RCA VICTOR MODELS 125 AND 225

Six-Tube, Two-Band, A. C. Receivers SERVICE NOTES

ELECTRICAL SPECIFICATIONS

Valence and Frequency Ratings	(105–125 Volts, 50–60 Cycles
Voltage and Frequency Ratings	105–125/200–250 Volts, 50–60 Cycles
Power Consumption	85 Watts
Radiotrons and Functions	((1) RCA-6A7 Oscillator and First Detector (2) RCA-6D6 I.F. Amplifier
Tuning Frequency Ranges	540 KC1720 KC. and 5400 KC18,000 KC.
Alignment Frequencies	KC. (Osc. and Det.) and 18,000 KC. (Osc. and Det.)
Undistorted Output	
Maximum Output	3.5 Watts
PHYSICAL SPE	CIFICATIONS
	Model 125 Model 225
Height	
Width	
Depth	

These six-tube, two-band receivers employ identical chassis assemblies, which are designed for frequency coverage of the standard broadcast band and the more important short-wave bands now in use for transoceanic broadcast work.

A variable ratio drive is used in combination with an "airplane" type dial to simplify the accurate tuning necessary for proper reception of the short-wave signals. An automatic volume control system is incorporated in the circuits of the receiver which stabilizes the output when atmospheric fluctuations cause fading. This feature is of prime importance when receiving short-wave signals.

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Reproduction of good quality is obtained from a pentode output tube operating into a uniformly efficient loudspeaker. Tone control is provided in the power output stage so that by operating a double throw switch, the high frequency response may be reduced by a predetermined amount.

DESCRIPTION OF ELECTRICAL CIRCUIT

The circuit embodied in this receiver is of the superheterodyne type. Its layout is shown schematically in Figure 3. Two ranges of tuning are provided by two separate sets of coils. A tuned transformer is employed to couple the antenna system into the first

detector tube which is an RCA-6A7. This tube also serves, by the coordinate arrangement of its elements, to generate the local oscillation required for superheterodyne operation. The local oscillation is modulated with the incoming signal by the mutual effect of the

tube elements on the electron flow. The difference beat frequency of these two signals is amplified by this same tube and delivered to the i-f amplifier system. There are two Radiotron 6D6 tubes used for i-f amplification. Three transformers intercouple these tubes. The primaries and secondaries of two of these transformers are resonated to the intermediate frequency (460 kc.). The third i-f transformer has no adjustable capacitors; its natural tuning is such as to obtain the desired selectivity and efficiency. Diode detection is performed in an RCA-6B7 tube, a duplex diode pentode. The signal from the i-f system is applied to one of the diodes of the tube, where detection takes place. The remaining diode is tied solidly to ground.

A voltage having the character of an audio wave superimposed upon a constant d-c is developed by the detection process across the manual volume control resistor R14. The d-c portion of this voltage, which is dependent upon the strength of the carrier of the signal being received, is used to automatically regulate the control grid bias voltages of the first-detector and the i-f amplifier stages. Maximum control is used on the detector and first i-f, while a reduced amount of control is applied to the second i-f. A portion of the audio component of the detected

voltage appearing across the manual volume control is carried through the variable arm and a blocking condenser to the control grid of the RCA-6B7, which simultaneously functions to provide audio amplification. The audio signal is conducted from the detector -a-f amplifier—a.v.c. stage to the power-output tube through a resistance-capacitance network. At this point there is provision for changing the audio response of the receiver, so that proper results will be obtained in both the long-wave and the short-wave bands. As shown on the schematic, the switch S7 operates so that for long-wave reception the resistor R25 and condenser C32 are in series with the plate resistor R17, while for short-wave reception the resistor-condenser combination is shorted out. The output tube delivers a high-level high-quality signal to the electro-dynamic loudspeaker through an efficiently designed matching transformer. A two-point tone control consisting of a small capacitor and a single pole switch is connected in the plate circuit of the RCA-41 output tube.

Direct current voltages required are obtained from a full-wave rectifier system. The electro-dynamic speaker receives its magnetization current from the rectifier tube, an RCA-80. It is connected into the circuit so that it will function as a reactor for filtering of the plate currents.

SERVICE DATA

(1) Line-Up Adjustments

Maximum efficiency and best quality of performance will only be obtained when the circuits are in proper alignment. "Trimmer" capacitors are provided at accessible locations on the receiver chassis for accurately realigning the circuits when they have deviated from normal. Incorrect alignment is usually evidenced by low sensitivity, poor quality and irregular double-peaked tuning.

It is important in re-adjusting the line-up trimmers to use proper oscillator and indicator apparatus. Certain standard service instruments, which are useful in making these adjustments, have been devised and made available to the service man by the manufacturer of this receiver. They are illustrated and described on page 2.

Preliminary Tests

Before making any adjustments, it is wise to determine the correctness of the existing alignment. This may be done by supplying a signal to the circuit (r-f, oscillator or i-f) from the "Full-Range Oscillator," and inserting the "Tuning Wand" into the coils involved. The "Tuning Wand" consists of a bakelite rod having a brass cylinder attached to one end, and a small core of finely divided iron compacted into the opposite end. By inserting the brass cylinder end into the center of a particular coil, through the opening provided in the top of the shield as shown in Figure 1, the inductance of the coil is lowered, and therefore, the resonant frequency is increased. Placing the other end (iron filing core) into the coil raises the inductance and conversely decreases the resonant frequency. Thus it is apparent, that if the circuits are in exact resonance

with the standard signal of the "Full-Range Oscillator," the insertion of either end of the wand will cause a reduction of receiver output; whereas if the circuits

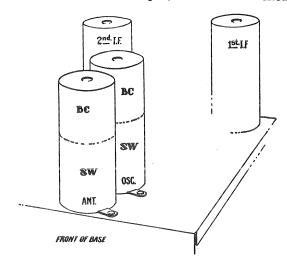


Figure 1—Locations of Coils

are not in tune or resonance with the incoming signal, one end will bring about an increase of the signal, and the other end will cause a decrease. When an increase in signal is obtained with the iron filled end of the wand, an increase of the inductance and decrease in frequency of resonance is indicated. The trimmer condenser associated with the circuit under test will therefore require adjustment so as to increase its capacitance. The reverse occurs when a gain in signal is obtained when using the brass cylinder end of the wand.

Changes Indicated By Wand

Wand	Signal	Trimmer
Brass	SignalDecreaseDecrease	None
{Brass Iron	Increase	Decrease
Brass	DecreaseIncrease	Increase

The following procedure should be applied:

I-F Tuning Adjustments

The four i-f trimmer screws shown on Figure 2 must be tuned to 460 kc., as explained below:

- (a) Short circuit the antenna and ground terminals of the receiver to prevent external signal pickup. Set the volume control to maximum and attach a good ground connection to the receiver.
- (b) Feed the test oscillator output to the control grid of the first-detector. Connect an output indicator to the voice coil circuit. Regulate the oscillator output control so that a slight indication occurs on the indicating instrument.
- (c) Adjust the secondary and primary trimmers of the second i-f transformer for maximum (peak)

output. Then tune the first i-f transformer in a similar manner. The oscillator output should be maintained at as low a level as will give a good output indication. This will keep the signal from being affected by the a.v.c. action of the receiver. A slight improvement in line-up may be obtained by repeating the above procedure, since there is an interlocking effect between the several tuned circuits.

R-F and Oscillator Adjustments

The trimmer capacitor locations for the r-f and oscillator stages are indicated on Figure 2. Their adjustments should be performed as follows:

- (a) Attach the oscillator output to the antennaground terminals of the receiver.
- (b) Check the dial pointer and correct its position if necessary. It should be coincident with the dial marking adjacent to 540 when the gang condenser plates are in full mesh.
- (c) With the external oscillator tuned to 1720 kc., and its output adjusted for the critical minimum at full volume control, set the station selector to the 1720 scale marking. Turn the range switch to its right position and adjust the trimmers C10 and C1 on Figure 2 to give

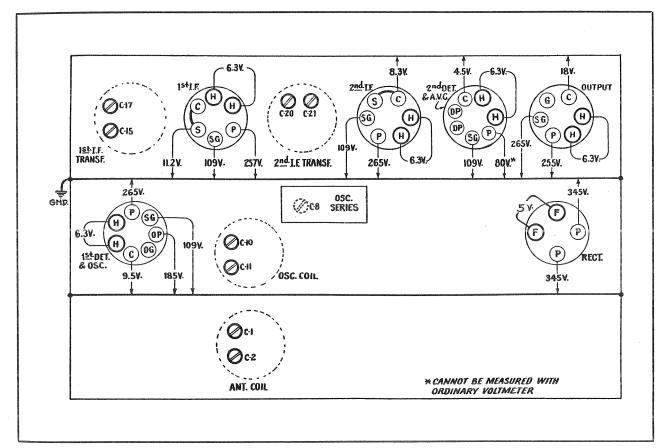


Figure 2—Trimmer Locations and Radiotron Socket Voltages to Ground (Measured at 115-volt A.C. Supply—Maximum Volume Control—No Signal)

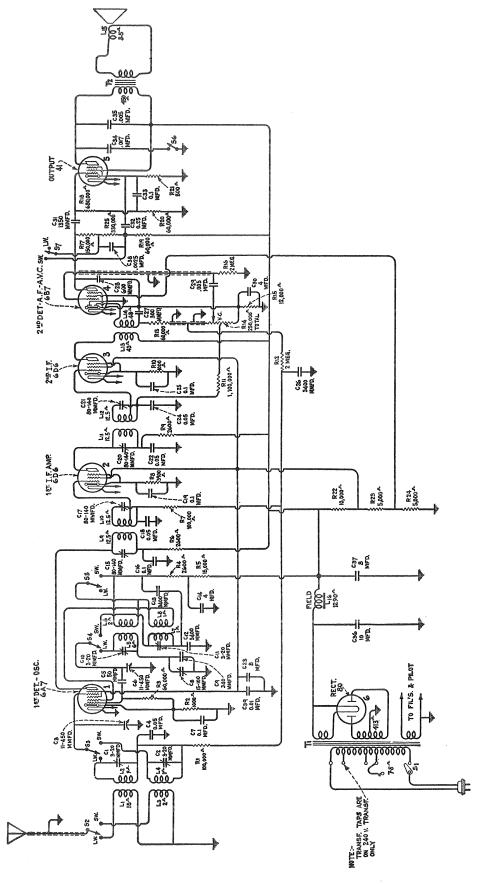
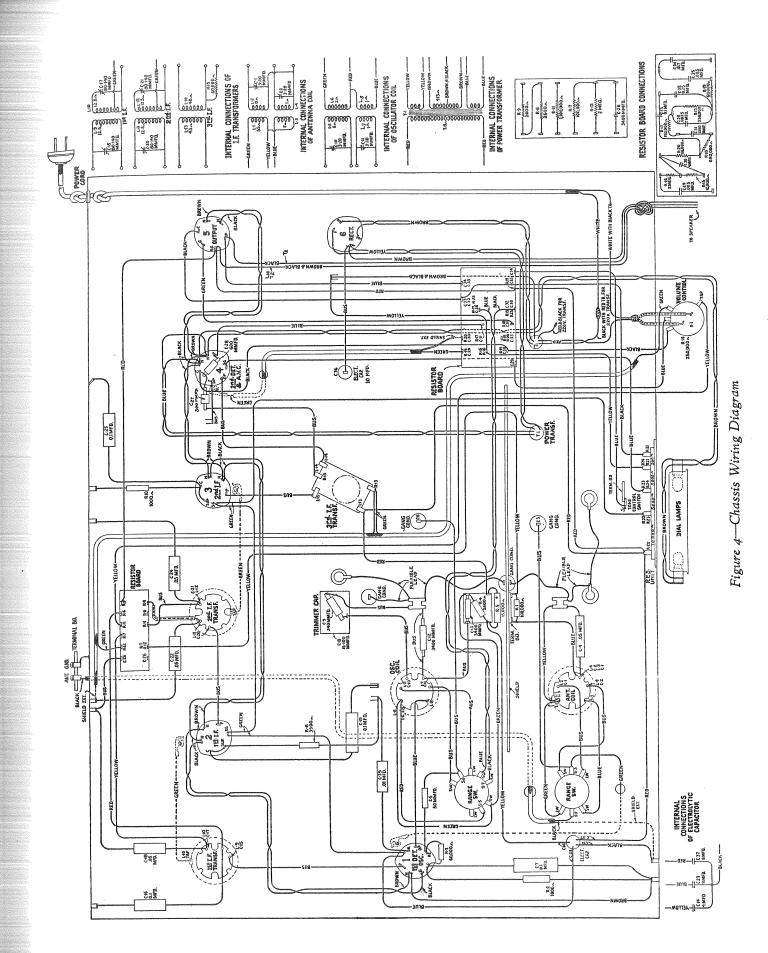


Figure 3—Schematic Circuit Diagram



maximum (peak) receiver output. Then shift the oscillator frequency to 600 kc., and tune in this signal on the receiver. Adjust the oscillator trimmer, C8, simultaneously rocking the tuning condenser slowly through the signal until the maximum output obtainable results from the two combined operations. The dial calibration should be disregarded for this adjustment. The oscillator trimmer C10 should be retuned at 1720 kc. to correct for any change caused by the 600 kc. adjustment.

(d) Turn the receiver range switch to its left (short-wave) position and set the station selector at the 18 megacycle dial marking. Tune the test oscillator to 18,000 kc. and regulate its output to produce a noticeable indication at the receiver output. Adjust C2 and C11 of the antenna and oscillator coils for maximum receiver output. There will be two positions of the trimmers which give maximum signal. On the oscillator, the position of minimum capacitance is correct; whereas the position of maximum capacitance is proper on the antenna trimmer. The latter should be made while slowly rocking the variable tuning condenser through the signal.

It is important in making the foregoing adjustments to have the receiver operating at maximum sensitivity and using as low an input as will give an accurate output indication. This procedure will obviate the broadness of tuning apparent from the effect of automatic volume control.

(2) Circuit Voltages

Refer to Figure 2. The voltages indicated at the various socket contacts are measured to the chassis.

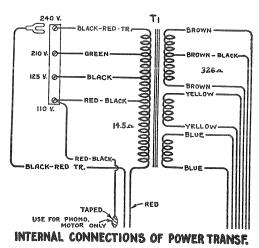


Figure 5—Universal Transformer Connections

They represent the values which apply to a receiver in normal operating condition at the specified supply

voltage. At other voltages, a consistent difference will be perceptible for all readings. Such a general deviation, due to line voltage, should not be judged as a sign of defective circuit conditions, but rather the erratic measurement used as a basis for the circuit analysis.

Accuracy of the voltage measurements will be a function of the internal resistance of the voltmeter used. It is advisable to employ a meter having at least 1000 ohms per volt and for each reading use the highest range which will give an acceptably accurate reading.

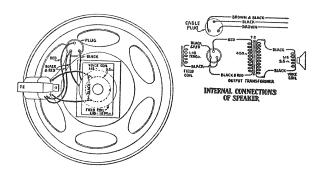


Figure 6—Loudspeaker Wiring—Console Model

(3) Code Interference

In certain localities near to high-powered radiotelegraph stations operating at frequencies in the vicinity of 460 kc., slight code interference may be present on both bands of the receiver. This adverse condition usually occurs over the entire tuning range of each band, and is not affected by change of tuning. To overcome this interference, a shielded wave trap, such as part No. 4539, should be installed. This trap consists of a parallel resonant circuit, tuned by two trimmer capacitors. It should be connected in series with the antenna input lead at the receiver. The connections should be arranged so that a minimum of exposed (unshielded) lead is left between the trap and the band switch or the shielded input lead of the receiver. The trap is mountable by means of two holes provided in the chassis between the first i-f transformer shield and the oscillator coil shield. The can of the trap should be securely grounded. The trimmers must be accurately tuned to suppress the undesired station.

(4) 220-Volt Transformer Connections

The 220–110 volt, 50–60 cycle transformer furnished with some instruments has taps for a variety of voltages. These taps are located on the transformer assembly, and are accessible without removing the chassis from the cabinet. A schematic of the transformer with colors of its leads is shown in Figure 5.

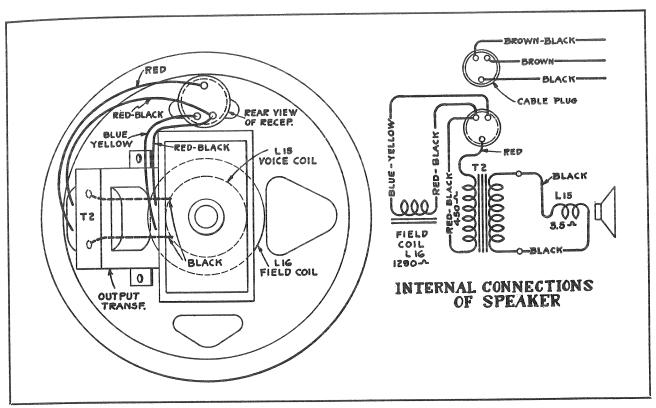


Figure 7—Loudspeaker Wiring—Table Model

RADIOTRON SOCKET VOLTAGES

(Referred to ground)

Meximum Volume Control—No Signal—115 Volts A. C. Input

Radiotron		Plate to Ground Volts, D.C.	Screen Grid to Ground Volts, D.C.	Cathode to Ground Volts, D.C.	Plate Current	Heater Volts
RCA-6A7	Oscillator	185	epplantish diger	destination for the	4.5	
RCA-0A7	Detector	265	109	9.5	1.6	6.3
RCA-6D6 First I.F.		257	109	11.2	2.2	6.3
RCA-6D6 Second I.F.		265	109	8.3	6.6	6.3
RCA-6B7 Second Det.		80*	109	4.5	0.3	6.3
RCA-41 Power		1 Power 255		18.0	30.0	6.3
RCA-80 Rectifier		345/345	-		68.0	5.0

^{*}Calculated from +B.

REPLACEMENT PARTS

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

Stock	dentined and may be purchased from authorized dentined and may be purchased from the following and the following authorized dentined and may be purchased from the following authorized dentined and may be purchased from the following authorized dentined and may be purchased from the following authorized dentined and may be purchased from the following authorized dentined and may be purchased from the following authorized dentined and may be purchased from the following authorized dentined and may be purchased from the following authorized dentined and may be purchased from the following authorized dentined and may be purchased from authorized dentined and may be purchased from the following authorized dentined and may be purchased from the following authorized dentined and may be purchased from the following authorized dentined and may be purchased from the following authorized dentined and from				
No.	Description	List Price	Stock No.	Description	List Price
	RECEIVER ASSEMBLIES		5400	D (10.000 1 0 0 1	
4880	Bracket — Tone control switch mounting		5109	Resistor—12,000 ohms—Carbon type—1/4 watt (R15)—Package of 5	\$1.00
	bracket	\$0.12	5114	Resistor — 15.000 ohms — Carbon type — 1	
4427	Bracket—Volume control mounting bracket	.18	The Charles	watt (R5)	.72
4358	Bracket—Electrolytic capacitor bracket for capacitor No. 7790.	.15	3602	Resistor—60,000 ohms—Carbon type—1/4 watt (R3, R19, R20)—Package of 5	1.00
4693	Bracket—Electrolytic capacitor bracket for capacitor No. 5101	.15	3118	Resistor—100,000 ohms—Carbon type—1/4 watt (R1, R7)—Package of 5	1.00
3861	Capacitor—Adjustable trimmer capacitor (C8).	.78	5027	Resistor—150,000 ohms—Carbon type—1/4	
5094	Capacitor—50 mmfd. (C5)	.20		watt (R17)—Package of 5	1.00
3981	Capacitor—300 mmfd. (C27)	.30	5108	Resistor—330,000 ohms—Carbon type— 1/4 watt (R25)—Package of 5	1.00
4811	Capacitor—340 mmfd. (C9)	.25	5110	Resistor—680,000 ohms—Carbon type—1/	2.00
4210	Capacitor—600 mmfd. (C28)	.25		watt (R18)—Package of 5	1.00
5115	Capacitor—1350 mmfd. (C31).		4 783	Resistor—1,100,000 ohms—Carbon type—1/4 watt (R11)—Package of 5	1.00
4439	Capacitor—3400 mmfd. (C12)		6242	Resistor—2 megohms—Carbon type—1/4 watt	1.00
4881	Capacitor—3400 mmfd. (C13, C26)	.35	0212	(R12, R16)—Package of 5	1.00
5107	Capacitor—0.0025 mfd. (C38)	.20	4721	Resistor—Tapped—One 500, one 10,000 and	
4793		.16		two 5000 ohm sections (R21, R22, R23, R24)	.88
4868	Capacitor—0.005 mfd. (C29)	20	4521	Shield—Antenna, I.F. or oscillator coil shield	.42
4906	Capacitor—0.003 mid. (C34)	.20	3942	Shield—First detector and output Radiotron	
4883	Capacitor—0.01 mfd. (C39).	.25		shield	.18
4836	Capacitor—0.05 mfd. (C4, C18, C24)	.20	3782	Shield—Second detector Radiotron shield	.26
4886	Capacitor—0.05 mfd. (C22)	.30 .20	7487	Shield—I.F. Radiotron shield	.25
4841	Capacitor—0.1 mfd. (C7, C19, C25, C33)	.22	4784	Socket—4-contact Radiotron socket	.15
4885	Capacitor—0.1 mfd. (C16)	.28	4 785	Socket—6-contact Radiotron socket	.15
3597	Capacitor—0.25 mfd. (C32)	.40	4786	Socket—6-contact Radiotron socket	.15
3796	Capacitor—4.0 mfd. (C30)	.60	4787	Socket—7-contact Radiotron socket	.15
7790	Capacitor—10.0 mfd. (C36)	1.05	4379	Strip — Terminal strip — Engraved "ANT-	
5101	Capacitor pack—Comprising two 8 mfd and			GND"	.20
5087	one 4. mfd. sections (C14, C23, C37)	2.14	5100	Switch—Range switch (S2, S3, S4, S5, S7)	1.20
5089	Coil—Oscillotor coil (L1, L2, L3, L4, C1, C2).	1.86	5052	Switch—Tone control switch (S6)	.30
5009	Coil—Oscillator coil (L5, L6, L7, L8, C10, C11)	1.90	9512	Transformer—Power transformer—105–125 volts—25–40 cycles	6.58
4504	Condenser—2-gang tuning condenser (C3, C6).	2.78	9513	Transformer—Power transformer—105–125/	50
5104	Lead — Shielded — Single conductor — From range switch to antenna terminal board	.30	9511	210–240 volts—40–60 cycles	4.85
5106	Lead—Shielded—2-conductor—From volume		9311	volts—50–60 cycles (T1)	4.78
	control to third I.F. transformer and resistor	.40	5102	Transformer—First intermediate frequency transformer (L9, L10, C15, C17)	1.98
5112	Resistor—1000 ohms—Carbon type—¼ watt (R2, R10)—Package of 5	1.00	5103	Transformer—Second intermediate frequency transformer (L11, L12, C20, C21)	1.98
4812	Resistor—2600 ohms *Carbon type—1/4 watt (R4, R6, R9)—Package of 5	1.00	5105	Transformer—Third intermediate frequency	
5113	Resistor—3900 ohms—Carbon type—¼ watt (R8)—Package of 5	1.00	4429	transformer (L13, L14, R13)	1.65 1.40
			l		

REPLACEMENT PARTS (Continued)

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
4450 4474 4434 4475 4363 4340 3943 3529	CONDENSER DRIVE ASSEMBLIES Dial—Station selector dial—Console model Dial—Station selector dial—Table model Drive—Tuning condenser drive assembly— Complete Indicator—Station selector (pointer) indicator —Table model Indicator—Station selector (pointer) indicator Console model Lamp—Dial lamp—Package of 5 Screen—Translucent screen for dial light—Package of 2 Socket—Dial lamp socket	\$0.52 .76 2.42 .18 .60 .18	8935 5118 5119 9589 4892 6755 6840	Cone—Reproducer cone (L15)—Package of 5 Plug—3-contact plug—Male section for reproducer cable Plug—3-contact plug—Female section for reproducer cable Reproducer Complete Transformer—Output transformer (T2) MISCELLANEOUS ASSEMBLIES Bezel—Station selector dial escutcheon bezel—Table model Bezel—Station selector dial escutcheon bezel—Console model	\$5.25 .25 .25 8.20 1.30
And the control of th	REPRODUCER ASSEMBLIES TABLE MODEL		6707	Glass—Station selector dial glass—Table model	.20
4915 9587	Cable—3-conductor reproducer cable Coil—Field coil, magnet and cone support	.50	6614	Glass—Station selector dial glass—Console model	.30
9588	(L16)	2.18 3.55	4449	Knob—Station selector, volume control, band switch or tone control knob—Package of 5.	.60
5118	Plug—3-contact plug—Male section for reproducer cable	.25	6708	Ring—Spring retaining ring for dial glass— Table model—Package of 5	.44
5119	Plug—3-contact plug—Female section for reproducer	.25 5.95	6615	Ring—Spring retaining ring for dial glass— Console model—Package of 5	.34
9586 4893	Reproducer—Complete	1.48	4446	Screw—Chassis mounting assembly—Comprising four screws, four spacers, eight cushions, four washers and four lockwashers—For table model	.28
4915 9590	Cable—3-conductor reproducer cable Coil—Field coil, magnet and cone support (L16)	.50 4.20	5184	Screw—Chassis mounting assembly—Comprising one screw, one spacer, two cushions, one washer and one lockwasher—Package of 4—For console model	.28