

RCA Victor

Portable Radiola P-31

SERVICE NOTES



RCA Victor Portable Radiola P-31

SERVICE DIVISION

RCA Victor Company, Inc.

Camden, N.J.

A RADIO CORPORATION OF AMERICA SUBSIDIARY

REPRESENTATIVES IN PRINCIPAL CITIES

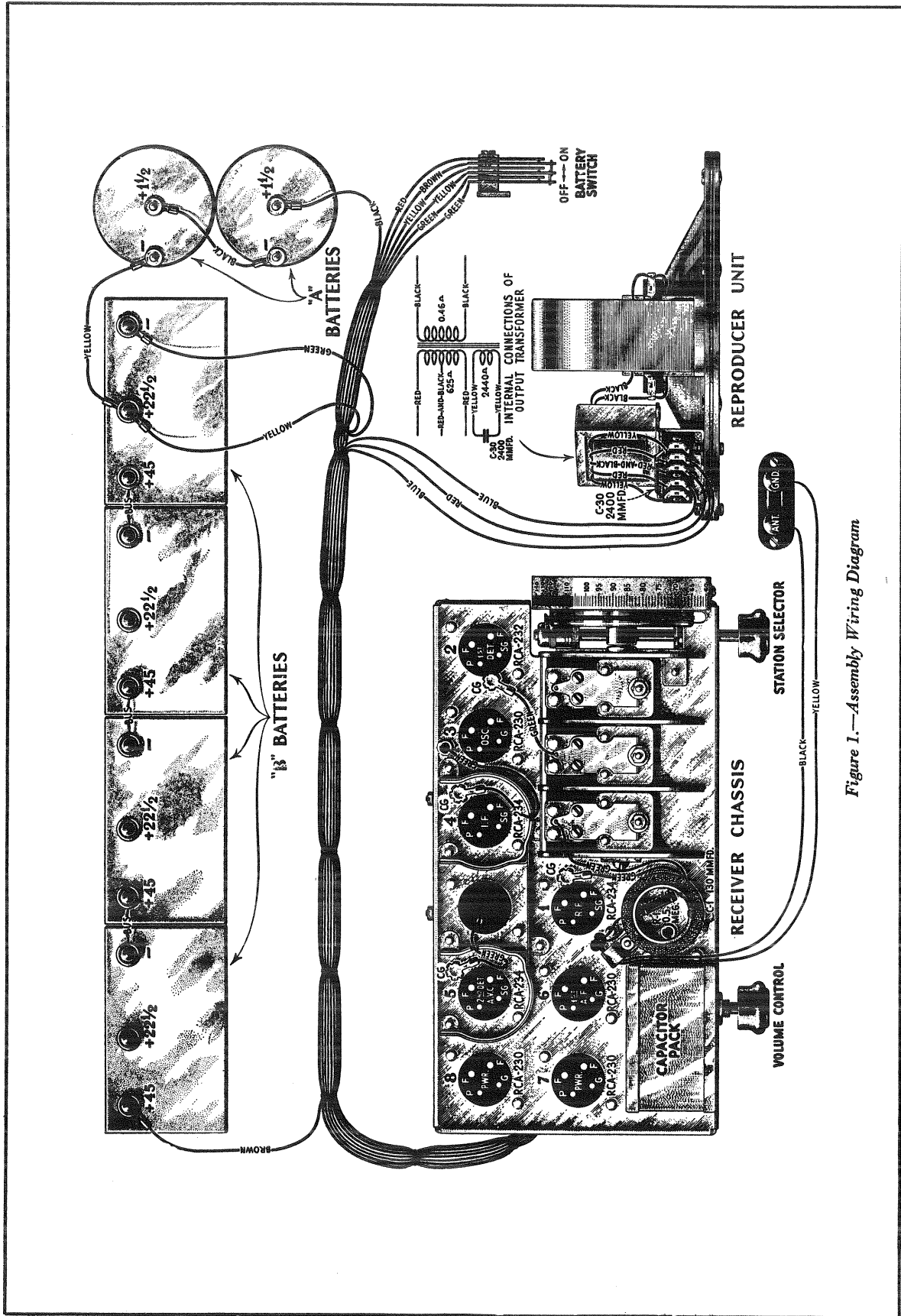


Figure 1.—Assembly Wiring Diagram

SERVICE NOTES

for

RCA Victor Portable Radiola P-31

ELECTRICAL SPECIFICATIONS

"A" Batteries required.....	Two No. 6 Dry Cells
"B" Batteries required.....	Four 45 volt blocks such as Burgess 5308
"A" Battery Current.....	0.48 Amps.
Average "B" Battery Current.....	18 M. A.
Type of Circuit.....	Super-Heterodyne with A. V. C.
Type and Number of Radiotrons.....	3 RCA-234, 1 RCA-232, 4 RCA-230
Number of R. F. Stages.....	One
Type of First Detector.....	Tuned Input Grid Bias
Number of Intermediate Stages.....	One
Type of Second Detector.....	Pentode combining detector, A. V. C. and audio amplification
Number of Audio Stages.....	Two
Type of Audio Output Amplifier.....	Class "B"
Undistorted Output.....	0.75 Watts

PHYSICAL SPECIFICATIONS

Height.....	14 $\frac{3}{8}$ inches
Depth.....	9 $\frac{5}{8}$ inches
Width.....	21 $\frac{1}{4}$ inches
Weight Alone (less batteries).....	32 lbs.
Weight Packed for Shipment.....	43 lbs.
Weight of Batteries.....	17 lbs.

RCA Victor Portable Radio P-31 is an eight tube battery operated super-heterodyne radio receiver incorporating such features as Super-Control R. F. Amplifier Pentode Radiotrons in the R. F. and I. F. Stages, automatic volume control, combination Pentode second detector, class "B" audio amplifier and the inherent sensitivity, selectivity and tone quality of the RCA Victor Super-heterodyne. The entire mechanism, permanent magnet dynamic loudspeaker and all batteries are enclosed in a portable type container.

ELECTRICAL DESCRIPTION OF CIRCUIT

As the circuit used in the P-31 is somewhat different from the usual circuit, a description of its functioning is of help in properly understanding the operation of the set.

The input from the antenna is coupled to the grid circuit of the first R. F. stage through an R. F. transformer, the secondary of which is tuned to the frequency of the incoming signal. A 130 mmfd. capacitor is placed in series with the antenna to reduce the effects of the variation in antenna capacity from affecting the tuning of the input circuit.

The output of the R. F. Stage is coupled inductively to the grid circuit of the first detector together with the output of the oscillator, the grid circuit of the first detector is tuned by means of the second of the gang condensers to the frequency of the incoming signal. The oscillator is tuned to a frequency of 175 K. C. greater than the incoming signal by the third unit of the gang condenser. The combining of these two frequencies produces a beat frequency—175 K. C.—which appears in the plate circuit of the first detector.

The plate circuit of the first detector, the grid circuit of the I. F. amplifier, the plate circuit of the I. F. amplifier and the grid circuit of the second detector are all tuned to 175 K. C.

The Radiotrons used for the R. F. and I. F. stages are the new Super-Control R. F. Amplifier Pentode Radiotrons, RCA-234. This Radiotron differs from the usual Super-Control Screen grid Radiotron in that it has a suppressor grid, similar to that in an output Pentode. Its characteristics are generally the same as the RCA-232 Screen grid Radiotron except for its exponential characteristics. The RCA-232 is used as a first detector.

The Radiotron RCA-234 used as the second detector is also the automatic volume control. It is a diode detector, being a straight rectifier, a triode audio amplifier and a bias control automatic volume control, the signal current across a resistor giving the necessary voltage drop. Details of its functioning follow. Refer to Figure 3 the schematic circuit.

The signal voltage is applied to the filament and plate of the second detector, being rectified by straight diode action. The audio output is then applied to the control grid and filament by means of capacitor C-19. The tube then operates as an Audio Amplifier, the screen grid acting as the plate. Now examining the input circuit it will be noted that the signal current flows through resistors R-7 and R-8. The drop across resistor R-8 constitutes the control grid bias for the I. F. amplifier and the drop across R-7 and R-8 constitutes the control grid bias for the R. F. stage. A small initial bias—1.5 volts—is present on these tubes being the drop across the 65,000 ohm resistor of the voltage dividing system. Also the control grid bias for the second detector is obtained from the drop across the resistors R-10 and R-11, while R-9 and R-10 in parallel constitute a grid leak for its operation as an audio amplifier, C-19 being the coupling capacitor.

The output of the detector is then coupled by means of impedance coupling to the grid of the first A. F. amplifying tube. The grid leak is in the form of a potentiometer which is the volume control, its action controlling the audio voltage applied to the grid of the first A. F. tube. The output of this tube is then applied to the grids of the two Radiotrons RCA-230 which are connected in Push-Pull as a Class "B" amplifier. The output of this stage is then transformer coupled to the cone coil of the permanent magnet dynamic type loudspeaker. An extra winding, shunted by a capacitor, acts as a high frequency cut-off.

SERVICE DATA

Service Data on the RCA Victor Portable Radiola P-31 is similar to that of other RCA Victor Super-Heterodyne receivers. Alignments of the R. F., Oscillator and I. F. stages should be made in a manner similar to that described in the Service Notes on the Automobile Radiola M-30. The location of the various line-up capacitors is the same as that of the M-30.

In making line-up adjustments on the P-31, there is one important feature that affects this operation, that should be remembered. That feature is the automatic volume control. Due to it being a combined A. V. C. and second detector, it cannot be removed from its socket or replaced with a dummy Radiotron.

R. F., OSCILLATOR AND I. F. ADJUSTMENTS

The R.F., Oscillator and I.F. Adjustments in Model P-31 are similar to those of the Automobile Radiola M-30. However, due to the A.V.C. tube also being the second detector, it cannot be removed while line-up adjustments are made. The proper manner in making this adjustment is as follows:

- (a) Set the volume control of the receiver at maximum.
- (b) Reduce the output of the external oscillator or its coupling to the receiver until a definite reduction in output meter reading is obtained. The oscillator output should again be reduced until but a slight indication in the output meter is obtained. At this low input the A.V.C. action is not sufficiently flat to interfere with the proper alignment of the various circuits.

RADIOTRON SOCKET VOLTAGES

(No Signal Being Received)

Radiotron No.	Control Grid to Filament Volts	Screen Grid to Filament Volts	Plate to Filament Volts	Screen Current M. A.	Plate Current M. A.	Filament Volts
1. R. F.	0.2	65	150	1.0	3.0	2.0
2. 1st Det.	0.5	65	150	0.1	0.2	2.0
3. Osc.	1.0	—	45	—	3.0	2.0
4. I. F.	0.5	65	150	1.0	3.0	2.0
5. 2nd Det.	2.0	150	—1.5	4.0	0	2.0
6. 1st A. F.	1.0	—	145	—	2.5	2.0
7. Power	14.0	—	150	—	1.5	2.0
8. Power	14.0	—	150	—	1.5	2.0

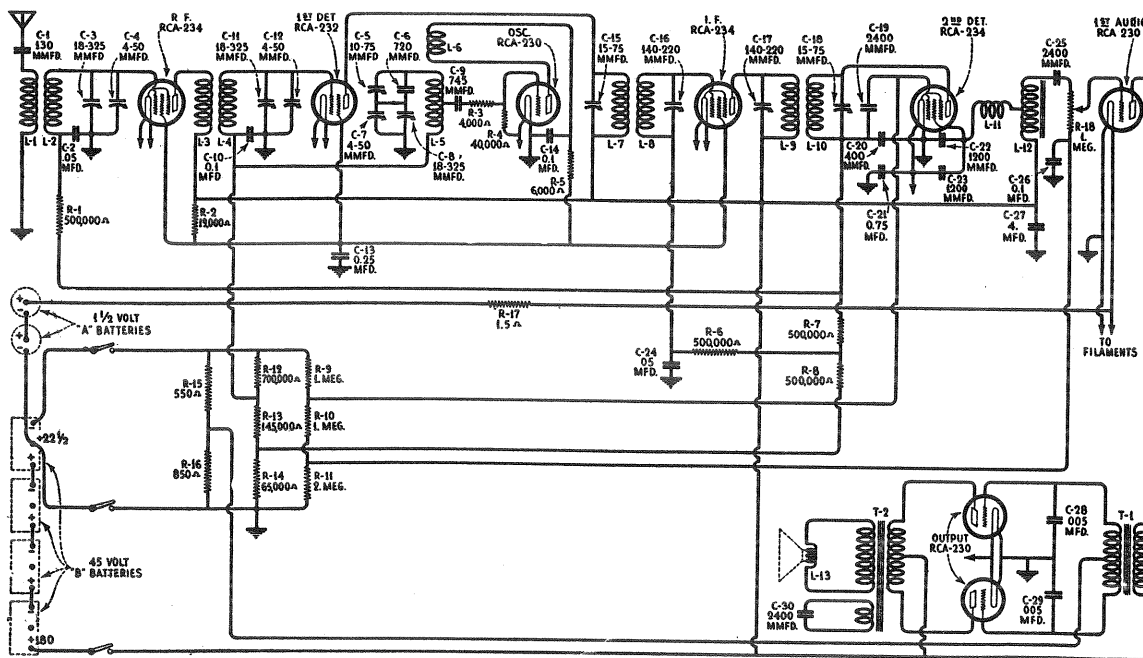


Figure 3.—Schematic Circuit

REPLACEMENT PARTS

Stock No.	DESCRIPTION	List Price	Stock No.	DESCRIPTION	List Price
RECEIVER ASSEMBLY					
2269	Capacitor—720 mmfd.	\$0.75	8890	Capacitor pack—Comprising two 0.005 mfd., one 0.75 mfd., one 4.0 mfd., three 0.1 mfd., one 0.25 mfd. and two 0.05 mfd. capacitor in metal container	\$5.40
2740	Cord—Tuning condenser drive cord—Package of 5	1.00	8891	Transformer—1st intermediate transformer	2.80
2741	Idler—Tuning condenser drive cord idler—Package of 5	.80	8892	Transformer—2d intermediate transformer	2.90
2742	Spring—Tuning condenser drive cord tension spring—Package of 5	.50	8893	Board—Resistor board complete less resistors, coil and capacitor	1.00
2748	Binding post—Ground—Antenna twin binding post	.50	8894	Coil—R.F. coil—Complete with mounting bracket	2.30
2749	Capacitor—2400 mmfd.	1.50	8895	Capacitor—3 gang variable tuning capacitor—Comprising 3 variable capacitors drive drum, drive cord, drive cord spring, idlers and drive cord guides—Assembled	7.75
2994	Coil—Detector choke coil complete with mounting rivet	.60	8898	Cable	1.15
3033	Resistor—1 megohm—Carbon type— $\frac{1}{4}$ watt—Package of 5	2.00	LOUDSPEAKER ASSEMBLY		
3079	Resistor—40,000 ohms—Carbon type— $\frac{1}{2}$ watt—Package of 5	2.50	2749	Capacitor—2400 mmfd.	1.50
3085	Capacitor—400 mmfd.	.60	2975	Rivet—Cone retaining ring mounting rivet—Package of 100	.50
6133	Socket—Four contact Radiotron socket complete with insulator—8 used	.50	6166	Board—Terminal board with two terminals—Located on cone bracket—Package of 5	1.00
6138	Coil—1st detector and oscillator coil complete with mounting brackets	3.30	6253	Board—Speaker terminal board—5 terminals—Complete with mounting eyelets—Package of 5	1.00
6186	Resistor—500,000 ohms—Carbon type— $\frac{1}{4}$ watt—Package of 5	2.00	6254	Transformer—Output transformer	2.20
6239	Volume control—Volume control complete with mounting nut—Package of 5	5.25	6255	Screw assembly—Speaker mounting screw assembly—Comprising 4 screws, 4 eyelets, 4 cushions, 4 bushings, 8 nuts and 8 lock washers—Package of 1 set	1.15
6240	Resistor—19,000 ohms—Carbon type— $\frac{1}{2}$ watt—Package of 5	2.00	8828	Magnet assembly—Comprising cone bracket core and magnet	4.60
6241	Resistor—140,000 ohms—Carbon type— $\frac{1}{4}$ watt—Package of 5	2.00	8829	Cone—Speaker paper cone—Package of 5	8.00
6242	Resistor—2 megohm—Carbon type— $\frac{1}{4}$ watt—Package of 5	2.00	8896	Ring—Speaker cone retaining ring	.90
6243	Resistor—6,000 ohms—Carbon type— $\frac{1}{4}$ watt—Package of 5	2.00	CABINET ASSEMBLY		
6244	Resistor—700,000 ohms—Carbon type— $\frac{1}{4}$ watt—Package of 5	2.00	X-89	Grille and grille cloth—Receiver side—Package of 2	1.30
6245	Resistor—65,000 ohms—Carbon type— $\frac{1}{4}$ watt—Package of 5	2.00	X-90	Board—Speaker baffle board and grille cloth—Package of 2	1.30
6246	Resistor—550 ohms—Carbon type— $\frac{1}{4}$ watt—Package of 5	2.00	X-91	Panel—Control panel less equipment	4.70
6247	Resistor—850 ohms—Carbon type— $\frac{1}{4}$ watt—Package of 5	2.00	X-92	Escutcheon—Tuning dial escutcheon complete with mounting screws	1.15
6248	Capacitor—130 mmfd.—Package of 5	1.50	6257	Escutcheon—Off and On escutcheon—Package of 10	1.35
6249	Resistor—1.5 ohms—Flexible type—Package of 5	1.25	6263	Knob and screw—Located on bottom of control panel—Package of 5	1.50
6250	Resistor—4,000 ohms—Carbon type— $\frac{1}{2}$ watt—Package of 5	2.00	6264	Knob—For locking control panel in cabinet—Package of 5	2.20
6251	Capacitor—1200 mmfd.—Package of 5	2.30	6265	Lock—Lid lock—Comprising lock, lock keeper, lock spacer and six mounting rivets—NOT KEY TYPE—Package of 5	3.50
6252	Scale—Dial scale—Package of 5	1.50	6266	Clamp—Battery clamp—Package of 10	1.70
6256	Switch—Off and On switch	1.80	6267	Lock—Lid lock—Comprising lock, lock keeper, lock spacer, key and six mounting rivets—KEY TYPE—Package of 5	4.60
6258	Knob—Off and On switch knob—Package of 5	1.20	6268	Key—Cabinet lock key—Package of 10	1.60
6259	Screw—Receiver chassis mounting bracket self tapping screw—Package of 25	.85	6269	Bracket—Corner bracket with mounting rivets—Package of 10	1.80
6260	Brackets—Receiver chassis mounting brackets R.H. and L.H.—Package of 5 sets	2.20	6270	Hinge—Cabinet bottom swivel hinge with mounting rivets—Case side—Package of 5	1.85
6261	Knob—Tuning control knob and screw—Package of 5	1.25	6271	Hinge—Cabinet bottom swivel hinge with mounting rivets—Lid side—Package of 5	1.85
6262	Screw assembly—Receiver mounting screw assembly—Comprising 4 screws, 4 eyelets, 4 lock washers, 2 flat washers and 12 nuts—Package of 1 set	.70	8897	Coverings—Cabinet coverings—Comprising one bottom outside cover, one top outside cover, one top inside cover and eight corner bindings—Package of 1 set	5.40
7062	Capacitor—Adjustable capacitor—15-70 mmfd.	1.00	9411	Cabinet—Cabinet complete less equipment	29.00
7299	Capacitor—745 mmfd.	.70	10123	Handle—Carrying handle with 2 brackets	1.00
7425	Transformer—Interstage transformer	2.20			
8889	Transformer—Input transformer	2.30			

