RCA

Short Wave Receiver

(Model AR-1145)

SERVICE NOTES

RCA Short Wave Receiver
(Model AR-1145)

First Edition—1M

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PREFACE

Service goes hand in hand with sales. The well-informed RCA Dealer renders service at time of sale in affording information as to proper installation and upkeep. Subsequent service and repair may be required by reason of wear and tear and mishandling, to the end that RCA Loudspeaker and Radiola owners may be entirely satisfied.

Obviously, this service can best be rendered by properly equipped service organizations having a thoroughly trained personnel with a knowledge of the design and operation of RCA Loudspeakers and Radiolas.

Such service organizations have been established by RCA Distributors, and RCA Dealers are advised to refer any major work or replacement to their selected Distributors. Minor replacements and mechanical and electrical adjustments may be undertaken by the RCA Dealer.

To assist in promoting this phase of the Dealer and Distributor's business the RCA Service Division has prepared a series of Service Notes—of which this booklet is a part—containing technical information and practical helps in servicing RCA Loudspeakers and Radiolas.

This information has been compiled from experience with RCA Dealers and Distributors' service problems and presents the best practice in dealing with them. A careful reading of these Service Notes will establish their value, and it is suggested they be preserved for ready reference.

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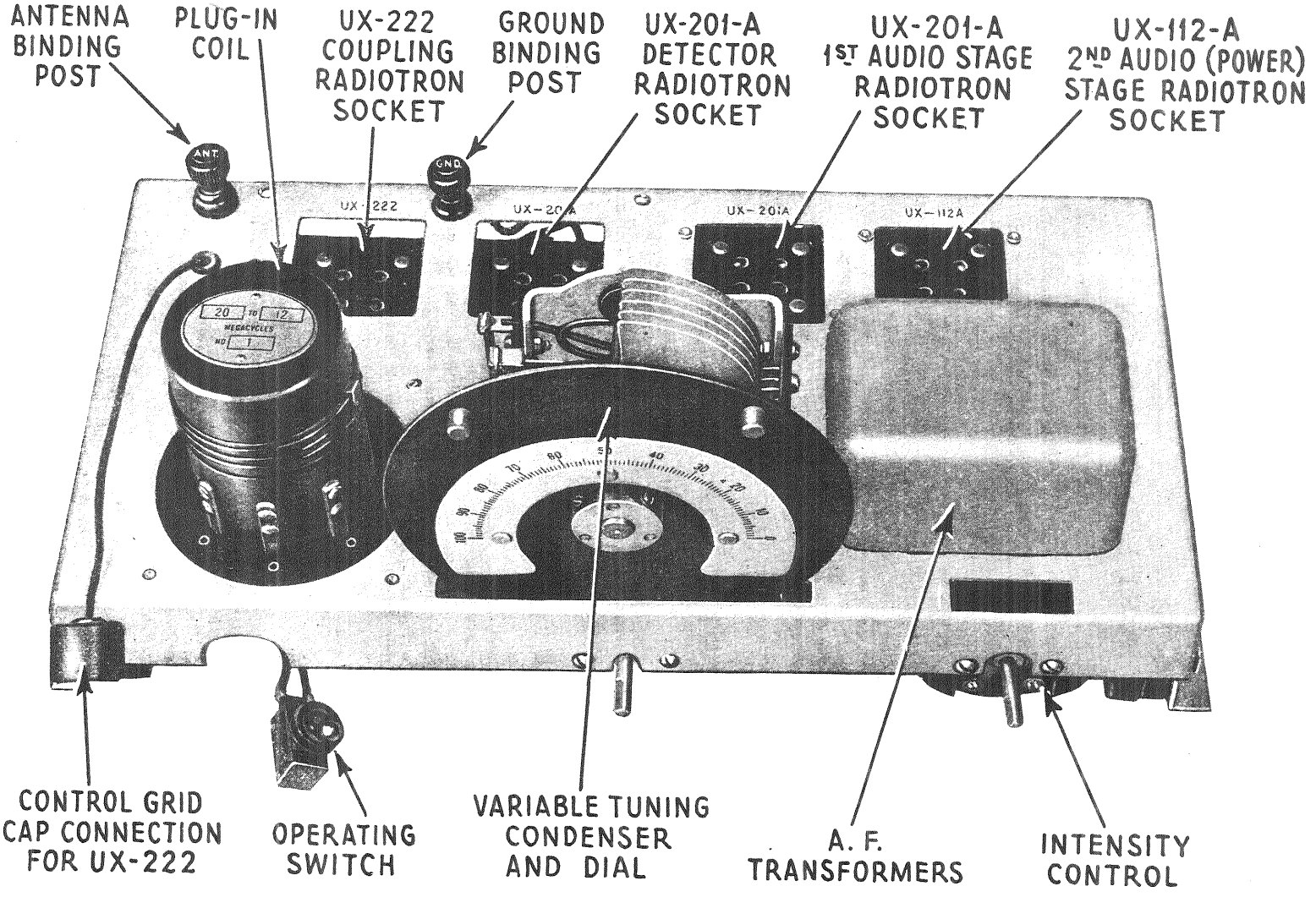


Figure 1—Top view of receiver chassis showing principal parts

RCA SHORT WAVE RECEIVER

(Model AR-1145)

SERVICE NOTES

Prepared by RCA Service Division

INTRODUCTION

RCA Short Wave Receiver, Model AR-1145 is a regenerative battery type short wave radio receiver employing one Radiotron UX-222, two Radiotrons UX-201A and power amplifier Radiotron UX-112A. Figure 1 illustrates a top view of the receiver chassis, Figure 2 the Radiotron sequence and Figure 3 the schematic circuit diagram. Figure 4 is a sub-chassis view showing the principal parts. Connected to an efficient antenna good sensitivity and tone quality are obtained with this receiver.

A single station selector with a high ratio frictional vernier control and three interchangeable coils provide efficient and easy tuning over the range of 20 to 4 megacycles or 15 to 75 meters. Two additional coils may be procured as optional equipment which cover the broadcast range of frequencies, *i. e.,* 1500 to 550 Kilocycles.

Filament current for this receiver is obtained from a 6-volt storage battery. Plate and grid voltages may be obtained from dry cell batteries, or from suitable socket power devices having correct rating and electrical characteristics.

PART I—INSTALLATION

[1] ANTENNA

The first requirement of a good installation is an efficient antenna system. The antenna should be enameled or bare copper wire, single strand, B. & S. No. 14, from 25 to 100 feet in length, erected as high as possible and removed from all obstructions. Enameled wire resists corrosion, and offers no hindrance to radio reception when properly used. The lead-in should preferably be a continuation of the antenna itself. However, before entering the receiver it should be spliced to an insulating wire, as the antenna wire will short circuit to the metal receiver housing if it is led directly into the receiver. All splices should be carefully soldered to insure a good electrical connection and increase the mechanical strength of the joint. Use a good hot iron and plenty of solder making sure to remove the enamel if enameled wire is used, and see that the ends of the wires are scraped clean, and that a good mechanical joint is made. Clean off all excess flux on completion of the soldering and tape the connection.

High grade glass or porcelain insulator supports are required, and at no point should the antenna or lead-in wire come in contact with any part of the building. Bring the lead-in wire through a porcelain tube insulator to the inside of the house for connection to the receiver.

The antenna should not cross either over or under any electric light, traction or power line and should be at right angles to these lines and other antennas. An outdoor antenna should be protected by means of an approved lightning arrester.

[2] ANTENNA (Indoor Type)

Where the installation of an outdoor antenna is not practical, satisfactory results may generally be obtained by using an indoor antenna of about 25 to 100 feet of insulated wire strung around the picture moulding or placed under a rug. In buildings where metal lathing is employed, satisfactory results are not always possible with this type of antenna. Under such conditions various arrangements of the indoor antenna should be tried to secure satisfactory results. An indoor antenna is not as efficient as a properly installed outdoor antenna.

[3] GROUND

A good ground is quite as important as the antenna. No specific recommendations can be given in this matter as conditions vary in different locations. Water and steam pipes usually make good grounds. Gas pipes usually make poor grounds and, as a rule are to be avoided. If neither water nor steam pipes are available, a pipe or metal rod may be driven into the ground to a depth of several feet. The success of this type of ground depends upon the moisture present in the soil. The ground lead should be short and connected by means of an approved ground clamp to a section of pipe that has been scraped and thoroughly cleaned. The connection should be inspected from time to time to make certain that a clean and tight electrical contact exists between the clamp and pipe. The service man should experiment with various grounds, and employ the one giving the best results.

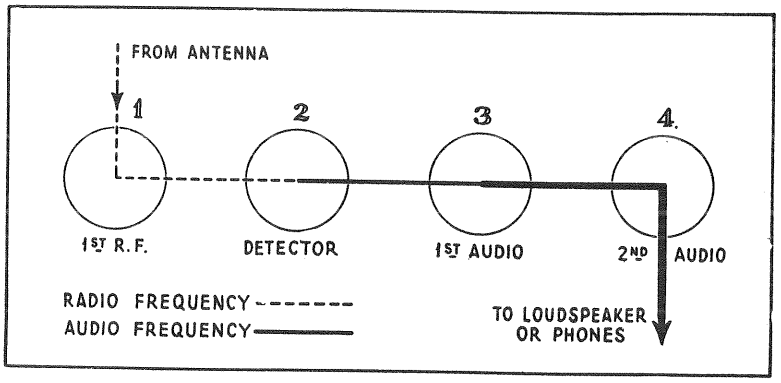


Figure 2—Radiotron sequence

[4] BATTERY CONNECTIONS

After the antenna and ground system has been properly installed the receiver should be unpacked and placed in the location it is to occupy, which must be in range of the antenna and ground connections. The battery cord should be pulled through the hole in the rear of the cabinet and connections made as shown in Figure 10. A fuse block equipped with a 5 or 10-ampere fuse should be placed in series with the positive "A" battery lead. This may be done by cutting the yellow lead and connecting the block to each of the ends made by the cut. All other connections should be accurately made, as otherwise correct operation will not be secured and damage in some cases will result.

The color scheme of the leads is shown on the tag tied to the battery cable and in Figure 10.

[5] LOUDSPEAKER OR HEADPHONE CONNECTIONS

A loudspeaker such as RCA Loudspeaker 100A, 100B, 103 or 106 should be provided with a standard plug on the end of the input cord for insertion in the bottom jack of the receiver when it is used. On many occasions sufficient signal strength will not be obtained for loudspeaker operation and a pair of headphones is necessary. These should be equipped with a similar plug and inserted in either the upper or lower jack, depending on the strength of the signal.

[6] PLUG-IN COILS

Three coils are provided with the RCA Short Wave Receiver which cover the range of 15 to 75 meters, illustrated in Figure 5. Two additional coils may be obtained as optional equipment which cover the broadcast range of 200 to 545 meters, illustrated in Figure 6. Bottom plug connections to windings are shown in Figure 7.

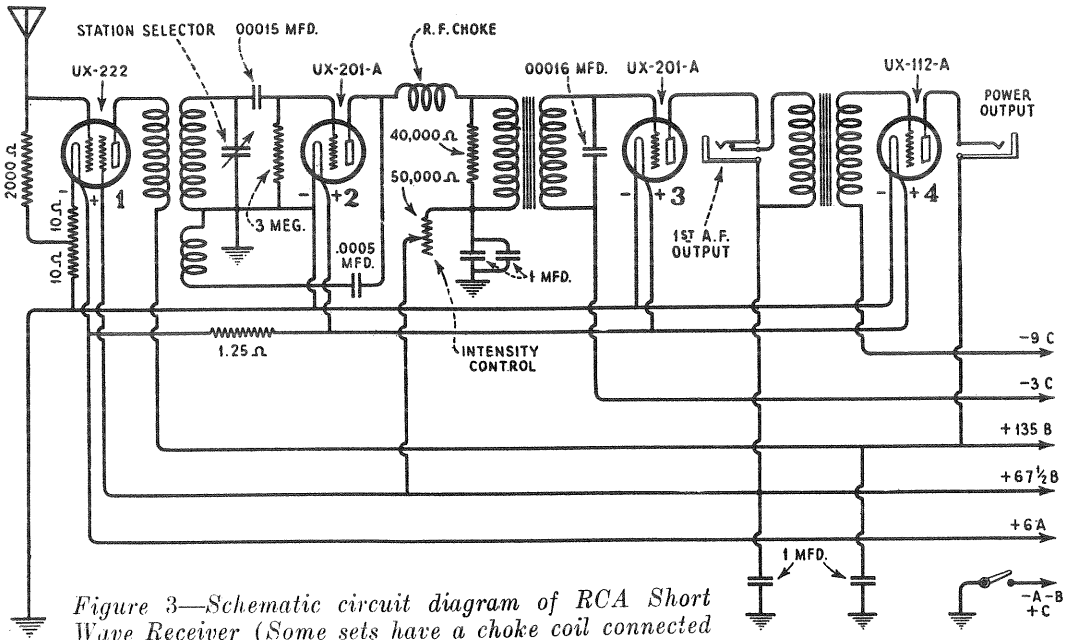


Figure 3—Schematic circuit diagram of RCA Short Wave Receiver (Some sets have a choke coil connected in the antenna circuit instead of the 2000-ohm resistor shown)

The ratings of the different coils are as follows:

Coil No.	*Frequency Range*		*Wavelength Range Meters*
	Megacycles	*Kilocycles*	
1	20—12	20,000—12,000	15— 25
2	12—7.2	12,000— 7,200	25— 42
3	7.2—4	7,200— 4,000	42— 75
6	.....	1,500— 940	200—320
7	.....	940— 550	320—545

The correct coil for the band of frequencies to be covered must be inserted in the coil socket on the left side of the receiver chassis.

[7] USE OF COILS COVERING BROADCAST BAND

The use of coils Nos. 6 and 7 gives the receiver a tuning range that covers the broadcast band of frequencies. Operation at these frequencies is somewhat different from that encountered at the lower wavelengths to be noted as follows:

Station Interference—In districts where stations are operating on frequencies close to each other, interference or cross talk from one station to the other may be experienced.

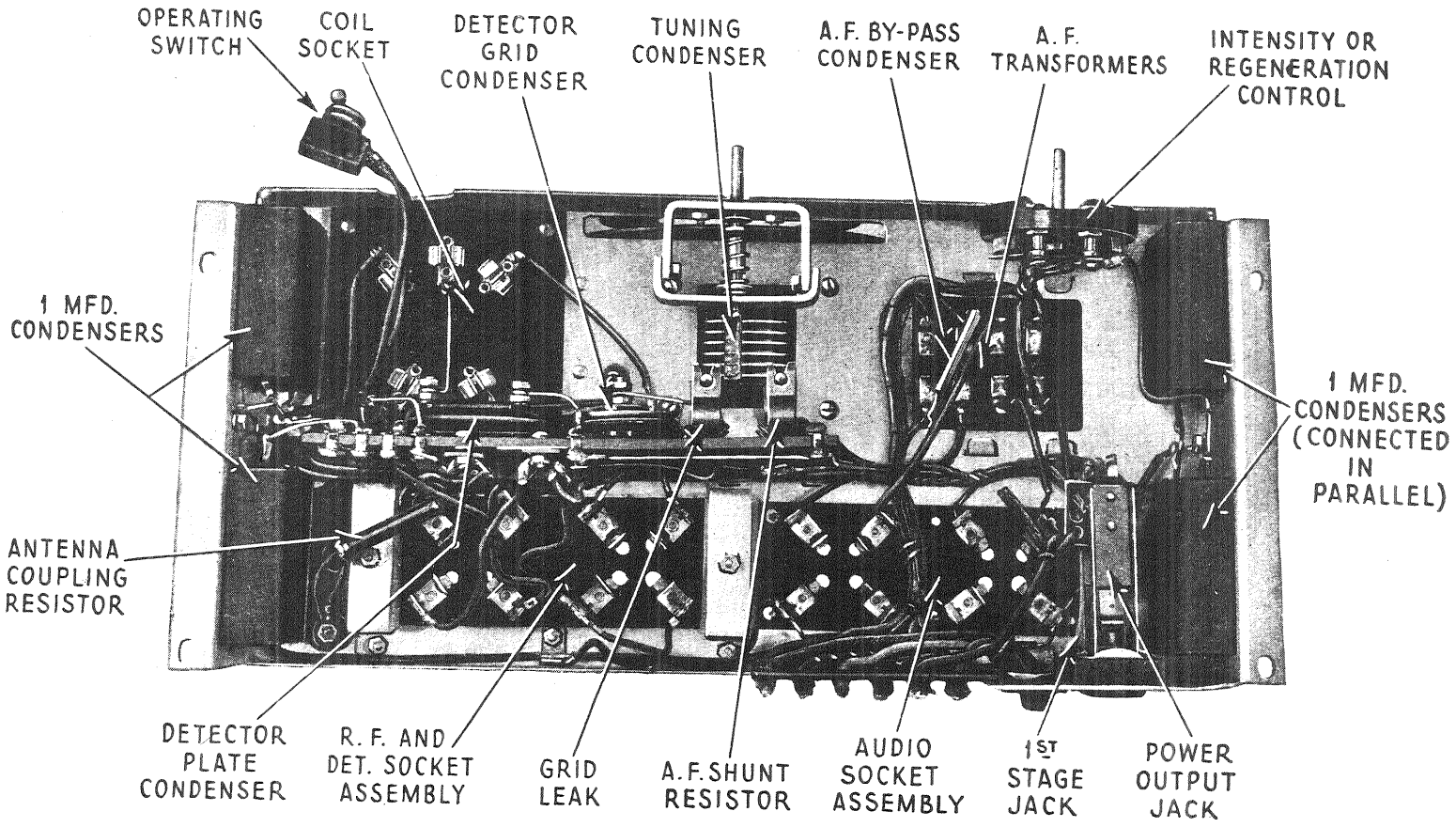


Figure 4—Sub-chassis assembly showing principal parts

Shortening the antenna to 25 feet or less may remedy this condition. If this size antenna does not provide sufficient signal strength at other frequencies, two antennas may be desirable. A double-throw single-pole switch may be used for changing from one antenna to the other.

If only one station is causing interference a wave trap may be used to reduce its signal input to the receiver and thereby prevent interference. The constants and correct connections are shown in Figure 8. The trap is tuned by the condenser until the signal strength of the interfering signal is reduced. If this cannot easily be determined the receiver should be slightly detuned and the trap adjusted until a reduction of signal is noticed.

Volume Control—When receiving stations of considerable strength sufficient reduction of volume may not be obtainable by use of the intensity control. In such cases detuning the receiver by means of the station selector may give the desired signal reduction without affecting the tone quality. If detuning causes interference with other stations in addition to reducing the volume, an external variable resistor may be inserted in series with the antenna lead to the receiver and the volume reduced by increasing the resistance in the antenna circuit. This variable resistor should be approximately of 2000 ohms in value, such as is used in Radiola 18, RCA Part No. 5901.

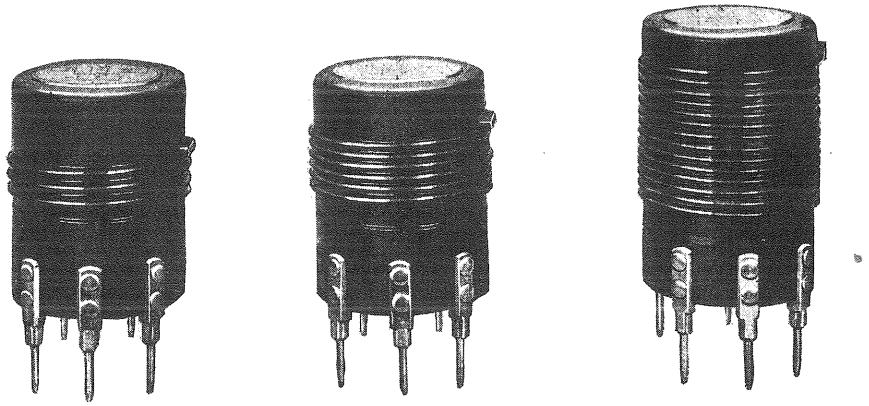


Figure 5—Short wave coils—15 to 75 meters

PART II—SERVICE DATA

[1] ANTENNA SYSTEM FAILURES

Complaints of swinging signals, or of intermittent reception with probable grating noises as distinguished from fading effects are generally the result of antenna and ground system failures, and to this therefore the service man should give his first attention. A grating noise may be caused by a poor battery connection, a poor lead-in connection to the antenna, or the antenna touching some metallic surface such as the edge of a tin roof, drain pipe, etc. By disconnecting the antenna and ground leads from the receiver and noting whether or not the grating noise continues, the service man can soon determine whether or not the cause of complaint is within or external to the receiver and plan his service work accordingly.

[2] RADIOTRONS

RCA Short Wave Receiver uses the screen grid Radiotron UX-222 as an R.F. coupling tube, two Radiotrons UX-201A as a regenerative detector and first audio frequency stage and one UX-112A as the power amplifier. The Radiotron sequence is shown in Figure 2. Care should be taken to place each Radiotron in its correct socket as designated at the rear of the

individual sockets. While putting the UX-201A or UX-112A tubes in wrong sockets will only cause poor operation, placing the UX-222 in any socket other than the correct one will result in filament damage.

Sometimes dirty Radiotron prongs will cause noisy operation. At frequent intervals they should therefore be cleaned with fine sand-paper. The use of emery cloth or steel wool is not recommended. Before reinserting the Radiotrons in the sockets, wipe the prongs and base carefully to make certain that all particles of sand are removed.

In placing Radiotrons in the gang sockets care should be exercised to make certain that the two large pins and two small pins of the Radiotrons match the socket holes. If a Radiotron will not fit into a socket without considerable pressure being applied, the trouble is probably due to excessive solder on one or more of the prongs. This may be removed with

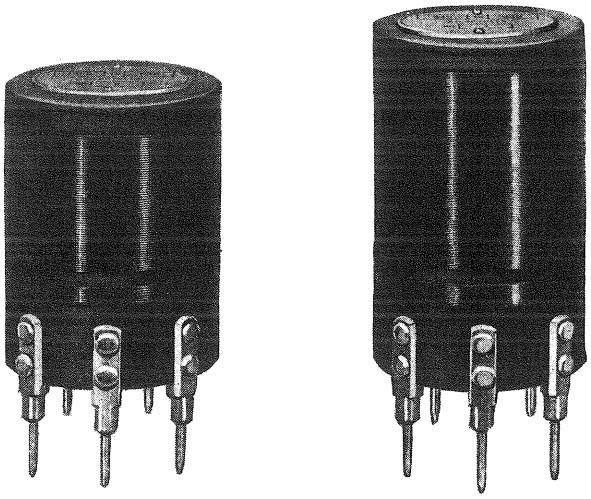


Figure 6—Broadcast frequency band coils—200 to 545 meters

a file or knife. Never try to force one in. These sockets are so designed that the prongs of the Radiotrons will fit in snugly without force being applied. If sufficient force is applied it might be possible to insert the prongs in the wrong holes, resulting in a filament burnout.

Caution—Do not remove or replace Radiotrons without first turning off the operating switch.

[3] RADIOTRON SOCKETS

The Radiotron sockets in the RCA Short Wave Receiver are of the standard UX two-gang type. The cushioned sockets are for the UX-222 coupling tube and the UX-201A detector. The solidly mounted sockets are for the first and power audio stages. Care must be exercised when inserting Radiotrons in their sockets. A socket contact may not be in its correct position and the forced insertion of a tube will bend or break it. If care is exercised and the Radiotrons inserted gently little trouble will be experienced with socket contacts. A bent one will be noticeable on inspection and may be corrected by inserting a narrow instrument in the socket hole and pushing the contact into its correct position. A badly bent or broken socket contact must be replaced. The Radiotron socket layout, with socket contact designations for use in the continuity tests outlined in Part III, Sec. 3 along with battery cable markings are shown in Figure 10.

[4] LOOSE OR DIRTY INTENSITY CONTROL ARM

Should a grating noise be obtained when the intensity control is moved it may be due to the arm being loose, or dirt or corrosion lodged between the contact wire and the arm.

Should the latter cause be the trouble, turning the knob back and forth several times to each extreme will probably rectify the trouble. If this procedure does not clean the resistor the bottom should be removed from the cabinet as described in Part IV, Section 1, and the resistance section cleaned with alcohol applied with a pipe cleaner.

If the arm is loose, removal of the chassis from the cabinet as described in Part IV, Section 1, is necessary to gain access to the intensity control so that the arm can be tightened.

[5] LOOSE STATION SELECTOR OR INTENSITY CONTROL KNOBS

If the station selector or intensity control knob becomes loose on its shaft, tighten the small set screw that holds it in place. If the threads are defective the knob must be replaced.

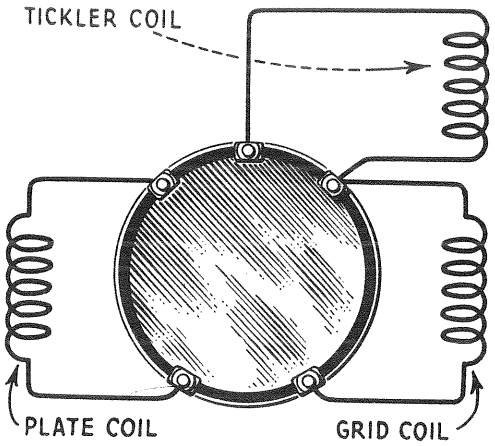


Figure 7—Schematic diagram of coil connections

[6] NOISY OR LOOSE JACKS

Noisy or intermittent operation may originate at either jack. This may be caused by loose connections, jacks having lost their tension, or by dirty contacts.

To remedy this trouble remove the bottom from the cabinet as described in Part IV, Section 1. The jacks can then be examined and necessary adjustments made. A loss of tension may be remedied by applying pressure to the spring leaf and pushing it toward the frame of the jack. The correct tension may be determined by inserting the loudspeaker or phone plug and noticing if the leaf is making proper contact. If the soldered connections appear faulty, a hot iron applied to them will generally remedy the trouble. Dirty contacts should be cleaned by the use of a small piece of fine sand-paper properly applied between the contacts of the jack spring leaves.

[7] "FRINGE" HOWL AND AUDIO HOWL

A howl occurring just as the intensity control reaches the point where oscillation occurs is sometimes called "fringe" howl. If it occurs one of the following conditions may be its cause:

(a) Poor detector tube, or microphonic detector tube (see Part II, Sec. 10).

(b) Wrong type of detector tube. Use of a UX-112A instead of a UX-201A will cause a howl.

(c) Resistance across primary of 1st A.F. transformer open.

(d) Condenser across secondary of 1st A.F. transformer open.

(e) Open grid connection or grid of any Radiotron.

(f) Defective wiring in audio system. Figure 9 illustrates the internal connections of the audio transformers.

[8] FAILURE TO REGENERATE

Advancing the intensity control clockwise to its maximum position without the receiver going into oscillation by regeneration to secure continuous wave signal reception at any point in the tuning range may be lue to:

(a) Shorted R.F. choke in detector plate circuit. This will cause oscillations to be obtainable only at portions of the tuning range and not through the entire range.

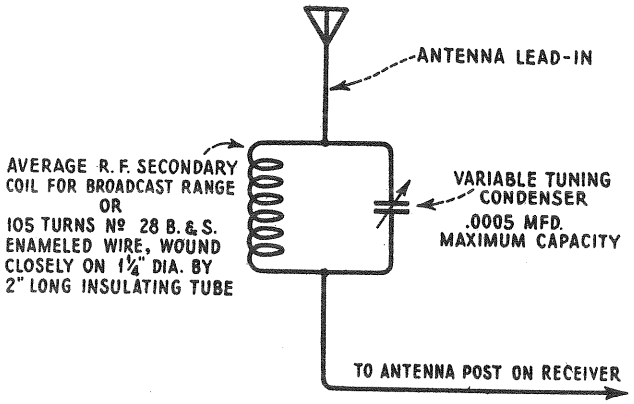


Figure 8—Schematic diagram of wave trap

(b) Defective Radiotron in detector stage. A Radiotron that may be suitable for other stages may not be suitable for use as a regenerative detector. Try interchanging the detector Radiotron with the 1st A.F. stage Radiotron.

(c) Open detector plate condenser. If this condenser is open, sufficient coupling from the plate through the tickler coil to the grid of the detector will not be obtained to cause oscillation.

(d) Low "B" batteries. If the 67½-volt connection drops below 50 volts at the battery terminals the battery should be replaced. The low voltage keeps the detector from oscillating due to low plate voltage.

[9] DISTORTED REPRODUCTION

Distorted reproduction may be due to any of the following causes:

(a) Defective Radiotrons. Check Radiotrons and replace any found defective.

(b) Defective batteries. Replace run down batteries.

(c) Wrong battery connections causing wrong plate and grid voltages. Check battery connections according to Figure 10.

(d) Defective audio transformer. A defective audio transformer will cause distortion.

(e) Defective grid condenser or grid leak.

[10] ACOUSTIC HOWL

This is caused by a microphonic Radiotron, or the loudspeaker being too close to the receiver. The sound waves from the loudspeaker striking a Radiotron may cause the Radiotron elements to vibrate, which in turn, produces an amplified howl in the output of the loudspeaker.

The remedy lies in interchanging the Radiotrons. Counting from left to right the second Radiotron UX-201A (see Figure 10) is the most susceptible to this microphonic condition. Interchanging it, with the UX-201A of the A.F. amplifier or placing the loudspeaker at a greater distance from the receiver will generally remedy this condition. In some cases both remedies may be necessary.

[11] LOUDSPEAKERS

Instead of head telephones connection can be made to magnetic or dynamic loudspeakers for reproduction. Among the various types of magnetic speakers RCA Loudspeaker Models 100A, 100B and 103 may be used with excellent results. Of the dynamic speakers RCA Models 104, 105 and 106 will give high class performance when used with the RCA Short Wave Receiver. The various RCA Service Notes issued on these speakers should be referred to when any service information is desired.

The polarity on these speakers is not an important factor when connection is made to a receiver. They should accordingly be connected in the manner that gives the most pleasing reproduction.

PART III—ELECTRICAL TESTS

[1] CHECKING RESISTANCE VALUES

The values of the various resistance units of RCA Short Wave Receiver, Type AR-1145, are shown in the schematic diagram, Figure 3. When testing a receiver for defects the various values of resistance should be checked. This may be done by a resistance bridge; the voltmeter-ammeter method shown in previous RCA Service Notes; or by the following method, the results depending upon the care exercised in using the prescribed method.

For resistances of low value, 5000 ohms or less, use a voltmeter not greater than 100 ohms per volt. The rating of 100 ohms per volt means that a meter with 50 volts maximum scale reading, has a total resistance of 50 times 100, or 5000 ohms, when the 50-volt scale is used. For high values of resistance use a meter of 1000 ohms or more per volt. The Weston Meters, Type 301 or 280, each have a resistance of 62 ohms per volt and are satisfactory for low values. For very low resistances below 100 ohms, it is best to use one dry cell—1½ volts—with the 3-volt scale of a Weston, Model 280. For higher resistances up to 5000 and above use sufficient battery to give a good deflection on the meter, for example, a 45-volt "B" for a 0-50 voltmeter. Then take two readings, one of the battery alone, and one of the battery with the unknown resistance in series.

Then apply the following formula:

$$\left(\frac{\text{Reading obtained of battery alone}}{\text{Reading obtained with resistance in series}} - 1\right) \text{Resistance of meter in ohms} = \text{Unknown resistance in ohms}$$

Example—Using a Weston, Type 301, 30-volt scale, 22½-volt "B" battery. Resistance of meter equals 30x62 or 1860 ohms.

$$\left(\frac{22.5}{8.45} - 1\right) 1860 = 3091 \text{ or unknown resistance in ohms approx.}$$

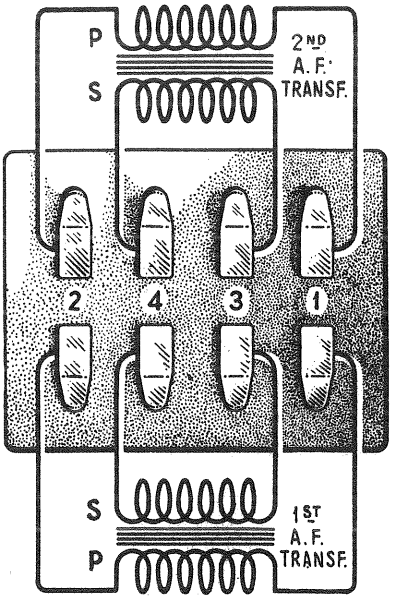


Figure 9—Internal connections of audio transformers

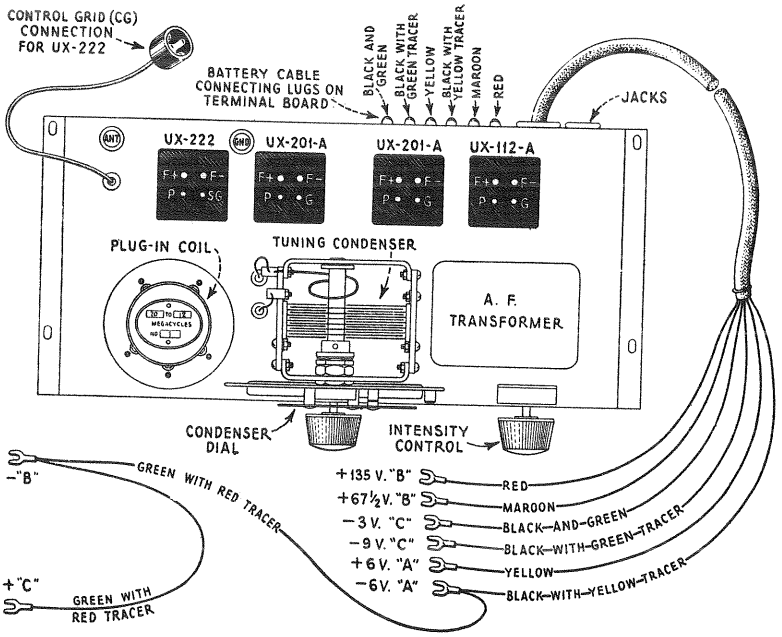


Figure 10—Socket layout and battery cable connections

[2] AUDIO TRANSFORMER CONTINUITY TESTS AND TESTING OF LARGE BY-PASS CONDENSERS

The audio transformers may be tested for continuity when not connected in circuit by using the method described in Part III, Sec. 3, and by referring to Figure 9, which illustrates the internal connections of the audio transformers.

Proper testing of the 1 mfd. by-pass condenser is accomplished by charging them with a handy D.C. voltage, as from "B" batteries connected to give 90 to 157½ volts. If sparking occurs as the charge is applied the condenser is shorted. After a few seconds wait a strong spark should appear when the condenser is discharged by shorting the terminals with a screw driver. If no spark appears the condenser is probably open. If a slight spark occurs the condenser is probably leaky.

All the 1 mfd. condensers have one side grounded (see Figure 3). In the tests given, with the condensers wired in the chassis, if the opposite terminal is defectively grounded a short will be indicated. It is therefore advisable when checking for grounds in the component parts of the receiver to remove all indicated ground connections, so that a defective ground will be truly indicated by a closed continuity test between the frame (ground) and a terminal of the suspected unit.

[3] VOLTAGE READINGS AT RADIOTRON SOCKETS

The following voltages taken at each Radiotron Socket with the receiver in operating condition should prove of value when checking is done with test sets such as the Weston, Model 537, Type 2, or others giving similar readings. The plate currents shown are not necessarily accurate for each tube, as the cable in the test set will cause some circuits to oscillate, due to its added capacity. Small variations of voltages will be caused by different tubes and battery voltages. Therefore the following values must be taken as approximately those that will be found under varying conditions. Radiotron positions are shown in Figure 10.

VOLTAGE READINGS AT RADIOTRON SOCKETS

Intensity Control Near Zero. Operating Switch "On." All Batteries Connected. (See Figure 10.) Radiotrons in Sockets, or Test Set. Loudspeaker Plugged in Second Audio Stage Jack.

Radiotron	*Fil. Volt.*	*Grid Volt.*	*Plate Volt.*	*Plate Current*
Coupling UX-222	3.2	*Control grid 1.5 *Screen grid 67.5	130.0	Plate 3.5 mil. amp. *Screen 0.5 mil. amp.
Detector UX-201A	5.0	....	30-60 (Depending on position of intensity control)	0.65 to 1.5 mil. amp.
1st Audio Amp. UX-201A	5.0	3.0	65	1.1 mil. amp.
2d Audio Amp. (Power) UX-112A	5.0	9.0	130.0	4.0 mil. amp.

* These readings cannot be measured by ordinary methods as with the Weston Model 537 test set.

[4] RCA SHORT WAVE RECEIVER CONTINUITY TESTS

The following tests will check the continuity of all circuits in the RCA Short Wave Receiver.

All Radiotrons should be removed and batteries disconnected. A plug-in coil should be inserted in the coil socket. The Radiotron socket numbers and designation of socket contacts are shown in Figure 10.

A pair of headphones with at least 4½ volts in series or preferably a voltmeter with sufficient voltage to give a full scale deflection when connected directly across battery terminals should be used in making these tests. Flexible insulated leads with partially insulated testing tips should be used to prevent false tests due to the hands.

The contacts of the test equipment should be placed across the terminals or leads indicated in the following test table under the column marked "Terminals." If the results are negative the cause of such negative effect will be found in the last column under the heading, "Incorrect Effect Caused By." The second column indicates the correct effect.

The designation P, CG, SG and G refer to the plate, control grid, screen grid and grid contacts of the various sockets. For example, G2 would indicate the grid contact of the second socket (see Figure 10).

The filament contacts are preceded by their polarity. For example, + F1 would indicate the positive filament contact of the first socket.

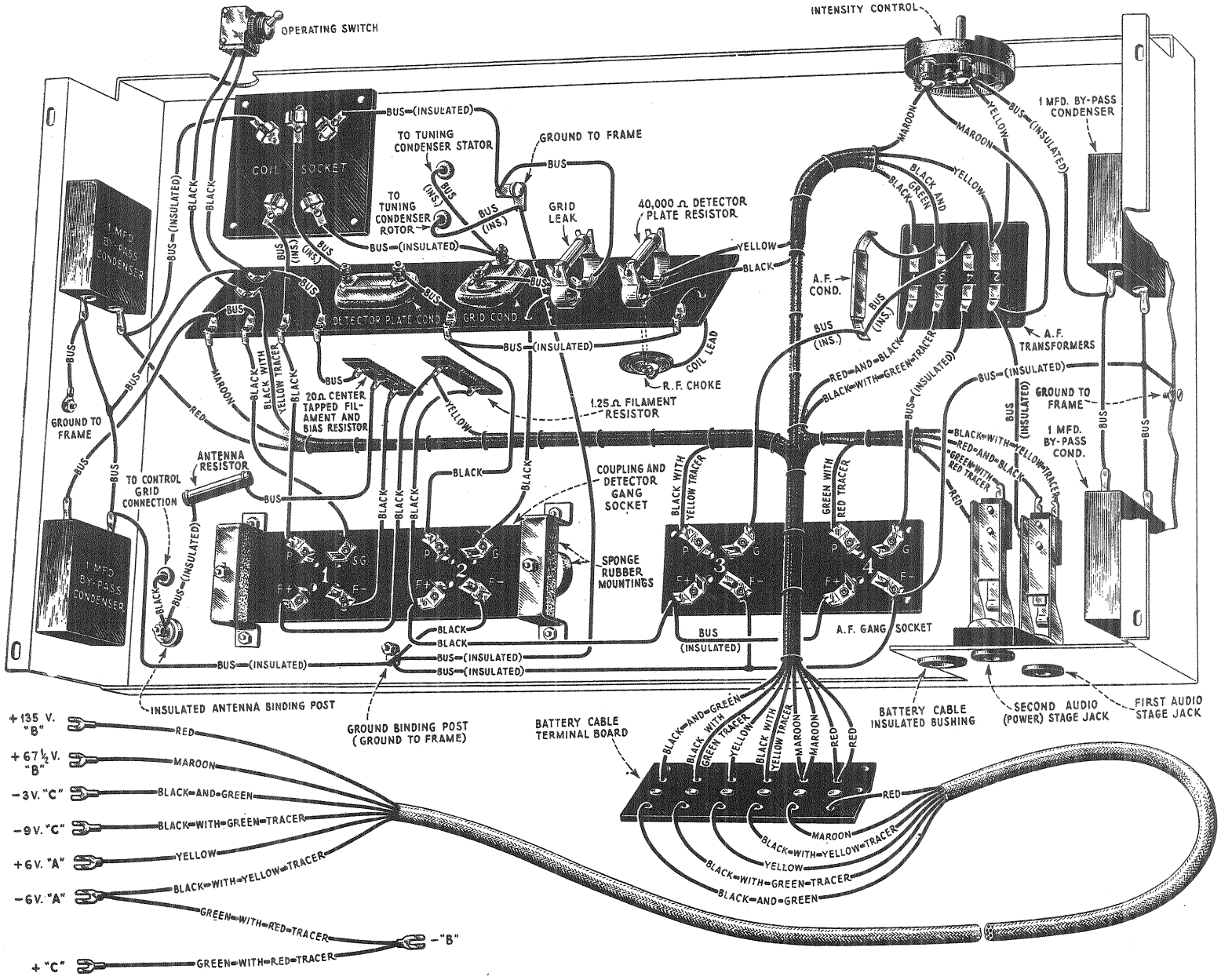


Figure 11—Sub-chassis wiring diagram of receiver

RCA SHORT WAVE RECEIVER CONTINUITY TESTS

Remove all Radiotrons and disconnect batteries. Insert a plug-in coil in coil socket. Refer to Figure 10 for Radiotron socket numbers and designation of socket contacts. Intensity control near zero. Keep hands free from chassis frame.

Circuits	*Terminals*	*Correct Effect*	*Incorrect Effect Caused by*
Grid	Antenna to ground	Closed	Open 2000-ohm resistor or UX-222 filament resistor
	Antenna to CG1	Closed	Open connection
	SG1 to +67½ battery lead	Closed	Open connection
	G2 to —F2	Closed (Weak)	Open grid leak
	Stator of tuning condenser to —F2 (Remove grid leak)	Closed	Open grid coil of plug-in coil
	G3 to —3 battery lead	Closed	Open secondary of 1st A.F. transformer
		Closed (Strong)	Shorted secondary condenser
	G4 to —9 battery lead	Closed	Open secondary of 2nd A.F. transformer
	G2 to stator of tuning condenser (Remove grid leak)	Open	Shorted grid condenser
Plate	P1 to +135 battery lead	Closed	Open primary coil of plug-in coil
	P2 to +67½ battery lead	Closed	Open R.F. choke coil, primary of 1st A.F. transformer and 40,000-ohm resistor, or intensity control
	Across plate winding of plug-in coil (see Fig. 8)	Closed	Plate winding open
	P2 to ground	Open	Shorted detector-plate condenser or shorted 1 mfd. condenser
	P3 to +67½ battery lead (no plug-in jack)	Closed	Open primary of 2nd A.F. transformer or defective jack
	P4 to +135 battery lead	Open	Shorted jack
Filament	—F1 to ground	Closed	Open 20-ohm UX-222 filament resistor
	+F1 to +A battery lead	Closed	Open connection
	—F1 to —A battery lead (operating switch closed)	Closed	Open connection
	—F2 to ground	Closed	Open connection
	+F2 to +A battery lead	Closed	Open 1.25-ohm filament resistor or connection
	—F3 to ground	Closed	Open connection
	+F3 to +A battery lead	Closed	Open 1.25-ohm filament resistor or connection
	—F4 to ground	Closed	Open connection
	+F4 to +A battery lead	Closed	Open 1.25-ohm resistor or connection
Misc.	+67½ battery lead to ground	Open	Shorted 1 mfd. condenser } Steady
	+135 battery lead to ground	Open	Shorted 1 mfd. condenser } condition
	—A to ground (switch closed)	Closed	Open wiring or defective switch
	—A to ground (switch open)	Open	Shorted switch or wiring

PART IV—MAKING REPLACEMENTS

[1] REMOVING CHASSIS FROM CABINET

Should replacement of any parts become necessary in the RCA Short Wave Receiver the following procedure may be used in gaining access to the different parts:

(a) Disconnect antenna and ground leads and all battery connections.

(b) Place the receiver in an upside down position on a blanket or cloth to protect the cabinet finish and to make the mechanism accessible.

(c) Remove the four machine screws that are in the center of the felt feet and then remove the bottom from the cabinet. Some parts such as grid leaks, fixed condensers, etc., may be replaced without further dismantling (see Figure 12).

(d) To remove the mechanism entirely from the cabinet the battery cable must be pulled through the hole in the cabinet, the station selector and intensity control knobs removed, the operating switch released, and the chassis lifted clear of the cabinet. It may be removed to a place convenient for work.

(e) After all work is completed the receiver should be reassembled in the reverse manner of that used to dismantle it.

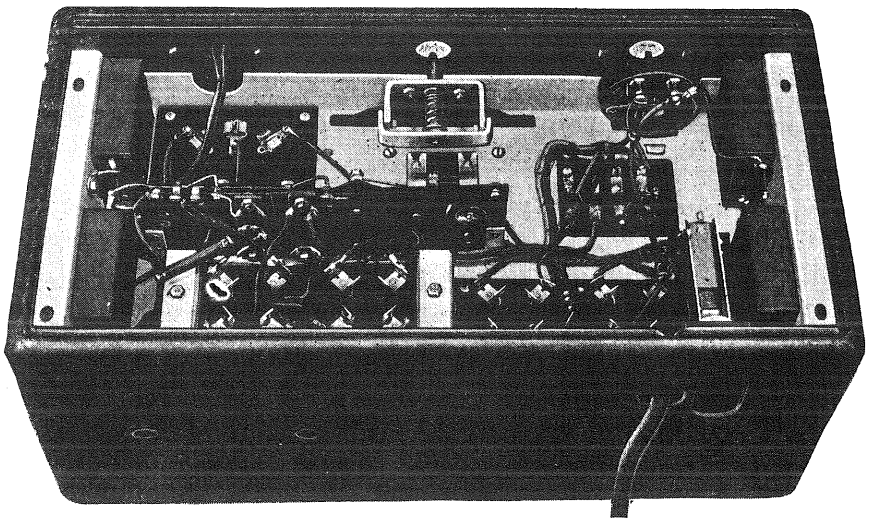


Figure 12—Bottom interior view with bottom removed and cable in place

[2] REPLACING AUDIO TRANSFORMER ASSEMBLY AND BY-PASS CONDENSERS

Should it be necessary to remove the audio transformers or the large by-pass condensers, the chassis should be removed from the cabinet as outlined in Section 1 above. When only one audio transformer is found defective it will be necessary, of course, to remove the complete assembly or container (see Figure 4). This container as well as the by-pass condenser container can be removed in the following manner:

(a) Unsolder connections to defective unit. Never cut them off.

(b) By carefully unbending the tabs holding the container in place, the part may be removed. In removing the 1 mfd. by-pass condenser adjacent to the output jacks, it will be found necessary to remove at least the second audio stage jack (Part IV, Sec. 5) before the condenser can be freed from the chassis.

(c) Replacements should carefully be made in the reverse order. It will be necessary to support the part replaced by holding it, or temporarily clamping it tightly to the chassis in order to bend the tabs to hold securely. Refer to Figure 11 for correct wiring.

[3] REPLACING THE DETECTOR-PLATE CONDENSER

To remove the detector plate condenser it will be necessary to remove the chassis from the cabinet as outlined in Part IV, Section 1.

Then proceed in the following manner after locating the detector-plate condenser (see Figures 4 and 11).

(a) Unsolder and remove the 1.25-ohm filament resistor by simply unscrewing the two end machine screws from their nuts.

(b) Unsolder the detector-plate condenser connections and remove the condenser by unscrewing the machine screws holding it in place.

(c) Replacement is made in the reverse order. Refer to Figure 11 for correct wiring.

[4] REPLACING COIL SOCKET, AUDIO SOCKET GANG ASSEMBLY, OR BATTERY TERMINAL BOARD

Remove chassis from cabinet as outlined in Part IV, Section 1.

(a) Unsolder connections from the part to be removed.

(b) Carefully drill out the rivets holding the part to the frame (see Figures 1 and 4) using a suitable size drill.

(c) Replace the part removed and secure in place by use of small machine screws with nuts and lock washers. Refer to Figure 11 for correct wiring.

[5] REPLACING AUDIO STAGE JACKS

Removal of jacks may be necessary for replacement or cleaning of contacts. For location see Figure 4.

Remove chassis from cabinet as outlined in Part IV, Section 1.

(a) Unsolder connections to the jack to be removed.

(b) By means of a key to fit the hexagonal hole, or careful use of a screw driver to fit, the insulating bushing used to support the jack may be unscrewed and removed.

(c) Replacement is made in reverse order. Refer to Figure 11 for correct wiring.

[6] REPLACING TUNING CONDENSER, INTENSITY CONTROL, ETC.

Remove chassis from cabinet as outlined in Part IV, Section 1.

(a) By unsoldering connections carefully, and simple removal of supporting machine screws when necessary, it will be evident how all remaining parts, such as the tuning condenser, intensity control, etc., can be easily removed without further explanation. See Figures 4 and 11 for location and connection of parts.

(b) Replace and connect properly by referring to Figure 11.

[7] REPLACING BATTERY CABLE

Remove chassis from cabinet as outlined in Part IV, Section 1.

(a) Unsolder the old battery cable from the terminal board.

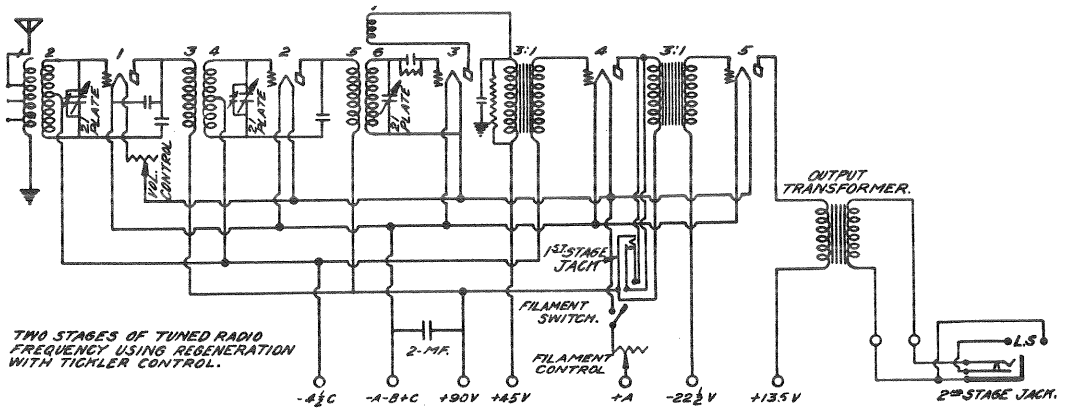
(b) Replace and resolder new battery cable by referring to Figure 10 for correct color code of connections.

SERVICE DATA CHART

Before using the following Service Data Chart, when experiencing no signals, weak signals, poor quality, noisy or intermittent reception, howling and fading, first look for *Defective Tubes, Defective Batteries, Wrong Battery Connections, a Poor Antenna System* and *Defective Loudspeaker* or *Phones.* If imperfect operation is not due to the above causes the "Service Data Chart" should be consulted for further detailed causes.

Indication	Possible Cause	Remedy	Service Notes
No Signals	Defective operating switch	Check and replace switch	Part IV, Sec. 6
	Open antenna resistor	Check and replace antenna resistor	Part IV, Sec. 6
	Defective battery cable	Check and replace battery cable	Part IV, Sec. 7
	Defective plug-in coil	Check and replace coil	Part I, Sec. 6
	Defective tuning condenser	Check and replace condenser	Part IV, Sec. 6
	Defective A.F. transformer	Check and replace A.F. transformer	Part III, Sec. 2 Part IV, Sec. 2
	Defective by-pass condenser	Check and replace by-pass condensers	Part III, Sec. 2 Part IV, Sec. 2
	Defective grid condenser	Replace grid condenser	Part IV, Sec. 6
	Open R.F. choke	Check and replace choke	Part IV, Sec. 6
Weak Signals	Failure to regenerate	Check continuity of coils, etc.	Part II, Sec. 8 Part III, Sec. 3
	Defective battery cable	Check and replace cable	Part IV, Sec. 7
	Defective antenna resistor	Check and replace antenna resistor	Part IV, Sec. 6
	Defective plug-in coil	Check and replace plug-in coil	Part I, Sec. 6
	Defective A.F. transformer	Check and replace A.F. transformer	Part III, Sec. 2 Part IV, Sec. 2
	Dirty prongs of Radiotrons	Clean Radiotron prongs	Part II, Sec. 2
	Defective by-pass condenser	Check and replace by-pass condenser	Part III, Sec. 2 Part IV, Sec. 2
	Loose intensity control arm	Tighten intensity control arm	Part II, Sec. 4
	Incorrect grid and plate voltages on Radiotrons	Check voltage supply at battery terminals or Radiotron sockets	Part I, Sec. 4 Part III, Sec. 4
Poor Quality	Incorrect plate and grid voltage on Radiotrons	Check voltage supply at battery terminals or Radiotron sockets	Part I, Sec. 4 Part III, Sec. 4
	Defective A.F. transformer	Check and replace A.F. transformer	Part III, Sec. 2 Part IV, Sec. 2
	Defective by-pass condenser	Check and replace by-pass condenser	Part III, Sec. 2 Part IV, Sec. 2
	Defective grid leak	Check and replace grid leak	Part III, Sec. 1 Part IV, Sec. 6
Noisy or intermittent reception	Dirty Radiotron prongs	Clean Radiotron prongs	Part II, Sec. 2
	Loose intensity control arm	Tighten intensity control	Part II, Sec. 9 Part III, Sec. 6
	Dirty jack contacts	Clean jack contacts	Part II, Sec. 5 Part IV, Sec. 5
	Socket contacts bent or broken	Readjust socket contact or replace gang socket if broken	Part II, Sec. 3 Part IV, Sec. 4
	Loose connection in receiver	Check continuity for steady condition. Examine all connections	Part III, Sec. 3
Howling	High plate voltage on Radiotrons	Check voltage supply at battery terminals or Radiotron sockets	Part I, Sec. 4 Part III, Sec. 4
	Open grid connections	Check continuity	Part III, Sec. 3
	Defect in audio system	Check A.F. transformers, etc.	Part III, Sec. 2 Part III, Sec. 3
	Acoustic howl caused by microphonic Radiotrons or loudspeaker too close to Radiola	Interchange Radiotrons or increase distance of loudspeaker from Radiola	Part II, Sec. 10
	Defective detector by-pass condenser	Replace by-pass condenser	Part IV, Sec. 6
Radiotrons fail to light	Operating switch not "ON"	Turn switch "ON"	.....
	Defective operating switch	Check and replace operating switch	Part III, Sec. 3 Part IV, Sec. 6
	Defective cable	Check and replace cable	Part III, Sec. 3 Part IV, Sec. 7
	No filament voltage at Radiotron sockets	Check for open connections by continuity tests	Part III, Sec. 3
Play in station selector	Loose knob	Tighten or replace knob	Part II, Sec. 5
	Loose dial	Tighten set screws	.....

Victor Model 7-1 (Alhambra I)



Wiring Diagram Alhambra I (7-1)

If there is evidence of the radio receiver being improperly neutralized, steps should be taken to make the necessary adjustments to bring the equipment to its normal operating efficiency.

1. Prepare the following material:

   a. A "modulated oscillator," the circuit and requirements of which are shown in Fig. 1.

      (A 4-megohm grid leak is recommended: do NOT use a variable grid leak in the construction of the oscillator.)

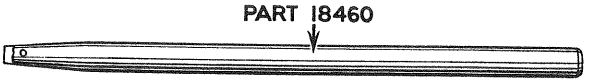


Fig. 2

   b. A screw driver, of bakelite construction (with metallic blade) similar to that shown in Fig. 2.

   c. A UX-199 Radiotron, from which one of the filament (LARGE) prongs has been sawed close to the base.

      Note:—DO NOT use a tube with burnt out, broken, or shorted filament.

   d. A pair of headphones.

2. Proceed as follows; being sure that the (black or red enameled) shipping strip has been removed.

   a. Place oscillator in operation, near the antenna lead in wire at a point approximately 15 to 20 feet from the receiver. Adjust the oscillator to a frequency of approximately 1100 kilocycles, so that its note is picked up by the radio receiver when the Station Selector is set at 60.

   b. Set the panel voltmeter at 3 volts and place the amplification dial at "0." Tune in the oscillator to full volume on the receiver, adjusting the vernier condensers for maximum volume.

   c. Plug head phones in first stage jack on panel.

   d. Remove Radiotron No. 1 (Fig. 2 in Service Bulletin 5-A) and substitute the special tube.

      If this change causes signal to disappear, it is an indication that the first radio frequency stage is properly neutralized.

3. If signal is heard, even though weakly—proceed as follows:

   a. With insulated screwdriver, shown in Fig. 2, adjust the neutralizing condenser located directly behind first tube (Fig. 3) until signal disappears—or is reduced to a minimum.

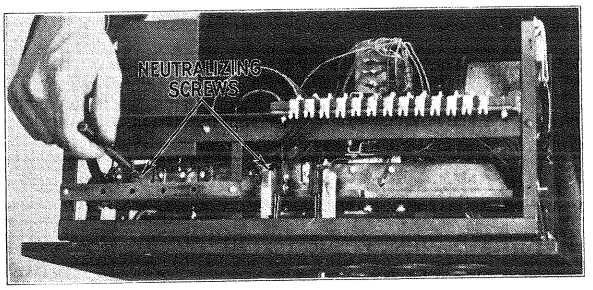
   b. Remove the special tube and re-insert the original Radiotron.

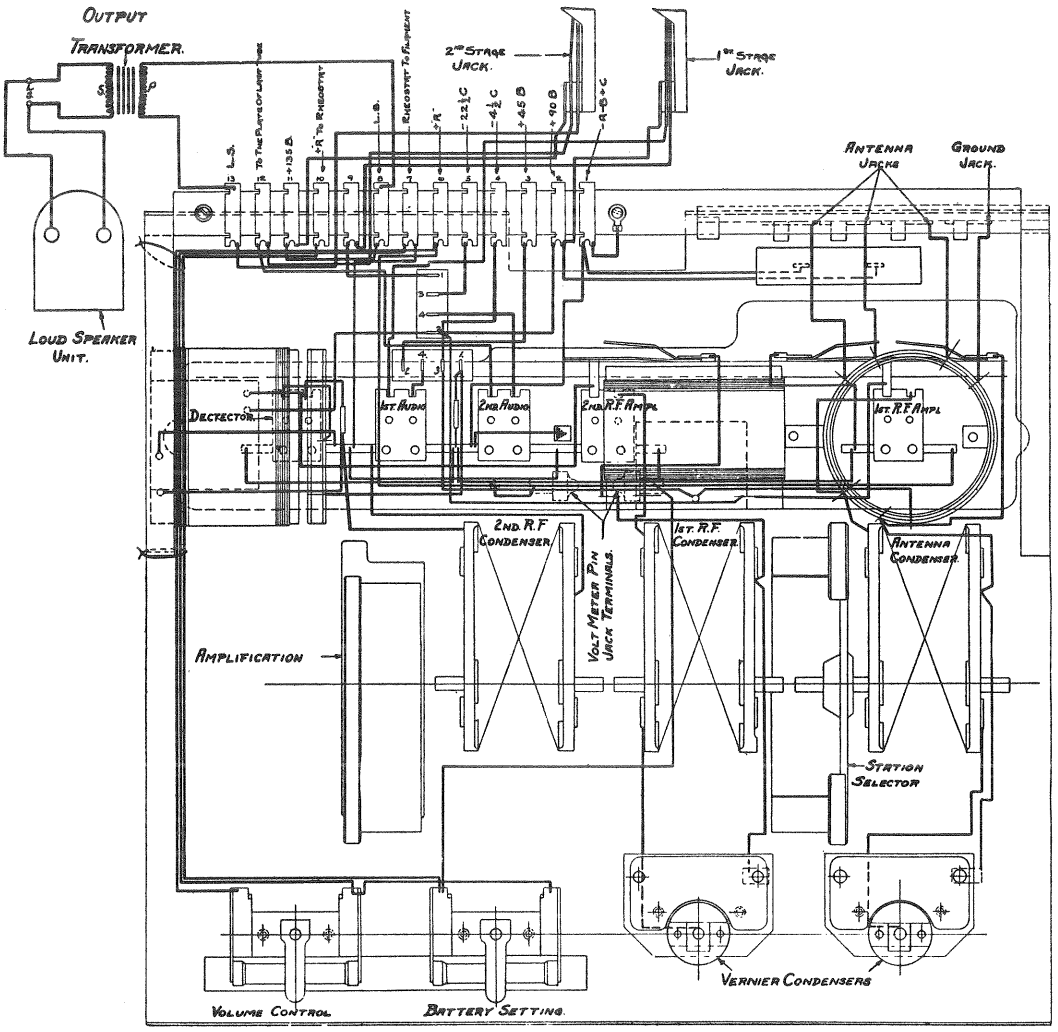
4. Repeat the procedure as outlined above, on next radio frequency stage (second tube in Fig. 2 of Service Bulletin 5-A) adjusting the other neutralizing condenser (Fig. 3).

   a. Remove the special tube from the second socket and re-insert the original.

If now properly adjusted, the receiver should NOT oscillate at any position of the Tuning Control, with "Amplification" at zero. It should oscillate only after amplification dial has been turned to approximately 6 or 7. The setting of the amplification dial necessary to produce oscillation in the detector circuit will depend upon

   a. The setting of the Station Selector.
   b. The condition of the detector tube.
   c. The detector B voltage.





Panel Assembly Diagram for Alhambra I (7-1)

IF THE TROUBLE HAS NOT BEEN FOUND TO LIE IN THE BATTERIES OR TUBES, THE FOLLOWING TESTS TO LOCALIZE THE TROUBLE IN THE SET ITSELF SHOULD BE MADE WITH TUBES REMOVED AND BATTERIES CONNECTED.

1. Using a low scale of meter with positive lead inserted in any — socket contact, insert negative lead in each "G" contact as shown in Fig. 2. The following table illustrates the results that should be obtained.

Normal	Faulty	Fault
G-1—4½	0	Open coil or broken wire.
G-2—4½	0	Open coil or broken wire.
G-3—1½	0	Open AF transformer or broken wire.
G-4— .3	0	Open AF transformer or broken wire.
G-5—0	Reversed	Short circuited grid condenser.

2. Using a high scale meter with negative lead inserted in any socket contact, insert positive lead in each P contact as shown in Fig. 2. The following are results that should be obtained:

Normal	Faulty	Fault
P-1—90	0	Open Coil or broken wire.
P-2—90	0	Open Coil or broken wire.
P-3—110	0	Open output transformer or broken wire.
P-4—85	0	Open audio transformer or broken wire.
*P-5—35 to 40	0	Open audio transformer or open tickler coil, or open tickler lead or broken wire.
45		Short circuited by-pass condenser.

Victor Model 7–2 (Alhambra II)

Victor Model 9–1 (Florenza)

RADIO PANEL TEST FOR ALHAMBRA II (7-2) and FLORENZA (9-1)

The six tube Radiola used in these instruments utilizes the well known superheterodyne principle.

In case of failure to operate or poor operation:

1. Eliminate the possibility of defective tubes by replacing each tube with a tested Radiotron. When the defective tube is located the set will resume normal operation.

2. Check the batteries (or battery eliminator if one is used) to determine that proper voltages are being delivered. Note:—A noisy B battery can be located by a constant fluctuation of the pointer on the meter.

3. Insert a pair of ear phones in the first stage jack. If reception comes through, there is no trouble at this point.

4. Insert phones in output jack. If there is no reception:

(a) UX-120 may be defective.
(b) Output transformer may be open.

5. If reception is obtained at this point but there is no sound through the speaker unit:

(a) The speaker unit may be defective.
(b) The phone jack may not be making proper contact.

6. Check Radio-Victrola valve to see that it is opening and closing the full amount. This can be determined by a sharp click at both ends of the arc.

7. If there is no reception when phones are plugged in first stage jack, remove all tubes and make the following tests:

Using preferably a double scale voltmeter 0-7.5 0-150 volts (a Weston Type 301 meter was used in these tests and the readings will vary if any other type meter is used).

(a) Place battery switch in radio position.
(b) Turn battery setting rheostat to 5.
(c) Turn volume control rheostat to 10.
(d) With the test leads attached to the lower scale, the reading between the large holes of each socket should be 4½ volts with new A batteries.

8. If there is no reading:

(a) Check between contacts —A+C and +A—B) on the terminal strip. If there is a 4½ volt reading at this point:—
(b) Check contacts in filament switch.
(c) Check contacts on battery setting rheostat.
(d) Remove two bolts securing catacomb to spring cushions.
(e) Drop catacomb out of place and tighten all screw connections.
(f) Test all soldered connections.
(g) Replace catacomb.
(h) Reading should now be 4½ volts at the large contacts in the tube sockets.

NOTE—If filament polarity of No. 4 socket is reversed from that shown in Fig .1, the A battery leads should be reversed at the terminal comb. Poor tone quality will otherwise result if A supply is incorrectly connected. The positive side of the voltmeter pin jacks should be on the right looking down on the top of the panel.

9. If reading is obtained only in large contacts of No. 3 socket.

(a) Check external wiring of connection between battery setting control and volume control.

10. If reading is obtained in all sockets except No. 3.

(a) Check external wiring of volume control rheostat.

11. Failure to obtain filament reading in any of the other sockets would indicate an open circuit in the catacomb. If all external connections have been checked, the catacomb should be replaced.

12. Next test grid circuit (indicated as G in Fig. 1) still using low scale of meter.

(a) Insert positive meter test lead in any negative (—) filament contact.
(b) Insert negative meter test lead in all contacts marked "G" in Fig. 1. The readings will indicate as follows:

	O. K.	*Defective*	
G 1	4	0	
G 2	4.5	0	Difficulty may be due to an open oscillator coil external to the catacomb.
G 3	3.3	0	
G 4	0		Any deflection of meter, the catacomb is defective.
G 5	.3	0	
G 6	1.7	0	

If the readings show up a defect, the catacomb should be replaced.

13. Test plate circuits (indicated as P Fig. 1) now using the high scale of the meter.

(a) Insert the negative meter test lead in any (+) filament contact.
(b) Insert the positive meter test lead in all contacts marked "P" in Fig. 1. The readings will indicate as follows:

	O. K.	*Defective*	
P 1	90	0	
P 2	90	0	Before assuming that the catacomb is defective on a 0 reading in this socket, check the external wiring through the oscillator coil.
P 3	90	0	
P 4	10 to 20	0	
P 5	82	0	Check external wiring connections of first stage jack before assuming that open circuit is in the catacomb.
P 6	130	0	A 0 reading might indicate an open circuit in the wiring to the output transformer or in the transformer itself. This transformer is the one to which the loud speaker leads are connected.

14. If all the above tests check O. K and the difficulty still remains:

(a) Remove outside loop lead when testing a Florenza or the outside antenna coil lead when testing an Alhambra II. Connect the meter for lower scale reading. Place the meter in series with this lead and A+ connection on terminal strip. The reading should be 4½. If 0, either the coil or loop is open, depending on which instrument is being tested. If O. K. continue the test.
(b) Disconnect the terminal strip.
(c) Remove set from cabinet.
(d) Connect a 4½ volt "C" battery in series with one of the meter test leads.

(e) Test between rotor and stationary plates of left hand condenser when facing under side of panel. If no meter deflection, look for a broken wire or loose connection between condenser and oscillator coil terminals.

(f) Test from stationary plates of right hand condenser and No. 1 contact of the terminal strip. If no reading, check for a broken wire or loose connections between these points.

(g) Test from rotor plates of right hand condenser and No. 7 contact of the terminal strip. If no reading, check for a broken wire or loose connections between these points.

**(h) Test between connections 1 and 7. If a reading is obtained, the plates of the right hand condenser are short circuited. This may be caused by foreign material between the plates or from mechanical alignment. If the difficulty is not overcome after these exhaustive tests, it becomes a problem for your Distributor.

**Note—Terminals No. 1 and No. 7 referred to can be located counting on the terminal strip closest to the panel from the end opposite the filament switch.

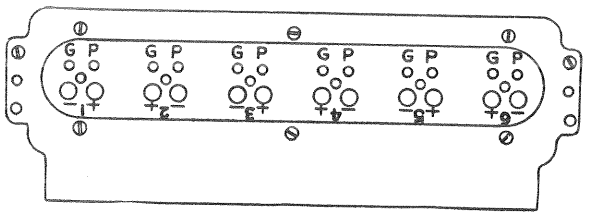


Figure 1

Standing at the front of the instrument looking down in the tube compartment, the top of the catacomb will appear as above.

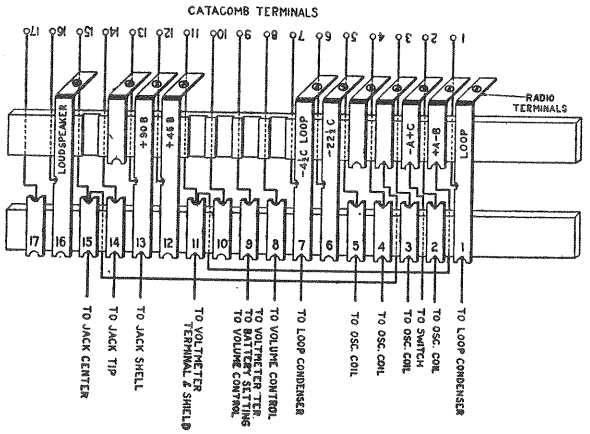
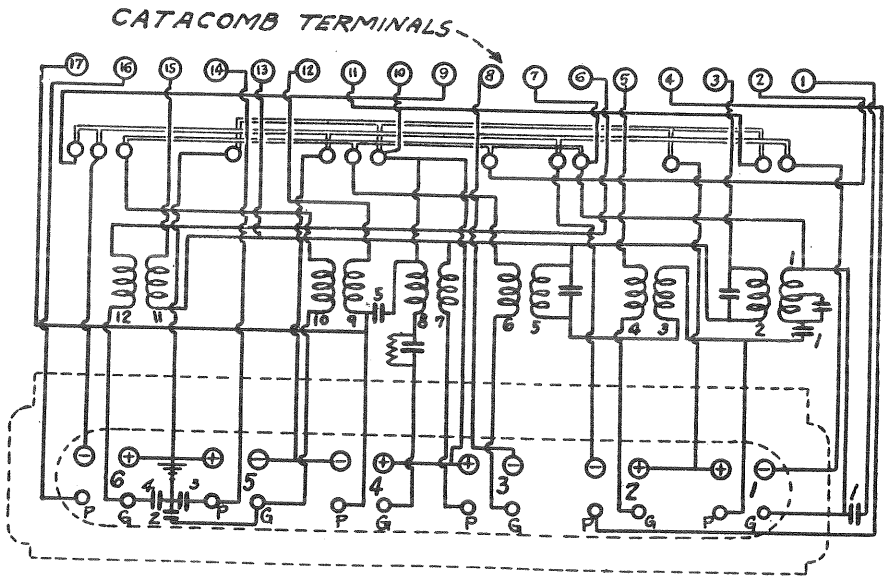
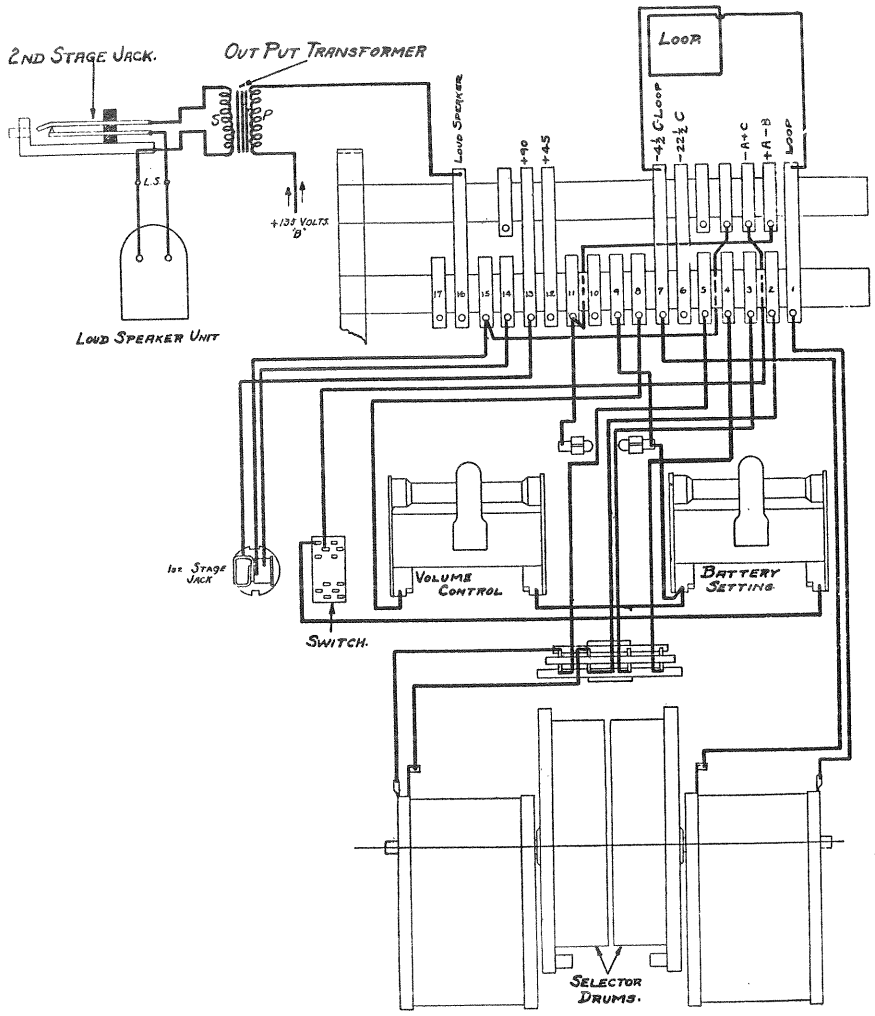


Figure 2



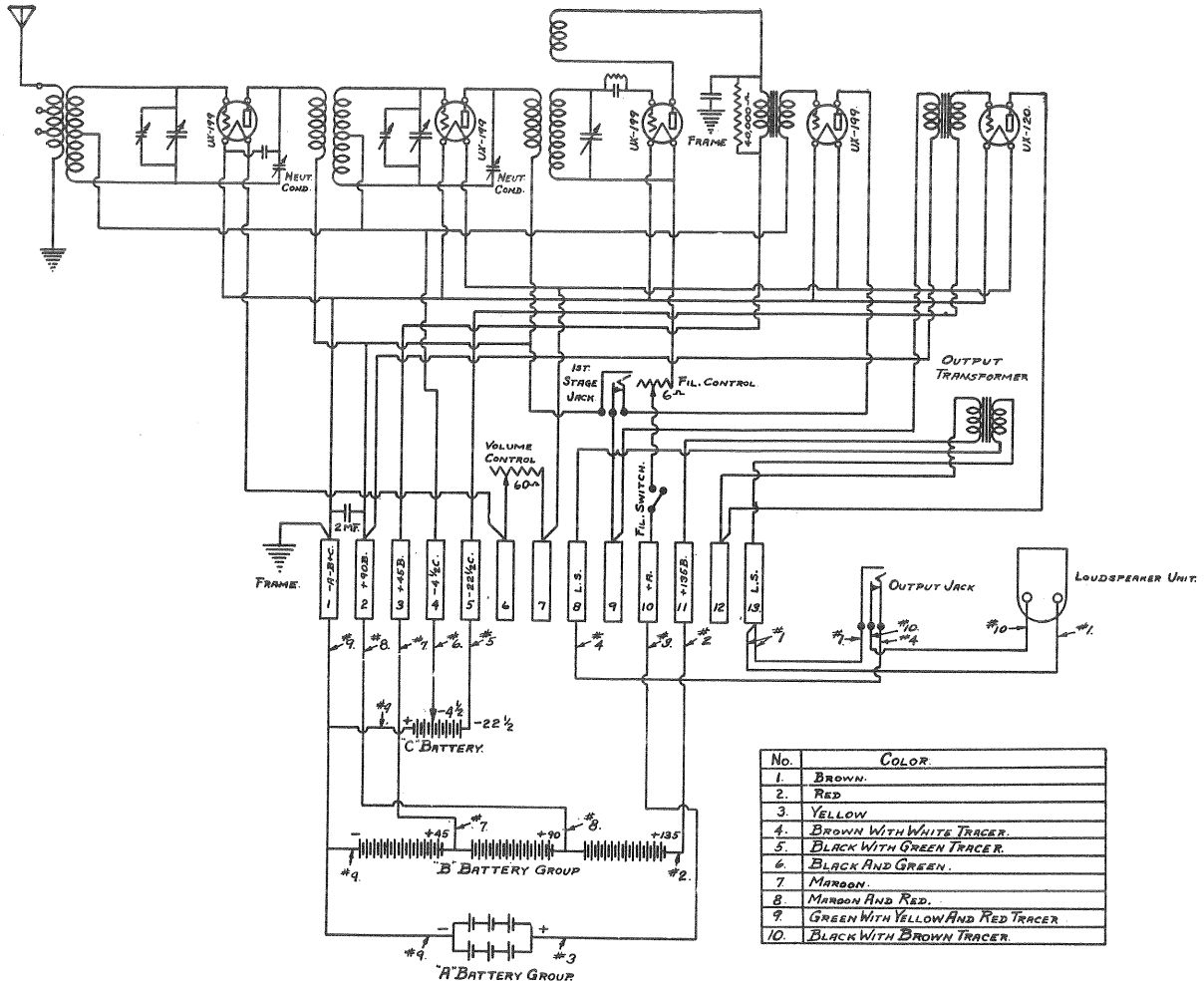
Radiola 25 Catacomb Continuity Diagram for Alhambra II (7-2) and Florenza (9-1) Instruments



Wiring Diagram for Alhambra II and Florenza

Victor Model 7–3

Victor Model 7–30



No.	Color
1.	Brown.
2.	Red
3.	Yellow
4.	Brown With White Tracer.
5.	Black With Green Tracer.
6.	Black And Green.
7.	Maroon.
8.	Maroon And Red.
9.	Green With Yellow And Red Tracer
10.	Black With Brown Tracer.

Wiring Diagram for Models 7-3, 7-30, and R-20

IF THE TROUBLE HAS NOT BEEN FOUND TO LIE IN THE BATTERIES OR TUBES, THE FOLLOWING TESTS TO LOCALIZE THE TROUBLE IN THE SET ITSELF SHOULD BE MADE WITH TUBES REMOVED AND BATTERIES CONNECTED.

1. Using a low scale of meter with positive lead inserted in any — socket contact, insert negative lead in each "G" contact as shown in Fig. 2. The following table illustrates the results that should be obtained.

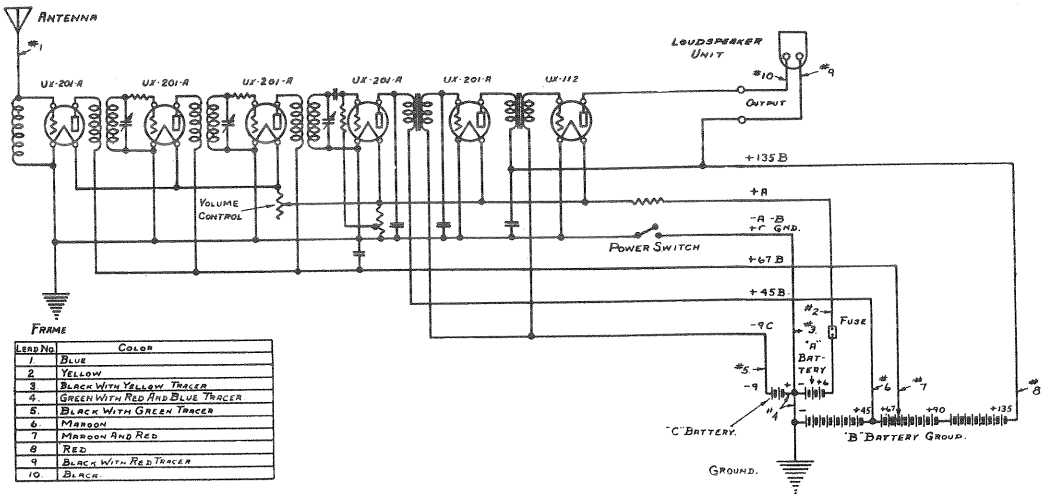
Normal	Faulty	Fault
G-1—4½	0	Open coil or broken wire.
G-2—4½	0	Open coil or broken wire.
G-3—1½	0	Open AF transformer or broken wire.
G-4— .3	0	Open AF transformer or broken wire.
G-5—0	Reversed	Short circuited grid condenser.

2. Using a high scale meter with negative lead inserted in any socket contact, insert positive lead in each P contact as shown in Fig. 2. The following are results that should be obtained:

Normal	Faulty	Fault
P-1—90	0	Open Coil or broken wire.
P-2—90	0	Open Coil or broken wire.
P-3—110	0	Open output transformer or broken wire.
P-4—85	0	Open audio transformer or broken wire.
*P-5—35 to 40	0	Open audio transformer or open tickler coil, or open tickler lead or broken wire.
45		Short circuited by-pass condenser.

NEUTRALIZING PROCEDURE SAME AS SHOWN UNDER VICTOR MODEL 7—1

Victor Model 7–10



LEAD NO.	COLOR
1.	BLUE
2.	YELLOW
3.	BLACK WITH YELLOW TRACER
4.	GREEN WITH RED AND BLUE TRACER
5.	BLACK WITH GREEN TRACER
6.	MAROON
7.	MAROON AND RED
8.	RED
9.	BLACK WITH RED TRACER
10.	BLACK

Wiring Diagram for Victor Radiola 16
(Used in Model 7-10)

VICTOR RADIOLA 16
(AS USED IN MODEL 7-10)

The Radiola used in combination with the Orthophonic Victrola in the model 7-10 is a six-tube battery operated tuned radio frequency receiver of the inside or outside antenna type, employing three stages of radio frequency amplification, a detector, and two stages of audio amplification. The UX-112-A power tube is used in the last stage of audio amplification. The Radiotrons UX-201-A are used in all the other stages and in the detector.

Most of the common causes of trouble can be located and corrected by the tests given below. In making the tests the use of a Weston Radio Set Tester is recommended. If this is not available, a high resistance voltmeter of reliable manufacture, having two scales (0-7.5 and 0-150 volts), should be used. The meter should be equipped with flexible insulated leads.

1. Test "A," "B" and "C" batteries or battery eliminator if used.

2. Test all cable connections to the batteries.

3. Test loudspeaker unit.

4. Test tubes.

If the Weston Radio Set Tester is used, the tube tests can be made in the regular manner by placing the plug in socket No. 1, Fig. 1. If the set tester is not available, the low scale of the voltmeter can be used, the procedure being as follows:

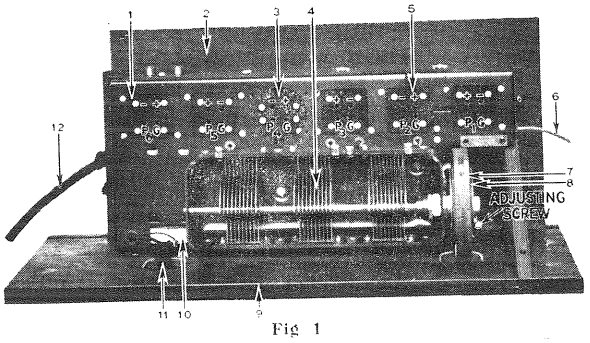


Fig 1

a. **Remove Radiotrons from all sockets except the one to the extreme right. Filament regulation in this socket can be obtained by means of the Volume Control.**

b. Place the two leads connected to the low scale of the voltmeter in the two filament socket contacts of Radiotron Socket No. 2 marked "+" and "−" as shown in Fig. 1; regulate the voltage to 5 volts.

c. Remove the +67½B lead from the battery terminal, and connect this lead to the 7.5 terminal of the meter; connect from the + terminal of the meter to the +67½B on the "B" battery.

d. Note the deflection of the meter when the latter is connected as described above, and compare this deflection with that given by a tube which is known to be good. The amount of deflection depends on (1) the meter used, (2) the condition of the "B" batteries, and (3) the condition of the tube under test. (1) and (2) remaining unchanged, a comparative indication of the condition of the various tubes can be obtained; in general a high deflection indicates a good tube, and a low deflection indicates a poor tube.

e. All Radiotrons may be tested in the same manner. The UX-112-A will ordinarily give a higher reading than the UX-201-A.

5. The various Radiotrons, shown in Fig. 1, function as follows:

1. First Radio Frequency Amplifier (UX-201-A).
2. Second Radio Frequency Amplifier (UX-201-A).
3. Third Radio Frequency Amplifier (UX-201-A).
4. Detector (UX-201-A).
5. First Stage Audio Frequency Amplifier (UX-201-A).
6. Second Stage Audio Frequency Amplifier (UX-112-A).

Changing the Radiotrons UX-201-A in the various sockets will often improve reception.

6. If the receiver oscillates:

a. Various Radiotrons should be tried in sockets Nos. 2 and 3, Fig. 1, until two have been found which cause a minimum amount of oscillation.

b If the set still continues to oscillate, the four leads under the center radio frequency transformer should be examined and pushed as far away from this coil as possible. Lengthening the antenna will also help to stop oscillation as the set has a tendency to oscillate more on a short antenna than on a long antenna. In no case, however, should this length exceed 150 feet, including the lead-in.

7. If the trouble has not been located in the batteries or tubes, make the following tests to localize the trouble in the set itself:

a. FILAMENT TESTS—Observe if all the filaments light. Any trouble in the filament circuit may be traced to:
(1) Broken wire in cable.
(2) Broken contact on fixed resistor, 22, Fig. 2, in +A line.
(3) Broken filament leads from resistor to sockets.
(4) Poor socket contacts.
(5) Leads to volume control, 10, Fig. 1, broken or loose.
(6) Contact arm on volume control not making proper contact.
(7) Open fuse (if used) in +A lead.
(8) Poor contact at battery terminals.

These tests can be made with a 4½ volt "C" battery connected in series with the low voltage scale of the voltmeter binding posts of a Weston Radio Set Tester, or with a voltmeter described in the beginning of this bulletin and connected as shown in Service Bulletin No. 5-A. All "B" and "C" batteries should be disconnected when making filament tests.

b. GRID TESTS—Reconnect the batteries; remove all tubes from the sockets; and turn the Switch knob of the Weston Radio Set Tester to the "C" position, or using the low scale of the 0-7.5 and 0-150 voltmeter, test the "C" battery voltage in sockets Nos. 5 and 6. No "C" battery reading will be obtainable from sockets 1, 2, 3 and 4. If the voltmeter is used, place the lead connected to the + terminal of the meter in a "—A" contact, and the lead connected to the 7.5 terminal of the meter in the "G" contact shown in Fig. 1. With the power switch pushed down to the "on" position, the following are the approximate results which should be obtained.

Note—All readings listed below were made with a Weston Radio Set Tester Type 519. Readings will vary slightly, depending upon the meter used and the condition of the batteries.

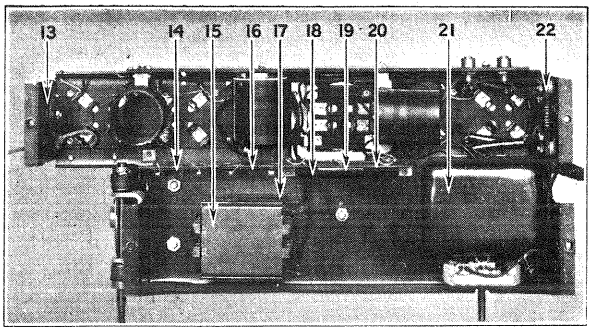


Fig. 2

METER READING

Normal	Faulty	Fault
G_5 6.5	0	Open first A.F. transformer secondary or broken wire.
G_6 6.5	0	Open second A. F. transformer secondary or broken wire.

c. PLATE TESTS—Using the "B" scale of the set tester or the high scale of the voltmeter, test the plate voltages in the various sockets. If the voltmeter is used, the lead from the high voltage terminal should be placed in the —A socket contact and the lead from the + terminal in the plate contact. With the power switch downward to the "on" position, the following are the approximate results which should be obtained.

METER READING

Normal	Faulty	Fault
P_1 63	0	Open R. F. coil or broken lead.
P_2 67	0	Open R. F. coil or broken lead.
P_3 63	0	Open R. F. coil or broken lead.
P_4 36	0	Open A. F. transformer primary or broken wire.
P_5 122	0	Open A. F. transformer primary or broken wire.
P_6 118	0	Poor contact or broken wire on loudspeaker unit.

8. If the trouble has not yet been located, connect a 4½ volt "C" battery and voltmeter as described in (a) above, and proceed as follows:

a. Disconnect all batteries from the cable.
b. Test between the stator (stationary) plates and rotor (rotating) plates of each tuning condenser. No deflection of the meter will indicate that there is a broken or loose connection between the condensers and their respective coils or open circuits in the coils themselves.
c. Check all condensers to see that the rotor plates do not touch the stator plates as the Station Selector is being turned.
d. Reconnect the batteries.

GENERAL

1. Adjustment of condenser drive cable.

Any slack in the condenser drive cable can be taken up by tightening the adjusting screw shown in Fig. 1.

2. Loose volume control contact.

A loose volume control contact is often a cause of noisy reception. If such a condition is found, the contact arm should be bent until it makes a firm contact against the resistance strip.

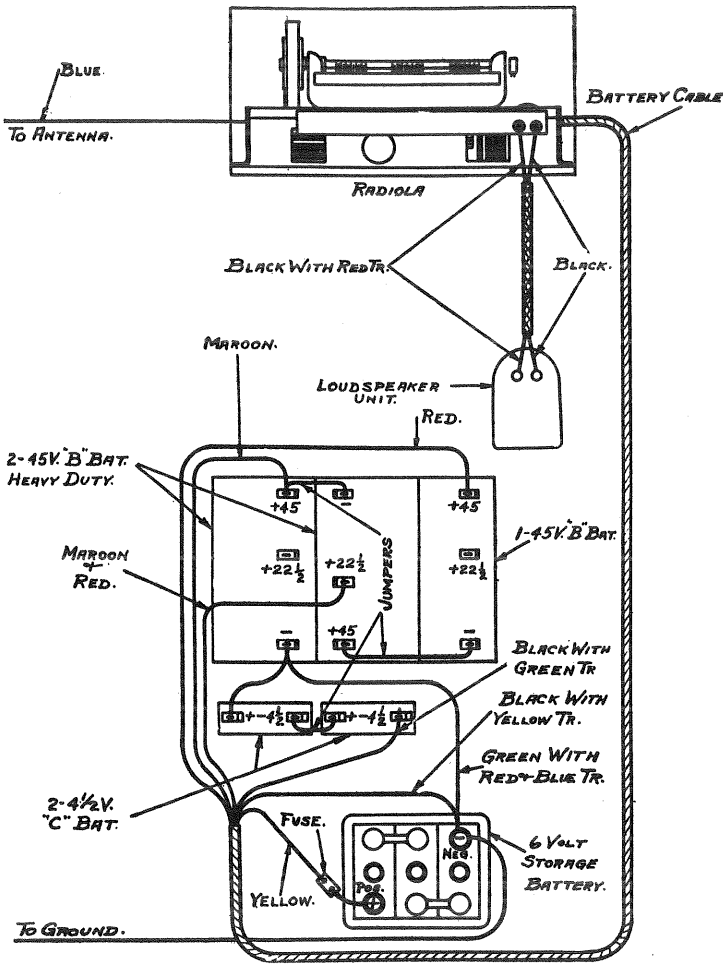
3. Operation with "B" battery eliminator not supplying 67½ volts plate voltage.

The Radiola requires 67½ volts for the radio frequency amplifiers and 45 volts for the detector. A higher amplifier plate voltage may cause the set to oscillate and will seriously affect the tone quality. A lower detector plate voltage will reduce the efficiency of the receiver. On battery eliminators not equipped to supply 67½ volts, the use of a potentiometer in excess of 18,000 ohms resistance is recommended. The General Radio Potentiometer No. 371 (18,000 ohms) is suggested for this purpose. Connection should be made across the +45 and the +90 (+Det. and +Ampl.) taps of the eliminator, with the contact arm connected to the 67½ volt lead of the cable. Using a high resistance voltmeter of the proper scale reading and connected across the —B and the contact arm, adjust the voltage to 67½ volts.

The Philco units AB-6562B (60 cycle) and AB-6522B (25 cycle) are equipped to supply 67½ volts on the +Ampl. tap and 45 volts on the +Det. tap. When using any other Philco unit, the small cartridge resistance should be replaced with a similar cartridge resistance of 50,000 ohms.

Battery cable colors.

A+6V	Yellow.
A—	Black with yellow tracer.
B− C+ Ground	Green with red and blue tracers.
B+Det.	45V Maroon.
B+Amp.	67V Maroon and red.
B+Pwr.	135V Red.
C−Pwr.	9V Black with green tracer.



Battery Cable Diagram