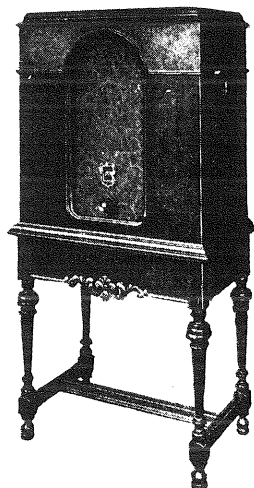


# RCA

## Radiola 46 (D. C.)

### SERVICE NOTES



RCA Radiola 46 (D.C.)

[ First Edition—5M  
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## PREFACE

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Service goes hand in hand with sales. The well-informed RCA 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 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 Authorized 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 Department 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.

In addition to supplying the Service Notes, the RCA Service Department 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 RCA Distributors in the performance of service work.

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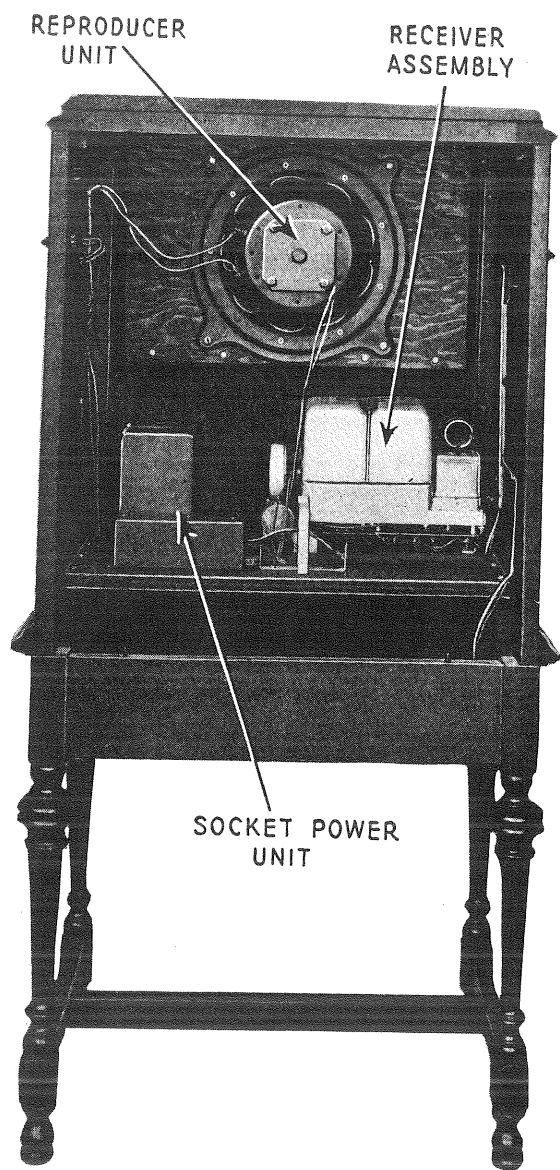
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*Figure 1—Rear interior cabinet view of Radiola 46 (D.C.)*

R46 (DC)

# RCA RADIOLA 46 (D. C.)

## SERVICE NOTES

Prepared by RCA Service Department

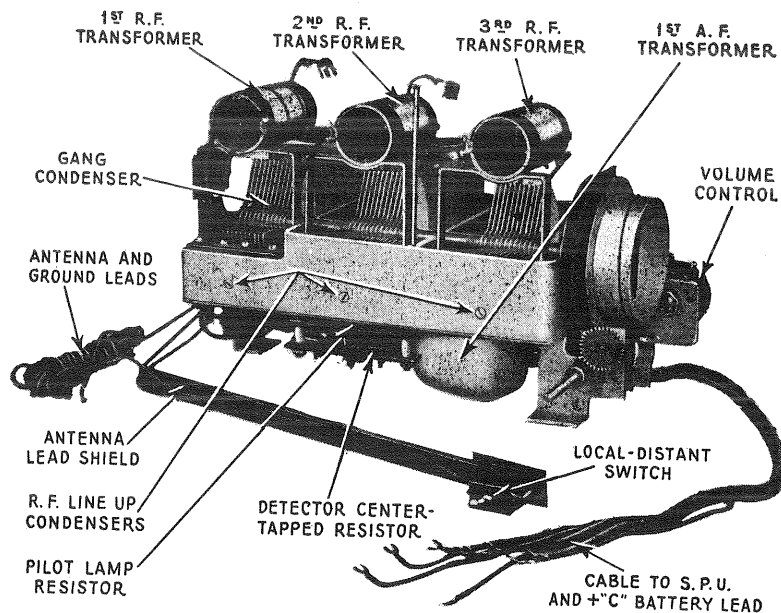


Figure 2—Top view of receiver chassis with shields removed.

### ELECTRICAL SPECIFICATIONS

Voltage Rating	. . . . .	107½-127½ Volts D. C.
Power Consumption	. . . . .	55 Watts Maximum
Recommended Antenna Length	. . . . .	25-60 Feet
Type of Circuit	. . . . .	Screen Grid Tuned R. F.
Number and Type of Tubes	. . . . .	Two UX-222, 2 UX-112A and 2 UX-171A
Number of R. F. Stages	. . . . .	2
Type of Detector	. . . . .	Grid Condenser and Leak
Number of A. F. Stages	. . . . .	2—Last Stage Push-Pull
Type of Loudspeaker	. . . . .	Electro Dynamic (107½-127½ Volts D. C.) (100-125 M. A. Field)

### PHYSICAL SPECIFICATIONS

Height	. . . . .	50¼ Inches
Width	. . . . .	26⅞ Inches
Depth	. . . . .	16 Inches
Weight, Net	. . . . .	100 Pounds
Weight, Packed in Standard Packing Case	. . . . .	145 Pounds
Size of Packing Case	. . . . .	20"x30½"x54"

## INTRODUCTION

RCA Radiola 46 (D.C.) is a console model screen grid radio receiver operating on house lighting D.C., 107½-127½ volts. The electro dynamic speaker employed is of the RCA 106 type. RCA screen grid Radiotrons UX-222 are employed as radio frequency amplifiers, Radiotrons UX-112A as the detector and first audio stage and Radiotrons UX-171A as the push-pull second audio stage. An external "C" battery is used to make available as high a plate voltage as possible for the UX-171A's. Figure 1 illustrates a rear interior cabinet view of Radiola 46 (D.C.). Figure 2 is a top view of the receiver chassis with shields removed. Figure 3 is a sub-chassis view of the receiver, and Figures 4 and 5 are top and bottom views of the socket power unit.

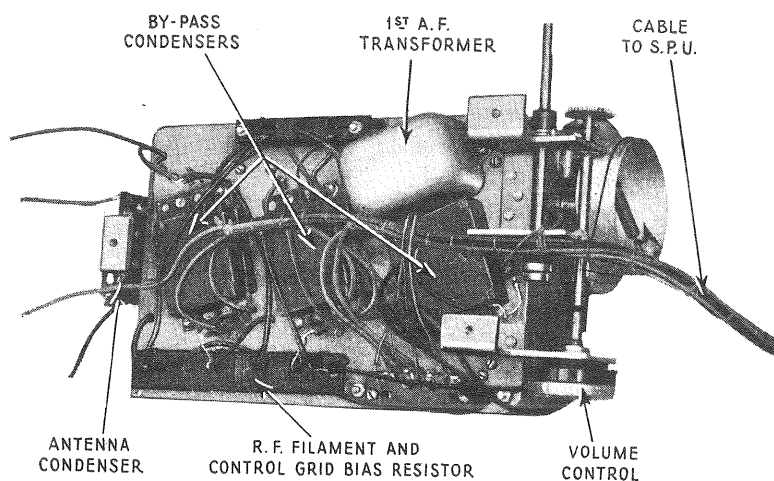


Figure 3—Sub-chassis view of receiver

Circuit features (See Figure 6) of this Radiola are:

- (a) Two tuned R.F. stages, tuned grid leak type detector, first audio stage and a second audio stage employing two UX-171A Radiotrons in push-pull connection.
- (b) Local-distant switch provides reception on both loud and weak signals. At the local position a .00023 mfd. condenser is connected from the antenna connection to ground. This condenser, or when the switch is at "distant," antenna to ground capacity, causes the circuit to resonate in the broadcast band, about 700 K.C., and thereby brings up the sensitivity of the low frequency end. The result is that the receiver has about equal sensitivity throughout the tuning range.
- (c) The use of screen grid tubes together with proper shielding, eliminates the necessity of neutralizing or other methods of stabilizing.
- (d) The volume control varies the voltage on the screen grid of the two R.F. tubes. This provides a smooth means of control which, together with the local-distant switch, provides a positive cut-off even on loud local stations.

## PART I—INSTALLATION

Information on the various points dealing with installation as listed below can be obtained by referring to the Service Notes or Instruction Books mentioned.

**Antenna (Indoor or Outdoor)**—See R-44 and 46 Service Notes, pp. 8-12.

**Ground**—See R-44 and 46 Service Notes, p. 10.

**Shields**—See R-44 and 46 Service Notes, p. 15.

**"C" Battery and Connections**—See R-46 (D.C.) Instruction Book, pp. 4 and 8.

**Line Voltage Adjustment**—See R-46 (D.C.) Instruction Book, p. 7.

**Use of "Local-Distant" Switch**—See R-44 and 46 Service Notes, p. 14.

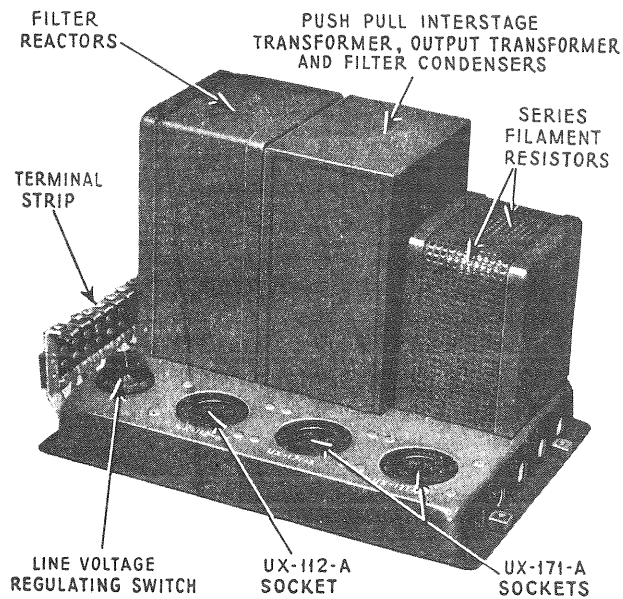


Figure 4—Top view of socket power unit

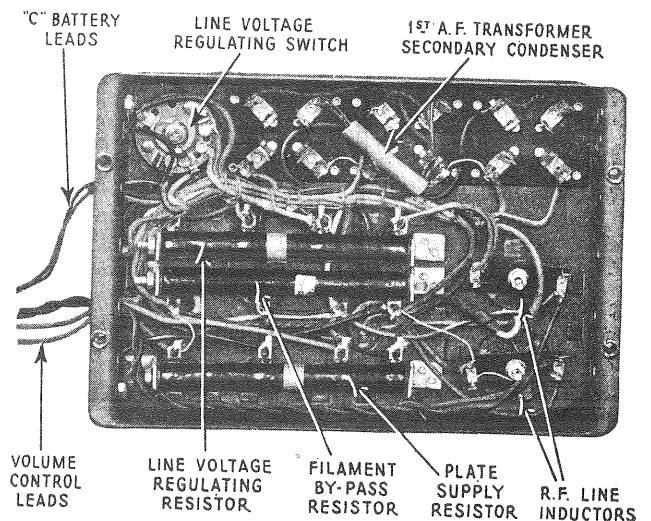


Figure 5—Sub-chassis view of socket power unit

## PART II—SERVICE DATA

Service data on the following subjects can be obtained from the Service Notes and Instruction Books mentioned below.

**Antenna System Failures**—See R-44 and 46 Service Notes, p. 16.

**Radiotron Sockets and Prongs**—See R-44 and 46 Service Notes, p. 16.

**Broken Condenser Drive Cord**—See R-44 and 46 Service Notes, p. 17.

**Adjusting R. F. Line-up Condensers**—See R-44 and 46 Service Notes, p. 17.

**Service Data on Reproducer Unit**—See R-44 and 46 Service Notes, pp. 34 and 35.

## SERVICE DATA CHART

The following service data chart indicates various troubles by their symptoms and gives the specific remedy necessary.

Indication	Cause	Remedy
No Reproduction	No line voltage	Check line voltage with 0-150 v. D.C. voltmeter
	Input plug in wrong position	Reverse input plug
	Defective Radiotrons	Replace
	Defective operating switch	Replace
	Defective volume control	Replace
	Wrong "C" battery connections, or defective "C" battery	Connect battery correctly, or replace (Complete instructions are given in R-46 (D.C.) Instruction Book, pp. 4 and 8)
	Defective Local-Distant Switch	Replace
	Defective parts in receiver	Check by means of continuity tests and make any replacement necessary
	Defective reproducer unit	Repair any defect in reproducer unit
Low Volume	Defective Radiotrons	Replace
	Poor antenna system	Install antenna as suggested in R-44 and 46 Service Notes, pp. 8 to 12
	R.F. line-up condensers out of adjustment	Adjust line-up condensers as described in R44-46 Service Notes, p. 17
	Defective parts in receiver	Check by means of continuity test and make any replacement necessary
	Defective reproducer unit	Check by means of external speaker known to be in good operating condition and make any replacement necessary
Distorted Reproduction	Defective Radiotrons	Replace
	Defective interstage A. F. transformer, push-pull transformer, output transformer, or other parts	Check parts by means of continuity test and make any replacement necessary
	Receiver oscillation	Should the Radiola oscillate, all signals will be weak, distorted, and accompanied by a whistle. See section on "Oscillation" for remedies
	Wrong "C" battery connections or defective "C" battery	Connect battery correctly or replace. Complete instructions are given in R46 (D.C.) Instruction Book, pp. 4 and 8
	Defective reproducer unit	Check by means of external speaker known to be in good operating condition and make any replacement necessary



Indication	Cause	Remedy
Acoustic Howl	Radiotron selection	Interchange Radiotrons, especially the detector
	Defective detector socket mounting	Check detector socket mounting
	Reproducer unit mounting	Check mounting of reproducer unit, and make sure it is properly supported
Audio Howl	Oscillation	Receiver oscillation will cause a whistle when the receiver is tuned through a broadcasting station's carrier wave. See section on "Oscillation" for remedies
	Defective by-pass condenser	An open in any of the by-pass condensers or connections may cause an audio howl
	Defective center tapped detector filament resistor	A defective center tapped detector filament resistor may cause audio howl
	Radiotrons	Vibrating elements in Radiotrons will cause a gradually developed howl. See section, "Acoustic Howl." Try changing the UX-171A's in the push-pull stage
	Defective audio system	A defective audio system may cause a howl
Excessive Line Noise	Defective R.F. line inductors, filter condensers, or connections	Check and replace parts where necessary
Oscillation	Shields not in place or not making good contact	Place the tube shield over sockets 1 and 2 and the stage shields over sockets 2 and 3. If oscillation does not stop clean points of contact between base and all shields
	Antenna lead shields not grounded	Ground antenna lead shield properly
	Shield contact clips not clamping condenser shaft properly	Bend shield contact clips so that a good firm contact is made to the condenser rotor shaft
	Open by-pass condenser	An open by-pass condenser or one improperly connected may cause oscillation. Check and replace if necessary
	Defective Radiotrons	A defective Radiotron UX-222 may cause oscillation. Interchanging with one known to be in good condition will remedy the trouble
Improper Scale Reflection	Pilot lamp improperly set	See R44-46 Service Notes. Try rotating pilot lamp in socket to improve image. Slight filing of the soldered tip will help to do this

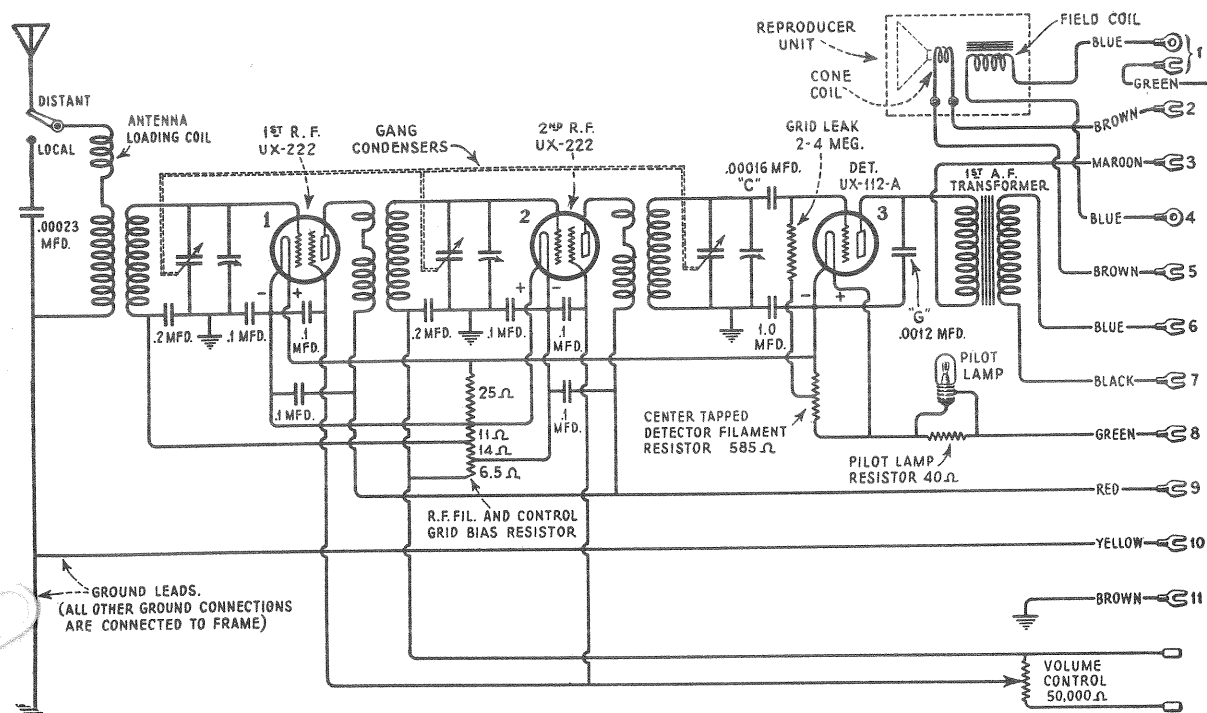


Figure 6—Schematic circuit

## PART III—ELECTRICAL TESTS

### (1) TESTING CONDENSERS

Most of the condensers in the RCA Radiola 46 (D.C.) can be tested by the continuity tests given in Part 37. If further tests are desirable the 0.5 mfd. and larger condensers may be tested by charging with any D.C. voltage available, preferably as high as 150 volts, and shorting their terminals with a screw driver. An O.K. condenser will give a good spark when such a short is made. A leaky condenser will give no spark and a shorted condenser will give a spark when an attempt is made to charge it.

Small condensers may be click tested for shorts or conveniently replaced by new ones to check on their operating condition.

### (2) VOLTAGE READINGS

The following readings are taken with a Weston Model 5337, Type 2, or other test set giving similar readings. These voltages are not exactly correct, due to the oscillating condition of the circuits. However, they enable the service man to obtain a check on the continuity of the circuits to the various sockets. The screen grid voltages are not readable, due to the reversal of the polarity at the contact points.

When making tests remove only the shield and control grid connection of the tube whose voltage is under measurement. Do not tie the control grid connection to the control grid cap of the tube in the test set. It is not practical to test the control grid voltage directly at the sockets.

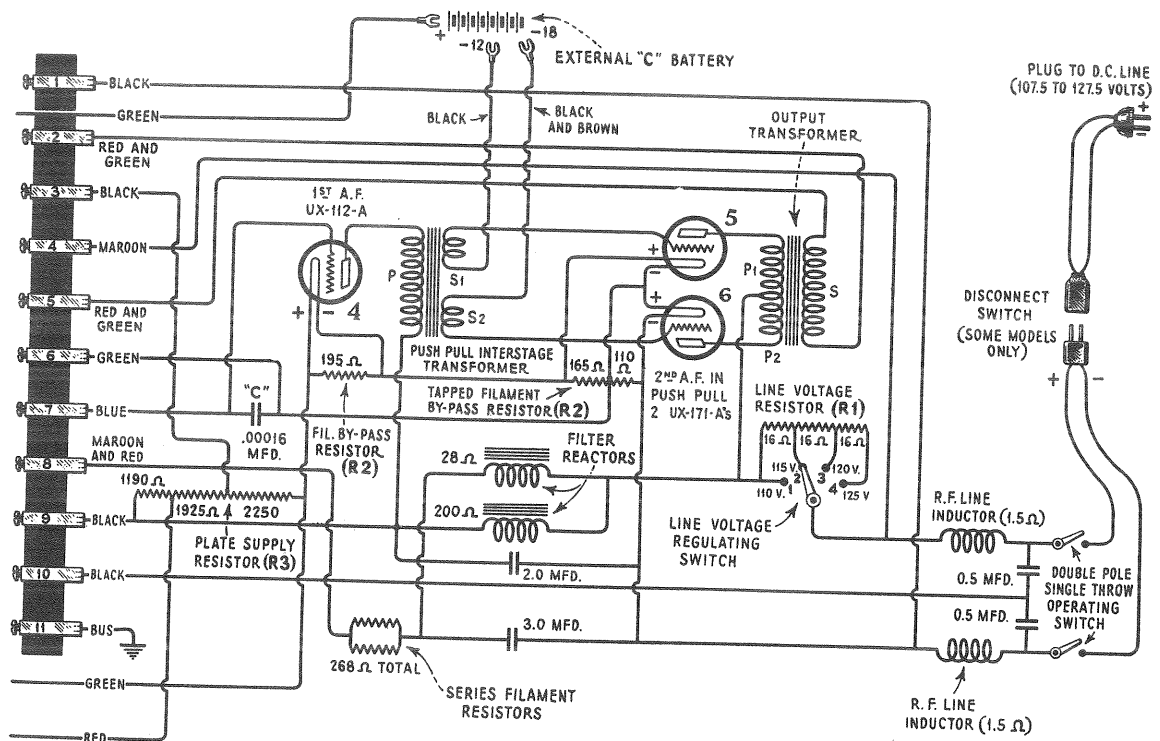


Diagram of Radiola 46 (D. C.)

### SOCKET VOLTAGES RADIOLA 46 (D. C.)

Volume Control at Minimum Position—D. C. Line Volts, 120.  
Line Switch at No. 3 Position.

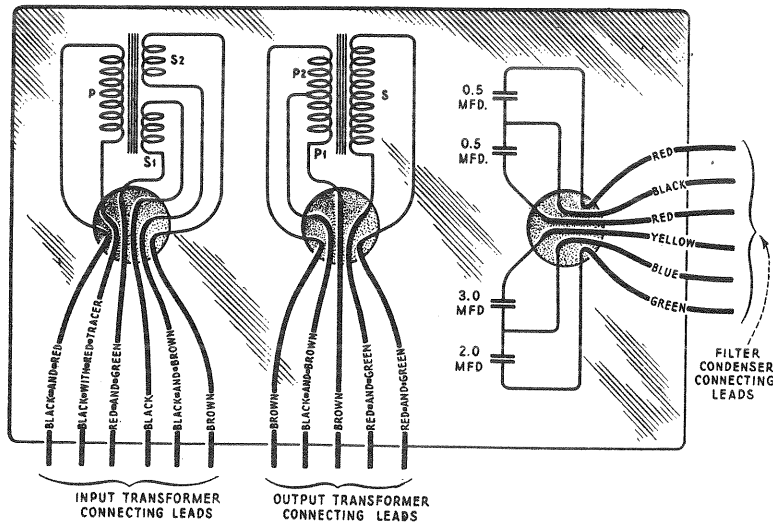
Socket No.	Control Grid to Filament Volts	Plate to Filament Volts	Plate Current Milliamperes	Filament Volts
1	—	85	0	3.2
2	—	85	0	3.2
3	0	25	1.5	4.9
4	5.0	85	3.0	4.8
5	16.5	100	15.0	4.8
6	18.0	105	15.0	4.8

Volume Control at Maximum Position—D. C. Line Volts, 120.  
Line Switch at No. 3 Position.

Socket No.	Control Grid to Filament Volts	Plate to Filament Volts	Plate Current Milliamperes	Filament Volts
1	—	80	3.0	3.2
2	—	80	3.0	3.2
3	0	25	1.5	4.9
4	5.0	80	3.0	5.0
5	16.5	100	12.0	4.9
6	18.0	105	12.0	4.9

## TERMINAL STRIP VOLTAGES

The following voltages taken at the S.P.U. terminal strip with the receiver operating and all tubes and shields in place are correct when the line voltage is within the limits for the switch tap being used.



*Figure 7—Internal connections of the A. F. coupling unit and filter condensers*

## VOLUME CONTROL AT MINIMUM OR MAXIMUM

Line voltage at 120 volts—Switch Tap at No. 3

Terminals	Voltage	Voltage Measured
1 to 4	120	Reproducer field voltage and plate voltage (approximately) of Radiotrons No. 5 and No. 6
8 to green Volume Control lead	18	Filament and R.F. control grid bias voltage for Radiotrons No. 1, No. 2, filament voltage for Radiotron No. 3, and filament voltage for pilot lamp
1 to 3	50	Plate voltage for Radiotron No. 3
1 to 9	105	Plate voltage for Radiotrons Nos. 1, 2 and 4
Across volume control	68	Screen grid voltage for Radiotrons Nos. 1 and 2

## PART IV—MAKING REPLACEMENTS

The various assemblies and parts of Radiola 46 (D.C.) are readily accessible and replacements can be made easily.

Since the D.C. model of Radiola 46 is very similar to the A.C. Model full information as to correct methods for removing assemblies in order to replace component parts if necessary, may be found in the Radiola 44-46 Service Notes as follows:

Removing Receiver Assembly from Cabinet—See R-44-46 Service Notes, p. 33.

Removing S.P.U. from Cabinet—See R-44-46 Service Notes, p. 34.

Removing Reproducer Assembly—See R-44-46 Service Notes, p. 34.

Replacing R.F. Line-up Condensers—See R-44-46 Service Notes, p. 35.

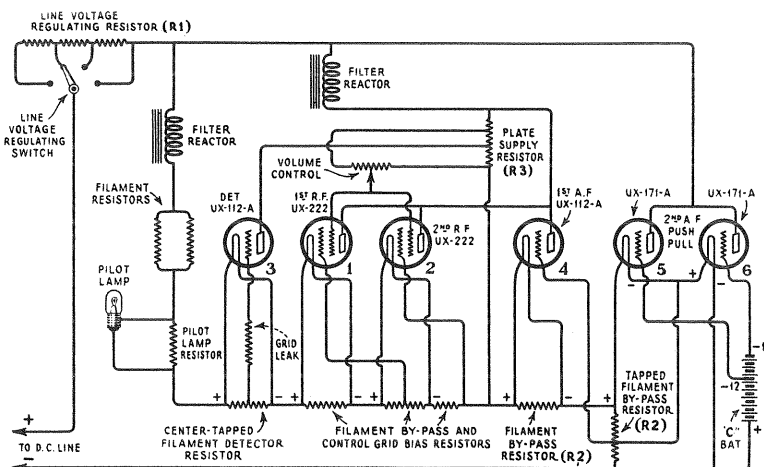


Figure 8—Schematic circuit diagram of the voltage system

## PART V—CONTINUITY TESTS

### RADIOLA 46 (D. C.) CONTINUITY TESTS

The following tests will show complete continuity for the receiver assembly of Radiola 46 (D.C.) Disconnect the antenna and ground leads, the cable connections to the "C" battery and terminal strip and unscrew the pilot lamp.

A pair of headphones with at least  $4\frac{1}{2}$  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 approximate D.C. resistances of the various circuits are also 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, or any of the methods shown in previous issues of RCA Service Notes.

The Radiotron contacts and socket numbers, the cable connections and color scheme are shown in Figure 9, and should be referred to when making these tests. Figure 7 illustrates the internal connections of the A.F. coupling unit and filter condensers. Figures 10 and 11 illustrate the wiring diagram of the receiver assembly and socket power unit respectively. Figure 8 is a voltage schematic circuit diagram for the Radiola 46 (D.C.)

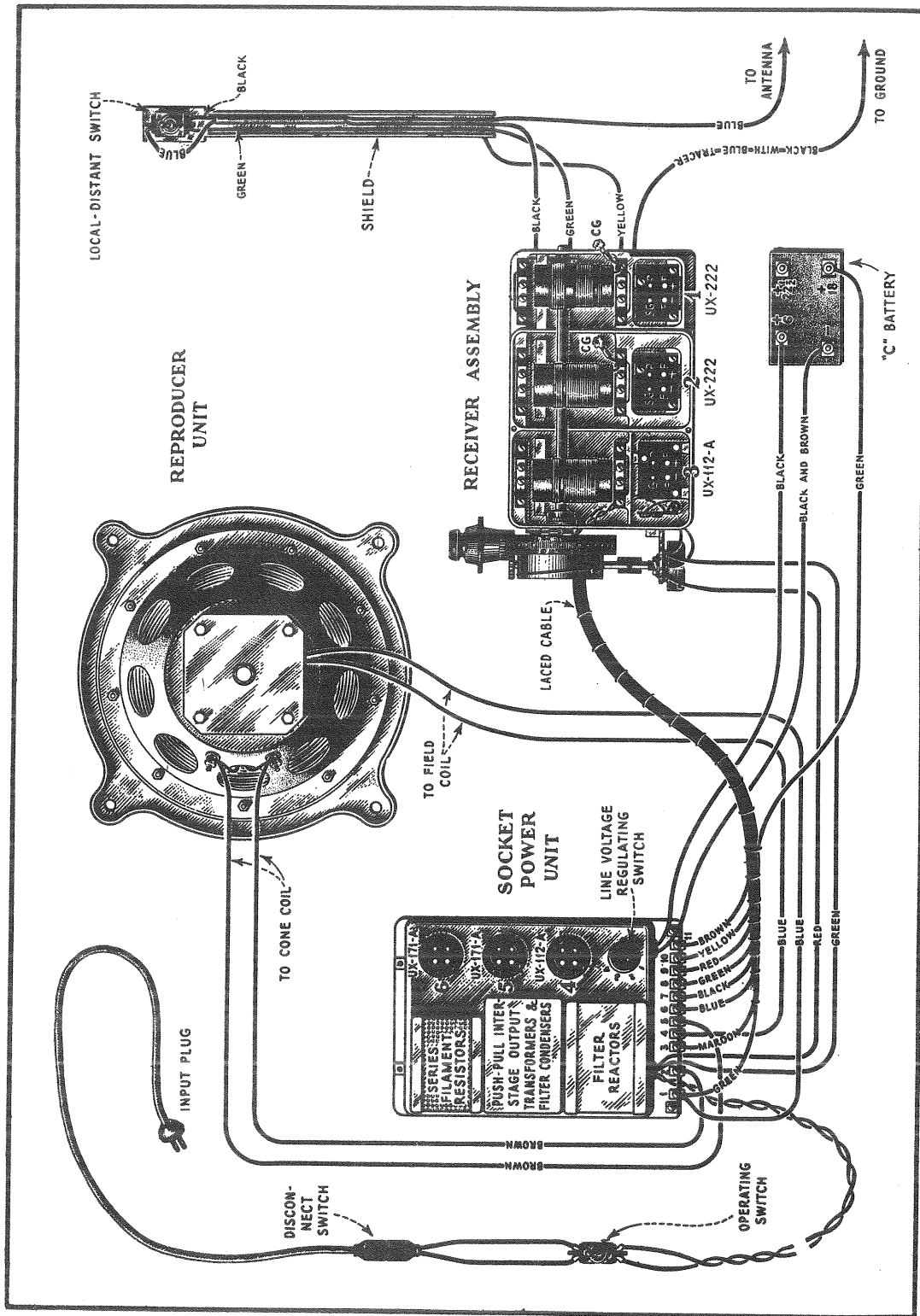


Figure 9—Complete layout and cable connections

## RECEIVER ASSEMBLY CONTINUITY TEST CHART

Circuit	Test Terminals	Correct Effect	Incorrect Effect	
			Indication	Caused by
Con- denser Tests	CG1 to Ground	Open	Closed	Shorted or grounded 0.2 mfd. condenser
	—F1 to Ground	Open	Closed	Shorted or grounded 0.1 mfd. condenser
	—F1 to SG1 (Unsolder center connection to volume control)	Open	Closed	Shorted 0.1 mfd. condenser
	—F1 to P1	Open	Closed	Shorted 0.1 mfd. condenser
	CG2 to Ground	Open	Closed	Shorted or grounded 0.2 mfd. condenser
	—F2 to Ground	Open	Closed	Shorted or grounded 0.1 mfd. condenser
	—F2 to SG2 (Unsolder center connection to volume control)	Open	Closed	Shorted 0.1 mfd. condenser
	—F2 to P2	Open	Closed	Shorted 0.1 mfd. condenser
	F3 to Ground	Open	Closed	Shorted or grounded 1.0 mfd. condenser
	G3 to Ground	Open	Closed	Shorted or grounded 0.00016 mfd. condenser
—F3 to P3	Open	Closed	Shorted 0.0012 mfd. condenser	
<b>Local-Distant Switch in "Distant" Position</b>				
Antenna and Ground	Antenna lead to ground lead	Closed (24 ohms)	Open	Open primary 1st R.F. transformer, antenna loading coil, or connection
	Ground lead to lug No. 10 (Yellow)	Closed	Open	Open connection
Control Grid	CG1 to —F2	Closed (17 ohms)	Open	Open secondary 1st R.F. transformer or filament and bias resistor
	CG2 to +F1	Closed (59.5 ohms)	Open	Open secondary 2nd R.F. transformer or filament and bias resistor
	G3 to +F3	Closed (2-4 meg)	Open	Open grid leak, center tapped resistor, or connection

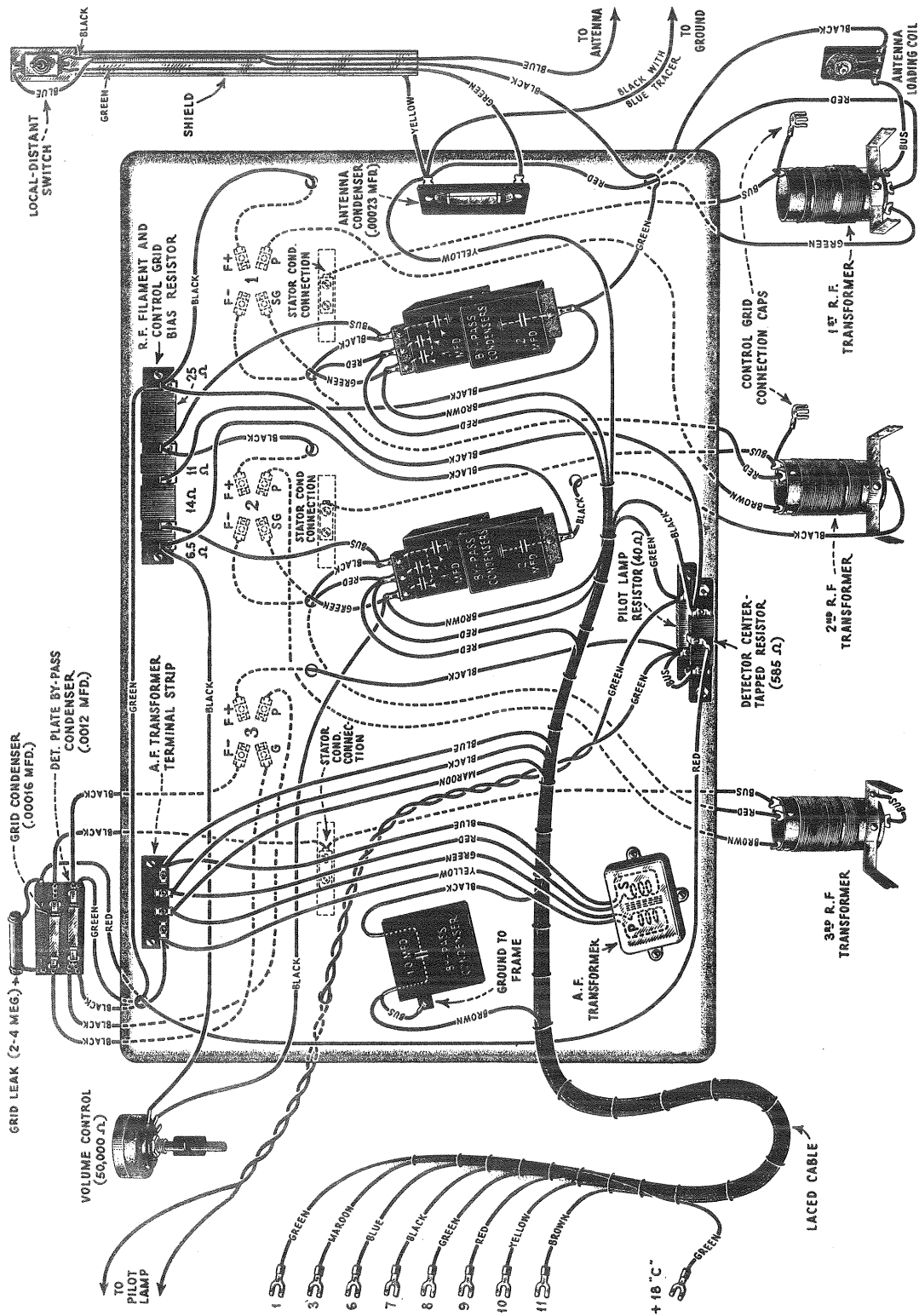


Figure 10—Wiring diagram of the receiver assembly



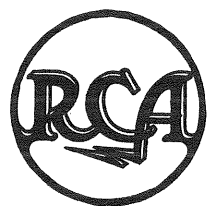
Circuit	Test Terminals	Correct Effect	Incorrect Effect		
			Indication	Caused by	
Screen Grid	SG1 to center arm of volume control	Closed	Open	Open connection	
	SG2 to center arm of volume control	Closed	Open	Open connection	
Plate	P1 to Lug No. 9 (Red)	Closed (60 ohms)	Open	Open primary 1st R.F. transformer or connection	
	P2 to Lug No. 9 (Red)	Closed (60 ohms)	Open	Open primary 2nd R.F. transformer or connection	
	P3 to Lug No. 3 (Maroon)	Closed (1050 ohms)	Open	Open primary 1st A.F. transformer or connection	
Miscellaneous and Filament	Lug No. 6 (Blue) to Lug No. 7 (Black)	Closed (5700 ohms)	Open	Open secondary 1st A.F. transformer or connection	
	Stationary contact (closest to casting) of volume control to -F2	Closed (6.5 ohms)	Open	Open section of filament and bias resistor or connection	
	-F1 to +F1	Closed (25 ohms)	Open	Open section of filament and bias resistor or connection	
	+F2 to -F2	Closed (25 ohms)	Open	Open section of filament and bias resistor or connection	
	+F1 to -F3	Closed	Open	Open connection	
	-F3 to +F3	Closed (585 ohms)	Open	Open center tapped detector filament resistor	
	<b>Remove Pilot Lamp</b>				
		+F3 to Lug 8 (Green)	Closed (40 ohms)	Open	Open pilot lamp resistor



# SOCKET POWER UNIT CONTINUITY TEST CHART

Line voltage switch at No. 4—Operating Switch "On"

Test Terminals	Correct Effect	Incorrect Effect	
		Indication	Caused by
G4 to Lug No. 7	Closed	Open	Open connections
P4 to Lug No. 9	Closed (1500 ohms)	Open	Open primary of push-pull inter-stage transformer
P5 to P6	Closed (380 ohms)	Open	Open primary of output transformer
P4 to P5	Closed (1880 ohms)	Open	Open primary of output transformer, primary (P1) of push-pull transformer or choke
Lug No. 2 to Lug No. 5	Closed (1 ohm approx.)	Open	Open secondary of output transformer, or connections
G5 to -12 v. "C" Battery Lug	Closed (5450 ohms)	Open	Open secondary (S1) of push-pull transformer
G6 to -18 v. "C" Battery Lug	Closed (3650 ohms)	Open	Open secondary (S2) of push-pull transformer
Green volume control lead to Lug No. 1	Closed (470 ohms)	Open	Open section of R2, or connections
Green volume control lead to Lug No. 9	Closed (5365 ohms)	Open	Open section of R3, or connections
Lug No. 8 to Lug No. 4	Closed (344 ohms)	Open	Open series filament resistors, open choke, open section of R1, or open connections
Lug No. 1 to Lug No. 8 (Disconnect R3 from R2)	Open	Closed (268 ohms)	Shorted 3 mfd. condenser
Lug No. 1 to Lug No. 9 (Disconnect R3 from R2)	Open	Closed (Short)	Shorted 2 mfd. condenser
Lug No. 1 to Lug No. 10	Open	Closed	Shorted 0.5 mfd. condenser
Lug No. 4 to Lug No. 10	Open	Closed	Shorted 0.5 mfd. condenser
Lug No. 1 to -blade of D.C. plug, or disconnect switch	Closed (1.5 ohms)	Open	Open R.F. line choke, switch, or connections
Lug No. 4 to +blade of D.C. plug, or disconnect switch	Closed (1.5 ohms)	Open	Open R.F. line choke, switch, or connections
Lug No. 6 to Lug No. 7	Open	Closed	Shorted 1st A.F. secondary condenser
+F5 to -F5	Closed (165 ohms)	Open	Open filament resistor section of R2, or connections
+F5 to -F6	Closed (275 ohms)	Open	Open tapped filament resistor section of R2, or connection
-F5 to +F6	Closed	Open	Open connection
-F4 to +F4	Closed (195 ohms)	Open	Open filament resistor section of R2, or connection



R46 (DC)