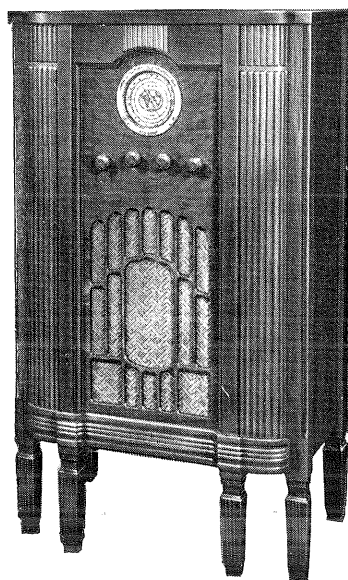


# RCA Victor

## Battery Radios 135-B and 235-B

Seven-Tube, Two Band Super-Heterodyne Receivers

### SERVICE NOTES



SERVICE DIVISION

# RCA Victor Company, Inc.

Camden, N. J., U. S. A.

A RADIO CORPORATION OF AMERICA SUBSIDIARY

REPRESENTATIVES IN PRINCIPAL CITIES



# RCA VICTOR MODELS 135-B AND 235-B

## Seven-Tube, Two-Band Battery Receivers

### SERVICE NOTES

#### ELECTRICAL SPECIFICATIONS

Type and Number of Radiotrons.....	1 RCA-1C6, 2 RCA-34, 2 RCA-30, 1 RCA-32, 1 RCA-19—Total, 7
Total "A" Battery Current.....	0.68 Ampere
Maximum "B" Battery Current.....	25 M. A.
Tuning Ranges.....	540 K. C.—1720 K. C.—5400 K. C.—18,000 K. C.
Maximum Undistorted Output.....	1.2 Watts
Maximum Output.....	2.2 Watts
Line-up Frequencies.....	460 K. C., 600 K. C., 1720 K. C. and 18,000 K. C.

#### PHYSICAL SPECIFICATIONS

	<i>Model 135-B</i>	<i>Model 235-B</i>
Height.....	17½ Inches	41 Inches
Width.....	14½ Inches	24½ Inches
Depth.....	10 Inches	14¼ Inches

These seven-tube, two-band battery operated Superheterodyne receivers provide excellent reception of both standard-wave and short-wave broadcasting stations. High sensitivity, excellent selectivity and good fidelity characterize this receiver. Outstanding features include a permanent magnet dynamic type loudspeaker, continuously variable tone control,

Class "B" output stage, two-speed vernier drive and excellent mechanical construction. The chassis is unusually accessible for repair or replacement of parts. A fuse in each "B" battery lead provides protection for the Radiotrons in event of short circuits or wrong battery connections. Figure 1 shows the schematic diagram, while Figure 2 shows the chassis wiring.

#### DESCRIPTION OF ELECTRICAL CIRCUIT

The circuit is of the superheterodyne type and consists of a combined oscillator-detector stage, two I. F. amplifying stages, a combined second detector and automatic volume control, a two-stage audio amplifier and a Class "B" output stage. Separate coil systems are used for each band, in conjunction with a push-pull type Range Switch. A three-pole operating switch opens one "A" and two "B" battery leads when the switch is at the "off" position.

The signal enters the receiver through a shielded antenna lead and trap circuit and is applied through the antenna transformer to the tuned grid circuit of the first detector. The trap circuit is tuned to 460 K. C. and reduces the effect of signals at or near the I. F. frequency. The grid circuit of the first detector is tuned to the desired signal. The RCA-1C6, which functions as the first detector, also functions as the local oscillator for producing a signal, 460 K. C. higher in frequency than the incoming signal. The combined signals after

passing through the first detector produce the I. F. signal.

The I. F. amplifier uses two RCA-34 Radiotrons in conjunction with three transformers. Two of the transformers are tuned very accurately to the I. F. frequency (460 K. C.) by means of suitable trimmer capacitors. The third transformer is untuned and couples the output of the second stage to the input of the second detector.

The output of the I. F. amplifier is applied to the grid circuit of the RCA-30, which functions as a combined diode second detector and automatic volume control. The plate of this tube is grounded. The automatic volume control action is due to the voltage drop of a portion of the rectified signal across resistor R-9. The voltage drop constitutes the automatic bias voltage for the first detector and I. F. stages and thereby gives the automatic volume control action of the receiver.

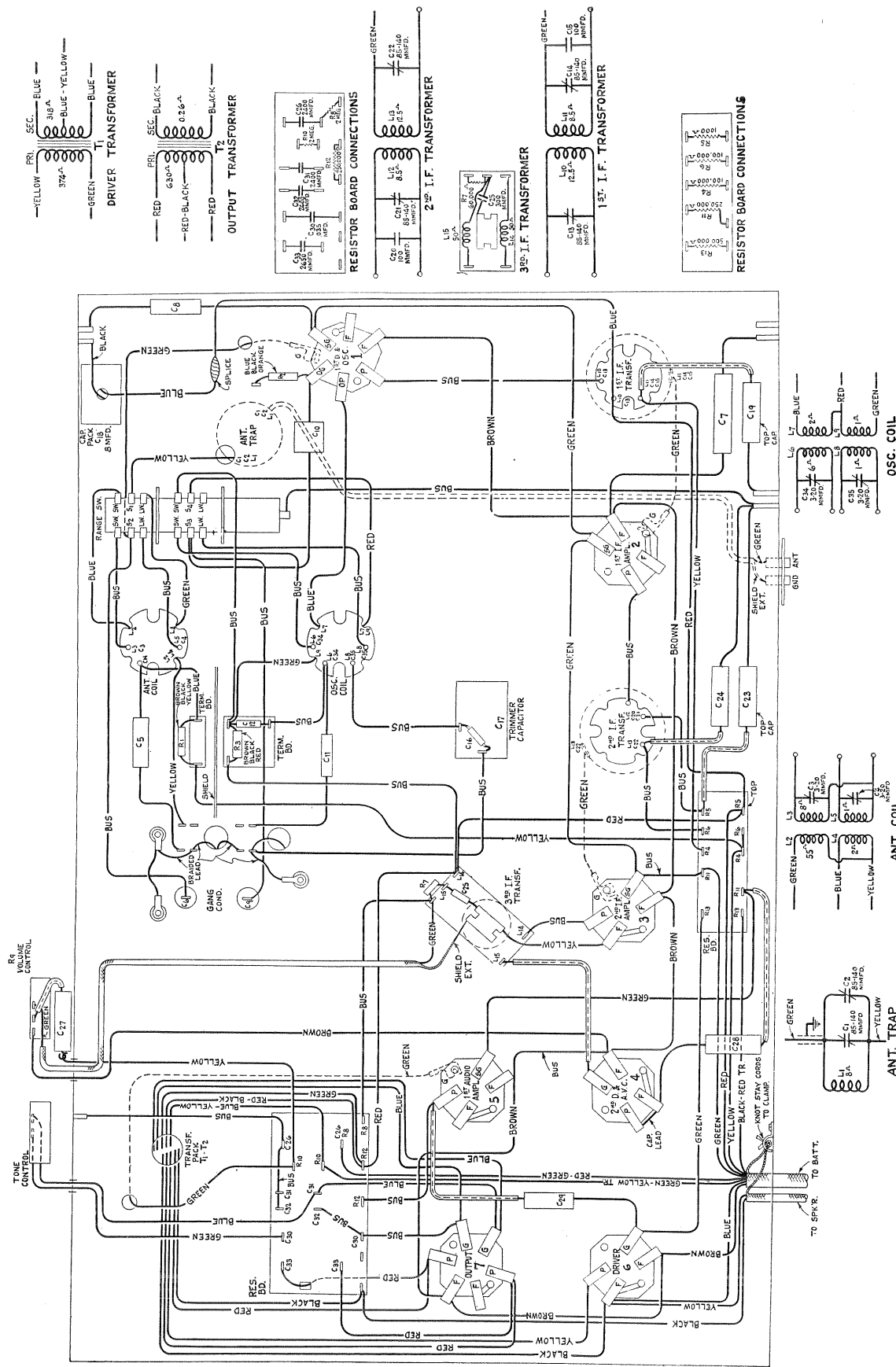


Figure 2—Wiring Diagram

The volume control selects the desired amount of audio signal from the drop across R-9 and applies it to the grid circuit of the first audio stage, RCA-32.

The output of the first audio stage is resistance coupled to the grid circuit of the RCA-30 driver stage, which is transformer coupled to the Class "B" output stage. The output stage utilizes the twin amplifier Radiotron RCA-19, which has two separate sets of elements and eliminates the necessity of having two

separate tubes for a Class "B" output stage. The plate circuit of this tube is transformer coupled to the cone coil of the permanent magnet dynamic loudspeaker.

Plate, grid and filament voltages are supplied by individual batteries. The +A lead provided includes a resistor for use in conjunction with a 2.5 volt "aircell." The resistor is easily removed when operation from a storage cell is desired.

## SERVICE DATA

### (1) Line-Up Capacitor Adjustments

To properly align this receiver, it is essential that a modulated R. F. oscillator of suitable frequency range such as Stock No. 9050, an output indicator, Stock No. 4317, and an alignment tool, Stock No. 4160, be available. Figure 4 shows the location of the various line-up capacitors.

### I. F. Tuning Adjustments

The I. F. amplifier comprises two stages which have three transformers. The third transformer is untuned so that only a total of four tuned circuits is used. Refer to Figure 4 and proceed as follows:

- (a) Short-circuit the antenna and ground terminals and tune the receiver so that no signal is heard. Set the volume control at maximum and connect a ground to the ground terminal.
- (b) Connect the test oscillator output between the first detector control grid and chassis ground. Connect the output indicator across the voice coil of the loudspeaker and adjust the oscillator output so that, with the receiver volume control at maximum, a slight deflection is obtained in the output meter.
- (c) Adjust the secondary and primary of the first and then the second I. F. transformers until a maximum deflection is obtained. The third transformer is untuned and does not require adjusting. Keep the oscillator output at a low value so that only a slight indication is obtained on the output meter at all times. Go over these adjustments a second time, as there is a slight interlocking of adjustments. This completes the I. F. adjustments.

### R. F. and Oscillator Adjustments

The R. F. line-up capacitors are located at the bottom of the coil assemblies instead of their usual position on the gang capacitor. They are all accessible from the bottom of the chassis except the 600 K. C. series capacitor, which is accessible from the top of the chassis. Proceed as follows:

- (a) Connect the output of the oscillator to the antenna and ground terminals of the receiver. Check the position of the indicator pointer when the tuning capacitor plates are fully meshed. It should be coincident with the radial line adjacent to the dial reading of 540.

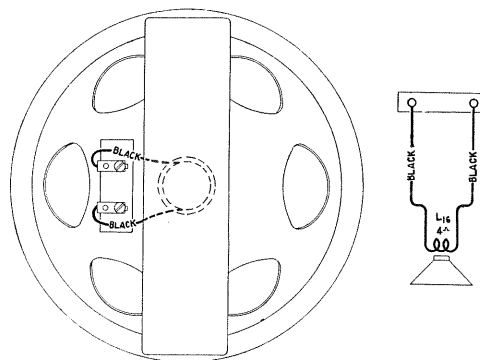


Figure 3—Loudspeaker Wiring

- (b) Then set the Test Oscillator at 1720 K. C., the dial indicator at 1720, the Range Switch at the "in" position, and adjust the oscillator output so that a slight deflection will be obtained in the output meter when the volume control is at its maximum position.

Adjust the two trimmers under the two R. F. coils, designated as BC in Figure 4, until a maximum deflection is obtained in the output meter. Then shift the Test Oscillator frequency to 600 K. C. The trimmer capacitor, accessible from the top of the chassis, should now be adjusted for maximum output while rocking the main tuning capacitor back and forth through the signal. Then repeat the 1720 K. C. adjustment.

- (c) Now place the Range Switch at the "out" position, shift the Test Oscillator to 18,000 K. C. and set the dial at 18M. Adjust the two trimmer capacitors designated as SW in

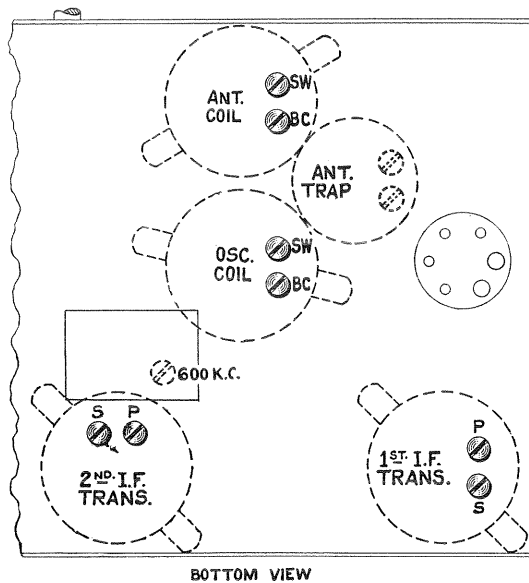


Figure 4—Location of Line-Up Capacitors

DRIVER GRID 7.5 V\*  
DRIVER M. A. 4.0

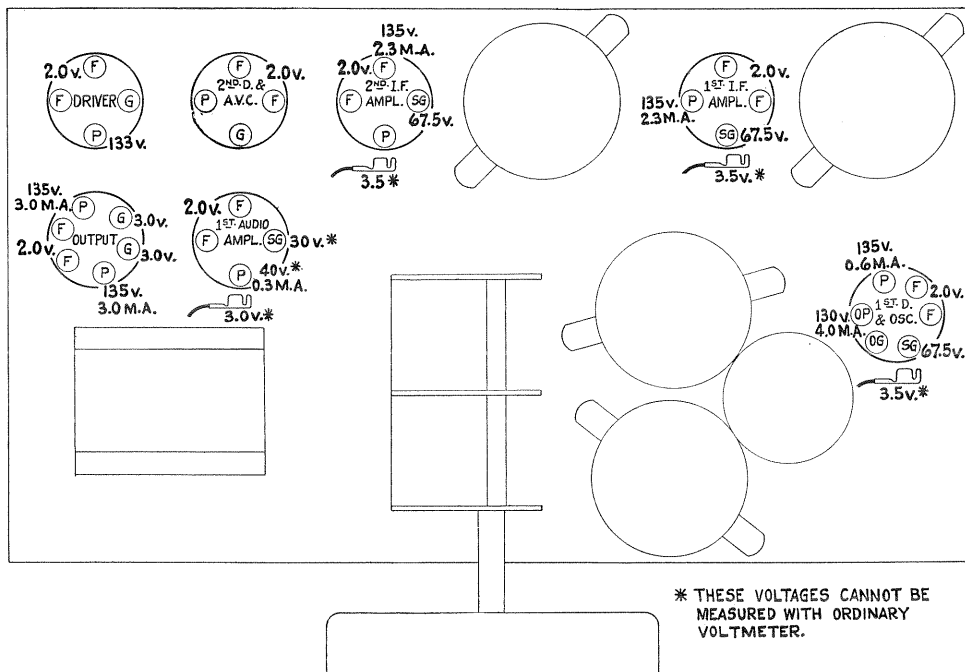


Figure 5—Radiotron Socket Voltages

Figure 4 for maximum output, beginning with the oscillator trimmer. It will be noted that the oscillator and first detector trimmers will have two positions at which the signal will give maximum output. The position which uses the lower trimmer capacitance, obtained by turning the screw counter-clockwise, is the proper adjustment for the oscillator, while the position that uses a higher capacitance is correct for the detector. The detector trimmer *must* be adjusted for maximum output while rocking the main tuning capacitor back and forth through the signal. *Both of these adjustments must be made as indicated.*

The important points to remember are the need for using the minimum oscillator output to obtain a deflection in the output meter with the volume control at its maximum position and the manner of obtaining the proper high-frequency oscillator and detector adjustments. Also the proper peak on the high-frequency adjustments must be used and the tuning capacitor rocked back and forth as indicated.

#### Trap Circuit Adjustment

A trap circuit, tuned to the I. F. frequency (460 K. C.) is used in the antenna circuit to reduce interference from signals approximately the same frequency

as that of the I. F. amplifier. Two parallel trimmers are used and adjustment may be made by means of either or both. Proceed as follows:

- (a) Place the receiver in operation and connect the test oscillator output from the antenna to ground terminals of the receiver. Adjust the test oscillator frequency to 460 K. C. and connect the output indicator across the cone coil of the reproducer.
- (b) Adjust either or both of the trap circuit trimmers, accessible from the top of the chassis, Figure 4, until a *minimum* output from the receiver is obtained. The point of minimum output is the proper adjustment.

It should be remembered that the trimmers provide an adjustment over a small range. However, in event constant interference is experienced at a slightly different frequency from 460 K. C., adjusting the trap to the frequency of the interference will materially reduce its effect.

#### (2) Radiotron Socket Voltages

The following voltages are those at the various tube sockets while the receiver is in operating condition. No allowance has been made for currents drawn by the meter, and if lower resistance meters are used, such allowances must be made:

## RADIOTRON SOCKET VOLTAGES

Volume Control at Maximum—No Signal—135 Volt "B" Battery—4.5 and 7.5-Volt Bias Batteries

Radiotron No.		Control Grid to Ground	Screen Grid to Ground	Plate to Ground	Plate, M. A.	Filament Volts
RCA-1A6	1st Detector	3.5*	67.5	135	0.6	2.0
	Oscillator	—	—	130	4.0	
RCA-34—I. F.		3.5*	67.5	135	2.3	2.0
RCA-34—I. F.		3.5*	67.5	135	2.3	2.0
RCA-30—Detector AVC		—	—	—	—	2.0
RCA-32—Audio		3.0*	30*	40*	0.3	2.0
RCA-30—Driver		7.5*	—	133	4.0	2.0
RCA-19—Power		3.0	—	135	3.0	2.0

\*These voltages cannot be measured with ordinary voltmeter.

# 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>			<b>REPRODUCER ASSEMBLIES (TABLE MODEL)</b>		
4427	Bracket—Volume or tone control mounting bracket.....	\$0.18	9539	Cone—Reproducer cone—Package of 5.....	\$4.30
2747	Cap—Contact cap—Package of 5.....	.50	9540	Magnet assembly—Comprising cone bracket core and magnet.....	5.72
4498	Capacitor—8 mfd. (C18).....	1.25	9538	Reproducer complete.....	7.65
4442	Capacitor—50 mmfd. (C10).....	.22	<b>DRIVE ASSEMBLY</b>		
3981	Capacitor—300 mmfd. (C25).....	.30	4422	Clutch—Condenser drive clutch assembly complete.....	.88
4413	Capacitor—360 mmfd. (C16).....	.22	4641	Dial—Station selector dial (console model)...	.80
2749	Capacitor—2400 mmfd. (C26).....	.35	4588	Dial—Station selector dial (table model)...	.80
4440	Capacitor—2400 mmfd. (C12, C31, C32)...	.26	4586	Drive—Variable tuning condenser drive assembly complete.....	2.42
4529	Capacitor—2650 mmfd. (C33).....	.32	4587	Pointer—Station selector pointer (table model)...	.18
4439	Capacitor—3400 mmfd. (C11).....	.35	4363	Pointer—Station selector pointer (console model).....	.18
4212	Capacitor—0.01 mfd. (C29).....	.30	<b>MISCELLANEOUS ASSEMBLIES</b>		
4518	Capacitor—0.05 mfd. (C27).....	.52	6706	Bezel—Metal bezel (escutcheon) for station selector dial glass (table model).....	.42
4417	Capacitor—0.05 mfd. (C5, C19, C23, C24)...	.25	6840	Bezel—Metal bezel (escutcheon) for station selector dial glass (console model).....	.56
4643	Capacitor—0.035 mfd. (C30).....	.30	4289	Body—Fuse connector body—Package of 10..	.35
3877	Capacitor—0.1 mfd. (C8, C28).....	.32	4642	Cable—Battery cable—8-conductor—Complete with switch and connectors (table model).....	3.60
4537	Capacitor—0.25 mfd. (C7).....	.38	4542	Cable—8-conductor battery cable complete with switch and connectors (console model)...	3.82
3861	Capacitor—Adjustable trimmer capacitor (C17).....	.78	4288	Cap—Fuse connector cap—Package of 10....	.36
4430	Coil—Antenna coil (L2, L3, L4, L5, C3, C4)...	1.92	6516	Connector—Fuse connector complete.....	.16
4432	Coil—Oscillator coil (L6, L7, L8, L9).....	1.65	6176	Escutcheon—"OFF-ON" operating switch escutcheon—Package of 5.....	.50
4539	Coil and shield assembly—Antenna trap circuit (L1, C1, C2).....	2.05	4286	Ferrule—Fuse connector ferrule and bushing—Package of 10.....	.38
4504	Condenser—2-gang variable tuning condenser (C6, C9).....	2.78	3748	Fuse—0.5 ampere—Package of 5.....	.40
4687	Resistor—1,000 ohms—Carbon type— $\frac{1}{4}$ watt—Package of 10 (R3, R5).....	2.00	6614	Glass—Station selector dial glass (console model).....	.30
3602	Resistor—60,000 ohms—Carbon type— $\frac{1}{4}$ watt (R2, R7)—Package of 5.....	1.00	6707	Glass—Station selector dial glass (table model)...	.20
3118	Resistor—100,000 ohms—Carbon type— $\frac{1}{4}$ watt (R1, R4, R6)—Package of 5.....	1.00	4290	Insulator—Fuse connector insulator—Package of 10.....	.35
3744	Resistor—250,000 ohms—Carbon type— $\frac{1}{4}$ watt (R11, R12)—Package of 5.....	1.00	3088	Knob—Operating switch knob—Package of 5..	.50
6186	Resistor—500,000 ohms—Carbon type— $\frac{1}{4}$ watt (R13)—Package of 5.....	1.00	4449	Knob—Station selector, volume control, tone control or range switch knob—Package of 5.....	.60
6242	Resistor—2 megohms—Carbon type— $\frac{1}{4}$ watt (R8, R10)—Package of 5.....	1.00	4644	Resistor—0.42 ohms—Flexible type—Filament series (R15)—Package of 5.....	.80
4521	Shield—Antenna, oscillator or I. F. transformer shield.....	.42	6615	Ring—Retaining ring for dial glass—Package of 5 (console model).....	.34
4103	Shield—Driver Radiotron shield.....	.20	6708	Ring—Retaining ring for dial glass—Package of 5 (table model).....	.44
4145	Shield—First detector and oscillator Radiotron shield.....	.30	4638	Screw—Chassis mounting screw assembly—Comprising eight cushions, four screws, four washers, four lockwashers and four spacers.....	.52
3056	Shield—First I. F. amplifier Radiotron shield—Package of 2.....	.40	3238	Screw—6-40- $\frac{1}{16}$ " knurled head—Set screw for operating switch knob No. 3088—Package of 10.....	.25
4530	Socket—4-contact Radiotron socket.....	.28	4613	Screw—8-32- $\frac{7}{16}$ " headless set screw for station selector volume control, tone control or range switch knob—Package of 10.....	.25
4532	Socket—4-contact audio amplifier—Radiotron socket.....	.28	4284	Spring—Fuse connector spring—Package of 10.	.30
4232	Socket—6-contact Radiotron socket.....	.35	4540	Switch—Operating switch.....	2.28
4531	Socket—6-contact output Radiotron socket...	.30	4285	Washer—Fuse connector insulating washer—Package of 10.....	.22
4534	Switch—Range switch (S1, S2, S3, S4, SW, LW).....	3.64			
4536	Tone control (R14).....	.95			
4431	Transformer—First intermediate transformer (L10, L11, C13, C14, C15).....	2.28			
7840	Transformer—Second intermediate transformer (L12, L13, C20, C21, C22).....	2.35			
4538	Transformer—Third intermediate frequency transformer (L14, L15).....	2.15			
4533	Transformer pack—Audio transformer pack—Comprising driver and output transformer (T1, T2).....	3.98			
4535	Volume control (R9).....	1.40			
<b>REPRODUCER ASSEMBLIES (CONSOLE MODEL)</b>					
4541	Cable—2-conductor reproducer cable.....	.38			
9432	Cone—Reproducer cone (L16).....	1.88			
7820	Magnet—Cone housing and magnet assembly...	8.98			
7819	Reproducer complete.....	12.18			
4234	Rivet—Cone mounting rivet—Package of 100.	.66			