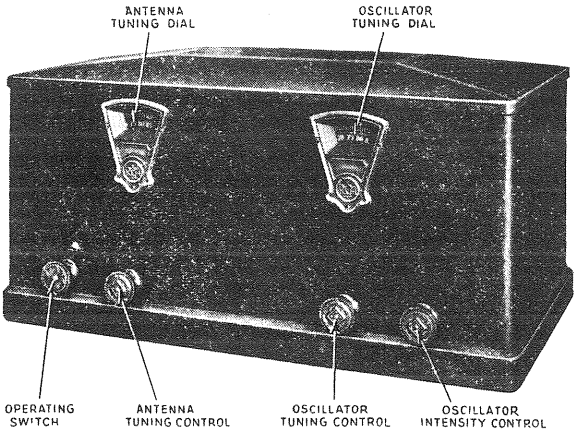
RCA Radiola
Short Wave Adaptor

SERVICE NOTES



RCA Radiola Short Wave Adaptor

First Edition—2M

RCA Victor Company, Inc.

FOREIGN SALES DIVISION FOR RCA BRANDS

Camden, New Jersey, U.S.A.

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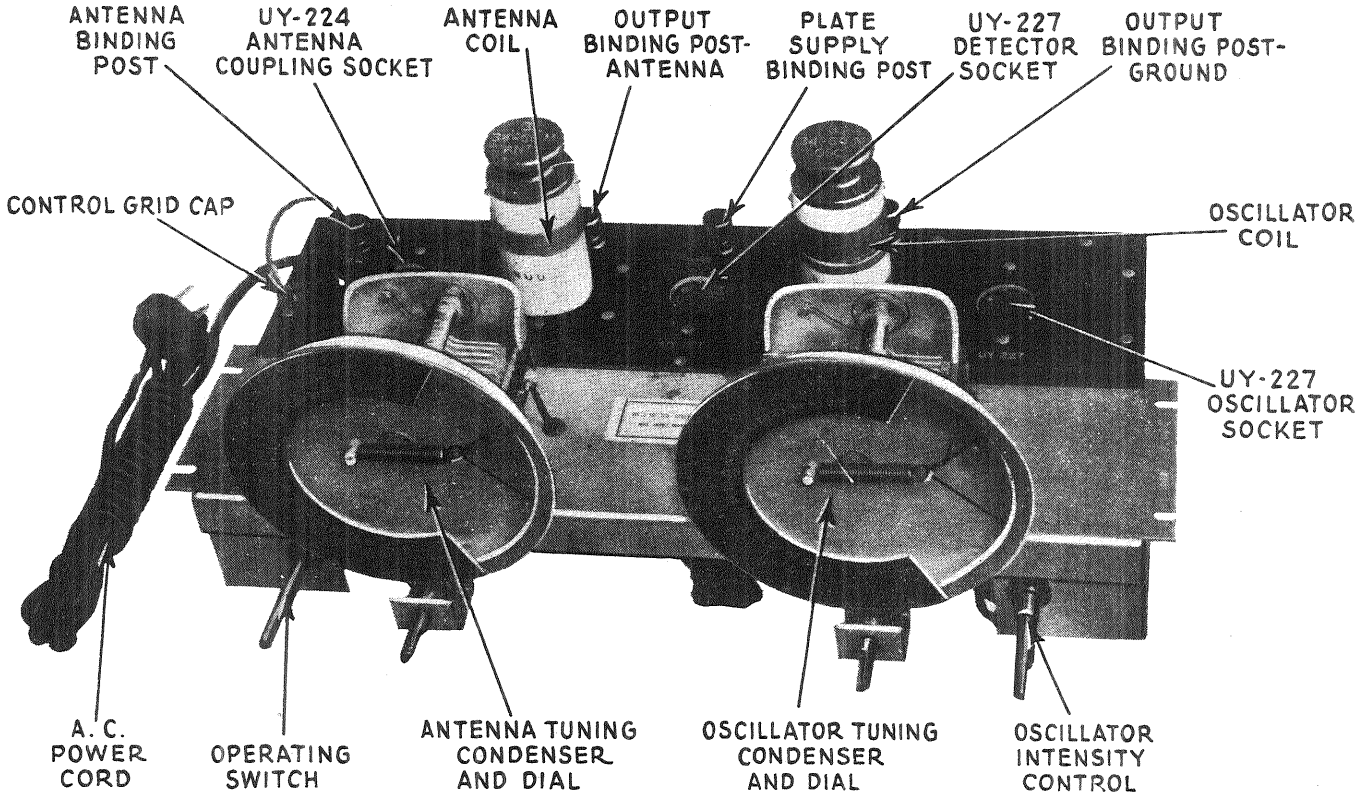

Figure 1—Top view of chassis

RCA Radiola Short Wave Adaptor

SERVICE NOTES

ELECTRICAL SPECIFICATIONS

Voltage Rating	105–125 Volts (200–250 Volts 60 Cycle A. C. Only)
Frequency Rating	25–40 Cycles and 50–60 Cycles
Power Consumption	15 Watts
Plate Voltage Supply	110–140 Volts D. C.
Recommended Antenna	Single Wire, 25–75 Feet Long
Recommended Ground	To Receiver Ground
Type of Circuit	Super-Heterodyne
Wavelength Range	16.5–110 Meters
Number of Plug-in Coils	8 (2 Per Set)
Recommended Output Frequency	1000 K. C.
Number of Tuning Controls	2
Number and Type of Radiotrons	1 UY-224 and 2 UY-227

PHYSICAL SPECIFICATIONS

Length	17 Inches
Width	10¼ Inches
Height	8¾ Inches
Weight Complete with Radiotrons and Coils	20 Lbs.
Shipping Weight with Coils	30 Lbs.
Shipping Carton Dimensions	12½ x 13½ x 20 Inches
Power Cord Length	8 Feet
Cabinet Material	Steel
Cabinet Finish	Crystalline Lacquer

INTRODUCTION

The RCA Radiola Short Wave Adaptor is designed for use in conjunction with an ordinary broadcast receiver to make possible the reception of signals from short wave transmitting stations. The construction of the instrument embodies compactness, simplicity and fine appearance. Its dimensions are ideal for convenient location atop, or in the vicinity of console cabinets, the dull crystalline finish blending with the usual cabinet colors. Unsightly wiring connections may be easily concealed in order to create an orderly installation that is capable of producing good results on weak signals. Figure 1 shows a view of the chassis removed from the cabinet.

All types of modern radio receivers can, if operating properly, be adapted to extend their usefulness to short wave channels. Adaptation requires little effort, since no changes are necessary in the receiver wiring. The small amount of power for the Radiotron heaters is secured from an alternating current line, while the higher voltage direct current for plate supply is taken from the radio receiver used.

The circuit is based upon the Super-Heterodyne principle and the device performs efficiently throughout an extensive wavelength range. A high degree of selectivity and good sensitivity are obtained.

Operation is consistent with the ability of an operator to carefully adjust the tuning controls and to recognize good signal quality. As with all short wave receiving equipment,

practice is required in tuning before stations can be received without difficulty. Under average conditions, great distances may be spanned, but such performance can not be continuously realized because of the changing character of the medium through which the waves must travel. Different phenomena from that encountered in the present broadcast band exists in the short wave bands, hence discontinuities such as rapid fading, skip distance, and occasional heavy static are to be considered normal. Response is limited to modulated waves only, thus excluding unmodulated powerful radio-telegraph interference. These coded continuous waves may be detected, if desired, by attaching the Adaptor to a receiver having an autodyne detector.

ELECTRICAL DESCRIPTION OF CIRCUIT

When used with the RCA Radiola Short Wave Adaptor, the receiver functions as the I. F. amplifier and second detector of the usual Super-Heterodyne circuit. The function of the Adaptor is therefore to convert high frequency signals to lower frequency signals, without altering the audio modulation components. This renders the signal suitable for the amplifying and detecting properties of a broadcast type receiver. Such a frequency reduction is effected by use of a circuit combination of the Super-Heterodyne type. A local signal is produced and mixed with the desired distant signal, causing its intensity to wax and wane periodically, the frequency of variation being equal to the frequency difference of the two signals.

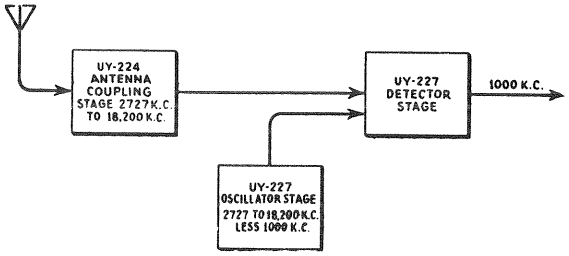

Figure 2—Path of various R. F. currents

Detection selects this difference and supplies it to the receiver where further operations transform the signal into sound energy.

In the diagram, Figure 2, each Adaptor stage is represented as a block. The evolution of signal frequency as it passes from the antenna into the system, to successive stages, and finally to the receiver is shown by the values marked at the transformation points. High frequency signals absorbed by the antenna enter the antenna coupling stage where unselective amplification increases the amplitude of any that range from 2727 K. C. to 18,200 K. C. (110–16.5 meters). The desired signal is picked out by an interstage tuning circuit and transmitted to the detector input. The locally generated signal is superimposed upon the same input, beating with the original signal to give the difference or beat frequency which is detected and impressed on the receiver input. The following mathematical example shows what happens to a signal having a carrier frequency of 10,000 K. C. when the receiver is tuned for an Adaptor output of 1,000 K. C. After reaching the detector the 10,000 K. C. signal is modulated with a frequency from the local oscillator which is tuned to 9,000 K. C. or 11,000 K. C., the resulting difference is 1,000 K. C. This 1,000 K. C. signal, as isolated from the others by the detector action, contains the original modulation. It is amplified in the same manner as other signals when introduced to the broadcast receiver.

Tracing the signal through the actual circuits it is seen from the schematic diagram, Figure 3, that it is intercepted by the antenna and applied across a portion of the resistance between the control grid and cathode of the untuned, screen grid, antenna coupling stage. The grid bias voltage is obtained by the voltage drop across the 1,000 ohm resistor in the cathode circuit. A by-pass condenser keeps this cathode at ground potential insofar as radio frequency is concerned. The coupling stage limits antenna effects upon the tuned circuit constants, amplifies the signal and prevents by its one way action any radiation of the local oscillator through the antenna. From the first stage, the signal voltage is applied between the terminals of a parallel tuned circuit and then onto the Radiotron UY 227 detector input. The grid leak condenser method of detection is used. Local oscillations from a Radiotron

UY-227 are coupled in series with the detector input. They react with the signal, giving a new frequency which travels to the output terminals.

The local oscillator stage has plate coil feedback, controllable by a variable resistor in the plate circuit. All heaters of the Radiotrons are supplied by A. C. from a small transformer. They are in parallel and are center tapped to ground by means of a resistor. The D. C. supply leads are well filtered by R. F. chokes and condensers, precluding reaction between the stages and excluding noises. Voltage for screen grid, oscillator plate and detector plate is supplied through a high series resistance to cause the required reduction. The coupling stage plate gets its voltage direct and separately from a higher potential junction.

Variable condenser rotors are grounded to minimize capacity effects from an operator's hand while the Adaptor is being tuned. Plug-in coils for both tuning circuits change the wave length ranges. The ranges overlap sufficiently to insure continuous capability from the lower to upper limits of response.

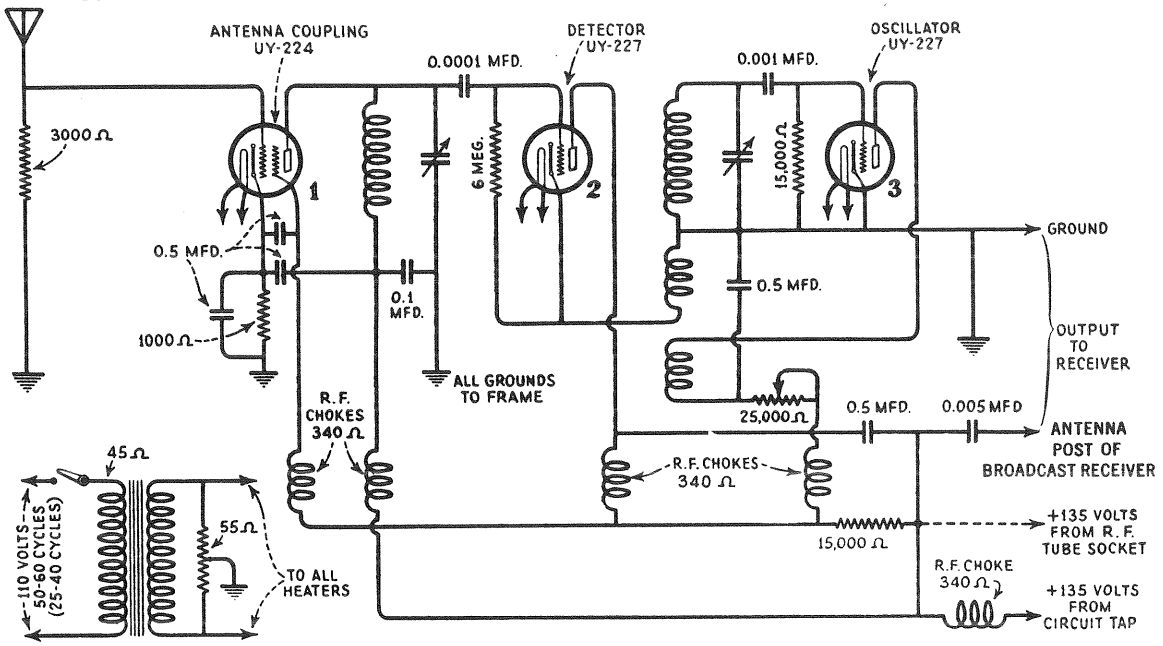

Figure 3—Schematic diagram of Short Wave Adaptor

MECHANICAL DESCRIPTION

The chassis supporting the electrical system is a removable unit, consisting of all necessary parts and apparatus mounted on a steel frame. The various stages are arranged to eliminate long connections as well as to avoid congestion of wires and parts. Each part is fastened rigidly to the chassis frame by rivets to prevent loosening by vibration. Variable condensers are substantially constructed and firmly mounted. Figure 4 shows a sub-chassis view of the Adaptor. Shafts of the controls project through the cabinet front, knobs being mounted on their ends. Uniformity is gained by incorporating UY sockets, wired to receive the plug-in coils. Markings stamped on the chassis indicate the position of the various coils and Radiotrons. The windings of the plug-in coils consist of silk covered copper wire, cemented to an Isolantite form. The cabinet bottom is wood, having four cushioned feet. Holes are provided in this base opposite the various connecting points of the chassis to insure a direct and short ex't for the leads. The base can be taken out of place quickly when access to the sub chassis is desired. The chassis top can be reached by merely lifting the lid from the cabinet. A large ratio of movement between the dial drum and the threaded pulley as transferred by a cord drive gives exact tuning. Material used in the cabinet is sheet steel, except for the wood base board of the bottom. This sturdy construction offsets danger of damage from careless handling. A crystalline-lacquer finish covers the entire surface of the metal.

PART I—INSTALLATION

(1) ANTENNA (Outdoor Type)

Satisfactory operation can be expected from the RCA Radiola Short Wave Adaptor where it is joined to the antenna that was in use on the broadcast receiver being adapted for short waves. A few constructional hints will probably aid in arranging an ideal antenna, and explain some sources of poor reception. A single wire 25 to 75 feet long located as high as possible above and away from surrounding objects, is recommended. Continuation of the antenna is the best lead-in possible. Keep the antenna short and run it in a direct line to the receiver. Swaying of the wires will give rise to fading, hence the antenna and lead-in should be taut. In cases where stray noises are present they may be reduced by using a shield on the lead-in, the shield being grounded or not as determined for best results by experiment.

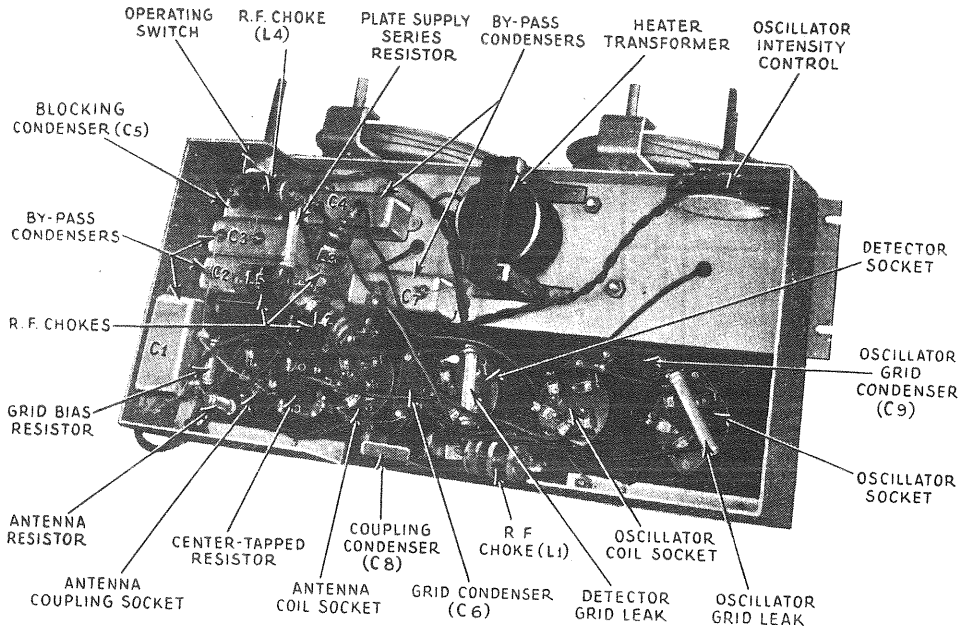

Figure 4—Sub-chassis view of Adaptor

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 from the outside through a porcelain tube or other approved insulator to the inside of the house for connection to the Adaptor.

The antenna should not cross either over or under any electric light, traction, or power line and should be a right angles to these lines and other antennas. An outdoor antenna should be protected by means of an approved lightning arrester, in accordance with the requirements of the National Fire Underwriters' Code.

(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 insulated wire strung around the picture moulding or placed under a rug. In buildings with steel framework or where metal lathing is employed, satisfactory results are not always possible with this type of antenna. In large buildings where the interference level is high, erection of an outdoor antenna may be necessary for satisfactory results.

(3) GROUND

No extra ground connection is needed for the Adaptor, other than the ground of the receiver with which it is used.

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 as short as possible 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.

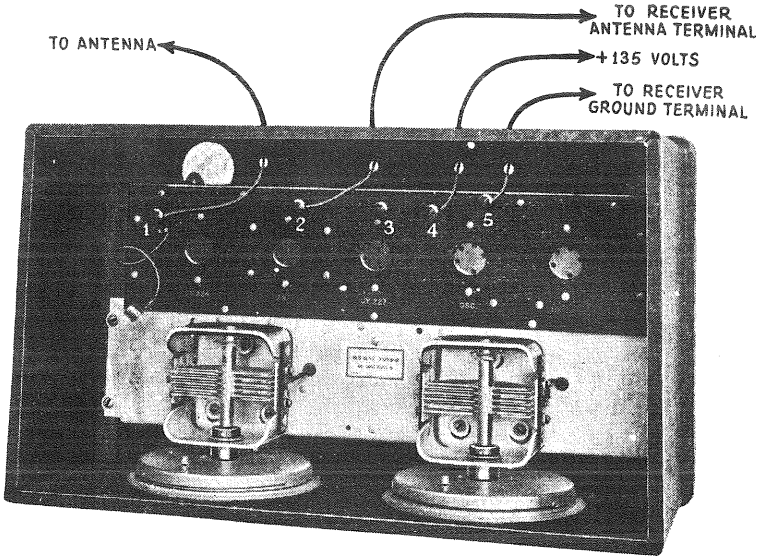

Figure 5—Connections for Method No. 1

(4) LOCATION

The primary consideration in locating the instrument is the length of the connections between the receiver and Adaptor. The length of the connecting leads should not be greater than six feet. Short direct leads give improved results over carelessly arranged ones. The receiver volume control must be within the operator's reach so that it can be regulated when tuning the Adaptor. The top of the receiver cabinet is a convenient location due to conditions mentioned. Howling is occasionally experienced due to acoustic feedback. This can be remedied by using a different support for the Adaptor.

(5) CONNECTING ADAPTOR TO THE RECEIVER

Two methods of connecting the Adaptor to the broadcast receiver are provided. In one, the D. C. voltage is taken from the voltage supply of the receiver at a point of zero R. F. potential, or as near to the filter system terminals as it can be attached. The alternative scheme utilizes the first R. F. stage plate contact as a source of D. C., as well as to couple the R. F. output of the Adaptor to the receiver circuit.

METHOD No. 1—110-140 VOLTS AVAILABLE AT RECEIVER

The following procedure should be followed when a connection can be made to a point in the receiver power system having a potential to ground of 110 to 140 volts. Figure 5 shows the connections.

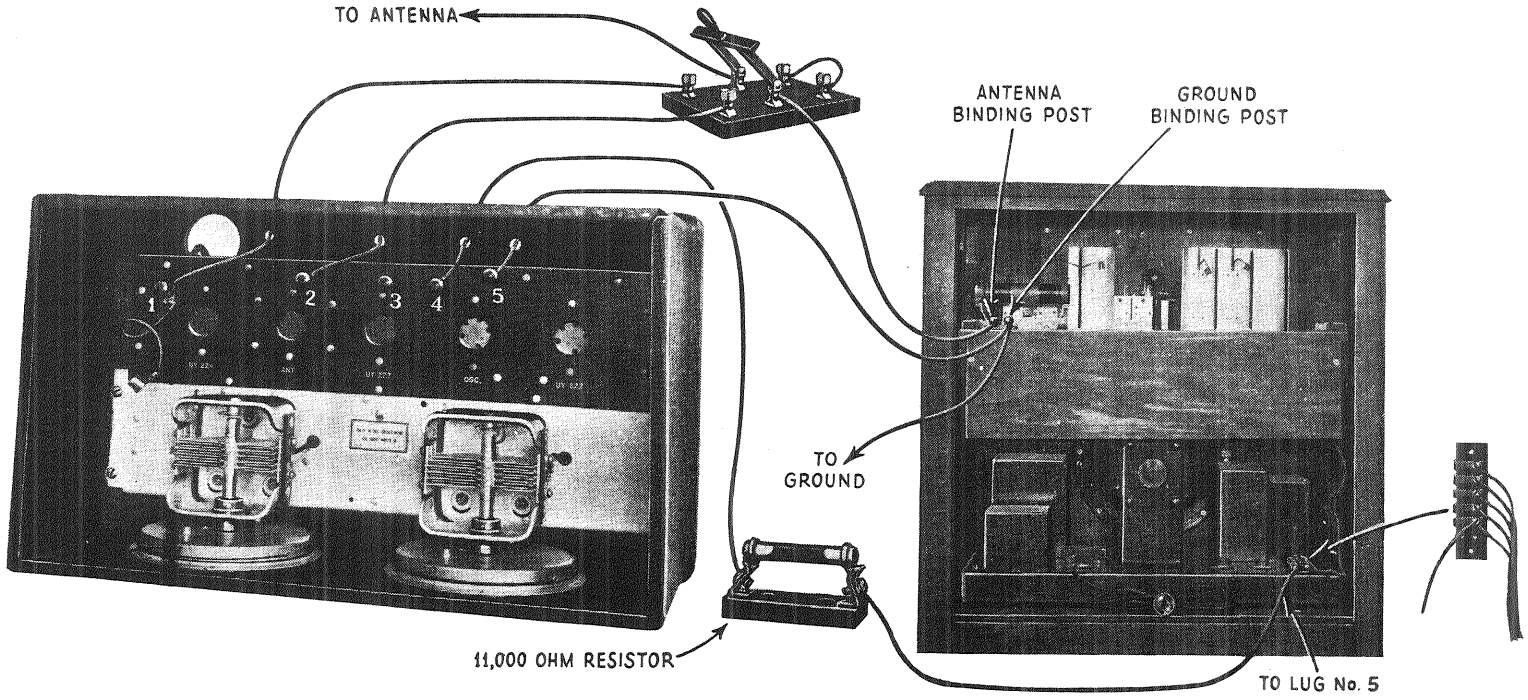

Figure 6—Connections of Short Wave Adaptor to Radiola 80

1. Remove the antenna lead from the receiver and let the ground lead remain as originally connected. Connect the antenna lead to Binding Post No. 1, the same binding post that holds the control grid lead.
2. Connect Binding Post No. 2 to the antenna terminal on the receiver. Special care must be taken to keep this lead away from all others.
3. Connect binding post No. 4 to the 110–140 Volt tap on the receiver. Voltages above 140 must be lowered by including a resistor of correct value in this lead. Approximately 7 M. A. will flow when the terminal is maintained at plus 135 volts. The series resistance necessary to bring the voltage to the normal value required can be computed by Ohm's law (Resistance equals 143 times Voltage Drop). A slight deviation in this calculated value from the actual measured value will be noticed due to voltage regulation in the power unit. It may be disregarded if the voltage at binding post No. 4 is within the limits stated above. Compensation for regulation error can be made by using a slightly lower resistance than the calculated one.
4. Connect Binding Post No. 5 to the receiver ground post. This should be connected to a good ground as described in Part I, Section 3.
5. Pass the A. C. power cord through the large hole in the Adaptor base. All other connections have outlet holes in the base board.

Changing from short wave reception with the Adaptor to long wave reception with the receiver can be simplified to a quick process with a double pole, double throw switch connected as shown in Figure 6.

When the switch is in the position to the right, the receiver will function in its usual fashion, picking up long wave stations only. Shifting the switch to the left side makes the connections required for the Short Wave Adaptor. This same shifting arrangement can not be used for Method No. 2 connection, where the output and voltage supply travel through the same interconnecting wire. Changing the wires and replacement of the first stage Radiotron restores the receiver to its original form in this case.

An example of Method No. 1 is illustrated by Figure 6, in which an RCA Radiola 80 is the receiving unit. The voltage available at the S. P. U. terminal strip lug No. 5 is about 220 volts. A 11,000 ohm resistor in the high voltage lead to the Adaptor reduces the voltage to 135 volts.

METHOD No. 2—OBTAINING PLATE SUPPLY FROM RECEIVER RADIOTRON SOCKET

Method No. 2 presumes that the plate voltage on the receiver's first R. F. tube is within the 110–140 volt limit.

The following procedure should be used for making connections. Refer to Figure 7.

a. Remove antenna lead from the receiver and let the ground lead remain as originally connected.
b. Connect the antenna lead to Binding Post No. 1. Connect a lead from Binding Post No. 5 to the receiver ground connection.
c. Insert the Adaptor plug into the first R. F. or antenna coupling Radiotron socket of the receiver and connect free end to binding post No. 3.

Binding Post No. 2 and No. 4 will have no connections.

If the plate voltage does not fall within the 110–140 volt limit a resistor of the value calculated by the method given in Method No. 1 should be connected in the following manner.

First—Connect resistor between binding posts Nos. 2 and 3.

Second—Connect free end of Adaptor plug lead to binding post No. 2 instead of No. 3

Then make other connections in the manner indicated under a, b and c.

(6) RADIOTRONS AND PLUG-IN COILS

Markings adjacent to each socket denote the Radiotron or coil to be inserted therein. Before inserting, make certain the prongs are clean and will form good connections to the socket contacts. Soldering flux or similar conductive material on the prongs can be removed by scraping with a knife or rubbing with sand paper. Remove all sand particles with a cloth. The lettering on the coil identifies it as ANT. or OSC. and it should go into the socket similarly labelled. Always choose the pair that have the same wavelength rating. If the signal lies within the overlap limits of two groups of coils, use the group having the highest

wavelength rating. This discrimination facilitates tuning because less tuning capacitance spreads the overlap over a larger dial range. Interchanging the Radiotrons UY-227 may improve signals, but critical selection of Radiotrons is not essential. Remove coils and Radiotrons gently, so that they will not be damaged by striking the upper rear edge of the metal cabinet. Replace the cabinet lid before operating the Adaptor.

(7) A. C. POWER SUPPLY

After all connections are correctly made, and the Adaptor ready for operation, the power plug is inserted into an A. C. outlet. Radiola Short Wave Adaptor is available for three types of A. C. supply, namely; 105–125 volts, 50–60 cycles; 105–125 volts, 25–40 cycles; and 200–250 volts, 50–60 cycles. A rating tag on the base gives the power requirements. **The difference in these various models is the heater transformer.**

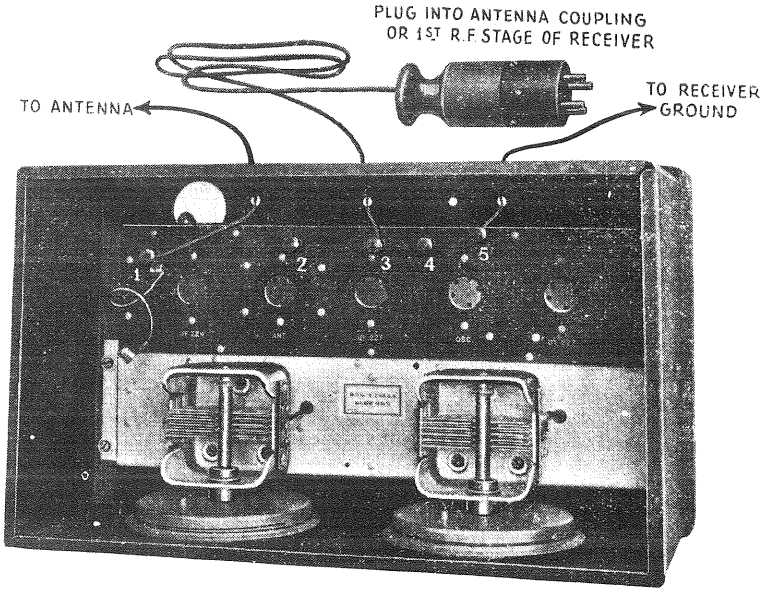

Figure 7—Connections for Method No. 2

PART II—SERVICE DATA

(1) FAILURE TO OPERATE

Failure to operate may be due to any of the following causes:

a. Not properly installed. Inspect all connections and make sure they are correct and make tight contact.

b. Radiotrons. Check the condition of each Radiotron by interchanging with others of similar type and known condition.

c. Inoperative receiver. The receiver with which the chassis is used must be in proper operating condition before any operation of the Adaptor may be expected.

d. Defective Adaptor. Check by means of socket voltage readings and continuity tests and make any repairs or replacements necessary.

(2) NOISY OPERATION

Noisy operation may be due to any of the following causes:

a. Poor joints. Repair any poor joints or connections.

b. Dirty Radiotron or Plug-In coil prongs. Clean any dirty prongs.

c. Loose or poorly made antenna and ground connections. Check and make any repairs necessary.

d. Noisy location. Disconnecting the antenna will indicate whether noise is coming in through the antenna. If noise still exists it may be coming over the supply lines or may be due to a faulty Adaptor. If Adaptor is found O. K. it may be necessary to use some form of line filter in the Adaptor A. C. supply. The fact that little or no interference is noted in broadcast reception is no proof that power supply noises do not exist when using the Adaptor.
e. Radiotrons. Check the condition of all Radiotrons both in the Adaptor and in the receiver.

(3) WEAK SIGNALS

High or low voltages on the Radiotrons will tend to decrease sensitivity of the Adaptor. When reception is limited to the strong signals, an investigation is sometimes necessary. See that the antenna is not in a shielded space, nor too near an object that will deflect or absorb the energy coming to the antenna. Rearrange the leads going to the receiver to assure a minimum of capacitance between them. When they are close together this capacitance lowers the signal intensity.

(4) DISTORTED SIGNALS

Distortion noticed at the loudspeaker may be due to one or more of the following causes:

a. Radiotrons overloading in Adaptor or receiver. In receivers where no input variation is included, the first stage will suffer from excessive signal on high powered local stations. A 50,000 ohm potentiometer placed across the Adaptor output will remedy the condition.
b. Defective Radiotrons. Check all Radiotrons carefully for loose elements and gas content.
c. Defective grid condenser or leak in either detector or oscillator stage. Check their values and replace them if they are not correct.
d. Detector stage oscillating. Check relation of grid and plate circuits to see that no coupling exists between them.

(5) ACOUSTIC HOWLING

Vibrations feeding back from the loudspeaker to tube elements will cause a howl that builds up in intensity. To overcome this objection, change the Radiotron causing it or use a different support for the Adaptor. Very strong continuous wave stations cause such acoustic interference in some cases. Also harmonics from a Super-Heterodyne receiver oscillator tube give a noise similar to an acoustic howl. This is due to the harmonics falling in the band being received. If the harmonics fall on the same frequency as the signal being received, a whistle will result. Slightly detuning the broadcast receiver will remedy this condition.

(6) LOOSE OR DIRTY INTENSITY CONTROL

A grating noise only when the oscillator intensity control is moved may be due to the movable contact being corroded or dirty. Rotate the control quickly throughout its range several times to wear away the foreign material. If this does not remedy the trouble the unit must be replaced.

(7) CROSS MODULATION OF STATIONS

A very strong local signal may be detected in the antenna coupling stage and will modulate the signal frequency being received. The effect is two audio signals in the loudspeaker, one of which is subdued. It is noticeable only when a station is tuned in. The remedy lies in changing the Adaptor response to the local interfering station, by use of a sharply tuned wave trap or some equivalent method of selective tuning ahead of the coupling stage.

A strong local station in the broadcast band is sometimes heard superimposed on the short wave channel, if the receiver is set near to such a station. The remedy is to change the setting of broadcast receiver (intermediate frequency) slightly.

(8) MAKING REPLACEMENTS

Due to the accessibility of parts, making replacements is quite simple. The following outline gives the suggested procedure for doing this work.

Remove the Radiotrons and Plug-In Coils. Unfasten all leads, pulling them free from the cabinet. With the lid removed, turn the Adaptor upon its top and take out the base board by unscrewing the four screws centered in the cushioned feet, thus exposing the entire sub-chassis assembly. If preferable, the chassis can be completely withdrawn from the cabinet by removing the four screws holding it, the screw heads of which are accessible from the top of the chassis. Slip the chassis out cautiously to prevent damaging the small choke coils and marring the tuning dials.

Substitution of a new part is essentially a question of maintaining the original relationship of the unit and its associated connections in the general assembly. Departure from the intended arrangement subtracts from the instrument's efficiency and may possibly lead to unsatisfactory operation. Workmanship is always a worthwhile consideration, since good electrical performance depends to a certain degree upon construction and mounting of the various parts. Perfect continuity in connections is obviously of equal importance. Every joint, after being cleaned thoroughly should be attached in an approved mechanical manner. Solder all joints and avoid leaving surplus solder or residue of resin on a connection. Note that choke coils should always be replaced with narrow coil section toward the same connection as originally connected.

PART III—ELECTRICAL TESTS

(1) 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 with test sets such as the Weston Model 547, Type 3, 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 line voltages. Therefore, the following values must be taken as approximately those that will be found under varying conditions. The numbers in column 1 indicate the tube socket numbers shown in Figure 3.

OSCILLATOR INTENSITY CONTROL AT MAXIMUM

Socket No.	Cathode to Heater Volts D. C.	Cathode to Control Grid Volts D. C.	Cathode to Screen Grid Volts D. C.	Cathode to Plate Volts D. C.	Heater Volts A. C.	Plate Current M.A. D.C.	Screen Grid Current M.A. D.C.
1	—1	—1	43	125	2.45	1.10	0.25
2	0	—1.3*	—	50	2.45	2.0	—
3	0	—0.4*	—	45	2.45	2.8	—

OSCILLATOR INTENSITY CONTROL AT MINIMUM

Socket No.	Cathode to Heater Volts D. C.	Cathode to Control Grid Volts D. C.	Cathode to Screen Grid Volts D. C.	Cathode to Plate Volts D. C.	Heater Volts A. C.	Plate Current M.A. D.C.	Screen Grid Current M.A. D.C.
1	—1.2	—1.2	54	127	2.45	1.25	0.28
2	0	0	—	56	2.45	3.0	—
3	0	—0.3*	—	23	2.45	1.7	—

*Measured on 50 volt range. Is inaccurate because of voltmeter resistance in shunt with grid circuit resistance. Actual grid voltage is slightly higher than the readings.

During observation of voltages, be alert for erratic readings which suggest the cause of failure. No voltage on plate or screen grid indicates an open circuit in an R. F. choke or the 15,000 ohm series resistor. Control grid bias on Radiotrons will be wrong or absent when the grid to cathode circuits are of improper resistance or open, respectively.

The oscillator will be generating a signal if a decrease occurs in the detector plate current when the intensity control is turned clockwise.

(2) PLUG-IN COIL CONTINUITY

The winding arrangement of the plug-in coils is given in Figure 8. Breaks in the windings can be detected by a continuity check between the base prongs. The windings are all wound in the same direction on the form.

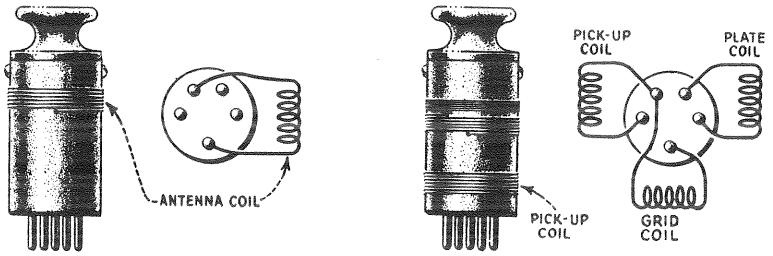

Figure 8—Internal connections of Plug-in Coils

(3) CONTINUITY TESTS

The table of possible faults is given here to assist in finding sources of trouble in the Adaptor. A direct reading "Ohmmeter," a Resistance Bridge or the voltmeter-ammeter method can be used to check resistance values. Also, the use of a Weston 301 or 280, 0–50 voltmeter which has 62 ohms per volt in series with a 45 volt "B" battery gives good indications. Two readings must be made, first by connecting the voltmeter across the battery, and second, by connecting the unknown resistance in series with the other two units. The following formula represents the desired resistance value.

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

The voltmeter should have higher internal resistance for measurement of higher resistances.

Before beginning the continuity test, remove all external connections from the Adaptor and remove the Radiotrons, antenna and oscillator coils. Turn the oscillator intensity control to maximum; unless noted otherwise.

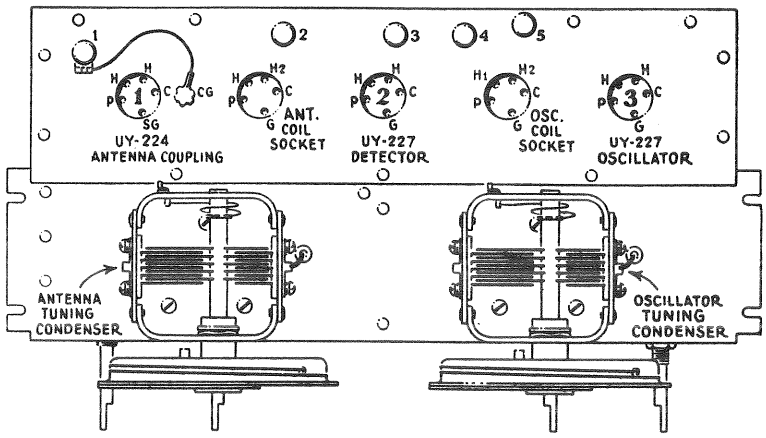

Figure 9—Test points of Short Wave Adaptor

Readings obtained on the meter used will in each case indicate whether that part of the circuit under test is normally intact or is failing. Indications for open circuit may be due to broken connecting wires. Also variations from the specified cause of shorts may come from wires being shorted to ground or to other conductors. The simplicity of wiring layout permits a ready discovery of breaks or shorts upon a visual inspection of the subchassis array. Refer to Figure 9 to see the designation of terminals. Figure 10 shows the wiring diagram of the Adaptor.

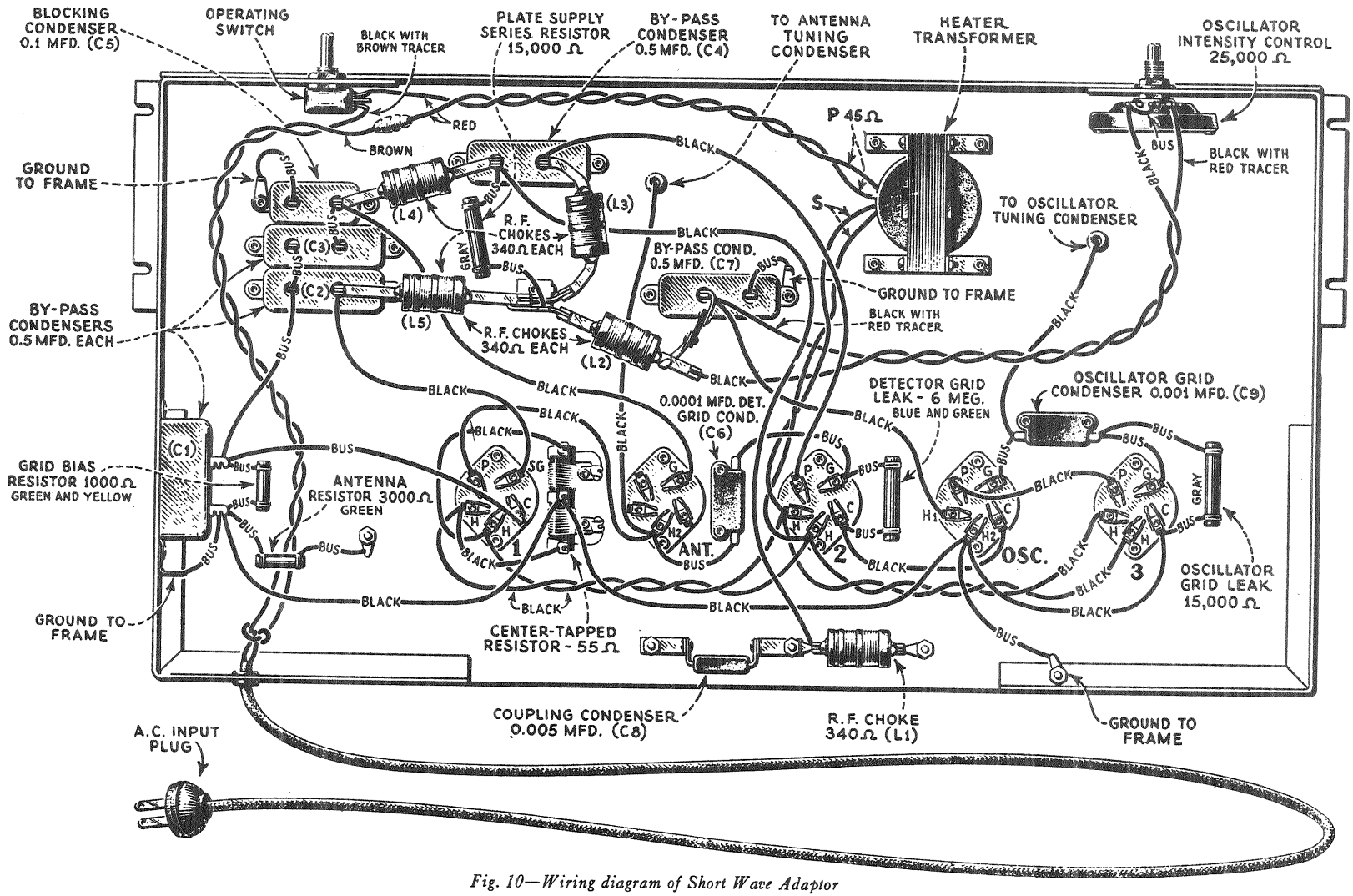

Fig. 10—Wiring diagram of Short Wave Adaptor

RCA RADIOLA SHORT WAVE ADAPTOR
CONTINUITY TESTS

Terminals	Correct Effect	Incorrect Effect	
		Indication	Cause
Gnd. to No. 1	Closed (3000 ohms)	Open Short	Open antenna resistor Shorted antenna resistor
Gnd. to C1	Closed (1000 ohms)	Open Short	Open bias resistor Shorted 0.5 mfd. condenser C1 or resistor
Gnd. to SG1	Open	1000 ohms 680 ohms 16680 ohms 15680 ohms	Shorted 0.5 mfd. condenser C2 Shorted 0.5 mfd. condenser C7 Shorted 0.5 mfd. condenser C3 Shorted 0.1 mfd. condenser C5
Gnd. to P1	Open	Short	Shorted antenna tuning condenser
Gnd. to H1	Closed (14 ohms)	Short 28 ohms	Shorted center-tap resistor Center-tap resistor open in one section or open secondary of heater transformer
Gnd. to G–Ant.	Open	Short 1000 ohms	Shorted 0.1 mfd. condenser C5 Shorted 0.5 mfd. condenser C3
Gnd. to G2	Open	Short	Grounded 6 meg. grid leak
Gnd. to C2	Open	Short	Grounded 6 meg. grid leak
Gnd. to G–Osc.	Open	Short 15000 ohms	Shorted oscillator tuning condenser Shorted 0.001 mfd. condenser C9
Gnd. to G3	Closed (15000 ohms)	Open Short	Open oscillator grid leak Shorted oscillator grid leak
Gnd. to H1–Osc.	Open	Short	Shorted 0. 5 mfd. condenser C7
No. 3 to No. 4	Closed (340 ohms)	Open Short	Open R. F. choke L1 Shorted R. F. choke L2

RCA RADIOLA SHORT WAVE ADAPTOR
CONTINUITY TESTS (Continued)

Terminals	Correct Effect	Incorrect Effect	
		Indication	Cause
No. 3 to No. 2	Open	Closed	Shorted 0.005 mfd. condenser C8
No. 3 to P2	Closed (15340 ohms)	340 ohms Open Short	Shorted series plate supply resistor Open series plate supply resistor Shorted 0.5 mfd. condenser C4
No. 3 to G–Ant.	Closed (340 ohms)	Open Short	Open R. F. choke L4 Shorted R. F. choke L4
SG1 to P2	Closed (680 ohms)	Open (340 ohms)	Open R. F. chokes L5 or L3 Shorted R. F. chokes L5 or L3
P2 to H1–Osc.	Closed (680 ohms)	Open	Open R. F. chokes L3 or L2
OSCILLATOR INTENSITY CONTROL AT MINIMUM (EXTREME COUNTER-CLOCKWISE POSITION)			
P2 to H1–Osc.	Closed (25680 ohms)	680 ohms	Shorted oscillator intensity control
P1 to G2	Open	Short	Shorted 0.0001 mfd. condenser C6
Tip to Tip of Power Plug	Closed 45 ohms	Open Short	Open heater transformer primary or power switch not making contact. Shorted primary winding
G3 to G–Osc.	Open	Short	Shorted 0.001 mfd. condenser C9
G2 to C2	Open	Short	Shorted 6 meg. grid leak

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SERVICE DATA CHART

Before using the following Service Data Chart, when experiencing no reception, low volume, poor quality, noisy or intermittent reception, howling and fading, first look for defective tubes, or a poor antenna system. If imperfect operation is not due to these causes the "Service Data Chart" should be consulted for further detailed causes. Reference to the text of this Service Note should be made for further details.

Indication	Possible Cause	Remedy
No Signals	Wrong or poor connections	Check and correct
	Inoperative receiver	Check and repair
	Defective Radiotrons	Check and replace
	Defective antenna or lead	Check and repair
	Radiotrons or Plug-In coils in wrong sockets	Check positions and correct
	No control grid connection	Place cap tightly on grid terminal
	Defective circuit	Check socket voltages and continuity
Weak Signals	Low emission Radiotrons	Check and replace
	High or Low Voltages	Measure and readjust
	Poor Coupling of Stages	Check condensers C4, C6, and C8
	Receiver subnormal	Check and repair
	Faulty antenna	Check and correct
	Defective Plug-In Coils	Check and replace
	Leads too long	Decrease length
	Defective choke	Check L3 and replace
	Loose intensity control arm	Replace intensity control
Distorted Signals	Defective Radiotrons	Check and replace
	Incorrect voltages	Measure and readjust
	Poor connections	Check all splices and terminals; correct defect
	Oscillator too strong	Change voltages on oscillator Radiotron
	Grid condenser or leak defective	Check detector and oscillator grid condensers and leaks; replace
	Receiver improperly tuned	Change setting away from broadcast station
Noisy or Intermittent Reception	Antenna or lead-in defective	Check all splices and connections; make good tight joints
	Dirty prongs	Check condition of Plug-In Coil and Radiotron bases; clean prongs thoroughly
	Radiotron elements loose	Check and replace any noisy Radiotron in Adaptor or receiver
	Loose intensity control arm or dirty contact	Check by varying and listening; replace defective control
	Loose connection in Adaptor	Check for poor connection and resolder
Howling	Microphonic Radiotron	Locate and replace Radiotron giving trouble
	Speaker too near Adaptor	Move Adaptor to a cushioned support away from speaker
	Receiver improperly tuned	Change selector setting slightly
Radiotrons Fail to Light	Heaters open	Check each Radiotron and replace all defects
	Power switch defective	Check, repair or replace if necessary
	Heater transformer defective	Check continuity of both windings and measure voltage values.

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