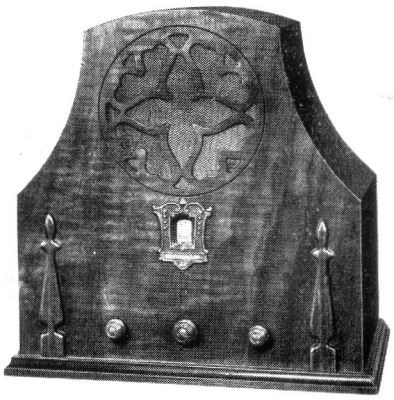
CANADIAN WESTINGHOUSE
RADIO
SERVICE MANUAL

SECTION RS-109

WESTINGHOUSE MODEL
61



MODEL 61 MIDGET

MODEL 61 CONSOLETTE

FEBRUARY 1931

CANADIAN WESTINGHOUSE COMPANY, LIMITED
Service Department

Preface

Service goes hand in hand with sales. The well-informed Westinghouse Authorized 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 Westinghouse Radio 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 Westinghouse Radio Receiving Sets.

¶ To assist in promoting this phase of the Dealer and Distributor's business Westinghouse has prepared a series of Service Notes—of which this booklet is a part—containing technical information and practical helps in servicing Westinghouse Radio Receiving Apparatus.

¶ This information has been compiled from experience with Dealers and Distributor's 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.

¶ In addition to supplying the Service Notes, the Westinghouse maintains a corps of engineers who are qualified to render valuable help in solving, service problems. These engineers call upon the trade at frequent intervals to advise and assist Westinghouse Dealers and Distributor's in the performance of service work.

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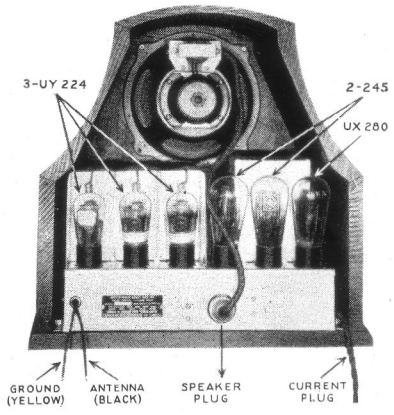


Fig. 1A

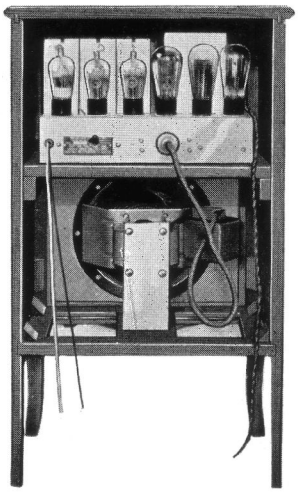


Fig. 1B

Rear View of Westinghouse 61

Westinghouse
Model 61 Service Notes

ELECTRICAL SPECIFICATIONS

Voltage Rating	105–125 Volts
Frequency Rating	25–60 Cycles
Power Consumption	115 Watts
Recommended Antenna Length	50-100 Feet
Type of Circuit	A.C. Screen Grid T.R.F.
Type and Number of Radiotrons	3 UY-224, 2 UX-245, 1 UX-280
Number of R. F. Stages	2
Type of Detector	Power Grid Bias
Number of Audio Stages	1 (Push-Pull)
Type of Volume Control	Potentiometer type (Changes screen voltage to R.F. tubes.)
Type of Rectifier	Full Wave, UX-280
Type of Loudspeaker	Electro-Dynamic
Wattage Dissipation in L.S. Field	10 Watts (110 V. 85 M.A.)
Undistorted Output	2.5 Watts

PHYSICAL SPECIFICATIONS

	Midget	Consolette
Height	18 Inches	32 Inches
Depth	10½ Inches	11½ Inches
Width	18 Inches	19 Inches
Weight (Packed for Shipment)	58 Lbs.	100 Lbs.
Packing Case Dimensions	21″x19½″x12¾″	22½″x36″x15″

INTRODUCTION

Westinghouse 61 is a six-tube A.C. operated screen grid type tuned radio frequency receiver. Excellent and uniform selectivity, sensitivity and fidelity are secured throughout the broadcast band. Included in the same cabinet is an improved electro-dynamic type loudspeaker which, together with the receiver, gives a very excellent quality of reproduction.

This set is manufactured in two styles, using the same chassis, but different reproducer units. One style is in the form of a Mantel type, or Midget Receiver, the other style is in the form of a very small Console or Consolette Receiver.

The receiver uses three Radiotrons UY-224, two as R.F. amplifiers and one as a detector; two Radiotrons UX-245 as a push-pull audio stage; and one Radiotron UX-280 as a full wave rectifier for converting the alternating current into direct current which, after suitable filtering, is used as a plate and grid supply to all Radiotrons.

Figure 1 shows a rear interior cabinet view and Figure 2 the schematic circuit diagram.

ELECTRICAL DESCRIPTION OF CIRCUIT

A unit type of construction is used on Model 61; that is, the receiver and power parts are all built into a single unit, see Figures 3 and 4. Numerous advantages are present in this type of construction. Individual shields are placed over each, so that a very complete system of shielding is present.

Examining the circuits we find the following functions taking place. See Figure 2.

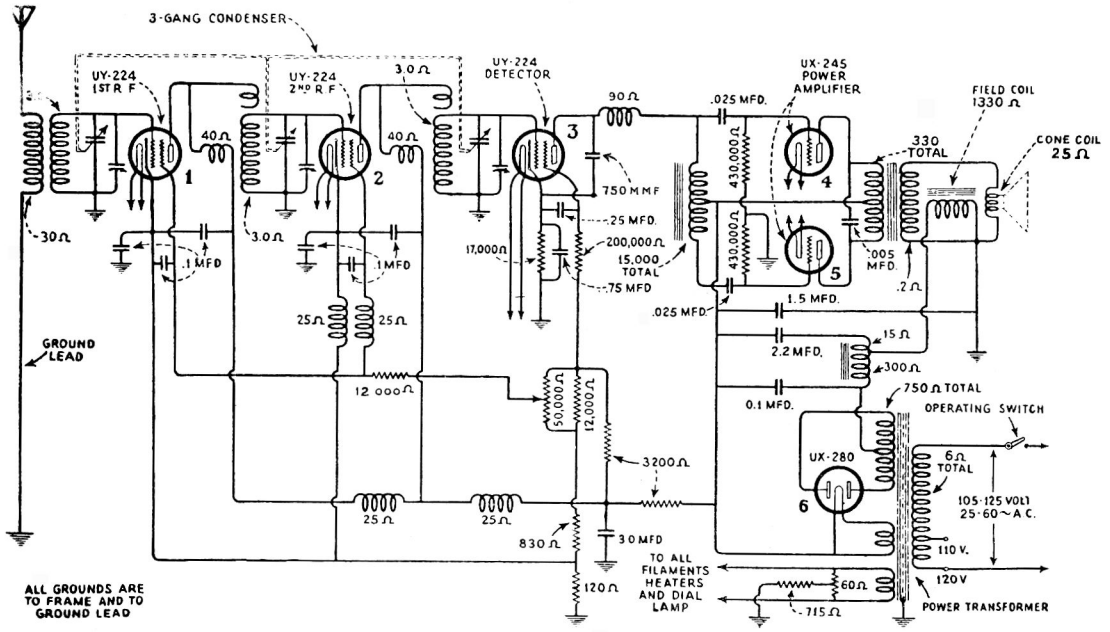


Fig. 2—Schematic Circuit Diagram

The secondary of the antenna R.F. transformer is connected to the grid circuit of the first R.F. Radiotron UY-224, which is tuned by the first unit of the gang condenser. The plate circuit of this tube contains a high impedance coil located inside the grid coil of the second R.F. transformer. This plate coil is of the correct impedance to match the UY-224 and is at right angles to the grid coil in which it is located. This is done so that the inductive coupling between these circuits is at a minimum. A single turn at one end of the grid coil is connected to the plate of the UY-224 and provides capacitive coupling between the circuits.

The reason for using capacitive instead of inductive coupling is due to the fact that the primaries of the R.F. transformer resonate at about 350 K.C. with receiver capacitance and tend to increase the sensitivity at the low end of the range. Capacitive coupling has less reactance to high frequencies than to low frequencies, thereby increasing the effective coupling at the high frequency end. A combination of the two gives about an equal gain throughout the tuning range.

The following R.F. circuit functions in the same manner as the one already described. The screen grid voltage of these two Radiotrons is varied by means of the volume control. This action gives a positive control of volume without distortion.

The detector circuit functions as a biased-grid, power detector operating at a high plate voltage so that an output sufficient to swing the two Radiotrons UX 245 to maximum output is obtained. The detector tube is operated at 250 volts plate potential and 10 volts negative grid bias.

As the detector is a Radiotron UY-224 and must therefore work into a high impedance, a transformer would not be suitable for coupling it to the grid circuit of two Radiotrons UX-245. Impedance coupling is therefore used, one-half of a tapped reactor being in the plate circuit of the detector. This reactor is of quite high impedance and functions as an auto transformer. Two coupling condensers are used to pass the A.C. component of the detector output to the grid of the Radiotrons UX-245. Two high resistance units are used so that the proper grid bias may also be impressed on these tubes.

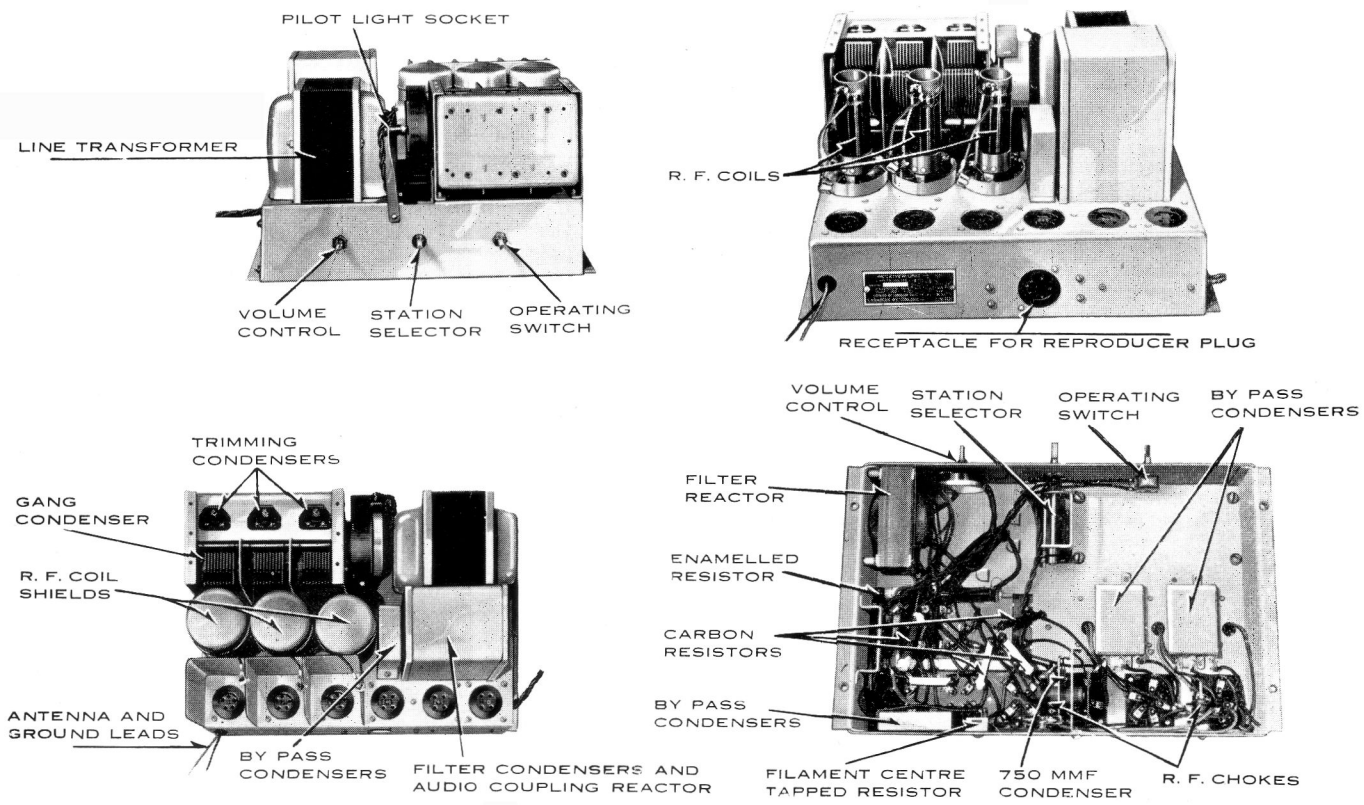


Fig. 3—Various views of chassis, showing parts

The output of the Radiotrons UX-245 is coupled to the cone coil of the electro-dynamic speaker through a center-tapped primary, step-down transformer.

A full wave rectifying circuit employing Radiotron UX-280 is used to provide the direct current voltages necessary for plate and grid supply to all Radiotrons and also for field current supply to the electro-dynamic loudspeaker. The filter circuit is of the type employed in the Super-Heterodyne models with the exception that a .1 mfd. condenser is used to by-pass any high frequency ripple that may be present in the rectified output. An explanation of the action of this filter follows.

Figure No. 2 shows the first stage of the filter having two condensers and a tapped reactor. The condensers function in the usual manner, acting as reservoirs to hold the current from one impulse to the next. The tapped reactor functions somewhat differently from the usual manner however. The D.C. current flows through one section of it, the other section being connected to a condenser. However, an A.C. voltage is present across the other section due to its transformer action similar to an auto transformer. This voltage is 180 degrees out of phase with the ripple voltage across the second condenser and to a large extent cancels out all ripple flowing from the tap to succeeding circuits. This results in the output of this section filter being substantially free from ripple. The field of the reproducer unit is connected in series with this output and further removes the slight ripple voltage remaining. The condensers are of ample capacity for proper filtering.

Part I. Installation

(1) ANTENNA AND GROUND

Instructions for erecting a good antenna and ground system, together with hints for special installations in noisy locations, are contained in previous Service Notes.

(2) RADIOTRONS

Model 61 uses a total of six Radiotrons, three Radiotrons UY-224, two Radiotrons UX-245 and one Radiotron UX-280. The Radiotrons should be placed in their correct sockets as indicated on the instruction card accompanying each set.

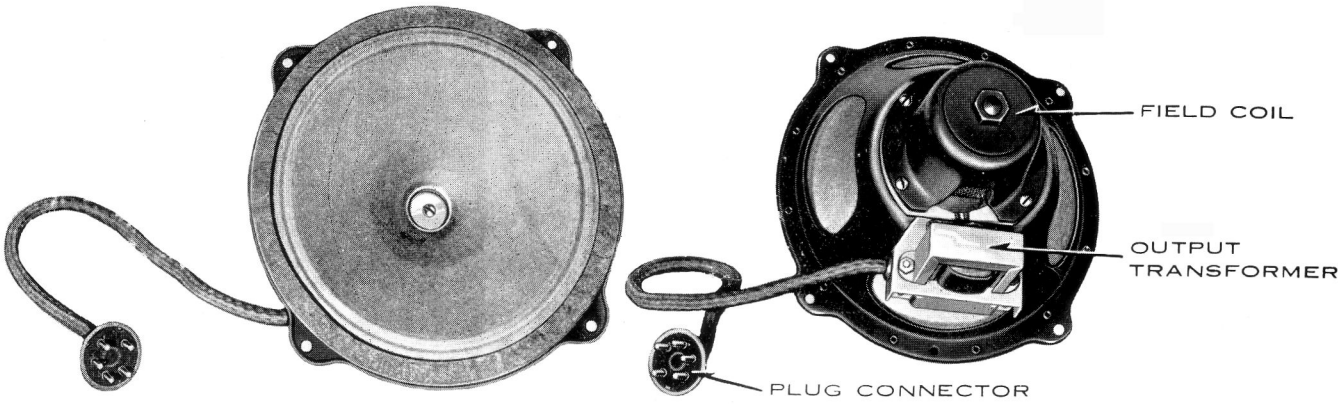


Fig. 4—Reproducer Assembly used in Midget

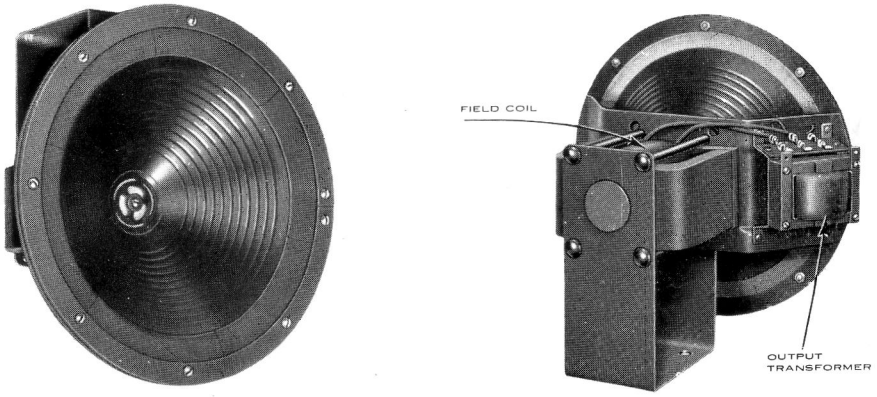


Fig. 5—Reproducer Assembly used in Consolette

The detector Radiotron should be chosen from the other Radiotrons UY-224 for the tube that will give the greatest output with the volume control advanced to its maximum undistorted position. Then interchange the remaining Radiotrons UY-224 until best results are obtained.

(3) LOCATION

This receiver should be tried in various locations in the room in which it is to be operated and the location giving the best acoustical results used. However, the eight-foot A.C. cord may prove a limiting factor if an A.C. outlet is not within its radius. An extension cord may be used in cases of this kind, as the better results usually justify its small cost.

The antenna and ground leads should be separated as much as possible until they connect to the receiver, otherwise a reduction in signal strength will result, due to the capacity between leads.

(4) JERKY ACTION OF STATION SELECTOR

Should operation of the station selector be stiff or jerky, a little oil dropped on each condenser bearing will effectively remedy this condition. When experiencing this trouble it is also well to check the cable tension spring to make sure that suitable tension is being applied to the condenser drive cable.

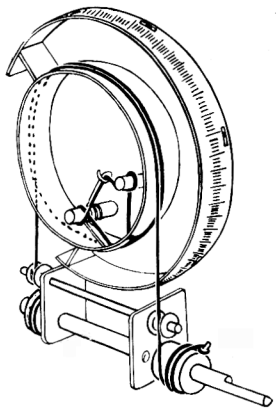


Fig. 6—Drive cord arrangement

Part 11. Service Data

(1) ANTENNA SYSTEM FAILURES

A grating noise may be caused by 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 and shorting the antenna and ground leads the service man can soon determine whether the cause of complaint is within or external to the receiver and plan his service work accordingly.

(2) RADIOTRON SOCKETS AND PRONGS

The tube sockets used in this set are of an improved type having a large contact surface and should require a minimum of service work. In order to get best results, however, the tube prongs should be periodically cleaned, as dirty Radiotron prongs may cause noisy operation. Fine sandpaper may be used to clean them so as to insure a good contact surface. The use of emery cloth or steel wool is not recommended. Before re-inserting the Radiotrons in their sockets wipe the prongs and bases carefully to make certain that all particles of sand are removed.

(3) BROKEN CONDENSER DRIVE CORD

The gang condenser is driven from the station selector knob by means of a cord arrangement that also functions as a vernier control. This cord is of rugged construction and a spring is used to maintain an even tension at all times. Should the cord become disengaged from the drum or a new cord be required, follow the arrangement indicated in Figure 6 for the correct position of the cord on the drum, otherwise the cord length will be incorrect or the stops on the shaft will engage at the wrong time.

If a standard replacement drive cord is not available one may be improvised from a length of rugged fish cord. If this is done it should be noted that the completed length of the drive cord from the extreme end of the loops should be 32½".

(4) ALIGNMENT OF GANG CONDENSER

Three small adjustable condensers connected in parallel to the main tuning condensers are provided to line up the circuits at the high frequency end of the scale and also to allow a line up that will cause the dial to read correctly at the high frequency end. A need for re-adjustment of these condensers is indicated by insensitivity of the receiver not due to other causes.

The gang condenser may be aligned according to the general instructions given in Service Manual Section No. RS-105 covering the use of Radio Service Oscillator S No. H-23618. In general it will not be necessary to make any other adjustment for alignment than to adjust the three small condensers. The design of this set follows the present tendency in manufacture to have the radio frequency circuit very close to oscillation at the low frequency end of the scale. In manufacture the gang condenser is aligned all over the scale sufficiently close to give good selectivity and sensitivity but not aligned sufficiently accurately to cause oscillation.

In general this adjustment is not as critical as the former method of accurate alignment of gang condensers over the entire scale. If however oscillation occurs at the low frequency end of the scale and the set still has normal sensitivity or better the gang condenser plates may be adjusted slightly to prevent oscillation. This should not be done however unless it is definitely found that oscillation is not due to tubes, poor contact of tube or RF shield or other causes.

To adjust the gang condenser in this way it is necessary to remove the shield from the gang condenser, make a slight adjustment in or out of the outside rotor plate of one gang condenser at the low frequency end of the scale, the set should then be operated to note whether the condition of oscillation has been corrected, if not a slight additional adjustment should be made in a similar manner and continued on one or the other of the gang condensers until the condition disappears and the sensitivity of the set is still normal.

If the sensitivity of the set when the RF line-up condensers are adjusted at the high frequency end is normal at the high frequency end but weak at the low frequency end a similar method should be used to line up the gang condensers at the low frequency end until sufficient sensitivity without oscillation is secured. The gang condenser outside rotor plates are slotted so as to facilitate this adjustment.

A special socket wrench is available under S No. H-23714 for making adjustments to the line-up condensers.

(5) RECENTERING REPRODUCER CONE.

(A).—In Midget Model 61.

1. Remove the reproducer assembly from the cabinet.
2. Slacken the four screws that hold the field coil assembly to the reproducer frame.
3. Take three or more strips of thin card (an ordinary visiting card has approximately the right thickness) about ten thousandths of an inch thick ¼ inch wide and 2 or 3 inches long.
4. Insert these strips of card lengthwise at equal distances apart between the aluminum ring of the cone and the iron core.
6. Tighten the four field coil mounting screws and remove the cardboard strips.
7. Check the operation of the speaker by testing it before returning it to the cabinet.

In most cases this adjustment can be made from the rear of the set without removing the reproducer from the cabinet. In this case as before the field coil mounting screws are slackened and the position of the field coil adjusted by trial until the cone vibrates freely.

(B).—Consolette Model 61.

1. Remove the reproducer assembly.
2. Remove the nuts, screws, and lock washers that hold the metal ring and cone in place.
3. Slacken the cone centering screw.
4. Place three pieces of cardboard the thickness of a visiting card and approximately 1½ inches by ¼ inches in size, in the space between the inside of the cone coil and the pole piece.
5. Tighten the cone centering screw.
6. Remove the pieces of card and check the operation of the speaker before returning it to the cabinet.

(6) SERVICE DATA CHART

The following Service Data Chart gives the cause and remedy of the most common indications of a defective receiver. If following the suggestions in this chart does not remedy any trouble that occurs, then the Voltage Reading Service Data Chart should be used to isolate the trouble. See Part III, Section 3.

Before making any tests or repairs, check the conditions of all the Radiotrons. A defective tube can be the cause of practically any indication that might be observed.

SERVICE DATA CHART

Indication	Cause	Remedy
No Reception	No current at Outlet	Turn line current "On"
	Defective Operating Switch	Repair or replace operating switch.
	Open cone or field coil in reproducer	Repair or replace defective part in reproducer unit.
	Defective parts in chassis	Test by means of voltage readings or continuity tests and repair or replace any defective parts.
Low Volume	Poor antenna system	Install antenna system as suggested on instruction book
	Shorted field coil in reproducer unit	Repair any defect in reproducer
	R.F. stages not properly aligned	Realign circuits as suggested in Part II, Sections 4 and 5.
	Defective parts in chassis	Test by means of voltage readings or continuity test and repair or replace any defective parts.
Poor Quality	Receiver not properly tuned	Tune in station properly
	Receiver improperly aligned	Align receiver properly as given in Part II, Sections 4 and 5.
	Defective coupling reactor	Replace coupling reactor unit.
	Defective coupling condenser	Replace coupling condenser.
	Defective output transformer	Repair or replace output transformer.
Audio Howl	Shipping blocks not removed	Remove shipping blocks
	Defective cushion supports	Replace any defective support. The receiver assembly should not be rigidly mounted to the cabinet
	Oscillation	R.F. oscillation will cause a whistle or howl when a signal is tuned in. Remove the cause of oscillation.
	By-pass condenser not properly mounted causing poor connection to frame	Check all by-pass condensers and make sure they are mounted securely to chassis frame.
	Open by-pass condenser	Repair or replace any open by-pass condenser.
	Broadcasting station heterodyne	This is caused by transmitting stations and is no fault of the receiver.
Oscillation	Poor ground	Connect set to good ground.
	Shields not in place	Make sure all shields are tightly in their proper positions.
	Open or shorted by-pass condenser	Replace any defective condenser or repair any poor connections.
	Radiotron	A defective Radiotron UY-224 may cause oscillation and should be replaced by one known to be in good operating condition.
	Screen grid resistor	Make sure screen grid resistor is 16,000 ohms.
Hum	Defective Radiotron UX-280	Replace defective Radiotron
	Shorted field coil	Repair or replace field coil.
	Grounded heater lead	Remove the cause of any grounds
	Loose laminations in filter reactor	Tighten filter reactor clamping screw.
	Shorted by-pass condenser from C4 to ground.	Replace defective condenser.
Nois Volume Control	Poor contact of arm	Work contact arm back and forth several times. If trouble does not clear up, replace volume control.

Part III. Electrical Tests

(1) VOLTAGE SUPPLY SYSTEM

Figure 7 illustrates the schematic diagram of the voltage supply system together with the values of the various resistors.

(2) 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 a Weston Model 547, Type 3, or others giving similar readings. The plate currents shown are not necessarily accurate for each tube, as the circuits will oscillate. 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. Figure 8 shows a simplified schematic circuit diagram. The numbers in Column 1 indicate the tube socket numbers shown in Figure 9.

(3) VOLTAGE READING SERVICE DATA CHART

The service data chart on page 14 provides a means of diagnosing trouble from socket voltage readings taken with any of the usual set analyzers.

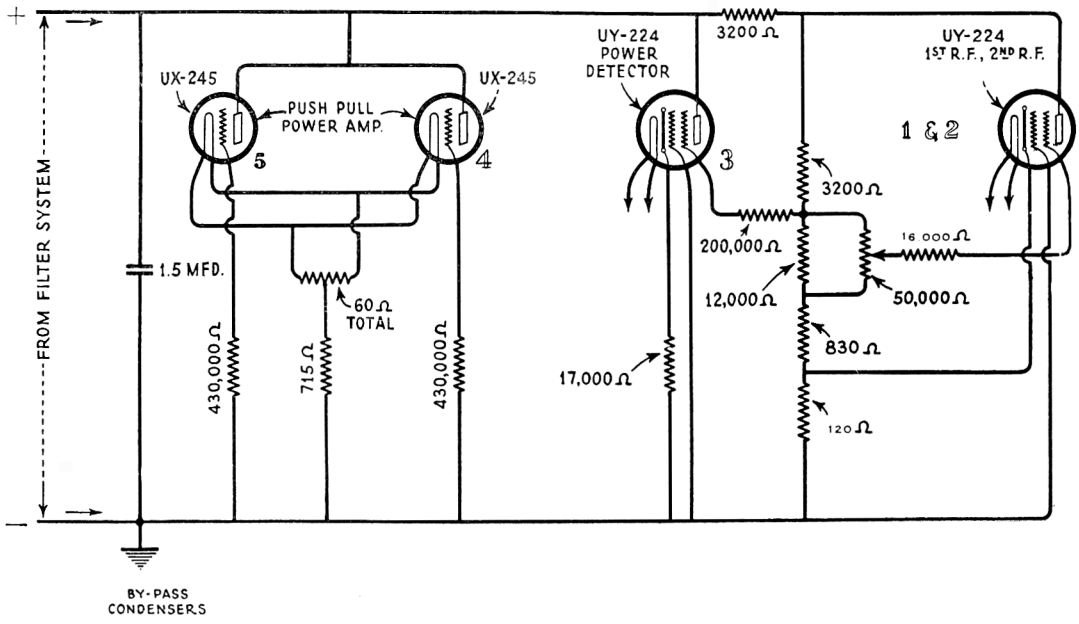


Fig. 7—Schematic circuit of diagram of voltage supply system

VOLTAGE READING SERVICE DATA CHART

Volume Control at Maximum

VOLTAGE CHARACTERISTICS	TUBE 1 1st R.F.				TUBE 2 2nd R.F.				TUBE 3 DETECTOR				TUBE 4 POWER A.F.			TUBE 5 POWER A.F			Cause of Incorrect Reading
	C.G. Volts	S.G. Volts	Plate Volts	Plate M.A.	C.G. Volts	S.G. Volts	Plate Volts	Plate M.A.	C.G. Volts	S.G. Volts	Plate Volts	Plate M.A.	Grid Volts	Plate Volts	Plate M.A.	Grid Volts	Plate Volts	Plate M.A.	
Normal	3·0	95	180	3·0	3·3	95	180	3·0	4·5	27	240	0	6·0	210	27	6·0	210	27	
No. C.G. Voltage on Tube No. 1	0	80	150	6·0	....	....	....	....	....	....	....	....	....	....	....	....	....	....	Open Secondary of 1st R.F. Transformer
No. C. G. Voltage on Tube No. 2	....	....	....	....	0	75	150	5·5	....	....	....	....	....	....	....	....	....	....	Open Secondary of 2nd R.F. Transformer
No C.G. Voltage on Tube No. 3	....	....	....	....	....	....	....	....	0	18	200	1·0	....	....	....	....	....	....	Open Secondary of 3rd R.F. Transformer
No Plate Voltage on Tube No. 1	2·5	80	0	0	....	....	....	....	....	....	....	....	....	....	....	....	....	....	Open Primary of 2nd R.F. Transformer
No Plate Voltage on Tube No. 2	....	....	....	....	2·5	75	0	0	....	....	....	....	....	....	....	....	....	....	Open Primary of 3rd R.F. Transformer
No Plate Voltage on Tube No. 3	....	....	....	....	....	....	....	....	3·5*	18*	0	0	....	....	....	....	....	....	Open Coupling Reactor or Detector R.F. Choke
No Plate Voltage on Tube No. 4	....	....	....	....	....	....	....	....	....	....	....	....	2·0	0	0	5·0	210	45	Open Primary of Output Transformer
No Plate Voltage on Tube No. 5	....	....	....	....	....	....	....	....	....	....	....	....	5·0	210	45	2·0	0	0	Open Primary of Output Transformer
No S.G. Voltage on Tube No. 2	2·5	100	155	4·5	2·5	0	165	0	4·0	60	240	0	....	....	....	....	....	....	Open S.G. R.F. Choke
No Voltages on Tube No. 2	2·5	80	170	3·0	18*	0	0	0	4·0	60	240	0	....	....	....	....	....	....	Open R.F. Choke Connected to Cathode of Tube No. 2
No Plate Voltages on Plates Nos. 1 and 2	2·1	60	0	0	2·1	60	0	0	10	60	240	0	....	....	....	....	....	....	Open R.F. Plate Supply Choke
No C.G. Voltages on Tubes Nos. 1 and 2	0	80	150	4·5	0	75	150	4·5	30	8·0	195	1·5	....	....	....	....	....	....	Shorted 0.1 Mfd. Condenser from Cathode No. 1 to Ground
No C.G. Voltages on Tubes Nos. 1 and 2	0·4	75	150	3·5	0	80	155	4·5	30	2·0	185	1·5	....	....	....	....	....	....	Shorted 0.1 Mfd. Condenser from Cathode No. 2 to Ground
No S.G. Voltages on Tubes Nos. 1 and 2	2·5	0	180	0	2·5	0	180	0	....	....	....	....	....	....	....	....	....	....	Shorted 0.1 Mfd. Condenser from S.G. No. 1 or 2 to Cathode
No Plate Voltages on Tubes Nos. 1 and 2	7·0	1·0	0	0	8·0	0	0	0	0	1·0	175	0	....	....	....	....	....	....	Shorted 0.1 Mfd. Condenser from Plate No. 2 to Cathode
No Plate Voltages on Tubes Nos. 1 and 2	7·0	1·0	0	0	7·0	1·0	0	0	0	1·0	175	0	....	....	....	....	....	....	Shorted 0.1 Mfd. Condenser from Plate No. 1 to Cathode
No C.G. Voltage on Tube No. 3	....	....	....	....	....	....	....	....	0	8·0	220	2·0	....	....	....	....	....	....	Shorted 0.75 Mfd. Condenser across Detector Bias Resistor
No S.G. Voltage on Tube No. 3	....	....	....	....	....	....	....	....	12	0	220	0·5	....	....	....	....	....	....	Shorted 0.25 Mfd. Condenser from S.G. to Cathode Tube No. 3
No C.G. or S.G. Voltages on Tubes Nos. 1 and 2	0	0	110	0	0	0	110	0	0	0	200	0	....	....	....	....	....	....	Shorted 0.1 Mfd. Condenser from Ground to Volume Control
Low Plate and S.G. Voltages on Tubes Nos. 1, 2 and 3	1·2	38	80	0·8	1·4	30	80	1·5	4·5	9	105	0·5	0	115	58	0	115	58	Shorted 0.1 Mfd. Condenser from Ground to No. 3 Heater
No Voltages on Tube No. 3	2·8	60	170	0·75	2·8	60	165	3·8	20т	0	0	0	....	....	....	....	....	....	Open 17,000-Ohm Resistor
No S.G. Voltage or Plate M.A. on Tube No. 3	2·5	80	165	2·0	3·0	60	165	3·8	5·5	0	220	0	....	....	....	....	....	....	Open 200,000-Ohm Resistor
High C.G. and Low S.G. Volts on Tube No. 3	....	....	....	....	....	....	....	....	19	24	210	1·25	....	....	....	....	....	....	Open 12,000-Ohm Resistor Across Volume Control
No Voltages on Tubes Nos. 1 and 2	0	0	0	0	0	0	0	0	0	0	260	0	....	....	....	....	....	....	Open 3,200-Ohm Section of Voltage Dividing Resistor
No C.G. or S.G. Voltages on Tubes Nos. 1, 2 and 3	0	0	265	0	0	0	265	0	0	0	260	0	....	....	....	....	....	....	Open 3,200-Ohm S.G. Supply Resistor
High C.G. Voltages on Tube No. 3	2·6	65	170	1·1	2·8	60	165	4·0	16	50	210	1.2	....	....	....	....	....	....	Open S.G. Voltage Section of Volume Control
High C.G. Voltage on Tube No. 3	2·0	80	190	2·2	3·6	75	180	5·8	20	70	205	1·3	....	....	....	....	....	....	Open 830-Ohm Section of Voltage Dividing Resistor
Very High C.G. Voltage on Tubes Nos. 1, and 2	255*	0	0	0	255*	0	0	0	16	145	245	1·0	....	....	....	....	....	....	Open 120-Ohm Section of Voltage Dividing Resistor
No S.G. Voltage on Tubes Nos 1 and 2	1·8	0	195	0	1·8	0	195	0	7·4	85	230	0·5	....	....	....	....	....	....	Open Volume Control Arm or 12,000-Ohm Resistor
High Plate Current on Tube No. 4	....	....	....	....	....	....	....	....	....	....	....	....	0	150	70	6·0	150	0	Open 430,000-Ohm Resistor
High Plate Current on Tube No. 5	....	....	....	....	....	....	....	....	....	....	....	....	6·0	150	0	0	150	70	Open 430,000-Ohm Resistor
High Plate Current on Tube No.4	....	....	....	....	....	....	....	....	....	....	....	....	+43	70	85	−8·0	80	0	Shorted .025 Mfd. Condenser
High Plate Current on Tube No. 5	....	....	....	....	....	....	....	....	....	....	....	....	−8	80	0	+43	70	85	Shorted .025 Mfd. Condenser

Caused by meter connection. No voltage present in operation.

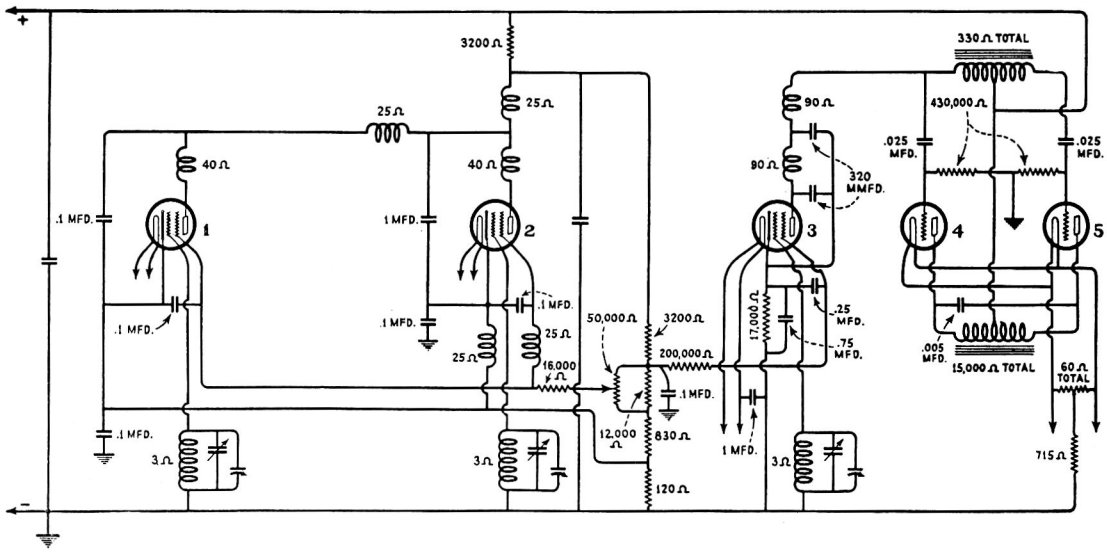
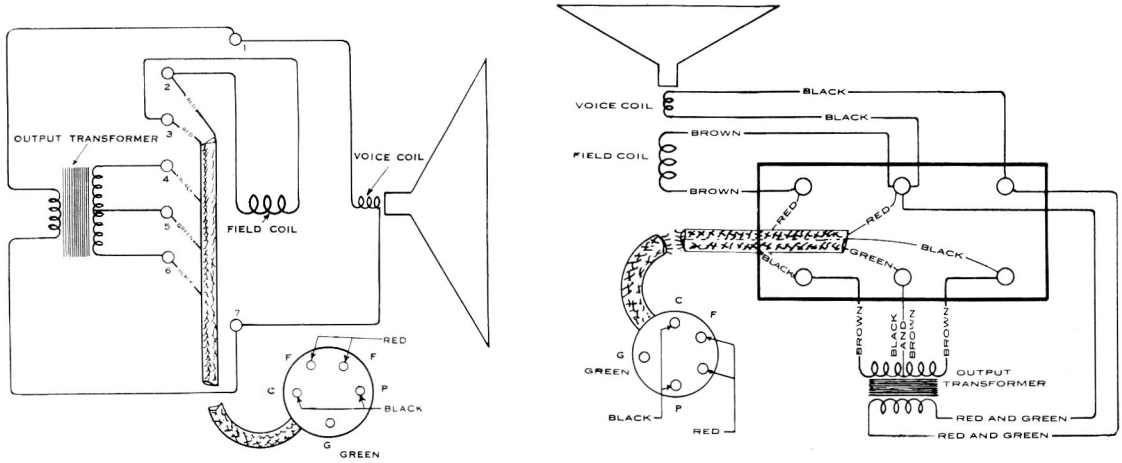


Fig. 8—Simplified schematic circuit diagram

RADIOTRON SOCKET VOLTAGES—120-VOLT LINE

Tube No.	Cathode or Filament to Control Grid-Volts D.C.	Cathode to Screen Grid Volts D.C.	Cathode or Filament to Plate Volts D.C.	Plate Current M.A.	Screen Grid Current M.A.	Heater or Filament Volts
Volume Control at Maximum						
1	—3.0	+95	180	3.0	0.9	2.3
2	—3.0	+95	180	3.0	0.8	2.3
3	—4.5	+27	240	0	0	2.3
4	*—6.0	—	210	27.0	—	2.5
5	*—6.0	—	210	27.0	—	2.5
Volume Control at Minimum						
1	—2.0	+ 0	220	0	0	2.3
2	—2.0	+ 0	220	0	0	2.3
3	—6.0	+33	250	0	0	2.3
4	*—6.0	—	225	30.0	—	2.5
5	*—6.0	—	225	30.0	—	2.5

*Not true reading due to resistor in circuit.



(A) Midget (B) Consolette

Fig. 10—Internal Connections of Reproducer

(4) CONTINUITY TESTS

The following tests will show complete continuity for the receiver assembly of this instrument. Disconnect the antenna and ground leads, and the A.C. supply cord at its outlet.

A pair of headphones with at least 4½ volts in series, or a voltmeter with sufficient battery to give a good deflection when connected across the battery terminals, should be used in making these tests.

The resistance of the various circuits are shown in the column titled "Correct Effect". Checking the resistance of the circuits adds an additional check on their correct functioning. This may be done by means of a direct reading "Ohmmeter," a resistance bridge, the voltmeter-ammeter method or the method suggested in previous Service Notes.

Radiotron socket numbers used in making these tests are shown in Figure 9. The schematic diagram, Figure 2, gives the values of the parts of the various circuits. Figure 8, the simplified schematic circuit diagram, is useful when making these tests.

Terminals	Correct Eflect	Incorrect Effect	
		Indication	Caused By
Ant. lead to Ground lead	Closed (30 ohms)	Open	Open antenna coil.
C1 to Ground	Closed (120 ohms)	Open	Open 120-ohm section of voltage divider resistor.
		Short	Shorted 0.1 mfd. condenser from C1 to Ground
		Closed (21 ohms)	Shorted 0.1 mfd. condenser from C3 to Ground.
CG1 to Ground	Closed (3 ohms)	Open	Open secondary of 1st R.F. transformer
		Short	Shorted 1st tuning or line-up condenser.
SG1 to C1, (Vol. Cont. at "Min".—	Closed (16,830 ohms)	Open	Open 16,000-ohm resistor or 830-ohm section of voltage divider resistor.
		Short	Shorted 0.1 mfd. condenser from SG1 to C1.
		Closed (50 ohms)	Short 0.1 mfd. condenser from SG3 to C3.
P1 to Ground	Closed (14,000) ohms)	Open	Open primary of 2d R.F. transformer R.F. choke, 3,200-ohm resistor, 12,000-ohm resistor and volume control, 830-ohm or 120-ohm section of voltage divider.
		Closed (160 ohms)	Shorted 0.1 mfd. condenser from C1 to plate supply.
		Closed (210 ohms)	Shorted 0.1 mfd. condenser from C3 to plate supply
		(Closed (54,240 ohms)	Open 12,000-ohm resistor across volume control.
		Closed (16,240 ohms)	Open volume control.
		Closed (90 ohms)	Shorted 1.0 mfd. condenser.
SG2 to SG1	Closed (25 ohms)	Open	Open R.F. Choke.
C2 to C1	Closed (25 ohms)	Open	Open R.F. Choke
P2 to P1	Closed (105 ohms)	Open	Open primary of 3d or 4th R.F. transformer or R.F. Choke.

*This may be higher on some sets due to the volume control arm not covering the full range of the resistance unit.

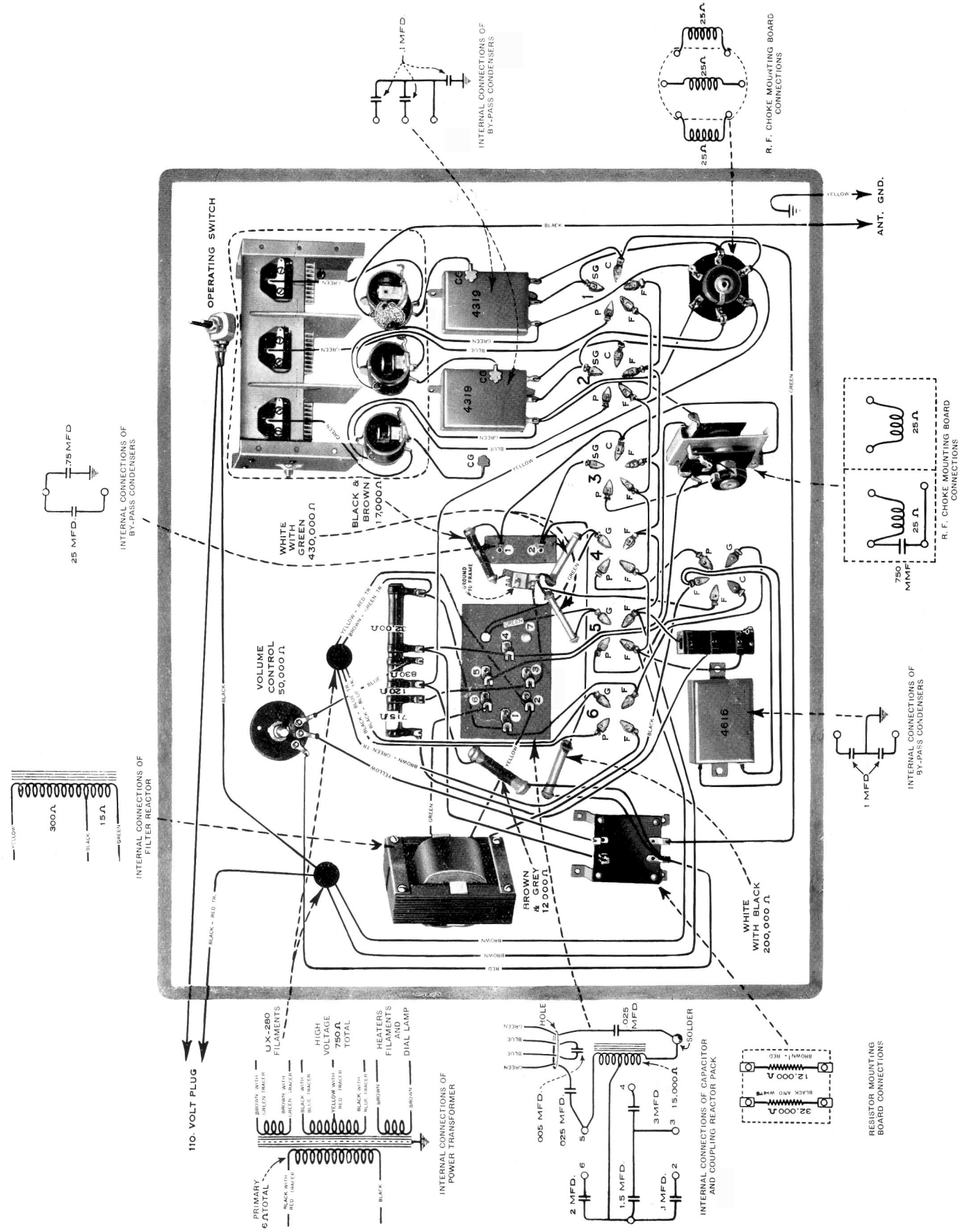


Fig. 9—Layout and Complete Wiring Diagram.

CONTINUITY TESTS—*Continued*

Terminals	Correct Effect	Incorrect Effect	
		Indication	Caused By
C2 to Ground	Closed (145 ohms)	Open	Open R.F. choke or 120-ohm section of voltage divider.
		Short	Short 0.1 mfd. condenser from C3 to ground.
		Closed (21 ohms)	Short 0.1 mfd. condenser from C1 to Ground.
CG2 to Ground	Closed (3 ohms)	Open	Open secondary of 3d R.F. transformer
		Short	Shorted 3d tuning or line-up condenser.
SG2 to C2 (Vol. Cont. at "Min")	Closed (16,880 ohms)	Open	Open cathode or S.G. choke, 16,000-ohm resistor or 830-ohm section of voltage divider resistor.
		Short	Shorted 0.1 mfd. condenser from C3 to SG3.
		Closed (50 ohms)	Shorted 0.1 mfd. condenser from C1 to SG1.
SG2 to centre tap on volume control	Closed (16,025 ohms)	Open	Open R.F. choke or 16,000-ohm resistor.
P2 to Ground	Closed (13,940 ohms)	Open	Open primary of 4th R.F. transformer, R.F. choke, 3,200-ohm resistor and volume control, 830-ohm or 120-ohm section of voltage divider.
		Closed (185 ohms)	Shorted 0.1 mfd. condenser from C3 to plate supply or from C1 to plate supply.
		Closed (54,215 ohms)	Open 12,000-ohm resistor across volume control.
		Closed (16,215 ohms)	Open volume control.
		Closed (65 ohms)	Shorted 1.0 mfd. condenser.
C3 to Ground	Closed (17,000 ohms)	Open	Open 17,000-ohm resistor.
		Short	Shorted 0.75 mfd. condenser across 17,000-ohm resistor.
CG3 to Ground	Closed (3 ohms)	Open	Open secondary of 4th R.F. transformer
		Short	Shorted 4th tuning or line-up condenser
SG3 to SG1 (Vol. Cont. at "Max.")	Closed (216,000 ohms	Open	Open 200,000-ohm or 16,000-ohm resistor.
C3 to P3	Closed (41,707 ohms)	Short	Shorted 750 mfd. condenser.
SG1 to P3 (Vol. Cont. at "Max".)	Closed 30080 ohms)	Open	Open R.F. choke, coupling reactor, either 3,200-ohm resistor or 16,000 ohm resistor.
P3 to either F6	Closed (7,680 ohms)	Open	Open R.F. choke, or one-half of coupling reactor.
P3 to G 5	Open	Closed 180 ohms)	Shorted .025 mfd. coupling condenser
P3 to G4	Open	Closed (15,180 ohms)	Shorted .025 mfd. condenser.

CONTINUITY TESTS—*Continued*

Terminals	Correct Effect	Incorrect Effect	
		Indication	Caused By
G5 to Ground	Closed (430,000 ohms)	Open	Open 430,000-ohm resistor.
G4 to Ground	Closed (430,000 ohms	Open	Open 430,000-ohm resistor
P5 to P4	Closed (330 ohms)	Open Short	Open primary of output transformer Shorted .005 mfd. condenser.
Across secondary of output transformer (cone coil disconnected)	Closed (.2 ohms)	Open	Open secondary of output transformer
Across cone Coil (Output transformer disconnected)	Closed (2.5 ohms)	Open	Open cone coil
G6 to P6	Closed (750 ohms)	Open	Open high voltage winding of power transformer
G6 or P6 to Ground	Closed (2115 ohms)	Open	Open high voltage winding of power transformer, filter reactor or reproducer field coil.
Across F6 contacts	Closed Short	Open	Open UX-280 filament winding
Either side of filament contacts of sockets 1, 2, 3, 4, or 5	Closed (745 ohms)	Open Short	Open 60-ohm center tapped resistor or 715-ohm bias resistor Shorted 0.1 mfd. condenser from heater to ground of Socket No. 3
Across AC.. input plug	Closed (6 ohms)	Open	Open primary of power transformer
Either F6 to Ground	Closed (17,350 ohms)	Open Closed (57,350 ohms) Closed (19,350 ohms) Closed (3,200 ohms) Closed (1,345 ohms) Closed (1,630 ohms) Short	Open either 3,200-ohm resistor, 12,000-ohm resistor and volume control, 830-or 120-ohm section of voltage divider. Open 12,000-ohm resistor across volume control. Open volume control. Shorted 1.0 mfd. condenser Shorted 2.0 mfd. condenser Shorted .1 mfd. condenser Shorted 1.5 mfd. filter condenser.
SG1 to F6 (Vol. Cont. in Max. Position)	Closed (22,400 ohms)	Open	Open 3,200-ohm resistor or 160,00 ohm resistor.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