



RCA Victor

MODEL VRA-249

Nine Tube, Six Band, A.C. Superheterodyne Radio Phonograph Combination

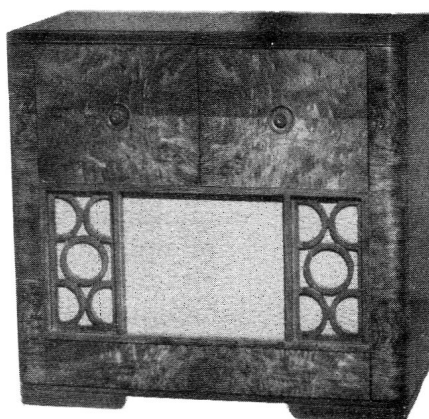
TECHNICAL INFORMATION AND SERVICE DATA

1946 No. 8

SERVICE DIVISION

RCA VICTOR COMPANY LIMITED

MONTREAL



Electrical Specifications

FREQUENCY RANGES

Standard Broadcast (A)	540-1,570 k.c.
Short Wave (B)	2,300-7,500 k.c.
31 M	9,450-9,700 k.c.
25 M	11,680-11,920 k.c.
19 M	15,030-15,380 k.c.
16-13 M	17,700-22,000 k.c.

Intermediate Frequency

R. F. ALIGNMENT FREQUENCIES

"B" (49 Meters)	6,100 k.c. (osc.)
31 M (31 Meters)	9,550 k.c. (osc., det., ant.)
25 M (25 Meters)	11,800 k.c. (osc.)
19 M (19 Meters)	15,200 k.c. (osc.)
Standard Broadcast (A)	600 k.c. (osc.), 1400 k.c. (osc., det., ant.)

(For order of alignment see page 3)

455 k.c.

RADIOTRON COMPLEMENT

(1) Type-6SK7	R-F Amplifier
(2) Type-6SA7	First Detector-Oscillator
(3) Type-6SK7	Intermediate Amplifier
(4) Type-6SQ7	2nd Det., A.V.C. & A.F.

Pilot Lamps (4)

(5) Type-6SF5	Audio amp.
(6) Type-6K6G	Power Output
(7) Type-6K6G	Power Output
(8) Type-5Y4G	Full Wave Rectifier
(9) Type-6U5	Tuning Tube

Mazda No. 51 6-8 volts, 0.2 amp.

POWER SUPPLY RATINGS

Rating A	105-125 volts, 50-60 cycles, 95 watts
Rating B	105-125 volts, 25-60 cycles, 95 watts

POWER OUTPUT

Undistorted	5 watts
Maximum	9 watts

LOUDSPEAKER (CRL511-2)

Type	12 inch Electrodynamic
Impedance (V.C.)	3.4 ohms at 400 cycles

PHONOGRAPH

Type	Automatic
Record Capacity	Twelve 10-inch or Ten 12-inch
Turntable Speed	78 r.p.m.

PICKUP

Type	Crystal
Impedance	75,000 ohms at 1,000 cycles
Average Output	.50 volts at 400 cycles across 500,000 ohm load

Cabinet Dimensions

Height	34 $\frac{1}{8}$ inches
Width	37 $\frac{1}{4}$ inches
Depth	18 $\frac{1}{2}$ inches
Net Weight	120 pounds
Shipping Weight	165 pounds

General Description

The RCA victrola model VR-249 is a deluxe combination radio and automatic phonograph housed in a console cabinet of exceptional beauty. The receiver employs a nine tube, six band superheterodyne circuit, the arrangement of which is shown in the schematic circuit diagram. Features of design include:

Loop antenna; high gain R.F. stage; stabilized oscillator circuit; magnetite core I.F. transformers; magnetite core oscillator coils on all bands; automatic volume control circuit; Tuning indicator tube; Illumi-

nated band indicator; variable tone control circuit; push button tuning of seven Standard Broadcast stations by means of pre-set oscillator coils; dust proof, electrodynamic loudspeaker; temperature stabilized capacitors in the oscillator circuits; push-pull output and a large edge lighted horizontal glass dial.

The automatic phonograph incorporates the type RP 160C mechanism which uses the rim drive type of motor. Reference to the RP 160C service notes will disclose details of adjustment.

Circuit Arrangement

The circuit consists of an R.F. amplifier stage incorporating the loop Antenna as the first tuned circuit; first detector (oscillator) stage; I.F. Amplifier stage; second detector A.V.C. and 1st Audio stage, Audio inverter stage; push pull pentode output; tuning inductor tube; and a well regulated power supply. The Loop Antenna used as the first tuned stage is in the circuit on all bands; temperature compensated capacitors in the oscillator circuits reduce oscillator drift. Spread band tuning is accomplished elect-

rically by shunting the oscillator section of the variable capacitor with relatively large temperature-stabilized fixed capacitors for tuning the oscillator coils on the 16-13M, 19M, 25M, 31M bands. Antenna and detector coils are designed to be sufficiently broad-tuned to require no variable tuning over the narrow frequency range of the spread bands. The windings of all I.F. transformers are resonated by fixed capacitors and adjusted by moulded magnetite cores to tune to 455 K.C.

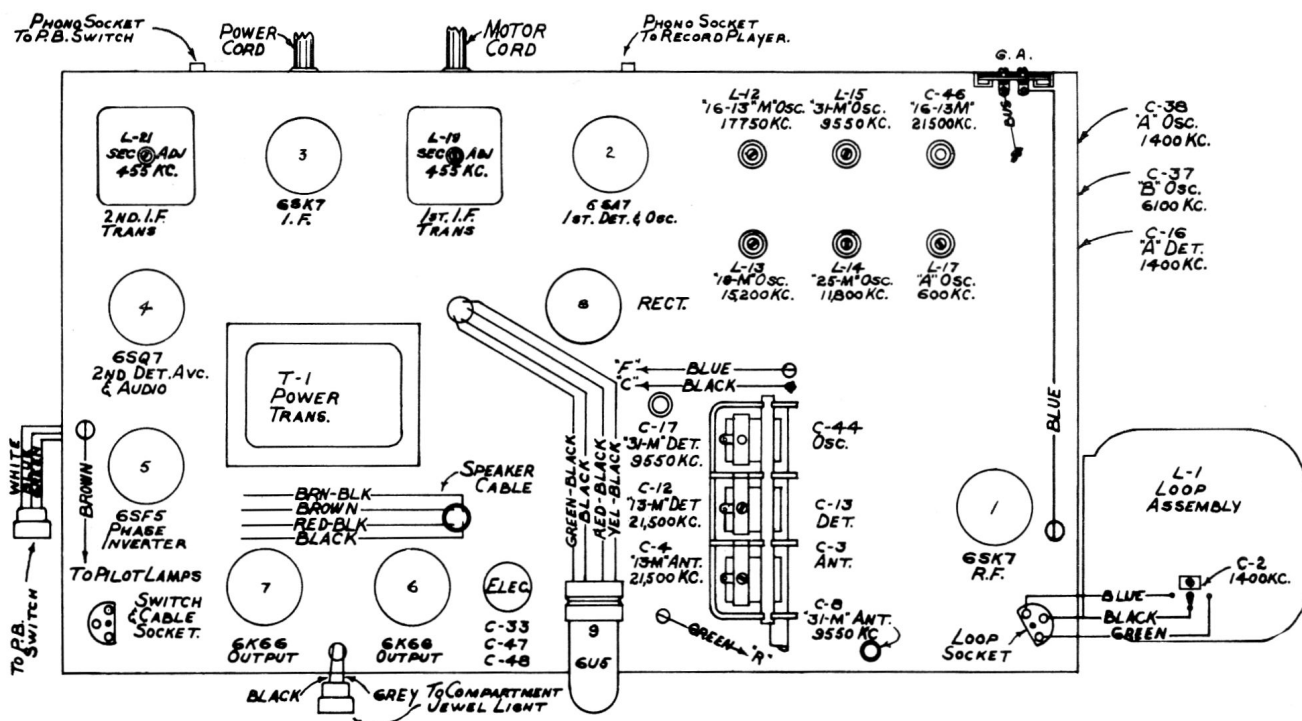


Fig. 1—Chassis Layout and Alignment Adjustments

Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown on the schematic diagram.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the output as low as possible to avoid a-v-c action.

Calibration Scale on Indicator-Drive-Cord-Drum.—The tuning dial is fastened in the cabinet and cannot be used for reference during alignment; therefore, a calibration scale is attached to the tuning drum. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang

in degrees, for each alignment frequency, is given in the alignment table.

As the first step in r-f alignment, check the position of the drum. The 0° mark on the drum scale must be vertical and directly above the center of the shaft of the tuning drum when the plates are fully meshed. The drum is held to the shaft by means of two set-screws, which must be tightened securely when the drum is in the correct position.

Pointer for Calibration Scale.—Improvise a pointer for the calibration scale by fastening a piece of wire to the chassis, and bend the wire so that it points to the 0° mark on the calibration scale when the plates are fully meshed.

Order of Alignment	Test Oscillator			Range Selector	Receiver Dial Setting	Circuit to Adjust	Adjustment Symbols
	Connection to Receiver	Dummy Antenna	Frequency Setting				
1	6SK7 2nd I.F. Grid	.1 Mfd.	455 kc	"A"	No Signal 550-750 kc	2nd I.F. Trans.	L20 & L21
2	6SA7 Det. Grid	.1 Mfd.	455 kc	"A"	No Signal 550-750 kc	1st I.F. Trans.	L18 & L19
3	Ant. Ter.	300 Ohms	6,100 kc	"B"	6.1 mc (149°)	"49 M" Osc.	C37
4	Ant. Ter.	300 Ohms	9,550 kc	"31 M"	9.55 mc (73°)	"31 M" Det.	C17
5	Ant. Ter.	300 Ohms	9,550 kc	"31 M"	9.55 mc (73°)	"31 M" Ant.	C8
6	Ant. Ter.	300 Ohms	9,550 kc	"31 M"	9.55 mc (73°)	"31 M" Osc.	L15
7	Ant. Ter.	300 Ohms	11,800 kc	"25 M"	11.8 mc (99°)	"25 M" Osc.	L14
8	Ant. Ter.	300 Ohms	15,200 kc	"19 M"	15.2 mc (94°)	"19 M" Osc.	L13
9	Ant. Ter.	300 Ohms	21,500 kc	"16-13 M"	21.5 mc (162°)	"16-13 M" Osc.	C46
10	Ant. Ter.	300 Ohms	17,750 kc	"16-13 M"	17.75 mc (17°)	"16-13 M" Osc.	L12
11	Ant. Ter.	300 Ohms	21,500 kc	"16-13 M"	21.5 mc (162°)	"16-13 M" Det.	C12
12	Ant. Ter.	300 Ohms	21,500 kc	"16-13 M"	21.5 mc (162°)	"16-13 M" Ant.	C 4
13	Ant. Ter.	300 Ohms	1,400 kc	"A"	1,400 kc (155°)	"A" H-F Osc.	C38
14	Ant. Ter.	300 Ohms	600 kc	"A"	600 kc (33.5°)	"A" L-F Osc.	L17
15	Ant. Ter.	300 Ohms	1,400 kc	"A"	1,400 kc (155°)	"A" Det.	C16
16	Radiation Loop	.300 Ohms	1,400 kc	"A"	1,400 kc (155°)	"A" Ant.	C2*

NOTE:—Align the I.F. Circuits by means of the oscillograph, for a symmetrical curve. Peak R.F. stages of all bands. * Radiation loop comprising two turns of wire 18 inches in diameter should be placed 4 feet from receiver loop, before aligning "C2".

Spread-Band Alignment.—The most satisfactory method of aligning or checking the spread-band ranges is on actual reception of short-wave stations of known frequency, by adjusting the magnetite-core oscillator coil for each band so that these stations come in at the correct points on the dial.

In exceptional cases, when the set is being serviced in a location where the noise level is high enough to prevent reception of short-wave stations, a test-oscillator may be used for alignment, but an extremely high degree of accuracy is required in the frequency settings of the test-oscillator, as a slight error will produce considerable inaccuracy on the spread-band dials. The frequency settings of the test-oscillator may be checked by one or both of the following methods:

1. Determine the exact dial settings of the test-oscillator (for frequencies at or close to the specified alignment frequencies) by zero-beating the test-oscillator against short-wave stations of known frequency.
2. Use harmonics of the standard-broadcast range of a test-oscillator, first checking the frequency settings on this range by means of a crystal calibrator (RCA Stock No. 9572), or by zero-beating against standard broadcast stations.

When a test oscillator is employed for spread-band alignment, a final check should be made on actual reception of short-wave

stations of known frequency, and the magnetite-core oscillator coil for each band should be re-adjusted so that the stations come in at the correct points on the dial.

NOTE:—Whenever possible spread band adjustments should be made with the chassis fastened in the cabinet and the pointer accurately aligned to the dial.

Spread-band Adjustments.—Alignment of the spread bands requires special procedure since test oscillators used alone are not ordinarily sufficiently accurate for this purpose. The RCA Stock No. 9572 Crystal Calibrator affords a convenient and accurate alignment standard. Wrap a few turns of wire around the crystal calibrator and connect one free end to the antenna terminal of the receiver. Using the crystal calibrator to obtain the necessary accuracy, follow the tabulated alignment procedure for the "31M.", "25M.", and "19M." bands.

For the "B" band, snap crystal calibrator "Hi-Lo" switch to "Hi", turn the range selector to "B" band, and set receiver dial pointer to 6.0 mc. Adjust oscillator padder C37 for minimum "Tuning Tube" opening. Use the peak indicated by the alignment table. Snap "Hi-Lo" switch to "Lo" and locate 6,100 kc (the first 100 kc harmonic above 6,000 kc) by slightly readjusting C37 with the dial pointer set at 6.1 mc. This method insures selection of correct crystal-calibrator harmonic.

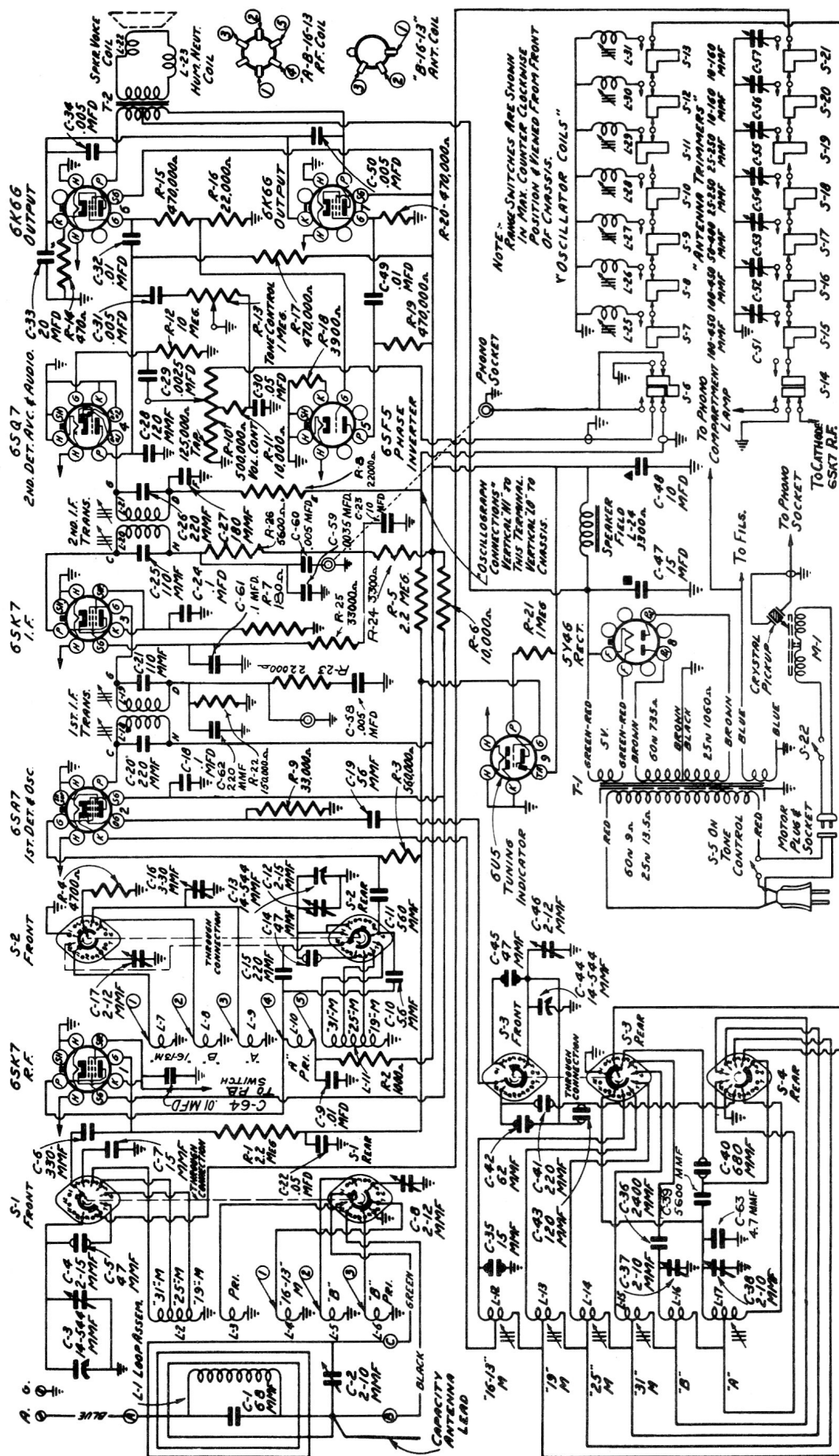


Figure 2—Schematic Circuit Diagram

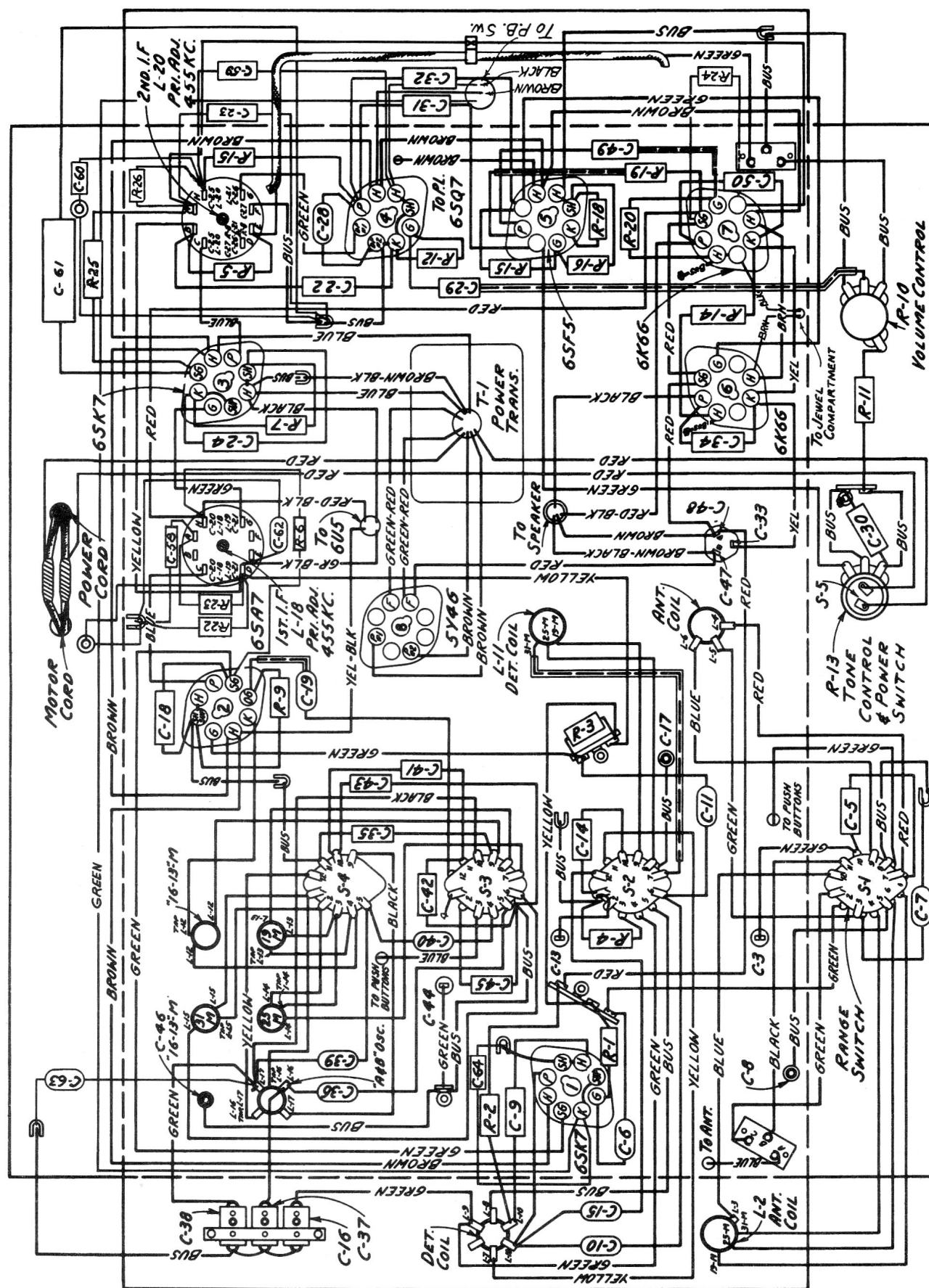


Figure 3—Chassis Wiring Diagram

RADIOTRON SOCKET VOLTAGES

Type	Plate	Screen Grid	Control Grid	Cathode	Heater
6SK7 R.F.	200V	100V	....	....	6.8V
6SA7 Conv.	195V	100V	....	....	6.8V
6SK7 I.F.	200V	100V	-2V	....	6.8V
6SQ7 2nd Det.	195V	....	....	....	6.8V
6SF5 Audio	95*V	....	....	2V	6.8V
6K6G Output	330V	200V	....	20V	6.8V
6U5 Indicator	210V	....		....	6.8V

Note:—All the above values hold within plus or minus 20 % when measured with a 1,000 ohm-per-volt meter, on a line voltage of 115 volts. All voltages are measured to chassis.

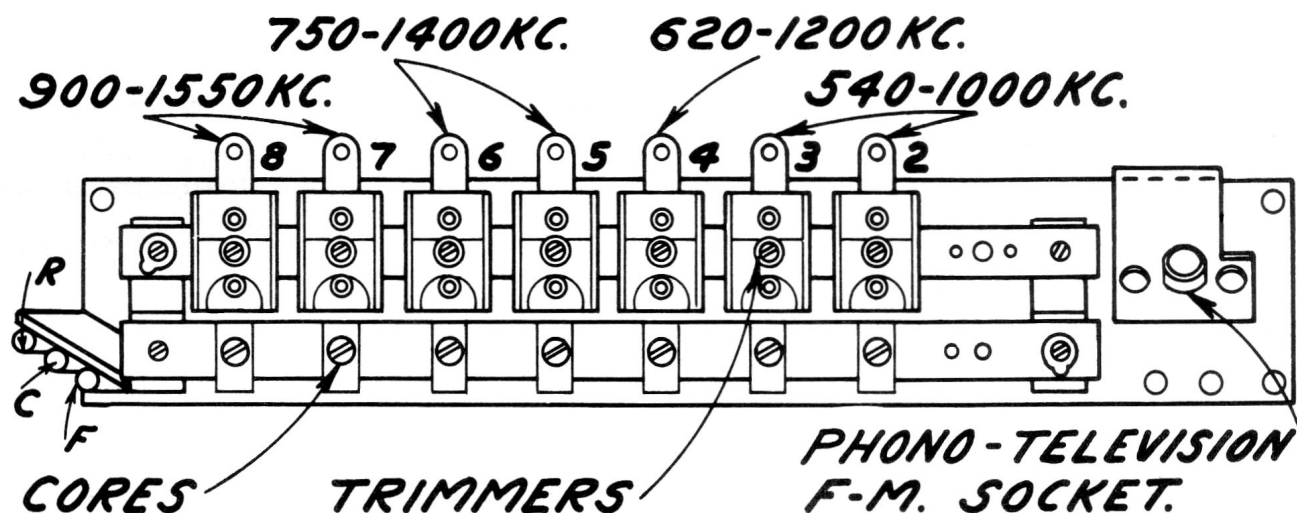


Fig. 4

Push Button Adjustment

The push buttons may be adjusted for any seven stations on the "A" band. The preferable arrangement is to adjust for stations in order of frequency.

Button No. 1 is used only for phonograph operation.

Proceed as follows:—

(1) Turn "Range selector" to "A" position and manually tune in the first station, say 560 k.c.

(2) Turn "Range selector" to "P.B." position, press button No. 2 located second from left on front panel.

(3) Referring to Figure 4, adjust core and trimmer No. 2 for a peak at 560 k.c. This adjustment can be made with the assistance of the "Magic Eye".

(4) Proceed to adjust the other six stations in order of frequency, as outlined above.

When a station is inaudible due to reception conditions a test oscillator should be substituted for the station signal.

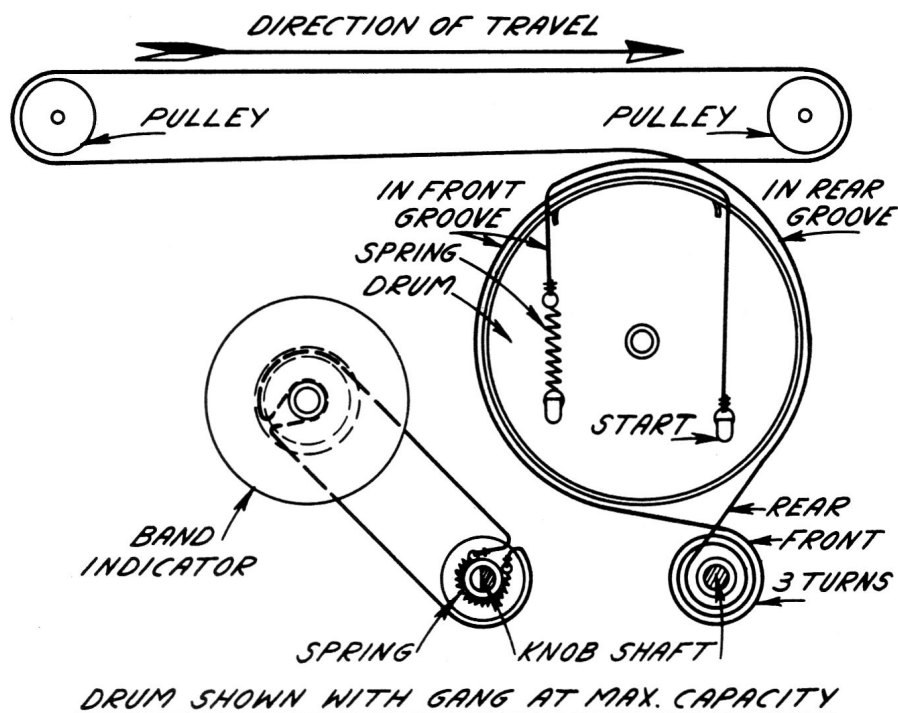


Fig. 5—Drive Cords

REPLACEMENT PARTS LIST FOR MODEL VRA-249

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

Stock No.	Description	Stock No.	Description
RECEIVER ASSEMBLIES			
S-2876	Board-Ant. and ground Terminal Board	52894	Capacitor-Electrolytic 10 mfd. (C23).....
12714	Capacitor-Adjustable Trimmer 2-12 Mfd. (C8,C17,C46).....	32240	Capacitor-Electrolytic comprising sections 10-450V,15-450V,20-25 volts(C48,C47,C33).....
34783	Capacitor-Adjustable Trimmer Bank (C16,C37,C38).....	S-2877	Coil-Ant.Coil AB 16-13 Bands,(L4-L5-L6).....
14392	Capacitor-4.7 Mmfd. (C63).....	S-2878	Coil-Ant.Coil 31-25-19 Meter (L2-L3).....
39601	Capacitor-5.6 " (C10).....	S-2879	Coil-RF Coil A-B 16-13 Meter (L7-L8-L9-L10).....
36012	Capacitor-15 " (Temp.Comp.)(C35).....	S-2880	Coil-BF Coil 31-25-19 Meter (L11).....
39608	Capacitor-15 " (C17).....	S-2881	Coil-19 Meter Band Oscillator Coil (L13).....
35644	Capacitor-47 " (Temp.Comp.)(C45).....	S-2882	Coil-25 Meter Band Oscillator Coil (L14).....
S-3008	Capacitor-47 " (Close Tol.)(C5,C14).....	S-2883	Coil-31 Meter Band Oscillator Coil (L15).....
12723	Capacitor-56 Mmfd. (C19).....	S-2884	Coil-15-13 Meter Band Oscillator Coil (L12).....
S-3123	Capacitor-62 Mmfd.(Temp.Comp.)(C42).....	S-2885	Coil-A-B Band Oscillator Coil (L16,L17).....
39624	Capacitor-68 Mmfd. (C1).....	S-2898	Condenser-3 Gang Variable Tuning (C3,C4,C12,C13,C44).....
S-3100	Capacitor-120 Mmfd.(Close Tol.)(C43).....	* 32634	Cord-Indicator Pointer Drive Cord (53-1/2").....
12724	Capacitor-120 Mmfd. (C28).....	* 32634	Cord-Band Indicator Drive Cord...
39636	Capacitor-220 Mmfd. (C15,C62).....	31273	Drum-Drive Drum assem.....
S-2895	Capacitor-220 Mmfd. (Close Tol.)(C41).....	S-2927	Drum-Drive Drum assem.Band Indicator.....
12952	Capacitor-330 Mmfd. (C6).....		
39646	Capacitor-560 Mmfd. (C11).....		
S-2988	Capacitor-680 Mmfd.(Close Tol.)(C40).....		
S-2896	Capacitor-2400 Mmfd. (C36).....		
13895	Capacitor-5600 Mmfd. (C39).....		
36854	Capacitor-.0025 Mfd. (C29).....		
30303	Capacitor-.0035 Mfd. (C59).....		
33584	Capacitor-.005 Mfd. (C31,C34,C50,C58,C60).....		
4937	Capacitor-.01 Mfd. (C9,C32,C49,C60).....		
32787	Capacitor-.05 Mfd. (C22,C30).....		
4839	Capacitor-.1 Mfd. (C18,C24,C61).....		
			* Universal Drive Cord 32634.

All parts and prices are subject to change or withdrawal without notice.

REPLACEMENT PARTS MODEL VRA-249--(Continued)

Stock No.	Description	Stock No.	Description
S-2886	Indicator-Station Selector Indicator Pointer.....	31825	Cap-Dust Cap for cone center (Pkg.5).....
S-2928	Indicator-Band Indicator assem....	S-2937	Coil-Field Coil (L24).....
11765	Lamp-Dial Lamp Mazda #51.....	11469	Coil-Hum Neutralizing Coil(L23).
30870	Plug-Socket and Lead assem.plug...	31275	Cone-Speaker cone and Voice coil assem. (L22).....
5040	Plug-4 contact Speaker Plug (Female).....	5039	Plug-4 contact plug (Male).....
31280	Pulley-Drive Cord Pulley.....	S-2938	Speaker-complete.....
30618	Resistor-180 ohms 1/2 watt (R7)...	S-2934	Transformer-Output (T2).....
30681	Resistor-470 ohms 1 watt (R14)....		SPEAKER ASSEMBLIES
34766	Resistor-1000 ohms 1/4 watt (R2)..		
30150	Resistor-3300 ohms 1 watt (R24)...		PUSH BUTTON ASSEMBLY
30694	Resistor-3900 ohms 1/4 watt (R18)..	S-3409	Cable-Shielded Phono Cable-less Plug.....
30494	Resistor-4700 ohms 1/10 watt (R4)..	S-2930	Capacitor-Trimmed Capacitor Bank- (C51,C57 inclusive).....
11298	Resistor-5000 ohms 1 watt (R26)...	35803	Coil-Oscillator Coil(L25,L31, Inclusive).....
3078	Resistor-10,000 ohms-1/4 watt(R11)	35871	Core-Oscillator Coil core assembly.....
S-2587	Resistor-10,000 ohms 4 watt Wire Wound (R6).....	32641	Plug-3 prong Male Plug for Phono Cable.....
30492	Resistor-22,000 ohms 1/4 watt (R8,R16,R23).....	31347	Socket-Phono Input Socket.....
30685	Resistor-33,000 ohms 1/2 watt (R9,R25).....	S-3049	Switch-Push Button Switch only (S6-S21 inclusive).....
14020	Resistor-150,000 ohm 1/4 watt(R22)		AUTOMATIC RECORD CHANGER MECHANISM
30648	Resistor-470,000 ohm 1/4 watt (R15,R17,R19,R20).....		REFER TO RP-160C Service Notes for Replacement Parts and Service Detail.
30653	Resistor-560,000 ohm 1/4 watt(R3)..		
12679	Resistor-2.2 megohms 1/4 watt (R1,R5).....		MISCELLANEOUS ASSEMBLIES
30992	Resistor-10 megohms 1/4 watt(R12)..	35883	Button-Station Selector Push Button.....
35969	Retainer-Drive Cord Pulley Retainer (Pkg.10).....	S-2913	Dial-Dial Scale.....
S-2888	Shaft-Station Selector Drive Shaft	13103	Jewel-Compartment Lamp Jewel....
S-2824	Socket-AC Socket.....	34489	Knob-Vol-Tone-Range-Tuning Knob.
31364	Socket-Dial Lamp Socket.....	S-3551	Loop-Loop antenna assembly(L1, C1,C2).....
36422	Socket-Loop Antenna Socket.....	S-3053	Marker-Push Button Call Letter Markers (1 set).....
31251	Socket-Tube Socket.....	34053	Spring-Push Button Retaining Spring (Pkg.5).....
30585	Spring-Band Indicator Drive Cord Spring (Pkg.2).....	14270	Spring-Knob retaining spring. (Pkg.2).....
13638	Spring-Drive Cord Tension Spring (Pkg.2).....	36414	Support-Lid Support.....
S-2929	Switch-Range Switch (S1,S2,S3,S4)..	S-2542	Tool-Push Button set-up tool....
S-2892	Tone Control and Power Switch (R13,S5).....		
S-2899	Transformer-1st I.F. Transformer (L18,L19,C20,C21).....		
S-2900	Transformer-2nd I.F. Transformer (L20,L21,C25,C26,C27,R8).....		
S-2903	Transformer-Power Transf.25/60 cycle (T1).....		
S-2904	Transformer-Power Transf.50/60 cycle (T1).....		
S-2906	Volume Control (R10).....		

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