

# RCA VICTOR MODELS 4X, 4X3, and 4X4

## Four-Tube, Single-Band, AC-DC, Superheterodyne Receivers

### TECHNICAL INFORMATION

#### Electrical Specifications

FREQUENCY RANGE		ALIGNMENT FREQUENCIES	
"Standard Broadcast" (A)..... 540-1,720 kc		"Standard Broadcast" (A)...1,500 kc (osc. and ant.)	
Intermediate Frequency.....460 kc			
RADIOTRON COMPLEMENT			
(1) RCA-6A7.....First Detector-Oscillator	(3) RCA-43.....Power Output		
(2) RCA-6F7.....I.F. and Second Detector	(4) RCA-25Z5.....Half-wave Rectifier		
Power Supply Rating (105-125 volts).....50-60 cycles—55 watts, D.C.—50 watts			
POWER OUTPUT		LOUDSPEAKER	
Undistorted.....0.3 watts A.C., 0.25 watts D.C.	Type.....Electrodynamic		
Maximum.....0.8 watts A.C., 0.6 watts D.C.	Impedance (v.c.) $\left\{ \begin{array}{l} \text{M80864-1, 4.5 ohms} \\ \text{M80864-2, 3.0 ohms} \end{array} \right\}$ at 400 cycles		
Pilot Lamp.....Mazda No. 40, 6.3 volts, 0.15 ampere			

#### Mechanical Specifications

CABINET DIMENSIONS	MODEL 4X	MODEL 4X3	MODEL 4X4
Height.....	10 $\frac{7}{8}$ inches.....	12 inches.....	10 $\frac{1}{2}$ inches
Width.....	8 $\frac{5}{16}$ inches.....	7 $\frac{1}{2}$ inches.....	7 $\frac{3}{8}$ inches
Depth.....	5 $\frac{5}{8}$ inches.....	5 $\frac{1}{8}$ inches.....	5 $\frac{5}{8}$ inches
WEIGHTS			
Net.....	9 pounds.....	9 pounds.....	8 $\frac{1}{2}$ pounds
Shipping.....	11 pounds.....	11 pounds.....	10 $\frac{1}{2}$ pounds
Chassis Base Dimensions.....9 $\frac{1}{4}$ inches x 4 $\frac{5}{8}$ inches x 1 $\frac{1}{2}$ inches			
Over-all Height of Chassis.....5 $\frac{3}{4}$ inches			
Operating Controls.....(1) Power Switch-Volume, (2) Tuning			

#### General Features

Each model contains a four-tube chassis mounted in a table-type cabinet. The superheterodyne type of circuit is used, with such features of design as magnetite core adjusted i-f transformers, improved core adjusted antenna wave-trap, illumination of full-

vision dial scale, resistance-coupled audio system, and an electrodynamic loudspeaker. The tuning range covers from 540 to 1,720 kc which includes the standard-broadcast and one police band.

#### Circuit Arrangement

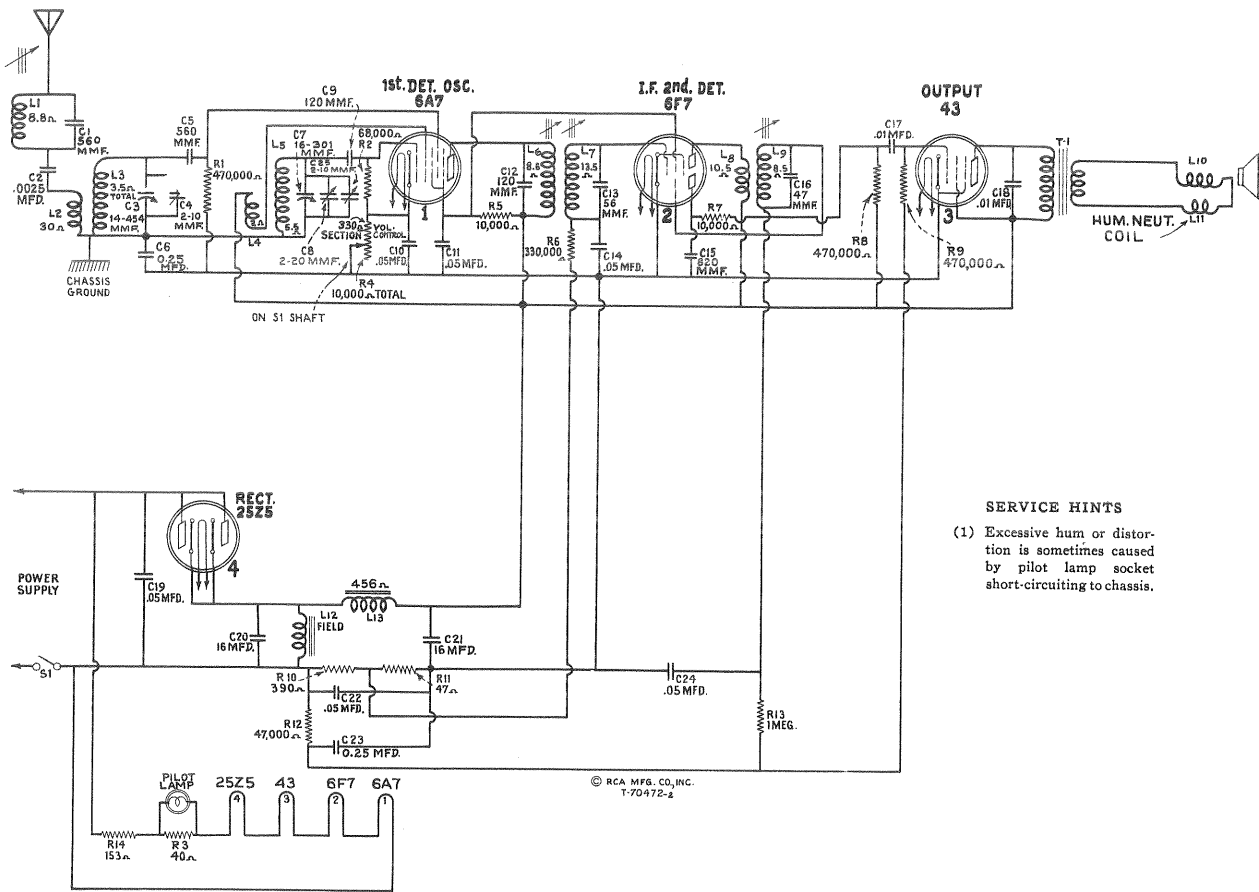
The conventional superheterodyne type of circuit, consisting of a combined first-detector-oscillator stage, a combined i-f amplifier and second detector stage, an audio power-output stage, and a half-wave rectifier stage, is used.

##### Tuned Circuits

The antenna and oscillator coils are tuned by a variable two-section gang condenser having trimming

capacitors in shunt with each section. A wave-trap is employed and is connected in series with the antenna to reduce undesirable signals in the range of the i-f amplifier. It is tuned to 460 kc by means of a screw attached to the molded magnetite core.

The intermediate-frequency amplifier system consists of the pentode section of the RCA-6F7 in a transformer-coupled circuit. This stage operates at a basic frequency of 460 kc. Adjustable magnetite cores are provided for adjusting the inductance of



**SERVICE HINTS**  
 (1) Excessive hum or distortion is sometimes caused by pilot lamp socket short-circuiting to chassis.

Figure 1—Schematic Circuit Diagram

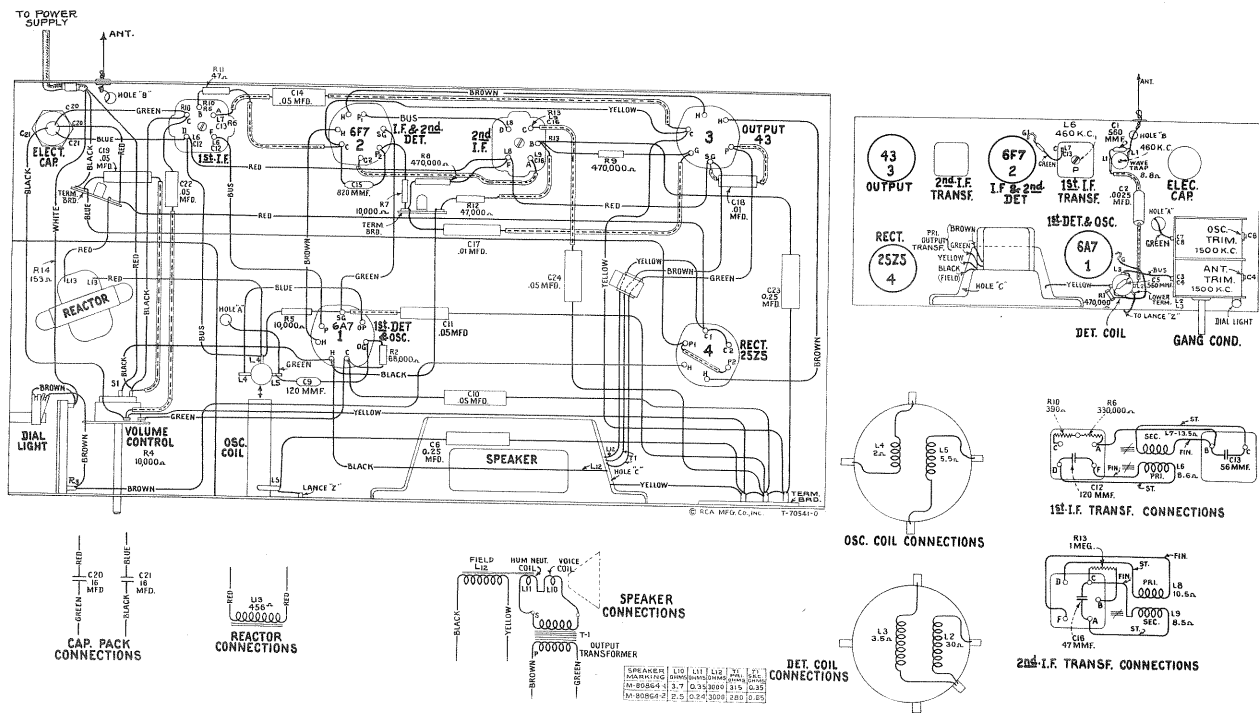


Figure 2—Chassis Wiring Diagram, Radiotron, Coil, and Trimmer Locations

the first i-f transformer primary and secondary, and the second i-f transformer secondary windings to 460 kc.

### Second Detector and Audio System

The second-detector circuit uses the triode-portion of the RCA-6F7 in a conventional three-element power-detector circuit. The output of this stage is resistance-capacitance coupled to an RCA-43 power-

output tube which, in turn, is transformer-coupled to the dynamic speaker.

### Rectifier

The plate, grid, cathode, and the loudspeaker field voltages required for the operation of this receiver are supplied by the RCA-25Z5 tube operating as a half-wave rectifier.

## SERVICE DATA

### Alignment Procedure

There are two 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. The wave-trap is likewise adjusted by a screw attached to its molded core. Re-adjustment may occasionally occur from continued extremes of climate, tampering, purported alteration for services, or after repairs have been made to the r-f or i-f tuned circuits. Improper alignment usually causes the impairment of sensitivity, selectivity, and tone quality. Such conditions 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:

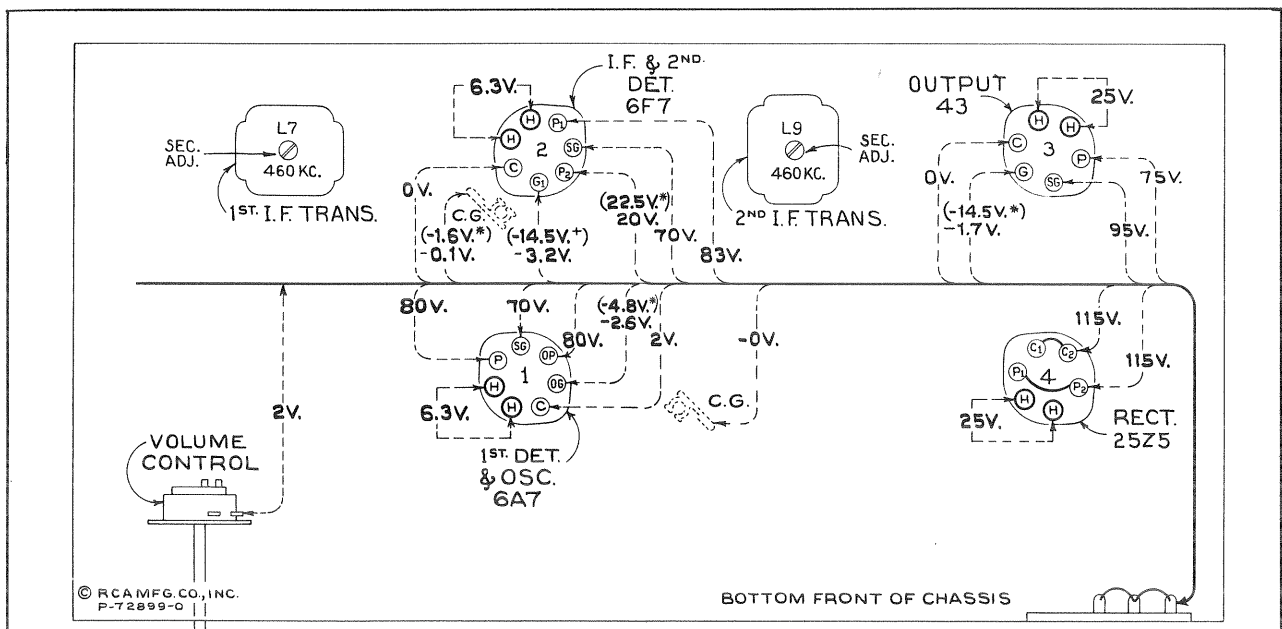


Figure 4—Radiotron Socket Voltages and Trimmer Locations

Measured at 115 volts, 60-cycle supply—For 115-volt d-c supply approximately 10% lower  
Tuned to approximately 550 kc—No signal being received—  
Volume control maximum

### Radiotron Socket Voltages

The voltage values indicated from the Radiotron socket contacts, grid caps, resistors, and terminals to receiver chassis ground, on figure 4, 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 approxi-

mately 550 kc, no signal being received, and volume control set to maximum. 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. Use nearest range above voltage to be measured. A-c voltages were measured with a corresponding a-c meter.

## 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 4. Each circuit must be aligned to a basic frequency of 460 kc. To do this, attach the output indicator across the loudspeaker voice coil. 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 chassis. Set the test oscillator to 460 kc. 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 broadcast stations or the heterodyne oscillator. Increase the output of the test oscillator until a slight indication is apparent on the output indicator.

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

output as shown by the indicating device.

It is advisable to repeat the adjustment of all i-f core screws to assure that the inter-action between them has not disturbed the original adjustment.

## Wave-Trap Adjustment

Attach the output of the test oscillator to the "Antenna terminal" (see wave-trap, top view chassis, figure 2) through an 80-mmfd. capacitor, the ground connection of the test oscillator and receiver chassis being connected as before. Receiver "Antenna wire" should be reeled up for this and the following r-f adjustments.

Leave the test oscillator adjusted to 460 kc as before. Then adjust the wave-trap trimmer to the point which causes maximum suppression of the 460 kc signal.

## R-F Trimmer Adjustments

Since the dial is mounted on the cabinet, it will be necessary to perform the operations, in sequence, as follows:

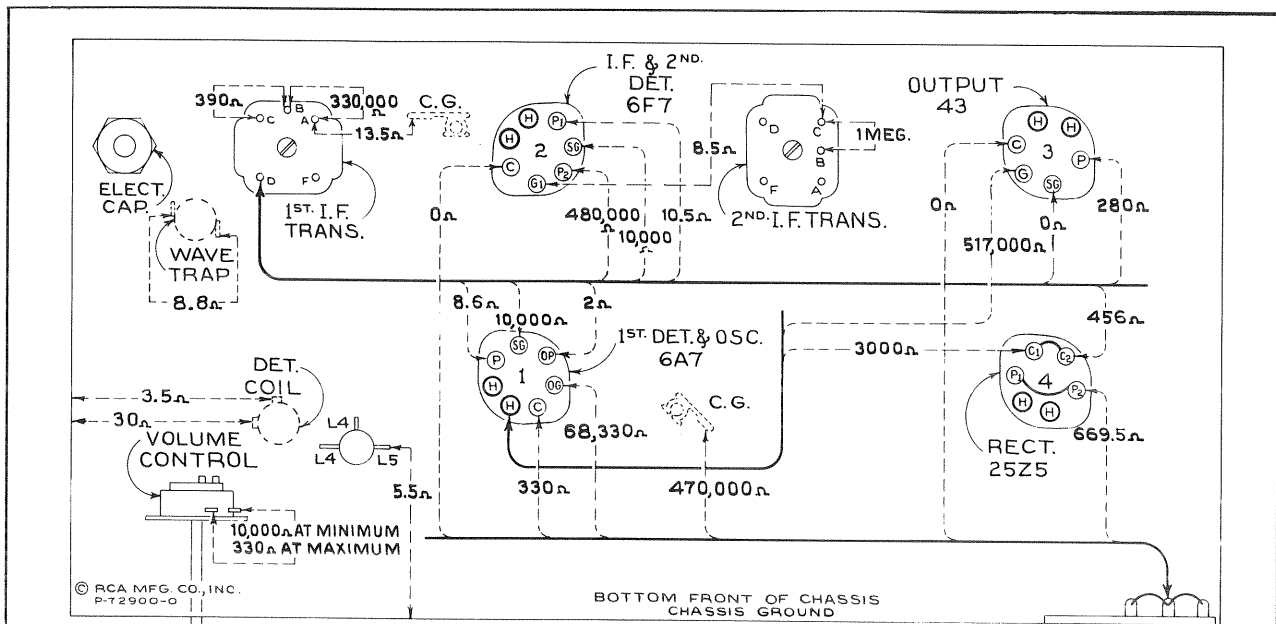


Figure 3—Resistance Diagram

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

## Resistance Measurements

The resistance values shown between Radiotron socket contacts, grid caps, resistors, terminals, and receiver chassis ground, on figure 3, 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.

Place the receiver in its cabinet. Set the gang tuning condenser to its maximum capacity (full-mesh) position and place the tuning knob on the gang tuning condenser shaft. Tighten the knob set screw with the dial pointer set to the low-frequency calibration line beyond 550 kc (beyond "55" on the dial). Turn the tuning knob until the dial pointer indicates 1,500 kc. Remove the tuning knob from shaft and receiver from cabinet, being careful not to disturb the setting of the gang condenser.

With the test oscillator and output indicator connected as specified under "Wave-trap adjustment" and receiver volume control in its maximum position, tune the test oscillator to 1,500 kc and regulate its

output to produce a suitable indication on the output indicator. Adjust the oscillator and antenna trimmers C8 and C4 for maximum (peak) output.

## 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>					
12118	Cap—Grid contact cap—Package of 5...	.15	12218	Shield—Radiotron shield.....	.15
12405	Capacitor—47 Mmfd. (C16).....	.26	12607	Shield—Shield top for Stock No. 12839	.30
12629	Capacitor—56 Mmfd. (C13).....	.20	12007	Spring—Retaining spring of core Stock No. 12006—Package of 10.....	.36
12404	Capacitor—120 Mmfd. (C12).....	.26	4786	Socket—6-contact 43 or 25Z5 radiotron socket.....	.15
12724	Capacitor—120 Mmfd. (C9).....	.28	4787	Socket—7-contact 6A7 or 6F7 radiotron socket.....	.15
12537	Capacitor—560 Mmfd. (C1, C5).....	.20	12846	Socket—Dial lamp socket.....	.25
12536	Capacitor—820 Mmfd. (C15).....	.25	12839	Transformer—First I.F. transformer complete (L6, L7, C12, C13, R6, R10)...	2.30
5107	Capacitor—.0025 Mfd. (C2).....	.16	12840	Transformer—Second I.F. transformer complete (L8, L9, C16, R13).....	1.50
4858	Capacitor—.01 Mfd. (C17, C18).....	.25	12497	Trap—Wave trap (L1).....	.70
4836	Capacitor—.05 Mfd. (C10, C11, C14, C22, C24).....	.30	12836	Volume Control and power switch (R4, S1).....	1.10
4886	Capacitor—.05 Mfd. (C19).....	.20	<b>REPRODUCER ASSEMBLIES</b> (M80864-1)		
4840	Capacitor—0.25 Mfd. (C23).....	.30	12499	Coil—Field coil (L12).....	1.60
12484	Capacitor—0.25 Mfd. (C6).....	.24	12731	Coil—Neutralizing coil (L11).....	.22
12844	Capacitor—Pack comprising 2 sections each 16 Mfd. (C20, C21).....	2.55	12498	Cone—Reproducer cone and dust cap (L10).....	1.20
12837	Coil—Antenna coil (L2, L3).....	1.50	9684	Reproducer Complete.....	2.25
12838	Coil—Oscillator coil (L4, L5).....	.85	12500	Transformer—Output transformer (T1)...	1.60
12842	Condenser—2-gang variable tuning condenser (C3, C4, C7, C8).....	2.30	<b>REPRODUCER ASSEMBLIES</b> (M80864-2)		
12847	Cord—Power cord, 153 ohm resistance (R14).....	.95	13149	Coil—Reproducer field and neutralizing coil (L11, L12).....	1.60
12006	Core—Adjustable core and stud for Stock No. 12497, 12839 and 12840.....	.22	13148	Cone—Reproducer cone complete (L10)	1.25
4340	Lamp—Dial lamp, 6.3 volt—Package of 5	.60	9750	Reproducer—Speaker complete.....	5.50
12409	Lead—Antenna lead approximately 20 feet long.....	.35	13151	Transformer—Output transformer (T1)...	1.60
12843	Reactor—Iron core reactor (L13).....	1.00	<b>MISCELLANEOUS ASSEMBLIES</b>		
12848	Resistor—47 ohm—insulated—1/4 watt—Package of 5 (R11).....	1.00	12834	Dial—Station selector dial scale (4X and 4X3).....	.50
12841	Resistor—390 ohm—carbon type—1/10 watt—Package of 5 (R10).....	.75	12935	Dial—Station selector dial scale (Used on 4X4 only).....	.55
12265	Resistor—10,000 ohm—insulated—1/4 watt—Package of 5 (R5, R7).....	1.00	12833	Knob—Station selector knob—Package of 5 (4X and 4X3).....	.50
12412	Resistor—47,000 ohm—insulated—1/4 watt—Package of 5 (R12).....	1.00	12934	Knob—Station selector knob—Package of 5 (4X4 only).....	.45
12696	Resistor—68,000 ohm—insulated—1/4 watt—Package of 5 (R2).....	1.00	12933	Knob—Volume control knob—Package of 5 (4X4 only).....	.45
11297	Resistor—330,000 ohm—carbon type—1/10 watt—Package of 5 (R6).....	.75	12673	Knob—Volume control knob—Package of 5 (4X and 4X3).....	.58
11452	Resistor—470,000 ohm—carbon type—1/10 watt—Package of 5 (R1).....	.75	12835	Screw—Chassis mounting screw and washers—Package of 10.....	.30
12285	Resistor—470,000 ohm—insulated—1/4 watt—Package of 5 (R8, R9).....	1.00	4119	Screw—Set screw for knob Stock No. 12673, 12833, 12933 and 12934—Package of 20.....	.38
12013	Resistor—1 meg—carbon type—1/10 watt—Package of 5 (R13).....	.75			
12845	Resistor—Wire wound 40 ohms (R3)...	.40			
12008	Shield—I.F. transformer shield for Stock No. 12839.....	.28			
12408	Shield—I.F. transformer shield for Stock No. 12840.....	.28			

The prices quoted above are subject to change without notice.