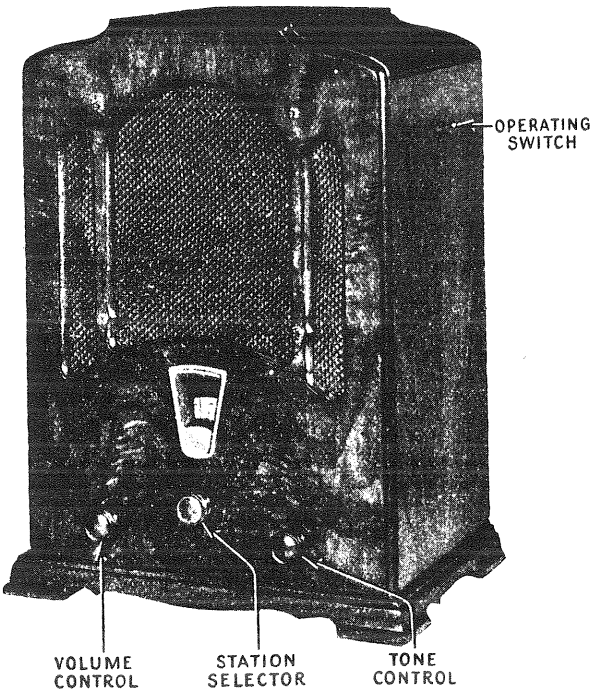
RCA Victor Radiola Superette

SERVICE NOTES



RCA Victor Radiola Superette

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RCA Victor Company, Inc.
Camden, N.J.
A RADIO CORPORATION OF AMERICA SUBSIDIARY
REPRESENTATIVES IN PRINCIPAL CITIES

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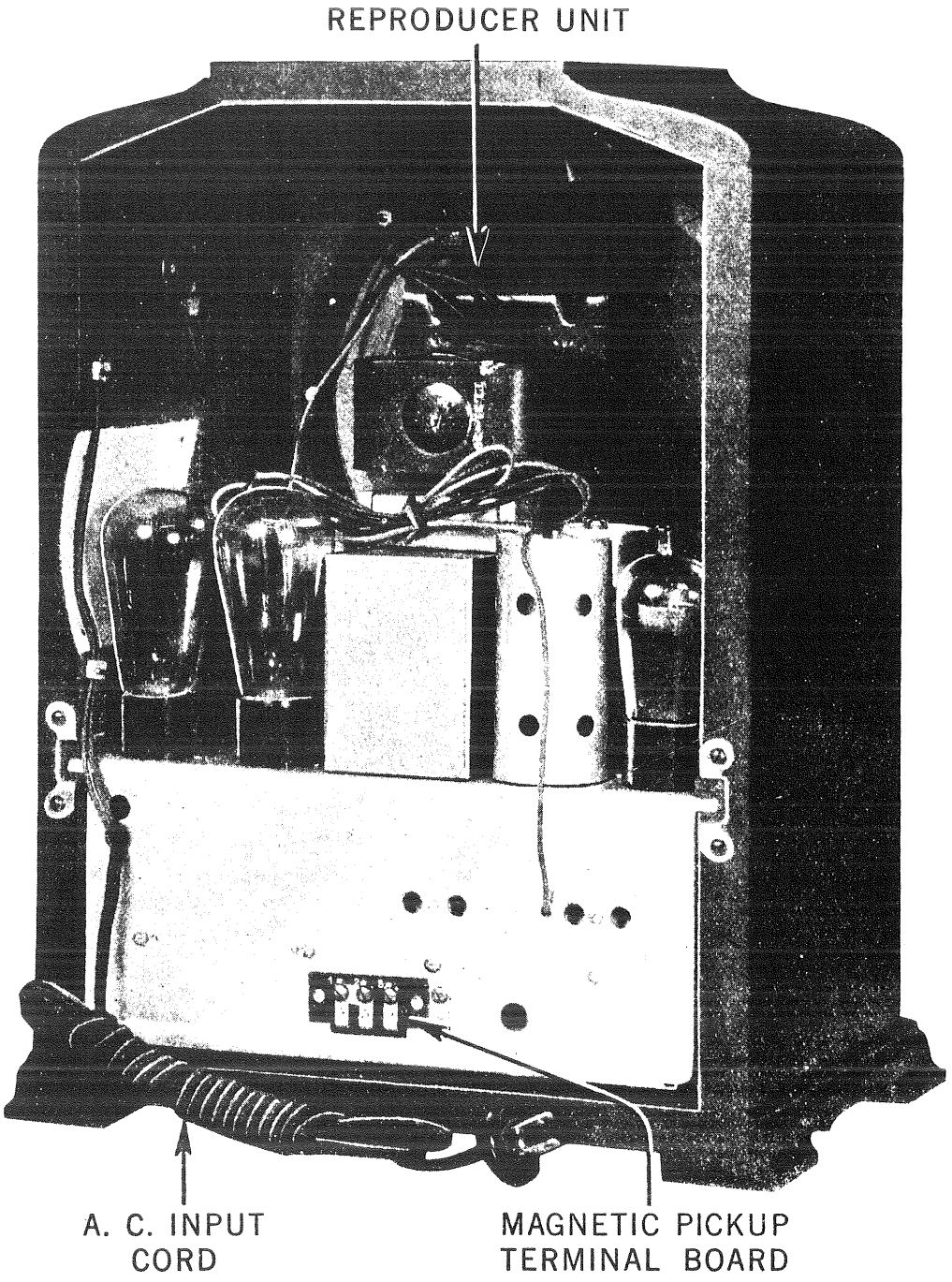

Figure 1—Rear Interior View of RCA Victor Radiola Superette

RCA Victor Radiola Superette

SERVICE NOTES

ELECTRICAL SPECIFICATIONS

Voltage Rating	105/125 Volts
Frequency Rating	50/60 Cycles, or 25/50 Cycles
Power Consumption	60 Cycles/100 Watts—25 Cycles/100 Watts
Recommended Antenna Length	25/75 Feet
Type of Circuit	A. C. Screen Grid Super-Heterodyne
Type and Number of Radiotrons	2 RCA-235, 1 UY-224, 2 UY-227, 2 UX-245, 1 UX-280, Total of 8
Number of Radio Frequency Stages	One
Type of First Detector	Tuned Input Grid Bias
Number of Intermediate Stages	One
Type of Second Detector	Power Grid Bias
Number of Audio Stages	One (Push-Pull)
Type of Rectifier	Full Wave, UX-280
Type of Loudspeaker	Dynamic
Wattage Dissipation in Loudspeaker Field	8.0 (100 Volts/80 M. A.)
Undistorted Output	3.0 Watts

PHYSICAL SPECIFICATIONS

Height	19 inches
Depth	10 inches
Width	14 inches
Weight Alone	37 pounds
Weight (Packed for Shipment)	44 pounds
Packing Case Dimensions	16¾" x 12⅞" x 23¼"

INTRODUCTION

The RCA Victor Radiola Superette is a compact radio receiver employing the super-heterodyne circuit. The inherent sensitivity, selectivity and tone quality of the super-heterodyne is a feature of this receiver. The unit type of construction is used (both S. P. U. and receiver assembly incorporated in the same chassis) which together with the reproducer unit results in a compact receiver of excellent performance. The entire mechanism is enclosed in a cabinet of pleasing design. Figure 1 shows a rear interior view.

Two Radiotrons UY-227, two Radiotrons RCA-235, two Radiotrons UX-245, one Radiotron UY-224 and one Radiotron UX-280 are used. The Radiotrons are shipped in their respective sockets.

ELECTRICAL DESCRIPTION OF CIRCUIT

The schematic diagram of the RCA Victor Radiola Superette is shown in Figure 2. Starting from the antenna circuit, we find the following action taking place in the various stages.

The antenna is coupled to the grid coil of the R. F. stage by means of a high inductance coil connected from antenna to ground. This inductance has a sufficiently high value so that variations in the antenna system have but little effect on the tuning of the adjacent circuit.

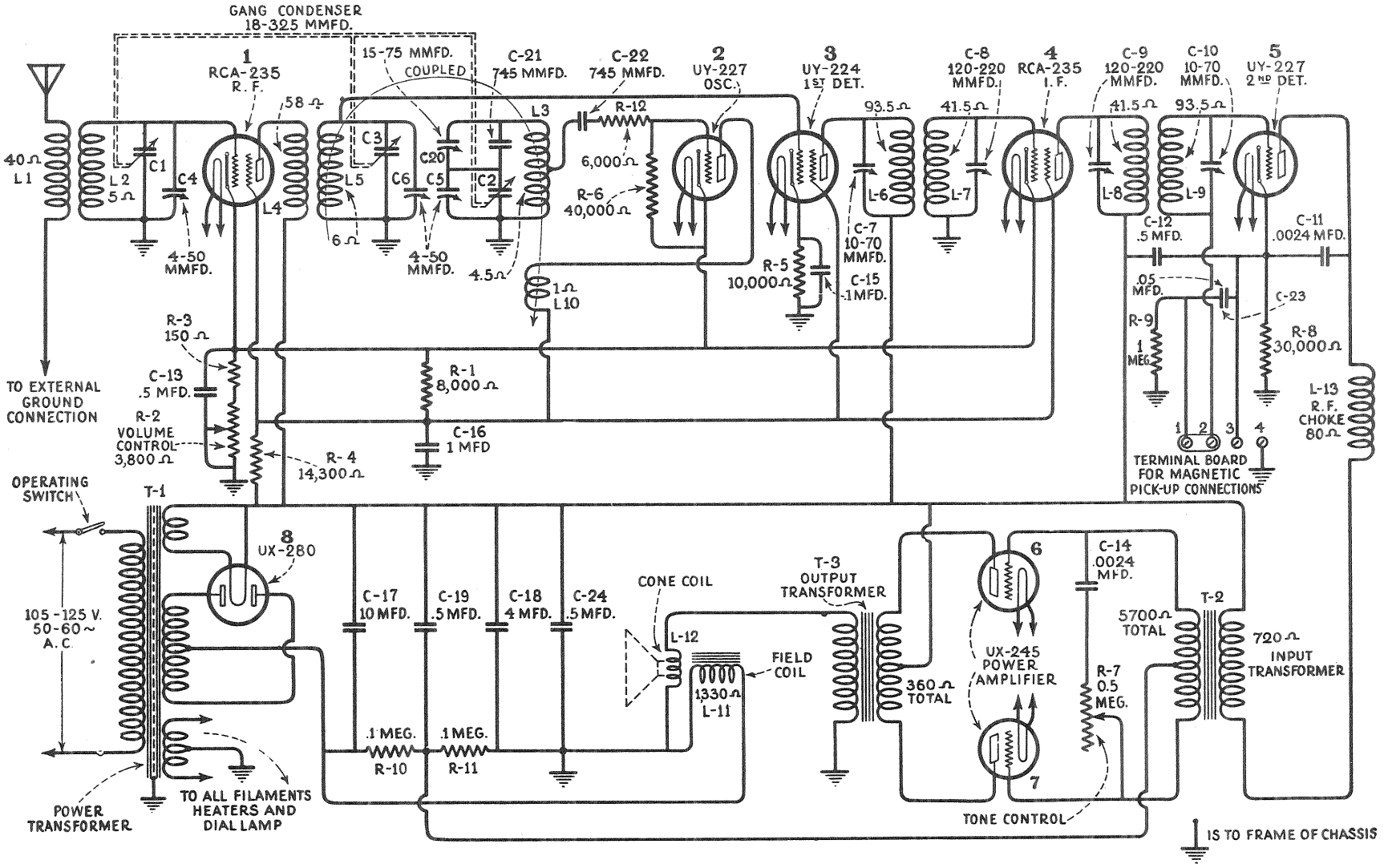

Figure 2—Schematic Wiring Diagram

The first tube is a tuned R. F. stage. This is the new Super Control Screen Grid Radiotron, RCA-235, which has a grid potential plate current curve that has no pronounced "knee." This characteristic reduces the tendency of the tube to become a detector when the control grid voltage is raised by the volume control. Such a characteristic means that secondary modulation effects will not be obtained and distortion due to high signal intensities will not develop. Also improved volume control action and elimination of the local-distant switch are obtained through the use of Radiotron RCA-235. The gain and other characteristics are approximately the same as those of Radiotron UY-224. The output of this circuit is inductively coupled to the grid coil of the first detector.

At this point the oscillator should be considered as its output is also coupled inductively to the grid coil of the first detector. This is a tuned grid circuit oscillator using a Radiotron UY-227, and having a closely coupled plate coil that gives sufficient feed-back to provide stable operation. The grid circuit is so designed that by means of a correct combination of capacity and inductance a constant frequency difference between the oscillator and the tuned R. F. circuits throughout the tuning range of the receiver is obtained.

The next circuit to examine is the first detector. The circuit is tuned by means of one of the gang condensers to the frequency of the incoming signal. In the 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 first detector 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 stage is that of the I. F. amplifier. A single stage is used. This requires two I. F. transformers consisting of four tuned circuits. The plate circuit of the first detector, the grid and plate circuit of the I. F. amplifier and the grid circuit of the second detector are all tuned to 175 K. C. The transformers are peaked, no attempt being made for flat top tuning. A Radiotron RCA-235 is used in this stage and its control grid voltage is also varied by means of the volume control.

The second detector is a high-plate voltage, grid-biased type, using Radiotron UY-227, which gives sufficient output to drive two Radiotrons UX-245 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 used further.

A filter circuit consisting of a 0.05 mfd. condenser and 1 megohm resistor is used in the second detector grid circuit. This further reduces the small A. C. hum voltages present in the detector stage.

The power A. F. stage consists of two Radiotrons UX-245 connected in push-pull. Transformer coupling is used between the detector and the grids of the Radiotrons UX-245 as well as from the plates to the cone coil of the reproducer unit.

A tone control, consisting of a 0.0024 mfd. condenser in series with a 500,000 ohm variable resistor connected across the two grids of Radiotrons UX-245, is incorporated in this stage. The tone control functions to reduce the high frequency output as the resistance is reduced. At the extreme low position, the condenser and secondary of the A. F. transformer resonate at a low frequency and thereby further accentuate the bass response, thus partially compensating for the lack of a large speaker baffle surface.

The direct plate and grid voltages used by all the tubes are supplied from high voltage alternating current which is rectified by means of Radiotron UX-280. The filter used is of the "brute force" type using the field of the reproducer unit as the reactor. Electrolytic type condensers of 10 and 4 mfd. capacity respectively are used before and after the reactor. Two 0.5 mfd. condensers in the filter circuit function to by-pass any R. F. current that may be present. The bias voltage (50 volts) for Radiotrons UX-245 is obtained by using half the voltage drop (100 volts) across the field coil of the reproducer unit. Two 100,000 ohm resistors shunted across the field act as the voltage dividing resistor for this bias voltage.

PART I—REPLACEMENT PARTS

The replacement parts used in this instrument are listed on pages 8 and 9. The key numbers shown in the illustrations provide a quick reference for illustration to text.

REPLACEMENT PARTS

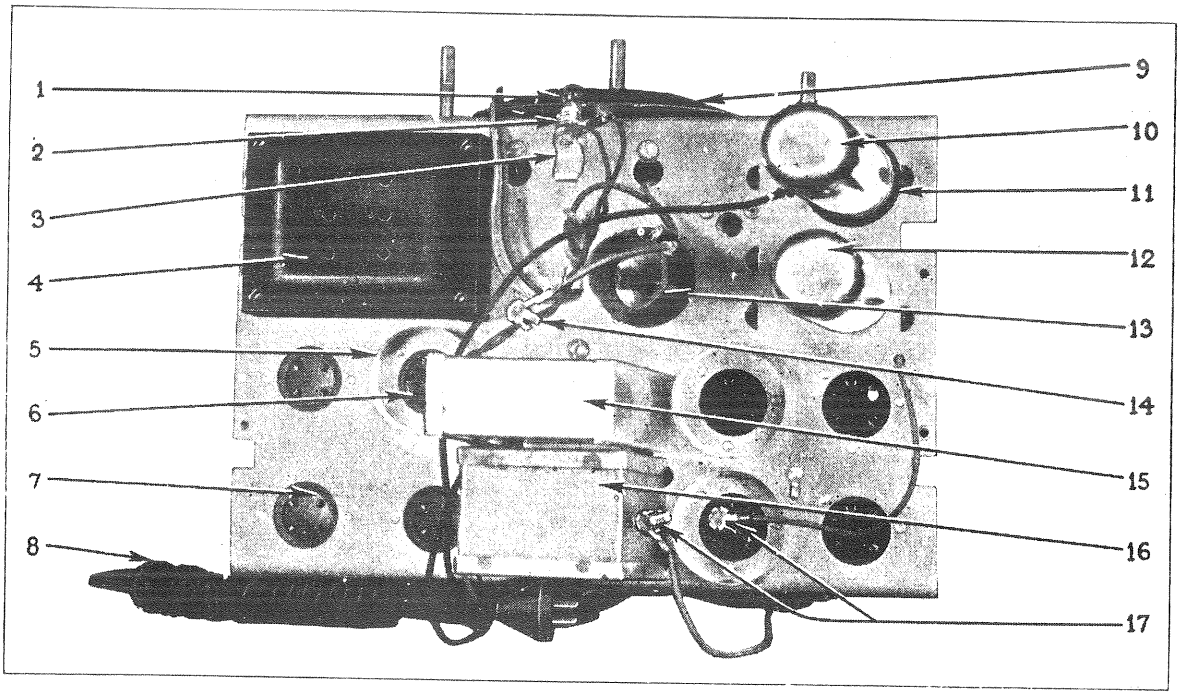

Figure 3—Top View of Chassis

Key No.	Stock No.	DESCRIPTION	List Price
		CHASSIS PARTS	
1	A2429	Lamp—Dial lamp	$0.12
2	A516	Socket—Dial lamp socket	.50
3	B2323	Bracket—For dial lamp socket	.04
4	A36	Transformer—105/125 volts, 50/60 cycles power transformer	9.00
	A37	Transformer—105/125 volts, 25/50 cycles power transformer	12.00
5	A1727	Base—Tube shield base—3 used	.10
	A1728	Shield—Tube shield—3 used	.18
6	A522	Socket—UY Radiotron socket—Complete with insulating shield—5 used	.40
7	A523	Socket—UX Radiotron socket—Complete with insulating shield—3 used	.40
8	A1582	Cord—Power cord complete with male connector plug	.75
9	B2326	Scale—Dial scale complete with drum and set screws	.60
	A3276	Screw—Set screw for dial scale drum—Package of 12 doz.	.24
	B2324	Shaft—Drive shaft for operating dial	.50
10	A268	Condenser—10 mfd. electrolytic condenser	3.00
11	A3031	Washer—For 10 mfd. electrolytic condenser	.10
	A745	Terminal—For 10 mfd. electrolytic condenser	.04
12	A267	Condenser—4 mfd. electrolytic condenser	2.50
13	A138	Transformer—R. F. transformer complete with mounting bracket, nut and lock washer	1.90
14	B2332	Cap—Grid contactor cap for R. F. socket	
15	A266	Capacitor Pack—R. F. by-pass capacitor pack	$3.50
16	A35	Transformer assembly — A. F. transformer assembly complete in metal container	6.00
17	A2398	Cap—Grid contactor cap for I. F. or 1st detector tubes	.10
18	A375	Resistor—150 ohms—Carbon type	.40
19	A369	Volume Control—Complete less knob	2.20
	A2304	Knob—Volume control, station selector or tone control knob	.30
	A2710	Nut—Volume control mounting nut	.04
20	A139	Coil—1st detector and oscillator coil complete with mounting bracket, screws and lock washers	2.40
21	A272	Condenser — 745 mmfd. — Oscillator grid or series condenser	.44
22	A372	Resistor — 40,000 ohms — carbon type	.40
23	A373	Resistor — 6000 ohms — carbon type	.60
24	A338	Resistor — 8000 ohms — carbon type	.40
25	A135	Transformer—1st I. F. transformer complete with shield	3.00
26	A136	Transformer—2nd I. F. transformer complete with shield	3.00
	A1729	Shield—Copper shield for I. F. transformer	.60
27	A744	Terminal—Single terminal complete with screw	.06
28	A959	Board—Magnetic pickup terminal board complete with terminals and screws	.25
29	A370	Tone control—Complete less knob	2.00

REPLACEMENT PARTS—Continued

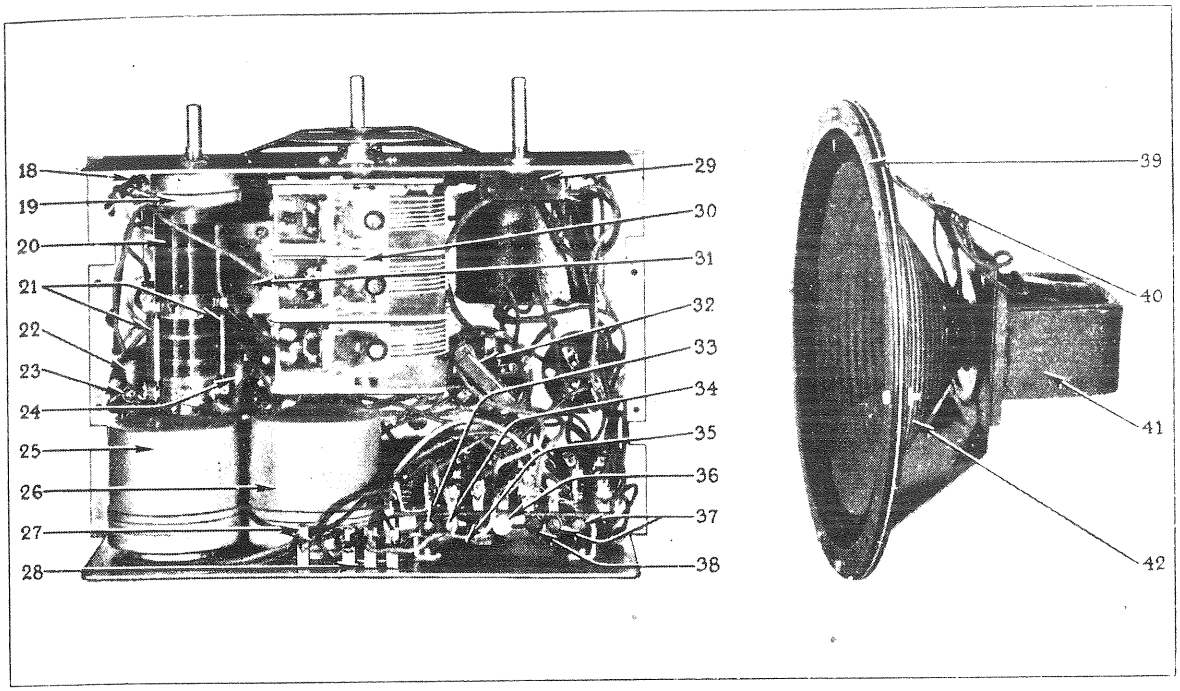

Figure 4—Bottom View of Chassis and Reproducer Unit

Key No.	Stock No.	DESCRIPTION	List Price
30	A269	Condenser—Three gang tuning condenser—Complete with line-up condensers and mounting screws	$8.00
31	A270	Condenser—Adjustable oscillator trimming condenser	1.00
	A3275	Screw—Adjusting screw for oscillator trimming condenser — Package of 10	.50
32	A271	Condenser—.0024 mfd. fixed condenser—Used as tone control or 2nd detector by-pass condenser	.80
33	A371	Resistor — 14,300 ohms — Carbon type	.60
34	A329	Resistor–1 megohm–Carbon type	.40
35	A137	Coil—2nd detector R. F. choke coil complete with rivet	.50
36	A313	Resistor–30,000 ohms–carbon type	.40
37	A368	Resistor—100,000 ohms—carbon type—two used	.40
38	A374	Resistor–10,000 ohms–carbon type	.40
	A960	Board—Resistor mounting board complete with terminals and mounting bracket—less resistors	1.00
	B2325	Insulator — For chassis shield — complete with rivets	.02
	B2330	Support—Rubber chassis support	.06
	A427	Switch—Operating switch complete with mounting nuts	.68
	A1867	Escutcheon—Dial scale escutcheon	.60
	B2331	Board — Baffle board complete with grille cloth	1.00
		LOUDSPEAKER PARTS	
39	A2421	Ring—Cone retaining ring	.35
	A3226	Screw—Cone mounting screw—Package of 12 doz.	.12
	A2987	Washer—Lock washer for mounting cone—Package of 12 doz.	.10
	A2702	Nut—For cone mounting screw—Package of 12 doz.	$ 0.06
	A3136	Screw—Cone centering screw—Package of 12 doz.	.24
	A2993	Washer—For cone centering screw—Package of 12 doz.	.12
	A3277	Screw—Special head screw for mounting loudspeaker to cabinet—Package of 12 doz.	1.20
	A2744	Nut—For loudspeaker mounting screw—Package of 12 doz.	.12
40	A942	Board — Loudspeaker terminal board	.16
41	8653	Coil Assembly—Field coil, core and cone support	5.00
42	A2446	Cone—Loudspeaker cone	3.00
		TOOLS	
	A6000	Screwdriver—Non-metallic screwdriver for oscillator and I. F. adjustments	.70
		line-up condenser adjustments	
	A6001	Wrench—Socket wrench for R. F.	.75
	A6004	Oscillator—Broadcast band oscillator comp. with batteries and Radiotron	10.00
		SPECIAL PARTS SUPPLIED ON ORDER ONLY (Not to be stocked)	
	9325	Cabinet—Cabinet complete with baffle board, grille cloth and escutcheon (Walnut)	15.00
	9326	Cabinet—Cabinet complete with baffle board, grille cloth and escutcheon (Mahogany)	15.00
	B2329	Loudspeaker—Dynamic loudspeaker complete	8.70
	B2328	Chasis—Receiver chasis complete—less loudspeaker	10.00
	8654	Transformer—220 Volt, 50-60 cycle power transformer	11.00

PART II—INSTALLATION

(1) ANTENNA AND GROUND

Instructions for erecting proper antenna and ground systems are covered in earlier Service Notes. The length recommended for use with the RCA Victor Radiola Superette is from 25 to 75 feet. In localities remote from broadcasting stations a longer antenna may give better results.

In localities close to extremely powerful transmitters the use of a single pole, single throw switch, placed in series with the antenna may give improved results. This switch allows the antenna to be disconnected when receiving from powerful nearby stations, thereby improving the quality of output from the loudspeaker.

The antenna is connected to the black lead and the ground to the yellow lead.

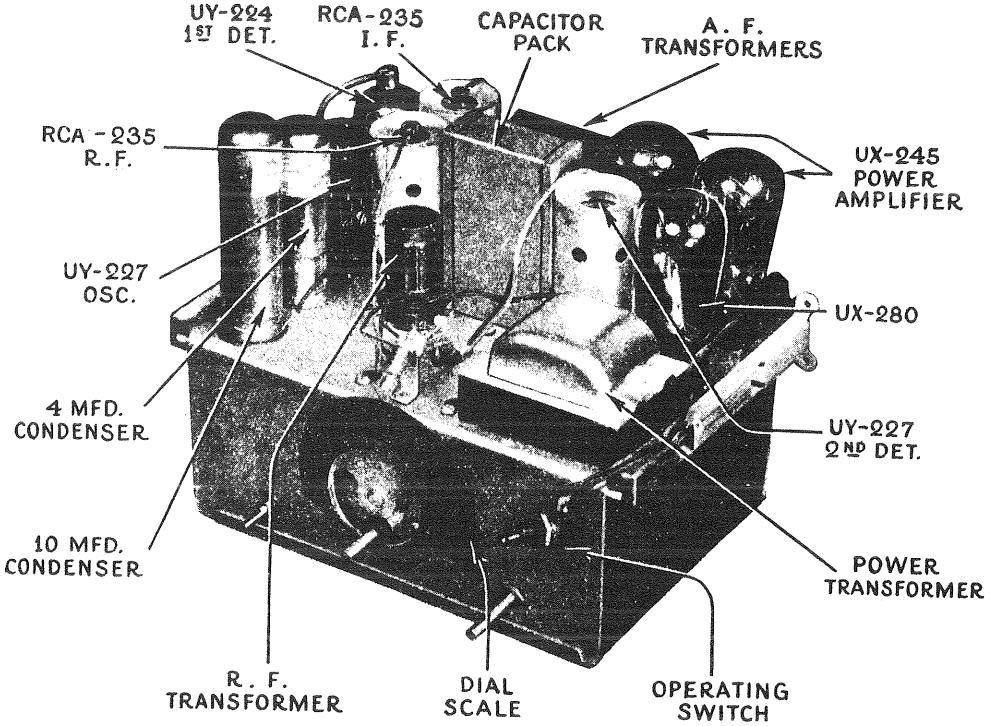

Figure 5—Top View of Chassis Showing Location of Radiotrons and Parts

(2) RADIOTRONS

Figure 5 shows the location of the various Radiotrons when inserted in their proper sockets. Interchanging those of the same type, either RCA-235 or UY-227 will sometimes give improved results.

(3) LOCATION

Various locations should be tried before permanently installing the RCA Victor Radiola Superette as different parts of the room may give different acoustical results. However, the eight foot A. C. cord may prove a limiting factor if the A. C. outlet is not within its radius. An extension cord may be provided, however, and the receiver placed in the location that produces best results. Placing the set within six inches of the wall will improve the low response.

(4) ADJUSTMENT FOR LOW LINE VOLTAGES (25 Cycle Only)

A lead connected to the 110 volt tap on the power transformer of 25 cycle models is provided for use when RCA Victor Radiola Superette is used on lines, the voltage of which never exeeeds 115 volts. Should such an adjustment become necessary, proceed as follows:

(a) Remove the chassis from the cabinet. Release the four nuts, screws and lock washers that hold the bottom cover to the chassis and remove the bottom

(b) A black and red transformer lead, taped up and not used, will be found on the underside of the chassis. Also a black with red tracer transformer lead is soldered to a terminal on the resistor board. (See Figure 6.)

(c) Interchange these two leads, soldering the black and red lead to the terminal and taping up the black with red tracer lead.

(d) Replace the cover on the bottom of the chassis and then return the chassis to the cabinet.

So connected the receiver will operate on lines the voltage of which is from 105 to 115, with maximum efficiency.

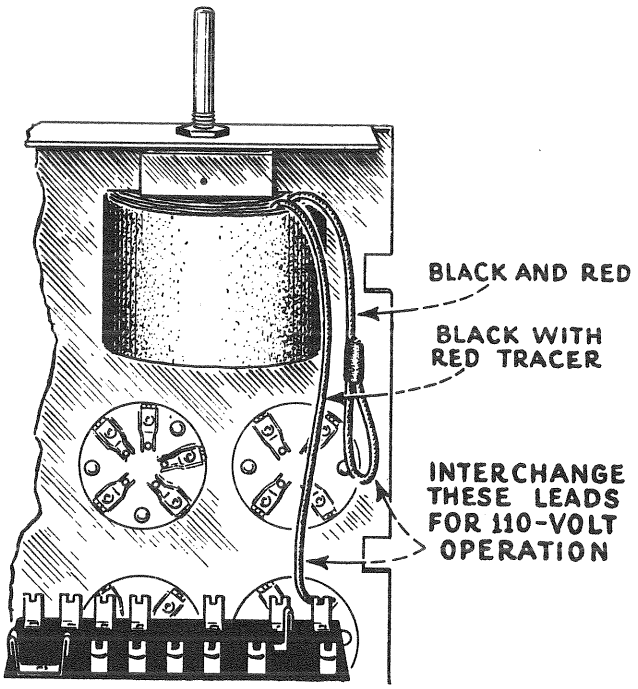

Figure 6—Changes Necessary for 110 Volt Operation on 25 Cycle Models

PART III—SERVICE DATA

(1) NOISY VOLUME OR TONE CONTROL

Noisy operation of the volume control or tone control is usually caused by dirt between the resistance element and the contact arm. Turning the volume control back and forth several times will usually clear up the trouble. If it does not, the cover must be removed and the resistance element cleaned. Figure 7 shows the method of removing the cover on the tone control. One of the various cigarette lighter fluids applied with a pipe cleaner will usually clear up the trouble. If it does not, the unit must be replaced.

(2) CONDENSER DRIVE

The gang condenser is driven from the station selector knob by means of a small rubber friction roller. The dial has an inside track which is driven by a small rubber pinion. A long period of wear may cause the rubber to become worn or hard and therefore require replacement. The holes by which the roller brackets are mounted are elongated. Should the roller fail to maintain the proper amount of friction with the dial drum, an adjustment can be easily made.

(3) EXCESSIVE HUM

Excessive hum may be caused by:

(a) Defective Radiotron UX-280.

(b) Defective power transformer. Key No. 4, page 8. (Open or off-center tap.)

(c) Shorted 0.05 mfd. condenser in second detector circuit. Key No. 15, page 8.

(d) Defective 1 megohm resistor in the second detector circuit. Key No. 34, page 9.

(e) Shorted field coil. As the field coil of the reproducer unit constitutes the reactor of the filter system, a failure in it will cause hum.

(f) Open filter condenser. An open in the condenser or connection of either the electrolytic or paper condenser used in the filter system will cause hum. Key Nos. 11 and 12, page 8.

(g) Grounded or shorted by-pass condensers. Key No. 15, page 8. Test all condensers and replace any found defective.

(h) Grounded heater lead. A grounded heater lead at either the points of connection to the sockets or in the transformer will cause hum.

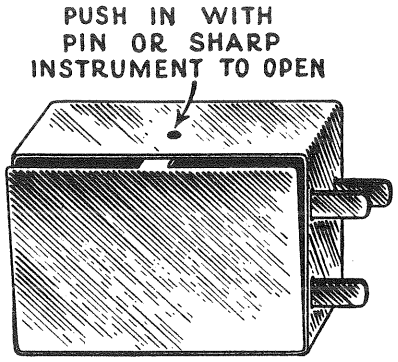

Figure 7—Method of Opening Tone Control

(4) ACOUSTIC HOWL

Acoustic howl may be caused by:

(a) Hardened rubber used for chassis supports. If this condition is present, the rubber must be replaced.

(b) Microphonic tube. Try interchanging the second detector and oscillator tubes.

(c) Loose parts in chassis. Tighten any loose parts.

(d) Chassis not entirely supported on rubber from cabinet. If the chassis, including the knobs and their shafts, is touching the cabinet, howl may result. Clear any such contact.

(5) LOW VOLUME

Low volume may be caused by:

(a) Inoperative Radiotrons. Try interchanging all Radiotrons with others of *similar type* known to be in good condition.

(b) Poor antenna system. Install antenna and ground system as suggested in other issues of Service Notes.

(c) Receiver improperly aligned. Check R. F. oscillator and I. F. tuning condenser adjustments as described in Part III, Sections 9, 10 and 11.

(d) Defective A. F. transformer. Key No. 16, page 8. The A. F. transformers are in a metal container, the internal connections of which are shown in Figure 14. All coils should be tested for continuity and possible grounds. If other defects are likely, measure the coils for D. C. resistance. Shorted turns may be disclosed by substituting an entirely new unit for the one in use.

(e) Low voltages. Measure all voltages and if low replace Radiotron UX-280 or any defective parts that are causing low voltage. Check by means of voltage reading chart, page 18.

(f) Opens, shorts or grounds in receiver assembly. Repair any defects of this type.

(g) Shorted field coil in reproducer unit. Any defect that reduces the strength of the magnetic field of the reproducer unit will reduce the output of the receiver. Check the current (80 M. A.) and the voltage drop (100 volts) across it. An open field coil will cause the receiver to become inoperative.

(6) DISTORTED REPRODUCTION

Distorted reproduction, not due to failure in the reproducer unit, may be caused by any of the following:

(a) Radiotrons. A defective Radiotron will cause distortion and can be defective even though it lights. Defects other than heater or filament failures are checked only by substitution with a tube of known quality or by testing the tube.

(b) Defective A. F. transformers. Key No. 16, page 8. An open in the secondary of the input transformer or shorted turns in any windings may cause distortion. Test by means of continuity or resistance measurement tests and make replacement if necessary.

(c) Oscillation in receiver assembly. Oscillation in the receiver assembly other than that of the oscillator will cause distortion to be experienced when tuning in a station. This distortion will be accompanied by a whistle when the station is tuned in. To remedy trouble of this character, refer to Part III, Section 8.

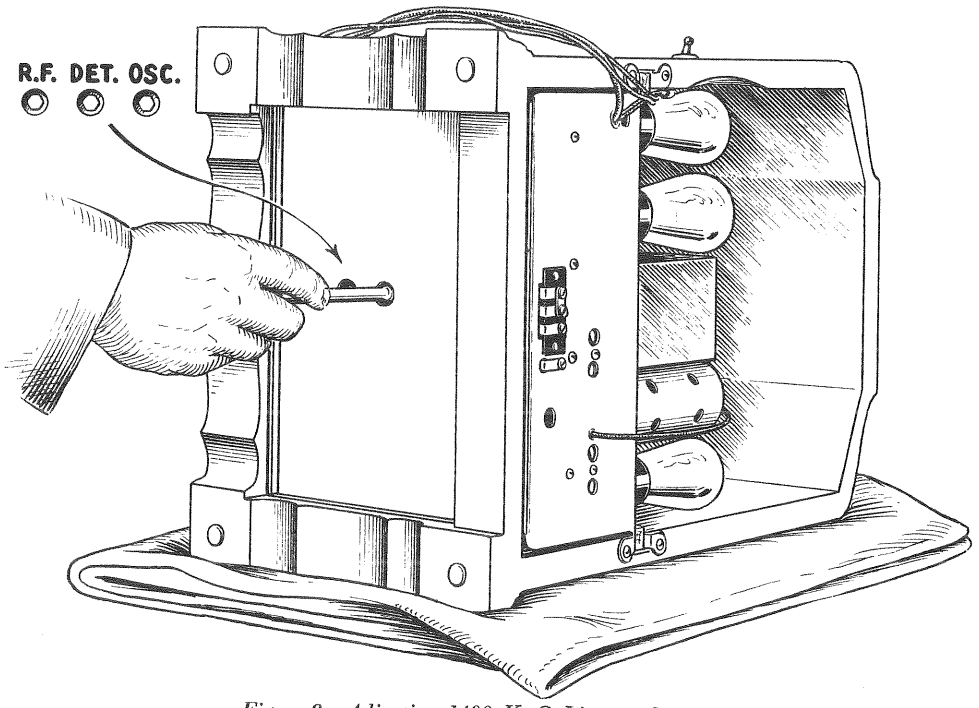

Figure 8—Adjusting 1400 K. C. Line-up Condensers

(d) Receiver improperly aligned. Improper alignment of the receiver in addition to affecting its sensitivity and selectivity, will cause distortion of any signal received. Realign the receiver as described in Part III, Sections 9, 10 and 11.

(e) Incorrect tuning. If the receiver is not accurately tuned to the station being received, distortion will result. Follow the instructions given on the instruction leaflet accompanying each set when tuning.

(f) Heterodyne between stations too close in frequency. This is no defect in the receiver and, therefore, cannot be remedied except by shifting the frequencies of the transmitters.

(g) Strong local station. Interchange the R. F. tube with the I. F. tube. Shorten the antenna. Place a switch in antenna lead. See Part II, Section 1.

(h) Open by-pass condensers or connections. Key No. 15, page 8. Any failure that will cause a by-pass condenser not to function will result in distortion. Repair or replace any such defect.

(i) Defect in receiver assembly or S. P. U. Check by means of continuity tests and make any replacement necessary.

(7) AUDIO HOWL

Audio howl may be caused by:

(a) Stations too close in frequency. This is a fault of the transmitting stations and no fault of the receiver. Such a howl will be picked up on any type of receiver.

(b) Open by-pass condensers. Key No. 15, page 8. An open of any of the by-pass condensers may cause an audio howl.

(c) Receiver oscillation. An oscillating receiver will give a whistle when a station is tuned in. Apply the remedies suggested in Part III, Section 8.

(d) Defective Radiotrons in push-pull or detector stage. A defective Radiotron in the push-pull or detector stage may cause the receiver to develop a howl. Replace any defective Radiotron.

(e) Vibrating elements in the receiver Radiotrons. A gradually developed howl may be due to the loudspeaker, causing the receiver Radiotron elements to vibrate. Apply the remedies given in Part III, Section 4.

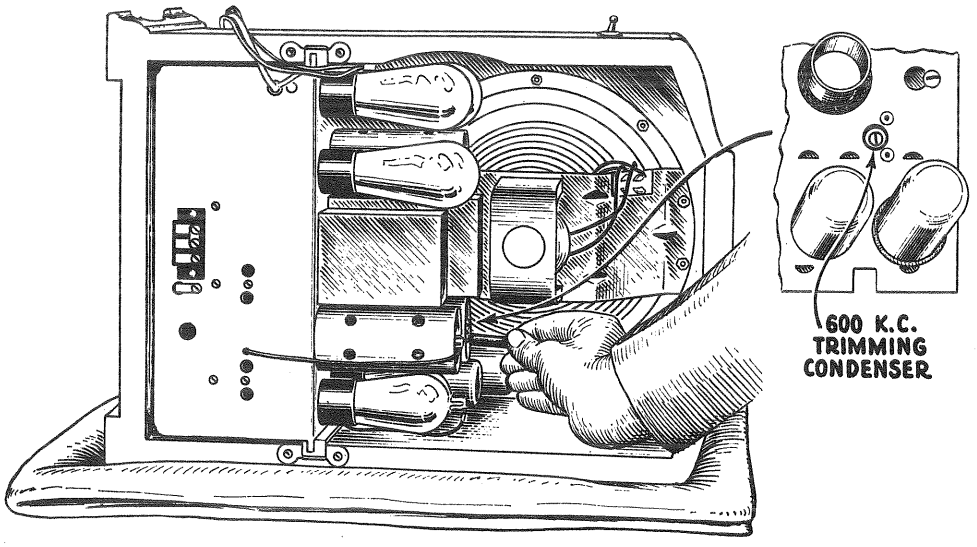

Figure 9—Adjusting 600 K. C. Oscillator Trimming Condensers
(Laying instrument on side is necessary to provide accessibility to all adjustments)

(8) OSCILLATION

Oscillation in the R. F. or I. F. stages may be due to:

(a) Failure of shielding of Radiotrons or their control grid leads not in place. Make sure all shielding and leads are as originally intended. Any failure should be repaired.

(b) Open by-pass condensers in receiver assembly. Key No. 15, page 8. Test and make any repair or replacement necessary.

(c) Ungrounded power line. Try connecting the ground to both the chassis and the ground lead.

MAKE FOLLOWING ADJUSTMENTS ONLY AFTER CHECKING ALL OTHER POSSIBILITIES FOR TROUBLE

(9) R. F. LINE-UP AND OSCILLATOR TRIMMING CONDENSER ADJUSTMENTS

Four adjustable condensers are provided for aligning the R. F. circuits and adjusting the oscillator frequency so that it will be at a 175 K. C. difference from the incoming R. F. signal throughout the tuning range of the set. Poor quality, insensitivity and possible inoperation of the receiver may be caused by these condensers being out of adjustment.

If the other adjustments have not been tampered with—the intermediate tuning condensers—the following procedure may be used for adjusting these condensers.

(a) Procure an R. F. oscillator giving a modulated signal at exactly 1400 K. C. and 600 K. C. The RCA Victor oscillator No. A6004, listed in the replacement parts list or the General Radio, Type 320 or Type 360 may be used. Also procure a non-metallic screw driver (Stock No. A6000) and a small socket wrench (Stock No. A6001). Both of these articles are listed in the replacement parts list in Part I of this book.

(h) An output indicator is necessary. This may be a current squared thermo-galvanometer connected to the secondary of the output transformer instead of the cone coil of the reproducer unit, a 0–5 milliameter connected in series with the plate supply to the second detector or a low range A. C. voltmeter connected across the reproducer unit cone coil.

(c) Turn the station selector until the dial reads exactly 100. Then remove the chassis from the cabinet, being careful not to disturb the setting of the dial. The gang condenser rotor plates should be fully meshed with the stator plates. If not, then the dial drum must be adjusted until such a condition exists. Be sure and tighten the set screws that hold the drum to the condenser shaft. A suitable socket wrench for making this adjustment is listed in Part I.

(d) Place the oscillator in operation at exactly 1400 K. C. and couple it to the antenna. Set the dial scale at 11 and turn the cabinet on its side. Place a soft pad under the instrument to prevent damage to the cabinet finish. Adjust the coupling between the oscillator and antenna lead of the set or the volume control until a deflection is obtained in the output meter.

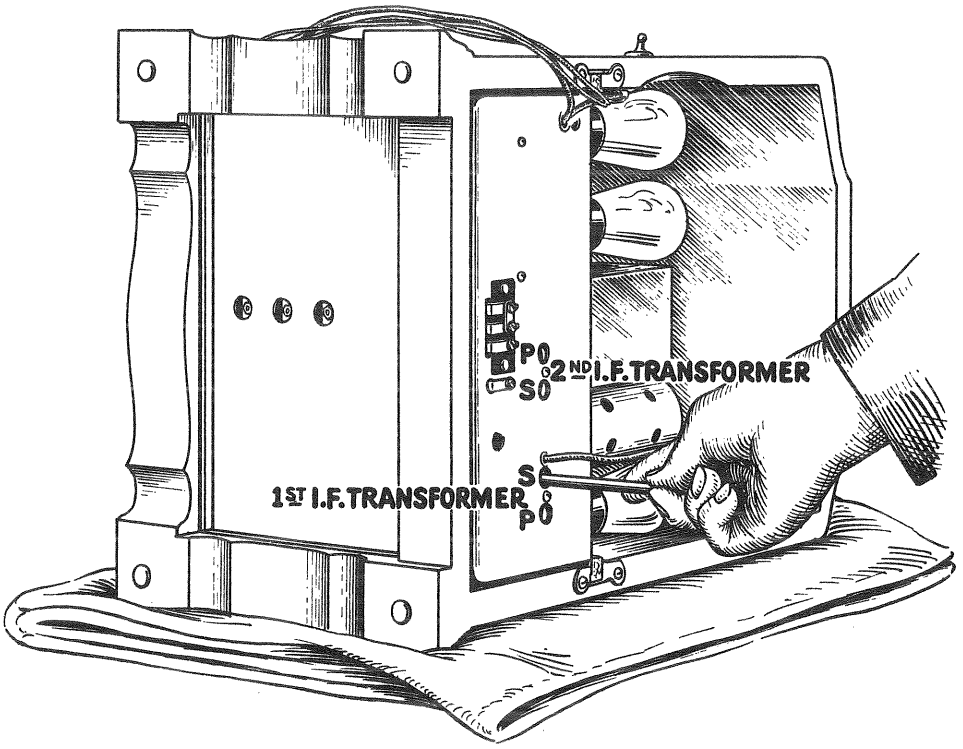

Figure 10—Adjusting I. F. Transformer Tuning Condenser

(e) With the socket wrench adjust the oscillator, first detector and R. F. line-up condensers until a maximum deflection is obtained in the output meter. (See Figure 8.) A suitable socket wrench for making this adjustment (Stock No. A6001), is listed in Part I.

(f) Set the oscillator at 600 K. C. Tune in this signal with the receiver and adjust for a deflection in the output meter. Now adjust the 600 K. C. series condenser, Figure 9, until maximum output has been obtained. Rock the gang condenser back and forth while making this adjustment. A suitable non-metallic screw driver is listed in Part I.

(g) Change the frequency of the oscillator to 1400 K. C. and set the dial at 11. Again make the adjustments given under (d) and (e).

So adjusted, the R. F. circuits are properly aligned and the oscillator will maintain a constant frequency difference from the incoming R. F. signal.

(10) I. F. TUNING CONDENSER ADJUSTMENTS

A single intermediate frequency amplifier stage is used in this receiver. Two transformers are used and all circuits are tuned to 175 K. C. The circuits are peaked and when alignment adjustments are made, the condensers are adjusted for maximum output.

A detailed procedure for making these adjustments follows:

(a) Procure a modulated R. F. oscillator giving a signal at 175 K. C. The General Radio, Type 360 oscillator or the Type 320 to which 175 K. C. has been added, may be used. A non-metallic screw driver is also necessary. A suitable screw driver is listed in Part I of this book. (Stock No. A6000.)

(b) Connect an output meter in the circuit. This may be a current squared thermo-galvanometer connected to the secondary of the output transformer instead of the reproducer unit cone coil, a 0–5 milliameter connected in series with the plate supply to the second detector or a low range A. C. voltmeter connected across the cone coil of the reproducer.

(c) Remove the oscillator tube, socket No. 2, and make a good ground connection to the chassis. Place the oscillator in operation and connect its output to the control grid cap of the first detector, socket No. 3. Adjust the oscillator output or the receiver volume control until a deflection is obtained in the output meter.

(d) Now adjust the secondary and primary of the second and first I. F. transformers until a maximum reading is obtained in the output meter. Go through these adjustments a second time as a slight readjustment may be necessary.

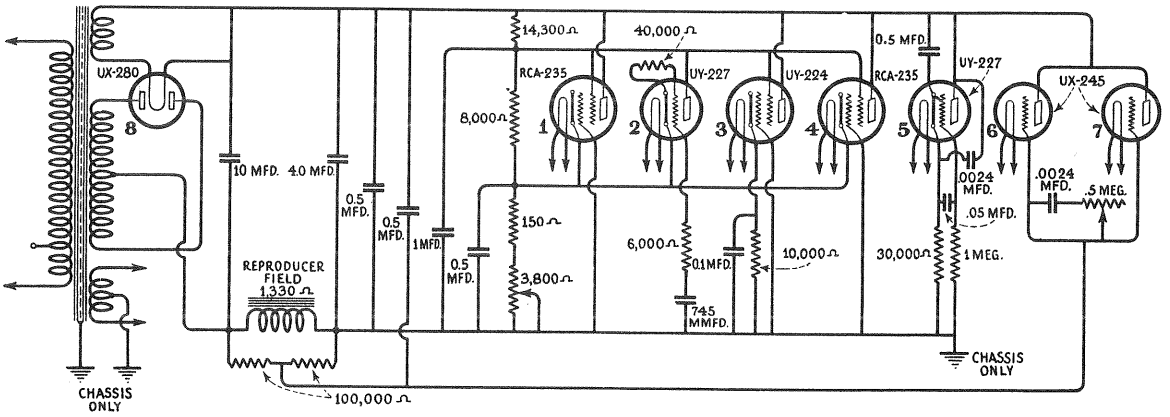

Figure 11—Schematic Diagram of Voltage Supply System.

When the adjustments are made, the set should perform at maximum efficiency. However, due to the interlocking of the adjustments, it is a good plan to follow the I. F. adjustments with the R. F. and oscillator line-up condenser adjustments. The correct method of doing this is given in Part III, Section 9.

(11) LINE-UP ADJUSTMENTS OF GANG CONDENSER

A three gang condenser is used in this instrument. The end plates of each unit are split into four sections that allow an exact adjustment for aligning the complete unit. Unless tampering has occurred, adjustments will not be necessary. However, if adjustments are necessary, the following procedure should be used.

(a) Remove the receiver assembly from the cabinet and place in a position convenient for work.

(b) Realign the I. F., oscillator and R. F. circuits as described in Part III, Sections 9 and 10. This must be done properly, otherwise subsequent adjustments cannot be properly made.

(c) A modulated oscillator, the frequency of which is continuously variable throughout the broadcast band is necessary. Also an output meter similar to those suggested in Part III, Sections 9 and 10 is necessary. Connect it in a similar manner in the circuit.

(d) Place the receiver in operation and turn the tuning condenser until the first section of the gang condenser end plates are fully meshed with the stator plates. Couple the output of the oscillator to the antenna system of the receiver and adjust its output frequency until a deflection is obtained in the output meter.

(e) Now bend the sections of the three end plates until an increased reading is obtained. If this is not possible, or if mechanical clearance from the stator plates cannot be obtained, an adjustment is not necessary.

(f) Turn the tuning condenser until the first and second sections of the rotor end plates are engaged with the stator plates. Shift the oscillator frequency until a deflection is obtained in the output meter. Then bend the second set of sections for a maximum deflection in the output meter at the same time maintaining mechanical clearance.

(g) Repeat this procedure until maximum output is obtained at all sections of the rotor plates. So adjusted, the condenser will be properly aligned.

PART IV—ELECTRICAL TESTS

(1) VOLTAGE SUPPLY SYSTEM

Figure 11 illustrates the schematic diagram showing the voltage supply system together with the values of the various resistors. It will be noted that the series method of voltage supply is used except in the volume control circuit. This keeps the current drain on the rectifier tube at a minimum value.

(2) VOLTAGE READING SERVICE DATA CHART

The service data chart on page 18 provides a means of diagnosing trouble from socket voltage readings taken at Radiotron sockets with any of the usual set analyzers. A set of readings taken from the receiver under consideration checked against this chart will quickly disclose the cause of most difficulties.

(3) VOLTAGE READINGS AT RADIOTRON SOCKETS

The following voltages taken at each Radiotron socket with the receiver in operating condition should prove of value when checking 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 12.

RADIOTRON SOCKET VOLTAGES
120 VOLT LINE

Tube No.	Cathode to Heater Volts, D. C.	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, A. C.
VOLUME CONTROL AT MINIMUM							
1	40	40	55	200	0	0	2.4
2	40	0	—	50	4.0	—	2.4
3	8.0	7.0	90	240	0.5	0.25	2.4
4	40	40	55	200	0	0	2.4
5	25	*5.0	—	220	0.5	—	2.4
6	—	*30.0	—	245	30.0	—	2.4
7	—	*30.0	—	245	30.0	—	2.4
VOLUME CONTROL AT MAXIMUM							
1	3.5	3.5	70	240	5.0	**0.7	2.4
2	2.5	0	—	65	5.5	—	2.4
3	5.0	5.0	70	235	0.5	0.25	2.4
4	3.5	3.5	70	240	5.0	**0.7	2.4
5	25	*5.0	—	220	0.5	—	2.4
6	—	*30	—	245	25.0	—	2.4
7	—	*30	—	245	25.0	—	2.4

*Not true reading due to resistance in circuit.
**This reading may be + or − depending on age of tube.

VOLTAGE READING SERVICE DATA CHART

VOLUME CONTROL AT MAXIMUM

VOLTAGE CHARACTERISTICS	1 R. F.				2 OSC.			3 1st DET.				4 I. F.				5 2nd DET.			6 PWR. A. F.			7 PWR. A. F.			CAUSE OF INCORRECT READING
	C. G. Volts	S. G. Volts	Plate Volts	Plate M. A.	Grid 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.	Grid Volts	Plate Volts	Plate M. A.	
Normal	3.5	70	240	5.0	0	65	5.5	5.0	70	235	0.5	3.5	70	240	5.0	5.0	220	0.5	30	245	25	30	245	25	
No C. G. Voltage on Tube No. 1	0	70	240	9.0	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	Open Secondary of R. F. Transformer L-2
No C. G. Voltage on Tube No. 3	....	....	....	....	....	....	....	0	70	235	1.5	....	....	....	....	....	....	....	....	....	....	....	....	....	Open 1st Det. Grid Coil L-5
No C. G. Voltage on Tube No. 4	....	....	....	....	....	....	....	....	....	....	....	0	70	240	9.0	....	....	....	....	....	....	....	....	....	Open Secondary of 1st I. F. Transformer L-7
No C. G. and Low Plate Voltage on Tube No. 5	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	70	5.5	....	....	....	....	....	....	Open Sec. of 2nd I. F. Trans. L-9 or 1 Meg. Res. R-9
Low Voltages on All Tubes	2.0	35	150	2.5	0	35	3.0	3.0	35	140	0.5	2.0	35	150	2.5	5.0	100	0.25	0	140	80	30	150	0	Open One-Half Secondary of Interstage Transformer T-2
Low Voltages on All Tubes	2.0	35	150	2.5	0	35	3.0	3.0	35	140	0.5	2.0	35	150	2.5	5.0	100	0.25	30	150	0	0	140	80	Open One-Half Secondary of Interstage Transformer T-2
No Voltages on Tube No. 2	....	....	....	....	0	0	0	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	Open Oscillator Plate Coil L-10
No Plate Voltage on Tube No. 1	3.5	60	0	0	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	Open R. F. Plate Coil L-4
No Plate Voltage on Tube No. 3	....	....	....	....	....	....	....	4.0	70	0	0	....	....	....	....	....	....	....	....	....	....	....	....	....	Open Primary of 1st I. F. Transformer L-6
No Plate Voltage on Tube No. 4	....	....	....	....	....	....	....	....	....	....	....	3.5	60	0	0	....	....	....	....	....	....	....	....	....	Open Primary of 2nd I. F. Transformer L-8
No Voltages on Tube No. 5	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	0	....	....	....	....	....	....	Open R. F. Choke L-13 or Primary of Transformer T-2
No Plate Voltage on Tube No. 6	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	20	0	0	....	....	....	Open One-Half Primary of Output Transformer T-3
No Plate Voltage on Tube No. 7	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	20	0	0	Open One-Half Primary of Output Transformer T-3
No C. G. Voltage on Tubes Nos. 1 and 4	0	70	240	9.0	....	....	....	....	....	....	....	0	70	240	9.0	....	....	....	....	....	....	....	....	....	Shorted 0.5 Mfd. Condenser C-13
No C. G. Voltage on Tube No. 3	....	....	....	....	....	....	....	0	70	240	4.0	....	....	....	....	....	....	....	....	....	....	....	....	....	Shorted 0.1 Mfd. Condenser C-15
No C. G. or S. G. Voltages on Tubes Nos. 1, 2, 3 or 4	0	0	240	0	0	0	0	0	0	235	0	0	0	240	0	....	....	....	....	....	....	....	....	....	Shorted 1.0 Mfd. Condenser C-16
Low Voltages on All Tubes	1.0	20	100	1.0	0	20	1.5	1.0	20	100	0.25	1.0	20	100	1.0	5	60	0.5	+8	80	50	+8	80	50	Shorted 0.5 Mfd. Condenser C-24
No. C. G. Voltage on Tube No. 5	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	180	30	....	....	....	....	....	....	Shorted 0.5 Mfd. Condenser C-12
Low Plate Voltage on Tube No. 5	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	60	1.5	....	....	....	....	....	....	Shorted 0.05 Mfd. Condenser C-23
No Plate Voltage on Tube No. 5	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	25	0	0	....	....	....	....	....	....	Shorted .0024 Mfd. Condenser C-11
Low Plate M. A. on Tubes Nos. 6 and 7	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	50	260	10.0	50	260	10.0	Shorted 100,000 Ohm Resistor R-10
Low Voltages on All Tubes	1.5	25	100	0.25	0	25	0.5	1.5	25	100	0.25	1.5	25	100	0.5	5.0	100	0.25	0	100	40	0	100	40	Shorted 100,000 Ohm Resistor R-11
High C. G. Voltage on Tubes Nos. 1 and 4	200	0	0	0	0	0	0	20	200	215	0	200	0	0	0	....	....	....	....	....	....	....	....	....	Open Volume Control R-2 or 150 Ohm Resistor R-3
High S. G. Voltages	7.0	160	210	25	0	100	12	14	160	200	2.0	7.0	160	210	25	....	....	....	....	....	....	....	....	....	Open 8,000 Ohm Resistor R-1
No C. G. or S. G. Voltage on Tubes Nos. 1, 2, 3 and 4	0	0	250	0	0	0	0	0	0	240	0	0	0	250	0	....	....	....	....	....	....	....	....	....	Open 14,300 Ohm Resistor R-4
No Voltages on Tube No. 3	....	....	....	....	....	....	....	0	0	0	0	....	....	....	....	....	....	....	....	....	....	....	....	....	Open 10,000 Ohm Resistor R-5
No Plate Voltage on Tube No. 5	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	20	0	0	....	....	....	....	....	....	Open 30,000 Ohm Resistor R-8

(4) CONTINUITY TESTS

The tests on page 21 show complete continuity for the receiver assembly and socket power unit 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, a voltmeter with sufficient battery to give a good deflection when connected across the battery terminals, or a direct reading "Ohmmeter" should be used in making these tests.

Socket No.	Radiotron Type
1	RCA-235
2	UY-227
3	UY-224
4	RCA-235
5	UY-227
6	UX-245
7	UX-245
8	UX-280

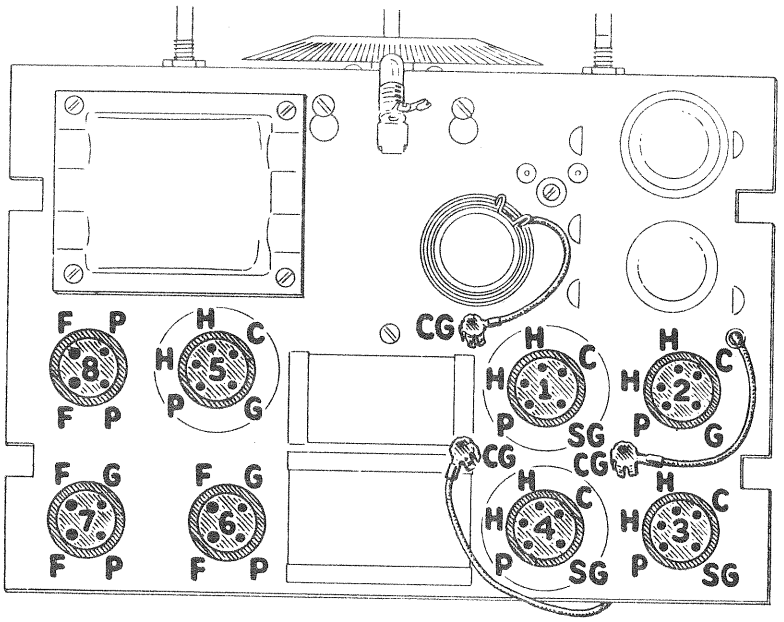

Figure 12—Socket Location and Contact Position

The resistance of the various circuits is 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 Part IV, Section 6.

The Radiotron sockets, numbers, contacts and terminals used in making these tests are shown in Figure 12. Reference to Figure 13, will be helpful while making these tests. The wiring diagram is shown in Figure 14.

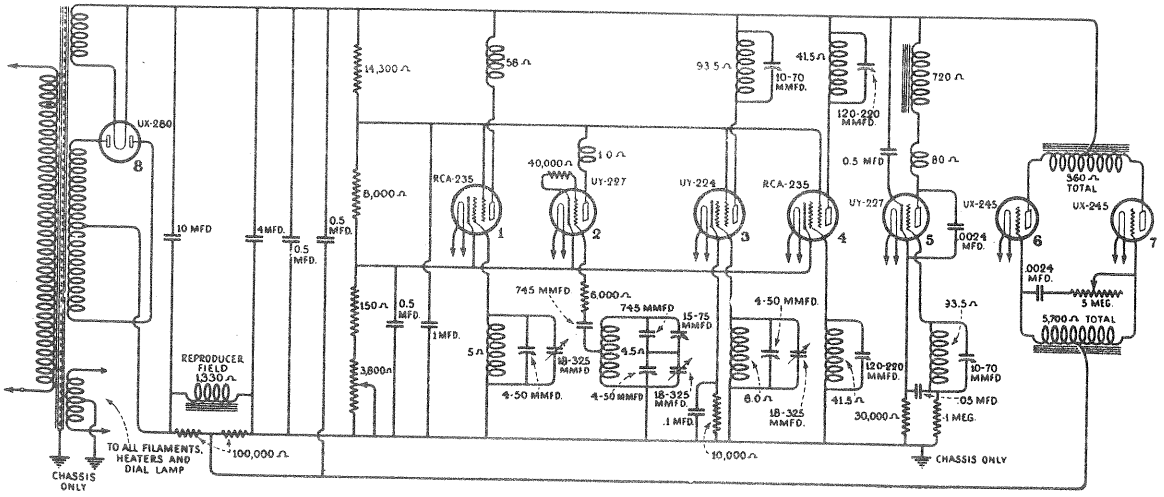

Figure 13—Continuity Schematic Diagram

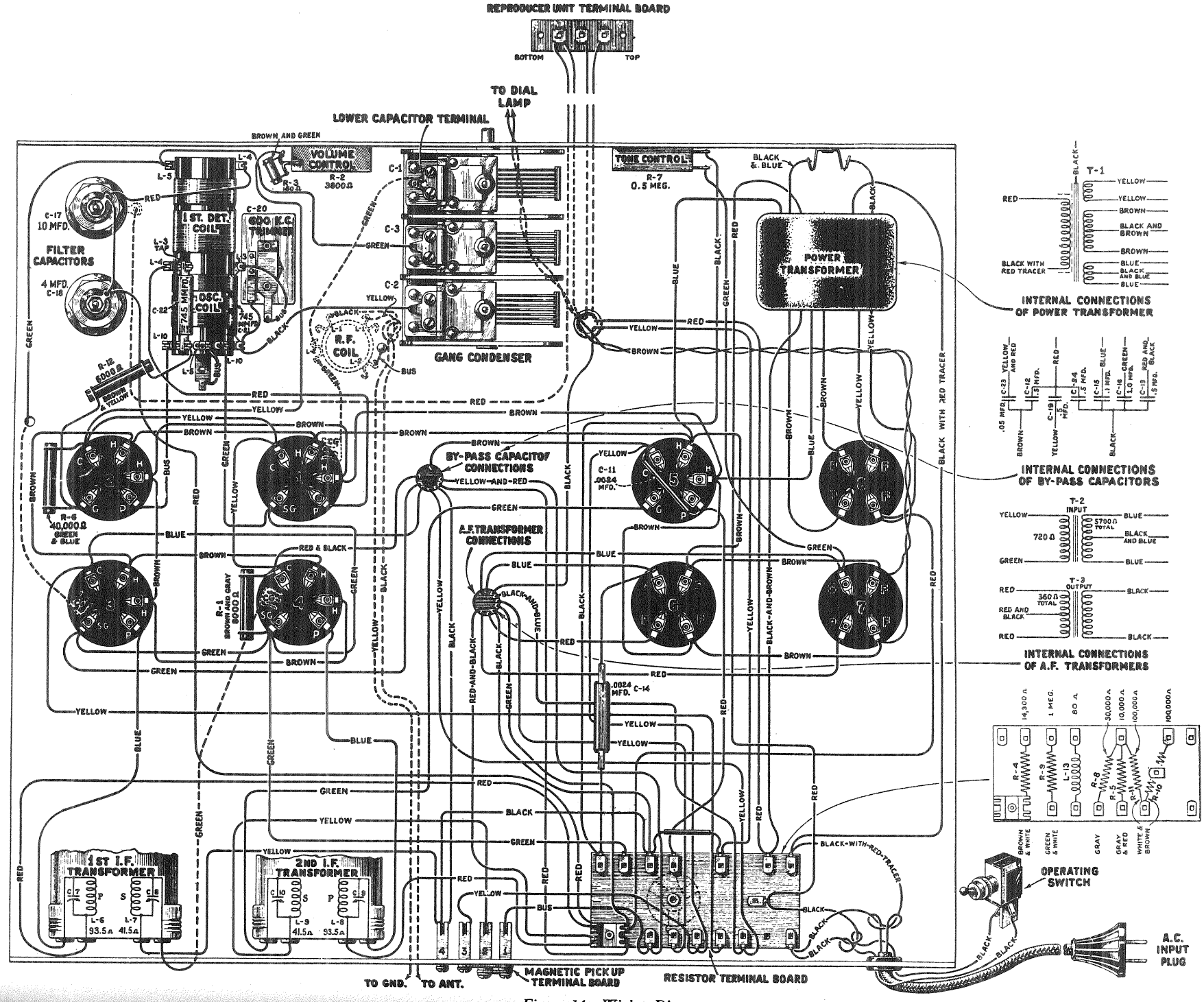

Figure 14—Wiring Diagram

CONTINUITY TESTS

VOLUME CONTROL AT MAXIMUM

DISCONNECT 4 MFD. AND 10 MFD. CONDENSERS BEFORE MAKING FOLLOWING TESTS

TERMINALS	CORRECT EFFECT	INCORRECT EFFECT	
		Indication	Caused By
Antenna lead to ground lead	Closed (40 ohms)	Open	Open antenna coupling coil
C1, 2 or 4 to gnd. (Vol. Cónt. at "Minimum")	Closed (3950 ohms)	Open Short	Open 150 ohm resistor Shorted .5 mfd. condenser
C1, 2 or 4 to Gnd. (Vol. Cont. at "Maximum")	Closed (150 ohms)	Open Short	Open volume control or 150 ohm resistor Shorted .5 mfd. condenser.
CG1 to Gnd.	Closed (5 ohms)	Open Short	Open grid coil of R. F. tube Shorted tuning or line-up condenser
SG 1, 3, 4 or P2 to Gnd.	Closed (8150 ohms)	Open Short	Open 8000 ohm or 150 ohm resistor Shorted 1 mfd. condenser
P1 to Gnd.	Closed (22,508 ohms)	Open 58 ohms 14,358 ohms 22,358 ohms	Open R. F. plate coil, 14300 ohm resistor, 8000 ohm resistor or 150 ohm resistor Shorted 4.0 mfd. or 0.5 mfd. condenser Shorted 1 mfd. condenser Shorted .5 mfd. condenser
CG2 to C2	Closed (40,000 ohms)	Open	Open 40,000 ohm resistor
P2 to Gnd.	Closed (8,151 ohms)	Open 1 ohm 8,001 ohms	Open 8,000 ohm resistor or 150 ohm resistor Shorted 1 mfd. condenser Shorted .5 mfd. condenser
C3 to Gnd.	Closed (10,000 ohms)	Open Short	Open 10,000 ohm resistor Shorted .1 mfd. condenser
CG3 to Gnd.	Closed (6.0 ohms)	Open Short	Open 1st detector grid coil Shorted 1st detector tuning or line-up condenser
P3 to Gnd.	Closed (22,543.5 ohms)	Open 22,450 ohms 93.5 ohms 14,393.5 ohms 22,393.5 ohms	Open primary of 1st I.F. transformer, 14,300 ohm resistor, 8,000 ohm resistor or 150 ohm resistor Shorted primary tuning condenser of 1st I.F. transformer. Shorted 4 mfd. or .5 mfd. condenser Shorted 1 mfd. condenser Shorted .5 mfd. condenser
CG4 to Gnd.	Closed (41.5 ohms)	Open Short	Open secondary of 1st I.F. transformer Shorted secondary tuning condenser of 1st I.F. transformer
P4 to Gnd.	Closed (22,491.5 ohms)	Open 22,450 ohms 41.5 ohms 14,341.5 ohms 22,341.5 ohms	Open primary of 2nd I.F. transformer, 14,300 ohm resistor, 8000 ohm resistor or 150 ohm resistor Shorted primary tuning condenser of 2nd I.F. transformer Shorted 4 mfd. or .5 mfd. condenser Shorted 1 mfd. condenser Shorted .5 mfd. condenser
C5 to Gnd	Closed (30,000 ohms)	Open	Open 30,000 ohm resistor
C5 to CG5	Closed (1,030,093.5 ohms)	Open Short	Open 30,000 ohm resistor and 1 meg. resistor Shorted .05 condenser
C5 to P5	Closed (53,250 ohms)	Closed (800 ohms) Short	Shorted .5 mfd. condenser Shorted .0024 mfd. condenser
CG5 to Gnd.	Closed (1 meg.)	Open Closed (30,000 ohms)	Open 1 meg. resistor Shorted .05 mfd.

Figure 14—Wiring Diagram

CONTINUITY TESTS—Continued
VOLUME CONTROL AT MAXIMUM

TERMINALS	CORRECT EFFECT	INCORRECT EFFECT	
		Indication	Caused By
P5 to Gnd.	Closed (23,250 ohms)	Open	Open R.F. choke, primary of A.F. transformer, 14,300 ohm resistor, 8000 ohm resistor or 150 ohm resistor
		800 ohms	Shorted 4 mfd. or .5 mfd. condenser
		15,100 ohms	Shorted 1 mfd. condenser
		23,100 ohms	Shorted .5 mfd. condenser
G6 to G7	Closed (5700 ohms)	Open	Open secondary of interstage transformer
		Short	Shorted .0024 mfd. condenser
P6 to P7	Closed (360 ohms)	Open	Open primary of output transformer
P8 to P8	Closed (250 ohms)	Open	Open UX-280 plate winding of power transformer
P8 to Gnd.	Closed (1455 ohms)	Open	Open field coil of reproducer or UX-280 plate winding
Across A.C. input plug	Closed	Open	Open primary of power transformer

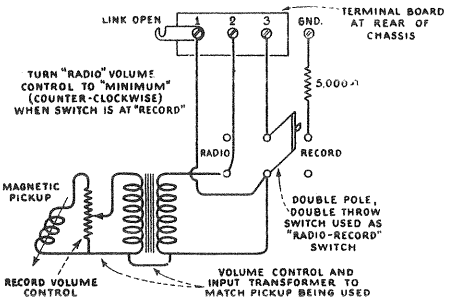

Figure 15—Connections for Attaching Magnetic Pick-up

(5) TESTING CONDENSERS

The by-pass condensers are in a metal container. The internal wiring diagram is shown in Figure 14.

The condensers can best be tested by freeing their connections and charging them with approximately 200 volts D. C. and then noting their ability to hold the charge. After charging, short circuiting the condenser terminals with a screw driver should produce a flash, the size of the flash depending on the capacity of the condenser and the voltage used for charging. A condenser that will not hold its charge is defective and requires replacement of the entire unit.

The electrolytic condensers can best be tested by measuring their leakage current. This should not exceed 2.4 M.A. for the 10 Mfd. condenser and 1.0 M.A. for the 4 Mfd. condenser, both measured with 400 D. C. volts applied across the condenser terminals.

(6) CHECKING RESISTANCE VALUES

The values of the various resistance units in this receiver are shown in the schematic diagram Figure 2. When testing a receiver for defects the various values of resistance should be checked. This may be done by a resistance bridge; the voltmeter-ammeter method, or by the following method.

For resistances of low value, 5000 ohms or less, use a voltmeter having a resistance not greater than 100 ohms per volt. For high values of resistance use a meter of 1000 ohms or more per volt. The Weston Meters, Type 301 or 280, each have a resistance of 62 ohms per volt and are satisfactory for the low values. Use sufficient battery to give a good deflection on the meter, for example, a 45 volt "B" battery for a 0–50 voltmeter. Take two readings, one of the battery alone, and one of the battery with the unknown resistance in series. Then apply the following formula:

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

(7) MAGNETIC PICKUP CONNECTIONS

Figure 15 shows the proper connections for attaching a magnetic pickup to RCA Victor Radiola Superette.

PART V—MAKING REPLACEMENTS

The various parts and assemblies of this receiver are easy of access, and replacement is comparatively simple.

(1) REMOVING CHASSIS FROM CABINET

To remove the chassis from the cabinet, proceed as follows:

(a) Remove the three control knobs on the front of the cabinet. These are of the set screw type.

(b) Unsolder the leads that connect the chassis to the loudspeaker terminal board.

(c) Remove the four screws that hold the rubber chassis supports in place. Also release the operating switch and its leads from the side of the cabinet.

(d) The chassis together with its rubber supports and their holders may be pulled clear and placed in a position convenient for work. A reversal of the above procedure may be used to replace the chassis in the cabinet.

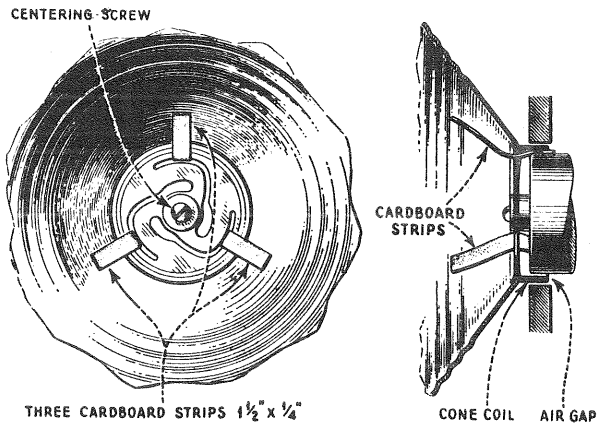

Figure 16—View of Strips in Place for Centering Cone

(2) REPLACING REPRODUCER CONE

Should replacement of the reproducer cone be necessary, proceed as follows:

(a) Remove the chassis from the cabinet as described in Part V, Section 1.

(b) Supporting the reproducer with one hand, remove the four screws, nuts and lock washers that hold it in place. Be careful not to mar the heads of these screws.

(c) Remove the six nuts, screws and lock washers that hold the metal ring and cone edge in place. Remove the cone centering screw. The cone coil is connected by means of two soldered terminals located adjacent to the cone bracket. Unsolder these leads. The cone may now be removed.

(d) Place the new cone in the position occupied by the old one, and replace cone ring, the ten screws, nuts and the lock washers. Do not tighten the screws.

(e) Place three pieces of cardboard the thickness of a visiting card and approximately 1½" x ¼" in size in the space between the inside of the cone coil and the pole piece. See Figure 16.

(f) Now replace the cone centering screw and tighten.

(g) Tighten the six screws that hold the cone edge.

(h) Remove the pieces of cardboard and solder the cone coil leads in place.

The unit may now be returned to the cabinet and the chassis replaced in the cabinet.

S. O. 7680, 15M—4-14-'31.