

Figure 3—Schematic Circuit Diagram

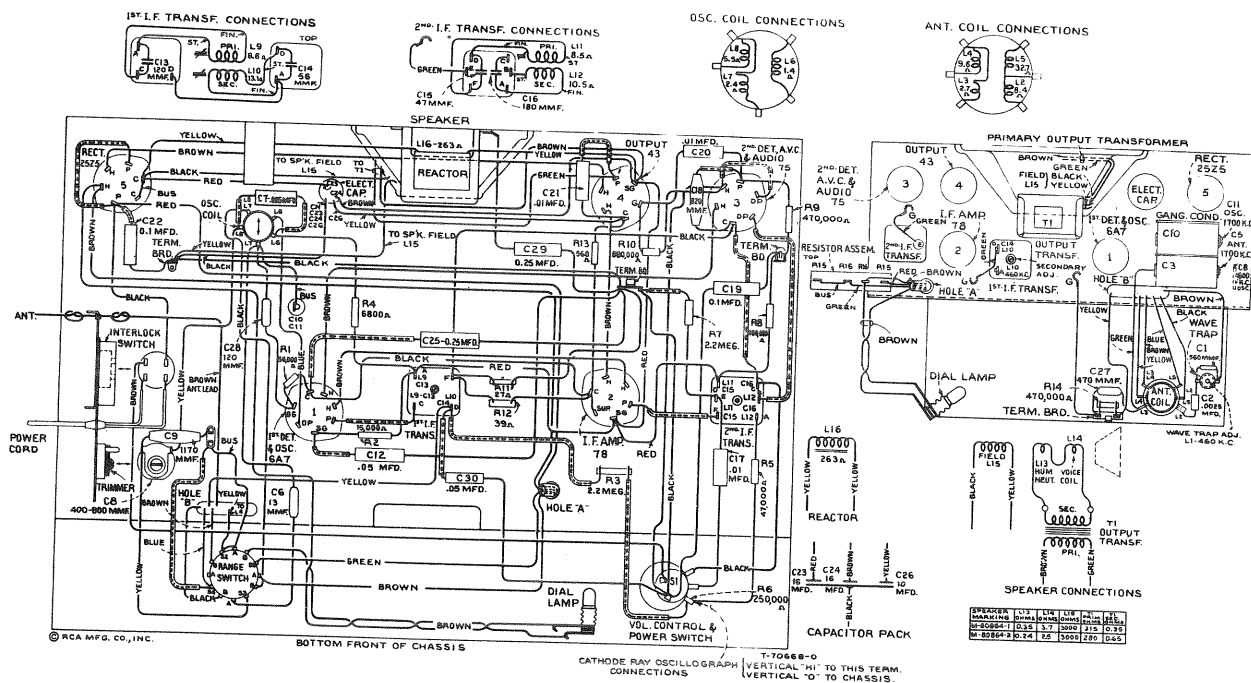


Figure 4—Chassis Wiring Diagram

# RCA VICTOR MODEL 5X2

## Five-Tube, Two-Band, AC-DC, Superheterodyne Receiver

### TECHNICAL INFORMATION

#### Electrical Specifications

<p><b>FREQUENCY RANGES</b>          "Standard broadcast"..... 540-1,800 kc.          "Short-wave".....1,800-6,500 kc.</p> <p>Intermediate Frequency.....460 kc.</p> <p><b>RADIOTRON COMPLEMENT</b>          (1) RCA-6A7.....First Detector-Oscillator          (2) RCA-78.....Intermediate Amplifier</p> <p><b>POWER SUPPLY</b>          200-250 volts, 50-100 cycles.....120 watts</p> <p><b>POWER OUTPUT</b>          Undistorted.....0.9 watts A-C, 0.7 watts D-C          Maximum.....2 watts A-C, 1.6 watts D-C          Pilot Lamps (2).....Mazda No. 40, 6.3 volts, 0.15 amperes</p>	<p><b>ALIGNMENT FREQUENCIES</b>          "Standard broadcast".....600 kc. (osc.); 1,700 kc. (osc. and ant.)          "Short-wave".....None Required</p> <p>(3) RCA-75.....Second Detector, A-F, and A.V.C.          (4) RCA-43.....Power Output          (5) RCA-12Z3.....Rectifier</p> <p>200-250 volts, D-C.....110 watts</p> <p><b>LOUDSPEAKER</b>          Type.....Electrodynamic          Voice Coil Impedance.....2.2 ohms at 400 cycles</p>
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#### Mechanical Specifications

<b>CABINET DIMENSIONS</b>		
Height.....9¼ inches	Width.....12⅞ inches	Depth.....5½ inches
Weight (Net).....16 pounds	Weight (Shipping).....20 pounds	
Chassis Base Dimensions.....9⅞ inches x 4¾ inches x 1⅞ inches		
Over-all Height of Chassis.....6⅞ inches		
Tuning Drive Ratio.....5 to 1		
Operating Controls.....(1) Power Switch-Volume, (2) Tuning, (3) Range Selector		

#### General Features

This model contains a five-tube chassis mounted in a table-type cabinet. The superheterodyne type of circuit is used, with such features of design as: automatic volume control, diode detection, magnetite core adjusted i-f transformers, improved core adjusted antenna wave-trap, band-selective illumination of full vision dial scales, resistance coupled audio system and an electrodynamic loudspeaker. Tuning range is con-

tinuous through the "Standard broadcast," and "Short wave" bands (including 49 meters). The short wave portion of this extensive range also includes channels assigned for police, amateur and aviation communication. Trimmer adjustments are located at accessible points. Their number is reduced to the least that is consistent with efficient operation.

#### Circuit Arrangement

The conventional superheterodyne type of circuit, consisting of a combined first-detector-oscillator stage, a single i-f stage, a diode-detector automatic-volume-control stage, an audio voltage amplifier stage, an audio power output stage, and a half-wave rectifier power supply stage, is used.

##### Tuned Circuits

The antenna coil system consists of two series-connected primary and two series-connected secondary windings to provide the two ranges of tuning. The oscillator coil is similarly wound on a single form. A multi-pole range selector switch, consisting of S2, S3, S4, and S5, is used to connect the various sections of these coil systems and to illuminate the proper tuning dial scale for the band in operation. The coils are tuned by a variable two-section gang condenser hav-

ing trimming capacitors in shunt with each section. A series trimming capacitor is also associated with the "Standard broadcast" oscillator coil.

The intermediate frequency amplifier system consists of an RCA-78 in a transformer coupled circuit. This stage operates at a basic frequency of 460 kc. Adjustable magnetite cores are provided for adjusting inductance of the input i-f transformer (primary and secondary) and the output transformer (primary) windings.

##### Detector and A.V.C.

The modulated signal, as obtained from the output of the i-f stage, is detected by one of the diodes in the RCA-75 tube. The audio frequency component, secured by this process, is transferred from the movable arm of the volume control R8 through coupling

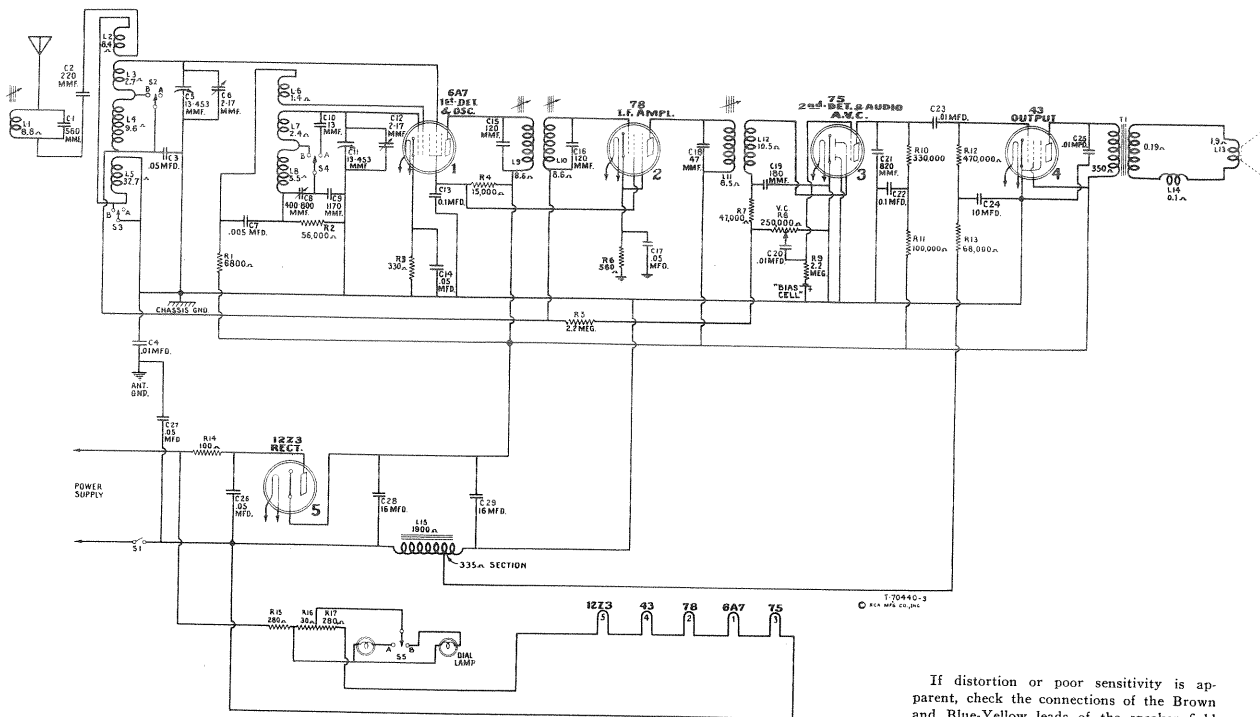


Figure 1—Schematic Circuit Diagram

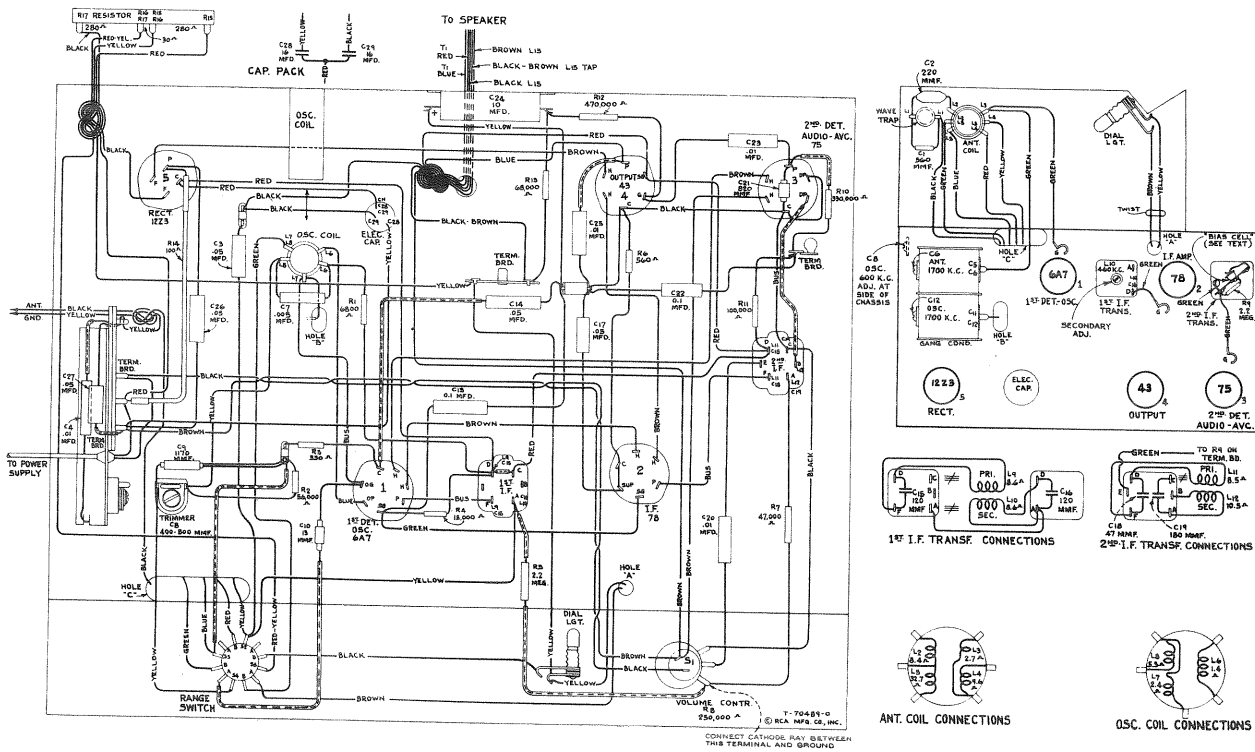


Figure 2—Chassis Wiring Diagram, Radiotron, Coil, and Trimmer Locations

capacitor C20 to the control grid of the RCA-75 for voltage amplification. The d-c voltage which results from detection of the signal is used for automatic volume control. This voltage which develops across resistor R8 is applied as automatic control grid bias to the first-detector and i-f tube through a suitable resistance filter circuit.

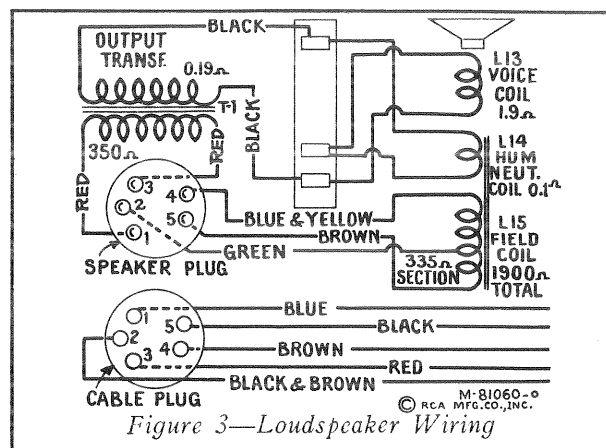
### Audio System

The audio frequency component, mentioned under "Detection and A.V.C.," transferred to the control grid of the RCA-75, is amplified in the tube and then coupled to the control grid of the power output tube RCA-43 through capacitor C23. The output of the power amplifier is transformer coupled into the dynamic loudspeaker. A single "Bias Cell," see figures 1 and 2, is used for supplying bias voltage to the control grid of the RCA-75 tube.

### Rectifier

The plate, grid, cathode, and loudspeaker field

voltages required for the operation of this receiver are supplied by the RCA-12Z3 tube operating as a half-wave rectifier.



## SERVICE DATA

**CAUTION:** Certain tests (e.g. alignment and voltage measurement) require operation of receiver with chassis removed from cabinet. Avoid external grounding of receiver chassis or associated equipment since the power supply is now connected to receiver chassis through the speaker field. Carelessness may cause serious damage to equipment.

### Alignment Procedure

There are three alignment trimmers provided in the antenna coil and oscillator coil tuned circuits. The i-f transformer adjustments are made by means of three screws attached to molded magnetite cores.

Improper alignment usually causes the impairment of sensitivity, selectivity, and tone quality. Such con-

ditions will usually exist simultaneously.

In re-adjusting the tuned circuits, it is important to apply a definite procedure and to use adequate and reliable test equipment. A standard test oscillator, such as the **RCA Stock No. 9595** will be required as the source of the signal at the specified alignment frequencies. Visual indication of the receiver output during alignment is also necessary to accurately show when the correct point of adjustment is reached. The **RCA Stock No. 4317 Neon Output Indicator** is especially suitable for this use.

The procedure outlined below should be followed in adjusting the various trimming capacitors and molded magnetite cores.

### I-F Core Adjustments

The three adjustment screws (one on top and one on bottom of first i-f transformer and one on bottom of second i-f transformer) are located as shown by figures 2 and 6. Each circuit must be aligned to a basic frequency of 460 kc. To do this attach the output indicator across the loudspeaker voice coil or across the output transformer primary. Connect the output of the test oscillator through a .05 mfd. capacitor to the RCA-6A7 control grid, the ground of the test oscillator being connected to the receiver external yellow ground lead. Set the test oscillator to 460 kc. Place the range selector in "Short wave" position. Advance the receiver volume control to its full-on position and adjust the receiver tuning control to a point within its range where no interference is encountered either from local broadcast stations or heterodyne oscillator. Increase the output of the test oscillator until a slight indication is apparent on the output indicator.

Adjust the bottom magnetite core screw of the second i-f transformer to produce maximum (peak) indicated receiver output. Then adjust the two magnetite core screws of the first i-f transformer for maximum (peak) receiver output as shown by the indicating device.

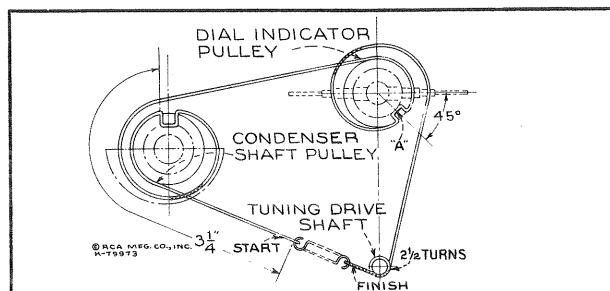


Figure 4—Tuning Drive Cord Mechanism

Rear view of drive assembly showing threading of drive cord with variable condenser plates in full mesh. To perform this operation, unsolder the four leads (connected between antenna coil and range selector switch) from the range selector switch, unsolder antenna lead-in wire from wave-trap terminal, unsolder lead from rear section of gang tuning condenser, and remove the four screws which secure the tuning drive frame to the chassis proper. This frame with gang tuning condenser still attached may now be easily removed for the threading operation. The relative position of the parts and method of threading are shown on the above diagram. In case the cord is too long for proper tension, it may be effectively shortened by first releasing finish end of cord, inserting a match or other shim under the cord at point "A" and then re-hooking the end of the cord to the tension spring. Replace drive assembly and re-solder leads.

During these adjustments regulate the test oscillator output so the indication is always as low as possible. By doing so, broadness of tuning due to A.V.C. action will be avoided. It is advisable to repeat the adjustment of all i-f magnetite core screws to assure that the interaction between them has not disturbed the original adjustment.

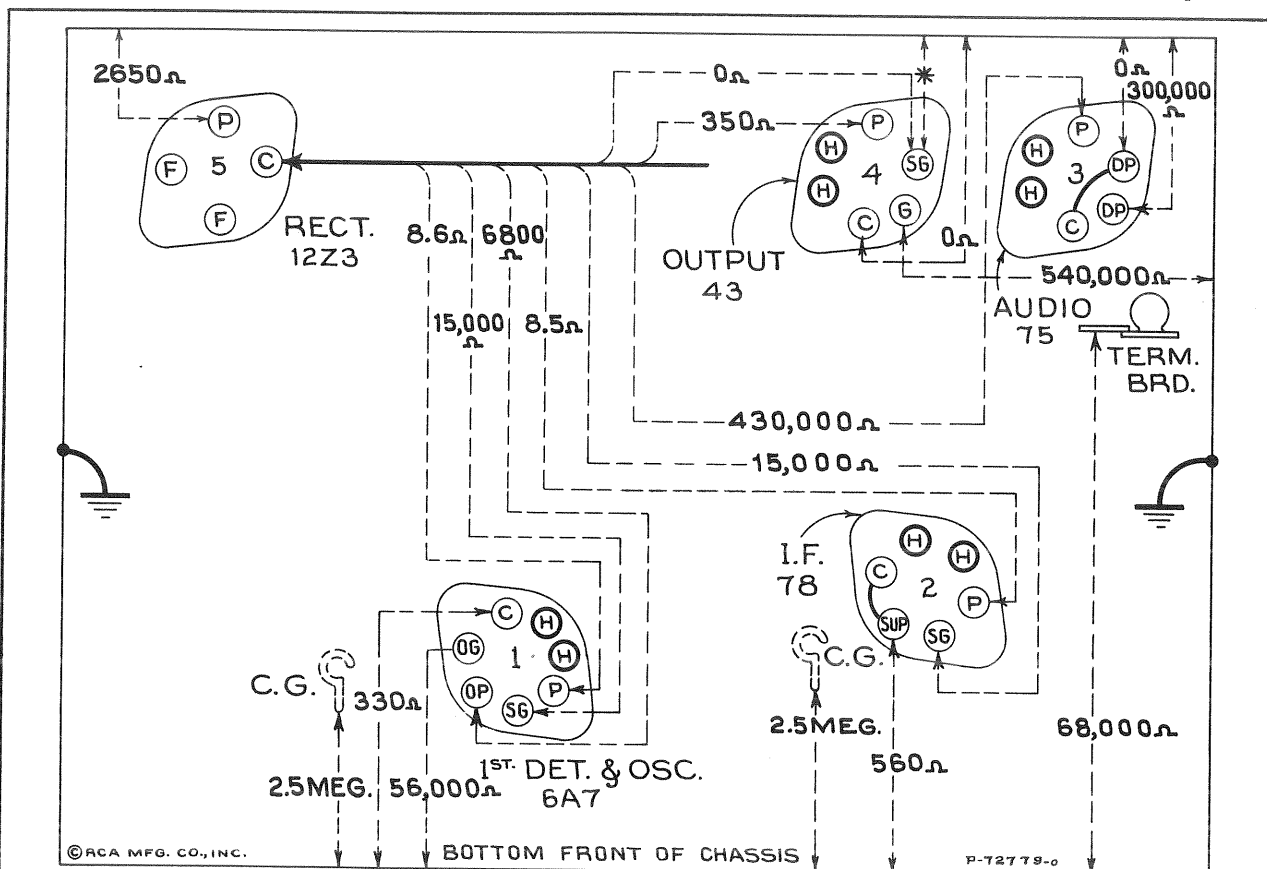
### Wave-Trap Adjustment

Attach the output of the test oscillator to the black antenna lead through a 200 mmfd. capacitor, the ground connection of the test oscillator and receiver being connected as before.

Leave the test oscillator adjusted to 460 kc., and range selector in "Short wave" position as before. Then adjust the wave-trap trimmer to the point which causes maximum suppression of the 460 kc. signal.

### R-F Trimmer Adjustments

Roughly calibrate the tuning dial by setting the pointer to the bottom horizontal line at the low frequency end of the broadcast scale with the two-gang tuning condenser at its maximum capacity. The output indicator should be left connected to the output system. The connections for the test oscillator remain the same as for "Wave-trap" adjustment. Volume control should be in maximum position.



**CAUTION: REMOVE BIAS CELL BEFORE MAKING RESISTANCE MEASUREMENTS.**  
**NOTE: \* OPEN CIRCUIT (LEAKAGE ELECTROLYTIC CAPACITORS ONLY).**

Figure 5—Resistance Diagram

Power supply disconnected—Tuning condenser in full mesh—Volume control at maximum  
 Radiotrons in sockets

### Resistance Measurement

**CAUTION:** The "Bias Cell," see figures 1 and 2, should be carefully removed before any resistance measurements are made. Do not allow the spring contact clips to short-circuit "Bias Cell" during its removal or insertion.

The resistance values shown between Radiotron socket contacts, grid caps, resistors, terminals, and receiver chassis ground, on figure 5 have been carefully selected so as to facilitate a rapid check of the circuit for defective parts, bad joints, etc. The use of this diagram in conjunction with the Schematic Circuit Diagram, figure 1, and the Chassis Wiring Diagram, figure 2, will permit the location of certain troubles which would otherwise be difficult

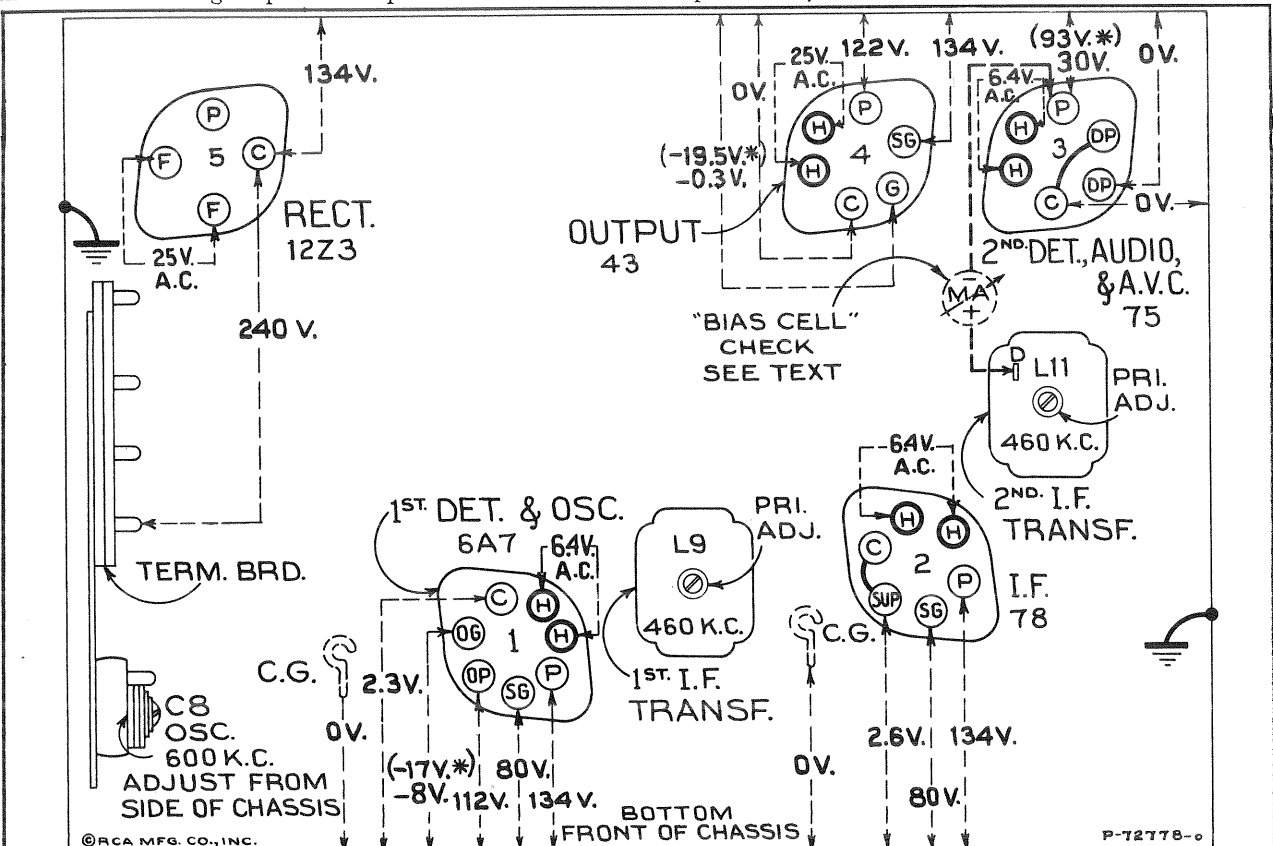
to ascertain. Each value as specified should hold within  $\pm 20\%$ . Variations in excess of this limit will usually be indicative of trouble in the basic circuits. Resistance values were measured with the Radiotrons in sockets; power supply disconnected; tuning condenser in full mesh, and volume control set at maximum except where otherwise noted. In all cases of measuring the resistance between points of the circuit and ground, it will be necessary to connect the negative (-) terminal of the resistance meter to the chassis ground. If the polarity of the resistance meter is not known, it may be readily ascertained by connecting a d-c voltmeter of indicated polarity across the terminals of the device.

Set range selector to "Standard broadcast" position.

Set oscillator and antenna trimming capacitors C12 and C6, respectively, to a position near minimum capacitance (plates near out). Adjust the test oscillator to 1,700 kc.

Tune the receiver to pick up this signal (near 1,700 kc. on dial) for maximum response disregarding dial reading. Always keep test oscillator output as low as is possible and still obtain visual indication. Adjust trimming capacitors C12 and C6 so that each produces maximum (peak) receiver output, re-adjusting receiver tuning slightly if necessary, but using the minimum trimming capacitance possible to obtain

peaks. Adjust the dial pointer (without disturbing gang tuning condenser) to a dial reading of 1,700 kc. Shift the test oscillator to 600 kc. Tune the receiver to receive the signal disregarding the dial reading at which it is best received. Then adjust the oscillator series capacitor, C8, simultaneously rocking the tuning control backward and forward through the signal until maximum receiver output results from these combined operations. The adjustment at 1,700 kc. should then be repeated to correct for any change which may have been caused by the oscillator series trimming capacitor adjustment.



**CAUTION: NEVER CONNECT VOLTMETER TO CONTROL GRID OF TUBE N° 3 (RCA-75)—SEE TEXT.**

Figure 6—Radiotron Socket Voltages and Trimmer Locations

Measured at 230 volts, 60 cycle supply—For 230 volt D-C approximately 10% lower  
Tuned to approximately 1,000 kc. ("Standard broadcast" position)—No signal being received—  
Volume control setting optional

### Radiotron Socket Voltages

**Note:** Two voltage values are shown for some readings. The higher value shown in parenthesis with asterisk (\*) indicates operating conditions without voltmeter loading. The lower value is the actual measured voltage and differs from the higher value because of the additional loading of the voltmeter through the high series circuit resistance.

**CAUTION:** The voltage between the RCA-75 control grid and ground should never be measured. All ordinary meters will paralyze the "Bias Cell," see figures 1 and 2, in this circuit for a period of approximately one to two hours. To check "Bias Cell," connect 0-1 M.A. milliammeter as shown on figure 6. A satisfactory cell should give a steady reading on the meter between 0.3 and 0.65 M.A. when used with a good RCA-75 tube.

The voltage values indicated from the Radiotron socket contacts, grid caps, resistors and terminals to receiver chassis ground on figure 6 will assist in locating cause for faulty operation. Each value as specified should hold within  $\pm 20\%$  when the receiver is normally operative at its rated line voltage. Variations in excess of this limit will usually be indicative of trouble in the basic circuits. These voltages were measured with set tuned to approximately 1,000 kc. ("Standard broadcast" range); no signal being received and volume control setting optional. To duplicate the conditions under which the voltages were measured requires a 1,000 ohm-per-volt d-c meter, having ranges of 10, 50 and 250 volts. Voltages between 0 and 10 read on 10-volt scale, between 10 and 50 on 50-volt scale, and between 50 and 250 on 250-volt scale. A-C voltages were measured with a corresponding a-c meter.



## Loudspeaker

Centering of the loudspeaker voice coil is made in the usual manner with three narrow paper feelers after first removing the front paper dust cover. This may be removed either permanently by cutting it

away with a sharp knife, or by softening its cement with a very light application of acetone using care not to allow the acetone to flow down into the air gap. The dust cover may be cemented back in place with ambroid upon completion of adjustment.

# 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
<b>RECEIVER ASSEMBLIES</b>					
11409	Band—Rubber band for first I.F. Transformer—Package of 5.....	.10	4794	Socket—4-contact 12Z3 Radiotron socket	.15
12118	Cap—Grid contact cap—Package of 5...	.15	4786	Socket—6-contact 43, 75, or 78 Radiotron socket.....	.15
11978	Capacitor—Adjustable capacitor (C8)...	.50	4787	Socket—7-contact 6A7 Radiotron socket..	.15
12535	Capacitor—13 Mmfd. (C10).....	.18	12007	Spring—Retaining spring for Stock No. 12006—Package of 10.....	.36
12405	Capacitor—47 Mmfd. (C18).....	.26	12403	Transformer—First I.F. transformer with shield (L9, L10, C15, C16).....	1.62
12404	Capacitor—120 Mmfd. (C15, C16).....	.26	12676	Transformer—Second I.F. transformer complete with shield (L11, L12, C18, C19, R3).....	1.72
12406	Capacitor—180 Mmfd. (C19).....	.26	12497	Trap—Wave trap (L1).....	.70
12694	Capacitor—220 Mmfd. (C2).....	.22	12394	Volume Control—Control and power switch (R8, S1).....	1.06
12537	Capacitor—560 Mmfd. (C1).....	.20	<b>DRIVE ASSEMBLY</b>		
12536	Capacitor—820 Mmfd. (C21).....	.25	12401	Condenser—2-gang variable tuning condenser (C5, C6, C11, C12).....	2.35
12534	Capacitor—1,170 Mmfd. (C9).....	.28	12420	Cord—Variable tuning condenser drive cord—Package of 5.....	.20
4868	Capacitor—.005 Mfd. (C7).....	.20	12608	Dial—Station selector dial scale.....	.45
4858	Capacitor—.01 Mfd. (C4, C20, C23, C25)	.25	12419	Indicator—Station selector indicator pointer	.15
4836	Capacitor—.05 Mfd. (C3, C14, C17)....	.30	12416	Pulley—Indicator pointer shaft and pulley	.24
12078	Capacitor—.05 Mfd. (C26, C27).....	.30	12417	Pulley—Variable tuning condenser pulley and set screws.....	.24
4841	Capacitor—0.1 Mfd. (C13, C22).....	.22	12418	Screw—8-32x3/16 milled head, cupped point, set screw for pulley Stock No. 12417—Package of 10.....	.18
12682	Capacitor—10 Mfd. (C24).....	.70	12422	Shaft—Variable condenser tuning knob shaft.....	.26
12677	Capacitor—2 Sections each 16 Mfd. (C28, C29).....	3.12	12421	Spring—Drive cord tension spring—Package of 10.....	.60
12681	Cell—Bias cell for Stock No. 12676....	.30	<b>REPRODUCER ASSEMBLY</b>		
12495	Coil—Antenna coil (L2, L3, L4, L5)....	1.30	12641	Board—Reproducer terminal board.....	.15
12680	Coil—Coil windings and form only for second I.F. transformer Stock No. 12676 (L11, L12).....	.60	12640	Bracket—Output transformer mounting bracket.....	.18
12496	Coil—Oscillator coil (L6, L7, L8).....	.80	12674	Coil—Reproducer field coil (L15).....	1.70
12006	Core—Adjustable core for Stock No. 12403, 12497 and 12676.....	.22	11469	Coil—Reproducer neutralizing coil (L14)	.20
4340	Lamp—Dial lamp—6.3 volt—Package of 5	.60	12642	Cone—Reproducer cone and dust cap (L13).....	.94
12409	Lead—Antenna lead—approximately 20 feet long.....	.35	12493	Connector—5-contact female connector for reproducer cable.....	.20
12395	Range Switch—(S2, S3, S4, S5).....	.68	12567	Connector—5-contact male connector for reproducer cable.....	.22
12697	Resistor—100 ohm, flexible type (R14)—Package of 5.....	.65	9711	Reproducer complete.....	6.42
12481	Resistor—330 ohm, insulated, ¼ watt, (R3)—Package of 5.....	1.00	11828	Transformer—Output transformer (T1)..	1.46
12414	Resistor—560 ohm, insulated ¼ watt, (R6)—Package of 5.....	1.00	11886	Washer—Spring washer to hold field coil securely—Package of 5.....	.20
12265	Resistor—6,800 ohm, insulated, ¼ watt, (R1)—Package of 5.....	1.00	<b>MISCELLANEOUS ASSEMBLY</b>		
12695	Resistor—15,000 ohm, insulated, ¼ watt, (R4)—Package of 5.....	1.00	12548	Crystal—Dial escutcheon and crystal....	1.06
12412	Resistor—47,000 ohm, insulated, ¼ watt, (R7)—Package of 5.....	1.00	12673	Knob—Station selector, volume control or range switch knob—Package of 5.....	.58
12286	Resistor—56,000 ohm, insulated, ¼ watt, (R2)—Package of 5.....	1.00	12672	Resistor—Wire wound ballast and line resistor comprising two 280 ohm sections and one 42 ohm section (R15, R16, R17).....	1.55
12696	Resistor—68,000 ohm, insulated, ¼ watt, (R13)—Package of 5.....	1.00	11210	Screw—Chassis mounting screw assembly comprising 1 screw, 1 lockwasher and 1 washer—Package of 4.....	.28
12263	Resistor—100,000 ohm, insulated, ¼ watt, (R11)—Package of 5.....	1.00	4119	Screw—Set screw for knob Stock No. 12673—Package of 20.....	.38
12452	Resistor—330,000 ohm, insulated, ¼ watt, (R10)—Package of 5.....	1.00			
12285	Resistor—470,000 ohm, insulated, ¼ watt, (R12)—Package of 5.....	1.00			
12679	Resistor—2.2 Megohm, insulated, ¼ watt, (R5, R9)—Package of 5.....	1.00			
12008	Shield—First I.F. transformer shield....	.28			
12607	Shield—First I.F. transformer shield top	.30			
12218	Shield—Radiotron shield.....	.15			
12678	Shield—Second I.F. transformer shield complete with bias cell holder.....	.38			
12400	Socket—Dial lamp socket.....	.22			

First Edition.

Prices quoted above are subject to change without notice.

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