivers, again make their appearance in some of the newer receivers, though much improved in performance.

Farnsworth AC-70 Series

As shown in Fig. 17, simple resistance-capacity coupling is employed in the r-f stage of this re-

ceiver. Note the low value (1500 ohms) of the plate load resistor. This is characteristic of all applications of resistance coupling in r-f stages, since the bypassing effect of the tube and circuit capacities is so great that there is no advantage in using high values of coupling resistors at high frequencies. In a-f stages, the contrary is true. There, though

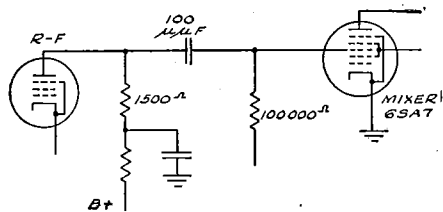


FIG. 17.—Resistance-capacity coupling in the r-f stage of the Farnsworth AC-70 series.

the tube and circuits capacitances are the same or greater, the reactance of these shunt capacities at low frequencies is so high that the signal is not bypassed.

In general, the higher the frequency the lower the value of plate resistance required to give any gain. Since the amount of gain which may be

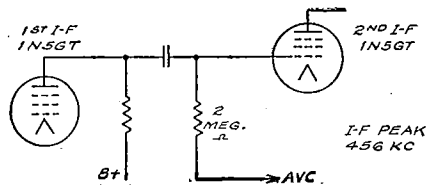


FIG. 18.—An example of resistance-capacity coupling in an i-f stage. The plate load resistor varies, in different models, from 10,000 to 20,000 ohms.

obtained, decreases as the load resistance is decreased it is apparent that the load resistance cannot be made too low without causing a stage loss rather than a stage gain. If the reactance of the

shunt capacity of the circuit is lower than that of the load resistor, no increase in gain can result by increasing the plate load resistance. When resistance coupling is employed in all-wave receivers, operating at frequencies up to 18 mc where the reactance of the shunt capacities is extremely low, it is natural to find a very low value of plate load resistor. This is the case in the circuit shown in Fig. 17. Over such ranges, the r-f stage serves as buffer rather than as an amplifier.

Eliminating Oscillator Grid Condenser

To replace the usual mica condenser coupling the oscillator grid to the tuned tank circuit, the capacity coupling between a small dead-end coil and

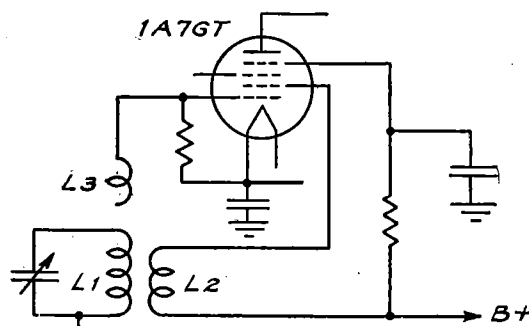


FIG. 19.—In the Emerson DF-302 receiver, the capacity coupling between L3 and L1 acts as a condenser.

the tuned circuit is used in some receivers. This is shown in the diagram, Fig. 19, which represents the oscillator circuit of the Emerson DF-302 receiver.

In the circuit shown, the oscillating circuit is composed of L1 and L2, which operate in a tickler-feedback arrangement. The capacity coupling to

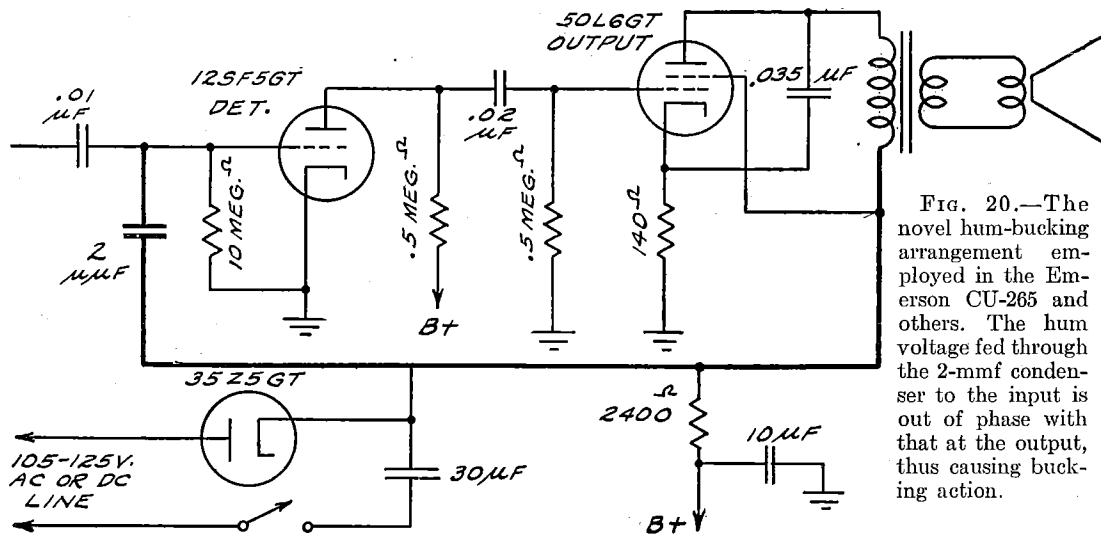


FIG. 20.—The novel hum-bucking arrangement employed in the Emerson CU-265 and others. The hum voltage fed through the 2-mmf condenser to the input is out of phase with that at the output, thus causing bucking action.

the oscillator grid is obtained by close coupling between $L3$ and $L1$.

In signal tracing, a negative d-c voltage will be developed across the oscillator grid leak in the same manner as in the more conventional circuit arrangement employing a mica coupling condenser. This method of obtaining capacity coupling in oscillator circuits is also used in some RCA and Farnsworth models.

Hum Bucking In Emerson CU-265, CULW-261, 262, 265, and 274

A novel arrangement to secure hum-bucking action is shown in the schematic, Fig. 20. The hum

voltage present at the filter input is fed through a tiny 2-mmf condenser to the grid of the 12SF5GT detector. Since this hum voltage is fed through a capacity into what is essentially a resistance load, its phase is shifted 90 degrees. In the plate circuit of the 12SF5GT, the hum voltage is reversed in phase and is fed to the output tube grid. In the output circuit of the 50L6GT, which is partly inductive, the phase of the hum voltage reaching the plate of the tube is such as to oppose a portion of the hum voltage fed to the plate of this tube from the filter circuit. In this manner an overall reduction in hum is secured.

MODERN PHASE INVERTER CIRCUITS

In more recent receivers, phase inversion circuits are simpler than those heretofore used. Otherwise they do not differ fundamentally from former designs.

RCA 9Q4

The phase inversion circuit used in the RCA 9Q4 is shown in Fig. 21. As illustrated, this is a single tube phase inverter employing the new 6SF5. The output of the triode section of the 6SQ7 first a-f tube is coupled to the lower 6F6-G power pentode and also to a voltage divider composed of $R1$ and $R2$. The audio signal voltage developed across $R2$ is capacity coupled to the grid of the 6SF5. This audio signal is amplified by the 6SF5 and reversed in phase. The amplified signal voltage across the plate load of the 6SF5 is then coupled to the upper 6F6-G power pentode control grid. When this cir-

cuit is functioning properly, the signal voltages delivered to each of the output tube grids should be equal, though opposite in phase.

The average gain which the phase inverter tube should normally give is readily determined from the constants of the voltage divider $R1$ and $R2$ and is represented by the ratio of $R1 + R2$ to $R2$ or more simply, because $R1$ is much larger than $R2$, by $R1/R2$. Since $R1$ is 1 meg and $R2$ is 15,000 ohms, the rated gain of the 6SF5 tube and circuit is 1,000,000/15,000 or 67. Thus, when 1/67th of the signal voltage fed to the lower 6F6G is applied to the phase inverter grid and is amplified 67 times, the resulting output signal voltage which is applied to the upper 6F6G grid is the same as that fed to the lower 6F6G grid.

The modification of this circuit which makes for simplicity and greater freedom from hum is the omission of the cathode biasing resistor in the phase inverter tube circuit. By grounding the cathode

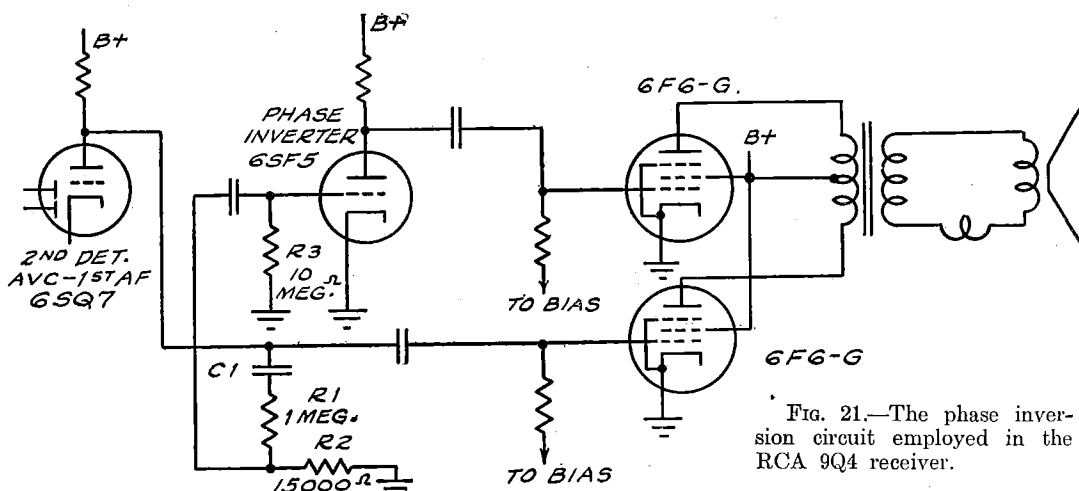


Fig. 21.—The phase inversion circuit employed in the RCA 9Q4 receiver.

directly, one resistor is eliminated and the cathode, being at ground potential, will not pick up hum to the extent as is usually experienced in former circuits.

This arrangement is made possible by the use of a high value of grid resistor. Though no grid bias is applied to the 6SF5, the high value of R_3 limits the amount of grid current which can flow. Thus, though the grid draws current over a large portion of the cycle, little distortion is introduced.

RCA 8Q2 Phase Inverter

An example of a double triode, used as an a-f amplifier and a phase inverter, is shown in Fig. 22. The audio signal is amplified first by one section of the 6SC7 and fed to the upper 6F6 output tube grid. The two grid resistors for this output tube form a voltage divider, as in the previous circuit described above. The audio signal voltage developed across the 10,000-ohm section of this voltage divider is fed to the phase inverter section of the 6SC7. The amplified signal voltage developed across the plate load resistor of the phase-inverter tube is then coupled to the lower 6F6G output tube grid.

The gain required in the phase inverter so that the output signal voltage applied to the lower 6F6 grid equals that fed to the upper output tube grid, is calculated by the same method as that previously described. Since the voltage divider is composed of a 470,000 and a 10,000-ohm resistor in series, 1/47 of the signal voltage fed to the upper 6F6 is applied to the phase-inverter grid. In order that the signal voltages applied to both output tube grids be made equal, then the phase inverter tube and circuit must amplify the signal 47 times.

As in the previous circuit, the cathode of the 6SC7 is directly grounded. The same advantages obtained in the case of this form of connection with a single triode are likewise secured with the double triode.

Note the low value of capacity used in the coupling condensers to the 6SC7 triode sections. Values larger than .0025 mf should not be used for replacement purposes, otherwise blocking may result due to the high value of the grid leaks used in the input circuits of this tube. The time required for a larger condenser to become discharged in a high resistance circuit is appreciable. Thus, if a large capacity is substituted, when the set is switched on, the charge which the coupling condenser accumulates due to the presence of the B-supply voltage at the plates of each tube section is, in part, discharged across the 10-meg grid resistors. Since this resistance is high, the time required for the charge to be dissipated is greater than when the resistance is lower in value. During this period the grids are temporarily at a high negative potential, causing blocking until the charge has leaked off.

Pushpull Parallel Operation

In circuits employing output tubes in pushpull-parallel operation, trouble due to parasitic oscillation often occurs unless special precautions are taken. In the diagram, Fig. 23, which shows the output circuit of the RCA Models K130, U-46, a single grid suppressor in each paralleled pair of output tubes serves to obviate this trouble.

These resistors are 1000 ohms each and are desig-

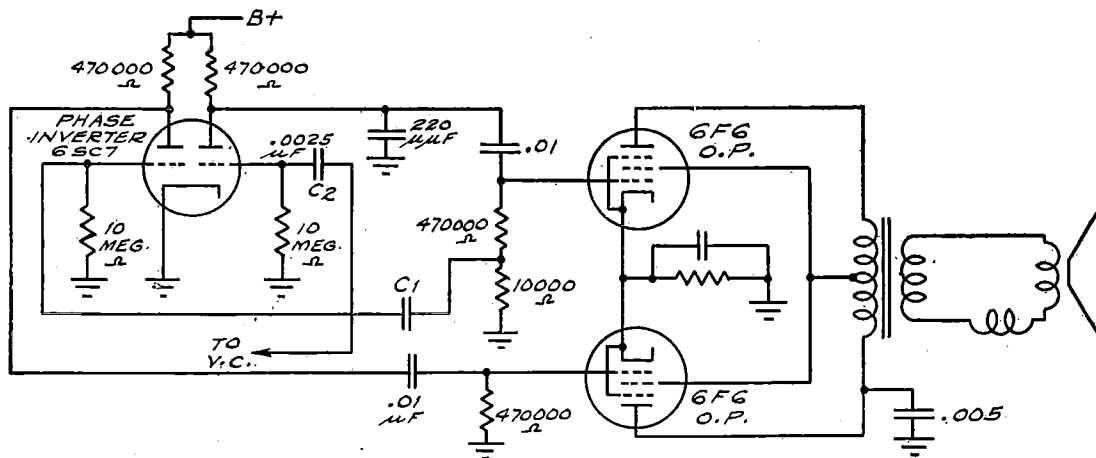


FIG. 22.—In the RCA 8Q2 receiver, the phase inverter is the 6SC7 double triode. Note that no cathode bias is employed in the phase inverter tube circuit.

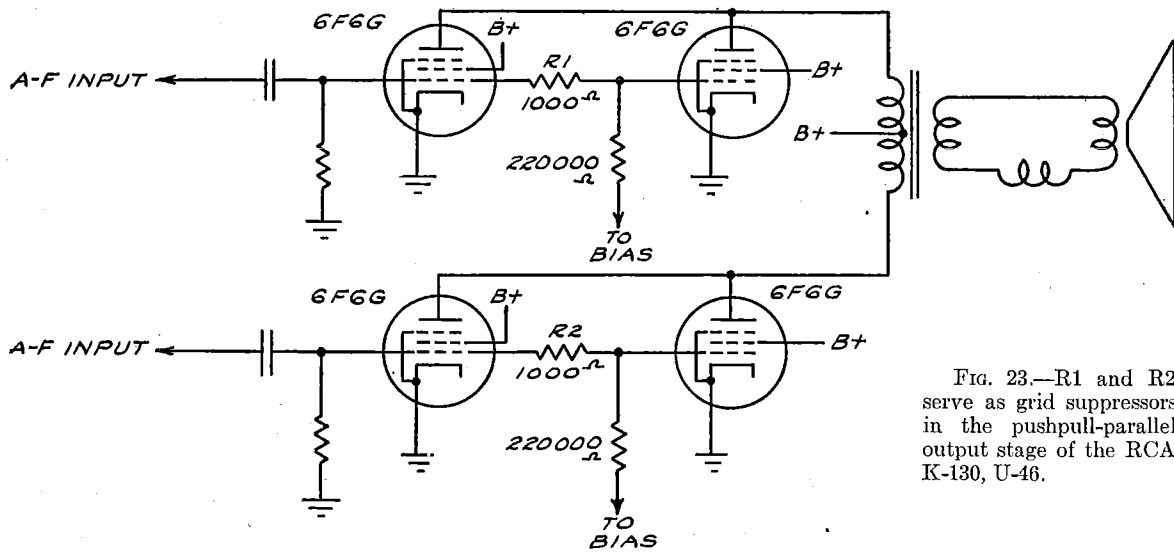


FIG. 23.—R1 and R2 serve as grid suppressors in the pushpull-parallel output stage of the RCA K-130, U-46.

nated on the diagram as *R1* and *R2*. Since the grid resistor in each of the return circuits to which these suppressors connect is much higher in resistance than the suppressors, the signal voltage applied to each grid is substantially the same as that which is

fed to the grids of the tubes which do not employ suppressors.

This arrangement is a simplification of former practice, in which suppressors were placed in each grid circuit.

F-M TUNING INDICATOR

A novel tuning indicator circuit, designed to make possible more accurate tuning of f-m receivers, is incorporated in the Stromberg-Carlson Model 480 receiver. This circuit is shown in the partial schematic, Fig. 24.

When the discriminator detector of an f-m receiver is tuned precisely to the intermediate fre-

quency employed in the receiver, the voltage from point 1 to ground is zero. When a frequency-modulated signal is being received, and the receiver is properly tuned, the average voltage over an audio cycle at this point will likewise be zero, since the two halves of the demodulated wave will be equal. On the other hand if the receiver is mistuned, the demodulated output of the discriminator will not be

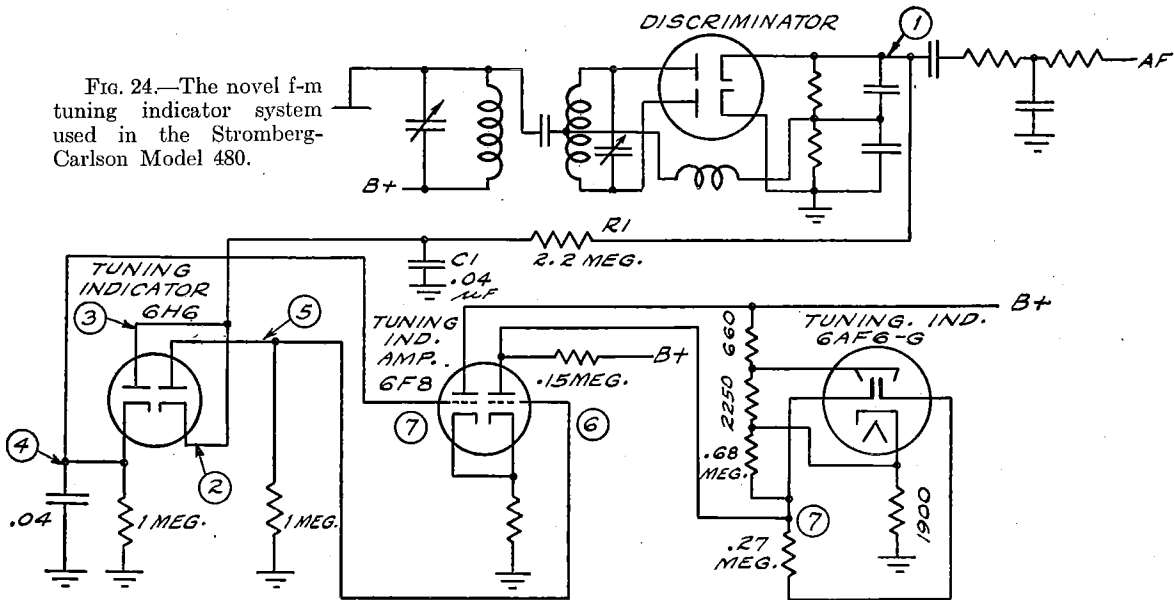


FIG. 24.—The novel f-m tuning indicator system used in the Stromberg-Carlson Model 480.

symmetrical and consequently point 1 will be either positive or negative with respect to ground. This fact is used in the application of the tuning indicator in this receiver.

In operation, the output of the discriminator is fed through the resistance-capacity filter *R1-C1*, which removes the audio signal variations, so that a d-c voltage is applied to points 2 and 3. This voltage is zero when the receiver is properly tuned and consequently points 2, 3, 4 and 5 are at the same potential. Points 4 and 5 in the double diode circuit are connected to the 6F8 twin triode. This tube serves as a direct-coupled amplifier.

When the set is tuned off resonance, point 1 becomes either positive or negative, depending on whether the receiver is tuned above or below resonance with the incoming signal. When the receiver is tuned above resonance with the signal point 1 becomes negative with respect to ground, this negative voltage being applied to points 2 and 3 in the double diode. When point 3 is negative, the diode plate is negative with respect to cathode and no current flows; consequently no current flows in this diode section and the grid (point 7) potential of the 6F8 remains unchanged. However, the cathode potential of the other section of the 6H6 becomes more

negative with respect to its plate which is equivalent to saying that the plate becomes positive with respect to its cathode, accordingly diode current flows in this section and point 5 becomes negative with respect to ground. This negative potential is applied to point 6 and causes a decrease in plate current so that point 7 becomes more positive, causing the shadow angle of the 6AF6-G to decrease.

When the receiver is tuned below resonance with the incoming signal, point 1 becomes positive as do points 2 and 3 likewise. Point 4 then becomes positive with respect to ground due to conduction in this diode section. This causes an increase in cathode current of the 6F8 due to the positive bias applied to point 7. Since the potential of point 5 remains unchanged because point 2 is now positive and no current flows in this section of the diode at point 5, the result is that point 6 effectively becomes negative, the plate current decreases and again point 7 becomes more positive, causing a decreasing shadow angle in the 6AF6-G.

Thus it is seen that tuning either above or below resonance causes a decreasing shadow angle in the indicator tube, while at exact resonance the eye closes.

IMAGE FREQUENCY

In the operation of a superheterodyne receiver, the local oscillator heterodynes, or beats with, the incoming signal and produces in the mixer a signal at the intermediate frequency which has all the characteristics of the desired incoming signal.

Since the selectivity of the mixer input stage is not sufficient to eliminate undesired signals completely, interference may result due to the fact that the local oscillator in the receiver will heterodyne not only the desired signal, but also an undesired one, so that both are fed to the i-f amplifier. One type of interference which may result from this condition is known as image frequency response.

To understand what is meant by image frequency, let us consider the block diagram, Fig. 25, which represents a typical superheterodyne which employs no r-f stage. It is assumed that a 10,000-kc signal is being picked up by the antenna and fed to the mixer input circuit. The receiver is tuned to 10,000 kc; the i-f is 450 kc, hence the local oscillator in the receiver is functioning at 10,450 kc. This is the normal condition of operation.

The i-f amplifier being tuned to 450 kc, any 450-kc signal present in the mixer output circuit will be amplified. When the receiver is tuned to 10,000 kc, a 10-mc signal will present in the mixer circuit. The local oscillator signal at 10,450 kc combines with the incoming signal to produce a new signal which represents the sum and difference of the two frequencies present in the mixer. The difference between 10,450 kc and 10,000 kc is 450 kc and since the i-f amplifier is tuned to this frequency, the signal will be amplified. The sum frequency, which is equal to 10,450 plus 10,000 or 20,450 kc, will also be present but will not be amplified because the i-f amplifier is not tuned to this frequency.

Now let us assume, that in addition to the desired signal of 10,000 kc to which the receiver is tuned, a strong signal of 10,900 kc is present in the mixer. This could be the case, since there is but a single tuned circuit and ordinarily this is not sufficient to cut out completely a strong signal which does not differ by a large percentage in frequency from that of the desired signal.

The 10,900-kc signal, when mixed with the 10,450-kc signal supplied by the local oscillator, pro-

duces a difference frequency equal to $10,900 - 10,450$ or 450 kc. Since this is the frequency to which the i-f amplifier is tuned, the undesired signal will be amplified along with the desired signal, representing the difference between $10,000$ and $10,450$ kc, and interference will result. The frequency at which this interference results is called the *image frequency*.

Now let us see what relation the image frequency bears to the desired signal frequency. If the receiver is tuned to $10,000$ kc and, as we have shown, the image frequency under such conditions is at $10,900$ kc, the difference between $10,000$ kc and $10,900$ kc is 900 , which is equal to twice the assumed intermediate frequency of 450 kc. If the intermediate frequency were 465 kc, then the local oscillator would function at $10,465$ kc when the receiver was tuned to $10,000$ kc. Also, a signal of $10,930$ kc would produce an image frequency response. The difference between the desired and undesired signal frequencies would then be $10,930 - 10,000$ or 930 kc. Again we see that the image frequency response occurs at a frequency which differs from that of the desired signal by twice the intermediate frequency. And we may set this up as a rule, that the image frequency will always differ from that of the desired signal frequency by twice the intermediate frequency.

In the examples above, we have seen that the image frequency is also higher in frequency than that of the incoming signal. In some receivers, particularly on short-wave bands, the oscillator functions at a frequency which is lower than that of the incoming signal. For instance, if the receiver is tuned to $10,000$ kc and the set oscillator operates at $9,550$ kc, an i-f signal, representing the difference between $10,000$ kc and $9,550$ kc, or 450 kc, is produced.

Now, if a $10,900$ -kc signal were also present in the mixer circuit, the beat between it and the local oscillator would result in the production of a signal frequency of $10,900 - 9,550$ or 1350 kc. Since the i-f amplifier is tuned to 450 kc and not 1350 kc, no interference will result. Therefore, $10,900$ kc, though it differs by twice the i-f from the desired signal frequency, will not produce interference when the oscillator frequency is lower than that of the signal frequency to which the receiver is tuned.

However, if a signal of $9,100$ kc instead of $10,900$ kc were present in the mixer circuit, when the set is tuned to $10,000$ kc and the oscillator is functioning at a frequency of $9,550$ kc, which is 450 kc lower than that to which the receiver is tuned, a

signal representing the difference between $9,550$ kc and $9,100$ kc or 450 kc will be formed and will therefore pass through the 450 -kc i-f amplifier and cause interference. This $9,100$ -kc signal, you will note, also differs from the desired signal frequency or $10,000$ kc, by 900 kc, an amount which is also equal to twice the intermediate frequency. This then is the image frequency when the oscillator is lower in frequency than that of the incoming signal.

So we may see from the above illustrations that *the image frequency always differs from the desired signal frequency by an amount which is equal to twice the intermediate frequency*. Also, that when the set oscillator operates at a frequency which is higher than that to which the receiver is tuned, the image frequency will always be higher, by twice the intermediate frequency than the desired signal frequency. And, on the other hand, when the set oscillator functions at a frequency which is lower than that of the desired signal frequency, the image frequency will likewise be lower in frequency than that of the desired signal.

One point which deserves particular attention in this analysis is that image frequency has nothing to do with harmonics. While interference can also be produced due to harmonics of the oscillator beating with undesired signals, this type of interference is not due to image frequency response.

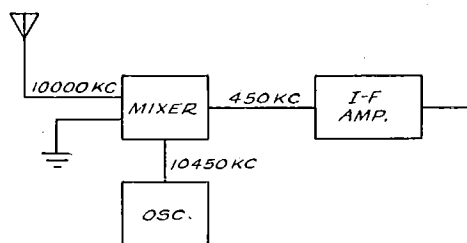


Fig. 25.—Block diagram showing how an i-f signal is formed.

The extent to which interference is produced because of image response will depend upon the strength of the interfering signal, the intermediate frequency employed in the receiver and the percentage difference in frequency between the image and the desired signal. Thus, when the intermediate frequency is 450 kc, the image frequency differs from the desired signal by 900 kc; when the i.f. is 175 kc, the image frequency is only 350 kc removed from the desired signal frequency. When the receiver is tuned to 550 kc, at the low frequency end of the standard broadcast band, and the i.f. is 450 kc, the image frequency occurs at 1450 kc . . .

the high frequency end of the band. The percentage difference in frequency in this instance is large. But, when the receiver is tuned to 20,000 kc under the same conditions, the image frequency at 20,900 kc differs but little in percentage from that of the desired signal. Accordingly, interference due to this cause will be much worse on short-wave bands than on the standard broadcast band.

Alignment Checks of Image Frequency

The fact that the local oscillator on short-wave bands can often be tuned to a frequency which differs from that of the desired signal by the i.f., but in the wrong direction, makes it desirable to check the alignment by making certain that the image response occurs at the proper point.

Thus when the receiver is to be aligned at 18 mc, the oscillator will normally be tuned to 18,450 kc, (if the intermediate frequency is 450 kc) but if the trimmer is screwed down too far, the oscillator frequency may be changed to 17,550 kc, which will likewise produce the required 450-kc i.f. when an 18-mc signal is tuned in.

To make certain the receiver oscillator is properly adjusted, after aligning at 18 mc, tune the test oscillator to 18,900 kc (or whatever frequency which is twice the i.f. higher than that frequency to which the receiver is tuned) and without changing any of the adjustments, note if a signal response is obtained. If the oscillator is adjusted to a frequency which is higher than that to which the set is tuned, the response should be obtained. If the set oscillator is adjusted to a frequency below that of the incoming signal, no response will result.

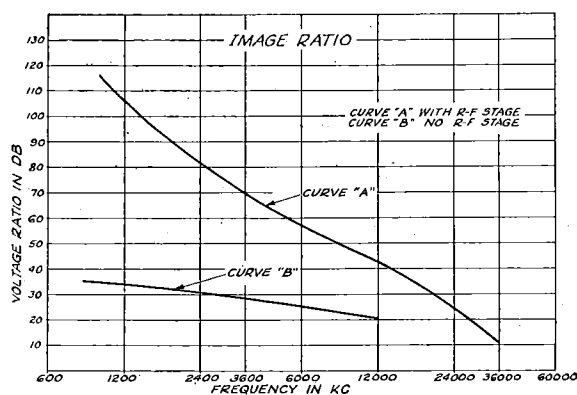


Fig. 26.—Curves showing the improvement in image ratio which results when an r-f stage precedes the mixer.

Image Ratio

When a receiver is tuned to a given frequency, the ratio of the input signal voltage at the image frequency to that required at the frequency to which the receiver is tuned is called the *image ratio*.

For example, if the receiver is tuned to 1000 kc and the i.f. is 450 kc, assuming that a 10-microvolt signal at 1000 kc produces a 50 milliwatt output at the receiver voice coil, then, if a 10,000-microvolt signal is required at the image frequency of 1900 kc to produce the same output while the receiver is tuned to 1000 kc, the image ratio is 10,000/10 or 1000.

Curves showing how the image ratio becomes lower as the frequency to which the receiver is tuned is increased are shown in Fig. 26. In this graph, Curve A is representative of the image ratios secured when an r-f stage is used ahead of the mixer in a high-grade receiver, while Curve B shows the lower image ratios which result when no r-f stage is employed.

In Curve A, the image ratio resulting when the receiver is tuned to 1200 kc is 106 db, corresponding to a voltage ratio of 200,000 to 1. That is, the signal input at the image frequency must be 200,000 times that required at the frequency to which the receiver is tuned, to produce the same output. This ratio decreases on the higher frequency bands, because of the relatively small percentage difference in frequency between the image frequency and the desired signal frequency on such bands. At 12 mc, the image ratio is 43 db, or 140 to 1, while at 36 mc it is only 11 db, or 3.5 to 1.

The improvement resulting from the use of an r-f stage is much more evident at frequencies in the broadcast band than at higher frequencies. As shown in Curve B, the image ratio secured with a representative receiver employing no r-f stage is 34 db, or 3500 to 1, at 1200 kc compared with 200,000 to 1 which is obtained with a receiver employing an r-f stage, over 50 times as great. Yet at 12 mc, where the image ratio on Curve B is 20 db, or 10 to 1, that obtained with the receiver employing the r-f stage is 140 to 1 at this frequency; only 14 times better. The improvement decreases more rapidly at still higher frequencies.

Silvertone Model 6335, 6435,
6490, 6495 Phase Inverter

A phase-inverter circuit employing degeneration is shown in Fig. 27. The audio signal voltage de-

veloped across the plate load resistor of the 6Q7G is fed directly to one of the pushpull output 25L6G's. A portion of this signal voltage also appears at point 2 and is fed to the grid of the 6J5G phase-inverter tube where it is amplified and reversed in phase. The output voltage of the phase inverter, appearing across R_4 , is applied through a .01-mf coupling condenser to the grid of the other 25L6G output tube.

This is the fundamental action of this circuit. However, since R_1 forms a portion of the grid return circuits of both output tubes, a portion of the signal voltage at point 1 will also appear at point 3 as well as point 2. And, by the same token, the out-of-phase voltage developed in the phase-inverter circuit and applied to point 3 will, in part, also be applied to points 1 and 2.

In action, the signal voltages at points 3 and 1 should be equal but opposite in phase. If the signal voltage at point 3 should tend to become greater than that at point 1, then a greater out-of-phase voltage would appear at point 2 which would buck the signal voltage at that point derived from point 1. This would result in lowering the signal voltage at point 3.

If, on the other hand, we suppose that the gain of the phase inverter falls off due to tube depreciation or for any other reason so that the signal voltage appearing at point 3 tends to become less than that at point 1, then the degenerative feed-

back voltage at point 2 also tends to become less and the resulting amplified voltage at point 3 increases.

This bucking action takes place at point 1 as well as at point 2, insofar as the out-of-phase signal

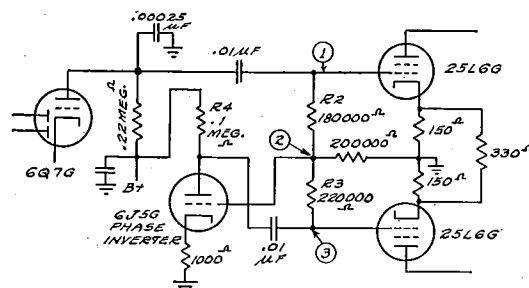


FIG. 27.—The degenerative phase inverter employed in the Silvertone Model 6335.

voltage is concerned. Also, the same action results from the presence of the in-phase voltage at points 2 and 3 in that it tends to oppose any increase in the out-of-phase voltages developed at points 2 and 3. The net result is a high degree of stability of output.

Degeneration is also used in the phase inverter itself, by eliminating the cathode bypass condenser. This method is also employed in the 25L6G cathode circuits and by coupling the cathodes by means of a 330-ohm resistor.

RADIO-PIANO AMPLIFIER

A combination amplifier, designed for radio, record and piano amplification is incorporated in the Ansley Dynatone, shown on Ansley pages 11-1 in Riders Manual, Volume XI. The use of this amplifier in conjunction with an ordinary piano converts it into what is essentially an electronic piano. A five-stage audio amplifier is used in this instrument, though only four stages are utilized when the amplifier is used for radio or phonograph amplification.

The input stage for piano amplification consists of two triode-connected type 1223 tubes. The input grids of these tubes are coupled to adjustable condenser microphones which act as piano string pickups. The output is transformer-coupled to another amplifier stage composed of two triode-connected 1223's, the output circuits of which are in parallel, rather than pushpull.

One of the input grids of the second stage connects to a volume control which connects, in series with a 100,000-ohm resistor, to the secondary of the first stage transformer; the other grid is fed by the radio-record volume control.

The output of the second stage is resistance-coupled to one section of a 6F8 double triode, the second section of which serves as a phase inverter. The output of these two sections of the first 6F8 feeds to a similar double triode which is pushpull connected and drives a pair of 2A3 output triodes. The pushpull 2A3's operate with fixed grid bias, which is supplied by a 45 triode connected as a diode and operating as a half-wave rectifier. The bias voltage is taken off the junction of the 7,000 and 4000-ohm resistors which act as a voltage divider and is filtered by a 16-mf electrolytic condenser.

The radio section of this instrument utilizes but three tubes. The pre-selector tuned circuit ahead

of the 6A8 converter serves to increase the selectivity. AVC is applied to the converter and i-f stages and is obtained from the section of the 6H6 which also acts as the second detector.

It is possible to operate the instrument as a piano amplifier in conjunction with record reproduction, thus enabling the pianist to accompany

the record, if desired. When so operated, the second stage amplifier serves also as a mixer. When operated solely as a piano amplifier, the instrument is played in the usual manner and the action of the keyboard and pedals is the same as if the amplifier were not connected.

BATTERY-OPERATED PORTABLE RECEIVERS

Modern portable receivers are smaller, lighter and more convenient to use than those which were heretofore available. Better performance is also obtained, due to an increase in sensitivity which better tubes and improved circuit design make possible. Greater economy in operation is secured by the use of specially designed batteries in conjunction with modern low-current, multi-purpose tubes. In many models, also, provision is made for operating the receiver from either a-c or d-c power lines when battery operation is not required.

Combination "3-in-1" Receivers

Receivers which are designed to operate either from an a-c or d-c line supply or from self-contained batteries, represent the latest development in portable models. In all of these receivers, loop operation is used. Usually the loop is built within the cabinet, though one of the Motorola models has the loop woven into a shoulder strap. In the receivers employing a built-in loop, directional operation is secured simply by turning the receiver until the desired station is received with greatest volume.

The number of tubes required is kept at a minimum by using multi-purpose types, such as the new 3A8GT. This tube is a diode-triode-pentode type which performs three functions: the pentode section serves as an i-f amplifier, the diode as the second detector and the triode, which is a high- μ type, as the first a-f amplifier. This tube requires but 50 ma filament current at 2.8 volts, thus reducing the battery consumption as well as the space requirements over those which would be needed if individual tubes for each purpose were employed.

In most receivers, conventional coupling methods are used in r-f, mixer and i-f circuits. An exception is the use of resistance coupling in one i-f stage of the Emerson DF-302, in which some additional gain is obtained without appreciably increasing the

space requirements which would be necessitated if an i-f transformer were used. Further, the additional tuning adjustments ordinarily needed with transformer coupling are eliminated.

In many models, the sensitivity to weak signals is increased by using delayed avc action, which is often obtained by applying a bucking voltage obtained from some portion of the filament circuit.

Operation from a-c power lines is usually obtained by using the new 117L7GT combination half-wave rectifier and output pentode. Since this tube has a 117-volt heater, it may be connected directly across the power line, thus eliminating the need for any voltage-dropping resistor.

When the receiver is line-operated, the pentode section of the 117L7GT, the input of which is connected in parallel with the battery-operated output pentode, functions alone, the switching arrangement being so devised that the filament circuit of the battery-operated output tube is opened when line operation is employed. The filaments of the remaining battery-operated tubes are connected in series with the cathode of the 117L7GT pentode so that the cathode current of this tube serves to operate the filaments of the other tubes.

Resistance-capacity filter systems are employed in the power-supply circuits when line operation is being used.

The maximum power output is greatly increased in line operation, being of the order of two watts, while with battery operation the usual output rating is approximately 275 milliwatts. Since the battery-operated output tube requires a higher plate load for efficient operation than the pentode section of the 117L7GT, the entire output transformer primary winding is employed in its plate circuit. For the 117L7GT pentode, the output transformer primary is tapped to provide the proper load.

The A-battery employed is normally a 6-volt flat-type unit, considerably larger than that formerly employed in older receivers. In some receivers, two 4.5-volt units, similar in design are

used when the total voltage required for all the series filaments is 9 volts. The B batteries are 45-volt units, designed to fit in a small space. No binding posts are used; pin receptacles, so arranged that the batteries cannot be improperly connected, are employed in all current receiver designs.

In some receivers, a female receptacle is provided for the line plug so that the battery circuit remains open until this plug is inserted. For line

operation, the plug must be removed and inserted in the power line receptacle. This complete protection against turning on the battery circuit when line operation is being employed is obtained. In other models, the same result is accomplished by the switch design.

The rated life of the batteries, in a representative type of portable, is 250 hours when the set is being used 4 hours a day.

REMOTE CONTROL

A variation of the wireless record player idea is employed in the RCA Model 5X5 receiver to enable remote control of another receiver. Instead of using record modulation, the broadcast program picked up by the 5X5 is used to modulate a self-contained oscillator which sends out the modulated signal to another receiver, which receiver is tuned to the frequency of the transmitting oscillator in the remote control unit. Means are provided so that the volume can also be controlled by the control unit.

RCA Model 5X5

A schematic diagram of this receiver is shown in Riders Manual, Volume X. The 12SA7 is employed as a conventional converter, the output of which is fed to the pentode section of the 12C8. The output of the pentode section is coupled by the second i-f transformer to the diode section of this tube, which also acts as the second detector and a-v-c tube.

The 12SC7 serves as the first a-f amplifier and remote control oscillator. The a-f output of the 12SA7 diode appears across the volume control and 47,000-ohm series resistor and is fed to the first section of the 12SC7. The output of this section is resistance-capacity coupled to the 35L6GT output tube; thence to the speaker in the usual manner when the receiver is operated as a conventional set.

For remote control operation, the radio-remote switch in the output circuit of the 35L6GT is thrown to "Remote" position. When this is done, the primary of the output transformer is placed in series with the plate circuit of the remote control

oscillator plate coil as well as the plate of the 35L6GT output tube. The 33,000-ohm series resistor and its associated 0.1-mf bypass condenser serve to drop the B voltage present at the output tube plate to a value suitable for the second section of the 12SC7. The 0.1-mf bypass condenser is used to allow the full audio voltage present at the output tube plate to be used to modulate the plate current of the remote control oscillator. In this way high percentage modulation can be obtained.

A plate-tuned oscillator circuit is employed in the remote control oscillator and, as has been shown, the primary of the 35L6GT output transformer serves as a modulation choke. The oscillator frequency is usually adjusted to 540 kc, but by readjusting C7 it may be tuned to any frequency between 540 and 800 kc.

The modulated output signal is fed to the power line by means of the coupling coil adjacent to the grid coil of the remote control oscillator. When remote control operation is employed, the voice coil circuit of the 5X5 speaker is opened and a 5-ohm resistor is automatically shunted across the output transformer secondary, thus providing the proper operating load. The speaker is then inoperative.

Since the degree of audio modulation applied to the remote control oscillator is dependent on the strength of the audio signal present across the primary of the output transformer which is in turn controllable by means of the receiver volume control, the output volume of receiver used to pick up the signal sent out by the remote control oscillator can also be controlled by the 5X5.

Phonograph records may be reproduced and transmitted in like manner by using a turntable and pickup connected to the phono jack provided in the receiver.

AN HOUR A DAY WITH RIDER

ALTERNATING CURRENTS IN RADIO RECEIVERS

Are you familiar with the different forms of alternating currents which are present in a radio receiver and just where these currents flow? When once you know the basic facts relating to the cycle—frequency—phase relations—sine waves—complex waves—modulated waves—you will have no trouble comprehending servicing problems which involve these considerations and testing with different types of units will be greatly simplified. This book combines theory and practice the way you like it.

96 pages....Hard Cover....60 cents

RESONANCE AND ALIGNMENT

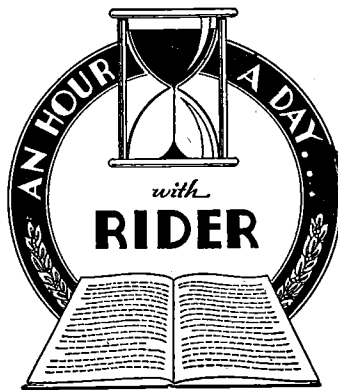
In order to align a receiver, oscillator, or transformer properly you must be familiar with more than just the mere mechanical operations. Do you know all the various alignment operations? Do you know which oscillator setting is correct? Why trimmers must be adjusted in a certain order? Rider has anticipated your needs and gives the answers to all these problems in this book.

96 pages.....Hard Cover.....Type Set.....60 cents

D.C. VOLTAGE DISTRIBUTION IN RADIO RECEIVERS

The distribution of the d-c. voltage to the various tubes in a multi-tube receiver is complicated and you should be able to recognize and understand any of the many forms these systems take, at a glance. . . . You should know how the resistance value and rating of each resistor is calculated and why. . . . These important facts are all explained in this new book by Rider, who starts right in with Ohm's Law and with easily understood examples tells you all you need to know.

96 pages....Hard Cover....60 cents

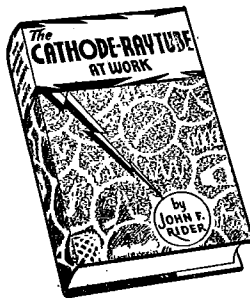


AUTOMATIC VOLUME CONTROL

A.V.C. has become a standard feature in every well-made receiver and you should understand every type in use. . . . how

the various types of tubes are used in the circuit. . . . Rider explains noise suppression systems, time delay circuits, automatic variable audio delay systems, etc. in such a way that you will understand them and know their oddities.

96 pages.....Hard Cover.....Type Set.....60 cents



THE CATHODE-RAY TUBE AT WORK

The cathode-ray tube oscillograph is the most universally used testing instrument in the radio servicing field and it is essential that the progressive serviceman know its many uses, so he can speed up his production. . . . To do this, he must be thoroughly familiar not only with the theory underlying the cathode-ray tube, but also its functioning in the oscillograph. This theory is clearly explained in this book and the explanations are illustrated with numerous drawings.

The second half of the book is devoted to the applications of the cathode-ray oscillograph to servicing problems. Actual servicing setups were made in the author's laboratory and photographs taken of the patterns on the screen. These unretouched oscillograms illustrate the text, so that you will know just what the patterns mean when you see them on the screen of your own oscillograph.

336 pages.....Over 450 Illustrations.....\$2.50



ALIGNING PHILCO RECEIVERS

Everything you need for aligning over 8,000,000 Philco receivers . . . i-f. peaks—adjustment frequencies—trimmer and padder locations—complete and detailed information for aligning every Philco model from 1929 up to December, 1936. This invaluable book, prepared with the co-operation of the engineering staff of the Philco

Radio & Television Corp., is the authentic source of alignment information and the data are presented in a brand new way that makes alignment easier and quicker.

176 pages.....Hard Cover.....\$1.00

SERVICING SUPERHETERODYNES

No other circuit in the radio field has undergone all the changes that have been incorporated in the superheterodyne. In order to service superhets with a profitable speed you must be able to analyze the different portions of the circuit quickly and find the trouble without loss of time. This necessitates a thorough knowledge of the theory of the circuit and the possible troubles that may occur in each part. In this text Rider has analyzed each portion of the superheterodyne circuit and shows clearly just how each plays its part in the functioning of the whole. Along with this theory goes an easily-understood explanation of the different troubles that occur in the various parts and, best of all, how these troubles can be recognized and corrected.

288 pages.....Hard Cover.....\$1.00



AUTOMATIC FREQUENCY CONTROL SYSTEMS

From the simplest type of A.F.C. circuits to the most complicated push pull control circuit . . . you will find them all clearly explained in Rider's new book. The first part of the book is devoted to a review of the combination of D.C. voltages, the phase relations in inductive, capacitive, and transformer circuits, with particular reference to

the manner in which these principles appear in A.F.C. circuits. The remaining chapters cover the operation of all types of discriminator circuits, the operation of the various types of control tube circuits, including the push-pull type, the reflected reactance type, and the mutual inductance type. Let Rider tell you all about A.F.C. in this up-to-the-minute book that combines theory and practice.

144 pages.....Hard Cover.....\$1.00

SERVICING RECEIVERS BY MEANS OF RESISTANCE MEASUREMENT

This book tells you how to make and correctly interpret point to point resistance measurements. It will simplify your servicing problems and enable you to use the resistance data furnished in RIDER MANUALS to the best advantage. Now that more and more manufacturers are supplying resistance data, you need this book to speed up your servicing with greater accuracy.

203 pages.....Hard Cover.....\$1.00

ELECTROLYTIC CONDENSERS Their Properties, Design and Practical Uses

By PHILIP R. COURSEY

Technical Director, Dubilier Condenser Co., London, England

By special arrangement with the English publishers, Chapman and Hall, Ltd., we have secured the sole American sales rights of this authoritative and comprehensive book on Electrolytic Condensers.

CONTENTS: Condensers and Dielectrics—Origin and Development of the Electrolytic Condenser—Testing Electrolytic Condensers, Methods and Apparatus—The Wet Electrolytic Condenser—The Non-Aqueous or Semi-Dry Electrolytic Condenser—The Dry Electrolytic Condenser—The Separator and its influence on the Performance of the Condenser—The Electrical Characteristics of Electrolytic Condensers—Applications of Electrolytic Condensers.

172 pages.....Hard Cover.....\$3.00

INDEX

*** ADMIRAL**

See CONTINENTAL RADIO & TELEVISION CORP.

AIR-CASTLE

Also see CONTINENTAL RADIO & TELEVISION CORP.
Also see SPIRGEL INC.

AIR CHIEF

See FIRESTONE TIRE & RUBBER CO.

AIR KING PRODUCTS CO., INC.

MODEL	PAGE
4, 23X, 9722, 9822, 9822A, 9823, 9922	Schematic, socket, trimmers, voltage 11-1
914	Schematic 11-2
920	Schematic 11-2
X937	Schematic 11-3
3906LW	Schematic 11-3
3907	Schematic, socket 11-4
3912, 3916	Schematic, socket, voltage 11-5
3950	Schematic, alignment 11-6
3980	Schematic, socket, trimmers, voltage 11-1
4000	Schematic, socket 11-4
4000A	Schematic, socket 11-4
4001	Schematic, socket, alignment 11-6
4002	Schematic, socket 11-7
4007	Schematic, socket 11-7
4012	Schematic, socket 11-8
4100	Schematic, socket 11-7
4200	Schematic, socket 11-8
5000	Schematic, voltage, socket, trimmers, recording data 11-9
9722, 9822, 9822A, 9823, 9922	See model 4

ALLIED RADIO CORP.

B10501	Schematic 11-1
B10508	Schematic 11-1
B10515, B10516, B10517, B10518	Schematic 11-3
B10520, B10521	Schematic 11-3
B10525, B10526, B10527	Schematic 11-3
B10545, B10546, B10547, B10548, B10549, B10553	Schematic, socket, trimmers, alignment 11-4
B10565, B10566, B10567, B10568	Schematic, voltage, socket 11-5
	Trimmers, alignment, chassis 11-6
B10577, B10578	Schematic, voltage, socket 11-7
	Chassis, trimmers, alignment 11-8
B10579	Schematic, voltage, socket 11-9
	Chassis, trimmers, alignment 11-10
	Tuner data 11-11
B10580, B10581, B10582	Schematic, voltage, socket 11-13
	Alignment, tuner 11-14
B10588, B10589	Schematic, voltage, socket 11-15
	Chassis, trimmers, socket 11-16
B10590, B10591, B10592, B10593, B10595, B10596	Schematic, voltage 11-17
	Chassis, trimmers, socket 11-16
B10702, B10706, B10707	Schematic, socket, trimmers, alignment 11-12
B10718, B10719	Schematic, alignment, socket, trimmers 11-2
B10750, B10760, B10761, B10762, B10770, B10771	Schematic, trimmers, socket, alignment 11-18
	Tuner data 11-11
B10782, B10784, B10786	Schematic, socket, trimmers, alignment 11-19
B10790, E10890	Schematic, alignment, socket, trimmers 11-20
B10791, E10891	Schematic, alignment, socket, trimmers 11-21
E10855	Schematic, alignment, socket, trimmers 11-22
E10865	Schematic, alignment, socket, trimmers 11-22
E10890	See model B10790
E10891	See model B10791

ANDREA RADIO CORP.

* 1F5 Television	Alignment Changes 11-1
2F-12, 8F-12 Television	Controls, assembly, chassis wiring 11-5
	Socket layouts 11-6
	Operating notes, part 1 11-9

ANDREA RADIO CORP.—(Cont.)

MODEL	PAGE
2F-12, 8F-12 Television	Operating notes, part 2, tuner data 11-10
	Test patterns, part 1 11-11
	Test patterns, part 2 11-12
Video Chassis VF-12	Schematic, trimmers, coils 11-1, 2
Radio Chassis RF-12	Schematic, coils 11-3, 4
Deflection Chassis DF-12	Schematic 11-7
	Notes, layouts, controls 11-6
Power Chassis PF-12	Schematic, notes 11-8
* KT5 Television	Kit for 1F5
UF-5 Chassis	See model 12F5
UG5S Chassis	See model 25G5
UF6 Chassis	See model 33F6
12F5, Chassis UF-5	Schematic, trimmers, alignment .. 11-13
21F5, 21AF5, Chassis UF-51	Schematic, alignment 11-14
25G5, Chassis UG5S	Schematic, coils, trimmers, alignment 11-15
33F6, Chassis UF6	Schematic, trimmers, alignment .. 11-16
UF-51 Chassis	See model 21F5

ANSLEY RADIO CORP.

Dynatone	Schematic 11-1
	Socket, notes 11-2
1.10, 1.11, S.P.U.	See model D-17A
1.12, 1.13, S.P.U.	See model D-21A
2.20 Tuner	See model D-9-A
2.21 Tuner	See model D-17A
2.22 Tuner	See model D-21A
2.23 Tuner	See model D-24A
D-9-A, D-10-A, 2.20 Tuner	Schematic, socket 11-3
D-17A, D-18A, D-23A, D29, D30	Schematics 11-4
1.10, 1.11, S.P.U.	Schematic, socket 11-4
2.21 Tuner	Schematic, socket 11-5
D-21A, D-22A Amplifier, S.P.U.	Schematic, socket 11-5
1.12, 1.13, S. P. U.	Schematics, sockets 11-5
2.22 Tuner	Schematic, socket 11-5
D-24A, D-25A, 2.23 Tuner	Schematic, socket, notes 11-6

ARVIN

See NOBLITT SPARKS INDUSTRIES, Inc.

AUTOCRAT RADIO CO.

90	Schematic, socket, voltage, trimmers, alignment 11-1
91	Schematic, voltage 11-3
	Socket, trimmers alignment 11-4
92	Schematic, socket, trimmers, assembly 11-5
93	Schematic, socket, trimmers, alignment 11-6
94	Schematic, socket, trimmers, alignment 11-6
95	Schematic, voltage 11-3
	Socket, trimmers, alignment 11-4
96	Schematic, socket, trimmers, alignment 11-6
98	Schematic, voltage 11-3
	Socket, trimmers, alignment 11-4
101I, 101O, 101W	Schematic, voltage 11-3
	Socket, trimmers, alignment 11-4
102I, 102O, 102W	Schematic, voltage 11-7
	Socket, trimmers, alignment 11-4
103I, 103W	Schematic, voltage 11-7
	Socket, trimmers, alignment 11-4
104	Schematic, socket, trimmers 11-5
106	Schematic, socket, voltage, trimmers, alignment 11-1
	Tuner data 11-2
107I, 107W	Schematic, voltage 11-7
	Socket, trimmers, alignment 11-4
109, 110	Schematic, voltage 11-7
	Socket, trimmers, alignment 11-4
112	Schematic, voltage 11-8
	Socket, trimmers, alignment 11-9
113	Schematic, voltage 11-8
	Socket, trimmers, alignment 11-9
114	Schematic, voltage 11-8
	Socket, trimmers, alignment 11-9
115	Schematic, voltage 11-10
	Socket, trimmers, alignment 11-9
116	Schematic, voltage 11-8
	Socket, trimmers, alignment 11-9
118	Schematic, voltage 11-10
	Socket, trimmers, alignment 11-9

* Also see Vol. X index

AUTOCRAT CONTINENTAL

MODEL	AUTOCRAT RADIO CO.—(Cont.)	PAGE
119	Schematic, voltage	11-10
	Socket, trimmers, alignment	11-9
120	Schematic, voltage	11-10
	Socket, trimmers, alignment	11-9
121, 125	Schematic, socket, trimmers, voltage, alignment	11-11
123	Schematic, socket, trimmers, voltage, alignment	11-11
130	Schematic, socket, trimmers, voltage, alignment	11-12
142	Schematic, socket	11-12
148	Schematic, voltage	11-13
	Tuner, alignment, socket, trimmers	11-2
148-2	Schematic, voltage	11-13
	Tuner, alignment, socket, trimmers	11-2
168	Schematic, voltage	11-13
	Tuner, alignment, socket, trimmers	11-2
213, Phono-Oscillator	Schematic	11-2
359	Schematic, voltage, socket, trimmers, alignment, notes	11-14
	Tuner data	11-2

AUTOMATIC RADIO MFG. CO., INC.

P43, P45	Schematic	11-1
	Socket layout	11-2
P57	Schematic	11-1
P58, P61	Socket layout	11-2
	Schematic	11-1
M-66, M-77	Schematic	11-3
	Socket layout	11-4
P72	Schematic	11-5
	Socket layout	11-2
400, 401	Schematic	11-5
	Socket layout	11-4
402, 403, 406	Schematic	11-6
	Socket layout	11-4
	Tuner data	11-2
404, 405, 408	Schematic	11-6
	Socket layout	11-4
	Tuner data	11-2
420	Schematic, socket	11-7
430	Schematic, socket	11-7
432, 434A	Schematic, socket	11-7
436	Schematic, socket	11-7
440, 441, 444	Schematic	11-6
	Socket layout	11-4
442, 443, 446	Schematic	11-6
	Socket layout	11-4
	Tuner data	11-2
448, 450, 452, 454	Schematic	11-5
	Socket layout	11-4
480	Schematic	11-6
	Socket layout	11-4
911	Schematic, alignment, trimmers	11-8
939, 949	Schematic	11-3
975, 979, 988	Schematic	11-3

BARKER BROS.

Tempo Tone	Schematic, tuner	Misc. 11-1
------------	------------------	------------

BELMONT RADIO CORP.

407	Schematic, voltage, socket, trimmers, alignment	11-1
411, Series A	Schematic, voltage, socket, trimmers	11-3
	Alignment	11-4
460, Series A	Schematic, voltage, socket, trimmers, alignment	11-2
507, 513, Series A, Serial 211, 300 and up	Schematic, voltage, trimmers, socket, alignment	11-5
510, Series A	Schematic, voltage, socket, trimmers	11-6
	Alignment	11-4
511, Series A	Schematic, voltage, socket, alignment	11-7
539-415, etc., (Export) Chassis 539, Series A, Serial 9M259100 and up	Schematic, voltage, socket, trimmers	11-9
	Alignment	11-10
551B, Series A, Issue B	Schematic, voltage, socket, trimmers, alignment	11-8
571, Series A, Serial 189300 and up	Schematic, voltage, socket, trimmers, notes	11-11
	Alignment	11-12
577D, Serial 214845 up	Schematic, voltage, socket, trimmers, alignment	11-13
	Tuner data	11-10
629, Series A, Serial 9L225000 up	Schematic, voltage, socket, trimmers	11-14
	Alignment	11-12
635, Series A	Schematic, voltage, socket, alignment, trimmers	11-15
636, Series A	Schematic, voltage, socket, trimmers, alignment	11-16
636, Series B	Schematic, voltage, socket, trimmers, alignment	11-20
637	Schematic, voltage, socket, trimmers	11-21
	Alignment, notes	11-22

MODEL	BELMONT RADIO CORP.—(Cont.)	PAGE
706-391, 706-398, 706-378, etc. Chassis 706, Series A, Serial 9K166700 up	Schematic, socket, trimmers	11-17
	Alignment, trimmers	11-18
	Voltage, tuner	11-19
707-391, 707-398, 707-378, etc. Chassis 707, Series A, Serial 9K167300 up	Schematic, voltage, trimmers	11-32
	Alignment, trimmers	11-18
	Tuner data	11-19
708-391, 708-398, 708-378, etc. Chassis 708, Series A, Serial 9K188300 up	Schematic, voltage, socket, trimmers	11-23
	Alignment, trimmers	11-18
	Tuner data	11-19
709 AC, S.P.U.	Schematic	11-17
	Installation notes	11-19
791	Schematic, voltage, socket	11-24
	Alignment trimmers	11-26
792, Series A	Schematic, voltage, socket	11-25
	Alignment, trimmers	11-26
	Tuner data	11-19
792, Series B, Serial 9L200500 up	Schematic, voltage, socket, trimmers	11-27
	Alignment, trimmers	11-28
	Tuner data	11-19
793, Series A	Schematic, voltage, socket	11-29
	Alignment, trimmers, phono data	11-30
793, Series B, Serial 9L199900 up	Schematic, voltage, socket, trimmers	11-31
	Tuner data	11-19

BRUNSWICK DIVISION—MERSMAN BROS.

A1020, A2020	Schematic, voltage, notes	11-1
	Alignment, trimmers, socket, dial drive data	11-2
	Automatic Record Changer notes	11-4
T1580, T2580, 3580, 4580, Chassis RC-482, P5580, Chassis RC-482A	Schematic, voltage, alignment, notes	11-2
1680, A2600, 2660, 2689, 3689	Schematic, voltage, notes	11-5
	Alignment, trimmers, socket, dial data	11-2
1700, A2700, A3720	Schematic, voltage, notes	11-7
	Alignment, trimmers, socket, tuner	11-8
	Dial and phonograph data	11-6
	Automatic record changer notes	11-4
A2020	See model A1020	
T2580	See model T1580	
A2600, 2660, 2689	See model 1680	
A2700	See model 1700	
3580	See model T1580	
3689	See model 1680	
A3720	See model 1700	
4580	See model T1580	
P5580	See model T1580	

CADILLAC DIVISION—GENERAL MOTORS

77	Schematic	11-1
	Voltage, alignment, trimmers, socket, chassis	11-2
	Dial drive and tuner assembly	11-3
	Dial Drive data	11-4
	Assembly views	11-5
7238399	Schematic	11-7
	Voltage, socket, chassis	11-6
	Antenna data	11-8
	Tuner, antenna and noise suppression notes	11-9
	Alignment, tuner data	11-10

THE CAPEHART, INC.

* 200-F	Data	Changes 11-5
---------	------	--------------

CHAMPION RADIO

See FERGUSON RADIO, INC.

CHEVROLET DIVISION—GENERAL MOTORS

See also UNITED MOTORS SERVICE

985536	Schematic	11-1
	Alignment, voltage, chassis, trimmers, socket, data	11-2
	Circuit data, tuner, alignment notes, parts	11-3, 4
985537	Schematic, alignment	11-5
	Voltage, chassis, tuner, parts	11-6
985538	Schematic, voltage, alignment	11-7
	Chassis, trimmers, dial data, parts	11-8
985651	Schematic, voltage	11-9
	Alignment, trimmers, socket, chassis	11-10

CONTINENTAL RADIO & TELEVISION CORP.

* See also RADIO PRODUCTS

B1	Schematic, socket, alignment, trimmers	11-1
A2	Schematic, socket, alignment, trimmers	11-2

* Also see Vol. X index

CONTINENTAL RADIO & TELEVISION CORP.—(Cont.)		
MODEL		PAGE
A4, B4	Schematic, alignment	11-3
	Socket, trimmers	11-5
4C	Schematic, alignment	11-4
	Socket, trimmers	11-6
4F	Schematic, alignment	11-7
	Socket, trimmers	11-6
4J	Schematic, alignment	11-4
	Socket, trimmers	11-6
4Z, 319-4Z	Schematic, socket, alignment, trimmers	11-9
AM-4	Schematic, socket, alignment, trimmers	11-8
B5, XB5	Schematic, alignment, voltage	11-10
	Socket, trimmers	11-5
C5, XC5	Schematic, alignment	11-3
	Socket, trimmers	11-5
F5, XF5	Schematic, alignment, voltage	11-10
	Socket, trimmers	11-5
5LS	Schematic, socket, alignment, trimmers	11-11
M5	Schematic, socket, alignment, trimmers	11-12
5N, 5NL	Schematic, socket, alignment, trimmers	11-13
5Q, 5QL	Schematic, alignment	11-7
	Socket, trimmers	11-6
5R, 5RL	Schematic, voltage, alignment	11-14
	Socket, trimmers	11-6
5S, 5SL	Schematic, voltage, alignment	11-14
A6, XA6	Schematic, voltage, alignment	11-15
	Socket, trimmers	11-5
G6, XG6	Schematic, voltage, alignment	11-15
	Socket, trimmers	11-5
6J, 6JL	Schematic, alignment	11-16
	Socket, trimmers	11-6
6M, 6ML	Schematic, alignment	11-16
	Socket, trimmers	11-6
7C	Schematic, alignment	11-17
	Socket, trimmers	11-6
7C-PH Automatic	Schematic, voltage, alignment	11-18
	Socket, trimmers	11-6
	Tuner data	11-19
	Record changer data	11-21
7H	Schematic, alignment	11-17
	Socket, trimmers	11-6
	Tuner, voltage	11-19
7H-PH, 7H-PH Automatic, 382-7H-PH	Schematic, voltage, tuner, alignment	11-19
	Socket, trimmers	11-6
	Record changer data	11-21
AM7	Schematic, socket, trimmers, alignment	11-20
8C	Schematic, socket, trimmers, voltage, alignment, tuner	11-23
AM8	Schematic, amplifier layout	11-22
	Socket, trimmers	11-20
11B, 11B-PH	Schematic, socket, trimmers, alignment, voltage	11-24
	Record changer data	11-21
CW13	Phonograph schematic	11-9
319-4Z	See model 4Z	
382-7H-PH	See model 7H-PH	

CORONADO

See GAMBLE-SKOGMO INC.

CROSLEY CORP.

A169	Schematic, socket, voltage, notes	11-1
	Alignment, trimmers, tuner	11-2
A259	Schematic, socket, voltage, notes	11-3
	Alignment, trimmers, tuner	11-2
429	Schematic, socket, voltage, alignment, trimmers, chassis	11-4
439	Schematic, voltage, socket, trimmers, alignment, chassis	11-7
449, 459	Schematic, socket, trimmers, chassis	11-5
	Alignment, voltage, parts	11-6
468	Schematic, socket, trimmers, chassis, notes	11-8
	Alignment, rear view	11-9
518, 6518	Schematic, socket, trimmers, chassis	11-10
	Alignment, voltage	11-9
519, 529	Schematic, socket, trimmers, chassis	11-11
	Alignment	11-12
* 548, 5548	Alignment, voltage, tuner, chassis	11-12
549	Schematic, chassis	11-13
	Voltage, socket, trimmers, alignment	11-14
558	Schematic, socket, trimmers, notes	11-15
	Alignment, voltage, tuner, chassis	11-12
599	Schematic, socket, trimmers, chassis, voltage, alignment	11-16
639	Schematic, voltage	11-17
	Socket, trimmers, phonograph assembly	11-18
	Alignment, record changer data	11-19
649, 5648	Schematic	11-21
	Voltage, chassis, socket, trimmers, tuner, alignment	11-22

CROSLEY CORP.—(Cont.)		
MODEL		PAGE
668	Schematic, voltage, socket, trimmers, chassis	11-20
	Wavetrap data, notes, tuner	11-12
689	Schematic, socket, chassis, trimmers	11-23
	Voltage, alignment, tuner	11-24
719 (3 types)	Schematics	11-25
	Circuit data, voltage, socket, trimmers, alignment	11-26
729, "Magnetune" (Types 1, 2)	Schematics	11-27
	Alignment, circuit notes, parts	11-29
729 (Type 3)	Schematic, voltage, socket, trimmers, chassis	11-28
	Alignment, circuit notes, parts	11-29
739 (Loop Type)	Schematic	11-30
	Alignment, voltage	11-32
	Socket, trimmers, chassis, notes	11-34
739 (2 types), 7739 (2 types)	Schematics	11-31
	Alignment, voltage	11-32
	Socket, trimmers, chassis, notes	11-34
J739, J7739	Schematics, parts	11-35
	Alignment, voltage	11-32
	Socket, trimmers, notes	11-34
* 758	Alignment, voltage	Changes 11-6
819, 1019 (Loop Type)	Schematic	11-37
	Parts list	11-36
	Socket, trimmers, chassis	11-39
	Voltage, alignment, drive cord data	11-40
819, J819	Schematics	11-38
	Parts list	11-36
	Socket, trimmers, chassis	11-39
	Voltage, alignment, drive cord data	11-40
5519, 5529, J5519, J5529, 6519	Schematics	11-41
	Socket, trimmers, chassis, voltage, alignment, notes	11-42
5548	See model 548	
5648	See model 649	
6518	See model 518	
6519	See model 519	
7739, J7739	See models 739, J739	

DETROLA CORP.

281, 2811	Schematic, alignment	11-1
293	Schematic, alignment, socket, trimmers	11-1
295-1	Schematic, alignment, socket, trimmers	11-2
297	Schematic, alignment, socket, trimmers	11-3
299	Schematic, alignment, socket, trimmers	11-2
301	Schematic, alignment, socket, trimmers	11-2
302	Schematic, alignment	11-1
303	Schematic, alignment, socket, trimmers	11-2
304, 3041	Schematic, alignment, socket, trimmers	11-1
305, 3051	Schematic, alignment, socket, trimmers	11-3
	Tuner data	10-6
310, 3101	Schematic, alignment, socket, trimmers	11-4
	Tuner data	10-6
314	Schematic, alignment, socket, trimmers	11-5
	Tuner data	10-6
315	Schematic, alignment, socket, trimmers, parts	11-6
	Tuner data	10-6
318	Schematic, alignment, socket, trimmers	11-5
	Tuner data	10-6
319	Schematic, alignment, socket, trimmers	11-1
320, 3201, 3202	Schematic, alignment, socket, trimmers	11-4
	Tuner data	10-6
321, 324	Schematic, alignment, socket, trimmers	11-7
322	Schematic, alignment, socket, trimmers	11-7
325	Schematic	11-7
	Socket, trimmers	11-6
326	Schematic, socket, trimmers, parts	11-8
	Alignment, voltage	11-9
	Tuner data	11-10
329	Schematic, socket, trimmers	11-11
333	Schematic, socket, trimmers	11-11
	Alignment	11-10
342	Schematic, socket, trimmers	11-11
343	Schematic, socket, trimmers	11-12
2811	See model 281	
3041	See model 304	
3051	See model 305	
3101	See model 310	
3201, 3202	See model 320	
3231	Schematic	11-12
	Alignment, socket, trimmers	11-10
3281	Schematic	11-12
	Socket, trimmers	11-4
	Alignment	11-10

* Also see Vol. X index

DEWALD FARNSWORTH

MODEL	DEWALD RADIO MFG. CORP.	PAGE
409	Schematic, alignment	11-1
414	Schematic	11-2
415, R415	Schematic	11-2
537, 538, 539 LW, SW	Schematic	11-3
542, 542LW	Schematic, alignment, socket	11-4
544	Schematic, socket	11-5
545, 545SW, 545LW	Schematic, notes	11-6
658, 658LW, 661	Schematic, alignment	11-1
662, 662L, 665	Schematic, alignment, socket, notes	11-7
663, 666	Schematic	11-3
704, 704LW, 705	Schematic, socket, alignment, tuner	11-8

ALLEN B. DUMONT LABS., INC.

180, Type 3 Television	Schematic	11-1, 2
------------------------	-----------	---------

EMERSON RADIO & PHONOGRAPH CORP.

CG, CG1 chassis	See model CG268 or CG293	
CJ, CJ1 chassis	See model CJ221	
CQ chassis	See model CQ269	
CR, CR1 chassis	See model CR297	
CRLW chassis	See model CRLW261	
CS chassis	See model CS268	
CU chassis	See model CU265	
CULW chassis	See model CULW261	
CV, CV1 chassis	See model CV264 or CV289	
CW chassis	See model CW279	
CX chassis	See model CX263	
CY chassis	See model CY269	
CZ chassis	See model CZ282	
DA chassis	See model DA287	
DB chassis	See model DB296	
DC chassis	See model DC308	
DD chassis	See model DD268	
DF chassis	See model DF302	
DH chassis	See model DH264	
DJ chassis	See model DJ310	
DL, DL1 chassis	See model DL330	
DM, DM1 chassis	See model DM331	
DP, DP1 chassis	See model DP332	
CJ221, CJ232 AC, Chassis CJ, Early, Late, CJ1-221, CJ1-232 AC-DC	Schematics Alignment, voltage, changes, coils, parts Changes	11-1 11-2 11-2
* (CP255 CRLW261, CRLW262, CRLW-274, Chassis CRLW	Schematic, voltage, alignment, trimmers	11-3
CULW261, CULW261, CULW-265, CULW274, Chassis CULW	Schematic, voltage, alignment, parts	11-4
CX263, CX283, CX284, CX285, CX305, CX292, Chassis CX (3 types)	Schematics Voltage, alignment, parts, changes, battery data	11-5 11-6
CV264, CV280, CV295, CV298, CV313, CV314, CV316, Chassis CV (2 types)	Schematics Voltage, alignment, trimmers, changes, parts	11-7 11-8
DH264, Chassis DH	Schematic, voltage, alignment, trimmers, parts	11-9
CU265, Chassis CU	Schematic, voltage, alignment, parts	11-10
CG268, CG270, CG272, CG276, CG318, Chassis CG, CY269, CY271, CY273, CY286, CY-288, CY319, Chassis CY	Schematics, voltage Alignment, trimmers, tuner, parts	11-11 11-12
DD268, DD270, DD272, DD276, Chassis DD	Schematic, voltage, socket, alignment, trimmers	11-15
CQ269, CQ271, CQ273, Chassis CQ, CS268, CS270, CS-272, CS276, Chassis CS	Schematic, voltage Tuner data Alignment, trimmers, parts	11-13 11-12 11-14
CW279, Chassis CW, CZ282, Chassis CZ	Schematics Voltage, alignment, trimmers, tuner	11-16 11-24
DA287, Chassis DA	Schematic, voltage, parts, notes Alignment, socket, trimmers	11-21 11-14
CV289, CV290, CV291, Chassis CV, CV1-290, CV1-291, Chassis CV1	Schematics Voltage, alignment, trimmers, changes, parts	11-17 11-18
CG293, CG294, Chassis CG, CG1-293, CG1-294, Chassis CG1	Schematic, record changer Voltage, alignment, trimmers, parts	11-19 11-20
DB296, DB301, Chassis DB, DL330, Chassis DL	Schematic, voltage, alignment, trimmers	11-22
CR297, CR303, Chassis CR, CR1-297, CR1-303, Chassis CR1	Schematic, voltage Record changer data Alignment, changes, parts	11-23 11-19 11-24

MODEL	EMERSON RADIO & PHONOGRAPH CORP.—(Cont.)	PAGE
DF302, DF306, Chassis DF (2 types)	Schematics, voltage Alignment, trimmers, changes, parts	11-25 11-26
DC308, Chassis DC	Schematic, voltage, alignment, trimmers, changes	11-29
DJ310, DJ311, DJ312, Chassis DJ (2 types)	Schematics, voltage, changes Alignment, trimmers, battery data, parts	11-27 11-28
DL1-330, Chassis DL1	Schematics, parts Alignment, voltage, trimmers	11-30 11-23
DM331, Chassis DM, DM1-331, Chassis DM1	Schematic, voltage, alignment, trimmers	11-31
DP332, Chassis DP, DP1-332, Chassis DP1	Schematic, voltage, alignment, trimmers	11-32

FADA RADIO & ELECTRIC CO.

21	Schematic	11-1
F25	Schematic	11-1
L26	Schematic	11-1
P40	Schematic	11-2
F44, F45	Schematic	11-2
B49SW, P49SW	Schematic	11-3
P50, PL50, PUL50	Schematic	11-3
52, F52	Schematic	11-4
53	Schematic	11-4
F55 Late	Schematic	11-4
L56	Schematic	11-4
57	Schematic	11-5
P58, PL58	Schematic	11-5
P60	Schematic	11-6
LA60	Schematic	11-1
PL60, PUL60	Schematic	11-7
61, 69	Schematic	11-6
63	Schematic, voltage	11-8
64APC	Schematic, voltage	11-9
65PC	Schematic, voltage	11-10
A66T, A66PC	Schematic, voltage	11-11
L67T, L67C	Schematic, voltage	11-12
68	Schematic, voltage	11-14
69	See model 61	
74APC	Schematic, voltage	11-13
A76T, A76PC	Schematic, voltage	11-15
L96	Schematic	11-7
913	Schematic, voltage	11-16

FAIRBANKS MORSE & CO.

9B	Schematic, trimmers, socket Voltage, alignment, resistance	11-1 11-2
12A	Changes	11-3

FARNSWORTH TELEVISION & RADIO CORP.

C1-1, C1-2 Chassis	See model AT10	
C1-3 Chassis	See model AK17	
C1-5, C1-6 Chassis	See model AT10	
C2-1 Chassis	See model ATL50	
C2-2 Chassis	See model ATL51	
C2-3 Chassis	See model ATL55	
C2-4 Chassis	See model ATL58	
C3-1 Chassis	See model AC70	
C3-2 Chassis	See model AK76	
C4-1 Chassis	See model AC90	
C4-2 Chassis	See model AK95	
C5-1 Chassis	See model AT-20	
C6-1 Chassis	See model AT-30	
C7-1 Chassis	See model AT-31	
C8-1 Chassis	See model AT-40	
AT10, AT11, AT12, AT14, AT15, AT16, ATL10, ATL11, ATL12, ATL14, ATL15, ATL16, Chassis C1-1, C1-2, C1-5, C1-6	Schematic, alignment, voltage, resistance, parts	11-1
AK17, Chassis C1-3	Schematic, voltage, alignment, resistance, parts	11-2
AT20, AT21, AT22, AT23, Chassis C5-1	Schematic, voltage, alignment, resistance, parts, tuner	11-3
AT30, Chassis C6-1	Schematic, voltage, alignment, resistance, parts	11-4
AT31, Chassis C7-1	Schematic, voltage, alignment, resistance, parts	11-5
AT40, Chassis C8-1	Schematic, voltage, alignment, resistance, parts	11-6
ATL50, ATL52, Chassis C2-1	Schematic, voltage, resistance Alignment, tuner	11-7 11-10
ATL51, Chassis C2-2	Schematic, voltage, resistance Alignment, tuner	11-7 11-10
ATL55, ATL56, Chassis C2-3	Schematic, voltage, resistance Alignment, tuner	11-7 11-10
ATL58, ATL59, Chassis C2-4	Schematic, voltage, resistance Alignment, tuner	11-10 11-10
AC70, AC71, Chassis C3-1	Schematic, voltage, tuner, resistance Alignment	11-8 11-10
AK76, Chassis C3-2	Schematic, voltage, tuner, resistance Alignment	11-8 11-10
AC90, AC91, Chassis C4-1	Schematic, voltage, resistance Alignment Tuner data	11-9 11-10 11-8

* Also see Vol. X index

FARNSWORTH TELEVISION & RADIO CORP.—(Cont.)

MODEL		PAGE
AK95, AK96, Chassis C4-2.....	Schematic, voltage, resistance.....	11-9
	Alignment	11-10
	Tuner data	11-8

FERGUSON RADIO, INC.

* See CHAMPION RADIO

Wireless Record Player.....	Schematic	11-6
3 Tube Phono.....	Schematic	11-5
4V6 (1938).....	Schematic	11-1
6V6PK, Battery	Schematic, alignment	11-2
123-40	Schematic	11-3
153-40	Schematic	11-4
639A, 639B	Schematic	11-5
6140AK, Serial 9293 up	Schematic	11-6
6340AB	Schematic	11-7
6340TZE	Schematic	11-8

FIRESTONE TIRE & RUBBER CO.

AIR CHIEF

R311 Chassis	See model S7426-1	
R313 Chassis	See model S7426-3	
R314 Chassis	See model S7427-1	
R316 Chassis	See model S7427-3	
R317 Chassis	See model S7425-8UA	
R320 Chassis	See model S7425-6	
S7402-1	Schematic, voltage, alignment, trimmers, sockets, parts.....	11-1
S7402-2, S7422-5	Schematic, voltage, alignment, socket, trimmers, parts.....	11-1
S7402-3	Schematic, voltage, socket, trimmers	11-3
S7403-3	Alignment	11-4
S7403-4	Schematic, voltage, socket, trimmers	11-3
S7403-8	Alignment	11-4
S7403-8	Schematic, voltage	11-5
S7404-1	Alignment, trimmers, socket.....	11-6
S7404-1	Schematic, voltage, socket, trimmers, parts	11-7
S7404-2 (Serial numbers pre- fixed with "A").....	Alignment, tuner	11-8
S7404-2 (Serial numbers pre- fixed with "C").....	Schematic, voltage	11-4
S7404-4	Tuner data	11-8
S7405-5	Alignment, trimmers, socket.....	11-11
S7407-5 Late	Schematic, voltage, socket, trim- mers, alignment, assembly.....	11-12
S7407-6	Schematic, voltage, socket, coils, parts	11-15
S7407-8	Alignment, trimmers, parts.....	11-16
S7407-8	Schematic, voltage, socket, trim- mers, assembly	11-18
S7422-5	Alignment	11-17
S7425-3	See model S7402-2	
S7425-3	Schematic, voltage, chassis, socket, trimmers	11-19
S7425-6, Chassis R320.....	Alignment, tuner, dial data, parts	11-20
S7425-6 Late, S7425-9 Loop... S7425-8UA, S7425-9, Chassis R317	Voltage, tuner assembly, parts... Schematic, voltage, socket, coils... Alignment, tuner, trimmers..... Schematic, voltage, socket.....	11-21 11-22 11-23 11-24
S7426-1, Chassis R311.....	Schematic, socket, trimmers, coils	11-25
S7426-2	Alignment, voltage, circuit data... Schematic, socket, trimmers, coils	11-26 11-25
S7426-2	Alignment, voltage, circuit data... Tuner data	11-26 11-23
S7426-3, S7426-4, Chassis R313	Schematic, voltage, socket, trim- mers, alignment	11-27
S7426-8	Tuner, drive cord data.....	11-28
S7427-1, Early, Chassis R314	Schematic, voltage	11-29
S7427-1, Late	Tuner data	11-8
S7427-3, Chassis R316.....	Alignment, socket, trimmers.....	11-30
S7427-7	Schematic, voltage	11-31
S7427-8	Alignment, socket, trimmers.....	11-32
S7427-8	Schematic, voltage	11-33
S7427-8	Tuner data	11-8
S7427-8	Schematic, voltage, socket.....	11-35, 36
S7427-8	Alignment, trimmers, coils, tuner dial drive	11-37, 38
S7427-8	Schematic, voltage	11-39
S7427-8	Schematic, voltage	11-4
S7427-8	Alignment, trimmers	11-11

F. J. FIEZGERALD CO.

BC	Schematic, socket, alignment, trimmers	Misc. 11-2
----------	---	------------

GALVIN MFG. CORP.

5A, 5AA, Chassis.....	See model 51A
5C, Chassis	See model 51C

GALVIN MFG. CORP.—(Cont.)

MODEL		PAGE
6A, Chassis	See model 61A	
6B, Chassis	See model 61B	
6E, Chassis	See model 61E	
11A, Wireless Record Player... *E11T, E12T (Tuners).....	Schematic	11-32
21A Wireless Record Player.....	See E5T	
25F, Ford, Mercury	Schematic	11-32
25F, Ford, Mercury	Schematic, voltage, sensitivity, gain	11-1
25F, Ford, Mercury	Alignment, socket, trimmers, notes, dial assembly	11-2
26-C, Chevrolet	Schematic	11-3
26-C, Chevrolet	Alignment, trimmers, voltage, socket, gain, sensitivity, drive cord data	11-4
26-C7, Chevrolet	Schematic	11-3
26-C7, Chevrolet	Alignment, trimmers, voltage, socket, gain, sensitivity, drive cord data	11-4
27-D, Chrysler, DeSoto, Plymouth, Dodge, 1940	Schematic	11-5
27-D, Chrysler, DeSoto, Plymouth, Dodge, 1940	Alignment, trimmers, voltage, socket, gain, sensitivity, dial drive	11-6
28-O, 30-P, Oldsmobile, Pontiac, 1940	Schematic, voltage	11-7
28-O, 30-P, Oldsmobile, Pontiac, 1940	Alignment, trimmers, sensitivity, gain	11-8
28-O, 30-P, Oldsmobile, Pontiac, 1940	Dial coil data, notes.....	11-4
29-B, Buick, 1940	Schematic	11-9
29-B, Buick, 1940	Alignment, trimmers, sensitivity, gain, drive cord data, voltage, notes	11-10
29-B-6, Buick, 1940.....	Schematic, voltage	11-11
29-B-6, Buick, 1940.....	Alignment, gain, sensitivity, drive cord	11-10
35-N, Nash, 1940	Alignment, trimmers, dial cord data	11-8
41-A, 41E	Schematic, alignment	11-12
41B, 41F	Schematic, alignment	11-12
41D1, 41D2	Schematic, alignment	11-14
41S	Battery connections	11-13
41S	Schematic, alignment	11-12
51A, 53A, 54A, Chassis 5A, 5AA	Schematics	11-15
51A, 53A, 54A, Chassis 5A, 5AA	Alignment	11-18
51A, 53A, 54A, Chassis 5A, 5AA	Aligning note	11-17
51A, 53A, 54A, Chassis 5A, 5AA	Sensitivity, gain, voltage, trim- mers, dial drive data.....	11-16
51C, 52C, 53C, Chassis 5C.....	Schematic, alignment	11-17
51C, 52C, 53C, Chassis 5C.....	Sensitivity, gain, voltage, trim- mers, dial drive data.....	11-16
51D1, 51D2	Schematic, alignment	11-14
51D1, 51D2	Battery connections	11-13
61A, 62A, 63A, Chassis 6A.....	Schematic, alignment	11-18
61A, 62A, 63A, Chassis 6A.....	Sensitivity, gain, voltage, trim- mers, dial drive data	11-16
61B, 62B, Chassis 6B.....	Schematic, alignment	11-19
61B, 62B, Chassis 6B.....	Aligning note	11-17
61B, 62B, Chassis 6B.....	Sensitivity, gain, voltage, trim- mers, dial drive data.....	11-16
61C, 61D, (with R.F. Stage)...	Schematic, coils	11-20
61C, 61D, (with R.F. Stage)...	Socket, trimmers, alignment, volt- age, sensitivity, gain	11-23
61CA, 61DA, (with Separate Osc.)	Schematic, coils	11-21
61D, (with Loop)	Schematic, coils	11-22
61E, 62E, 63E, Chassis 6E.....	Schematic, alignment	11-24
61E, 62E, 63E, Chassis 6E.....	Sensitivity, gain, voltage, trim- mers, dial drive data	11-16
81C, (Cylindrical Loop)	Schematic	11-25
81C, (Cylindrical Loop)	Socket, trimmers, alignment, voltage, sensitivity, gain.....	11-23
81C, (Square Loop)	Schematic	11-26
81C, (Square Loop)	Socket, trimmers, alignment, voltage, sensitivity, gain.....	11-23
82A	Schematic	11-27, 28
82A	Alignment, tuner data	11-30
82A	Voltage, sensitivity, clock data, drive data	11-29
82A	Clock data, tuner notes	11-31
89K1, Type 2	Schematic	11-33
89K1, Type 3	Schematic	11-34
89K2, Type 2	Schematic	11-35
89K3	Schematic	11-36
89K3	Alignment, trimmers, voltage, sensitivity, switch data	11-43, 44
109K1, Type 1	Schematic	11-37, 38
109K1, Type 1	Alignment, voltage, sensitivity, trimmers	11-39, 40
109K1, Type 2	Schematic	11-39, 40
109K1, Type 2	Alignment, voltage, sensitivity, trimmers	11-39, 40
109K2, Type 1	Schematic	11-41, 42
109K2, Type 1	Alignment, voltage, sensitivity, trimmers	11-39, 40
109K2, Type 2	Schematic, switch data	11-43, 44
109K2, Type 2	Alignment, voltage, sensitivity, trimmers	11-39, 40
300	Schematic, voltage, socket, trimmers	11-45
300	Alignment, sensitivity	11-47
350	Schematic, socket, trimmers, voltage	11-46
350	Alignment, sensitivity	11-47
400	Schematic, voltage	11-48
400	Alignment, socket, trimmers, gain, sensitivity	11-50

* Also see Vol. X index

GALVIN GENERAL ELECTRIC

MODEL	GALVIN MFG. CORP.—(Cont.)	PAGE
450	Schematic, socket, voltage, trimmers	11-49
	Alignment, gain, sensitivity	11-50
GAMBLE-SKOGMO INC.		
6B, Power Converter	Schematic	11-1
540, Late	Schematic	11-1
571, Series A, Serial 189300 up	Schematic, voltage, socket, trimmers	11-3
	Alignment	11-4
577C	Schematic, voltage, battery notes	11-5
	Alignment, trimmers, socket, tuner	11-6
577D, Serial 214845 up	Schematic, voltage, socket, trimmers	11-2
	Tuner data	11-4
589, Series A, Issue B	Schematic, alignment, socket, trimmers	11-7
601, Series A, B, C	Schematic, voltage, alignment, trimmers, socket, notes	11-8
636	Schematic, voltage, socket, trimmers, alignment	11-14
665, 765, Series A	Schematic, voltage, trimmers, socket	11-9
	Alignment	11-10
678, Issue A	Schematic, voltage, socket, trimmers	11-11
	Alignment, tuner, trimmers	11-13
	Tuner data, notes	11-12
767, Series A	Schematic, socket, trimmers	11-15
	Alignment, voltage, trimmers	11-17
	Tuner data	11-16
802, 804	Schematic, voltage, alignment, trimmers, socket	11-18
816, 816B	Schematic, alignment	11-23
864	Schematic, voltage, socket, sensitivity	11-19
	Alignment, trimmers, drive cord data	11-20
902	Schematic, voltage, socket, trimmers	11-21
	Alignment, notes	11-22
907	Schematic, voltage, alignment, trimmers, socket	11-24
908	Schematic, voltage, alignment, trimmers, socket	11-24
940, 940A	Schematic	11-25
951, 951A	Schematic	11-25
953	Schematic, tuner	11-25
962	Schematic, tuner	11-26
970B, 970BX	Schematic, tuner	11-26
980B, 980BX	Schematic, tuner	11-26
990	Schematic, alignment	11-23
4912, 4914	Schematic, voltage	11-30
	Alignment, trimmers, socket, notes	11-22
4954	Schematic, voltage, socket, coils, notes	11-27, 28
	Alignment, trimmers	11-29
4954, Issue B	Hum change	11-29
GAROD RADIO CORP.		
BP4	Schematic, socket, alignment, chassis	11-1
BP5	Schematic, socket, alignment, chassis	11-1
BP9, BP10	Schematic, socket, alignment, trimmers	11-2
150	Schematic, alignment	11-3
389	Schematic, socket	11-4
	Alignment	11-14
399, 4990	Schematic, sockets, trimmers	11-6
453	Schematic, alignment	11-14
493	Schematic, socket, trimmers	11-7
	Alignment	11-14
939	Schematic	11-8
	Alignment	11-14
1039, 1049	Schematic	11-9
1239	Schematic, trimmers	11-10
	Alignment	11-14
1540	Schematic, socket	11-11
1739	Schematic, socket, trimmers	11-12
3109	Schematic	11-13
4990	See model 399	
GENERAL ELECTRIC CO.		
HM21 Wireless Record Player	Schematic, adjustments	11-79
H73, H77, H78, H79 (Final)	Schematic, data	11-1
	Chassis Wiring, voltage, socket, dial data	11-2
	Trimmers, coils, notes, gain, phonograph data	11-3
	Alignment, parts	11-4
	Parts list	11-5
H79 Record changer	Data, Part 1	11-14
	Data, Part 2	11-15
	Data, Part 3, Parts list	11-16
	Data, Part 4	11-17
HM80	Schematic, socket, trimmers	11-6
HM87	Schematic, socket, trimmers	11-7
	Chassis wiring	11-8
	Alignment, gain, voltage, socket	11-9
	Parts list	11-10

MODEL	GENERAL ELECTRIC CO.—(Cont.)	PAGE
HM16, HM18, HJ119 (Final)	Schematic, socket, trimmers, dial data	11-11, 12
	Chassis wiring, coils	11-13
	Alignment, gain, voltage, socket, record changer data, Part 1	11-14
	Data, Part 2	11-15
	Data, Part 3, parts list	11-16
	Data, Part 4	11-17
	Parts list	11-18
	Alignment	Changes 11-5
*GM125	Schematic, notes	11-19
HM136	Chassis wiring, voltage, socket, notes	11-20
	Alignment, parts	11-21
	Circuit data, alignment procedure	11-22
	Trimmers, socket, parts	11-23
HM171 Television	Schematic	11-25, 26
HM185 Television	Schematic	11-29, 30
HM171, HM185	Voltage, chassis, notes	11-27, 28
	Alignment	11-31
	Alignment	11-32
	Trimmers, notes	11-33
	Parts list	11-34
HM225, HM226-7A Television	Schematic	11-35, 36
	Voltage, trimmers, socket, chassis controls, notes	11-37, 38
	Alignment	11-39
	Alignment	11-40
	Parts list	11-41
	Circuit data, parts	11-42
HM226-7A Radio Receiver	Schematic, socket, voltage, trimmers	11-43
	Radio chassis wiring, phonograph data, power chassis	11-44
	Alignment, parts	11-45
	Data	Changes 11-2
H400	Schematic, voltage, alignment, trimmers	11-24
H406U	Schematic, notes	11-47
HB412	Voltage, socket, alignment, trimmers	11-48
*H500, H501, H510, E511, H520, H521	Changes	Changes 11-2
H500U, H500UW, H500UX, H510U, H510UW, H510UX, Early, Late, H520U, H520UW, H520UX	Schematics, changes	11-49
	Alignment, parts	11-10
	Gain, voltage, trimmers, socket, coils	11-50
*H500, H500W, H500X, H501, H501W, H501X, H510, H510W, H510X, H511, H511W, H511X, H520, H520W, H520X, H521, H521W, H521X	Voltage, socket, chassis wiring, gain, parts	11-51
H502	Schematic, voltage, alignment, gain, coils, socket	11-53
	Chassis wiring, trimmers, parts	11-54
H503, H530, H531, H532	Schematic, voltage, alignment, gain, coils, socket	11-53
	Chassis wiring, trimmers, parts	11-54
HB504	Schematic	11-55
	Voltage, socket, trimmers, alignment, notes	11-56
HB505	Schematic	11-55
	Voltage, socket, trimmers, alignment, notes	11-56
H508	Schematic, alignment, socket, trimmers	11-46
HJ514	Schematic, gain, voltage, alignment, socket, trimmers	11-52
H530, H531, H532	See model H503	
*H600, H600W, H600X, H601, H601W, H601X, H610, H610W, H610X, H611, H611W, H611X, Final	Chassis wiring, gain, voltage, dial, socket	11-57
*H600U, Early	See model H600 Preliminary	
*H610U, Early	See model H610 Preliminary	
H600U, H600UW, H600UX, H610U, H610UW, H610UX	Schematic, voltage, changes	11-59
	Chassis wiring, trimmers, dial	11-58
	Alignment, gain, coils, parts	11-60
HJ612	Schematic, voltage, socket, alignment, gain, trimmers	11-61
HJ618AC, HJ618DC	Schematic, voltage, gain, alignment, trimmers, socket	11-62
	Phonograph switch, parts	11-63
	Turntable parts	11-64
H620U, H620UW, H620UX, H630U, H632U (Late)	Schematic, voltage, changes	11-59
	Chassis wiring, trimmers, dial	11-58
	Alignment, gain, coils, parts	11-60
H622, H623	Schematic, voltage, socket, alignment, gain, trimmers, chassis wiring, changes	11-65
	Parts list	11-5
HJ624	Schematic, voltage, gain, trimmers, socket, changes	11-66
	Alignment	11-62
	Phonograph switch, parts	11-63
	Turntable parts	11-64

* Also see Vol. X index

GENERAL ELECTRIC
KADETTE

GENERAL ELECTRIC CO.—(Cont.)		PAGE
MODEL		
H625 (Final)	Schematic, gain	11-67
	Chassis wiring, voltage, socket, notes	11-68
	Alignment, trimmers, changes, dial, parts	11-69
	Parts list	11-70
HJ628	Schematic, voltage, gain, trimmers, sockets, changes	11-66
	Alignment	11-62
	Phonograph switch, parts	11-63
	Turntable parts	11-64
H630, H631, H632, H633 (Final) H630U, H632U (Early)	Schematic, gain	11-67
	Chassis wiring, voltage, socket, notes	11-68
	Alignment, trimmers, changes, dial, parts	11-69
	Parts List	11-70
H630U, H632U (Late)	See model H620U	
H634, H638, H640	Schematic, socket, trimmers	11-71
	Chassis wiring, voltage	11-72
	Gain, coils, notes	11-73
	Alignment, phonograph, dial drive data	11-74
H639AC, H639DC	Schematic, voltage, gain, alignments, trimmers, socket, phonograph switch assembly	11-80
H640	See model H634	
H708, H736, HJ737	Schematic, chassis wiring, voltage, socket	11-75
	Alignment, trimmers, gain, circuit data, notes	11-76
HJ905, HJ908, HJ908B	Schematic	11-77
	Chassis wiring, gain, trimmers, alignment, voltage, socket, drive cord data	11-78
	Circuit data, record changer	11-79
HJ1005	Schematic, trimmers, notes	11-81
	Alignment, gain	11-9
	Parts list	11-18
	Chassis wiring, voltage, socket	11-82
HJ1205	Schematic, voltage, socket, coils	11-83, 84
	Chassis wiring, gain	11-85
	Alignment, drive cord data	11-86
GILFILLAN BROS., INC.		
5AD	Schematic, socket	Misc. 11-3
54-A Late	Schematic, socket	Misc. 11-3
GOODYEAR TIRE & RUBBER CO., INC.		
522	Schematic, voltage, socket, trimmers, alignment	11-1
525	Schematic, voltage, socket, trimmers, alignment	11-2
566	Schematic, voltage, socket, trimmers, alignment, notes	11-3
586	Schematic, voltage, socket, trimmers, alignment, notes	11-4
660	Schematic, socket, trimmers	11-5
680	Schematic, socket, voltage, trimmers, alignment	11-6
685, 686, Runs 1, 2	Schematic, voltage, socket, trimmers	11-7
	Alignment	11-2
770	Schematic, voltage, alignment, trimmers, socket	11-8
778, Runs 1, 2	Schematic, voltage	11-9
	Alignment, trimmers, socket, notes	11-10
THE HALICRAFTERS INC.		
S20-R	Schematic, notes	11-1
	Socket, trimmers, parts	11-2
	Alignment, antenna notes	11-3
SX-25, Super Defiant	Schematic	11-4
	Alignment, trimmers, parts, frequency tuning meter	11-5
	Alignment procedure, notes	11-6
	Antenna notes	11-3
HALSON RADIO & TELEVISION, INC.		
6 Button Automatic Tuner	Data	11-1
40A1	Schematic, socket, alignment, trimmers	11-2
40A1X	Changes	11-4
40B2X	Schematic, socket, alignment, trimmers	11-3
40C3X	Schematic, socket, alignment, trimmers	11-4
HAMILTON RADIO COMPANY		
289	Schematic, socket, alignment, trimmers	Misc. 11-2
THE HAMMARLUND MFG. CO., INC.		
SP210X, SPR210X, SP220X, SPR220X, SP210SX, SPR210SX, SP220SX, SPR220SX, SP210LX, SPR210LX, SP220LX, SPR220LX	Schematic, voltage, socket, chassis, S.P.U. schematic	11-1, 2
	Circuit data	11-3
	Circuit data, operation, alignment, trimmers	11-4
	Assembly, selectivity curves	11-5
	Notes, parts	11-6

HOWARD RADIO COMPANY		PAGE
MODEL		
12B	Schematic, notes	11-1
14ACB	Schematic	11-2
210A, Push-Button Adapter	Schematic	11-7
300	Schematic, voltage, alignment, trimmers, socket	11-3
	Dial and tuner data	11-5
300A, 301, 303, 304	Schematic, voltage, alignment, trimmers	11-4
	Dial and tuner data	11-5
301APC	Schematic, voltage, alignment, trimmers	11-4
	Dial and tuner data	11-5
	Automatic phono. data	11-6
	Automatic phono. data	11-7
302APC	Schematic, voltage, alignment, trimmers	11-8
	Dial and tuner data	11-5
	Automatic phono. data	11-6
	Automatic phono. data	11-7
302R, 302RA, 302RT	Schematic	11-9, 10
	Dial and tuner data	11-5
302S	Schematic, voltage, alignment, trimmers	11-8
	Dial and tuner data	11-5
305	Schematic, voltage, alignment, trimmers	11-11
	Dial and tuner data	11-5
306	Schematic, voltage, alignment, trimmers	11-12
	Dial and tuner data	11-5
307	Schematic	11-13
	Dial and tuner data	11-5
308APC	Schematic, voltage, alignment, trimmers	11-14
	Dial and tuner data	11-5
	Automatic phono. data	11-6
	Automatic phono. data	11-7
308C	Schematic, voltage, alignment, trimmers	11-14
	Dial and tuner data	11-5
308TT	Schematic, voltage, alignment, trimmers	11-14
	Dial and tuner data	11-5
	Schematic, voltage, socket, alignment, trimmers	11-15
518, 518S	Dial and tuner data	11-5
518APC	Schematic, voltage, socket, alignment, trimmers	11-15
	Dial and tuner data	11-5
	Automatic phono. data	11-6
	Automatic phono. data	11-7
520APC	Schematic, voltage, alignment, trimmers	11-16
	Dial and tuner data	11-5
	Automatic phono. data	11-6
	Automatic phono. data	11-7
565, (6v.), 565, (12v.)	Schematic, voltage, alignment, trimmers, socket	11-17
	Dial and tuner data	11-5
568	Schematic, voltage, alignment, trimmers, socket	11-18
	Dial and tuner data	11-5
568R, 568RA	Schematic	11-19, 20
	Dial and tuner data	11-5
575	Schematic, voltage, alignment, trimmers	11-21
	Dial and tuner data	11-5
580, 580C	Schematic, voltage, socket, alignment, trimmers	11-22
	Dial and tuner data	11-5
580APC	Schematic, voltage, socket, alignment, trimmers	11-22
	Dial and tuner data	11-5
	Automatic phono. data	11-6
	Automatic phono. data	11-7
700	Schematic	11-2
HUDSON MOTOR CAR COMPANY		
DB39	Schematic, voltage, socket	11-1
	Alignment, trimmers, socket, coils	11-3
	Chassis wiring	11-4
	Dial and tuner data, notes	11-5
SA39	Schematic, voltage, socket	11-2
	Alignment, trimmers, socket, coils	11-3
	Chassis wiring	11-4
	Dial and tuner data, notes	11-5
DB40	Schematic, voltage	11-7
	Control unit, chassis wiring	11-6
	Alignment, trimmers, changes, notes	11-9
	Tuner adjustments, notes	11-10
	Tuner assembly, notes	11-11
	Dial drive data	11-12
SA40	Schematic, voltage	11-8
	Control unit, chassis wiring	11-6
	Alignment, trimmers, changes, notes	11-9
	Tuner adjustments, notes	11-10
	Tuner assembly, notes	11-11
	Dial drive data	11-12
KADETTE RADIO CORP.		
* See INTERNATIONAL INDUSTRIES, INC.		
L25	Schematic, socket, trimmers, voltage, notes	Misc. 11-4

* Also see Vol. X index

KADETTÉ MIDWEST

MODEL	KADETTÉ RADIO CORP. (Cont.)	PAGE
L40	Schematic, socket, trimmers, voltage, notes	Misc. 11-4
L41	Schematic, socket, trimmers, voltage, notes	Misc. 11-4

KNIGHT

See ALLIED RADIO CORP.

LAFAYETTE RADIO MFG. CO.

C-10 Late	Schematic, voltage, alignment, socket, trimmers	11-1
L-20, Nomad	Schematic, voltage, socket	11-2
L-22, L-23	Schematic, voltage, socket, alignment	11-3
B-61	Schematic, voltage, socket, resistance	11-4
B-64	Schematic, voltage, socket	11-5
B-65	Schematic, voltage, socket	11-6

LAUREHK RADIO MFG. CO.

Radio-Hearing Aid	Schematic	11-1
LA35	Schematic	11-1
L67	Schematic, alignment	11-2

THE MAGNAVOX CO., INC.

Model numbers in which the figure 30 appears are housed in the Playfellow cabinet		
Model numbers in which the figure 31 appears are housed in the Concerto cabinet		
Model numbers in which the figure 32 appears are housed in the Chairside cabinet		
Model numbers in which the figure 33 appears are housed in the Duette cabinet		
Model numbers in which the figure 34 appears are housed in the Berkeley cabinet		
Model numbers in which the figure 35 appears are housed in the Regent cabinet		
Model numbers in which the figure 36 appears are housed in the Windsor cabinet		
Model numbers in which the figure 38 appears are housed in the Hepplewhite cabinet		
Model numbers in which the figure 40 appears are housed in the Swedish Console, Swedish Moderene, or American Modern cabinet		
Model numbers in which the figure 41 appears are housed in the Battery Playfellow cabinet		
Model numbers in which the figure 42 appears are housed in the Belvedere cabinet		
Model numbers in which the figure 43 appears are housed in the Sheraton Console		
Model numbers in which the figure 44 appears are housed in the Sheraton Table cabinet		
Model numbers in which the figure 45 appears are housed in the Modern Table cabinet		
Model numbers in which the figure 46 appears are housed in the Chippendale cabinet		
Model numbers in which the figure 60 appears are housed in the Grinnell cabinet		
Model numbers in which the figure 61 appears are housed in the Chippendale cabinet		
*CR113 Chassis	See CR113 Chassis	
Model 31D, Style TPR-337		
*CR121 Chassis	See CR121 Chassis	
Model 34F, Style CPAR-338		
Model 38B, Style CPAR-381		
CR133 Chassis	Schematic, voltage, alignment, trimmers, socket, chassis	11-3
Model 41, Style PBR-378		
CR134 Chassis		
Model 31D, Style TPR-333		
Model 32B, Style EPR-379	Schematic, voltage, socket	11-1
Model 32C, Style EPR-382	Chassis, alignment, trimmers	11-2
Model 40A, Style CPR-387	10-KC Filter adjustment	11-4
CR144 Chassis		
CR137 Chassis	Schematic, voltage, socket	11-1
Model 40B, Style CPR-380	Chassis, alignment, trimmers	11-2
CR136, Chassis	Schematic, voltage	11-5
Model 42, Style CPAR-348	Chassis, alignment, socket, trimmers	11-6
	10-KC Filter adjustment	11-4
CR140 Chassis		
Model 32B, Style EPR-398		
Model 32C, Style EPR-403		
Model 40A, Style CPR-401		
Model 40B, Style CPR-399		
Model 43A, Style CPAR 421	Schematic, voltage	11-7, 8
Model 46, Style CPR-409	Chassis, alignment, socket, trimmers	11-11
Model 46A, Style CPR-420	10-KC Filter adjustment	11-4
CR150, Chassis		
Model 43, Style CPAR-389		
Model 60, Style CPAR-390		
Model 61, Style CPAR-404		
CR151 Chassis		
Model 43A, Style CPAR-400		
CR141 Chassis	Schematic, voltage	11-13
Model 31B, Style TPR-338	Chassis, alignment, socket, trimmers	11-14
Model 44, Style EPR-391	Changes	11-4
Model 45, Style EPR-392		
CR142 Chassis	Schematic, voltage	11-13
	Chassis, alignment, socket, trimmers	11-14
	10-KC Filter adjustment, changes	11-4

THE MAGNAVOX CO., INC.—(Cont.)

MODEL		PAGE
CR143 Chassis		
Model U32B, Style EPUR-416		
Model U34F, Style CPAUR-419		
Model U34F, Style CPAUR-425		
Model U38C, Style CPAUR-414		
Model U38, Style CPUR-415	Schematic, voltage	11-15
Model U38C, Style CPAUR-418	Chassis, alignment, socket, trimmers	11-16
Model U40B, Style CPUR-417	10-KC Filter adjustment	11-4
Model U43A, Style CPAUR-410		
Model U46, Style CPUR-422		
CR145 Chassis		
Model 31D, Style TRUR-413		
Model U44, Style EPUR-411		
Model U45, Style EPUR-412		
CR146 Chassis		
Model 34F, Style CPAR-394		
Model 38, Style CPR-396	Schematic, voltage	11-17
Model 38, Style CPR-407	Chassis, alignment, socket, trimmers	11-18
Model 38A, Style CPR-397	10-KC Filter adjustment	11-4
Model 38A, Style CPR-408		
Model 38C, Style CPAR-395		
Model 38C, Style CPAR-406		
CR147 Chassis	Schematic, voltage	11-19
Model 34-E, Style CPAR-423	Chassis, alignment, socket, trimmers	11-20
Model 34E, Style CPAR-424	10-KC Filter adjustment	11-4
Model 42, Style CPAR-393	Schematic, voltage	11-21
CR148 Chassis	Chassis, alignment, socket, trimmers	11-22
Model 42, Style CPAR-402	10-KC Filter adjustment	11-4
CR153 Chassis	Schematic, voltage	11-9, 10
	Chassis, alignment, socket, trimmers, notes	11-12
	10-KC Filter adjustment	11-4
MAJESTIC RADIO & TELEV. CORP.		
1A50A, 1A50F, 1A50H, 1A50-AB, 1A50FB, 1A50HB, P1A50, P1A50AB	Schematic, alignment, socket, trimmers	11-1
* 1A59-PL, P1A59-PL	See model 1A59	
1D50MB	Schematic, alignment, socket, trimmers, tuner	11-1
1D59-EB-PL	Schematic, socket, alignment, trimmers, tuner	11-2
1M40I, 1M40R, 1M40W	Schematic, socket, alignment, trimmers	11-3
	Tuner data	11-4
2A50F, 2A50FB, 2A50FM, 2A50FMB	Schematic, alignment, socket, trimmers, tuner	11-5
3C70, 360	Schematic, alignment, socket, trimmers, tuner	11-6
3C80, 3C80P, 380	Schematic, socket, alignment, trimmers	11-7
	Tuner data	11-4
3SC80, 3SC80B	Schematic, tuner layout	11-8
	Alignment, socket, trimmers	11-6
3C90, 3SC90, 390	Schematic, alignment, socket, trimmers, tuner layout	11-9
	Tuner data	11-4
4-PWO Wireless Record Player	Schematic, socket	11-10
5BDA, 5BEA	Schematic	11-11
	Alignment, trimmers, socket, tuner	11-4
5T, 5TO	Schematic, socket, trimmers, alignment	11-12
6UL51	Schematic, socket, alignment, trimmers	11-10
130, 130U	Schematic, socket, alignment, trimmers	11-13
140, 148	Schematic, socket, alignment, trimmers	11-12
150L	Schematic, socket, alignment, trimmers	11-13
310UL	Schematic, socket, alignment, trimmers	11-14
360	See model 3C70	
380	See model 3C80	
390	See model 3C90	
419B, 420, 420PL, 421, 421PL	Schematic, socket, alignment, trimmers	11-14
511, 511A, 519P, 519PA Late	Schematic, socket, alignment, trimmers	11-15
* 519PA Early	See 511 Early	
699P	Schematic	11-15
	Socket, trimmers, alignment, tuner	11-16
* 11056, 11057, 11058	Changes	11-2
MARCONI BROS., INC.		
* See MARCONIPHONE INC.		
D-11	Schematic	Misc. 11-5
MIDWEST RADIO CORP.		
7-39 Battery	Schematic, socket, voltage	11-1
12-40	Schematic, socket, voltage	11-2

* Also see Vol. X index

MIDWEST RADIO CORP.—(Cont.)		PAGE
MODEL		
14-40	Schematic, socket, voltage, trimmers	11-3
15-40	Schematic, socket, voltage	11-4
90	Schematic, socket, voltage, trimmers	11-5
170	Schematic, socket, voltage	11-6

MITCHELL MFG., CO.

Lullaby Combination and Bed Lamp	Schematic, socket, voltage, alignment, trimmers	Misc. 11-6
----------------------------------	---	------------

MISSION BELL RADIO MFG. CO., INC.

404	Schematic	11-1
407, 408, 412	Schematic	11-1
407 Late	Schematic, socket, trimmers	11-2
410	Schematic	11-3
411	Schematic, socket, trimmers	11-2
412	See model 407	
416	Schematic	11-4
417	Schematic	11-5
498 Record Player	Schematic	11-3
504	Schematic	11-6

MONTGOMERY-WARD & CO.

04WG-663, 04WG-668	Schematic, voltage, socket, trimmers, sensitivity, battery connections, loop data	11-1
04WG-725	Schematic, voltage, socket, trimmers, sensitivity	11-2
	Tuner data	11-40
	Alignment, trimmers	11-42
62-303, 62-433	Schematic, socket, coils, transformer and phonograph connections	11-3, 4
	Alignment, trimmers, voltage, notes	11-5
Electric drive panel	Replacement instructions, notes. Adjustments, compound gear	11-6
	notes	11-7
	Replacing main drive cable	11-8
	Drive cord data, Movie dial	11-9
	Film Drum cable, notes, parts	11-10
62-309, 62-449	Schematic, selectivity, transformer data	11-11
	Circuit data, voltage, socket, coils	11-12
	Alignment, trimmers	11-13
Electric drive panel	Replacement instruction notes	11-6
	Adjustments, compound gear notes	11-7
	Replacing main drive cable	11-8
	Drive cord data, Movie dial	11-9
	Film drum cable, notes, parts	11-10
62-321, 62-451	Schematic, sensitivity, transformer and phonograph data	11-15
	Alignment, trimmers	11-13
	Circuit data, voltage, socket, coils, notes	11-16
Electric drive panel	Replacement instruction notes	11-6
	Adjustments, compound gear notes	11-7
	Replacing main drive cable	11-8
	Drive cord data, Movie dial	11-9
	Film drum cable, notes, parts	11-10
62-347, 62-417, 62-447	Schematic, sensitivity, transformer data	11-17
	Alignment, trimmers	11-13
	Circuit data, voltage, socket, coils, phonograph data	11-18
Electric drive panel	Replacement instructions, notes. Adjustments, compound gear notes	11-6
	Replacing main drive cable	11-7
	Drive cord data, Movie dial	11-8
	Film drum cable, notes, parts	11-9
	Film drum cable, notes, parts	11-10
62-362, Issue B	Changes	11-3
62-376, 62-425, 62-486	Schematic, socket, trimmers, alignment	11-14
62-381 S.P.U.	See model 93BR-393A	
* 62-403	Changes	11-6
62-417	See model 62-347	
62-425	See model 62-376	
62-433	See model 62-303	
62-447	See model 62-347	
62-449	See model 62-309	
62-451	See model 62-321	
62-486	See model 62-376	
93BR-335A, Series A	Schematic, voltage, alignment, trimmers, socket	11-20
93BR-391A, Series A	Schematic, voltage, alignment, trimmers, socket	11-21
	Tuner data	11-39
93BR-392A, Series A	Schematic, voltage, alignment, trimmers, socket	11-22
	Tuner data	11-39
93BR-393A, Series A, Serial 9K166700 up	Schematic, socket, trimmers	11-23
	Voltage, alignment, trimmers, S.P.U. notes	11-24
	Tuner data	11-39
	Installation notes	11-26
Model 62-381 S.P.U.		
93BR-420A, 93BR-421A, Series A; 93BR-420B, 93BR-421B, 93BR-423B, 93BR-424B, 93BR-431B, Series B, Serial 813000 up	Schematic, voltage, socket, sensitivity, trimmers	11-25
	Alignment, trimmers	11-26

MONTGOMERY-WARD & CO.—(Cont.)		PAGE
MODEL		
93BR-461A, Serial 759400 up, 93BR-462A, Serial 939800 up	Schematics, sensitivity	11-27
	Alignment, trimmers	11-26
	Tuner data	11-39
	Voltage, trimmers, battery connections	11-28
93BR-561A, 93BR-563A, Serial 783300 up	Schematic, voltage, socket, alignment, trimmers, coils	11-29
	Tuner data	11-39
93BR-658A, 93BR-666A, Series A, Serial 9F824600 up	Schematic, voltage, socket, alignment, trimmers	11-30
	Tuner data	11-39
93BR-659A, 93BR-660A, Serial 9F806900 up	Schematic, voltage, socket, alignment, coils, trimmers, sensitivity	11-31
	Tuner data	11-39
93BR-714A, 93BR-716A, Serial 939200 up, 93BR-715A, Series A, Serial 786400 up	Schematic, voltage, socket, alignment, trimmers, coils	11-32
	Tuner data	11-39
93BR-714B, Series A	Schematic, voltage, socket, trimmers, coils	11-19
	Alignment, trimmers	11-26
	Tuner data	11-39
93BR-715B, Series A, Serial 105400 up	Schematic, voltage, socket, alignment, trimmers, sensitivity, coils	11-33
	Tuner data	11-39
93BR-717A, Series A, Serial 786400 up	Schematic, alignment, coils, voltage, trimmers, sensitivity, socket	11-34
	Tuner data	11-39
93BR-719A, Series A, Serial 9L228300 up	Schematic, voltage, coils, alignment, trimmers, sensitivity, socket	11-35
	Tuner data	11-39
93BR-720A, Series A, Serial 9L221400 up	Schematic, voltage, coils, alignment, trimmers, sensitivity, socket	11-36
	Tuner data	11-39
93BR-1201A, Series A, Serial 9F826400 up	Schematic	11-37
	Alignment, trimmers, voltage, socket, sensitivity	11-38
	Tuner data	11-39
93WG-382	Schematic, voltage, sensitivity, coils, socket	11-41
	Tuner data	11-40
	Alignment, trimmers	11-42
93WG-510	Schematic, voltage, trimmers, alignment, sensitivity, socket	11-43
	Drive cord data	11-40
93WG-565A	Schematic, voltage, socket, trimmers, alignment, sensitivity	11-44
93WG-754, 93WG-755	Schematic, voltage, coils, sensitivity, socket	11-45
	Tuner data	11-40
	Alignment, trimmers	11-42
	Drive cord replacement	11-48
93WG-800, 93WG-801 (with Loop)	Schematic, voltage, coils, sensitivity, socket	11-46
	Tuner data	11-40
	Chassis layout	11-47
	Drive cord replacement, alignment, trimmers	11-48
93WG-801, 93WG-802	Schematic, voltage, coils, socket, sensitivity, layout	11-47
	Alignment, trimmers	11-48
	Tuner data	11-40
93WG-805	Schematic, voltage, coils, sensitivity, layout	11-49
	Alignment, trimmers	11-48
93WG-805 (with Loop)	Schematic, voltage, sensitivity, coils, socket	11-50
	Alignment, trimmers	11-48
93WG-1000, 93WG-1001	Schematic, socket, voltage, coils, sensitivity	11-51
	Tuner data	11-40
	Alignment, trimmers	11-48
93WG-1000, 93WG-1001 (with Loop)	Schematic, voltage, coils, sensitivity, socket	11-52
	Tuner data	11-40
	Alignment, trimmers	11-48
93WG-1103, 93WG-1104	Schematic, voltage, coils, socket, sensitivity, drive cord replacements	11-53
	Alignment, trimmers	11-40
93WG-2208	Schematic, chassis, parts	11-54

MOTOROLA

See GALVIN MFG. CORP.

NOBLITT-SPARKS INDUSTRIES, INC.

See ARVIN

40, 40A	Schematic	11-3
71, Chassis RE-43	Schematic, voltage, alignment, sensitivity	11-1
	Chassis, trimmers, socket	11-2

* Also see Vol. X index

NOBLITT-SPARKS PHILCO

MODEL	NOBLITT-SPARKS INDUSTRIES, INC.—(Cont.)	PAGE
402, 402A, Chassis RE-55	Schematic	11-3
502, 502A, Chassis RE-48	Schematic, alignment	11-4
510, Chassis RE-54, 610, Chassis RE-58	Schematic, socket, trimmers, alignment, tuner	11-5
	Antenna data, tuner, noise elimination	11-6
602, 602A, Chassis RE-53	Schematic, alignment	11-7
610	See model 510	
702, Chassis RE-56	Schematic, tuner, alignment	11-8
710, Chassis RE-59	Schematic	11-9
	Alignment, socket, trimmers	11-10
802, Chassis RE-57	Schematic, alignment	11-11
803, Chassis RE-63	Schematic, alignment	11-12
810, Chassis RE-60	Schematic	11-9
	Alignment, socket, trimmers	11-10

OLDSMOBILE DIVISION—GENERAL MOTORS

See also UNITED MOTORS SERVICE

982160	Schematic, tuning control assem- bly	11-1
	Alignment, trimmers, chassis, voltage	11-2
982161	Schematic	11-3
	Alignment, trimmers, chassis, voltage	11-4

PACIFIC RADIO CORP.

102 Early	Schematic	11-1
301	Schematic, alignment, socket, trimmers	11-2

PACKARD BELL CO.

5AC	Schematic	11-1
5AB, 5AEP	Schematic, socket	11-1
40B	Schematic, socket	11-2
46EP	Schematic	11-3
46G	Schematic, socket	11-3
46H, 46HC	Schematic, socket	11-4
46HP	Schematic, socket	11-4
48E, 48EP	Schematic, socket	11-5
48F	Schematic, socket	11-5
48FPA	Schematic, socket	11-6
50P	Schematic, socket	11-2
58A	Schematic, socket	11-6

PATHE

P5, 500P	Schematic, socket, trimmers, notes	11-1
23X	Schematic, socket	11-2
38T	Schematic, socket	11-3
40T	Schematic	11-3
	Socket, trimmers	11-4
52	Schematic, socket	11-3
54	Schematic, socket, alignment, trimmers, tuner	11-4
114C	Schematic, socket	11-2

PHILCO RADIO & TELEVISION CORP.

L, Record changer	Instructions	11-1
TH-1	Schematic, alignment	11-2
TH-3	Schematic	11-3
	Alignment	11-4
RP-3 Wireless Record Player	Schematic, data	11-5
TH-4, TH-4T	Schematic, notes	11-6
	Alignment	11-4
TP-4, TP-4-I	Schematic, notes	11-7
	Alignment	11-4
TH-5, TH-5T	Schematic, tuner	11-8
	Alignment	11-4
	Tuner data	11-10
TP-5, TP-5-I, TP-5T	Schematic, tuner	11-9
	Alignment	11-4
	Tuner data	11-10
TP-10	Schematic, notes	11-11
	Alignment	11-4
TP-11	Schematic, tuner	11-12
	Alignment	11-4
	Tuner data	11-10
TP-12	Schematic, notes	11-13
	Alignment	11-4
12TP, 39-12, 39-12TP, Early, Late	Schematic, changes	11-14
	Alignment, trimmers, socket, parts	11-15
35-1169 Automatic record changer	Notes	11-16
	Assembly, parts	11-17
35-1176 Intermix, Auto- matic record changer	Assembly, motor notes	11-18
	Adjustments, notes	11-19
	Notes	11-20
	Assembly, notes	11-21
35-1180 Automatic record changer	Operating notes	11-21
	Adjustments, notes	11-22
	Service notes	11-23
	Assembly, notes	11-24
* 37-62	Changes	Changes
39-2-40PC, 39-3-31PA, 39-40PCX	Schematic, notes	11-25
39-8, 39-8T	Schematic, voltage	11-26
	Alignment	11-10
39-12, 39-12TP	See model 12TP	
* 39-17	Tuner data	11-27
* 39-18	Tuner data	11-27

MODEL	PHILCO RADIO & TELEVISION CORP.—(Cont.)	PAGE
* 39-19, 39-19PA, 39-19PF, 39-19PCS, 39-19PT	Tuner data	11-27
	Phonograph connections, notes, parts	11-28
* 39-25	Changes	Changes
* 39-30PCX	Phonograph connections, notes, parts	11-28
39-31, 39-31XF, 39-31XK (Code 121)	Schematic, notes	11-25
* 39-75	Tuner data	11-27
39-85 (Code 121)	Schematic, chassis, voltage	11-29
	Alignment, trimmers	11-27
* 39-116PCX	Phonograph connections, notes	11-30
39-117 (Codes 121, 122)	Schematic, voltage	11-31
	Alignment	11-32
	Chassis, trimmers, parts	11-33
39-118 (Codes 121, 122)	Schematic, voltage	11-31
	Alignment	11-32
	Chassis, trimmers, parts	11-33
39-119 (Codes 121, 122)	Schematic, voltage, notes	11-34
	Alignment, trimmers, chassis, parts	11-32
39-119EZ (Codes 121, 122)	Changes	11-34
39-175 (Codes 121, 122)	Schematic, voltage	11-35
39-711 (Code 121)	Schematic, voltage, changes	11-37
	Alignment	11-39
	Chassis, trimmers, parts	11-36
39-744 (Code 121), Runs 1, 2, 3,	Schematic, voltage, changes	11-41
	Alignment, chassis, trimmers, parts	11-42
39-751 (Code 121) Runs 1, 2	Schematic, voltage, changes	11-38
	Chassis, trimmers, parts	11-36
	Alignment	11-39
39-770 (Code 121)	Schematic, voltage	11-43
	Chassis, trimmers, drive cord data	11-44
	Alignment, parts	11-45
39-2770 (Code 121)	Alignment, notes	11-46
40-81 (Code 121, 122)	Schematic, voltage, chassis	11-40
	Alignment	11-50
40-88 (Code 121)	Schematic, voltage, chassis, trimmers	11-65
	Alignment	11-50
40-110	Schematic, voltage, chassis, trimmers	11-47
	Alignment, notes	11-48
40-115, 40-124 (Code 121)	Schematic, voltage, chassis, trim- mers, alignment	11-49
40-130, 40-135	Schematic, voltage, tuner, chassis, trimmers	11-51
	Alignment	11-52
40-140, 40-145	Schematic, voltage, chassis, trim- mers, loop, tuner	11-53
	Alignment	11-50
40-165	Schematic, voltage, chassis, trimmers, notes	11-54
	Alignment	11-52
40-205	Schematic, voltage	11-55
	Alignment, remote control adjust- ments, notes	11-57
	Wireless remote control adjust- ments, notes	11-56
	Chassis, trimmers, stepper unit, adjustments	11-58
	Parts list	11-62
40-216	Schematic, voltage	11-59, 60
	Alignment, remote control, notes	11-57
	Wireless remote control, notes	
	Chassis, trimmers, stepper unit, dial	11-61
	Parts list	11-62
40-503, 40-506	Schematic, voltage	11-63
	Alignment	11-52
	Chassis, tuner	11-51
	Parts list	11-64
40-507	Schematic, voltage, trimmers	11-66
	Alignment	11-50
	Tuner, chassis	11-53
	Parts list	11-64
40-510	Schematic, voltage, notes	11-67
	Chassis, trimmers, stepper unit adjustments	11-58
	Alignment, remote control notes	11-57
	Wireless remote control adjust- ments, notes	11-56
	Stepper unit, parts	11-68
	Schematic, voltage, notes	11-69
	Alignment, remote control notes	11-57
	Chassis, trimmers, stepper unit, dial	11-61
	Wireless remote control adjust- ments, notes	11-56
	Parts list	11-68
525 (Code 121)	Schematic, voltage	11-70
	Alignment	11-52
	Chassis tuner	11-51
	Parts	11-64
40-710	Schematic, voltage, chassis, trimmers	11-71
	Alignment	11-72
40-715 (Code 121)	Schematic, voltage, chassis, trimmers	11-73
	Alignment	11-72
40-725 (Code 121)	Schematic, voltage	11-75
	Alignment	11-74
	Chassis, parts	11-76
40-748 (Code 121)	Schematic, voltage	11-77
	Chassis, trimmers, alignment	11-78

* Also see Vol. X index

PHILCO RADIO & TELEVISION CORP.—(Cont.)

MODEL		PAGE
40-755 (Code 121)	Schematic, voltage, trimmers	11-79
	Alignment	11-74
	Chassis, parts	11-76
91A, 91B, 99A, 99B, Ford	Antenna data	11-90
107 (Code 121) Runs 1, 2	Schematic, voltage, notes	11-80
* 620	Changes	Changes 11-2
* 630, 630PF	Changes	Changes 11-3
931, 932	Schematic, chassis, trimmers, alignment	11-81
933	Schematic, chassis	11-83
	Alignment, trimmers	11-82
C-1708 Chrysler	Schematic, chassis, trimmers	11-85
	Alignment	11-86
	Dial cord data	11-84
S-1722 Studebaker	Schematic, chassis, trimmers	11-87
	Alignment	11-86
	Tuner data	11-78
	Dial cord data	11-84
F-1740, Ford	Schematic, chassis, trimmers	11-88
	Schematic, tuner parts	11-89
	Dial cord data	11-84

PIERCE-AIRO, INC.
See DEVALD RADIO MFG. CORP.

PILOT RADIO CORP.

T-101	Schematic, socket, trimmers, alignment	11-1
T-102	Schematic, socket, trimmers, alignment	11-2
T-121	Schematic	11-3
	Alignment, trimmers	11-4
T-122	Schematic	11-3
	Alignment, trimmers	11-4
TP1062, TP1862	Schematic, socket, trimmers, alignment	11-4
TI264	Schematic, socket, trimmers, alignment	11-5
TI351	Schematic, socket, trimmers, alignment	11-5
TI451	Schematic, trimmers, alignment	11-6
TI584, TI684,	Schematic, socket, alignment, trimmers, tuner data	11-8
X1584, X1684	Schematic, socket, trimmers, alignment	11-7
TI664, TI764	Schematic, trimmers, alignment	11-6
TI854	Schematic, socket, trimmers, alignment	11-7
TP1862	See TP1062	

RCA MFG. CO., INC.

Gain Data	Test schematic	11-171, 172
	Instructions, notes, Part 1	11-173
	Instructions, notes, Part 2	11-174
Governor Motors	Assembly, maintenance, notes	11-116
4QB, Chassis RC-440	Schematic, lead dress	11-1
	Alignment, socket, trimmers, voltage, chassis wiring	11-2
	Alignment notes, drive cord data	11-3
CV-111 S.P.U.	Schematic, voltage, notes	11-3
4QB4, Chassis RC-440A	Schematic, lead dress	11-5
	Alignment, trimmers, chassis wiring, voltage, socket	11-6
5Q1 (Formerly 95FT)	Schematic, chassis wiring	11-7
	Alignment, voltage, socket, trimmers, notes	11-8
5Q2, Chassis RC-325C	Schematic, voltage, chassis wiring	11-9
	Alignment, trimmers, socket, phonograph data	11-10
5Q2X, Chassis RC-325D	Schematic, voltage, chassis wiring	11-11
	Alignment, socket, trimmers, lead dress	11-12
5Q4, Chassis RC-366	Schematic, voltage, chassis wiring	11-13
	Alignment, trimmers, socket, lead dress	11-14
5Q5, 5Q5A, 5Q5B, 5Q5C, 5Q5D, 5Q5E, 5Q55, 5Q56	Schematic, voltage, chassis wiring, lead dress	11-15
Chassis RC-396, 6Q7, Chassis RC-414A	Alignment, trimmers, socket, drive cords, notes	11-16
5Q6, Chassis RC-477A	Schematic, voltage	11-17
	Alignment, trimmers, socket, drive cord, notes	11-18
5Q8, Chassis RC-396B	Schematic, voltage, chassis wiring, lead dress	11-19
	Alignment, trimmers, drive cord, socket	11-20
5Q55, 5Q56	See model 5Q5	
5Q66, Chassis RC-477C	Schematic, voltage	11-123
	Alignment, trimmers, socket	11-124
* 5X5 Series	See 5X51	
6Q1, Chassis RC-441	Schematic	11-21
	Chassis wiring, voltage, lead dress	11-22
	Alignment, trimmers, socket, drive cord and controls data	11-23
6Q4, Chassis RC-441A	Schematic, controls	11-25
	Alignment, trimmers, drive cord, socket	11-24
	Chassis wiring, voltage, lead dress	11-26
	Parts list	11-4
6Q4X, Chassis RC-442	Schematic, drive cord, controls, phonograph data	11-27
	Alignment, trimmers, socket	11-28
	Chassis wiring, voltage, lead dress	11-29
	Parts list	11-4

RCA MFG. CO., INC.—(Cont.)

MODEL		PAGE
6Q7	See model 5Q5	
6Q8, Chassis RC-414B	Schematic, voltage, chassis wiring	11-33
	Alignment, trimmers, socket, drive cord	11-34
	Parts list	11-4
7Q4X, Chassis RC-502	Schematic	11-125
	Chassis wiring, voltage, phonograph data, lead dress	11-126
	Alignment, trimmers, socket	11-127
8A, 8B, 8C, 10A, 10B, 10C, A-C Socket power units	Schematics, data, parts	11-120
8E, 10E Socket power units	Schematic, chassis wiring	11-35
	Voltage, notes, parts	11-36
8QB, 8QBK, Chassis RC-336	Schematic, lead dress	11-129
	Alignment, trimmers, socket	11-128
	Chassis wiring, voltage, SPU schematics	11-130
8Q1, Chassis RC-337	Schematic	11-31
	Chassis wiring, voltage, lead dress	11-30
	Alignment, trimmers, socket	11-32
8Q2, Chassis RC-443, 8QU5C, 8QU5M, Chassis RC-443B	Schematic, lead dress	11-131
	Chassis wiring, voltage	11-132
	Alignment, trimmers, socket, notes	11-133
	Phonograph data	11-134
	Parts list	11-135
8Q4, Chassis RC-337A	Schematic, lead dress, phonograph data	11-137
	Alignment, trimmers, socket	11-136
	Chassis wiring, voltage, dial notes, SPU notes	11-138
	Parts list	11-135
9Q1, 9QK, Chassis RC-444	Schematic, socket, trimmers, lead dress	11-139
	Chassis wiring, voltage, dial assembly	11-140
	Alignment	11-141
	Parts list	11-142
9Q4, Chassis RC-478	Schematic	11-143
	Parts list	11-142
	Chassis wiring, voltage, lead dress, dial data	11-144
	Alignment, trimmers, socket	11-145
	Changes	Changes 11-4
* 9TX-31, 9TX-32, 9TX-33	See 9TX-50, 9TX-50M, Chassis RC-454; 40X-52, 40X-55, Chassis RC-453, 2nd Production	
U9, Chassis RC-482B	Schematic, socket, voltage, alignment, trimmers	11-37
	Schematic, voltage, socket, alignment, trimmers, phonograph data	11-52
U9 (2nd Production)	Schematic, gain, voltage, alignment, trimmers, socket, lead dress, phonograph data	11-147
	Phonograph data, parts list	11-148
10A, 10B, 10C	See model 8A	
10E	See model 8E	
10Q1, Chassis RC-337B	Schematic, lead dress, phonograph connections	11-39
	Chassis wiring, voltage, drive cord, notes	11-38
	Alignment, trimmers, socket, Victrola attachment	11-40
U10, Chassis RC-418B	Schematic, alignment, tuner	11-41
	Chassis wiring, voltage, socket, trimmers, lead dress, phonograph, drive cord data	11-42
11Q4, 11QK, Chassis RC-335C, 11QU, Chassis RC-335E	Schematic, changes	11-43
	Chassis wiring, voltage, lead dress, drive cord data, speaker notes	11-44
	Alignment, trimmers, socket	11-45
	Electric tuner data	11-46
	Record changer assembly for model 11QU	11-51
12Q4, 12QK, Chassis RC-338, 12QU, Chassis RC-338A	Schematic, changes	11-47
	Chassis wiring, voltage, lead dress	11-48
	Socket, trimmers, drive cord data, SPU notes	11-49
	Alignment, notes	11-50
	Record changer assembly for model 12QU	11-51
U12, Chassis RC-425A	Schematic, socket, trimmers, lead dress, voltage	11-53
	Alignment, phonograph and dial data, parts	11-54
14BT1, 14BT2, 14BK, Chassis RC-525, RC-525A, RC-525B	Schematic, gain, voltage, alignment, trimmers, socket, lead dress, battery connections	11-149
	Parts list	11-150
16K, Chassis RC-509C, 16T3, Chassis RC-509A	Schematic, gain, voltage	11-151
	Alignment, trimmers, socket	11-152
	Tuner data, trimmers, dial, loop connections, lead dress	11-154
	Parts list	11-150
16T2, Chassis RC-509B	Schematic, gain, voltage	11-153
	Alignment, trimmers, socket	11-152
	Loop connections, dial, lead dress	11-154
	Parts list	11-150

* Also see Vol. X index

RCA MFG. CO., INC.—(Cont.)		PAGE
MODEL		
16T4, Chassis RC-509	Schematic, gain, voltage, dial, tone control data	11-155
	Alignment, trimmers, socket, tuner, loop connections	11-156
	Parts list	11-150
17K, Chassis RC-512	Schematic, gain, voltage	11-157
	Alignment, trimmers, socket, dial, loop	11-158
	Tuner data, parts	11-159
18T, Chassis RC-511	Schematic, gain	11-161
	Tuner data, parts	11-160
	Alignment, trimmers, socket, dial, loop, tone control data	11-162
	Chassis wiring, voltage	11-163
19K, Chassis RC-512A	Schematic, gain, voltage	11-165
	Tuner data, dial, parts	11-164
	Alignment, trimmers, socket, speaker, lead dress	11-166
Q20, Q21, Chassis RC-514	Schematic, voltage	11-167
	Alignment, gain, trimmers, socket, lead dress, parts	11-168
U20, Chassis RC-498, U40, Chassis RC-498A	Schematic, socket, trimmers, pickup, voltage, motorboard	11-55
	Alignment, phonograph, speaker, parts	11-56
VA-20 Wireless Record Player	Schematic, set-up procedure, notes, chassis wiring	11-66
OSC-22 Wireless Oscillator	Schematic, voltage, installation, operation, lead dress, parts	11-61
U25, U26, Chassis RC-386B	Schematic, socket, trimmers, tuner, lead dress	11-59
	Alignment, parts	11-58
	Chassis wiring, voltage, dial drive	11-60
40X-30, Chassis RC-405C, 40X-31, Chassis RC-405D	Schematic, voltage, alignment, trimmers, socket, lead dress	11-62
40X-50, 40X-51, 40X-52, 40X-53, 40X-54, 40X-55, 40X-56, 40X-57, Chassis RC-436	Schematic, voltage, alignment, trimmers, socket, lead dress	11-63
40X-52, 40X-55, Chassis RC-453 (2nd Production)	See model 9TX-50	
BK41, BT41, Chassis RC-449	Schematic, voltage, alignment, trimmers, socket, lead dress	11-64
CV40 S.P.U.	Schematic	11-64
BT42, Chassis RC-408A	Schematic, voltage, socket, alignment, trimmers, lead dress	11-65
U42, Chassis RC-498B	Schematic, trimmers, socket, S.P.U. schematic	11-57
	Alignment, phonograph, speaker, parts	11-56
U43, Chassis RC-498E	Schematic, voltage, tuner	11-67
	Alignment, trimmers, socket, dial mechanism	11-68
U44, Chassis RC-486B	Schematic, speaker connections, S.P.U. schematic	11-69
	Chassis wiring, voltage, tuner, trimmers, socket	11-70
	Alignment, lead dress	11-71
45E, 45E-M, 45E-W, Chassis RC-435A	Schematic, voltage, alignment, lead dress, trimmers, socket	11-72
U45, Chassis RC-486C	Schematic	11-73
	Chassis wiring, voltage, lead dress, tuner	11-74
	Alignment, trimmers, socket	11-75
45X1, 45X2, Chassis RC-457	Schematic, voltage, alignment, socket, trimmers	11-76
45X3, 45X4, Chassis RC-457E	Schematic, gain, voltage, alignment, trimmers, socket, parts	11-169
45X5, 45X6, Chassis RC-457D	Schematic, voltage, alignment, trimmers, socket, lead dress	11-77
45X11, 45X12, Chassis RC-469	Schematic, voltage, alignment, trimmers, socket, lead dress	11-78
45X16, 45X17, Chassis RC459M	Schematic, gain, voltage, alignment, trimmers, socket	11-170
	Parts list	11-168
45X111, 45X112, Chassis RC-459J, 45X113, Chassis RC-459K	Schematic, voltage, alignment, trimmers, socket, lead dress	11-83
U46, Chassis RC-501, K130, Chassis RC-501A	Schematic	11-79
	Chassis wiring, voltage	11-80
	Alignment, trimmers	11-81
	Record changer assembly	11-82
46X1, 46X2, Chassis RC-459B, 46X3, Chassis RC-459C	Schematic, voltage, socket, alignment, trimmers, lead dress	11-84
46X11, 46X12, Chassis RC-456, 46X13, Chassis RC-456A	Schematic, voltage, socket, trimmers, alignment	11-85
46X21, Chassis RC-461A, 46X23, Chassis RC-461B, 46X24, Chassis 461	Schematic, voltage, alignment, trimmers, socket, lead dress	11-86
K50, Chassis RC-418A, T55, T56, Chassis RC-418	Schematic, voltage, chassis wiring	11-87
	Alignment, trimmers, socket, dial data, lead dress, parts	11-88

RCA MFG. CO., INC.—(Cont.)		PAGE
MODEL		
K50, Chassis RC-497 (2nd Production)	Schematic, voltage, socket, trimmers, dial data	11-89
	Alignment, lead dress, parts	11-81
BP55, BP56, BP85, Chassis RC-455	Schematic, voltage, alignment, trimmers, socket	11-90
T55	See model K50	
K60, Chassis RC-415	Schematic, voltage, chassis wiring, changes	11-91
	Alignment, trimmers, socket	11-92
	Dial data, parts	11-93
K60, K62, Chassis RC-415B (with Loop)	Schematic, socket, trimmers	11-95
	Alignment, parts	11-94
	Chassis wiring, voltage	11-96
R60, Chassis RS91B Victrola	Schematic, voltage, chassis wiring, assembly	11-103
T60, Chassis RC-425, T62, Chassis 425D	Schematic, voltage, lead dress	11-97
	Alignment, trimmers, socket, tuner, dial data	11-98
K61, Chassis RC-498F	Schematic, voltage, lead dress	11-99
	Alignment, trimmers, socket, dial data	11-100
	Tuner data	11-102
T63, Chassis RC-472F	Schematic, voltage	11-101
	Alignment, trimmers, socket, dial data, tuner	11-102
T64, T65, Chassis RC-416	Schematic, voltage, chassis wiring, changes	11-105
	Tuner data, parts	11-104
	Alignment, trimmers, socket, drive cable	11-106
K80, Chassis RC-415A	Schematic, voltage, chassis wiring, changes	11-107
	Alignment, trimmers, socket	11-92
	Dial data, parts	11-93
K80, Chassis RC-415C, RC-415D, K81, K82, Chassis RC-415C	Schematic, socket, trimmers	11-108
	Alignment, parts	11-94
	Chassis wiring, voltage	11-96
T80, Chassis RC-416A	Schematic, voltage, chassis wiring	11-109
	Socket, trimmers, tuner, parts	11-104
BP85	See model BP55	
RS91B Victrola Chassis	See model R60	
95FT	See model 5Q1	
95T5LW, Chassis RC-348F	Schematic, voltage, chassis wiring, lead dress	11-111
	Alignment, trimmers, socket, tuner, dial data	11-112
	Parts list	11-135
95XLW, Chassis RC-345F	Schematic, voltage, socket, trimmers, chassis wiring, lead dress	11-110
	Changes	11-15
* R98	Changes	11-10
98T2, Chassis RC-352D	Schematic, alignment, tuner	11-113
	Chassis wiring, voltage, trimmers, socket, lead dress	11-114
	Parts list	11-115
K105, Chassis RC-476	Schematic, socket, trimmers	11-117
	Chassis wiring, voltage, lead dress	11-118
	Alignment, parts	11-119
K130	See model U46	
CV-111 S.P.U.	See model 4QB	
RP139A	Adjustments, notes, parts	11-121
	Assembly, ratings	11-122
RP145	Adjustments, notes, parts	11-121
	Assembly, ratings	11-122
RC325C chassis	See model 5Q2	
RC325D chassis	See model 5Q2X	
RC335C, RC335E chassis	See model 11Q4	
RC336 chassis	See model 8QB	
337A chassis	See model 8Q4	
338, 338A chassis	See model 12Q4	
345F chassis	See model 95XLW	
348F chassis	See model 95T5LW	
352D chassis	See model 98T2	
366 chassis	See model 5Q4	
386B chassis	See model U25	
396 chassis	See model 5Q5	
396B chassis	See model 5Q8	
405C, 405D chassis	See model 40X-30	
408A chassis	See model BT42	
414A chassis	See model 6Q7	
415 chassis	See model K60	
415A chassis	See model K80	
415B chassis	See model K60 with loop	
415C, 415D chassis	See model K80	
416 chassis	See model T64	
416A chassis	See model T80	
425, 425D chassis	See model T60	
425A chassis	See model U12	
435A chassis	See model 45E	
436 chassis	See model 40X-50	
440 chassis	See model 4QB	
440A chassis	See model 4QB4	
441 chassis	See model 6Q1	
443 chassis	See model 8Q2	
443B chassis	See model 8QU5C	
444 chassis	See model 9Q1	
449 chassis	See model BK41	
455 chassis	See model BP55	
456, 456A chassis	See model 46X11	

* Also see Vol. X index

MODEL	RCA MFG. INC.—(Cont.)	PAGE
457 chassis	See model 45X1	
457D chassis	See model 45X5	
457E chassis	See model 45X3	
459 chassis	See model 45X11	
459B, 459C chassis	See model 46X1	
459J, 459K chassis	See model 45X111	
459M chassis	See model 45X16	
461, 461A, 461B chassis	See model 46X21	
472F chassis	See model T63	
476 chassis	See model K105	
477A chassis	See model 5Q6	
477C chassis	See model 5Q66	
478 chassis	See model 9Q4	
482B chassis	See model U9	
486B chassis	See model U44	
486C chassis	See model U45	
497 chassis	See model K50, 2nd production	
498 chassis	See model U20	
498A chassis	See model U40	
498B chassis	See model U42	
498E chassis	See model U43	
498F chassis	See model K61	
501, 501A chassis	See model U46	
502 chassis	See model 7Q4X	
509 chassis	See model 16T4	
509A, 509C chassis	See model 16K	
509B chassis	See model 16T2	
511 chassis	See model 18T	
512 chassis	See model 17K	
512A chassis	See model 19K	
514 chassis	See model Q20	
525 525A, 525B chassis	See model 14TB1	

RADIO MFG. ENGINEERS, INC.

RME ME-14	Schematic	11-1
	Alignment, socket, trimmers, parts	11-2
RME DB-20 Battery	Schematic	11-3
	Alignment, trimmers, voltage	11-4
	Trimmers, chassis, parts list	11-5
RME DB-20 Late	Schematic	11-3
	Alignment, trimmers, voltage	11-4
	Trimmers, chassis, parts list	11-5
RME DM-30X	Schematic, voltage	11-6
RME 69, Revised AC or Battery	Schematic	11-9
	Voltage	11-11
	Notes, parts	11-10
RME 69A	Schematic	11-8
RME 69 AC, Late	Schematic	11-7
RME 69 AC, Late Revised	Schematic	11-7
RME 69B	Schematic	11-8
RME 70	Schematic	11-13
	Chassis, socket, trimmers, switch data	11-12
	Voltage, parts	11-14

RADIO PRODUCTS CORP.

See CONTINENTAL RADIO & TELEVISION CORP.

REMLER COMPANY LTD.

* 49, 171	Changes	Changes	11-3
462	Schematic		11-1
463, 464, 465, 470	Schematic, tuner, notes		11-2

SEARS, ROEBUCK & CO.

* 4682A	See model 4608A		
5710, 5711, Chassis 107.450	Schematic, voltage, coils	11-1	
	Alignment, socket, trimmers	11-2	
5710A, 5711A, Chassis 107.450-2	Schematic, voltage, coils	11-1	
	Alignment, socket, trimmers	11-2	
5727, 5728, Chassis 107.A450	Schematic, voltage	11-3	
	Alignment	11-6	
	Socket, trimmers, chassis wiring	11-4	
	Changers, transformers, specifications	11-5	
5750, Chassis 107.A450-S4	Schematic, voltage	11-3	
	Socket, trimmers, chassis wiring	11-4	
	Alignment	11-6	
	Changers, transformers, specifications	11-5	
5752, 5753, Chassis 107.440-S1	Schematic, voltage	11-7	
	Socket, trimmers, chassis	11-8	
	Alignment	11-9	
6025, 6201, Chassis 101.547	Schematic, voltage, changes	11-11	
	Socket, trimmers, chassis	11-12	
	Alignment, push buttons, notes	11-10	
6056, 6057, Chassis 101.548	Schematic, voltage, socket, trimmers, chassis	11-13	
	Alignment, bias cells, whistle note	11-10	
* 6075, Chassis 101.507-1	See model 6005		
6106, 6107, 6108, 6116, Chassis 109.278	Schematic, voltage, socket, alignment trimmers	11-14	
	Changes	Changes	11-4
* 6109, 6110, 6111			
6119, 6120, 6126, 6127, 6200, 6250, Chassis 101.546, 101.546-1	Schematic, voltage	11-15	
	Socket, trimmers, chassis	11-12	
	Alignment, changes	11-16	
	Push buttons	11-10	
	Filament circuit, whistle note	11-10	

MODEL	SEARS, ROEBUCK & CO.—(Cont.)	PAGE
6120A, 6230, 6250A, Chassis 101.546-1A	Schematic, voltage	11-15
	Socket, trimmers, chassis	11-12
	Alignment, changes	11-16
6128, 6251, Chassis 101.547-1, 101.547A	Schematic, voltage, changes	11-11
	Alignment, push buttons, whistle note	11-10
	Socket, trimmers, chassis	11-12
6130, Chassis 101.557, 101.557-1	Schematic, voltage, changes	11-17
	Alignment, trimmers, socket, chassis	11-18
6133, 6137, 6139, 6141, 6199, 6202, 6203, 6252, 6253, Chassis 101.535	Schematic, voltage	11-19
	Socket, trimmers, chassis	11-20
	Alignment, whistle notes	11-10
	Push buttons	11-27
6151, Chassis 101.556, 101.556-1	Schematic, voltage, changes	11-21
	Alignment, chassis, socket, trimmers	11-22
6155, 6156, 6254, Chassis 101.549	Schematic, voltage, changes	11-23
	Socket, trimmers, chassis	11-20
	Alignment	11-24
	Push buttons	11-27
6158, 6159, 6192, Chassis 101.555, 101.555-1	Schematic, voltage, socket, chassis, trimmers	11-25
	Alignment	11-24
	Push buttons	11-27
6160, 6161, 6163, 6175, Chassis 109.199-1	Schematic, voltage, socket, trimmers, alignment	11-26
6177, 6178, 6179, 6185, Chassis 109.279	Schematic, voltage, socket, alignment, trimmers, notes	11-28
6177A, 6178A, 6179A, 6185A, Chassis 109.279-1	Schematic, voltage	11-22
	Alignment, trimmers, socket, notes	11-28
6185A, Chassis 109.279-2	See model 6177A	
6190, Chassis 126.209	Schematic, voltage, drive cord data	11-29
	Chassis wiring, socket, trimmers	11-30
	Alignment, tuner assembly	11-31
6192	See model 6158	
6199	See model 6133	
6200	See model 6119	
6201	See model 6025	
6202	See model 6133	
6208, 6209, Chassis 101.554	Schematic, voltage, chassis, socket, trimmers, tuner	11-32
	Alignment	11-10
6214, 6270, Chassis 101.552, 101.552A	Schematic, voltage, chassis, socket, trimmers, notes	11-33
	Alignment	11-10
6218, 6271, 6272, Chassis 101.553, 101.553A	Schematic, voltage, chassis, socket, trimmers, notes	11-34
	Alignment	11-45
6225, Chassis 133.333, Wireless remote control	Schematic, chassis, trimmers, control data	11-35
	Alignment, notes, parts	11-36
	Push button data, notes	11-37
6229, Chassis 126.210, Wireless Record Player	Schematic, voltage, chassis wiring	11-39
	Operation, notes	11-38
6230	See model 6120A	
6231, Chassis 101.547-1B	Schematic, voltage, changes	11-11
	Socket, trimmers, chassis	11-12
	Alignment, push button data	11-10
	Motor details	11-40
6233, Chassis 126.222, Wireless Record Player	Schematic, voltage, chassis wiring, motor details	11-40
	Operation, notes	11-38
6250	See model 6119	
6250A	See model 6120A	
6251	See model 6128	
6252, 6253	See model 6133	
6254	See model 6155	
6256, Chassis 109.290	Schematic, voltage, socket, trimmers, alignment	11-41
6260, Chassis 101.558	Schematic, voltage, chassis, socket, trimmers	11-42
	Alignment	11-78
6261, Chassis 101.561	Schematic, voltage, chassis, alignment, socket, trimmers, tuner	11-43
6262, Chassis 101.550	Schematic, voltage, chassis, alignment, socket, trimmers, tuner	11-44
6263, Chassis 101.562	Schematic, voltage, chassis, alignment, socket, trimmers, tuner	11-45
6264, 6265, Chassis 101.551	Schematic, voltage, socket, chassis, tuner, trimmers	11-46
	Alignment	11-24
6266, Chassis 101.563, 101.563-1A	Schematic, voltage, alignment, socket, trimmers, chassis	11-47
6270	See model 6214	
6271, 6272	See model 6218	

* Also see Vol. X index

SEARS-ROEBUCK

SEARS, ROEBUCK & CO.—(Cont.)		PAGE
6274, Chassis 110.391, 110.391-1	Schematic, voltage, alignment, battery connections	11-48
6301, Chassis 126.311	Schematic, voltage, dial assembly Alignment	11-49 11-31
6302, Chassis 101.598	Chassis wiring, socket, trimmers Schematic, voltage, chassis, socket, trimmers, alignment	11-50 11-51
6303, Chassis 126.223	Tuner data	11-52
6320, Chassis 101.585	Schematic, voltage, dial, chassis wiring, socket, trimmers, notes	11-53 11-54
6321, 6322, 6323, 6421, Chassis 101.571, 101.571-1, 101.571-1A, 101.571-1B.....	Schematic, voltage, chassis, socket, trimmers, alignment, changes	11-55 11-56
6324, 6424, Chassis 101.570....	Schematic, voltage, chassis, socket, trimmers, alignment, changes	11-57
6324, 6424, 6493, Chassis 101.570-1A, 101.570-1B	Schematic, voltage, chassis, socket, trimmers, alignment, changes	11-58
6325, 6425, Chassis 101.572....	Schematic, voltage, jack Installation	11-59
6326, Chassis 110.987	Alignment, chassis, socket, trim- mers, tuner	11-60
6327, Chassis 110.990	Schematic, voltage, alignment, socket, trimmers, notes	11-61
6329, Chassis 110.989	Schematic, voltage, socket, trim- mers, alignment	11-62 11-98
6335, 6435, 6490, 6495, Chassis 101.573	Schematic, socket, trimmers, alignment	11-76
6336, 6436, Chassis 101.574....	Schematic, voltage, tuner	11-63
6337, 6437, Chassis 101.576....	Alignment, chassis, socket, trim- mers, dial data	11-64
6345, Chassis 110.982	Schematic, voltage, socket, tuner, chassis, trimmers	11-65
6345, Chassis 110.982-2	Alignment	11-24
6345A Chassis 110.982-3.....	Circuit change, notes	11-66
6346, 6346A, 6446, 6446A, Chassis 101.584, 101.584-1, 101.584-2, 101.584-3, 101.584-4, 101.584-5	Schematic, voltage, tuner, changes	11-67
6350, 6351, 6352, Chassis 101.580, 101.580-1	Alignment, trimmers, socket, chassis	11-68
6353, 6354, 6355, Chassis 101.577	Schematic, voltage, socket, align- ment, trimmers	11-69
6356, 6357, 6358, Chassis 101.578	Schematic, voltage	11-70
6359, 6360, 6361, 6379, 6380, 6381, Chassis 101.579	Alignment, trimmers	11-69
6362, 6363, 6364, Chassis 101.581	Schematic, voltages, changes	11-71
6368, Chassis 101.582	Alignment, socket, trimmers, chassis, dial drive data	11-72
6372, 6373, Chassis 110.991....	Automatic record changer assem- bly, adjustments, notes	11-73
6379, 6380, 6381	Record changer notes, assembly..	11-74
6382, Chassis 101.594	Notes, assembly views	11-75
6400, 6401, 6402, Chassis 101.565, 101.565-A, 101.565-B	Schematic, voltage, chassis, align- ment, socket, trimmers	11-77
6400A, 6401A, 6402A, Chassis 101.593, 101.593-A, 101.593-B	Schematic, voltage, chassis, align- ment, socket, trimmers	11-78
6403, 6404, 6405, 6406, 6492, 6496, Chassis 101.566, 101.566A, 101.566B, 101.566C, 101.566D, 101.566E, 101.566-I, 101.566-1A, 101.566-1B, 101.566-1C, 101.566-1D, 101.566-1E, 101.566-2, 101.566-2A, 101.566-2B, 101.566-2C, 101.566-2D, 101.566-2E	Schematic, voltage, chassis, socket, trimmers	11-85
6403A, 6404A, 6405A, 6406A, Chassis 101.566-3, 101.566-3A, 101.566-3B, 101.566-3E	Schematic, voltage, chassis, socket, trimmers, alignment	11-86
6407, 6408, 6409, Chassis 101.567, 101.567-A, 101.567-B, 101.567-1, 101.567-1A, 101.567-1B, 101.567-2, 101.567-2A, 101.567-2B	Schematic, socket, trimmers, changes	11-52 11-86
6407A, 6408A, 6409A, Chassis 101.567-3, 101.567-3A, 101.567-3B	Schematic, voltage, chassis, socket, trimmers, drive cord.... Alignment	11-87 11-86
6421	Changes to chassis	11-88
6424	Schematic, voltage	11-88
6425, Chassis 101.572	Alignment	11-86
6425, Chassis 101.572-1	See model 6321	11-88
6435	See model 6324	11-86
6436	See model 6325	11-88
6437	Schematic, voltage, alignment, notes	11-60
6437A, Chassis 101.576-1	See model 6335	11-67
6438, 6438A, 6439, Chassis 101.583	See model 6336	11-67
6438B, 6439A, 6497, Chassis 101.583-1	See model 6337	11-67
6438B, 6439A, 6440, Chassis 101.583-2	Schematic, voltage, tuner, changes	11-67
6439	Alignment, trimmers, chassis, socket	11-68
6440	Schematic, voltage, chassis, tuner, socket, trimmers	11-89
6441, Chassis 101.599	Alignment	11-82
6446, 6446A	Dial and drive system	11-72
6447, Chassis 101.590, 101.590-1, 101.590-2, 101.590-3, 101.590-4, 101.590-5	Schematic	11-95
6490	Socket, trimmers, chassis	11-89
6490A, Chassis 101.573-1, 101.573-1B	Alignment	11-82
6491, 6494, Chassis 110.982-1A	Dial and drive system	11-72
6492	Dial and drive system	11-72
6493	Schematic, voltage, chassis, notes Alignment	11-90 11-82
6495	Dial and drive system	11-72
6496	See model 6438	11-92
6497, Chassis 101.583-1	See model 6438B	11-92
6497, Chassis 101.595	Schematic, voltage, chassis, socket, trimmers, tuner	11-92
7219, Chassis 110.7219	Alignment	11-82
7227, 7243, Chassis 110.258....	Alignment, socket, tuner trimmers Dial data	11-82 11-64
7228, Chassis 126.206	Change in schematic	11-63
7230, Chassis 126.208	Alignment, chassis, trimmers, socket, dial data	11-64

SEARS, ROEBUCK & CO.—(Cont.)		PAGE
6403, 6404, 6405, 6406, 6492, 6496, Chassis 101.566, 101.566A, 101.566B, 101.566C, 101.566D, 101.566E, 101.566-I, 101.566-1A, 101.566-1B, 101.566-1C, 101.566-1D, 101.566-1E, 101.566-2, 101.566-2A, 101.566-2B, 101.566-2C, 101.566-2D, 101.566-2E	Schematic, voltage, chassis, socket, trimmers	11-85
6403A, 6404A, 6405A, 6406A, Chassis 101.566-3, 101.566-3A, 101.566-3B, 101.566-3E	Schematic, voltage, chassis, socket, trimmers, alignment	11-86
6407, 6408, 6409, Chassis 101.567, 101.567-A, 101.567-B, 101.567-1, 101.567-1A, 101.567-1B, 101.567-2, 101.567-2A, 101.567-2B	Schematic, socket, trimmers, changes	11-52 11-86
6407A, 6408A, 6409A, Chassis 101.567-3, 101.567-3A, 101.567-3B	Schematic, voltage, chassis, socket, trimmers, drive cord.... Alignment	11-87 11-86
6421	Changes to chassis	11-88
6424	Schematic, voltage	11-88
6425, Chassis 101.572	Alignment	11-86
6425, Chassis 101.572-1	See model 6321	11-88
6435	See model 6324	11-86
6436	See model 6325	11-88
6437	Schematic, voltage, alignment, notes	11-60
6437A, Chassis 101.576-1	See model 6335	11-67
6438, 6438A, 6439, Chassis 101.583	See model 6336	11-67
6438B, 6439A, 6497, Chassis 101.583-1	See model 6337	11-67
6438B, 6439A, 6440, Chassis 101.583-2	Schematic, voltage, tuner, changes	11-67
6439	Alignment, trimmers, chassis, socket	11-68
6440	Schematic, voltage, chassis, tuner, socket, trimmers	11-89
6441, Chassis 101.599	Alignment	11-82
6446, 6446A	Dial and drive system	11-72
6447, Chassis 101.590, 101.590-1, 101.590-2, 101.590-3, 101.590-4, 101.590-5	Schematic	11-95
6490	Socket, trimmers, chassis	11-89
6490A, Chassis 101.573-1, 101.573-1B	Alignment	11-82
6491, 6494, Chassis 110.982-1A	Dial and drive system	11-72
6492	Dial and drive system	11-72
6493	Schematic, voltage, chassis, notes Alignment	11-90 11-82
6495	Dial and drive system	11-72
6496	See model 6438	11-92
6497, Chassis 101.583-1	See model 6438B	11-92
6497, Chassis 101.595	Schematic, voltage, chassis, socket, trimmers, tuner	11-92
7219, Chassis 110.7219	Alignment	11-82
7227, 7243, Chassis 110.258....	Alignment, socket, tuner trimmers Dial data	11-82 11-64
7228, Chassis 126.206	Change in schematic	11-63
7230, Chassis 126.208	Alignment, chassis, trimmers, socket, dial data	11-64

* Also see Vol. X index

SEARS, ROEBUCK & CO.—(Cont.)		PAGE
MODEL		
7231, Chassis 105.6H	Schematic, socket, trimmers, alignment	11-107
7232, Chassis 105.6L	Schematic, socket, alignment, trimmers	11-108
7233, Chassis 105.6PU	Schematic, socket, alignment, trimmers	11-109
7234, Chassis 105.7MU	Schematic, socket, alignment, trimmers	11-110
7235, Chassis 105.8KU	Schematic, socket, alignment, trimmers	11-111
	Tuner data	11-112
7236, Chassis 105.8TU	Schematic, alignment, socket, trimmers	11-117
	Tuner data	11-112
7237, 7239, Chassis 104.709	Schematic, voltage	11-113
	Socket, trimmers, coils, alignment, voltage, voltage connections	11-114
7241, 7241A, Chassis 109.246	Schematic, voltage, socket, trimmers, alignment	11-115
	Automatic tuner data	11-116
7242, 7242A, Chassis 109.190	Schematic, socket, alignment, trimmers	11-118
	Automatic tuner data	11-116
7243	See model 7227	
7244, Chassis 110.907	Schematic, voltage, socket, trimmers, alignment	11-119
7245, Chassis 107.375	Schematic, voltage, socket, trimmers	11-133
	Alignment, trimmers, tuner	11-134
	Tuner data	11-112
7246, 7251, Chassis 110.988-1A, 110.988-2	Schematic, socket, trimmers	11-120
7250, Chassis 110.258-1	Schematic, voltage, socket, trimmers	11-97
	Alignment, tuner	11-98
7251, Chassis 110.988	Schematic, socket, trimmers	11-120
	Alignment, tuner	11-98
7300 (Export), Chassis 126.216	Schematic, voltage, phono. connections	11-121
	Chassis wiring, socket, trimmers, dial, notes	11-122
	Alignment	11-123
7305 (Export), Chassis 126.217	Schematic, voltage	11-125
	Chassis wiring, socket, trimmers, notes	11-126
	Alignment	11-127
	Phonograph data, dial	11-128
7306 (Export), Chassis 126.218	Schematic, voltage	11-124
	Chassis wiring, socket, trimmers, notes	11-126
	Alignment	11-127
	Phonograph data, dial	11-128
7307 (Export), Chassis 126.220	Schematic, voltage	11-125
	Chassis wiring, socket, trimmers, notes	11-126
	Alignment	11-127
	Phonograph data, dial	11-128
7310 (Export), Chassis 126.219	Schematic, voltage	11-129
	Chassis wiring, socket, trimmers, dial data	11-130
	Alignment	11-131
	Phonograph data, dial	11-128
7312 (Export), Chassis 126.221	Schematic, voltage	11-129
	Chassis wiring, socket, trimmers, dial data	11-130
	Alignment	11-131
	Phonograph data, dial	11-128
7807, Chassis 113.414	Schematic, voltage, chassis, socket, trimmers	11-132
* 101.507-1 Chassis	See model 6075	
* 101.508 Chassis	See model 6109	
101.535 Chassis	See model 6133	
101.546 Chassis	See model 6119	
101.546-1 Chassis	See model 6119	
101.546-1A Chassis	See model 6120	
101.547 Chassis	See model 6025	
101.547A Chassis	See model 6128	
101.547-1 Chassis	See model 6128	
101.547-1B Chassis	See model 6231	
101.548 Chassis	See model 6056	
101.549 Chassis	See model 6155	
101.550 Chassis	See model 6262	
101.551 Chassis	See model 6264	
101.552 Chassis	See model 6214	
101.552A Chassis	See model 6214	
101.553 Chassis	See model 6218	
101.553A Chassis	See model 6218	
101.554 Chassis	See model 6208	
101.555 Chassis	See model 6158	
101.555-1 Chassis	See model 6158	
101.556 Chassis	See model 6151	
101.556-1 Chassis	See model 6151	
101.557 Chassis	See model 6130	
101.557-1 Chassis	See model 6130	
101.558 Chassis	See model 6260	
101.561 Chassis	See model 6261	
101.562 Chassis	See model 6263	
101.563 Chassis	See model 6266	
101.563-1A Chassis	See model 6266	
101.565 Chassis	See model 6400	
101.565-A Chassis	See model 6400	
101.565-B Chassis	See model 6400	
101.566 Chassis	See model 6403	

SEARS, ROEBUCK & CO.—(Cont.)		PAGE
MODEL		
101.566A Chassis	See model	6403
101.566B Chassis	See model	6403
101.566C Chassis	See model	6403
101.566D Chassis	See model	6403
101.566E Chassis	See model	6403
101.566-1 Chassis	See model	6403
101.566-1A Chassis	See model	6403
101.566-1B Chassis	See model	6403
101.566-1C Chassis	See model	6403
101.566-1D Chassis	See model	6403
101.566-1E Chassis	See model	6403
101.566-2 Chassis	See model	6403
101.566-2A Chassis	See model	6403
101.566-2B Chassis	See model	6403
101.566-2C Chassis	See model	6403
101.566-2D Chassis	See model	6403
101.566-2C Chassis	See model	6403
101.566-3 Chassis	See model	6403A
101.566-3A Chassis	See model	6403A
101.566-3B Chassis	See model	6403A
101.566-3C Chassis	See model	6403A
101.566-3D Chassis	See model	6403A
101.566-3E Chassis	See model	6403A
101.567 Chassis	See model	6407
101.567A Chassis	See model	6407
101.567B Chassis	See model	6407
101.567-1 Chassis	See model	6407
101.567-1A Chassis	See model	6407
101.567-1B Chassis	See model	6407
101.567-2 Chassis	See model	6407
101.567-2A Chassis	See model	6407
101.567-2B Chassis	See model	6407
101.567-3 Chassis	See model	6407A
101.567-3A Chassis	See model	6407A
101.567-3B Chassis	See model	6407A
101.570 Chassis	See model	6324
101.570-1A Chassis	See model	6324
101.570-1B Chassis	See model	6324
101.571 Chassis	See model	6321
101.571-1 Chassis	See model	6321
101.571-1A Chassis	See model	6321
101.571-1B Chassis	See model	6321
101.572 Chassis	See model	6325
101.572-1 Chassis	See model	6425
101.573 Chassis	See model	6335
101.573 Chassis	See model	6490A
101.573-1 Chassis	See model	6490A
101.573-1B Chassis	See model	6490A
101.574 Chassis	See model	6336
101.576 Chassis	See model	6337
101.576-1 Chassis	See model	6437A
101.577 Chassis	See model	6353
101.578 Chassis	See model	6356
101.579 Chassis	See model	6359
101.580 Chassis	See model	6350
101.580-1 Chassis	See model	6350
101.581 Chassis	See model	6362
101.582 Chassis	See model	6368
101.583 Chassis	See model	6438
101.583-1 Chassis	See model	6438B
101.583-2 Chassis	See model	6438B
101.584 Chassis	See model	6346
101.584-1 Chassis	See model	6346
101.584-2 Chassis	See model	6346
101.584-3 Chassis	See model	6346
101.584-4 Chassis	See model	6346
101.584-5 Chassis	See model	6346
101.585 Chassis	See model	6320
101.590 Chassis	See model	6447
101.590-1 Chassis	See model	6447
101.590-2 Chassis	See model	6447
101.590-3 Chassis	See model	6447
101.590-4 Chassis	See model	6447
101.590-5 Chassis	See model	6447
101.594 Chassis	See model	6382
101.593 Chassis	See model	6400A
101.593-A Chassis	See model	6400A
101.593-B Chassis	See model	6400A
101.595 Chassis	See model	6497
101.598 Chassis	See model	6302
101.599 Chassis	See model	6441
104.709 Chassis	See model	7237
105.6H Chassis	See model	7231
105.6L Chassis	See model	7232
105.6PU Chassis	See model	7233
105.7MU Chassis	See model	7234
105.8KU Chassis	See model	7235
105.8TU Chassis	See model	7236
107.375 Chassis	See model	7245
107.440-S1 Chassis	See model	5725
107.450 Chassis	See model	5710
107.450-2 Chassis	See model	5710A
107.A450 Chassis	See model	5727
107.A450-S4 Chassis	See model	5750
109.190 Chassis	See model	7242
109.199-1 Chassis	See model	6160
109.278 Chassis	See model	6106
109.279 Chassis	See model	6177
109.279-1 Chassis	See model	6177A
109.279-2 Chassis	See model	6185A
109.290 Chassis	See model	6256
110.258 Chassis	See model	7227
110.258-1 Chassis	See model	7250
110.391 Chassis	See model	6274
110.391-1 Chassis	See model	6274
110.907 Chassis	See model	7244
110.982 Chassis	See model	6345
110.982-1A Chassis	See model	6491

* Also see Vol. X index

**SEARS-ROEBUCK
SONORA**

MODEL	SEARS, ROEBUCK & CO.—(Cont.)	PAGE
110.982-2 Chassis	See model 6345	
110.982-3 Chassis	See model 6345A	
110.987 Chassis	See model 6326	
110.988 Chassis	See model 7251	
110.988-1A Chassis	See model 7246	
110.988-2 Chassis	See model 7246	
110.989 Chassis	See model 6329	
110.990 Chassis	See model 6327	
110.991 Chassis	See model 6372	
110.7219 Chassis	See model 7219	
113.414 Chassis	See model 7807	
126.206 Chassis	See model 7228	
126.208 Chassis	See model 7230	
126.209 Chassis	See model 6190	
126.210 Chassis	See model 6229	
126.216 Chassis	See model 7300	
126.217 Chassis	See model 7305	
126.218 Chassis	See model 7306	
126.219 Chassis	See model 7310	
126.220 Chassis	See model 7307	
126.221 Chassis	See model 7312	
126.222 Chassis	See model 6233	
126.223 Chassis	See model 6303	
126.311 Chassis	See model 6301	
133.333 Chassis	See model 6225	

SENTINEL RADIO CORP.

1U-194UL	Schematic, voltage	11-1
	Socket, trimmers, chassis, alignment	11-2
1U-C-194UL, RC-1U-194UL	Schematic, voltage	11-3
	Socket, trimmers, chassis, alignment	11-4
1U-195UL	Schematic, voltage	11-5
	Socket, trimmers, chassis, alignment	11-6
160BL	Schematic, voltage, chassis, alignment, socket, trimmers	11-42
168B	Schematic, voltage	11-7
	Socket, trimmers, alignment, chassis	11-8
175B	Schematic, voltage	11-9
	Socket, trimmers, chassis, alignment	11-10
176B	Schematic, voltage	11-11
	Socket, trimmers, alignment, chassis	11-12
180XL	Schematic, voltage	11-13
	Socket, trimmers, alignment, chassis	11-14
181BL	Schematic, voltage	11-15
	Socket, trimmers, alignment, chassis	11-16
184U, 184UE	Schematic, voltage	11-17
	Socket, trimmers, alignment, chassis	11-18
185A, 185AE	Schematic, voltage	11-19
	Socket, trimmers, alignment, chassis	11-20
186B, 186BE	Schematic, voltage	11-21
	Socket, trimmers, alignment, chassis	11-22
189L	Schematic, voltage	11-23
	Socket, trimmers, alignment, chassis	11-24
190A, 190AE	Schematic, voltage	11-25, 26
	Socket, trimmers, alignment, chassis	11-29
191B, 191BE	Schematic, voltage	11-27, 28
	Socket, trimmers, alignment, chassis	11-30
194UL	Schematic, voltage	11-31
	Socket, trimmers, alignment, chassis	11-32
195UL	Schematic, voltage	11-33
	Socket, trimmers, alignment, chassis	11-34
197X	Schematic, voltage	11-35
	Socket, trimmers, alignment, chassis	11-36
198A, 198AE	Schematic, voltage	11-37
	Socket, trimmers, alignment, chassis	11-38
199A, 199AE	Schematic, voltage	11-39, 40
	Socket, trimmers, alignment, chassis	11-41
200X	Schematic, voltage	11-43
	Socket, trimmers, alignment, chassis	11-44
201XL	Schematic, voltage	11-45
	Socket, trimmers, alignment, chassis	11-46
202BL	Schematic, voltage	11-47
	Socket, trimmers, alignment, chassis	11-48
203UL	Schematic, voltage	11-49
	Socket, trimmers, alignment, chassis	11-50
204A, 204AE	Schematic, voltage	11-51
	Socket, trimmers, alignment, chassis	11-52
205BL	Schematic, voltage	11-53
	Socket, trimmers, alignment, chassis	11-54
206A, 206AE, RC206A, RC-206AE	Schematic, voltage	11-55
	Socket, trimmers, alignment, chassis	11-56

MODEL	SETCHELL-CARLSON INC.	PAGE
330	Schematic	11-1
401, 405	Schematic	11-2
407, 408, 4017	Schematic	11-2
588	Schematic	11-1

SILVERTONE

See SEARS, ROEBUCK & CO.

SIMPLEX RADIO CO.

HA	Schematic	Misc. 11-7
----	-----------	------------

SKY-CHIEF RADIO CORP.

A-218	Schematic, notes	11-1
A-219	Schematic	11-2
A-221	Schematic	11-2

SONORA RADIO & TELEVISION CORP.

AU chassis	See model AU-10	
BE, BS chassis	Schematic, socket, trimmers, alignment	11-2
BJE chassis	Schematic, socket, trimmers, alignment	11-3
BJI chassis	Schematic, socket, trimmers, alignment	11-4
KB chassis	See model KB-73	
KD chassis	See model KD-75	
KE chassis	See model KE-78	
KU chassis	See model KU-9	
P chassis	Schematic, socket, trimmers	11-10
PL chassis	Schematic, socket, trimmers, alignment	11-11
Q, QA chassis	Schematic, socket, alignment, trimmers	11-12
	Tuner data	11-14
SL chassis	Schematic, socket, alignment, trimmers	11-13
	Tuner data	11-14
SM chassis	Schematic, socket, alignment, trimmers, tuner	11-14
TB chassis	Schematic, socket, trimmers, alignment	11-15
	Phonograph data	11-8
TC chassis	Schematic, socket, trimmers, alignment	11-16
	Tuner data	11-14
TD chassis	Schematic, socket, alignment, trimmers	11-17
	Tuner data	11-14
TF chassis	See model TF-39	
TH chassis	See model TH-46	
TJ chassis	See model TJ-62	
TJF chassis	Schematic, socket, alignment, trimmers	11-21
	Phonograph data	11-8
TK chassis	See model TK-44	
TKE, TPE chassis	Schematic, socket, trimmers	11-22
TL chassis	Schematic, socket, trimmers, alignment	11-23
	Tuner data	11-14
TM chassis	Schematic, socket, trimmers, alignment	11-24
	Tuner data	11-14
TN chassis	See model TN-45	
TNE chassis	Schematic, socket, alignment, trimmers	11-25
TNF chassis	See model TNF-60	
TP chassis	See model TP-108	
TR chassis	See model TR-53	
TS chassis	Schematic, socket, alignment, trimmers	11-16
TSA chassis	See model TN-45	
TT chassis	See model TT-64	
TW, TWU chassis	See model TW-49	
TX chassis	See model TX-53	
TY, TYI chassis	See model TY-54	
KU-9, chassis KU	Schematic, socket, alignment, trimmers	11-9
	Noise notes	11-1
AU-10, chassis AU	Schematic, socket, trimmers, alignment, noise notes	11-1
TF-39, chassis TF	Schematic, socket, trimmers, alignment	11-18
	Phonograph data	11-8
TK-44, chassis TK	Schematic, socket, trimmers	11-22
TN-45, chassis TN, TSA-105		
TSA-106, chassis TSA	Schematic, socket, alignment, trimmers	11-20
TH-46, chassis TH, Early, Late	Schematic, socket, alignment, trimmers, changes	11-19
TW-49, chassis TW, TWU	Schematic, socket, alignment, trimmers	11-28
	Tuner data	11-14
TR-53, chassis TR	Schematic, socket, alignment, trimmers	11-27
	Tuner data	11-14
TX-53, TX-58, chassis TX	Schematic, socket, alignment, trimmers	11-29
	Tuner data	11-14
TY-54, chassis TY, TYI	Schematic, socket, alignment, trimmers	11-30
	Tuner data	11-14
TNF-60, TNF-68, chassis TNF	Schematic, socket, alignment, trimmers	11-26
	Phonograph data	11-8
TJ-62, TJ-63, chassis TJ	Schematic, socket, trimmers, alignment	11-20

* Also see Vol. X index

SONORA RADIO & TELEVISION CORP.—(Cont.)

MODEL	PAGE
TT-64, chassis TT	Schematic, socket, alignment, trimmers 11-28 Tuner data 11-14
KB-73, chassis KB	Schematic, socket, alignment, trimmers, battery data 11-5
KD-75, chassis KD	Schematic, socket, alignment, trimmers 11-6 Battery data 11-5
KE-78, chassis KE	Schematic, socket, alignment, trimmers 11-7 Phonograph data 11-8
TSA-105, TSA-106, chassis TSA	See model TN-45
TP-108, chassis TP	Schematic, socket, trimmers 11-10

SPARKS WITHINGTON CO.

520, 520M	Schematic, voltage, alignment, socket, trimmers 11-1
530X	Schematic, voltage, alignment, socket, trimmers 11-2
540LX	Schematic, voltage, alignment, socket, trimmers 11-3
540SX	Schematic, voltage, alignment, socket, trimmers 11-4
550M	Schematic, voltage, alignment, socket, trimmers 11-5
570M	Schematic, voltage, alignment, socket, trimmers 11-6
580X	Schematic, voltage, alignment, socket, trimmers 11-9
590-1	Schematic, changes 11-7 Alignment, voltage, socket, trimmers 11-8
620M, 690M	Schematic, voltage, alignment, socket, trimmers 11-10
640LX, 740LX, 740LX-PA	Schematic 11-11 Voltage, alignment, trimmers 11-12
640SX, 740SX, 740SX-PA	Schematic 11-13 Voltage, alignment, trimmers 11-12
660M	Schematic, voltage, alignment, socket, trimmers 11-14
670-6L, 670-6S	Schematic, voltage, socket 11-15 Alignment, trimmers 11-16
740LX, 740LX-PA	See model 640LX
740SX, 740SX-PA	See model 640SX
760PS	Schematic, socket, voltage, alignment, trimmers 11-17
770, 770PA, 880A	Schematic, socket, voltage, alignment, trimmers 11-18
880	Schematic, voltage 11-19 Alignment, socket, trimmers 11-20
940LX, 940SX	Schematic 11-21 Alignment, voltage, socket, trimmers 11-22
1160	Schematic 11-23 Voltage, alignment, socket, trimmers 11-24

SPARTON

See SPARKS WITHINGTON CO.

SPIEGEL, INC.

AIR CASTLE

1T chassis	See model 2006
MX-2 chassis	See model 1902
ML-4 chassis	See model 1904
5A chassis	See model 2014
Z5P7026	Schematic, socket, trimmers 11-1
Z5P7112	Schematic, socket, trimmers 11-1
6A chassis	See model 2006
8A5 chassis	See model 1008
10M chassis	See model 4534
25 chassis	See model 2222
68B chassis	See model 6700
80B chassis	See model 1204
128B	Schematic, voltage, socket 11-3 Alignment 11-2 Chassis, trimmers 11-4
142, 154, 6602, 6650, chassis 725	Schematic, socket, trimmers, alignment 11-5
190 chassis	See model 4504
525 chassis	See model 6606
562 chassis	See model 4402
600 chassis	See model 6714
645 chassis	See model 2056
701 chassis	See model 5004
725 chassis	See model 142
1008, 1009, chassis 8A5 (1939) 2012, 2013, chassis 8A5 (1938)	Schematic, alignment 11-6
1075B chassis	See model 5104
1091B chassis	See model 4510
1095B chassis	See model 4000
1204, 1205, 1206, 1207, chassis 80B	Schematic, voltage, socket 11-7 Chassis, socket, trimmers 11-2
1902, 1917, 1926, 1936, 1959, 1971, 1980, 4503, 4506, 4525, 4580, 4532, chassis MX-2	Schematic, alignment 11-9
1904, 1916, 1952, 1965, chassis ML-4	Schematic 11-8 Alignment 11-20
2006, 2007, 4040, chassis 6A	Schematic, socket, alignment, trimmers 11-10
2006, 2007, chassis 1T	Schematic, alignment 11-6

SPIEGEL, INC.—(Cont.)

MODEL	PAGE
2012	See model 1008
2014, 2015, 2016, chassis 5A	Schematic, socket, tuner, alignment, trimmers 11-11
2056, 2057, chassis 645	Schematic, voltage, socket, trimmers, alignment 11-12
2222, 2223, 2224, 2225, chassis 25	Schematic, alignment 11-16
4000, 4020, chassis 1098AE	Schematic, voltage, socket 11-17 Chassis, socket, alignment, trimmers 11-18
4040	See model 2006
4402, 4410, chassis 562	Schematic, voltage, alignment, socket 11-19
4503, 4506	See model 1902
4504, 4507, 4536, 9936 chassis 190	Schematic, alignment 11-20
4510, 4556, chassis 1091B	Schematic, voltage, alignment, socket 11-21 Automatic tuner assembly, data.. 11-13 Push-button tuner assembly, notes, parts 11-14 Drive cord data 11-15
4525, 4530	See model 1902
4534, chassis 10M	Schematic, voltage, alignment 11-22
5004, 5005, 5056, chassis 701	Schematic, voltage, alignment, trimmers, socket 11-26
5104, 5152, chassis 1075B	Schematic, voltage, chassis, alignment, socket, trimmers 11-23, 24
6602	See model 142
6606, chassis 525	Schematic, socket, trimmers, alignment 11-25
6650	See model 142
6700, chassis 68B	Schematic, voltage, socket, trimmers 11-27
6714, 6758, chassis 600	Schematic, alignment, socket, trimmers 11-28
9936	See model 4504

STEWART-WARNER CORP.

Magician	See model 03-5K1
Senior Varsity, chassis 03-5B, 07-5B	Schematic, voltage 11-31 Alignment, trimmers, socket, notes 11-34
01-5D9, 01-5D9-WT, chassis 01-5D	Schematic, voltage, socket, phonograph connections 11-33 Alignment, trimmers, socket, notes 11-34
01-5H1, 01-5H2, 01-5H3, 01-5H4, 01-5H5, 01-5H6, 01-5H7, 01-5H8, 01-5H9, chassis 01-5H	Schematic, voltage 11-1 Alignment, trimmers, socket, notes 11-2
01-6A, 01-6B, 01-6D, chassis	Schematic, voltage, socket, phonograph schematic 11-3, 4 Alignment, trimmers, phonograph notes, drive cord 11-5, 6
01-6C9, chassis 01-6C	Schematic, voltage, socket, changes 11-7, 8 Alignment, trimmers, tuner, drive cord, notes 11-5, 6 Automatic record changer assemblies, adjustments 11-9 Assemblies, notes 11-10 Notes, parts 11-11
01-6E1, 01-6E2, 01-6E3, 01-6E4, 01-6E5, 01-6E6, 01-6E7, 01-6E8, 01-6E9, chassis 01-6E	Schematic 11-13 Alignment, voltage, trimmers, socket 11-14
01-6G1, 01-6G4-1, 01-6G4-2, 01-6G4-3, 01-6G4-4, 01-6G4-5, chassis 01-6G; 01-6G1-Z, 01-6G4-1-Z, 01-6G4-2-Z, 01-6G4-3-Z, 01-6G4-4-Z, 01-6G4-5-Z, Chassis 01-6G-Z	Schematic 11-15 Alignment, voltage, socket, trimmers 11-16 Drive cord data 11-46
01-6K1, chassis 01-6K; 01-6M9, chassis 01-6M	Schematic, voltage 11-17 Alignment, trimmers, socket 11-18
01-8A1, 01-8A2, 01-8A3, 01-8A4, 01-8A5, 01-8A6, 01-8A7, 01-8A8, 01-8A9, chassis 01-8A	Schematic, voltage 11-19 Alignment, socket, trimmers 11-20
01-8B1, 01-8B2, 01-8B3, 01-8B4, 01-8B5, 01-8B6, 01-8B7, 01-8B8, 01-8B9, chassis 01-8B	Schematic, voltage 11-27 Alignment, socket, trimmers 11-20
01-8C7, chassis 01-8C; 01-8C7-Z, chassis 01-8C-Z	Schematic, voltage 11-21 Alignment, socket, trimmers, drive cord data 11-22
01-9A7, chassis 01-9A, 01-9A7-Z, chassis 01-9A-Z	Schematic, voltage 11-23, 24 Alignment, trimmers, socket, loop, drive cord 11-25, 26

* Also see Vol. X index

STEWART-WARNER UNITED

MODEL	STEWART-WARNER CORP.—(Cont.)	PAGE
02-4A1, 02-4A2, 02-4A3, 02-4A4, 02-4A5, 02-4A6, 02-4A7, 02-4A8, 02-4A9, chassis 02-4A	Schematic, voltage Alignment, trimmers, socket, notes	11-28 11-2
03-5A1, 03-5A2, 03-5A3, 03-5A4, 03-5A5, 03-5A6, 03-5A7, 03-5A8, 03-5A9, chassis 03-5A	Schematic, voltage Alignment, trimmers, socket	11-29 11-30
03-5B chassis 03-5C1, chassis 03-5C	See model Senior Varsity Schematic, voltage, socket, phonograph connections Alignment, trimmers, socket, notes	11-33 11-33 11-34
03-5E, 03-5J chassis	Schematic Alignment, voltage, trimmers, socket	11-35 11-36
03-5K1, 03-5K2, 03-5K3, 03-5K4, 03-5K5, 03-5K6, 03-5K7, 03-5K8, 03-5K9, Magician, chassis 03-5K	Schematic Alignment, voltage, socket, trimmers, notes	11-37 11-38
03-5R1, 03-5R3, 03-5R4, 03-5R5, 03-5R6, chassis 03-5R	Schematic, voltage Alignment, trimmers, socket	11-39 11-40
03-5S1, 03-5S2, chassis 03-5S	Schematic, voltage Alignment, socket, trimmers	11-41 11-42
03-6J1, chassis 03-6J; 03-6J1-Z, chassis 03-6J-Z; 03-6L7, chassis 03-6L; 03-6L7-Z, chassis 03-6L-Z	Schematic Alignment, voltage, trimmers, socket	11-43 11-44
05-5L1, 05-5L2, 05-5L3, 05-5L4, 05-5L5, 05-5L6, 05-5L7, 05-5L8, 05-5L9, chassis 05-5L	Schematic, voltage, socket Alignment, trimmers, socket	11-12 11-30
07-5B chassis 07-5R1, 07-5R3, 07-5R4, 07-5R5, 07-5R6, chassis 07-5R	See model Senior Varsity Schematic, voltage Alignment, trimmers, socket	11-39 11-40
01-6AX, 01-6BX, 010-6DX, chassis	Schematic, voltage, socket, phonograph schematic Alignment, trimmers, phonograph notes, drive cord data	11-3, 4 11-5, 6
010-6C9X, chassis 010-6CX	Schematic, voltage, socket, changes Alignment, trimmers, drive cord data, tuner, notes	11-7, 8 11-5, 6
R-1781	Schematic, voltage Alignment, trimmers, socket	11-45 11-46

STROMBERG-CARLSON TEL. MFG. CO.

400H, 400HB, 400N, 400NB, 400S, 400SB	Schematic, chassis wiring Alignment, voltage, socket, trimmers, resistance	11-1 11-2
402, chassis 30990	Schematic, chassis wiring Voltage, socket trimmers, chassis, resistance	11-3 11-4
405H	Schematic, chassis wiring Alignment Voltage, socket, trimmers, resistance Tuner data	11-5 11-2 11-6 11-16
410H, 410HB, 410J, 410JB, 410T, 410TB	Schematic Chassis wiring, phonograph data Voltage, socket, trimmers, resistance Alignment	11-7 11-8 11-10 11-17
411PF, 411PFB, 411PT, 411PTB	Schematic Chassis wiring, dial lamp note Voltage, socket, trimmers, resistance Alignment	11-7 11-9 11-10 11-17
412H, 412HB	Schematic, chassis wiring Voltage, socket, trimmers, resistance Alignment	11-11 11-12 11-17
420H, 420HB, 420L, 420LB	Schematic Chassis wiring Voltage, tuner Alignment, socket, trimmers	11-13 11-14 11-16 11-17
420PL, 420PLB, 420PR, 420PRB	Schematic Chassis wiring Voltage, tuner Alignment, socket, trimmers	11-13 11-15 11-16 11-17
425H, 425HB	Schematic, voltage Chassis wiring Socket, trimmers, resistance Alignment, notes	11-21 11-22 11-23 11-24
430H, 430HB, 430L, 430LB, 430M, 430MB, 430PL, 430PLB, 430PF, 430PFB	Schematic Tuner data Chassis wiring Voltage, socket, trimmers, resistance	11-19 11-16 11-18 11-20

MODEL	STROMBERG-CARLSON TEL. MFG. CO.—(Cont.)	PAGE
435M	A-M schematic, chassis wiring F-M schematic, chassis wiring Socket, trimmers, A-M and F-M notes Alignment Tuner, voltage, resistance Schematic Chassis wiring Voltage, resistance, tuner data Alignment, trimmers, socket Schematic Chassis wiring Voltage, alignment, socket, trimmers, resistance Tuner data	11-25 11-26 11-27 11-28 11-29 11-33 11-34 11-35 11-36 11-31 11-30 11-32 11-35
440M, 440MB	Schematic Chassis wiring Voltage, resistance, tuner data Alignment, trimmers, socket Schematic Chassis wiring Voltage, alignment, socket, trimmers, resistance Tuner data	11-33 11-34 11-35 11-36 11-31 11-30 11-32 11-35
450M, 450MB	Schematic Chassis wiring Voltage, alignment, socket, trimmers, resistance Tuner data	11-37 11-38 11-39
455M, 455MB, 455PL, 455PLB	Schematic Chassis wiring Alignment, trimmers, socket, notes Voltage, tuner, circuit data, resistance Schematic Socket, trimmers, notes Chassis wiring, notes Alignment Voltage, resistance Tuner data	11-37 11-38 11-39 11-40 11-41 11-42 11-43, 44 11-45 11-46 11-47
480M, 480MB	Schematic Socket, trimmers, notes Chassis wiring, notes Alignment Voltage, resistance Tuner data	11-41 11-42 11-43, 44 11-45 11-46 11-47

STUDEBAKER and TRANSITONE

See PHILCO RADIO & TELEVISION CORP.

TRAV-LER RADIO & TELEV., CORP.

5 Tube AC-DC TRF	Schematic	11-1
7 Tube AC-DC Super	Schematic, socket, trimmers, alignment	11-1
7 Tube Auto	Schematic, socket, trimmers, alignment, voltage	11-2
315	Schematic, socket, trimmers, alignment	11-5
315SW	Schematic, socket, trimmers, alignment	11-5
325	Schematic, socket, trimmers, alignment	11-5
336	Schematic, alignment Socket, trimmers, tuner data	11-3 11-4
455L, 455LN	Schematic, alignment	11-3
539M	Schematic, alignment Tuner data	11-6 11-4
553, 553BT, 554, 554BT	Schematic, alignment	11-3
555, 555BT, 556, 556B, 556BT, 1555, 1555BT	Schematic, alignment	11-7
570B	Schematic, socket, alignment, trimmers Conversion data Tuner data	11-9 11-10 11-4
576, 576B	Schematic, socket, alignment, trimmers Conversion data Tuner data	11-8 11-10 11-4
620 Early	Schematic Alignment, tuner Socket, trimmers	11-7 11-10 11-4
620 Late, 621	Schematic Socket, trimmers	11-7 11-4
720	Alignment, tuner Schematic Socket, trimmers	11-10 11-8 11-4
801	Schematic, chassis, alignment	11-8
1555, 1555BT	See model 555	
1556, 1556B, 1556BT	Schematic, socket, alignment, trimmers	11-9

TROY RADIO MFG. CO.

4 (Revised)	Schematic, socket	11-1
45, 55, 57 (Revised)	Schematic, socket	11-1
113	Schematic, socket	11-2

TRUETONE

See WESTERN AUTO SUPPLY CO.

ULTRAMAR MFG. CORP.

327, 337	Schematic, socket, voltage, alignment, trimmers	11-1
345, 355	Schematic, socket, voltage, alignment, trimmers	11-2
366, 376	Schematic, socket, voltage, alignment, trimmers	11-5
826	Schematic, voltage Alignment, trimmers, phonograph data	11-3 11-4
857	Schematic, voltage Alignment, trimmers, phonograph data	11-3 11-4

UNITED MOTORS SERVICE

R1150	Schematic Voltage, socket, chassis, trimmers Alignment	11-1 11-2 11-3
R1151, R1152	Schematic Voltage, chassis, socket, trimmers	11-4 11-3
R1153	Schematic Voltage, alignment, chassis, socket, trimmers	11-5 11-6

* Also see Vol. X index

UNITED MOTORS SERVICE—(Cont.)		PAGE
MODEL		
R1154, R1155	Schematic	11-7
	Voltage, alignment, chassis, socket, trimmers	11-8
R1156	Schematic	11-9
	Alignment, trimmers	11-10
	Voltage, chassis, socket, trimmers	11-11
R1157	Schematic, voltage	11-15
	Alignment, chassis, socket, trimmers	11-16
R1160	Schematic, voltage, tuner	11-13
	Chassis, socket, trimmers	11-12
	Alignment, parts	11-14
R1400	Schematic, chassis	11-17
	Voltage, alignment, socket, trimmers	11-18
R1401, R1402	Schematic, chassis	11-19
	Voltage, alignment, socket, trimmers	11-20

WALGREEN CO.

* 4-J	See model 400	
22U-73	Schematic, voltage, socket, alignment, trimmers	11-1
66	Schematic	11-2
B-66-RIS	Schematic, voltage, alignment, socket, trimmers	11-3
200	Schematic	11-3
209	Schematic, socket	11-4
250	Schematic, socket	11-5
252P	Schematic	11-6
300, 300P, Early	Schematic	11-7
400, Late	Schematic, voltage, socket, trimmers	11-8
404B, 404I	Schematic, socket, trimmers	11-9
409, 419	Schematic, socket, trimmers	11-9
410	Schematic, socket	11-4
419	See model 409	
502	Schematic, socket, alignment, trimmers	11-8
510 AC, Early	Schematic, socket, alignment, trimmers	11-10
510 AC-DC, Late	Schematic, socket, alignment, trimmers	11-11
525	Schematic, voltage, alignment, socket, trimmers	11-2
529	Schematic, alignment, socket, trimmers	11-11
542	Schematic, socket, trimmers, tuner	11-12
600, 650	Schematic, alignment, socket, trimmers	11-15
750	Schematic, voltage, socket	11-13
	Alignment, trimmers, chassis	11-14
901	Schematic, alignment, socket, trimmers	11-16

WARWICK MFG. CORP.

0-30, 0-300, 0-301, 0-302, 0-303, 0-304, 0-305, 0-306, 0-307, 0-308, 0-309	Schematic, socket, voltage, alignment, trimmers	11-1
0-40, 0-407	Schematic, socket, voltage, alignment, trimmers	11-1
0-43, 0-430, 0-431, 0-432, 0-433, 0-434, 0-435, 0-436, 0-437, 0-438, 0-439	Schematic, socket, voltage, alignment, trimmers	11-2
0-44, 0-440, 0-441, 0-442, 0-443, 0-444, 0-445, 0-446, 0-447, 0-448, 0-449	Schematic, socket, voltage, alignment, trimmers	11-2
0-50, 0-501	Schematic, socket, voltage, alignment, trimmers	11-7
0-51	Schematic, socket, voltage, alignment, trimmers	11-3
	Tuner data	11-4
0-53	Schematic, socket, voltage, alignment, trimmers	11-5
0-60	Schematic, socket, voltage, alignment, trimmers	11-6
0-61, 0-610, 0-611, 0-612, 0-613, 0-614, 0-615, 0-616, 0-617, 0-618, 0-619	Schematic, socket, voltage, alignment, trimmers	11-7
0-62, 0-620, 0-621, 0-622, 0-623, 0-624, 0-625, 0-626, 0-627, 0-628, 0-629	Schematic, socket, voltage, alignment, trimmers	11-2
0-63	Schematic, socket, voltage, alignment, trimmers	11-3
0-64	Schematic, socket, voltage, alignment, trimmers	11-8
0-65	Schematic, socket, voltage, alignment, trimmers	11-9
0-66	Schematic, socket, voltage, alignment, trimmers	11-8
0-67	Schematic, socket, voltage, alignment, trimmers	11-9
0-70	Schematic, socket, voltage, alignment, trimmers	11-10
	Tuner data	11-4
0-71	Schematic, socket, voltage, alignment, trimmers	11-10
0-72	Schematic, socket, voltage, alignment, trimmers	11-11
0-73	Schematic, socket, voltage, alignment, trimmers	11-11

WARWICK MFG. CORP.—(Cont.)		PAGE
MODEL		
0-74	Schematic, socket, voltage, alignment, trimmers	11-12
	Tuner data	11-4
0-75	Schematic, socket, voltage, alignment, trimmers	11-12
0-76	Schematic, socket, voltage, alignment, trimmers	11-13
0-77	Schematic, socket, voltage, alignment, trimmers	11-14
0-78	Schematic, voltage, socket, alignment, trimmers	11-13
0-79	Schematic, voltage, socket, alignment, trimmers	11-15
0-80	Schematic, voltage, socket, alignment, trimmers	11-14
	Tuner data	11-4
0-81	Schematic, voltage, socket, alignment, trimmers	11-15
0-82, 0-82B, 0-82C	Schematic, voltage, socket, alignment, trimmers	11-16
0-83	Schematic, voltage, socket, alignment, trimmers	11-16
0-300, 0-301, 0-302, 0-303, 0-304, 0-305, 0-306, 0-307, 0-308, 0-309	See model 0-30	
0-407	See model 0-40	
0-430, 0-431, 0-432, 0-433, 0-434, 0-435, 0-436, 0-437, 0-438, 0-439	See model 0-43	
0-440, 0-441, 0-442, 0-443, 0-444, 0-445, 0-446, 0-447, 0-448, 0-449	See model 0-44	
0-501	See model 0-50	
0-610, 0-611, 0-612, 0-613, 0-614, 0-615, 0-616, 0-617, 0-618, 0-619	See model 0-61	
0-620, 0-621, 0-622, 0-623, 0-624, 0-625, 0-626, 0-627, 0-628, 0-629	See model 0-62	
9-21 Phonograph Oscillator	Schematic, notes	11-4
9-41, 9-44, 406	Schematic, voltage, socket, alignment, trimmers	11-17
	Tuner data	11-18
9-42	Schematic, voltage, socket, alignment, trimmers	11-19
	Tuner data	11-18
9-51, 9-52, 9-54, 542 (1938)	Schematic, voltage, socket, alignment, trimmers, tuner	11-18
9-61, 9-63, 9-64, 630, 631	Schematic, socket, alignment, trimmers	11-20
	Tuner data	11-18
9-627	Schematic, socket, voltage, alignment, trimmers, notes	11-21
	Assembly, notes, tuner data	11-22
10-70	Schematic, voltage, alignment, socket, trimmers	11-6
	Tuner data	11-4
406	See model 9-41	
542	See model 9-51	
630, 631	See model 9-61	
652B	Schematic, voltage, alignment, socket, trimmers	11-5

WATTERSON RADIO MFG. CO.

49, L440	Schematic	Misc. 11-8
68, 69, 95	Schematic	11-8
400-1936, 500	Schematic	11-8

WELLS-GARDNER & CO.

1A17	Schematic, voltage, socket, sensitivity, coils	11-1
	Alignment, trimmers, drive cord data	11-2
1A29 (Early)	Schematic, voltage, socket, sensitivity	11-3, 4
	Alignment, trimmers	11-8
	Tuner data	11-9
	Drive cord, phono. data	11-10
	Changes in chassis	11-7
1A29, Issue B	Changes in chassis	11-7
1A29, Issue C	Schematic, voltage, socket, sensitivity, antenna, coil data	11-5, 6
	Changes in chassis	11-7
	Alignment, trimmers	11-8
	Tuner data	11-9
	Drive cord, phono. data	11-10
5A25S	Schematic, voltage, socket, alignment, trimmers, sensitivity	11-11
	Drive cord data	11-10
5D2	Schematic, voltage, socket, alignment, trimmers, sensitivity	11-12
6A26, 6A26S	Schematic, voltage, socket, sensitivity, notes	11-13
	Alignment, trimmers	11-14
	Tuner data	11-9
	Phonograph data	11-10
6A27	Schematic, voltage, socket, sensitivity	11-15
	Alignment, trimmers	11-14
	Tuner data	11-9
	Phonograph data	11-10
6B7 (Early)	Schematic, voltage, socket, sensitivity	11-16
	Alignment, trimmers, changes, notes	11-18

* Also see Vol. X index

**WELLS-GARDNER
WESTINGHOUSE**

WELLS-GARDNER & CO.—(Cont.)

MODEL		PAGE
6B7, Issue B	Changes, alignment, trimmers, notes	11-18
	Socket layout	11-16
6B7, Issues C,D, 6B7-3, 6B7-4	Schematic, voltage	11-17
	Alignment, trimmers, changes, notes	11-18
	Socket layout	11-16
6D1	Schematic, voltage, socket, sensitivity	11-28
	Alignment, trimmers	11-14
	Tuner data	11-9
	Phonograph data	11-10
8A30	Schematic, voltage, socket, sensitivity, antenna data, coils	11-19, 20
	Alignment, trimmers	11-8
	Tuner data	11-9
	Drive cord, phono. data	11-10
	Automatic record changer assembly, adjustments	11-23, 24
	Automatic record changer assembly views, adjustments	11-25, 26
	Record changer notes	11-7
	Record changer service notes	11-27
8A31	Schematic, voltage, socket, coils, sensitivity, notes	11-21, 22
	Alignment, trimmers	11-8
	Tuner data	11-9
	Drive cord, phono. data	11-10

WESTERN AIR PATROL

W221	Schematic	11-1
W403	Schematic, alignment, socket, trimmers	11-2
W409	Schematic, socket	11-3
	Circuit data, voltage, resistance	11-4
W416	Schematic	11-5
	Voltage, socket, trimmers, alignment, changes, drive cord data	11-6
W491	Schematic, socket	11-7
W493	Schematic	11-9
	Voltage, socket, trimmers, alignment	11-10
W831	Schematic, voltage, socket, alignment, trimmers	11-8

WESTERN AUTO SUPPLY CO

* See TRUETONE

D699, D724 (1938)	Schematic, socket, alignment, trimmers	11-1
D716 (1938, 1939)	Schematic, socket, alignment, trimmers	11-2
D717 (1937)	Schematic, socket, alignment, trimmers, voltage, tuner	11-3
S720	Schematic, voltage, socket, trimmers	11-4
D729 (1937)	Schematic, socket, trimmers, alignment	11-5
D730 (1938, 1939)	Schematic, socket, trimmers, alignment	11-5
D731 (1935)	Schematic, voltage, socket, trimmers, alignment	11-6
D731 (1938, 1939) 4 Lever	Schematic, voltage, socket, trimmers, alignment	11-8
	Alignment, tuner data	11-9
D731 (1938, 1939) 5 Lever	Schematic, voltage, socket, trimmers	11-7
	Alignment, tuner data	11-9
D734 (1935)	Schematic, voltage, socket, trimmers	11-10
D737 (1935)	Schematic	11-11
	Voltage, socket, trimmers, coils, changes	11-12
D737-C (1936)	Schematic, socket, trimmers	11-13
	Voltage, resistance, coils, antenna data	11-14
	Alignment, noise data, notes	11-15
D739	Schematic, voltage, socket, trimmers, assembly	11-17
	Alignment, notes, parts	11-18
D-740, S740 (1934) (Mallory Vibrator 296)	Schematic, voltage, socket, alignment, trimmers	11-16
D743 (1936)	Schematic, voltage, socket, trimmers, battery connections	11-21
	Alignment, notes	11-22
D743-W, S743 (1935)	Schematic	11-19
	Alignment, trimmers, socket, voltage, resistance	11-20
D744 (1936)	Schematic, voltage, socket, trimmers	11-23
	Alignment, assembly, notes	11-24
D744 (1937)	Schematic, voltage, socket, trimmers, battery connections	11-25
	Alignment, notes, assembly	11-26
D745 (1936)	Schematic, socket, trimmers, coils	11-27
	Voltage, alignment, notes, parts	11-28

MODEL	WESTERN AUTO SUPPLY OF CALIFORNIA	PAGE
169	Schematic, voltage, socket, trimmers, alignment, tuner	Misc. 11-9
279	Schematic, voltage, socket, trimmers, alignment, tuner	Misc. 11-9
WESTINGHOUSE ELECTRIC SUPPLY CO., INC.		
WR120	Schematic, voltage	11-1
	Alignment, parts	11-2
WR140	Schematic, voltage	11-3
	Alignment, parts	11-4
WR150, Early, Late	Schematic, voltage, alignment, socket, trimmers, notes	11-5
WR152	Schematic, voltage	11-7
	Alignment, chassis, socket, trimmers, parts	11-8
WR162	Schematic, voltage, alignment, socket, trimmers, dial data	11-9
	Parts list	11-10
WR165W, WR165I, WR165M	Schematic, voltage, alignment, socket, trimmers, lead dress	11-6
WR166A	Schematic, voltage	11-7
WR166B, WR166C, WR166G, WR166I, WR166R, WR166W	Schematic, socket, voltage, alignment, trimmers, lead dress	11-11
WR166L, WR166LB, WR166LC, WR166LI, WR166LG, WR166LR, WR166LW	Schematic, voltage, socket, trimmers	11-36
	Alignment, lead dress	11-11
WR168, WR168A	Schematic, voltage, socket, alignment, trimmers, lead dress, dial data	11-12
WR168B	Schematic, voltage, socket, trimmers	11-13
WR169	Schematic, voltage, alignment, socket, tuner	11-14
WR170	Schematic, voltage, alignment, socket, phonograph data	11-23
	Tuner data	11-22
WR224	Schematic, voltage, resistance	11-15
	Alignment, parts	11-16
WR258, Runs A, B, C, etc.	Schematic, voltage, chassis wiring, lead dress	11-18
	Socket, trimmers, drive cord, notes	11-17
	Alignment, tuner	11-20
WR260, Runs A, B, C, etc.	Schematic, voltage, chassis wiring, lead dress	11-19
	Socket, trimmers, drive cord, notes	11-17
	Alignment, tuner	11-20
WR262	Schematic, voltage, socket, trimmers	11-13
	Parts list	11-10
WR270	Schematic, voltage, phonograph data	11-21
	Alignment, socket, trimmers, tuner	11-22
WR366	Schematic, lead dress	11-24
	Chassis wiring, voltage	11-25
	Socket, trimmers, drive cord data	11-26
	Tuner assembly, data, Part 1	11-27
	Tuner data, Part 2, notes	11-28
	Alignment	11-29
WR368	Schematic, lead dress	11-31
	Socket, trimmers, drive cord data	11-26
	Tuner assembly, data, Part 1	11-27
	Tuner data, Part 2, notes	11-28
	Alignment	11-29
	Chassis wiring, voltage	11-30
WR370	Schematic, drive cord, speaker data	11-33
	Tuner assembly, data, Part 1	11-27
	Tuner data, Part 2, notes	11-28
	Tuner adjustments	11-29
	Chassis wiring, voltage, lead dress	11-32
	Alignment, trimmers, socket, notes	11-34
WR468	Schematic, voltage	11-35
	Alignment, phonograph data, lead dress	11-36
WR468L	Schematic, voltage	11-35
	Alignment, phonograph data, lead dress	11-36
WR475	Schematic, socket, trimmers, alignment	11-9
WR502	Schematic, voltage	11-37
	Service data, vibrator adjustments	11-38
	Alignment, socket, trimmers, parts	11-39
WR503	Chassis, parts	11-40
	Schematic, voltage	11-41
	Alignment, parts	11-42
	Service notes	11-38
	Chassis, socket, trimmers	11-43
WR610	Schematic, voltage, trimmers	11-45
	Alignment, parts	11-46

* Also see Vol. X index

WESTINGHOUSE ELECTRIC SUPPLY CO., INC.—(Cont.)

MODEL	PAGE
WR675, WR675A	Schematic, voltage, alignment, socket, trimmers 11-44
WR677	Schematic 11-47

WESTINGHOUSE INTERNATIONAL

WR315	Schematic, alignment 11-1, 2
	Socket, trimmers, chassis 11-3
	Alignment, parts list 11-4

WILCOX-GAY CORP.

7G5, 7GB5	Schematic, socket, trimmers 11-1
	Alignment, voltage 11-2
7J7	Schematic, socket, trimmers 11-3
	Alignment, voltage 11-2
7K7	Schematic, socket, trimmers 11-4
	Alignment, voltage 11-2
9E5 Chassis	See model A73
9J9 Chassis	See model A70
9N7	See model A79
9P7	See model A78
9Q5	See model A72
A61 Wireless Record Player ..	Schematic, notes 11-5
	Motor data 11-22
A63 Wireless Record Player ..	Schematic, notes 11-5
	Motor data 11-22
A64 Wireless Record player ..	Schematic, notes 11-5
	Motor data 11-22
A69	Schematic, socket, trimmers 11-7
A70, A81, A82, Chassis 9J9 ..	Schematic, switch data 11-8
	Chassis, voltage 11-8
	Recorder adjustments 11-9
	Recorder notes, part 1 11-10
	Recorder notes, part 2 11-11
	Recorder notes, part 3, alignment, trimmers 11-12
A71	Schematic 11-13
A72 Recordio, Chassis 9Q5 ...	Schematic 11-13
	Chassis, voltage, socket 11-14
	A-F service note 11-22
	Recorder adjustments 11-9
	Recorder notes, part 1 11-10
	Recorder notes, part 2 11-11
	Recorder notes, part 3 11-12
A73, Chassis 9E5	Schematic, socket, trimmers 11-15
	Voltage, alignment, chassis, socket 11-16
A78, Chassis 9P7	Schematic, socket, voltage, trimmers, alignment 11-17
	Chassis 11-18
A79, Chassis 9N7	Schematic, socket, trimmers 11-19
	Chassis 11-20
	Alignment, voltage 11-17

ZENITH RADIO CORP.

Ford Roto-Matic 01A18805	See model 6MF490
Nash Deluxe AC4289	See model 6MN496
Nash Special AC4398	See model 6MN495
4B422, 4B437, 4B466, 4B468, Chassis 5417	Schematic, socket, voltage, trimmers 11-1
	Alignment 11-3
4K402D, 4K402L, 4K402M, 4K402Y, Chassis 5419	Schematic, voltage 11-2
	Alignment, trimmers 11-30
4K422, 4K435, 4K465, 4K466, Chassis 5420	Schematic, voltage, socket, alignment, trimmers 11-3
5G401D, 5G401L, 5G401M, 5G401Y, Chassis 5537	Schematic, voltage 11-2
	Alignment, trimmers 11-30
5G438, 5G467, Chassis 5536 ..	Schematic, voltage, socket, trimmers 11-4
	Alignment 11-3
5G441, 5G442, 5G461, Chassis 5539	Schematic, voltage, socket, trimmers 11-5
	Tuner adjustments 11-31
	Tuner 11-32
5G484, 5G484-M, Chassis 5538	Schematic, voltage 11-6
	Alignment, trimmers 11-30
6D410, 6D411, 6D425, Chassis 5659, 5663	Schematic 11-7
	Alignment, trimmers 11-30
	Service notes 11-32
6D413, 6D414, 6D426, 6D427, 6D446, 6D455, Chassis 5660, 5664	Schematic, voltage, socket 11-8
	Alignment, trimmers 11-30
	Tuner adjustments 11-31
	Tuner 11-32
6J436, 6J463, Chassis 5679 ..	Schematic 11-9
	Voltage, socket, trimmers 11-28
	Alignment 11-30
	Tuner 11-31
6P416, 6P417, 6P418, 6P419, 6P428, Chassis 5661, 5665 ..	Schematic, voltage, socket 11-10
	Alignment, trimmers 11-30
6P418, 6P419, 6P428, 6P429, 6P430, 6P447, 6P448, 6P457, Chassis 5662, 5666 ..	Schematic 11-7
	Alignment, trimmers 11-30
	Voltage, socket 11-10
	Tuner adjustments 11-31
	Tuner 11-32
6R481, Chassis 5675	Schematic, voltage, socket, alignment, trimmers 11-11

ZENITH RADIO CORP.—(Cont.)

MODEL	PAGE
6R485, Chassis 5672-P	Schematic, voltage 11-12
	Alignment, trimmers, socket 11-11
	Tuner adjustments 11-31
	Tuner 11-32
6S439, 6S469, Chassis 5678 ..	Schematic, voltage, socket, trimmers 11-17
	Alignment 11-19
	Tuner 11-31
6MF490, Ford Roto-Matic, 01A18805	Schematic, voltage 11-13
	Alignment, trimmers, socket, tuning adjustments 11-14
6MN495, Nash Special AC4398, Chassis 5673	Schematic, voltage, socket, trimmers 11-15
	Alignment, tuner 11-32
6MN496, Nash Deluxe AC4289, Chassis 5676	Schematic, voltage, socket, trimmers 11-16
	Alignment, tuner 11-32
7S432, 7S433, 7S434, 7S449, 7S450, 7S458, 7S459, 7S460, 7S461, 7S462, Chassis 5719	Schematic, voltage, socket 11-18
	Alignment, trimmers 11-31
	Tuner adjustments 11-31
	Tuner, service notes 11-32
7S432, 7S433, 7S434, 7S449, 7S450, 7S458, 7S459, 7S460, 7S461, 7S462, Chassis 5724	Schematic, alignment, socket, trimmers 11-19
	Voltage 11-21
	Tuner adjustments 11-31
	Tuner, service notes 11-32
7S487, 7S488, 7S490, Chassis 5721	Schematic 11-20
	Alignment, trimmers 11-30
	Voltage, socket 11-18
	Tuner adjustments 11-31
	Tuner, service notes 11-32
7S487, 7S488, 7S490, Chassis 5725	Schematic, voltage, socket 11-21
	Alignment, trimmers 11-19
	Tuner adjustments 11-31
	Tuner, service notes 11-32
8S432, 8S433, 8S434, 8S449, 8S450, 8S458, 8S459, 8S460, 8S461, 8S462, Chassis 5810	Schematic, voltage, socket, trimmers 11-22
	Alignment 11-30
8S443, 8S451, 8S463, Chassis 5808	Schematic 11-23
	Voltage, socket, trimmers 11-26
	Alignment 11-30
	Tuner 11-31
	Service notes 11-32
10S443, 10S452, 10S464, 10S470, 10S491, 10S492, Chassis 1005	Schematic 11-24
	Alignment 11-30
	Voltage, socket, trimmers 11-26
	Tuner 11-31
	Service notes 11-32
10S491, 10S492, Chassis 1007	Phono. circuit schematic 11-29
12S494, Chassis 1208	Phono. circuit schematic 11-29
15S495, Chassis 1504	Phono. circuit schematic 11-29
11S474, Chassis 1103	Schematic 11-24
	Voltage, socket, trimmers 11-26
	Alignment 11-30
	Tuner 11-31
	Service notes 11-32
12S445, 12S453, 12S471, 12S475, 12S494, Chassis 1207	Schematic 11-25
	Voltage, socket, trimmers 11-26
	Alignment 11-30
	Tuner 11-31
	Service notes 11-32
15S479, 15S495, Chassis 1503	Schematic 11-27
	Voltage, socket, trimmers 11-28
	Alignment 11-30
	Tuner 11-31
	Service notes 11-32
S7000, S7001, S7002, S7003, Wireless Record Player	Schematic 11-6
1005 Chassis	See model 10S443
1007 Chassis	See model 10S491
1103 Chassis	See model 11S474
1207 Chassis	See model 12S445
1208 Chassis	See model 12S494
1503 Chassis	See model 15S497
5417 Chassis	See model 4B422
5419 Chassis	See model 4K402D
5420 Chassis	See model 4K422
5536 Chassis	See model 5G438
5537 Chassis	See model 5G401D
5538 Chassis	See model 5G484
5539 Chassis	See model 5G441
5659 Chassis	See model 6D410
5660 Chassis	See model 6D413
5661 Chassis	See model 6P416
5662 Chassis	See model 6P418
5663 Chassis	See model 6D410
5664 Chassis	See model 6D413

* Also see Vol. X index

ZENITH
ZEPHYR

ZENITH RADIO CORP.—(Cont.)		PAGE
MODEL		
5665 Chassis	See model 6P416	
5666 Chassis	See model 6P418	
5672-P Chassis	See model 6R485	
5673 Chassis	See model 6MN495	
5675 Chassis	See model 6R481	
5676 Chassis	See model 6MN496	
5678 Chassis	See model 6S439	
5679 Chassis	See model 6J436	
5719 Chassis	See model 7S432	
5721 Chassis	See model 7S487	
5724 Chassis	See model 7S432	
5725 Chassis	See model 7S487	
5808 Chassis	See model 8S443	
5810 Chassis	See model 8S432	
ZEPHYR RADIO CO.		
6G	Schematic	11-1
6GM	Schematic	11-1
25B5	Schematic	11-2
32Y6	Schematic	11-3

ZEPHYR RADIO CO.—(Cont.)		PAGE
MODEL		
35Y5, 36X5	Schematic, socket	11-4
40X4	Schematic, socket	11-4
40Y6	Schematic, voltage	11-4
43X5	Schematic, socket	11-2
62P	Schematic, socket	11-5
62X8	Schematic, socket	11-5
153-5L	Schematic, voltage, alignment	11-6
	Socket, trimmers	11-7
352-5R	Schematic, voltage, alignment	11-6
	Tuner, socket, trimmers	11-9
381-7H	Schematic, voltage, alignment	11-8
	Tuner, socket, trimmers	11-7
576-5Q, 577-5Q	Schematic, voltage, socket, alignment, trimmers, tuner	11-9
605-7C	Schematic, voltage, alignment	11-8
	Tuner, socket, trimmers	11-7
666-6J, 667-6J, 668-6J, 669-6J	Schematic, voltage	11-10
	Socket, trimmers	11-7
696-6M, 697-6M	Schematic, voltage	11-10
	Socket, trimmers	11-7

* Also see Vol. X Index

NEW *Rider* BOOKS

for the

PROGRESSIVE SERVICEMAN

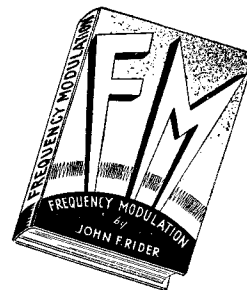
F M

An Introduction to

FREQUENCY MODULATION

by

JOHN F. RIDER



The latest development in radio—FREQUENCY MODULATION—is on the air. More and more stations all over the country are making provision for “staticless” broadcasting and the number of F-M receivers on the market is increasing. . . . Here is your chance to get in at the start—Rider’s newest book explains the transmission and reception of frequency-modulated signals with especial attention given to the different types of f-m receivers now available—their adjustments and maintenance. . . . This is a “must” for every serviceman who has an eye on the future. . . . It is an investment that will pay real dividends!

CONTENTS

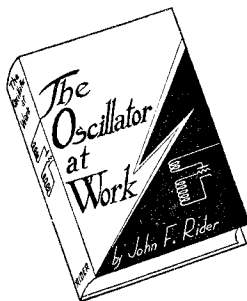
Chapter I. Frequency Modulation.—An introduction to the subject with comparisons drawn between the frequency-modulation and amplitude-modulation forms of transmission and reception. **Chapter II. What Happens at the Transmitter.**—A non-mathematical explanation of how frequency-modulated signals are broadcast, including a discussion of phase modulation. **Chapter III. What Happens in the Receiver.**—How the f-m signal progresses through the receiver and how it is affected by the limiter discriminate tubes. **Chapter IV. Wave Propagation and Service Areas.**—How the ultra-high frequency waves are used for f-m transmission and the area covered. **Chapter V. F-M Receiving Antennas.**—Explanations and data concerning the best types of antennas for the reception of f-m signals. **Chapter VI. Servicing F-M Receivers.**—Valuable instructions for the adjusting and maintenance of the receiver including numerous oscillograms that will guide you in your servicing problems.

136 Pages Illustrated Price \$1.00

THE OSCILLATOR AT WORK

by

JOHN F. RIDER



Do you get your money’s worth out of your present-day oscillator? Do you derive the maximum utility from that unit? Do you know how to test your oscillator and establish if it is working properly? Would you know how to repair it if it went bad? Do you know how many different types of oscillators can be used in the servicing field? Here is your opportunity to get the true facts about oscillators! Rider’s book “The Oscillator at Work” is worth many times the price asked because it helps protect the investment you have made in oscillator equipment. The serviceman cannot afford to be without this book. Not only does it tell you, as a serviceman, how you can get the most for your money already spent on equipment, but it will serve admirably as a guide in telling you how to choose between the different types of oscillators and decide upon the oscillators you will buy in the future.

CONTENTS

I—Oscillation. II—Complex Waves. III—How an Oscillator Works. IV—Triode Oscillators. V—Electron-Coupled Oscillators. VI—Ultra-High-Frequency Oscillators. VII—Negative Resistance Oscillators. VIII—Electro-Mechanical Oscillators. IX—Relaxation Oscillators. X—Modulation of Oscillators. XI—Audio-Frequency Oscillators. XII—Radio-Frequency Signal Sources. XIII—Testing and Servicing Test Oscillators. XIV—Receiver Checking with a Test Oscillator. XV—Oscillators in Superheterodyne Receivers. Appendix. Bibliography.

256 Pages Illustrated Price \$1.50

