

SERVICE NOTES

for

RCA Victor Radiolas R-50 and R-55

The RCA Victor Radiola R-50 and R-55 are ten tube screen grid automatic volume control Super-Heterodyne radio receivers. With the exception of the cabinets, both models are identical.

Features of these Models are: Super Control Screen Grid Radiotrons in the R. F. and I. F. stages, automatic volume control so arranged in the circuit to reduce noise between channels, push-pull Pentode output stage, accurately calibrated dial reading directly in kilocycles, totally shielded chassis and sensitivity, selectivity and fidelity superior to any previous RCA Victor receiver.

Referring to Figure 1 and tracing a signal through the various stages, we find the following action taking place.

The signal voltage, induced into the antenna system, is coupled by means of the antenna coil to the "link circuit." The link circuit tunes exactly with the tuned R. F. and first detector circuits. There is no gain in the circuit, it being merely a selection circuit.

A tuned R. F. stage follows which uses Radiotron RCA-235. The control grid bias for this tube is a function of the automatic volume control tube. The output is coupled inductively to the first detector grid circuit together with the output from the oscillator.

The first detector is tuned by one unit of the gang condenser. In its grid circuit, there is present the incoming signal and the oscillator signal, the latter being at a 175 K. C. difference from the former. The tube is biased so as to operate as a plate rectification detector and its purpose is to extract the difference or beat frequency, produced by combining the signal and oscillator frequencies. The beat frequency—175 K. C.—appears in the plate circuit of the first detector, which is accurately tuned to 175 K. C. The tube used as a first detector is Radiotron UY-224.

The next circuit is that of the first I. F. stage. It is a high gain Amplifier having both its grid and plate circuits tuned to 175 K. C. Its grid voltage is controlled by the automatic volume control tube.

At this point the automatic volume control tube should be considered, as its grid is controlled by the output from the first I. F. Stage.

The automatic volume control tube functions in the usual manner in that the signal voltage is applied to its grid and the voltage drop across a resistor in its plate circuit is the grid voltage applied to the R. F. and first I. F. amplifier. As the value of the plate current is a direct result of the signal voltage applied to the grid, a greater plate current gives a greater voltage drop across the resistor in its plate

circuit and therefore a higher bias on the R. F. and I. F. stage. This results in less sensitivity, and vice versa. The signal output of the first I. F. stage is always maintained at a constant value.

The volume control should now be considered, as its position in the circuit has a large bearing on the quiet and smooth operation of the receiver.

In previous automatic volume control receivers, the volume control was placed in the grid circuit of the automatic volume control tube, its action being to vary the control grid voltage of this tube. When operating sets of this character, the receiver jumped to full sensitivity when not tuned to a signal and if in a noisy location, this noise was very objectionable.

In this instrument, however, the volume control is not in the automatic volume control tube circuit, but in the grid circuit of the second I. F. amplifier. By means of it the signal voltage applied to the second I. F. amplifier is controlled and under no conditions can noise or other signals exceed the level for which it has been set. Electrically, the primary and secondary of the second I. F. transformer are placed so that there is no transference of energy except by means of a small pickup coil. The volume control is a potentiometer shunted across this coil which determines the amount of pickup that will be used.

The second detector is a high-plate voltage, grid-biased type, using Radiotron UY-227, which gives sufficient output to drive two Radiotrons RCA-247 connected in push-pull without an intermediate audio stage. The purpose of the second detector is to extract the audio frequency component of the R. F. signal, which represents the voice or musical modulations produced in the studio of the broadcasting station. The audio component is extracted and used to drive the power tubes while the R. F. current is by-passed and not further used.

A grid filter consisting of a 1 megohm resistor in the second detector circuit helps to reduce any possible hum in this stage. The power A. F. Stage consists of two Radiotrons RCA-247 connected in push-pull. Transformer coupling is used between the detector and the grids of the Radiotrons RCA-247 as well as from the plates to the cone coil of the reproducer unit.

A tone control, consisting of an inductor, .01 mfd. Capacitor and a 0.5 meg. variable resistor, is in the plate circuit of the second detector. The tone control functions to reduce the high frequency output as the resistance is reduced, without accentuating the bass response.

Two 0.0004 mfd. condensers, connected in series with their mid-point grounded, are connected across the

secondary of the input transformer. The purpose of these condensers is to prevent audio oscillations and provide a high frequency audio cut-off.

A 0.005 mfd. condenser connected in series with an 18,000 ohm resistor is placed across the primary of the output transformer. This functions to reduce the third harmonic distortion, an inherent characteristic of the Pentode output tube. The direct plate and grid voltages are supplied from high voltage alternating current, which is rectified by means of Radiotron UX-280. The filter is of the tapped reactor type, which gives an output of well filtered D. C. The bias voltage of Radiotrons RCA-247 is obtained by using a portion of the drop across the reproducer field. One 100,000 and 20,000 ohm resistors act as the voltage dividing resistors.

SERVICE DATA

Information pertaining to R. F., Oscillator and I. F. adjustments, together with general service data for this type receiver, may be obtained from the Service Notes already issued on the RCA Radiola 80. Figure 1 shows the schematic diagram, Figure 2 the receiver assembly wiring and Figure 3 the magnetic pickup connections. Figure 4 shows the S. P. U. wiring and Figure 5 the assembly wiring. The voltage readings and replacement parts are shown on pages 2 and 3.

R. F. OSCILLATOR AND I. F. ADJUSTMENTS

A reference to the RCA Radiola 80 Notes will give the details for making correct R. F., I. F. and Oscillator adjustments. However, due to the use of an automatic volume control tube, its action will defeat the use of an output meter. To overcome this, a "dummy" Radiotron UY-227 (one that has one heater prong removed but is otherwise O. K.) should be substituted for the tube in the automatic volume control socket. Do not make any adjustments with this tube removed from the socket. While apparently everything functions in the normal manner, the lack of tube capacity in the circuits will cause an incorrect alignment to be made.

In the RCA Victor Radiola R-50 and R-55 the I. F. transformers are adjusted for maximum output and no attempt at band pass tuning should be made when these adjustments are made.

It will be noted on the early Models of R-50 and R-55 that a small 9 mmfd. capacitor is inserted in series with the oscillator trimming capacitor. This capacitor is not used on later models that have a slightly different dial scale. When replacing a dial scale it may therefore be necessary to short this capacitor. A failure in the capacitor may be remedied either by replacing the capacitor or the dial scale.

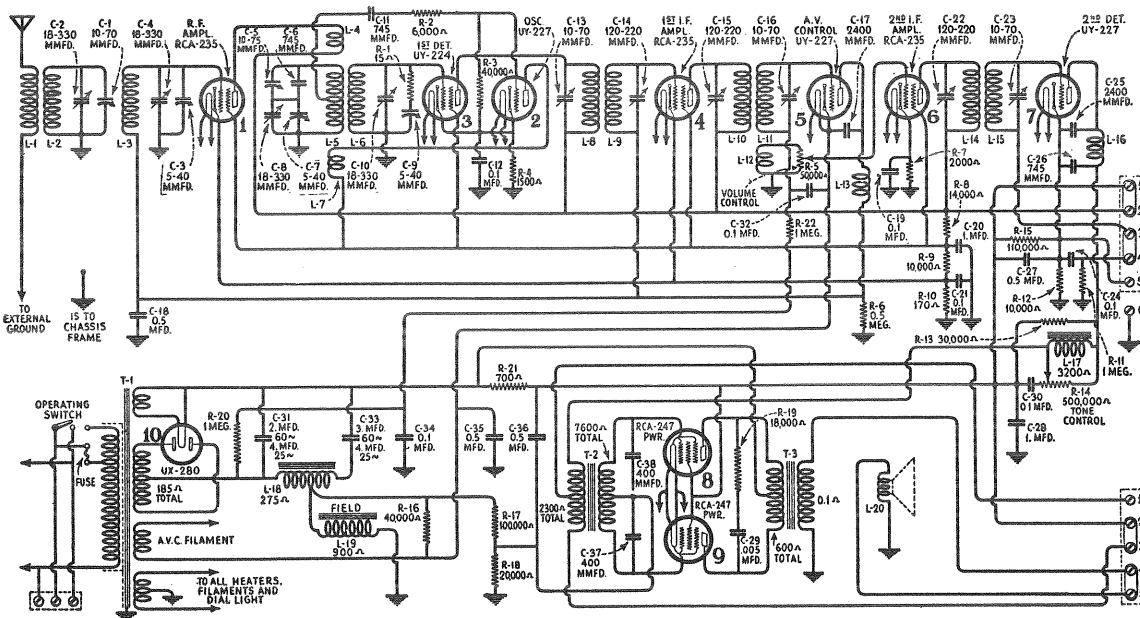


Figure 1—Schematic Wiring Diagram

REPLACEMENT PARTS

Insist on genuine factory tested parts, which are readily identified and may be purchased from authorized dealers

Stock No.	DESCRIPTION	List Price	Stock No.	DESCRIPTION	List Price			
RECEIVER ASSEMBLY								
2563	Resistor—6,000 ohms—Carbon type—Package of 5..	\$1.10	7288	Scale—Dial scale—Package of 5.....	\$1.50			
2726	Socket—UY type Radiotron socket complete with shield (7 used).....	.30	7297	Coil—R. F. choke coil for second detector or automatic volume control.....	.50			
2731	Resistor—10,000 ohms—Carbon type—Package of 5..	1.10	7298	Capacitor—0.01 mfd.....	.40			
2732	Resistor—110,000 ohms—Carbon type—Package of 5..	1.10	7331	Cable—Shielded receiver cable.....	1.40			
2734	Capacitor—745 mmfd.—Package of 5.....	1.50	8703	Escutcheon—Station selector escutcheon.....	2.15			
2736	Resistor—170 ohms—Carbon type—Package of 5.....	1.10	8708	Capacitor—Tuning capacitor assembly—Comprising four variable capacitors, drive cord, spring and dial drum (assembled).....	9.50			
2746	Socket—Dial lamp socket.....	.20	8714	Shield—Shield complete for receiver assembly.....	3.92			
2747	Cap—Grid contact cap—Package of 5.....	.50	8777	Cover—Shield Removable Cover.....	.80			
2749	Capacitor—2,400 mmfd.....	.35	S.P.U. REPRODUCER ASSEMBLY					
2970	Resistor—500,000 ohms—Carbon type—Package of 5..	1.10	2546	Resistor—1 megohm—Carbon type—Package of 5.....	1.10			
3031	Board—Terminal board complete with insulator—Three terminals.....	.35	2725	Fuse—Class type—1.5 amperes—Package of 5.....	.40			
3045	Resistor—40,000 ohms—Carbon type—Package of 5..	1.10	3045	Resistor—40,000 ohms—Carbon type—Package of 5..	1.10			
3050	Resistor—14,000 ohms—Carbon type.....	.25	3058	Resistor—100,000 ohms—Carbon type—Package of 5..	1.10			
3076	Resistor—1 megohm—Carbon type—Package of 5.....	1.00	3085	Capacitor—400 mmfd.....	.30			
3137	Knob—Station selector, volume control or tone control knob—Package of 5.....	2.40	3099	Capacitor—0.005 mfd. capacitor.....	.50			
3138	Board—Terminal board complete with soldering terminal.....	.35	3145	Resistor—700 ohms—Carbon type.....	.25			
3139	Coil—Oscillator and first detector coil complete with shield.....	2.65	3147	Cover—Fuse cover with insulator.....	.60			
3142	Volume control—Volume control complete with mounting nut.....	1.25	3149	Switch—Operating switch—Toggle type—Assembled—Complete with mounting nuts and escutcheon.....	1.00			
3143	Tone control—Tone control with mounting nut.....	1.20	6114	Resistor—20,000 ohms—Carbon type—Package of 5.....	1.10			
3144	Inductor—Tone control inductor.....	1.20	7290	Reactor—Filter reactor.....	3.50			
3152	Resistor—30,000 ohms—Carbon type—Package of 5..	1.00	7293	Strip—Terminal strip—Complete with 8 terminals.....	.60			
3153	Resistor—1,500 ohms—Carbon type—Package of 5.....	1.10	7294	Cover—Terminal strip cover for 7293.....	.25			
3154	Resistor—2,000 ohms—Carbon type—Package of 5.....	1.10	7295	Strip—Terminal strip—Complete with 5 terminals.....	.50			
3219	Resistor—18,000 ohms—Carbon type—Package of 5.....	1.00	7296	Cover—Terminal strip cover—5 terminals for 7295.....	.25			
3220	Resistor—15 ohms—Flexible type—Package of 5.....	1.00	7369	Socket—UY Radiotron socket complete with shield.....	.50			
3240	Nut—Removable Cover Mounting Nut—Package of 13.....	.50	8710	Transformer—Power transformer—105-125 volts, 50-60 cycles.....	9.52			
6034	Cushion—Receiver chassis rubber cushion—Package of 4.....	1.20	8711	Transformer—Audio transformer assembly.....	4.25			
7054	Cord—Power cord.....	.60	8712	Capacitor pack—Comprising one 2.0 mfd., one 3.0 mfd., one 0.1 mfd. and two 0.5 mfd. condensers in metal container—60 cycles.....	4.60			
7062	Capacitor—Adjustable capacitor (2 used).....	.50	8749	Transformer—Power transformer—105-125 volts—25-40 cycles.....	15.56			
7063	Capacitor—Adjustable capacitor (3 used).....	.50	8750	Transformer—Power transformer—220 volts, 60 cycles.....	9.60			
7278	Coil—R. F. and link circuit coil.....	1.60	8751	Capacitor pack—Comprising two 4.0 mfd., two 0.5 mfd. and one 0.1 mfd. in metal container—25 cycles.....	4.60			
7279	Support—Dial screen support.....	.35	10907	Fuse—3 amperes—Package of 5.....	.40			
7280	Board—Terminal board complete with six terminals.....	.40	REPRODUCER UNIT					
7281	Transformer—First intermediate transformer.....	2.00	7292	Screw assembly—Comprising two screws, two nuts, two lockwashers and plate—For mounting speaker to amplifier.....	.40			
7282	Transformer—Second intermediate transformer.....	2.40	8558	Cone—Reproducer cone.....	2.00			
7283	Transformer—Third intermediate transformer.....	3.25	8559	Ring—Cone retaining ring.....	.25			
7285	Capacitor pack—Comprising one 1.0 mfd., one 0.5 mfd. and two 0.1 mfd. condensers in metal container.....	2.10	8713	Coil—Reproducer field coil.....	3.16			
7286	Capacitor pack—Comprising one 1.0 mfd., one 0.5 mfd. and three 0.1 mfd. condensers in metal container.....	2.50						
7287	Bracket—Dial lamp bracket and indicator.....	.20						

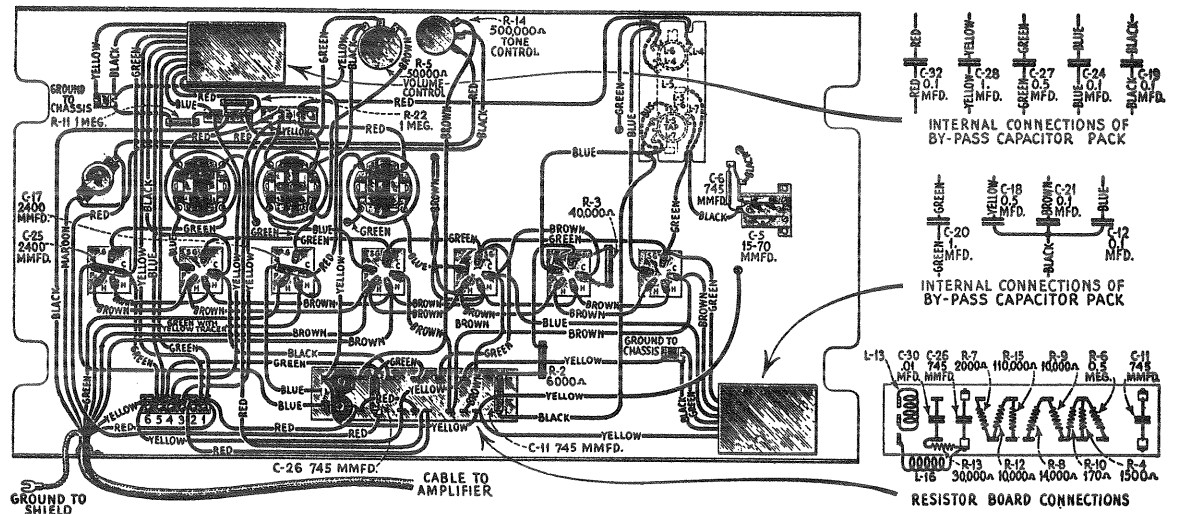


Figure 2—Receiver Assembly Wiring Diagram

RADIOTRON SOCKET VOLTAGES

VOLTAGES ARE THE SAME AT EITHER POSITION OF THE VOLUME CONTROL
110 VOLT LINE

Radiotron No.	Heater to Cathode Volts	Cathode or Filament to Control Grid Volts	Cathode or Filament to Screen Grid Volts	Cathode or Filament to Plate Volts	Plate Current M. A.	Heater Volts
1. R. F.	2.0	*0.2	60	230	3.5	2.5
2. Osc.	5.0	0	—	50	4.0	2.5
3. 1st Det.	4.0	3.5	60	230	0.5	2.5
4. 1st I.F.	2.0	*0.2	60	230	3.5	2.5
5. A.V.C.	0	0	—	30	0.1	2.
6. 2nd I.F.	2.0	3.5	60	230	2.5	2.5
7. 2nd Det.	20.0	*8.0	—	210	0.5	2.5
8. Pwr.	—	*10.0	250	235	25.0	2.5
9. Pwr.	—	*10.0	250	235	25.0	2.5

*These readings are not correct due to the resistance in the circuits

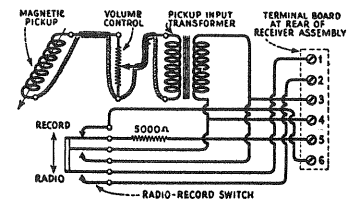


Figure 3—Magnetic Pickup connections

Note: Place the Radio-Record switch and input transformer in the receiver cabinet. Try connecting a wire from receiver terminal No. 6 to input transformer frame or braided shield to pickup and use connection that gives minimum hum.

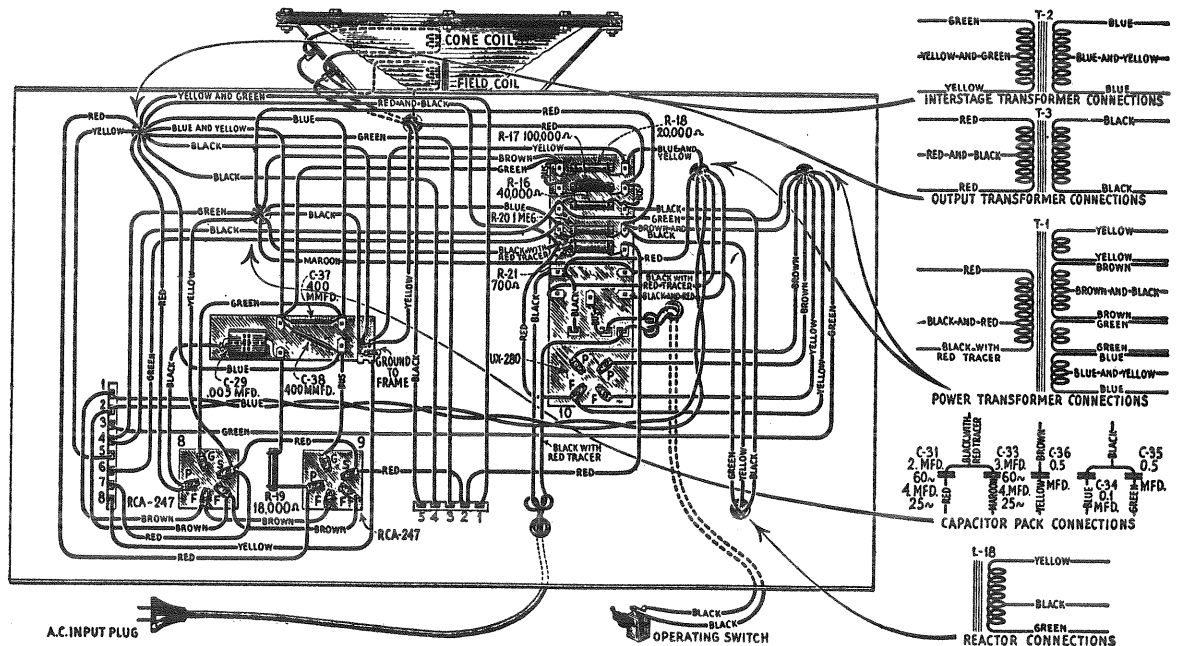


Figure 4—S. P. U. Reproducer Assembly Wiring

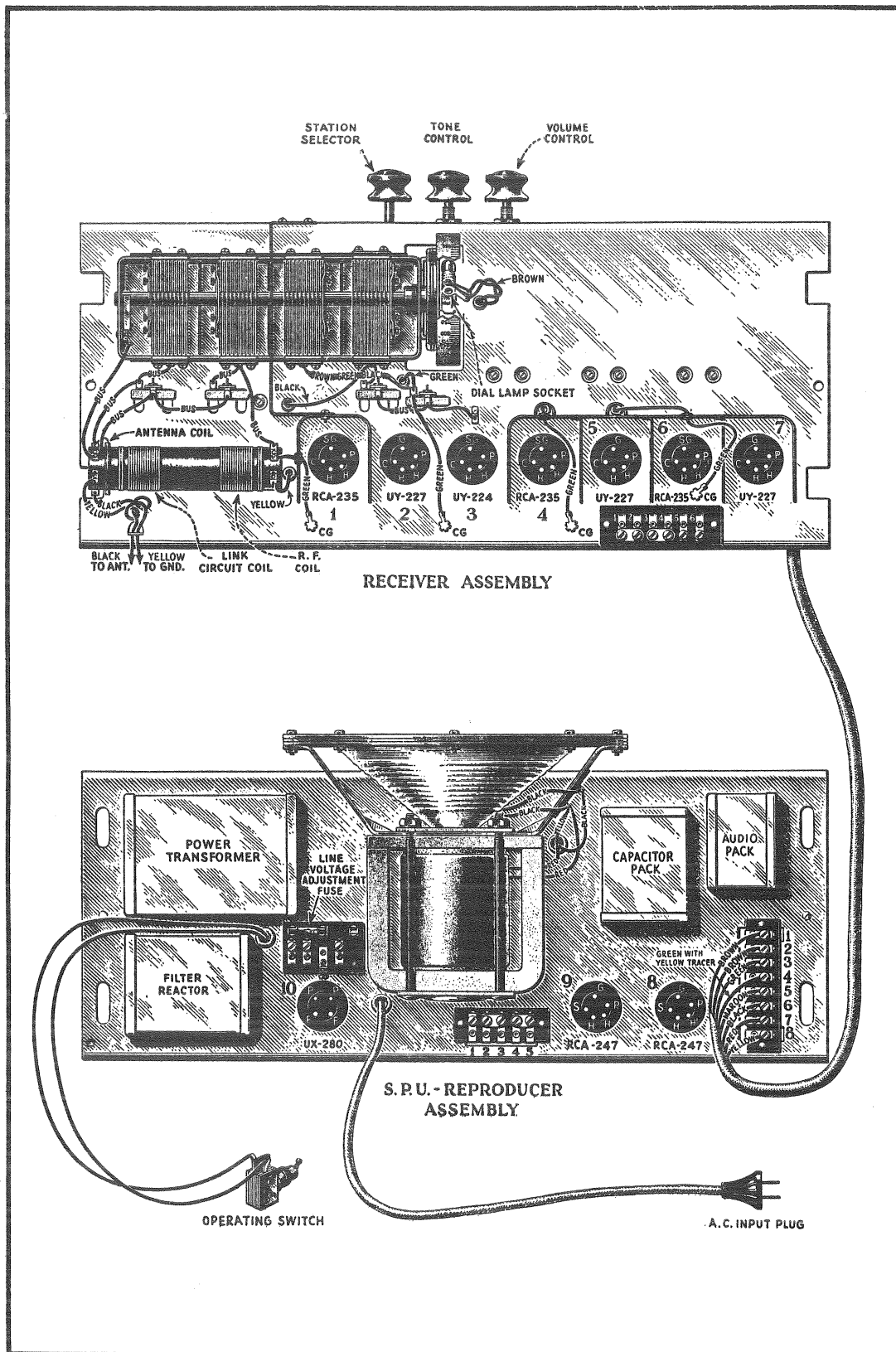


Figure 5—Assembly Wiring Diagram

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