RCA VICTOR

SERVICE MANUAL

VOLUME IV

RADIO RECEIVERS
PHONOGRAPHS

RCA VICTOR COMPANY, LTD.
HOME INSTRUMENT SERVICE DIVISION, MONTREAL, CANADA

RCA VICTOR

SERVICE DATA

VOLUME IV

- AC RECEIVERS
- AC-DC RECEIVERS
- AUTO RECEIVERS
- BATTERY PORTABLES
- BATTERY RECEIVERS
- RADIO-PHONOGRAPH COMBINATIONS
- RECORD CHANGERS
- RECORD PLAYERS

THIS VOLUME IS A COMPILATION OF SERVICE DATA PREVIOUSLY ISSUED FOR THE YEARS 1945-1948 (INCLUSIVE) WITH THE LATEST CHANGES AND CORRECTIONS.

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HOME INSTRUMENT SERVICE DIVISION
RCA VICTOR COMPANY, LTD.
MONTREAL, CANADA

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1945 1948

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SUPPLEMENTARY INFORMATION

MODEL 50

Change in Parts List

S3658 should read S-3656 Capacitor—.25 mfd. (C18)

MODEL VRA73

Due to late changes in design of the Model VRA73 receiver, a few errors occurred in the Service Note drawings. Correction of these errors may be made through reference to the informatoin contained in the following paragraphs.

The changes and additions affect the following drawings:

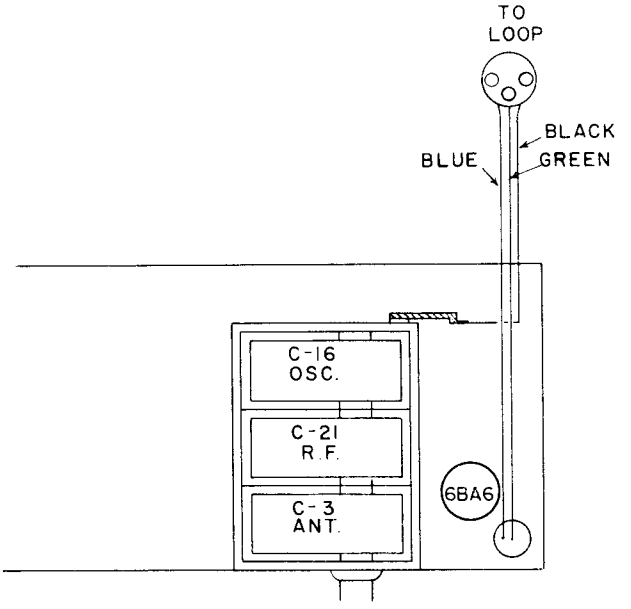
(1) Chassis Layout and Alignment Adjustments.

(2) Schematic Diagram.

(3) Wiring Diagram.

1. CHASSIS LAYOUT AND ALIGNMENT ADJUSTMENTS

The drawing below incorporates a wiring change and indicates the colors of the loop antenna leads.

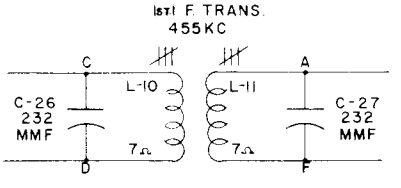


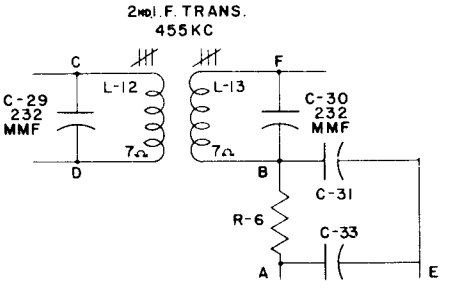
2. SCHEMATIC DIAGRAM

The changes on the schematic diagram are as follows:

(a) Loop antenna trimmer C-2 should be shown connected across the secondary of the loop, rather than returned to ground as indicated in the Service Note.

(b) The I.F. transformer connections and tuning capacities should be corrected as indicated below.





(c) The following changes should be made in the A.V.C. and Audio connections:

(1) Resistor R-5 should be connected to terminal "B" on the second I.F. transformer. (Terminal "B" as per revised I.F. transformer drawing in section 2b).

(2) Terminal "A" should be shown connected to the range switch S-3 (rear)—terminal #7.

3. WIRING DIAGRAM

The changes required on the wiring diagram affect the L and C numbers on the second I.F. transformer.

(a) L-13, C-30 should be between terminals B and F.

(b) C-31 should be between terminals B and E.

(c) C-33 should be between terminals A and E.

VRA 121

Change in parts list.

12568—Plug-Spkr. plug (5 pins) should read 12567

VRA123M & VRA123C

ADDITION to Parts List.

35352 Socket (Female)
35384 Socket (Male)

These are for connecting plug and socket on cable.

VR145

Correction in Parts List.

S-2548 Transformer—Power Transf. 105/125 V. 25-60 cycle, should read only 60 cycle.

33618 Transformer—Power Transf. 105/125 V. 50-60 cycle, should read only 25 cycles.

VR146

The first line of the General Description should read "The Model VR146 Console Type — instead of the Model VR58 console type.

Correction in Replacement Parts List

32618—Transformer—Power Transformer 105/125 volts should read 33618

S-3141 Dial—Scale should read S-3148

RP178

ADDITION to Replacement Parts List.

73158—Conversion for 50 cy. operation.

VR245

ADDITION to Parts List

S-4175 Base only—used with S-3511

RCA Victor

MODEL V4X
RECORD PLAYER
TECHNICAL INFORMATION AND SERVICE DATA

1945 No. 1

SERVICE DIVISION • RCA VICTOR COMPANY LIMITED • MONTREAL



Electrical and Mechanical Specifications

MOTOR

Type	Self-starting Rim drive
Turntable Speed	78 r.p.m.
Turntable Diameter	9 inches

POWER SUPPLY RATING

Rating A	105-125 volts, 60 cycles, 14 watts
Rating B	105-125 volts, 25 cycles, 15 watts

PICKUP

Type	Crystal
Impedance	100,000 ohms at 1,000 cycles
Volume Control Resistance	250,000 ohms
Average Output Voltage	1½ volts at 1,000 cycles across 250,000 ohm load

CABINET DIMENSIONS

Height	7⅛ inches
Depth	13¼ inches
Width	15½ inches

General Description

The RCA Victor Record Player Model V4X includes a rim drive motor, and a new type, light weight, crystal pick-up. This record player can be adapted to play records through the audio amplifier and loudspeaker system of practically every type of radio receiver. The cabinet is of walnut veneer, with a hinged lid, which locks in the "open" position. It is recommended that the lid be closed while records are being played. This instrument is designed for 10-inch or 12-inch diameter records.

Service Data

The crystal pick-up unit is thoroughly sealed in a metal casing, against extreme changes of climate. The offset pickup arm insures ideal tracking between needle and record grooves. If failure occurs due to a defective crystal, no attempt should be made to repair the unit, but a new replacement crystal unit should be installed. To replace crystal: Remove two filister head screws. Lift crystal from arm. Remove plug-in cable. The crystal unit uses a removable type needle.

The turntable speed should be 78 R.P.M., and the speed may be checked by a stroboscopic disc. When unavailable, place a piece of paper between a record and the turntable, with the paper protruding beyond the edge of the record, and then count the number of revolutions of the turntable per minute.

The motor should be lubricated once or twice a year by placing a few drops of S.A.E. 20 (or equivalent) on the turntable spindle and saturating the oil retaining felt pads on the motor shaft with S.A.E. 10 oil. See Fig. #1.

It is important that the motor drive spindle and rubber tire be kept clean and free from oil, grease, dirt or any foreign matter at all times. Any quick-drying naphtha is satisfactory for cleaning these parts.

The output lead from the volume control is a single conductor shielded cable, terminating in a small, male, pin plug. This pin plug fits into the female jack receptacle provided on most RCA Victor radio receivers. If no receptacle is provided on the receiver the correct adaptor with No. S-3122 Switch may be used.

Motor and Pickup Data

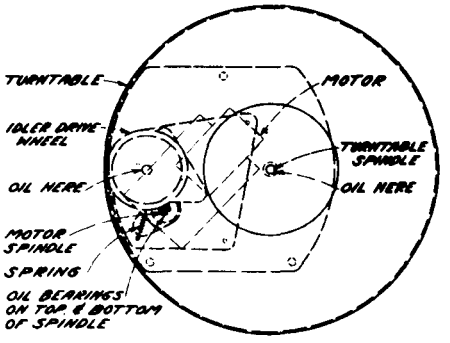


Figure 1—Motor Top View

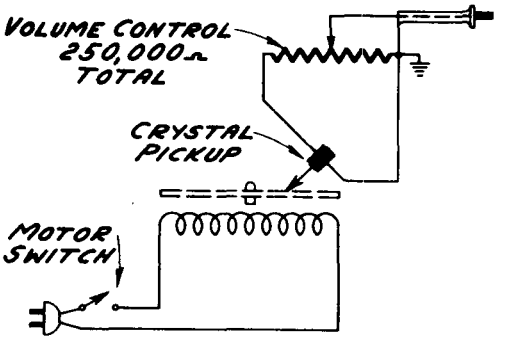


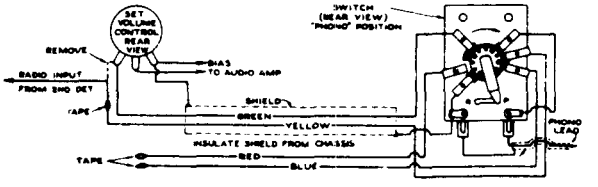
Figure 2—Motor and Pickup Schematic

Connecting Record Player to Radio Receivers

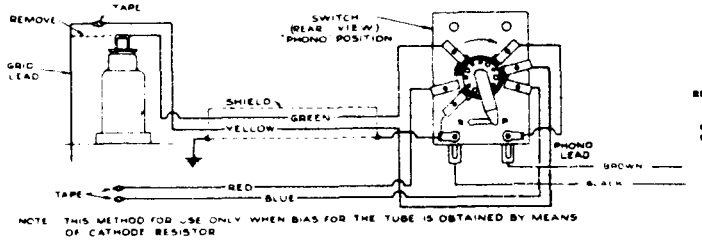
In general, the Record Player must be used with radio receivers having at least two stages of high-gain audio amplification. The output of the Record Player should be connected to the input of the first audio tube, and at the same time the output of radio receiver portion of the chassis should be shorted or opened, to prevent radio signals being heard while the Record Player is in operation.

Methods of connecting the Record Player to various types of audio systems are given in the accompanying diagrams. The data given requires that a Stock No. S-3122 Radio-Phono switch be used for switching from radio to phonograph. For ease in connecting the "phono" lead to the Stock No. S-3122 switch, the male plug on the end of the lead should be removed by unsoldering or by cutting it off.

RADIO RECEIVERS WHERE THE VOLUME CONTROL IS IN THE AUDIO INPUT CIRCUIT.

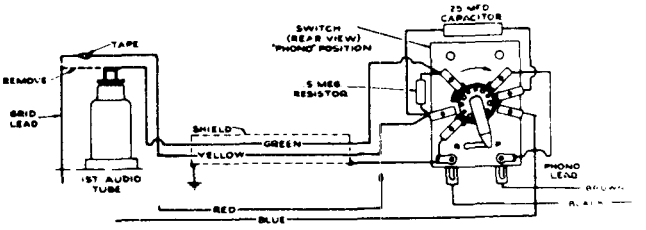


RADIO RECEIVERS WHERE FIRST AUDIO AMPLIFIER TUBE IS OF THE GRID CAP TYPE.



NOTE THIS METHOD FOR USE ONLY WHEN BIAS FOR THE TUBE IS OBTAINED BY MEANS OF CATHODE RESISTOR

RADIO RECEIVERS WHERE FIRST AUDIO TUBE IS OF THE GRID CAP TYPE, AND FIXED BIAS FOR TUBE IS OBTAINED THROUGH GRID LEAD.



NOTE - REMOVE BLUE AND RED LEADS CONNECT YELLOW LEAD TO TERMINAL SHOWN

REPLACEMENT PARTS FOR MODEL V4X

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

STOCK NO.	DESCRIPTION		STOCK NO.	DESCRIPTION	
	MOTOR ASSEMBLIES		31054	Grommet-Pickup base rubber grommet..	
S-3077	Motor-110 volt,60 cycle motor.....		S-3462	Screw-Pickup needle screw (Pkg.2)...	
S-3078	Motor-110 volt,25 cycle motor.....		S-3465	Screw-Pickup crystal retaining screw (Pkg.10).....	
S-3079	Spindle-Turntable spindle.....		S-3466	Spring-Pickup cable retaining spring (Pkg.2).....	
S-3080	Spring-Drive wheel tension spring (Pkg.2).....			**MISCELLANEOUS ASSEMBLIES**	
S-3081	Turntable-Motor turntable.....		31986	Cable-Pickup cable.....	
S-3082	Wheel-Rubber tired drive wheel.....		S-3266	Knob-Volume control knob.....	
	PICK-UP ASSEMBLIES		S-3464	Nut-Knurled for volume control.....	
S-3459	Arm-Pickup arm.....		S-3463	Rest-Pickup arm rest (Pkg.2).....	
S-3460	Base-Pickup arm base.....		S-2865	Support-Cabinet lid support.....	
S-3461	Crystal-Pickup crystal cartridge....		S-3268	Volume control and "Off-on" switch..	

All parts subject to change or withdrawal without notice.

RCA Victor

MODEL BP-4 PERSONAL RADIO

Four-Tube, Single-Band, Battery-Operated, Superheterodyne Receiver

TECHNICAL INFORMATION AND SERVICE DATA

— 1946 No. 17 —

SERVICE DIVISION • RCA VICTOR COMPANY LIMITED • MONTREAL

Specifications

Frequency Range ..... 550-1,600 kc
Intermediate Frequency ..... 455 kc

TUBE COMPLEMENT

(1) Type-1R5..... 1st Det.—Osc.
(2) Type-1T4..... I-F Amplifier
(3) Type-1S5..... 2nd Det., A-F, and A.V.C.
(4) Type 3S4..... Power Output

Type Battery	Current Consumption	Approximate Life (Intermittent Duty)
"A"—1.5 volt Eveready No. 950	0.25 amperes	3-5 hours
"B"—67.5 volts Eveready No. 467	8.5 milliamperes	25-40 hours

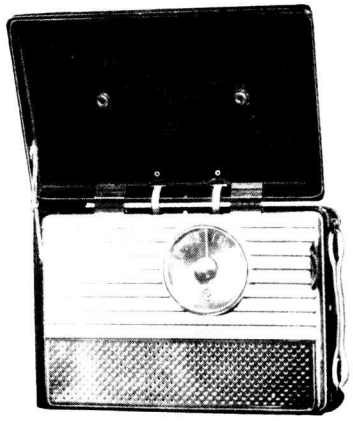
Power Output..... Undistorted 0.05 watts ..... Maximum 0.12 watts

Loudspeaker

Type Permanent-Magnet Dynamic Elliptical ..... 2 x 3 in.

Voice Coil Impedance ..... 11¾ ohms at 500 cycles

Cabinet Dimensions (inches)..... 3-3/16 x 6½ x 4-3/16
Weight..... 3¼ lbs. (net) Tuning Drive Ratio .....1 to 1



Replacement Parts

STOCK NO.	DESCRIPTION
	RECEIVER ASSEMBLIES
70444	Board-Speaker terminal board(5 contact).....
70445	Board-Terminal board (1 contact).
33111	Capacitor-Ceramic 33 MMF. (C16)..
60954	Capacitor-Ceramic 56 MMF. (C4)...
71514	Capacitor-Ceramic 82 MMF. (C13)..
70454	Capacitor-Tubular .002 Mfd.(C14, C19).....
70627	Capacitor-Tubular .005 Mfd.(C20).
70453	Capacitor-Tubular .02 Mfd.(C10, C15).....
71013	Capacitor-Tubular .05 Mfd.(C7),..
36718	Capacitor-Electrolytic 10 Mfd. (C17).....
70443	Coil-Oscillator Coil (L2,L4).....
70438	Condenser-Variable tuning (C1, C2,C5,C6).....
70447	Loop-antenna loop complete (L1) less lid (black).....
70985	Loop-Antenna loop complete (L1) less lid (brown).....
14076	Resistor,820 ohms 1/4 watt (R9)..
36714	Resistor,15,000 ohms-1/4 watt(R2)
14138	Resistor,68,000 ohms-1/4 watt(R5)
3252	Resistor,100,000 ohms-1/4 watt(R1)
30652	Resistor,1 Megohm - 1/4 watt(R7).
12928	Resistor,3.3 Megohm-1/4 Watt(R3, R10).....
30931	Resistor,4.7 Megohm -1/4 Watt(R8)
30992	Resistor,10 Megohm - 1/4 Watt(R4).
70436	Socket-Tube Socket.....
70430	Switch-Power Switch (S1).....
70442	Transformer-1st I.F.(L5,L6,C8,C9)
70437	Transformer-2nd I.F.(L7,L8,C11, C12).....
70439	Volume Control (R6) 2 Megohms....
	SPEAKER ASSEMBLIES
70428	Speaker.....
70440	Transformer-Output (T1).....

STOCK NO.	DESCRIPTION
	MISCELLANEOUS ASSEMBLIES
70456	Bottom-Case bottom - black.....
70988	Bottom-Case bottom - brown .....
70457	Catch-Spring catch assembly.....
70455	Center-case center-black.....
70987	Center-Case center-brown.....
70452	Connector-loop connector.....
36645	Fastener-Push fastener to hold loop (Pkg.3).....
70429	Grommet-For tube support & var.cond. (Pkg.5).....
70459	Handle-Carrying handle - black.....
70989	Handle-Carrying handle - brown.....
70434	Hinge-Lid hinge-black.....
70984	Hinge-Lid hinge-brown.....
70441	Holder-Battery holder.....
70424	Knob-Tuning knob.....
70432	Knob-Volume Control.....
70708	Lead-Battery lead complete.....
70450	Lid-Case lid & support,less loop (Black).....
70986	Lid-Case lid & support,less loop(brown)
70461	Link-Handle link - Black.....
70990	Link-Handle link - Brown.....
70449	Nameplate - "RCA".....
70427	Nut-Retaining nut for lid support stud (Pkg.10).....
70420	Panel-Chrome panel.....
70422	Plate-Backing plate for mtg.hinge on lid (black).....
70983	Plate-backing plate for mtg.hinge on lid (brown).....
70421	Screw-case cover mtg.screw(1 set blk)
71150	Screw-case cover mtg.screw(1 set brwn)
70446	Screw-#6-32x1/4" to mount battery holder(Pkg.10).....
70423	Spacer-Rubber shock spacer (Pkg.5).
70425	Spring-Tuning knob spring clip.....
70426	Stud-Lid support stud (Pkg.5).....
70451	Support-Lid support.....
70435	Support-Tube support less sockets & transformer.....
70460	Screw-4-40 x 1/8" for case center strip (Pkg.5).....
70433	Washer-Spring washer for V.C.knob (Pkg.10).....

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

Replacement of Component Parts

I. **To remove back cover:**

a. Depress locking spring clip through hole in top of case.

b. With spring clip depressed, pull cover carefully out and up off the locking lug in the bottom of the case.

II. **To replace batteries:**

a. Remove back cover.

b. Remove, either or both, the "A" and "B" battery as the case may warrant. The "B" battery snap fasteners can best be removed by inserting a screwdriver under the snap fastener strip and prying upward.

III. **To remove the case center strip:**

a. Remove one screw on the inside near the back cover.

b. Tilt case center strip and lift.

IV. **To replace tubes:**

a. Remove back cover.

b. Remove "B" battery.

c. Remove case center strip.

d. Remove and replace tubes as required.

V. **To remove the escutcheon plate (top cover):**

a. Remove the main dial knob, just pull.

b. Remove the four corner nuts (B), rear.

c. The plate may either be removed from the stay arm or folded into the lid.

VI. **To remove speaker:**

a. Remove escutcheon plate (see item V above).

b. Remove two Phillips screws (C) on chassis front of panel assembly holding speaker.

c. Unsolder voice coil leads.

d. Slide forward away from hinge side.

VII. **To remove output transformer:**

a. Remove speaker (see item VI).

b. Remove rivet (when replacing use small brass bolt).

c. Unsolder mounting lug and leads.

d. Pull out transformer.

VIII. **To remove volume control:**

a. Remove speaker (item VI).

b. Unsolder (disconnect) lead to positive terminal of "A" battery holder.

c. Lift up the "A" battery holder by removing the one screw in its base. This holder has a hinge action and must be lifted up and back to remove.

d. Remove front plate (panel) as follows:

1. Unsolder two copper strips (E) (from end of tube shelf to front plate) located under tubes 1R5 3S4.
2. Remove two screws (F) holding tube shelf to front plate. These screws are located between tubes 1R5 and 1T4, also 3S4 and 1S5. Rubber shock mounts may stick on studs, pry loose.
3. Remove nut (G) beneath tube shelf below second I-F transformer.
4. Remove screw (G) beneath the negative terminal of "A" battery holder, near cover hinge and also screw (G) adjacent to volume control below "A" battery holder near release catch.
5. Unsolder three chassis leads to cover switch assembly or remove the switch assembly from the front cover plate.
6. Lay chassis on board or jig.
7. Remove front plate.
8. Unsolder volume control leads.
9. Remove volume control knob and spider.
10. Remove volume control assembly by bending back four lugs.

Caution: Do not close lid unless center screw of switch assembly is in place.

e. Reassemble in reverse order.

IX. **To remove oscillator coil:**

a. Same procedure and steps as covered in item VIII for removal of volume control plus the following.

b. Unsolder oscillator coil leads.

c. Remove coil by unsnapping spring mounting clips from angle bracket.

X. **To remove 1st I-F transformer:**

a. Remove speaker.

b. Unsolder four leads from 1st I-F transformer.

1. Blue to plate (screen used as plate) of 1R5 tube.
2. Green to grid of 1T4 tube.
3. Red to B+ terminal of 5 lug terminal board adjacent output transformer.
4. Black to AVC terminal of same strip as above.

c. Remove connections as required from two lug terminal board adjacent to 1st I-F transformer to permit this terminal board to be moved to a position free of the 1st I-F transformer.

d. Unsolder and bend mounting lugs straight on the I-F transformer can. These lugs are immediately below the 2nd I-F transformer on tube shelf.

e. Slip 1st I-F transformer forward toward volume control and out.

Note: It is possible to fold the 1st I-F transformer out the front of the chassis if the front plate is removed. This will eliminate the unsoldering of leads from the two lug terminal board.

XI. **To remove 2nd I-F transformer:**

a. Carefully remove the two 0.02 uf C10, C15 capacitors.

b. Carefully depress the two leads (B+ and A+) near the I-F transformer case mounting lugs and unsolder these lugs from the tube mounting shelf and bend out.

c. Unsolder the blue (plate of 1T4), green (grid of 1S5), red (B+ on terminal board), and black leads.

d. Remove 2nd I-F transformer.

XII. **To remove condenser tuning gang:**

a. Loosen oscillator coil.

b. Unsolder leads to tuning gang.

c. Unsolder grounding straps.

d. Remove three screws holding gang assembly to chassis.

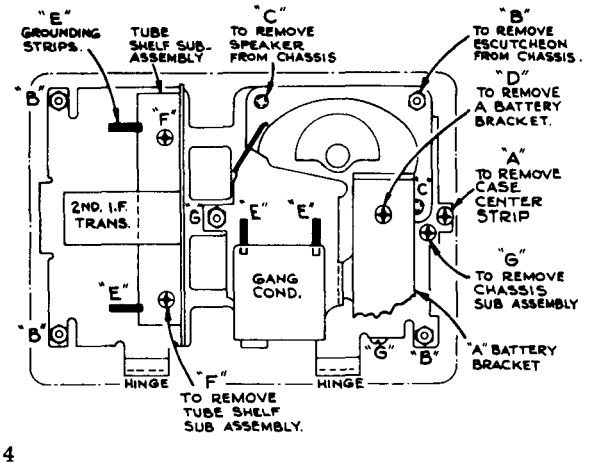
e. Remove gang from rear of chassis.

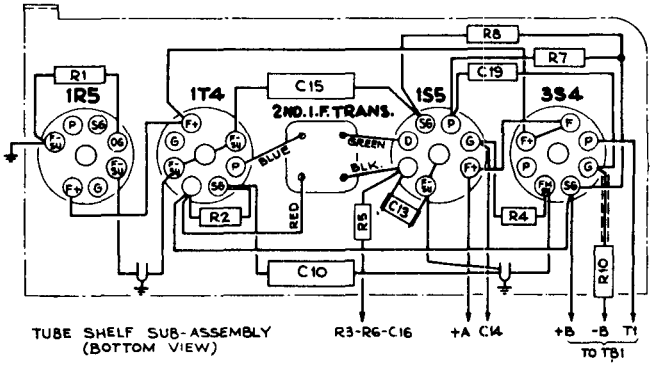
XIII. **To remove loop assembly:**

a. Unsolder loop leads in chassis.

b. Remove screw holding fish paper insulating envelope to chassis switch.

c. Remove snap fasteners holding loop in cover.





Alignment Procedure

Test Oscillator.—Connect test oscillator as indicated in chart keeping the output as low as possible to avoid A V C action.

Output Meter.—Connect meter from top lug of TB1 (plate of 3S4) to ground. Turn volume control to maximum position.

Fig. 1 shows the modifications necessary to convert the center strip portion of a case into a convenient shield to be used as a substitute for the regular case center strip in the RF, Osc. alignment.

Steps	Connect the high side of test osc. to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output—
1	Connection lug of C2, located on rear of gang in series with .01 mf.	455 kc	Quiet point near 1,600 kc	C11, C12 2nd I-F trans.
2		455 kc	Quiet point near 1,600 kc	C8, C9 1st I-F trans.
3	*Antenna coupling loop thru 200 mmf. capacitor	1,600 kc	1,600 kc	C5 (osc.)
4		1,500 kc	1,500 kc	C2 (ant.)
5		600 kc	600 kc	L2 (osc.)
6	Repeat steps 4 and 5 for final adjustments.			

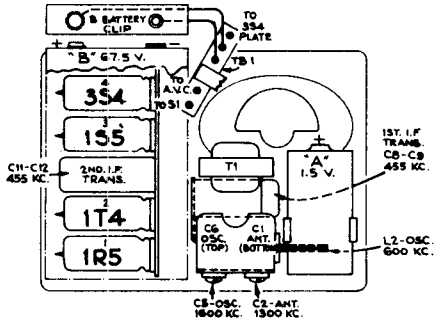
* Steps 3, 4 and 5 require a coupling loop from the signal generator to feed a signal into the receiver loop located in the lid. This loop should be approximately one turn of 6 x 3½ inches coupled to the signal generator through a 200 mmf. capacitor, and loosely coupled to the receiver loop antenna at about 1¾ inches distance, so as not to disturb the receiver loop inductance. Ground test oscillator through .1 mf. capacitor to receiver chassis.

Tools required:

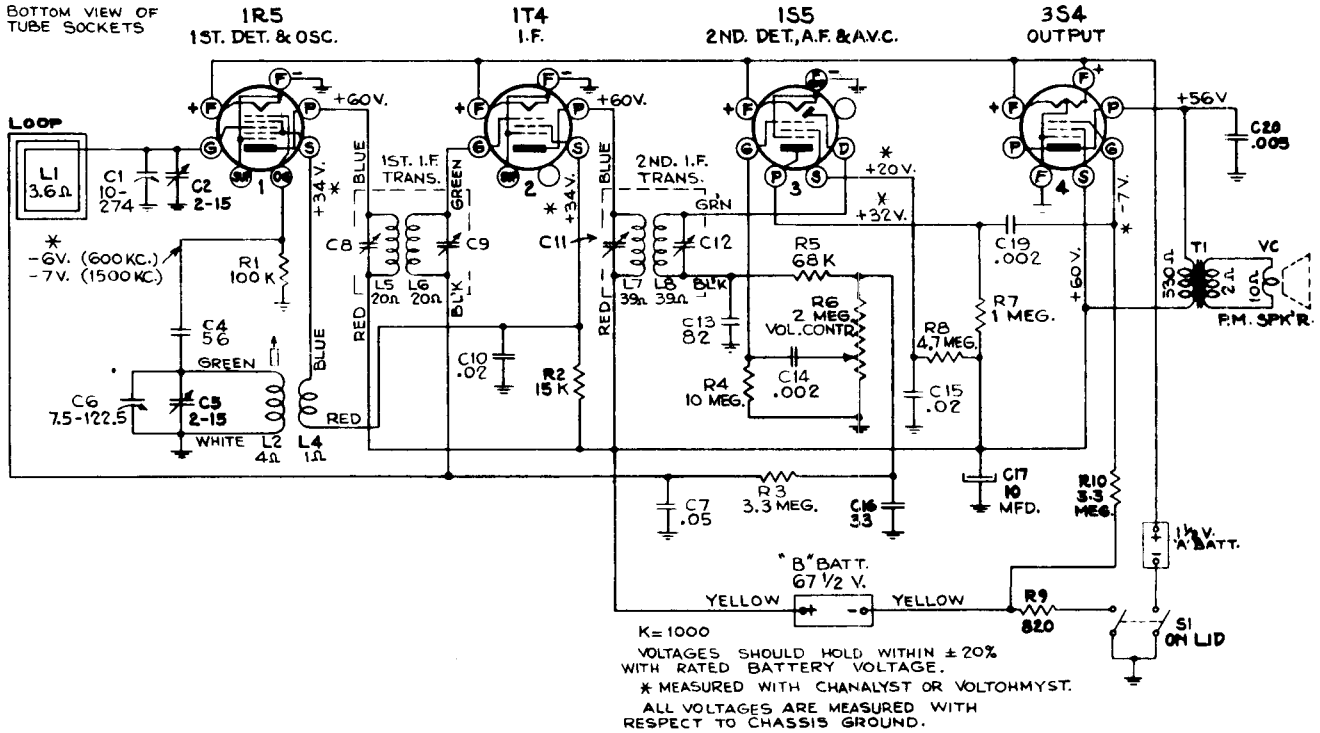
1. One Phillips No. 1 screwdriver.
2. One small neutralizing alignment tool No. 70180.

CRITICAL LEAD DRESS

1. Dress blue, green and black leads of second I-F transformer as direct as possible. If excess lead exists, dress down side of socket and flat against chassis to transformer opening.
2. Cross the green and the black leads inside the first I-F transformer can, keeping the green lead to the outside. Keep the blue and the green leads separated as far as possible throughout their length.
3. Dress audio coupling capacitor (C14; .002 mf.) and the lead to the volume control up and underneath the shelf supporting the output transformer.
4. Dress the three capacitors pyramided behind the speaker, parallel to the complete assembly and with enough room behind the battery holder to allow the holder to move when a battery is installed or removed.
5. Dress the "B" battery leads behind the gang frame and over the top of the output transformer.
6. Observe the outside foil connections on all paper capacitors, also the polarity of the electrolytic capacitor (C17).
7. Keep blue and red leads of output transformer above the mounting shelf.



Note: DO NOT install "A" battery without cardboard cover. A rubber band should be placed around each tube for cushioning.




RCA
"HIS MASTER'S VOICE"

RCA VICTOR

"HIS MASTER'S VOICE"

MODEL BP5

PORTABLE 6 TUBE SINGLE BAND AC-DC SUPERHETERODYNE

TECHNICAL INFORMATION AND SERVICE DATA

1948 No. 15

GENERAL SERVICE DIVISION • RCA VICTOR COMPANY LTD.

Electrical and Mechanical Specifications

Frequency Range ..... 540-1,600 kc
Intermediate Frequency ..... 455 kc
Power Supply Rating
110 to 125 volts, AC 50 or 60 cycles, or DC..18 watts
Batteries required ....1 Eveready Battery Pack W167

Tube Complement

(1) RCA—1R5 ..... Converter
(2) RCA—1T4 ..... I. F.-Amplifier
(3) RCA—1U5 .....2nd Det. AVC. & A.F.-Amplifier
(4) RCA—3V4 ..... Power Output
(5) RCA—117Z3 ..... Rectifier

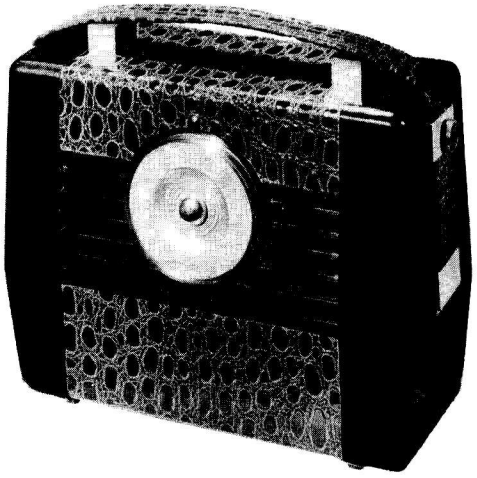
Current Consumption

Battery Operation....."A" 60 ma., "B" 10 ma.
(Average life of Eveready W167 Battery 100 hrs intermittent service.)
Total Rect. Current (117 volt, 60 cycle)..... 60 ma.

Power Output (AC Operation)

Undistorted ..... .15 watt
Maximum ..... .25 watt
(Output is slightly lower on battery operation)

Loudspeaker .....4 in. P.M. 3.4 ohms at 400 cycles



Cabinet Dimensions

Height....9½ in. Width....11 in. Depth....5 in.

CAUTION.—

Do not remove any tubes from the chassis with the set operating and the plug connected to the power line. Damage to tubes may result.

To Remove Carrying Handle

1. Pull off the volume control knob.
2. Insert a small knife blade between one side of a spring clip and the cabinet as shown below, push upward on the slip shield to disengage the locking of the slip shield to the spring clip. Repeat this procedure on the other side of the spring clip. The slip shield may then be removed by pushing it upward thus disengaging it from the spring clip.
3. Repeat step 2 for each slip shield.
4. Remove the four screws (2 on each side) which hold the carrying handle to the case.

Caution: When re-assembling make certain that the slip shield and the spring clip is assembled with their locks in the correct relation to each other.

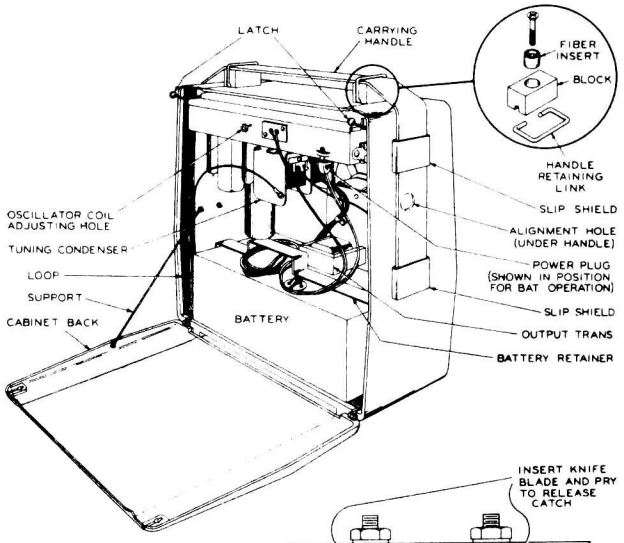
To Remove Chassis

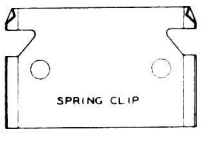
1. Pull off the volume control knob.
2. Close tuning condenser (dial at 55) to prevent possible damage to tuning condenser.
3. Remove dial knob by grasping both sides with the tips of the fingers of both hands and pull to the front —or—close the tuning condenser, open the back, reach in and push outward on the hub of the dial knob.

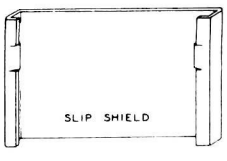
NOTE: When re-assembling press inward on the back of the tuning condenser and on the front of the knob to properly seat the hub on the shaft.

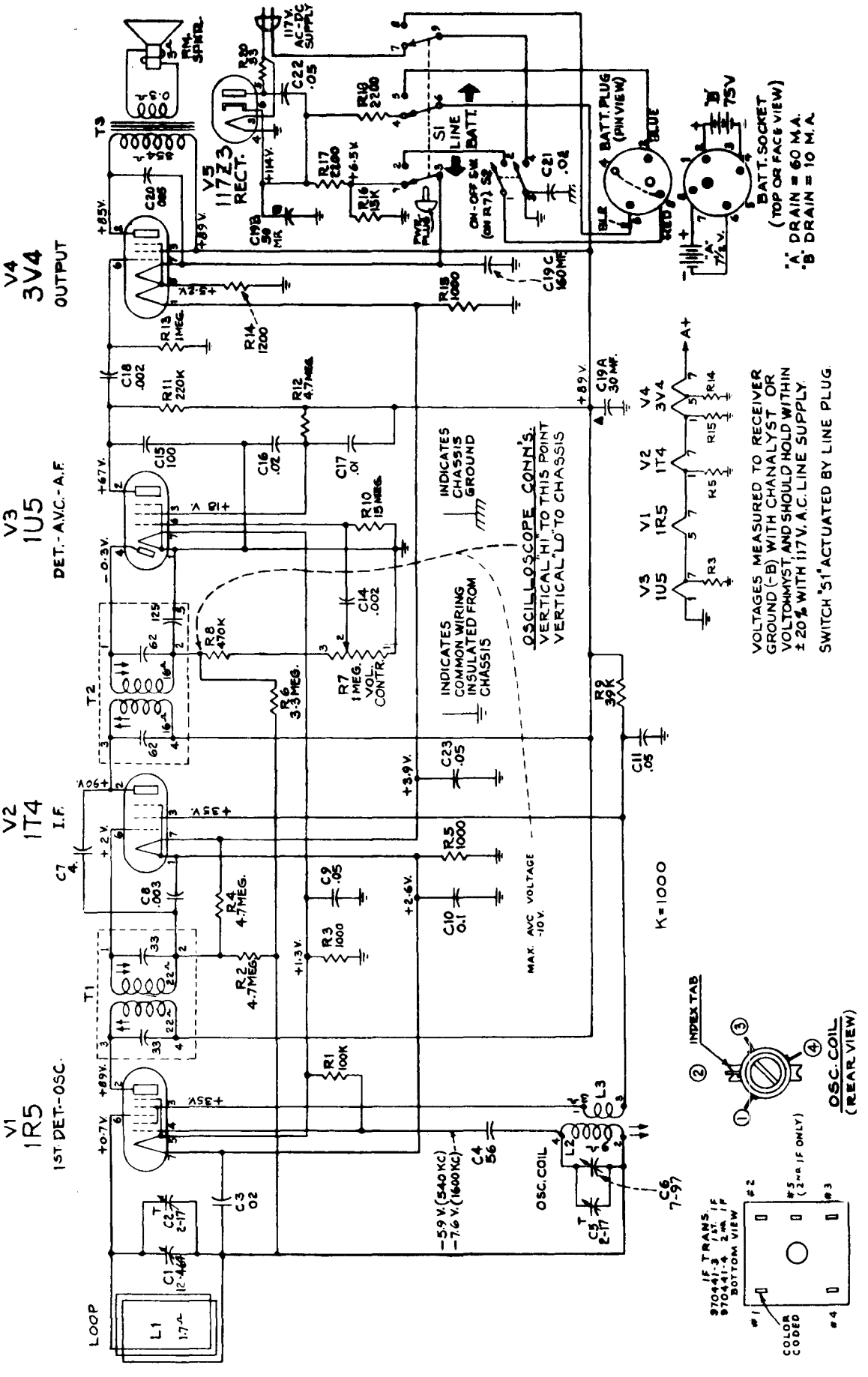
4. Remove the two slip shields on the R.H. side of the cabinet (opposite the volume control) and unfasten the end of the carrying handle using the procedure described under, "To Remove Carrying Handle."
5. Unsolder the loop leads.
6. Remove the two screws holding the bottom edge of the speaker to the cabinet.
7. Remove the plug from the battery.
8. Remove the two screws at the top of the cabinet while supporting the chassis with one hand.

NOTE: When re-installing replace speaker holding screws first but do not securely tighten until the two screws at the top of the cabinet have been tightened.









SCHEMATIC DIAGRAM

SERVICE DATA

AC-DC Operation

This receiver will operate on 105 to 125 volts, AC 25 or 60 cycles, or DC.

A power cord is stored inside the cabinet. To open the cabinet, push upward on the two metal ball catches at the top rear of the cabinet. Remove the plug of the power cord from its socket on the chassis and insert the plug into a convenient electrical outlet. A slot in the bottom of the back cover allows the back to be closed with the cord passing through.

NOTE: If reception is not obtained on DC, reverse plug in outlet receptacle. This may also reduce hum on AC operation.

When returning to battery operation replace the plug in the socket provided on the chassis, roll up the cord and place under the raised portion of the battery holder bracket.

NOTE: Make certain that the plug is fully inserted (base of plug touching chassis) to assure proper operation of the Batt-Line switch.

Insulating Washers:

The tuning condenser is insulated from the chassis with an insulating plate and insulating washers. In servicing make certain that these are in place and properly positioned.

Cabinet Hinges

The cabinet hinges may be readily removed, they are secured to the cabinet and back by force fit. To remove back from cabinet—pull straight outward on both hinges at the same time.

Critical Lead Dress

1. Dress output plate bypass C20 capacitor against chassis.
2. Dress output plate lead to output transformer against chassis.
3. Dress audio coupling capacitor C14 (volume control to grid of 1U5) away from chassis, away from audio limiting resistor R8 and to permit adjustment of second I.F. Transformer.
4. Dress all exposed leads away from each other, and away from chassis to prevent short circuits.
5. Dress all filament and ground leads against chassis.
6. Dress filament bypass capacitor C23 and accompanying compensating resistor R15 (volume control to IT4 socket) against volume control.
7. Dress power line cord away from line-battery switch mechanism.
8. Dress all capacitors and wiring away from oscillator coil.
9. Dress 4 mmf. neutralizing capacitor C7 against A.V.C. bypass capacitor C8 (IT4 filament to first I.F. trans.).

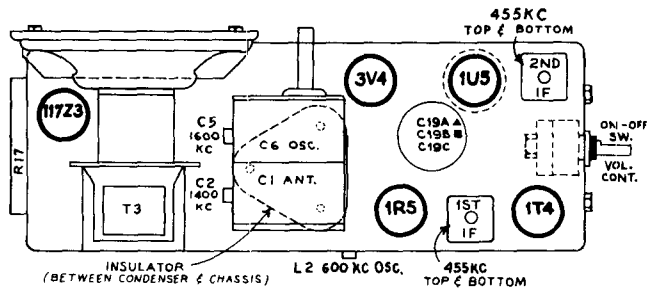
Alignment Procedure

Cathode Ray Alignment is the preferable method. Connections for the oscilloscope 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 Common Ground and keep the oscillator output as low as possible to avoid AVC action.

Battery operation of the receiver is preferable during alignment; on AC operation an isolation transformer (117v./117v.) may be necessary for the receiver if the test oscillator is also AC operated.



Tube and Trimmer Locations

Order of Alignment		TEST OSCILLATOR: Connect "HI" Side To	Connect "LO" Side To	Dummy Antenna	Frequency Setting	Range Selector	Receiver Dial Setting	Circuit to Adjust	Adjustment Symbols	Notes
I.F. ALIGNMENT	1	Disconnect loop - remove chassis - remove bottom plate, connect a 10,000 ohm resistor from C1 stator terminal to tuning condenser frame.								
	2	IT4 I.F. Grid	Gnd	.01 mfd	455 Kc		550 Kc	2nd I.F. Trans.	Top & Bottom Cores	Max. output
	3	1R5 Conv. Grid	Gnd	.01 mfd	455 Kc		550 Kc	1st I.F. Trans.	Top & Bottom Cores	Same
	4	Remove the 10,000 ohm resistor. Replace bottom cover and install chassis in cabinet. Re-connect loop.								
S.R. ALIGNMENT	5	SHORT WIRE PLACED NEAR	Gnd		1600 Kc		1600 Kc	Osc.	C-5	Same
	6	RECEIVER (FOR	Gnd		1400 Kc		1400 Kc	Ant.	†C-2	Same
	7	RADIATED SIGNAL)	Gnd		600 Kc		600 Kc	Osc.	L-2 (Rocking Gang)	Same
	8	Repeat steps No. 5, 6 & 7								

† Adjustable thru hole in side of case which is accessible after unfastening one end of the carrying handle.

REPLACEMENT PARTS FOR MODEL BP5

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

DESCRIPTION	STOCK NO.	DESCRIPTION	LIST PRICE
RECEIVER ASSEMBLY		**SPEAKER ASSEMBLY 4" P.M.**	
Capacitor-Ceramic 4 MMF (C7).....	S-3556	Dust Cap (Pkg.3).....	$.18
Capacitor-Ceramic 56 MMF(C4).....	S-4330	Cone-Cone and Voice Coil Assembly.	1.50
Capacitor-Ceramic 100 MMF(C15).....	S-4333	Output transformer (T3).....	5.75
Capacitor-.002 MFD (C14,C18).....	S-4332	Speaker.....	1.75
Capacitor-.003 MFD (C8).....			
Capacitor-.005 MFD (C20).....			
Capacitor-.01 MFD (C17).....		**MISCELLANEOUS ASSEMBLY**	
Capacitor-.02 MFD (C3,C16,C21)....			
Capacitor-.05 MFD (C3,C11,C9,C22, C23).....	73134	Back-Cabinet back (less hinges)...	3.95
	73147	Ball-for back cover latch mechanism (Pkg.2).....	.18
Capacitor-.1 MFD (C10).....			
Capacitor-Electrolytic (50 MFD - 30 MFD-160 MFD)(C19A,C19B,C19C)..	73136	Button-centre button for dial knob	.49
Coil-Oscillator coil with core and stud (L2,L3).....	73142	Button-station selector indicator button (Pkg.2).....	.28
Condenser-Variable (C1,C2,C5,C6)...	S-4399	Cabinet-front.....	6.00
Loop-Antenna loop (L1).....	S-4400	Cloth-Alligator cloth for cabinet.	1.50
Resistor-W.W. 33-ohms (R20).....	70425	Clip-spring slip for volume control & power switch knob (Pkg.2).....	.18
Resistor-1000 ohms,1/4 watt(R3,R5, R15).....	73148	Catch-Spring catch for back cover LH	.18
	73146	Catch-Spring catch for back cover RH	.18
Resistor-1200 ohms,1/4 watt (R14)..	73143	Handle-Carrying handle.....	2.60
Resistor-Voltage divider,2200 ohms, 7-watt (R17).....	73144	Hinge-Cabinet hinge.....	.28
	73135	Knob-Dial knob complete.....	1.05
Resistor-2200 ohms,1/2 watt (R18)..	73138	Knob-Volume control and power switch.....	.21
Resistor-15000 ohms,1/2 watt(R16)..			
Resistor-39000 ohms,1/2 watt(R9)...	73459	Link-Carrying handle link (Pkg.2).	.20
Resistor-100000 ohms, 1/2 watt(R1)..	73275	Plug-Battery cable plug.....	.21
Resistor-220000 ohms,1/2 watt(R11).	73139	Shield-Slip shield for carrying strap(bottom R.H.and L.H.and upper L.H.).....	.21
Resistor-470000 ohms,1/2 watt(R8)..			
Resistor-1 Megohm, 1/2 watt (R13)..			
Resistor-3.3 Megohm,1/2 watt (R6)..	73140	Shield-Slip shield for carrying strap (upper R.H.).....	.21
Resistor-4.7 Megohm,1/2 watt (R2, R4,R12).....	30900	Spring-Retaining spring for dial knob (Pkg. 5).....	.39
Resistor-15 Megohm,1/2 watt (R10)..			
Socket-Tube socket.....	73483	Support-Flexible loop support for back cover.....	.20
Switch-Line battery switch (S1)....			
Transformer 1st I.F. (T1).....			
Transformer 2nd I.F. (T2).....			
Volume Control (R7,S2).....			

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

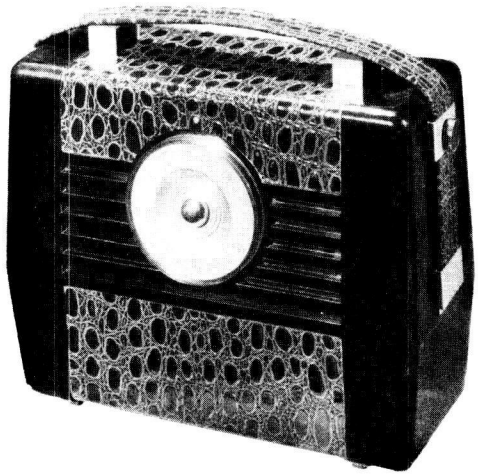
RCA VICTOR
MODEL BP5A

Portable 5 Tube Single Band AC-DC Superheterodyne

TECHNICAL INFORMATION AND SERVICE DATA

1948 No. 21

GENERAL SERVICE DIVISION • RCA VICTOR COMPANY LTD.



Electrical and Mechanical Specifications

Frequency Range ..... 540-1,600 kc
Intermediate Frequency ..... 455 kc
Power Supply Rating
110 to 125 volts, AC 50 or 60 cycles, or DC . . 18 watts
Batteries required .... 1 Eveready Battery Pack W167

Tube Complement

(1) RCA—1R5 ..... Converter
(2) RCA—1U4 ..... I. F.-Amplifier
(3) RCA—1U5 ..... 2nd Det. AVC. & A.F.-Amplifier
(4) RCA—3V4 ..... Power Output
(5) RCA—117Z3 ..... Rectifier

Current Consumption

Battery Operation ..... "A" 60 ma., "B" 10 ma.
(Average life of Eveready W167 Battery 100 hrs. intermittent service.)
Total Rect. Current (117 volt, 60 cycle) ..... 60 ma.

Power Output (AC Operation)

Undistorted ..... .15 watt
Maximum ..... .25 watt
(Output is slightly lower on battery operation)

Loudspeaker ..... 4 in. P.M. 3.4 ohms at 400 cycles

Cabinet Dimensions

Height ..... 9½ in. Width ..... 11 in. Depth ..... 5 in.

CAUTION.—

Do not remove any tubes from the chassis with the set operating and the plug connected to the power line. Damage to tubes may result.

NOTE: If reception is not obtained on DC, reverse plug in outlet receptacle. This may also reduce hum on AC operation.

Service Data

AC-DC Operation

This receiver will operate on 105 to 125 volts, AC 25 or 60 cycles, or DC.

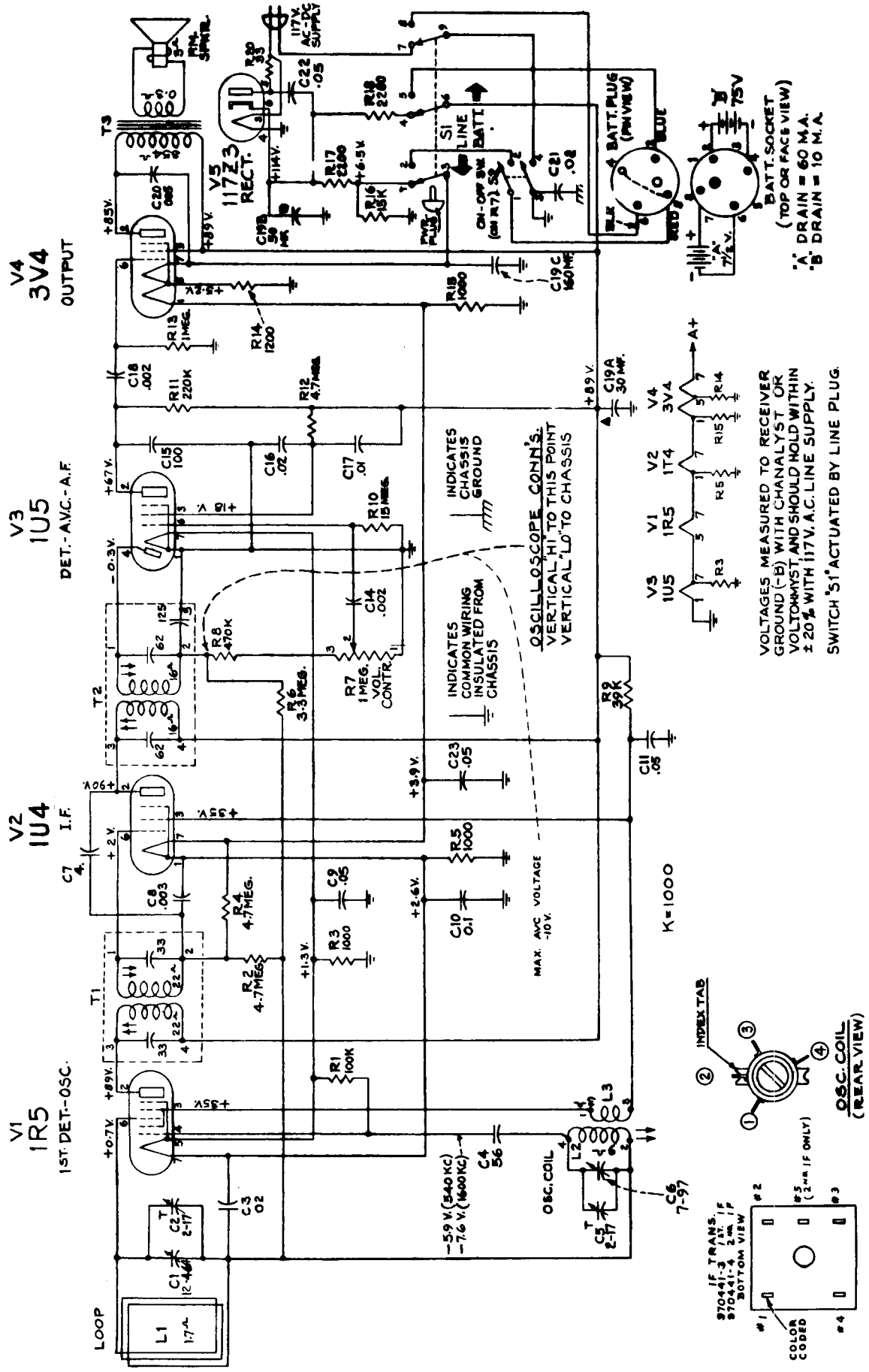
A power cord is stored inside the cabinet. To open the cabinet, push upward on the two metal ball catches at the top rear of the cabinet. Remove the plug of the power cord from its socket on the chassis and insert the plug into a convenient electrical outlet. A slot in the bottom of the back cover allows the back to be closed with the cord passing through.

When returning to battery operation replace the plug in the socket provided on the chassis, roll up the cord and place under the raised portion of the battery holder bracket.

NOTE: Make certain that the plug is fully inserted (base of plug touching chassis) to assure proper operation of the Batt-Line switch.

General Description

The RCA Victor Model BP5A is a portable five tube single band battery and A.C. operated receiver, housed in an attractive plastic cabinet with crocodile leatherette covering. Features of the design include a built-in loop antenna; powdered iron core I.F. transformers and oscillator coil; automatic volume control and a 4 inch round P.M. loudspeaker. For replacement parts information and other service data refer to the BP5A Service Note.



SCHEMATIC DIAGRAM

RCA Victor

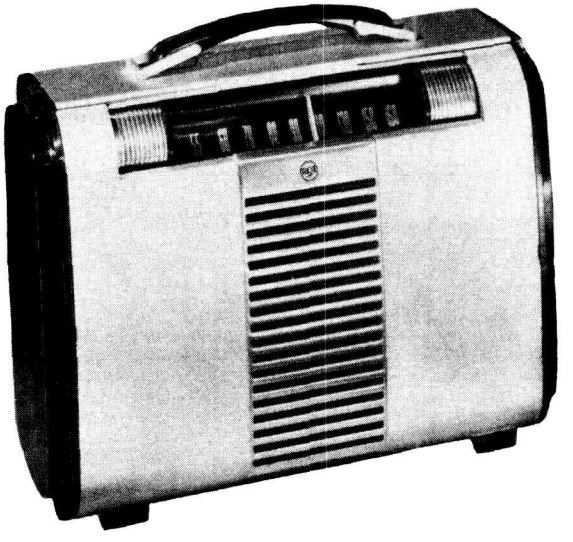
MODEL BP6

Portable 6 Tube Single Band AC-DC Superheterodyne

TECHNICAL INFORMATION AND SERVICE DATA

1947 No. 4

SERVICE DIVISION • RCA VICTOR COMPANY LIMITED • MONTREAL



Electrical and Mechanical Specifications

Frequency Range ..... 540-1600 Kcs.

TUBE COMPLEMENT

(1) 1T4 ..... R.F.
(2) 1R5 ..... Converter
(3) 1T4 ..... I.F. Amplifier
(4) 1S5 ..... 2nd Det. AVC & A.F. Amplifier
(5) 3Q4 ..... Power Output
(6) 117Z3 ..... Rectifier

LOUDSPEAKER

Type ..... 4" x 6" Elliptical P.M.
V.C. Impedance ..... 3.4 Ohms at 400 Cycles

Intermediate Frequency ..... 455 Kcs.

CURRENT CONSUMPTION

Battery Operation "A" ..... 50 MA.
"B" ..... 13 MA.
Total Rect. Current ..... 61 MA.

POWER OUTPUT

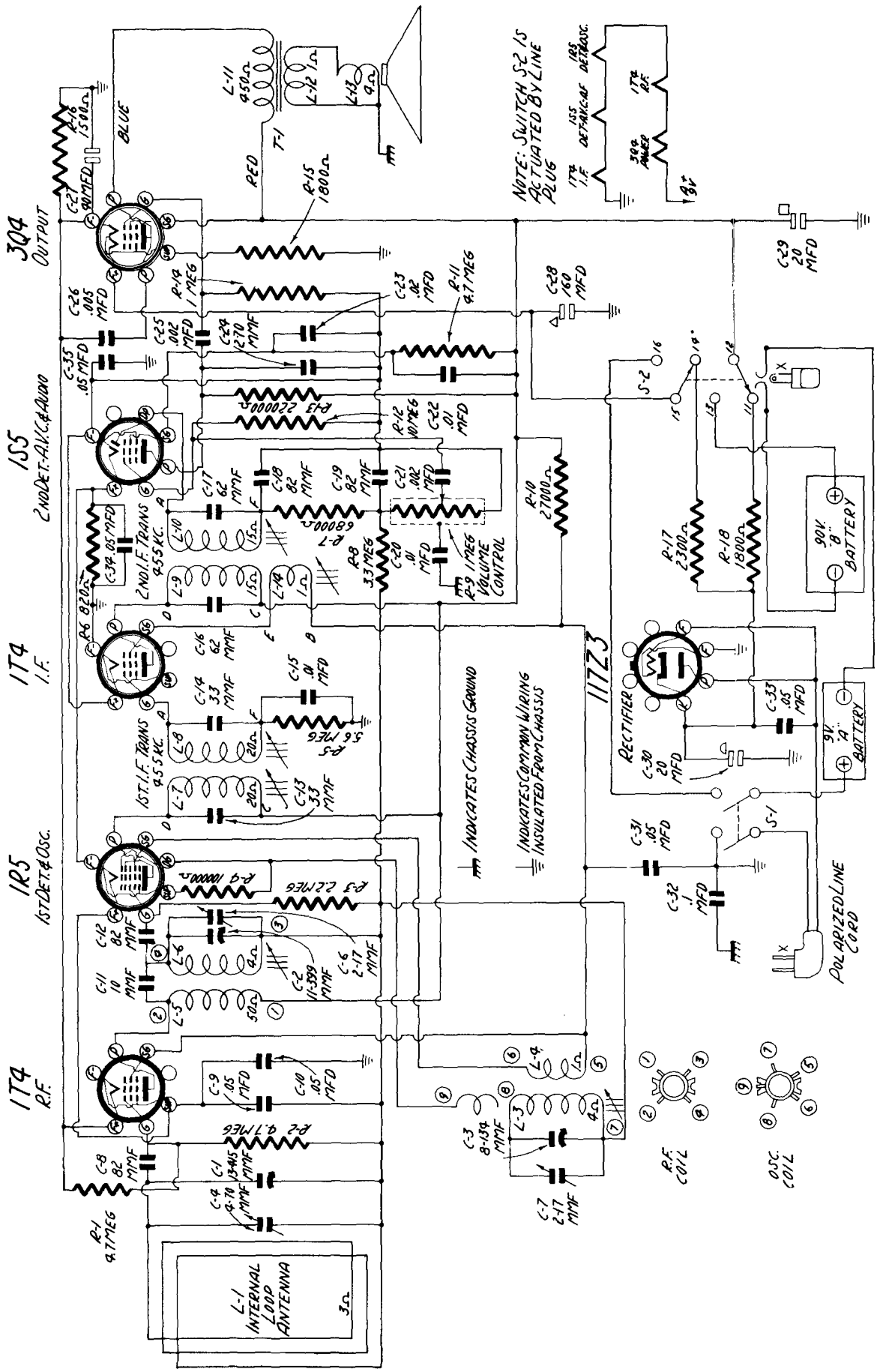
Maximum ..... .23 Watt

BATTERY REQUIRED

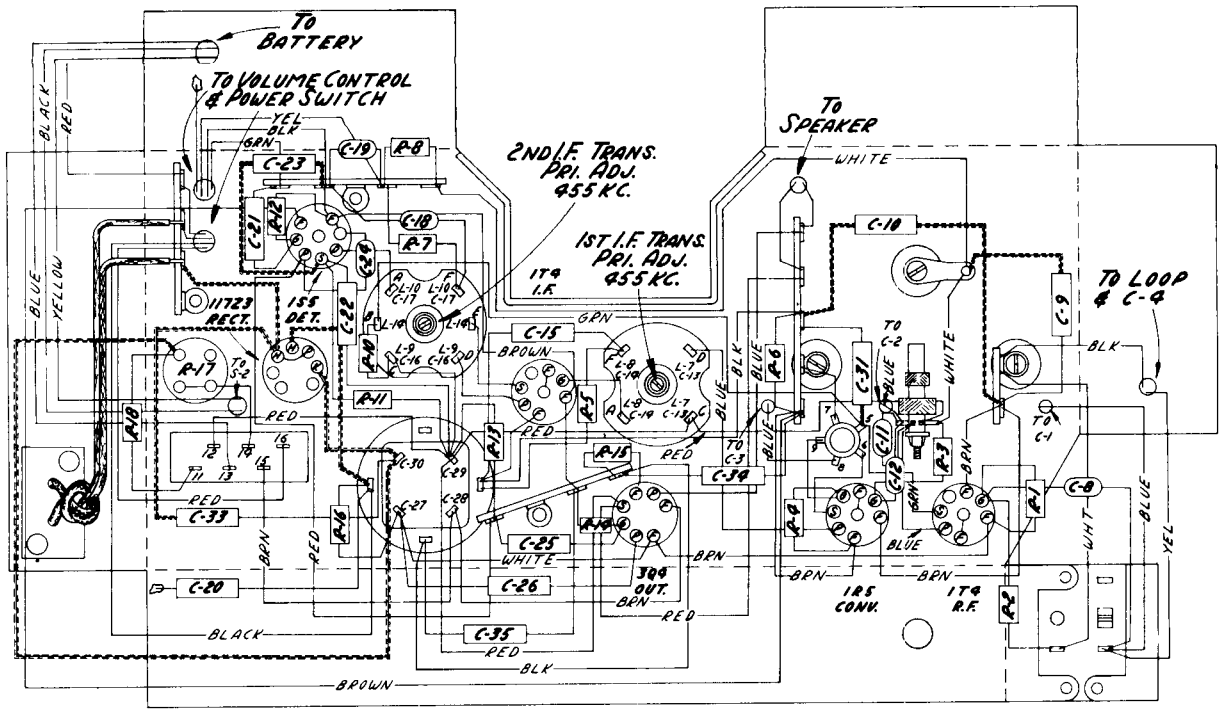
One Eveready Pack No. X340

CABINET DIMENSIONS

Height ..... 13¼ In.
Width ..... 9½ In.
Depth ..... 5½ In.



Schematic Diagram



Chassis Wiring Diagram

Alignment Procedure

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 oscillator output as low as possible to avoid AVC action.

Calibration Scale.—The calibrated dial scale is permanently connected to chassis. It can therefore be used directly as a reference for alignment.

With the gang at full mesh set the dial pointer so that the left hand edge of the pointer is 19/32 inches to the right of the point indicated in the dial cord drawing.

Steps	Connect the high side of test oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output
1	High side of loop (blue lead) in series with .1 Mfd	455 kc	Gang at max. cap.	L9 - L10 2nd I.F. Trans.
2				L7 - L8 1st I.F. Trans.
3	High side of loop (blue lead) in series with .1 Mfd. Bottom shield in place.	1300 kc	1300 kc	C7 (Osc.) C6 (RF)
4		600 kc	600 kc	L3 (Osc.) L6 (RF)
5	220 Mmf. in series with a single turn loop 4 x 8". Approx. 3 in. from receiver loop. Chassis in cabinet. C4 connected and lid closed.	1300 kc	1300 kc	C4 loop

AC-DC Operation.—

This receiver will operate on 105 to 125 volts, AC 50 or 60 cycles, or DC.

A power cord is stored in the fiber tube which is clamped above the chassis inside the cabinet. To open the cabinet, slide the two plastic feet in the rear of the cabinet toward each other, and raise the back cover upward on its hinges. Then pull the power cord plug out of the socket on the top of the chassis as shown, and take out and unroll the power cord. A slot in the bottom of the cabinet allows the closing of the cabinet with the power cord passing through. Close the cabinet with the cord extending through the slot and insert the plug into a convenient electrical outlet.

When returning to battery operation, be sure to replace the power plug in its socket inside the case with the cord stored in the fiber tube.

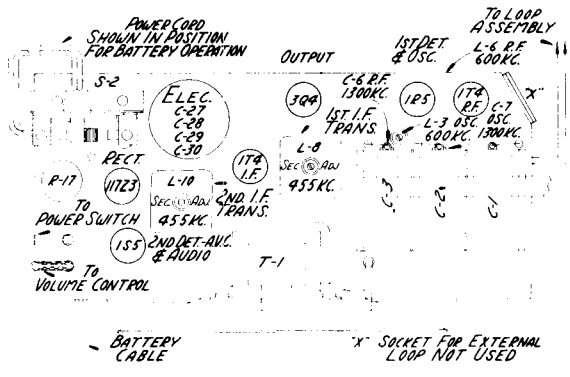
CRITICAL LEAD DRESS

1. Dress all filament leads next to chassis.
2. Keep the leads short on the ends of the three components which connect to the grid terminal (#6) of the r.f. socket. (R-1, R-2, C-8)
3. Separate leads to front and center sections of gang as far as possible and away from tubes.
4. Dress loop leads away from tuning drum and battery.
5. Dress output transformer leads away from rear section of gang.
6. Dress r.f. plate lead away from r.f. grid circuit.
7. Dress components and wiring near external loop socket to clear external loop pins.
8. Dress avc lead away from 2nd IF transformer and associated components.
9. Dress converter plate lead away from chassis and away from output twisted leads.
10. Dress twisted output leads up and away from other wiring.
11. Dress volume control cable, switch cable, and line receptacle leads away from rectifier tube and resistor case.
12. Dress 1st audio plate lead up and away from other wiring.
13. Do not restrict floating action of sockets by tight wiring.

CAUTION.—

1. **Do not remove any tubes from the chassis with the set operating and the plug connected to the power line. Damage to tubes may result.**
2. **When cleaning the aluminum portion of the case use soap and water or cleaning fluid. Do not use abrasive cleansers.**

NOTE.—If reception is not obtained on DC, reverse plug in outlet receptacle. This may also reduce hum on AC operation.



Chassis Layout

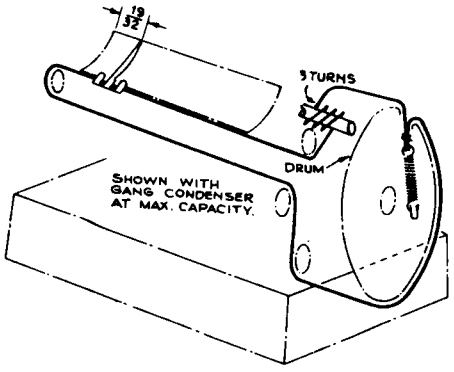
REPLACEMENT PARTS FOR MODEL

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

STOCK NO.	DESCRIPTION
	SPEAKER ASSEMBLIES
39043	Capacitor-Ceramic-10 Mmf. (C11)..
71514	" -Ceramic-82 Mmfd.(C8, C12,C18,C19).....
71540	" -Ceramic-270 Mmfd.(C24).
36854	" -.002 Mfd. (C21,C25)....
33584	" -.005 Mfd. (C26).....
4937	" -.01 Mfd.(C15,C20,C22).
31796	" -.02 Mfd.(C23).....
32787	" -.05 Mfd.(C9,C10,C31, C33,C34,C35).....
4839	" -.1 Mfd. (C32).....
71035	Condenser-Variable(C1,C2,C3,C6,C7)
37961	Condenser-Adjustable (C4).....
71043	Capacitor-Electrolytic (C27,C28, C29,C30).....
71402	Coil-R.F. (L5,L6).....
71401	Coil-Oscillator-(L3,L4).....
71030	Indicator-Station selector pointer
71079	Loop-Antenna loop (L1).....
14076	Resistor-820 ohms 1/4 watt (R6)..
30654	" -1500 ohms 1/4 watt(R16).
12194	" -1800 ohms 1/4 watt(R15, R18)...
30409	" -27000 ohms 1/4 watt(R10)
14138	" -68,000 ohms 1/4 watt (R7)
3252	" -100,000 ohms 1/4 watt(R4)
14583	" -220,000 ohms 1/4 watt(R13)
30652	" -1 Megohm 1/4 watt (R14).
30649	" -2.2 " 1/4 watt (R3)..
31417	" -3.3 " 1/4 watt (R8)..
30931	" -4.7 " 1/4 watt (R1, R2,R11)...
31455	" -5.6 " 1/4 watt (R5)..
30992	" -10 " 1/4 watt (R12).
71038	" -2300 ohms 6 watt (R17) (ballast).....
71037	Socket-tube socket(rubber moulded)
71827	" -tube socket.....
71055	Shaft-Drive shaft.....
70390	Spring-Drive cord tension(Pkg.2).
S-3585	Switch assembly (S2).....
71045	Switch (power switch - S1).....
71397	Transformer I.F.1st(L7,L8,C13, C14).....
71400	Transformer I.F.2nd(L9,L10,L14, C16,C17).....
71057	Volume Control-1 megohm (R9).....

STOCK NO.	DESCRIPTION
	RECEIVER ASSEMBLIES
S-3556	Dust Cap (Pkg.3).....
S-3516	Cone-Cone and Voice Coil Assy.(L13)
S-3580	Speaker.....
S-3583	Transformer-Output (T1) (L11,L12)..
	MISCELLANEOUS ASSEMBLIES
71074	Arm-Shutter arm lever.....
S-3740	Battery plug and cable.....
71044	Bracket-Power switch bracket less switch.....
71060	Back-Case back complete with center strip.....
32634	Cord-Drive cord - universal.....
71080	Clip-Case side spring clip & screw (2 req'd).....
71067	Front-case front complete less shutter.....
71068	Foot-Case foot (wood).....
71063	Handle assembly.....
71052	Knob assembly.....
71041	Plugs-4 prong for battery cable....
70392	Power Cord.....
71071	Shutter-Case shutter.....
S-4041	Scale-Dial scale.....
71072	Spring-Case shutter compression spring.....
71075	Side-Case side (RH) less capacitor assembly.....
71076	Side-Case side (LH).....
71077	Screw-Screw complete with washer & nut to secure one side to case front or case latch (Pkg.5).....
S-3741	Volume Control Cable.....
71078	Washer-Dampening washer for shutter shaft (Pkg.10).....
31608	Washer-"C" washer for case shutter (Pkg.10).....
71049	Window-Dial window.....

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



Dial Cord

RCA VICTOR
MODEL BP6A

"HIS MASTER'S VOICE"

PORTABLE 6 TUBE SINGLE BAND AC-DC SUPERHETERODYNE

TECHNICAL INFORMATION AND SERVICE DATA

1948 No. 11

GENERAL SERVICE DIVISION • RCA VICTOR COMPANY LTD.

Electrical and Mechanical Specifications

Frequency Range ..... 540-1,600 kc

Intermediate Frequency ..... 455 kc

Power Supply Rating

110 to 125 volts, AC 25 to 60 cycles, or DC.....18 watts

Batteries required

One Eveready Pack. No. 753

Tube Complement

(1) RCA—1T4 ..... R.F.
(2) RCA—1R5 ..... Converter
(3) RCA—1T4 ..... I.F.-Amplifier
(4) RCA—1U5 .....2nd Det. AVC. & A.F.-Amplifier
(5) RCA—3V4 ..... Power Output
(6) RCA—117Z3 ..... Rectifier

Current Consumption

Battery Operation....."A" 50 ma., "B" 13 ma.
Total Rect. Current (117 volt, 60 cycle).....61 ma.

Power Output

Undistorted ..... .150 watt
Maximum ..... .275 watt

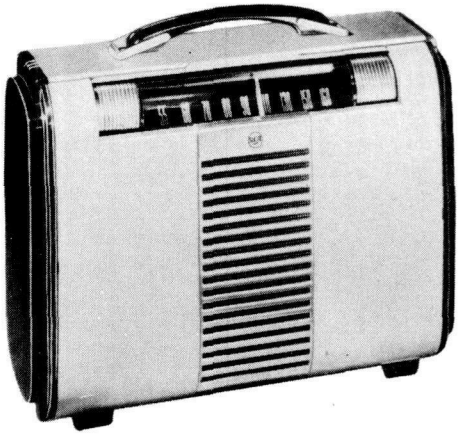
Loudspeaker.....4 in. P.M. 3.4 ohms at 400 cycles

Cabinet Dimensions

Height...13¼ in. Width...9½ in. Depth...5½ in.

CAUTION.—

1. **Do not remove any tubes from the chassis with the set operating and the plug connected to the power line. Damage to tubes may result.**
2. **When cleaning the aluminum portion of the case use soap and water or cleaning fluid. Do not use abrasive cleansers.**



(PHOTOGRAPH OF MODEL BP6)

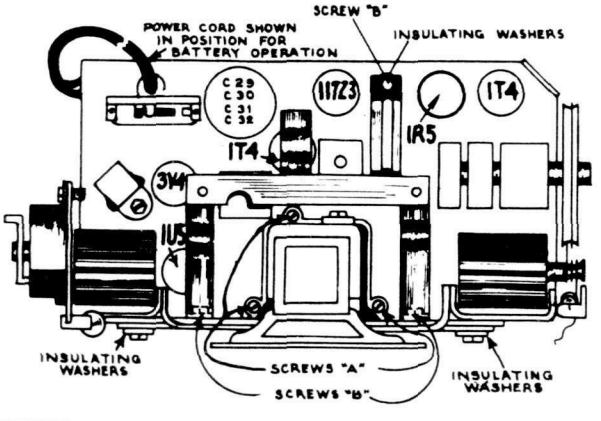
AC-DC Operation.—

This receiver will operate on 105 to 125 volts, AC 25 to 60 cycles, or DC.

A power cord is stored in the fiber tube which is clamped above the chassis inside the cabinet. To open the cabinet, push the wire latch on the bottom of the case to the right, and raise the back cover upward on its hinges. Then pull the power cord plug out of the socket on the top of the chassis as shown, and take out and unroll the power cord. A slot in the bottom of the cabinet allows the closing of the cabinet with the power cord passing through. Close the cabinet with the cord extending through the slot and insert the plug into a convenient electrical outlet.

When returning to battery operation, be sure to replace the power plug in its socket inside the case with the cord stored in the fiber tube.

NOTE. If reception is not obtained on DC, reverse plug in oulet receptacle. This may also reduce hum on AC operation.



Insulating Washers:

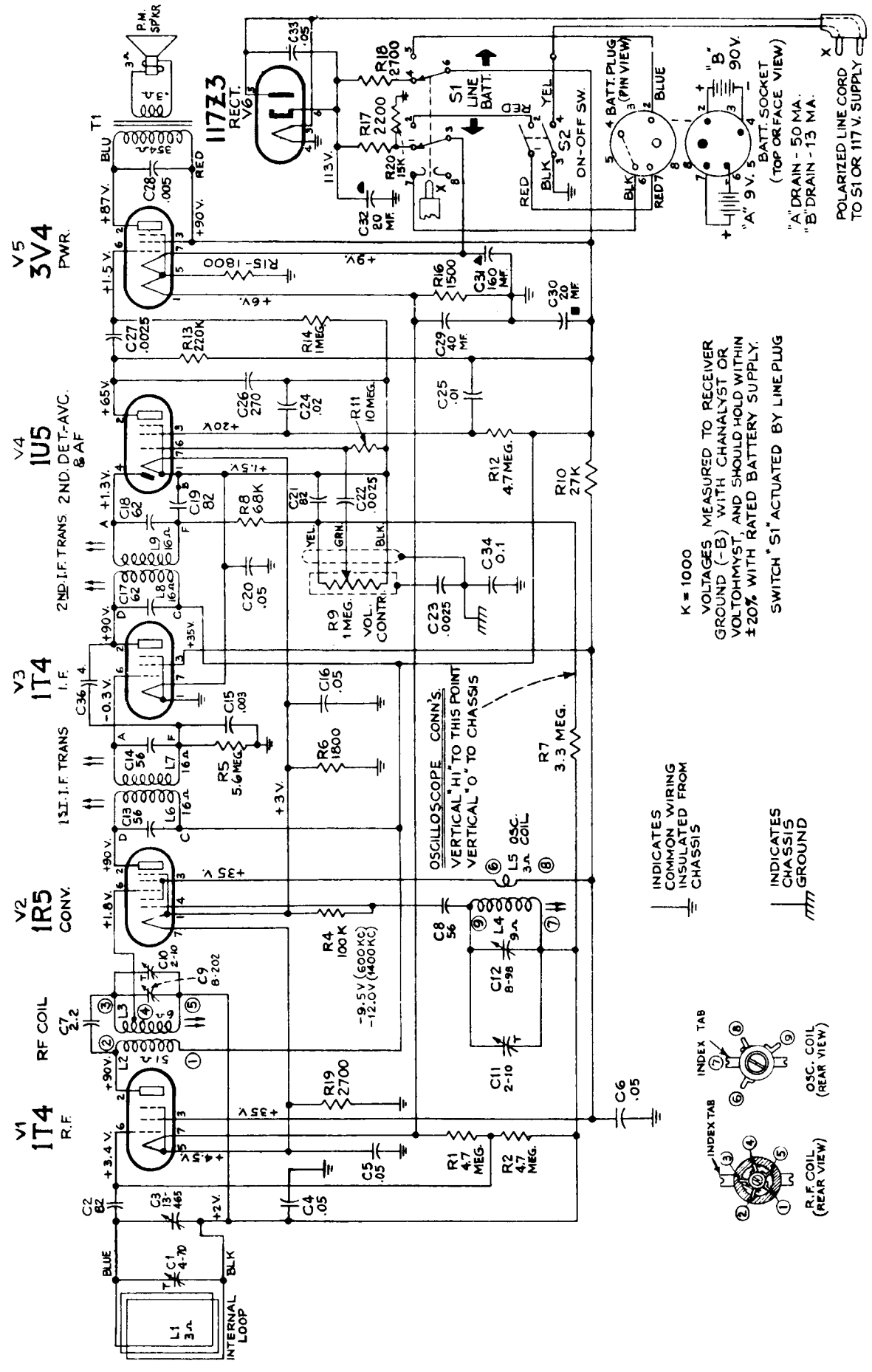
The mounting bracket and dial frame are insulated from the chassis with insulating washers. This serves to insulate the case from the chassis. In servicing make certain that these washers are in place and properly positioned.

To Remove Chassis from Cabinet:

1. Disconnect battery plug and remove battery.
2. Disconnect antenna in cabinet.
3. Remove the two screws in the top of the cabinet (beneath handle).
4. Remove the two battery clips.
5. Remove the chassis from the cabinet

To Remove Speaker:

1. Remove tubes 3V4 and 1U5.
2. Remove the three screws "B" holding power cord bracket assembly and remove bracket.
3. Remove the three screws "A" holding speaker bracket assembly.
4. Disconnect voice coil leads.
5. The speaker and speaker bracket may now be removed.



SCHEMATIC DIAGRAM

RCA VICTOR
MODEL BP6C

"HIS MASTER'S VOICE"

Portable 6 Tube Single Band AC-DC Superheterodyne

TECHNICAL INFORMATION AND SERVICE DATA

1948 No. 20

GENERAL SERVICE DIVISION • RCA VICTOR COMPANY LTD.

Electrical and Mechanical Specifications

Frequency Range ..... 540-1,600 kc

Intermediate Frequency ..... 455 kc

Power Supply Rating

110 to 125 volts, AC 25 to 60 cycles, or DC.....18 watts

Batteries required

One Eveready Pack. No. 753

Tube Complement

(1) RCA—1T4 ..... R.F.
(2) RCA—1R5 ..... Converter
(3) RCA—1U4 ..... I.F.-Amplifier
(4) RCA—1U5 ..... 2nd Det. AVC. & A.F.-Amplifier
(5) RCA—3V4 ..... Power Output
(6) RCA—117Z3 ..... Rectifier

Current Consumption

Battery Operation..... "A" 50 ma., "B" 13 ma.
Total Rect. Current (117 volt, 60 cycle)..... 61 ma.

Power Output

Undistorted ..... .150 watt
Maximum ..... .275 watt

Loudspeaker..... 4 in. P.M. 3.4 ohms at 400 cycles

Cabinet Dimensions

Height...13¼ in. Width...9½ in. Depth...5½ in.

CAUTION.—

1. **Do not remove any tubes from the chassis with the set operating and the plug connected to the power line. Damage to tubes may result.**
2. **When cleaning the aluminum portion of the case use soap and water or cleaning fluid. Do not use abrasive cleansers.**



(PHOTOGRAPH OF MODEL BP6)

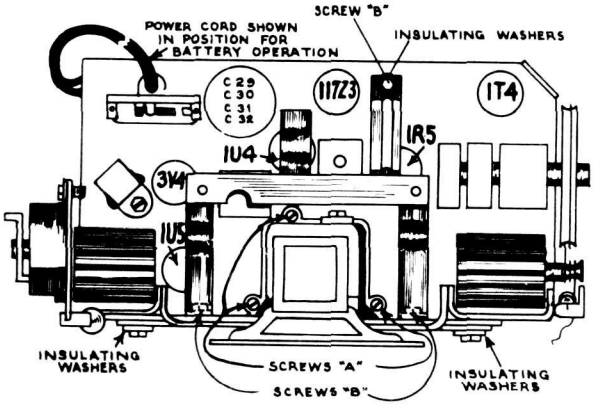
AC-DC Operation.—

This receiver will operate on 105 to 125 volts, AC 25 to 60 cycles, or DC.

A power cord is stored in the fiber tube which is clamped above the chassis inside the cabinet. To open the cabinet, push the wire latch on the bottom of the case to the right, and raise the back cover upward on its hinges. Then pull the power cord plug out of the socket on the top of the chassis as shown, and take out and unroll the power cord. A slot in the bottom of the cabinet allows the closing of the cabinet with the power cord passing through. Close the cabinet with the cord extending through the slot and insert the plug into a convenient electrical outlet.

When returning to battery operation, be sure to replace the power plug in its socket inside the case with the cord stored in the fiber tube.

NOTE. If reception is not obtained on DC, reverse plug in outlet receptacle. This may also reduce hum on AC operation.



Insulating Washers:

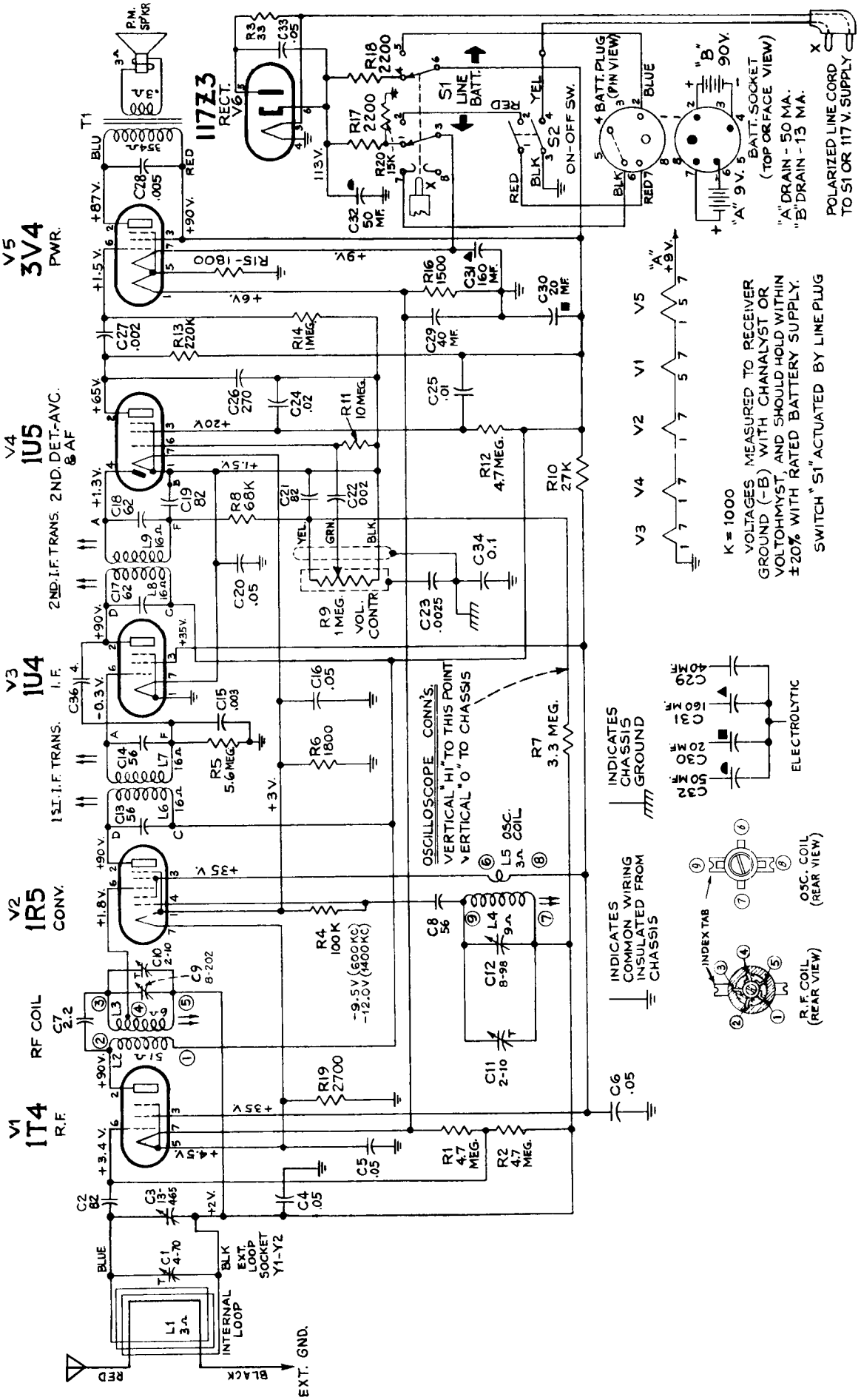
The mounting bracket and dial frame are insulated from the chassis with insulating washers. This serves to insulate the case from the chassis. In servicing make certain that these washers are in place and properly positioned.

To Remove Chassis from Cabinet:

1. Disconnect battery plug and remove battery.
2. Disconnect antenna in cabinet.
3. Remove the two screws in the top of the cabinet (beneath handle).
4. Remove the two battery clips.
5. Remove the chassis from the cabinet

To Remove Speaker:

1. Remove tubes 3V4 and 1U5.
2. Remove the three screws "B" holding power cord bracket assembly and remove bracket.
3. Remove the three screws "A" holding speaker bracket assembly.
4. Disconnect voice coil leads.
5. The speaker and speaker bracket may now be removed.



SCHEMATIC DIAGRAM

Alignment Procedure

Cathode Ray Alignment is the preferable method. Connections for the oscilloscope 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 oscillator output as low as possible to avoid AVC action.

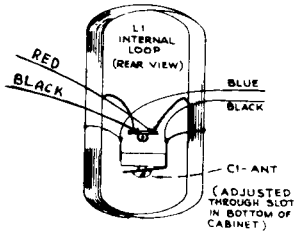
Battery operation of the receiver is preferable during alignment: on AC operation an isolation transformer (117v./117v.) may be necessary for the receiver if the test oscillator is also AC operated.

Calibration Scale.—The calibrated dial scale is attached to the chassis. It can be used directly as a reference for alignment.

With the gang at full mesh set the dial pointer so that the pointer is in line with the left hand vertical of the first figure 5 of the figures 55 on the dial scale as illustrated below.

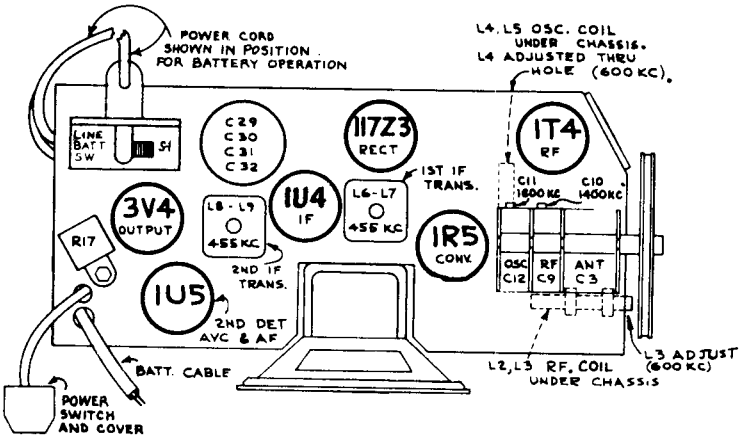


Dial Pointer Setting



Critical Lead Dress

1. Dress all filament leads next to chassis.
2. Keep the leads short on the end of the three components which connect to the grid terminal (#6) of the r.f. socket. (R-1, R-2, C-2).
3. Keep lead to center section of gang as short as possible.
4. Dress loop leads away from tuning drum and battery.
5. Dress lead to pin #4 of 1U5 tube away from other wiring.
6. Dress r.f. plate lead away from r.f. grid circuit.
7. Dress avc lead away from 2nd IF transformer and associated components.
8. Dress converter plate lead away from chassis and away from output leads.
9. Dress output leads up and away from other wiring.
10. Dress neutralizing capacitor C36, flat against chassis.
11. Dress 1st audio plate lead up and away from other wiring.
12. Dress R.F. tube plate lead slightly away from chassis base.
13. Dress 33 ohm resistor (R3) over bottom of rectifier socket and clear of other wiring.



Tube and Trimmer Locations

ALIGNMENT CHART

Order of Alignment		TEST OSCILLATOR: Connect "HI" Side To	Connect "LO" Side To	Dummy Antenna	Frequency Setting	Range Selector	Receiver Dial Setting	Circuit To Adjust	Adjustment Symbols	Notes
I.F. ALIGNMENT	1	1U4 I.F. GRID	GND	.01 MFD.	455 KC.		1600 KC.	2ND. I.F. TRANS.	L8 & L9 TOP *	MAX. OUTPUT
	2	1R5 CONV GRID	GND	.01 MFD.	455 KC.		1600 KC.	1ST. I.F. TRANS.	L6 & L7 TOP *	SAME
	3	SAME	SAME	SAME	SAME		SAME	2ND. I.F. TRANS.	L8	SAME
S.B. ALIGNMENT	4	BLUE LOOP LEAD	SAME	SAME	1600 KC		SAME	OSC.	C-11	SAME
	5	SAME	SAME	SAME	1400 KC.		1400 KC.	R.F.	C-10	SAME
	6	SAME	SAME	SAME	600 KC.		600 KC.	OSC. R.F.	L4 L3	SAME
	7	REPEAT STEPS 4, 5 AND 6								
	8	SEE NOTE	GND		1400 KC.		1400 KC.	LOOP ANT	C-1 CABINET CLOSED	SAME

NOTE: SHORT WIRE PLACED NEAR LOOP. (CHASSIS IN CABINET AND INTERNAL LOOP CONNECTED)

TOP * TWO PEAKS MAY BE FOUND, THE CORRECT PEAK IS THAT WITH THE CORE IN THE OUTER POSITION (COUNTER-CLOCKWISE)

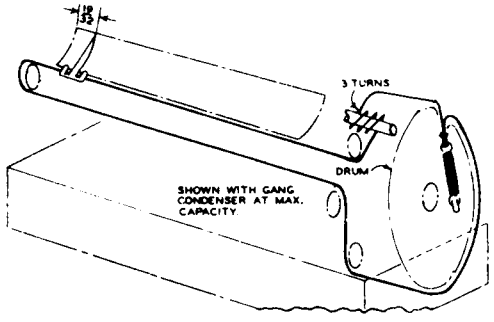
REPLACEMENT PARTS FOR MODEL BP6C

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

STOCK NO.	DESCRIPTION
	CHASSIS ASSEMBLY
71069	Capacitor - trimmer (C1)
71502	" - 2.2 Mmf. (7)
S-4382	" - 4 Mmf. (C36)
71924	" - 56 Mmf. (C8)
71514	" - 82 Mmf. (C2-C21)
71540	" - 270 Mmf. (C26)
S-3644	" - .0025 Mfd. (C22-C23-C27)
S-4383	" - .003 Mfd. (C15)
S-3646	" - .005 Mfd. (C28)
70615	" - .05 Mfd. (C4-C5-C6-C16-C20-C33)
S-3650	" - .02 Mfd. (C24)
S-3648	" - .01 Mfd. (C25)
S-3655	" - .1 Mfd. (C34)
73112	Condenser - Variable (C3-C9-C10-C11-C12)
73113	Capacitor - Electrolytic (C29-C30-C31-C32)
S-4329	Coil R.F. Coil (L2-L3)
S-4328	Coil Osc. Coil (L4-L5)
73111	Indicator - Station Selector pointer
73237	Resistor - 33 ohms W.W. (fuse type)(R3)
30654	" - 1500 ohms ½ watt (R16)
12194	" - 1800 " ½ " (R6-R15)
30492	" - 2200 " ½ " (R18)
73238	" - 2200 " 6 watts (R17) - ballast
30730	" - 2700 " ½ " (R19)
36714	" - 15,000 " ½ " (R20)
30409	" - 27,000 " ½ " (R10)
14138	" - 68,000 " ½ " (R8)
3252	" - 100,000" ½ " (R4)
14583	" - 220,000" ½ " (R13)
30652	" - 1 Megohm ½ watt (R14)
31417	" - 3.3 " ½ " (R7)
30931	" - 4.7 " ½ " (R1-R2-R12)
31455	" - 5.6 " ½ " (R5)
30992	" - 10. " ½ " (R11)
73115	Socket - tube socket (rubber moulded)
73116	" - " " (" ") less shield
73122	Shaft - Drive shaft
70390	Spring - Drive cord tension (Pkg. 2)
S-3585	Switch assembly (S1)
71045	" power switch (S2)
S-4326	Transformer 1st I.F. (L6-L7-C13-C14)
S-4327	" 2nd I.F. (L8-L9-C17-C18-C19)
71057	Volume Control (R9)

STOCK NO.	DESCRIPTION
	SPEAKER ASSEMBLY 4" ROUND
S-4330	Cone - cone & Voice coil assembly
S-4325	Speaker
S-4355	Output transformer (T1)
	MISCELLANEOUS ASSEMBLIES
71074	Arm - shutter arm lever
71064	Bracket - to hold battery
71073	" - bearing bracket for shutter arm lever
71044	" - Power switch bracket less switch
73243	Back - case back complete with centre strip
71080	Clip - case side spring clip & screw (2 req'd)
S-4331	Cord - power cord
S-4313	Cord - drive cord
S-4385	Cable - battery cable & plug
S-3741	" - volume control
S-4041	Dial - dial scale
71068	Foot - case foot (front section)
73124	Front - case front complete (less shutter)
71061	Foot - case foot (rear section)
71063	Handle Assembly
71031	Holder - power cord holder
73121	Knob - volume & tuning
71079	Loop - antenna loop
71065	Link - Handle link assembly
73244	Latch - case latch
71041	Plug - battery cable plug
30900	Spring - retaining knob spring (Pkg. 5)
71072	Spring - case shutter compression spring
71071	Shutter
72979	Side - case side R.H. (less capacitor assy.)
72980	" - " " L.H.
71049	Window - Dial window
31608	Washer "C" washer for case shutter (Pkg. 10)
71078	" - dampening washer for shutter shaft (Pkg. 10)

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



Dial-Indicator and Drive Mechanism

RCA Victor

MODEL BP-10A PERSONAL RADIO

Four-Tube, Single-Band, Battery-Operated, Superheretodyne Receiver

TECHNICAL INFORMATION AND SERVICE DATA

— 1945 No. 5 —

SERVICE DIVISION • RCA VICTOR COMPANY LIMITED • MONTREAL

Electrical and Mechanical Specifications

FREQUENCY RANGE ..... 540-1,600 kc

INTERMEDIATE FREQUENCY ..... 455 kc

TUBE COMPLEMENT

(1) Type-1R5 ..... 1st Det.—Osc.
(2) Type-1T4 ..... I-F Amplifier
(3) Type-1S5 ..... 2nd Det., A-F, and A.V.C.
(4) Type-1S4 ..... Power Output

Battery Supply	Current Consumption
"A"—1.5 volt Eveready No. 950	0.25 amperes
"B"—67.5 volts Eveready No. 467	8.5 milliamperes

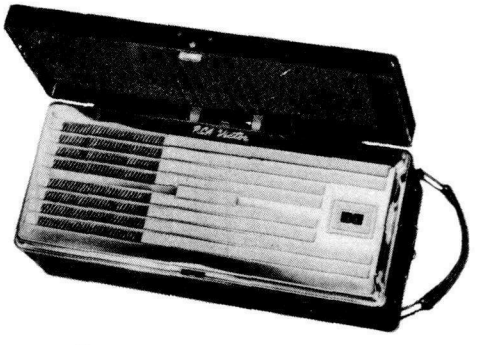
POWER OUTPUT

Undistorted ..... 0.05 watts
Maximum ..... 0.12 watts

LOUDSPEAKER

Type ..... 3-inch permanent-magnet dynamic
V.C. Impedance ..... 3 ohms at 400 cycles

	Height	Width	Depth
Cabinet Dimensions (inches)	3	8⅞	3⅝
Weight	3¾ lbs. (net)	4¾ lbs. (shipping)	
Tuning Drive Ratio			1 to 1



REPLACEMENT PARTS FOR MODEL BP-10A

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

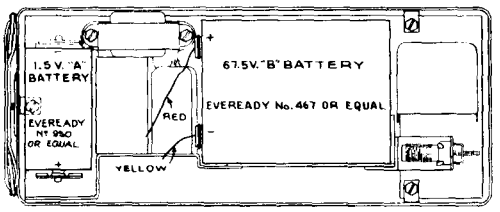
STOCK NO.	DESCRIPTION	LIST PRICE
	RECEIVER ASSEMBLIES	
36717	Capacitor-20 mmfd.Temp.Comp.(C18).	
36715	Capacitor-50 mmfd. " " (C3,C16)	
36716	Capacitor-100 " " " (C13).	
12488	Capacitor-270 " " " (C4)..	
36163	Capacitor-.001 mfd. (C14,C19).....	
33584	Capacitor-.005 " (C20).....	
36248	Capacitor-.02 " (C10-C15).....	
32787	Capacitor-.05 " (C7).....	
36718	Capacitor-Electrolytic 10 mfd.(C17)	
36496	Condenser-Variable tuning(C1,C6)..	
36497	Coil-Oscillator (L2,L3).....	
36495	Control-Volume control (R6).....	
36606	Core-Adjustable core and stud,Osc. coil	
36503	Holder-Battery holder complete....	
36501	Knob-Tuning disc	
36502	Knob-Volume knob.....	
30158	Resistor-820 ohms - 1/4 watt (R9).	
36714	Resistor-15,000 ohms-1/4 " (R2).	
14983	Resistor-47,000 " -1/4 " (R5).	
3252	Resistor-100,000 " -1/4 " (R1).	
30652	Resistor- 1 Megohm -1/4 " (R7).	
31417	Resistor-3.3 " -1/4 "(R3-R10)	
30931	Resistor-4.7 " -1/4 " (R8).	
30992	Resistor-10. " -1/4 " (R4).	
36500	Socket-Tube socket.....	
S-3041	Socket-Cushion tube socket.....	
36069	Socket-1T4-Shield tube socket.....	
36506	Switch-Power Switch.....	
36498	Transformer-1st I.F.(L4,L5,C8,C9)..	
36499	Transformer-2nd I.F.(L6,L7,C11,C12)	
	SPEAKER ASSEMBLIES	
39467	Cone-Speaker cone.....	
36504	3" P.M.Speaker,less output transformer.....	
36505	Transformer-Output T-1.....	
	MISCELLANEOUS ASSEMBLIES	
38204	Antenna-Loop antenna and cover.....	
36507	Bottom-Receiver case bottom.....	
36508	Centre-Receiver centre strip.....	
37179	Clip-"B" Battery Clip.....	
37180	Clip-"B" " "	
38207	Connector-Loop contact	
36509	Handle-Carrying handle and bracket.	
37857	Hinge pins and hinge springs(1 set)	
37156	Latch-Bottom latch and rivets.....	
38205	Latch-Top Latch and rivets.....	
37835	Lid and antenna with antenna cover and lid support.....	
S-3068	Lid-Lid only with lid support.....	
37854	Panel-Control panel.....	
S-3063	Rivet-Hinge rivet (Pkg.25).....	
37811	Support-lid support	

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

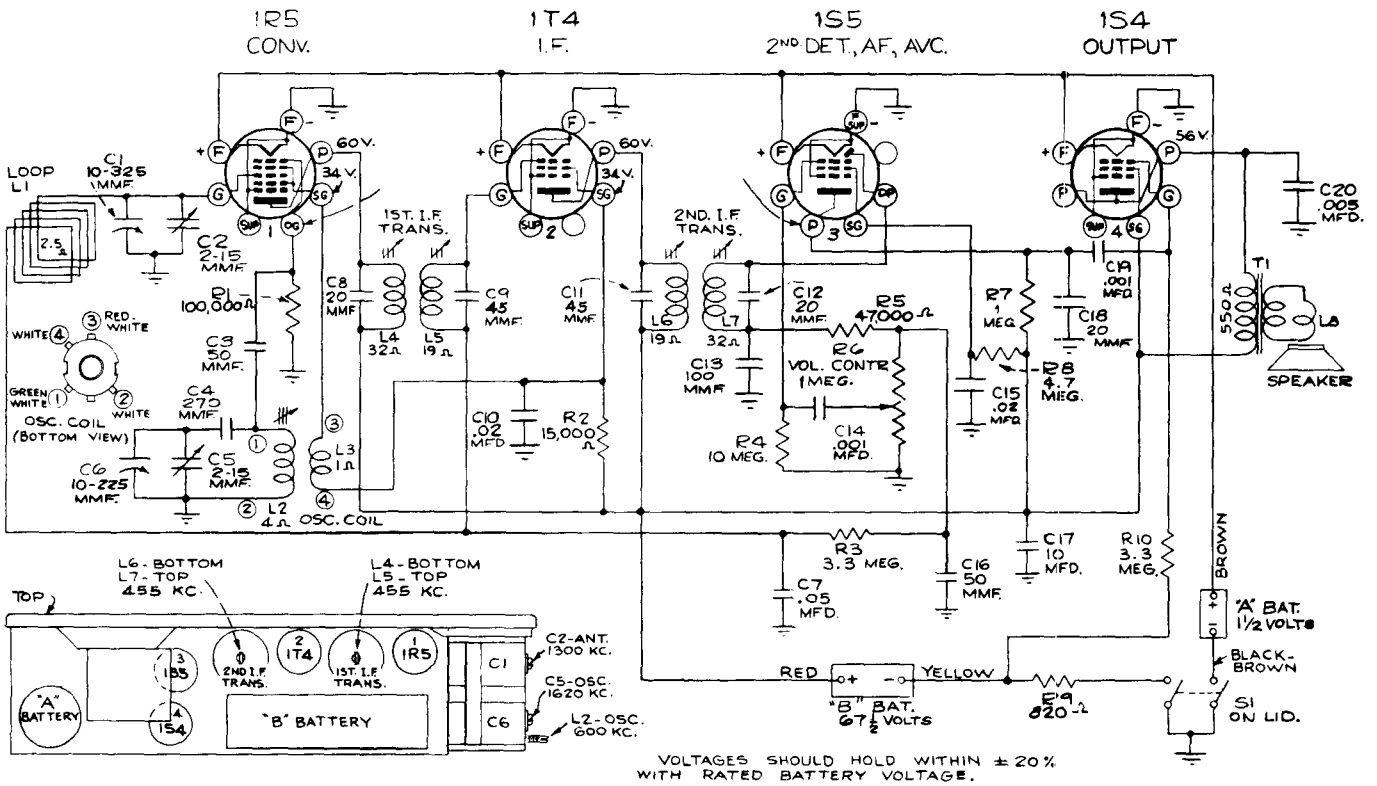
Alignment Procedure

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, keep the output as low as possible to avoid a-v-c action.



Steps	Connect the high side of test-osc. to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output—
1	Tuning condenser stator (ant.) in series with .01 *mfd.*	455 kc	Quiet point at 1,600 kc end of dial	L7, L6, L5, L4 (2nd and 1st I-F transformers)
2	Radiated signal 1,620 kc	1,620 kc	Full clockwise (out of mesh)	C5 (oscillator)
3	Radiated signal 1,300 kc	1,300 kc	1,300 kc	C2 (antenna)
4	Radiated signal 600 kc	600 kc	600 kc	L2 (osc.)
5	Repeat steps 2, 3 and 4.			



Model BP-10 Schematic Diagram

Installation instructions for lid or control Panel

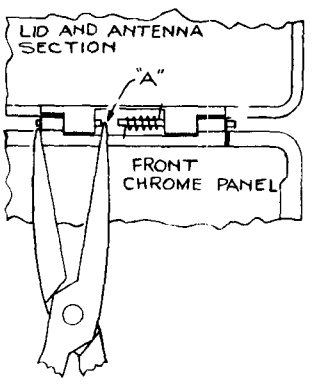
First remove the three self-tapping screws that hold the chassis in the centre case, and remove the case. Unsolder the leads from the loop lugs.

(a) With lid closed, cut hinge pins at point "A" with sharp cutters.

(b) Start removal of pin sections as shown, using long-nose pliers.

(c) Grasp end of pin section with long-nose pliers and pull out of hinge.

(d) Install new lid, or new front panel, using replacement hinge pins and springs. Arrange springs as shown. Apply a small amount of cement near outer end of each pin to insure tight and permanent fit.



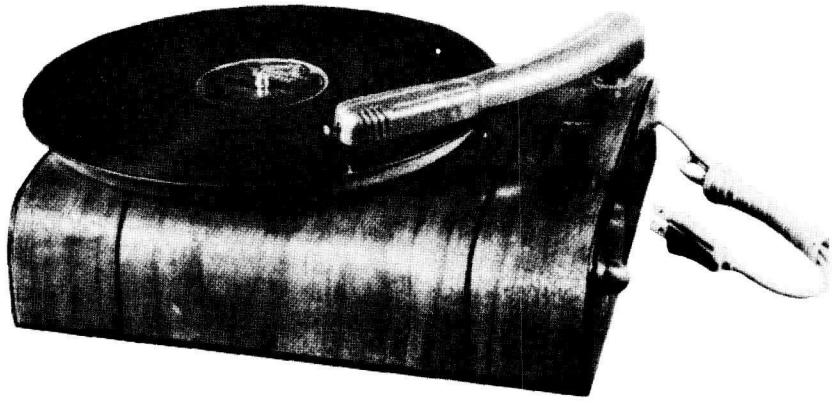
Replacing Lid or Control Panel

RCA Victor

MODEL V14
RECORD PLAYER
TECHNICAL INFORMATION AND SERVICE DATA

1945 No. 3

SERVICE DIVISION • RCA VICTOR COMPANY LIMITED • MONTREAL



Electrical and Mechanical Specifications

MOTOR

Type	Self-starting Rim drive
Turntable Speed	78 r.p.m.
Turntable Diameter	9 inches

POWER SUPPLY RATING

Rating A	105-125 volts, 60 cycles, 14 watts
Rating B	105-125 volts, 25 cycles, 15 watts

PICKUP

Type	Crystal
Impedance	100,000 ohms at 1,000 cycles
Volume Control Resistance	250,000 ohms
Average Output Voltage	1½ volts at 1,000 cycles across 250,000 ohm load

CABINET DIMENSIONS

Height	27/8 inches
Depth	97/8 inches
Width	113/8 inches

General Description

The RCA Victor Player Model V-14 includes a rim drive motor and a new type, light weight, crystal pickup. This record player can be adapted to play records through the audio amplifier and loudspeaker system of practically every type of radio receiver. The instrument is designed to play 10-inch or 12-inch diameter records.

Service Data

The crystal pick-up unit is thoroughly sealed in a metal casing, against extreme changes of climate. The offset pickup arm insures ideal tracking between needle and record grooves. If failure occurs due to a defective crystal, no attempt should be made to repair the unit, but a new replacement crystal unit should be installed. To replace crystal: Remove two fillister head screws. Lift crystal from arm. Remove plug-in cable. The crystal unit uses a removable type needle.

The turntable speed should be 78 R.P.M., and the speed may be checked by a stroboscopic disc. When unavailable place a piece of paper between a record and the turntable, with the paper protruding beyond the edge of the record, and then count the number of revolutions of the turntable per minute.

The motor should be lubricated once or twice a year by placing a few drops of S.A.E. 20 (or equivalent) on the turntable spindle and saturating the oil retaining felt pads on the motor shaft with S.A.E. 10 oil. See Fig. 1.

It is important that the motor drive spindle and rubber tire be kept clean and free from oil, grease, dirt or any foreign matter at all times. Any quick-drying naphtha is satisfactory for cleaning these parts.

The output lead from the volume control is a two conductor twisted cable, terminating in a small, male, pin plug. This pin plug fits into the female jack receptacle provided on most RCA Victor radio receivers. If no receptacle is provided on the receiver the correct adaptor with No. S-3122 Switch may be used.

Motor and Pickup Data

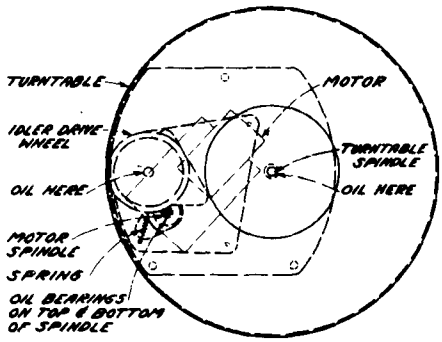


Figure 1—Motor Top View

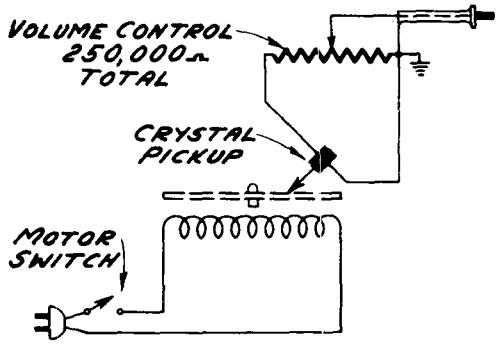


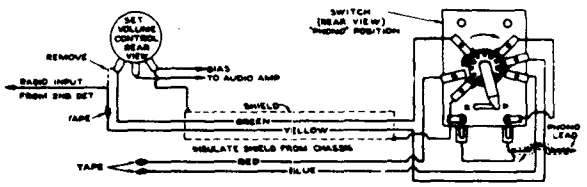
Figure 2—Motor and Pickup Schematic

Connecting Record Player to Radio Receivers

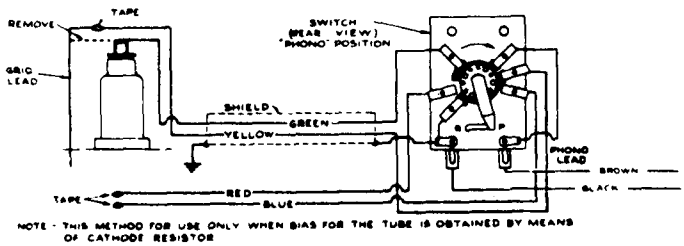
In general, the Record Player must be used with radio receivers having at least two stages of high-gain audio amplification. The output of the Record Player should be connected to the input of the first audio tube, and at the same time the output of radio receiver portion of the chassis should be shorted or opened, to prevent radio signals being heard while the Record Player is in operation.

Methods of connecting the Record Player to various types of audio systems are given in the accompanying diagrams. The data given requires that a Stock No. S-3122 Radio-Phono switch be used for switching from radio to phonograph. For ease in connecting the "phono" lead to the Stock No. S-3122 switch, the male plug on the end of the lead should be removed by unsoldering or by cutting it off.

RADIO RECEIVERS WHERE THE VOLUME CONTROL IS IN THE AUDIO INPUT CIRCUIT.

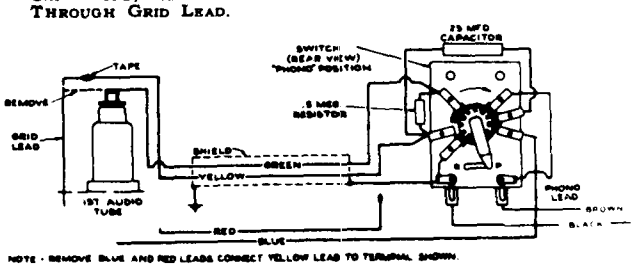


RADIO RECEIVERS WHERE FIRST AUDIO AMPLIFIER TUBE IS OF THE GRID CAP TYPE.



NOTE - THIS METHOD FOR USE ONLY WHEN BIAS FOR THE TUBE IS OBTAINED BY MEANS OF CATHODE RESISTOR

RADIO RECEIVERS WHERE FIRST AUDIO TUBE IS OF THE GRID CAP TYPE, AND FIXED BIAS FOR TUBE IS OBTAINED THROUGH GRID LEAD.



NOTE - REMOVE BLUE AND RED LEADS CONNECT YELLOW LEAD TO TERMINAL SHOWN.

REPLACEMENT PARTS FOR MODEL V14

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

STOCK NO.	DESCRIPTION		STOCK NO.	DESCRIPTION	
	MOTOR ASSEMBLIES		31054	Grommet-Pick-up base rubber grommet	
S-3077	Motor-110 volts,60 cycle Motor....		S-3462	Screw-Pick-up Needle Screw(Pkg.2)..	
S-3078	Motor-110 volts,25 cycle Motor....		S-3465	Screw-Pick-up crystal retaining screw (Pkg.10).....	
S-3079	Spindle-Turntable spindle.....		S-3466	Spring-Pick-up Cable retaining spring (Pkg.2).....	
S-3080	Spring-Drive Wheel tension spring (Pkg.2).....				
S-3081	Turntable-Motor Turntable.....			**MISCELLANEOUS ASSEMBLIES**	
S-3082	Wheel-Rubber tired drive wheel....				
	PICK-UP ASSEMBLIES		31986	Cable-Pickup Cable.....	
S-3459	Arm-Pickup Arm-shell only.....		S-3266	Knob-Volume Control Knob.....	
S-3470	Base-Pickup Arm base and pivot shaft.....		S-3464	Nut-Knurled for Volume control.....	
			S-3463	Rest-Pickup Arm Rest (Pkg.2).....	
S-3461	Crystal-Crystal cartridge.....		S-3268	Volume Control-Off-On Switch.....	

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

RCA Victor

MODEL V16
RECORD PLAYER
TECHNICAL INFORMATION AND SERVICE DATA

1947 No. 2

SERVICE DIVISION • RCA VICTOR COMPANY LIMITED • MONTREAL



Electrical and Mechanical Specifications

MOTOR	
Type	Self-starting Rim drive
Turntable Speed	78 r.p.m.
Turntable Diameter	8 inches

POWER SUPPLY RATING	
Rating A	105-125 volts, 60 cycles, 14 watts
Rating B	105-125 volts, 25 cycles, 15 watts

PICKUP	
Type	Crystal
Impedance	100,000 ohms at 1,000 cycles
Volume Control Resistance	250,000 ohms
Average Output Voltage	1½ volts at 1,000 cycles across 250,000 ohm load

CABINET DIMENSIONS	
Height	3 inches
Depth	10¼ inches
Width	13¾ inches

General Description

The RCA Victor Record Player Model V16 includes a rim drive motor, and a new type, light weight, crystal pick-up. This record player can be adapted to play records through the audio amplifier and loudspeaker system of practically every type of radio receiver. The instrument is designed to play 10-inch or 12-inch diameter records.

Service Data

The crystal pick-up unit is thoroughly sealed in a metal casing, against extreme changes of climate. The offset pickup arm insures ideal tracking between needle and record grooves. If failure occurs due to a defective crystal, no attempt should be made to repair the unit, but a new replacement crystal unit should be installed. To replace crystal: Remove two fillister head screws. Lift crystal from arm. Remove plug-in cable. The crystal unit uses a removable type needle.

The turntable speed should be 78 R.P.M., and the speed may be checked by a stroboscopic disc. When unavailable place a piece of paper between a record and the turntable, with the paper protruding beyond the edge of the record, and then count the number of revolutions of the turntable per minute.

The motor should be lubricated once or twice a year by placing a few drops of S.A.E. 20 (or equivalent) on the turntable spindle and saturating the oil retaining felt pads on the motor shaft with S.A.E. 10 oil. See Fig. 1.

It is important that the motor drive spindle and rubber tire be kept clean and free from oil, grease, dirt or any foreign matter at all times. Any quick-drying naphtha is satisfactory for cleaning these parts.

The output lead from the volume control is a two conductor twisted cable, terminating in a small, male, pin plug. This pin plug fits into the female jack receptacle provided on most RCA Victor radio receivers. If no receptacle is provided on the receiver the correct adaptor with No. S-3122 Switch may be used.

Motor and Pickup Data

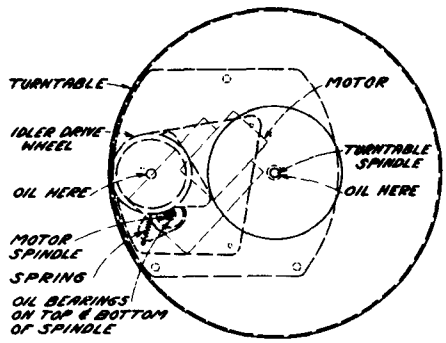


Figure 1—Motor Top View

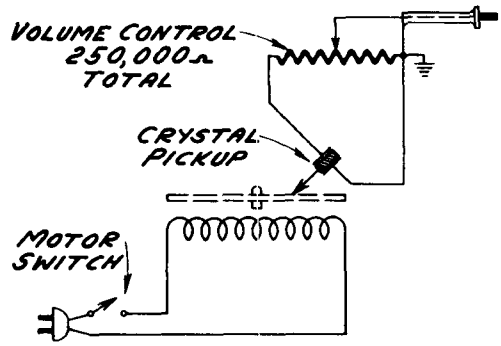


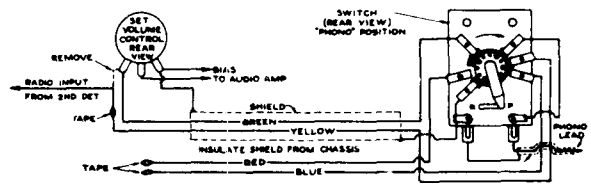
Figure 2—Motor and Pickup Schematic

Connecting Record Player to Radio Receivers

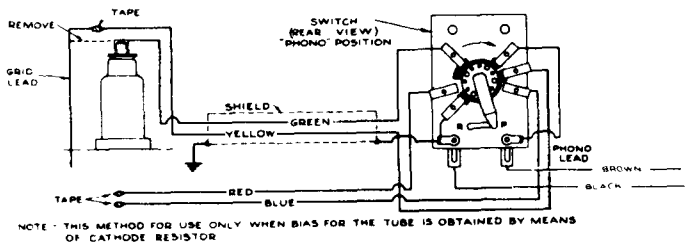
In general, the Record Player must be used with radio receivers having at least two stages of high-gain audio amplification. The output of the Record Player should be connected to the input of the first audio tube, and at the same time the output of radio receiver portion of the chassis should be shorted or opened, to prevent radio signals being heard while the Record Player is in operation.

Methods of connecting the Record Player to various types of audio systems are given in the accompanying diagrams. The data given requires that a Stock No. S-3122 Radio-Phono switch be used for switching from radio to phonograph. For ease in connecting the "phono" lead to the Stock No. S-3122 switch, the male plug on the end of the lead should be removed by unsoldering or by cutting it off.

RADIO RECEIVERS WHERE THE VOLUME CONTROL IS IN THE AUDIO INPUT CIRCUIT.

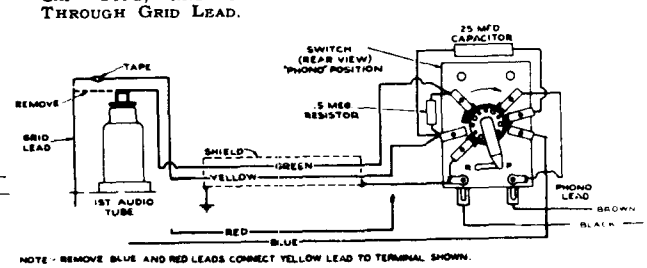


RADIO RECEIVERS WHERE FIRST AUDIO AMPLIFIER TUBE IS OF THE GRID CAP TYPE.



NOTE - THIS METHOD FOR USE ONLY WHEN BIAS FOR THE TUBE IS OBTAINED BY MEANS OF CATHODE RESISTOR

RADIO RECEIVERS WHERE FIRST AUDIO TUBE IS OF THE GRID CAP TYPE, AND FIXED BIAS FOR TUBE IS OBTAINED THROUGH GRID LEAD.



NOTE - REMOVE BLUE AND RED LEADS CONNECT YELLOW LEAD TO TERMINAL SHOWN.

REPLACEMENT PARTS FOR MODEL V16

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

STOCK NO.	DESCRIPTION		STOCK NO.	DESCRIPTION	
	MOTOR ASSEMBLIES		31054	Grommet-Pickup base rubber grommet	
S-3688	Motor-110 Volts-60 cycle.....		S-3484	Screw-Pickup needle screw(Pkg.2)..	
S-3689	Motor-110 Volts-25 cycle.....		S-3513	Screw-Pickup crystal retaining screw (Pkg.10).....	
S-3079	Spindle-Turntable spindle.....		S-3466	Spring-Pickup cable retaining spring (Pkg.2).....	
S-3080	Spring-Drive Wheel tension spring (Pkg.2).....				
S-3690	Turntable-Motor turntable.....			**MISCELLANEOUS ASSEMBLIES**	
S-3082	Wheel-Rubber tired drive wheel....		31986	Cable-pickup cable.....	
	PICK-UP ASSEMBLIES		S-2700	Knob-Volume control knob.....	
S-3481	Arm-Pickup arm (shell only).....		31048	Plug-Pickup cable plug.....	
S-3482	Base-Pickup arm base & pivot shaft		S-2701	Spring-Knob retaining spring(Pkg.5)	
S-3693	Crystal-Crystal cartridge.....		S-3691	Volume Control and switch.....	

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

RCA VICTOR

"HIS MASTER'S VOICE"

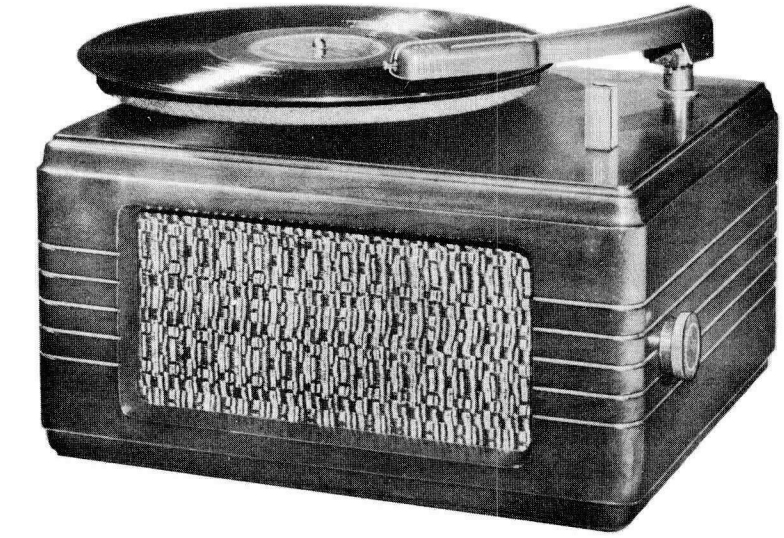
MODEL VE 20

TWO-TUBE, A-C ELECTRIC PHONOGRAPH

TECHNICAL INFORMATION AND SERVICE DATA

— 1946 No. 18 —

GENERAL SERVICE DIVISION • R C A VICTOR COMPANY LTD.



Electrical and Mechanical Specifications

RADIOTRON COMPLEMENT

(1) Type 50L6GT ---------- Audio Voltage Amplifier
(2) Type 35Z5GT ---------- Rectifier

POWER OUTPUT

Undistorted ---------- .80 watts
Maximum ---------- 1.75 watts

LOUDSPEAKER

Type ---------- 4" x 6" Elliptical P.M.
Impedance (V.C.) ----------3.4 ohms at 400 cycles

POWER SUPPLY

Rating A ----------105-125 volts, 60 cycles, 40 watts
Rating B ---------- 105-125 volts, 25 cycles, 40 watts

MOTOR-BOARD

Motor Type ---------- Synchronous, rim drive
Turntable Speed ---------- 78 r.p.m.
Pickup ---------- High-Impedance crystal
Pickup Impedance ----------100,000 ohms at 1000 cycles

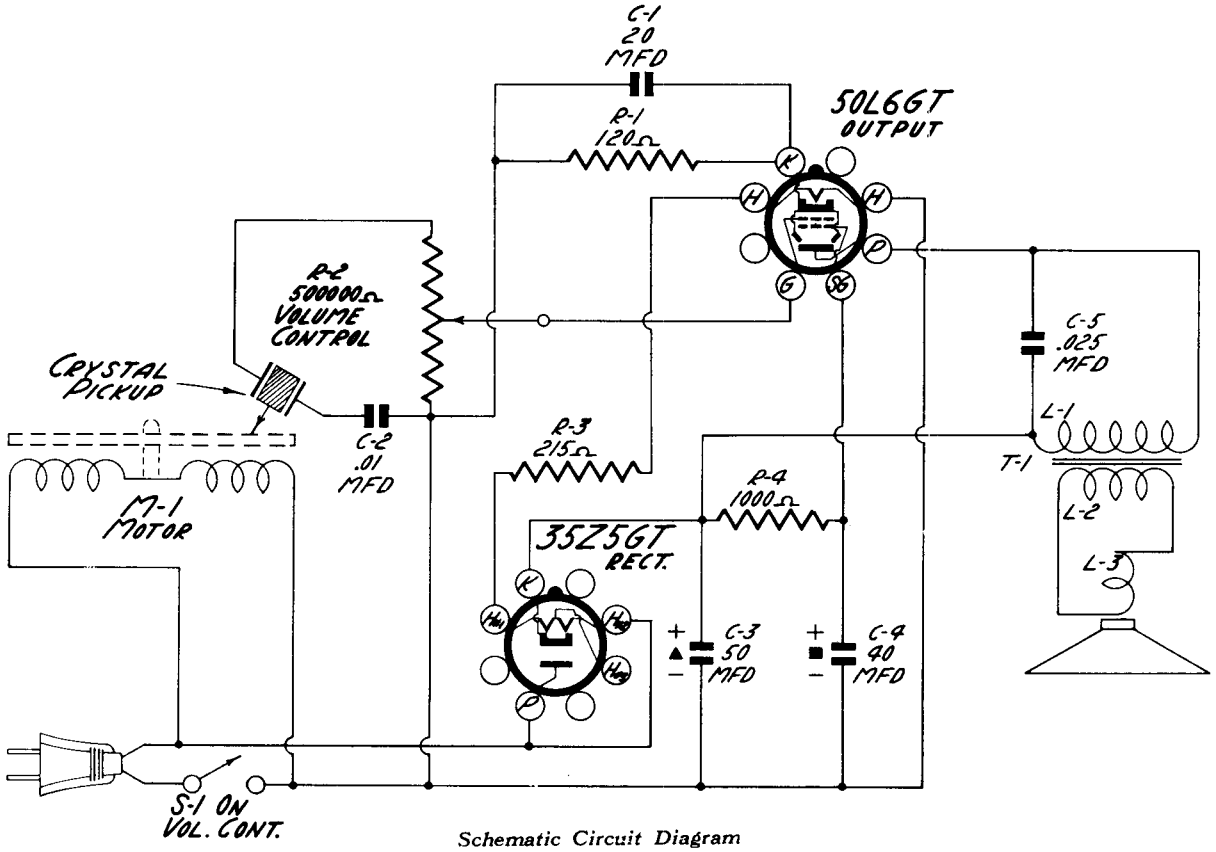
CABINET DIMENSIONS

Height ---------- 6½ inches
Width ----------12½ inches
Depth ----------10 inches

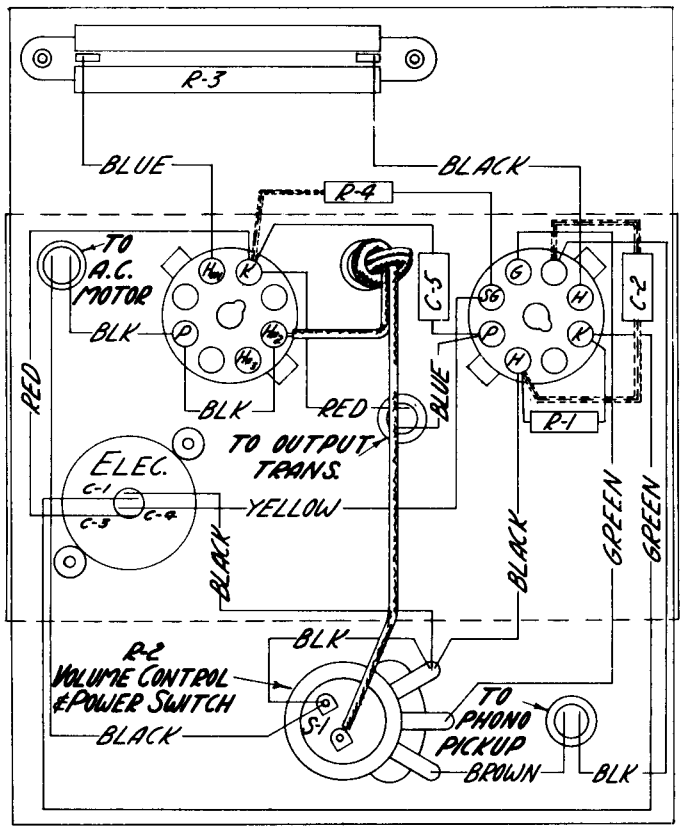
General Description

The Model VE20 electric phonograph consists of a two tube amplifier, a four inch by six inch elliptical speaker, a constant speed rim drive induction motor, and a light weight crystal pickup, combined in a table type cabinet.

Second Edition (1947)—Supersedes Original Edition (1946)



Schematic Circuit Diagram



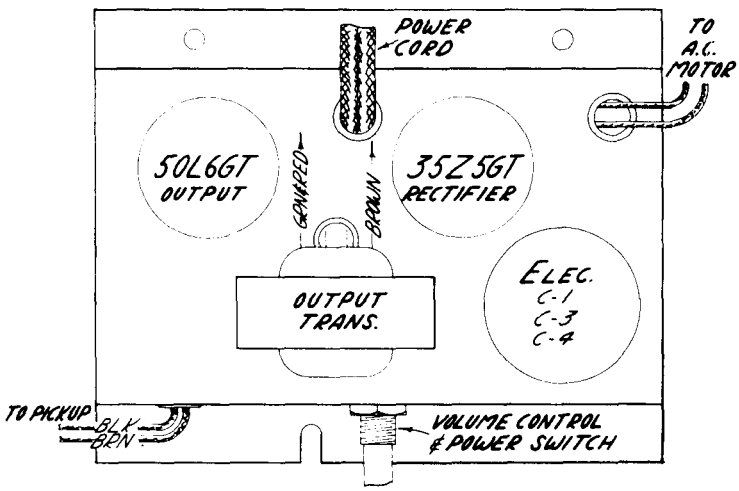
Chassis Wiring Diagram

Service Data

The Crystal pickup unit is thoroughly sealed in a metal casing as protection against extreme changes of climate. If failures occur due to a defective crystal unit, no attempt should be made to repair the unit, but a new replacement crystal unit should be installed.

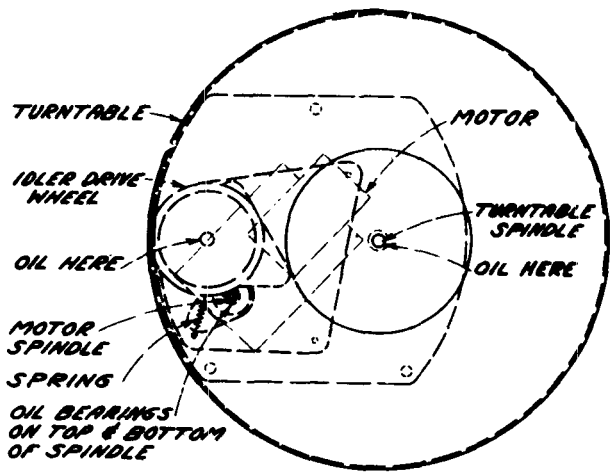
The Turntable drive is a self-starting, constant speed rim drive induction motor. The motor speed should be 78 R.P.M., and may be checked by placing a piece of paper between a record and the turntable, with the paper protruding beyond the edge of the record, and counting the number of revolutions of the turntable per minute while playing a record.

It is important that the drive motor spindle, and rubber tire be kept clean and free from oil, grease, dirt or any foreign matter at all times. Any quick drying naphtha is satisfactory for cleaning these parts.



Chassis Layout

Motor Data



Turntable Lubrication.—Apply a few drops of medium machine oil to the turntable spindle bearing every six months.

REPLACEMENT PARTS FOR MODEL VE 20

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

STOCK NO.	DESCRIPTION
	AMPLIFIER ASSEMBLY
4937	Capacitor-.01 Mfd. (C2).....
37706	Capacitor-.025 Mfd. (C5).....
S-3558	Capacitor-Electrolytic 50-40-20 Mfd. (C1,C3,C4).....
30189	Resistor-120 Ohms (R1).....
S-3560	Resistor-215 Ohms 8 Watt (R3).....
34766	Resistor-1000 Ohms 1/4 watt (R4)..
37605	Socket-Tube socket.....
S-3559	Volume Control (R2, S1).....
	SPEAKER ASSEMBLIES
S-3556	Dust Cap (Pkg.3).....
S-3867	Cone & Voice Coil Ass'y. (L3).....
S-3554	Speaker.....
S-4008	Output Transformer (L1,L2).....
	PICKUP ASSEMBLIES
S-3459	Arm-Pickup arm shell only.....
S-3470	Base-Pickup arm base & pivot shaft
S-3553	Crystal-Crystal cartridge.....
31054	Grommet-Pickup base rubber grommet
S-3462	Screw-Pickup needle screw (Pkg.2)
S-3465	Screw-Pickup crystal retaining screw. (Pkg.10).....
S-3466	Spring-Pickup cable retaining spring (Pkg.2).....
	MOTOR ASSEMBLIES
S-3077	Motor-110 V. 60 cycle (M1).....
S-3078	Motor-110 V. 25 cycle (M1).....
S-3079	Spindle-Turntable spindle.....
S-3080	Spring-Drive wheel tension (Pkg.2)
S-3081	Turntable.....
S-3082	Wheel-Rubber tired drive wheel...
	MISCELLANEOUS ASSEMBLIES
35814	Knob-Volume Control Knob.....
31986	Cable-Pickup cable.....
S-3463	Rest-Pickup arm rest (Pkg.2).....

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


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MODEL VE 22

TWO-TUBE, A-C ELECTRIC PHONOGRAPH

TECHNICAL INFORMATION AND SERVICE DATA

—1947 No. 11—

GENERAL SERVICE DIVISION • RCA VICTOR COMPANY LTD.



Electrical and Mechanical Specifications

RADIOTRON COMPLEMENT

(1) Type 50L6GT ---------- Audio Voltage Amplifier
(2) Type 35Z5GT ---------- Rectifier

POWER OUTPUT

Undistorted ---------- .80 watts
Maximum ---------- 1.75 watts

LOUDSPEAKER

Type ---------- 4" x 6" Elliptical P.M.
Impedance (V.C.) ----------3.4 ohms at 400 cycles

POWER SUPPLY

Rating A ----------105-125 volts, 60 cycles, 40 watts
Rating B ---------- 105-125 volts, 25 cycles, 40 watts

MOTOR-BOARD

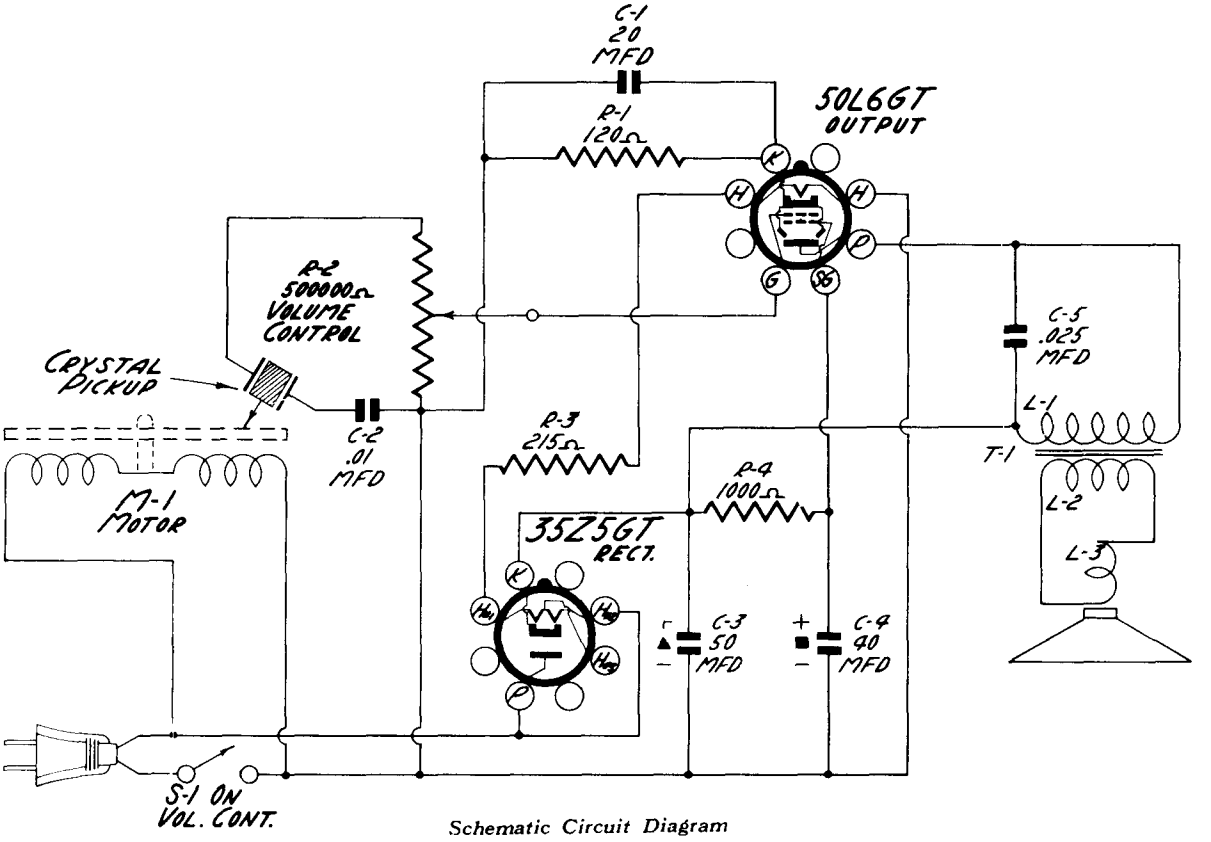
Motor Type ---------- Synchronous, rim drive
Turntable Speed ---------- 78 r.p.m.
Pickup ---------- High-Impedance crystal
Pickup Impedance ----------100,000 ohms at 1000 cycles

CABINET DIMENSIONS

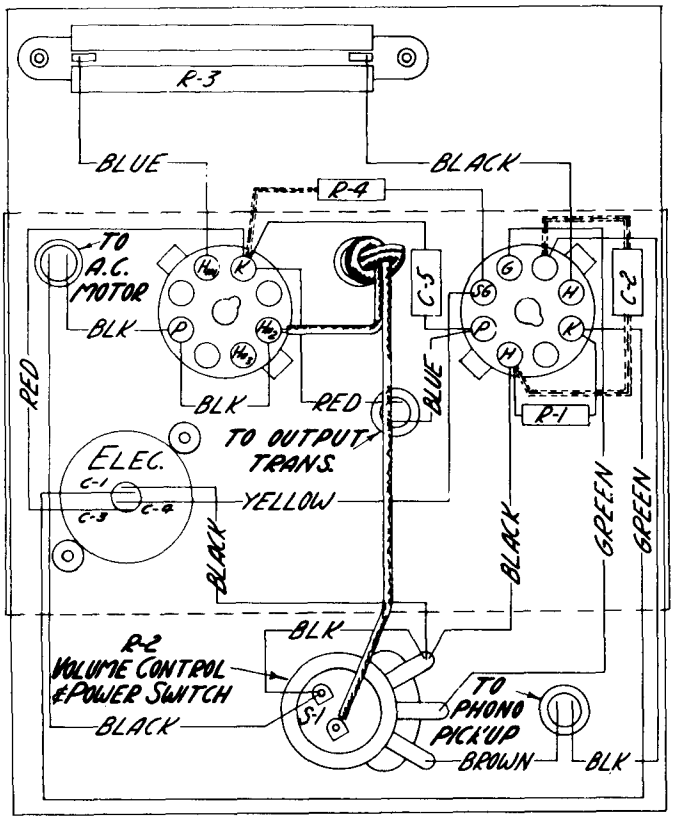
Height ---------- 6½ inches
Width ----------12½ inches
Depth ----------10 inches

General Description

The Model VE22 electric phonograph consists of a two tube amplifier, a four inch by six inch elliptical speaker, a constant speed rim drive induction motor, and a light weight crystal pickup, combined in a portable type cabinet.



Schematic Circuit Diagram



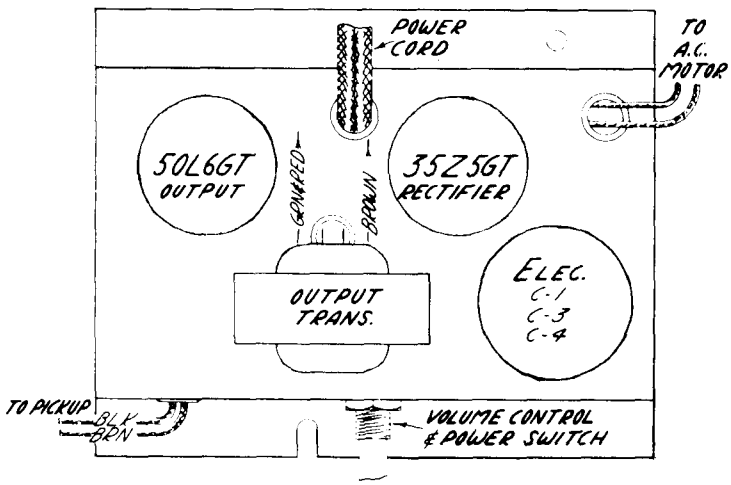
Chassis Wiring Diagram

Service Data

The Crystal pickup unit is thoroughly sealed in a metal casing as protection against extreme changes of climate. If failures occur due to a defective crystal unit, no attempt should be made to repair the unit, but a new replacement crystal unit should be installed.

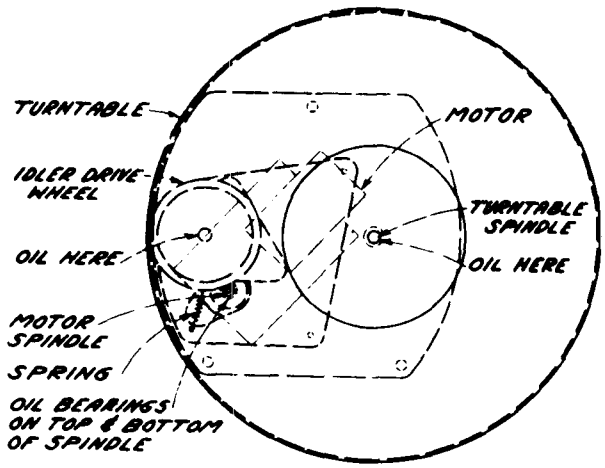
The Turntable drive is a self-starting, constant speed rim drive induction motor. The motor speed should be 78 R.P.M., and may be checked by placing a piece of paper between a record and the turntable, with the paper protruding beyond the edge of the record, and counting the number of revolutions of the turntable per minute while playing a record.

It is important that the drive motor spindle, and rubber tire be kept clean and free from oil, grease, dirt or any foreign matter at all times. Any quick drying naphtha is satisfactory for cleaning these parts.



Chassis Layout

Motor Data



Turntable Lubrication.—Apply a few drops of medium machine oil to the turntable spindle bearing every six months.

REPLACEMENT PARTS FOR MODEL VE 22

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

STOCK NO.	DESCRIPTION
	AMPLIFIER ASSEMBLY
4937	Capacitor-.01 Mfd. (C2).....
37706	Capacitor-.025 Mfd.(C5).....
S-3558	Capacitor-Electrolytic 50-40-20 Mfd. (C1,C3,C4).....
30189	Resistor-120 Ohms (R1).....
S-3560	Resistor-215 Ohms 8 Watt (R3).....
34766	Resistor-1000 Ohms 1/4 Watt (R4)..
37605	Socket-Tube socket.....
S-4193	Volume Control (R2, S1).....
	SPEAKER ASSEMBLIES
S-3556	Dust Cap (Pkg.3).....
S-3867	Cone and Voice Coil Ass'y. (L3)...
S-3554	Speaker.....
S-4194	Output Transformer (L1,L2).....
	PICKUP ASSEMBLIES
S-3459	Arm-Pickup arm shell only.....
S-4249	Base-Pickup arm base & pivot shaft.
S-3553	Crystal-Crystal cartridge.....
31054	Grommet-Pickup base rubber grommet
S-3462	Screw-Pickup needle screw (Pkg.2)..
S-3465	Screw-Pickup crystal retaining screw (Pkg.10).....
S-3466	Spring-Pickup cable retaining spring (Pkg.2).....
	MOTOR ASSEMBLIES
S-3077	Motor-110 V. 60 cycle (M1).....
S-3078	Motor-110 V. 25 cycle (M1).....
	Note:- Above motors supplied with short spindle.
S-4247	Spindle-Turntable spindle (long)...
S-3080	Spring-Drive wheel tension(Pkg.2)..
S-3081	Turntable.....
S-3082	Wheel-Rubber tired drive wheel.....
	MISCELLANEOUS ASSEMBLIES
S-3266	Knob-Volume Control Knob.....
31986	Cable-Pickup cable.....
S-3463	Rest-Pickup arm rest (Pkg.2).....
S-3467	Cord-Power cord.....
S-4250	Support-Lid support.....
S-4252	Hinge-Lid Hinge.....
S-4251	Catch-Lid ring pull catch.....

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


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RCA Victor

MODEL V26
RECORD PLAYER
TECHNICAL INFORMATION AND SERVICE DATA

1947 No. 3

SERVICE DIVISION • RCA VICTOR COMPANY LIMITED • MONTREAL



Electrical and Mechanical Specifications

MOTOR

Type	Self-starting Rim drive
Turntable Speed	78 r.p.m.
Turntable Diameter	9 inches

POWER SUPPLY RATING

Rating A	105-125 volts, 60 cycles, 14 watts
Rating B	105-125 volts, 25 cycles, 15 watts

PICKUP

Type	Crystal
Impedance	100,000 ohms at 1,000 cycles
Volume Control Resistance	250,000 ohms
Average Output Voltage	1½ volts at 1,000 cycles across 250,000 ohm load

CABINET DIMENSIONS

Height	7⅛ inches
Depth	13¼ inches
Width	15½ inches

General Description

The RCA Victor Record Player Model V26 includes a rim drive motor, and a new type, light weight, crystal pick-up. This record player can be adapted to play records through the audio amplifier and loudspeaker system of practically every type of radio receiver. The cabinet is of walnut veneer, with a hinged lid, which locks in the "open" position. It is recommended that the lid be closed while records are being played. This instrument is designed for 10-inch or 12-inch diameter records.

Service Data

The crystal pick-up unit is thoroughly sealed in a metal casing, against extreme changes of climate. The offset pickup arm insures ideal tracking between needle and record grooves. If failure occurs due to a defective crystal, no attempt should be made to repair the unit, but a new replacement crystal unit should be installed. To replace crystal: Remove two filister head screws. Lift crystal from arm. Remove plug-in cable. The crystal unit uses a removable type needle.

The turntable speed should be 78 R.P.M., and the speed may be checked by a stroboscopic disc. When unavailable, place a piece of paper between a record and the turntable, with the paper protruding beyond the edge of the record, and then count the number of revolutions of the turntable per minute.

The motor should be lubricated once or twice a year by placing a few drops of S.A.E. 20 (or equivalent) on the turntable spindle and saturating the oil retaining felt pads on the motor shaft with S.A.E. 10 oil. See Fig. #1.

It is important that the motor drive spindle and rubber tire be kept clean and free from oil, grease, dirt or any foreign matter at all times. Any quick-drying naphtha is satisfactory for cleaning these parts.

The output lead from the volume control is a single conductor shielded cable, terminating in a small, male, pin plug. This pin plug fits into the female jack receptacle provided on most RCA Victor radio receivers. If no receptacle is provided on the receiver the correct adaptor with No. S-3122 Switch may be used.

Motor and Pickup Data

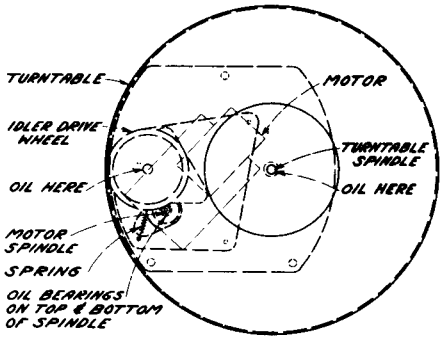


Figure 1—Motor Top View

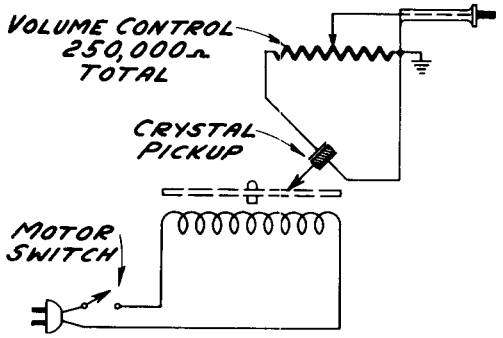


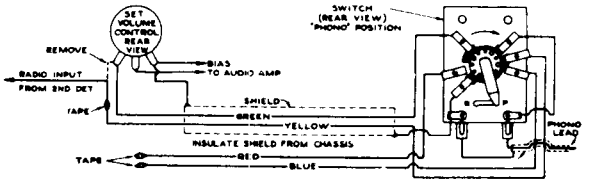
Figure 2—Motor and Pickup Schematic

Connecting Record Player to Radio Receivers

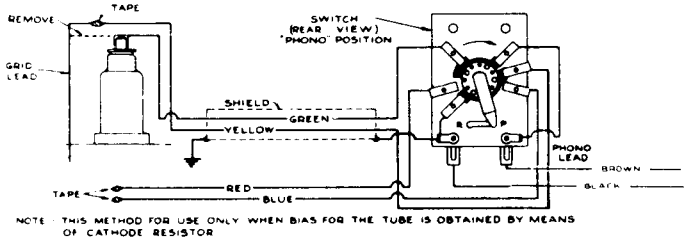
In general, the Record Player must be used with radio receivers having at least two stages of high-gain audio amplification. The output of the Record Player should be connected to the input of the first audio tube, and at the same time the output of radio receiver portion of the chassis should be shorted or opened, to prevent radio signals being heard while the Record Player is in operation.

Methods of connecting the Record Player to various types of audio systems are given in the accompanying diagrams. The data given requires that a Stock No. S-3122 Radio-Phono switch be used for switching from radio to phonograph. For ease in connecting the "phono" lead to the Stock No. S-3122 switch, the male plug on the end of the lead should be removed by unsoldering or by cutting it off.

RADIO RECEIVERS WHERE THE VOLUME CONTROL IS IN THE AUDIO INPUT CIRCUIT.

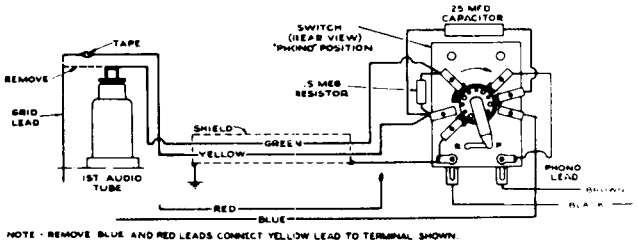


RADIO RECEIVERS WHERE FIRST AUDIO AMPLIFIER TUBE IS OF THE GRID CAP TYPE.



NOTE: THIS METHOD FOR USE ONLY WHEN BIAS FOR THE TUBE IS OBTAINED BY MEANS OF CATHODE RESISTOR

RADIO RECEIVERS WHERE FIRST AUDIO TUBE IS OF THE GRID CAP TYPE, AND FIXED BIAS FOR TUBE IS OBTAINED THROUGH GRID LEAD.



NOTE - REMOVE BLUE AND RED LEADS CONNECT YELLOW LEAD TO TERMINAL SHOWN.

REPLACEMENT PARTS FOR MODEL V26

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

STOCK NO.	DESCRIPTION		STOCK NO.	DESCRIPTION	
	MOTOR ASSEMBLIES		31054	Grommet-Pickup base rubber grommet	
S-3077	Motor 110 volts-60 cycle.....		S-3462	Screw-Pickup needle screw (Pkg.2).	
S-3078	Motor 110 volts-25 cycle.....		S-3465	Screw-Pickup crystal retaining screw (Pkg.10).....	
S-3079	Spindle-Turntable spindle.....		S-3466	Spring-Pickup cable retaining spring (Pkg.2).....	
S-3080	Spring-Drive Wheel tension spring (Pkg.2).....			**MISCELLANEOUS ASSEMBLIES**	
S-3081	Turntable-Motor turntable.....		S-3524	Cable-Pickup cable.....	
S-3082	Wheel-Rubber tired drive wheel.		S-2779	Knob-Volume control knob.....	
	PICKUP ASSEMBLIES		31048	Plug-Pickup cable plug.....	
S-3459	Arm-Pickup arm (shell only)....		S-3463	Rest-Pickup arm rest (Pkg.2).....	
S-3460	Base-Pickup arm base and pivot shaft.....		S-4040	Support-Cabinet lid support.....	
S-3461	Crystal-Crystal cartridge.....		S-3522	Volume Control & Switch.....	

All parts subject to change or withdrawal without notice.

RCA VICTOR

"HIS MASTER'S VOICE"

MODEL VA34

Automatic Record Player

TECHNICAL INFORMATION AND SERVICE DATA

1948 No. 2

GENERAL SERVICE DIVISION • RCA VICTOR COMPANY LTD.



MODEL VA34

Electrical and Mechanical Specifications

PHONOGRAPH

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

PICKUP

Type ---------- Crystal
Impedance ---------- 100,000 ohms at 1,000 cycles
Average Output ----------1.0 volts at 400 cycles across 500,000 ohm load

POWER SUPPLY

Rating A ---------- 105-125 volts, 60 cycles, 20 watts
Rating B ---------- 105-125 volts, 25 cycles, 20 watts

CABINET DIMENSIONS

Height ---------- 10 inches
Width ---------- 17⅝ inches
Depth ---------- 14½ inches

GENERAL DESCRIPTION

Model VA34 is a table model radio attachment incorporating an automatic record changing mechanism and a compensated volume control network. The record changer used is similar to the 960260-2 mechanism with the exception of the tone arm and crystal cartridge. These parts are listed in the replacement parts list. Reference to the 960260-2 Service Notes will disclose complete adjustment details and service hints for the automatic mechanism.

Where a receiver has a phono input socket supplied for ease in connecting a record player, simply plug it into the socket and the unit is ready for operation.

CONNECTION TO RADIO RECEIVER

In general, the automatic record player attachment must be used with radio receivers or amplifiers having at least two stages of high gain audio amplification. The output of the automatic record player attachment should be connected to the input of the first audio tube, and at the same time the output of the radio receiver portion of the chassis should be shorted or opened, to prevent radio signals being heard while the automatic record player is in operation.

With ordinary audio amplifiers, the output from the automatic record player should be connected directly to the input, provided the input is of the high impedance type.

Methods of connecting the automatic record player to various types of audio systems are given in the accompanying text and illustrations. The RCA Stock No. S-4200 Radio-Phono switch is used for switching from radio to phonograph, as desired.

SWITCH AND PICKUP DATA

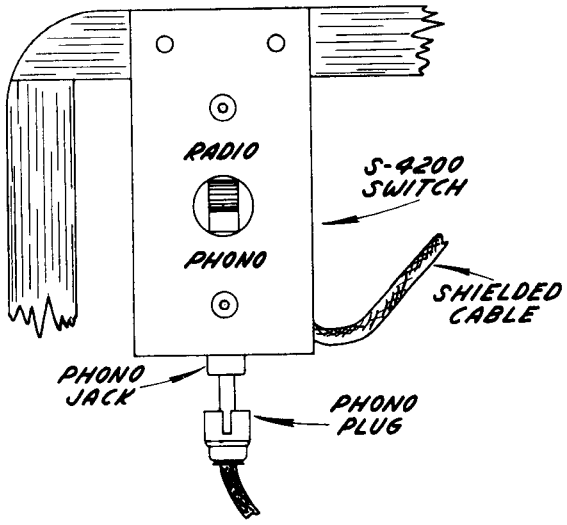


Figure 1—Switch Mounting

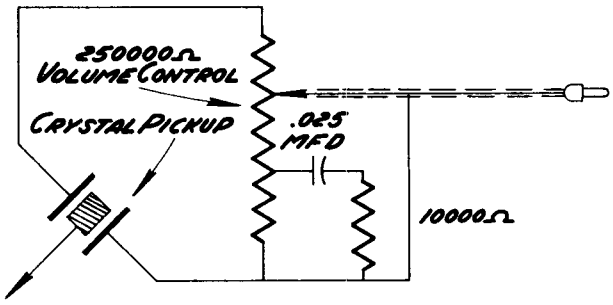
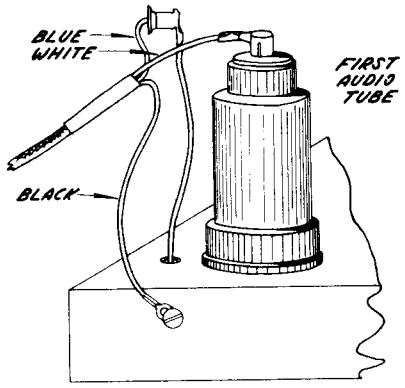


Figure 2—Pickup Schematic

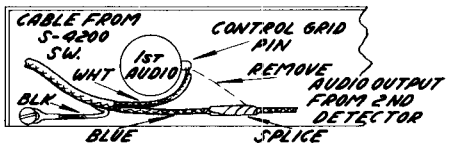
Connecting Record Player to Radio Receivers

In radio receivers which do not incorporate any connections for record player attachment, proceed as follows:—

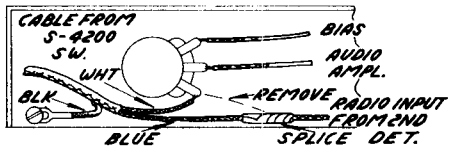
Radio Receivers Where First Audio Amplifier Tube is of The Grid Cap Type.



Radio Receivers Where First Audio Tube is of The Grid Cap Type, and Fixed Bias for Tube is Obtained Through Grid Lead.



Radio Receivers Where the Volume Control is in the Audio Input Circuit.



REPLACEMENT PARTS FOR MODEL VA34

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-4009	Spring-Motorboard Mounting(Pkg.2)	
S-3651	Capacitor-.025 MFD.....		S-4040	Support-Lid Support (L.H.).....	
S-3642	Motor-60 cycles.....		S-4312	Washer "C" Washer & Rubber Washer for Motorboard Mtg.(Pkg.2).....	
S-3641	Motor-25 cycles.....			AUTOMATIC RECORD CHANGER MECHANISM	
3078	Resistor-10,000 ohms.....			Refer to 960260-2 Service Note for Replacement Parts and Service Data.	
S-3881	Volume Control-250,000 ohms.....			NOTE:With following exception:	
	MISCELLANEOUS ASSEMBLIES		71172	Arm-Pickup arm shell only.....	
S-3467	Cord-power cord.....		S-3461	Crystal-Crystal cartridge.....	
S-3882	Cover-Volume Control Cover.....		71174	Screw-Needle screw (Pkg.2).....	
36386	Decal.....				
S-3883	Knob-Red brown.....				

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

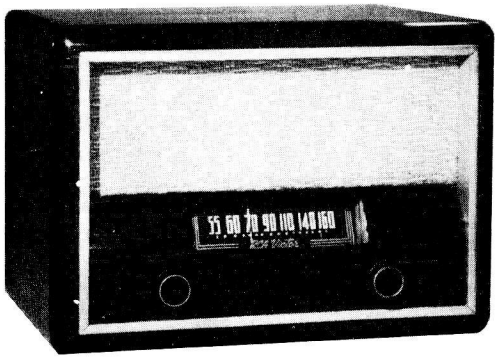
RCA Victor

MODELS BT 40 & BT 44
FIVE-TUBE, SINGLE BAND, SUPERHETERODYNE BATTERY RECEIVER

TECHNICAL INFORMATION AND SERVICE DATA

1946 No. 14

SERVICE DIVISION • RCA VICTOR COMPANY LIMITED • MONTREAL



BT 40



BT 44

Electrical and Mechanical Specifications

Frequency Range ..... 540 kcs. to 1600 kcs.

Intermediate Frequency ..... 455 kcs.

RADIOTRON COMPLEMENT

(1) Type-1R5 ..... First Detector—Oscillator
(2) Type-1T4 ..... Intermediate Amplifier
(3) Type-1S5 ..... Second-Detector, A.V.C., and A-F Amplifier
(4) Type-3Q4 ..... Power Output

POWER OUTPUT RATING

Undistorted ..... .18 watts
Maximum ..... .48 watts

LOUDSPEAKER

Type ..... 4" x 6" Elliptical P.M.
Voice-Coil Impedance ..... 3.4 Ohms at 400 Cycles

CABINET DIMENSIONS

Height ..... 9¼ inches
Width ..... 12⅞ inches
Depth ..... 8½ inches

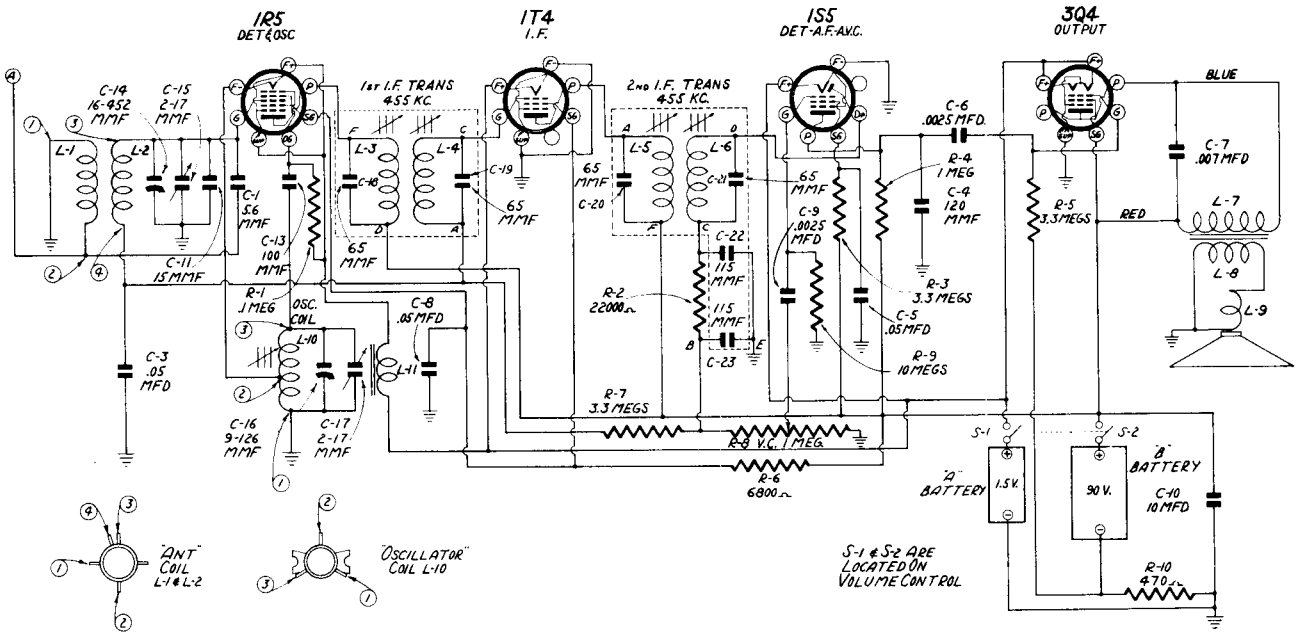
CURRENT CONSUMPTION

"A" at 1.4 Volts ..... 250 Ma.
"B" at 90 Volts ..... 13 Ma.

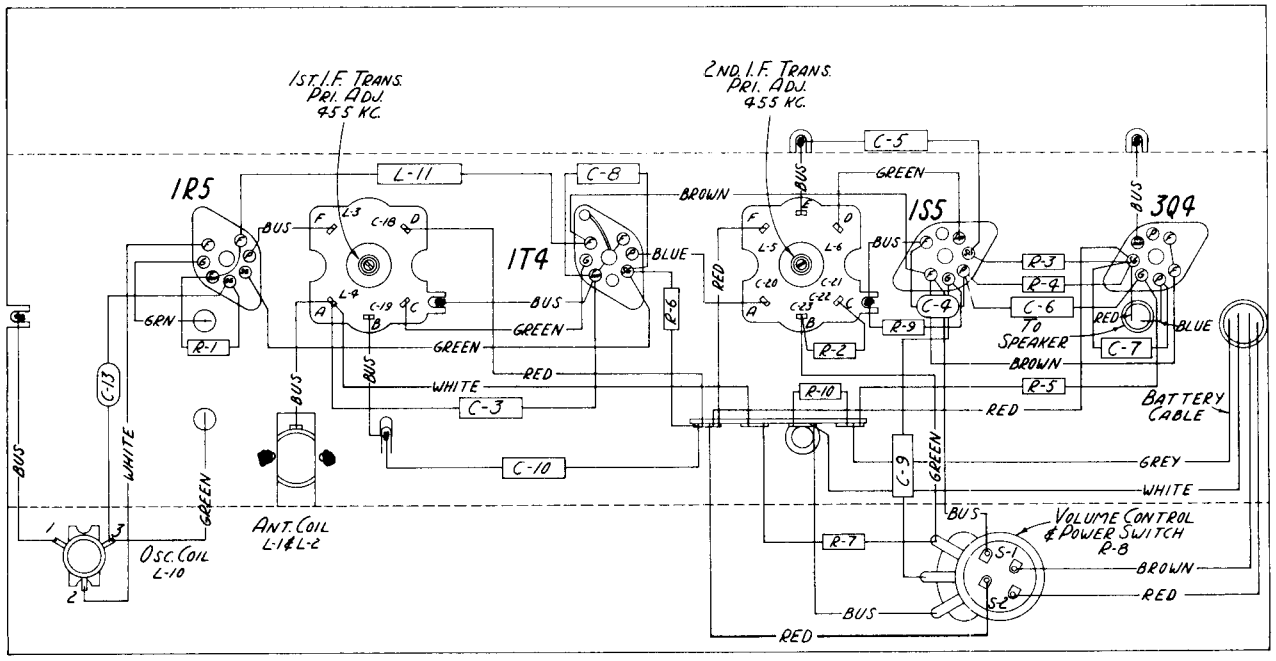
Batteries Required ..... One No. 758T Eveready Pack.
OR "A"—one 1.4 Volt Air Cell or 1.5 Dry Cell. "B"—two 45 Volt heavy duty "B" Batteries.

General Description

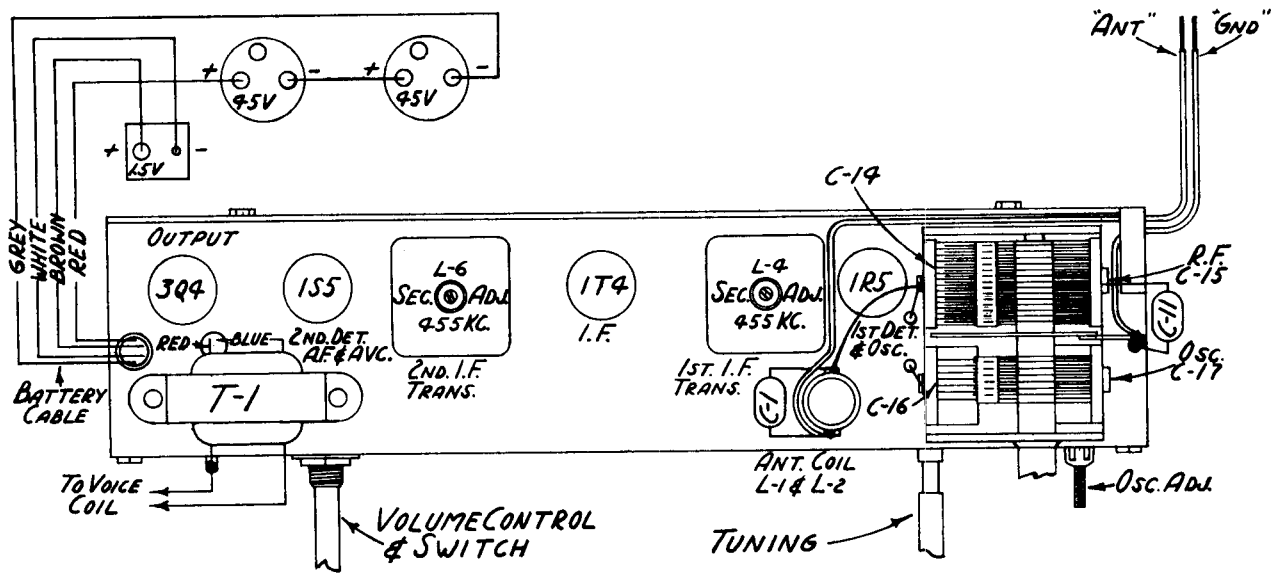
The Models BT-40 and BT-44 are four tube, battery operated superheterodyne receivers, covering the broadcast band only. Features of design include:—New type midget tubes; straight line dial; precision built iron core I. F. transformers; exceptionally low current drain; and a four inch by six inch elliptical speaker; all housed in a wooden cabinet of modern design.



Schematic Circuit Diagram



Chassis Wiring Diagram



Chassis Layout and Alignment Adjustments

Alignment Procedure

Steps	Connect the high side of the test-osc. to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. output
No. 1	Grid of 1T4 through .01 Mfd.	455 k.c.	Quiet Point at 600 k.c	L5 - L6 2nd I.F. Transf.
No. 2	Grid of 1R5 through .01 Mfd.		End of Dial	L3 - L4 1st I.F. Transf.
No. 3	Ant. Term. through 200 Mmfd.	1630 k.c.	Full clockwise (out of mesh)	C17 (osc.)
No. 4	Ant. Term. through 200 Mmfd.	1500 k.c.	1500 k.c.	C15 (Ant.)
No. 5	Ant. Term. through 200 Mmfd.	600 k.c.	600 k.c.	Rock in Osc. slug for max.
No. 6	REPEAT 3 - 4 - 5			

Output Meter Alignment

If this method is used, connect the meter across the voice coil, and turn the volume control to maximum.

Test Oscillator

For all alignment operations, connect the low side of the test-oscillator to the receiver chassis through a .01 capacitor, and keep the output as low as possible to avoid A.V.C. action.

Pre-Setting Dial

With the gang condenser in full mesh, adjust the pointer so that it lines up with the first mark on the left of the dial scale.

Radiotron Voltages

Type	Plate	Screen Grid	Bias	Filament
1R5	90	60		1.5V
1T4	90	60		1.5V
1S5	40	36		1.5V
3Q4	86	88	−6.2	1.5V

NOTE—Readings taken with a receiver supply of 90 Volts "B" and 1.4 Volts "A". Should hold within ±20%.

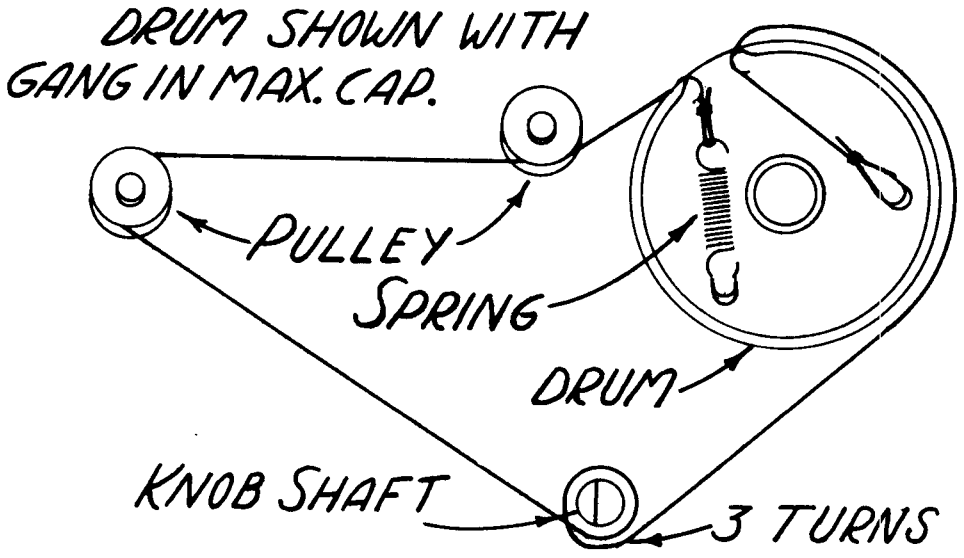
REPLACEMENT PARTS FOR MODELS BT 40 & BT 44

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

STOCK NO.	DESCRIPTION
	RECEIVER ASSEMBLIES
39601	Capacitor,Mica 5.6 Mmf..(C1).....
39608	Capacitor, " 115 Mmf. (C11).....
39628	Capacitor, " 100 Mmf. (C13).....
12724	Capacitor, " 120 Mmf..(C4).....
5148	Capacitor, .007 Mfd. (C7).....
5107	Capacitor, .0025 Mfd. (C6,C9)....
4886	Capacitor, .05 Mfd. (C3,C5,C8).
S-3221	Capacitor,Electrolytic, 10 Mfd(C10)
S-3525	Variable Condenser & Drum (C14, C15,C16,C17).....
S-3695	Choke, Filament choke (L11).....
S-3528	Coil, Oscillator coil (L10).....
S-3529	Coil, Antenna coil (L1,L2).....
30499	Resistor,470 Ohms 1/4 watt (R10)...
14659	Resistor,6800 Ohms 1/4 watt (R6)...
30492	Resistor,22,000 Ohms 1/4 watt (R2).
14560	Resistor,100,000 Ohms 1/4 watt(R1).
13730	Resistor, 1 Megohm 1/4 watt (R4)...
12928	Resistor, 3.3 Megohm 1/4 watt(R3, R5,R7).....
13601	Resistor, 10 Megohm 1/4 watt (R9)..
30585	Spring, Drive cord tension(Pkg.2)..
S-3533	Shaft, Drive shaft.....
S-3567	Scale, Dial scale.....
36500	Socket, Tube socket.....
S-3526	Transformer I.F. 1st (L3,L4,C18,C19)
S-3527	Transformer I.F. 2nd (L5,L6,C20, C21,C22,C23)..
S-3530	Volume Control 1 Meg.(R8,S1,S2)....

STOCK NO.	DESCRIPTION
	SPEAKER ASSEMBLIES
35849	Dust Cap (Pkg. 3).....
S-3569	Cone & Voice Coil Assembly (L9)...
S-3502	Speaker - Complete.....
S-3531	Transformer-Output (L7, L8).....
	MISCELLANEOUS ASSEMBLIES
35814	Knob Assembly.....
35775	Knob Assembly.....
S-3696	Cord-Indicator Drive Cord.....
S-3532	Indicator Station Selector Pointer
S-3534	Cable Battery Cable.....
12827	Plug "B" Battery Cable Plug.....
S-2398	Plug "A" Battery Cable Plug.....
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All parts and prices subject to change or withdrawal without notice.



Dial Drive Cord

RCA Victor

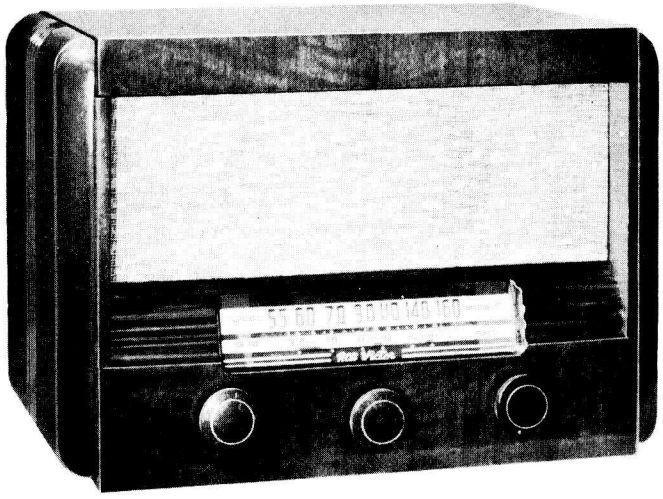
MODEL BT42

Four-Tube, Two-Band, Battery-Operated Superheterodyne Receiver

TECHNICAL INFORMATION AND SERVICE DATA

1946 No. 19

SERVICE DIVISION • RCA VICTOR COMPANY LIMITED • MONTREAL



Electrical and Mechanical Specifications

FREQUENCY RANGES

"Standard Broadcast"	540-1,600 kc.
"Short Wave"	9.45-15.5 mc.
Intermediate Frequency	455 kc.

TUBE COMPLEMENT

(1) Type-1R5	1st Det.—Osc.
(2) Type-1T4	I-F Amplifier
(3) Type-1S5	2nd Det., A-F, and A.V.C.
(4) Type-3Q4	Power Output

POWER OUTPUT

Undistorted	.18 watts
Maximum	.48 watts

LOUDSPEAKER

Type	4" x 6" Elliptical P.M.
V.C. Impedance	3 ohms at 400 cycles

CURRENT CONSUMPTION

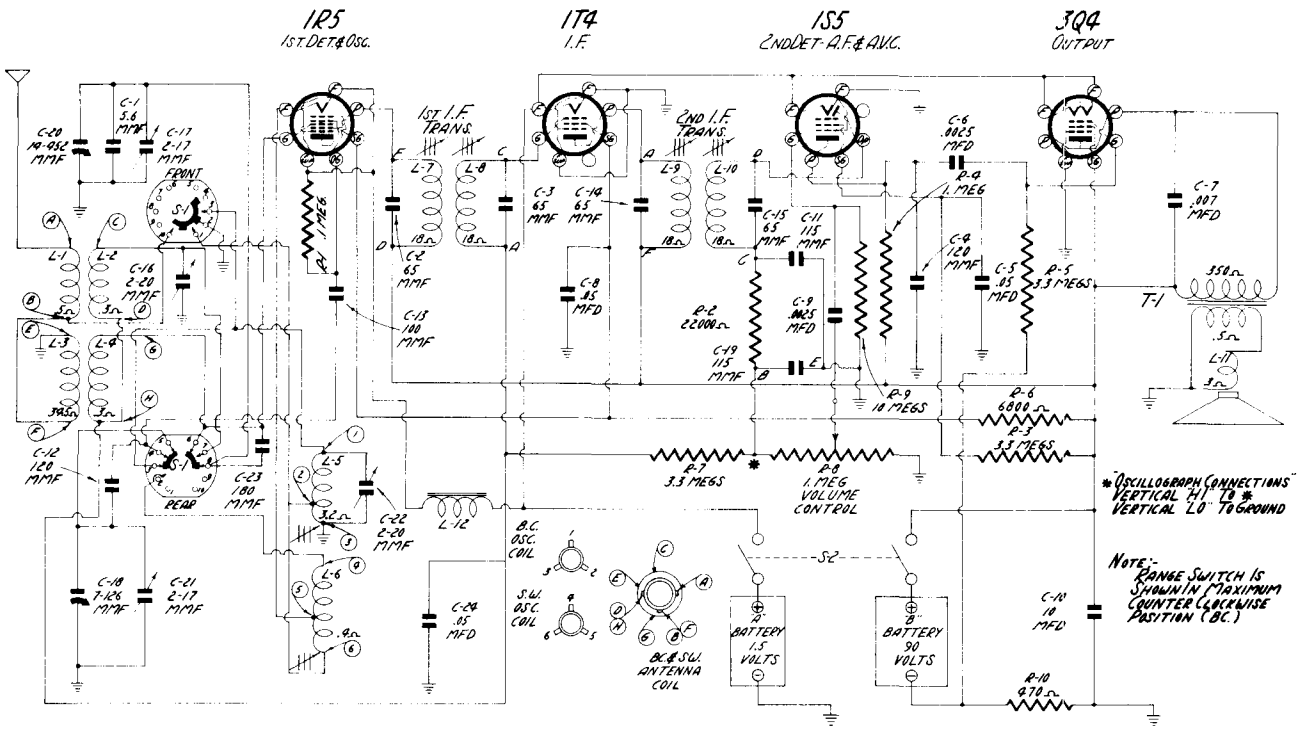
"A" at 1.4 Volts	250 ma.
"B" at 90 Volts	13 ma.

BATTERIES REQUIRED ---------- one No. 758T Eveready Pack

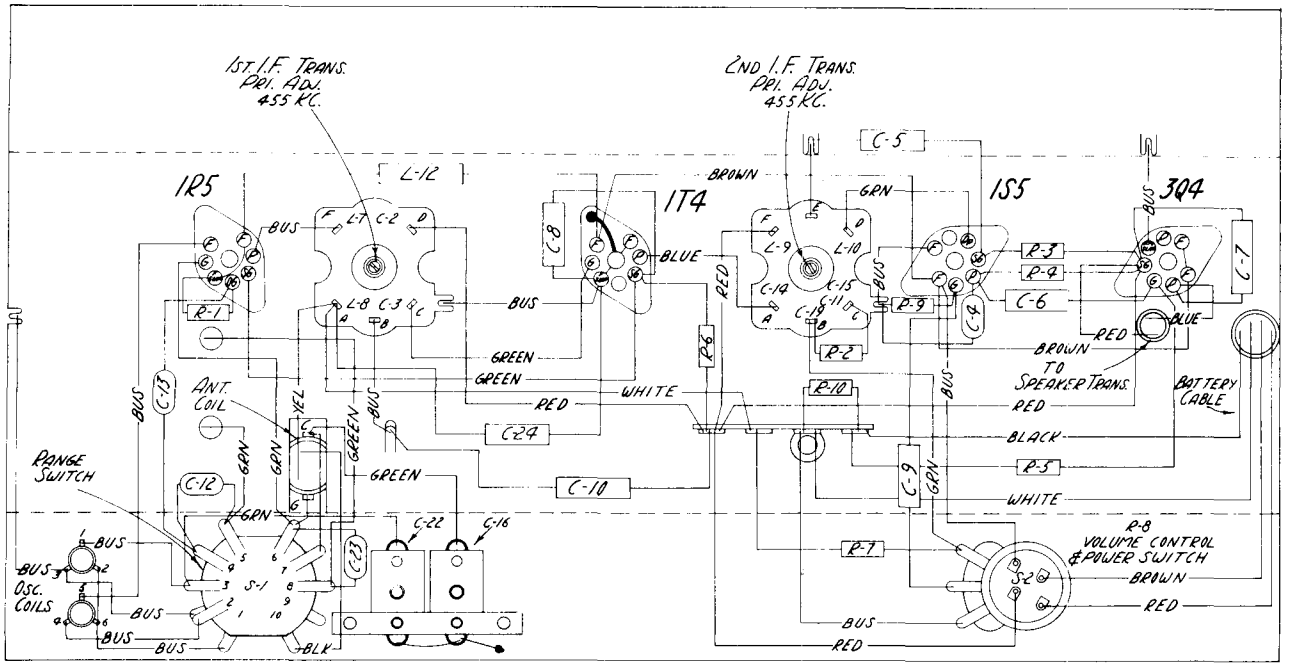
or—"A" one 1.4 Volt Air Cell or 1.5 Dry Cell; "B" two 45 Volt heavy duty "B" Batteries

General Description

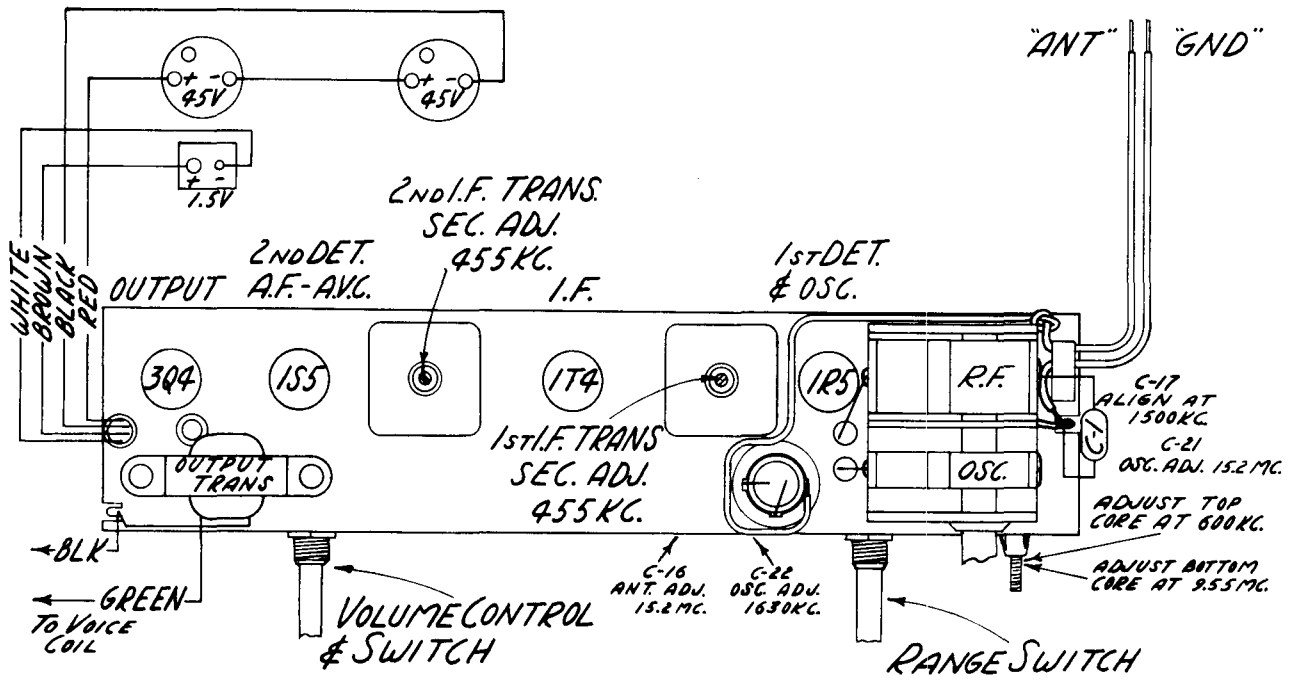
The Model BT-42 is a four-tube, battery-operated, superheterodyne receiver, covering both the Standard Broadcast and Short Wave Bands. Features of design include: stabilized oscillator circuit: precision built magnetite core I.F. transformers: new type midget tubes with exceptionally low current drain: large, full vision, easy to read straight line dial: four inch by six inch elliptical speaker; housed in a table type wooden cabinet of modern design.



Schematic Circuit Diagram



Chassis Wiring Diagram



Chassis Layout and Alignment Adjustments

Alignment Procedure

STEPS	TEST OSCILLATOR			RANGE SELECTOR	RECEIVER GANG SETTING	CIRCUIT TO ADJUST	ADJUST-MENT SYMBOLS
	CONNECTION TO RECEIVER	DUMMY ANTENNA	FREQUENCY SETTING				
1.	Grid of 1T4	.01 Mfd.	455 KC.	B. C.	Min.	2nd I.F.	L9-L10
2.	Grid of 1R5	.01 Mfd.	455 KC.	B. C.	Min.	1st I.F.	L7-L8
3.	Ant. Lead	200 Mmfd.	600 KC.	B. C.	600 KC.	Osc.	L5
4.	Ant. Lead	200 Mmfd.	1630 KC.	B. C.	1630 KC.	Osc.	C22
5.	Ant. Lead	200 Mmfd.	1500 KC.	B. C.	1500 KC.	Ant.	C17
6.			REPEAT 3 - 4 - 5				
7.	Ant. Lead	300 Ohms	9550 KC.	S. W.	9.5 MC.	Osc.	L6
8.	Ant. Lead	300 Ohms	15,200 KC.	S. W.	15.2 MC.	Osc.	C21
9.	Ant. Lead	300 Ohms	15,200 KC.	S. W.	15.2 MC.	Ant.	C16
10.			REPEAT 7 - 8 - 9				
11.	Ant. Lead	300 Ohms	1630 KC.	B. C.	1630 KC.	Osc.	C22

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 ground terminal, and keep the output as low as possible to avoid a-v-c action.

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the schematic drawing.

Pre setting dial.—With the gang condenser in full mesh, the pointer should be adjusted so that it lines up with the first mark on the left of the dial scale.

Radiotron Socket Voltages

Tube	Plate	Screen Grid	Bias	Filament
1R5	82 V.	56 V.		1.5 V.
1T4	82 V.	56 V.		1.5 V.
1S5	17 V.	17 V.		1.5 V.
3Q4	82 V.	80 V.	-4.6 V.	1.5 V.

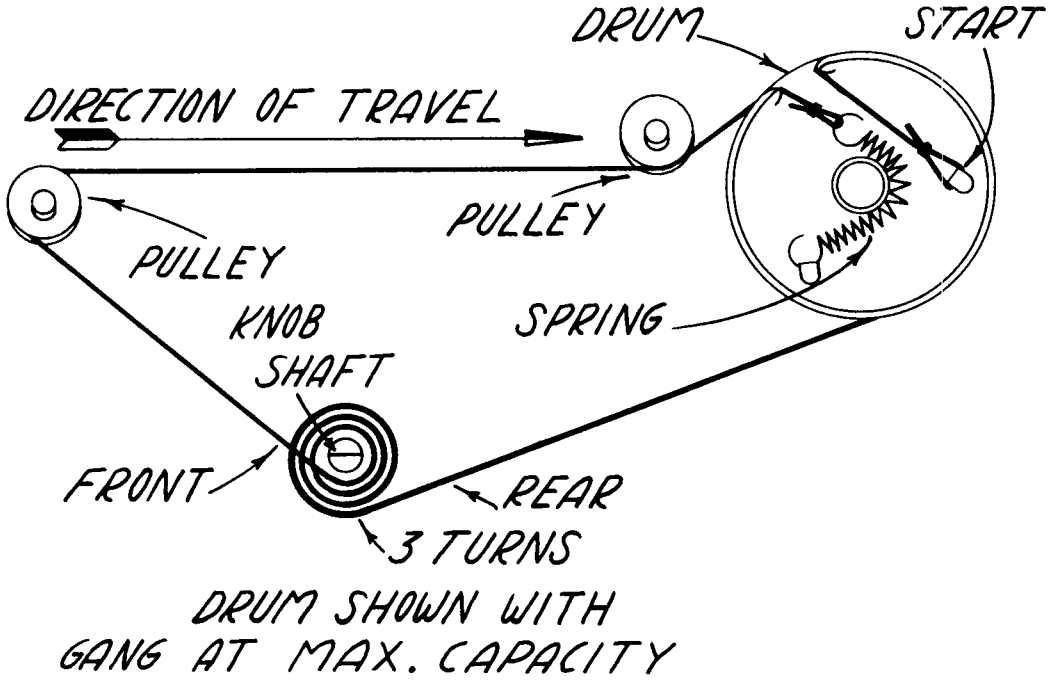
The above voltages should hold within plus or minus 20% when measured with rated battery voltage.

REPLACEMENT PARTS FOR MODEL BT42

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

STOCK NO.	DESCRIPTION
	RECEIVER ASSEMBLIES
32830	Capacitor-Adj.trimmer(C16,C22).....
39601	Capacitor-Mica 5.6 Mmf. (C1).....
39628	Capacitor-Mica 100 Mmf. (C13).....
12724	Capacitor-Mica 120 Mmf. (C12,C4)...
39634	Capacitor-Mica 180 Mmf. (C23).....
5148	Capacitor-.007 Mfd.(C7).....
5107	Capacitor-.0025 Mfd.(C6,C9).....
4886	Capacitor-.05 Mfd. (C5,C8,C24).....
S-3221	Capacitor-Electrolytic 10 Mfd.(C10)
S-3525	Condenser-Variable & Drum(C20,C18, C21,C17).....
S-3695	Choke-filament choke (L12).....
S-3536	Coil-Antenna Coil(L1 L2,L3,L4).....
S-3528	Coil-Oscillator Coil (L5).....
S-3535	Coil-Oscillator Coil (L6).....
30499	Resistor-470 Ohms 1/4 watt (R10)...
14659	Resistor-6,800 ohms 1/4 watt(R6)...
30492	Resistor-22,000 ohms 1/4 watt(R2)..
14560	Resistor-100,000 ohms 1/4 watt(R1).
13730	Resistor-1 Megohm 1/4 watt (R4)....
12928	Resistor-3.3 Megohm 1/4 watt(R3,R7, R5).....
13601	Resistor 10 Megohm 1/4 watt (R9)...
30585	Spring-Drive cord tension (Pkg.2)..
S-3533	Shaft-Drive shaft.....
36500	Socket-Tube socket.....
S-3537	Switch-Range Switch (S1).....
S-3526	Transformer-1st I.F.(C2,C3,L7,L8)
S-3527	Transformer-2nd I.F.(C14,C15,C11, C19,L9,L10).....
S-3530	Volume Control-(S2,R8).....
	SPEAKER ASSEMBLIES
35849	Dust Cap-(Pkg.3).....
S-3569	Cone & Voice Coil Ass'y (L11)....
S-3502	Speaker Complete.....
S-3531	Transformer-Output (T1).....
	MISCELLANEOUS ASSEMBLIES
S-3534	Cable-Battery Cable.....
S-3696	Cord-Indicator Drive Cord.....
S-3532	Indicator-Station selector pointer.....
35814	Knob Assembly.....
35775	Knob Assembly.....
S-2398	Plug "A" Battery Cable Plug.....
12827	Plug "B" Battery Cable Plug.....
S-3570	Scale-station selector dial scale

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



Drive Cord

RCA Victor

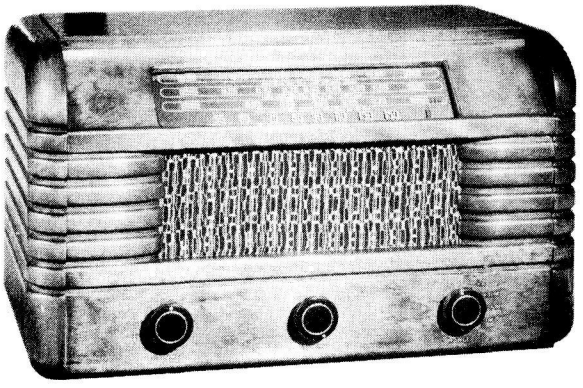
MODEL M-45

FIVE-TUBE, FOUR-BAND, A-C, SUPERHETERODYNE RECEIVER

TECHNICAL INFORMATION AND SERVICE DATA

1945 No. 2

SERVICE DIVISION • RCA VICTOR COMPANY LIMITED • MONTREAL



Electrical and Mechanical Specifications

FREQUENCY RANGES

Standard Broadcast "A"	540-1570 k.c.
31 Meter Spread Band	9,450-9,700 k.c.
25 Meter Spread Band	11,680-11,920 k.c.
19 Meter Spread Band	15,030-15,380 k.c.
Intermediate Frequency	455 k.c.

TUBE COMPLEMENT

(1) TYPE-6SA7	First Detector—Oscillator
(2) TYPE-6SK7	Intermediate Amplifier
(3) TYPE-6SQ7	Second-Detector, A.V.C., and A-F Amplifier
(4) TYPE-6K6G	Power Output
(5) TYPE-5Y4-G	Full-Wave Rectifier
Pilot Lamp (2)	Mazda 51, 6.3 volts, 0.2 amp.

POWER OUTPUT RATING

Undistorted	**1.2 watts**
Maximum	**2.5 watts**

LOUDSPEAKER

Type CRL-528-1	**5-inch Electrodynamic**
Voice-Coil Impedance	**3.8 ohms at 400 cycles**

POWER SUPPLY RATINGS

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

CABINET DIMENSIONS

Height	9⅞ inches
Width	16 inches
Depth	7¾ inches
Tuning Drive Ratio	12 to 1

General Description

Model M-45 is a five tube, four band, table type superheterodyne receiver, designed to cover the standard broadcast range, and three short wave spread bands. Features of design include:—built in loop antenna for broadcast band reception; removable capacity type short wave antenna; magnetite-core I.F. transformers and oscillator coils; automatic volume control; two position tone control; edge lighted straight line dial; phono input socket and a 5 inch dust-proof electrodynamic loudspeaker.

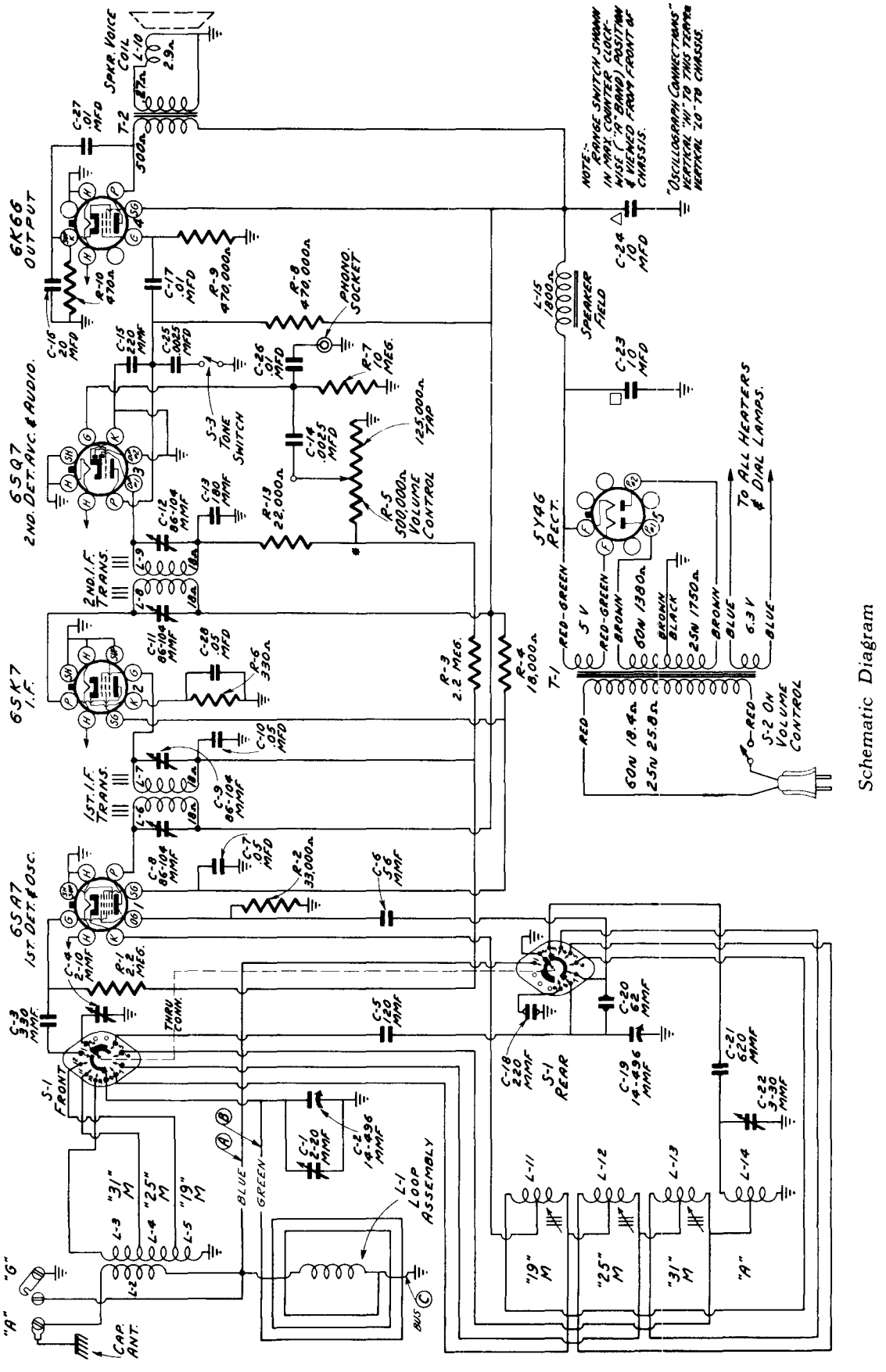
Miscellaneous Service Data

CAPACITY TYPE SHORT-WAVE ANTENNA:—

To obtain best results this antenna should be removed from the cabinet, the wire unwound, dropped to the floor and the form replaced in its receptacle.

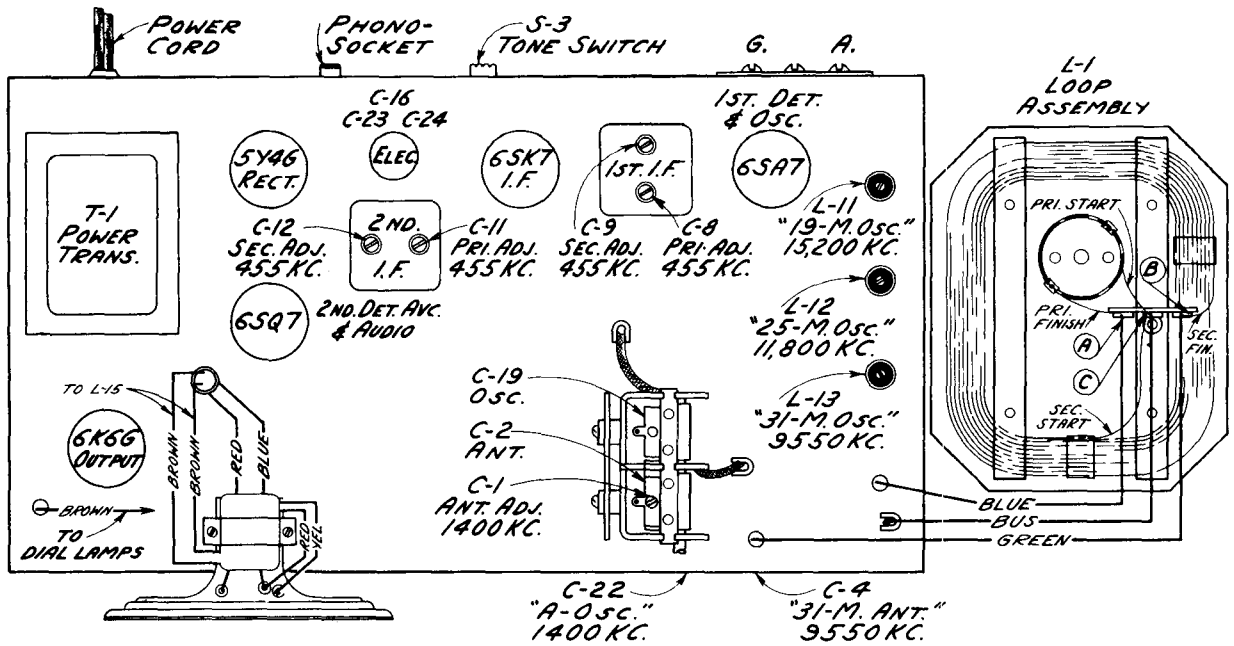
RECORD PLAYER ATTACHMENT:—

A jack is provided on the rear of the chassis for connection of a Record Player attachment. The cable from the attachment should be terminated in a Stock No. 31048 plug to fit the jack.



Schematic Diagram

Schematic Circuit Diagram



Tube and Trimmer Locations

Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the schematic drawing.

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 ground terminal, 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 rear of the drum which is mounted on the shaft of the gang condenser. 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 180° degree mark on the drum scale must be in a vertical position 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 gang-condenser frame, and bend the wire so that it points to the "180°" mark on the calibration scale when the plates are fully meshed.

Order of Alignment	Test Oscillator Connection to Receiver	Test Oscillator Dummy Antenna	Test Oscillator Frequency Setting	Range Selector	Receiver Dial Setting	Circuit to Adjust	Adjustment Symbols
1	Control grid 6SK7	.1 mfd.	455 kc	"A"	No signal 550-750 kc	2nd I.F. Trans.	C11 & C12
2	Control grid 6SA7	.1 mfd.	455 kc	"A"	No signal 550-750 kc	1st I.F. Trans.	C8 & C9
3	Ant. terminal	300 ohms	1400 kc	"A"	1400 kc 27°	"A" Osc.	C22
4	* Radiated signal	—	1400 kc	"A"	1400 kc 27°	"A" Ant.	C1
5	Ant. terminal	300 ohms	15,200 kc	19M	15,200 kc 93°	19M Osc.	L11
6	Ant. terminal	300 ohms	11,800 kc	25M	11,800 kc 82°	25M Osc.	L12
7	Ant. terminal	300 ohms	9,550 kc	31M	9,550 kc 104°	31M Osc.	L13
8	Ant. terminal	300 ohms	9,550 kc	31M	9,550 kc 104°	31M Ant.	C4**

All adjustments indicated above except operation 4 are made with antenna link in the *open* position.

* Radiation loop comprising two turns of wire 18 inches in diameter should be connected to test oscillator and placed approximately 4 feet from receiver before adjusting C1

** Capacity antenna lead should be removed from Ant. and ground terminal board before adjusting C4.

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-bearing 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:—All final spread band adjustments should be made with the chassis fastened in the cabinet and the pointer accurately aligned to the dial.

Tube Socket Voltages

TYPE	PLATE	SCREEN GRID	CATHODE	HEATER
6SA7	190V	65V	—	6.6V
6SK7	185V	65V	—	6.6V
6SQ7	70V*	—	—	6.6V
6K6G	175V	190V	12V	6.6V
5Y4-G	A.C. VOLTAGE PER PLATE 280V			5.0V

***NOTE: Values marked with an asterisk (*) are measured voltages in circuits with high series resistance. The actual voltages will be higher, depending on the voltmeter loading.**

Above values hold within plus or minus 20% when measured with a 20,000 ohm-per-volt meter on a line voltage of 115 volts.

REPLACEMENT PARTS FOR MODEL M-45

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

STOCK NO.	DESCRIPTION
	RECEIVER ASSEMBLIES
34025	Board-Ant.and Ground Terminal Board
S-3099	Capacitor-Adjustable trimmer Band comprising 1 sec.of 2-10 mmfd., 1 sec.of 3-30 mmfd. (C4,C22).....
12723	Capacitor-56 mmfd. (C6).....
S-3123	Capacitor-62 mmfd.(Close Tol.)(C20)
12724	Capacitor-120 mmfd. (C5).....
13003	Capacitor-180 mmfd. (C13).....
12694	Capacitor-220 mmfd. (C15).....
S-2895	Capacitor-220 mmfd.(Close Tol.)(C18)
12952	Capacitor-330 mmfd. (C3).....
31381	Capacitor-620 mmfd. (C21).....
5107	Capacitor-.0025 mfd.(C14,C25).....
4937	Capacitor-.01 mfd.(C17,C26).....
32787	Capacitor-.05 mfd.(C7,C10,C28)...
32240	Capacitor,Electrolytic,1 section-20 mfd. and 2 sections-10 mfd. (C16,C23,C24).....
S-3109	Coil-Antenna coil 19-25-31(L2,L3, L4,L5).....
S-3111	Coil-"A" Band Oscillator (L14).....
S-3114	Coil-19 M.Band Oscillator(111).....
S-3112	Coil-25 M.Band Oscillator(L12).....
S-3113	Coil-31 M.Band Oscillator(L13).....
S-3124	Condenser-Two gang tuning Condenser (C1,C2,C19).....
S-3125	Cord-Indicator pointer drive cord (approx.52").....
S-3110	Drum-Drive Cord Drum Assembly.....
S-3098	Indicator-Station selector indicator pointer.....
11765	Lamp-Dial Lamp Mazda #51.....
S-3108	Loop-Antenna Loop Assembly (L1).....
S-3105	Loop-Short wave-Capacity Antenna....
33726	Retainer-"C" Washer for drive shaft (Pkg.5).....
8063	Resistor-330 ohm 1/2 watt (R6).....
30499	Resistor-470 ohm 1/2 watt (R10).....
30151	Resistor-18,000 ohm 1 watt (R4).....
30492	Resistor-22,000 ohm 1/4 watt (R13)..
30685	Resistor-33,000 ohm 1/4 watt (R2)...
30648	Resistor-470,000 ohm 1/4 watt(R8,R9)
12679	Resistor-2.2 Meg. 1/4 watt (R1,R3)..
13601	Resistor-10 Meg. 1/4 watt (R7).....
S-3106	Shaft-Station selector drive shaft..
31364	Socket-Dial Lamp Socket.....
31319	Socket-Tube socket.....
14278	Socket-Phono Input Socket.....
30585	Spring-Drive cord tension spring (Pkg.2).....
S-3097	Switch-Range switch (S1).....
33634	Switch-Tone switch (S3).....
S-3115	Transformer-1st I.F.Transformer (L6,L7,C8,C9).....
S-3116	Transformer-2nd I.F.Transformer (L8,L9,C11,C12).....
S-3117	Transformer-Power 110 volt,60 cy.(T1)
S-3118	Transformer-Power 110 volt,25 cy.(T1)
S-3095	Volume Control and switch (R5,S2)...
	SPEAKER ASSEMBLIES(CRL 528-1)
32907	Cap-Dust Cap for cone centre(Pkg.5).
S-3248	Coil-Field coil (L15).....
32904	Coil-Speaker Cone & Voice Coil(L10).
S-3246	Speaker-complete.....
S-3247	Transformer-Output (T2).....
	MISCELLANEOUS ASSEMBLIES
S-3093	Dial-Station selector dial scale....
S-3102	Knob-Range switch knob.....
S-3101	Knob-Volume or tuning knob.....
30900	Spring-Knob retaining spring (Pkg.5).....

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

RCA Victor

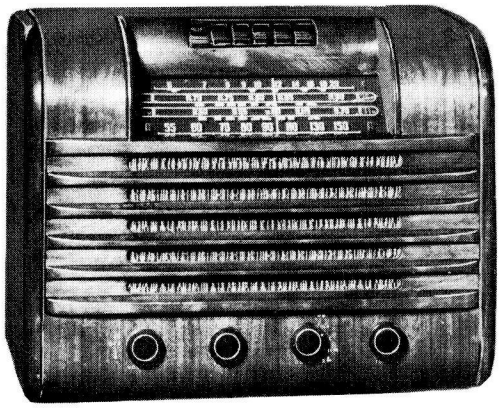
MODEL M-46

SIX-TUBE, FOUR-BAND, A-C, SUPERHETERODYNE RECEIVER

TECHNICAL INFORMATION AND SERVICE DATA

—1945 No. 4—

SERVICE DIVISION • RCA VICTOR COMPANY LIMITED • MONTREAL



Electrical and Mechanical Specifications

FREQUENCY RANGES

Standard Broadcast "A"	540-1570 k.c.
Short Wave "C"	5700-20,000 k.c.
31 Meter Spread Band	9,450-9,700 k.c.
25 Meter Spread Band	11,680-11,920 k.c.
Intermediate Frequency	455 k.c.

TUBE COMPLEMENT

(1) TYPE-6SK7	R.F. Amplifier
(2) TYPE-6SA7	First Detector—Oscillator
(3) TYPE-6SK7	Intermediate Amplifier
(4) TYPE-6SQ7	Second-Detector, A.V.C., and A-F Amplifier
(5) TYPE-6F6G	Power Output
(6) TYPE-5Y4-G	Full-Wave Rectifier
Pilot Lamp (2)	Mazda 51, 6.3 volts, 0.2 amp.

POWER OUTPUT RATING

Undistorted	2 watts
Maximum	4.5 watts

LOUDSPEAKER

Type CRL-526-1	6-inch Electrodynamic
Voice-Coil Impedance	3.8 ohms at 400 cycles

POWER SUPPLY RATINGS

Rating A	105-125 volts, 50-60 cycles, 75 watts
Rating B	105-125 volts, 25-60 cycles, 75 watts

CABINET DIMENSIONS

Height	12¾"
Width	16⅜"
Depth	8¾"

Tuning Drive cord length 49" ——— Drive Ratio 12 to 1

General Description

Model M-46 is a six tube, four band, table type superheterodyne receiver designed to cover standard broadcast range, and three short wave bands. Six push-buttons are provided five for standard broadcast stations and one for phonograph attachment. Features of design include:—built in loop antenna for broadcast reception; removable capacity type short wave antenna; magnetite-core I.F. transformers and oscillator coils; automatic volume control; three position tone control; edge lighted straight line dial; phono input socket and a 6 inch dust-proof Electrodynamic loudspeaker.

Miscellaneous Service Data

CAPACITY TYPE SHORT-WAVE ANTENNA:—

To obtain best results this antenna should be removed from the cabinet, the wire unwound, dropped to the floor and the form replaced in its receptacle.

RECORD PLAYER ATTACHMENT:—

A jack is provided on the rear of the push button switch for connection of a Record Player attachment. The cable from the attachment should be terminated in a Stock No. 31048 plug to fit the jack.

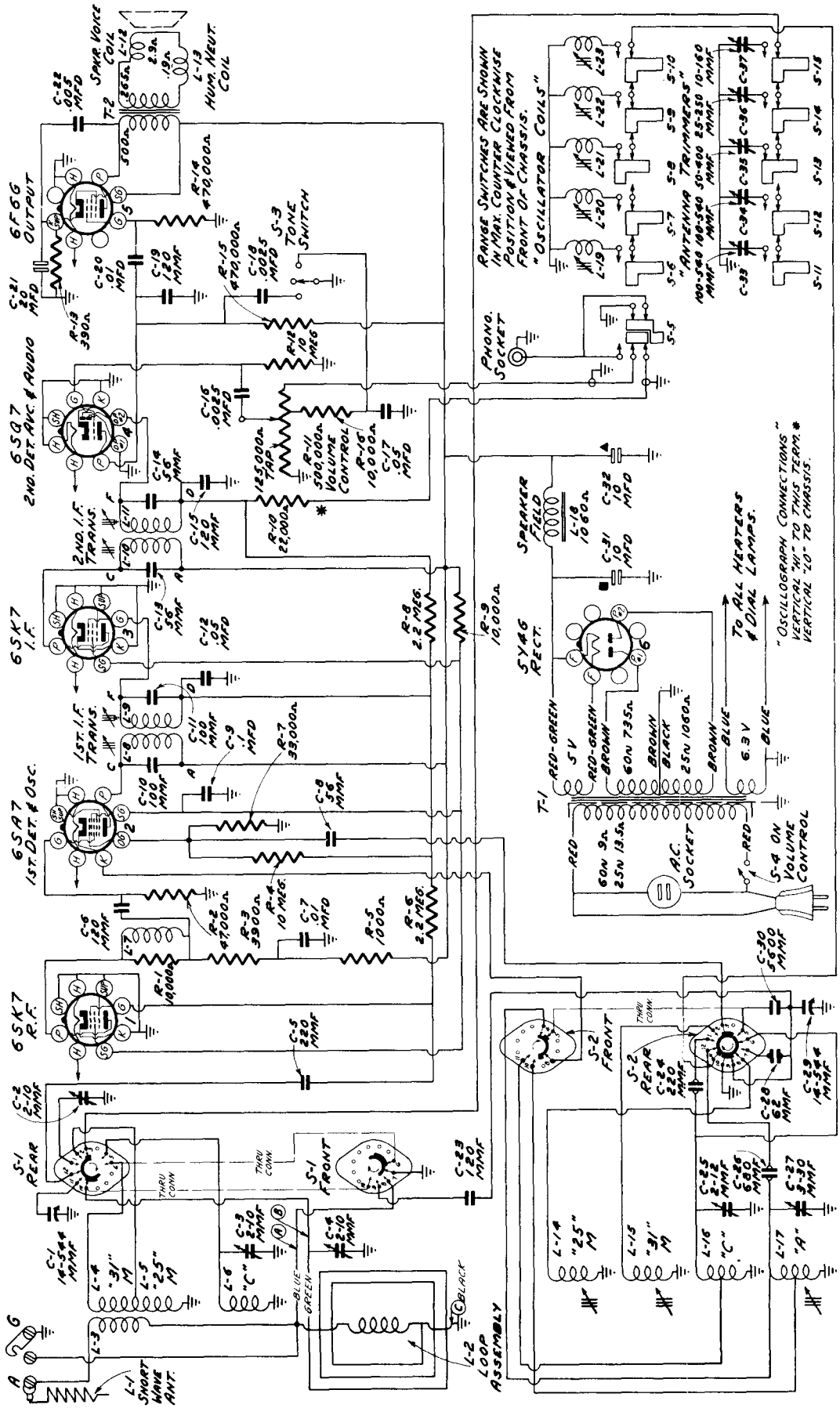


Figure 1.—Schematic Circuit Diagram.

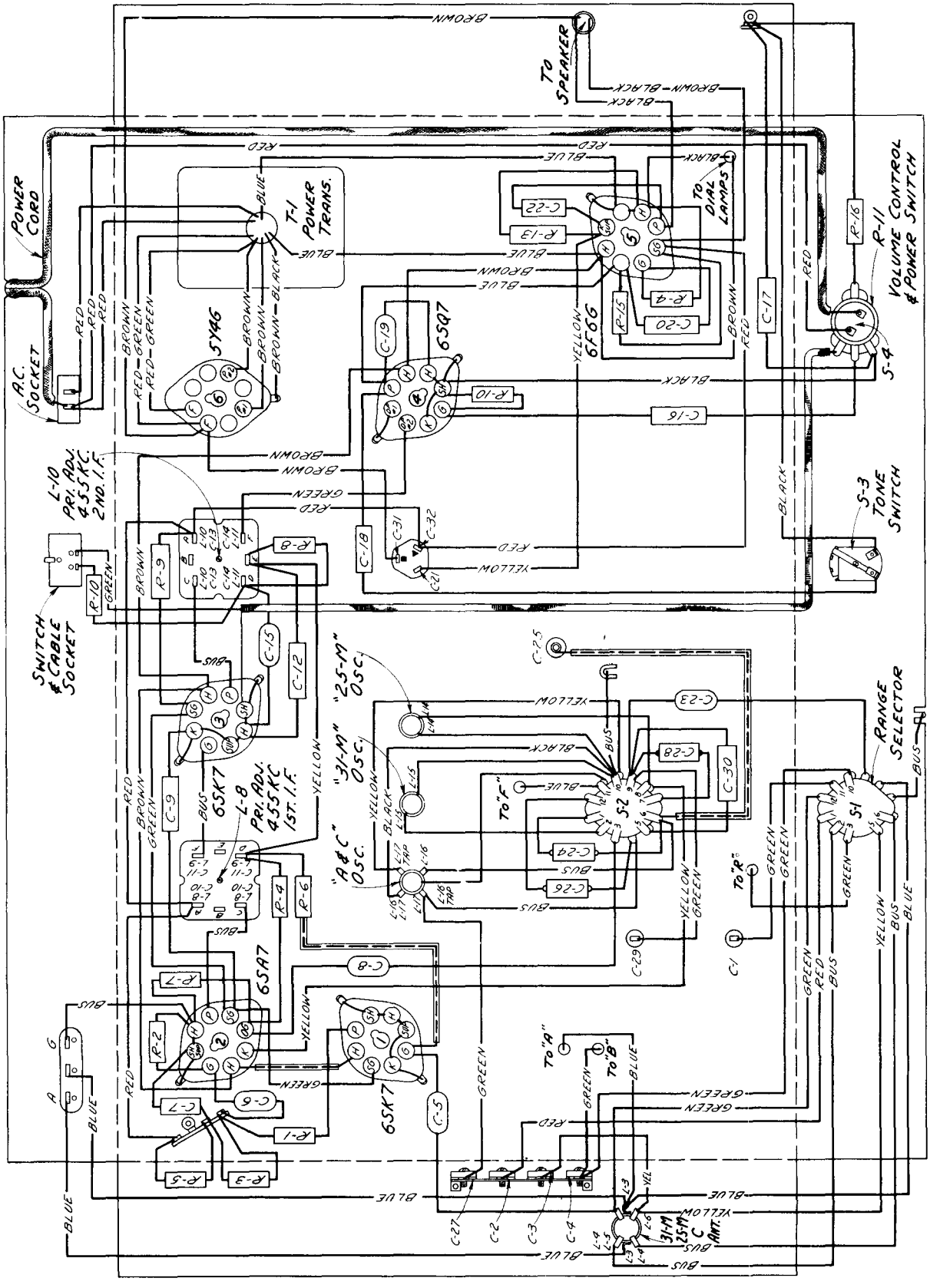


Figure 2.—Chassis Wiring Diagram.

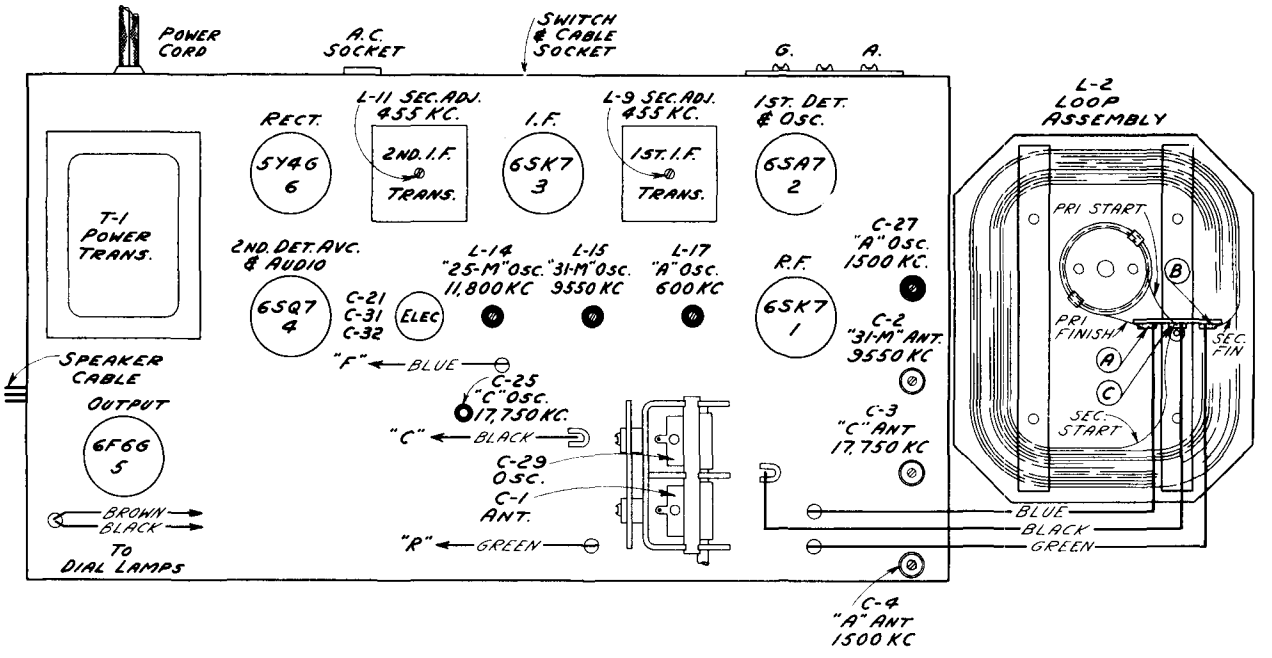


Figure 3.—Tube and Trimmer Locations.

Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the schematic drawing.

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 ground terminal, 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 rear of the drum which is mounted on the shaft of the gang condenser. 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 180° degree mark on the drum scale must be in a vertical position when the plates are fully meshed. The drum is held to the shaft by means of 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 gang-condenser frame, and bend the wire so that it points to the "180°" mark on the calibration scale when the plates are fully meshed.

Alignment Chart

Order of Alignment	Test Oscillator			Range Selector	Receiver Dial Setting	Circuit to Adjust	Adjustment Symbols
	Connection to Receiver	Dummy Antenna	Frequency Setting				
1	Grid Pin #4 6SK7 I.F.	.01 mfd.	455 k.c.	"A"	No Signal 550-750 k.c.	2nd I.F. Trans.	L10 & L11
2	Grid Pin # 8 6SA7 Con.	.01 mfd.	455 k.c.	"A"	No Signal 550-750 k.c.	1st I.F. Trans.	L8 & L9
3	*Radiated	signal	600 k.c.	"A"	600 k.c. 147°	"A" L.F. Osc.	L17
4	*Radiated	signal	1500 k.c.	"A"	1500 k.c. 19.5°	"A" H.F. Osc.	C27
5	*Radiated	signal	1500 k.c.	"A"	1500 k.c. 19.5°	"A" Ant.	C4
6	Ant. terminal	300 ohms	17750 k.c.	"C"	17750 k.c. 28.5°	"C" Osc.	C25
7	Ant. terminal	300 ohms	17750 k.c.	"C"	17750 k.c. 28.5°	"C" Ant.	C3
8	Ant. terminal	300 ohms	9550 k.c.	31 M	9550 k.c. 103.5°	31M Osc.	L15
9	Ant. terminal	300 ohms	9550 k.c.	31 M	9550 k.c. 103.5°	31M Ant.	C2
10	Ant. terminal	300 ohms	11800 k.c.	25 M	11800 k.c. 89.5°	25M Osc.	L14

All adjustments indicated above except operations three, four, five and six are made with antenna link in the (open) position.

*Radiation loop comprising two turns of wire 18 inches in diameter should be connected to test oscillator and placed approximately 4 feet from receiver before adjusting L17, C27 and C4.

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 scales. 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-bearing 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:—All final spread band adjustments should be made with the chassis fastened in the cabinet and the pointer accurately aligned to the dial.

Radiotron Socket Voltages

Type	Function	Plate	Screen Grid	Cathode	Heater
6SK7	R.F. Amplifier	200 V	100 V	—	6.3
6SA7	Converter	250 V	100 V	—	6.3
6SK7	I.F. Amplifier	250 V	100 V	—	6.3
6SQ7	2nd Det. A.V.C. Audio	65 V	—	—	6.3
6F6G	Power Output	232 V	250 V	14	6.3
5Y4G	A.C. Voltage per plate 310 V				5.0

Above values hold within plus or minus 20% when measured with a 1000 ohm per volt meter on a line voltage of 115 volts.

* Actual measured voltage may be lower, depending on the voltmeter loading.

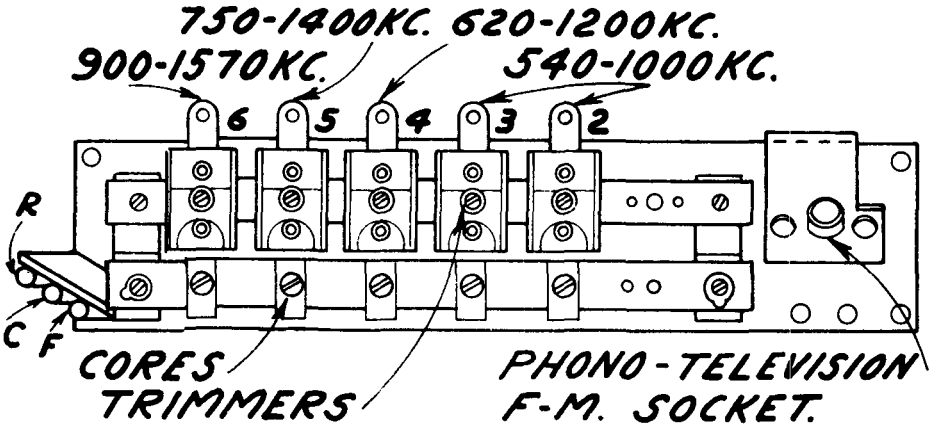


Fig. 4

Push Button Adjustment

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

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.

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

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

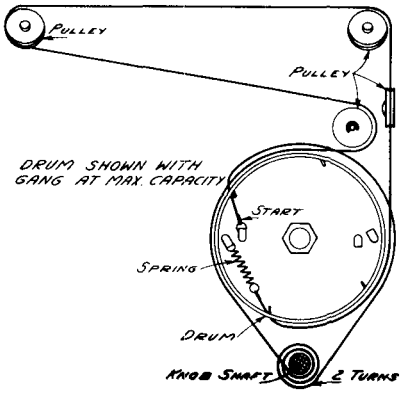


Figure 5.—Dial Drive Cord.

REPLACEMENT PARTS FOR MODEL M-46

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

STOCK NO.	DESCRIPTION
	RECEIVER ASSEMBLY
34025	Board-Ant.and Ground Terminal Board
S-3119	Capacitor-Adjustable trimmer bank comprising 1 of 3-10 mmfd, and 2 of 10 mmfd.....
12714	Capacitor-Adj. trimmer 2-12 mmfd...
12723	Capacitor- 56 mmfd.....
S-3123	Capacitor- 62 mmfd. (Temp.Comp.)..
12724	Capacitor- 120 mmfd.....
12694	Capacitor- 220 mmfd.....
S-2895	Capacitor- 220 mmfd. (Close Tol.)..
S-2988	Capacitor- 680 mmfd. (Close Tol.)..
13895	Capacitor-5600 mmfd.....
34459	Capacitor-.0025 mfd.....
33584	Capacitor-.005 mfd.....
4937	Capacitor-.01 mfd.....
32787	Capacitor-.05 mfd.....
4839	Capacitor-.1 mfd.....
32240	Capacitor-Electrolytic comprising 1 section of 20 mfd. and 2 sections of 10 mfd.....
35876	Coil-Coupling coil.....
S-3289	Coil-Antenna coil.....
S-3290	Coil-A. & C. Oscillator.....
S-3291	Coil-31 M. Band Oscillator.....
S-3292	Coil-25 M. Band Oscillator.....
S-3149	Condenser-Two-gang condenser.....
S-3383	Cord-Indicator pointer drive cord (approx. 59" long).....
35627	Drum-Drive cord drum assembly.....
35648	Indicator-Station selector indicator pointer.....
11765	Lamp-Dial lamp Mazda #51.....
S-3288	Loop-Antenna Loop assembly.....
S-3105	Loop-Short wave capacity ant.....
5119	Plug-3 contact female speaker plug.
35641	Pulley-Dial cord pulley.....
33726	Retainer-Drive shaft "C" Washer (Pkg.5).....
34373	Retainer-Pulley "C" Washer (Pkg.5).
31388	Resistor-390 ohm-1 watt.....
14720	Resistor-1000 ohm-1/4 watt.....
30694	Resistor-3900 ohm-1/2 watt.....
3078	Resistor-10,000 ohm-1/4 watt.....
S-2587	Resistor-10,000 ohm-4 watt wire-wound.....
30492	Resistor-22,000 ohm-1/4 watt.....
30685	Resistor-33,000 ohm-1/4 watt.....
30562	Resistor-47,000 ohm-1/4 watt.....
30648	Resistor-470,000 ohm-1/4 watt.....
12679	Resistor-2.2 megohm-1/4 watt.....
13601	Resistor-10. megohm-1/4 watt.....
S-3155	Shaft-Station selector drive shaft.
S-2424	Socket-A.C. socket.....
31364	Socket-Dial lamp socket.....
36422	Socket-Push button cable socket....
31319	Socket-Tube socket.....
30585	Spring-Dial cord spring (Pkg.2)....
S-3286	Switch-Range switch.....
S-3285	Switch-Tone switch.....
35636	Transformer-1st I.F. Transformer...
35628	Transformer-2nd I.F. Transformer...
S-2548	Transformer-Power 110/125 volt, 50/60 cycle.....
33618	Transformer-Power 110/125 volt, 25/60 cycle.....
S-3295	Volume control and Power switch....
	SPEAKER ASSEMBLY (CRL 526-1)
32907	Cap-Dust cap for cone center (Pkg.5).....
S-2463	Coil-Field coil.....
35441	Cone-Speaker cone and voice coil...
5118	Plug-Three contact-male plug.....
S-3293	Speaker-complete.....
S-2377	Transformer-Output.....
	PUSH BUTTON ASSEMBLY
S-3241	Cable-Shielded phono cable less plug.....
S-2908	Capacitor-Trimmer capacitor bank...
35803	Coil-Oscillator coil.....
32641	Plug-3-spring male plug for phono cable.....
31347	Socket-Phono input socket.....
S-2911	Switch-Push button switch assembly.
	MISCELLANEOUS ASSEMBLY (RCA)
35883	Button-Station selector push button
S-3284	Dial-Station selector dial scale...
S-3101	Knob-Volume or tuning control.....
S-3287	Knob-Tone or range switch.....
S-3053	Marker-Push button call letter marker (1 set).....
30900	Spring-Knob retaining spring(Pkg.5)
34053	Spring-Push button retaining spring (Pkg.5).....
S-2542	Tool-Push button tuning set-up tool

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

RCA Victor

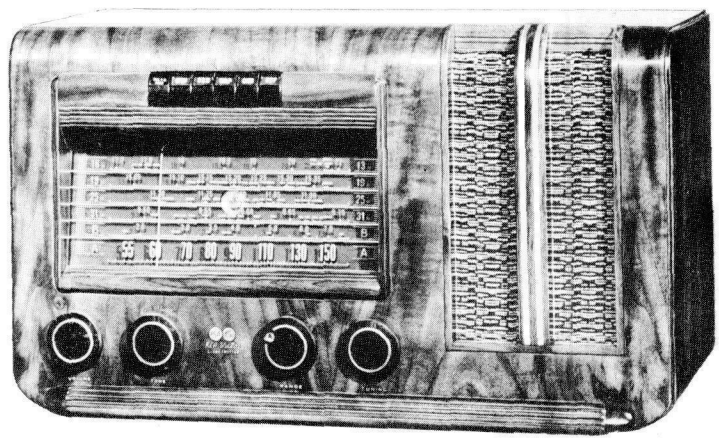
MODEL M47A

Seven-Tube, Six-Band, A-C, Superheterodyne Receivers

TECHNICAL INFORMATION AND SERVICE DATA

1945 No. 7

SERVICE DIVISION • RCA VICTOR COMPANY LIMITED • MONTREAL



Electrical and Mechanical Specifications

R. F. Alignment Frequencies

(For order of alignment see Page 3.)

Standard Broadcast "A"	600 k.c.	(osc.) 1400 k.c. (osc., det., ant.)
Medium Wave "B" (49 Meter)	6,100 k.c.	(osc.)
31 M (31 Meter)	9,550 k.c.	(osc., det., ant.)
25 M (25 Meter)	11,800 k.c.	(osc.)
19 M (19 Meter)	15,200 k.c.	(osc.)
16-13 M (16-13 Meter)	21,500 k.c.	(osc., det., ant.)

Frequency Ranges

Standard Broadcast (A)	540-1,570	k.c.
Medium Wave (B)	2,300-7,600	k.c.
31 M Spread band	9,450-9,700	k.c.
25 M Spread band	11,680-11,920	k.c.
19 M Spread band	15,030-15,380	k.c.
16-13 M Spread band	17,700-22,000	k.c.

Intermediate Frequency ..... 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.	
(5)	Type-6F6G	Power Output	
(6)	Type-5Y4G	Full Wave Rectifier	
(7)	Type-6U5	Tuning Tube	

Pilot Lamps (2) ..... Mazda No. 51, 7.5 volts, 0.2 amp.

Drive ratio 12:1

Power Supply Ratings

Rating A ..... 105-125 volts, 50-60 cycles, 80 watts

Rating B ..... 105-125 volts, 25-60 cycles, 80 watts

Loudspeaker (CRL-517-1)

Type ..... 6 inch Electrodynamic

Impedance (V.C.) ..... 3 ohms at 400 cycles

Electrical and Mechanical Specifications (continued)

Cabinet Dimensions	A25	A38
Width	22 inches	28¾ inches
Depth	10¾ inches	13½ inches
Height	13 inches	39¼ inches

Power Output	
Undistorted	3 watts
Maximum	4.5 watts

Push Button Tuning Range	
Button No. 1	Phonograph
Button No. 2	540—1,000 k.c.
Button No. 3	540—1,000 k.c.
Button No. 4	620—1,200 k.c.
Button No. 5	750—1,400 k.c.
Button No. 6	900—1,570 k.c.

General Description

The M47A is a seven-tube, six band superheterodyne circuit, the arrangement of which is shown in the Schematic Circuit Diagram. Features of design include: —Loop antenna as the first tuned circuit; high gain R.F. stage; stabilized oscillator circuit resulting in less frequency drift; magnetite core I.F. transformers; magnetite core oscillator coils on all bands; automatic volume control; A.C. outlet on chassis back apron; Tuning indicator tube for fine, accurate tuning on all bands; variable tone control circuit; push button tuning of five Standard Broadcast stations by means of pre-set oscillator coils; dust proof electrodynamic loudspeaker; temperature stabilized capacitors in the oscillator circuits; and a large, edge lighted dial individually calibrated for each band.

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 first Audio stage and a single pentode output operating in Class A-B; tuning indicator; 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 are used in the oscillator circuits to reduce oscillator drift.

Spread band tuning is accomplished electrically 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 intermediate frequency amplifier consists of a Type 6SK7 tube in a single stage transformer-coupled circuit. The windings of all I.F. Transformers are resonated by fixed capacitors and are adjusted by moulded magnetite cores to tune to 455K.C.

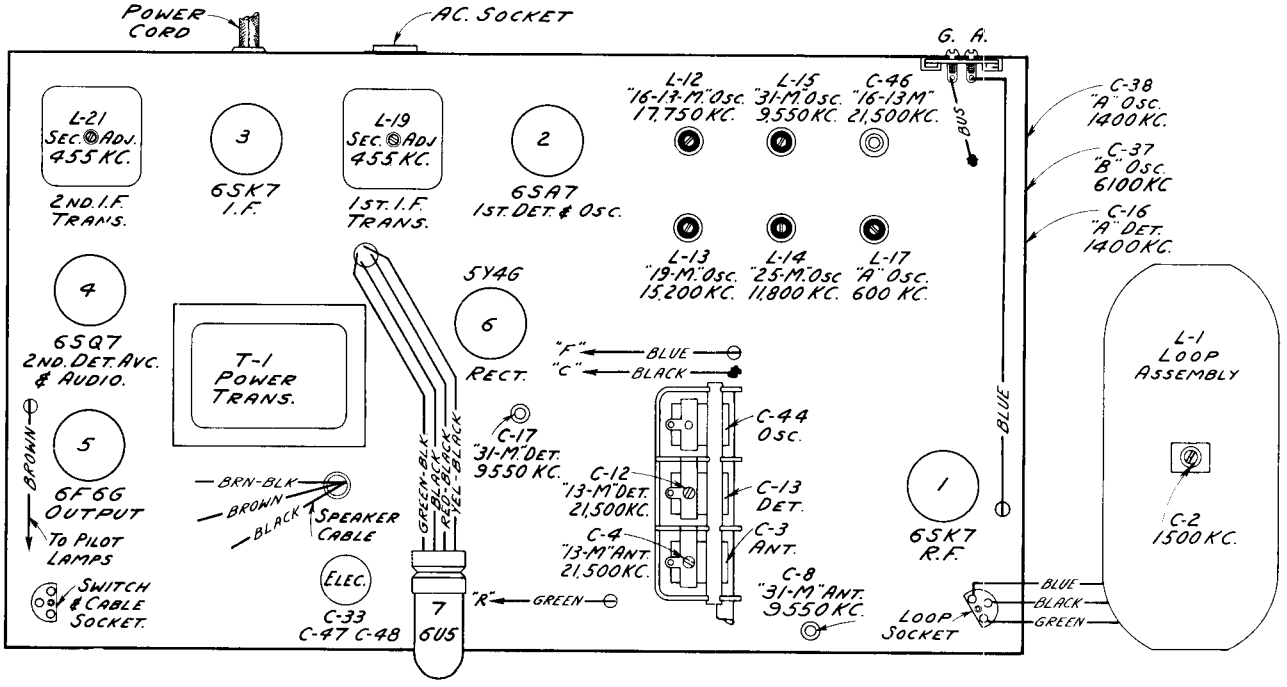


Fig. 1—Chassis Layout and Alignment Adjustments

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 O° 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 O° 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	455 kc	"A"	No Signal 550-750 kc	2nd I.F. Trans.	L20 & L21
2	6SA7 Det. Grid	.1	455 kc	"A"	No Signal 550-750 kc	1st I.F. Trans.	L18 & L19
3	Ant. terminal	300 Ohms	21,500 kc	"16-13 M"	21.5 mc (162°)	"16-13 M" Osc.	L46
4	Ant. terminal	300 Ohms	17,750 kc	"16-13 M"	17.75 mc (17°)	"16-13 M" Osc.	L12
5	Ant. terminal	300 Ohms	21,500 kc	"16-13 M"	21.5 mc (162°)	"16-13 M" Det.	C12
6	Ant. terminal	300 Ohms	21,500 kc	"16-13 M"	21.5 mc (162°)	"16-13 M" Ant.	C4
7	Ant. terminal	300 Ohms	15,200 kc	"19 M"	15.8 mc (94°)	"19 M" Osc.	L13
8	Ant. terminal	300 Ohms	11,800 kc	"25 M"	11.8 mc (99°)	"25 M" Osc.	L14
9	Ant. terminal	300 Ohms	9,550 kc	"31 M"	9.55 mc (73°)	"31 M" Osc.	L15
10	Ant. terminal	300 Ohms	9,550 kc	"31 M"	9.55 mc (73°)	"31 M" Det.	C17
11	Ant. terminal	300 Ohms	9,550 kc	"31 M"	9.55 mc (73°)	"31 M" Ant.	C8
12	Ant. terminal	300 Ohms	6,100 kc	"B"	6.1 mc (149°)	"B" Osc.	C37
13	Ant. terminal	300 Ohms	1,400 kc	"A"	1,400 kc (155°)	"A" H.F. Osc.	C38
14	Ant. terminal	300 Ohms	600 kc	"A"	600 kc (33°)	"A" LF Osc.	L17
15	Ant. terminal	300 Ohms	1,400 kc	"A"	1,400 kc (155°)	"A" Det.	C16
16	Radiation Loop	300 Ohms	1,500 kc	"A"	1,500 kc (163°)	Loop	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 four 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.

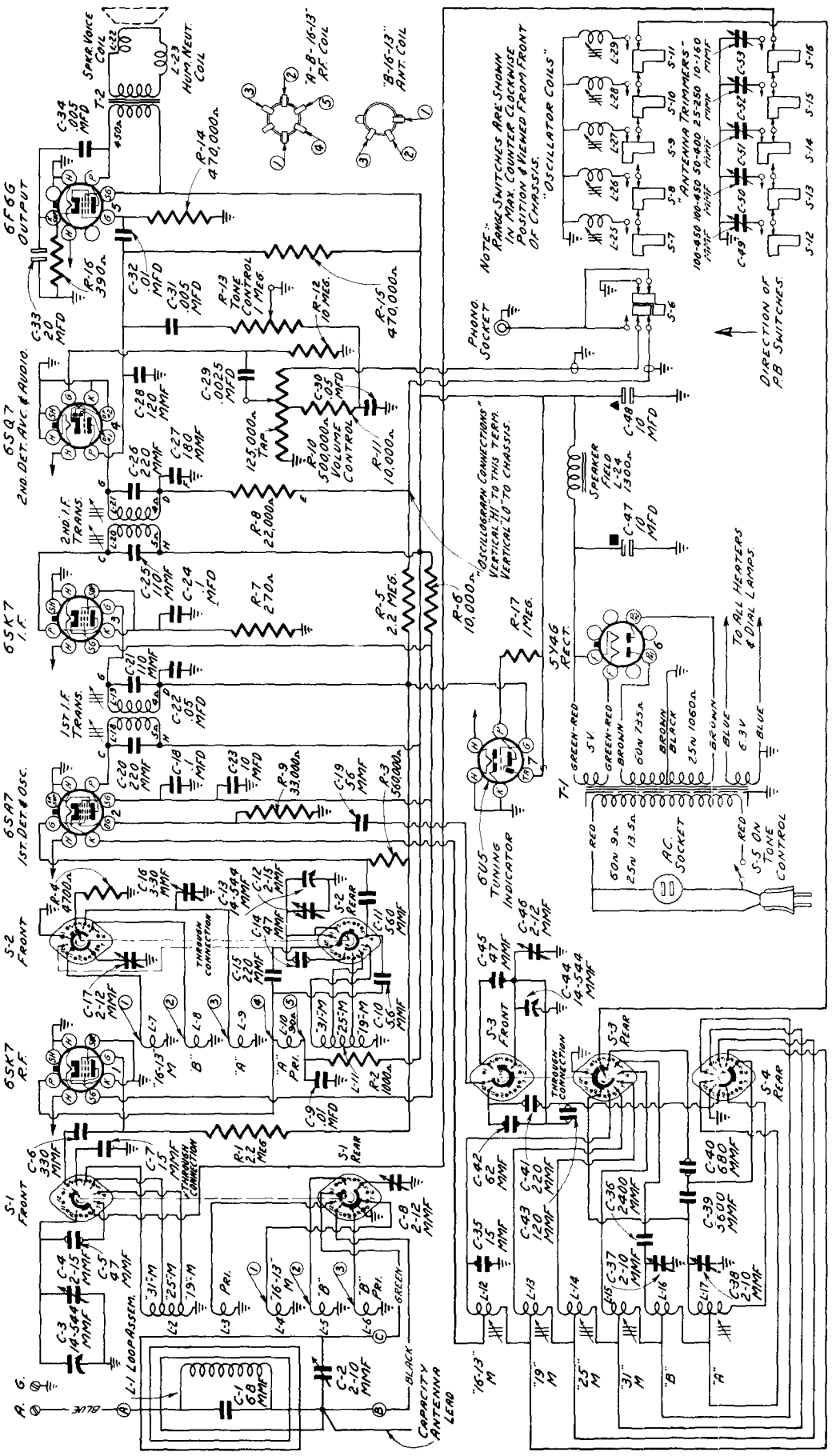


Figure 2—Schematic Circuit Diagram

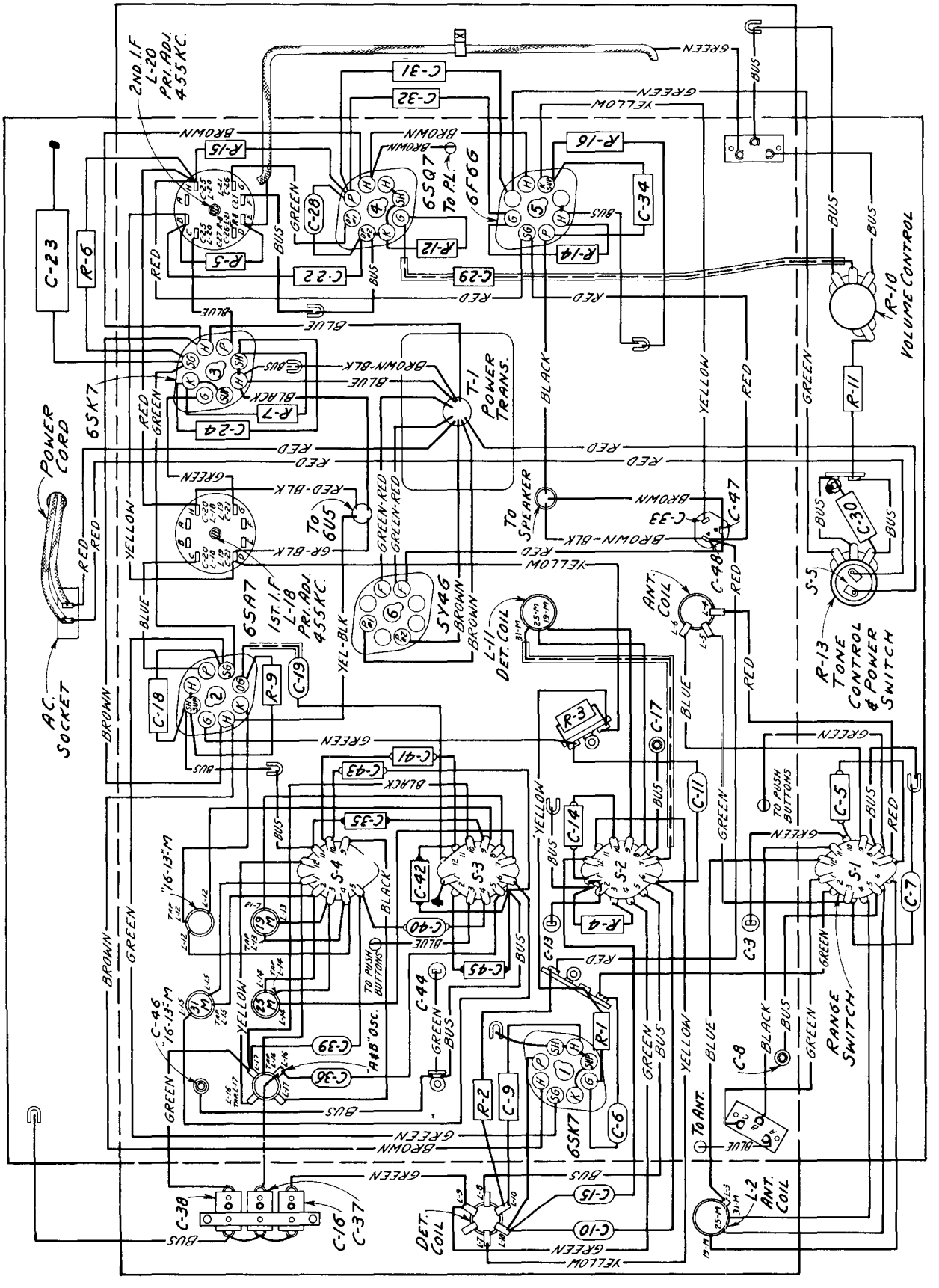


Figure 3—Chassis Wiring Diagram

RADIOTRON SOCKET VOLTAGES

Type	Plate	Screen Grid	Control Grid	Cathode	Heater
6SK7 R.F.	210	82V	....	....	6.3V
6SA7 Conv.	220	82V	....	....	6.3V
6SK7 I.F.	220	82V	-.2V	....	6.3V
6SQ7 Audio	195	....	....		6.3V
6F6G Output	205V	220V	....	13V	6.3V
5Y4G Rectifier	D.C. output measured across C47 340V				5.0V

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.

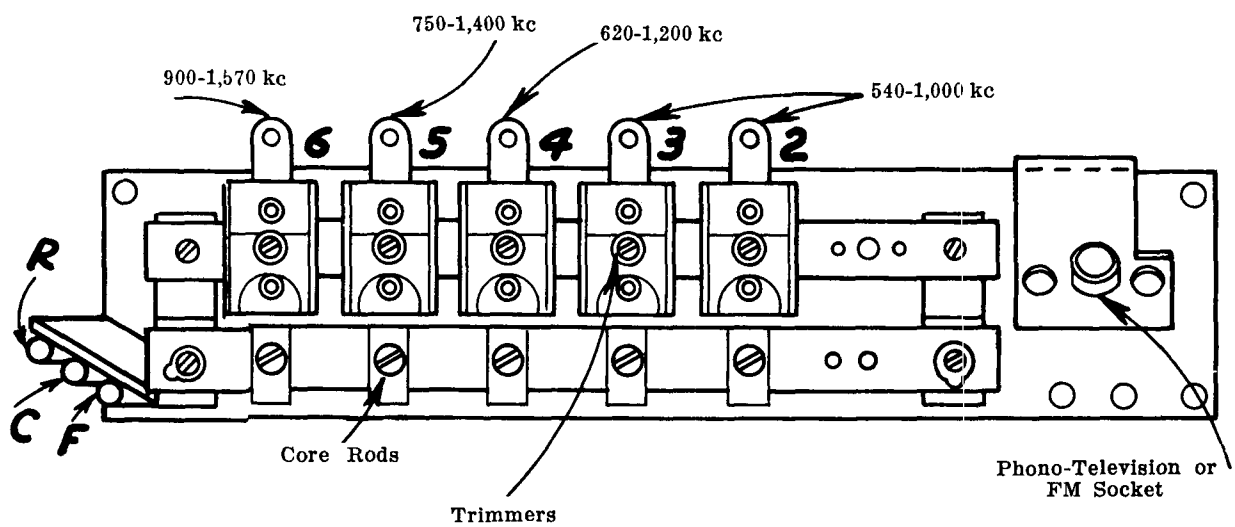


Fig. 4

Push Button Adjustment

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

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.

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

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

REPLACEMENT PARTS FOR MODEL M47A

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

STOCK NO.	DESCRIPTION
	RECEIVER ASSEMBLY
S-2876	Board-Ant. Ground Terminal Board...
12714	Capacitor-Adjustable Trimmer 2-12 mmfd. (C8, C17-C46).....
34783	Capacitor Trimmer Condenser 2-10 mmfd. one 3-30 mmfd. (C16-C37-C38)
12814	Capacitor 5.6 mmfd. (C10).....
12896	Capacitor 15 mmfd. (C7).....
36012	Capacitor 15 mmfd. (Temp.Comp)(C35)
S-3008	Capacitor 47 mmfd. (Close Tol.) (C5-C14).....
35644	Capacitor 47 mmfd.(Temp.Comp.)(C45)
12723	Capacitor 56 mmfd. (C19).....
S-3123	Capacitor 62 mmfd.(Temp.Comp.)(C42)
39624	Capacitor 68 mmfd. (On loop) (C1)..
12724	Capacitor 120 mmfd. (C28).....
S-3100	Capacitor 120 mmfd. (Close Tol.) (C43).....
12694	Capacitor 220 mmfd. (C15).....
S-2895	Capacitor 220 mmfd. (Close Tol.) (C41).....
12952	Capacitor 330 mmfd. (C6).....
12537	Capacitor 560 mmfd. (C11).....
S-2988	Capacitor 680 mmfd. (Close Tol.) (C40).....
4881	Capacitor 2400 mmfd. (C36).....
13895	Capacitor 5600 mmfd. (C39).....
5107	Capacitor .0025 mfd. (C29).....
4838	Capacitor .005 mfd. (C31-C34).....
4937	Capacitor .01 mfd. (C9-C32).....
32787	Capacitor .05 mfd. (C22-C30).....
4839	Capacitor .1 mfd. (C18-C24).....
S-2894	Capacitor-Electrolytic-10 mfd.(C23)
32240	Capacitor-Electrolytic comprising two sections 10 mfd.(C33,C47-C48) one section 20 mfd.....
S-2877	Coil-Antenna coil 'B-16-13' bands (L4, L5, L6).....
S-2878	Coil-Antenna coil '31-25-19' bands (L2, L3).....
S-2879	Coil-R.F. Coil 'A-B-16-13 bands (L7, L8, L9, L10).....
S-2880	Coil-R.F. Coil '31-25-19' bands(L11)
S-2884	Coil-Oscillator 16-13 M. Band (L12)
S-2881	Coil-Oscillator 19 M. Band (L13)...
S-2882	Coil-Oscillator 25 M. Band (L14)...
S-2883	Coil-Oscillator 31 M. Band (L15)...
S-2885	Coil-Oscillator 'A & B' Band (L16, L17).....
S-2898	Condenser-3 gang variable tuning condenser (C3, C4, C12).....
S-2897	Cord-Indicator pointer drive cord 53-1/2" (C13, C44).....
31273	Drum-Drive cord drum assembly.....
S-2886	Indicator-Station selector indicator pointer.....
11765	Lamp-Mazda #51.....
31280	Pulley-Drive cord pulley.....
14887	Retainer-Drive cord pulley retainer (Pkg. 10).....
30929	Resistor-270 ohms 1/2 watt (R7)....
31388	Resistor-390 ohms 1 watt (R16).....
14720	Resistor-1000 ohms 1/4 watt (R2)...
30146	Resistor-4700 ohms 1/4 watt (R4)...
3078	Resistor-10,000 ohms 1/4 watt (R11)
S-2587	Resistor-10,000 ohms 4 watt (R6)...
30685	Resistor-33,000 ohms 1/4 watt (R9).
14659	Resistor-470,000 ohms 1/4 watt (R14, R15).....
12486	Resistor-560,000 ohms 1/4 watt (R8)
30652	Resistor-1 meg. 1/10 watt (R17)....
12679	Resistor-2.2 meg. 1/4 watt (R1, R5)
30992	Resistor-10. meg. 1/4 watt (R12)...
S-2824	Socket-A.C. Socket.....
31364	Socket-Dial lamp socket.....
36422	Socket-Loop Antenna & Push Button switch cable socket.....
5119	Socket-Speaker Cable female connector.....
31251	Socket-Tube Socket.....
13638	Spring-Drive cord tension spring (Pkg. 2).....
S-2889	Switch-Range switch (S1, S2, S3,S4)
S-2891	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 (R8, L20, L21, C25, C26, C27)....
S-2903	Transformer-Power - 110 volt-25/60 cycle (T1).....
S-2904	Transformer-Power - 110 volt-50/60 cycle (T1)
S-2905	Volume control (R10).....
	SPEAKER ASSEMBLIES (CRL-517-1)
32907	Cap-Dust Cap for cone centre(Pkg.5)
33077	Coil-Field coil (L24).....
35441	Cone-Speaker cone & voice coil(L22)
5118	Plug-3-contact male plug connector.
S-2875	Speaker-complete.....
S-2377	Transformer-Output transformer (T2)
	PUSH BUTTON SWITCH ASSEMBLY
S-3241	Cable-shielded phono cable, less plug.....
S-2908	Capacitor-Trimmer capacitor bank (C49, C50, C51, C52, C53).....
35803	Coil-Oscillator coil (L25, L26, L27, L28, L29).....
35871	Core-Oscillator coil core.....
32641	Plug-Three prong male plug for Phono cable.....
14278	Socket-Phono input socket.....
	MISCELLANEOUS ASSEMBLIES
35883	Button-Station selector push button
S-2913	Dial-Station selector dial scale...
34489	Knob-Volume, tone or tuning control knob.....
S-3316	Knob-Range switch knob (Outer section only).....
S-2914	Knob-Range switch knob (Inner section only).....
S-2915	Loop-Antenna loop assembly (L1, C1, C2).....
36149	Marker-Push button call letter marker (1 set).....
S-2887	Shaft-Station selector drive shaft (RCA).....
34053	Spring-Push Button retaining spring (Pkg. 5).....
14270	Spring-Knob retaining spring (Pkg. 2).....
S-2911	Switch-Push Button switch assembly (S1 to S16 inc.).....
S-2542	Tool-Push Button tuning set up tool

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

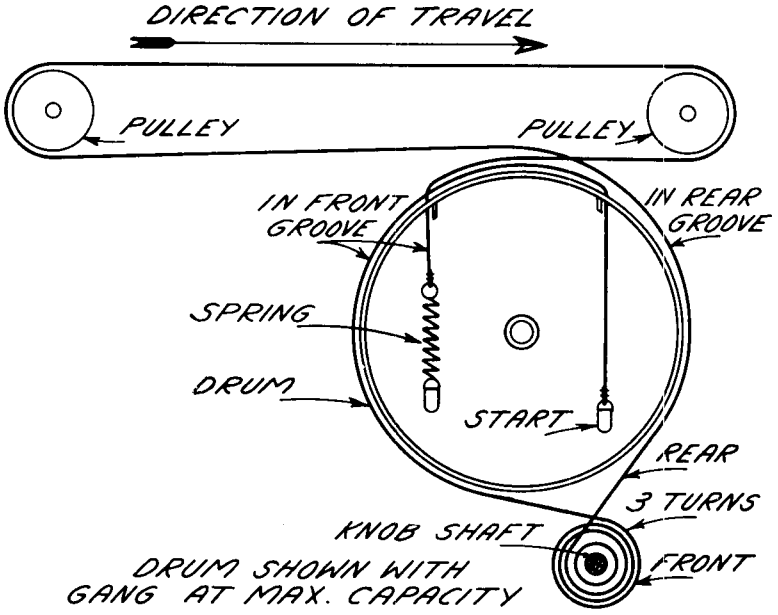
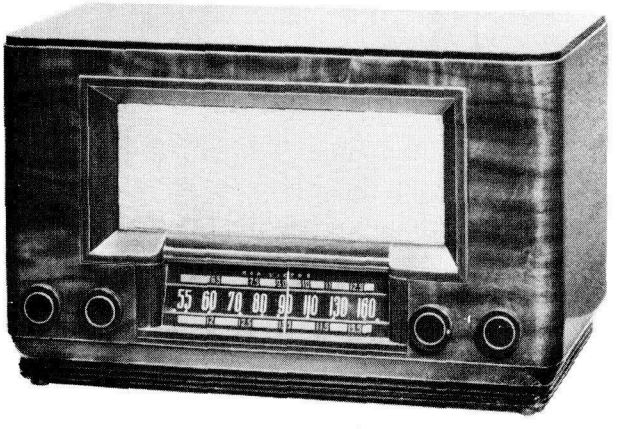


Fig. 5—Dial Drive Cord.

RCA VICTOR
MODEL 50
FIVE-TUBE, THREE-BAND, A-C, SUPERHETERODYNE RECEIVER
TECHNICAL INFORMATION AND SERVICE DATA

—1947 No. 9—

GENERAL SERVICE DIVISION • RCA VICTOR COMPANY LTD.



Electrical and Mechanical Specifications

FREQUENCY RANGE

Standard Broadcast S.B.	540—1600 k.c.
Short Wave 49—31 M.	5.7—13.0 m.c.
25—19 M.	11.6—16.0 m.c.
Intermediate Frequency	455 k.c.
Tuning drive ratio	12 to 1

RADIOTRON COMPLEMENT

(1) Type 6BE6	Converter
(2) Type 6BA6	I.F. Amplifier
(3) Type 6AT6	Det A.V.C. & 1st A.F.
(4) Type 6K6GT/G	Power Output
(5) Type 5Y3GT/G	Rectifier

POWER OUTPUT

Undistorted	2 Watts
Maximum	3 Watts

LOUDSPEAKER

Type	4 x 6 inch elliptical P.M.
Voice coil impedance	3.4 ohms at 400 cycles

POWER SUPPLY RATINGS

Rating A	105—125 volts, 50-60 cycle, 50 watts
Rating B	105—125 volts, 25-60 cycle, 55 watts

CABINET DIMENSIONS (Inches)

Height	9 7/8"
Width	17"
Depth	8 1/4"

General Description

The Model 50 is a five tube, three band, table type superheterodyne receiver, designed to cover the broadcast band and two short wave bands. Features of the design include: Built-in loop antenna for broadcast band reception; Powdered iron core I.F. transformers, R.F. and oscillator coils; Automatic volume control; Two position tone control; Edge lighted straight line dial; Phono input socket with PHONO position on range switch; 4 x 6 inch dustproof elliptical P.M. loudspeaker.

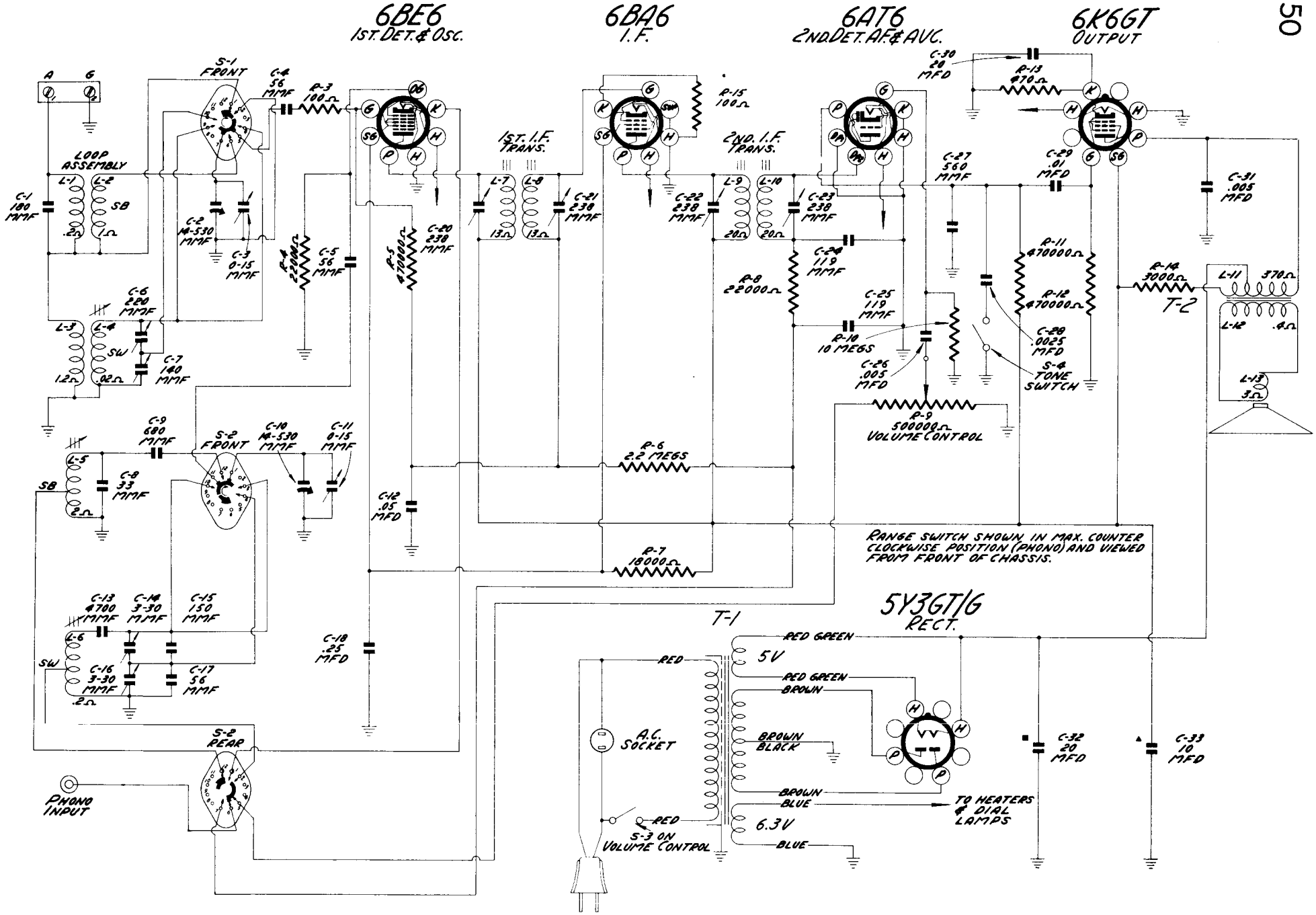


Fig. 1—Schematic Diagram

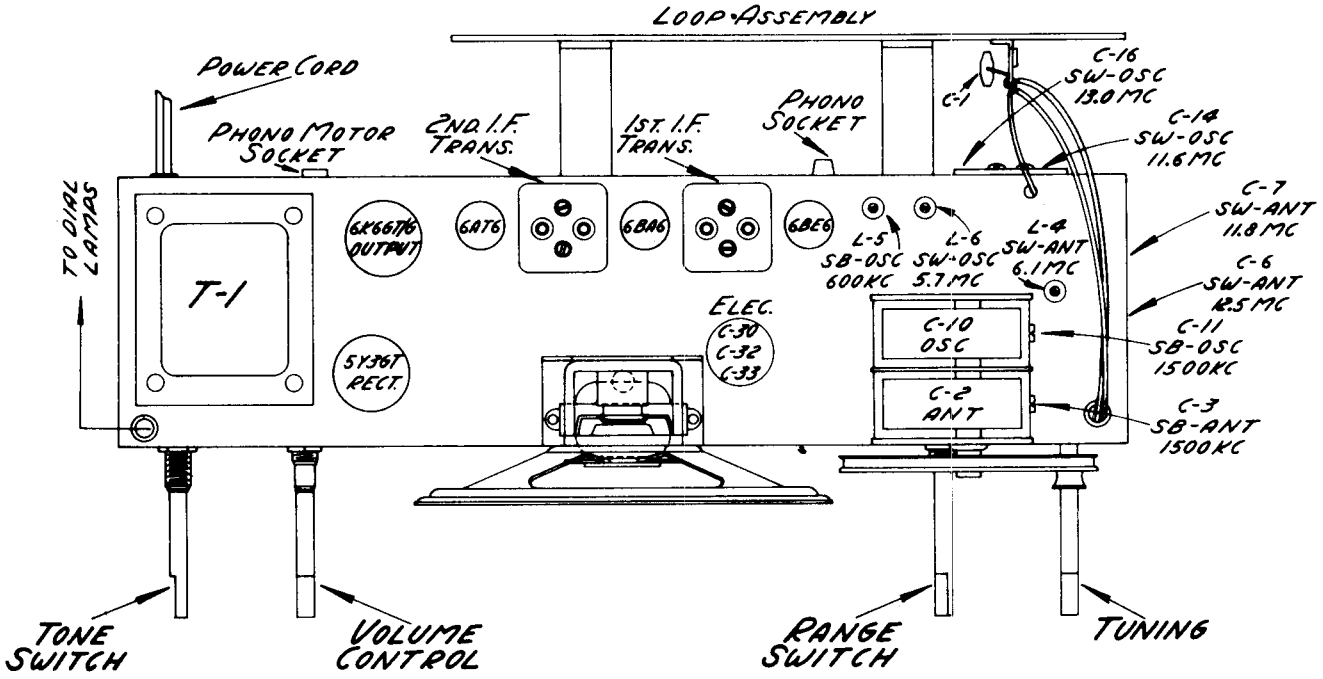


Fig. 2—Chassis Layout and Alignment Adjustments

ALIGNMENT PROCEDURE

Before aligning set, completely mesh the gang and set the dial pointer on the calibration point at the extreme left hand end of the dial.

When making a complete alignment follow in proper sequence the tabulated form below.

If only a portion of the circuit is to be aligned select the portion required, followed by the remaining steps in the chart.

For "S.B.", 49-31M and 25-19M band alignment use output meter across voice coil keeping Test Oscillator output as low as possible to prevent AVC action.

Cathode-ray oscilloscope and sweep signal generator alignment of the 455 kc. A.M. I.F. transformers is the preferable method. Connect oscilloscope across the volume control. If the required equipment is not available use the method outlined below.

ALIGNMENT CHART

Order of Alignment		TEST OSCILLATOR: Connect "HI" Side To	Connect "LO" Side To	Dummy Antenna	Frequency Setting	Range Selector	Receiver Dial Setting	Circuit To Adjust	Adjustment Symbols	Notes
A.M. I.F. ALIGNMENT	1	6BA6 1st I.F. Grid	Ground	.01 mfd.	455 K.C. 30% mod. 400 Cy. A.M.	S.B.	High freq. end of dial	2nd I.F. Trans.	C22, C23	Adjust for max. A.C. voltage across voice coil.
	2	6BE6 Converter Grid	Same	Same	Same	Same	Same	1st I.F. Trans.	C20, C21	Same
S.B. ALIGNMENT	3	"A" on Ant. Ter Board	Ground	200 m.m.f.	1500 K.C. 30% mod. 400 Cy. A.M.	S.B.	1500 K.C. on dial	Oscillator	C11	Adjust for max. A.C. voltage across voice coil
	4	Same	Same	Same	Same	Same	Same	Ant.	C3	Same
	5	Same	Same	Same	600 K.C. 30% mod. 400 Cy. A.M.	Same	600 K.C. on dial	Oscillator	L5	*Same
		* NOTE:- Rock Oscillator in to loop at 600 K.C.								
	6	Repeat steps 3 to 5 for maximum output								
49-31M ALIGNMENT	7	"A" on Ant. Ter. Board	Ground	300 ohms	5.7 Mc. 30% mod. 400 Cy. A.M.	49-31M	Low freq. end of dial	Oscillator	L6	Adjust for max. A.C. voltage across voice coil.
	8	Same	Same	Same	13.0 Mc. 30% mod. 400 Cy. A.M.	Same	High freq. end of dial	Oscillator	C16	Same
		Repeat steps 7 and 8 for maximum output.								
	9	Same	Same	Same	6.1 Mc. 30% mod. 400 Cy. A.M.	Same	Tune in test osc. signal	Ant.	L4	**Same
		**NOTE:- Rock antenna circuit in to oscillator. Do not readjust osc. circuit.								
	10	Same	Same	Same	11.8 Mc. 30% mod. 400 Cy. A.M.	Same	Tune in test osc. signal	Ant.	C7	**Same
	11	Repeat steps 9 and 10 for maximum output.								
25-19M ALIGNMENT	12	"A" on Ant. Ter. Board	Ground	300 ohms	11.6 Mc. 30% mod. 400 Cy. A.M.	25-19M	Low freq. end of dial	Oscillator	C14	Adjust for max. A.C. voltage across voice coil.
	13	Same	Same	Same	12.5 Mc. 30% mod. 400 Cy. A.M.	Same	Tune in test osc. signal	Antenna	C6	***Same
		***NOTE:- Rock antenna circuit in to oscillator. Do not readjust osc. circuit.								
	14	Check at high freq. end of dial. Receiver should tune to 16 Mc. approx.								

RADIOTRON SOCKET VOLTAGES

Type	Plate	Screen Grid	Control Grid	Oscillator Grid		Cathode	Heater
					Freq.		
6BE6 Converter	250	46		-8.0	600 K.C.		6.3 A.C.
				-9.5	1500 K.C.		
				-2.75	6.1 M.C.		
				-6	11.8 M.C.		
				-6	15.8 M.C.		
6BA6 I.F.	250	46				1.0	6.3 A.C.
6AT6 Det. & 1st A.F.	62						6.3 A.C.
6K6GT/G Output	300	240				15	6.3 A.C.
5Y3GT/G Rectifier	310 A.C. (Pin 4) 310 A.C. (Pin 6)						5.0 A.C.
"B" voltage measured from rectifier fil. to ground - 310 volts.							

Note:—All the above values hold within plus or minus 20% when measured with a RCA Voltohmyst or equivalent, on a line voltage of 117 volts. All voltages are measured to chassis.

REPLACEMENT PARTS FOR MODEL

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

STOCK NO.	DESCRIPTION
	RECEIVER ASSEMBLIES
12930	Board-Ant.Terminal Board.....
S-3717	Capacitor-Trimmer (C14,C16).....
S-3718	Capacitor-Trimmer (C6,C7).....
39616	Capacitor-33 MMF Mica (C8).....
39622	Capacitor-56 MMF Mica(C4,C5,C17).
12725	Capacitor-150 MMF Mica(C15).....
39646	Capacitor-560 MMF Mica(C27).....
14498	Capacitor-680 MMF Mica(C9).....
39668	Capacitor-4700 MMF Mica(C13).....
S-3644	Capacitor-.0025 Mfd. (C28).....
S-3646	Capacitor-.005 Mfd. (C26,C31)....
S-3653	Capacitor-.050 Mfd. (C12).....
S-3648	Capacitor-.010 Mfd. (C29).....
S-3658	Capacitor-.25 Mfd. (C18).....
S-3731	Condenser-Variable(C2,C10,C3,C11)
S-3720	Capacitor-Electrolytic(C30,C32, C33).....
S-3712	Coil-Antenna coil Short Wave (L3,L4).....
S-3715	Coil-Oscillator coil Short Wave (L6).....
S-3716	Coil-Oscillator coil Standard Broadcast (L5).....
S-3940	Indicator-Station Selector Pointer.....
S-3900	Loop-Antenna Loop (L1,L2).....
34765	Resistor-100 ohms 1/2 watt(R15, R3).....
30499	Resistor-470 ohms 1/2 watt(R13)..
34768	Resistor-18,000 ohms,2 watt(R7)..
30492	Resistor-22,000 ohms,1/2 watt (R4,R8).....
30648	Resistor,470,000 ohms,1/2 watt (R5,R11,R12).....
30649	Resistor-2.2 Meg. 1/2 watt (R6)..
30992	Resistor-10 Meg. 1/2 watt (R10)..
S-3521	Resistor-3000 ohms, 5 watt W.W. (R14).....
S-4210	Scale-Dial scale.....
14278	Socket-Phono Socket.....
36600	Socket-Tube Socket(Less centre Shield).....
31319	Socket-Tube Socket(Octal).....
36069	Socket-Tube Socket(Miniature Centre Shield).....

STOCK NO.	DESCRIPTION
S-3939	Shaft-Drive Shaft.....
S-3728	Switch-Range Switch (S1,S2).....
S-3732	Transformer-1st I.F.(L7,L8,C20,C21)
S-3733	Transformer-2nd I.F.(L9,L10,C22, C23).....
S-3730	Transformer-Power(60 Cycle)(T1)...
S-3729	Transformer-Power(25 Cycle)(T1)...
S-3727	Volume Control (R9,S3).....
S-3938	Tone Control (S4).....
	SPEAKER ASSEMBLIES
S-3656	Dust Cap (Pkg.3).....
S-3867	Cone-Cone & Voice Coil Assembly (L13).....
S-3734	Speaker.....
S-4025	Output Transformer (L11,L12).....
	MISCELLANEOUS ASSEMBLIES
S-4232	Cloth-Grille Cloth.....
S-4233	Decal.....
32634	Cord-Drive Cord (Universal 50")...
S-3467	Cord-Power Cord.....
35814	Knob (Range).....
35776	Knob (Volume-tuning-tone).....
11766	Lamp-Pilot lamp (Mazda 51).....
31418	Spring-Drive Cord Tension (Pkg.2).....
S-2824	Socket-AC.....

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

RCA VICTOR MODEL 51

"HIS MASTER'S VOICE"

Five-Tube, Three-Band, A-C, Superheterodyne Receiver

TECHNICAL INFORMATION AND SERVICE DATA

1948 No. 18

GENERAL SERVICE DIVISION • R C A VICTOR COMPANY LTD.



Electrical and Mechanical Specifications

FREQUENCY RANGE

Standard Broadcast S.B.	540—1600 k.c.
Short Wave 49—31 M	5.7—13.0 m.c.
25—19 M	11.6—16.0 m.c.
Intermediate Frequency	455 k.c.
Tuning drive ratio	11 to 1

RADIOTRON COMPLEMENT

(1) Type 6BE6	Converter
(2) Type 6BA6	I.F. Amplifier
(3) Type 6AT6	Det A.V.C. & 1st A.F.
(4) Type 6K6GT/G	Power Output
(5) Type 5Y3GT/G	Rectifier

POWER OUTPUT

Undistorted	2 Watts
Maximum	3 Watts

LOUDSPEAKER

Type	8 inch round P.M.
Voice coil impedance	2.2 ohms at 400 cycles

POWER SUPPLY RATINGS

Rating A	105—125 volts, 50-60 cycle, 50 watts
Rating B	105—125 volts, 25-60 cycle, 55 watts

CABINET DIMENSIONS (Inches)

Height	30-5/16"
Width	24-7/8"
Depth	13-1/16"

General Description

The Model 51 is a five tube, three band, console type superheterodyne receiver, designed to cover the broadcast band and two short wave bands. Features of the design include: Built-in loop antenna for broadcast band reception; Powdered iron core I.F. transformers, R.F. and oscillator coils; Automatic volume control; Full range tone control; Edge lighted straight line dial; Phono input socket with PHONO position on range switch; 8 inch dustproof round P.M. loudspeaker.

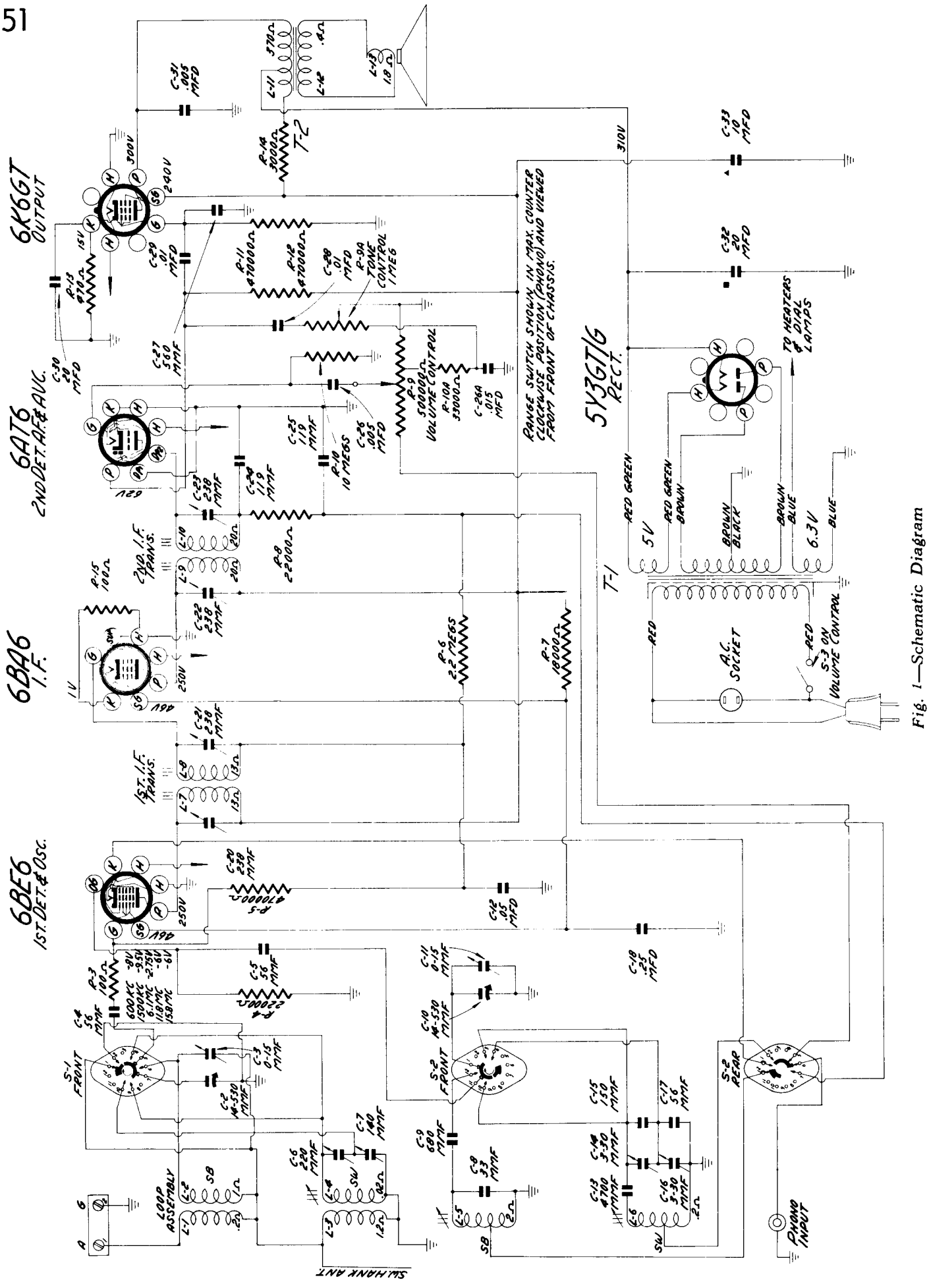


Fig. 1—Schematic Diagram

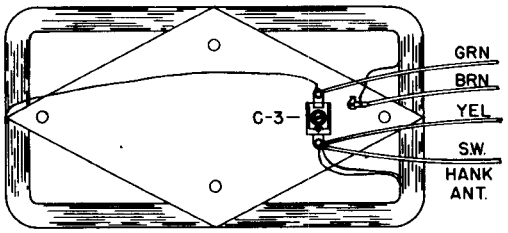


Fig. 2—Loop Antenna

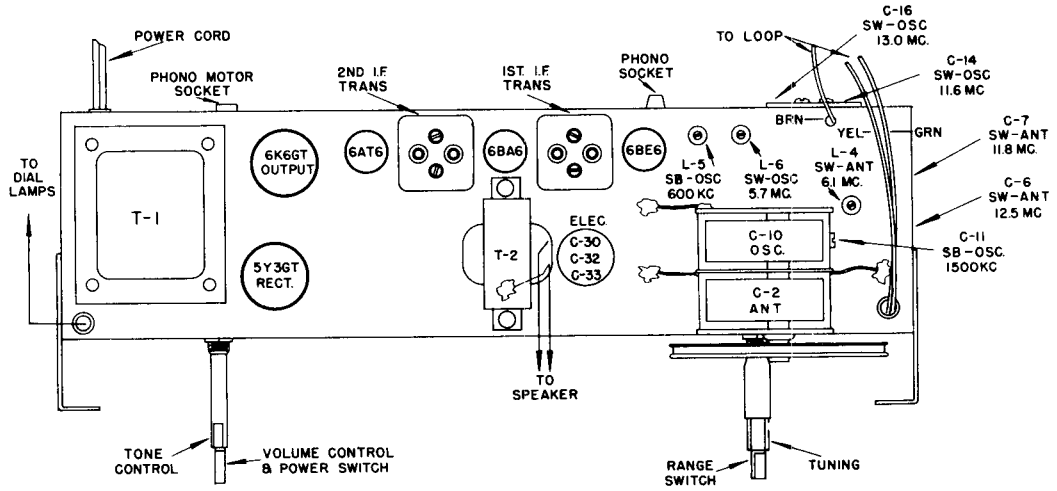


Fig. 3—Chassis Layout and Alignment Adjustment

ALIGNMENT PROCEDURE

Before aligning set, completely mesh the gang and set the dial pointer on the calibration point at the extreme left hand end of the dial.

When making a complete alignment follow in proper sequence the tabulated form below.

If only a portion of the circuit is to be aligned select the portion required, followed by the remaining steps in the chart.

For "S.B.", 49-31M and 25-19M band alignment use output meter across voice coil keeping Test Oscillator output as low as possible to prevent AVC action.

Cathode-ray oscilloscope and sweep signal generator alignment of the 455 kc. A.M. I.F. transformers is the preferable method. Connect oscilloscope across the volume control. If the required equipment is not available use the method outlined below.

ALIGNMENT CHART

Order of Alignment		TEST OSCILLATOR: Connect "HI" Side To	TEST OSCILLATOR: Connect "LO" Side To	TEST OSCILLATOR: Dummy Antenna	TEST OSCILLATOR: Frequency Setting	Range Selector	Receiver Dial Setting	Circuit To Adjust	Adjustment Symbols	Notes
A.M. I.F. ALIGNMENT	1	6BA6 1st I.F. Grid	Ground	.01 mfd.	455 K.C. 30% mod. 400 Cy. A.M.	S.B.	High freq. end of dial	2nd I.F. Trans.	C22, C23	Adjust for max. A.C. voltage across voice coil.
	2	6BE6 Converter Grid	Same	Same	Same	Same	Same	1st I.F. Trans.	C20, C21	Same
S.B. ALIGNMENT	3	"A" on Ant. Ter Board	Ground	200 m.m.f.	1500 K.C. 30% mod. 400 Cy. A.M.	S.B.	1500 K.C. on dial	Oscillator	C11	Adjust for max. A.C. voltage across voice coil
	4	Same	Same	Same	Same	Same	Same	Ant.	C3	Same
	5	Same	Same	Same	600 K.C. 30% mod. 400 Cy. A.M.	Same	600 K.C. on dial	Oscillator	L5	*Same
		* NOTE:- Rock Oscillator in to loop at 600 K.C.								
	6	Repeat steps 3 to 5 for maximum output								
49-31M ALIGNMENT	7	"A" on Ant. Ter. Board	Ground	300 ohms	5.7 Mc. 30% mod. 400 Cy. A.M.	49-31M	Low freq. end of dial	Oscillator	L6	Adjust for max. A.C. voltage across voice coil.
	8	Same	Same	Same	13.0 Mc. 30% mod. 400 Cy. A.M.	Same	High freq. end of dial	Oscillator	C16	Same
		Repeat steps 7 and 8 for maximum output.								
	9	Same	Same	Same	6.1 Mc. 30% mod. 400 Cy. A.M.	Same	Tune in test osc. signal	Ant.	L4	**Same
		**NOTE:- Rock antenna circuit in to oscillator. Do not readjust osc. circuit.								
	10	Same	Same	Same	11.8 Mc. 30% mod. 400 Cy. A.M.	Same	Tune in test osc. signal	Ant.	C7	**Same
	11	Repeat steps 9 and 10 for maximum output.								
25-19M ALIGNMENT	12	"A" on Ant. Ter. Board	Ground	300 ohms	11.6 Mc. 30% mod. 400 Cy. A.M.	25-19M	Low freq. end of dial	Oscillator	C14	Adjust for max. A.C. voltage across voice coil.
	13	Same	Same	Same	12.5 Mc. 30% mod. 400 Cy. A.M.	Same	Tune in test osc. signal	Antenna	C6	***Same
		***NOTE:- Rock antenna circuit in to oscillator. Do not readjust osc. circuit.								
	14	Check at high freq. end of dial. Receiver should tune to 16 Mc. approx.								

SERVICE DATA

NOTE: When placing chassis in cabinet, care should be taken to replace shims between the chassis and cabinet shelf so that the range/tuning, volume/tone control shafts will centre through the dial glass, allowing a clearance between the knobs and dial glass.

REPLACEMENT PARTS FOR MODEL 51

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

STOCK NO.	DESCRIPTION		STOCK NO.	DESCRIPTION	
	CHASSIS ASSEMBLY		S-3732	Transformer-1st I.F.(L7,L8,C20, C21).....	
S-3717	Capacitor-trimmer (C14,C16).....		S-3733	Transformer-2nd I.F.(L9,L10,C22, C23).....	
S-3718	Capacitor-trimmer (C6,C7).....		S-3730	Transformer-Power 60 cycle (T1)..	
39616	Capacitor-33 MMF mica (C8).....		S-2903	Transformer-Power 25 cycle (T1)..	
39622	Capacitor-56 MMF mica(C4,C5,C17)....		S-4394	Volume & tone control-1/2 Meg. (R9,S3).....	
12725	Capacitor-150 MMF mica (C15).....			1 Meg. (R9A).....	
39646	Capacitor-560 MMF mica (C27).....				
14498	Capacitor-680 MMF mica (C9).....				
39668	Capacitor-4700 MMF mica (C13).....				
S-3646	Capacitor-.005 MFD (C26,C31).....				
S-3653	Capacitor-.05 MFD (C12).....			SPEAKER ASSEMBLY (8" PM)	
S-3649	Capacitor-.015 MFD (C26A).....				
S-3648	Capacitor-.01 MFD (C28,C29).....		31825	Dust Cap (Pkg.5).....	
S-3656	Capacitor-.25 MFD (C18).....		S-4349	Cone-Cone and voice coil assembly (L13).....	
S-4397	Condenser-Variable (C2,C10,C11).....				
S-3720	Capacitor-Electrolytic(C30,C32,C33).		S-4391	Speaker.....	
S-3712	Coil-Antenna coil S.W. (L2,L4).....		S-4396	Output Transformer (L11,L12).....	
S-3715	Coil-Oscillator coil S.W. (L6).....				
S-3716	Coil-Oscillator coil B.C. (L5).....			MISCELLANEOUS ASSEMBLIES	
S-4393	Indicator-Station selector pointer..				
S-4392	Loop-Antenna loop (L1,L2,C3).....				
34765	Resistor-100 ohms 1/2 watt (R3,R15).		S-4826	Clip-Dial scale clip (Pkg.2).....	
30499	Resistor-470 ohms 1/2 watt (R13)....		S-4367	Cord-Power cord.....	
S-3521	Resistor-3,000 ohms 5 watt W.W.(R14)		S-4313	Cord-Dial cord.....	
34768	Resistor-18,000 ohms 2 watt (R7)....		S-4387	Knob-Range switch.....	
30492	Resistor-22,000 ohms 1/2 watt(R4,R8)		S-4388	Knob-Volume control.....	
30685	Resistor-33,000 ohms 1/2 watt(R10A).		S-4389	Knob-Tone control.....	
30648	Resistor-470,000 ohms 1/2 watt (R5, R11,R12).....		S-4390	Knob-Tuning control.....	
			11765	Lamp-Pilot lamp (Mazda #51).....	
30649	Resistor-2.2 Megohms 1/2 watt (R6)..		31418	Spring-Drive cord tension (Pkg.2)	
30992	Resistor-10 Megohms 1/2 watt (R10).		S-2824	Socket-AC socket.....	
S-4386	Scale-Dial Scale.....		31364	Socket-pilot lamp.....	
14278	Socket-Phono socket.....		4982	Spring-Knob spring for tuning control (Pkg.5).....	
36500	Socket-Tube socket (less centre shield).....		14270	Spring-Knob spring for range and tone control (Pkg.2).....	
31319	Socket-Tube socket octal.....		30330	Spring-Knob spring for vol. control (Pkg.3).....	
36069	Socket-Tube socket (miniature with centre shield).....				
S-4827	Shaft-Tuning drive shaft.....				
S-4395	Switch-Range switch (S1,S2).....				

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

RCA Victor

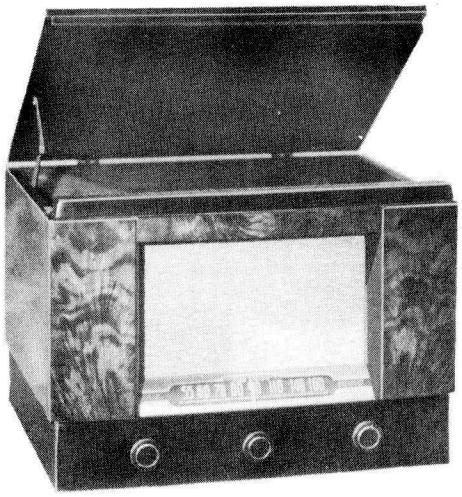
MODEL VR54

Five-Tube, Single-Band, A.C. Superheterodyne Radio Phonograph Combination

TECHNICAL INFORMATION AND SERVICE DATA

1946—No. 13

SERVICE DIVISION • RCA VICTOR COMPANY LIMITED • MONTREAL



Electrical and Mechanical Specifications

FREQUENCY RANGE ..... 540 k.c. to 1630 k.c.

Intermediate Frequency ..... 455 k.c.

TUBE COMPLEMENT

(1) TYPE-6SA7 ..... First Detector—Oscillator
(2) TYPE-6SK7 ..... Intermediate Amplifier
(3) TYPE-6SQ7 ..... Second-Detector, A.V.C., and A-F Amplifier
(4) TYPE-6K6GT ..... Power Output
(5) TYPE-5Y3GT ..... Full-Wave Rectifier
Pilot Lamp (2) ..... Mazda 51, 6.3 volts, 0.2 amp.

PICKUP

Type ..... Crystal
Impedance ..... 100,000 ohms at 1,000 cycles

POWER OUTPUT RATING

Undistorted ..... 2 watts
Maximum ..... 3.13 watts

POWER SUPPLY RATINGS

Rating A ..... 105-125 volts, 50-60 cycles, 65 watts
Rating B ..... 105-125 volts, 25-60 cycles, 65 watts

CABINET DIMENSIONS

Height ..... 11½ inches
Depth ..... 15½ inches
Width ..... 16½ inches

MOTOR

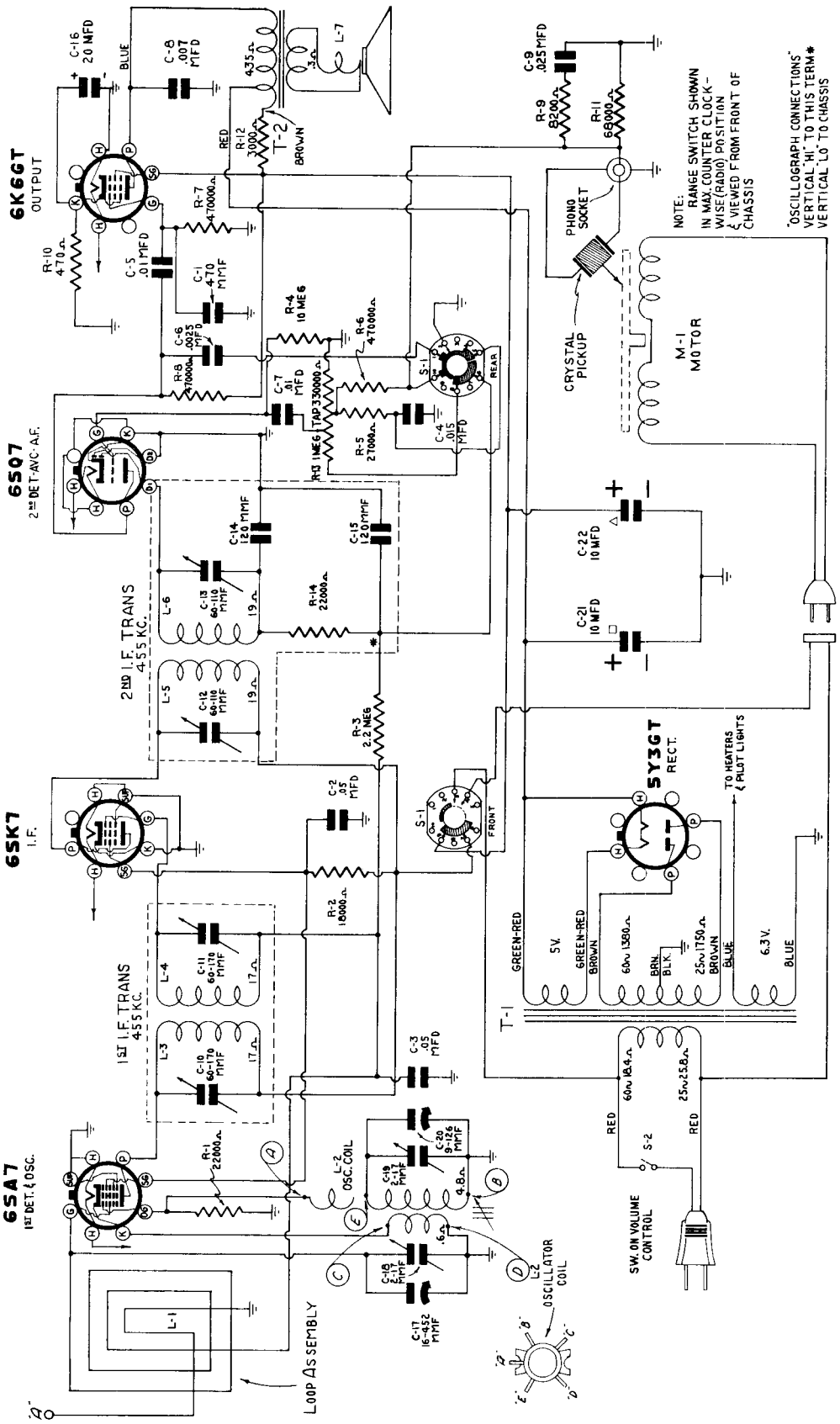
Type ..... Self-starting Rim drive
Turntable Speed ..... 78 r.p.m.
Turntable Diameter ..... 9 inches

LOUDSPEAKER

Type ..... 4" x 6" Elliptical P.M.
Voice-Coil Impedance ..... at 400 cycles ..... 3.4 ohms

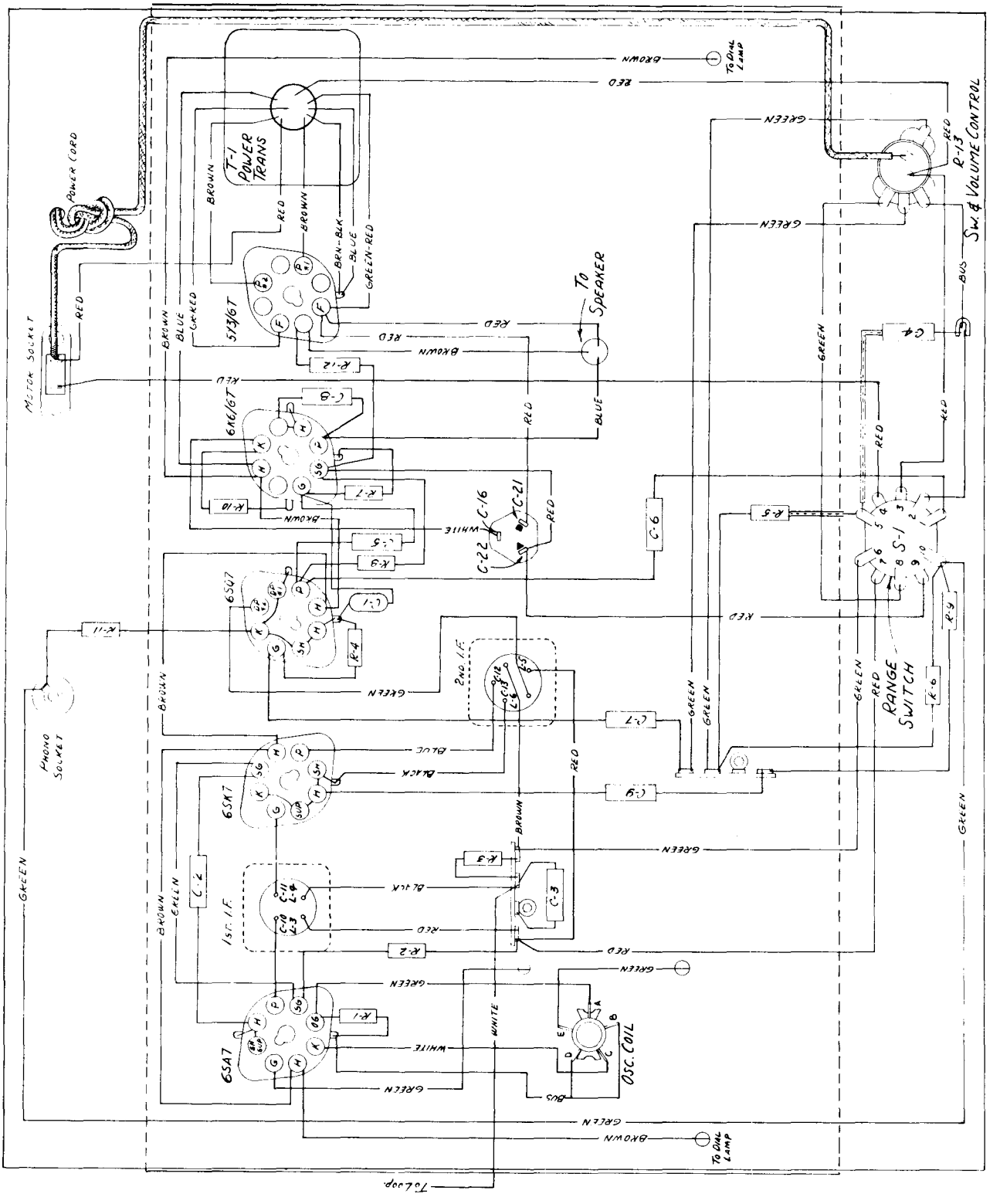
General Description

The model VR-54 is a five tube table model superheterodyne Radio and Phonograph Combination: Features include: loop antenna, I.F. transformers of efficient design, a well filtered power supply utilizing a new filtering principle, a six by four inch elliptical speaker, an edge light dial of plastic material calibrated in easy to read figures; Features of Record Player include: a light weight crystal pickup and a rim drive motor: all housed in a wooden cabinet of modern design.

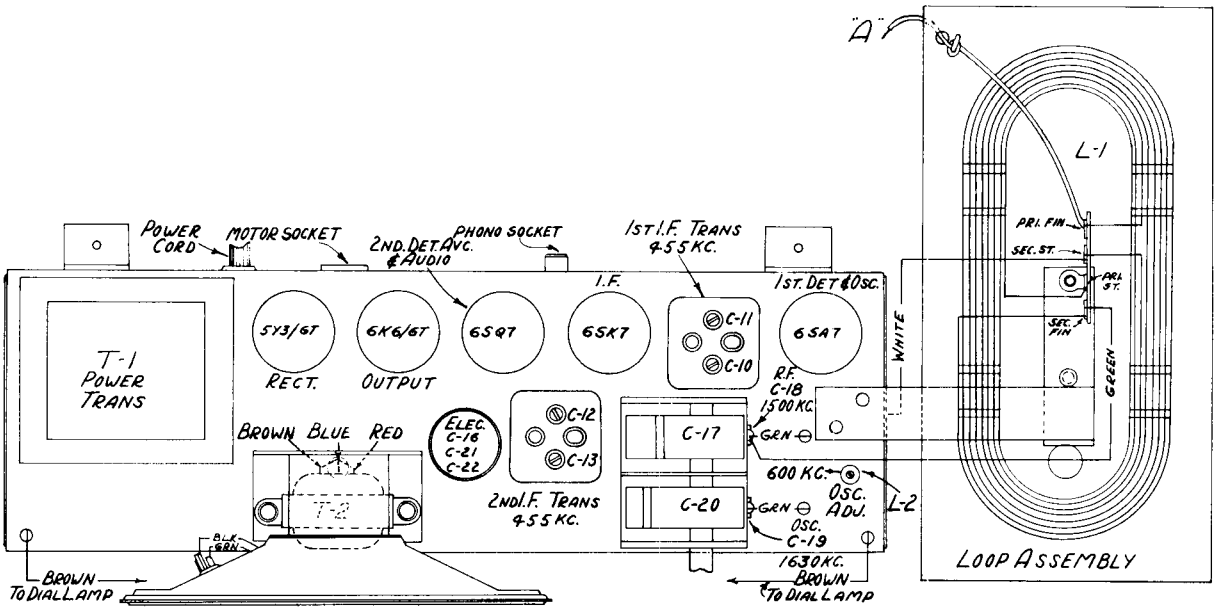


Schematic Circuit Diagram

Schematic Diagram



Chassis Wiring Diagram



Chassis Layout and Alignment Adjustments

Alignment Procedure

OUTPUT METER ALIGNMENT—Connect the meter across the voice coil, and turn the receiver volume to maximum.

CATHODE RAY ALIGNMENT is the preferable method. Connections for the oscillograph are shown on the schematic diagram.

TEST OSCILLATOR—For all alignment operations, connect the low side of the test oscillator to the receiver chassis, through a .01 capacitor, and keep the output as low as possible to avoid AVC action.

PRE SETTING DIAL—With the gang condenser in full mesh, the pointer should be adjusted so that it lines up with the first mark on the left of the dial scale.

Each step of the alignment procedure should be repeated in the order indicated for greater accuracy.

Steps	Connect High Side of Test Oscillator to:—	Tune Test-Osc. to:	Turn Radio Dial to:	Adjust the following for max. output
1.	Grid of 6SK7 through .1 Mfd.	455 KC	Quiet Point at 600 KC end of dial	C12 (2nd) C13 (IF)
2.	Grid of 6SA7 through .1 Mfd.			C10 (1st) C11 (I.F.)
3.	Use 220 MMF Dummy Antenna	1630 KC	Out of Mesh	C19 (Osc.)
4.	Use 220 MMF Dummy Antenna	1500 KC	Resonance at 1500 KC	C18 (RF)
5.	Use 220 MMF Dummy Antenna	600 KC	600 KC	Rock Osc. slug (L2) for "Max" Output
6.	REPEAT	3 - 4 - 5		

Service Data

The crystal pick-up unit is thoroughly sealed in a metal casing, against extreme changes of climate. The offset pickup arm insures ideal tracking between needle and record grooves. If failure occurs due to a defective crystal, no attempt should be made to repair the unit, but a new replacement crystal unit should be installed. To replace crystal: Remove two fillister head screws. Lift crystal from arm. Remove plug-in cable. The crystal unit uses a removable type needle.

It is important that the motor drive spindle and rubber tire be kept clean and free from oil, grease, dirt or any foreign matter at all times.

Any quick-drying naphtha is satisfactory for cleaning these parts.

The turntable speed should be 78 R.P.M., and the speed may be checked by a stroboscopic disc. When unavailable place a piece of paper between a record and the turntable, with the paper protruding beyond the edge of the record, then count the number of revolutions of the turntable per minute.

The motor should be lubricated once or twice a year by placing a few drops of S.A.E. 20 (or equivalent) on the turntable spindle and saturating the oil retaining felt pads on the motor shaft with S.AE. 10 oil.

Tube Socket Voltages

TYPE	PLATE	SCREEN GRID	CATHODE	HEATER
6SA7	235V	80V	—	6.6V
6SK7	235V	80V	—	6.6V
6SQ7	90V	—	—	6.6V
6K6GT	300V	245	15	6.6V
5Y3GT	D.C. OUTPUT ACROSS C22—300V			5.0V

With a line voltage of 117 volts the above voltages hold within plus or minus 20% when measured to common wiring insulated from chassis.

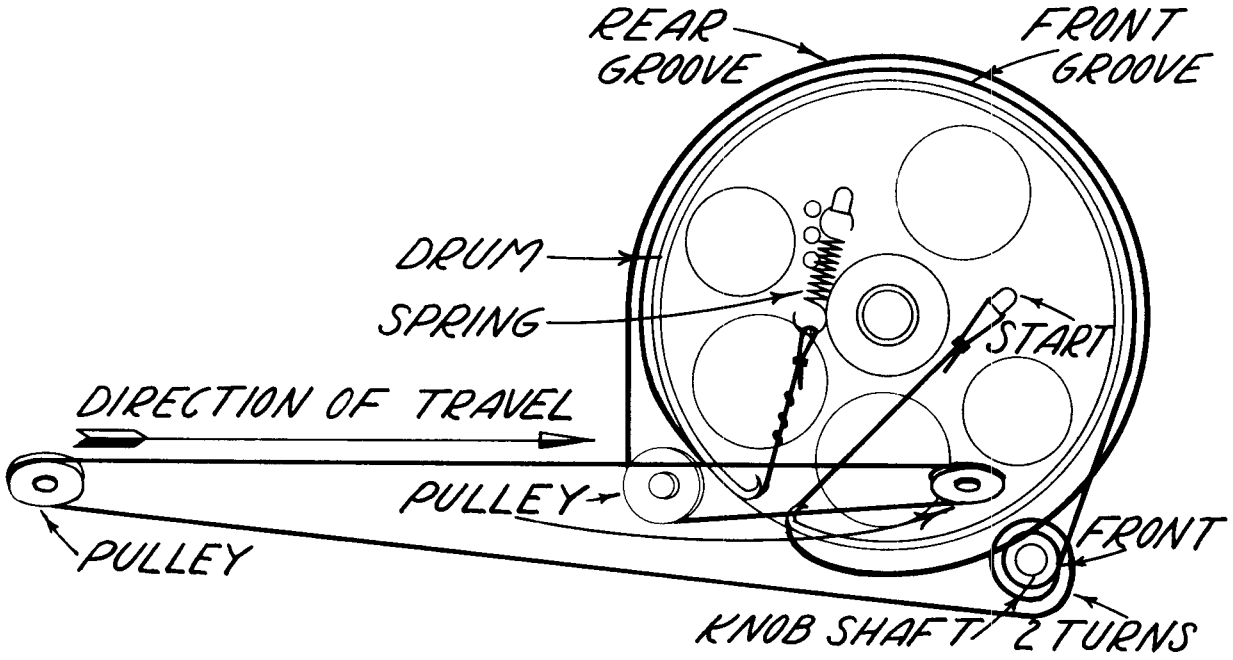
REPLACEMENT PARTS FOR MODEL VR54

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

STOCK NO.	DESCRIPTION
	RECEIVER ASSEMBLIES
30433	Capacitor-470 Mmf. (C1).....
34459	Capacitor-.0025 Mfd.(C6).....
5148	Capacitor-.007 Mfd. (C8).....
4937	Capacitor-.01 Mfd. (C5,C7).....
11315	Capacitor-.015 Mfd. (C4).....
4870	Capacitor-.025 Mfd. (C9).....
32240	Capacitor-Electrolytic 10-10-20 Mfd. (C16,C21,C22).....
S-3497	Condenser-Variable (C17,C18,C19,C20)
S-3480	Coil-Oscillator (L2).....
S-3499	Cord Indicator Drive Cord.....
S-3581	Indicator Station Selector Pointer.
S-3508	Loop and Bracket Assembly (L1).....
S-3178	Pulley-Dial Cord Pulley (Pkg.2)....
30681	Resistor-470 ohms, 1 watt (R10)....
S-3521	Resistor-3000 ohms,W.W.5 watt (R12)
14250	Resistor-8200 ohms,1/4 watt (R9)...
30151	Resistor-18000 ohms,1watt (R2).....
30492	Resistor-22000 ohms,1/4 watt (R1, R14).....
30409	Resistor-27000 ohms,1/4 watt (R5)..
14138	Resistor-68000 ohms,1/4 watt (R11).
30648	Resistor-470000 ohms,1/4 watt (R6, R7,R8).....
12679	Resistor-2.2 Meg. 1/4 watt (R3)....
30992	Resistor-10 Meg. 1/4 watt (R4).....
S-3506	Shaft-Drive Shaft Assembly.....
31418	Spring-Drive Cord tension spring (Pkg.2).....
32537	Socket-Tube socket.....
34909	Socket-Pilot lamp.....
S-2824	Socket-AC for Phono motor.....
14278	Socket-Phono Input.....
S-3498	Switch-Tone & Phono Switch (S1)....
S-3503	Transformer-1st I.F.(L3,L4,C10,C11)
S-3504	Transformer-2nd I.F.(L5,L6,C12,C13, C14,C15,R4).....
S-2317	Transformer-60 Cy.(T1) Power.....
S-3501	Transformer-25 Cy.(T1) " .....
S-3505	Volume Control-1 Meg.(S2,R13).....

STOCK NO.	DESCRIPTION
	SPEAKER ASSEMBLIES
35849	Dust Cap (Pkg.3).....
S-3867	Cone & Voice Coil Ass'y (L7).....
S-3866	Speaker Complete.....
S-3507	Transformer-Output (T2).....
	MOTOR ASSEMBLIES
S-3077	Motor 110 V. 60 Cycle (M1).....
S-3078	Motor 110 V. 25 Cycle (M1).....
S-3079	Spindle-Turntable Spindle.....
S-3080	Spring-Drive wheel tension spring (Pkg.2).....
S-3081	Turntable.....
S-3082	Wheel-Rubber tired drive wheel...
	PICK-UP ASSEMBLIES
S-3459	Arm-Pick-up arm-shell only.....
S-3633	Base-Pick-up arm-base & pivot shaft.....
S-3461	Crystal-Crystal cartridge.....
31054	Grommet-Pick-up base rubber grommet.....
S-3462	Screw-Pick-up needle screw(Pkg.2)
S-3465	Screw-Pick-up crystal retaining screw (Pkg.10).....
S-3466	Spring-Pick-up cable retaining spring (Pkg.2).....
	MISCELLANEOUS ASSEMBLIES
S-3520	Dial Scale.....
S-3582	Knob-Tone & Phono Switch.....
S-3634	Knob-Volume & Tuning.....
S-3463	Rest-Pickup arm rest (Pkg.2).....
11765	Pilot Lamp-Mazda 51.....
14270	Spring-Knob retaining spring (Pkg.2).....

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



Dial Drive Cord

RCA VICTOR
MODEL 54X

"HIS MASTER'S VOICE"

Five-Tube, Single-Band, AC-DC Superheterodyne Receiver

TECHNICAL INFORMATION AND SERVICE DATA

1948 No. 5

GENERAL SERVICE DIVISION • RCA VICTOR COMPANY LTD.

Electrical and Mechanical Specifications

FREQUENCY RANGE

Standard Broadcast S.B. ---------- 540—1600 k.c.
Intermediate Frequency ---------- 455 k.c.
Tuning drive ratio ---------- 10 to 1

RADIOTRON COMPLEMENT

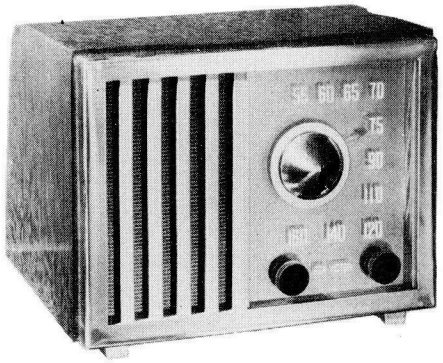
(1) Type 12SA7 ---------- Converter
(2) Type 12SK7 ---------- I.F. Amplifier
(3) Type 12SQ7 ---------- Det A.V.C. & 1st A.F.
(4) Type 50L6GT ---------- Power Output
(5) Type 35Z5GT ---------- Rectifier

POWER OUTPUT

Undistorted ---------- .75 Watts
Maximum ---------- 1.5 Watts

LOUDSPEAKER

Type ---------- 5 inch Round P.M.
Voice coil impedance ---------- 3.4 ohms at 400 cycles



POWER SUPPLY RATINGS

Rating A ---------- 105—12 volts, 50-60 cycle, 30 watts

CABINET DIMENSIONS (Inches)

Height ---------- 7¾"
Width ---------- 10"
Depth ---------- 7½"

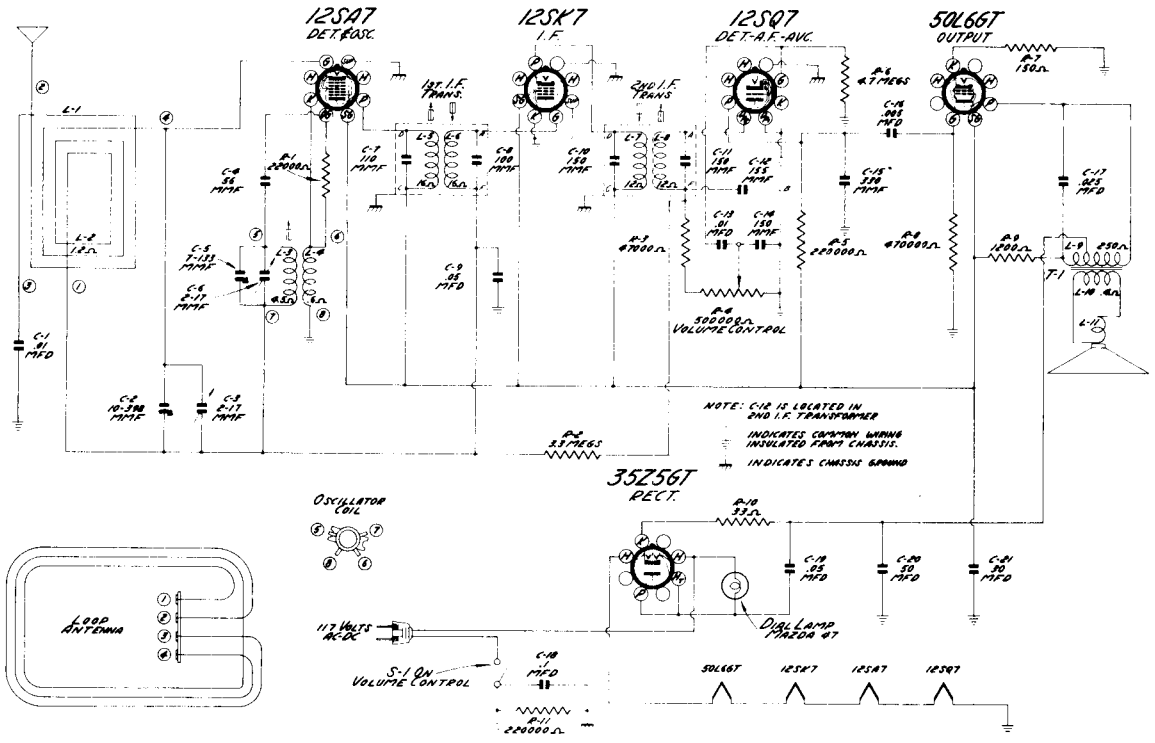
REPLACEMENT PARTS FOR MODEL 54X

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

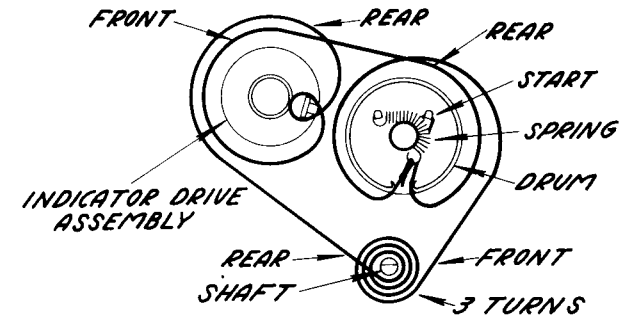
STOCK NO.	DESCRIPTION
	RECEIVER ASSEMBLIES
S-4307	Capacitor-56 MMF (C4)
S-4308	Capacitor-150 MMF (C14)
S-4303	Capacitor-330 MMF (C15)
S-3646	Capacitor-.005 Mfd.(C16)
70615	Capacitor-.05 Mfd.(C9,C19)
S-3651	Capacitor-.025 Mfd.(C17)
S-3648	Capacitor-.01 Mfd.(C1,C13)
S-3655	Capacitor-.1 Mfd.(C18)
72992	Condenser-Variable(C2,C3,C5,C6)
70408	Condenser-Electrolytic 30-50 Mfd. 150 V. (C20,C21)
S-4304	Coil-Oscillator coil (L3,L4)
72869	Indicator-Station selector pointer.
72313	Resistor-33 ohms W.W.Fuse type(R10)
30880	Resistor-150 ohms-1/4 watt (R7)
6134	Resistor-1200 ohms 1 watt (R9)
30452	Resistor-22,000 ohms 1/4 watt (R1).
30787	Resistor-47,000 ohms 1/4 watt (R3).
14583	Resistor-220,000 ohms 1/4 watt(R5, R11).
30648	Resistor-470,000 ohms 1/4 watt (R8)
31417	Resistor-3.3 Megohms 1/4 watt (R2).
30931	Resistor-4.7 Megohms 1/4 watt (R6).
72877	Shaft-Tuning shaft
32299	Socket-Tube socket
S-3573	Transformer-1st I.F.(L5,L6,C7,C8)
S-4306	Transformer-2nd I.F.(L7,L8,C10,C11)
S-4305	Volume Control (R4,S1)

STOCK NO.	DESCRIPTION
	SPEAKER ASSEMBLIES
S-4309	Cone-Cone and voice coil (L11)
S-4310	Speaker-(less transformer)
S-4302	Output Transformer (L9,L10)
	MISCELLANEOUS ASSEMBLIES
72878	Bracket-Mounting bracket for pulley assy.
72880	Bracket-Dial lamp bracket
72884	Baffle-Baffle board & grille cloth
72883	Bezel only (less dial)
32634	Cord-Drive cord (Universal)
S-3467	Cord-Power cord
72871	Cover-Bottom cover
S-4278	Cabinet-(red-brown)
S-4294	Cabinet-(ivory)
72868	Dial-Dial scale with lamp shield
72885	Foot-Mounting foot (Pkg.2)
72283	Grommet(to mount tuning condenser (Pkg.10)
72867	Loop-Antenna loop(complete)(L1,L2)
72870	Knob-(Red-brown)
72890	Knob-(Ivory)
31480	Lamp-Pilot lamp (Mazda #47)
72882	Pulley-Dial scale indicator mounting pulley
72881	Ring-Retaining ring for pulley assy.
70390	Spring-Drive cord tension (Pkg.5).
72879	Socket-Dial lamp socket
14270	Spring-Knob retaining spring(Pkg.2)
33726	Washer-"C" Washer for tuning shaft (Pkg.5).

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



Schematic Diagram



DRUM SHOWN WITH GANG AT MAX. CAPACITY

Dial Cord Stringing

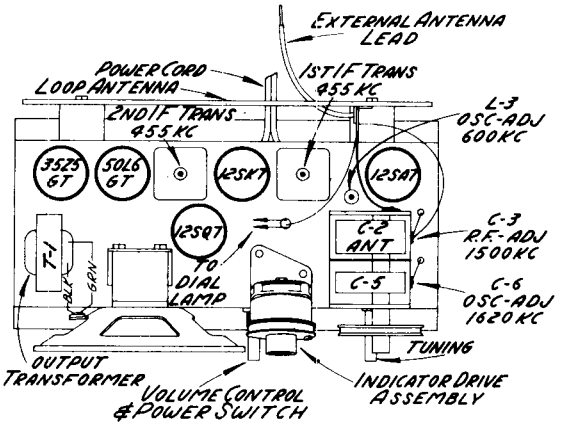
RADIOTRON SOCKET VOLTAGES

Type	Circuit	Plate	Screen	Cathode	Heater
12SA7	Conv.	93	93		12.6V
12SK7	I.F.	93	93		12.6V
12SQ7	1st Audio	56			12.6V
50L6/GT	Output	110	93	6V	50. V
35Z5/GT	Rect.			115	32 V

CRITICAL LEAD DRESS

(Make lead dress before alignment)

1. Dress all heater leads to chassis.
2. Dress A.V.C. resistor away from 12SK7 tube socket.
3. Dress diode load resistor away from 12SQ7 socket.
4. Dress 12SQ7 plate resistor over second I.F. transformer terminal.
5. Dress power cord along chassis rear apron and next to bottom of chassis between 35Z5 and 50L6 tubes.
6. Dress audio coupling capacitor to bottom of chassis.
7. Keep lead of capacitor to Pin 3 of 50L6 socket short as possible.
8. Keep lead of capacitor to Pin 3 of 35Z5 socket short as possible.
9. Keep low side of power cord short as possible so as not to foul oscillator coil or associated circuits.



Chassis Layout and Alignment Adjustments

Order of Alignment		TEST OSCILLATOR: Connect "HI" Side To	TEST OSCILLATOR: Connect "LO" Side To	TEST OSCILLATOR: Dummy Antenna	TEST OSCILLATOR: Frequency Setting	Range Selector	Receiver Dial Setting	Circuit To Adjust	Adjustment Symbols	Notes
A.M. I.F. ALIGNMENT	1	12SK7 1st I.F. Grid	Ground thru .01 mfd.	.01 mfd.	455 K.C. 30% mod. 400 Cy. A.M.	S.B.	High freq. end of dial	2nd I.F. Trans.	L7, L8	Adjust for max. A.C. voltage across voice coil.
	2	12SA7 Converter Grid	Same	Same	Same	Same	Same	1st I.F. Trans.	L5, L6	Same
S.B. ALIGNMENT		NOTE:- To compensate for the metal screen at the back of the cabinet, a shorted loop of hookup wire (of the same dimensions as the loop winding) must be spaced one inch away from the rear surface of the loop support.								
	3	Ant. Lead	Ground thru .01 mfd.	200 m.m.f.	1500 K.C. 30% mod. 400 Cy. A.M.	S.B.	1500 K.C. on dial	Oscillator	C6	Adjust for max. A.C. voltage across voice coil
	4	Same	Same	Same	Same	Same	Same	Ant.	C3	Same
	5	Same	Same *	Same	600 K.C. 30% mod. 400 Cy. A.M.	Same	600 K.C. on dial	Oscillator	L3	*Same
		* NOTE:- Rock Oscillator in to loop at 600 K.C.								
	6	Repeat steps 3 to 5 for maximum output								

RCA Victor

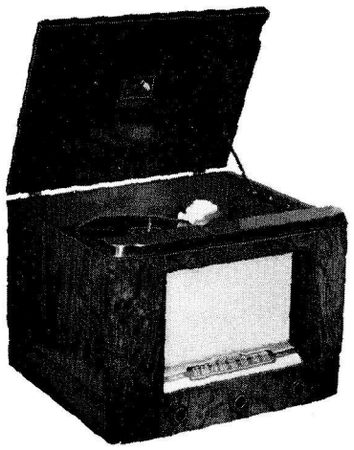
MODELS VRA-55 & 56

Five Tube, Single Band, A.C. Superheterodyne Radio Phonograph Combination

TECHNICAL INFORMATION AND SERVICE DATA

1946 No 15

SERVICE DIVISION • RCA VICTOR COMPANY LIMITED • MONTREAL



VRA 56



VRA 55

Electrical and Mechanical Specifications

FREQUENCY RANGE ..... 540 k.c. to 1630 k.c.

Intermediate Frequency ..... 455 k.c.

RADIOTRON COMPLEMENT

(1) Type-6SA7 ..... First Detector-Oscillator
(2) Type-6SK7 ..... Intermediate Amplifier
(3) Type-6SQ7 ..... 2nd Det., A.V.C. & A.F.
(4) Type-6K6GT ..... Power Output
(5) Type-5Y3GT ..... Full Wave Rectifier

Pilot Lamp (2) ..... Mazda 51, 6.3 volts, 0.2 amp.

LOUDSPEAKER (VRA 56)

Type .....4" x 6" Elliptical P.M.
Voice-Coil Impedance .....3.4 Ohms at 400 Cycles

POWER SUPPLY RATINGS

Rating A .....105-125 volts, 50-60 cycles, 65 watts
Rating B .....105-125 volts, 25-60 cycles, 65 watts

POWER OUTPUT

Undistorted .....2 Watts
Maximum .....3.13 Watts

PHONOGRAPH

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

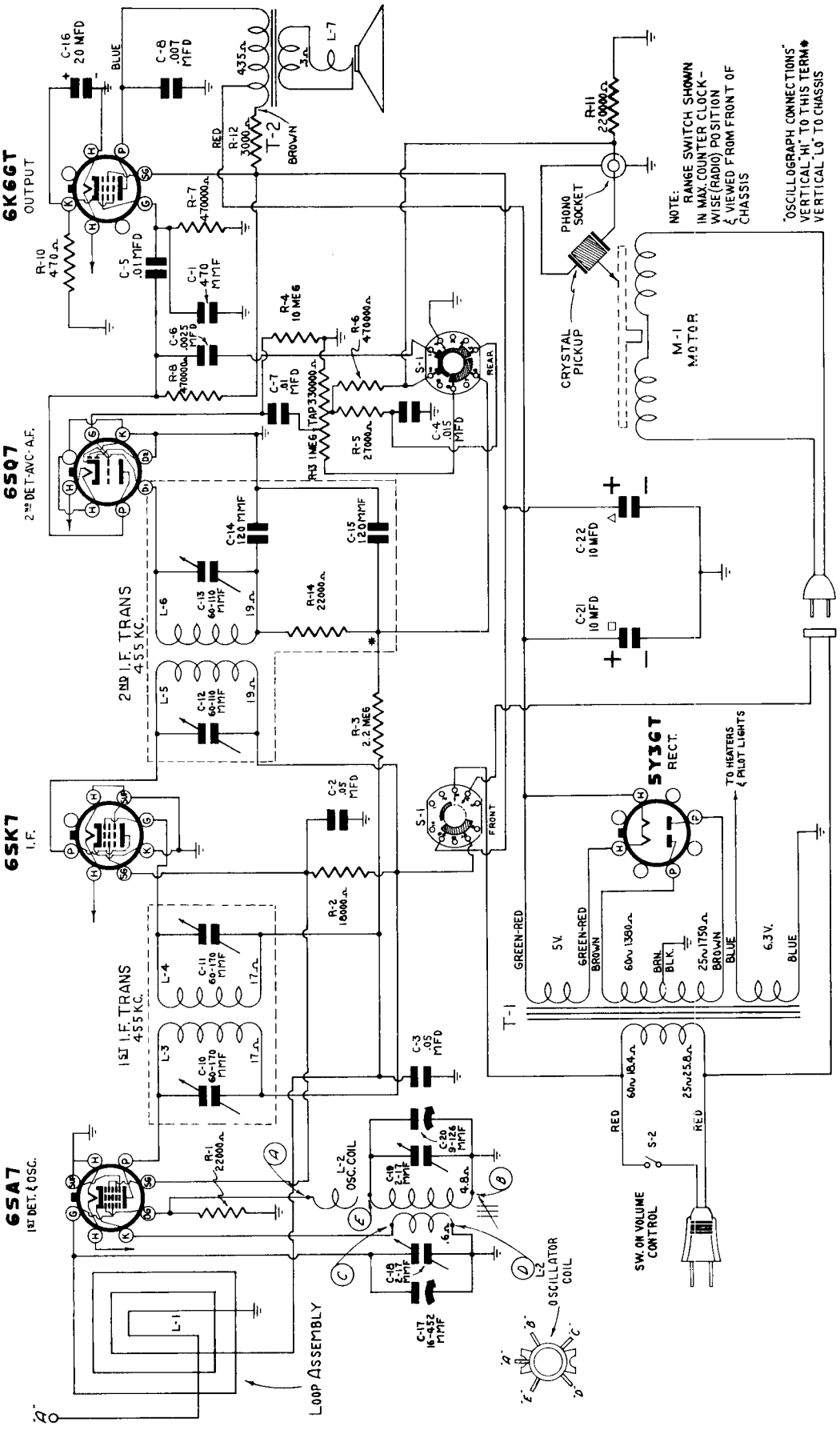
LOUDSPEAKER (VRA 55)

Type ..... 12 inch permanent magnet dynamic
Voice-Coil Impedance .....2.2 Ohms at 400 Cycles

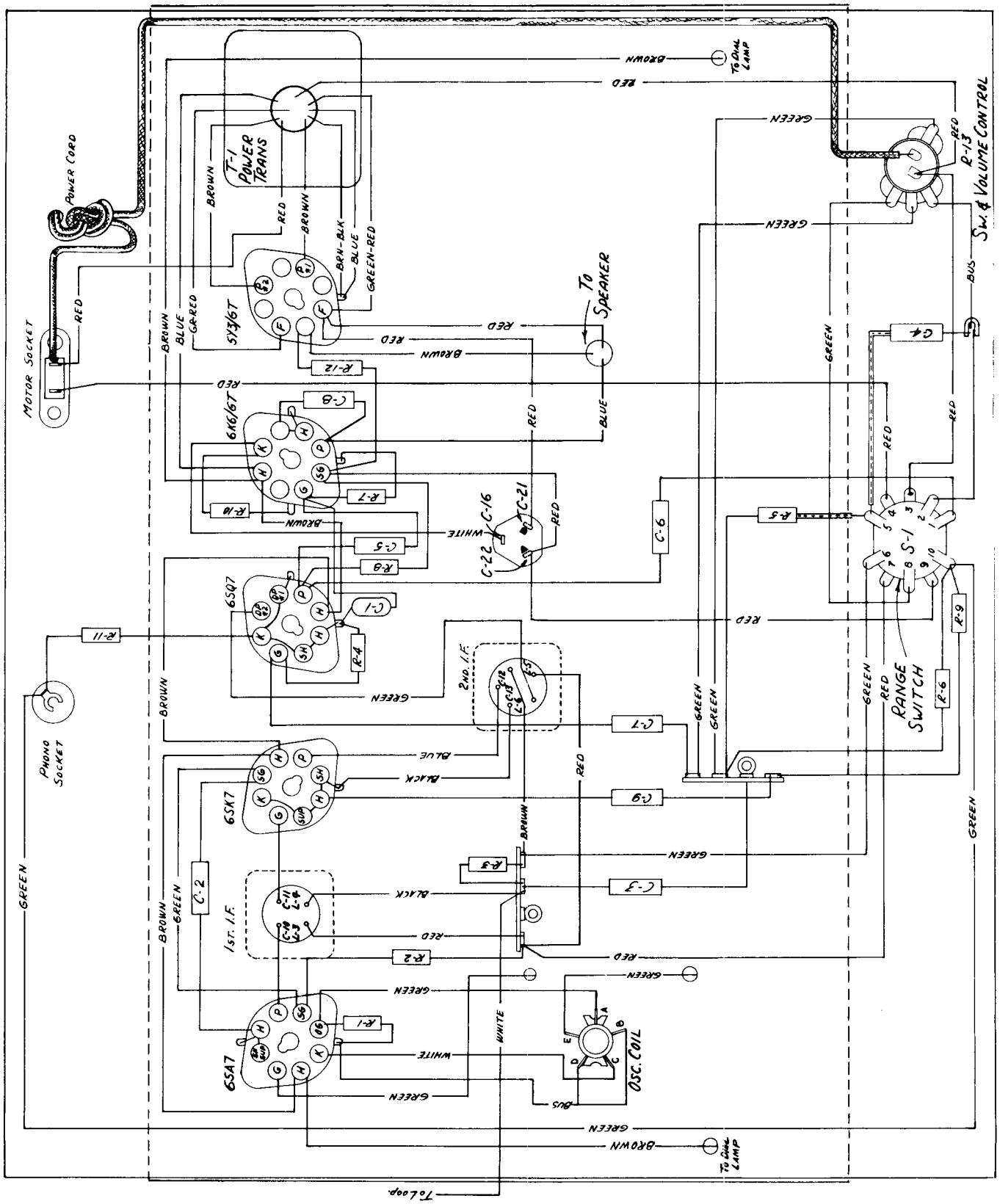
General Description

Models VRA 55 & 56 are five tube, single band, A.C., superheterodyne radio and phonograph combinations. Features of design include: Built in loop antenna: I.F. transformers of efficient design: stable oscillator circuit: Edge lighted straight line dial: and a well filtered power supply.

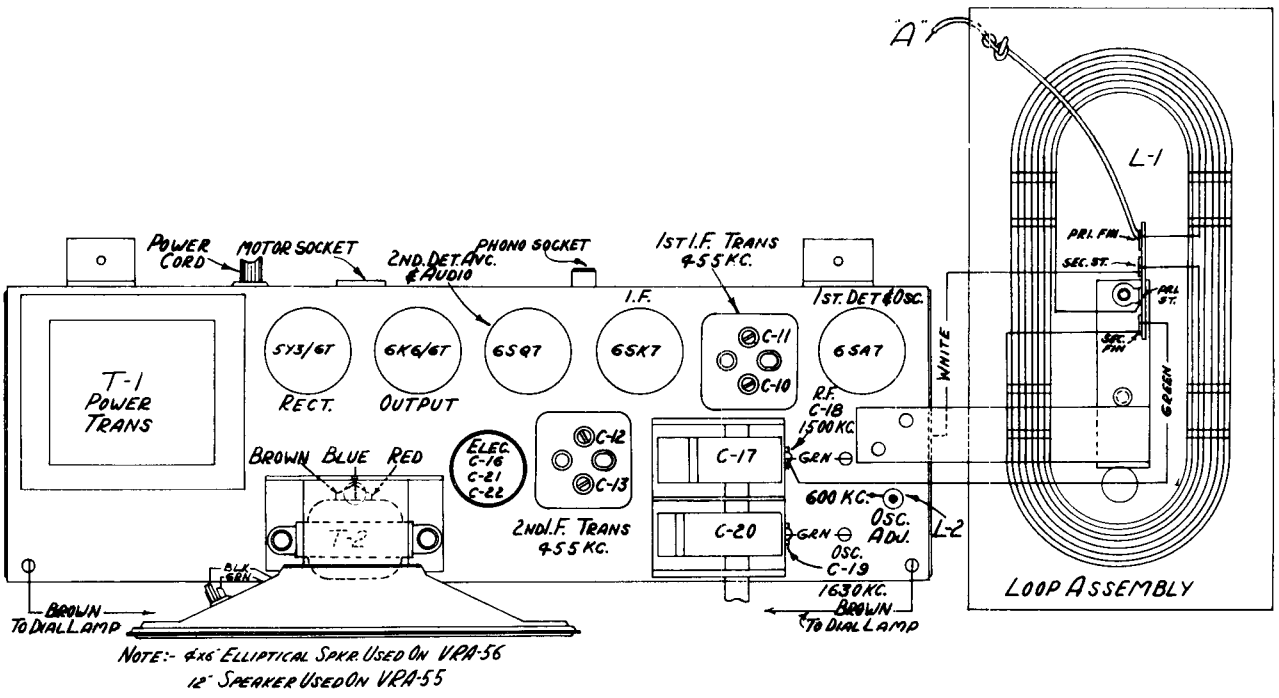
Features of automatic record player: designed to play twelve ten-inch or ten twelve-inch records: light weight crystal pickup and a constant speed rim drive motor.



Schematic Circuit Diagram



Chassis Wiring Diagram



Chassis Layout and Alignment Adjustments

Alignment Procedure

Steps	Connect the high side of test-osc. to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output—
1	Grid of 6SK7 through .01 Mfd.	455 KC.	Quiet point at 600 KC.	C12 C13 2nd I.F.
2	Grid of 6SA7 through .01 Mfd.			C10 C11 1st I.F.
3	Use 220 Mmfd. Dummy Ant.	1630 KC.	Out of mesh	C19 (Osc.)
4	Use 220 Mmfd. Dummy Ant.	1500 KC.	Resonance at 1500 KC.	C18 (RF)
5	Use 220 Mmfd. Dummy Ant.	600 KC.	600 KC.	Rock Osc. Slug (L2) for Max. Output
6		REPEAT	3 — 4 — 5	

Output meter alignment: 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 through a .01 capacitor and keep the output as low as possible, to avoid A.V.C. action.

Pre-setting dial: With the gang condenser in full mesh, the pointer should be adjusted so that it lines up with the first mark on the left of the dial scale.

Cathode Ray alignment is the preferrable method. Connections for the oscillograph are shown in the schematic diagram.

SERVICE DATA

Refer to Model No. 960260-2 Service Notes for all replacement parts and service details on automatic changer mechanism.

RADIOTRON SOCKET VOLTAGES

Type	Plate	Screen Grid	Cathode	Heater
6SA7	235 V.	80 V.	—	6.3 V.
6SK7	235 V.	80 V.	—	6.3 V.
6SQ7	90 V.	—	—	6.3 V.
6K6GT	300 V.	245 V.	15V	6.3 V.
5Y3GT	DC Output Across C22 — 300 V.			5.0 V.

The above voltages should hold within plus or minus 20% when measured with a line voltage of 117 volts.

REPLACEMENT PARTS LIST FOR MODELS VRA-55 & 56

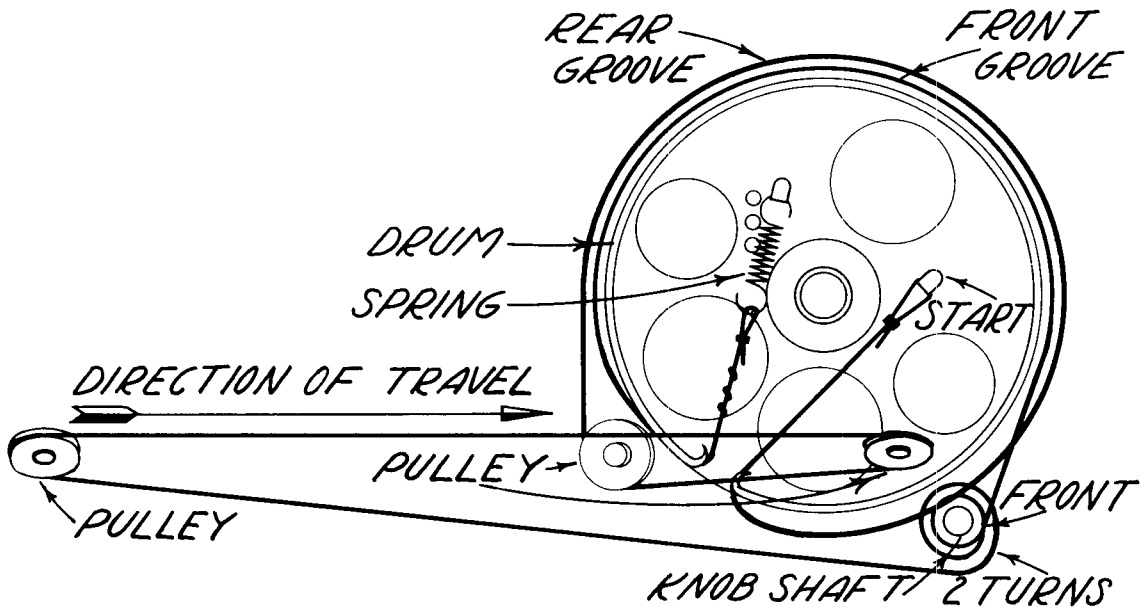
Insist on genuine factory tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK NO.	DESCRIPTION
	RECEIVER ASSEMBLIES
39644	Capacitor-470 Mmf. (C1).....
36854	Capacitor-.0025 Mfd.(C6).....
5148	Capacitor-.007 Mfd.(C8).....
11315	Capacitor-.015 Mfd.(C4).....
4937	Capacitor-.01 Mfd. (C5,C7).....
32787	Capacitor-.05 Mfd. (C2,C3).....
32240	Capacitor-Electrolytic 10-10-20 Mfd. (C16,C21,C22).....
S-3497	Condenser-Variable & Drum (C17, C18,C19,C20).....
S-3480	Coil-Oscillator Coil (L2).....
S-3581	Indicator-Station selector pointer.
S-3508	Loop-Ant.loop & bracket ass'y (L1).
30681	Resistor-470 ohms 1/4 watt (R10)...
S-3521	Resistor-3000 ohms W.W.5 watt (R12)
30151	Resistor-18,000 ohms 1 watt (R2)...
30492	Resistor-22,000 ohms 1/4 watt(R1, R14).....
12738	Resistor-27,000 ohms 1/4 watt(R5)..
12264	Resistor-220,000 ohms 1/4 watt(R11)
12285	Resistor-470,000 ohms 1/4 watt(R6, R7,R8).....
12679	Resistor-2.2 Megohms 1/4 watt(R3).
13601	Resistor-10 Megohms 1/4 watt(R4).
S-3506	Shaft-Drive shaft ass'y.....
31418	Spring-Drive cord tension (Pkg.2)..
S-3498	Switch-Tone & phono switch (S1)....
32537	Socket-Tube socket.....
S-2824	Socket-AC for phono motor.....
14278	Socket-Phono input.....
S-3503	Transformer 1st I.F.(L3,L4,C10,C11)
S-3504	Transformer 2nd I.F.(L5,L6,C12,C13, C14,C15,R14).....
S-2317	Transformer Power 60 cy. (T1).....
S-3501	Transformer Power 25 cy. (T1).....
S-3505	Volume Control 1 Megohm (S2,R13)...

STOCK NO.	DESCRIPTION
	SPEAKER ASSEMBLIES (VRA56)
35849	Dust Cap (Pkg.3).....
S-3867	Cone-Cone & Voice Coil Assy. (L7).
S-3866	Speaker-Complete.....
S-3507	Transformer-Output (T2).....
	SPEAKER ASSEMBLIES (VRA55)
31825	Dust Cap (Pkg.5).....
S-2565	Cone-Cone & Voice Coil Ass'y.(L7).
S-2566	Speaker-Complete.....
S-3637	Transformer-Output (T2).....
	AUTOMATIC RECORD CHANGER MECHANISM
	(Refer to Model No.960260-2 Service Notes for Replacement Parts and Service Data.)
	MISCELLANEOUS ASSEMBLIES
S-3499	Cord-Indicator Drive Cord.....
S-3520	Dial Scale.....
S-3947	Decal-VRA56 - 1 Set.....
S-3582	Knob-Tone & Phono Switch.....
S-3634	Knob-Volume & Tuning.....
S-3909	Lid Support - VRA56.....
S-3910	Lid Hinges - VRA56.....
11765	Pilot Light - Mazda #51.....
14270	Spring-Knob retaining spring (Pkg.2).....
S-4009	Spring-Motorboard Mounting.....

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

CAUTION—Before placing record player in operation, the four mounting bolts painted red, underneath the motor board, are to be removed.



DRUM SHOWN WITH GANG AT MAX. CAPACITY

Drive Cord

RCA VICTOR

"HIS MASTER'S VOICE"

MODELS VRA56X & SPINETTE

Five-Tube, Single-Band, A-C. Superheterodyne Radio Phonograph Combination

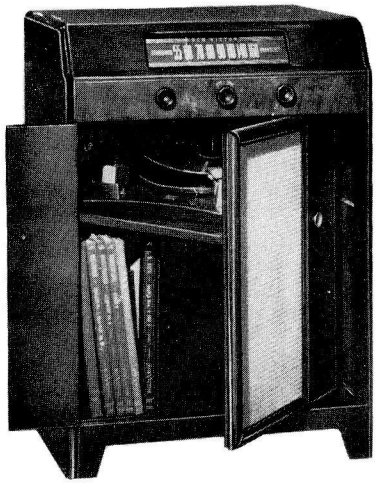
TECHNICAL INFORMATION AND SERVICE DATA

1948 No. 7

GENERAL SERVICE DIVISION • R C A VICTOR COMPANY LTD.



Model VRA56X



SPINETTE

Electrical and Mechanical Specifications

FREQUENCY RANGE

Standard Broadcast S.B. ---------- 540-1630 K.C.
Intermediate Frequency A.M. ---------- 455 K.C.
Tuning Drive Ratio ---------- 12 to 1

RADIOTRON COMPLEMENT

(1) Type 6SA7 ---------- Converter
(2) Type 6SK7 ---------- 1st I.F.
(3) Type 6SQ7 ---------- Det., A.V.C. & 1st A.F.
(4) Type 6K6GT ---------- Power Output
(5) Type 5Y3GT/G ---------- Rectifier
Pilot Lamps (2) ---------- Mazda No. 51 6-8 volts 0.2 amp.

POWER OUTPUT

Undistorted ---------- 2 Watts
Maximum ---------- 3 Watts

LOUDSPEAKER (VRA56X)

Type ---------- 4x6 inch Elliptical
Impedance ---------- 3.4 ohms at 400 Cycles

LOUDSPEAKER (Spinette)

Type ---------- 8 inch P.M.
Voice Coil impedance ---------- 2.2 ohms at 400 Cycles

CABINET DIMENSIONS (Inches)

	Height	Width	Depth
Model VRA56X	13	16½	15½
Model Spinette	32⅛	23¼	16½

POWER SUPPLY RATINGS

Rating A ---------- 105-125 volts, 50-60 cycle, 65 watts
Rating B ---------- 105-125 volts, 25 cycle, 65 watts

PHONOGRAPH

Type ---------- RP178 Automatic
Record Capacity ---------- Twelve 10-inch or Ten 12-inch
Turntable Speed ---------- 78 r.p.m.

PICKUP

Type ---------- Crystal
Impedance ---------- 100,000 ohms at 1,000 cycles
Average Output ---------- 1.4 volts at 400 cycles across 500,000 ohm load

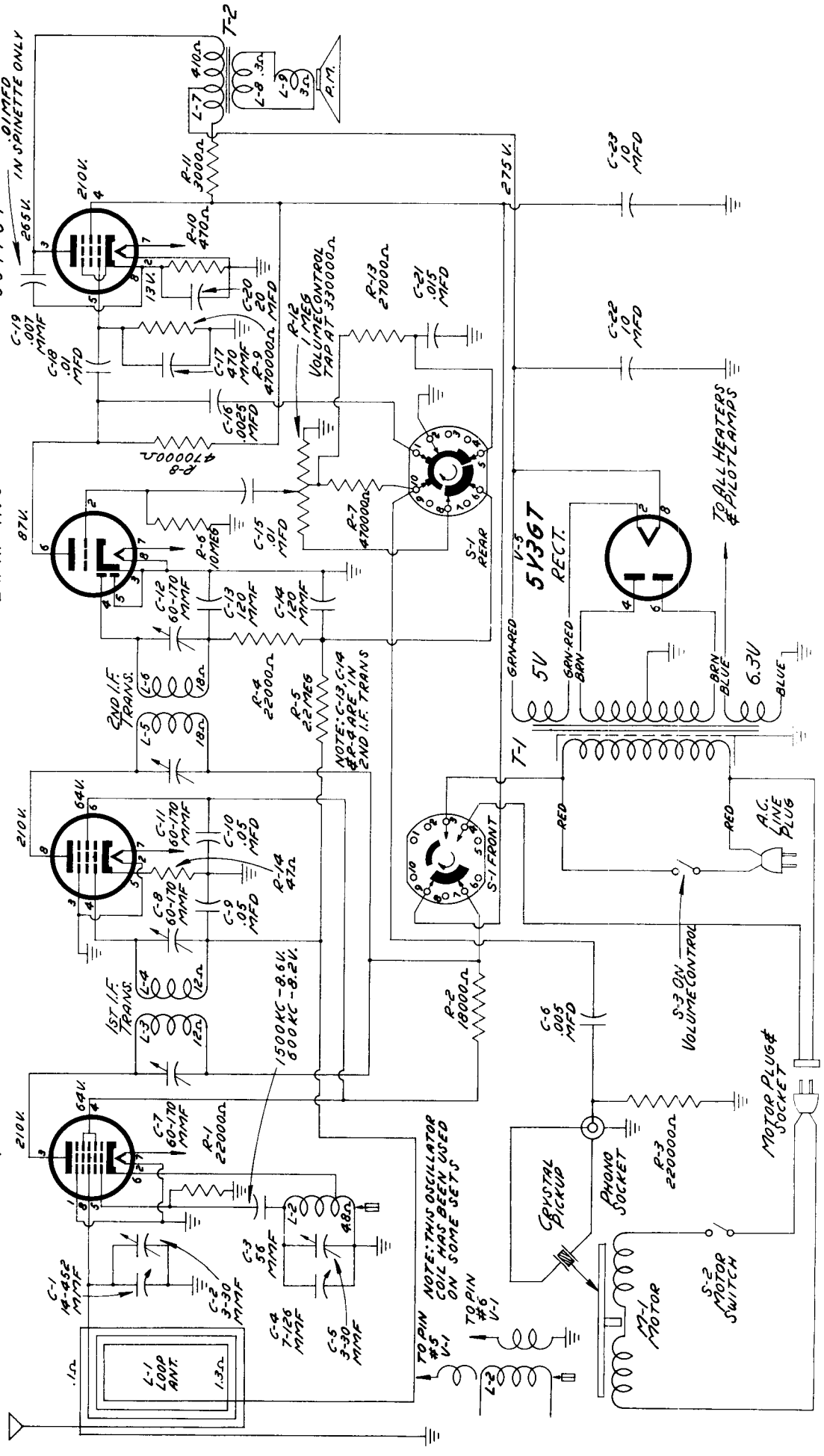


Fig. 1 — Schematic Diagram.

Note—All the above values hold within plus or minus 20% when measured with a RCA Voltohmyst or equivalent, on a line voltage of 117 volts. All voltages are measured to chassis.

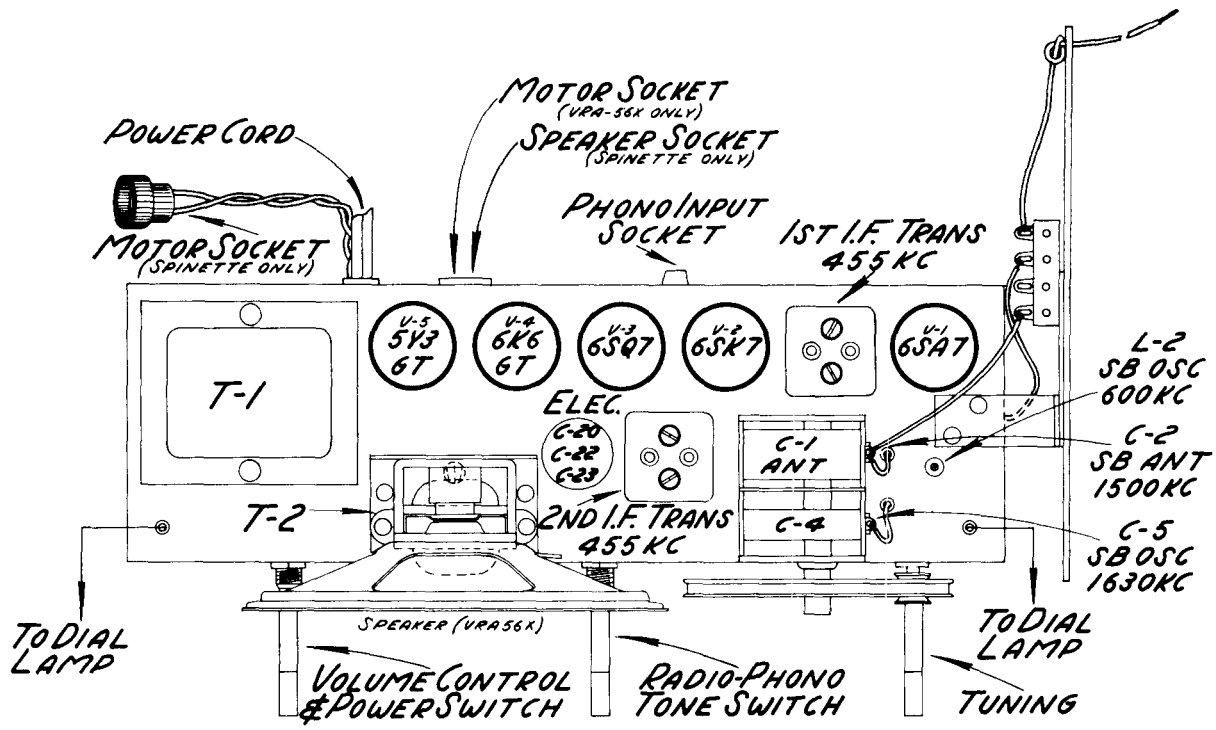


Fig. 2—Chassis Layout and Alignment Adjustments.

ALIGNMENT PROCEDURE

Before aligning set, completely mesh the gang and set the dial pointer on the calibration point at the extreme left hand end of the dial.

When making a complete alignment follow in proper sequence the tabulated form below.

If only a portion of the circuit is to be aligned select the portion required, followed by the remaining steps in the chart.

For "S.B.", band alignment use output meter across voice coil keeping Test Oscillator output as low as possible to prevent AVC action.

Cathode-ray oscilloscope and sweep signal generator alignment of the 455 kc. A.M. I.F. transformers is the preferable method. Connect oscilloscope across the volume control. If the required equipment is not available use the method outlined below.

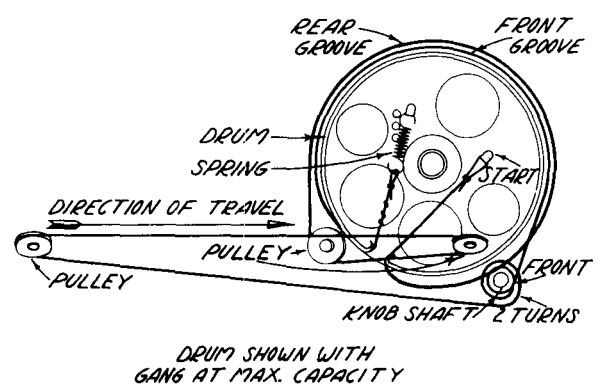


Fig. 3—Dial Cord Stringing.

ALIGNMENT CHART

Order of Alignment		TEST OSCILLATOR: Connect "HI" Side To	TEST OSCILLATOR: Connect "LO" Side To	TEST OSCILLATOR: Dummy Antenna	TEST OSCILLATOR: Frequency Setting	Tone Switch	Receiver Dial Setting	Circuit To Adjust	Adjustment Symbols	Notes
A.M. I.F. ALIGNMENT	1	6SK7 1st I.F. Grid	Ground	.01 mfd.	455 K.C. 30% mod. 400 Cy. A.M.	Radio	High freq. end of dial	2nd I.F. Trans.	C11, C12	Adjust for max. A.C. voltage across voice coil.
	2	6SA7 Converter Grid	Same	Same	Same	Same	Same	1st I.F. Trans.	C7, C8	Same
S.B. ALIGNMENT	3	Ant. Lead	Ground	200 m.m.f.	1630 K.C. 30% mod. 400 Cy. A.M.	Radio	1630 K.C. on dial	Oscillator	C5	Adjust for max. A.C. voltage across voice coil
	4	Same	Same	Same	1500 K.C.	Same	1500 K.C.	Ant.	C2	Same
	5	Same	Same	Same	600 K.C. 30% mod. 400 Cy. A.M.	Same	600 K.C. on dial	Oscillator	L2	*Same
		* NOTE:- Rock Oscillator in to loop at 600 K.C.								
	6	Repeat steps 3 to 5 for maximum output.								

REPLACEMENT PARTS FOR MODELS VRA56X & SPINETTE

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

STOCK NO.	DESCRIPTION
	CHASSIS ASSEMBLY
S-4307	Capacitor-56 MMF (C3).....
39644	Capacitor-470 MMFD (C17).....
S-3644	Capacitor-.0025 MFD (C16).....
S-3646	Capacitor-.005 MFD (C6).....
S-3647	Capacitor-.007 MFD (C19).....
S-3648	Capacitor-.01 MFD (C15,C18).....
S-3649	Capacitor-.015 MFD (C21).....
70615	Capacitor-.05 MFD (C9,C10).....
S-3497	Condenser-Variable (C1,C2,C4,C5)...
32240	Capacitor-Electrolytic (C20,C22, C23).....
S-3480	Coil-Oscillator coil (L2) VRA56X...
S-4324	Coil-Oscillator coil (L2)(Spinette)
S-3581	Indicator-Station Selector Pointer (VRA56X).....
S-4360	Indicator-Station Selector Pointer (Spinette).....
S-3508	Loop-Antenna loop and bracket (L1).
30732	Resistor-47 ohms (R14).....
30681	Resistor-470 ohms (R10) 1 watt.....
S-3521	Resistor-W.W. 3,000 ohms 5 watt(R11)
30151	Resistor-18,000 ohms (R2) 1 watt...
30492	Resistor-22,000 ohms (R1,R4)1/4 watt).....
12738	Resistor-27,000 ohms (R13) 1/4 watt.....
14583	Resistor-220,000 ohms (R3) 1/4 watt.....
30648	Resistor-470,000 ohms (R7,R8,R9) 1/4 watt.....
30649	Resistor-2.2 Megohms (R5)1/4 watt..
30992	Resistor-10 Megohms (R6) 1/4 watt..
S-3506	Shaft-Drive Shaft.....
S-3498	Switch-Tone & phono switch (S1)....
S-4341	Socket-Tube socket.....
S-4202	Socket-Phono socket.....
S-2824	Socket-AC socket.....
S-3503	Transformer-1st I.F. (L3,L4,C7,C8).
S-3504	Transformer-2nd I.F. (L5,L6,C11, C12).....
S-2317	Transformer-Power 60 cy. (T1).....
S-3501	Transformer-Power 25 cy. (T1).....
S-3505	Volume Control 1 Meg. (R12,S3).....

STOCK NO.	DESCRIPTION
	SPEAKER ASSEMBLY (VRA56X)
35849	Dust Cap (Pkg.3).....
S-3867	Cone-Cone & voice coil assy. (L9).
S-3866	Speaker.....
S-3507	Output transformer (L7,L8) (T2)...
	SPEAKER ASSEMBLY (SPINETTE)
31825	Dust Cap (Pkg.5).....
S-4349	Cone-Cone & voice coil assy.....
S-4323	Speaker.....
S-3637	Output Transformer.....
	MISCELLANEOUS ASSEMBLY
S-4344	Adapter-Shaft adapter.....
S-4313	Cord-Dial cord (Universal).....
S-3467	Cord-Power Cord.....
S-4342	Cloth-Grille Cloth (VRA56X).....
S-4348	Cloth-Grille Cloth (Spinette).....
S-3925	Door Catch and Strike.....
S-4339	Dial-Dial Scale (VRA56X).....
S-4322	Dial-Dial Scale (Spinette).....
S-4340	Decal (VRA56X).....
S-4347	Decal (Spinette).....
36386	Decal (HMV).....
S-4345	Hinge-friction hinge (Spinette)...
S-4292	Knob-Door Knob (Spinette).....
S-4213	Knob-(Radio-phono).....
S-4214	Knob-(Volume-tuning).....
30868	Plug-Motor lead plug (Spinette)...
32208	Plug-Speaker lead plug (Spinette).
31418	Spring-Dial cord tension (Pkg.2)..
S-4040	Support-Lid support (L.H.)(VRA56X)
30900	Spring-Knob retaining spring (Pkg.5).....
S-3219	Socket-Speaker socket (Spinette)..
33726	Washer-"C" washer for drive shaft (Pkg.5).....
	AUTOMATIC RECORD CHANGER MECHANISM
Refer to Model RP-178 Service Note for Replacement Parts & Service Data.	

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

RCA VICTOR

"HIS MASTER'S VOICE"

MODEL VRA-57

Five Tube, Single Band, A.C. Superheterodyne Radio Phonograph Combination

TECHNICAL INFORMATION AND SERVICE DATA

1947 No. 14

GENERAL SERVICE DIVISION • RCA VICTOR COMPANY LTD.



General Description

The Model VRA-57 is a five tube, single band A.C. superheterodyne radio and phonograph combination. It is similar to the Model VRA-55 except for the cabinet and loudspeaker. Features of the design include: Built-in loop antenna; I.F. transformers of efficient design; Stable oscillator circuit; Edge lighted straight line dial; Well filtered power supply.

Features of the automatic record player (960260-2) include: Light weight crystal pickup; Constant-speed rim drive motor; Plays twelve ten-inch or ten twelve-inch records.

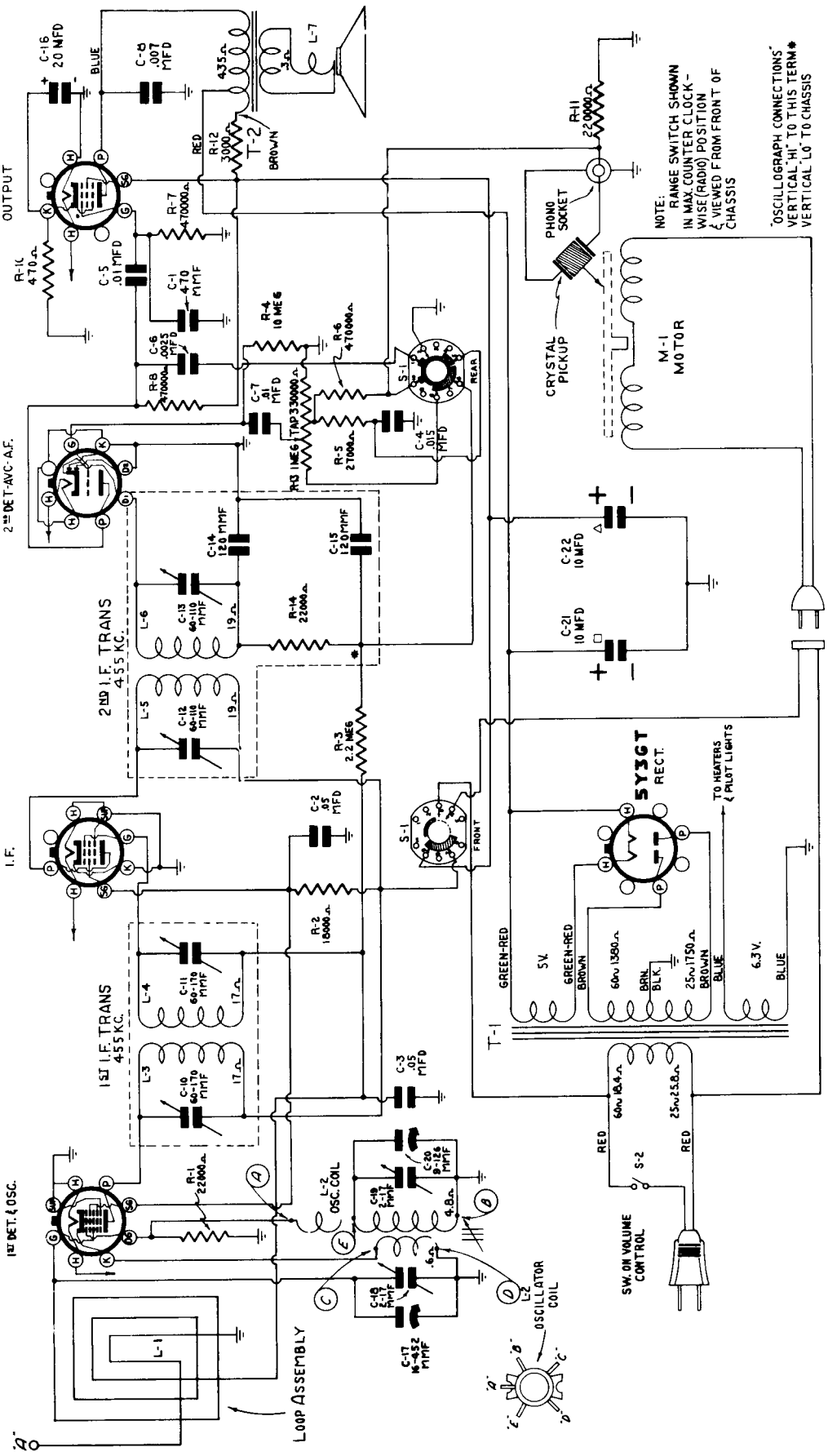
REPLACEMENT PARTS PECULIAR TO MODEL VRA-57

(For other replacement parts refer to Service Note for Model VRA-55)

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

STOCK NO.	DESCRIPTION		STOCK NO.	DESCRIPTION	
	RECEIVER ASSEMBLY			MISCELLANEOUS	
S-3646	Capacitor-.005 Mfd.(C23).....		*S-3947	Decal.....	
			*S-4046	Slide holder and carriage.....	
			*S-4047	Slide bar (LH).....	
	SPEAKER ASSEMBLY		*S-4048	Slide bar (RH).....	
			*71815	Mtg.Kit for Motorboard.....	
			*S-4009	Spring only to mount motorboard (Pkg.2).....	
31825	Dust Cap (Pkg.5).....				
S-4258	Cone-Cone and Voice coil assembly.		S-4259	Cloth-grille cloth.....	
S-4257	Speaker.....		*S-4203	Catch-Drawer catch.....	
				*ALSO USED ON VRA-55.	

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



NOTE:—C23, a .005 mfd. capacitor, has been added between the phono socket and pin 10 on the rear section of the tone and phono switch S1. This capacitor replaces the green lead which originally connected these points.

Schematic Circuit Diagram

RCA Victor

MODEL 60

Six-Tube, Single-Band, AC-DC Superheterodyne Receiver

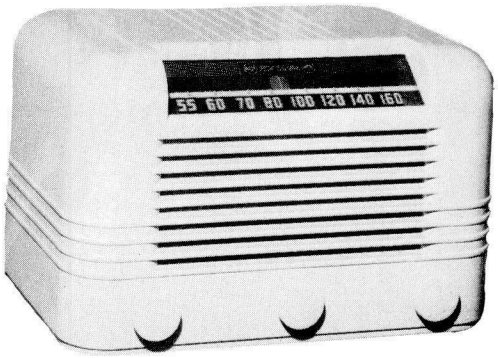
TECHNICAL INFORMATION AND SERVICE DATA

— 1946 No. 16 —

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Precautionary Lead Dress

1. Dress output plate bypass capacitor (C-19 .02 mf) against chassis.
2. Dress 35L6GT plate lead (red) against chassis and away from volume control leads and terminals.
3. Dress audio coupling capacitor (C-15 .02 mf) away from 35L6GT heater leads.
4. Dress tone control lead against front apron.
5. Dress 2nd I-F yellow and brown leads away from output plate bypass capacitor (C-19 .02 mf.) and away from all heater leads.
6. Dress lead to speaker voice coil away from tuning shaft "C" washer.
7. Dress tone control capacitor (C-18 .0018 mf.) away from oscillator coil.
8. Dress all uninsulated leads away from each other and away from chassis to prevent short circuits.
9. Dress blue and green leads of both IF transformers back in shields leaving exposed lengths as short as possible.



Electrical and Mechanical Specifications

Frequency Range ..... 540-1,600 kc
Intermediate Frequency ..... 455 kc

TUBE COMPLEMENT
(1) TYPE 12SG7 ..... Converter
(2) TYPE 12SK7 ..... Oscillator
(3) TYPE 12SK7 ..... I-F Amplifier
(4) TYPE 12SQ7 .... 2nd-Detector, 1st A-F, and A.V.C.
(5) TYPE 35L6GT ..... Power Output
(6) TYPE 35Z5GT ..... Rectifier

POWER OUTPUT
Undistorted ..... 1. watts
Maximum ..... 1.5 watts

POWER SUPPLY RATINGS
Rating A ..... 105-125 volts, 50-60 cycles, 30 watts
Rating B ..... 105-125 volts, 25-60 cycles, 30 watts

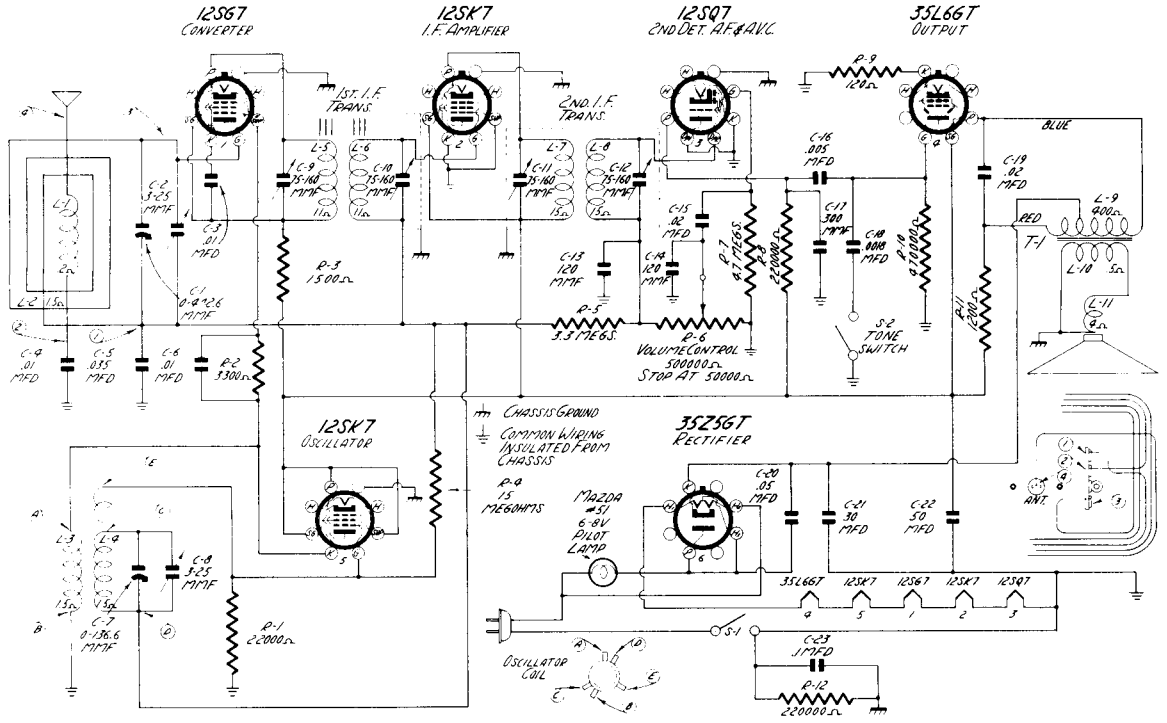
Loudspeaker (92510-1)
Type ..... 5-inch PM
V. C. Impedance ..... 3.4 ohms at 400 cycles

REPLACEMENT PARTS

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		37605	Socket-Tube Socket	
12952	Capacitor 330 Mmfd.(C17)		31418	Spring-Drive cord tension (Pkg.2)	
33640	Capacitor .005 Mfd.(C16)		36228	Switch-Tone Switch (S2)	
34506	Capacitor .001 Mfd.(C18)		S-3639	Transformer-1st I.F.(L5,L6,C9,C10)	
70652	Capacitor .01 Mfd. (C3,C4,C6)		S-3640	Transformer-2nd I.F.(L7,L8,C11,C12, C13,C14)	
31796	Capacitor .02 Mfd. (C15,C19)		36242	Volume Control (R6,S1)	
5196	Capacitor .035 Mfd.(C5)			**SPEAKER ASSEMBLIES**	
32787	Capacitor .05 Mfd. (C20)		70413	Speaker-Complete	
70617	Capacitor .1 Mfd.(C23)		S-4016	Transformer-Output (T1)	
39152	Capacitor-Electrolytic 30-50 Mfd.(C21, C22)			**MISCELLANEOUS ASSEMBLIES**	
36226	Condenser-Variable (C1,C2,C7,C8)		39953	Back-Cabinet back	
S-3911	Coil-Oscillator Coil (L3,L4)		S-3694	Cabinet-Walnut	
36236	Indicator-Station selector pointer		S-3743	Cabinet-Ivory	
S-3638	Loop-Antenna Loop (L1,L2)		32634	Cord-Drive Cord (Universal)	
30189	Resistor-120 ohms 1/4 watt (R9)		37831	Fastener-Push fastener for cabinet backs (Set 4)	
6134	Resistor-1200 ohms 1 watt (R11)		70414	Knob-Ivory	
30654	Resistor-1500 ohms 1/4 watt (R3)		36722	Knob-Walnut	
30733	Resistor-3300 ohms 1/4 watt (R2)		11765	Lamp-Pilot lamp (Mazda 51)	
30492	Resistor-22,000 ohms 1/4 watt (R1)		36230	Pulley-Drive Cord Pulley(Pkg.3)	
14583	Resistor-220,000 ohms 1/4 watt(R8,R12)		39954	Scale-Station selector dial scale	
30648	Resistor-470,000 ohms 1/4 watt(R10)		30900	Spring-Knob retaining spring(Pkg.5)	
31417	Resistor-3.3 Megohms 1/4 watt (R5)				
30931	Resistor-4.7 Megohms 1/4 watt (R7)				
38785	Resistor-15. Megohms 1/4 watt (R4)				
36897	Shaft-Drive Shaft				

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



Schematic Circuit Diagram

NOTE—C13-C14 located in can of 2nd I-F Trans.

Alignment Procedure

Steps	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output
1	Grid of 12SG7 in series with .01 mfd.	455 kc	Quiet-point 1,600 kc end of dial	C11 and C12 2nd I-F transformer
2				C9 and C10 1st I-F transformer
3	Ant. lead in series with 220 mmfd.	1,630 kc	1,630 kc	C8 (osc.)
4		1,500 kc	1,500 kc	C2 (ant.)
5	Repeat 3 & 4			

Radiotron Socket Voltages

Type	Plate	Screen Grid	Cathode	Heater
12SG7	98 v.	98 v.	4.7 v.	12 v.
12SK7	100 v.			12 v.
12SK7	99 v.	100 v.		12 v.
12SQ7	60 v.			12 v.
35L6GT	120 v.	100 v.	5.6 v.	35 v.
35Z5GT			132 v.	35 v.

Voltages should hold within plus or minus 20% with rated supply voltage.

Output Meter Alignment

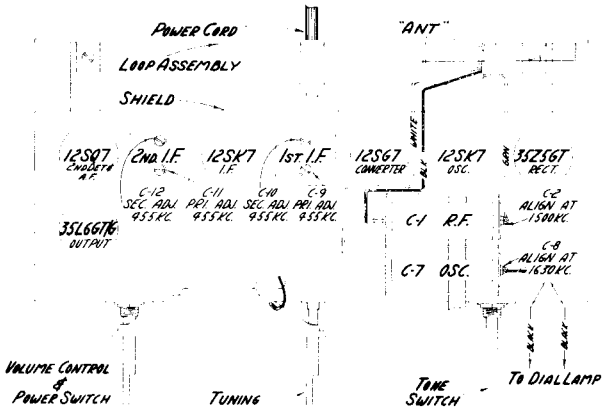
Connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test Oscillator

For all alignment operations, connect the low side of the test oscillator to the receiver chassis through a .01 capacitor and keep the output as low as possible, to avoid A.V.C. action.

Pre Setting Dial

With the gang condenser in full mesh, the pointer should be adjusted so that it lines up with the first mark on the left of the dial scale.



Tube and Trimmer Locations

RCA VICTOR

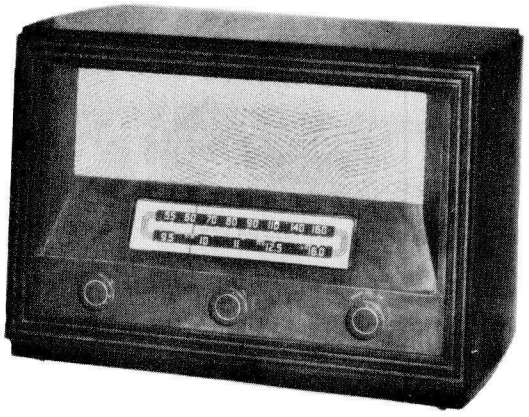
MODEL BT-60

SIX-TUBE, TWO-BAND, BATTERY SUPERHETERODYNE RECEIVER

TECHNICAL INFORMATION AND SERVICE DATA

—1947 No. 10—

GENERAL SERVICE DIVISION • RCA VICTOR COMPANY LTD



Electrical and Mechanical Specifications

FREQUENCY RANGES

Standard Broadcast—S.B.	540-1600 Kc.
Short Wave 31-25-19M	9.3-16.0 Mc.
Intermediate Frequency	455 Kc.

RADIOTRON COMPLEMENT

(1)	Type 1T4	R.F. Amplifier
(2)	Type 1R5	Converter
(3)	Type 1T4	I.F. Amplifier
(4)	Type 155	2nd Det., A.V.C. & 1st A.F.
(5)	Type 1A5GT	A.F. Amplifier
(6)	Type 1G6GT/G	Power Output

POWER OUTPUT

Undistorted	0.50 Watts
Maximum	0.58 Watts

LOUDSPEAKER

Type	4 x 6 elliptical P.M.
Voice coil impedance	3.4 ohms at 400 cycles

CABINET DIMENSIONS

Height	12¼ inches
Width	17¾ inches
Depth	11-5/16 inches

CURRENT CONSUMPTION

"A" at 1.4 volts		300 MA
"B" at 90 volts	(minimum)	14 MA
	(maximum)	26 MA

BATTERIES REQUIRED

Eveready battery pack number 758 or one 1.4 volt air cell or 1.5 volt dry cell and two 45 volt heavy duty "B" batteries.

General Description

The BT-60 is a six-tube, two band superheterodyne receiver, housed in a table type cabinet of pleasing appearance. This receiver is designed to cover the standard broadcast band and the 31-25-19 meter short wave bands. Features of the design include:—Low-drain, high efficiency miniature tubes; Iron-core RF coils, Oscillator coils and I.F. transformers; Automatic volume control; Straight line dial; Phono input socket with PHONO position on range switch; Four by six inch dust-proof elliptical P.M. loudspeaker.

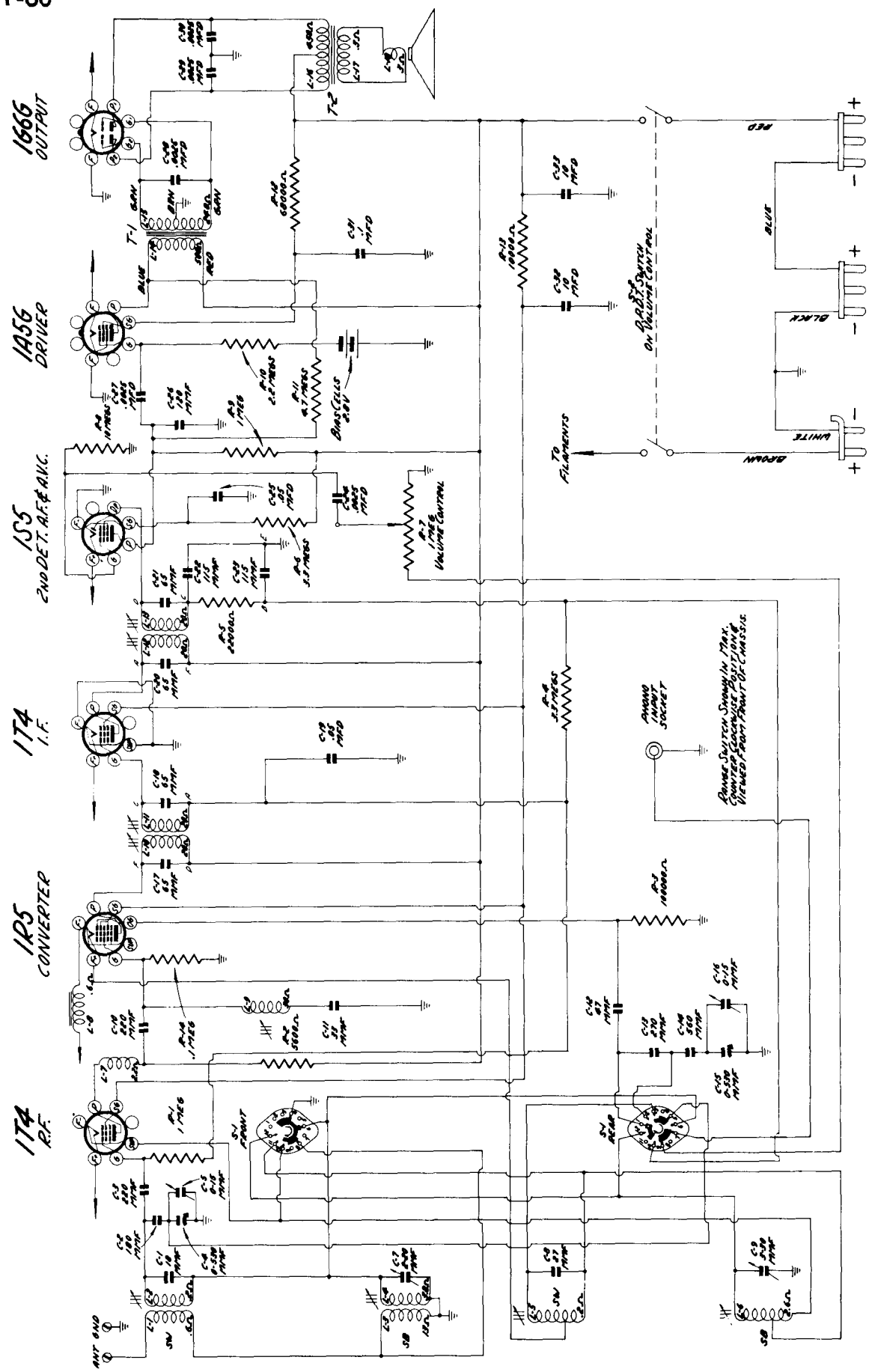


Fig. 1—Schematic Diagram—range switch shown in phono position

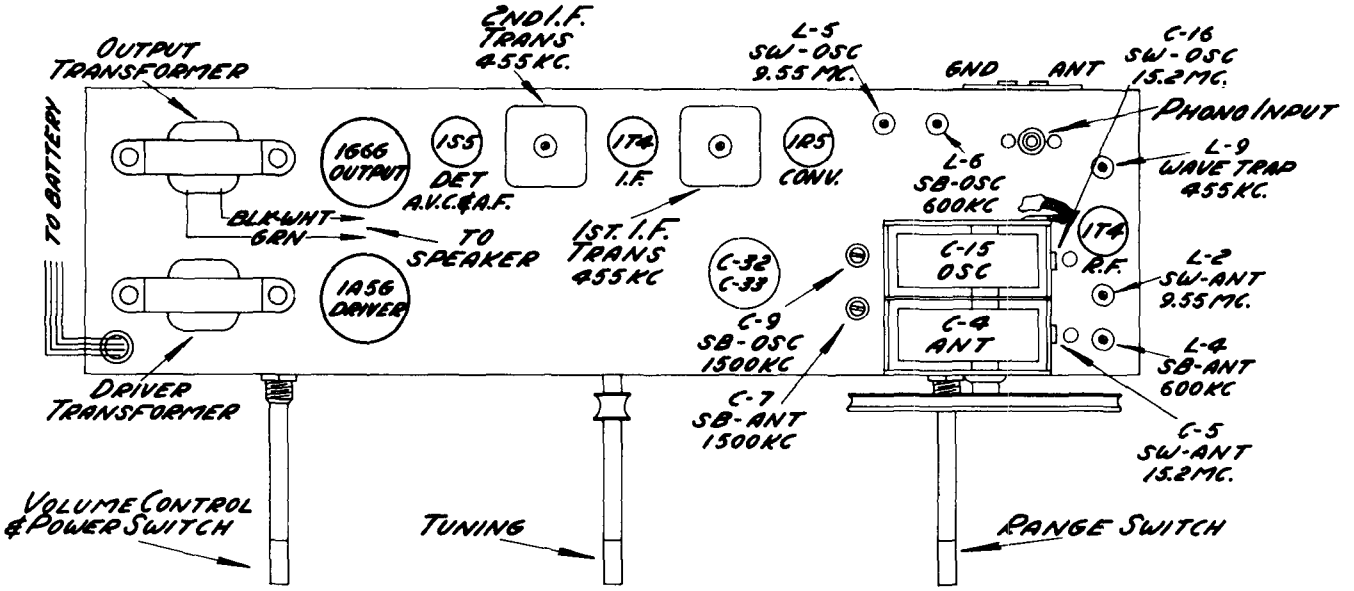


Fig. 2—Chassis Layout and Alignment Adjustments

ALIGNMENT PROCEDURE

Before aligning set, completely mesh the gang and set the dial pointer on the mechanical maximum calibration point at the extreme left hand end of the dial.

When making a complete alignment follow in proper sequence the tabulated form below.

If only a portion of the circuit is to be aligned select the portion required, followed by the remaining steps in the chart.

For "S.B." and 31-25-19M band alignment use output meter across voice coil keeping Test Oscillator output as low as possible to prevent AVC action.

Cathode-ray oscilloscope and sweep signal generator alignment of the 455 kc. A.M. I.F. transformers is the preferable method. Connect oscilloscope across the volume control. If the required equipment is not available use the method outlined below.

ALIGNMENT CHART

ORDER OF ALIGNMENT		TEST OSCILLATOR				RANGE SELECTOR	RECEIVER DIAL SETTING	CIRCUIT TO ADJUST	ADJUSTMENT SYMBOLS	NOTES
		CONNECT "HI" SIDE TO	CONNECT "LO" SIDE TO	DUMMY ANTENNA	FREQUENCY SETTING					
A.M. I.F. ALIGNMENT	1	1T4 1st I.F. Grid	Ground	.01 mfd.	455 KC 30% mod. 400 Cy.A.M.	S.B.	High Freq. end of Dial	2nd I.F. Trans.	L-12 and L-13	Adjust for max. Voltage across Voice Coil.
	2	1R5 Mixer Grid	Same	Same	Same	Same	Same	1st I.F. Trans.	L-10 and L-11	Same
	3	1T4 R.F. Grid	Same	Same	Same	Same	Same	Wave Trap	L-9	Adjust for min. Voltage across Voice Coil.
31-25-19M ALIGNMENT	4	"A" on Ant. Ter. Board	Ground	300 Ohms	9.55 MC 30% Mod. 400 Cy.A.M.	31-25-19M	9.55 MC Calibration point on dial.	Oscillator	L-5	
	5	Same	Same	Same	Same	Same	Same	Ant.	L-2	Same
	6	Same	Same	Same	15.2 MC 30% Mod. 400 Cy.A.M.	Same	15.2 MC Calibration point on dial.	Oscillator	C-16	Same
	7	Same	Same	Same	Same	Same	Same	Ant.	C-5	Same
	8	Repeat steps 4 to 7 for maximum output.								
		NOTE:- To guard against the possibility of alignment of L-5 and C-16 to image frequency, tune the test oscillator and receiver to 15.2 MC, then set test oscillator to 16.11 MC (image frequency). Increase the test oscillator output; A signal should be heard. Then tune test osc. and receiver to 9.55 MC. Reset test osc. to 10.46 MC (image frequency) and increase test osc. output; A signal should be heard. If these image frequencies cannot be heard, the receiver is incorrectly aligned. Therefore repeat steps 4 to 8.								
S.B. ALIGNMENT	9	"A" on Ant. Ter. Board	Ground	200 mmf.	600 KC 30% Mod. 400 Cy.A.M.	S.B.	600 KC Calibration point on dial.	Oscillator	L-6	Same
	10	Same	Same	Same	Same	Same	Same	Ant.	L-4	Same
	11	Same	Same	Same	1500 KC 30% Mod. 400 Cycles	Same	1500 KC Calibration point on dial	Oscillator	C-9	Same
	12	Same	Same	Same	Same	Same	Same	Ant.	C-7	Same
	13	Repeat steps 9 to 12 for max. output.								

RADIOTRON SOCKET VOLTAGES

TYPE	PLATE	SCREEN GRID	CONTROL GRID	OSC. GRID		FILAMENT
					FREQ.	
1T4 R.F.	82	51				1.4
1R5 Converter	90	51		3.6 7.2 2.5 4.3	600 kc. 1500 kc. 9.55 mc. 15.2 mc.	1.4
1T4 I.F.	90	51				1.4
1S5 2nd Det. & 1st A.F.	18	27				1.4
1A5GT, A.F. Amplifier	88	60	2.0			1.4
1G6GT/G Power Output	90 (Pin 3) 90 (Pin 6)					1.4

NOTE:—All the above values hold within plus or minus 20% when measured with an RCA voltohmyst or equivalent, with an "A" battery voltage of 1.4 volts and "B" battery voltage of 90 volts. All voltages are measured to chassis.

REPLACEMENT PARTS FOR MODEL BT-60

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

STOCK NO.	DESCRIPTION
	RECEIVER ASSEMBLIES
12930	Board-Antenna Terminal Board.....
S-4245	Capacitor-Trimmer Assembly(C7,C9).
39041	Capacitor-18 Mmfd.Ceramic (C1)....
48162	Capacitor-27 Mmfd.Ceramic (C8)....
39616	Capacitor-33 Mmfd. Mica 10% (C11).
39620	Capacitor-47 Mmfd. Mica 10% (C12).
12724	Capacitor-120 Mmfd.Mica 20% (C26).
39634	Capacitor-180 Mmfd.Mica 5% (C2)...
39638	Capacitor-270 Mmfd. (C13).....
39636	Capacitor-220 Mmfd. 10% (C3,C10)..
39646	Capacitor-560 Mmfd. 5% (C14).....
S-3644	Capacitor-.0025 Mfd.(C24,C27,C28, C29,C30).....
S-3653	Capacitor-.05 Mfd. (C19,C25).....
S-3655	Capacitor-.1 Mfd. (C31).....
28114	Capacitor-Electrolytic 10-10 Mfd. (C32,C33).....
S-3731	Condenser-Variable(C4,C5,C15,C16).
S-4237	Coil-Antenna coil B.C. (L1,L2)....
S-4238	Coil-Antenna coil S.W. (L3,L4)....
S-4240	Coil-Oscillator coil Standard Broadcast (L5).....
S-4241	Coil-Oscillator coil Short Wave (L6).....
S-3098	Indicator-Station selector pointer
30734	Resistor-5600 ohms 1/2 watt (R2)..
3078	Resistor-10,000 ohms 1/2 watt(R13)
30492	Resistor-22,000 ohms 1/2 watt (R5)
14138	Resistor-68,000 ohms 1/2 watt (R12)
3252	Resistor-100,000 ohms 1/2 watt (R3,R14).....
30652	Resistor-1 Megohm 1/2 watt (R1,R9) 20%.....
30649	Resistor-2.2 Megohm 1/2 watt (R10)
31417	Resistor-3.3 Megohm 1/2 watt(R4, R6).....
30931	Resistor-4.7 Megohm 1/2 watt(R11).
30992	Resistor-10 Megohm 1/2 watt (R8)..
S-4236	Switch-Range Switch (S1).....
71037	Socket-Tube Socket (Moulded).....
S-4202	Socket-Phono Socket.....
S-4244	Scale-Dial Scale.....
31319	Socket-Tube Socket (Octal).....
36069	Socket-Tube Socket (Miniature with centre shield).....
36500	Socket-Tube Socket (less centre shield).....
S-4235	Shaft-Drive Shaft.....
S-3526	Transformer-I.F.1st(L10,L11,C17,C18)
S-3527	Transformer-I.F.2nd(L12,L13,C20,C21, C22,C23,R5).....
S-4242	Transformer-Driver (T1)(L14,L15)...
S-4239	Trap-Wave Trap (L9).....
S-4234	Volume Control (R7,S2).....
	SPEAKER ASSEMBLIES
S-3556	Dust Cap (Pkg.3).....
S-3867	Cone-Cone and Voice Coil Assy.(L18)
S-3502	Speaker.....
S-4243	Output Transformer (T2) (L16,L17)..
	MISCELLANEOUS ASSEMBLIES
31581	Cell-Bias cell.....
S-4248	Cloth-Grille Cloth.....
S-3383	Cord-Drive Cord.....
31580	Cell-Bias Cell Holder.....
S-4246	Cable-Battery Cable.....
S-3510	Decal-.....
35214	Knob-(Range).....
35775	Knob-(Volume-tuning).....
31418	Spring-Drive Cord Tension (Pkg.3).....
S-2398	Plug-Battery Cable Plug "A".....
12827	Plug-Battery Cable Plug "B".....

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RCA VICTOR
MODEL 62

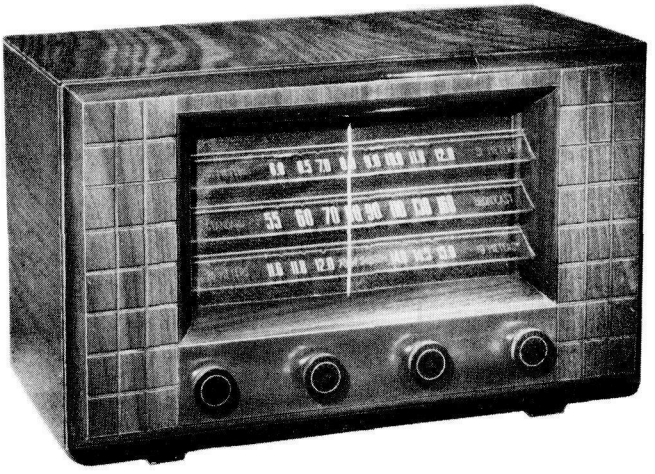
"HIS MASTER'S VOICE"

Six-Tube, Three-Band, A-C, Superheterodyne Receiver

TECHNICAL INFORMATION AND SERVICE DATA

1947 No. 12

GENERAL SERVICE DIVISION • RCA VICTOR COMPANY LTD.



Electrical and Mechanical Specifications

FREQUENCY RANGE

Standard Broadcast S.B.	540-1600 kc.
Short Wave 49-31M	5.7-13.0 mc.
25-19M	11.6-16.0 mc.
Intermediate Frequency	455 kc.
Tuning Drive Ratio	18 to 1

RADIOTRON COMPLEMENT

(1)	Type 6BA6	R. F. Amplifier
(2)	Type 6BE6	Converter
(3)	Type 6BA6	I.F. Amplifier
(4)	Type 6AT6	Det., A.V.C., & 1st A.F.
(5)	Type 6K6GT/G	Power Output
(6)	Type 5Y3GT/G	Rectifier

POWER OUTPUT

Undistorted	2 watts
Maximum	3 watts

LOUDSPEAKER

Type	6 inch round P.M.
Voice Coil Impedance	3.2 ohms at 400 cycles

POWER SUPPLY RATINGS

Rating A	105-125 volts, 50-60 cycle, 70 watts
Rating B	105-125 volts, 25-60 cycle, 70 watts

CABINET DIMENSIONS

Height	11 inches
Width	17¾ inches
Depth	8¾ inches

GENERAL DESCRIPTION

The Model 62 is a six tube, three band, table type superheterodyne receiver, designed to cover the broadcast band and two short wave bands. Features of the design include: Built-in loop antenna for broadcast band reception; Short-wave "hank" antenna; Powdered iron core I.F. transformers, antenna, R.F., and oscillator coils; Automatic volume control; Full range variable tone control; Three edge-lighted lucite dials, one for each band; Phono input socket with PHONO position on range switch; 6 inch dustproof round P.M. loudspeaker.

CIRCUIT ARRANGEMENT

The circuit uses a tuned R.F. stage in which the loop antenna operates as the first tuned circuit on the standard broadcast band. For short wave reception a "hank" antenna is connected to the short wave antenna coil primary. This antenna coil operates as the first tuned circuit on the short wave bands. Both short wave bands use the same antenna, R.F. and Oscillator coils. On the 49-31M band, the coils are tuned in the usual manner, while on the 25-19M band they are tuned by padders in series with each section of the tuning condenser. The R.F. amplifier stage is followed by a converter stage which supplies 455 kc. signals to the permeability tuned I.F. amplifier. A double-diode-triode acts as a second detector A.V.C. and first audio amplifier. This is followed by a pentode output stage which drives the 6 inch P.M. loudspeaker.

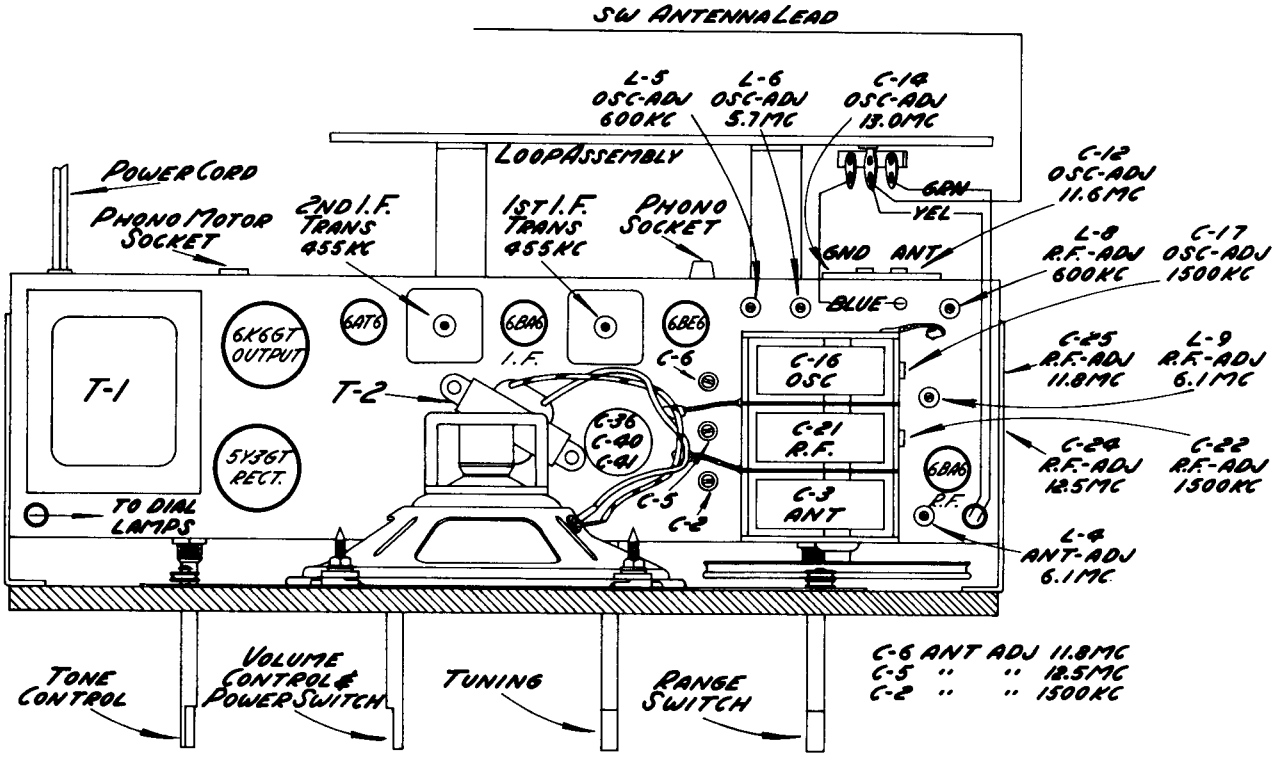


Figure 1—Chassis Layout and Alignment Adjustments.

ALIGNMENT PROCEDURE

Before aligning set, completely mesh the gang and set the dial pointer on the calibration point at the extreme left hand end of the dial.

When making a complete alignment follow in proper sequence the tabulated form below.

If only a portion of the circuit is to be aligned select the portion required, followed by the remaining steps in the chart.

For "S.B.", 49-31M and 25-19M band alignment use output meter across voice coil keeping Test Oscillator output as low as possible to prevent AVC action.

Cathode-ray oscilloscope and sweep signal generator alignment of the 455 kc. A.M. I.F. transformers is the preferable method. Connect oscilloscope across the volume control. If the required equipment is not available use the method outlined below.

ALIGNMENT CHART

Order of Alignment		TEST OSCILLATOR					Receiver Dial Setting	Circuit To Adjust	Adjustment Symbols	Notes
		Connect "HI" Side To	Connect "LO" Side To	Dummy Antenna	Frequency Setting	Range Selector				
A.M. I.F. ALIGNMENT	1	6BA6 1st I.F. Grid	Ground	.01 mfd.	455 K.C. 30% mod. 400 Cy. A.M.	S.B.	High freq. end of dial	2nd I.F. Trans.	L12, L13	Adjust for max. A.C. voltage across voice coil
	2	6BE6 Converter Grid	Same	Same	Same	Same	Same	1st I.F. Trans.	L10, L11	Same
S.B. ALIGNMENT	3	"A" on Ant. Ter Board	Ground	200 m.m.f.	1500 K.C. 30% mod. 400 Cy. A.M.	S.B.	1500 K.C. on dial	Oscillator	C17	Adjust for max. A.C. voltage across voice coil
	4	Same	Same	Same	Same	Same	Same	R.F.	C22	Same
	5	Same	Same	Same	Same	Same	Same	Ant.	C2	Same
	6	Same	Same	Same	600 K.C. 30% mod. 400 Cy. A.M.	Same	600 K.C. on dial	Oscillator	L5	*Same
	7	Same	Same	Same	Same	Same	Same	R.F.	L8	Same
		*NOTE: - Rock Oscillator in to loop at 600 K.C.								
	8	Repeat steps 3 to 7 for maximum output								
49-31M ALIGNMENT	9	"A" on Ant. Ter. Board	Ground	300 ohms	5.7 Mc. 30% mod. 400 Cy. A.M.	49-31M	Low freq. end of dial	Oscillator	L6	Adjust for max. A.C. voltage across voice coil
	10	Same	Same	Same	13.0 Mc. 30% mod. 400 Cy. A.M.	Same	High freq. end of dial	Oscillator	C14	Same
		Repeat steps 9 and 10 for maximum output.								
	11	Same	Same	Same	6.1 Mc. 30% mod. 400 Cy. A.M.	Same	Tune in test osc. signal	R.F.	L9	**Same
		**NOTE:- Rock R.F. circuit in to oscillator. Do not readjust osc. circuit.								
	12	Same	Same	Same	Same	Same	Same	Ant.	L4	Same
	13	Same	Same	Same	11.8 Mc. 30% mod. 400 Cy. A.M.	Same	Tune in test osc. signal	R.F.	C25	**Same
	14	Same	Same	Same	Same	Same	Same	Ant.	C6	Same
	15	Repeat steps 11 to 14 for maximum output.								
25-19M ALIGNMENT	16	"A" on Ant. Ter. Board	Ground	300 ohms	11.6 Mc. 30% mod. 400 Cy. A.M.	25-19M	Low freq. end of dial	Oscillator	C12	Adjust for max. A.C. voltage across voice
	17	Same	Same	Same	12.5 Mc. 30% mod. 400 Cy. A.M.	Same	Tune in test osc. signal	R.F.	C24	***Same
		***NOTE:- Rock R.F. circuit in to oscillator. Do not readjust osc. circuit.								
	18	Same	Same	Same	Same	Same	Same	Ant.	C5	Same
	19	Check at high freq. end of dial. Receiver should tune to 16 Mc. approx.								

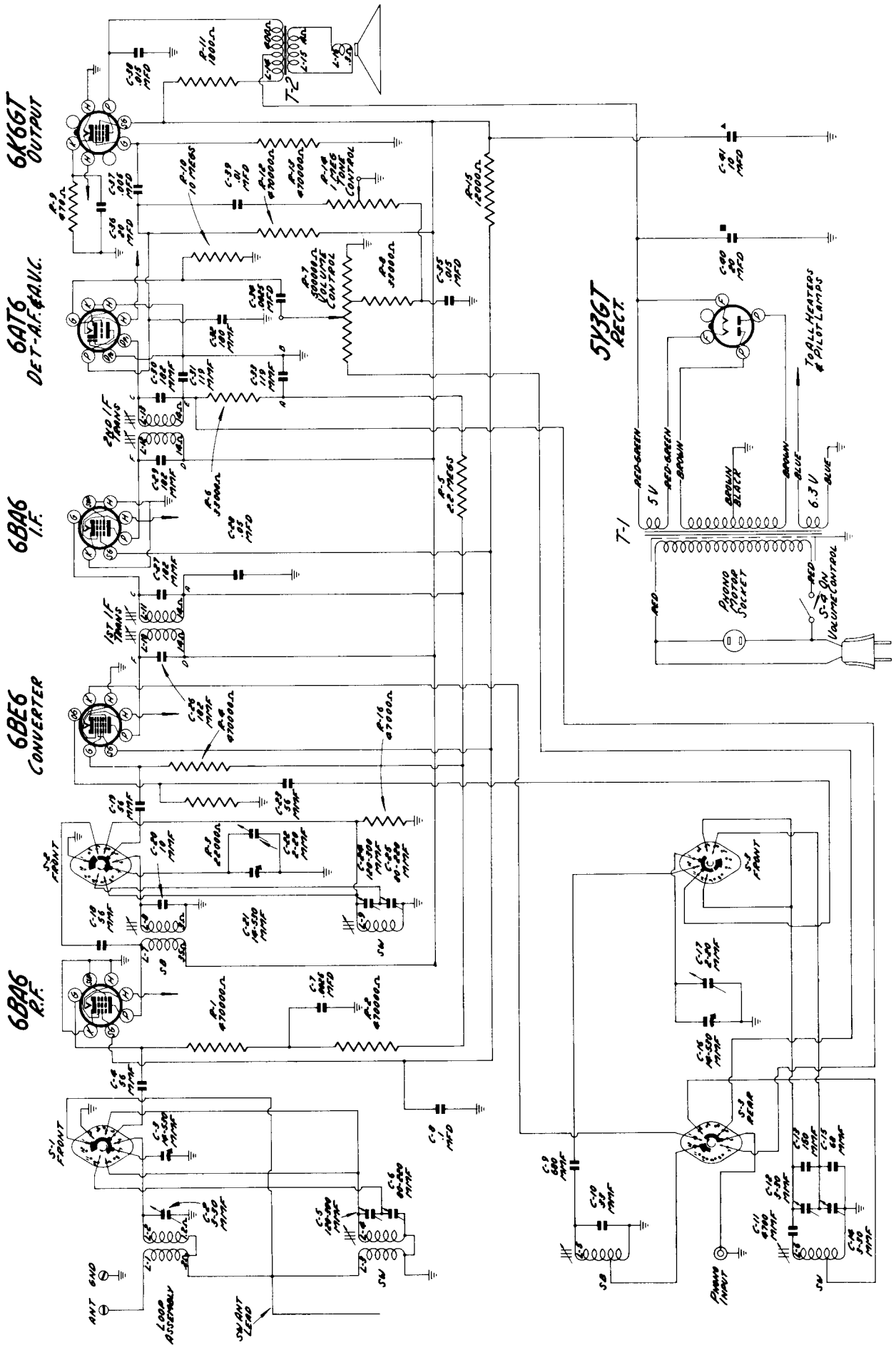


Figure 2—Schematic Diagram—Range Switch in Phono Position.

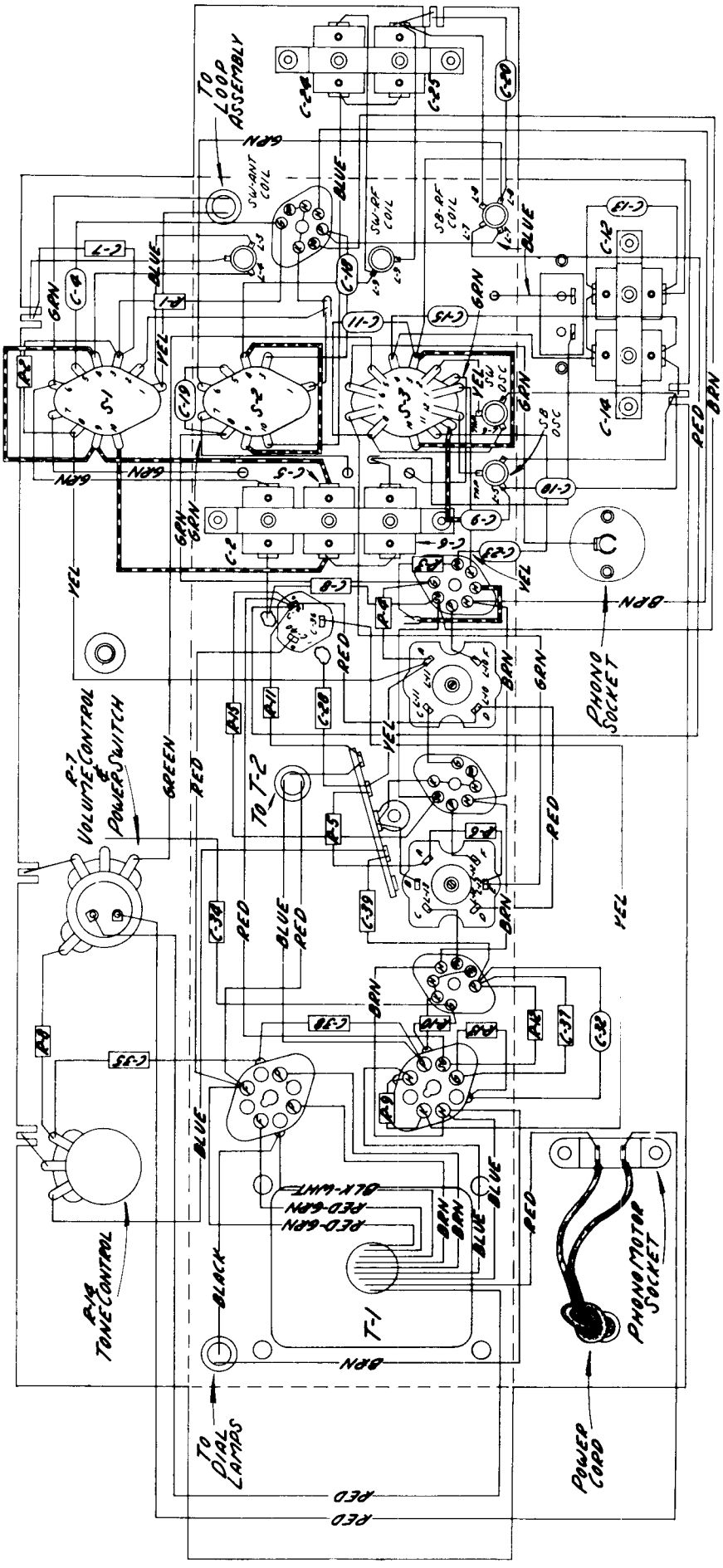


Figure 3—Wiring Diagram.

RADIOTRON SOCKET VOLTAGES

TYPE	CIRCUIT	PLATE	SCREEN	CONT. GRID	OSC. GRID		CATHODE	HEATER
					FREQ.			
6BA6	R. F.	260	120					6.3 A.C.
6BE6	Converter	260	120		600 Kc. 1500 Kc. 6.1 Mc. 12 Mc. 15.8 Mc.	-6 -10 -2 -5.5 -6		6.3 A.C.
6BA6	I. F.	260	120					6.3 A.C.
6AT6	Det. AVC & 1st Audio	60						6.3 A.C.
6K6GT/G	Output	300	260				18	6.3 A.C.
5Y3GT/G	Rectifier	300 A.C. (Pin 4) 300 A.C. (Pin 6)						5.0 A.C. (Pin 2 to Pin 8)
"B" Voltage measured from rectifier filament to ground 300 volts.								

Note:—All the above values hold within plus or minus 20% when measured with an RCA Voltohymst or equivalent, on a line voltage of 11 volts. All voltages except the rectifier filament voltage are measured to chassis.

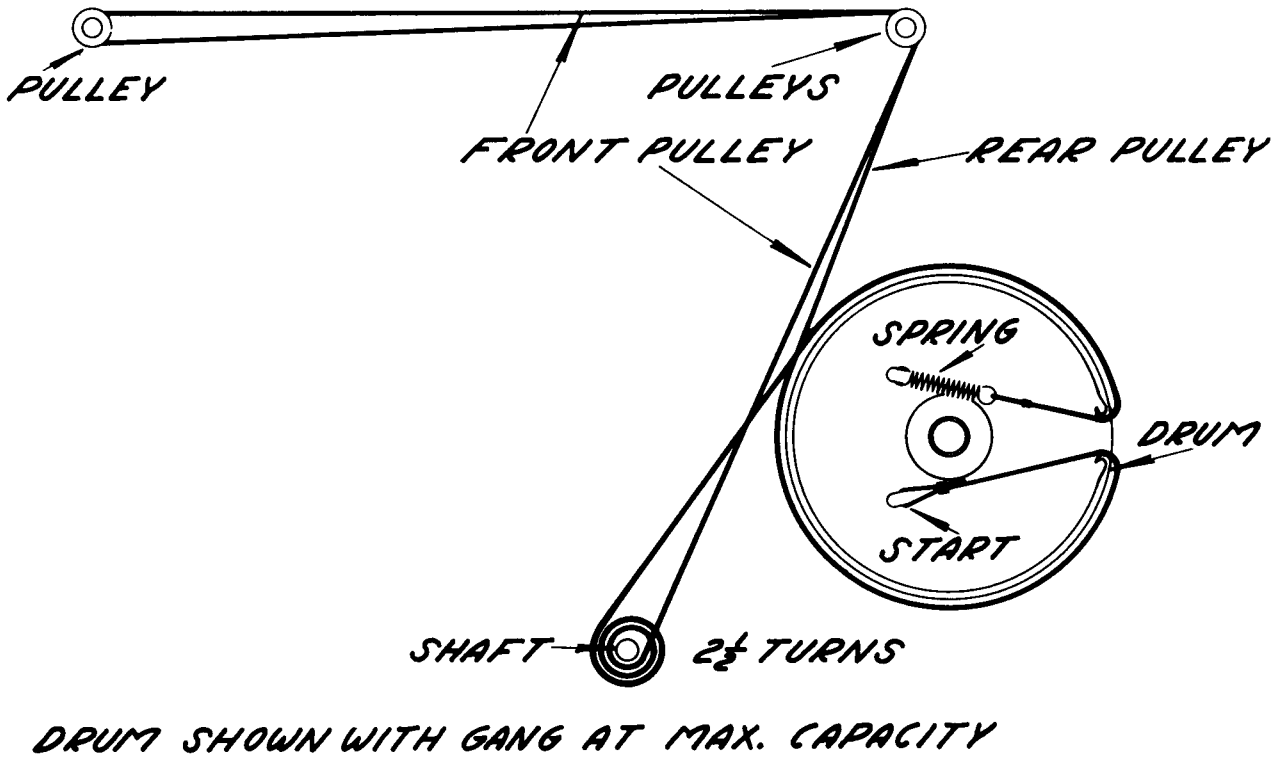


Figure 4—Dial Cord Stringing

REPLACEMENT PARTS FOR MODEL 62

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

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

STOCK NO.	DESCRIPTION		STOCK NO.	DESCRIPTION	
	RECEIVER ASSEMBLIES		30992	Resistor-10 Megohms 1/2 watt(R10)	
			S-3726	Switch-Range Switch(S1,S2,S3)....	
12930	Board-Ant.terminal board.....		S-3875	Shaft-Drive Shaft.....	
S-3717	Capacitor-Trimmer(C14,C12).....		14278	Socket-Phono Input.....	
S-3718	Capacitor-Trimmer(C24,C25).....		36500	Socket-Tube socket(Miniature less centre shield).....	
S-3719	Capacitor-Trimmer(C2,C5,C6).....		31319	Socket-Tube socket (octal).....	
31709	Capacitor-10 Mmfd.Ceramic(C20).....		36069	Socket-Tube socket(Miniature with centre shield).....	
39616	Capacitor-33 MMF mica(C10).....		S-3878	Scale-Dial Scale(Broadcast).....	
39622	Capacitor-56 MMF mica (C4,C19,C23, C18).....		S-3879	Scale-Dial Scale(49-31M).....	
39624	Capacitor-68 MMF mica (C15).....		S-3880	Scale-Dial Scale(25-19M).....	
12725	Capacitor-150 MMF mica (C13).....		S-3710	Transformer 1st I.F. (C26,C27, L10,L11).....	
39634	Capacitor-180 MMF mica (C32).....		S-3711	Transformer-2nd I.F. (C29,C30, C31,C33,L12,L13).....	
14498	Capacitor-680 MMF mica (C9).....		S-3722	Transformer-Power-60 cycles(T1)..	
39668	Capacitor-4700 MMF mica (C11).....		S-3721	Transformer-Power-25 cycles(T1)..	
S-3646	Capacitor-.005 Mfd. (C37).....		S-3725	Volume Control-500,000 ohms(R7, S4).....	
S-3644	Capacitor-.0025 Mfd.(C7,C34).....		S-3724	Tone Control-1 Meg. (R14).....	
S-3649	Capacitor-.015 Mfd.(C35,C38).....				
S-3648	Capacitor-.01 Mfd. (C39).....			**SPEAKER ASSEMBLIES**	
S-3653	Capacitor-.05 Mfd. (C28).....				
S-3655	Capacitor-.1 Mfd. (C8).....		S-4253	Cone-Cone and voice coil assy. (L16).....	
S-3720	Capacitor-Electrolytic(C36,C40,C41)		S-3723	Speaker.....	
S-3706	Condenser-Variable (with drive drum)(C3,C21,C22,C16,C17).....		S-3933	Output Transformer (T2), (L14, L15).....	
S-3712	Coil-Antenna Coil Short Wave(L3,L4)				
S-3713	Coil-R.F.Coil Standard Broadcast (L7,L8).....			**MISCELLANEOUS ASSEMBLIES**	
S-3714	Coil-R.F.Coil Short Wave (L9).....				
S-3715	Coil-Osc.Coil Short Wave (L6).....		S-3467	Cord-Power cord.....	
S-3716	Coil-Osc.Coil Standard Broadcast (L5).....		S-4256	Cloth-Grille cloth	
S-3877	Indicator-Dial Pointer.....		S-3876	Cord-Drive cord.....	
S-3899	Loop-Ant.loop (L1,L2).....		S-2824	Socket-A,C.....	
30499	Resistor-470 ohms 1/2 watt (R9)....		31418	Spring-Drive cord tension(Pkg.2).	
S-3682	Resistor-1800 ohms W.W. (R11).....		35814	Knob-Range.....	
43765	Resistor-12,000 ohms (R15).....		35775	Knob-Volume,tuning and tone.....	
30492	Resistor-22,000 ohms 1/2 watt (R3).				
30685	Resistor-33,000 ohms 1/2 watt (R6, R8).....				
30787	Resistor-47,000 ohms 1/2 watt(R16).				
30648	Resistor-470,000 ohms 1/2 watt (R2,R1,R4,R12,R13).....				
30649	Resistor-2.2 Megohms 1/4 watt(R5)..				

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


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MODEL VRB-62

Six-Tube, Two-Band, Battery Superheterodyne Radio-Phonograph Combination

TECHNICAL INFORMATION AND SERVICE DATA

1948 No. 12

GENERAL SERVICE DIVISION • RCA VICTOR COMPANY LTD.

Specifications



FREQUENCY RANGES

Standard Broadcast—S.B.	540-1600 Kc.
Short Wave 31-25-19M	9.3-16.0 Mc.
Intermediate Frequency	455 Kc.

RADIOTRON COMPLEMENT

(1) Type 1T4	R.F. Amplifier
(2) Type 1R5	Converter
(3) Type 1T4	I.F. Amplifier
(4) Type 155	2nd Det., A.V.C. & 1st A.F.
(5) Type 1A5GT	A.F. Amplifier
(6) Type 1G6GT/G	Power Output

POWER OUTPUT

Undistorted	0.50 Watts
Maximum	0.58 Watts

LOUDSPEAKER

Type	4 x 6 elliptical P.M.
Voice coil impedance	3.4 ohms at 400 cycles

BATTERIES REQUIRED

Eveready battery pack number 758 or one 1.4 volt air cell or 1.5 volt dry cell and two 45 volt heavy duty "B" batteries.

CURRENT CONSUMPTION

"A" at 1.4 volts		300 MA
"B" at 90 volts	(minimum)	14 MA
	(maximum)	26 MA

CABINET DIMENSIONS

Height	11¾ inches
Width	17⅜ inches
Depth	16¼ inches

PHONOGRAPH

Type	Manual
Motor	Spring Wound
Turntable Speed	78 R.P.M.

PICKUP

Type	Crystal
Impedance	100,000 Ohms at 1000 Cycles
Average Output	1 Volt at 1000 Cycles Across 1 Megohm Load

GENERAL DESCRIPTION

The VRB-62 is a six-tube, two band superheterodyne radio-phonograph combination receiver, housed in a table type cabinet of pleasing appearance. This receiver is designed to cover the standard broadcast band and the 31-25-19 meter short wave bands. Features of the design include:— Low-drain, high efficiency miniature tubes; Iron-core RF coils, Oscillator coils and I.F. transformers; Automatic volume control; Straight line dial; Spring-wound phonograph motor; Crystal type phonograph pickup with semi-permanent stylus; Four by six inch dust-proof elliptical P.M. loudspeaker.

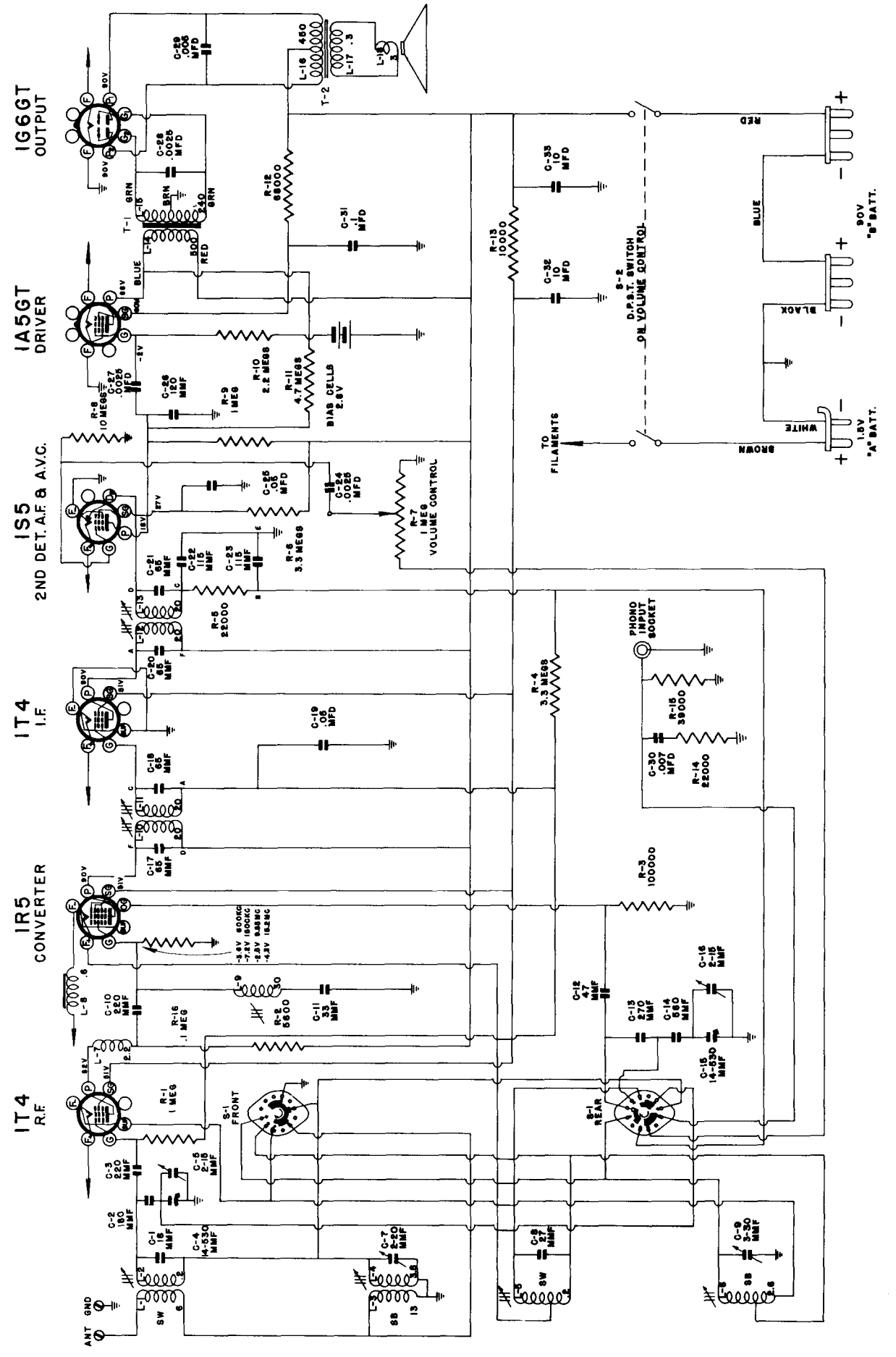


Fig. 1—Schematic Diagram—range switch shown in phono position

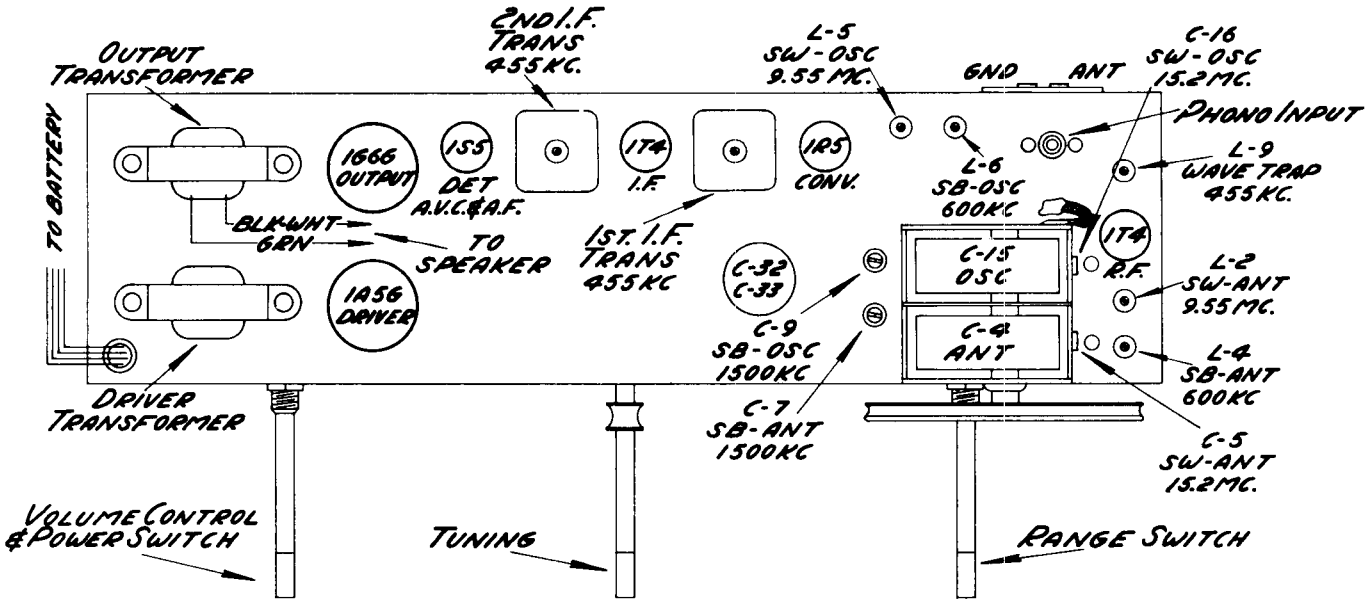


Fig. 2—Chassis Layout and Alignment Adjustments

ALIGNMENT PROCEDURE

Before aligning set, completely mesh the gang and set the dial pointer on the mechanical maximum calibration point at the extreme left hand end of the dial.

When making a complete alignment follow in proper sequence the tabulated form below.

If only a portion of the circuit is to be aligned select the portion required, followed by the remaining steps in the chart.

For "S.B." and 31-25-19M band alignment use output meter across voice coil keeping Test Oscillator output as low as possible to prevent AVC action.

Cathode-ray oscilloscope and sweep signal generator alignment of the 455 kc. A.M. I.F. transformers is the preferable method. Connect oscilloscope across the volume control. If the required equipment is not available use the method outlined below.

ALIGNMENT CHART

ORDER OF ALIGNMENT		TEST OSCILLATOR: CONNECT "HI" SIDE TO	TEST OSCILLATOR: CONNECT "LO" SIDE TO	TEST OSCILLATOR: DUMMY ANTENNA	TEST OSCILLATOR: FREQUENCY SETTING	RANGE SELECTOR	RECEIVER DIAL SETTING	CIRCUIT TO ADJUST	ADJUSTMENT SYMBOLS	NOTES
A.M. I.F. ALIGNMENT	1	1T4 1st I.F. Grid	Ground	.01 mfd.	455 KC 30% mod. 400 Cy. A.M.	S.B.	High Freq. end of Dial	2nd I.F. Trans.	L-12 and L-13	Adjust for max. Voltage across Voice Coil.
	2	1R5 Mixer Grid	Same	Same	Same	Same	Same	1st I.F. Trans.	L-10 and L-11	Same
	3	1T4 R.F. Grid	Same	Same	Same	Same	Same	Wave Trap	L-9	Adjust for min. Voltage across Voice Coil.
31-25-19M ALIGNMENT	4	"A" on Ant. Ter. Board	Ground	300 Ohms	9.55 MC 30% Mod. 400 Cy. A.M.	31-25-19M	9.55 MC Calibration point on dial.	Oscillator	L-5	
	5	Same	Same	Same	Same	Same	Same	Ant.	L-2	Same
	6	Same	Same	Same	15.2 MC 30% Mod. 400 Cy. A.M.	Same	15.2 MC Calibration point on dial.	Oscillator	C-16	Same
	7	Same	Same	Same	Same	Same	Same	Ant.	C-5	Same
	8	Repeat steps 4 to 7 for maximum output.								
		NOTE:- To guard against the possibility of alignment of L-5 and C-16 to image frequency, tune the test oscillator and receiver to 15.2 MC, then set test oscillator to 16.11 MC (image frequency). Increase the test oscillator output; A signal should be heard. Then tune test osc. and receiver to 9.55 MC. Reset test osc. to 10.46 MC (image frequency) and increase test osc. output; A signal should be heard. If these image frequencies cannot be heard, the receiver is incorrectly aligned. Therefore repeat steps 4 to 8.								
S.B. ALIGNMENT	9	"A" on Ant. Ter. Board	Ground	200 mmf.	600 KC 30% Mod. 400 Cy. A.M.	S.B.	600 KC Calibration point on dial.	Oscillator	L-6	Same
	10	Same	Same	Same	Same	Same	Same	Ant.	L-4	Same
	11	Same	Same	Same	1500 KC 30% Mod. 400 Cycles	Same	1500 KC Calibration point on dial	Oscillator	C-9	Same
	12	Same	Same	Same	Same	Same	Same	Ant.	C-7	Same
	13	Repeat steps 9 to 12 for max. output.								

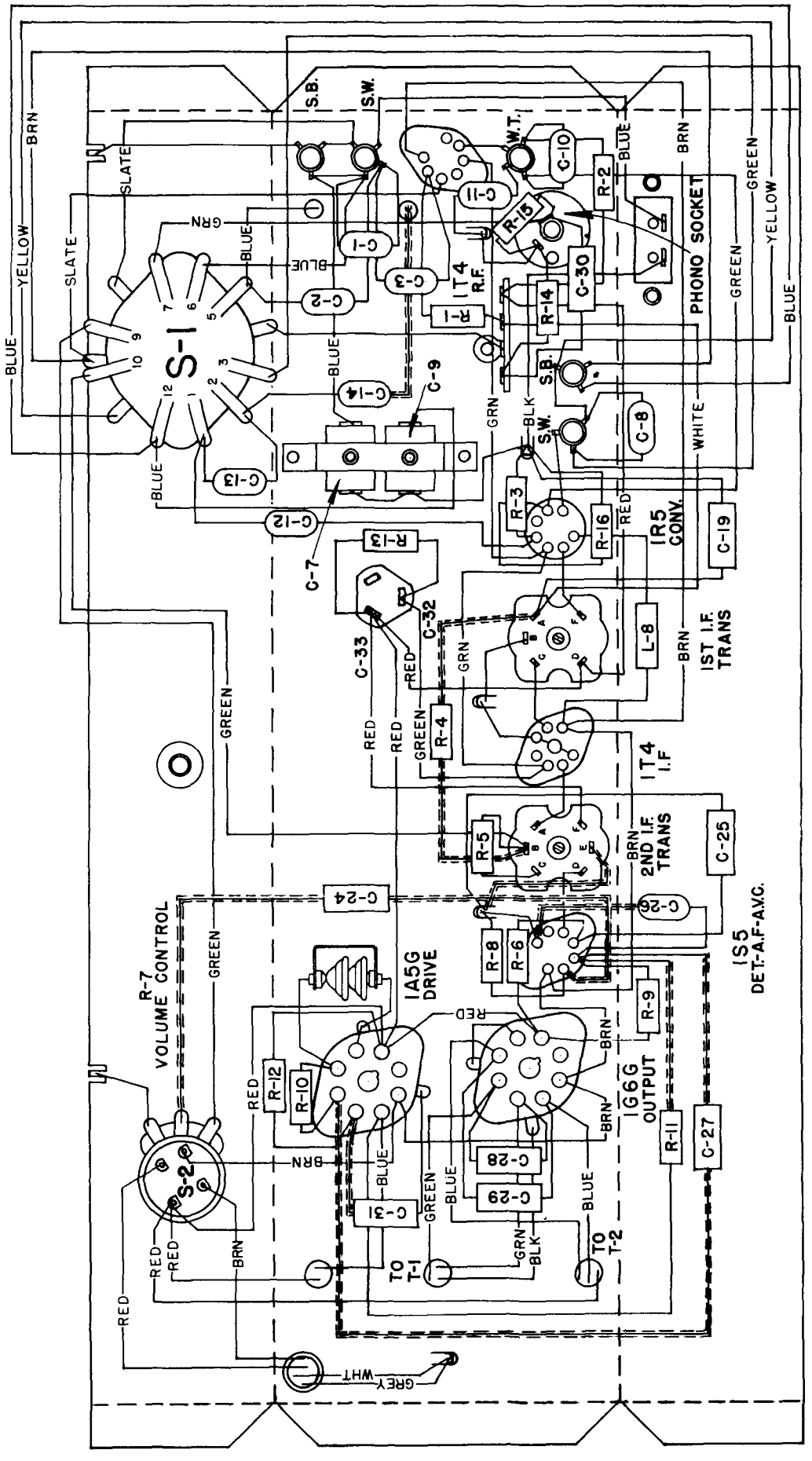


Fig. 3—Wiring Diagram.

Motor.—The drive motor is of simple design and substantial construction. It should require little or no service if properly maintained. Attention to lubrication of the moving parts and occasional cleaning of the mechanism will go far to prevent faulty operation. Should it become necessary to repair the motor, the following procedure should be applied: **CAUTION. —Allow the motor mechanism to run down completely before attempting adjustment, repairs, or replacements.**

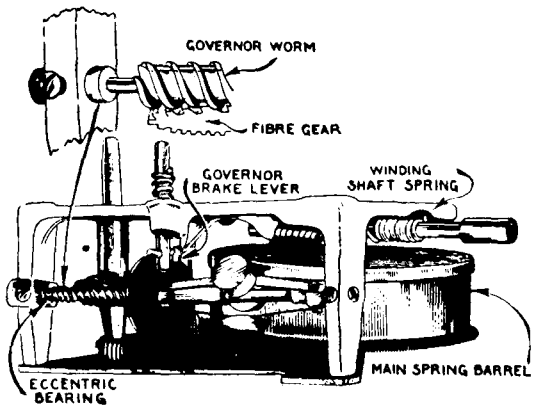
Removing Motor from Cabinet.—Remove the winding crank. Remove the four wood screws holding the base board in the cabinet. To dismount the motor, remove "C" washer from spindle shaft and remove turntable, slightly tapping the spindle while exerting an upward lift on the turntable. Loosen the screw holding the speed-regulating lever and remove the latter. The three screws holding motor to motor board should then be removed.

Replacing Main Spring Barrel.—In case of main spring failure, the entire spring barrel and gear should be replaced. Remove the spring-barrel spindle screw by **unscrewing to right.** Remove the C washer and two pillar screws holding bottom plate. Remove bottom plate, intermediate spindle shaft, and spring barrel. Reassemble parts in reverse sequence.

Winding Shaft Spring.—This spring functions as a friction ratchet. It may be removed as follows: remove pin holding winding worm on shaft; remove winding shaft; then remove screw holding spring. Replace in reverse sequence.

Speed Regulator Lever.—After assembly, adjust the speed regulator until the turntable rotates at 78 r.p.m.; loosen the speed regulator screw and set pointer to center of speed indicator scale; tighten screw and recheck turntable speed.

Lubrication.—All moving parts of the motor should be thoroughly cleaned and lubricated every six months to prevent excess wear and to assure proper operation. A small amount of grease should be applied to the worm gear of the governor, the gear of the winding shaft, and on the small pinion gear. All other points, including regulator friction pad, should be lubricated with light oil. All motor parts should be covered with a light film of oil to prevent rusting.



Motor Adjustments:

Speed variations or WOWS may be experienced with these instruments due to a variety of causes. Some of the troubles and corrections are listed below:

1. A regular WOW occurring on every revolution of the turntable, or every few revolutions.

(a) A frequent cause of this difficulty is faulty adjustment of the governor springs. If the governor weights seem to oscillate in and out when the motor is in operation, the spring tension of the three weights may not be evenly balanced. Loosen the spring clamping screws and position the springs so that all three weights are held with the same tension.

(b) Another possible cause of this trouble is faulty adjustment of the governor bearings. To adjust these bearings:

First: Set the speed regulator lever so that the face of the felt friction pad is accurately parallel to the governor friction plate.

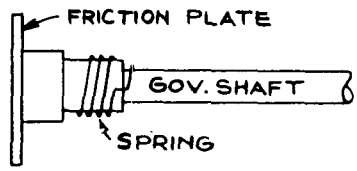
Second: Loosen both governor bearing set screws and position the governor so that the motor revolves at rated speed (78.4 rpm).

Third: Adjust the mesh of the worm and the fiber drive gear by turning the eccentric bearings. These should be set so that the worm meshes properly with the fiber gear without binding.

Fourth: Adjust the distance between bearings so that the governor turns freely with a minimum of end-play.

(c) A take-up spring is mounted on the governor friction plate shaft to ensure against lost motion and erratic operation of this plate. It is essential that this spring be in place and adjusted to provide adequate tension. It should be positioned as indicated in the sketch below.

(d) Marred or broken teeth on either gear on the turntable shaft or on the intermediate gear shaft may cause this trouble. If inspection shows this to be the case, the defective gear should be replaced.



Correct Position of Take-up Spring

2. The turntable loses speed or WOWS on the louder parts of a record:

(a) This may be caused by failure of the governor to respond accurately to speed changes, due to excessive or irregular friction between the sliding friction plate and the governor shaft. When this occurs it may be corrected by removing the weights and working the plate back and forth until it frees up. If the governor shaft does not have a smooth surface it may be necessary to smooth it down slightly using "Crocus Cloth" or to replace the governor.

(b) This condition may also be caused by excessive friction in any part of the motor. Be sure that the governor bearings are properly adjusted as described in section 1 (b). Lubricate all bearings in the motor using a high grade light oil. The governor shaft, friction plate, and felt friction pad should also be lubricated with this oil. Lubricate the worm with a light grease such as RCA Stock No. 10975 Electric Motor Grease. Remove the main spring and pack it with a graphite lubricant.

3. The turntable speed changes erratically over long periods of time.

(a) This may be caused by binding of the main spring due to improper lubrication. To correct this condition pack the spring with graphite grease as described in section 2 (b).

(b) Make sure that the top of the main spring housing does not rub on the end of the winding shaft.

(c) Inspect the gear teeth on the main spring gear. If these are marred or broken, it may be necessary to replace the spring assembly.

REPLACEMENT PARTS FOR MODEL VRB-62

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

STOCK NO.	DESCRIPTION
	RECEIVER ASSEMBLIES
12930	Board-Antenna terminal board
S-4245	Capacitor-Trimmer assembly (C7,C9)
39041	Capacitor-18 MMF Ceramic(C1) 5%
48162	Capacitor-27 " " (C8) 5%
39616	Capacitor-33 " Mica 10% (C11)
39620	Capacitor-47 " " 10% (C12)
12724	Capacitor-120 " " 20% (C26)
39634	Capacitor-180 " " 5% (C2)
39636	Capacitor-220 " " 10% (C3,C10)
39638	Capacitor-270 " " 5% (C13)
39646	Capacitor-560 " " 5% (C14)
S-3647	Capacitor-.007 Mfd.(C30)
S-3646	Capacitor-.005 Mfd.(C29)
S-3644	Capacitor-.0025 " (C24,C27,C28)
70615	Capacitor-.05 " (C19,C25)
S-3655	Capacitor-.1 " (C31)
28114	Capacitor-Electrolytic 10-10 Mfd. (C32,C33)
S-3731	Condenser,Variable with drum(C4,C15, C5,C16)
S-4237	Coil-Antenna coil B.C. (L3,L4)
S-4238	Coil-Antenna coil S.W. (L1,L2)
S-4240	Coil-Oscillator coil B.C. (L6)
S-4241	Coil-Oscillator coil S.W. (L5)
S-3695	Choke-Filament choke (L8)
S-3940	Indicator:Station selector pointer
30734	Resistor-5600 ohms 1/2 watt (R2)
3078	Resistor-10,000 ohms,1/2 watt (R13)
30492	Resistor-22,000 ohms,1/2 watt(R5,R14)
30147	Resistor-39,000 ohms,1/2 watt (R15)
14138	Resistor-68,000 ohms,1/2 watt (R12)
3252	Resistor-100,000 ohms,1/2 watt(R3, R16)
30652	Resistor-1 megohm,1/2 watt (R1,R9)
30649	Resistor-2.2 megohm,1/2 watt (R10)
31417	Resistor-3.3 megohm,1/2 watt (R6)
30931	Resistor-4.7 megohm,1/2 watt (R11)
30992	Resistor-10. megohm,1/2 watt (R8)
S-4337	Switch-Range switch (S1,S2)
71037	Socket-Tube socket (moulded)
31319	Socket-Tube socket (octal)
36069	Socket-Tube socket (miniature with centre shield)
36500	Socket-Tube socket (less centre shield)
S-4202	Socket-Phono socket
S-4336	Shaft-Drive Shaft
S-3526	Transformer-1st I.F. (L10,L11,C17, C18)
S-3527	Transformer-2nd I.F.(L12,L13,C20,C21)
S-4242	Transformer-Driver(L14,L15) (T1)
S-4239	Trap-Wave trap (L7,L9)
S-4335	Volume Control (R7,S2)
	SPEAKER ASSEMBLIES
S-3556	Dust Cap (Pkg.3)
S-3867	Cone-Cone and Voice Coil Assembly (L18)
S-3502	Speaker
S-4243	Transformer-Output (T2) (L16,L17)
	MISCELLANEOUS ASSEMBLIES
S-4403	Clamp-Dial clamp (Pkg.2)
31581	Cell-Bias cell
S-4402	Cloth-Grille cloth
S-4313	Cord-Drive cord
S-4248	Cable-Battery cable
S-4338	Dial-Dial scale
S-4404	Decal
S-4252	Hinge-Lid hinge
S-4213	Knob-(Range)
S-4214	Knob-(tuning and volume)
S-2398	Plug-Battery cable plug "A"
12827	Plug-Battery cable plug "B"
S-3463	Rest-Pick-up arm rest (Pkg.2)
S-4040	Support-Lid support (LH)
31418	Spring-Drive cord tension(Pkg.2)
30900	Spring-Knob retaining spring(Pkg.5)
	MOTOR ASSEMBLIES
S-3956	Governor spring screw (Pkg.3)
S-3957	Metal handle escutcheon
S-3960	Screw to attach Governor to shaft.
S-3962	Felt for speed regulating lever (Pkg.3)
S-3963	Spring barrel cover
S-3964	Governor bearing set screw(Pkg.3)
S-3965	Steel washer for mounting screw (Pkg. 3)
S-3966	Screw for attaching bottom plate to motor frame (Pkg.3)
S-3967	Washer used under speed regulator post (Pkg.3)
S-3968	Winding shaft gear
S-3969	Motor bottom plate
S-3970	Speed indicator pointer
S-3971	Speed regulating lever with felt
S-3973	Tension spring used on speed regulating post
S-3974	Spring barrel cup and gear
S-3975	Tubular rivet for attaching regulating lever,to motor frame (Pkg.3)
S-3976	Spring barrel,complete
S-3977	Mainspring
S-3979	Governor spring and weight
S-3980	Spring barrel shaft winding gear
S-3981	Governor tension spring
S-3982	Spring barrel shaft used with S-3980
S-3984	Fibre handle escutcheon
S-3985	Winding shaft
S-4401	Winding handle 4-1/2"
S-3988	Clip to hold spring barrel shaft to bottom plate
S-3989	Turntable brake
S-3990	Spring barrel shaft rivet
S-3997	Rubber washer for mounting screw (Pkg.3)
S-4153	Turntable 9"
S-3999	Governor shaft
S-4000	Intermediate gear, complete
S-4001	Governor bearing(smaller dia.centre)
S-4004	Governor bearing
S-4156	Speed indicator dial
S-4421	Turntable shaft
S-4422	Turntable holding clip (Pkg.3)
S-4003	Governor
	PICK-UP ARM ASSEMBLIES
S-3459	Arm-Pick-up arm shell
S-4407	Crystal-Crystal cartridge
S-3633	Base and pivot shaft.
S-4408	Needle-Plug-in type
31054	Grommet-Pick-up base
S-3466	Spring-Cable retaining spring(Pkg.2)
S-3462	Screw-Crystal retaining screw(Pkg.2)

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

RCA VICTOR

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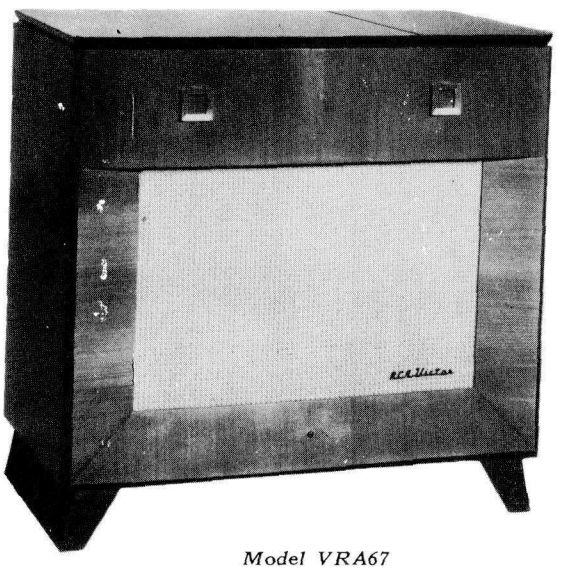
MODELS VRA65 & VRA67

Six Tube, Single-Band, A-C, Superheterodyne Radio-Phonograph Combination

TECHNICAL INFORMATION AND SERVICE DATA

1948 No. 9

GENERAL SERVICE DIVISION • R C A VICTOR COMPANY LTD.



Model VRA67



Model VRA65

Electrical and Mechanical Specifications

FREQUENCY RANGE

Standard Broadcast S.B. ---------- 540-1630 K.C
Intermediate Frequency A.M. ---------- 455 K.C.
Tuning Drive Ratio ---------- 12 to 1

RADIOTRON COMPLEMENT

(1) Type 6SA7 ---------- Converter
(2) Type 6SK7 ---------- I.F.
(3) Type 6SQ7 ---------- Det., A.V.C. & 1st A.F.
(4) Type 6AD7G ----Phase Inverter & Power Output
(5) Type 6F6 ---------- Power Output
(6) Type 5Y3GT ---------- Rectifier
Dial Lamps (2) ------Mazda No. 51 6-8 volts 0.2 amp.
Pilot Lamp (1) ------Mazda No. 47 6-8 volts 0.15 amp.

POWER OUTPUT

Undistorted ---------- 4 Watts
Maximum ---------- 5.5 Watts

LOUDSPEAKER

Type ---------- 12 inch P.M.
Voice Coil impedance ----------2.2 ohms at 400 cycles

CABINET DIMENSIONS (Inches)

	Height	Width	Depth
Model VRA65 ----------	32-3/16	33	17-1/32
Model VRA67 ----------	32-3/16	33	17-1/32

POWER SUPPLY RATINGS

Rating A ---------- 105-125 volts, 50-60 cycle, 75 watts
Rating B ----------105-125 volts, 25 cycle, 75 watts

PHONOGRAPH

Type RP-178 ---------- Automatic
Record Capacity -------Twelve 10-inch or Ten 12-inch
Turntable Speed ---------- 78 r.p.m.

PICKUP

Type ---------- Crystal
Impedance ----------100,000 ohms at 1,000 cycles
Average Output ---------- 1.4 volts at 400 cycles across 500,000 ohm load

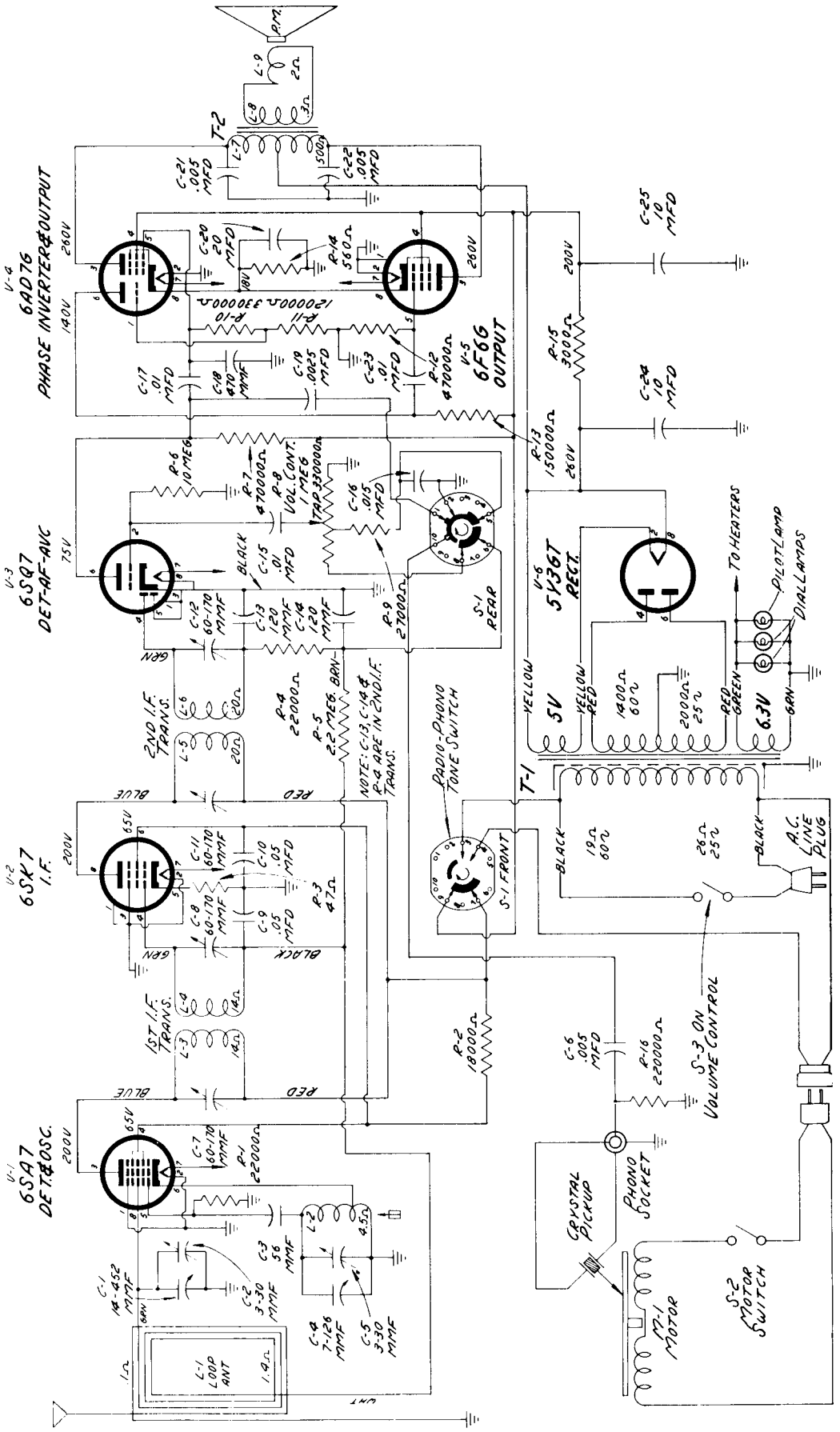


Fig. 1—Schematic Diagram.

Note:—The above voltages hold within plus or minus 20% when measured with a RCA Voltohmyst or equivalent, on a line voltage of 117 volts. All voltages are measured to chassis.

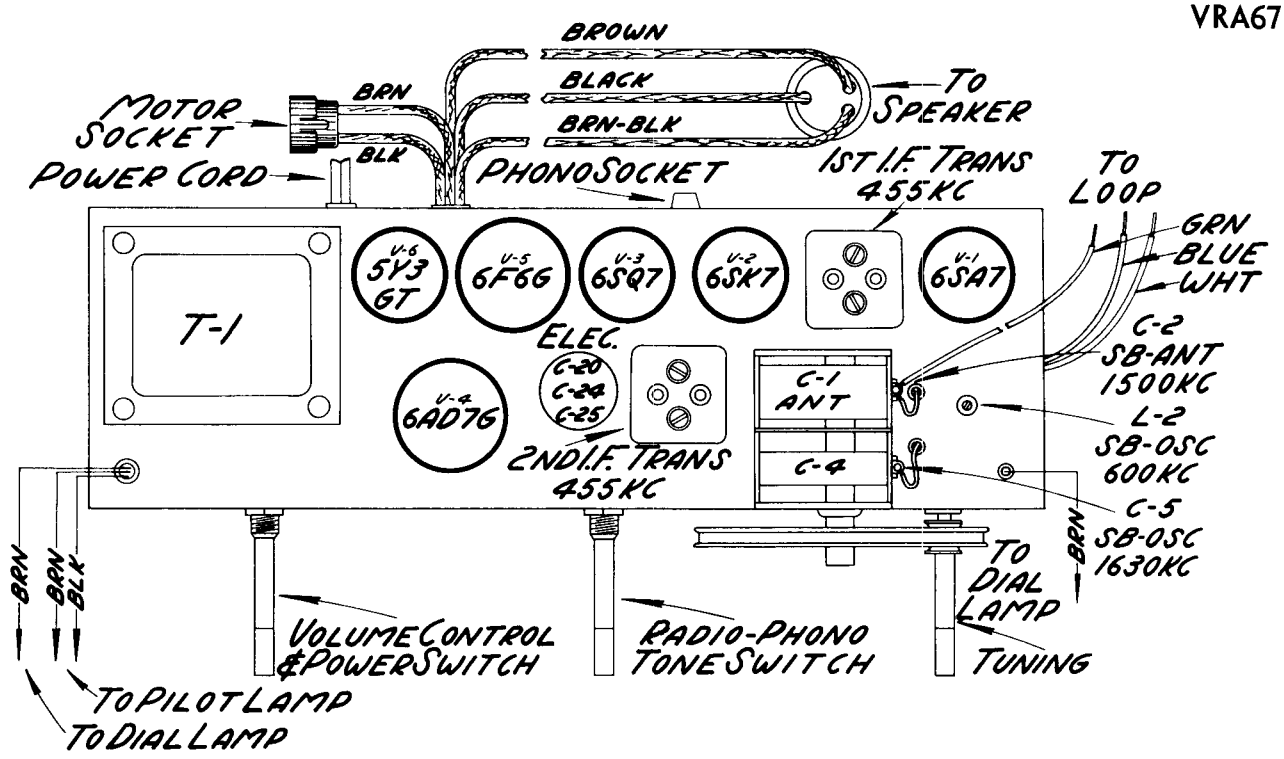


Fig. 2—Chassis Layout and Alignment Adjustments

ALIGNMENT PROCEDURE

Before aligning set, completely mesh the gang and set the dial pointer on the calibration point at the extreme left hand end of the dial.

When making a complete alignment follow in proper sequence the tabulated form below.

If only a portion of the circuit is to be aligned select the portion required, followed by the remaining steps in the chart.

Cathode-ray oscilloscope and sweep signal generator alignment of the 455 kc. A.M. I.F. transformers is the preferable method. Connect oscilloscope across the volume control. If the required equipment is not available use the method outlined below.

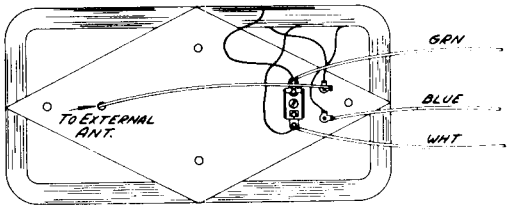


Fig. 3—Loop Connections

CRITICAL LEAD DRESS

(Make lead dress before alignment)

(1) Dress plate lead (blue) of 2nd I.F. transformer close to chassis and away from 6SQ7 socket.

(2) Dress audio coupling condenser to grid of 6SQ7 well up and away from 2nd I.F. transformer leads.

ALIGNMENT CHART

Order of Alignment		TEST OSCILLATOR				Tone Switch	Receiver Dial Setting	Circuit To Adjust	Adjustment Symbols	Notes
		Connect "HI" Side To	Connect "LO" Side To	Dummy Antenna	Frequency Setting					
A.M. I.F. ALIGNMENT	1	6SK7 1st I.F. Grid	Ground	.01 mfd.	455 K.C. 30% mod. 400 Cy. A.M.	Radio	High freq. end of dial	2nd I.F. Trans.	C11,C12	Adjust for max. A.C. voltage across voice coil.
	2	6SA7 Converter Grid	Same	Same	Same	Same	Same	1st I.F. Trans.	C7,C8	Same
S.B. ALIGNMENT	3	Lead Ant.	Ground	200 m.m.f.	1500 K.C. 30% mod. 400 Cy. A.M.	Radio	1500 K.C. on dial	Oscillator	C5	Adjust for max. A.C. voltage across voice coil.
	4	Same	Same	Same	Same	Same	Same	Ant.	C2	Same
	5	Same	Same	Same	600 K.C. 30% mod. 400 Cy. A.M.	Same	600 K.C. on dial	Oscillator	L2	"Same
		* NOTE:- Rock Oscillator in to loop at 600 K.C.								
	6	Repeat steps 3 to 5 for maximum output								

REPLACEMENT PARTS FOR MODELS VRA65 & VRA67

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

STOCK NO.	DESCRIPTION
	CHASSIS ASSEMBLY
S-4307	Capacitor-56 Mmfd. (C3).....
39644	Capacitor-470 Mmfd. (C18).....
S-3644	Capacitor-.0025 Mfd.(C19).....
S-3646	Capacitor-.005 Mfd.(C6,C21,C22)...
S-3648	Capacitor-.01 Mfd.(C17,C23,C15)..
S-3649	Capacitor-.015 Mfd.(C16).....
70615	Capacitor-.05 Mfd.(C9,C10).....
S-4280	Condenser-Variable (C1,C2,C4,C5)...
32240	Capacitor-Electrolytic(C20,C24,C25)
S-3480	Coil-Oscillator Coil (L2).....
S-4281	Indicator-Station Selector pointer.
30732	Resistor-47 ohms 1/4 watt (R3).....
30735	Resistor-560 ohms 1 watt (R14)....
S-3521	Resistor-3,000 ohms W.W.5 watt(R15)
30151	Resistor-18,000 ohms 1 watt (R2) ..
30492	Resistor-22,000 ohms 1/4 watt(R1,R4)
12738	Resistor-27,000 ohms 1/4 watt(R9)..
30180	Resistor-120,000 ohms 1/4 watt(R11)
14020	Resistor-150,000 ohms 1/4 watt(R13)
14583	Resistor-220,000 ohms 1/4 watt(R16)
14983	Resistor-330,000 ohms 1/4 watt(R10)
30648	Resistor-470,000 ohms 1/4 watt (R7,R12)....
30649	Resistor-2.2 Megohms 1/4 watt (R5).
30992	Resistor-10 Megohms 1/4 watt (R6).
S-4277	Shaft-Drive Shaft.....
S-4276	Switch-Tone and phono switch (S1)..
S-4341	Socket-Tube socket.....
S-4202	Socket-Phono socket.....
S-3503	Transformer-1st I.F.(L3,L4,C7,C8)..
S-3504	Transformer-2nd I.F.(L5,L6,C11,C12)
S-2317	Transformer-Power 60 cycle (T1)....
S-3501	Transformer-Power 25 cycle (T1)....
S-4275	Volume Control 1 Meg. (R8).....

STOCK NO.	DESCRIPTION
	SPEAKER ASSEMBLY 12" P.M.
31825	Dust Cap (Pkg.5).....
S-4270	Cone-Cone and voice coil assy. (L9).....
S-4274	Speaker-complete.....
S-2934	Output transformer (T2)(L7,L8)..
	MISCELLANEOUS ASSEMBLIES
S-4313	Cord-Dial cord (Universal).....
S-4367	Cord-Power cord.....
S-4271	Dial-Dial Scale.....
S-4366	Decal.....
36386	Decal His Master's Voice.....
13103	Jewel-lamp cap.....
S-4272	Knob-(Volume-tuning).....
S-4273	Knob-(Radio-phono).....
S-4279	Loop-Antenna loop assembly (L1).
11765	Lamp-Pilot lamp.....
30868	Plug-Motor lead plug.....
5119	Plug-Speaker lead plug.....
S-4040	Support-Lid support L.H.....
30900	Spring-Knob retaining spring (Pkg.5).....
31418	Spring-Drive cord tension (Pkg.2).....
33726	Washer-"C" washer for drive shaft (Pkg.5).....
	AUTOMATIC RECORD CHANGER MECHANISM
	Refer to Model RP-178 Service Note for Replacement parts and service data.

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

RCA VICTOR

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MODEL VE 66D

SIX-TUBE, A-C ELECTRIC PHONOGRAPH

TECHNICAL INFORMATION AND SERVICE DATA

1948 No. 6

GENERAL SERVICE DIVISION • RCA VICTOR COMPANY LTD.

Electrical and Mechanical Specifications

Tube Complement

(1) RCA-6J5.....1st Audio Amplifier
(2) RCA-6SQ7.....2nd Audio Amplifier
(3) RCA-6SQ7.....Phase Inverter
(4) RCA-6K6GT.....Power Output
(5) RCA-6K6GT.....Power Output
(6) RCA-5Y3GT.....Rectifier

Power Supply Rating

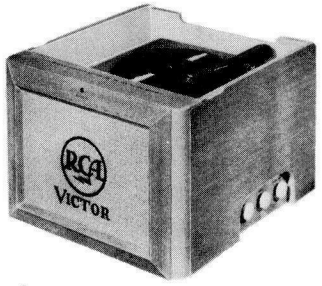
105-125 volts AC, 60 cycles.....100 watts
105-125 volts AC, 25 cycles.....100 watts

Loudspeaker

Type.....Twelve-inch PM
Voice Coil Impedance.....2.2 ohms at 400 cycles

Motor Board

Motor.....Shaded Pole Self-starting
Turntable speed.....78 RPM
Pickup.....Crystal (Low noise, low voltage, sapphire point)



Lid Removed

Cabinet Dimensions

Height 14⅛".....Width 18½".....Depth 20⅝"

Pilot Lamps

(2) Mazda 55 (Control and compartment lamp)....6-8 volts
(1) Mazda 51 (Pilot lamp).....6-8 volts.

Power Output

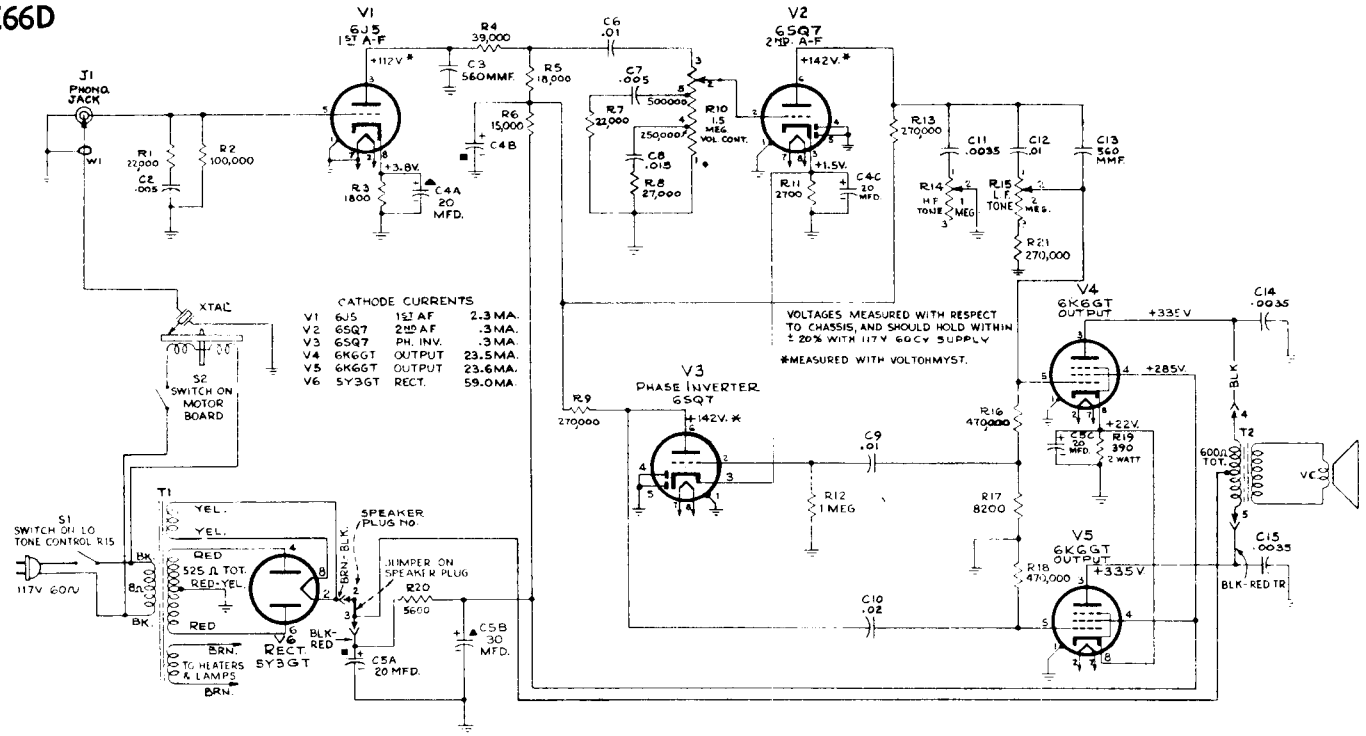
Undistorted.....7 watts

REPLACEMENT PARTS FOR MODEL VE 66D

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

STOCK NO.	DESCRIPTION		STOCK NO.	DESCRIPTION	
	AMPLIFIER ASSEMBLY			MOTORBOARD ASSEMBLY	
39646	Capacitor-560 MMF (C3,C13).....		71294	Arm-Pickup arm.....	
S-3645	Capacitor-.0035 Mfd.(C14,C11,C15)..		70332	Crystal-Crystal cartridge.....	
S-3646	Capacitor-.005 Mfd. (C2,C7).....		S-4015	Motor-60 cycle.....	
S-3648	Capacitor-.01 Mfd. (C6,C9,C12)....		S-3951	Motor-25 cycle.....	
S-3649	Capacitor-.015 Mfd. (C8).....		70546	Motorboard Mtg. Kit.....	
S-3650	Capacitor-.02 Mfd. (C10).....		72208	Rest-Pickup arm rest.....	
71976	Capacitor-Electrolytic 20-30-20 Mfd. (C5A,C5B).....		72203	Switch-off/on switch (S2).....	
			72205	Spindle-turntable spindle.....	
38233	Capacitor-Electrolytic 20-20-20 Mfd.(C4A,C4B,C4C).....		38449	Sapphire.....	
			71414	Spring-Idler tension spring.....	
72325	Resistor-390 ohms 2 watt (R19).....		S-4034	Stop-Volume control stop.....	
30930	Resistor-1800 ohms 1/2 watt (R3)...		72206	Turntable.....	
30730	Resistor-2700 ohms 1/2 watt (R11)..		71413	Wheel-Idler wheel.....	
S-4035	Resistor-5600 ohms 2 watt (R20)....				
14250	Resistor-8200 ohms 1/2 watt (R17)..			MISCELLANEOUS ASSEMBLY	
36714	Resistor-15000 ohms 1/2 watt (R6).		S-4036	Cable-Speaker cable.....	
3219	Resistor-18,000 " 1/2 watt (R5)..		71978	Cover-Compartment lamp lead cover..	
30492	Resistor-22,000 ohms 1/2 " (R1,R7).		4577	Connector male.....	
30409	Resistor-27,000 ohms 1/2 watt (R8).		S-3467	Cord-Power cord.....	
30147	Resistor-39,000 ohms 1/2 watt (R4).		72115	Decal RCA Victor.....	
3252	Resistor-100,000 ohms 1/2 watt (R2)		72116	Decal Control panel.....	
30651	Resistor-270,000 ohms 1/2 watt (R9, R13,R21).....		38386	Decal RCA Victor.....	
			72112	Grille cloth and wire screen.....	
30648	Resistor-470,000 ohms 1/2 watt(R16, R18).....		72105	Hinge-lid hinge.....	
			13103	Jewel.....	
30652	Resistor-1 Megohm 1/2 watt (R12)...		S-3871	Knob.....	
31319	Socket-Tube Socket.....		72110	Lid support (LH).....	
31251	Socket-Tube Socket wafer.....		11765	Lamp-Pilot lamp.....	
35787	Socket-Phono socket.....		5117	Lamp-Pilot lamp.....	
S-4023	Transformer-Power 60 cycle (T2)....		31364	Socket-Dial lamp socket and lead...	
S-4024	Transformer-Power 25 cycle (T1)....		30900	Spring-Knob retaining spring (Pkg.5)	
38402	Tone Control & switch(LF)(R15,S1)..		31048	Plug-Plug for pickup cable.....	
38405	Tone Control H.F. (R14).....		30868	Plug-2 pin plug for motor cable....	
71596	Volume Control (R10).....		12493	Plug-5 pin plug for speaker.....	
	SPEAKER ASSEMBLY				
31825	Dust Cap (Pkg.5).....				
S-4299	Cone-Cone and Voice Coil Assembly..				
S-4319	Speaker.....				
S-2934	Output Transformer.....				

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



Schematic Circuit Diagram

ADJUSTMENT OF VOLUME CONTROL LOCK

This instrument is provided with a Volume Control Lock, which can be adjusted in such a manner that will permit the control to be operated from zero to some pre-determined "Maximum" level to which it has been locked.

1. While instrument is in operation, remove Volume control knob.
2. The ends of two different weight springs can be seen in the Volume control shaft opening in the cabinet.
3. Turn Control "Maximum" clockwise until it is against stop.
4. To INCREASE desired maximum Volume level—
   (a) Apply just enough force (to unlock volume control shaft) with the eraser end of a pencil, on the end of the light weight spring, in direction indicated in sketch "B"



   (b) Rotate volume control shaft in direction indicated until desired level is reached.
   (c) Releasing force on spring automatically locks control so it can be operated from zero to the level where it has been locked.
5. To DECREASE desired maximum Volume level—
   (a) Apply force with the eraser end of a pencil on the heavy weight spring as indicated in sketch (c).
   (b) Rotate to a very low level, then proceed as in step 4.

NOTE: The procedure in step (5b) is necessary to prevent possible error that may be introduced due to backlash.

VIBRATION OF LID HOLD

A small piece of spring material is fastened on the inside of the cabinet in such a position as to apply force against the lid hold and keep it from vibrating when the lid is closed.

When servicing the instrument, make certain this spring is in position and serving its purpose.

Removal of Speaker and Jewel Pilot Light

The bottom front and the inside sloped panels are removable, making it convenient for removal of speaker and jewel pilot light.

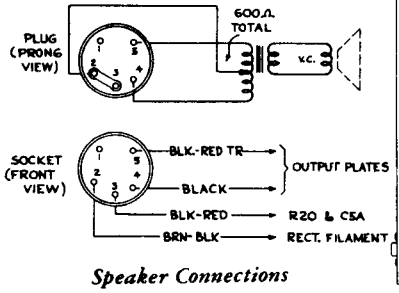
Lubrication

Under normal operating conditions the turntable drive motor should not require lubrication for a long period of time. When lubrication becomes necessary, use good quality light machine oil (SAE #10).

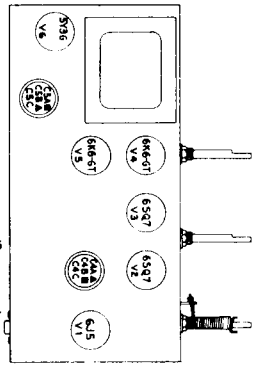
CAUTION:
Exercise extreme care to prevent getting any oil on the rubber tire or on the motor shaft. Oil on these parts will cause slippage with resultant irregular turntable speed.

CRITICAL LEAD DRESS

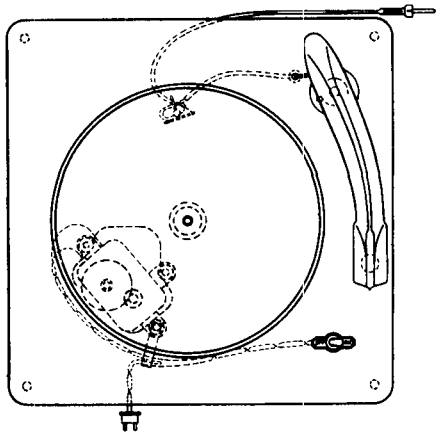
1. All leads and parts connected to the 6J5 socket should have sufficient slack to insure flexibility of socket.
2. The green lead from the center terminal of R10 volume control to terminal #2 of the 6SQ7 socket should be dressed up and away from all other leads and parts.
3. The lead from pin #5 of the 6J5 socket to the phono jack should be dressed up and away from all other leads and parts.

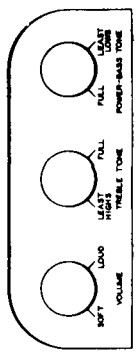


Speaker Connections



Location of Tubes



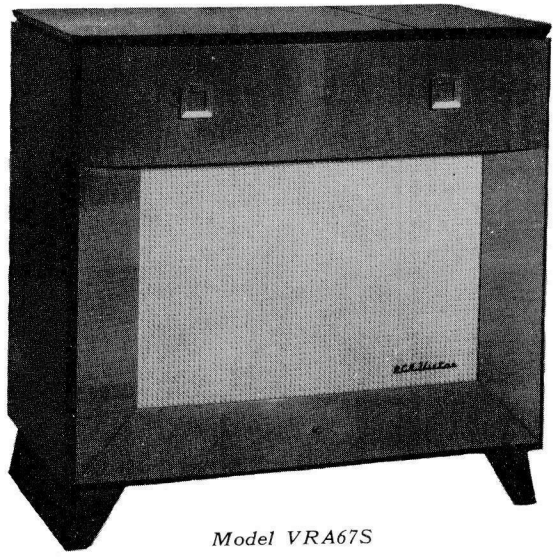


Controls

RCA VICTOR
MODEL VRA67S
Six Tube, Two-Band, A-C, Superheterodyne Radio-Phonograph Combination
TECHNICAL INFORMATION AND SERVICE DATA

1948 No. 14

GENERAL SERVICE DIVISION • RCA VICTOR COMPANY LTD.



Model VRA67S

Electrical and Mechanical Specifications

FREQUENCY RANGE

Standard Broadcast S.B.	530-1630 K.C.
Short Wave	9.3-16 M.C.
Intermediate Frequency	455 K.C.

RADIOTRON COMPLEMENT

(1)	Type 6SA7	Converter
(2)	Type 6SK7	I.F.
(3)	Type 6SQ7	Det., A.V.C. & 1st A.F.
(4)	Type 6AD7G	Phase Inverter & Power Output
(5)	Type 6F6G	Power Output
(6)	Type 5Y3GT	Rectifier

Dial Lamps (2) ——Mazda No. 51 6-8 volts 0.2 amp.

Pilot Lamp (1) ——Mazda No. 47 6-8 volts 0.15 amp.

POWER OUTPUT

Undistorted	4 Watts
Maximum	5.5 Watts

LOUDSPEAKER

Type	12 inch P.M.
Voice Coil impedance	2.2 ohms at 400 cycles

CABINET DIMENSIONS (Inches)

	Height	Width	Depth
Model VRA67S	32-3/16	33	17-1/32

POWER SUPPLY RATINGS

Rating A	105-125 volts, 50-60 cycle, 75 watts
Rating B	105-125 volts, 25 cycle, 75 watts

PHONOGRAPH

Type RP-178	Automatic
Record Capacity	Twelve 10-inch or Ten 12-inch
Turntable Speed	78 r.p.m.

PICKUP

Type	Crystal
Impedance	100,000 ohms at 1,000 cycles
Average Output	1.4 volts at 400 cycles across 500,000 ohm load

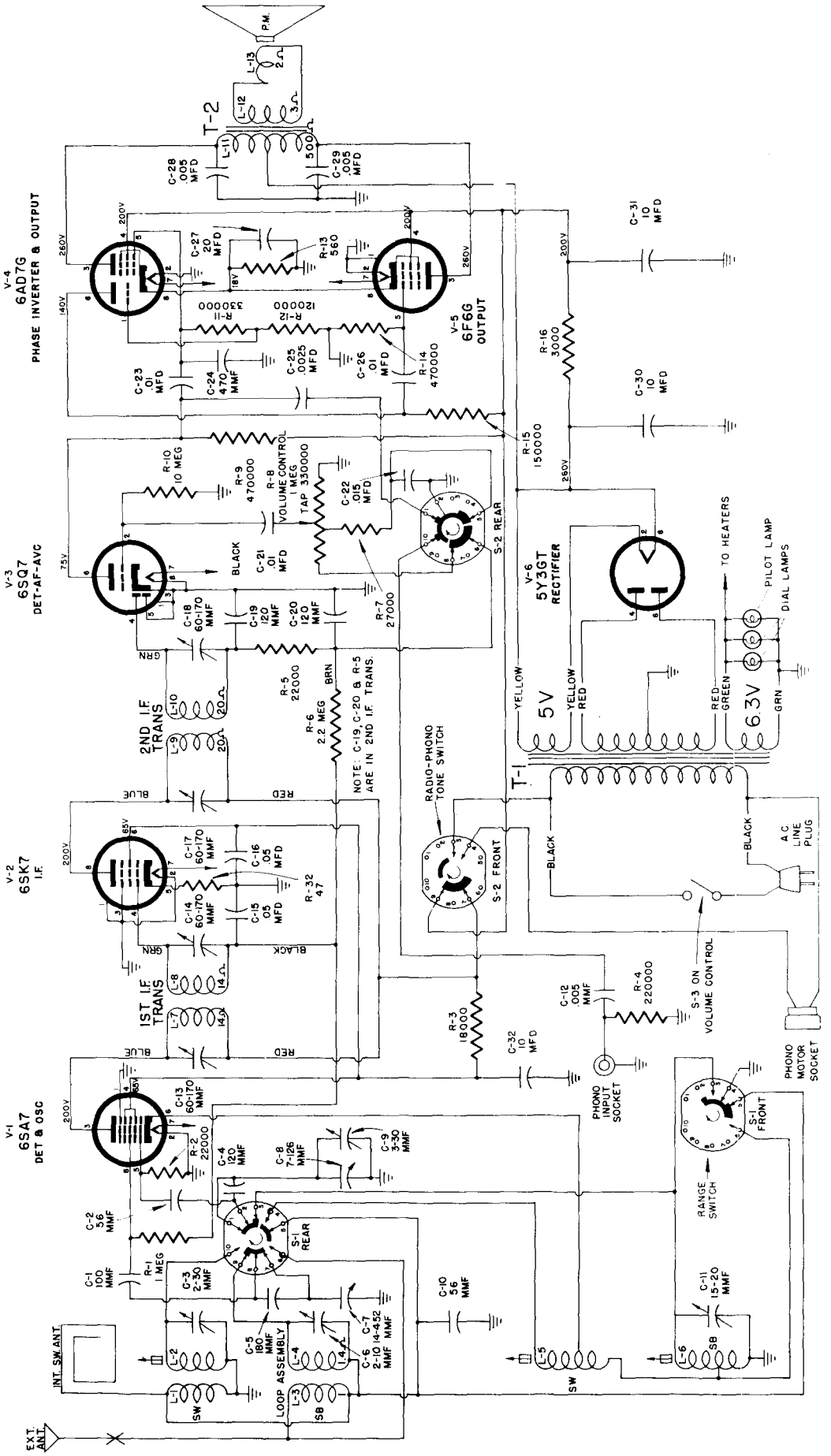


Fig. 1—Schematic Diagram.

Note:—The above voltages hold within plus or minus 20% when measured with a RCA Voltohmyst or equivalent, on a line voltage of 117 volts. All voltages are measured to chassis.

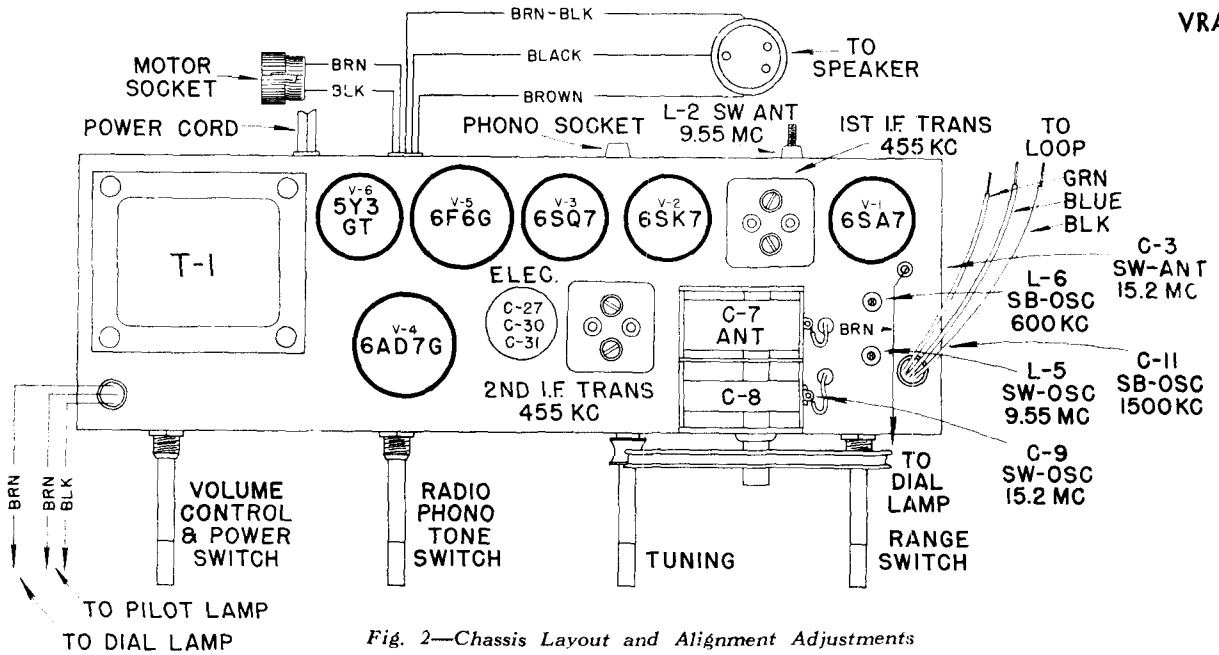


Fig. 2—Chassis Layout and Alignment Adjustments

ALIGNMENT PROCEDURE

Before aligning set, completely mesh the gang and set the dial pointer on the calibration point at the extreme left hand end of the dial.

When making a complete alignment follow in proper sequence the tabulated form below.

If only a portion of the circuit is to be aligned select the portion required, followed by the remaining steps in the chart.

Cathode-ray oscilloscope and sweep signal generator alignment of the 455 kc. A.M. I.F. transformers is the preferable method. Connect oscilloscope across the volume control. If the required equipment is not available use the method outlined below.

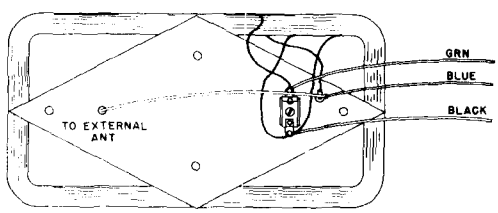


Fig. 3—Loop Connections

CRITICAL LEAD DRESS

(Make lead dress before alignment)

(1) Dress plate lead (blue) of 2nd I.F. transformer close to chassis and away from 6SQ7 socket.

(2) Dress audio coupling condenser to grid of 6SQ7 well up and away from 2nd I.F. transformer leads.

ALIGNMENT CHART

	Order of Alignment	TEST OSCILLATOR: Connect "HI" Side To	TEST OSCILLATOR: Connect "LO" Side To	TEST OSCILLATOR: Dummy Antenna	TEST OSCILLATOR: Frequency Setting	Range Switch	Receiver Dial Setting	Circuit To Adjust	Adjustment Symbols	Notes
I.F. ALIGNMENT	1	6SK7 1st I.F. Grid	Ground	.01 mfd.	455 K.C. 30% mod. 400 Cy.A.M.	S.B.	High freq. end of dial	2nd I.F. Trans.	C17,C18	Adjust for max. A.C. voltage across voice coil.
	2	6SA7 Converter Grid	Same	Same	Same	Same	Same	1st I.F. Trans.	C13,C14	Same
31-25-19M ALIGNMENT	3	Ant. Lead	Ground	300 Ohms	9.55 MC 30% Mod. 400 Cy.A.M.	31-25-19M	9.55 MC Calibration point on dial.	Oscillator	L-5	Adjust for max. voltage across voice coil
	4	Same	Same	Same	Same	Same	Same	Ant.	L-2	Same
	5	Same	Same	Same	15.2 MC 30% Mod. 400 Cy.A.M.	Same	15.2 MC Calibration point on dial.	Oscillator	C-9	Same
	6	Same	Same	Same	Same	Same	Same	Ant.	C-3	Same
	7	Repeat steps 3 to 6 for maximum output.								
		NOTE:- To guard against the possibility of alignment of L-5 and C-9 to image frequency, tune the test oscillator and receiver to 15.2 MC, then set test oscillator to 16.11 MC (image frequency). Increase the test oscillator output: A signal should be heard. Then tune test osc. and receiver to 9.55 MC. Reset test osc. to 10.46 MC (image frequency) and increase test osc. output; A signal should be heard. If these image frequencies cannot be heard, the receiver is incorrectly aligned. Therefore repeat steps 3 to 7.								
S.B. ALIGNMENT	8	Ant. Lead	Ground	220 m.m.f.	1500 K.C. 30% mod. 400 Cy.A.M.	S.B.	1500 K.C. on dial	Oscillator	C-11	Adjust for max. A.C. voltage across voice coil.
	9	Same	Same	Same	Same	Same	Same	Ant.	C-6	Same
	10	Same	Same	Same	600 K.C. 30% mod. 400 Cy.A.M.	Same	600 K.C. on dial	Oscillator	L-6	*Same
		* NOTE:- Rock Oscillator in to loop at 600 K.C.								
	11	Repeat steps 8 to 10 for maximum output								

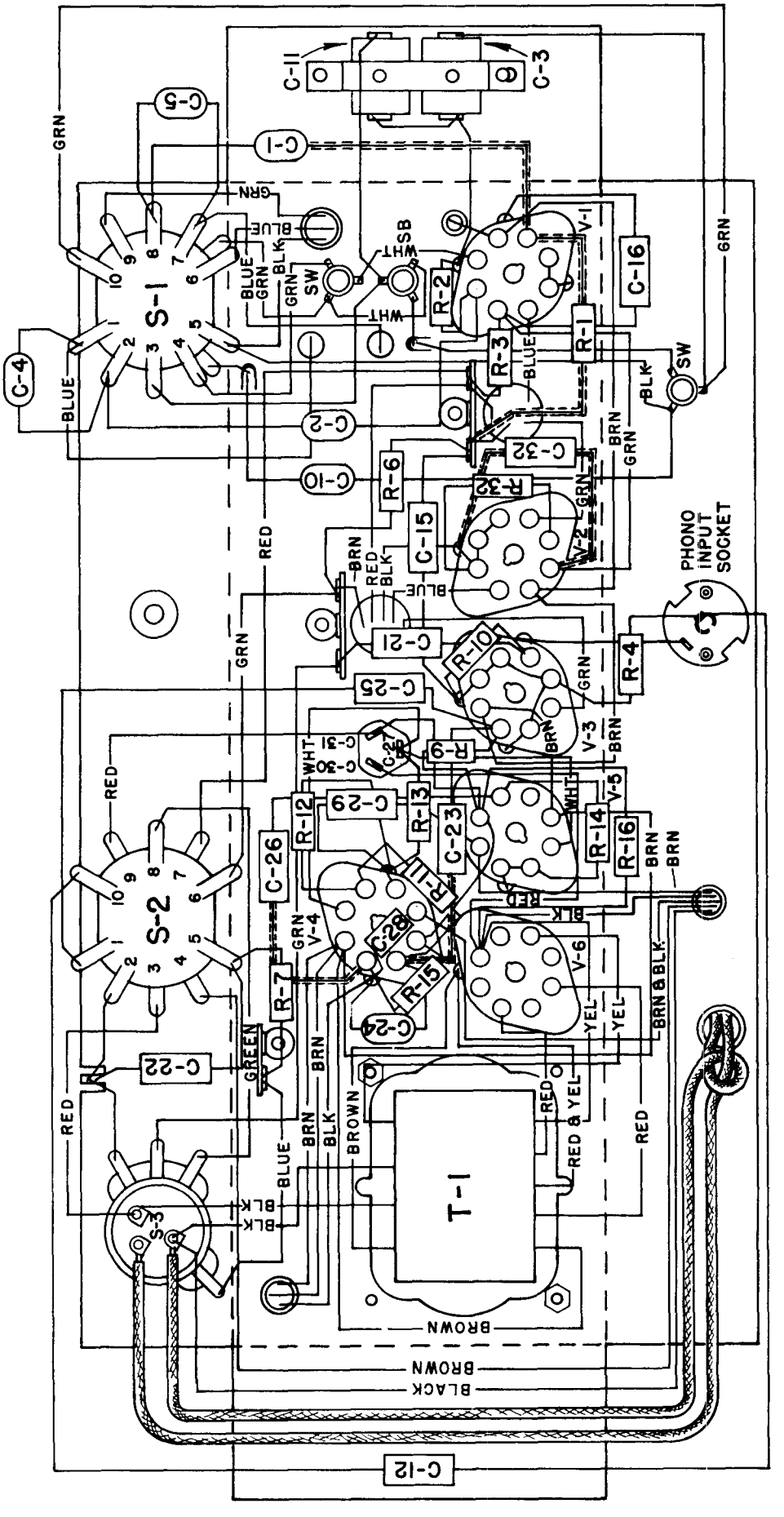


Fig. 4 Chassis Wiring Diagram

REPLACEMENT PARTS FOR MODEL VRA67S

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

STOCK NO.	DESCRIPTION
	CHASSIS ASSEMBLY
S-4431	Capacitor-trimmer assembly(C11,C3)..
S-4307	Capacitor-56 MMF (C2,C10).....
39628	Capacitor-100 MMF(C1).....
12724	Capacitor-120 MMF(C4).....
39634	Capacitor-180 MMF(C5).....
39644	Capacitor-470 MMF(C24).....
S-3644	Capacitor-.0025 MFD (C25).....
S-3649	Capacitor-.015 MFD (C22).....
S-3648	Capacitor-.01 MFD (C21,C23,C26)...
70615	Capacitor-.05 MFD (C15,C16).....
S-3646	Capacitor-.005 MFD (C28,C29,C12)...
S-4670	Capacitor-Electrolytic 10 MFD (C32).
32240	Capacitor- " 10-10-20 MFD (C27,C30,C31).....
S-4280	Condenser-Variable (C7,C8,C9).....
S-4669	Coil-Oscillator coil (L6).....
S-4433	Coil-Antenna coil S.W. (L1,L2).....
S-4434	Coil-Oscillator coil S.W. (L5).....
S-4281	Indicator-station selector pointer..
S-4667	Loop-Loop Assembly (L3,L4).....
S-4668	Resistor-47 ohms W.W. (R32).....
30735	Resistor-560 ohms 1 watt (R13).....
30151	Resistor-18,000 ohms, 1 watt (R3)...
30492	Resistor-22,000 ohms, 1/4 watt (R2).
12738	Resistor-27,000 ohms, 1/4 watt (R7).
30180	Resistor-120,000 ohms,1/4 watt (R12)
14020	Resistor-150,000 ohms,1/4 watt (R15)
14583	Resistor-220,000 ohms,1/4 watt (R4).
14983	Resistor-330,000 ohms,1/4 watt (R11)
30648	Resistor-470,000 ohms,1/4 watt(R9, R14).....
30652	Resistor-1 Megohm 1/4 watt (R1).....
30649	Resistor-2.2 Megohm 1/4 watt(R6)....
30992	Resistor-10. Megohm 1/4 watt(R10)...
S-3521	Resistor-W.W.3000 ohms,5 watt (R16).
S-4430	Switch-phono-tone (S2).....
S-4277	Shaft-Drive shaft.....
31418	Spring-Dial cord spring (Pkg.2).....
S-4202	Socket-Phono socket.....
S-4341	Socket-Tube socket.....
S-4432	Switch-Range switch (S1).....
S-4429	Scale-Dial Scale.....

STOCK NO.	DESCRIPTION
S-4286	Transformer-Power 60 cycle (T1)....
S-4287	Transformer-Power 25 cycle (T1)....
S-3503	Transformer-1st I.F.(L7,L8,C13,C14)
S-3504	Transformer-2nd I.F.(L9,L10,C17, C18).....
S-4275	Volume Control (R8,S3).....
	SPEAKER ASSEMBLY 12" P.M.
31825	Dust Cap (Pkg.5).....
S-4270	Cone-Cone and Voice Coil Assembly (L13).....
S-4274	Speaker.....
S-2934	Output transformer (L11,T2).....
	MISCELLANEOUS ASSEMBLY
S-4313	Cord-Drive cord.....
S-4367	Cord-Power cord.....
36891	Clamp-Dial clamp.....
13103	Cap-Lamp cap jewel.....
S-4671	Cover-Cabinet back cover.....
S-4678	Escutcheon.....
S-4366	Decal.....
36386	Decal (HMV).....
11765	Lamp-Pilot lamp (Mazda 51).....
31480	Lamp-Indicator lamp (Mazda 47).....
S-4273	Knob-Walnut.....
S-4673	Knob-Blonde.....
30900	Spring-Knob retaining (Pkg.5).....
33726	Washer-"C" washer for drive shaft (Pkg.5).....
S-4040	Support-Lid support (LH).....
S-4672	Monogram RCA Victor.....
	AUTOMATIC RECORD CHANGER MECHANISM:
	Refer to RP-178 Service Note for Replacement Parts and Service Data.

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


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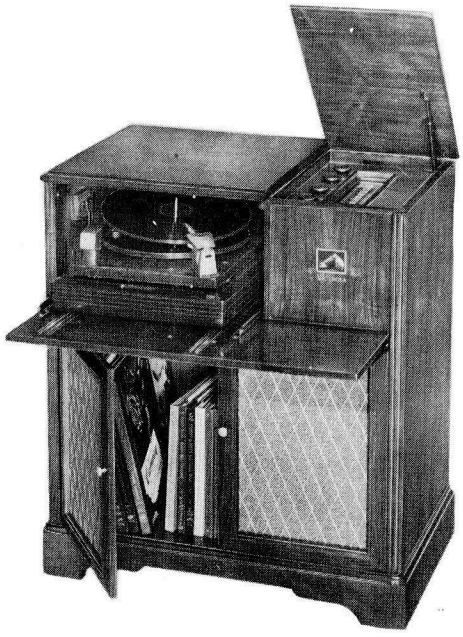
MODEL VRA73

Seven-Tube, Three-Band, A-C, Superheterodyne Radio-Phonograph Combination

TECHNICAL INFORMATION AND SERVICE DATA

1948 No. 17

GENERAL SERVICE DIVISION • RCA VICTOR COMPANY LTD.



Electrical and Mechanical Specifications

FREQUENCY RANGE

Standard Broadcast S.B.	540-1600 kc.
Short Wave 49-31M	5.7-13.0 mc.
25-19M	11.6-16.0 mc.
Intermediate Frequency	455 kc.
Tuning Drive Ratio	12 to 1

RADIOTRON COMPLEMENT

(1) Type 6BA6	R.F. Amplifier
(2) Type 6BE6	Converter
(3) Type 6BA6	I.F. Amplifier
(4) Type 6AT6	Det., A.V.C., & 1st A.F.
(5) Type 6AD7G	Phase Inverter & Power Output
(6) Type 6F6G	Power Output
(7) Type 5Y3GT/G	Rectifier

POWER OUTPUT

Undistorted	4 watts
Maximum	6 watts

LOUDSPEAKER

Type	12 inch round P.M.
Voice Coil Impedance	2.2 ohms at 400 cycles

POWER SUPPLY RATINGS

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

CABINET DIMENSIONS

Height	33 inches
Width	30¼ inches
Depth	17-11/16 inches

PHONOGRAPH

Type RP-178	Automatic
Record Capacity	Twelve 10-inch or Ten 12-inch
Turntable Speed	78 r.p.m.

PICKUP

Type	Crystal
Impedance	100,000 ohms at 1,000 cycles
Average Output	1.4 volts at 400 cycles across 500,000 ohm load

GENERAL DESCRIPTION

The Model VRA73 radio-phonograph console combination, incorporates a seven tube, three band, superheterodyne receiver, designed to cover the broadcast band and two short wave bands. Features of the design include: Built-in loop antenna for broadcast band reception; Short-wave "hank" antenna; Powdered iron core I.F. transformers, antenna, R.F., and oscillator coils; Automatic volume control; Full range variable tone control; Edge-lighted slide-rule dial, 12 inch dustproof round P.M. loudspeaker. The RP178 automatic record changer mechanism used incorporates a high-fidelity, low noise crystal cartridge. Refer to the RP178 service note for adjustment details and list of replacement parts for this mechanism.

CIRCUIT ARRANGEMENT

The circuit uses a tuned R.F. stage in which the loop antenna operates as the first tuned circuit on the standard broadcast band. For short wave reception a "hank" antenna is connected to the short wave antenna coil primary. This antenna coil operates as the first tuned circuit on the short wave bands. Both short wave bands use the same antenna, R.F. and Oscillator coils. On the 49-31M band, the coils are tuned in the usual manner, while on the 25-19M band they are tuned by padders in series with each section of the tuning condenser. The R.F. amplifier stage is followed by a converter stage which supplies 455 kc. signals to the permeability tuned I.F. amplifier. A double-diode-triode acts as a second detector A.V.C. and first audio amplifier. Phase-inversion is provided by the triode section of a 6AD7G tube. A push-pull pentode output stage (6F6G and 6AD7G) drives the 12 inch P.M. loudspeaker.

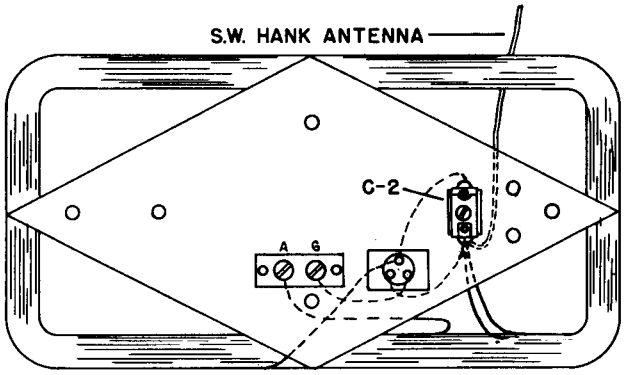


Figure 1—Loop Antenna Connections.

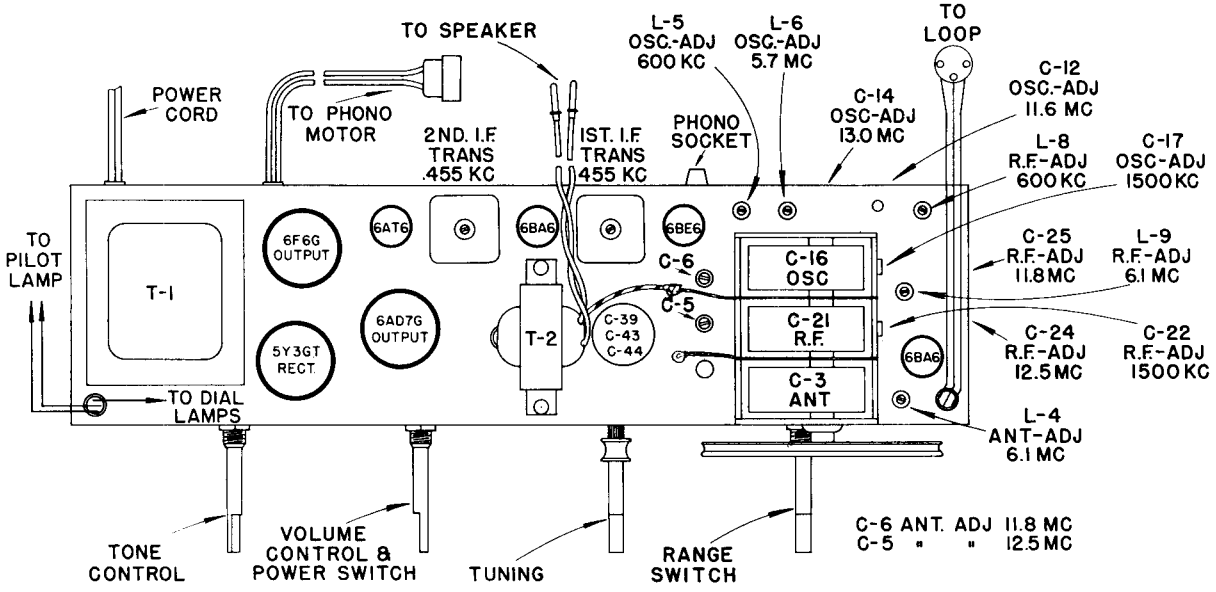


Figure 2—Chassis Layout and Alignment Adjustments.

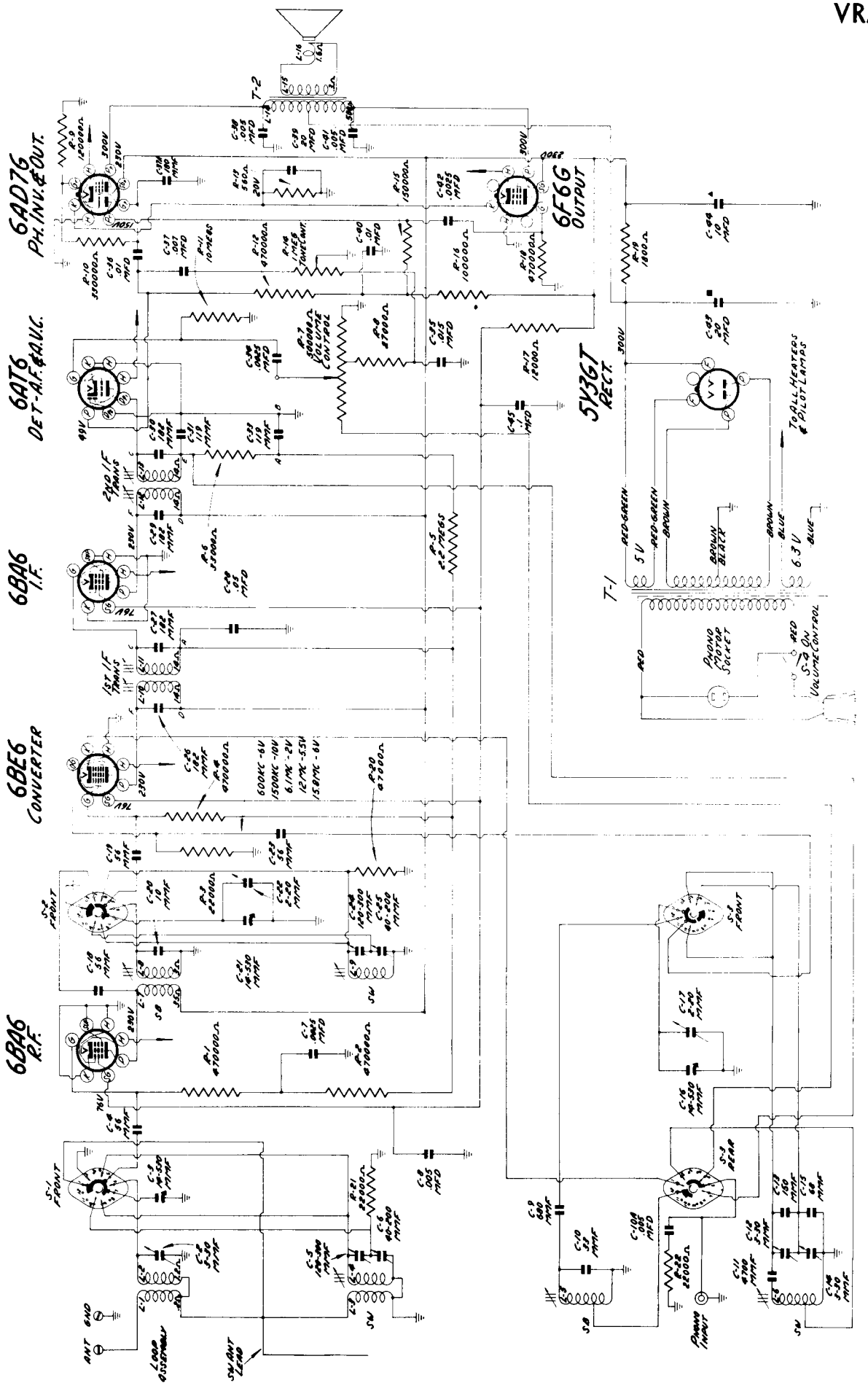


Figure 3—Schematic Diagram—Range Switch in Phono Position.

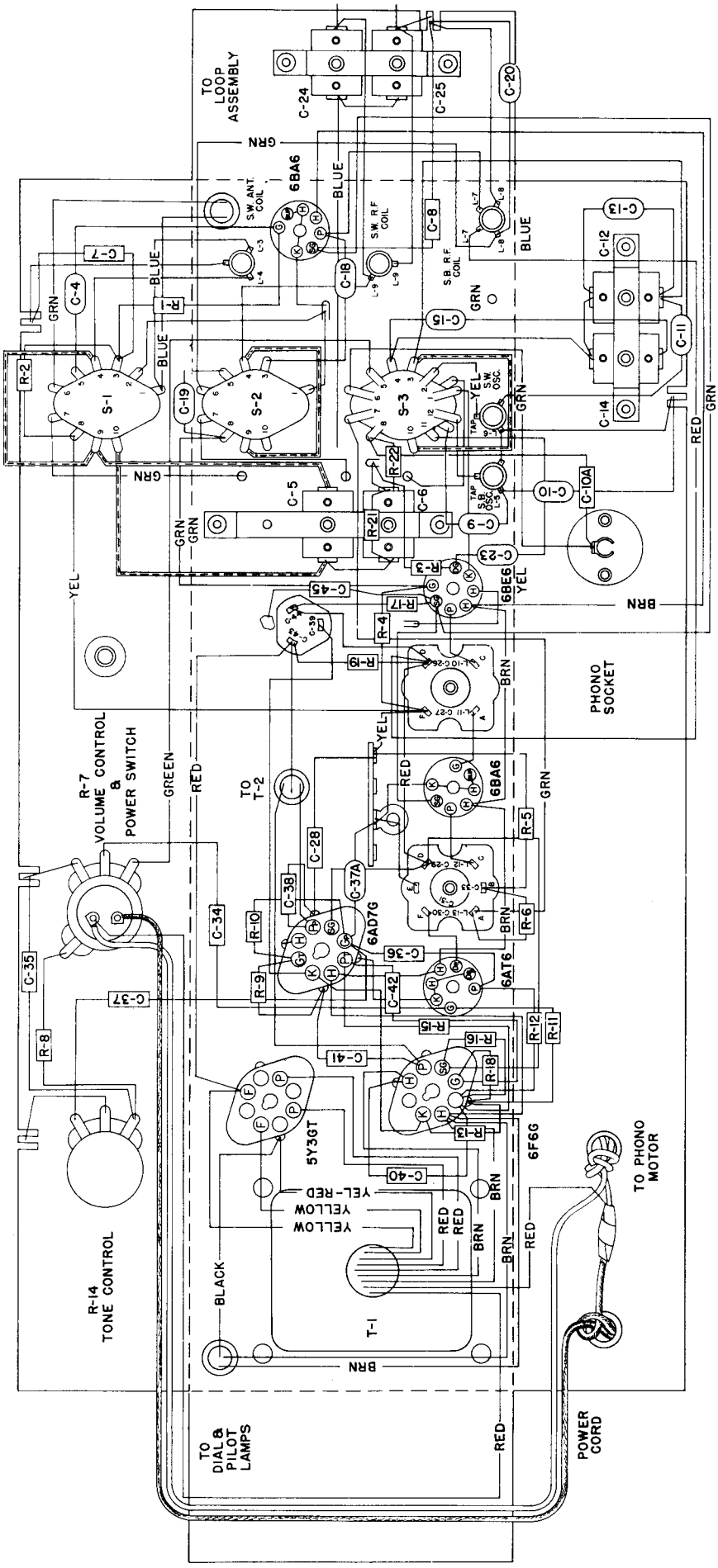


Figure 4—Wiring Diagram.

ALIGNMENT PROCEDURE

Before aligning set, completely mesh the gang and set the dial pointer on the calibration point at the extreme left hand end of the dial.

When making a complete alignment follow in proper sequence the tabulated form below.

If only a portion of the circuit is to be aligned select the portion required, followed by the remaining steps in the chart.

For "S.B.", 49-31M and 25-19M band alignment use output meter across voice coil keeping Test Oscillator output as low as possible to prevent AVC action.

Cathode-ray oscilloscope and sweep signal generator alignment of the 455 kc. A.M. I.F. transformers is the preferable method. Connect oscilloscope across the volume control. If the required equipment is not available use the method outlined below.

ALIGNMENT CHART

Order of Alignment		TEST OSCILLATOR					Receiver Dial Setting	Circuit To Adjust	Adjustment Symbols	Notes
		Connect "HI" Side To	Connect "LO" Side To	Dummy Antenna	Frequency Setting	Range Selector				
A.M. I.F. ALIGNMENT	1	6BA6 1st I.F. Grid	Ground	.01 mfd.	455 K.C. 30% mod. 400 Cy. A.M.	S.B.	High freq. end of dial	2nd I.F. Trans.	L12, L13	Adjust for max. A.C. voltage across voice coil
	2	6BE6 Converter Grid	Same	Same	Same	Same	Same	1st I.F. Trans.	L10, L11	Same
S.B. ALIGNMENT	3	"A" on Ant. Ter Board	Ground	200 m.m.f.	1500 K.C. 30% mod. 400 Cy. A.M.	S.B.	1500 K.C. on dial	Oscillator	C17	Adjust for max. A.C. voltage across voice coil
	4	Same	Same	Same	Same	Same	Same	R.F.	C22	Same
	5	Same	Same	Same	Same	Same	Same	Ant.	C2	Same
	6	Same	Same	Same	600 K.C. 30% mod. 400 Cy. A.M.	Same	600 K.C. on dial	Oscillator	L5	*Same
	7	Same	Same	Same	Same	Same	Same	R.F.	L8	Same
		*NOTE: - Rock Oscillator in to loop at 600 K.C.								
	8	Repeat steps 3 to 7 for maximum output								
49-31M ALIGNMENT	9	"A" on Ant. Ter. Board	Ground	300 ohms	5.7 Mc. 30% mod. 400 Cy. A.M.	49-31M	Low freq. end of dial	Oscillator	L6	Adjust for max. A.C. voltage across voice coil
	10	Same	Same	Same	13.0 Mc. 30% mod. 400 Cy. A.M.	Same	High freq. end of dial	Oscillator	C14	Same
		Repeat steps 9 and 10 for maximum output.								
	11	Same	Same	Same	6.1 Mc. 30% mod. 400 Cy. A.M.	Same	Tune in test osc. signal	R.F.	L9	**Same
		**NOTE:- Rock R.F. circuit in to oscillator. Do not readjust osc. circuit.								
	12	Same	Same	Same	Same	Same	Same	Ant.	L4	Same
	13	Same	Same	Same	11.8 Mc. 30% mod. 400 Cy. A.M.	Same	Tune in test osc. signal	R.F.	C25	**Same
	14	Same	Same	Same	Same	Same	Same	Ant.	C6	Same
	15	Repeat steps 11 to 14 for maximum output.								
25-19M ALIGNMENT	16	"A" on Ant. Ter. Board	Ground	300 ohms	11.6 Mc. 30% mod. 400 Cy. A.M.	25-19M	Low freq. end of dial	Oscillator	C12	Adjust for max. A.C. voltage across voice
	17	Same	Same	Same	12.5 Mc. 30% mod. 400 Cy. A.M.	Same	Tune in test osc. signal	R.F.	C24	***Same
		***NOTE:- Rock R.F. circuit in to oscillator. Do not readjust osc. circuit.								
	18	Same	Same	Same	Same	Same	Same	Ant.	C5	Same
	19	Check at high freq. end of dial. Receiver should tune to 16 Mc. approx.								

REPLACEMENT PARTS FOR MODEL VRA73

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

STOCK NO.	DESCRIPTION
	CHASSIS ASSEMBLY
S-3717	Capacitor - trimmer 3-30 MMF - 3-30 MMF (C14-C12)
S-3718	" - trimmer 120-300 MMF - 40-200 MMF (C24-C25)
S-4356	" - trimmer 120-300 MMF - 40-200 MMF (C5-C6)
31709	" - 10 MMF ceramic (C20)
39616	" - 33 " mica (C10)
39622	" - 56 " " (C4-C18-C19-C23)
39624	" - 68 " " (C15)
12725	" -150 " " (C13)
39634	" -180 " " (C37A)
14498	" -680 " " (C9)
39668	" 4700 " " 5% (C11)
S-3647	" .007 Mfd. (C37)
S-3646	" .005 " (C8-C38-C41)
S-3644	" .0025 " (C7-C34-C42)
S-3649	" .015 " (C35)
S-3648	" .01 " (C36-C40)
S-3653	" .05 " (C28)
S-3655	" .1 " (C45)
S-3720	" Electrolytic (C39-C43-C44)
S-3706	Condenser - Variable (C3-C16-C21)
S-3712	Coil - Antenna coil S.W. (L3-L4)
S-3713	" - R.F. coil S.B. (L7-L8)
S-3714	" - R.F. " S.W. (L9)
S-3715	" - Osc. " S.W. (L6)
S-3716	" - " " S.B. (L5)
S-4786	Indicator - dial pointer
S-4358	Loop - antenna loop (L1-L2)
30735	Resistor - 560 ohms 1 watt (R13)
S-3682	" -1800 " W.W. (R19)
43765	" -12,000 " 2 watt (R17)
30492	" -22,000 " ½ " (R3-R21-R22)
30409	" -27,000 " ½ " (R8)
30685	" -33,000 " " " (R6)
14983	" -47,000 " ½ " (R20)
3252	" -100,000" ½ " (R16)
30180	" -120,000" ½ " (R9)
14020	" -150,000" ½ " (R15)
14983	" -330,000" ½ " (R10)
30648	" -470,000" ½ " (R1-R2-R4-R12-R18)
30649	" -2.2 Megohms ½ w. (R5)
30992	" -10 " ½ w. (R11)
S-3709	Switch - Range switch (S1-S2-S3)
S-4787	Shaft - drive shaft
14278	Socket - phono input
36500	Socket - tube socket (less centre shield)
31319	" - " " (octal)
36069	" - " " (Miniature with centre shield)
S-4357	Scale - dial scale
S-3667	Transformer - 1st I.F. (L10-L11-C26-C27)
S-3668	" - 2nd I.F. (L12-L13-C29-C30-C31-C33)
S-4023	" - Power 60 cycle (T1)
S-4024	" - " 25 " (T1)
S-3708	Volume Control - 500,000 (R7-S4)
S-4359	Tone " - 1,Meg. (R14)
	SPEAKER ASSEMBLY 12" P.M.
13867	Dust Cap (Pkg. 5)
S-3568	Cone - cone & voice coil assy (L16)
S-4288	Speaker
S-4788	Output transformer (L14-L15)
	MISCELLANEOUS ASSEMBLY
S-4789	Clamp - Dial Scale clamp (Pkg. 10)
S-4313	Cord - Dial cord (universal)
S-4790	Cord - power cord
13103	Cap - jewel lamp cap
S-4167	Clamp - back cover clamp (Pkg. 10)
S-4792	Cloth - Grille cloth
S-4793	Decal
S-4213	Knob
S-4214	"
11891	Lamp - pilot lamp (Mazda #44)
31418	Spring - Dial cord tension (Pkg. 2)
S-4794	Support - lid support telescopic
S-4791	Tire & wheel assy for record player

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

AUTOMATIC RECORD CHANGER MECHANISM

Refer to RP178 service note for replacement parts and service data.

RCA VICTOR

"HIS MASTER'S VOICE"

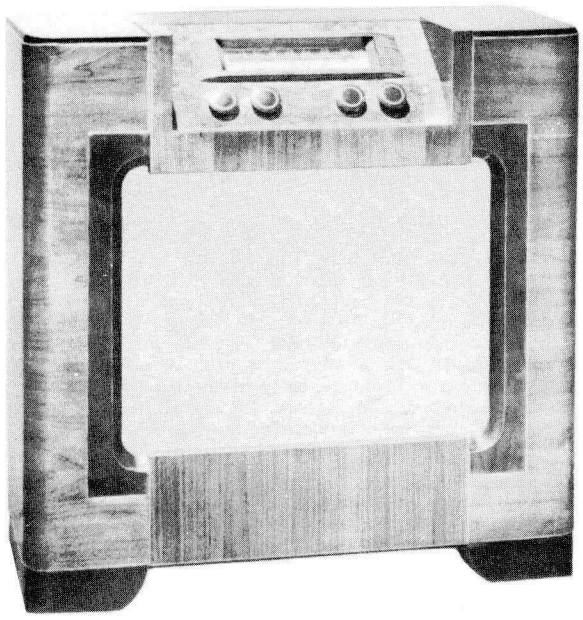
MODELS 80 & 81

Eight-Tube, Three-Band, A.M.-F.M. Superheterodyne

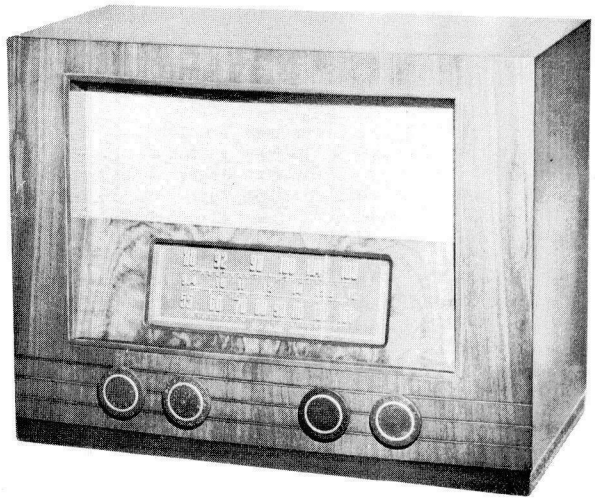
TECHNICAL INFORMATION AND SERVICE DATA

—1947, No. 8—

GENERAL SERVICE DIVISION • RCA VICTOR COMPANY LTD.



Model 81



Model 80

Electrical and Mechanical Specifications

FREQUENCY RANGE

Standard Broadcast S.B.	540-1600 K.C.
Short Wave 31 - 25 - 19 M.	9.4-15.8 M.C.
Frequency Modulation	88-108 M.C.
Intermediate Frequency A.M.	455 K.C.
Intermediate Frequency F.M.	10.7 M.C.
Tuning Drive Ratio	20 to 1

RADIOTRON COMPLEMENT

(1)	Type 6BA6	R.F. Amplifier
(2)	Type 6BE6	Converter
(3)	Type 6BA6	1st I.F. (FM & AM)
(4)	Type 6BA6	2nd I.F. (FM only)
(5)	Type 6AL5	F.M. Ratio Detector
(6)	Type 6AT6	A.M. Det., A.V.C. & 1st A.F.
(7)	Type 6V6 GT/G	Power Output
(8)	Type 5Y3 GT/G	Rectifier

Pilot Lamps (2) ------ Mazda No. 51 6-8 volts 0.2 amp.

POWER OUTPUT

Undistorted	2.5 Watts
Maximum	4.5 Watts

LOUDSPEAKER

Type (Model 80)	6 x 9 inch P.M.
Voice Coil impedance	3.5 ohms at 400 cycles
Type (Model 81)	12 inch P.M.
Voice Coil impedance	2.2 ohms at 400 cycles

CABINET DIMENSIONS (Inches)

	Height	Width	Depth
Model 80	15¼	20	10-13/16
Model 81	33¾	34½	13-11/16

POWER SUPPLY RATINGS

Rating A	105-125 volts, 50-60 cycle, 75 watts
Rating B	105-125 volts, 25-60 cycle, 75 watts

GENERAL DESCRIPTION

The RCA Victor Models 80 and 81 AM-FM radios are housed in cabinets of striking beauty. The AM-FM receiver is an eight tube, three band superheterodyne using the most up-to-date circuits for high quality radio reproduction. Features of the design include: Built-in folded dipole antenna for F.M. reception; Built-in short wave antenna on the model 81; Standard broadcast loop antenna, adjustable on the Model 81; Miniature tubes for improved high frequency performance; R.F. stage; Iron core R.F.; Oscillator and I.F. coils; "Amplitude Ignorer" for improved rejection of AM when receiving FM; Ratio detector for high quality FM reproduction; Automatic volume control circuits; Full range variable tone control; Tone compensated volume control; Pentode output stage; Twelve inch P.M. loudspeaker on the Model 81, six by nine inch P.M. loudspeaker on the Model 80. Both models can be used with an RCA Victor Record player and a phono position is incorporated on the range switch.

A COMPARISON OF F.M. AND A.M.

A conventional A.M. receiver operates with a signal in which the intelligence is transmitted by means of amplitude variations while the frequency remains fixed. An F.M. receiver, however, operates with a signal in which the intelligence is transmitted by means of frequency variations while the amplitude remains fixed. Noise, which consists largely of amplitude variations passes readily through an A.M. receiver which responds to these variations. In an F.M. receiver, special circuits are provided to minimize the response to amplitude variations so that noise free reception is assured with all except very weak signals. Where the signals picked up by the built-in folded dipole antenna are too weak, an outside F.M. antenna is necessary.

Due to the very high frequencies used for F.M. (88 to 108 megacycles) certain differences may be noticed in this type of reception. It is known that in some locations, particularly urban areas, a type of distortion peculiar to F.M. may be experienced. This is in no way a fault of the receiver but rather a physical phenomena caused by the signal being reflected from some object resulting in two or more paths for the transmitted signal. The reflected signal, arriving late and out of phase, tends to amplitude modulate the F.M. signal. This distortion may appear as a strange buzz, rattle or swish. It may even give the effect of an overloaded audio stage. In other cases an increase in noise level may be noticed. Choosing a different location for the receiver may eliminate the trouble since the directive folded dipole antenna housed in the cabinet will be oriented differently. In severe cases, an outside dipole and reflector pointing in the right direction may correct the trouble.

CIRCUIT ARRANGEMENT

The circuit for A.M. reception uses an untuned R.F. stage in which the loop antenna is used as the first tuned circuit. This is followed by a converter stage. The incorporation of temperature compensating capacitors in the tuned circuits greatly reduces the oscillator drift.

Primaries and secondaries of the 455 kc. A.M. and 10.7 mc; F.M. I.F. transformers are connected in series in the plate and grid circuits of the I.F. amplifier stages, except for the secondaries of the second I.F. transformers which are connected to the A.M. detector and F.M. driver amplifier respectively. The F.M. driver is followed by a ratio detector. The 10.7 mc I.F. transformers have relatively little effect on the 455 kc. A.M. I.F. signals due to low inductance of their coils and the I.F. amplifier operates in the conventional manner.

A double diode triode acts as A.M. detector, A.V.C. and first audio amplifier and drives the pentode output stage.

The circuit for F.M. reception uses a tuned R.F. stage designed to match a 300 ohm antenna. This is followed by a converter stage. Temperature compensating capacitors and other precautions have been taken to make the oscillator as stable as possible consistent with the frequency at which it operates. All high frequency circuit connections are critical as to length and care must be taken that these lengths are maintained when any repair work is done.

As previously explained, the F.M. and A.M. I.F. transformers are connected in series. The 455 kc I.F. transformers have relatively little effect on the 10.7 mc. F.M. I.F. signals due to the low reactance of the capacitors in the 455 kc transformers, so that the two stage amplifier operates in the conventional manner. In the first I.F. stage an unbypassed cathode resistor is used to compensate for the variation in input capacity of the tube with a change in A.V.C. voltage. The second I.F. amplifier stage incorporates an "amplitude ignorer" circuit which provides noise suppression additional to that obtained in the ratio detector.

The ratio detector, appearing in RCA post-war f-m. receivers, is a new device for converting a frequency modulated carrier to an audio signal, while at the same time offering a high degree of attenuation to any incident amplitude modulation. The relative insensitivity to amplitude variations, which is an inherent characteristic of ratio detectors, enables them to be used without the usual preceding limiter stage, thus affording the use of a high gain i-f stage instead of the low-gain limiter.

The ratio detector is discussed in detail on page 5. The audio amplifier is the same one used for A.M. reception and uses the triode section of the double diode triode as the first A.F. amplifier, and a pentode output stage.

ANTENNAS

If reception is not satisfactory on one or more of the three bands, using the built-in cabinet antennas, an external antenna may be used.

An external antenna for broadcast and short wave reception, when required, is connected to terminal 6

If an external F.M. antenna is to be used, disconnect the internal folded dipole antenna and connect in its place the leads from the external antenna.

Two general types of F.M. antennas are used. These are the folded dipole and the folded dipole with reflector, both of which are used with a 300 ohm transmission line. The reflector element used is somewhat longer than the folded dipole element. These antennas are directive and must be oriented for maximum signal pickup from the desired stations. The folded dipole picks up a maximum signal from stations at right angles to the direction in which the dipole is pointing. The folded dipole with reflector is similarly directive but provides additional signal pickup from the side of the folded dipole away from the reflector and rejects signals from the reflector side of the folded dipole.

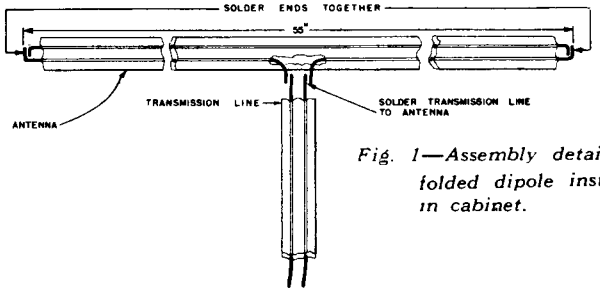


Fig. 1—Assembly details of folded dipole installed in cabinet.

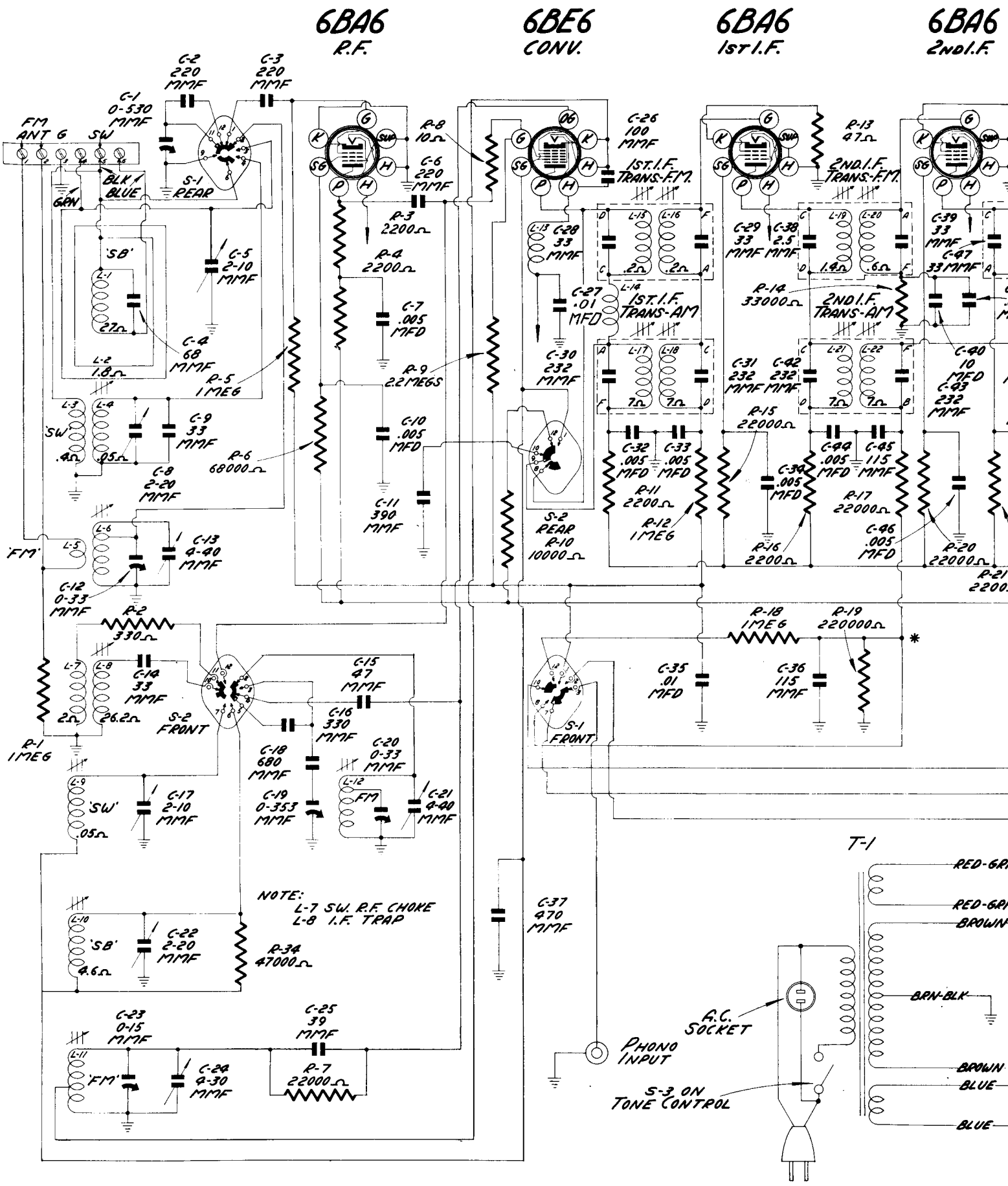
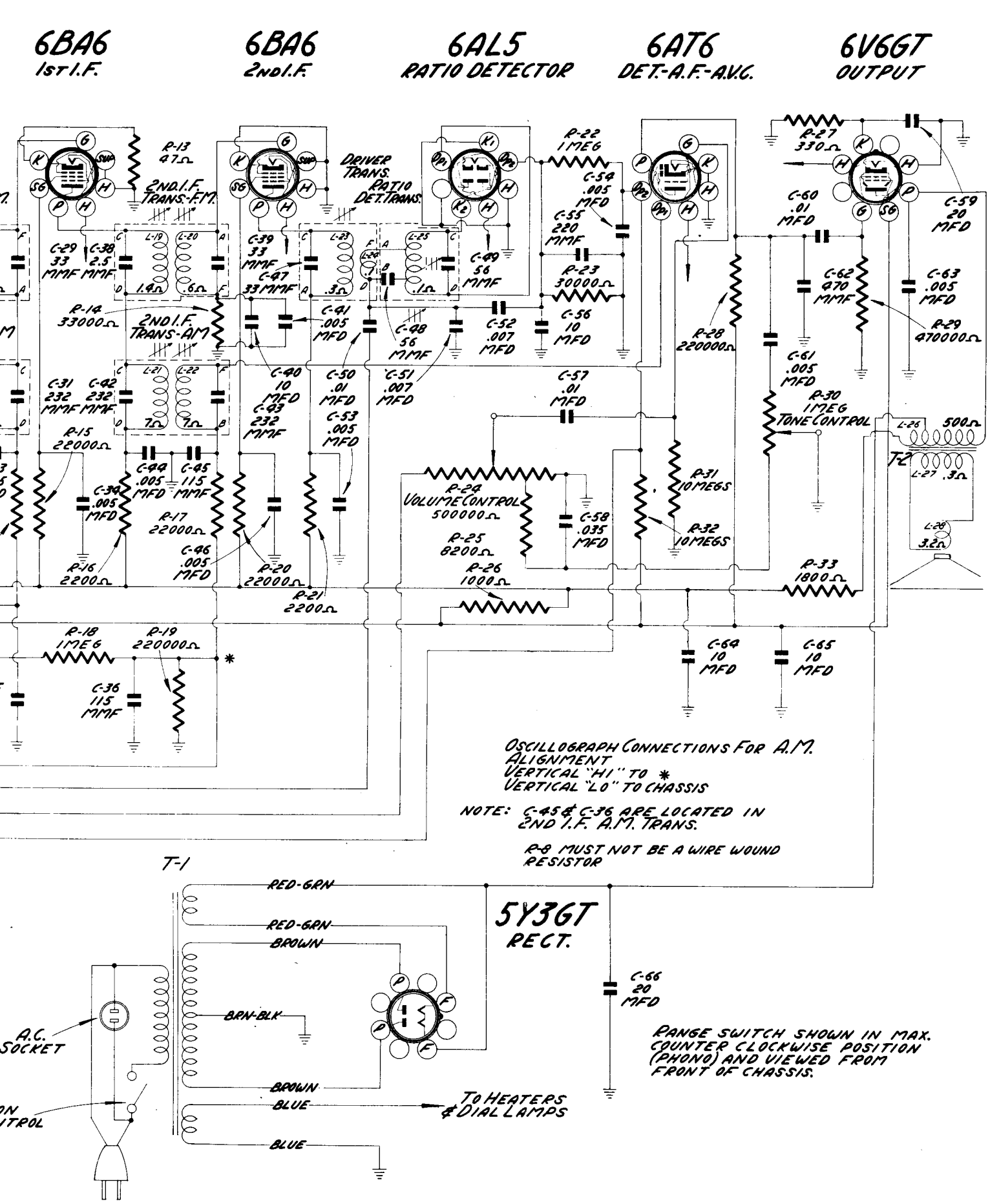


Fig. 2—Schematic Diagram—Range Switch shown in



atic Diagram—Range Switch shown in Phono Position.

THE RATIO DETECTOR

A schematic of the fundamental ratio detector is shown in Figure 3. C7 and C4 have very little reactance at the intermediate frequency, so it is evident that the parallel resonant circuit L_2 C_2 is the true load for the driver stage, this stage being shunt fed. A driver stage, in this case is nothing more than a conventional I.F. amplifier preceding the ratio detector.

The A.C. voltage applied to each diode is the vector sum of E_1 and the voltage across that half of L_1 which is connected to the diode plate, as shown in the diagrams of Figure 5. E_1 has practically the same amplitude and phase as the voltage across the tank in the driver plate circuit. Since the primary (L_2) of the ratio detector transformer is inductively coupled to the secondary (L_1), the current in L_2 induces a voltage in L_1 and causes a circulating current to flow in L_1 and C_1. E_2 and E_3 are the voltage drops which occur across each half of L_1 as a result of this circulating current. When the carrier frequency is equal to the frequency at which the ratio detector transformer is tuned (Fig. 5A), the AC voltage applied to diode 1 equals that applied to diode 2. When the carrier frequency increases during a half cycle of modulation, the phase relations between E_1, E_2 and E_3 change in accordance with Figure 5B, and it is evident that the vector sum of the voltages applied to diode 2 exceeds the vector sum of the voltages applied to diode 1. When the carrier frequency decreases during a half cycle of modulation, the phase relations between E_1, E_2 and E_3 change in accordance with Figure 5C, and the vector sum of the voltages applied to diode 1 exceeds the vector sum of the voltages applied to diode 2.

A comparison with conventional discriminator circuits will show that as far as the AC voltages applied to the diodes are concerned, these circuits are almost exactly similar. Here the similarity ends, because the ratio detector method of extracting intelligence from the FM carrier differs greatly from previously used methods. Diode 1, R3, and diode 2 complete a series circuit fed by the AC voltage across L_1. Since the two diodes are in series, they will conduct on the same half cycle, and the rectified current through R_3 will cause a negative potential to appear at the plate of diode 1. The time constant of R_3C_6 is usually about 0.2 second, so that the negative potential at the plate of diode 1 will remain constant even at the lowest audio frequencies to be reproduced.

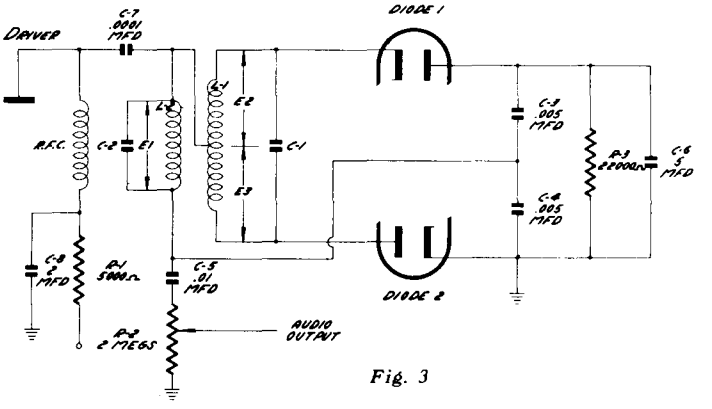


Fig. 3

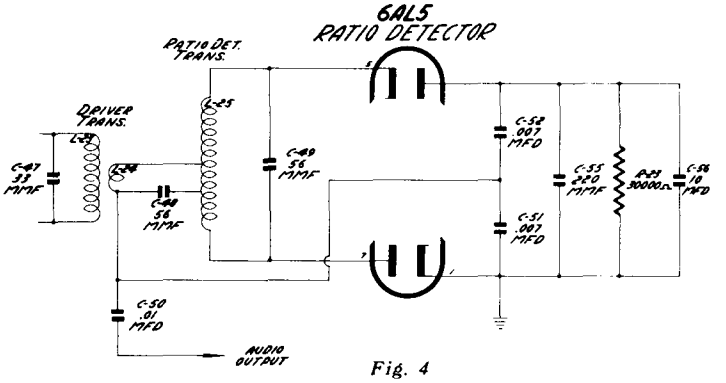


Fig. 4

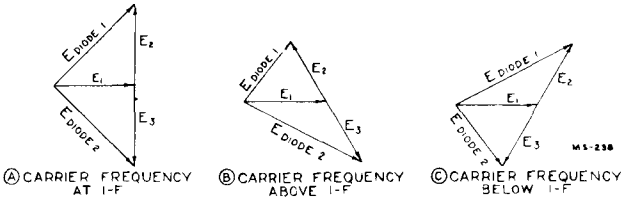


Fig. 5

C3 will be charged by the rectified current through diode 1 to a voltage proportional to the voltage represented by vector Ediode 1 (Figure 5), and C4 will be charged through diode 2 in proportion to the vector Ediode 2. Since the magnitudes of these vectors differ according to the instantaneous frequency of the carrier, the voltages across C3 and C4 will differ proportionately, the voltage across C3 being the larger of the two voltages at carrier frequencies below the i-f, and the smaller at frequencies above the i-f.

Note that the voltages across C3 and C4 are additive and that their sum is fixed by the constant potential across R3. Therefore, while the ratio of these voltages will vary at an audio rate, their sum will always be constant and equal to the voltage across R3. The potential at the junction of C3 and C4 will vary at an audio rate when an f-m carrier is applied to the detector, hence the audio voltage is extracted at this point and fed into the audio amplifier.

There is no direct d-c return path across either C3 or C4; the reason for this is twofold. Firstly, a direct return path is not needed because whenever the potential of the junction of C3 and C4 is raised or lowered in accordance with the frequency of the voltage applied to the detector, there will be a point on R3 having a potential equal to the voltage across C4. This point will shift up and down on R3 in synchronism with the audio voltage across C4. If this point could be connected to the junction of C3 and C4, a d-c return for each diode would be provided, but no current would flow through the connection because there would be no difference of potential between the point on R3 and the junction of C3 and C4. Since no current would flow through this connection, a direct return path would be useless.

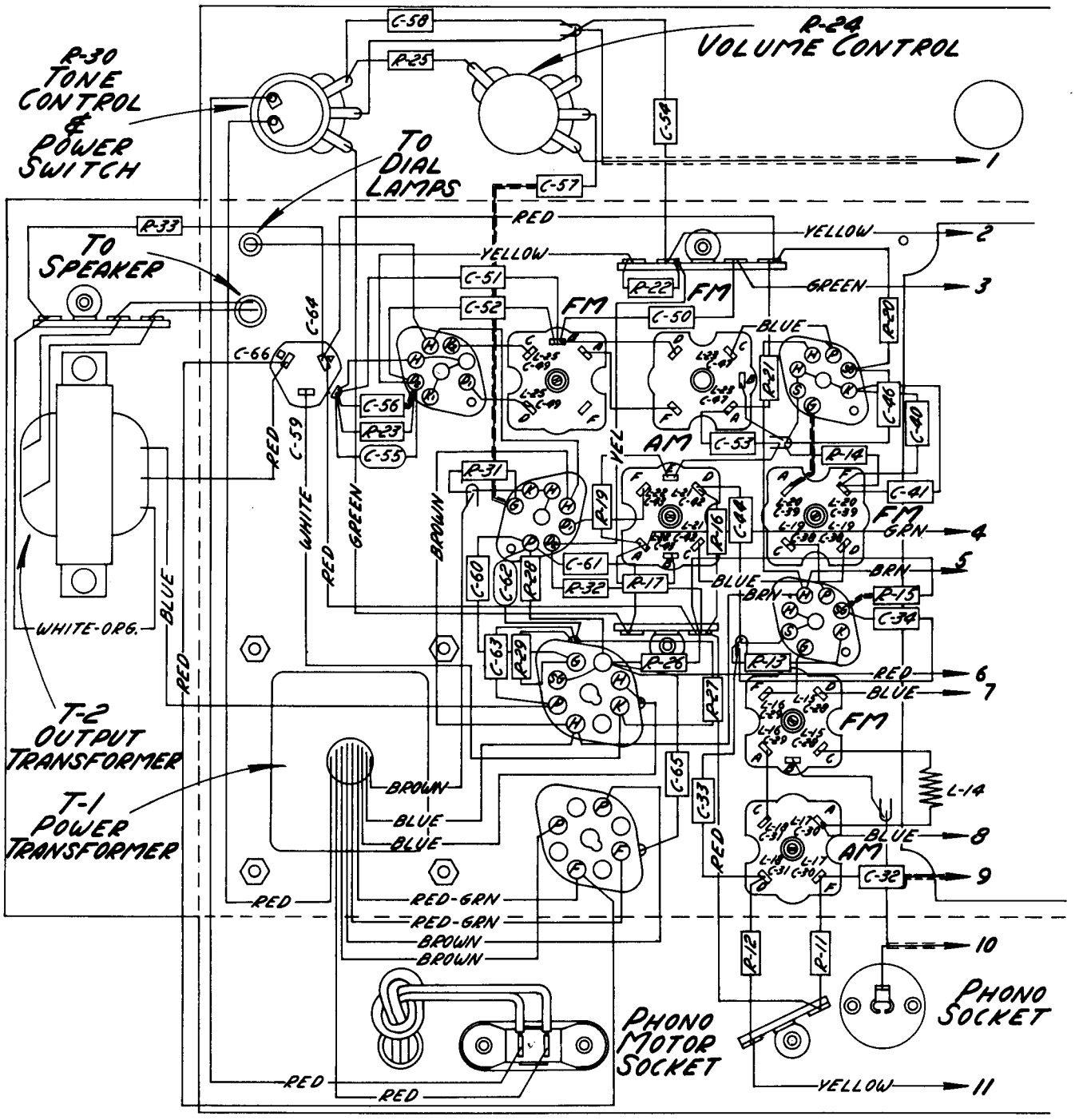
Secondly, a peculiar form of distortion, apparent at low carrier levels; is evident if a resistance is connected directly across C4. This distortion is caused by C4 discharging through the resistance whenever the carrier level falls below the level at which the diodes are biased off by the voltage across R3. The effect of the distortion is to add a long peak to one loop of the audio cycle.

The rejection of amplitude modulation in the ratio detector may be explained as follows: A rapid increase in the amplitude of the carrier applied to the ratio detector will tend to increase the d-c voltages across C3 and C4. The sum of these voltages must always be equal to the voltage across C6. The voltage across C6 cannot change with a rapid increase in the amplitude of the carrier, due to the large time constant of R3 and C6. Therefore, this constant potential across C6 prevents the voltages across C3 and C4 from rising with an increase in the strength of the carrier. A reduction in carrier amplitude is prevented from appearing as a reduction in the voltages across C4 in the same way. The constant voltage across C6 can be considered to be a stabilizing voltage; i.e., it stabilizes the ratio detector output against amplitude modulation of the applied carrier.

The time constant of R3 C6 is not too large to prevent average changes in carrier level from appearing as changes in voltage across R3; in other words the voltage across R3 is proportional to the average strength of the received carrier. Thus this voltage serves as an excellent AVC voltage.

There is no "threshold" effect apparent in the ratio detector; i.e., there is no minimum carrier level which must be applied to the detector to cause noise attenuation as in other types of f-m detectors requiring the use of a limiter stage.

The Ratio Detector used in this receiver, differing only in the method of applying i-f energy to L1 and C1, is shown in Figure 4. This circuit, as well as any other ratio detector circuit, can be broken down and analyzed in almost the same manner as was the basic ratio detector circuit of Figure 3.



NOTE: 6BA6 2nd F.M. I.F. amplifier heater lead wired to 6AT6 tube pin 4 instead of to 6BA6 1st I.F. amplifier.

Fig. 6—Wiring Diagram of Main Chassis.

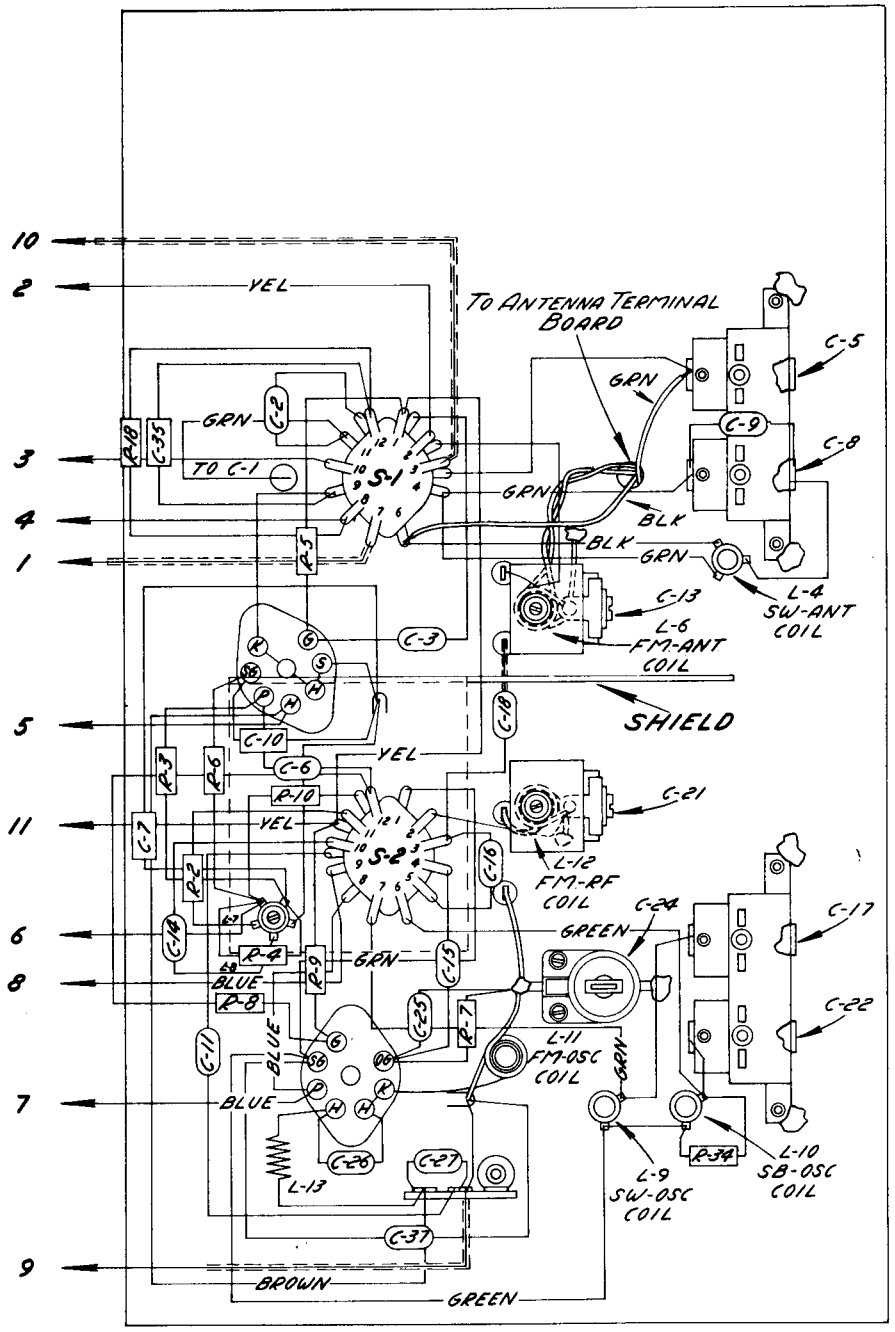


Fig. 7—Wiring Diagram of R.F. Sub Chassis.

RADIATRON SOCKET VOLTAGES

TYPE	CIRCUIT	PLATE	SCREEN	CONT. GRID	OSC. GRID AM FM FREQ.	CATHODE	HEATER
6BA6	R.F.	130	60				6.3 A.C.
6BE6	CONV.	180	100		−16 600 kc. −7 1500 kc. −3 100 mc.		6.3 A.C.
6BA6	1st I.F.	180	90				6.3 A.C.
6BA6	2nd I.F.	180	90				6.3 A.C.
6AL5	Ratio Detector						6.3 A.C.
6AT6	Det.-AVC & Audio	80					6.3 A.C.
6V6GT	Output	275	175			+10	6.3 A.C.
5Y3GT	Rectifier	275 A.C. (Pin 4) 275 A.C. (Pin 6)					5.0 A.C.
"B" Voltage measured from Rectifier F.I. (5Y3GT) to Gnd.—275 Volts.							

Note:—All the above values hold within plus or minus 20% when measured with a RCA Voltohmyst or equivalent, on a line voltage of 115 volts. All voltages are measured to chassis.

ALIGNMENT PROCEDURE

Before aligning set, completely mesh the gang and set the dial pointer on the mechanical maximum calibration point at the extreme left hand end of the dial. (See Fig. 10.)

When making a complete alignment follow in proper sequence the tabulated form on page 9.

If only a portion of the circuit is to be aligned select the portion required, followed by the remaining steps in the chart. Any adjustments made on the FM 10.7 mc. I.F.'s make it necessary to realign the A.M. 455 kc. I.F.'s.

For "S.B." and 31-25-19M band alignment use output meter across voice coil keeping Test Oscillator output as low as possible to prevent AVC action.

Cathode-ray oscilloscope and sweep signal generator alignment of the 455 kc. A.M. I.F. transformers is the preferable method. Connect oscilloscope across the volume control. If the required equipment is not available use the method outlined below.

CRITICAL LEAD DRESS

(Make lead dress before alignment)

1. Dress green lead from antenna terminal board pin 4 away from chassis.
2. All F.M. coil connections must be kept to the exact length of the original (one-sixteenth inch difference in length may be excessive).
3. All wiring in the receiver is critical as to length and placement. It is therefore important when servicing, that extreme care should be taken so as not to disturb more of the wiring than absolutely necessary.

NOTE: Keep tuning capacitor grounding brushes clean and under correct tension for proper contact.

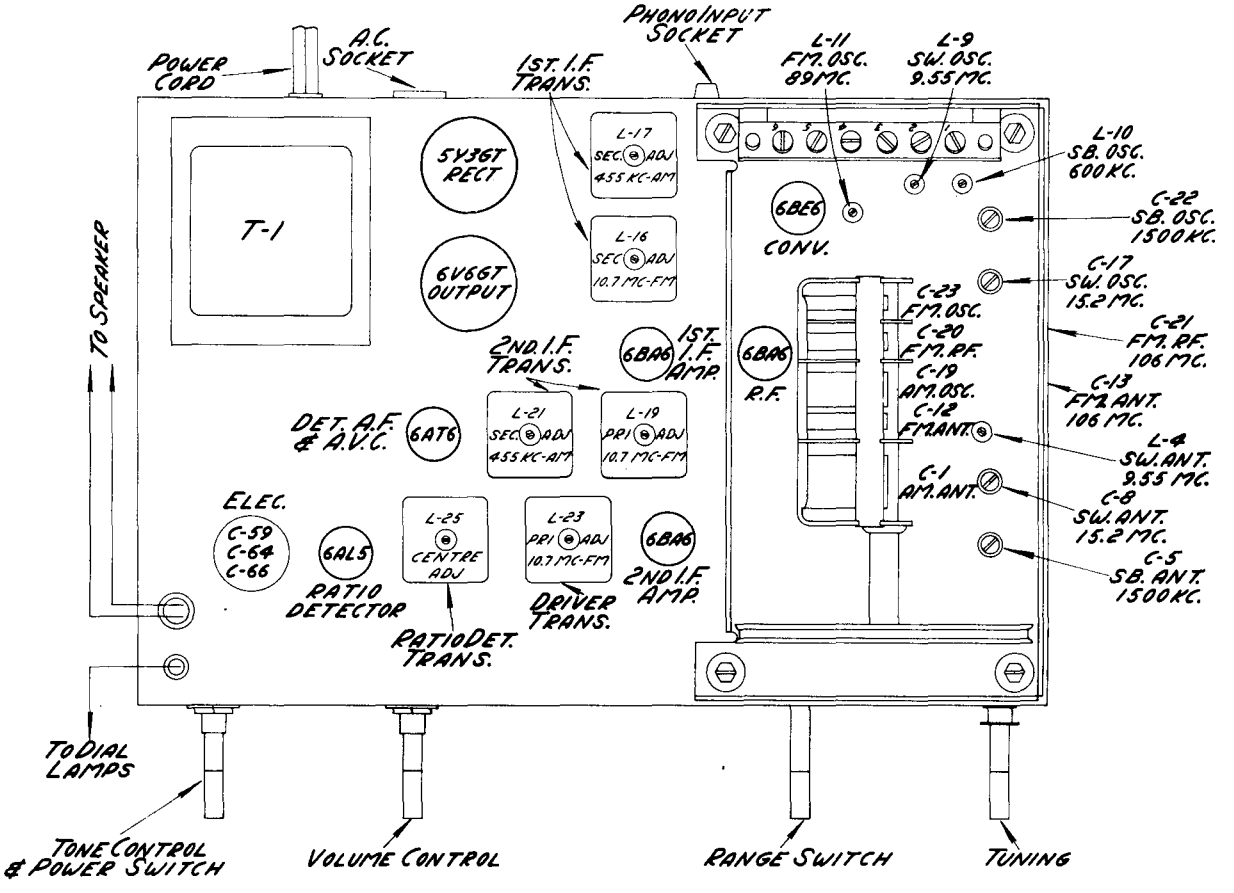


Fig. 8—Chassis Layout and Alignment Adjustments.

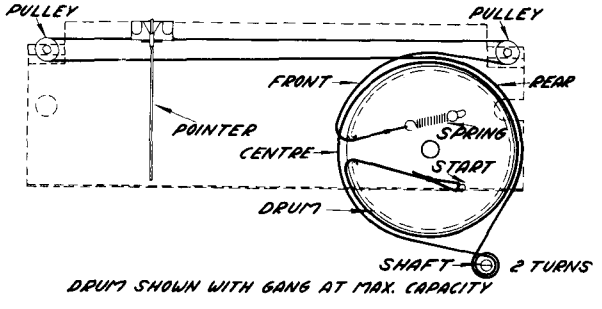


Fig. 9—Dial Cord Stringing.

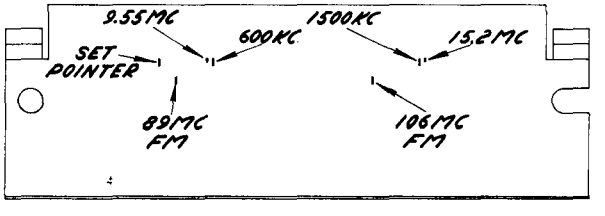


Fig. 10—Alignment Calibration Markers.

ALIGNMENT CHART

ORDER OF ALIGNMENT		TEST OSCILLATOR: CONNECT "HI" SIDE TO	TEST OSCILLATOR: CONNECT "LO" SIDE TO	TEST OSCILLATOR: DUMMY ANTENNA	TEST OSCILLATOR: FREQUENCY SETTING	RANGE SELECTOR	RECEIVER DIAL SETTING	CIRCUIT TO ADJUST	ADJUSTMENT SYMBOLS	NOTES
F.M. RATIO DETECTOR ALIGNMENT	1	Connect a 1000 ohm resistor between lugs "C" and "D" of the ratio detector trans. Connect DC probe of a Voltohmyst to the negative lead of the 10 mfd elec. capacitor C-56. The common lead of the meter is connected to the chassis.								
	2	6BA6 2nd I.F. Grid	Ground	.01 mfd	10.7 MC 30% Mod. 400 Cy.Am.	F.M.	Max.Cap (Fully Meshed)	Driver Trans-former	L-23 Det. Trans.	For Max. D.C.Voltage Across C-56
	3	Remove meter leads and disconnect the 1000 ohm resistor from "C" and "D" on ratio det. trans. Connect two 100,000 ohm resistors (within 1% of being equal) in series across C56. Connect the common lead of the Voltohmyst to the centre point of the 100,000 ohm resistors and the D.C. probe to pin "B" of ratio det. trans. Use 30 volt scale for preliminary alignment. Complete alignment using 3 volt scale								
	4	Same	Same	Same	Same	Same	Same	Ratio Det.Trans.	Bottom Core L-25	†† For Zero D.C.Balance
	5	Near the correct core position the zero point is approached rapidly and continued adjustment causes the indicated polarity to reverse. A slow approach to the zero point is an indication of severe detuning, and the bottom core should be turned in the opposite direction.. Same	Same	Same	Same	Same	Same	Ratio Det.Trans	Top Core L-25	†† For Minimum Audio Output
		NOTE:- Two or more points may be found which will satisfy the condition required. Top core should be correctly adjusted when approximately 1/8 inch of threads extend above the can, therefore, it is desirable to start adjustment with the top core in its furthest "in" position and turn out, while adjusting the bottom core, until the first point of minimum AF and minimum DC is reached. †† The zero DC balance and the minimum AF output should occur at the same point: if such is not the case, the two cores should be adjusted until both occur with no further adjustment of either core. It may be advantageous to adjust both cores simultaneously, watching the Voltohmyst, and an output meter connected across the voice coil for the point at which both zero DC and minimum output occurs.								
	6	Reconnect Voltohmyst as in step 1, omitting 1000 ohm resistor.								
	7	Repeat step 2, omitting 1000 ohm.								
	8	Remove all connections.								
F.M. I.F. ALIGNMENT	9	Connect the DC probe of a Voltohmyst to the negative lead of the 10 mfd electrolytic capacitor C56 and the common lead of the meter to chassis ground.								
	10	6BA6 1st I.F. Grid	Ground	.01 mfd.	10.7 MC 30% Mod. 400 Cy.Am.	F.M.	Max.Cap (Fully meshed)	2nd I.F. Trans.	L-19 and L-20	*Adjust test Osc. Output for 6-10 Volts developed across C-56 use very short leads
		* Top and bottom cores alternately loading primary & secondary of each trans. with 1000 ohms while the opposite side of the same trans. is being adjusted. Adjust all trans. for max. voltage across C-56. This method is known as alternate loading which involves the use of a 1000 ohm resistor to load the plate winding while the grid winding of the same transformer is being peaked. Then the grid winding is loaded with 1000 ohm resistor while the plate winding is being peaked. When the windings are loaded, it is necessary to increase the 10.7 MC input since the gain will decrease and the voltage across C56 will be less.								
	11	6BE6 Mixer grid	Same	Same	Same	Same	Same	1st I.F. Trans.	L-15 and L-16	* Adjust test Osc. Output for 6-10 Volts developed across C-56 use very short leads
A.M. I.F. ALIGNMENT	12	6BA6 1st I.F. Grid	Ground	.01 mfd.	455 KC 30% mod. 400 Cy.Am.	S.B.	High Freq. end of Dial	2nd I.F. Trans.	L-21 and L-22	Adjust for max. Voltage across Voice Coil.
		It is necessary to alternately load the primary and secondary of each 455 KC I.F. trans. with 10,000 ohms while the opposite side of the same trans. is being adj.								
	13	6BE6 Mixer Grid	Same	Same	Same	Same	Same	1st I.F. Trans.	L-17 and L-18	Same
	14	#6 on Ant. Ter.Board	Ground	200 mmf.	Same	S.B.	1500 KC.Calibration point on dial plate	Wave trap	L-8	Adjust for min. voltage across voice coil.
S.B. ALIGNMENT	15	#6 on Ant. Ter.Board	Ground	200 mmf.	1500 KC 30% Mod. 400 Cycles	S.B.	1500 KC.Calibration point on dial plate	Oscillator	C-22	Adjust for max. voltage across voice coil.
	16	Same	Same	Same	Same	Same	Same	Ant.	C-5	Same
	17	Same	Same	Same	600 KC 30% Mod. 400 Cy.Am.	Same	600 KC.Calibration point on dial plate	Oscillator	L-10	Same
		NOTE:- The oscillator must be rocked into the loop at 600 KC.								
	18	Repeat steps 15 to 17 for max. output.								
25-19M ALIGNMENT	19	#6 on Ant. Ter.Board	#3 on Ant. Ter.Board	300 Ohms	15.2 MC 30% Mod. 400 Cy.Am.	31-25-19M	15.2 MC Calibration point on dial plate	Oscillator	C-17	Adjust for Max.Voltage across voice coil
	20	Same	Same	Same	Same	31-25-19M	Same	Ant.	C-8	Same
	21	Same	Same	Same	9.55 MC 30% Mod. 400 Cy.Am.	31-25-19M	9.55 MC Calibration point on left hand end of dial plate	Oscillator	L-9	Same
	22	Same	Same	Same	Same	25-19M	Same	Ant.	L-4	Same
	23	Repeat steps 19 to 22 for maximum output.								
		NOTE:- To guard against the possibility of alignment of L-9 and C-17 to image frequency, tune the test oscillator and receiver to 15.2 MC, then set test oscillator to 16.11 MC (image frequency). Increase the test oscillator output: A signal should be heard. Then tune test osc. and receiver to 9.55 MC. Reset test osc. to 10.46 MC (image frequency) and increase test osc. output: A signal should be heard. If these image frequencies cannot be heard, the receiver is incorrectly aligned, Therefore repeat steps 19 to 23.								
F.M. ALIGNMENT	24	#1 on Ant. Ter.Board	#2 on Ant. Ter.Board	150 Ohm Resistor in Series with each Lead	106 MC 30% Mod. 400 Cy.Am.	F.M.	106 MC Calibration point on dial plate	Oscillator	C-24	Adjust for Max.Voltage across C-56 (Use Voltohmyst)
	25	Same	Same	Same	89 MC 30% Mod. 400 Cy.Am.	Same	89 MC Calibration point on dial plate	Oscillator	L-11	Same
		NOTE:- Two points may be found to fulfill the requirements. Use the one with the longest threaded end extending out of the transformer.								
	26	Repeat steps 24 and 25 for exact calibration.								
	27	Same	Same	Same	106 MC 30% Mod. 400 Cy.Am.	Same	106 MC Calibration point on dial plate	R.F.	C-21	Same
		NOTE:- Two points may be found having the greatest voltage developed. Use the one with greater capacity (tighter adjustment).								
	28	Same	Same	Same	89 MC 30% Mod. 400 Cy.Am.	Same	89 MC Calibration point on dial plate	R.F.	L-12	Same
		NOTE:- Two points may be found to fulfill the requirements. Use the one with the longest threaded end extending out of the transformer.								
	29	Repeat steps 27 and 28 for maximum output.								
	30	Same	Same	Same	106 MC 30% Mod. 400 Cy.Am.	Same	106 MC Calibration point on dial plate	Ant.	C-13	Same
	31	Same	Same	Same	89 MC 30% Mod. 400 Cy.Am.	Same	89 MC Calibration point on dial plate	Ant.	L-6	Same
	32	Repeat steps 30 and 31 for maximum output.								

REPLACEMENT PARTS FOR MODELS 80 & 81

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

STOCK NO.	DESCRIPTION
	RECEIVER ASSEMBLIES
S-4017	Board-Terminal Board.....
S-3697	Capacitor-Trimmer Assy(C5,C8,C17,C22)
S-3698	Capacitor-Ceramic trimmer(C24).....
39616	Capacitor-33MMF 5% Mica(C14,C9).....
S-4219	Capacitor-39 " 5% Ceramic(C25).....
S-4220	Capacitor-47 " 5% Ceramic(C15).....
39624	Capacitor-68 " 5% Mica (C4).....
45233	Capacitor-100" 10% Ceramic(C26).....
S-4221	Capacitor-220" 5% Ceramic(C3,C55,C6)
39636	Capacitor-220" 5% Mica (C2).....
39640	Capacitor-330" 5% Mica (C16).....
39642	Capacitor-390" 5% Mica (C11).....
39644	Capacitor-470" 5% Mica(C62,C37)
14498	Capacitor-680" 5% Mica (C18).....
S-3647	Capacitor-.007 MFD (C51,C52).....
S-3646	Capacitor-.005 MFD (C7,C10,C32,C33, C34,C41,C44,C46,C53,C61,C63).....
S-3652	Capacitor-.035 Mfd. (C58).....
S-3648	Capacitor-.010 " (C35,C50,C57, C60,C 27).....
36718	Capacitor-Electrolytic 10 MFD. (C56,C40).....
S-2894	Capacitor-Electrolytic 10 MFD (C65)
S-3720	Capacitor-Electrolytic 20-10-20 MFD (C59,C64,C66).....
S-3684	Condenser-Variable(C1,C12,C23,C20, C19).....
S-3607	Coil,Antenna Coil (Short Wave) (L3,L4).....
S-3680	Coil-Oscillator (Standard Broadcast) (L10).....
S-3679	Coil-Oscillator (Short Wave) (L9).
S-3678	Coil-Oscillator (F.M.) (L11).....
S-3621	Indicator-Station Selector Pointer.
S-3660	Loop-Antenna Loop (Model 80)(L1,L2)
S-4222	Loop-Antenna Loop (Model 81)(L1,L2)
34761	Resistor-10 Ohms 10% 1/4 Watt (R8). (This Resistor must be Carbon)
30732	Resistor-47 Ohms 1/2 Watt (R13)....
11670	Resistor-330 Ohms 10% 1/4 Watt(R27)
30538	Resistor-330 Ohms 20% 1/4 Watt(R2).
34766	Resistor-1000 Ohms 20% 1/2 Watt(R26)
34767	Resistor-2200 Ohms 1/2 Watt(R3,R4, R11,R16,R21).....
14250	Resistor-8200 Ohms 1/2 Watt (R25)..
3078	Resistor-10000 Ohms 1/2 Watt(R10)..
30492	Resistor-22000 Ohms 1/2 Watt(R7, R15,R17,R20).....
3077	Resistor-30000 Ohms 1/2 Watt(R23)..
30685	Resistor-33000 Ohms 1/2 Watt(R14)..
30787	Resistor-47000 Ohms 1/2 Watt(R34)..
14138	Resistor-68000 Ohms 1/2 Watt(R6)...
14583	Resistor-220000 Ohms 1/2 Watt(R19, R28).....
30648	Resistor-470,000 Ohms 1/2 Watt(R29)
30652	Resistor-1 Megohm, 1/2 Watt (R1,R5, R18,R12,R22).....
30649	Resistor-2.2 Megohm 1/4 Watt (R9).....
30992	Resistor-10 Megohm 1/2 Watt (R31, R32).....
S-2594	Resistor-1800 Ohms W.W. (R33).....

STOCK NO.	DESCRIPTION
S-3671	Switch-Range Switch(S1,S2)(M.80).
S-4223	Switch-Range Switch(S1,S2)(M.81).
36069	Socket-Tube Socket(Miniature-Centre Shield).....
51384	Socket-Tube Socket (Miniature)...
31319	Socket-Tube Socket (Octal).....
14278	Socket-Phono Socket.....
S-3670	Shaft-Drive Shaft (M.80).....
S-4226	Shaft-Drive Shaft (M.81).....
S-3658	Scale-Dial Scale (M.80).....
S-4227	Scale-Dial Scale (M.81).....
S-3667	Transformer 1st I.F. (A.M.) (L17,L18,C30,C31).....
S-3668	Transformer-2nd I.F. (A.M.) (L21,L22,C42,C43,C45,C36).....
S-4010	Transformer-1st I.F. (F.M.) (L15,L16,C28,C29).....
S-4011	Transformer-2nd I.F. (F.M.) (L19,L20,C38,C39).....
S-3703	Transformer-Driver (L23,L24,C47).
S-3702	Transformer-Radio Det.(C48,L25, C49).....
S-4037	Transformer-Power 60 Cycle (T1)..
S-3663	Transformer-Power 25 Cycle(T1)...
S-3664	Tone Control (1 Meg.) (S3,R30)(80)
S-4225	Tone Control (1 ") (S3,R30)(81)
S-3665	Volume Control 1/2 Meg.(R24)(80).
S-4224	Volume Control 1/2 Meg.(R24)(81).
S-3739	Wave Trap L8, Choke L7.....
	SPEAKER ASSEMBLY (Model 80)
S-3674	Cone-Cone & Voice Coil (L28).....
S-3661	Speaker (6x9 inch elliptical P.M.)
S-3669	Output Transformer(L26,L27) T2...
	SPEAKER ASSEMBLY (Model 81)
13867	Dust Cap (Pkg.5).....
S-3568	Cone-Cone & Voice Coil Assy.(L28)
S-3700	Speaker (12 inch round P.M.).....
S-3635	Output Transformer (L26,L27) (T2)
	MISCELLANEOUS ASSEMBLIES
---	Antenna F.M. - See R.F. Transmission Line.
S-4215	Cloth-Grille Cloth (Model 81)....
32634	Cord-Drive Cord.....
S-3467	Cord-Power Cord.....
S-4216	Decal.....
34489	Knob-(Tuning-Volume, Tone).....
37837	Knob-(Range).....
11765	Lamp-Pilot Lamp (Mazda 51).....
5133	Pin-Speaker cable pin (Pkg. 5)...
31418	Spring-Drive cord tension (Pkg.2)
S-2824	Socket-A.C.....
70788	RF Transmission Line-(See Fig.1 for Antenna Assembly details).

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

RCA VICTOR

"HIS MASTER'S VOICE"

MODEL V84B

Spring Wound Record Player

TECHNICAL INFORMATION AND SERVICE DATA

1948 No. 1

GENERAL SERVICE DIVISION • RCA VICTOR COMPANY LTD.

GENERAL DESCRIPTION

The RCA Victor Model V84B Record Player attachment is designed for use with a battery-operated receiver where a mechanical type unit is required having the characteristics necessary for record fidelity. The motor is of the mechanical, spring wound, variable speed type completely governed to maintain a constant speed. The pickup assembly is of the crystal type and incorporates a replaceable needle. A volume control is placed across the pickup output terminals providing a means of controlling the output voltage.

MOTOR SERVICE DATA

Motor.—The drive motor is of simple design and substantial construction. It should require little or no service if properly maintained. Attention to lubrication of the moving parts and occasional cleaning of the mechanism will go far to prevent faulty operation. Should it become necessary to repair the motor, the following procedure should be applied: **CAUTION. —Allow the motor mechanism to run down completely before attempting adjustment, repairs, or replacements.**

Removing Motor from Cabinet.—Remove the winding crank. Remove the four wood screws holding the base board in the cabinet. To dismount the motor, remove "C" washer from spindle shaft and remove turntable, slightly tapping the spindle while exerting an upward lift on the turntable. Loosen the screw holding the speed-regulating lever and remove the latter. The three screws holding motor to motor board should then be removed.

Replacing Main Spring Barrel.—In case of main spring failure, the entire spring barrel and gear should be replaced. Remove the spring-barrel spindle screw by **unscrewing to right.** Remove the C washer and two pillar screws holding bottom plate. Remove bottom plate, intermediate spindle shaft, and spring barrel. Reassemble parts in reverse sequence.

Winding Shaft Spring.—This spring functions as a friction ratchet. It may be removed as follows: remove pin holding winding worm on shaft; remove winding shaft; then remove screw holding spring. Replace in reverse sequence.

Speed Regulator Lever.—After assembly, adjust the speed regulator until the turntable rotates at 78 r.p.m.; loosen the speed regulator screw and set pointer to center of speed indicator scale; tighten screw and recheck turntable speed.

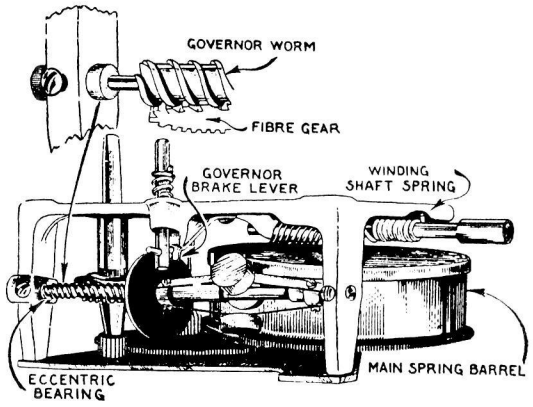
Lubrication.—All moving parts of the motor should be thoroughly cleaned and lubricated every six months to prevent excess wear and to assure proper operation. A small amount of grease should be applied to the worm gear of the governor, the gear of the winding shaft, and on the small pinion gear. All other points, including regulator friction pad, should be lubricated with light oil. All motor parts should be covered with a light film of oil to prevent rusting.



MODEL V84B

CABINET DIMENSIONS

Height	4¾	inches
Width	13½	inches
Depth	10	inches



Motor Adjustments:

Speed variations or WOWS may be experienced with these instruments due to a variety of causes. Some of the troubles and corrections are listed below:

1. A regular WOW occurring on every revolution of the turntable, or every few revolutions.

(a) A frequent cause of this difficulty is faulty adjustment of the governor springs. If the governor weights seem to oscillate in and out when the motor is in operation, the spring tension of the three weights may not be evenly balanced. Loosen the spring clamping screws and position the springs so that all three weights are held with the same tension.

(b) Another possible cause of this trouble is faulty adjustment of the governor bearings. To adjust these bearings:

First: Set the speed regulator lever so that the face of the felt friction pad is accurately parallel to the governor friction plate.

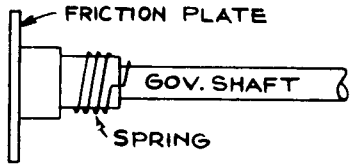
Second: Loosen both governor bearing set screws and position the governor so that the motor revolves at rated speed (78.4 rpm).

Third: Adjust the mesh of the worm and the fiber drive gear by turning the eccentric bearings. These should be set so that the worm meshes properly with the fiber gear without binding.

Fourth: Adjust the distance between bearings so that the governor turns freely with a minimum of end-play.

(c) A take-up spring is mounted on the governor friction plate shaft to ensure against lost motion and erratic operation of this plate. It is essential that this spring be in place and adjusted to provide adequate tension. It should be positioned as indicated in the sketch below.

(d) Marred or broken teeth on either gear on the turntable shaft or on the intermediate gear shaft may cause this trouble. If inspection shows this to be the case, the defective gear should be replaced.



Correct Position of Take-up Spring

2. The turntable loses speed or WOWS on the louder parts of a record:

(a) This may be caused by failure of the governor to respond accurately to speed changes, due to excessive or irregular friction between the sliding friction plate and the governor shaft. When this occurs it may be corrected by removing the weights and working the plate back and forth until it frees up. If the governor shaft does not have a smooth surface it may be necessary to smooth it down slightly using "Crocus Cloth" or to replace the governor.

(b) This condition may also be caused by excessive friction in any part of the motor. Be sure that the governor bearings are properly adjusted as described in section 1 (b). Lubricate all bearings in the motor using a high grade light oil. The governor shaft, friction plate, and felt friction pad should also be lubricated with this oil. Lubricate the worm with a light grease such as RCA Stock No. 10975 Electric Motor Grease. Remove the main spring and pack it with a graphite lubricant.

3. The turntable speed changes erratically over long periods of time.

(a) This may be caused by binding of the main spring due to improper lubrication. To correct this condition pack the spring with graphite grease as described in section 2 (b).

(b) Make sure that the top of the main spring housing does not rub on the end of the winding shaft.

(c) Inspect the gear teeth on the main spring gear. If these are marred or broken, it may be necessary to replace the spring assembly.

ELECTRICAL SPECIFICATIONS

A 500,000 ohm Volume Control is connected across the output of the crystal cartridge. The centre lug of the control is connected to the common side by a 470,000 ohm resistor in series with a 470 micro-micro farad capacitor. The output cable is connected across the 470 MMF capacitor.

REPLACEMENT PARTS FOR MODEL V84B

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

STOCK NO.	DESCRIPTION
	MOTOR ASSEMBLIES
S-3956	Governor Spring Screw (Pkg.3)
S-3957	Metal Handle Escutcheon
S-3960	Screw to attach Governor to Shaft
S-3962	Felt for speed regulating lever(Pkg.3)
S-3963	Spring barrel cover
S-3964	Governor Bearing Set Screw (Pkg.3)
S-3965	Steel washer for mounting screw(Pkg.3)
S-3966	Screw for attaching bottom plate to motor frame (Pkg.3)
S-3967	Washer used under speed regulator post (Pkg.3)
S-3968	Winding shaft gear
S-3969	Motor bottom plate
S-3970	Speed Indicator pointer
S-3971	Speed Regulating lever with felt
S-3973	Tension spring used on speed Reg.Post
S-3974	Spring barrel cup and gear
S-3975	Tubular Rivet for attaching Regulating lever to Motor frame (Pkg.3)
S-3976	Spring barrel complete
S-3977	Mainspring
S-3979	Governor Spring and Weight
S-3980	Spring barrel shaft winding gear
S-3981	Governor tension spring
S-3982	Spring barrel shaft used with S-3980.
S-3984	Fibre Handle Escutcheon
S-3985	Winding Shaft
S-3986	Winding Handle
S-3988	Clip to hold spring barrel shaft to bottom plate
S-3989	Turntable brake
S-3990	Spring barrel shaft rivet
S-3997	Rubber washer for mounting screw (Pkg.3)
S-3999	Governor shaft
S-4000	Intermediate gear complete
S-4001	Governor bearing
S-4002	Motor frame
S-4004	Governor bearing
S-4153	Turntable
S-4156	Speed Indicator Dial
	PICKUP ARM ASSEMBLIES
S-3481	Arm-Pickup arm shell
S-3693	Crystal-Crystal cartridge
S-3482	Base and pivot shaft
S-3484	Needle screw (Pkg.2)
S-3513	Screw-Crystal retaining screw (Pkg.10)
	MISCELLANEOUS ASSEMBLIES
31986	Cable-Pickup Cable
31054	Grommet-Pickup base grommet
S-4159	Knob
31048	Plug-Pickup cable plug
S-3515	Rest-Arm rest
S-4158	Volume Control-500,000 ohms
30648	Resistor-470,000 Ohms
S-4195	Capacitor-470 MMFD

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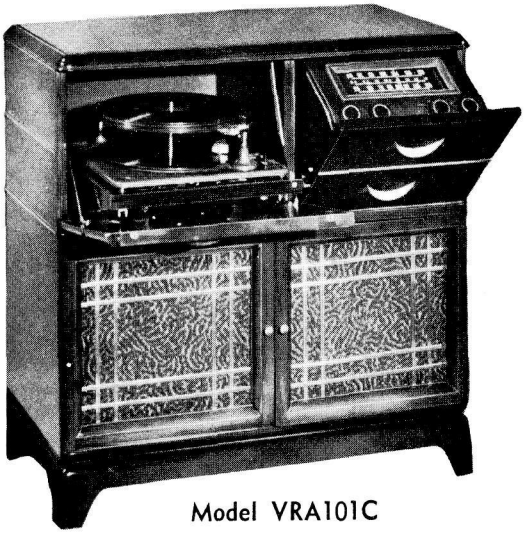
MODELS VRA101M & VRA101C

Ten-Tube, Three-Band, A.M.-F.M. Superheterodyne

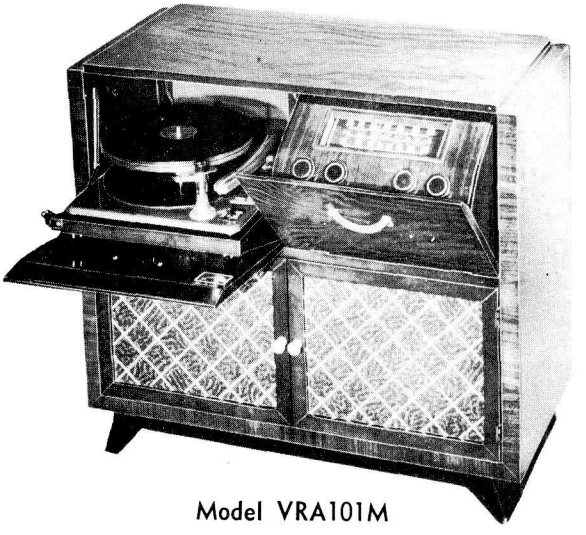
TECHNICAL INFORMATION AND SERVICE DATA

1947 No. 15

GENERAL SERVICE DIVISION • R C A VICTOR COMPANY LTD.



Model VRA101C



Model VRA101M

Electrical and Mechanical Specifications

FREQUENCY RANGE

Standard Broadcast S.B.	540-1600 K.C.
Short Wave 31 - 25 - 19 M.	9.4-15.8 M.C.
Frequency Modulation	88-108 M.C.
Intermediate Frequency A.M.	455 K.C.
Intermediate Frequency F.M.	10.7 M.C.
Tuning Drive Ratio	20 to 1

RADIOTRON COMPLEMENT

(1)	Type 6BA6	R.F. Amplifier
(2)	Type 6BE6	Converter
(3)	Type 6BA6	1st I.F. (FM & AM)
(4)	Type 6BA6	2nd I.F. (FM only)
(5)	Type 6AL5	F.M. Ratio Detector
(6)	Type 6AT6	A.M. Det., A.V.C. & 1st A.F.
(7)	Type 6AT6	Phase Inverter
(8)	Type 6V6GT/G	Power Output
(9)	Type 6V6GT/G	Power Output
(10)	Type 5Y3GT/G	Rectifier
Pilot Lamps (2)		Mazda No. 51 6-8 volts 0.2 amp.
(1)		Mazda No. 47 6-8 volts 0.15 amp.

POWER OUTPUT

Undistorted	4.5 Watts
Maximum	7.0 Watts

LOUDSPEAKER

Type	12 inch P.M.
Voice Coil impedance	2.2 ohms at 400 cycles

CABINET DIMENSIONS (Inches)

	Height	Width	Depth
Model VRA101M	33½	37	17
Model VRA101C	36¾	37¾	17¾

POWER SUPPLY RATINGS

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

PHONOGRAPH

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

PICKUP

Type	Crystal
Impedance	100,000 ohms at 1,000 cycles
Average Output	1.4 volts at 400 cycles across 500,000 ohm load

GENERAL DESCRIPTION

The RCA Victor Models VRA101M and VRA101C AM-FM radio-phonograph combinations are housed in cabinets of striking beauty. The AM-FM receiver is a ten tube, three band superheterodyne using the most up-to-date circuits for high quality radio reproduction. Features of the design include: Built-in folded dipole antenna for F.M. reception; Built-in short wave antenna; Adjustable standard broadcast loop antenna. Miniature tubes for improved high frequency performance; R.F. stage; Iron core R.F.; Oscillator and I.F. coils; "Amplitude Ignorer" for improved rejection of AM when receiving F.M.; Ratio detector for high quality F.M. reproduction; Automatic volume control circuits; Full range variable tone control; Tone compensated volume control; Push-pull pentode output stage; Twelve inch P.M. loudspeaker. Models VRA101M and VRA101C use type 960001-4 automatic record changer mechanism with high fidelity, low noise crystal pickup. Refer to the 960001-4 Service Note for adjustment details and list of replacement parts for this mechanism.

A COMPARISON OF F.M. AND A.M.

A conventional A.M. receiver operates with a signal in which the intelligence is transmitted by means of amplitude variations while the frequency remains fixed. An F.M. receiver, however, operates with a signal in which the intelligence is transmitted by means of frequency variations while the amplitude remains fixed. Noise, which consists largely of amplitude variations passes readily through an A.M. receiver which responds to these variations. In an F.M. receiver, special circuits are provided to minimize the response to amplitude variations so that noise free reception is assured with all except very weak signals. Where the signals picked up by the built-in folded dipole antenna are too weak, an outside F.M. antenna is necessary.

Due to the very high frequencies used for F.M. (88 to 108 megacycles) certain differences may be noticed in this type of reception. It is known that in some locations, particularly urban areas, a type of distortion peculiar to F.M. may be experienced. This is in no way a fault of the receiver but rather a physical phenomena caused by the signal being reflected from some object resulting in two or more paths for the transmitted signal. The reflected signal, arriving late and out of phase, tends to amplitude modulate the F.M. signal. This distortion may appear as a strange buzz, rattle or swish. It may even give the effect of an overloaded audio stage. In other cases an increase in noise level may be noticed. Choosing a different location for the receiver may eliminate the trouble since the directive folded dipole antenna housed in the cabinet will be oriented differently. In severe cases, an outside dipole and reflector pointing in the right direction may correct the trouble.

CIRCUIT ARRANGEMENT

The circuit for A.M. reception uses an untuned R.F. stage in which the loop antenna is used as the first tuned circuit. This is followed by a converter stage. The incorporation of temperature compensating capacitors in the tuned circuits greatly reduces the oscillator drift.

Primaries and secondaries of the 455 kc. A.M. and 10.7 mc; F.M. I.F. transformers are connected in series in the plate and grid circuits of the I.F. amplifier stages, except for the secondaries of the second I.F. transformers which are connected to the A.M. detector and F.M. driver amplifier respectively. The F.M. driver is followed by a ratio detector. The 10.7 mc I.F. transformers have relatively little effect on the 455 kc. A.M. I.F. signals due to low inductance of their coils and the I.F. amplifier operates in the conventional manner.

A double diode triode acts as A.M. detector, A.V.C. and first audio amplifier and, with a phase inverter, drives the push-pull pentode output stage.

The circuit for F.M. reception uses a tuned R.F. stage designed to match a 300 ohm antenna. This is followed by a converter stage. Temperature compensating capacitors and other precautions have been taken to make the oscillator as stable as possible consistent with the frequency at which it operates. All high frequency circuit connections are critical as to length and care must be taken that these lengths are maintained when any repair work is done.

As previously explained, the F.M. and A.M. I.F. transformers are connected in series. The 455 kc I.F. transformers have relatively little effect on the 10.7 mc. F.M. I.F. signals due to the low reactance of the capacitors in the 455 kc transformers, so that the two stage amplifier operates in the conventional manner. In the first I.F. stage an unbypassed cathode resistor is used to compensate for the variation in input capacity of the tube with a change in A.V.C. voltage. The second I.F. amplifier stage incorporates an "amplitude ignorer" circuit which provides noise suppression additional to that obtained in the ratio detector.

The ratio detector, appearing in RCA post-war f-m receivers, is a new device for converting a frequency modulated carrier to an audio signal, while at the same time offering a high degree of attenuation to any incident amplitude modulation. The relative insensitivity to amplitude variations, which is an inherent characteristic of ratio detectors, enables them to be used without the usual preceding limiter stage, thus affording the use of a high gain i-f stage instead of the low-gain limiter.

The ratio detector is discussed in detail on page 5. The audio amplifier is the same one used for A.M. reception and uses the triode section of the double diode triode as the first A.F. amplifier, with a phase inverter and push-pull pentode output stage.

ANTENNAS

If reception is not satisfactory on one or more of the three bands, using the built-in cabinet antennas, an external antenna may be used. (A 1000 ohm resistor is connected from terminal 1 to terminal 5 so that the F.M. antenna will also act as a short wave antenna.)

An external antenna for broadcast and short wave reception, when required, is connected to terminal 6.

If an external F.M. antenna is to be used, disconnect the internal folded dipole antenna and connect in its place the leads from the external antenna.

Two general types of F.M. antennas are used. These are the folded dipole and the folded dipole with reflector, both of which are used with a 300 ohm transmission line. The reflector element used is somewhat longer than the folded dipole element. These antennas are directive and must be oriented for maximum signal pickup from the desired stations. The folded dipole picks up a maximum signal from stations at right angles to the direction in which the dipole is pointing. The folded dipole with reflector is similarly directive but provides additional signal pickup from the side of the folded dipole away from the reflector and rejects signals from the reflector side of the folded dipole.

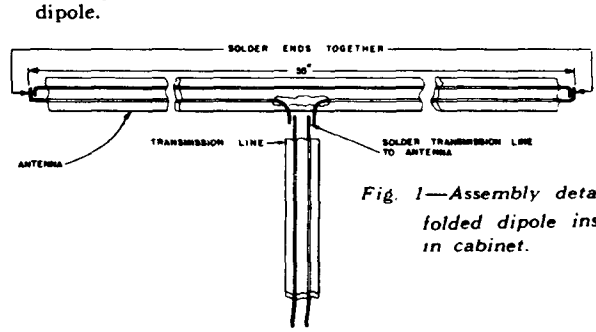


Fig. 1—Assembly details of folded dipole installed in cabinet.

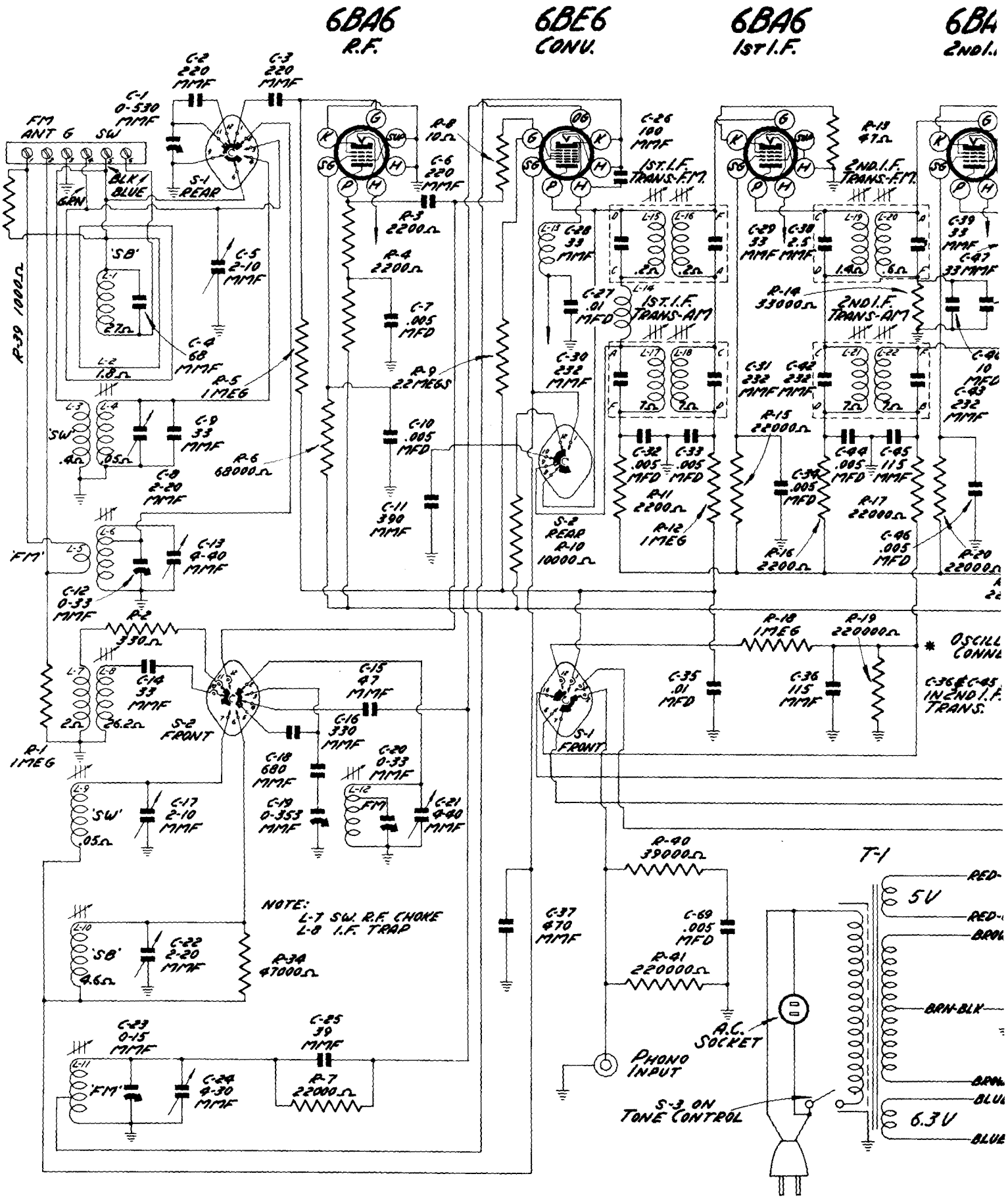
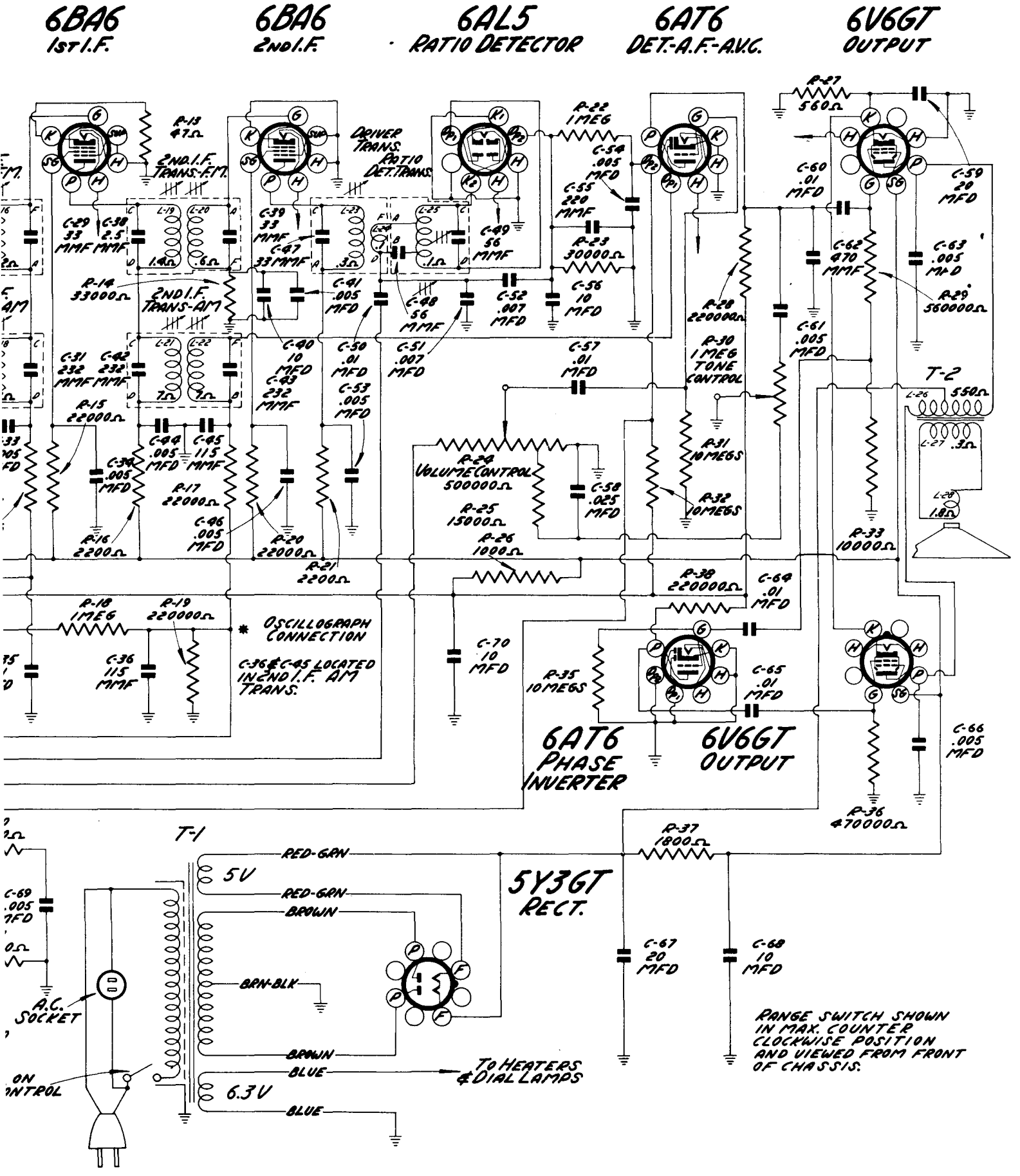


Fig. 2—Schematic Diagram—Range Switch shown in



iatic Diagram—Range Switch shown in Phono Position.

THE RATIO DETECTOR

A schematic of the fundamental ratio detector is shown in Figure 3. C7 and C4 have very little reactance at the intermediate frequency, so it is evident that the parallel resonant circuit L_2 C_2 is the true load for the driver stage, this stage being shunt fed. A driver stage, in this case is nothing more than a conventional I.F. amplifier preceding the ratio detector.

The A.C. voltage applied to each diode is the vector sum of E_1 and the voltage across that half of L_1 which is connected to the diode plate, as shown in the diagrams of Figure 5. E_1 has practically the same amplitude and phase as the voltage across the tank in the driver plate circuit. Since the primary (L_2) of the ratio detector transformer is inductively coupled to the secondary (L_1), the current in L_2 induces a voltage in L_1 and causes a circulating current to flow in L_1 and C_1. E_2 and E_3 are the voltage drops which occur across each half of L_1 as a result of this circulating current. When the carrier frequency is equal to the frequency at which the ratio detector transformer is tuned (Fig. 5A), the AC voltage applied to diode 1 equals that applied to diode 2. When the carrier frequency increases during a half cycle of modulation, the phase relations between E_1, E_2 and E_3 change in accordance with Figure 5B, and it is evident that the vector sum of the voltages applied to diode 2 exceeds the vector sum of the voltages applied to diode 1. When the carrier frequency decreases during a half cycle of modulation, the phase relations between E_1, E_2 and E_3 change in accordance with Figure 5C, and the vector sum of the voltages applied to diode 1 exceeds the vector sum of the voltages applied to diode 2.

A comparison with conventional discriminator circuits will show that as far as the AC voltages applied to the diodes are concerned, these circuits are almost exactly similar. Here the similarity ends, because the ratio detector method of extracting intelligence from the FM carrier differs greatly from previously used methods. Diode 1, R3, and diode 2 complete a series circuit fed by the AC voltage across L_1. Since the two diodes are in series, they will conduct on the same half cycle, and the rectified current through R_3 will cause a negative potential to appear at the plate of diode 1. The time constant of R_3C_6 is usually about 0.2 second, so that the negative potential at the plate of diode 1 will remain constant even at the lowest audio frequencies to be reproduced.

C3 will be charged by the rectified current through diode 1 to a voltage proportional to the voltage represented by vector Ediode 1 (Figure 5), and C4 will be charged through diode 2 in proportion to the vector Ediode 2. Since the magnitudes of these vectors differ according to the instantaneous frequency of the carrier, the voltages across C3 and C4 will differ proportionately, the voltage across C3 being the larger of the two voltages at carrier frequencies below the i-f, and the smaller at frequencies above the i-f.

Note that the voltages across C3 and C4 are additive and that their sum is fixed by the constant potential across R3. Therefore, while the ratio of these voltages will vary at an audio rate, their sum will always be constant and equal to the voltage across R3. The potential at the junction of C3 and C4 will vary at an audio rate when an f-m carrier is applied to the detector, hence the audio voltage is extracted at this point and fed into the audio amplifier.

There is no direct d-c return path across either C3 or C4; the reason for this is twofold. Firstly, a direct return path is not needed because whenever the potential of the junction of C3 and C4 is raised or lowered in accordance with the frequency of the voltage applied to the detector, there will be a point on R3 having a potential equal to the voltage across C4. This point will shift up and down on R3 in synchronism with the audio voltage across C4. If this point could be connected to the junction of C3 and C4, a d-c return for each diode would be provided, but no current would flow through the connection because there would be no difference of potential between the point on R3 and the junction of C3 and C4. Since no current would flow through this connection, a direct return path would be useless.

Secondly, a peculiar form of distortion, apparent at low carrier levels; is evident if a resistance is connected directly across C4. This distortion is caused by C4 discharging through the resistance whenever the carrier level falls below the level

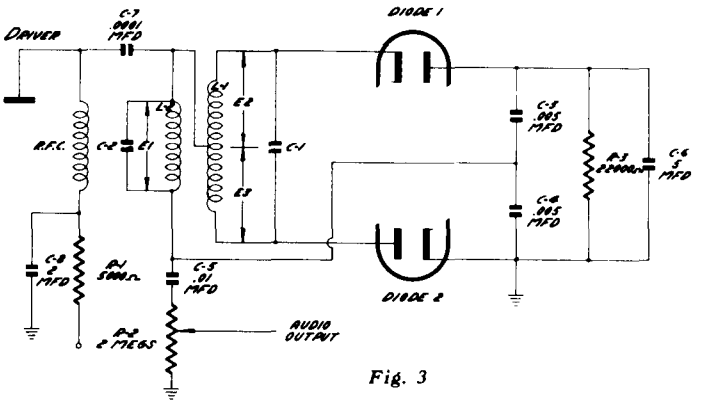


Fig. 3

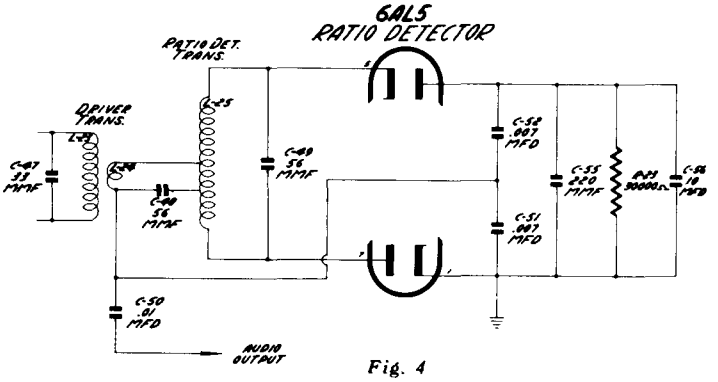


Fig. 4

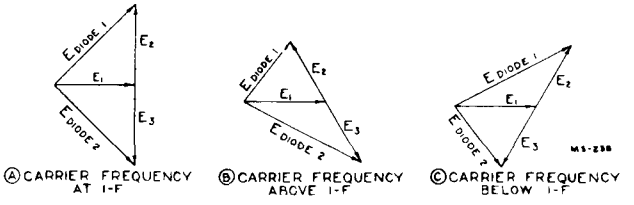


Fig. 5

at which the diodes are biased off by the voltage across R3. The effect of the distortion is to add a long peak to one loop of the audio cycle.

The rejection of amplitude modulation in the ratio detector may be explained as follows: A rapid increase in the amplitude of the carrier applied to the ratio detector will tend to increase the d-c voltages across C3 and C4. The sum of these voltages must always be equal to the voltage across C6. The voltage across C6 cannot change with a rapid increase in the amplitude of the carrier, due to the large time constant of R3 and C6. Therefore, this constant potential across C6 prevents the voltages across C3 and C4 from rising with an increase in the strength of the carrier. A reduction in carrier amplitude is prevented from appearing as a reduction in the voltages across C4 in the same way. The constant voltage across C6 can be considered to be a stabilizing voltage; i.e., it stabilizes the ratio detector output against amplitude modulation of the applied carrier.

The time constant of R3 C6 is not too large to prevent average changes in carrier level from appearing as changes in voltage across R3; in other words the voltage across R3 is proportional to the average strength of the received carrier. Thus this voltage serves as an excellent AVC voltage.

There is no "threshold" effect apparent in the ratio detector; i.e., there is no minimum carrier level which must be applied to the detector to cause noise attenuation as in other types of f-m detectors requiring the use of a limiter stage.

The Ratio Detector used in this receiver, differing only in the method of applying i-f energy to L1 and C1, is shown in Figure 4. This circuit, as well as any other ratio detector circuit, can be broken down and analyzed in almost the same manner as was the basic ratio detector circuit of Figure 3.

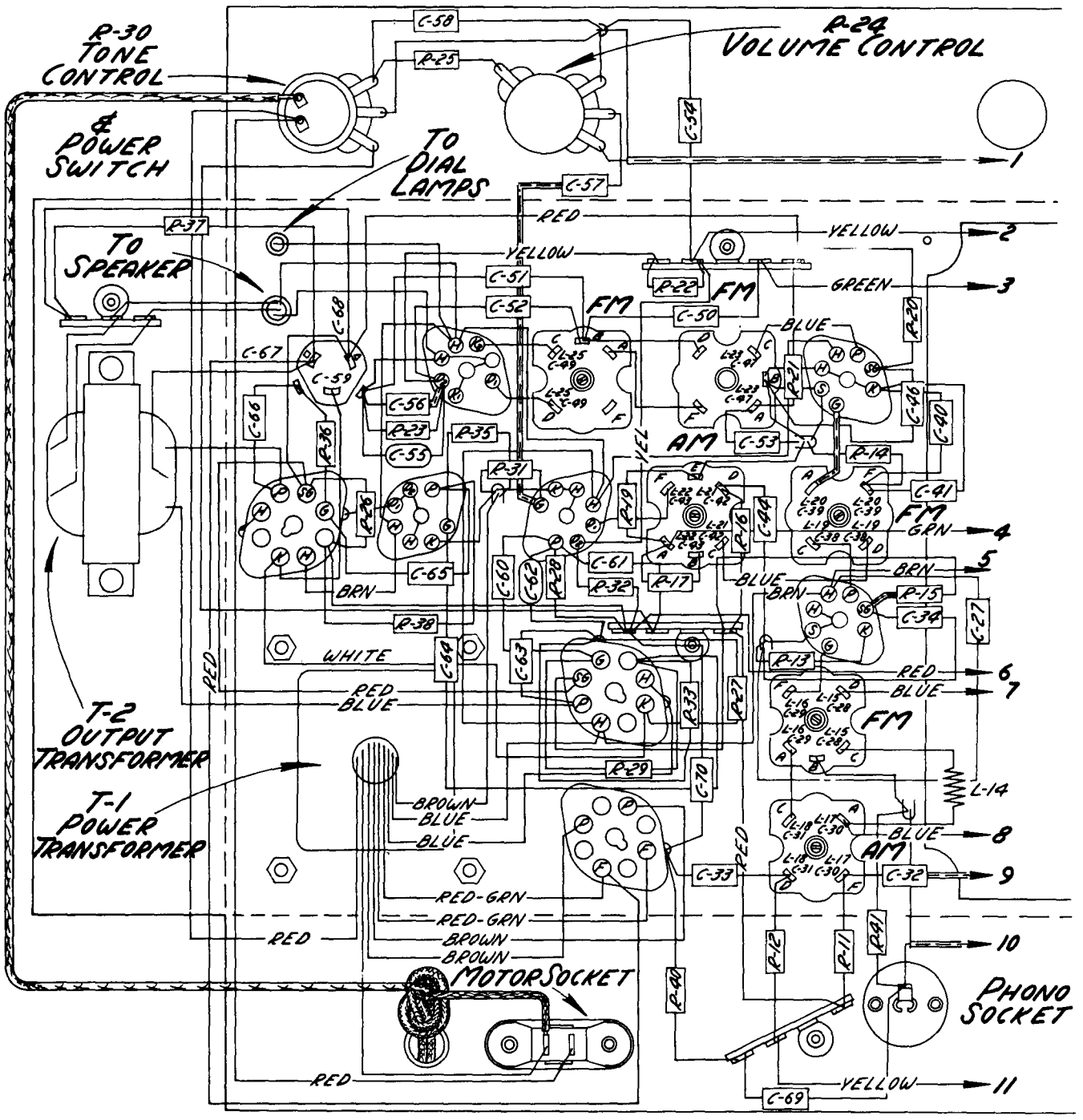


Fig. 6—Wiring Diagram of Main Chassis.

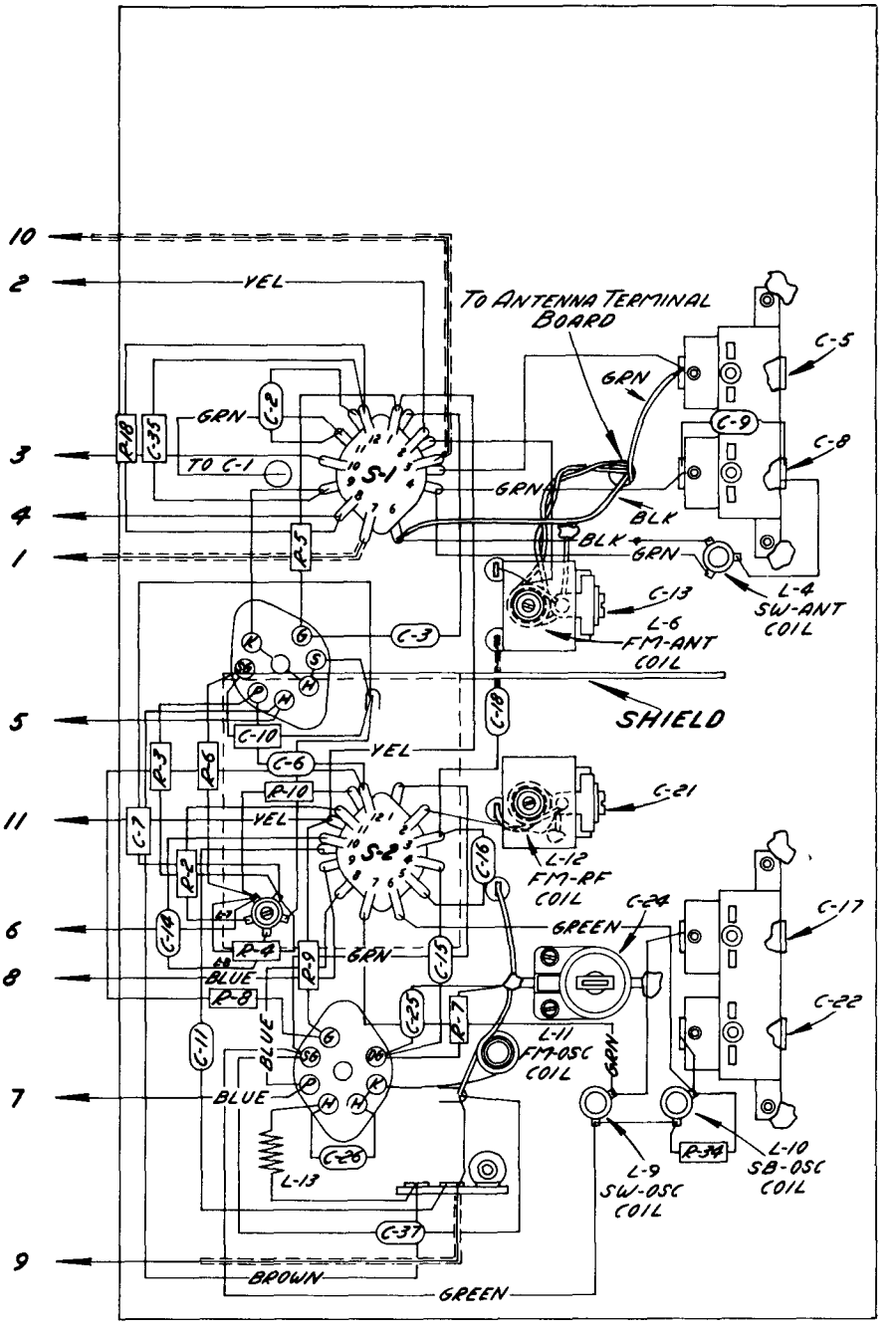


Fig. 7—Wiring Diagram of R.F. Sub Chassis.

RADIOTRON SOCKET VOLTAGES

TYPE	CIRCUIT	PLATE	SCREEN	CONT GRID	OSC. GRID			CATHODE	HEATER
					AM	FM	FREQ.		
6BA6	R.F.	130	60				•		6.3 A.C.
6BE6	CONV.	180	100		16 −7	−3	600 kc. 1500 kc. 100 mc.		6.3 A.C.
6BA6	1st I.F.	180	90						6.3 A.C.
6BA6	2nd I.F.	180	90						6.3 A.C.
6AL5	Ratio Detector								6.3 A.C.
6AT6	Det.-AVC & Audio	80							6.3 A.C.
6AT6	Phase Inverter	80							6.3 A.C.
6V6GT	Output	275	175					+10	6.3 A.C.
6V6GT	Output	275	175					+10	6.3 A.C.
5Y3GT	Rectifier	275 A.C. (Pin 4) 275 A.C. (Pin 6)							5.0 A.C.
"B" Voltage measured from Rectifier Fil. (5Y3GT) to Gnd.—275 Volts.									

Note:—All the above values hold within plus or minus 20% when measured with a RCA Voltohmyst or equivalent, on a line voltage of 117 volts. All voltages are measured to chassis.

ALIGNMENT PROCEDURE

Before aligning set, completely mesh the gang and set the dial pointer on the mechanical maximum calibration point at the extreme left hand end of the dial. (See Fig. 10.)

When making a complete alignment follow in proper sequence the tabulated form on page 9.

If only a portion of the circuit is to be aligned select the portion required, followed by the remaining steps in the chart. Any adjustments made on the FM 10.7 mc. I.F.'s make it necessary to realign the A.M. 455 kc. I.F.'s.

For "S.B." and 31-25-19M band alignment use output meter across voice coil keeping Test Oscillator output as low as possible to prevent AVC action.

Cathode-ray oscilloscope and sweep signal generator alignment of the 455 kc. A.M. I.F. transformers is the preferable method. Connect oscilloscope across the volume control. If the required equipment is not available use the method outlined below.

CRITICAL LEAD DRESS

(Make lead dress before alignment)

1. Dress green lead from antenna terminal board pin 4 away from chassis.
2. All F.M. coil connections must be kept to the exact length of the original (one-sixteenth inch difference in length may be excessive).
3. All wiring in the receiver is critical as to length and placement. It is therefore important when servicing, that extreme care should be taken so as not to disturb more of the wiring than absolutely necessary.

NOTE: Keep tuning capacitor grounding brushes clean and under correct tension for proper contact.

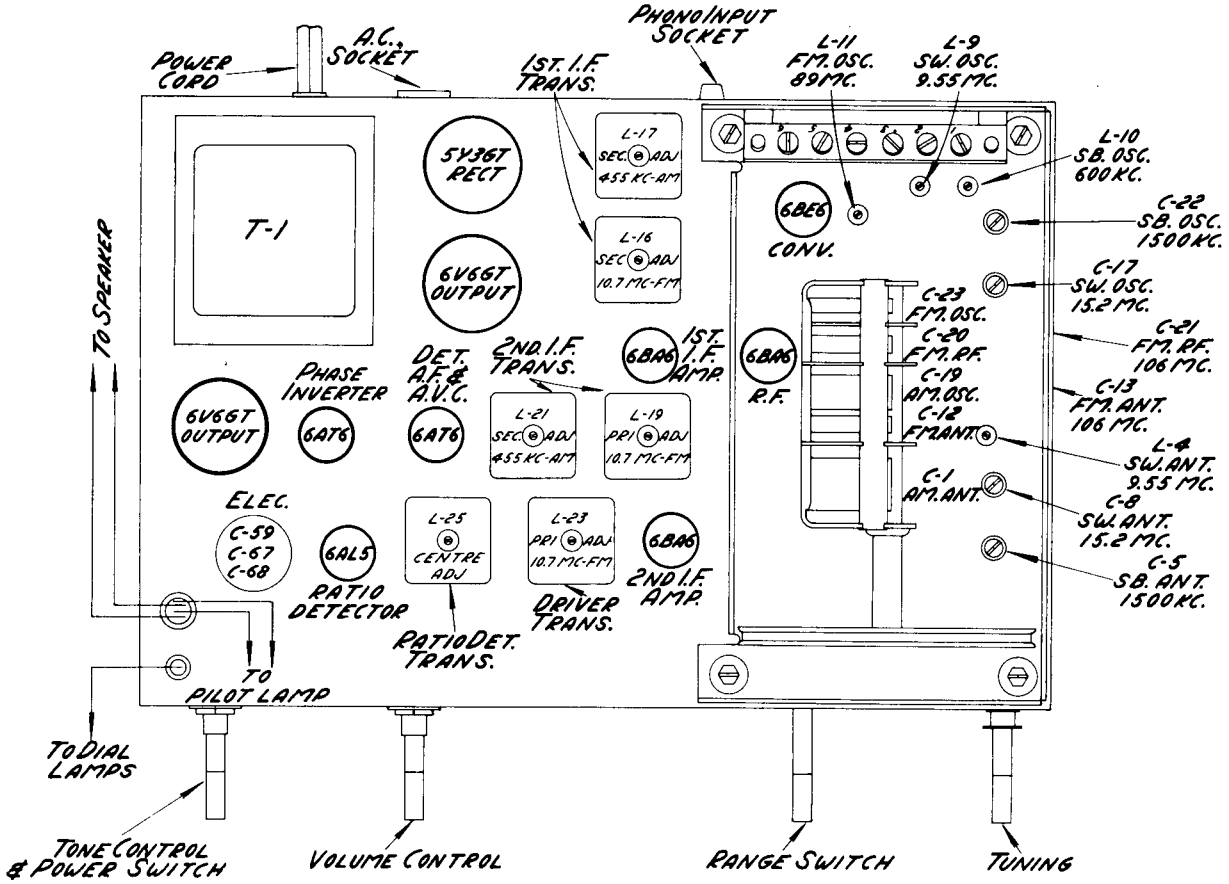


Fig. 8—Chassis Layout and Alignment Adjustments.

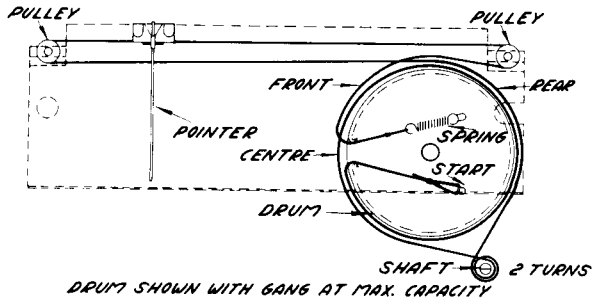


Fig. 9—Dial Cord Stringing.

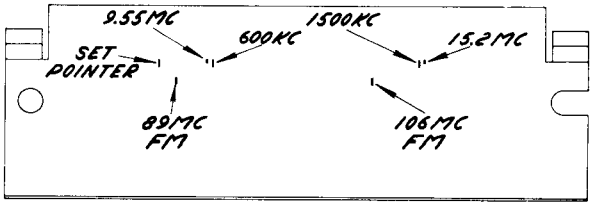


Fig. 10—Alignment Calibration Markers.

ALIGNMENT CHART

VRA101M
VRA101C

ORDER OF ALIGNMENT		TEST OSCILLATOR: CONNECT "HI" SIDE TO	TEST OSCILLATOR: CONNECT "LO" SIDE TO	TEST OSCILLATOR: DUMMY ANTENNA	TEST OSCILLATOR: FREQUENCY SETTING	RANGE SELECTOR	RECEIVER DIAL SETTING	CIRCUIT TO ADJUST	ADJUSTMENT SYMBOLS	NOTES
F.M. RATIO DETECTOR ALIGNMENT	1	Connect a 1000 ohm resistor between lugs "C" and "D" of the ratio detector trans. Connect DC probe of a Voltohmyst to the negative lead of the 10 mfd elec. capacitor C-56. The common lead of the meter is connected to the chassis.								
	2	6BA6 2nd I.F. Grid	Ground	.01 mfd	10.7 MC 30% Mod. 400 Cy.Am.	F.M.	Max.Cap (Fully Meshed)	Driver Trans-former	L-23 Det. Trans.	For Max. D.C.Voltage Across C-56
	3	Remove meter leads and disconnect the 1000 ohm resistor from "C" and "D" on ratio det. trans. Connect two 100,000 ohm resistors (within 1% of being equal) in series across C56. Connect the common lead of the Voltohmyst to the centre point of the 100,000 ohm resistors and the D.C. probe to pin "B" of ratio det. trans. Use 30 volt scale for preliminary alignment. Complete alignment using 3 volt scale								
	4	Same	Same	Same	Same	Same	Same	Ratio Det.Trans.	Bottom Core L-25	†† For Zero D.C.Balance
	5	Near the correct core position the zero point is approached rapidly and continued adjustment causes the indicated polarity to reverse. A slow approach to the zero point is an indication of severe detuning, and the bottom core should be turned in the opposite direction..								
		Same	Same	Same	Same	Same	Same	Ratio Det.Trans	Top Core L-25	†† For Minimum Audio Output
		NOTE:- Two or more points may be found which will satisfy the condition required. Top core should be correctly adjusted when approximately 1/8 inch of threads extend above the can, therefore, it is desirable to start adjustment with the top core in its furthest "in" position and turn out, while adjusting the bottom core, until the first point of minimum AF and minimum DC is reached. †† The zero DC balance and the minimum AF output should occur at the same point: if such is not the case, the two cores should be adjusted until both occur with no further adjustment of either core. It may be advantageous to adjust both cores simultaneously, watching the Voltohmyst, and an output meter connected across the voice coil for the point at which both zero DC and minimum output occurs.								
	6	Reconnect Voltohmyst as in step 1, omitting 1000 ohm resistor.								
	7	Repeat step 2, omitting 1000 ohm.								
	8	Remove all connections.								
F.M. I.F. ALIGNMENT	9	Connect the DC probe of a Voltohmyst to the negative lead of the 10 mfd electrolytic capacitor C56 and the common lead of the meter to chassis ground.								
	10	6BA6 1st I.F. Grid	Ground	.01 mfd.	10.7 MC 30% Mod. 400 Cy.Am.	F.M.	Max.Cap (Fully meshed)	2nd I.F. Trans.	L-19 and L-20	*Adjust test Osc. Output for 6-10 Volts developed across C-56 use very short leads
		* Top and bottom cores alternately loading primary & secondary of each trans. with 1000 ohms while the opposite side of the same trans. is being adjusted. Adjust all trans. for max. voltage across C-56. This method is known as alternate loading which involves the use of a 1000 ohm resistor to load the plate winding while the grid winding of the same transformer is being peaked. Then the grid winding is loaded with 1000 ohm resistor while the plate winding is being peaked. When the windings are loaded, it is necessary to increase the 10.7 MC input since the gain will decrease and the voltage across C56 will be less.								
	11	6BE6 Mixer grid	Same	Same	Same	Same	Same	1st I.F. Trans.	L-15 and L-16	* Adjust test Osc. Output for 6-10 Volts developed across C-56 use very short leads
A.M. I.F. ALIGNMENT	12	6BA6 1st I.F. Grid	Ground	.01 mfd.	455 KC 30% mod. 400 Cy.Am.	S.B.	High Freq. end of Dial	2nd I.F. Trans.	L-21 and L-22	Adjust for max. Voltage across Voice Coil.
		It is necessary to alternately load the primary and secondary of each 455 KC I.F. trans. with 10,000 ohms while the opposite side of the same trans. is being adj.								
	13	6BE6 Mixer Grid	Same	Same	Same	Same	Same	1st I.F. Trans.	L-17 and L-18	Same
	14	#6 on Ant. Ter.Board	Ground	200 mmf.	Same	S.B.	1500 KC.Calibration point on dial plate	Wave trap	L-8	Adjust for min. voltage across voice coil.
S.B. ALIGNMENT	15	#6 on Ant. Ter.Board	Ground	200 mmf.	1500 KC 30% Mod. 400 Cycles	S.B.	1500 KC.Calibration point on dial plate	Oscillator	C-22	Adjust for max. voltage across voice coil.
	16	Same	Same	Same	Same	Same	Same	Ant.	C-5	Same
	17	Same	Same	Same	600 KC 30% Mod. 400 Cy.Am.	Same	600 KC.Calibration point on dial plate	Oscillator	L-10	Same
		NOTE:- The oscillator must be rocked into the loop at 600 KC.								
	18	Repeat steps 15 to 17 for max. output.								
25-19M ALIGNMENT	19	#6 on Ant. Ter.Board	#3 on Ant. Ter.Board	300 Ohms	15.2 MC 30% Mod. 400 Cy.Am.	31-25-19M	15.2 MC Calibration point on dial plate	Oscillator	C-17	Adjust for Max.Voltage across voice coil
	20	Same	Same	Same	Same	31-25-19M	Same	Ant.	C-8	Same
	21	Same	Same	Same	9.55 MC 30% Mod. 400 Cy.Am.	31-25-19M	9.55 MC Calibration point on left hand end of dial plate	Oscillator	L-9	Same
	22	Same	Same	Same	Same	25-19M	Same	Ant.	L-4	Same
	23	Repeat steps 19 to 22 for maximum output.								
		NOTE:- To guard against the possibility of alignment of L-9 and C-17 to image frequency, tune the test oscillator and receiver to 15.2 MC, then set test oscillator to 16.11 MC (image frequency). Increase the test oscillator output; A signal should be heard. Then tune test osc. and receiver to 9.55 MC. Reset test osc. to 10.46 MC (image frequency) and increase test osc. output; A signal should be heard. If these image frequencies cannot be heard, the receiver is incorrectly aligned. Therefore repeat steps 19 to 23.								
F.M. ALIGNMENT	24	#1 on Ant. Ter.Board	#2 on Ant. Ter.Board	150 Ohm Resistor in Series with each Lead	106 MC 30% Mod. 400 Cy.Am.	F.M.	106 MC Calibration point on dial plate	Oscillator	C-24	Adjust for Max.Voltage across C-56 (Use Voltohmyst)
	25	Same	Same	Same	89 MC 30% Mod. 400 Cy.Am.	Same	89 MC Calibration point on dial plate	Oscillator	L-11	Same
		NOTE:- Two points may be found to fulfill the requirements. Use the one with the longest threaded end extending out of the transformer.								
	26	Repeat steps 24 and 25 for exact calibration.								
	27	Same	Same	Same	106 MC 30% Mod. 400 Cy.Am.	Same	106 MC Calibration point on dial plate	R.F.	C-21	Same
		NOTE:- Two points may be found having the greatest voltage developed. Use the one with greater capacity (tighter adjustment).								
	28	Same	Same	Same	89 MC 30% Mod. 400 Cy.Am.	Same	89 MC Calibration point on dial plate	R.F.	L-12	Same
		NOTE:- Two points may be found to fulfill the requirements. Use the one with the longest threaded end extending out of the transformer.								
	29	Repeat steps 27 and 28 for maximum output.								
	30	Same	Same	Same	106 MC 30% Mod. 400 Cy.Am.	Same	106 MC Calibration point on dial plate	Ant.	C-13	Same
	31	Same	Same	Same	89 MC 30% Mod. 400 Cy.Am.	Same	89 MC Calibration point on dial plate	Ant.	L-6	Same
	32	Repeat steps 30 and 31 for maximum output.								

REPLACEMENT PARTS FOR MODELS VRA101M & VRA101C

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

STOCK NO.	DESCRIPTION
	RADIO CHASSIS ASSEMBLIES
S-4017	Board-terminal board
S-3697	Capacitor-trimmer assembly (C5,C8, C17,C22)
S-3698	Capacitor-ceramic trimmer (C24)
39616	Capacitor-33 MMF 5% mica(C9,C14)
S-4219	Capacitor-39 MMF 5% ceramic(C25)
S-4220	Capacitor-47 MMF 5% ceramic(C15)
S-3510	Capacitor-68 MMF 20% mica (C4)
45233	Capacitor-100 MMF 10% ceramic(C26)
S-4221	Capacitor-220 MMF 5% ceramic(C3,C6, C55)
39636	Capacitor-220 MMF 5% mica (C2)
39640	Capacitor-330 MMF 5% mica (C16)
39642	Capacitor-390 MMF 5% mica (C11)
39644	Capacitor-470 MMF 5% mica (C37,C62)
14498	Capacitor-680 MMF 5% mica (C18)
S-3646	Capacitor-.005 MFD (C7,C10,C32,C33, C34,C41,C44,C46,C53,C61,C63,C66, C69)
S-3647	Capacitor-.007 Mfd. (C51,C52)
S-3648	Capacitor-.010 Mfd. (C27,C35,C50, C57,C60,C64,C65)
S-3651	Capacitor-.025 Mfd. (C58)
36718	Capacitor-10 Mfd. Electrolytic (C40,C56)
S-2894	Capacitor-10 Mfd. Electrolytic(C70)
S-3720	Capacitor-20-10-20 Mfd.Electrolytic (C59,C64,C66)
S-3684	Condenser-Variable,tuning cond.with drum(C1,C12,C19,C20,C23)
S-3607	Coil-Antenna coil Short Wave(L3,L4)
S-3679	Coil-Oscillator coil Short Wave(L9)
S-3680	Coil-Oscillator coil Standard Broadcast (L10)
S-3678	Coil-Oscillator coil F.M. (L11)
32634	Cord-Drive cord (universal)
16058	Grommet-Rubber grommet for mounting R.F. sub-chassis (Pkg.5)
S-4172	Grommet-Rubber grommet for mounting main chassis (Pkg.3)
S-3621	Indicator-station selector pointer.
11765	Lamp-Dial lamp (Mazda 51)
S-4300	Plate-Dial backplate with pulleys
34761	Resistor-10 ohms 10% 1/4 watt(R8)
30732	Resistor-47 ohms 1/2 watt (R13)
30538	Resistor-330 ohms 20% 1/2 watt(R2)
5164	Resistor-560 ohms 1/4 watt (R27)
34766	Resistor-1,000 ohms 20% 1/2 watt (R26)
S-2594	Resistor-1,800 ohms W.W. (R37)
34767	Resistor-2200 ohms 1/2 watt(R3,R4, R11,R16)
3078	Resistor-10,000 ohms 1/2 watt(R10, R33)
36714	Resistor-15,000 ohms 1/4 watt(R25)
30492	Resistor-22,000 ohms 1/2 watt(R7, R15,R17,R20)
3077	Resistor-30,000 ohms 1/2 watt(R23)
30685	Resistor-33,000 ohms 1/2 watt(R14)
12266	Resistor-39,000 ohms 1/4 watt(R40)
30787	Resistor-47,000 ohms 1/4 watt(R34)
14138	Resistor-68,000 ohms 1/2 watt(R6)
14583	Resistor-220,000 ohms 1/2 watt(R19, R28,R38,R41)
30648	Resistor-470,000 ohms 1/2 watt(R36)
30653	Resistor-560,000 ohms 1/2 watt(R29)
30652	Resistor-1 Megohm 1/2 watt(R1,R5, R12,R18,R22)
30649	Resistor-2.2 Megohms 1/2 watt (R9)
30992	Resistor-10 Megohms 1/2 watt(31,R32, R35)
S-4226	Shaft-Tuning drive shaft
31364	Socket-Dial lamp socket
36069	Socket-Tube socket(Miniature with center shield)
51384	Socket-Tube socket(Miniature)
31319	Socket-Tube socket (Octal)
14278	Socket-Phono socket
31418	Spring-Drive cord spring (Pkg.2)
S-4223	Switch-Range switch (S1,S2)
S-4225	Tone Control-1 Megohm (S3,R30)
S-3667	Transformer 1st I.F.-A.M.(L17, L18,C30,C31)
S-3668	Transformer 2nd I.F.-A.M.(L21, L22,C36,C42,C43,C45)
S-4010	Transformer-1st I.F.-F.M.(L15, L16,C28,C29)
S-4011	Transformer-2nd I.F.-F.M.(L19, L20,C38,C39)
S-3703	Transformer-Driver-F.M.(L23,L24, C47)
S-3702	Transformer-Ratio Det.F.M.(L25, C48,C49)
S-3722	Transformer-Power-60 cycle (T1)
S-4297	Transformer-Power 25 cycle (T1)
S-4038	Transformer-Output (T2)(L26,L27)
S-4224	Volume Control-500,000 ohms (R24)
2917	Washer-"C" washer for tuning drive shaft (Pkg.10)
S-3739	Wave trap (L8) Choke (L7)
	SPEAKER ASSEMBLIES (12" P.M.)
S-4298	Board-speaker terminal board
13867	Dust cap (Pkg.5)
S-4299	Cone-Cone & voice coil assembly(L28)
S-4288	Speaker (complete)
	AUTOMATIC RECORD CHANGER MECHANISM
Refer to Model 960001-4 Service Note for replacement parts & Service Data.	
	PULL OUT MECHANISM ASSEMBLIES
S-4182	Door balancing assy.(complete)
S-4180	Fibre washer (Pkg.3)
S-4169	Hex.nut for door balance assembly
S-3742	Pull-out mechanism(record player)
S-4179	Rubber washer (Pkg.2)
S-4176	Set screw for door balance assy. (Pkg.3)
S-4046	Slide holder & carriage
S-4047	Slide bar (L.H.)
S-4048	Slide bar (R.H.)
S-4177	Spring washer for door balance assy.(Pkg.3)
S-4166	Spring-balancing spring
S-4178	Stud for door balancing assy.
S-4168	Support-door fall support
	MISCELLANEOUS ASSEMBLIES
	Antenna-F.M.(see R.F.transmission line).
33545	Cap-pilot lamp cap
S-3924	Catch-door catch & strike plate (VRA101C)
S-3925	Catch-door catch& strike plate (VRA101M)
S-4167	Clamp-back cover clamp(Pkg.10)
S-4228	Cloth-grille cloth(VRA101C)
S-4229	Cloth-grille cloth(VRA101M)
S-4216	Decal-(front panel)
36386	Decal-(Record drawer)
S-3658	Dial-Dial Scale (VRA-101M)
S-4227	Dial-Dial Scale (VRA-101C)
S-4230	Grille-metal grille (VRA-101C)
S-4231	Grille-metal grille (VRA-101M)
S-4293	Handle-Door handle(VRA101C)
S-4289	Handle-Door handle(VRA101M)
13103	Jewel-Amber jewel
S-4291	Knob-Door knob(VRA-101C)
S-4292	Knob-door knob(VRA-101M)
34489	Knob-Tuning,volume,tone
37837	Knob-Range
31480	Lamp-pilot lamp (Mazda 47)
S-4022	Loop-Antenna loop (L1,L2)
5133	Pin-Speaker cable pin(Pkg.5)
S-4009	Spring-conical spring to mount record changer
14270	Spring-retaining spring for knob (Pkg.3)
70788	R.F.transmission line(see Fig.1 for antenna assembly details).. ft.

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

RCA VICTOR

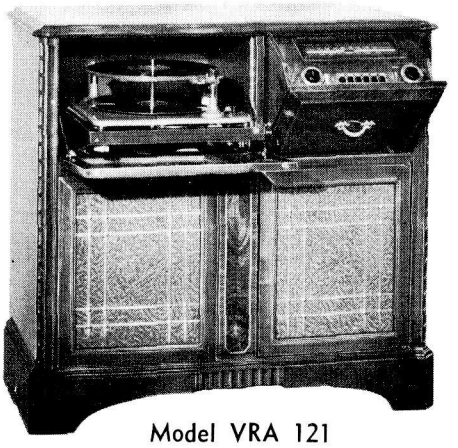
MODELS 121 & VRA 121

Twelve-Tube, Four-Band, A.M.-F.M. Superheterodyne Radio (121) & Radio-Phonograph Combination (VRA121)

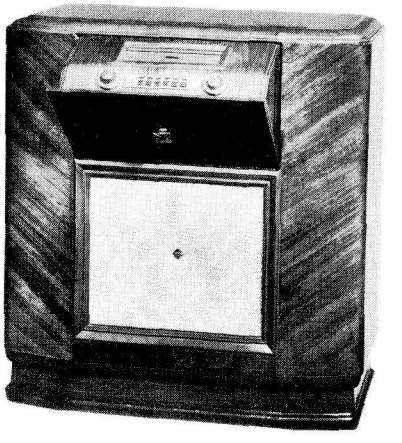
TECHNICAL INFORMATION AND SERVICE DATA

—1947 No. 5—

SERVICE DIVISION • RCA VICTOR COMPANY LIMITED • MONTREAL



Model VRA 121



Model 121

Electrical and Mechanical Specifications

FREQUENCY RANGE

Standard Broadcast S.B.	540-1600 k.c.
Short Wave 49-31 M	5.7-12.0 mc
25-19 M	11.5-15.8 mc
Frequency Modulation	88-108 mc
Intermediate Frequency AM	455 kc
Intermediate Frequency FM	10.7 mc
Tuning Drive Ratio	20 to 1

POWER OUTPUT

Undistorted	9 watts
Maximum	12 watts

POWER SUPPLY RATINGS

Rating A (121)	105-125 volts, 50-60 cycle, 120 watts
Rating B (121)	105-125 volts, 25-60 cycle, 120 watts
Rating A (VRA 121)	105-125 volts, 50-60 cycle, 140 watts
Rating B (VRA 121)	105-125 volts, 25-60 cycle, 140 watts

LOUDSPEAKER

Type	12 inch Electrodynamic
Voice coil impedance	2.2 ohms at 400 cycles

PHONOGRAPH

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

RADIOTRON COMPLEMENT OF RADIO CHASSIS

(1) Type 6BA6	RF Amplifier
(2) Type 6BA6	Mixer
(3) Type 6BE6	Oscillator
(4) Type 6BA6	1st IF
(5) Type 6BA6	2nd IF
(6) Type 6AL5	F.M. Ratio Detector
(7) Type 6AT6	A.M. Det., A.V.C. & 1st A.F.
(8) Type 6U5	Tuning Indicator

RADIOTRON COMPLEMENT OF AMPLIFIER CHASSIS

(1) Type 6SC7	Phase Inverter
(2) Type 6F6G	Power Output
(3) Type 6F6G	Power Output
(4) Type 5U4G	Full Wave Rectifier
Pilot Lamps (2)	Mazda No. 51 6-8 volts, 0.2 amp.
(1)	Mazda No. 47 6-8 volts, 0.15 amp.

CABINET DIMENSIONS (inches)

	Height	Width	Depth
121	36	34	14 7/8
VRA 121	36 3/32	39 1/2	18 1/32

PICKUP

Type	Crystal
Impedance	100,000 ohms at 1,000 cycles
Average Output	1.4 volts at 400 cycles across 500,000 ohm load

GENERAL DESCRIPTION

The RCA Victor Model 121 AM-FM radio and the Model VRA-121 AM-FM radio phonograph combination are housed in console cabinets of striking beauty. The AM-FM receiver is a twelve tube, four band superheterodyne using the most up-to-date circuits for high quality radio and phonograph reproduction. Features of the design include: Built-in folded dipole antenna for F.M. reception; Built-in short wave antenna; Adjustable standard broadcast loop antenna; Miniature tubes for improved high frequency performance; Highly selective RF stage; Separate oscillator tube for improved oscillator stability; Iron core R.F.; oscillator and I.F. coils; Push-button tuning of six Standard Broadcast stations by means of pretuned circuits; "Amplitude Ignorer" for improved rejection of AM when receiving FM; Ratio detector for high quality FM reproduction; Automatic volume control circuits; Tuning indicator tube; Full range variable tone control; Tone compensated volume control; Push-pull output stage and twelve inch duo-cone electrodynamic loudspeaker. The Model VRA-121 uses a Type 960001-4 automatic record changer mechanism with high fidelity, low noise crystal pickup. Refer to the 960001-4 Service Note for adjustment details and list of replacement parts for this mechanism.

A COMPARISON OF F.M. AND A.M.

Since the new F.M. receiver circuits and the frequencies on which F.M. operates are new to the home receiver field, it is important that the serviceman be informed of the differences between F.M. receivers and the conventional A.M. receivers.

A conventional A.M. receiver operates with a signal in which the intelligence is transmitted by means of amplitude variations while the frequency remains fixed. An F.M. receiver, however, operates with a signal in which the intelligence is transmitted by means of frequency variations while the amplitude remains fixed. Noise, which consists largely of amplitude variations passes readily through an A.M. receiver which responds to these variations. In an F.M. receiver, special circuits are provided to minimize the response to amplitude variations so that noise free reception is assured with all except very weak signals. Where the signals picked up by the built-in folded dipole antenna are too weak, an outside F.M. antenna is necessary.

Due to the very high frequencies used for F.M. (88 to 108 megacycles) certain differences may be noticed in this type of reception. It is known that in some locations, particularly urban areas, a type of distortion peculiar to F.M. may be experienced. This is in no way a fault of the receiver but rather a physical phenomena caused by the signal being reflected from some object resulting in two or more paths for the transmitted signal. The reflected signal, arriving late and out of phase, tends to amplitude modulate the F.M. signal. This distortion may appear as a strange buzz, rattle or swish. It may even give the effect of an overloaded audio stage. In other cases an increase in noise level may be noticed. Choosing a different location for the receiver may eliminate the trouble since the directive folded dipole antenna housed in the cabinet will be oriented differently. In severe cases, an outside dipole and reflector pointing in the right direction may correct the trouble.

For further details on antennas for F.M. refer to the External Antennas section on this page.

CIRCUIT ARRANGEMENT

The circuit for A.M. reception uses a tuned R.F. stage in which the loop antenna is used as part of the first tuned circuit. This is followed by a mixer stage with separate oscillator tube. The use of a separate oscillator tube and the incorporation of temperature compensating capacitors in the tuned circuits greatly reduces the oscillator drift. The use of a separate oscillator tube also increases the gain of the mixer on the short-wave bands.

Primaries and secondaries of the 455 kc. A.M. and 10.7 mc; F.M. I.F. transformers are connected in series in the plate and grid circuits of the I.F. amplifier stages, except for the secondaries of the last transformers which are connected to the A.M. and F.M. detectors respectively. The 10.7 mc I.F. transformers have relatively little effect on the 455 kc. A.M. I.F. signals due to low inductance of their coils and the two stage I.F. amplifier operates in the conventional manner.

A double diode triode acts as A.M. detector, A.V.C. and first audio amplifier. A phase inverter follows and drives the push-pull pentode output stage.

The circuit for F.M. reception uses a tuned R.F. stage designed to match a 300 ohm antenna. This is followed by a mixer stage with separate oscillator tube. Temperature compensating capacitors and other precautions have been taken to make the oscillator as stable as possible consistent with the frequency at which it operates. The use of a separate oscillator tube provides more gain in the mixer, in addition to the improved stability just mentioned. All high frequency circuit connections are critical as to length and care must be taken that these lengths are maintained when any repair work is done.

As previously explained, the F.M. and A.M. I.F. transformers are connected in series. The 455 kc I.F. transformers have relatively little effect on the 10.7 mc. F.M. I.F. signals due to the low reactance of the capacitors in the 455 kc transformers, so that the two stage amplifier operates in the conventional manner. In the first I.F. stage an unbypassed cathode resistor is used to compensate for the variation in input capacity of the tube with a change in A.V.C. voltage. The second I.F. amplifier stage incorporates an "amplitude ignorer" circuit which provides noise suppression additional to that obtained in the ratio detector. The ratio detector is discussed in detail on pages 10 and 11. The audio amplifier is the same one used for A.M. reception and uses the triode section of the double diode triode as the first A.F. amplifier, a double triode phase inverter and a push-pull pentode output stage.

EXTERNAL ANTENNAS

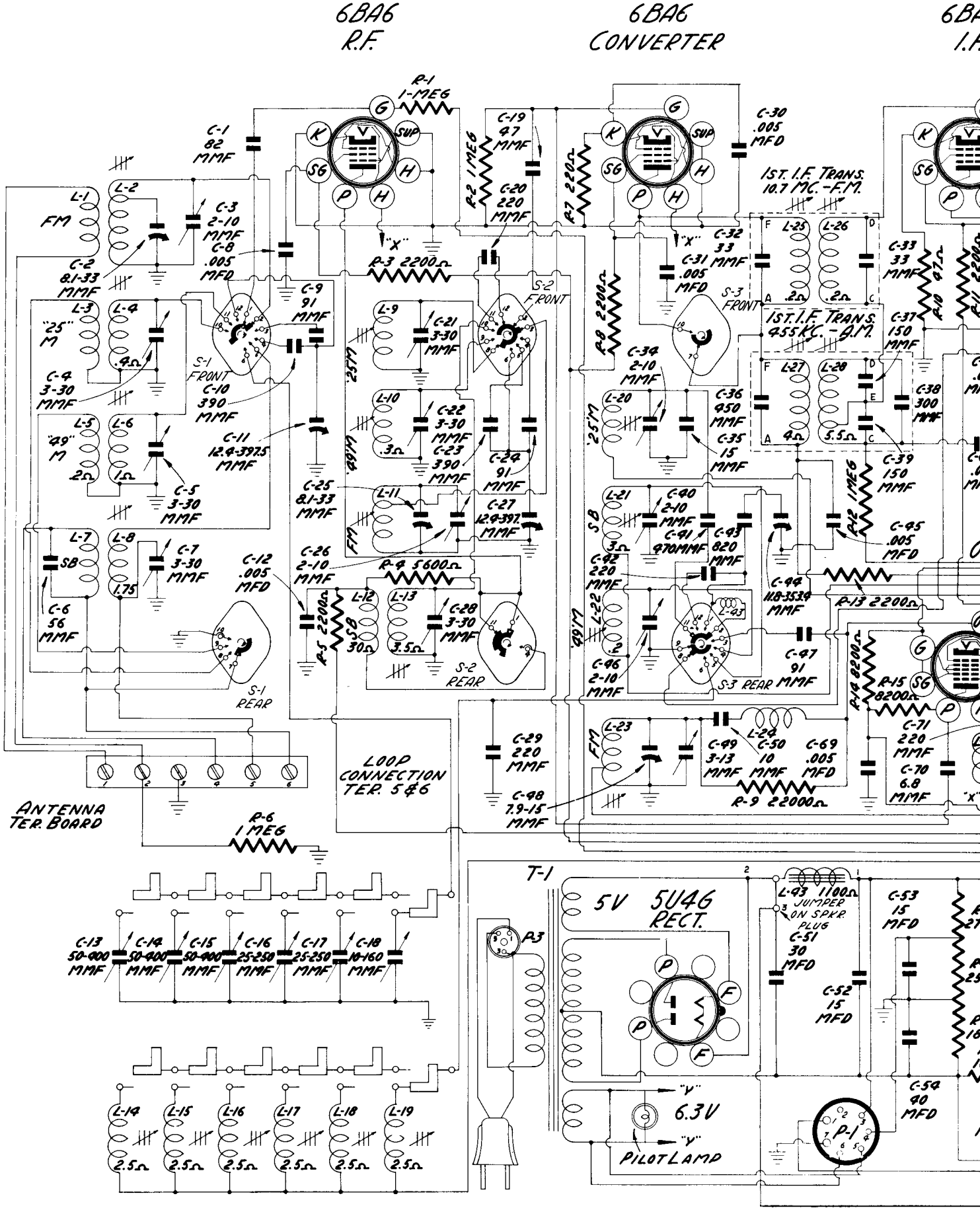
If reception is not satisfactory on one or more of the four bands, using the built-in cabinet antennas, an external antenna may be used. Connections to the antenna terminal board for operation with the internal antennas are as follows:

Terminals 1 and 2	—Internal folded dipole F.M. antenna
Terminal 3	—Ground
Terminal 4	—No connection
Terminal 5	—Loop antenna (green lead)
Terminal 6	—Loop antenna (black lead) and Internal short wave antenna.

An external antenna for broadcast and short wave reception, when required, is connected to terminal 4.

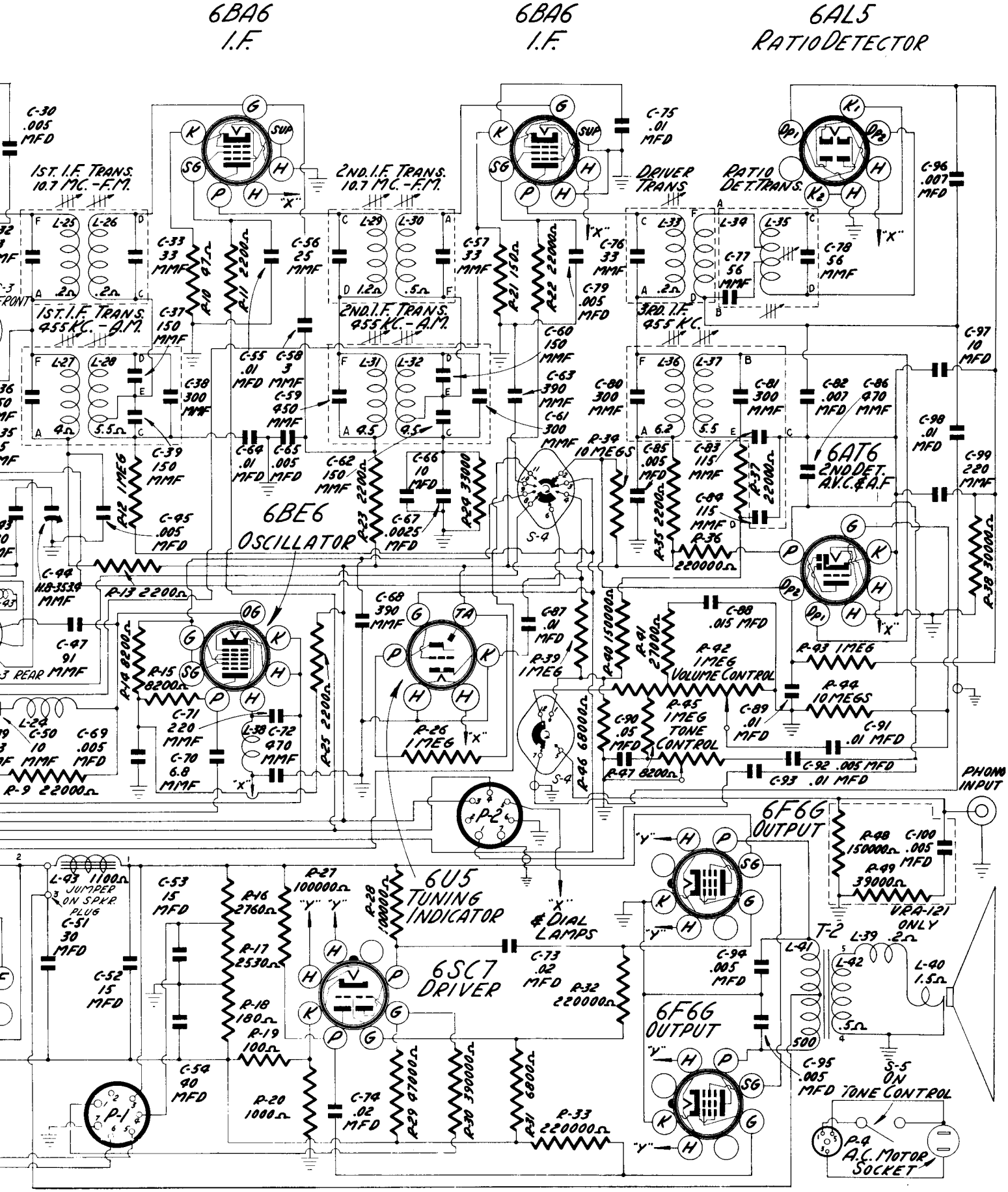
If an external F.M. antenna is to be used, disconnect the internal folded dipole antenna and connect in its place the leads from the external antenna.

Two general types of F.M. antennas are used. These are the folded dipole and the folded dipole with reflector, both of which are used with a 300 ohm transmission line. The reflector element used is somewhat longer than the folded dipole element. These antennas are directive and must be oriented for maximum signal pickup from the desired stations. The folded dipole picks up a maximum signal from stations at right angles to the direction in which the dipole is pointing. The folded dipole with reflector is similarly directive but provides additional signal pickup from the side of the folded dipole away from the reflector and rejects signals from the reflector side of the folded dipole.



NOTE—Terminals No. 11 on front and rear sections of S2 are connected together.

Fig. 1—Schematic Diagram-Range Switch Sho



matic Diagram-Range Switch Shown in F.M. Position.

NOTE—A resistor R-50, 3.3 megohms, should be shown connected from terminal 3 on S4 to pin 7(DP1) of 6AL5 Ratio Detector.

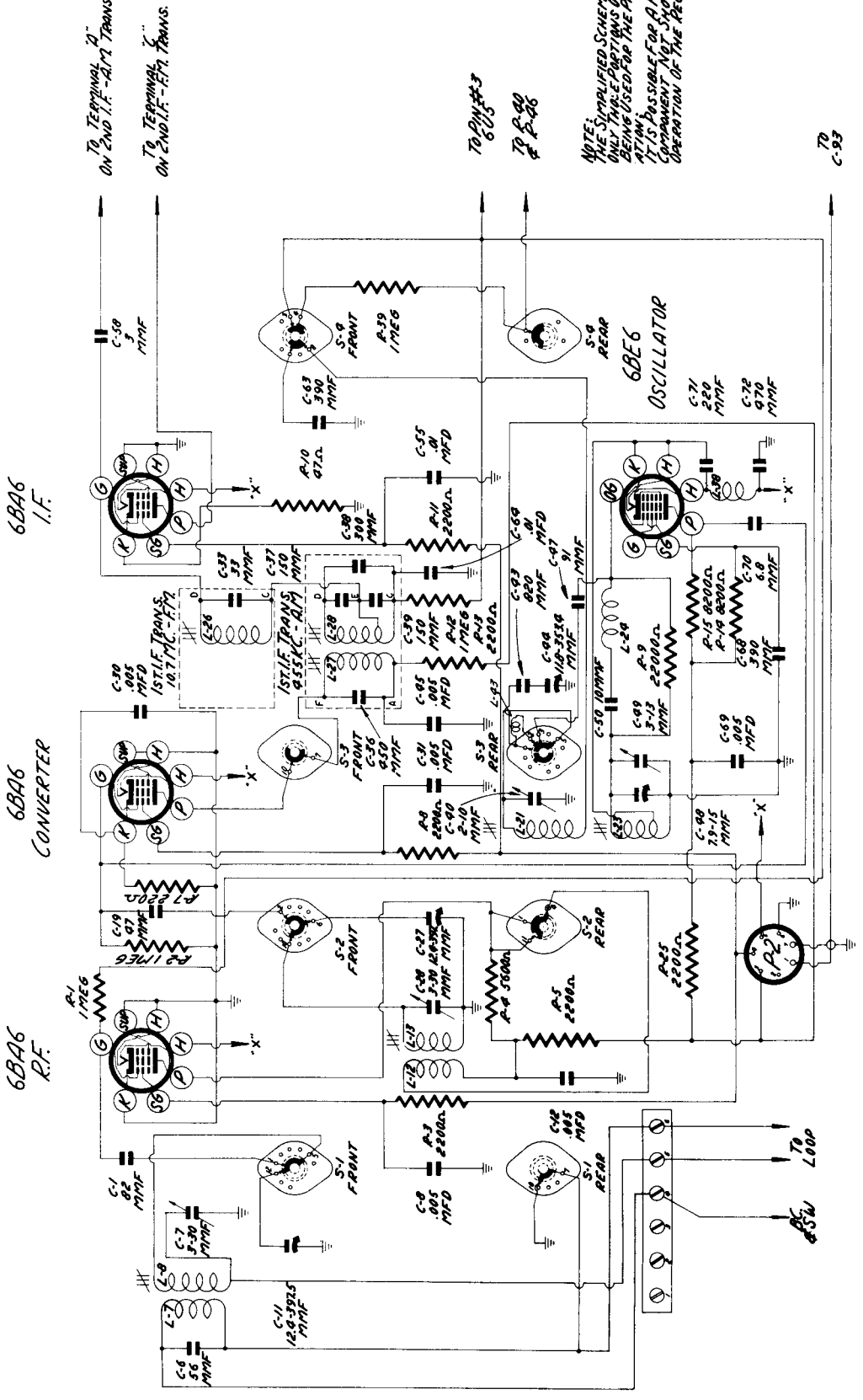


Fig. 3—Simplified Schematic of R.F. Circuits in S.B. Position.

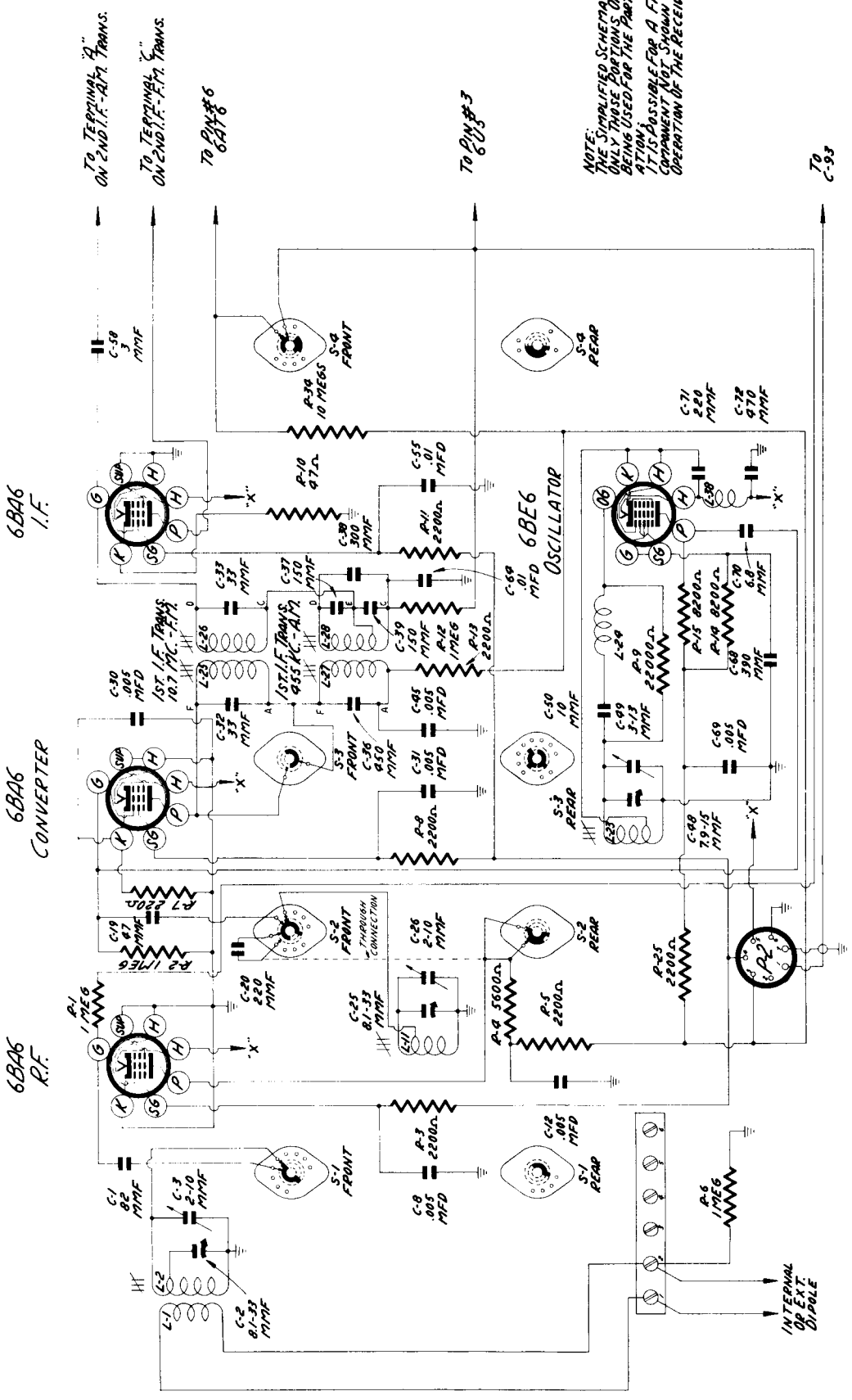


Fig. 2—Simplified Schematic of F.M., R.F. Circuits.

RADIOTRON SOCKET VOLTAGES

TYPE	PLATE	SCREEN GRID	CONTROL GRID	CATHODE	HEATER
6BA6 R.F.	200 (A.M.) 140 (F.M.)	90	—0.5		6.3 A.C.
6BA6 Mixer	200	90		1.6	6.3 A.C.
6BE6 Osc.	140	115	-6 to -10 (F.M.) -25 to -8 (S.B.) (Low to Hi ends)		6.3 A.C.
6BA6 1st I.F.	200	90	—0.5	0.5	6.3 A.C.
6BA6 2nd I.F.	200	125 (A.M.) 100 (F.M.)		2.5 (A.M.) 0 (F.M.)	6.3 A.C.
6AT6 A.M. Det. & 1st A.F.	75				6.3 A.C.
6AL5 Ratio Det.					6.3 A.C.
6SC7 Phase Inverter	155 (Pin 2) 145 (Pin 7)		—23	—20	6.3 A.C.
6F6G Output	375	230	—23		6.3 A.C.
6F6G Output	375	230	—23		6.3 A.C.
5U4G Rect.	370 A.C. (Pin 4) 370 A.C. (Pin 6)				5.0 A.C.
6U5 Indicator	230		—0.5		
"B" voltage measured from Rectifier Fil. (5U4G) to Gnd. — 390 Volts.					

Note:—All the above values hold within plus or minus 20% when measured with a RCA Voltohmyst or equivalent, on a line voltage of 115 volts. All voltages are measured to chassis.

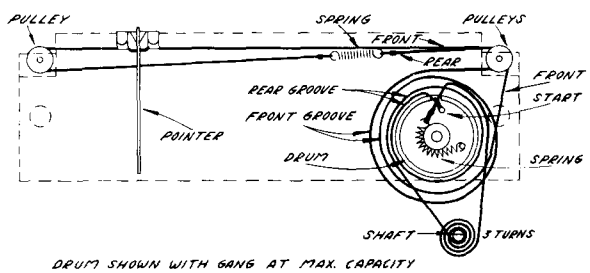


Fig. 4 — Dial Cord Stringing

ROLL-OUT AND TILT-OUT MECHANISMS

These mechanisms should ordinarily require little attention. Occasional lubrication of the record changer roll-out tracks with a light grease may be required to keep them operating freely. The radio tilt-out balance arm mechanism has a friction nut adjustment which is provided so that the door may be set to close fully and yet respond to light operating pressure. To adjust this friction nut first loosen the two set screws found around the rim. When adjustment is completed, re-tighten the set screws to prevent movement of the nut.

CRITICAL LEAD DRESS

(Make lead dress before alignment)

1. C91 and C92 must be dressed up against the chassis.
2. The lead from pin 5 of the 6BA6 R.F. amplifier tube to pin 1 on S2 rear must be kept short.
3. Dress lead connected from pin 5 of the 6BA6 mixer tube to pin 7 on S3 front away from chassis.
4. Lead from L11 to pin 3 on S2 front must be kept short.
5. Dress green lead from antenna terminal board pin 5 away from chassis.
6. Dress blue lead from C28 R.F. trimmer away from all adjacent components.
7. Dress all leads away from S2.
8. Twisted leads going to ON-OFF switch must be dressed against edge of chassis.
9. C68 leads must be kept short.
10. Dress lead from pin 3 of 6AL5 to pin 3 of 6AT6 away from pin 1 (grid) of 6AT6.
11. All F.M. coil connections must be kept to the exact length of the original (one-sixteenth inch difference in length may be excessive).
12. All wiring in the receiver is critical as to length and placement. It is therefore important when servicing, that extreme care should be taken so as not to disturb more of the wiring than absolutely necessary.

NOTE: Keep tuning capacitor grounding brushes clean and under correct tension for proper contact.

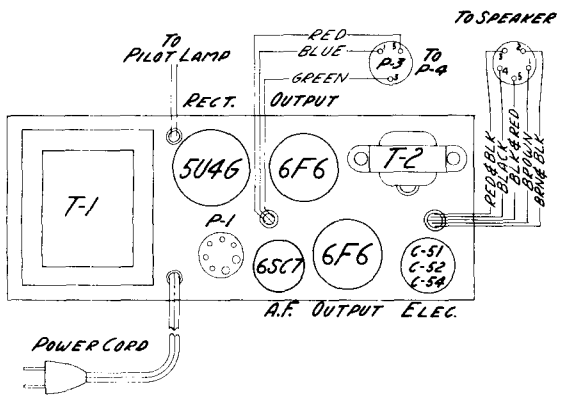


Fig. 5 — Amplifier Tube Layout

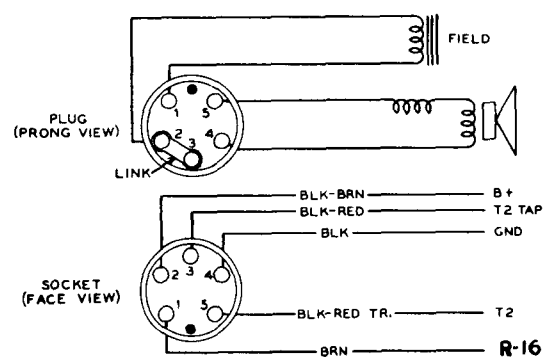


Fig. 6 — Speaker Connections

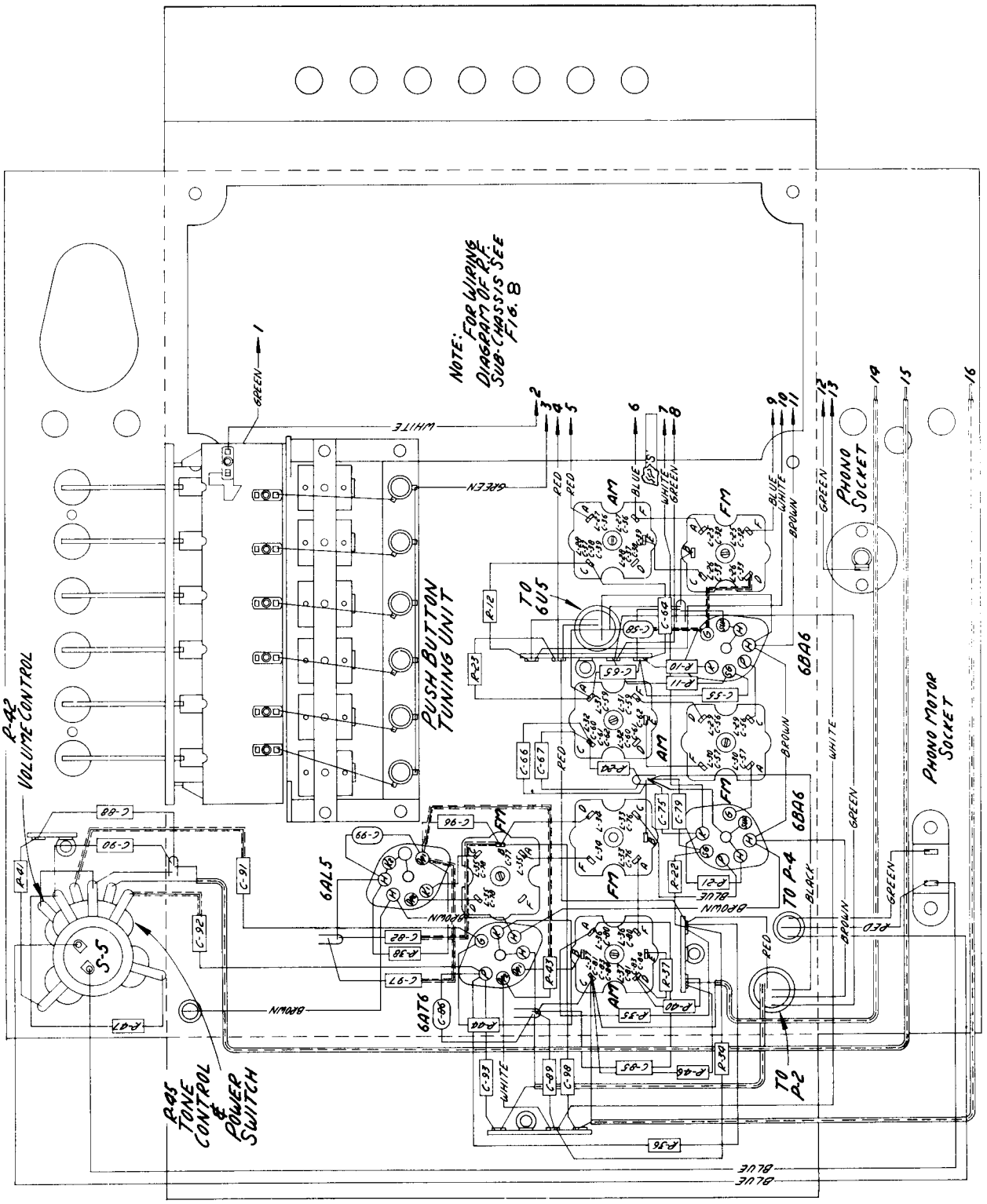


Fig. 7—Wiring Diagram of Main Chassis.

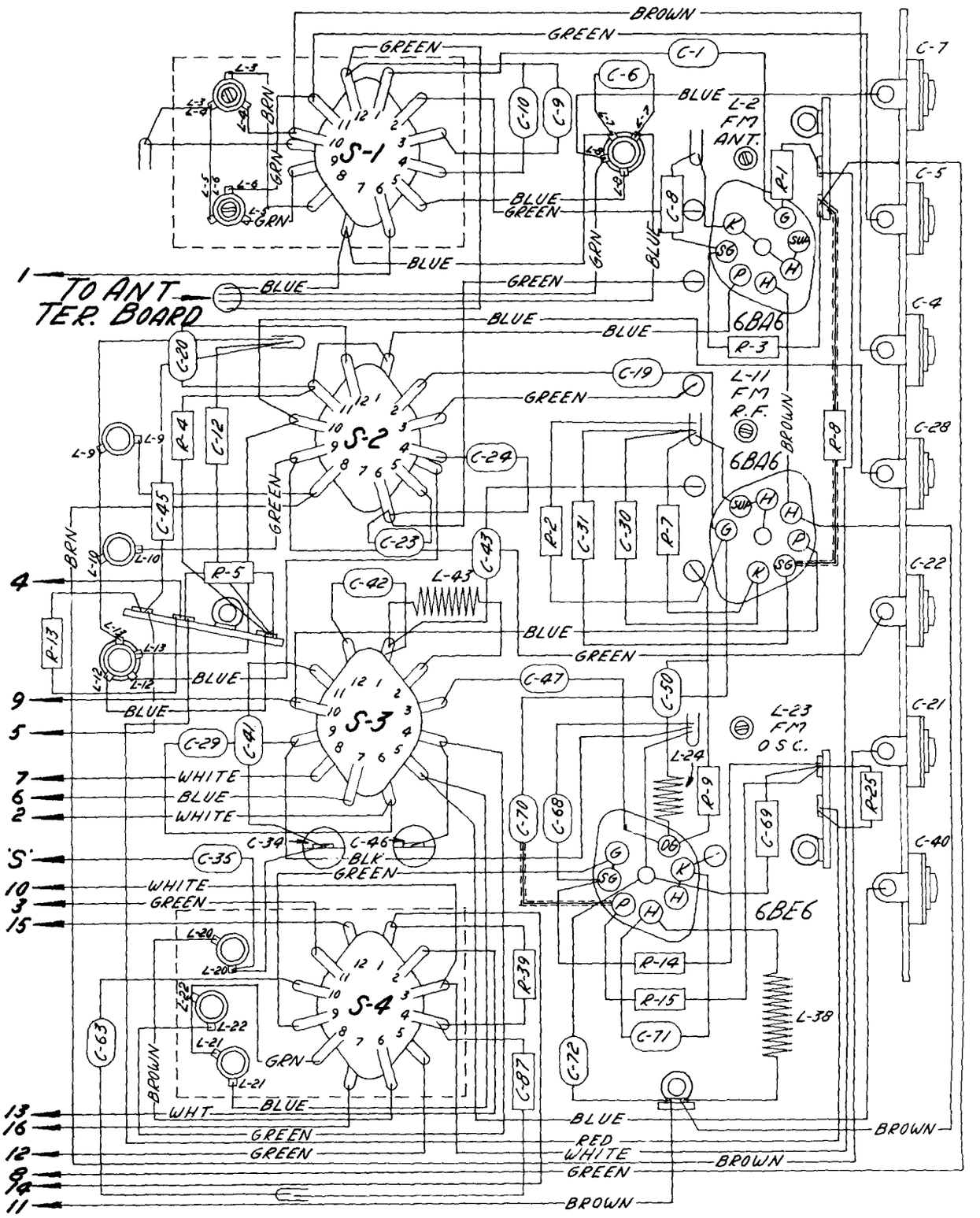


Fig. 8—Wiring Diagram of R.F. Sub-Chassis.

ALIGNMENT PROCEDURE

Make lead dress (page 5) before alignment

Before aligning set, completely mesh the gang and set the dial pointer on the mechanical maximum calibration point at the extreme left hand end of the dial. (See Fig. 9.)

When making a complete alignment follow in proper sequence the tabulated form below.

If only a portion of the circuit is to be aligned select the portion required, followed by the remaining steps in the chart. Any adjustments made on the FM 10.7 mc. I.F.'s make it necessary to realign the A.M. 455 kc. I.F.'s.

For "S.B.", 49-31M and 25-19M band alignment use output meter across voice coil keeping Test Oscillator output as low as possible to prevent AVC action.

Cathode-ray oscilloscope and sweep signal generator alignment of the 455 kc. A.M. I.F. transformers is the preferable method. Connect oscilloscope across the volume control. If the required equipment is not available use the method outlined below.

PUSH BUTTON ALIGNMENT

The push buttons may be adjusted for any six stations on the S.B. band. The preferable arrangement is to adjust for stations in order of frequency. Proceed as follows:

1. Turn "Range Selector" to S.B. position and manually tune in the first station, say 560 kc.
2. Turn "Range Selector" to P.B. position and press button No. 1 located at the left on the front panel.
3. Referring to Fig. 10, adjust core and trimmer No. 1 for a peak at 560 kc. This adjustment can be made with the assistance of the "Magic Eye". To align the push buttons with set still in cabinet, unfasten "Magic Eye" from its bracket and face to the rear.
4. Proceed to adjust the other five stations in order of frequency, as outlined above.

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



Fig. 9 — Alignment Calibration Markers

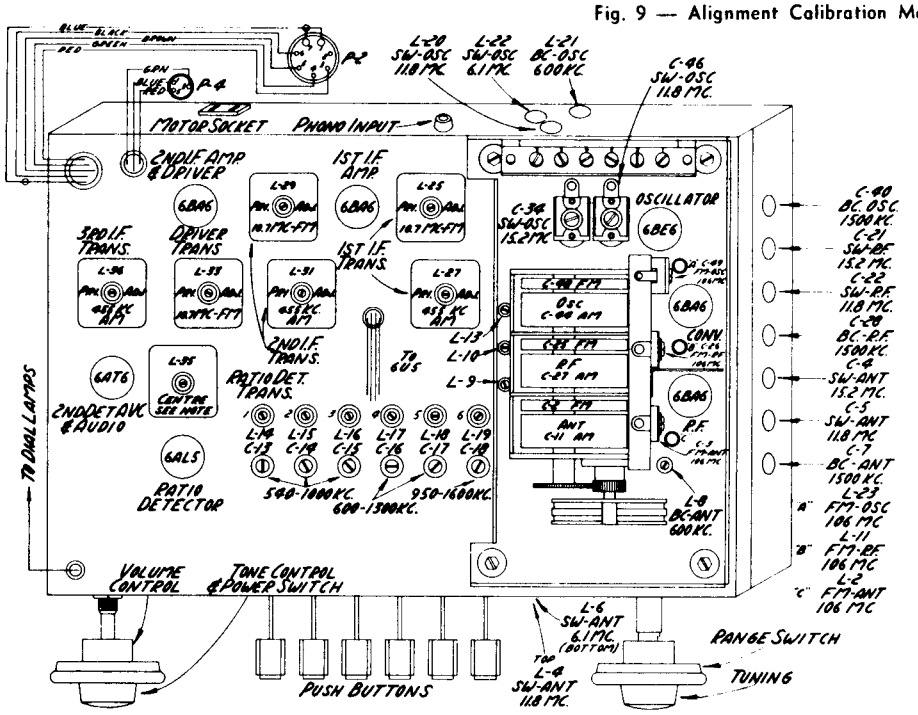


Fig. 10 — Chassis Layout and Alignment Adjustments

ALIGNMENT CHART

ORDER OF ALIGNMENT		TEST OSCILLATOR: CONNECT "HI" SIDE TO	TEST OSCILLATOR: CONNECT "LO" SIDE TO	TEST OSCILLATOR: DUMMY ANTENNA	TEST OSCILLATOR: FREQUENCY SETTING	RANGE SELECTOR	RECEIVER DIAL SETTING	CIRCUIT TO ADJUST	ADJUSTMENT SYMBOLS	NOTES
F.M. RATIO DETECTOR ALIGNMENT	1	Connect a 1000 ohm resistor between lugs "C" and "D" of the ratio detector trans. Connect DC probe of a Voltohmyst to the negative lead of the 10 mfd elec. capacitor C-97. The common lead of the meter is connected to the chassis.								
	2	6BA6 2nd I.F. Grid	Ground	.01 mfd	10.7 MC 30% Mod. 400 Cy. Am.	F.M.	Max. Cap (Fully Meshed)	Driver Transformer	L-33 Det. Trans.	For Max. D.C. Voltage Across C-97
	3	Remove meter leads and disconnect the 1000 ohm resistor from "C" and "D" on ratio det. trans. Connect two 100,000 ohm resistors (within 1% of being equal) in series across C97. Connect the common lead of the Voltohmyst to the centre point of the 100,000 ohm resistors and the D.C. probe to pin "B" of ratio det. trans. Use 30 volt scale for preliminary alignment. Complete alignment using 3 volt scale								
	4	Same	Same	Same	Same	Same	Same	Ratio Det. Trans.	Bottom Core L-35	†† For Zero D.C. Balance
	5	Near the correct core position the zero point is approached rapidly and continued adjustment causes the indicated polarity to reverse. A slow approach to the zero point is an indication of severe detuning, and the bottom core should be turned in the opposite direction..								
		Same	Same	Same	Same	Same	Same	Ratio Det. Trans	Top Core L-35	†† For Minimum Audio Output
		NOTE:- Two or more points may be found which will satisfy the condition required. Top core should be correctly adjusted when approximately 1/8 inch of threads extend above the can, therefore, it is desirable to start adjustment with the top core in its furthest "in" position and turn out, while adjusting the bottom core, until the first point of minimum AF and minimum DC is reached. †† The zero DC balance and the minimum AF output should occur at the same point: if such is not the case, the two cores should be adjusted until both occur with no further adjustment of either core. It may be advantageous to adjust both cores simultaneously, watching the Voltohmyst, and an output meter connected across the voice coil for the point at which both zero DC and minimum output occurs.								
	6	Reconnect Voltohmyst as in step 1, omitting 1000 ohm resistor.								
	7	Repeat step 2, omitting 1000 ohm.								
	8	Remove all connections.								

ALIGNMENT CHART

ORDER OF ALIGNMENT		TEST OSCILLATOR: CONNECT "HI" SIDE TO	TEST OSCILLATOR: CONNECT "LO" SIDE TO	TEST OSCILLATOR: DUMMY ANTENNA	TEST OSCILLATOR: FREQUENCY SETTING	RANGE SELECTOR	RECEIVER DIAL SETTING	CIRCUIT TO ADJUST	ADJUSTMENT SYMBOLS	NOTES
F.M. I.F. ALIGNMENT	9	Connect the DC probe of a Voltohmyst to the negative lead of the 10 mfd electrolytic capacitor C97 and the common lead of the meter to chassis ground.								
	10	6BA6 1st I.F. Grid	Ground	.01 mfd.	10.7 MC 30% Mod. 400 Cy.Am.	F.M.	Max.Cap (Fully meshed)	2nd I.F. Trans.	L-29 and L-30	*Adjust test Osc. Output for 6-10 Volts developed across C-97 use very short leads
		* Top and bottom cores alternately loading primary & secondary of each trans. with 1000 ohms while the opposite side of the same trans. is being adjusted. Adjust all trans. for max. voltage across C-97. This method is known as alternate loading which involves the use of a 1000 ohm resistor to load the plate winding while the grid winding of the same transformer is being peaked. Then the grid winding is loaded with 1000 ohm resistor while the plate winding is being peaked. When the windings are loaded, it is necessary to increase the 10.7 MC input since the gain will decrease and the voltage across C97 will be less.								
	11	6BE6 Mixer grid	Same	Same	Same	Same	Same	1st I.F. Trans.	L-25 and L-26	* Adjust test Osc. Output for 6-10 Volts developed across C-97 use very short leads
A.M. I.F. ALIGNMENT	12	6BA6 2nd I.F. Grid	Ground	.01 mfd.	455 KC 30% mod. 400 Cy.Am.	S.B.	High Freq. end of Dial	3rd I.F. Trans.	L-36 and L-37	Adjust for max. Voltage across Voice Coil.
		It is necessary to alternately load the primary and secondary of each 455 KC I.F. trans. with 10,000 ohms while the opposite side of the same trans. is being adj.								
	13	6BA6 1st I.F. Grid	Same	Same	Same	Same	Same	2nd I.F. Trans.	L-31 and L32	Same
	14	6BE6 Mixer Grid	Same	Same	Same	Same	Same	1st I.F. Trans.	L-27 and L-28	Same
S.B. ALIGNMENT	15	#4 on Ant. Ter.Board	Ground	200 mmf.	1500 KC 30% Mod. 400 Cycles	S.B.	1500 KC.Calibration point on dial plate	Oscillator	C-40	Same
	16	Same	Same	Same	Same	Same	Same	R.F.	C-28	Same
	17	Same	Same	Same	Same	Same	Same	Ant.	C-7	Same
	18	Same	Same	Same	600 KC 30% Mod. 400 Cy.Am.	Same	600 KC.Calibration point on dial plate	Oscillator	L-21	Same
	19	Same	Same	Same	Same	Same	Same	R.F.	L-13	Same
	20	Same	Same	Same	Same	Same	Same	Ant.	L-8	Same
	21	Repeat steps 15 to 20 for max. output.								
49-31M ALIGNMENT	22	#4 on Ant. Ter.Board	Ground	300 Ohms	11.8 MC 30% Mod. 400 Cy.Am.	49-31M	11.8 MC Calibration point on right hand end of dial plate	Oscillator	C-46	Same
	23	Same	Same	Same	Same	Same	Same	R.F.	C-22	Same
	24	Same	Same	Same	Same	Same	Same	Ant.	C-5	Same
	25	Same	Same	Same	6.1 MC 30% Mod. 400 Cy.Am.	Same	6.1 MC Cal. point on dial plate	Oscillator	L-22	Same
	26	Same	Same	Same	Same	Same	Same	R.F.	L-10	Same
	27	Same	Same	Same	Same	Same	Same	Ant.	L-6	Same
	28	Repeat steps 22 to 27 for max. output.								
		NOTE:- To guard against the possibility of alignment of L-22 and C-46 to image freq., tune the test Oscillator and receiver to 11.8 MC. Then adjust test oscillator to 12.71 (image freq.). By increasing the test oscillator output, a signal should be heard. Next, tune test oscillator and receiver to 6.1 MC. Retune test oscillator to 7.01 MC (image freq.) and increase test oscillator output. A signal should then be heard. If these image freq. cannot be heard, the set is incorrectly aligned. Therefore repeat steps 22 to 28.								
25-19M ALIGNMENT	29	#4 on Ant. Ter.Board	#3 on Ant. Ter.Board	300 Ohms	15.2 MC 30% Mod. 400 Cy.Am.	25-19M	15.2 MC Calibration point on dial plate	Oscillator	C-34	Adjust for Max.Voltage across voice coil
	30	Same	Same	Same	Same	25-19M	Same	R.F.	C-21	Same
	31	Same	Same	Same	Same	25-19M	Same	Ant.	C-4	Same
	32	Same	Same	Same	11.8 MC 30% Mod. 400 Cy.Am.	25-19M	11.8 MC Calibration point on left hand end of dial plate	Oscillator	L-20	Same
	33	Same	Same	Same	Same	25-19M	Same	R.F.	L-9	Same
	34	Same	Same	Same	Same	25-19M	Same	Ant.	L-4	Same
	35	Repeat steps 29 to 34 for maximum output.								
		NOTE:- To guard against the possibility of alignment of L-20 and C-34 to image frequency, tune the test oscillator and receiver to 15.2 MC, then set test oscillator to 16.11 MC (image frequency). Increase the test oscillator output; A signal should be heard. Then tune test osc. and receiver to 11.8 MC. Reset test osc. to 12.71 MC (image frequency) and increase test osc. output: A signal should be heard. If these image frequencies cannot be heard, the receiver is incorrectly aligned, Therefore repeat steps 29 to 35.								
F.M. ALIGNMENT	36	#1 on Ant. Ter.Board	#2 on Ant. Ter.Board	150 Ohm Resistor in Series with each Lead	106 MC 30% Mod. 400 Cy.Am.	F.M.	106 MC Calibration point on dial plate	Oscillator	C-49	Adjust for Max.Voltage across C-97 (Use Voltohmyst)
	37	Same	Same	Same	89 MC 30% Mod. 400 Cy.Am.	Same	89 MC Calibration point on dial plate	Oscillator	L-23	Same
		NOTE:- Two points may be found to fulfill the requirements. Use the one with the longest threaded end extending out of the transformer.								
	38	Repeat steps 36 and 37 for exact calibration.								
	39	Remove connections or turn test oscillator off				Same	106 MC Calibration point on dial plate	R.F.	C-26	Same
		NOTE:- Two points can be found having the greatest noise voltage developed. Use the one with the greater capacity (tighter adjustment).								
	40	Same	Same	Same	Same	Same	89 MC Calibration point on dial plate	R.F.	L-11	Same
		NOTE:- Two points may be found to fulfill the requirements. Use the one with the longest threaded end extending out of the transformer.								
	41	Repeat steps 39 and 40 for maximum output.								
	42	#1 on Ant. Ter.Board	#2 on Ant. Ter.Board	150 Ohm Resistor in Series with Each Lead	106 MC 30% Mod. 400 Cy.Am.	Same	106 MC Calibration point on dial plate	Ant.	C-3	Same
	43	Same	Same	Same	89 MC 30% Mod. 400 Cy.Am.	Same	89 MC Calibration point on dial plate	Ant.	L-2	Same
	44	Repeat steps 42 and 43 for maximum output.								

THE RATIO DETECTOR

The ratio detector, appearing in RCA post-war f-m receivers, is a new device for converting a frequency modulated carrier to an audio signal, while at the same time offering a high degree of attenuation to any incident amplitude modulation. The relative insensitivity to amplitude variations, which is an inherent characteristic of ratio detectors, enables them to be used without the usual preceding limiter stage, thus affording the use of a high gain i-f stage instead of the low-gain limiter.

Theory of Operation

A brief review of the theory of the discriminator detector will help the serviceman to understand the action of the ratio detector.

Figure 1 portrays a conventional discriminator stage, and it can be seen that it consists essentially of two diode rectifiers which are differentially connected so that the d-c potentials across their respective load resistors are subtractive. These two d-c voltages (across R1 and R2 in Figure 1) are proportional to the a-c voltages applied to the diodes. The a-c voltage applied to each diode is the vector sum of E1 and the voltage across that half of L1 which is connected to the diode plate, as shown in the diagrams of Figure 4. E1 has practically the same amplitude and phase as the voltage across the tank in the limiter plate circuit. The current in this same tank circuit induces a voltage in L1, which causes a circulating current to flow in the resonant circuit composed of L1 and C1. E2 and E3 are the voltage drops which occur across each half of L1 as a result of this circulating current. When the carrier frequency is equal to the frequency at which the discriminator transformer is tuned (Fig. 4A), the a-c voltage applied to diode 1 equals that applied to diode 2, therefore the rectified voltages are equal and since they are bucking voltages, the output of the discriminator is zero.

When the carrier frequency increases during a half cycle of modulation, the phase relations between E1, E2 and E3 change in accordance with Figure 4B, and it is evident that the vector sum of the voltages applied to diode 2 exceeds the vector sum of the voltages applied to diode 1, resulting in a higher rectified voltage across R2 than across R1. The instantaneous difference of the rectified voltages appears as a negative voltage in the discriminator output. Figure 4C shows the condition occurring when the carrier frequency swings below the resonant frequency of the discriminator transformer, the end result being a positive voltage at the output of the discriminator.

The important fact in discriminator action is that the output voltage is proportional to the difference between Ediode 1 and Ediode 2. This is true because the d-c voltages appearing across R1 and R2 vary directly with Ediode 1 and Ediode 2, respectively, and the instantaneous output voltage is the difference between the rectified voltage drops.

In considering the effect of amplitude variation on discriminator output, refer again to the vector diagrams of Figure 4. An increase in the amplitude of the voltage applied to the discriminator would increase all of the vectors in the diagram proportionately. In other words, the effect would be as though the vector diagrams were enlarged photographically. It can be seen that while the phase relationships would remain the same, the difference between Ediode 1 and Ediode 2 would increase, so long as the frequency of the applied voltage differed even slightly from the receiver i-f. Thus components of amplitude modulation would be detected and passed on to the audio amplifier. Ordinarily, discriminators are preceded by limiters which remove most of the amplitude variation from the f-m carrier, but the discriminator itself is not a device capable of rejecting amplitude modulation, except when the instantaneous frequency of the applied carrier is exactly equal to the resonant frequency of the discriminator transformer. This condition occurs only twice in every modulation cycle.

Note that while an increase in the amplitudes of the vectors in Figure 4 results in a proportionate increase in the difference between Ediode 1 and Ediode 2 for off-resonant conditions, the ratio of Ediode 1 to Ediode 2 is a constant, as far as amplitude variations are concerned. Therefore, a detector responsive only to changes in the ratio of Ediode 1 to Ediode 2, and insensitive to changes in the difference between these voltages would be a detector capable not only of converting frequency variations to audio variations, but of rejecting any amplitude modulation. Such a detector is the ratio detector.

DISCRIMINATOR

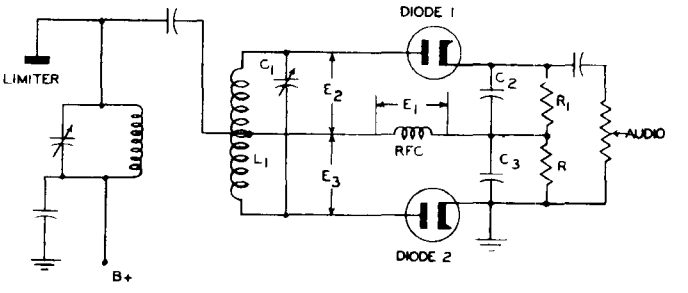


FIG. 1

RATIO DETECTOR

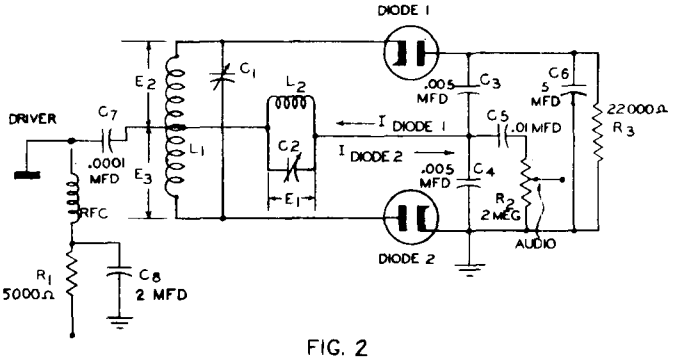


FIG. 2

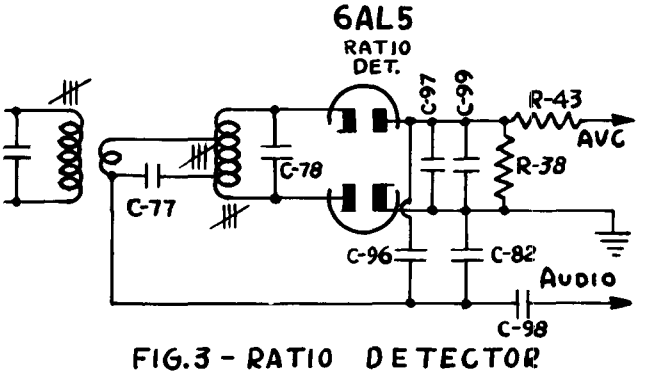


FIG.3 - RATIO DETECTOR

A schematic of the fundamental ratio detector is shown in Figure 2. C7 and C4 have very little reactance at the intermediate frequency, so it is evident that the parallel resonant circuit L2 C2 is the true load for the driver stage, this stage being shunt fed. A driver stage, in this case, is nothing more than a conventional i-f amplifier preceding the ratio detector. L2 is inductively coupled to L1, therefore a comparison of Figures 1 and 2 will show that as far as the a-c voltages applied to the diodes are concerned, these circuits are almost exactly similar, indeed, the same vector diagrams used in the analysis of Figure 1 can be used to portray the a-c voltages across the diodes in Figure 2. Here the similarity ends, because the ratio detector method of extracting intelligence from the f-m carrier differs greatly from previously used methods. Diode 1, R3, and diode 2 complete a series circuit fed by the a-c voltage across L1. Since the two diodes are in series, they will conduct on the same half cycle, and the rectified current through R3 will cause a negative potential to appear at the plate of diode 1. The time constant of R3 C6 is usually about 0.2 second, so that the negative potential at the plate of diode 1 will remain constant even at the lowest audio frequencies to be reproduced.

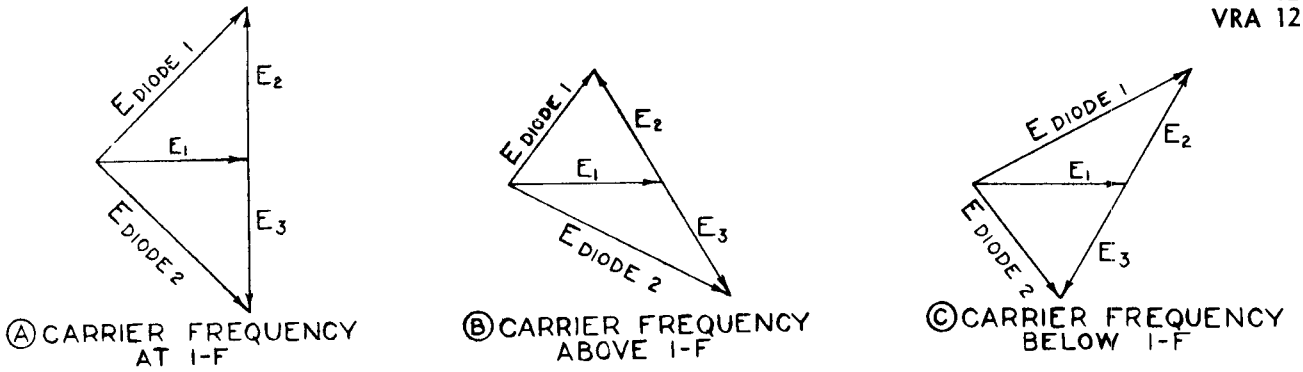


Fig. 4

C3 will be charged by the rectified current through diode 1 to a voltage proportional to the voltage represented by vector Ediode 1 (Figure 4), and C4 will be charged through diode 2 in proportion to the vector Ediode 2. Since the magnitudes of these vectors differ according to the instantaneous frequency of the carrier, the voltages across C3 and C4 will differ proportionately, the voltage across C3 being the larger of the two voltages at carrier frequencies below the i-f, and the smaller at frequencies above the i-f.

Note that the voltages across C3 and C4 are additive and that their sum is fixed by the constant potential across R3. Therefore, while the ratio of these voltages will vary at an audio rate, their sum will always be constant and equal to the voltage across R3. The potential at the junction of C3 and C4 will vary at an audio rate when an f-m carrier is applied to the detector, hence the audio voltage is extracted at this point and fed into the audio amplifier.

There is no direct d-c return path across either C3 or C4; the reason for this is twofold. Firstly, a direct return path is not needed because whenever the potential of the junction of C3 and C4 is raised or lowered in accordance with the frequency of the voltage applied to the detector, there will be a point on R3 having a potential equal to the voltage across C4. This point will shift up and down on R3 in synchronism with the audio voltage across C4. If this point could be connected to the junction of C3 and C4, a d-c return for each diode would be provided, but no current would flow through the connection because there would be no difference of potential between the point on R3 and the junction of C3 and C4. Since no current would flow through this connection, a direct return path would be useless.

Secondly, a peculiar form of distortion, apparent at low carrier levels; is evident if a resistance is connected directly across C4. This distortion is caused by C4 discharging through the resistance whenever the carrier level falls below the level at which the diodes are biased off by the voltage across R3. The effect of the distortion is to add a long peak to one loop of the audio cycle.

The rejection of amplitude modulation in the ratio detector may be explained as follows: A rapid increase in the amplitude of the carrier applied to the ratio detector will tend to increase the d-c voltages across C3 and C4. The sum of these voltages must always be equal to the voltage across C6. The voltage across C6 cannot change with a rapid increase in the amplitude of the carrier, due to the large time constant of R3 and C6. Therefore, this constant potential across C6 prevents the voltages across C3 and C4 from rising with an increase in the strength of the carrier. A reduction in carrier amplitude is prevented from appearing as a reduction in the voltages across C4 in the same way. The constant voltage across C6 can be considered to be a stabilizing voltage; i.e., it stabilizes the ratio detector output against amplitude modulation of the applied carrier.

The time constant of R3 C6 is not too large to prevent average changes in carrier level from appearing as changes in voltage across R3; in other words the voltage across R3 is proportional to the average strength of the received carrier. Thus this voltage serves as an excellent AVC voltage.

There is no "threshold" effect apparent in the ratio detector; i.e., there is no minimum carrier level which must be applied to the detector to cause noise attenuation as in other types of f-m detectors requiring the use of a limiter stage.

The Ratio Detector used in this receiver, differing only in the method of applying i-f energy to L1 and C1, is shown in Figure 3. This circuit, as well as any other ratio detector circuit, can be broken down and analyzed in almost the same manner as was the basic ratio detector circuit of Figure 2.

REPLACEMENT PARTS FOR MODELS 121 & VRA121

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-3612	Capacitor-Trimmer bank (C4,C5,C7, C21,C22,C28,C40).....		39650	Capacitor-Ceramic 820 MMF (C43)...	
S-3615	Capacitor-Trimmer bank (C13,C14, C15,C16,C17,C18).....		S-3647	Capacitor-.007 MFD (C82, C96).....	
S-3613	Capacitor-Trimmer (C34,C46).....		S-3646	Capacitor-.005 MFD (C8,C12, C30,C31,C69,C45,C65,C79,C85, C92,C100).....	
S-3614	Capacitor-Trimmer (C3,C26).....				
S-3611	Capacitor-Ceramic Trimmer (C49)...		S-3644	Capacitor-.0025 MFD. (C67).....	
S-4181	Capacitor-Ceramic 3 MMF (C58).....		S-3653	Capacitor-.05 MFD. (C90).....	
39043	Capacitor-Ceramic 6.8 MMF (C70)...		S-3649	Capacitor-.015 MFD. (C88).....	
45466	Capacitor-Ceramic 10 MMF (C50)...		S-3648	Capacitor-.010 MFD. (C64,C55,C75, C89,C91,C98,C87,C93).....	
31353	Capacitor-Ceramic 15 MMF (C35)...				
39042	Capacitor-Ceramic 47 MMF (C19)...		36718	Capacitor-Electrolytic 10 Mfd. (C66,C97).....	
70599	Capacitor-Ceramic 56 MMF (C6)....				
33104	Capacitor-Ceramic 82 MMF (C1)....		S-3616	Condenser-Variable (C11,C27,C44, C2,C25,C48).....	
71021	Capacitor-Ceramic 91 MMF (C9,C47, C24).....		S-3598	Push Button-Coil (L14,L15,L16, L17,L18,L19).....	
71920	Capacitor-Ceramic 220 MMF (C20, C29,C42,C71,C99).....		S-3599	Coil Assembly SW. Osc. (L20).....	
			S-3600	Coil Assembly SW. Osc. (L22).....	
39642	Capacitor-Ceramic 390 MMF (C10, C23,C63,C68).....		S-3601	Coil Assembly B.C.Osc. (L21).....	
			S-3602	Coil Assembly FM. Ant. (L2).....	
39644	Capacitor-Ceramic 470 MMF (C41, C72,C86).....		S-3603	Coil Assembly FM. R.F. (L11).....	

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

REPLACEMENT PARTS FOR MODELS 121 & VRA121—Cont'd

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

STOCK NO.	DESCRIPTION
S-3604	Coil Assembly FM. Osc. (L23).....
S-3605	Coil Assembly BC. R.F. (L12,L13)...
S-3606	Coil Assembly BC. Ant. (L7,L8).....
S-3607	Coil Assembly SW. Ant. (L4).....
S-3608	Coil Assembly SW. Ant. (L6).....
S-3685	Coil Assembly SW. RF. (L9).....
S-3686	Coil Assembly SW. RF. (L10).....
S-3681	Choke R.F. (L24,L43).....
S-3901	Choke R.F. (L38).....
S-4160	Drum-Dial Drum.....
S-3621	Indicator-Station Selector pointer.
S-3609	Loop Assembly (121) (Broadcast)....
S-3949	Loop Assembly (VRA121) (Broadcast).
30732	Resistor 47 ohms 1/2 watt (R10)....
30880	Resistor 150 ohms 1/2 watt(R21)....
14561	Resistor 220 ohms 1/4 watt (R7)....
34767	Resistor 2200 ohms 1/2 watt(R15,R3, R5,R8,R13,R11,R25,R23,R35).
30734	Resistor-5600 ohms 1/2 watt (R4)...
14250	Resistor-8200 ohms 1/2 watt (R14, R47).....
30492	Resistor-22,000 ohms 1/2 watt (R22, R37).....
30409	Resistor-27,000 ohms 1/2 watt (R41)
3152	Resistor-30,000 ohms 1/4 watt (R38)
30685	Resistor-33,000 ohms 1/2 watt (R24)
30694	Resistor-39,000 ohms 1/2 watt (R49)
14138	Resistor-68,000 ohms 1/2 watt (R46).....
14020	Resistor-150,000 ohms 1/4 watt(R40, R48).....
14583	Resistor-220,000 ohms 1/2 watt(R36)
30652	Resistor-1 Megohm 1/2 watt (R1, R2,R6,R12,R26,R39,R43).....
31417	Resistor-3.3 Megohm 1/2 watt(R50)...
30992	Resistor-10 Megohm 1/2 watt (R34, R44).....
S-3617	Switch-Range Switch (S1,S2,S3,S4)..
S-3618	Switch-Push Button.....
S-3620	Scale-Dial Scale.....
S-3622	Shaft-Drive Shaft.....
51384	Socket-Tube Socket (Miniature).....
S-2824	Socket-AC.....
S-3593	Transformer-I.F. 1st A.M. (L27,L28, C36,C37,C38,C39).....
S-3593	Transformer-I.F. 2nd A.M. (L31,L32, C59,C60,C61,C62).....
S-3594	Transformer-I.F. 3rd A.M. (L36,L37, C80,C81,C83,C84).....
S-4010	Transformer-I.F. 1st F.M. (L25,L26, C32,C33).....
S-4011	Transformer-I.F. 2nd F.M. (L29,L30, C56,C57).....
S-3703	Transformer-Driver (L33,L34,C76)...
S-3702	Transformer-Ratio Det.(L35,C77,C78)
S-3619	Volume & Tone Control-1 Meg.(R42).. 1 Meg.(R45)
13867	Cap-Dust Cap (Pkg.3).....
S-3589	Cone-Cone & Voice Coil Assy. (L40).
S-3587	Speaker.....
S-3588	Field Coil (L43).....
	AMPLIFIER ASSEMBLIES
S-3646	Capacitor-.005 Mfd. (C94,C95).....
S-3650	Capacitor-.020 Mfd. (C74,C73).....
37877	Capacitor-Electrolytic 16 Mfd.(C52)
36599	Capacitor-Electrolytic 30-15-40 Mfd.(C51,C53,C54).....
S-3628	Cable-Speaker Cable.....
S-3629	Cable-Power Cable(Rec.to power Supply)
34765	Resistor-100 ohms 1/2 watt (R19)...

STOCK NO.	DESCRIPTION
34766	Resistor-1000 " 1/2 " (R20)..
14659	Resistor-6800 " 1/2 " (R31)..
30787	Resistor-47,000" 1/2 " (R29)..
3252	Resistor-100,000" 1/2 " (R27, R28)..
14583	Resistor-220,000 ohms 1/2 watt (R32,R33).....
11988	Resistor-390,000 ohms 1/2 watt(R30)
S-4161	Resistor-Bleeder Resistor(R16, R17,R18).....
32537	Socket-Tube Socket (Octal).....
S-3591	Transformer-Power 60 cycle (T1)..
S-3592	Transformer-Power 25 cycle (T1)..
S-3590	Transformer-Output(T2)(L39,L41, L42).
	MISCELLANEOUS ASSEMBLIES
S-3610	Antenna F.M. (121)Folded dipole).
S-3590	Antenna F.M.(VRA121) " " .
38375	Button-Push Button.....
S-4017	Board-Ant.Terminal Board.....
32634	Cord-Drive Cord (Universal)(50").
S-4167	Clamp-Back cover clamp (Pkg.3)...
S-4163	Cloth-Grille cloth (VRA 121).....
S-4162	Decal-121-VRA121(front panel)....
36386	Decal-VRA121 Record Drawer.....
S-3636	Grille-Metal Speaker grille(VRA121)
S-4170	Gear-Drive Gear.....
S-4171	Gear-Sleeve gear.....
S-4172	Grommet-Chassis mounting(Pkg.3)..
S-4026	Handle-Door handle (VRA121).....
13103	Jewel-Indicator jewel.....
72147	Knob-Range.....
72148	Knob-Tone.....
72149	Knob-Tuning.....
72150	Knob-Volume.....
11765	Lamp-Pilot Lamp Mazda #51.....
31480	Lamp-Indicator lamp Mazda #47....
S-3948	Marker-Station Marker.....
5118	Plug-Cable plug (3 pins).....
12568	Plug-Speaker plug (5 pins) .....
S-4183	Plug-Power cable plug (7 pins)...
11984	Plug-Loop connector.....
4982	Spring-Range Knob retaining spring(Pkg.5).....
14270	Spring-Tone Knob retaining spring (Pkg.2).....
30330	Spring-Volume knob retaining spring(Pkg.3).....
30900	Spring-Tuning knob retaining spring(Pkg.5).....
30585	Spring-Drive cord tension(Pkg.2).
34053	Spring-Push Button retaining spring (Pkg.5).....
31611	Screw-Set Screw for gear #8-32 x 1/4 (Pkg.10).....
14278	Socket-Phono Socket.....
5119	Socket-Cable socket (3 pins).....
12493	Socket-Speaker cable(5 pins).....
S-4164	Socket-Power cable (7 pins).....
S-4168	Support-Door fall support.....
	AUTOMATIC RECORD CHANGER MECHANISM
	Refer to Model No.960001-4 Service Note for Replacement Parts & Service Data.
	PULLOUT MECHANISM
S-4165	Door balancing Ass'y.(121).....
S-4182	Door balancing Ass'y(VRA 121)....
S-4166	Spring-balancing spring.....
S-4027	Drawer Slide(1 set)(record player)
S-3742	Pull out Mechanism(record player) VRA 121.....
S-4169	Hex Nut (door balancing Ass'y)
S-4176	Set Screw (Pkg.3) " " "
S-4177	Spring Washer (Pkg.3) " " "
S-4178	Stud (door balancing Ass'y).....
S-4179	Rubber Washer (Pkg.2) (door balancing Ass'y).....
S-4180	Fibre Washer (Pkg.5).....

All parts and prices subject to change or withdrawal without notice

VRA123M
VRA123C

RCA VICTOR

"HIS MASTER'S VOICE"

MODELS VRA123M & VRA123C

Twelve-Tube, Three-Band, A.M.-F.M. Superheterodyne Radio-Phonograph Combination

TECHNICAL INFORMATION AND SERVICE DATA

1948 No. 13

GENERAL SERVICE DIVISION • R C A VICTOR COMPANY LTD.



Model VRA123C



Model VRA123M

Electrical and Mechanical Specifications

FREQUENCY RANGE

Standard Broadcast S.B.	540-1600 K.C.
Short Wave 31 - 25 - 19 M.	9.4-15.8 M.C.
Frequency Modulation	88-108 M.C.
Intermediate Frequency A.M.	455 K.C.
Intermediate Frequency F.M.	10.7 M.C.
Tuning Drive Ratio	20 to 1

RADIOTRON COMPLEMENT (Radio chassis)

(1) Type 6BA6	R.F. Amplifier
(2) Type 6BE6	Converter
(3) Type 6BA6	1st I.F. (FM & AM)
(4) Type 6BA6	2nd I.F. (FM only)
(5) Type 6AL5	F.M. Ratio Detector
(6) Type 6AT6	A.M. Det., A.V.C. & 1st A.F.
(7) Type 6AT6	Phase Inverter
(8) Type 6V6GT/G	Power Output
(9) Type 6V6GT/G	Power Output
(10) Type 5Y3GT/G	Rectifier
Pilot Lamps (2)	Mazda No. 51 6-8 volts 0.2 amp.
(1)	Mazda No. 47 6-8 volts 0.15 amp.

RADIOTRON COMPLEMENT (Magic Monitor chassis)

(1) Type 6AV6	Control Amplifier and Rectifier
(2) Type 6BA6	Reactance Tube

POWER OUTPUT

Undistorted	4.5 Watts
Maximum	7.0 Watts

LOUDSPEAKER

Type	12 inch P.M.
Voice Coil impedance	2.2 ohms at 400 cycles

CABINET DIMENSIONS (Inches)

	Height	Width	Depth
Model VRA123M	33½	37	17
Model VRA123C	36¾	37¾	17¾

POWER SUPPLY RATINGS

Rating A	105-125 volts, 50-60 cycle, 110 watts
Rating B	105-125 volts, 25 cycle, 110 watts

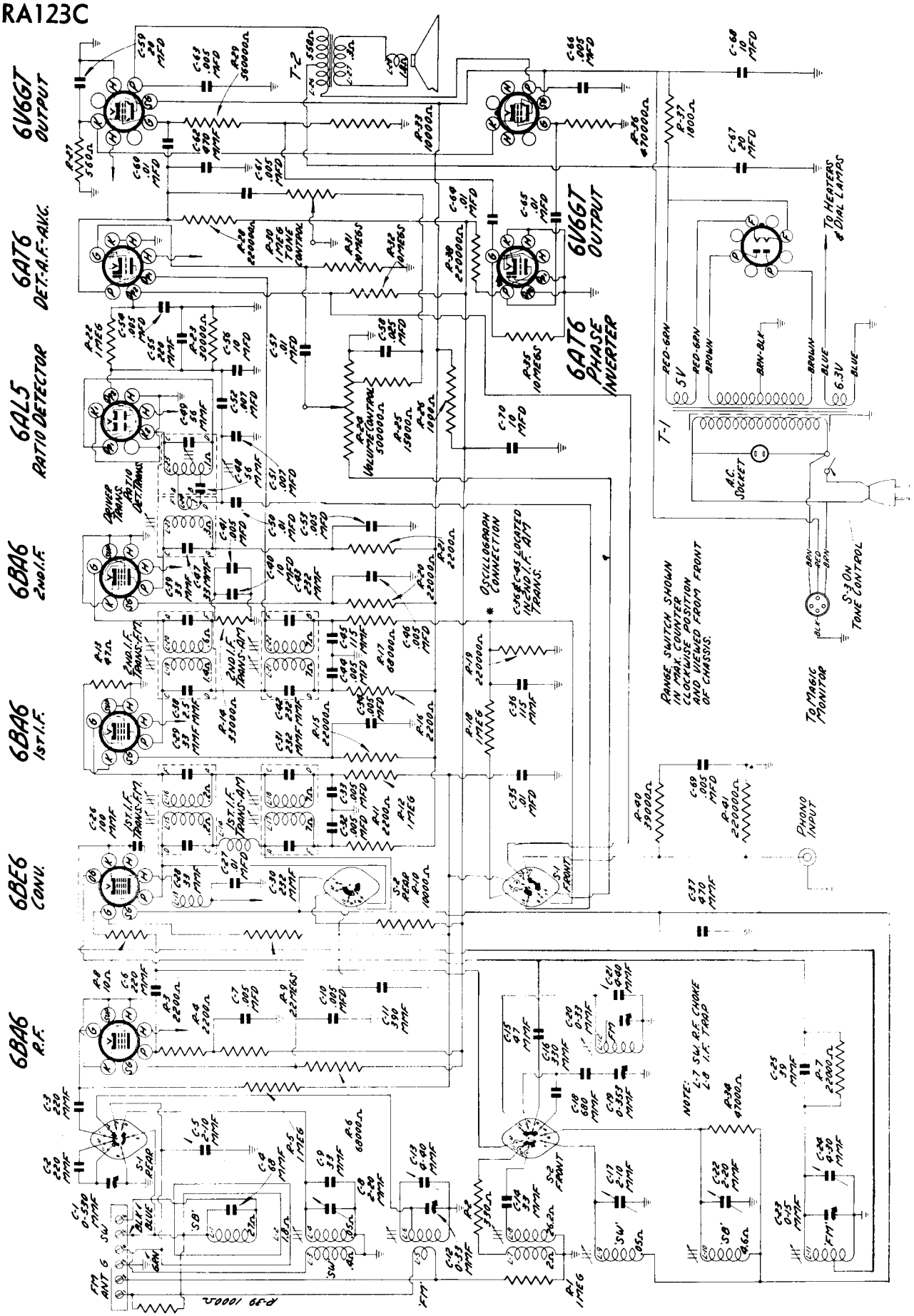
PHONOGRAPH

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

PICKUP

Type	Crystal
Impedance	100,000 ohms at 1,000 cycles
Average Output	1.4 volts at 400 cycles across 500,000 ohm load

VRA123M
VRA123C



GENERAL DESCRIPTION

The RCA Victor Models VRA123M and VRA123C AM-FM radio-phonograph combinations are housed in cabinets of striking beauty. The AM-FM receiver is a twelve tube, three band superheterodyne using the most up-to-date circuits for high quality radio reproduction. Features of the design include: Built-in folded dipole antenna for F.M. reception; Built-in short wave antenna; Adjustable standard broadcast loop antenna. Miniature tubes for improved high frequency performance; R.F. stage; Iron core R.F.; Oscillator and I.F. coils; "Amplitude Ignorer" for improved rejection of AM when receiving F.M.; Ratio detector for high quality F.M. reproduction; Automatic volume control circuits; Full range variable tone control; Tone compensated volume control; Magic Monitor for improved phonograph reproduction; Push-pull pentode output stage; Twelve inch P.M. loudspeaker. Models VRA101M and VRA101C use type 9600001-4 automatic record changer mechanism with high fidelity, low noise crystal pickup. Refer to the 960001-4 Service Note for adjustment details and list of replacement parts for this mechanism.

NOTE: Refer to VRA101M and VRA101C Service Note for alignment instructions, chassis wiring drawings and other service data.

MAGIC MONITOR SERVICE DATA

GENERAL DESCRIPTION

The RCA Magic Monitor circuit reduces the high frequency surface noise during the low-level passages on a phonograph record and permits maximum treble response during the high-level passages. The circuit consists of a reactance tube (6BA6), a half-wave rectifier (diode section of a 6AV6) and an amplifier (triode section of a 6AV6).

A portion of the audio signal is amplified, rectified and applied as a bias voltage to the grid of the reactance tube. This tube (connected across the output of the Magic Monitor) functions as a variable capacitance which shunts a controlled amount of the surface noise frequencies to ground.

During the low-level passages, when the surface noise tends to mask the high frequencies, the low bias voltage increases the capacitance of the reactance tube, and the surface noise is reduced. During the high-level passages, when the surface noise itself is masked by the signal, the high bias voltage decreases the capacitance of the tube, thus permitting all audio frequencies to pass relatively unaffected.

CIRCUIT ARRANGEMENT

Audio signals from the phonograph pickup pass from Magic Monitor input to output through the parallel combination C 71 R 40 which functions as a tone compensation network. Connected across the output is the grid circuit of the reactance tube through 1000 mmfd. coupling capacitor C 77. This tube functions as a variable capacitance by virtue of the well known "Miller" effect. The capacity presented by the reactance tube (6BA6) grid is dependent upon the grid plate capacity C 78 and the reactance tube circuit gain. A decrease in grid-plate capacity or in circuit gain will decrease the effective capacity presented by the reactance tube grid. In the Magic Monitor, a variable-mu tube (6BA6) is used and control exerted by variations in grid bias. A negative bias, dependent on the amplitude of the high frequency components in the signal, is provided by the diode section of the 6AV6 and filtered by the RC network between 6AV6 diode plate and 6BA6 reactance tube grid. The triode section of the 6AV6 amplifies a portion of the incoming signal and passes the high frequency components to the diode rectifier through the 180 mmfd coupling capacitor C 73.

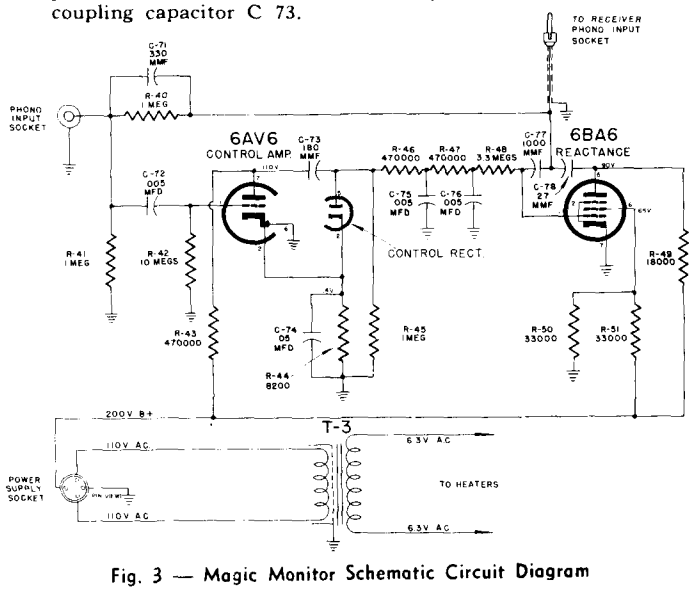


Fig. 3 — Magic Monitor Schematic Circuit Diagram

TEST PROCEDURE

The Magic Monitor circuits may be tested for correct operation as follows:

1) Set the volume control for maximum amplifer gain.
2) Set the tone control for maximum high frequency response.
3) Connect an audio signal generator to the phono input socket through a 1500 mmfd capacitor.
4) Set the audio signal generator frequency to 5000 c.p.s. and adjust the output level until the voltage across the loudspeaker voice coil = 1.5 volts.
5) Ground the control rectifier diode plate (pin #5 on 6AV6 socket). This removes the bias from the 6BA6 reactance tube and increases the effective grid circuit capacity to its maximum value. The voltage across the loudspeaker voice-coil should be reduced to approximately .9 volt when the reactance tube operation is normal.
6) Adjust the audio signal generator output voltage to 0.25 volt.
7) Use an RCA Voltohmyst or equivalent instrument to measure the D.C voltage developed across the control rectifier diode load resistor R 45. This voltage should be approximately —10 volts when the control amplifier and rectifier operation is normal.

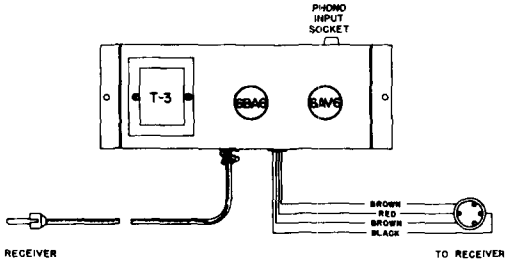


Fig. 2 — Magic Monitor Chassis Layout

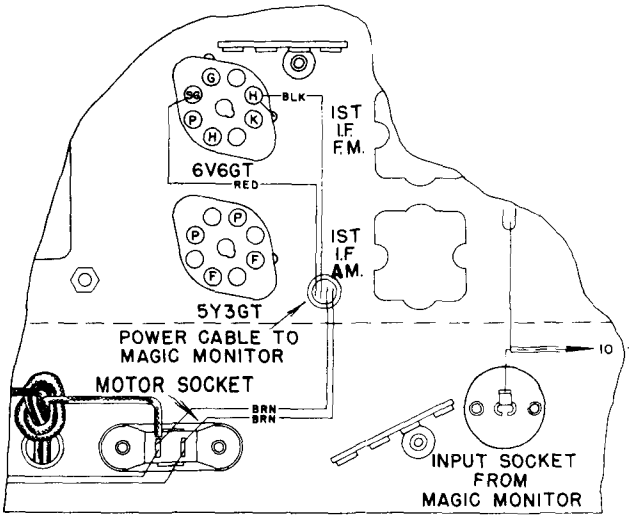


Fig. 4 — Section of Chassis Wiring Diagram Showing Magic Monitor Power Cable Connections

REPLACEMENT PARTS FOR MODELS VRA123M & VRA123C

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

STOCK NO.	DESCRIPTION
	CHASSIS ASSEMBLY
S-4017	Board-Terminal board
S-3614	Capacitor-Mica trimmer (C13,C21)
S-3697	Capacitor-Trimmer assembly (C5,C8,C17,C22)
S-3698	Capacitor-Ceramic trimmer (C24)
39616	Capacitor-33 MMF Mica 5% (C9,C14)
S-4219	Capacitor-39 MMF Ceramic 5% (C25)
S-4220	Capacitor-47 MMF Ceramic 5% (C15)
S-3510	Capacitor-68 MMF Mica 20% (C4)
45233	Capacitor-100 MMF Ceramic 10% (C26)
S-4221	Capacitor-220 MMF Ceramic 5% (C3,C6,C55)
39636	Capacitor-220 MMF Mica 5% (C2)
39640	Capacitor-330 MMF Mica 5% (C16)
39642	Capacitor-390 MMF Mica 5% (C11)
39644	Capacitor-470 MMF Mica 5% (C37,C62)
14498	Capacitor-680 MMF Mica 5% (C18)
S-3646	Capacitor-.005 MFD (C7,C10,C32,C33,C34, C41,C44,C46,C53,C61,C63,C66)
S-3647	Capacitor-.007 MFD (C51,C52)
S-3648	Capacitor-.010 MFD (C27,C35,C50,C57,C60, C64,C65)
S-3651	Capacitor-.025 MFD (C58)
36718	Capacitor-Electrolytic 10 MFD (C40,C56)
S-2894	Capacitor-Electrolytic 10 MFD (C70)
S-3720	Capacitor-Electrolytic 20-10-20 MFD (C59, C67,C68)
S-3684	Condenser-Variable & drum (C1,C12,C19,C20, C23)
S-3607	Coil-Antenna coil S.W. (L3,L4)
S-3679	Coil-Oscillator coil S.W. (L9)
S-3680	Coil-Oscillator coil S.B. (L10)
S-3678	Coil-Oscillator coil F.M. (L11)
S-3621	Indicator-station selector pointer
11765	Lamp-Dial lamp (Mazda #51)
S-4300	Plate-Dial backplate and pulleys
34761	Resistor-10 ohms, 1/4 watt (R6)
30732	Resistor-47 ohms, 1/2 watt (R13)
30538	Resistor-330 ohms,1/2 watt (R2)
5164	Resistor-560 ohms,1/4 watt (R27)
34766	Resistor-1000 ohms,1/2 watt(R26)
S-3682	Resistor-1800 ohms,W.W. (R37)
34767	Resistor-2200 ohms,1/2 watt(R3,R4,R11,R16)
14659	Resistor-6800 ohms,1/2 watt(R17)
3078	Resistor-10000 ohms, 1/2 watt (R10,R33)
36714	Resistor-15000 ohms,1/4 watt (R25)
30492	Resistor-22000 ohms,1/2 watt (R7,R15,R20)
3077	Resistor-30000 ohms,1/2 watt (R23)
30685	Resistor-33000 ohms,1/2 watt (R14)
30787	Resistor-47000 ohms,1/2 watt (R34)
14138	Resistor-68000 ohms,1/2 watt (R6)
14583	Resistor-220000 ohms,1/2 watt(R19,R28,R38)
30648	Resistor-470000 ohms,1/2 watt(R36)
30653	Resistor-560000 ohms,1/2 watt(R29)
30652	Resistor-1 Megohm,1/2 watt(R1,R5,R12,R18, R22)
30649	Resistor-2.2 Megohm,1/2 watt (R9)
30992	Resistor-10 Megohm,1/2 watt(R31,R32,R35)
S-4226	Shaft-Drive shaft
31364	Socket-Dial lamp socket
36069	Socket-Tube socket(Miniature with centre shield)
51384	Socket-Tube socket(Miniature)
31319	Socket-Tube socket(Octal)
14278	Socket-Phono socket
31418	Spring-Drive cord spring (Pkg.2)
S-4223	Switch-Range switch (S1,S2)
S-4225	Tone-Control,1 Megohm (S3,R30)
S-3667	Transformer-1st I.F.A.M.(L17,L18,C30,C31)
S-3668	Transformer-2nd I.F.A.M.(L21,L22,C36,C42, C43,C45)
S-4010	Transformer-1st I.F.F.M.(L15,L16,C28,C29)
S-4011	Transformer-2nd I.F.F.M.(L19,L20,C38,C39)
S-3703	Transformer-Driver-F.M.(L23,L24,C47)
S-3702	Transformer-Ratio Detector F.M.(L25,C48,C49)
S-3722	Transformer-Power,60-cycle (T1)
S-4297	Transformer-Power,25-cycle (T1)
S-4038	Transformer-Output (T2) (L26,L27)
S-4224	Volume Control-500,000 ohms (R24)
2917	Washer-"C" Washer for drive shaft(Pkg.10)
S-3739	Wave trap-(L-8) Choke (L7)

STOCK NO.	DESCRIPTION
	SPEAKER ASSEMBLY
S-4298	Board-Speaker terminal board
13867	Dust Cap (Pkg.5)
S-4299	Cone-Cone & Voice Coil Assembly (L28)
S-4288	Speaker-complete
	AUTOMATIC RECORD CHANGER MECHANISM
	Refer to Model 960001-4 Service Note for replacement parts and service data.
	PULL OUT MECHANISM ASSEMBLIES
S-4182	Door balancing assembly (complete)
S-4180	Fibre Washer (Pkg.3)
S-4169	Hex.nut for door balance assembly
S-4373	Roll out mechanism arm
S-4374	Roll out mechanism roller
S-4179	Rubber washer (Pkg.2)
S-4176	Set screw for door balance assembly (Pkg.3)
S-4046	Slide holder and carriage
S-4047	Slide bar (LH)
S-4048	Slide bar (RH)
S-4177	Spring washer for door balance assembly(Pkg.3)
S-4166	Spring-balance spring
S-4178	Stud for door balancing assembly
S-4168	Support-door fall support
	MISCELLANEOUS ASSEMBLIES
	Antenna-F.M. (See R.F. transmission line).
33545	Cap-pilot lamp cap
S-3924	Catch-door catch and strike plate (VRA123C)
S-3925	Catch-door catch and strike plate (VRA123M)
S-4167	Clamp-Back cover clamp (Pkg.10)
S-4228	Cloth-Grille cloth (VRA 123C)
S-4229	Cloth-Grille cloth (VRA 123M)
S-4216	Decal-(front panel)
36386	Decal-(Record Drawer)
S-3658	Dial-Dial Scale (VRA123M)
S-4227	Dial-Dial Scale (VRA123C)
S-4230	Grille-Metal grille (VRA123C)
S-4231	Grille-Metal grille (VRA123M)
S-4293	Handle-Door handle (VRA123C)
S-4289	Handle-Door handle (VRA123M)
13103	Jewel-Amber jewel
S-4291	Knob-Door knob (VRA 123C)
S-4292	Knob-Door knob (VRA 123M)
34489	Knob-Tuning-Volume-Tone
37837	Knob-Range
31480	Lamp-Pilot lamp (Mazda 47)
S-4022	Loop-Antenna loop
5133	Pin-Speaker cable pin (Pkg.5)
S-4009	Spring-Conical spring to Mount Record Changer
14270	Spring-Retaining spring for knob (Pkg.3)
70788	R.F. transmission line
	MAGIC MONITOR
70935	Capacitor-27 MMF 10% Ceramic (C78)
71922	Capacitor-180 MMF 10% Ceramic(C73)
71919	Capacitor-330 MMF 10% Ceramic(C71)
S-4425	Capacitor-1000 MMF 20% Ceramic (C77)
S-3646	Capacitor-.005 MFD (C72,C75,C76)
70615	Capacitor-.05 MFD (C74)
14250	Resistor-8200 ohms,1/2 watt (R44)
3219	Resistor-18000 ohms,1/2 watt(R49)
30685	Resistor-33000 ohms,1/2 watt(R50,R51)
30648	Resistor-470000 ohms,1/2 watt(R43,R46,R47)
30652	Resistor-1 megohm, 1/2 watt(R40,R41,R45)
31417	Resistor-3.3 Megohm, 1/2 watt(R48)
30992	Resistor-10 Megohm, 1/2 watt(R42)
S-4426	Socket-Tube socket-Miniature
S-4202	Socket-Phono socket
S-4427	Transformer-Power transformer,60 cycle (T3)
S-4428	Transformer-Power transformer,25 cycle (T3)

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

RCA VICTOR

"HIS MASTER'S VOICE"

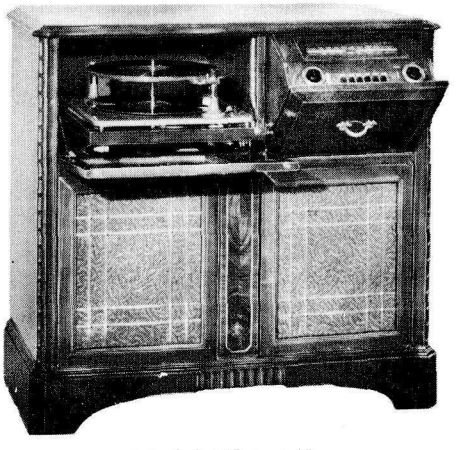
MODEL VRA 141

Fourteen-Tube, Four-Band, A.M.-F.M. Superheterodyne Radio-Phonograph Combination

TECHNICAL INFORMATION AND SERVICE DATA

1948 No. 10

GENERAL SERVICE DIVISION • RCA VICTOR COMPANY LTD.



Model VRA 141

Electrical and Mechanical Specifications

FREQUENCY RANGE

Standard Broadcast S.B.	540-1600 k.c.
Short Wave 49-31 M	5.7-12.0 mc
25-19 M	11.5-15.8 mc
Frequency Modulation	88-108 mc
Intermediate Frequency AM	455 kc
Intermediate Frequency FM	10.7 mc
Tuning Drive Ratio	20 to 1

POWER OUTPUT

Undistorted	9 watts
Maximum	12 watts

POWER SUPPLY RATINGS

Rating A	105-125 volts, 50-60 cycle, 145 watts
Rating B	105-125 volts, 25-60 cycle, 145 watts

LOUDSPEAKER

Type	12 inch Electrodynamic
Voice coil impedance	2.2 ohms at 400 cycles

PHONOGRAPH

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

RADIOTRON COMPLEMENT OF RADIO CHASSIS

(1) Type 6BA6	RF Amplifier
(2) Type 6BA6	Mixer
(3) Type 6BE6	Oscillator
(4) Type 6BA6	1st IF
(5) Type 6BA6	2nd IF
(6) Type 6AL5	F.M. Ratio Detector
(7) Type 6AT6	A.M. Det., A.V.C. & 1st A.F.
(8) Type 6U5	Tuning Indicator

RADIOTRON COMPLEMENT OF AMPLIFIER CHASSIS

(1) Type 6SC7	Phase Inverter
(2) Type 6F6G	Power Output
(3) Type 6F6G	Power Output
(4) Type 5U4G	Full Wave Rectifier

RADIOTRON COMPLEMENT OF MAGIC MONITOR CHASSIS

(1) Type 6AV6	Control Amplifier & Rectifier
(2) Type 6BA6	Reactance Tube
Pilot Lamps (2)	Mazda No. 51 6-8 volts, 0.2 amp.
(1)	Mazda No. 47 6-8 volts, 0.15 amp.

CABINET DIMENSIONS (inches)

	Height	Width	Depth
VRA 141	$36\frac{3}{32}$	$39\frac{1}{2}$	$18\frac{17}{32}$

PICKUP

Type	Crystal
Impedance	100,000 ohms at 1,000 cycles
Average Output	1.4 volts at 400 cycles across 500,000 ohm load

VRA 141

GENERAL DESCRIPTION

The RCA Victor Model VRA 141 AM-FM radio phonograph combination is housed in a console cabinet of striking beauty. The AM-FM receiver is a fourteen tube, four band superheterodyne using the most up-to-date circuits for high quality radio and phonograph reproduction. Features of the design include: Built-in folded dipole antenna for F.M. reception; Built-in short wave antenna; Adjustable standard broadcast loop antenna; Miniature tubes for improved high frequency performance; Highly selective RF stage; Separate oscillator tube for improved oscillator stability; Iron core R.F.; oscillator and I.F. coils; Push-button tuning of six Standard Broadcast stations by means of pretuned circuits; "Amplitude Ignorer" for improved rejection of AM when receiving FM; Ratio detector for high quality FM reproduction; Automatic volume control circuits; Tuning indicator tube; Full range variable tone control; Tone compensated volume control; Magic Monitor for improved phonograph reproduction; Push-pull output stage and twelve inch duo-cone electrodynamic loudspeaker. The Model VRA-141 uses a Type 960001-4 automatic record changer mechanism with high fidelity, low noise crystal pickup. Refer to the 960001-4 Service Note for adjustment details and list of replacement parts for this mechanism.

A COMPARISON OF F.M. AND A.M.

Since the new F.M. receiver circuits and the frequencies on which F.M. operates are new to the home receiver field, it is important that the serviceman be informed of the differences between F.M. receivers and the conventional A.M. receivers.

A conventional A.M. receiver operates with a signal in which the intelligence is transmitted by means of amplitude variations while the frequency remains fixed. An F.M. receiver, however, operates with a signal in which the intelligence is transmitted by means of frequency variations while the amplitude remains fixed. Noise, which consists largely of amplitude variations passes readily through an A.M. receiver which responds to these variations. In an F.M. receiver, special circuits are provided to minimize the response to amplitude variations so that noise free reception is assured with all except very weak signals. Where the signals picked up by the built-in folded dipole antenna are too weak, an outside F.M. antenna is necessary.

Due to the very high frequencies used for F.M. (88 to 108 megacycles) certain differences may be noticed in this type of reception. It is known that in some locations, particularly urban areas, a type of distortion peculiar to F.M. may be experienced. This is in no way a fault of the receiver but rather a physical phenomena caused by the signal being reflected from some object resulting in two or more paths for the transmitted signal. The reflected signal, arriving late and out of phase, tends to amplitude modulate the F.M. signal. This distortion may appear as a strange buzz, rattle or swish. It may even give the effect of an overloaded audio stage. In other cases an increase in noise level may be noticed. Choosing a different location for the receiver may eliminate the trouble since the directive folded dipole antenna housed in the cabinet will be oriented differently. In severe cases, an outside dipole and reflector pointing in the right direction may correct the trouble.

For further details on antennas for F.M. refer to the Antennas section on this page.

CIRCUIT ARRANGEMENT

The circuit for A.M. reception uses a tuned R.F. stage in which the loop antenna is used as part of the first tuned circuit. This is followed by a mixer stage with separate oscillator tube. The use of a separate oscillator tube and the incorporation of temperature compensating capacitors in the tuned circuits greatly reduces the oscillator drift. The use of a separate oscillator tube also increases tne gain of the mixer on the short-wave bands.

Primaries and secondaries of the 455 kc. A.M. and 10.7 mc; F.M. I.F. transformers are connected in series in the plate and grid circuits of the I.F. amplifier stages, except for the secondaries of the last transformers which are connected to the A.M. and F.M. detectors respectively. The 10.7 mc I.F. transformers have relatively little effect on the 455 kc. A.M. I.F. signals due to low inductance of their coils and the two stage I.F. amplifier operates in the conventional manner.

A double diode triode acts as A.M. detector, A.V.C. and first audio amplifier. A phase inverter follows and drives the push-pull pentode output stage.

The circuit for F.M. reception uses a tuned R.F. stage designed to match a 300 ohm antenna. This is followed by a mixer stage with separate oscillator tube. Temperature compensating capacitors and other precautions have been taken to make the oscillator as stable as possible consistent with the frequency at which it operates. The use of a separate oscillator tube provides more gain in the mixer, in addition to the improved stability just mentioned. All high frequency circuit connections are critical as to length and care must be taken that these lengths are maintained when any repair work is done.

As previously explained, the F.M. and A.M. I.F. transformers are connected in series. The 455 kc I.F. transformers have relatively little effect on the 10.7 mc. F.M. I.F. signals due to the low reactance of the capacitors in the 455 kc transformers, so that the two stage amplifier operates in the conventional manner. In the first I.F. stage an unbypassed cathode resistor is used to compensate for the variation in input capacity of the tube with a change in A.V.C. voltage. The second I.F. amplifier stage incorporates an "amplitude ignorer" circuit which provides noise suppression additional to that obtained in the ratio detector. The ratio detector appearing in RCA post-war F-M receivers is a new device for converting a frequency modulated carrier to an audio signal while at the same time offering a high degree of attenuation to any incident amplitude modulation. The relative insensitivity to amplitude variations, which is an inherent characteristic of ratio detectors, enables them to be used without the usual preceding limiter stage, thus affording the use of a high gain i-f stage instead of a low gain limiter. The audio amplifier is the same one used for A.M. reception and uses the triode section of the double diode triode as the first A.F. amplifier, a double triode phase inverter and a push-pull pentode output stage. The Magic Monitor is fully described on Page 7.

ANTENNAS

If reception is not satisfactory on one or more of the three bands, using the built-in cabinet antennas, an external antenna may be used.

An external antenna for broadcast and short wave reception, when required, is connected to terminal 4.

If an external F.M. antenna is to be used, disconnect the internal folded dipole antenna and connect in its place the leads from the external antenna.

Two general types of F.M. antennas are used. These are the folded dipole and the folded dipole with reflector, both of which are used with a 300 ohm transmission line. The reflector element used is somewhat longer than the folded dipole element. These antennas are directive and must be oriented for maximum signal pickup from the desired stations. The folded dipole picks up a maximum signal from stations at right angles to the direction in which the dipole is pointing. The folded dipole with reflector is similarly directive but provides additional signal pickup from the side of the folded dipole away from the reflector and rejects signals from the reflector side of the folded dipole.

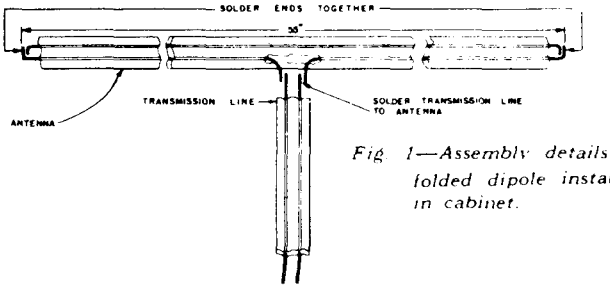


Fig 1—Assembly details of folded dipole installed in cabinet.

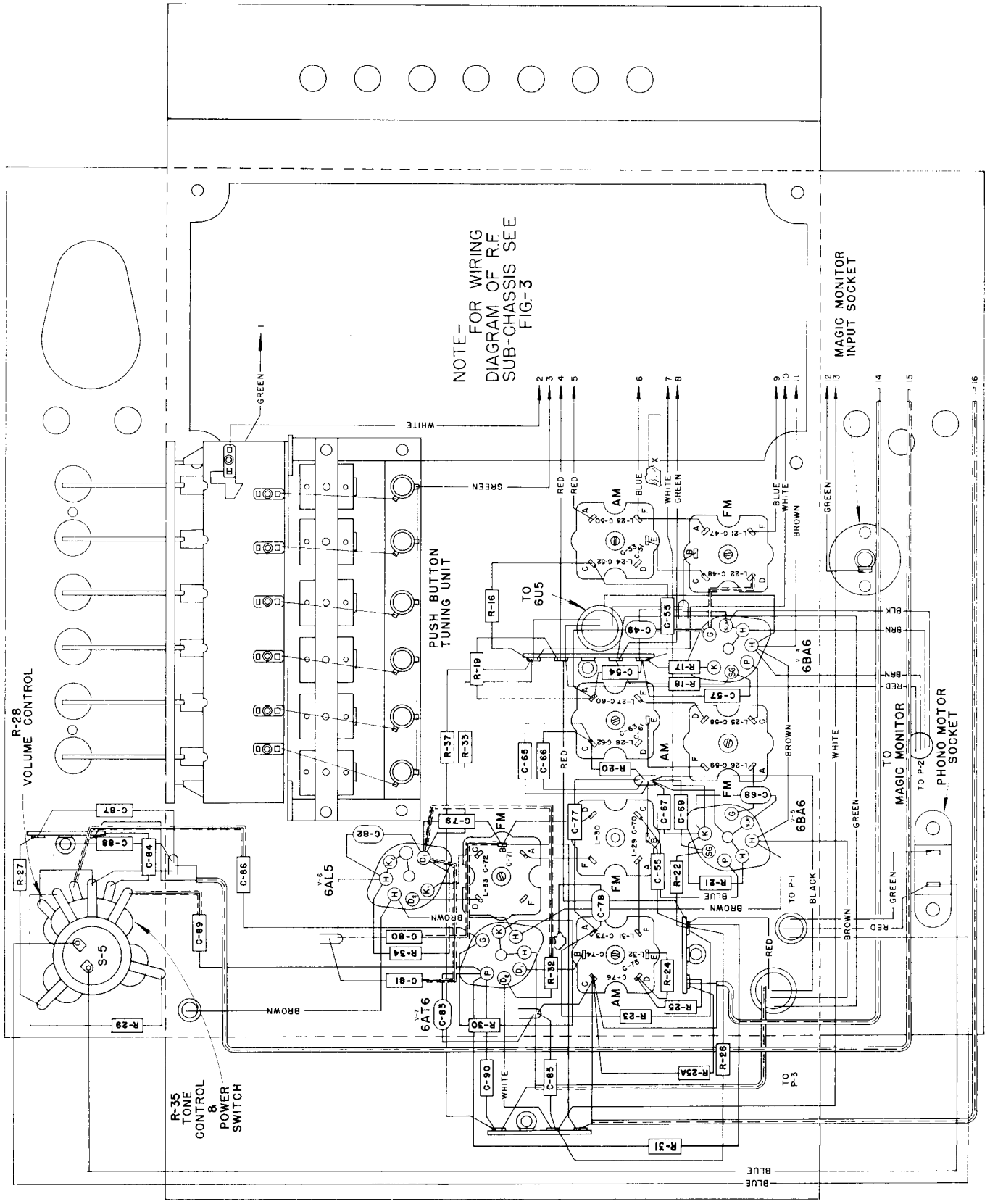


Fig. 2—Radio Tuner Chassis Wiring Diagram

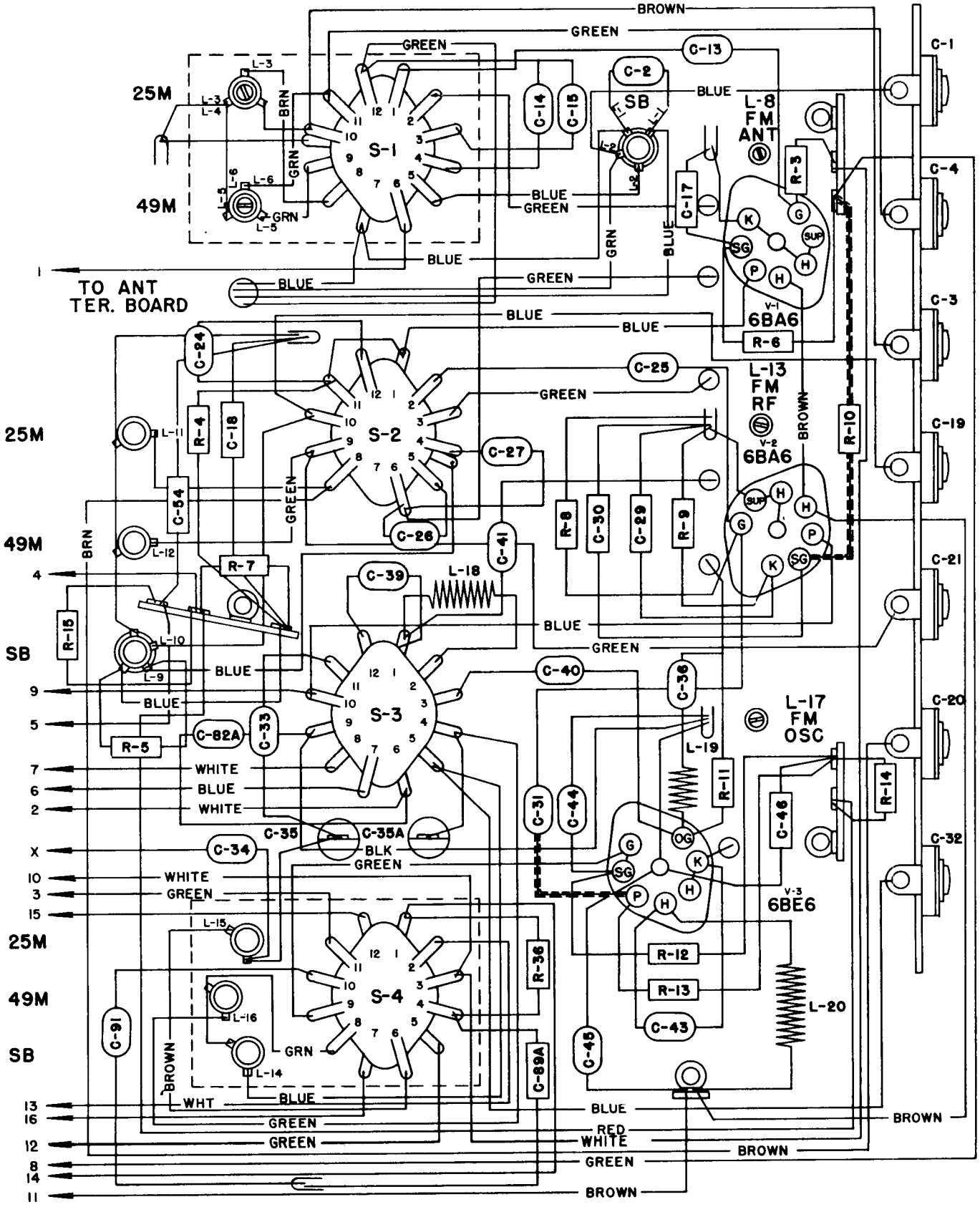


Fig. 3—R.F. Sub-chassis Wiring Diagram

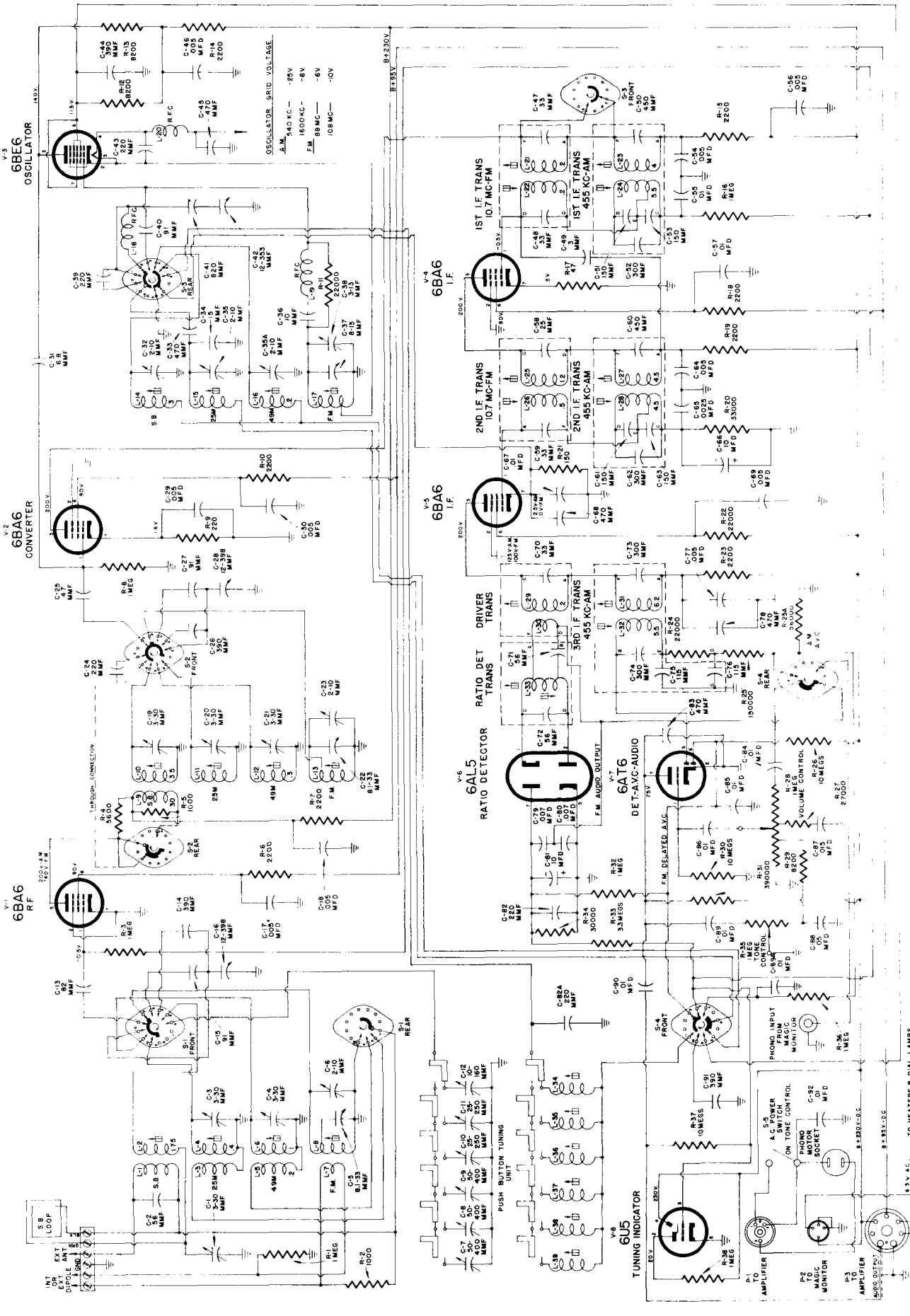


Fig. 4—Radio Tuner Schematic Circuit Diagram

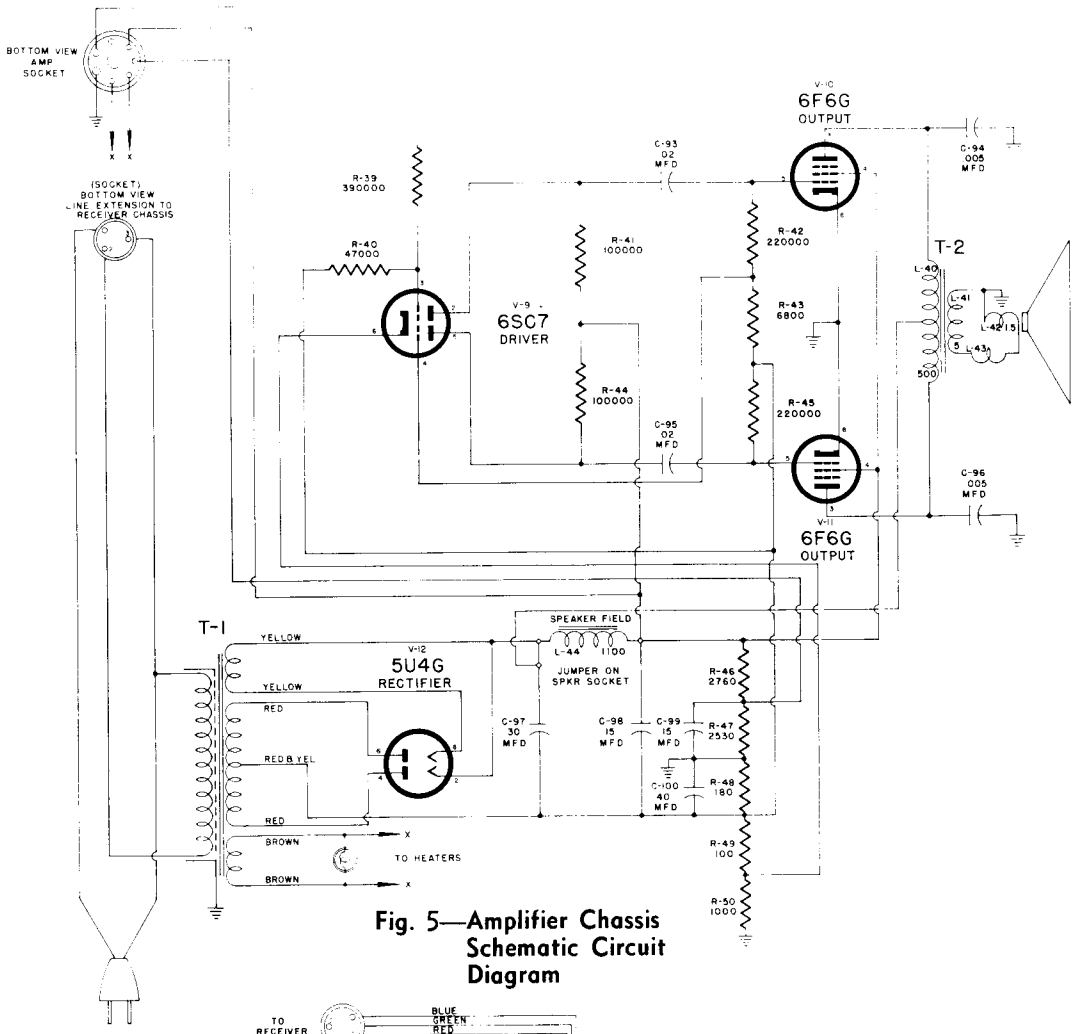


Fig. 5—Amplifier Chassis Schematic Circuit Diagram

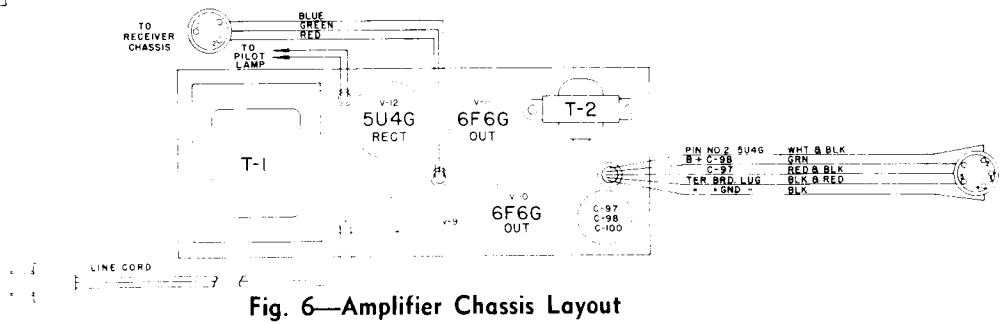


Fig. 6—Amplifier Chassis Layout

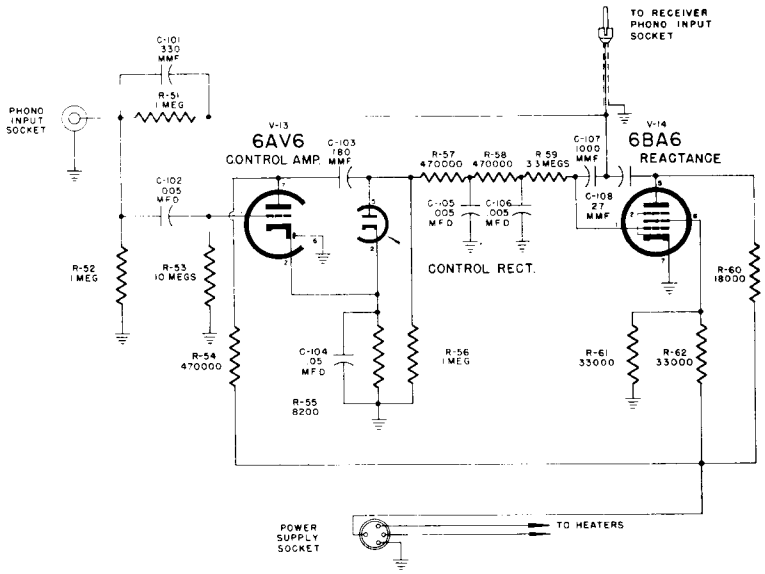


Fig. 7—Magic Monitor Schematic Circuit Diagram

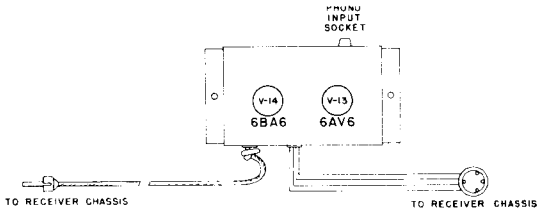


Fig. 8—Magic Monitor Chassis Layout

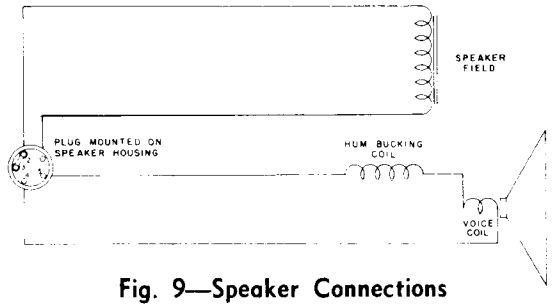


Fig. 9—Speaker Connections

MAGIC MONITOR SERVICE DATA

GENERAL DESCRIPTION

The RCA Magic Monitor circuit reduces the high frequency surface noise during the low-level passages on a phonograph record and permits maximum treble response during the high-level passages. The circuit consists of a reactance tube (6BA6), a half-wave rectifier (diode section of a 6AV6) and an amplifier (triode section of a 6AV6).

A portion of the audio signal is amplified, rectified and applied as a bias voltage to the grid of the reactance tube. This tube (connected across the output of the Magic Monitor) functions as a variable capacitance which shunts a controlled amount of the surface noise frequencies to ground.

During the low-level passages, when the surface noise tends to mask the high frequencies, the low bias voltage increases the capacitance of the reactance tube, and the surface noise is reduced. During the high-level passages, when the surface noise itself is masked by the signal, the high bias voltage decreases the capacitance of the tube, thus permitting all audio frequencies to pass relatively unaffected.

CIRCUIT ARRANGEMENT

Audio signals from the phonograph pickup pass from Magic Monitor input to output through the parallel combination C 10/ R 5 which functions as a tone compensation network. Connected across the output is the grid circuit of the reactance tube through 1000 mmfd. coupling capacitor C 107. This tube functions as a variable capacitance by virtue of the well known "Miller" effect. The capacity presented by the reactance tube (6BA6) grid is dependent upon the grid plate capacity C 108 and the reactance tube circuit gain. A decrease in grid-plate capacity or in circuit gain will decrease the effective capacity presented by the reactance tube grid. In the Magic Monitor, a variable mu tube (6BA6) is used and control exerted by variations in grid bias. A negative bias, dependent on the amplitude of the high frequency components in the signal, is provided by the diode section of the 6AV6 and filtered by the RC network between 6AV6 diode plate and 6BA6 reactance tube grid. The triode section of the 6AV6 amplifies a portion of the incoming signal and passes the high frequency components to the diode rectifier through the 180 mmfd coupling capacitor C 103.

TEST PROCEDURE

The Magic Monitor circuits may be tested for correct operation as follows:

1) Set the volume control for maximum amplifier gain.
2) Set the tone control for maximum high frequency response.
3) Connect an audio signal generator to the phono input socket through a 1500 mmfd capacitor.
4) Set the audio signal generator frequency to 5000 c.p.s. and adjust the output level until the voltage across the loudspeaker voice coil = 2 volts.
5) Ground the control rectifier diode plate (pin #5 on 6AV6 socket). This removes the bias from the 6BA6 reactance tube and increases the effective grid circuit capacity to its maximum value. The voltage across the loudspeaker voice-coil should be reduced to approximately 1.2 volts when the reactance tube operation is normal.
6) Adjust the audio signal generator output voltage to 0.25 volt.
7) Use an RCA Voltohmyst or equivalent instrument to measure the D.C. voltage developed across the control rectifier diode load resistor R56. This voltage should be approximately —10 volts when the control amplifier and rectifier operation is normal.

SERVICE DATA

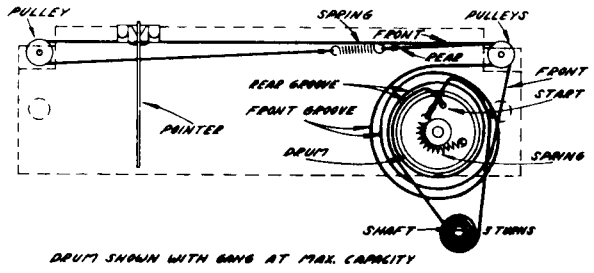


Fig. 10 — Dial Cord Stringing

ROLL-OUT AND TILT-OUT MECHANISMS

These mechanisms should ordinarily require little attention. Occasional lubrication of the record changer roll-out tracks with a light grease may be required to keep them operating freely. The radio tilt-out balance arm mechanism has a friction nut adjustment which is provided so that the door may be set to close fully and yet respond to light operating pressure. To adjust this friction nut first loosen the two set screws found around the rim. When adjustment is completed, re-tighten the set screws to prevent movement of the nut.

CRITICAL LEAD DRESS

(Make lead dress before alignment)

1. C86 and C89 must be dressed up against the chassis.
2. The lead from pin 5 of the 6BA6 R.F. amplifier tube to pin 1 on S2 rear must be kept short.
3. Dress lead connected from pin 5 of the 6BA6 mixer tube to pin 10 on S3 front away from chassis.
4. Lead from L13 to pin 3 on S2 front must be kept short.
5. Dress green lead from antenna terminal board pin 5 away from chassis.
6. Dress blue lead from C19 R.F. trimmer away from all adjacent components.
7. Dress all leads away from S2.
8. Twisted leads going to ON-OFF switch must be dressed against edge of chassis.
9. C44 leads must be kept short.
10. Dress lead from pin 3 of 6AL5 to pin 3 of 6AT6 away from pin 1 (grid) of 6AT6.
11. All F.M. coil connections must be kept to the exact length of the original (one-sixteenth inch difference in length may be excessive).
12. All wiring in the receiver is critical as to length and placement. It is therefore important when servicing, that extreme care should be taken so as not to disturb more of the wiring than absolutely necessary.

NOTE: Keep tuning capacitor grounding brushes clean and under correct tension for proper contact.

VRA 141 ALIGNMENT PROCEDURE

Make lead dress (page 5) before alignment

Before aligning set, completely mesh the gang and set the dial pointer on the mechanical maximum calibration point at the extreme left hand end of the dial. (See Fig. 11.)

When making a complete alignment follow in proper sequence the tabulated form below.

If only a portion of the circuit is to be aligned select the portion required, followed by the remaining steps in the chart. Any adjustments made on the FM 10.7 mc. I.F.'s make it necessary to realign the A.M. 455 kc. I.F.'s.

For "S.B.", 49-31M and 25-19M band alignment use output meter across voice coil keeping Test Oscillator output as low as possible to prevent AVC action.

Cathode-ray oscillocsope and sweep signal generator alignment of the 455 kc. A.M. I.F. transformers is the preferable method. Connect oscilloscope across the volume control. If the required equipment is not available use the method outlined below.

PUSH BUTTON ALIGNMENT

The push buttons may be adjusted for any six stations on the S.B. band. The preferable arrangement is to adjust for stations in order of frequency. Proceed as follows:

1. Turn "Range Selector" to S.B. position and manually tune in the first station, say 560 kc.
2. Turn "Range Selector" to P.B. position and press button No. 1 located at the left on the front panel.
3. Referring to Fig. 12, adjust core and trimmer No. 1 for a peak at 560 kc. This adjustment can be made with the assistance of the "Magic Eye". To align the push buttons with set still in cabinet, unfasten "Magic Eye" from its bracket and face to the rear.
4. Proceed to adjust the other five stations in order of frequency, as outlined above.

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

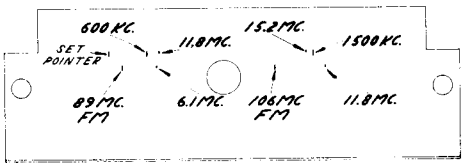


Fig. 11 — Alignment Calibration Markers

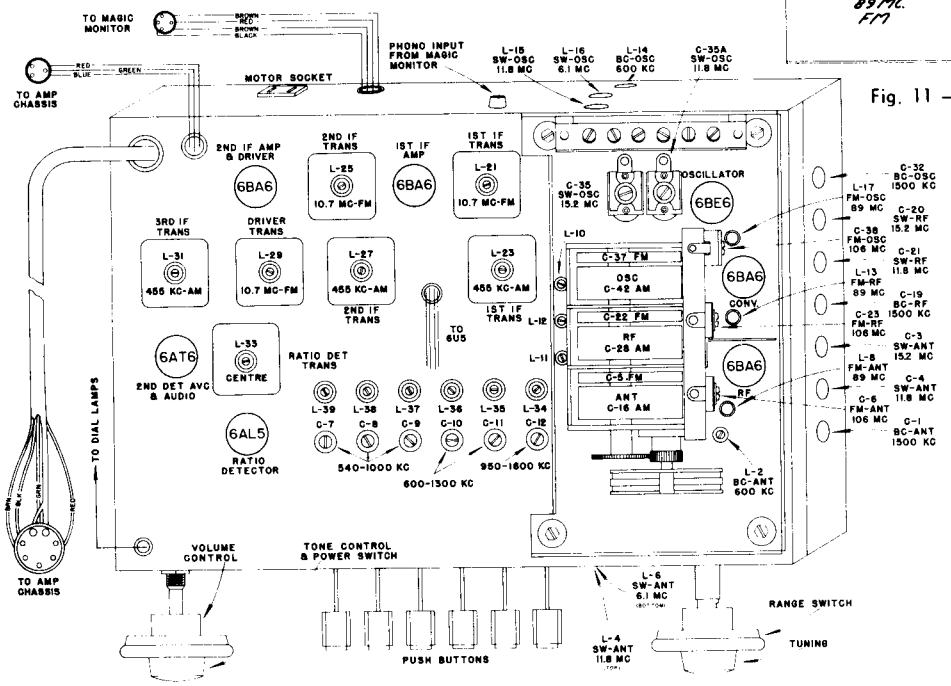


Fig. 12 — Chassis Layout and Alignment Adjustments

ALIGNMENT CHART

ORDER OF ALIGNMENT		TEST OSCILLATOR: CONNECT "HI" SIDE TO	TEST OSCILLATOR: CONNECT "LO" SIDE TO	TEST OSCILLATOR: DUMMY ANTENNA	TEST OSCILLATOR: FREQUENCY SETTING	RANGE SELECTOR	RECEIVER DIAL SETTING	CIRCUIT TO ADJUST	ADJUSTMENT SYMBOLS	NOTES
F.M. RATIO DETECTOR ALIGNMENT	1	Connect a 1000 ohm resistor between lugs "C" and "D" of the ratio detector trans. Connect DC probe of a Voltohmyst to the negative lead of the 10 mfd elec. capacitor C-81. The common lead of the meter is connected to the chassis.								
	2	6BA6 2nd I.F. Grid	Ground	.01 mfd	10.7 MC 30% Mod. 400 Cy. Am.	F.M.	Max. Cap (Fully Meshed)	Driver Trans-former	L-29 Det. Trans.	For Max. D.C. Voltage Across C-81
	3	Remove meter leads and disconnect the 1000 ohm resistor from "C" and "D" on ratio det. trans. Connect two 100,000 ohm resistors (within 1% of being equal) in series across C81. Connect the common lead of the Voltohmyst to the centre point of the 100,000 ohm resistors and the D.C. probe to pin "B" of ratio det. trans. Use 30 volt scale for preliminary alignment. Complete alignment using 3 volt scale								
	4	Same	Same	Same	Same	Same	Same	Ratio Det. Trans.	Bottom Core L-33	†† For Zero D.C. Balance
	5	Near the correct core position the zero point is approached rapidly and continued adjustment causes the indicated polarity to reverse. A slow approach to the zero point is an indication of severe detuning, and the bottom core should be turned in the opposite direction.. Same	Same	Same	Same	Same	Same	Ratio Det. Trans	Top Core L-33	†† For Minimum Audio Output
		NOTE:- Two or more points may be found which will satisfy the condition required. Top core should be correctly adjusted when approximately 1/8 inch of threads extend above the can, therefore, it is desirable to start adjustment with the top core in its furthest "in" position and turn out, while adjusting the bottom core, until the first point of minimum AF and minimum DC is reached. †† The zero DC balance and the minimum AF output should occur at the same point: if such is not the case, the two cores should be adjusted until both occur with no further adjustment of either core. It may be advantageous to adjust both cores simultaneously, watching the Voltohmyst, and an output meter connected across the voice coil for the point at which both zero DC and minimum output occurs.								
	6	Reconnect Voltohmyst as in step 1, omitting 1000 ohm resistor.								
	7	Repeat step 2, omitting 1000 ohm.								
	8	Remove all connections.								

ALIGNMENT CHART

ORDER OF ALIGNMENT		TEST OSCILLATOR: CONNECT "HI" SIDE TO	TEST OSCILLATOR: CONNECT "LO" SIDE TO	TEST OSCILLATOR: DUMMY ANTENNA	TEST OSCILLATOR: FREQUENCY SETTING	RANGE SELECTOR	RECEIVER DIAL SETTING	CIRCUIT TO ADJUST	ADJUSTMENT SYMBOLS	NOTES
F.M. I.F. ALIGNMENT	9	Connect the DC probe of a Voltohmyst to the negative lead of the 10 mfd electrolytic capacitor C81 and the common lead of the meter to chassis ground.								
	10	6BA6 1st I.F. Grid	Ground	.01 mfd.	10.7 MC 30% Mod. 400 Cy.Am.	F.M.	Max.Cap (Fully meshed)	2nd I.F. Trans.	L-25 and L-26	*Adjust test Osc. Output for 6-10 Volts developed across C-81 use very short leads
		* Top and bottom cores alternately loading primary & secondary of each trans. with 1000 ohms while the opposite side of the same trans. is being adjusted. Adjust all trans. for max. voltage across C-81. This method is known as alternate loading which involves the use of a 1000 ohm resistor to load the plate winding while the grid winding of the same transformer is being peaked. Then the grid winding is loaded with 1000 ohm resistor while the plate winding is being peaked. When the windings are loaded, it is necessary to increase the 10.7 MC input since the gain will decrease and the voltage across C81 will be less.								
	11	6BE6 Mixer grid	Same	Same	Same	Same	Same	1st I.F. Trans.	L-21 and L-22	* Adjust test Osc. Output for 6-10 Volts developed across C-81 use very short leads
A.M. I.F. ALIGNMENT	12	6BA6 2nd I.F. Grid	Ground	.01 mfd.	455 KC 30% mod. 400 Cy.Am.	S.B.	High Freq. end of Dial	3rd I.F. Trans.	L-31 and L-32	Adjust for max. Voltage across Voice Coil.
		It is necessary to alternately load the primary and secondary of each 455 KC I.F. trans. with 10,000 ohms while the opposite side of the same trans. is being adj.								
	13	6BA6 1st I.F. Grid	Same	Same	Same	Same	Same	2nd I.F. Trans.	L-27 and L-28	Same
	14	6BE6 Mixer Grid	Same	Same	Same	Same	Same	1st I.F. Trans.	L-23 and L-24	Same
S.B. ALIGNMENT	15	#4 on Ant. Ter.Board	Ground	200 mmf.	1500 KC 30% Mod. 400 Cycles	S.B.	1500 KC.Calibration point on dial plate	Oscillator	C-32	Same
	16	Same	Same	Same	Same	Same	Same	R.F.	C-19	Same
	17	Same	Same	Same	Same	Same	Same	Ant.	C-1	Same
	18	Same	Same	Same	600 KC 30% Mod. 400 Cy.Am.	Same	600 KC.Calibration point on dial plate	Oscillator	L-14	Same
	19	Same	Same	Same	Same	Same	Same	R.F.	L-10	Same
	20	Same	Same	Same	Same	Same	Same	Ant.	L-2	Same
	21	Repeat steps 15 to 20 for max. output.								
9-31M ALIGNMENT	22	#4 on Ant. Ter.Board	Ground	300 Ohms	11.8 MC 30% Mod. 400 Cy.Am.	9-31M	11.8 MC Calibration point on right hand end of dial plate	Oscillator	C-35A	Same
	23	Same	Same	Same	Same	Same	Same	R.F.	C-21	Same
	24	Same	Same	Same	Same	Same	Same	Ant.	C-4	Same
	25	Same	Same	Same	6.1 MC 30% Mod. 400 Cy.Am.	Same	6.1 MC Cal. point on dial plate	Oscillator	L-16	Same
	26	Same	Same	Same	Same	Same	Same	R.F.	L-12	Same
	27	Same	Same	Same	Same	Same	Same	Ant.	L-6	Same
	28	Repeat steps 22 to 27 for max. output.								
		NOTE:- To guard against the possibility of alignment of L-16 and C-35A to image freq., tune the test Oscillator and receiver to 11.8 MC. Then adjust test oscillator to 12.71 (image freq.). By increasing the test oscillator output, a signal should be heard. Next, tune test oscillator and receiver to 6.1 MC. Retune test oscillator to 7.01 MC (image freq.) and increase test oscillator output. A signal should then be heard. If these image freq. cannot be heard, the set is incorrectly aligned. Therefore repeat steps 22 to 28.								
25-19M ALIGNMENT	29	#4 on Ant. Ter.Board	#3 on Ant. Ter.Board	300 Ohms	15.2 MC 30% Mod. 400 Cy.Am.	25-19M	15.2 MC Calibration point on dial plate	Oscillator	C-35	Adjust for Max.Voltage across voice coil
	30	Same	Same	Same	Same	25-19M	Same	R.F.	C-20	Same
	31	Same	Same	Same	Same	25-19M	Same	Ant.	C-3	Same
	32	Same	Same	Same	11.8 MC 30% Mod. 400 Cy.Am.	25-19M	11.8 MC Calibration point on left hand end of dial plate	Oscillator	L-15	Same
	33	Same	Same	Same	Same	25-19M	Same	R.F.	L-11	Same
	34	Same	Same	Same	Same	25-19M	Same	Ant.	L-4	Same
	35	Repeat steps 29 to 34 for maximum output.								
		NOTE:- To guard against the possibility of alignment of L-15 and C-35 to image frequency, tune the test oscillator and receiver to 15.2 MC, then set test oscillator to 16.11 MC (image frequency). Increase the test oscillator output; A signal should be heard. Then tune test osc. and receiver to 11.8 MC. Reset test osc. to 12.71 MC (image frequency) and increase test osc. output; A signal should be heard. If these image frequencies cannot be heard, the receiver is incorrectly aligned, Therefore repeat steps 29 to 35.								
F.M. ALIGNMENT	36	#1 on Ant. Ter.Board	#2 on Ant. Ter.Board	150 Ohm Resistor in Series with each Lead	106 MC 30% Mod. 400 Cy.Am.	F.M.	106 MC Calibration point on dial plate	Oscillator	C-38	Adjust for Max.Voltage across C-97 (Use Voltohmyst)
	37	Same	Same	Same	89 MC 30% Mod. 400 Cy.Am.	Same	89 MC Calibration point on dial plate	Oscillator	L-11	Same
		NOTE:- Two points may be found to fulfill the requirements. Use the one with the longest threaded end extending out of the transformer.								
	38	Repeat steps 36 and 37 for exact calibration.								
	39	Remove connections or turn test oscillator off				Same	106 MC Calibration point on dial plate	R.F.	C-23	Same
		NOTE:- Two points can be found having the greatest noise voltage developed. Use the one with the greater capacity (tighter adjustment).								
	40	Same	Same	Same	Same	Same	89 MC Calibration point on dial plate	R.F.	L-13	Same
		NOTE:- Two points may be found to fulfill the requirements. Use the one with the longest threaded end extending out of the transformer.								
	41	Repeat steps 39 and 40 for maximum output.								
	42	#1 on Ant. Ter.Board	#2 on Ant. Ter.Board	150 Ohm Resistor in Series with Each Lead	106 MC 30% Mod. 400 Cy.Am.	Same	106 MC Calibration point on dial plate	Ant.	C-6	Same
	43	Same	Same	Same	89 MC 30% Mod. 400 Cy.Am.	Same	89 MC Calibration point on dial plate	Ant.	L-8	Same
	44	Repeat steps 42 and 43 for maximum output.								

REPLACEMENT PARTS FOR MODEL VRA141

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

STOCK NO.	DESCRIPTION
	RECEIVER ASSEMBLY
S-3612	Capacitor-Trimmer bank(C1,C4,C3,C19,C20,C21,C32)
S-3615	Capacitor-Trimmer bank(C7,C8,C9,C10,C11,C12)....
S-3613	Capacitor-Trimmer(C35,C35A).....
S-3614	Capacitor-Trimmer(C23,C6).....
S-3611	Capacitor-Ceramic trimmer (C38).....
S-4181	Capacitor-3 MMF 10% Ceramic (C49).....
39043	Capacitor-6.8 MMF 10% Ceramic (C31).....
45466	Capacitor-10 MMF 5% Ceramic (C36).....
31353	Capacitor-15 MMF 10% Ceramic (C34).....
39042	Capacitor-47 MMF 10% Ceramic (C25).....
70599	Capacitor-56 MMF Mica (C2).....
33104	Capacitor-82 MMF 10% Ceramic (C13).....
71021	Capacitor-91 MMF 5% Ceramic (C15,C27,C40).....
71920	Capacitor-220 MMF 10% Ceramic(C82A,C24,C39,C43, C82).....
39642	Capacitor-390 MMF Mica (C14,C26,C44,C91).....
39644	Capacitor-470 MMF 20% (C33,C45,C83,C78,C68).....
39650	Capacitor-820 MMF 5% (C41).....
S-3647	Capacitor-.007 MFD (C79,C80).....
S-3646	Capacitor-.005 MFD (C17,C18,C29,C30,C46,C77,C56, C54,C64,C69).....
S-3653	Capacitor-.05 MFD (C88).....
S-3649	Capacitor-.015 MFD(C87).....
S-3648	Capacitor-.01 MFD(C57,C55,C67,C84,C90,C92,C89A, C89,C86,C85).....
S-4423	Capacitor-Electrolytic-10 MFD (C66,C81).....
S-3616	Condenser-Variable(C5,C16,C22,C28,C37,C42).....
S-3598	P.B.Coils(L34-L35,L36,L37,L38,L39).....
S-3599	Coil Assembly Sw. Osc. (L15).....
S-3600	Coil Assembly Sw. Osc. (L16).....
S-3601	Coil Assembly B.C.Osc. (L14).....
S-3602	Coil Assembly F.M. Ant.(L7,L8).....
S-3603	Coil Assembly F.M. R.F.(L13).....
S-3604	Coil Assembly F.M. Osc.(L17).....
S-3605	Coil Assembly B.C. R.F.(L9,L10).....
S-3606	Coil Assembly B.C. Ant.(L2,L1).....
S-3607	Coil Assembly S.W. Ant.(L3,L4).....
S-3608	Coil Assembly S.W. Ant.(L5,L6).....
S-3685	Coil Assembly S.W. R.F.(L11).....
S-3686	Coil Assembly S.W. R.F.(L12).....
S-3681	Choke R.F. (L18,L20).....
S-3901	Choke R.F. (L19).....
S-4160	Drum-Dial drum.....
S-3621	Indicator-Station selector pointer.....
S-3609	Loop-Loop Assembly (broadcast).....
30732	Resistor-47 ohms,1/2 watt (R17).....
30880	Resistor-150 ohms,1/2 watt (R21).....
14561	Resistor-220 ohms,1/4 watt (R9) .....
34766	Resistor-1000 ohms,1/4 watt(R2,R5).....
34767	Resistor-2200 ohms,1/2 watt(R6,R7,R10,R14,R15, R18,R19,R23).....
30734	Resistor-5600 ohms,1/2 watt (R4).....
14250	Resistor-8200 ohms,1/2 watt(R12,R13,R29).....
30492	Resistor-22000 ohms,1/2 watt(R11,R22,R24).....
30409	Resistor-27000 ohms,1/2 watt(R27).....
3152	Resistor-30000 ohms,1/4 watt(R34).....
30685	Resistor-33000 ohms,1/2 watt(R20).....
14020	Resistor-150000 ohms,1/2 watt(R25).....
11988	Resistor-390000 ohms,1/2 watt(R31).....
30652	Resistor-1 meg.1/2 watt(R1,R3,R8,R16,R32,R38,R36)
31417	Resistor-3.3 meg.(R33).....
30992	Resistor-10 meg.1/2 watt(R26,R30,R37).....
S-3617	Switch-Range Switch (S1,S2,S3,S4).....
S-3618	Switch-Pushbutton.....
S-3622	Shaft-Drive shaft.....
51384	Socket-Tube socket (miniature).....
S-2824	Socket-AC input.....
S-4269	Scale-Dial scale.....
S-3593	Transformer-I.F.1st A.M.(L24,L23,C50,C51,C52,C53)
S-3593	Transformer-I.F.2nd A.M.(L27,L28,C60,C61,C62,C63)
S-3594	Transformer-I.F.3rd A.M.(L31,L32,C73,C74,C75,C76)
S-4010	Transformer-I.F.1st F.M.(L21,L22,C47,C48).....
S-4011	Transformer-I.F.2nd F.M.(L25,L26,C58,C59).....
S-3703	Transformer-Driver (L29,L30,C70).....
S-3702	Transformer-Ratio Det. (L33,C71,C72).....
S-3619	Volume and Tone Control-1 meg.(R28)1 meg.(R36)..
	SPEAKER ASSEMBLY
13867	Cap-Dust Cap (Pkg.3).....
S-3589	Cone-Cone & voice coil assembly (L42).....
S-3587	Speaker.....
S-3588	Field Coil (L44).....
	AUTOMATIC RECORD CHANGER MECHANISM
	Refer to Model No. 960001-4 Service Note for replacement parts and service data.

STOCK NO.	DESCRIPTION
	AMPLIFIER ASSEMBLY
S-3646	Capacitor-.005 MFD (C94,C96).....
S-3650	Capacitor-.02 MFD (C93,C95).....
37877	Capacitor-Electrolytic 15 MFD (C98).....
36599	Capacitor-Electrolytic(30-15-40 MFD)(C97,C99, C100)..
S-3628	Cable-Speaker cable.....
S-3629	Cable-Power cable (Receiver).....
34765	Resistor-100 ohms, 1/2 watt (R49).....
34768	Resistor-1000 ohms,1/2 watt (R50).....
14659	Resistor-6800 ohms,1/2 watt (R43).....
30787	Resistor-47000 ohms, 1/2 watt (R40).....
3252	Resistor-100000 ohms,1/2 watt (R41,R44).....
14583	Resistor-220000 ohms,1/2 watt (R42,R45).....
11988	Resistor-390000 ohms,1/2 watt (R39).....
S-4161	Resistor-Bleeder resistor(R46,R47,R48).....
32537	Socket-octal tube socket.....
S-3591	Transformer-Power 50-cycle (T1).....
S-3592	Transformer-Power 25-cycle (T1).....
S-3590	Transformer-Output (T2) (L40,L41).....
	MISCELLANEOUS ASSEMBLY
S-4424	Arrestor-Lightning arrestor.....
70788	Antenna-FM transmission line.....
38376	Bezel.....
38375	Button-Pushbutton.....
S-4017	Board-Ant.terminal board.....
S-4313	Cord-Drive cord (Universal).....
S-4167	Clamps-Back cover clamp (Pkg.10).....
S-4163	Cloth-Grille cloth.....
S-4162	Decal (front panel).....
36386	Decal (record drawer).....
S-3636	Grille-Metal speaker grille.....
S-4170	Gear-Drive gear.....
S-4171	Gear-Sleeve gear.....
S-4172	Grommet-Chassis mtg. (Pkg.3).....
S-4369	Hinge-Knife hinge for record album door.....
S-4028	Hinge-Invisible hinge for radio door.....
S-4026	Handle-Door handle.....
13103	Jewel-Indicator jewel.....
72147	Knob-Range.....
72148	Knob-Tone.....
72149	Knob-Tuning.....
72150	Knob-Volume.....
11765	Lamp-Pilot lamp (Mazda #51).....
31480	Lamp-Indicator lamp (Mazda #47).....
S-3948	Marker-Station marker.....
3118	Plug-Cable plug (3 pins).....
12567	Plug-Speaker cable (5 pins).....
S-4183	Plug-Power cable plug (7 pins).....
11984	Plug-Loop connector.....
4982	Spring-Range knob retaining spring (Pkg.5).....
14270	Spring-Tone knob retaining spring (Pkg.2).....
30330	Spring-Volume knob retaining spring (Pkg.3)...
30900	Spring-Tuning knob retaining spring (Pkg.5)...
30585	Spring-Drive cord tension (Pkg.2).....
34053	Spring-P.B. retaining spring (Pkg.5).....
31611	Screw-Set screw for gear #8-32x1/4 (Pkg.10)...
14278	Socket-Phono socket.....
5119	Socket-Cable socket (3 pins).....
12493	Socket-Speaker cable (5 pins).....
S-4164	Socket-Power cable (7 pins).....
S-4168	Support-Door fall support.....
	MAGIC MONITOR
70935	Capacitor-27 MMF 10% Ceramic (C108).....
71922	Capacitor-180 MMF 10% Ceramic(C103).....
71919	Capacitor-330 MMF 10% Ceramic(C101).....
S-4425	Capacitor-1000 MMF plus or minus 20%Ceramic(C107)
S-3646	Capacitor-.005 MFD(C102,C105,C106).....
70615	Capacitor-.05 MFD.(C104).....
14250	Resistor -8200 ohms,1/2 watt(R55).....
3219	Resistor-18000 ohms,1/2 watt(R60).....
30685	Resistor-33000 ohms,1/2 watt(R61,R62).....
30648	Resistor-470,000 ohms1/2 watt(R54,R57,R58)...
30652	Resistor-1 Megohm, 1/2 watt(R51,R52,R56).....
31417	Resistor-3.3 Megohm,1/2 watt(R59).....
30992	Resistor-10 Megohm, 1/2 watt(R53).....
S-4426	Socket-Tube socket.....
S-4202	Socket-Phono socket.....
	PULLOUT MECHANISM
S-4182	Door balancing assembly.....
S-4166	Spring-balancing spring.....
S-4027	Drawer Slide (1 set) (record player).....
S-4373	Roll out mechanism arm.....
S-4374	Roll out mechanism roller.....
S-4169	Hex nut-door balancing assembly.....
S-4176	Set screw (Pkg.3).....
S-4177	Spring washer (Pkg.3).....
S-4178	Stud.....
S-4180	Fibre Washer (Pkg.5).....

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

RCA Victor

MODEL VR145

Five-Tube, Single-Band, A-C, Superheterodyne Radio Phonograph

TECHNICAL INFORMATION AND SERVICE DATA

— 1946 No. 2 —

SERVICE DIVISION • RCA VICTOR COMPANY LIMITED • MONTREAL



Electrical Specifications

Frequency Range .....540 to 1,600 k.c.
R.F. Alignment Frequency ....1,500 k.c. (osc., ant.)
Intermediate Frequency .....455 k.c.

LOUDSPEAKER..... CRL-515-2
Type ..... 6 inch Permanent Magnet Dynamic
Voice-coil Impedance .....3 ohms at 400 cycles

Tube Complement

(1) Type 6SA7 .....First-Det., Osc.
(2) Type 6SK7.....Intermediate Frequency Amp.
(3) Type 6SQ7.....Second-Det., A.V.C., A.F.
(4) Type 6K6-G.....Power Output
(5) Type 5Y4G.....Full Wave Rectifier

POWER SUPPLY RATING
Rating A.....105-125 volts, 50-60 cycle 90 watts
Rating B.....105-125 volts, 25-60 cycle 90 watts

MOTOR
Type .....Self Starting Rim Drive
Turntable Speed .....78 R.P.M.
Turntable diameter ..... 9"

POWER OUTPUT
Undistorted .....1 watt
Maximum .....2 watts

PICKUP
Type .....Crystal
Impedance .....100,000 ohms at 1000 cycles
Average Output Voltage.....1.5 volts at 1000 cycles across a 250,000 ohm load.

Mechanical Specifications

	Height	Width	Depth
Cabinet Dimensions	11¾ inches	15¾ inches	13½ inches

General Description

The Model VR145 is a five tube Single Band Radio Phonograph combining the latest developments in Radio and Phonograph circuits. The mechanism is housed in a table type cabinet of medium design. Features of the radio include: a built-in loop antenna; Full AVC; Stabilized Oscillator Circuit; Aurally compensated Volume Control; Full Vision Dial; Radio-Phono Tone Switch and a six-inch Permanent Dynamic high efficiency Speaker. Features of the Phonograph include: A Rim Drive Motor; a new light weight Crystal Pick-up and an Automatic Motor Start-Stop Switch.

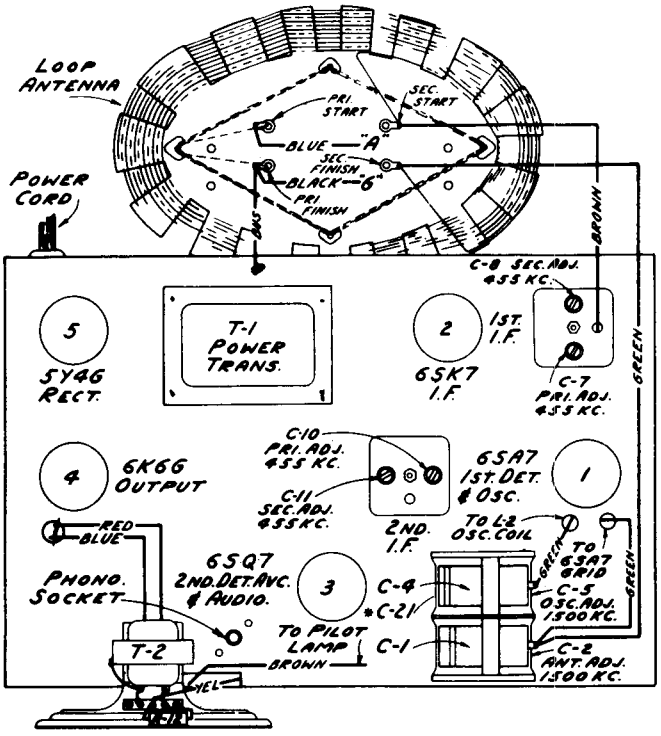
Alignment Procedure

Cathode-ray Alignment is the preferable method. Connections for the oscillograph are shown in the wiring 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.

Pre-setting Dial. With gang condenser in full mesh position, move pointer to coincide with calibration mark at the low frequency end of dial.



· *Fig. No. 1 Tube & Trimmer Locations*

Steps	Connect the high side of test-oscillator to—	Tune test-osc. to—	Tune radio dial to—	Adjust the following for max. peak output
No. 1	6SK7 I-F grid, in series with .01 mfd.	455 kc	Quiet point between 550-750 kc	C10 and C11 (2nd I-F Transformer)
No. 2	6SA7 1st-det. grid in series with .01 mfd.	455 kc		C7 and C8 (1st I-F Transformer)
No. 3	Antenna lead, in series with 300 ohms	1,500 kc	1,500 kc	C5 *(oscillator) C2 (antenna)

* Trimmer C21 on gang condenser should be unscrewed one complete turn before adjusting C5.

Radiotron Socket Voltages

Type	Plate	Screen Grid	Cathode	Filament
6SA7 det.	195 V	65 V	0.V	6.3 V. A.C.
6SA7 osc.	65 V	...	...	6.3 V. A.C.
6SK7	195 V	65 V	0.V	6.3 V. A.C.
6SQ7 amp.	62 V	...	0.V	6.3 V. A.C.
6K6G	185 V	195 V	12.5 V	6.3 V. A.C.
5Y4G	290/290 V	...	295 V	5 V. A.C.

The above measurements are all made to chassis. Measurements made with set tuned to quiet point, volume control set at minimum, using 1,000-ohm-per-volt meter, having ranges of 10, 50, 250, and 500 volts. (Use nearest range above the specified measured voltage.)

All the above values should hold within approximately ± 20% for 115 volt, 25-60 cycle supply.

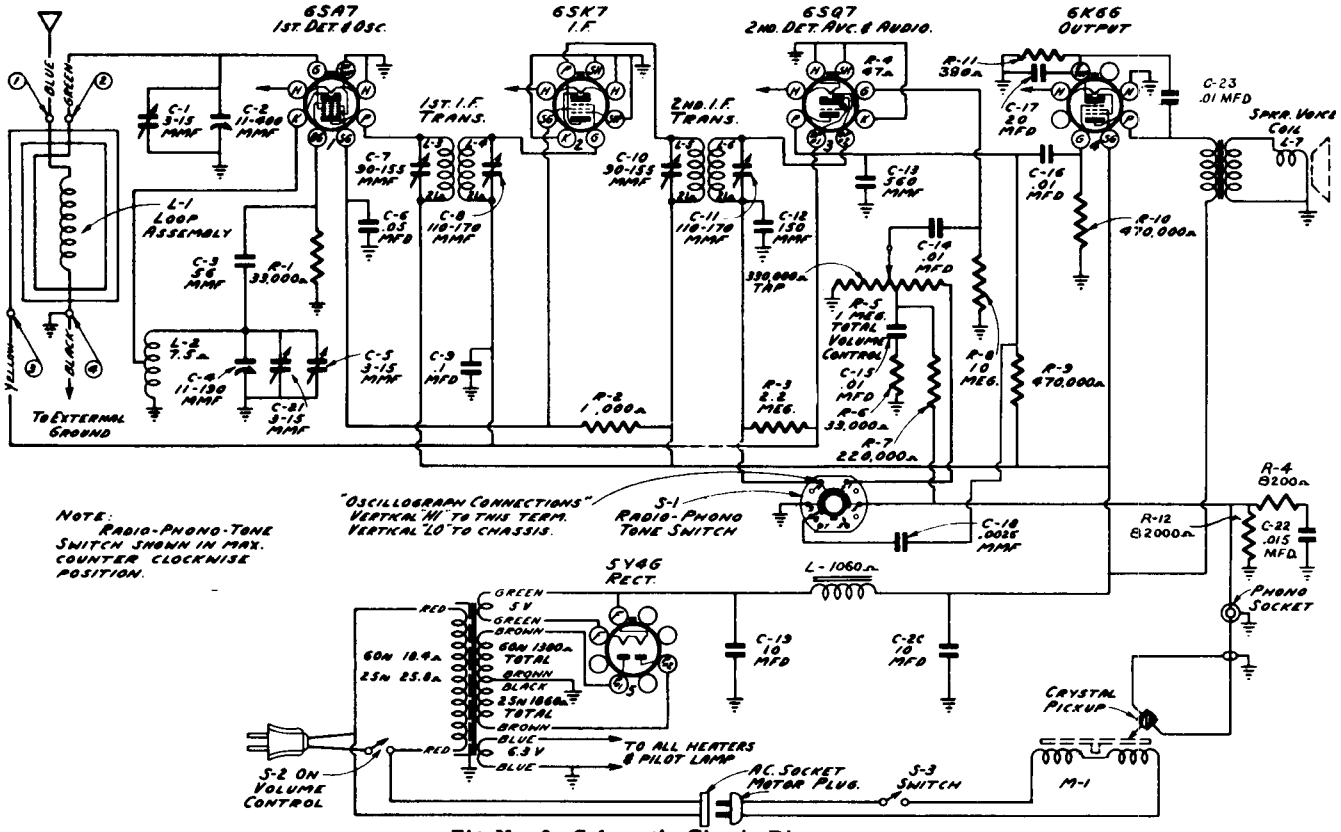


Fig No. 2 Schematic Circuit Diagram

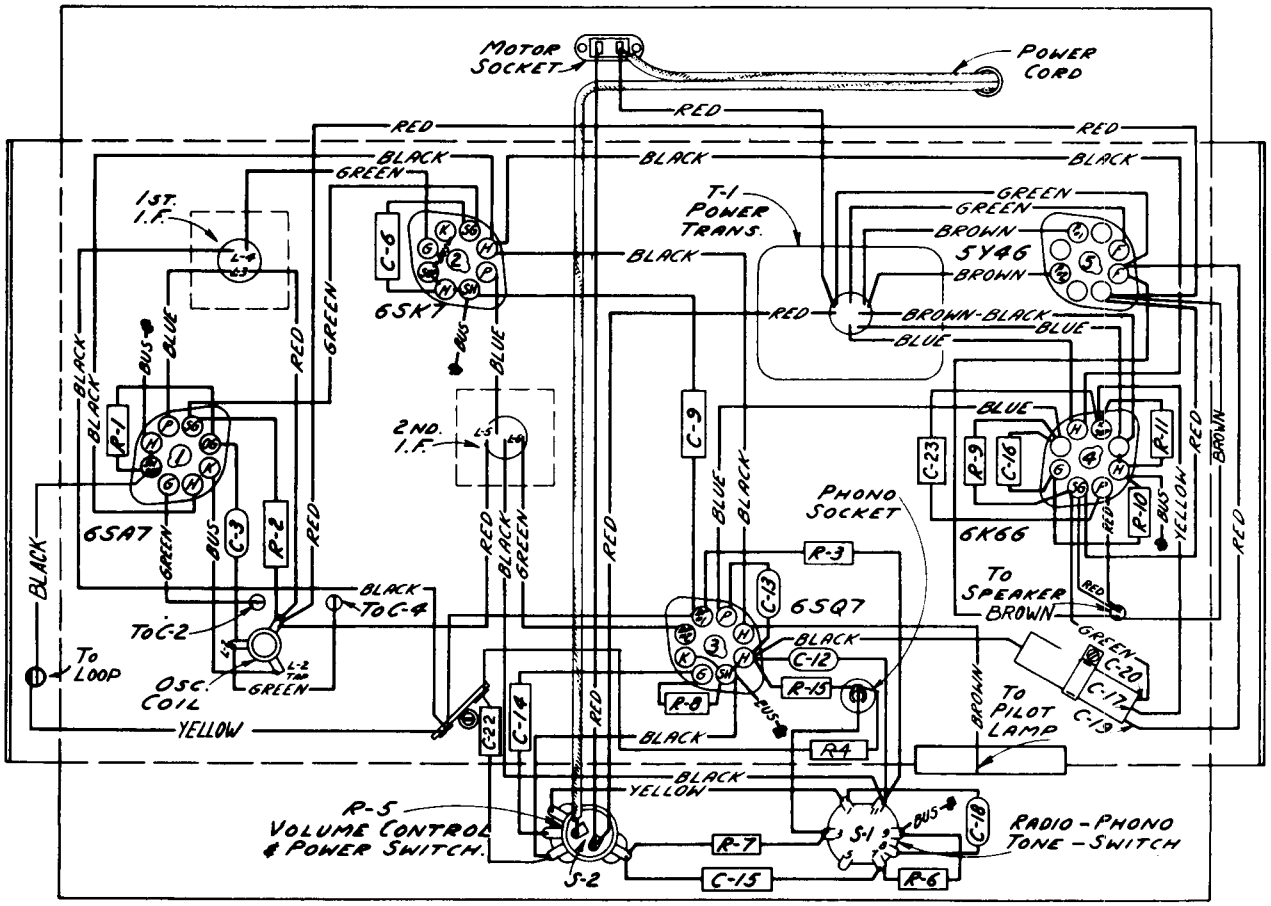


Fig. No. 3 Chassis Wiring Diagram

Precautionary Lead Dress

(1) Keep a-c leads away from volume-control wiring.

(2) Keep lead from high side of volume control away from plate circuit of 6SQ7 tube.

(3) Dress speaker leads to front of chassis away from 6K6G tube.

REPLACEMENT PARTS FOR MODEL VR145

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

STOCK NO.	DESCRIPTION
	RECEIVER ASSEMBLIES
12723	Capacitor-56 mmfd.....
12725	Capacitor-150 " .....
30423	Capacitor-470 " .....
34459	Capacitor-.0025 mfd.....
4937	Capacitor-.01 " .....
11315	Capacitor-.015 " .....
32787	Capacitor-.05 " .....
4839	Capacitor-.1 " .....
32240	Capacitor-Electrolytic comprising sections 20 Mfd-10 Mfd-10 Mfd....
S-2707	Coil-Oscillator Coil (L2).....
S-2708	Condenser-2 Gang Variable Cond....
S-2709	Cord-Tuning Drive Cord.....
S-2309	Drum-Drive drum assembly.....
S-2713	Indicator-Station Selector Indicator Pointer.....
11765	Lamp-Dial Lamp.....
S-3273	Loop-Antenna Loop Assembly.....
31388	Resistor-390 Ohms 1 watt.....
14250	Resistor-8200 Ohms 1/4 watt.....
33489	Resistor-15000 Ohms Wire Wound 1 watt.....
12454	Resistor-33000 Ohms 1/4 watt.....
14023	Resistor-82000 Ohms 1/4 watt.....
14583	Resistor-220,000 Ohms 1/4 watt....
30648	Resistor-470,000 Ohms 1/4 watt....
12679	Resistor-2.2 Megohms 1/4 watt.....
30992	Resistor-10 Megohms 1/4 watt.....
14887	Retainer-Drive Shaft or Pulley Retainer (Pkg.10).....
3903	Screw-Drive Drum Set Screw(Pkg.10)
S-3076	Shaft-Station Selector Drive shaft
S-2824	Socket-A.C. Socket.....
S-2719	Socket-Pilot Lamp Socket.....
31251	Socket-Tube Socket .....
35787	Socket-Phono Socket.....
31418	Spring-Drive Cord Tension Spring..
S-3001	Switch-Radio Phono Tone Switch...
S-3272	Transformer-1st I.F. Transformer..
S-2716	Transformer-2nd I.F. Transformer..
S-2548	Transformer-Power Transformer 105/125 V. 25-60 cycle.....
33618	Transformer-Power Transformer 105/125 volt 50-60 cycle.....
S-2998	Volume Control and Power Switch...

STOCK NO.	DESCRIPTION
	SPEAKER ASSEMBLIES
35849	Cap-Dust Cap for Cone Center(Pkg. 3).....
S-3566	Coil-Field Coil.....
	Cone-Speaker Cone Assembly.....
S-3564	Speaker-Speaker complete.....
S-3565	Transformer-Output Transformer....
	MOTOR ASSEMBLIES
S-3077	Motor-110 volt-60 cycle Motor.....
S-3078	Motor-110 " 25 " " .....
S-3079	Spindle-Turntable spindle.....
S-3080	Spring-Drive Wheel Tension Spring (Pkg.2).....
S-3081	Turntable-Motor Turntable.....
S-3082	Wheel-Rubber Tired Drive Wheel....
	AUTOMATIC SWITCH ASSEMBLIES
S-3083	Bracket-A.C. Switch Bracket and Hub (Pkg.2).....
S-3048	Screw-Set Screw for hub (Pkg.2)...
S-3085	Switch-A.C. Motor Switch only.....
	PICKUP ARM ASSEMBLIES
S-3459	Arm-Pickup arm.....
S-3512	Base-Pickup arm Base and Pivot shaft.....
S-3461	Crystal-Pickup Crystal Cartridge..
31054	Grommet-Pickup Base Rubber Grommet
S-3465	Screw-Pickup Crystal Retaining Screw(Pkg.10).....
S-3462	Screw-Pickup Needle Screw-Pkg.2...
S-3466	Spring-Pickup Cable Retaining Spring (Pkg.2).....
	MISCELLANEOUS ASSEMBLIES
S-2706	Crystal-Dial Crystal.....
S-3397	Dial-Station Selector Dial Scale..
S-2972	Knob-Volume control and Tuning Knob
S-2971	Knob-Tone Control Knob.....
30900	Spring-Knob Spring (Pkg.5).....

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

RCA Victor

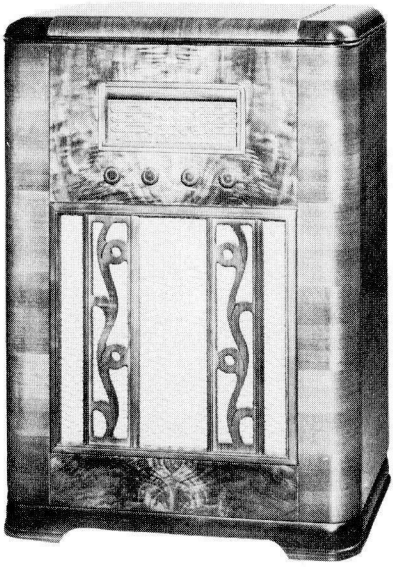
MODEL VR146

Six-Tube, Four-Band, A-C, Superheterodyne Radio Phonograph Combination

TECHNICAL INFORMATION AND SERVICE DATA

1946 No. 4

SERVICE DIVISION • RCA VICTOR COMPANY LIMITED • MONTREAL



Electrical and Mechanical Specifications

Frequency Ranges

Standard Broadcast (A)	540-1,570 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.

R. F. Alignment Frequencies

Standard Broadcast (A)	1,500 k.c. (osc., ant.)
31 M (31 Meters)	9,550 k.c. (osc., ant.)
25 M (25 Meters)	11,800 k.c. (osc.)
19 M (19 Meters)	15,200 k.c. (osc.)

Intermediate Frequency ..... 455 k.c.

Tuning Drive Ratio 12:1

Radiotron Complement

(1) Type-6SA7	First Detector-Oscillator
(2) Type-6SK7	Intermediate Amplifier
(3) Type-6SQ7	2nd Det., A. V. C. & A. F.
(4) Type-6AD7G	Inverter Power Output
(5) Type-6F5G	Power Output
(6) Type-5Y4G	Full Wave Rectifier

Pilot Lamps (2) ..... Mazda No. 51, 6.3 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	3.5 watts
Maximum	5.0 watts

Loudspeaker (CRL-523)

Type	12" Electrodynamic
Impedance (V.C.)	2.4 ohms at 400 cycles

Cabinet Dimensions

Height	38 3/16 inches
Width	26½ inches
Depth	15 inches

Phonograph

Type	Manual; self-starting constant-speed motor; Edge-driven Turntable.
Pickup	Crystal; 100,000 ohms at 1,000 cycles
Average Output	1½ volts at 1,000 cycles across ½ meg.

General Description

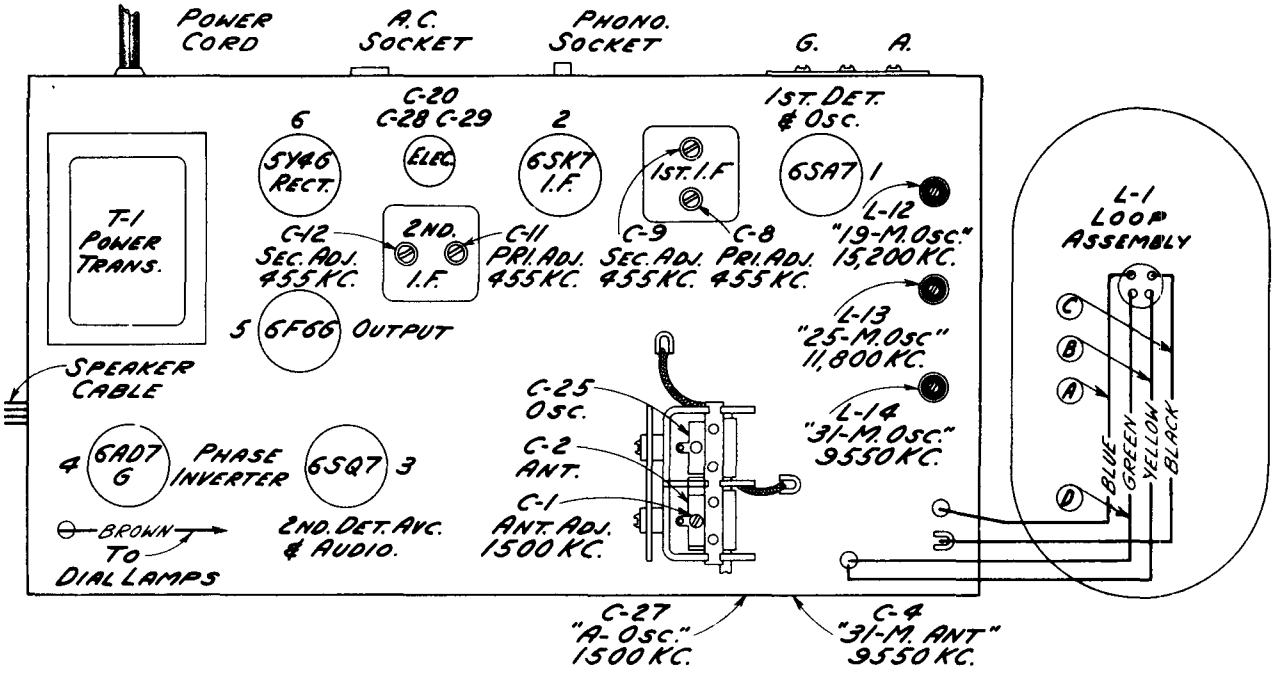
The Model VR 58 Console type Victrola employs a six tube, four band superheterodyne circuit, the arrangement of which is shown in the Schematic Circuit Diagram. Features of design include:— Loop antenna as the first tuned circuit; three spread bands; stabilized oscillator circuit resulting in less frequency drift; magnetite core I.F. transformers; magnetite core oscillator coils; automatic volume control; two position tone control circuit; inverter push pull output stage; dust proof electrodynamic loudspeaker; temperature stabilized capacitors in the oscillator circuits; and a large, edge lighted dial individually calibrated for each band. Features of the Phonograph include crystal pickup, edge drive constant speed synchronous motor and an automatic motor switch.

Circuit Arrangement

The circuit consists of a first detector (oscillator) stage incorporating the Loop Antenna as the first tuned circuit; I.F. amplifier stage; second detector, A.V.C. and first Audio stage; push pull pentode output stage; and a well regulated power supply.

The Loop Antenna used in the first tuned stage is in the circuit on the "A" band; temperature compensated capacitors are used in the oscillator circuits to reduce oscillator drift.

The intermediate frequency amplifier consists of a Type 6SK7 tube in a single stage transformer-coupled circuit. The windings of both I.F. Transformers are resonated by magnetite cores and are adjusted by adjustable capacitors to tune to 455 K.C.



RADIOTRON SOCKET VOLTAGES

Type	Function	Plate	Screen Grid	Cathode	Heater
6SA7	Det.	290 V	105 V	.....	6.4 V
	Osc.	.....	.....	2.3 V	.....
6SK7	I.F.	290 V	105 V	.....	6.4 V
6SQ7	2nd Det. Audio & A.V.C.	80*V	.....	.....	6.4 V
6AD7G	Inverter	285 V	.....	24 V	6.4 V
	Output	285 V	290 V	24 V	6.4 V
6F6-G	Output	285 V	290 V	24 V	6.4 V
5Y4-G	Rectifier	Measured Across C-28		370 V	5.0 V

Rectifier A.C. Voltage per plate 350

Note:—All the above values hold within plus or minus 20% when measured with a 1000 ohm-per-volt meter, on a line voltage of 115 volts. All voltages are measured to chassis.

* Cannot be accurately measured with an ordinary voltmeter.

Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph should be made to the chassis and the green lead on the volume control.

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 180° 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 condenser gang, and bend the wire so that it points to the 180° mark on the calibration scale when the plates are fully meshed.

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 scales. 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-bearing 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.

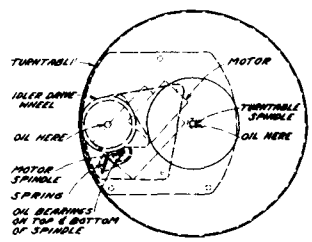
NOTE:—Whenever possible spread band final adjustments should be made with the chassis fastened in the cabinet and the pointer accurately aligned to the dial.

Order of Alignment	Test Oscillator			Range Selector	Receiver Dial Setting	Circuit to Adjust	Adjustment Symbols
	Connection to Receiver	Dummy Antenna	Frequency Setting				
1	Control Grid 6SK7 Pin No. 4	.1 Mfd.	455 k.c.	"A"	No Signal 550-750 k.c.	2nd I.F. Transformer	C11 & C12
2	Control Grid 6SA7 Pin No. 8	.1 Mfd.	455 k.c.	"A"	550-750 k.c.	1st I.F. Transformer	C8 & C9
3	Ant. Terminal	300 Ohms	1,500 k.c.	"A"	1,500 k.c. 22°	"A" Osc.	C27
4	Radiated signal *	—	1,500 k.c.	"A"	1,500 k.c. 22°	"A" Ant.	C1
5	Ant. Terminal	300 Ohms	15,200 k.c.	19 M	15,200 k.c. 93°	19 M Osc.	L12
6	Ant. Terminal	300 Ohms	11,800 k.c.	25 M	11,800 k.c. 82°	25 M Osc.	L13
7	Ant. Terminal	300 Ohms	9,550 k.c.	31 M	9,550 k.c. 104°	31 M Osc.	L14
8	Ant. Terminal	300 Ohms	9,550 k.c.	31 M	9,550 k.c. 104°	31 M Ant.	C4

All adjustments indicated above except operation 4, are made with antenna link in the **open** position.

*Radiation loop comprising two turns of wire 18 inches in diameter should be connected to test oscillator and placed approximately 4 feet from receiver before adjusting C1.

Motor Data



Motor Oiling

The phonograph motor is of the self starting synchronous type and operates the turntable through friction drive between the motor drive spindle and the rubber tired idler on the rim of the turntable.

The motor should be lubricated once or twice a year by placing a few drops of S. A. E. 20 (or equivalent) on the turntable spindle and saturating the oil retaining felt pads on the motor shaft with S. A. E. 10 oil. **Caution—The motor drive spindle and the rubber tire on the idler must be kept clean and entirely free from oil and grease at all times.**

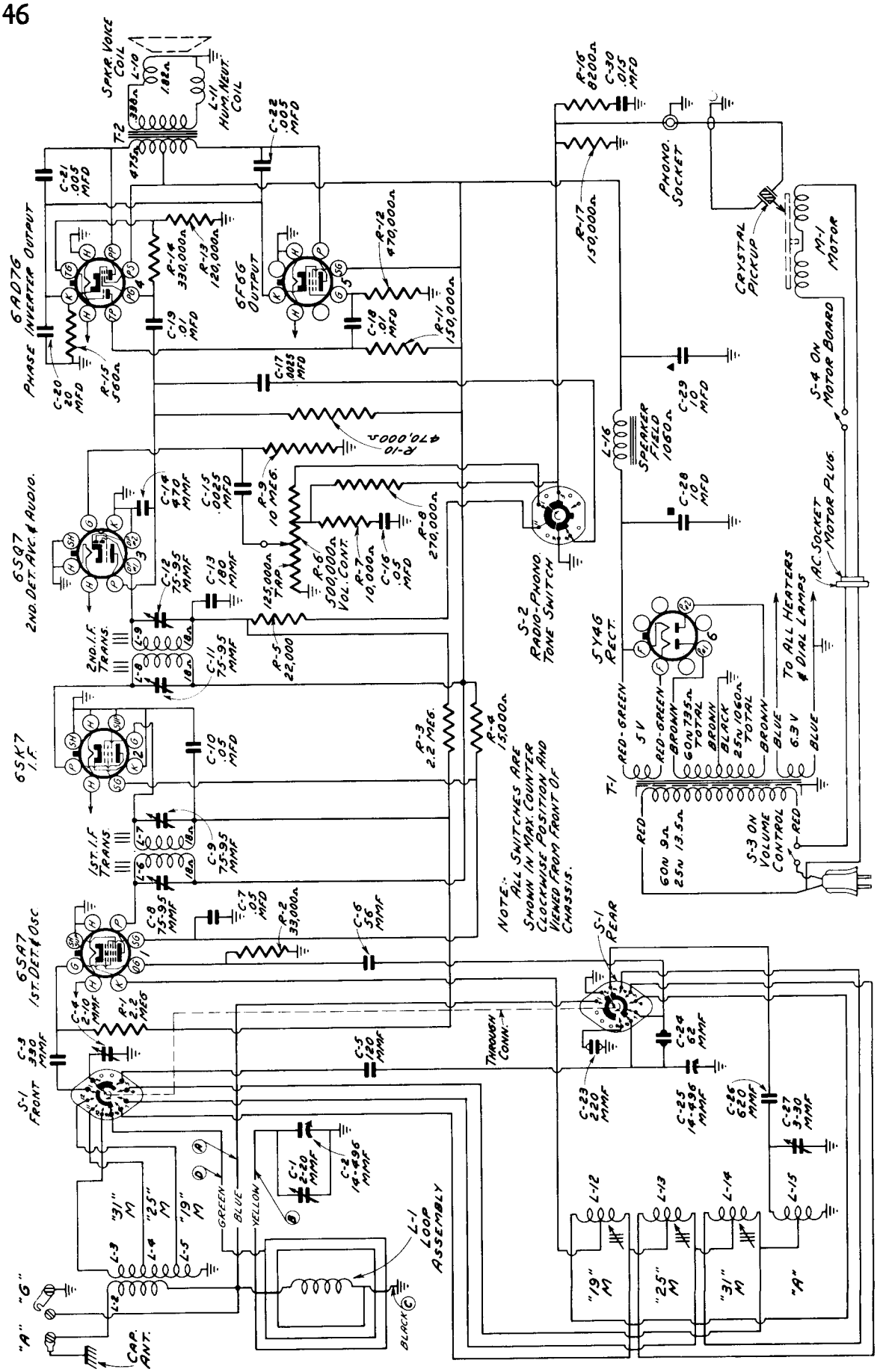


Figure 2—Schematic Circuit Diagram

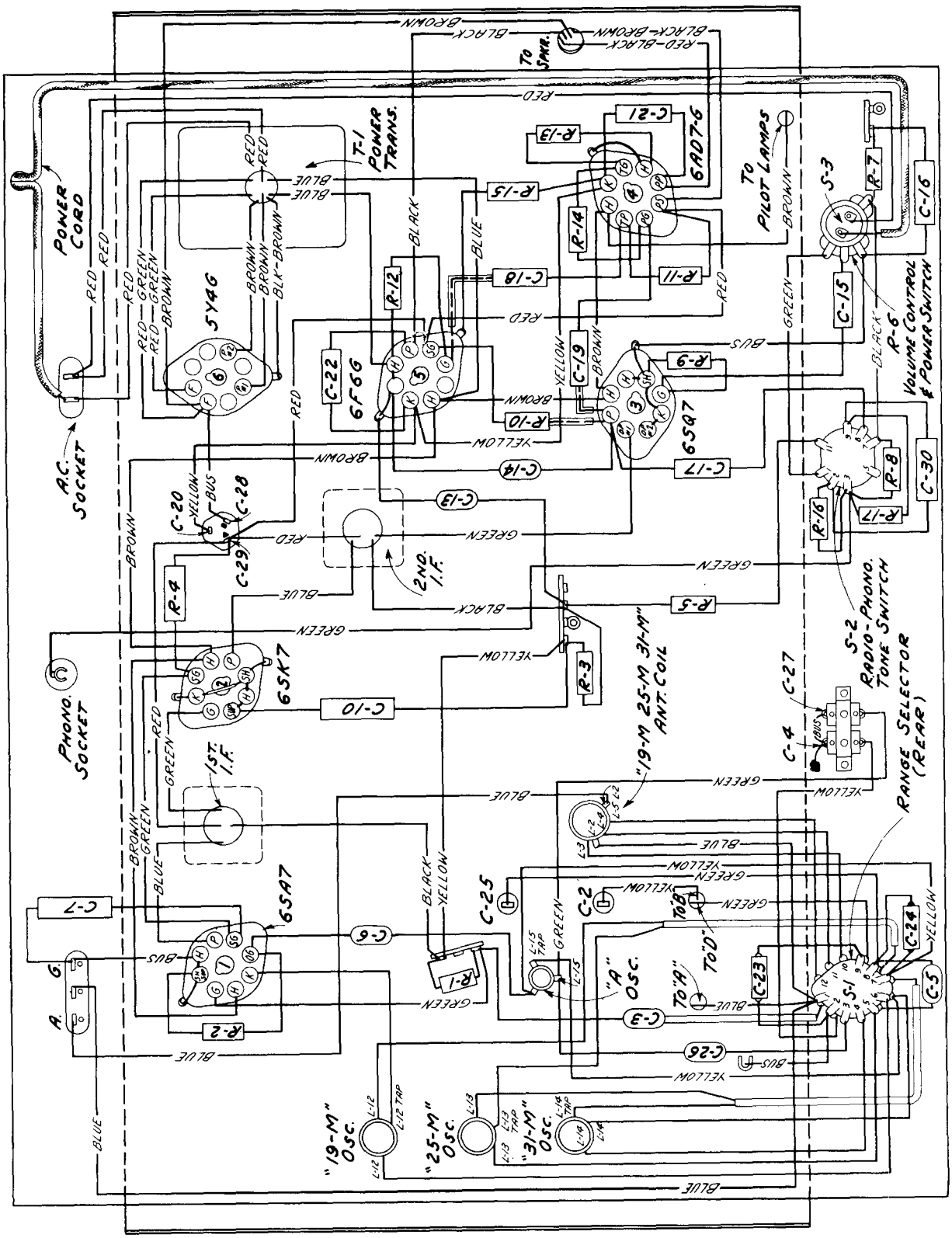


Figure 3—Chassis Wiring Diagram

REPLACEMENT PARTS FOR MODEL VR146

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

STOCK NO.	DESCRIPTION
	RECEIVER ASSEMBLIES
34025	Board-Antenna and Ground Terminal Board.....
S-3099	Capacitor-Adjustable trimmer bank.
12723	Capacitor-56 mmfd. (C6).....
S-3123	Capacitor-62 " (Temp.Comp.)...
12724	Capacitor-120 " (C5).....
13003	Capacitor-180 " (C13).....
S-2895	Capacitor-220 " (Close Tol.)(C23)
12952	Capacitor-330 " (C3).....
30433	Capacitor-470 " (C14).....
31381	Capacitor-620 " (C26).....
34459	Capacitor-.0025 mfd.(C15,C17).....
33584	Capacitor-.005 " (C21,C22).....
4937	Capacitor-.01 " (C18,C19).....
11315	Capacitor-.015 " (C30).....
32787	Capacitor-.05 " (C7,C10,C16)..
32240	Capacitor-Electrolytic,comprising 2 sections of 10 mfd. 1 section of 20 mfd. (C20,C28,C29).....
S-3109	Coil-Antenna 19.25 and 31 M.Bands (L2,L3,L4,L5).....
S-3111	Coil-Oscillator-"A" Band (L15)....
S-3114	Coil- " 19 M " (L12)....
S-3112	Coil- " 25 M " (L13)....
S-3113	Coil- " 31 M " (L14)....
S-3149	Condenser-Two gang tuning condenser (C1,C2,C25).....
*32634	Cord-Drive cord.....
35627	Drum-Drive cord drum.....
S-3152	Indicator-Station selector indicator pointer.....
11765	Lamp-Dial Lamp Mazda #51.....
S-3179	Plug-4 contact male loop plug.....
S-3178	Pulley-Dial cord pulley (Pkg.2)...
30735	Resistor-560 ohm - 1 watt (R15)...
14075	Resistor-8200 " 1/4 " (R16)...
14559	Resistor-10,000 ohm 1/4 watt (R7).
33489	Resistor-15,000 " 2.5 " (R4).
13998	Resistor-22,000 " 1/4 " (R5).
12454	Resistor-33,000 " 1/4 " (R2).
13734	Resistor-120,000 " 1/4 " (R13)
14020	Resistor-150,000 " 1/4 " (R17)
30493	Resistor-150,000 " 1/2 " (R11)
30651	Resistor-270,000 " 1/4 " (R8).
14983	Resistor-330,000 " 1/4 " (R14)
30648	Resistor-470,000 " 1/4 "(R10,R12)
12679	Resistor-2.2 Megohm 1/4 watt(R1,R3)
30992	Resistor-10 " 1/4 " (R9)..
33726	Retainer-"C" Washer for drive shaft (Pkg.5).....
34373	Retainer-"C" Washer for pulleys (Pkg.5).....
S-3155	Shaft-Station selector drive shaft
S-2824	Socket-A.C.socket.....
31364	Socket-Dial lamp socket.....
35787	Socket-Phono,input socket.....
5040	Socket-Speaker cable connection (Female).....
31319	Socket-Tube socket.....
30585	Spring-Drive cord tension spring (Pkg.2).....
S-3151	Switch-Range switch (S1).....
S-3232	Switch-Phono,radio tone switch(S2)
S-3239	Transformer-1st I.F.Transformer (L6,L7,C8,C9).....
S-3240	Transformer-2nd I.F.Transformer (L8,L9,C11,C12).....
S-2457	Transformer-Power 105/125 volt, 60 cycle (T1).....
32618	Transformer-Power 105/125 volt, 25/60 cycle (T1).....
S-3150	Volume control and power switch (R6,S3).....
	SPEAKER ASSEMBLIES(CRL 523-12")
31825	Cap-Dust cap for cone centre (Pkg.5).....
S-2458	Coil-Field coil (L16).....
31275	Cone-Speaker cone & Voice coil(L10)
5039	Plug-4 contact male plug.....
S-3036	Speaker complete CRL 523.....
S-2934	Transformer-Output (T2).....
	MOTOR ASSEMBLIES
S-3077	Motor-110 volt 60 cycle motor(M1).
S-3078	Motor- " " 25 " " (M1).
4577	Plug-2 contact male motor plug....
S-3079	Spindle-Turntable spindle(Pkg.2)..
S-3080	Spring-Drive wheel tension spring (Pkg.2).....
S-3081	Turntable-9" diameter turntable...
S-3082	Wheel-Rubber tired drive wheel....
	AUTOMATIC SWITCH ASSEMBLIES
38996	Cam,Cam assembly comprising main & auxiliary cam,hub & set screw.
4319	Screw-set screw for cam hub(Pkg.10)
36521	Spring-Actuating lever tension spring (Pkg.2).....
S-3500	Switch-Contact and Plunger (S4)...
	PICKUP ARM ASSEMBLIES
S-3459	Arm-Pickup Arm less crystal and base.....
S-3511	Base-Pickup Base(Pivot shaft & base ass.).....
S-3461	Crystal-Pickup crystal & Needle screw
31048	Plug-Pickup cable plug.....
S-3462	Screw-Pickup needle screw.....
S-3465	Screw-Pickup crystal retaining screw.....
S-3466	Spring-Pickup lead retaining spring
	MISCELLANEOUS ASSEMBLIES
S-3141	Dial-Scale.....
S-3086	Knob-Phono radio tone switch(Use S-2971).....
S-3184	Knob-Range switch.....
S-3101	Knob-Tuning and Volume.....
S-3160	Loop-Antenna loop Assembly (L1)...
30900	Spring-Knob retaining spring(Pkg.5)
S-3463	Support-Pickup arm support.....
S-3180	Socket-Loop socket(On Loop).....

(*Universal type approximately 50" long).

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

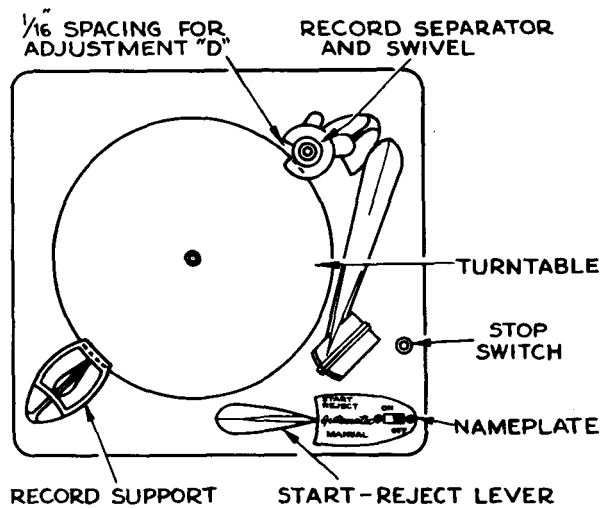
RCA Victor

RP-160C
AUTOMATIC RECORD CHANGERS
TECHNICAL INFORMATION AND SERVICE DATA

1946 No. 9

SERVICE DIVISION • RCA VICTOR COMPANY LIMITED • MONTREAL

A Service of the Radio Corporation of America



This mechanism is designed to play a series up to twelve 10-inch, or ten 12-inch records of the 78 r.p.m. type. It will also play single records of any diameter up to 12 inches.

Features Include—

1. **Light-pressure sapphire-point** plug-in crystal pickup.
2. **Positive ratchet trip,** actuated by eccentric groove at end of record.
3. **Safety clutch,** relieves strain on mechanism due to jamming. (The clutch makes a clicking sound if the mechanism jams.)
4. **Stop switch,** shuts off the motor after the last record is played. This switch is the pickup "rest."
5. **Pickup shorting switch,** shorts pickup during record-changing cycle to prevent noise.
6. **Simplified mechanism.**

Manual Operation

1. See that the mechanism is out of cycle, with the pickup on its rest.
2. Set the "start-reject" lever at "manual."
3. Place record on turntable and push turntable switch "on."
4. Lift the pickup and set it down on the record.
5. When the record is finished, the pickup will swing in the eccentric groove, or run in the last groove, until the power is shut off.
6. Lift the pickup and place it on its rest.

Automatic Operation

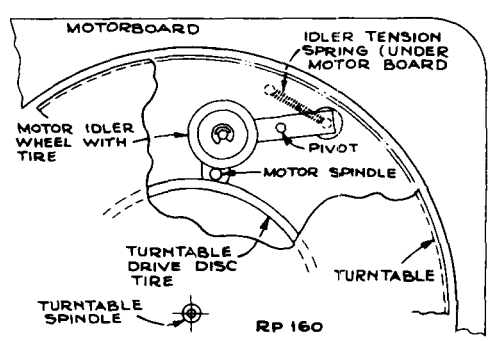
The pickup "rest" is a button on the stop switch that opens the motor circuit when the pickup comes down on the rest after completion of the cycle following the last record. Before starting automatic operation, see that the mechanism is out of cycle and that the pickup is on its rest. If it is not, start the motor and allow to run until the pickup comes down on its rest.

1. Turn the "record support" in front left-hand corner, to its position for 10-inch or 12-inch records as required. Turning the front record support automatically positions the rear support.
2. Load the records on the supports, with required selections upward, the last record to be played on top. **Be sure that the rear record support is pushed down.**
3. Push turntable switch "on."
4. Push the "start-reject" lever towards the back to its "start-reject" position, and let go. The first record drops on turntable, and the pickup moves onto the record.
5. When the last record is finished, the pickup moves out and comes down on its rest. This depresses the rest button and opens the stop switch, thus shutting off the motor.
6. To reject a record being played, push the "start-reject" lever to "start-reject," and let go.
7. For automatic operation, each record must have the standard eccentric groove.

Lubrication

The drive motor bearing is lubricated from felt washers at the bottom and top. A light machine oil should be used at these points.

On all bearing surfaces except the motor bearings Houghton Stayput No. 320 should be used. On all other surfaces Lubriplate No. 110 is recommended. *(Continued on next page.)*



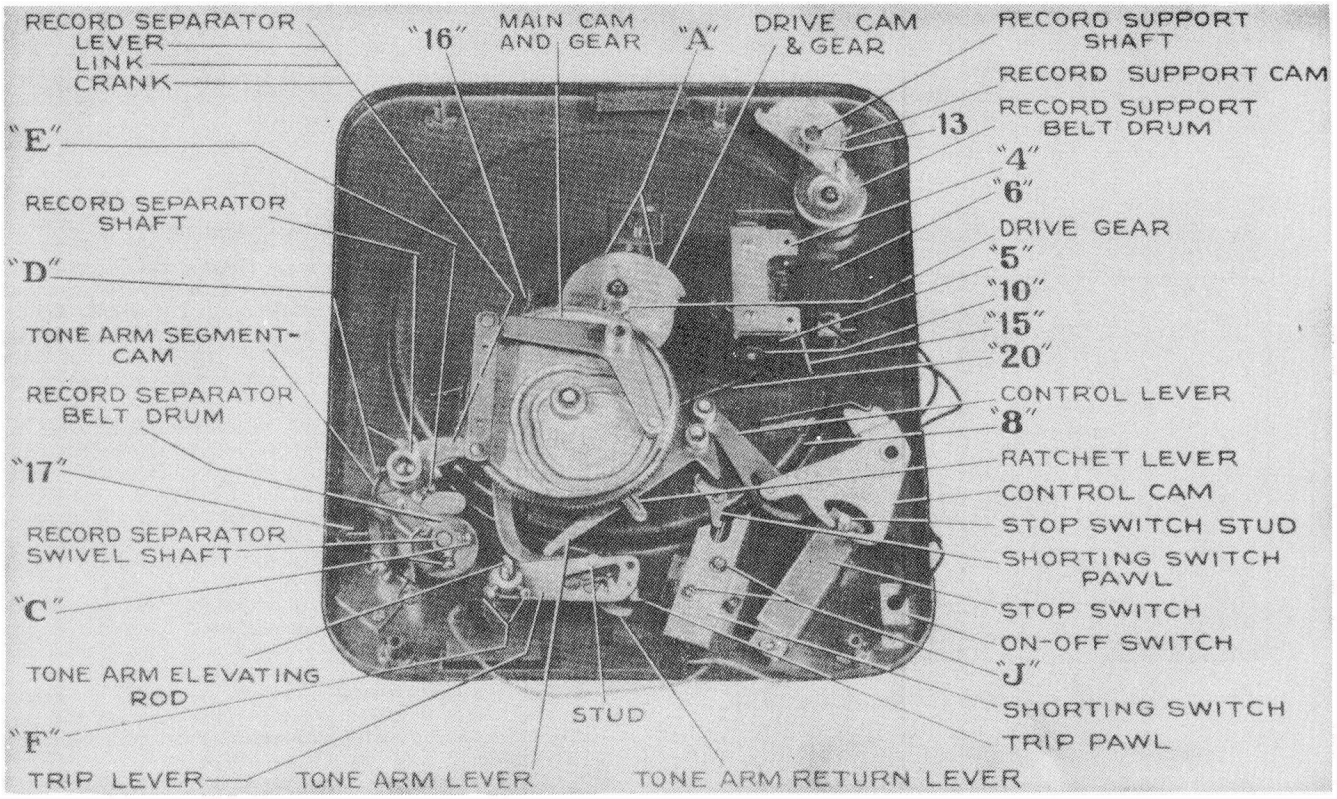
Do not oil the record separator shaft.

It is important that the drive motor spindle and the rubber tire on the friction drive disc as well as that on the idler wheel be kept clean and free from oil, grease, dirt, or any foreign material at all times. Any quick drying naphtha is satisfactory for cleaning these parts.

Cautions

Before servicing the automatic changer, inspect the assembly to see that all gears, cams, springs, levers, etc., are correctly assembled and in good working order.

1. Never use force to start or stop the motor or any part of the record changing mechanism.
2. Warped or damaged records may cause the mechanism to jam. **When jamming occurs, the safety clutch slips, causing a clicking sound.**
3. A cracked or chipped record may damage the sapphire.
4. Warped records may slide on one another while playing and result in unsatisfactory reproduction.
5. Do not leave the records on the record posts or on the turntable as they may warp, particularly in warm climates. Warped records may be flattened by placing them on a flat surface with a heavy flat article placed on top of them for a few days.
6. If, for any reason, the mechanism stalls, turn off the turntable switch and remove the records from the posts. Start the turntable by turning the switch on and allow the pickup arm to complete its cycle.
7. Do not tighten copper-plated, cone-pointed screws until final adjustment has been made.



Function of Principal Levers

Trip Lever

When the tone arm swings in the eccentric groove, the trip lever latch acts on the ratchet lever to start the automatic cycle.

Ratchet Lever

Transfers motion from trip lever or control lever to start automatic cycle by allowing pawl to engage with sprocket of safety clutch.

Drive Cam Pawl and Sprocket (This is the "safety clutch")

Engages turntable spindle to drive gear during cycle (see sketch "A").

Drive Gear

Transfers rotation of turntable spindle to main cam and gear when the clutch is engaged.

Main Cam and Gear

Has four "tracks" which control horizontal and vertical motion of tone arm, and rotation of record separator knife and shelf. The bushing on this gear governs position of the ratchet lever.

Control Cam and Lever

In **"manual"** position, it keeps the motor stop switch closed, and disengages the ratchet lever and safety clutch so the mechanism cannot go into cycle.

In **"automatic"** position, it permits operation of the ratchet lever, safety clutch, and stop switch.

In **"start-reject"** position, it closes the motor stop switch, and moves the ratchet lever away from the drive cam pawl, permitting the clutch to engage and thus start the change cycle.

Shorting Switch Pawl

Closes the pickup shorting switch when the pickup is outside the 12-inch landing position.

Tone Arm Lever

Directs horizontal motion of tone arm.

Tone Arm Return Lever

Keeps tone arm moving in with receding tone arm lever and provides proper landing.

Tone Arm Elevating Lever

Directs vertical motion of tone arm.

Tone Arm Elevating Rod

Transfers motion of elevating lever to tone arm.

Record Separator Lever Train (Lever-Link-Crank)

Directs motion of separator knife and shelf.

Separator Knife

Separates record from stack and supports stack during cycle.

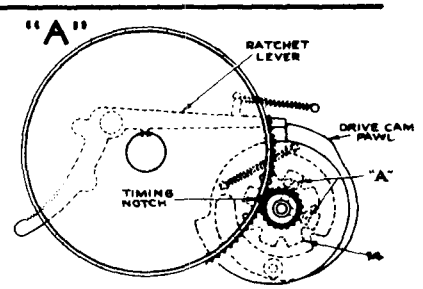
Separator Shelf

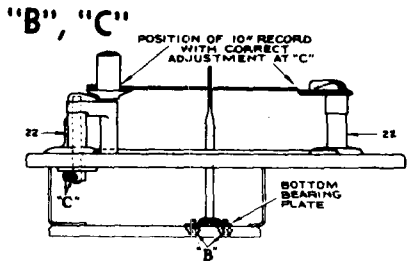
Supports stack during playing time.

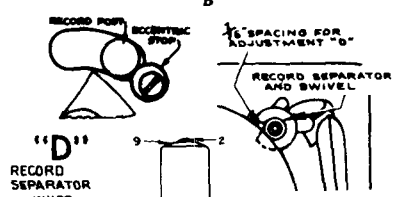
Quick-Reference Chart for

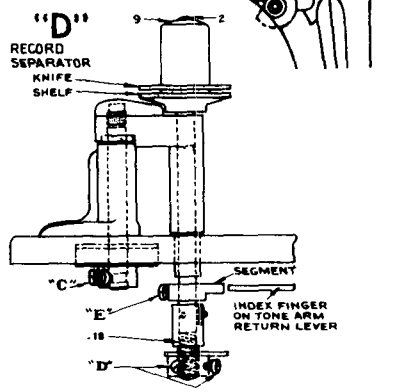
Automatic Record Changer Adjustments

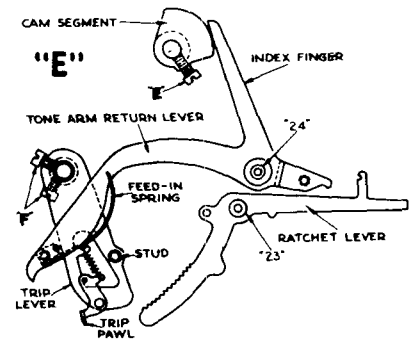
Mechanism jams. General irregularity of operation. *(Mechanism Timing)*	With the ratchet lever and the pawl on the drive shaft cam in playing position as shown, remove the bottom support bracket. Remove the "C" washer on the main cam shaft and slip the cam down far enough that it can be rotated with respect to the drive gear. Then rotate it until the timing notch is positioned as shown. Put the main gear back in mesh with the drive gear, replace the "C" washer, place the elevating lever on the cam ridge. Make certain the separator lever train is in its correct position and replace the bottom support bracket.
Turntable does not turn freely. *(Turntable Bottom Bearing Position)*	Loosen the bottom bearing screws "B" and position the bottom bearing plate until the turntable revolves freely. Tighten the screws and check by applying a.c. to the turntable motor, allowing it to reach full speed, then pull motor away from friction drive disc and noting that the turntable continues to make at least twelve revolutions.
Records strike separator post or fail to stay on record shelf. *(Spacing Between Record Posts)*	Turn the record support post to the ten-inch position. Loosen set screws "C," hold the separator post against the end of its slot in the motorboard and turn the belt drum to take up any slack in the belt. Tighten the zinc-plated, blunt-nosed screw and check to see that a ten-inch record fits the posts as shown. Then tighten the copper-plated, cone-pointed screw. The twelve-inch position is adjusted after that of the ten-inch, by changing the support post to take the twelve-inch record, and turning the eccentric stop until the edge of the record is halfway up on the record support bevel while the other edge is against the record separator post.
Records do not drop at proper time. *(Record Shelf Timing)*	Place a ten-inch record on the posts. Loosen the set screws "D" and turn the record separator shaft until the edge of the record-separating knife is one-sixteenth inch away from the edge of the record. The teeth on the inner circumference of the knife should be resting in the bottom of their slots at the time the adjustment is made. Tighten the zinc-plated screw first, run through cycle several times as a check, then tighten the copper-plated screw.
Tone arm continues to repeat playing of top record or jams when part way in on record. *(Segment-cam height or radial position)*	Take all records off the posts. Loosen the set screw "E." Set the record separator segment-cam so that the index finger of the tone arm return lever rides on the middle of the segment-cam, as shown. Rotate the segment-cam until it is in such a position that the index finger will not ride off either end. Check to see that the index finger rides in over top of the cam when the record shelf is depressed by the weight of one record. Tighten the set screw.
Sapphire does not land at correct point on 10-inch record. *(Tone Arm Position With Respect To Trip Lever)* *Correct dimension from outside edge of spindle to sapphire 4 11/16 inches.*	Place a ten-inch record on the turntable and rotate the changer through cycle until the sapphire is just ready to land. Make sure that the index finger of the pickup arm return lever is against the record separator shaft and that the tone arm trip lever stud is held firmly against the return lever. Loosen the set screws "F" and move the pickup arm to the correct landing position. See that there is a 1/32 inch clearance between the pickup arm bearing and the set screw collar. Tighten the zinc-plated screw, run the changer through cycle several times as a check, then tighten the copper-plated screw. The twelve-inch landing position is automatically maintained.
Top of pickup arm strikes stack of records or sapphire fails to clear the records on the turntable. *(Pickup Arm Height While In Cycle)*	Rotate the changer through cycle until the pickup arm has risen to its maximum height above the turntable but has not begun to move out. At this point adjust the screw "G" until the distance between the turntable and the sapphire is one and three-sixteenths inch. Tighten the locknut.

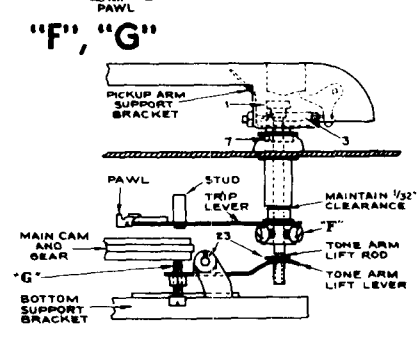




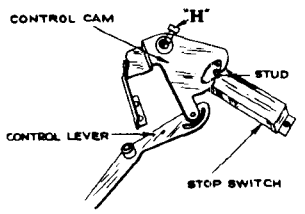
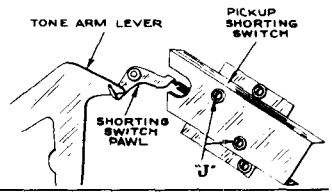








Quick-Reference Chart (Continued)

Mechanism fails to start, or automatic stop switch is inoperative in "automatic" position. *(Control Cam Position)*	Set the control lever to "automatic." Loosen set screw "H" and move the control cam until the stud on stop switch is centrally located as shown. Tighten set screw "H."	
No output, or noise during cycle. *(Position of Pickup Shorting Switch)*	Loosen screws "J." Position the switch to obtain 1/32-inch clearance between the switch blades when the tone arm is in playing position. Tighten screws "J." **Make certain that the pawl is on the correct side of the long leaf spring in the shorting switch.**	

Miscellaneous Service Hints

Mechanism trips continuously. — Check to see that the ratchet lever engages drive cam pawl at end of change cycle. Bend lever if necessary. Check adjustment "H." Bend the control cam flat spring for greater pressure.

Turntable does not stop automatically. — Check for bind in stop button bushing. Bend the flat bracket that limits outward movement of the trip lever, so that pickup lands on the stop button.

Turntable fails to start. — Check spacing of stop switch contacts to be certain that weight of stop button does not open them.

Loud clicking noise resulting from drive cam pawl slipping out of teeth in cam sprocket.
Mechanism jams. — Check mechanism timing adjustment. Make certain that pickup arm lever is not binding on its stud. Any jam will cause the clutch to slip and produce clicking sound.

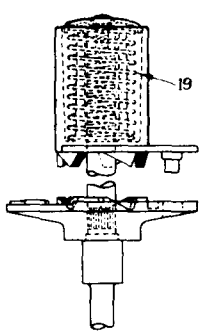
Irregular landing on 10 and 12 inch records. — Check adjustment "C." Insufficient tension on belt.

Tone arm continues to repeat playing top record of the stack. — Check adjustment "E." Record separator shaft, or the spring on which it rests, is binding on the shaft bushing. Pin on record separator shaft is binding in its slot. Shaft spring is too weak. Do not tighten set screws "D" enough to distort the housing of the separator shaft spring. Do not oil the record separator shaft.

Tone arm continues to come down in rest position. — Check adjustment "E." Record separator shaft or the spring on which it rests is binding on the shaft bushing. Pin on record separator shaft is binding in its slot. Shaft spring is too strong.

Sapphire strikes motorboard. — Bend the pickup arm support bracket until the sapphire clears the motorboard by approximately 3/32 of an inch.

Separator knife jams on last record of the stack. — Check the separator knife edge. It should not be sharp enough to dig in the record and carry the record up with it.



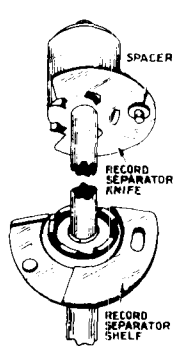
Illustrations Show Details of Record Separator

To Remove the Turntable.—

To remove the turntable, loosen set screws "A" and lift the turntable up.

To Remove Pickup Arm.—

One of the tone arm bearings has a slotted head and can be turned out to facilitate removal of the tone arm. Raise the tone arm and loosen the bearing set screw. Turn the bearing partly out through the hole in the side of the tone arm and lift the arm off.

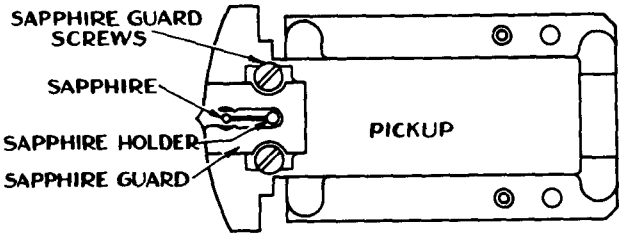


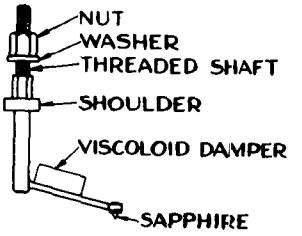
Cycle of Operation

The changer can be conveniently rotated through the change cycle by pushing the reject button and revolving the turntable by hand. Eight turntable revolutions are required for one change cycle. Block up the motor, so it is disengaged from the drive disc, to permit easier manual rotation of the turntable.

	Function	Explanation
Operator	Turn Record Support to 10" or 12" Position as Desired	1. Separator post positions itself by means of belt drive.
	Place Records on Posts	1. Separator shaft is pushed down against its spring and carries segment-cam out of path of index finger.
	Press Start Button	1. Reject lever moves in and pushes ratchet lever. 2. Ratchet lever is pushed out of eccentric step on main gear shaft and releases drive cam pawl. 3. Drive cam pawl engages cam sprocket and it revolves carrying drive gear with it.
Automatic Cycle	Tone Arm Rises	1. Main cam and gear revolves with drive gear. 2. Stud on tone arm lever rides in top track on main cam and directs movement of the lever. 3. Tone arm elevating lever rides up on ridge on main cam and pushes tone arm up by means of elevating rod.
	Tone Arm Moves Out	1. Tone arm lever pushes on trip lever stud. 2. Trip lever moves out. 3. Tone arm return lever is carried along by trip lever stud, and by stud on main cam top track.
	Record Knife Separates Bottom Record from Stack after Gauging Thickness of Record	1. Stud on separator lever follows main cam bottom track and directs the motion of the lever. 2. Through the separator link and crank, the separator lever turns the separator shaft. 3. Knife turns with shaft and strikes edge of bottom record. 4. Separator shaft continues to revolve and teeth on inner circumference of knife ride up on shelf teeth until knife is carried high enough against the action of spring 19 to move in over top of record.
	Record Drops to Turntable	1. Separator shaft continues to turn until knife supports stack of records and shelf moves out from under bottom record.
	Tone Arm Moves In	1. Separator shaft reverses rotation. 2. Tone arm lever moves away from trip lever stud. 3. Tone arm return lever pushes on trip lever stud. 4. Trip lever moves in.
	Tone Arm Lowers Sapphire on to Record	1. Index finger on tone arm return lever moves against separator shaft to insure proper landing position. 2. Tone arm elevating lever rides down on main cam ridge thus lowering the elevating rod and the tone arm. 3. Separator shaft returns knife to original position and allows stack of records to rest on shelf.
	Sapphire Moves In to Record Groove	1. Ratchet lever rides down into eccentric step on main gear shaft and blocks drive cam pawl. 2. Pawl is disengaged from drive cam sprocket.
	Record Begins to Play	3. Drive gear and main gear stop. 4. Tone arm lever moves into cam to maintain disengagement.

Replacing Sapphire in Pickup





Specifications....Output at 400 cycles..... 0.50 volts
Impedance at 1,000 cycles... 75,000 ohms

Replacement of Complete Unit...Simply slide the unit out of the tone arm and insert a new one.

Replacement of Sapphire.....Caution: Never bend the sapphire support wire. Slide the pickup forward out of the arm.

The nut on the sapphire holder assembly is locked by a light cement (such as Glyptal). Extreme care should be used when loosening the nut so that the twisting motion does not break the crystal.

Remove the two screws holding the sapphire guard in place and take the guard off. Remove the small nut and washer on the threaded shaft of the sapphire holder and push the shaft through the hole in the viscoloid until the sapphire holder assembly comes free.

Insert threaded shaft of replacement sapphire holder through viscoloid and replace the washer and nut. Make sure that the flat sides of the shaft are firmly in place in the clamp and then tighten the nut very carefully so as not to strip the threads nor break the crystal. Replace the sapphire guard, positioning it by means of the oversize screw slots. Make certain that the sapphire and its supporting wire are centered in the guard. Tighten the guard screws. Before using, check to see that the sapphire projects far enough beyond the guard so that the guard will not strike the record. If necessary, bend the guard a little. Apply a drop of light cement (such as Glyptal) to the sapphire nut holder.

Bend the spring contacts to make good contact with the slides in the tone arm.

Tone Arm Feed-in Spring.—

When the sapphire comes down on the record, the feed-in spring (shown in adjustment sketch "E," acts to push the tone arm toward the music grooves. The spring should be adjusted to do this without causing the sapphire to skip grooves. This action is also related to—

Cabinet Leveling.—

If the sapphire fails to enter the starting groove, raise the right-hand side of the cabinet by inserting thin spacers under the legs. If the pickup slides over a few grooves, raise the left-hand side of the cabinet.

Sapphire Pressure.—

In these mechanisms, the correct pressure is from 1 to 1¼ ounces, measured at the sapphire. Adjust the spring (3) in the tone-arm base if necessary.

Replacement Parts

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

STOCK NO.	DESCRIPTION
	PICKUP AND ARM
39671	Arm-Pickup arm shell-less crystal cable and pivot arm
39672	Arm-Pivot arm and shaft for pickup arm-less spring
35694	Cable-Shielded pickup cable-connects pickup to shorting switch
39550	Crystal-Pickup crystal cartridge with sapphire and holder
38607	Cushion-Rubber cushion (1) for pickup arm push rod
38451	Damper-Viscoloid damper for sapphire holder
38452	Guard-Needle guard
38450	Nut-Special Nut and washer for sapphire holder.
38458	Nut-Speed nut to hold cable in pickup arm(Pkg.2)
39674	Rivet-Rivet to hold pivot arm spring-(Pkg.5)
38606	Rod-Pickup arm push rod-less cushion
38449	Sapphire-Sapphire and holder-less nut
37763	Screw-No. 2-56 x 1/8 screw to mount needle guard (2 required)(Pkg.2)
38609	Screw-No. 4-40 x 1/4 headless set screw for pickup arm(Pkg.2)
38608	Screw-No. 6-32 x 9/32 headless set screw for pickup arm(Pkg.3)
39673	Spring-Pivot arm spring (19-1/2 turns)
38604	Stud-Pivot arm spring stud, and nut
	MOTOR ASSEMBLIES
36954	Armature-Motor armature and shaft for 25 cycle motor
36255	Armature-Motor armature and shaft for 60 cycle motor
37108	Bearing-Bottom bearing and bracket (4)
37107	Bearing-Top bearing and bracket
37109	Bracket-Motor mounting bracket (5)
36952	Cap - Bakelite cap for motor
36951	Capacitor-1.25 mfd. for motors (2 required for 25 cycles
37111	Coil-Motor field coil assembly (6)
36726	Motor-105-125 volts, 25 cycle, complete with capacitor (91655-3 or 8)
38612	Motor-105-125 volts, 60 cycle (91706-1)
37106	Pad-Rotor thrust pad (Pkg.2)
37110	Rotor-Motor rotor complete with fan
39748	Sleeve-Motor spindle sleeve for 50 cycle conversion of motor No.91706-1,Stock No.38612
	MOTORBOARD ASSEMBLIES
38640	Arm-Motor idler arm-less wheel
3658	Ball-3/32 steel ball for tone arm bearing(Pkg.6)
10129	Ball-Bearing ball for spindle
38647	Bearing-Turntable spindle bearing
38616	Belt-Record support to separator belt (8)
38653	Board-Motorboard with all welded or riveted studs, posts, or bearings-less operating mechanism
38630	Brace-Angle brace,or bottom support bracket and bearing plate
38620	Bushing-Record separator shaft end bushing
38668	Button-Stop switch button
39386	Cable-Shielded pickup cable and plug - connects shorting switch to amplifier
38627	Cam-Drive shaft cam and pawl-less spring
38641	Cam-Main cam
38646	Cam-Record support shaft cam
38470	Cap-Record separator cap (9)
38665	Cover-Stop switch cover and stud
38657	Disc-Turntable drive disc and spindle
38463	Drum-Record separator belt drum
38617	Drum-Record support belt drum
38660	Escutcheon-Index escutcheon ("Manual," "Automatic" - "Start-Reject")

STOCK NO.	DESCRIPTION
34368	Grommet-Rubber grommet for motor mounting(10) (Pkg.4)
38467	Knife-Record separator knife
39106	Lever-Index control lever and shaft
38622	Lever-Link and lever assembly-fastens on record separator shaft
38661	Lever-Manual lever
38656	Lever-Ratchet lever
38633	Lever-Tone arm lever
38631	Lever-Tone arm lift lever
39751	Lever-Tone arm return lever
38619	Lever-Tone arm segment-fastens on record separator shaft - less screws
38632	Lever-Trip lever-less pawl spring
32943	Nut-Speed nut for stop switch button (Pkg.10).
38740	Pin-Drive pin for record separator shaft and bushing (Pkg.2)
38474	Pin-Record support shaft cam pin (13) (Pkg.2).
38663	Plate-Index control lever plate and screw
30868	Plug-Female plug for motor extension cable
30870	Plug-Male plug for motor and switch leads and extension cable
38624	Ratchet-Ratchet wheel (drive cam sprocket) for turntable spindle (14)
38469	Screw-Oval head screw for record separator cap (Pkg.2)
38626	Screw-No. 8-32 x 1/4 in. cone point set screw for ratchet wheel (drive cam sprocket) (Pkg.3)
38625	Screw-No. 8-32 x 1/4 in. set screw for ratchet wheel (drive cam sprocket) (Pkg.5)
31118	Screw-No.10-32 x 5/16 in. cone point set screw for index lever plate (Pkg.2)
32869	Screw-No.10-32 x 5/16 in. set screw for drum, tone arm segment, record separator crank and trip lever (Pkg.10)
38652	Shelf-Record separator shelf and shaft
38471	Spacer-Record separator spacer(washer)(Pkg.3).
38628	Spring-Cam pawl and ratchet lever spring
38669	Spring-Index lever plate spring
30585	Spring-Motor idler arm spring (Pkg.2)
38643	Spring-Motor tension spring (15)
39679	Spring-Ratchet lever spring (16)
38642	Spring-Record separator belt drum spring (17).
38621	Spring-Record separator shaft bottom spring (18)
38468	Spring-Record separator spring (19)
39554	Spring-Reject button spring
38634	Spring-Tone arm lever spring (20)
39599	Spring-Tone arm and return lever spring
38667	Spring-Tone arm switch spring
38562	Spring-Trip lever pawl spring
38666	Stud-Tone arm switch pivot stud (Pkg.2)
38645	Support-Record support and shaft
39085	Support-Separator support (2 used) (22)
32875	Switch-'ON-OFF' switch
38844	Switch-Pickup shorting switch
38664	Switch-Stop switch less leads
38615	Swivel-Record separator swivel and shaft
37873	Tire-Rubber tire only for drive disc
38623	Turntable-Finished turntable plate
33726	Washer "C" washer for motor idler arm or idler wheel (Pkg.5)
20165	Washer-"C" washer for ratchet lever, tone arm lift lever or tone arm lift rod (23) (Pkg.2).
2917	Washer-"C" washer for tone arm lever, tone arm return lever, record support belt drum link, or cam (24) (Pkg.5)
38560	Washer-Felt washer for tone arm bearing (Pkg.3)
38629	Washer-Felt washer for turntable spindle bottom bearing (Pkg.3)
36274	Wheel-Motor idler wheel

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

RCA VICTOR

"HIS MASTER'S VOICE"

MODEL RP178

Automatic Record Changer

TECHNICAL INFORMATION AND SERVICE DATA

1948 No. 8

GENERAL SERVICE DIVISION • RCA VICTOR COMPANY LTD.

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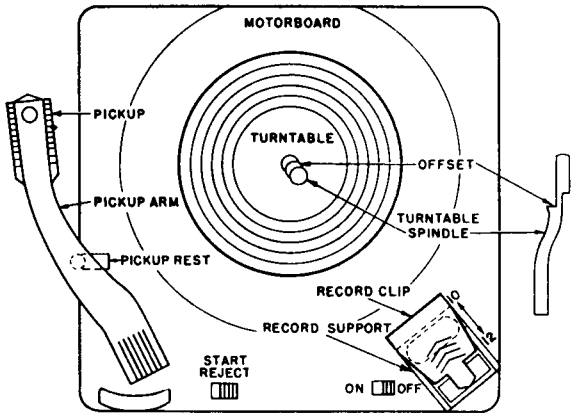
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FEATURES

1. This mechanism is designed to play automatically a series of twelve 10-inch or ten 12-inch standard records of the 78 r.p.m. type.
2. It will play manually records up to 12 inches in diameter.
3. Tripping system is of "eccentric" type, insuring reliable automatic operation on all records made to RMA proposed standards.
4. It is a simple operation of sliding the record support to change from 10- to 12-inch records or vice versa.
5. Cycling mechanism is disconnected completely while records are being played. This reduces the load on the drive motor, thereby reducing the tendency for "wow" or rumble.
6. Low noise sapphire point pickup cartridge.

AUTOMATIC OPERATION

1. With the power switch in the off position slide the record support shelf as required for 10- or 12-inch records.
2. Place the records to be played in a stack with desired selections upward and in proper sequence with the last record on top. Load them on the changer by placing them over the center post and resting on the record support shelf. Place record stabilizing clamp on top of the record stack.
3. Turn power switch on and press the reject button. The changer will play automatically one side of each record in the stack.
   The tone arm can be moved to the rest position any time the mechanism is not in cycle.
4. Turn the power switch off, lift the stabilizing clamp and remove the stack from the turntable by placing fingers of both hands directly opposite and under the stack. Then lift straight up "don't tilt" or squeeze stack.



MANUAL OPERATION

1. Slide the record support shelf in towards the center post for 10-inch or away from the center post for 12-inch position.
2. Place the record to be played on the turntable and turn the power switch on.
3. Place the pickup on the start of the record.

   Note: The mechanism should be allowed to complete cycle before attempting to move tone arm to the rest position.
4. Turn power switch off manually.
5. Remove the record by raising straight up without tilting.

CAUTIONS

1. Avoid handling the tone arm or sliding the record support assembly while mechanism is in cycle.
2. Never turn the power switch off, leaving the mechanism in cycle for an extended period of time.
3. Do not allow the records to remain on supports when not in use.
4. Do not allow oil or grease to come in contact with any rubber parts.
5. Do not install instrument near source of heat. Excessive heat may damage the pickup cartridge.

LUBRICATION

Motor

Motor is lubricated at factory to provide normal operation for a long period of time.

If it becomes necessary to lubricate, use SAE #10 motor oil to saturate the felt wicks on the motor bearings.

Main Bearing

Use SAE #30 motor oil.

Slides and Levers

Lubriplate #105.

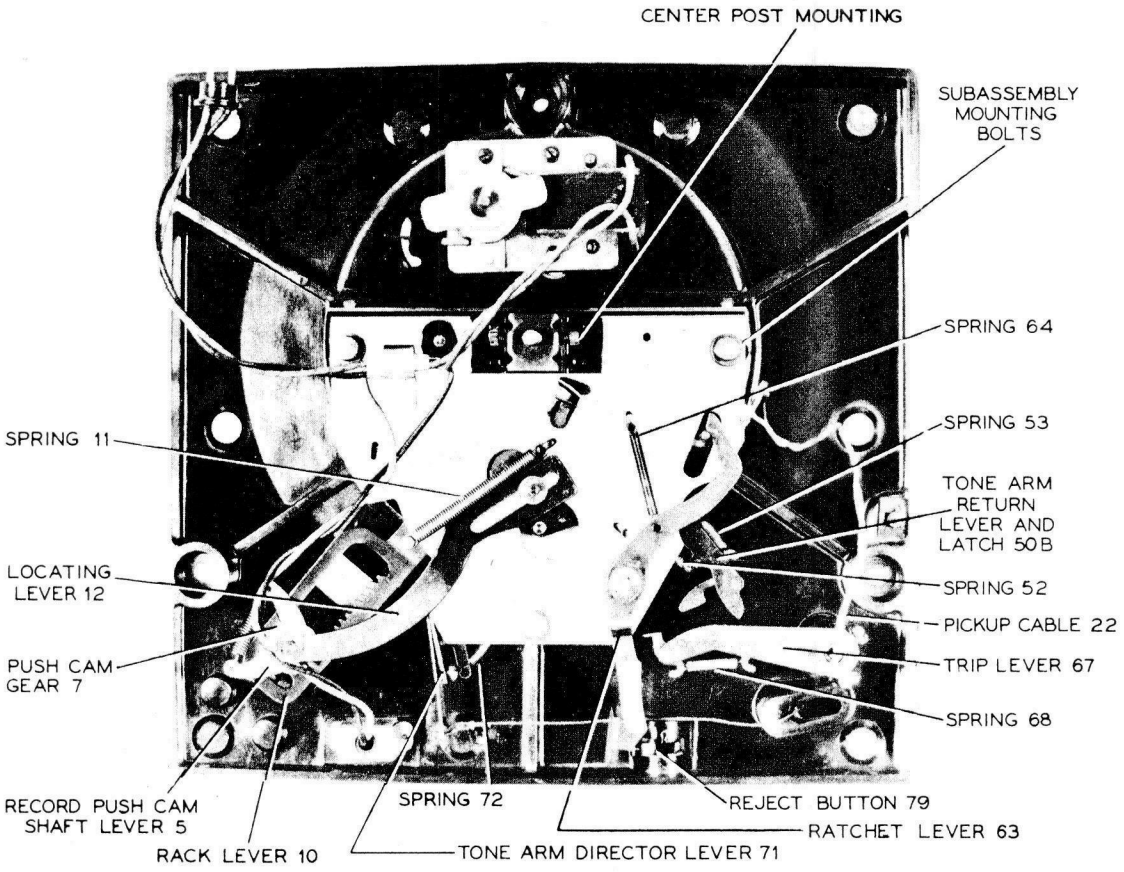


Figure 1

FUNCTION OF PRINCIPAL PARTS

Trip Lever—67

When the sapphire is riding the eccentric groove, the trip pawl engages the ratchet lever, starting cycle.

Ratchet Lever—63

Portion of the lever acts as a ratchet and the other portion incorporates a catch for the stud on the cycling cam carriage. The engagement of this stud prevents the mechanism from going into cycle.

Center Post—32

The center post performs the function of supporting and aids in the separation of the records.

Tone Arm Return Lever and Latch—53B

The tone-arm return lever, together with the latch, locks and stabilizes the tone arm in its outermost position. It also gives the necessary inward motion to the tone arm.

Cycling Cam Carriage—50A

This carriage provides a movable support for the cycling cam.

Tone Arm Director Lever—71

The roller on one end of this lever follows a channel in the cycling cam and thereby pulls on the cable directing the vertical and outward motion of the tone arm.

Locating Lever—12

The sloped portion of the lever forms a stop for the stud on the tone arm return lever thereby determining the landing position of the pickup.

Record Push Cam Gear Assembly—5, 7

Provides a means of coupling the push cam to the rack lever.

Record Support—1A, B, C, D

Provides a support for the edge of the records and a mounting for the record push cam.

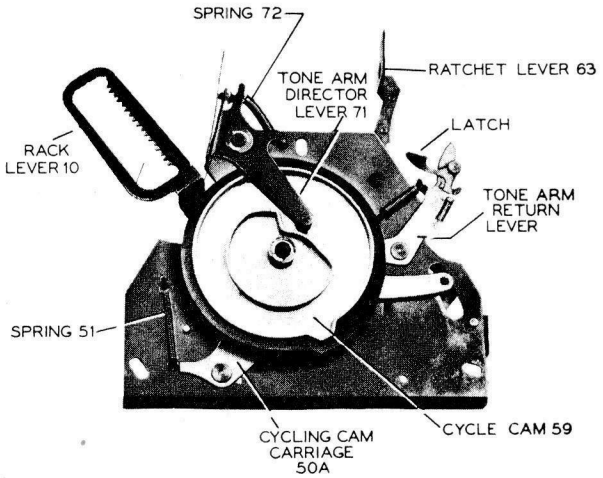


Figure 2

Rack Lever—10

One end of the lever follows the eccentric elevated portion of the cycling cam causing the lever to move in and out from the center of the mechanism. The teeth on the rack lever engage the teeth in the record push cam gear producing a rotary motion necessary to push the record off the step in the center post.

Record Push Cam—4

The oval shaped cam located in the record support, rotates during change cycle. This cam engages and pushes the record from the step in the center post.

ADJUSTMENTS

Tone arm (out of cycle) height adjustment

1. Rotate the turntable until the change cycle is completed.
2. Move the tone arm to a position off the edge of the record and allow it to rest freely in air.
3. Bend portion of the tone arm bracket so that the sapphire is 3/16 inches above the flat surface of the motorboard. (Figure 3.)

Tone arm height adjustment while in change cycle

1. Press the reject button and rotate the turntable by hand until the pickup has raised, to the maximum height in the change cycle.
2. Turn the adjustment screw "A" until the sapphire is 1⅜ inches above the turntable.
   This adjustment will permit the pickup to land and play one record placed on the turntable. At the same time it prevents the tone arm from touching the record resting on the centerpost while the mechanism is going through cycle.
   (If this height cannot be reached by the adjustment screw, take up on the cotter pin.) (Figures 4 and 5.)

Pickup landing adjustment

1. Slide the record support as required for playing 10-inch records.
2. Place a ten-inch record on the turntable and rotate the turntable by hand until the sapphire is just ready to land.
   Loosen set screws "B" (Figure 6).
3. Hold the trip lever to keep it from moving while the pickup is moved to the start of the record.
4. Tighten the black screw "B" and allow the mechanism to run through cycle automatically. If landing is correct, tighten copper plated screw "B." (Figure 6.)
   (Note) No separate 12-inch landing adjustment is necessary.

Record push cam and gear assembly adjustment

1. Have the mechanism out of cycle.
2. With the push cam in place and the record support in the 10-inch position, assemble and engage the teeth of the push cam gear with the rack lever so the eye in the lever is approximately in line with the centerpost as shown in drawing. (Figure 7.)
3. Set the push cam parallel to the front edge of the record support, make certain the thin edge of the cam is on the left side, viewed from the front or centerpost side of the support. (Figure 8.)

Removing the turntable

1. Loosen the two screws mounting the centerpost. (Figure 10.)
2. The centerpost, turntable and thrust bearing can now be easily lifted out.

Replacing the turntable

1. Slip the turntable over the lower end of the centerpost until it comes against the stop or ears. (Figure 9.)
2. Place the thrust bearing and washers on the bottom end of the centerpost and place the centerpost and turntable in position as shown. (Figure 9.)
3. Turn the spindle so the step in the centerpost is away from the record support. (Figure 11.)
4. Tighten the two mounting screws. (Figure 10.)

Turntable centering

If for any reason the sub-assembly had been removed from the motorboard it is necessary to re-center the turntable.

1. Loosen the three sub-assembly mounting bolts. (Figure 12.)
2. Place the turntable in place with the center post extending down through the mounting as shown. (It is not necessary to have the thrust bearing in place for this operation.) (Figure 9.)
3. Center the turntable in respect to the recess in the motorboard by shifting the position of the sub-assembly slightly. (Figure 11.)
4. Tighten the nut on the end of the square head mounting bolt. (Figure 12.)
5. Remove the turntable and tighten the other two mounting bolts. (Figure 12.)

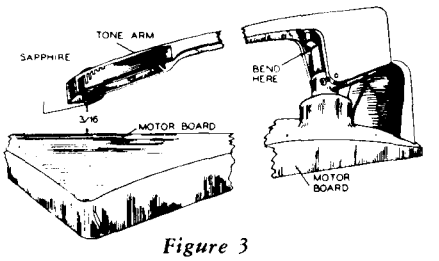


Figure 3

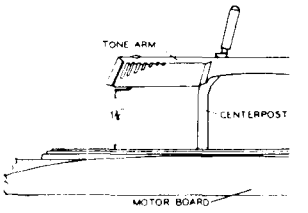


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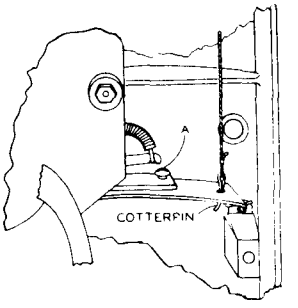


Figure 5

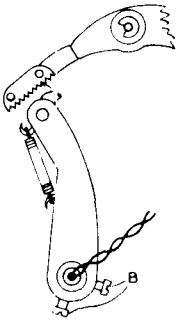


Figure 6

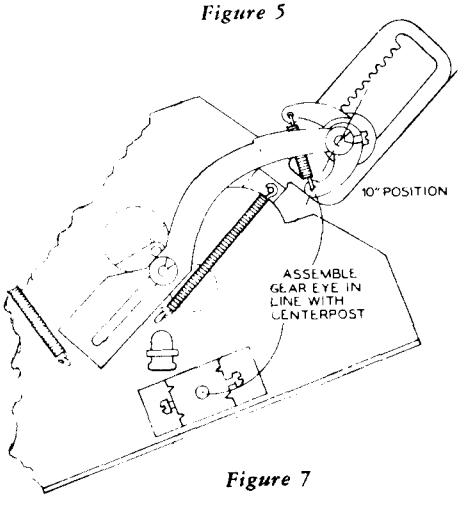


Figure 7

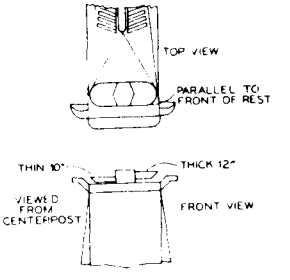


Figure 8

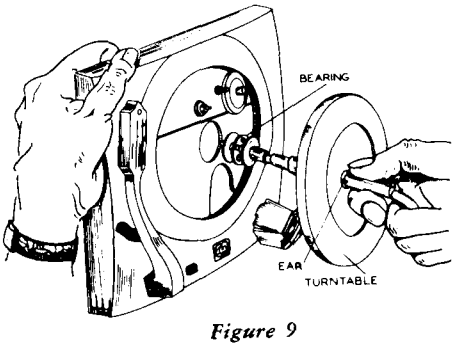


Figure 9

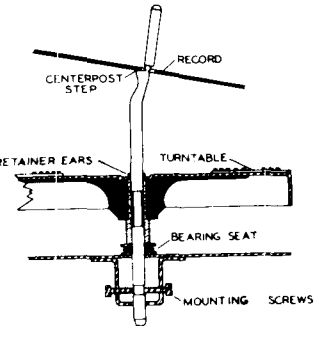


Figure 10

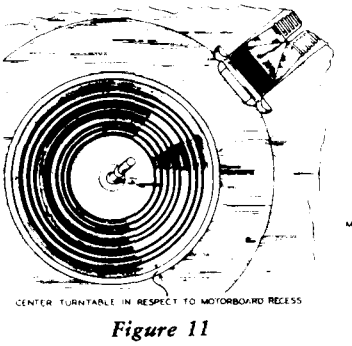


Figure 11

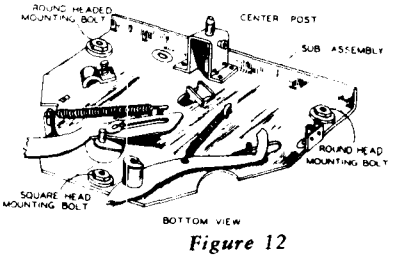
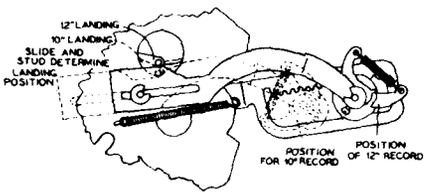
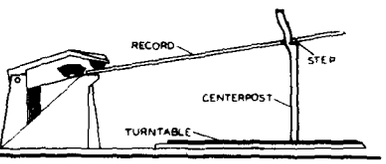
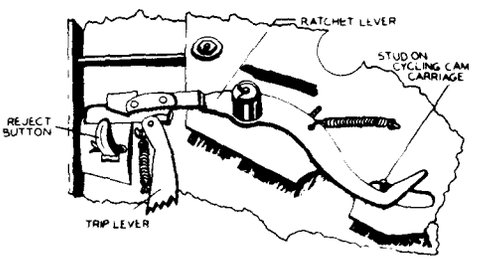
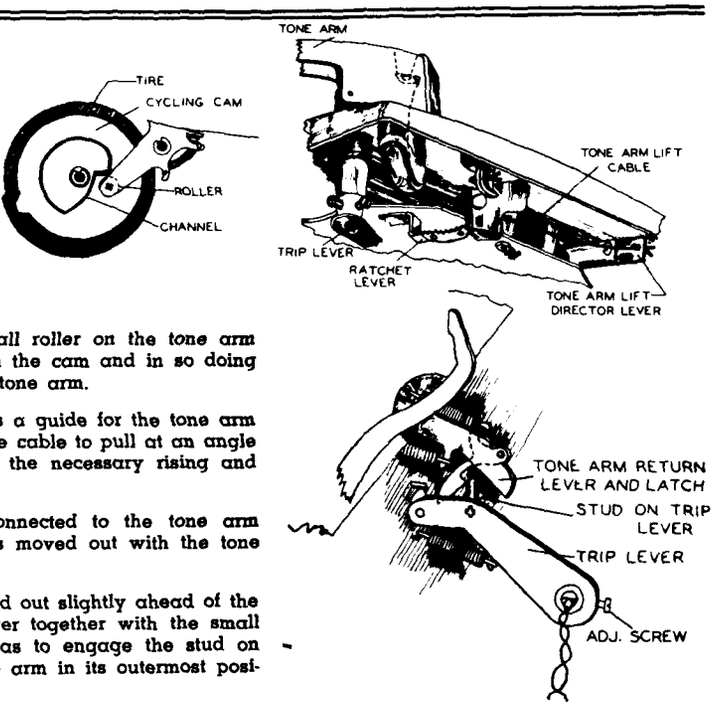
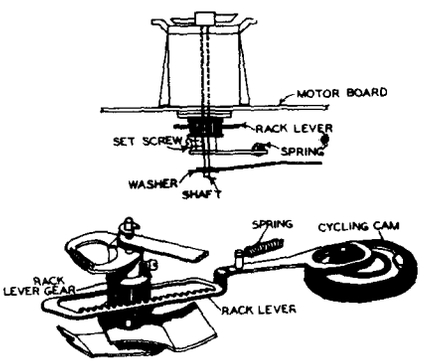


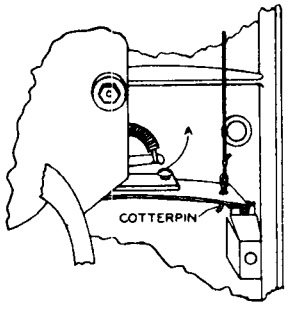
Figure 12

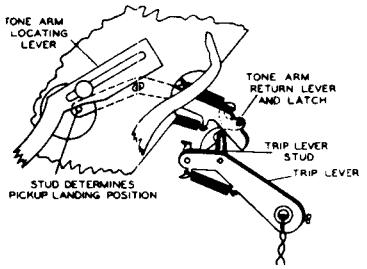
CYCLE OF OPERATION

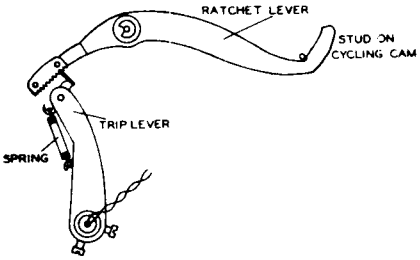
	Function	Explanation	
Operator	Lift and slide the record support to 10 or 12 inch position as desired	1. Record support locks in position and at the same time the record push cam and gear rotates and assumes a position as required for 10- or 12-inch records.	
Operator	Place the stack of records over the center post	1. The lower record of the stack is sitting on the step in the centerpost, and the edge is resting on the record support.	
Automatic Cycle	Push reject button	1. The end of the reject button extending through the motorboard contacts and moves ratchet lever. 2. Ratchet lever unlatches stud which is mounted on cycling carriage. This allows the tension spring to pull the cycling cam against the rotating knurled roller and start cycle.	
Automatic Cycle	Tone arm rises and moves out	1. As the cycling cam rotates the small roller on the tone arm director lever follows the channel in the cam and in so doing pulls on the cable connected to the tone arm. 2. The hole in the motorboard provides a guide for the tone arm cable. It is so placed as to allow the cable to pull at an angle slightly off 90 degrees thus giving the necessary rising and outward motion of the tone arm. 3. The trip lever which is rigidly connected to the tone arm through the tone arm pivot shaft is moved out with the tone arm. 4. The tone arm return lever has moved out slightly ahead of the trip lever. The tone arm return lever together with the small latch assumes such a position so as to engage the stud on the trip lever and stabilize the tone arm in its outermost position.	
Automatic Cycle	The record push cam together with the "step" in the centerpost separates the lower record of the stack allowing it to drop to the turntable	1. While the cycling cam is continuing to rotate, the rack lever is being pushed outward by the small eccentric elevated cam, with which it is engaged. 2. The teeth in the rack lever being engaged with record push cam gear, converts the sliding action of the rack lever into a rotary motion. 3. The rotary motion of the record push cam pushes the record off the step in the centerpost.	

CYCLE OF OPERATION

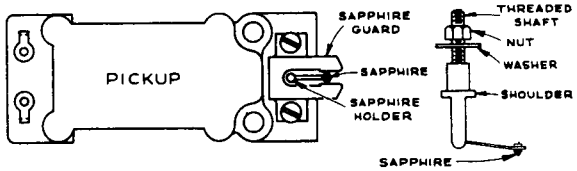
Function	Explanation
Tone arm moves in and lands on record	1. As the cycling cam is returning to normal position, the tone arm director lever is gradually allowing a slack in the tone arm cable. 2. While the tone arm director lever is gradually allowing slack in cable, the tone arm return lever is tending to retain the tension on the cable by returning the tone arm to the landing position. 3. The distance the tone arm return lever travels, while moving the pickup in for landing, is determined by the contact between the tone arm locating lever and the stud on the tone arm return lever. 4. After the tone arm return lever has moved the tone arm to the landing position the tone arm director lever continues to move and allow enough slack in the cable so the pickup can sit down on the start of the record.
Sapphire moves into record groove. Record begins to play	1. As the sapphire moves into the playing groove, the cycling cam becomes disengaged from the rotating knurled roller as the roller falls into the step in the cam. 2. The change cycle is completed as the stud on the cycling cam carriage becomes engaged with the ratchet lever. This engagement prevents the cycling cam from contacting the knurled roller, starting a new cycle.
The record plays	1. After the playing of the record, the pickup moves into the eccentric groove. 2. The movement of the pickup in the eccentric groove causes the trip pawl to engage the ratchet lever starting a new cycle. (The mechanism plays one side of each record in the stack then repeats the playing of the last record until the pickup is manually placed on the rest or the power removed from the mechanism.)







REPLACEMENT OF SAPPHIRE



Caution: Never bend the sapphire support wire.

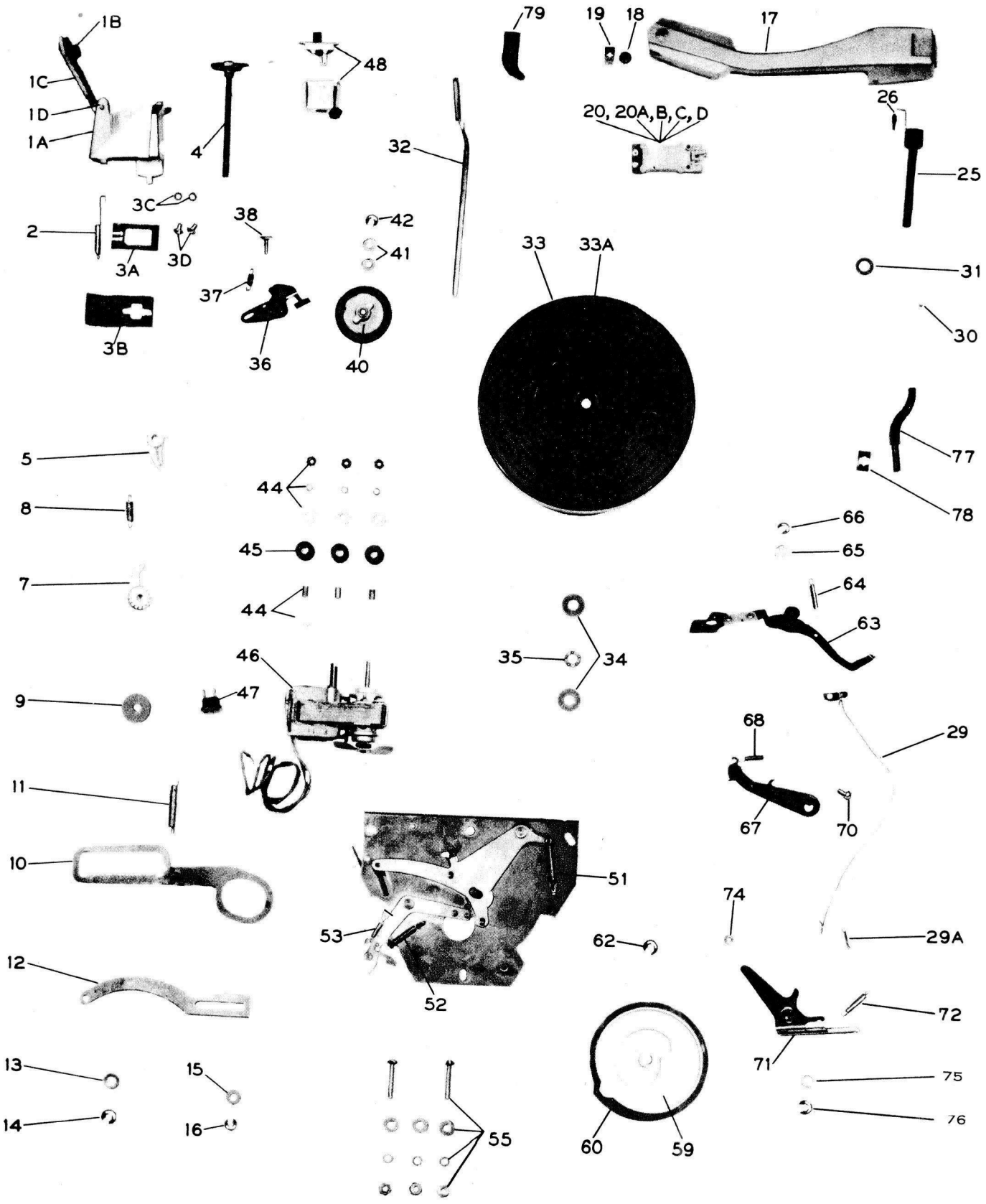
Extreme care should be used when loosening the sapphire mounting nut so that the twisting motion does not break the crystal.

Remove the two screws holding the sapphire guard in place and remove guard. Remove the small nut and washer on the threaded shaft of the sapphire holder and gently push the shaft through the hole in the armature shaft until the sapphire holder assembly comes free.

Do not use force as the crystal may be broken.

Insert threaded shaft of replacement sapphire holder through armature shaft and replace the washer and nut. Make sure that the sapphire is in the correct position. Take hold at the lower end of the shaft with a pair of pliers while tightening the nut, being very careful so as not to strip the threads or break the crystal. Replace the sapphire guard, positioning it by means of the oversize screw slots. Make certain that the sapphire and its supporting wire are centered in the guard. Tighten the guard screws. Before using, check to see that the sapphire projects far enough (approx. .020) beyond the guard so that the guard will not strike the record. If necessary, bend the guard a little.

Note: Pickup pressure should be approximately 1 to 1¼ oz.



Photograph of Parts

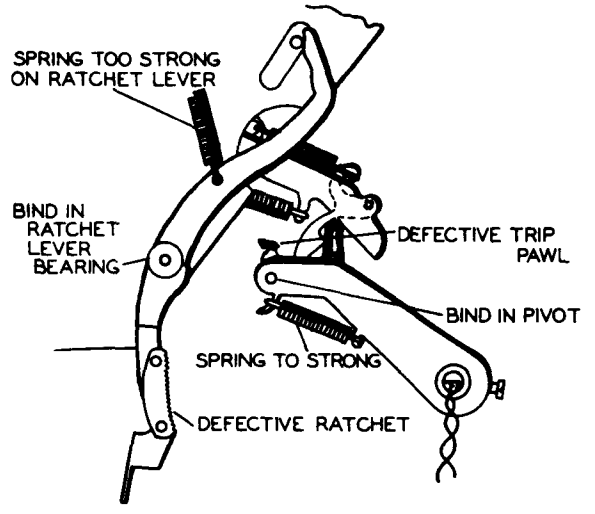
REPLACEMENT PARTS FOR MODEL RP178

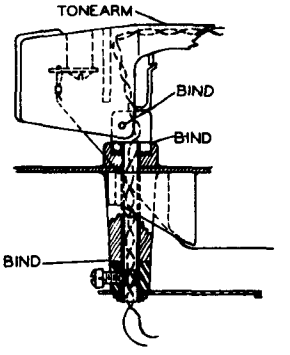
Insist on genuine factory tested parts, which are readily identified and may be purchased from authorized dealers.

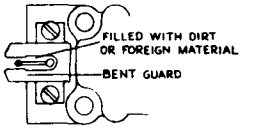
REF. NO.	STOCK NO.	DESCRIPTION
1A	72390	Record Support assy.complete with rubber cushion 1B,top clamp 1C and pins 1D.....
2	72357	Spring-Record support and clamp spring.....
3A	72391	Plate-Clamp 3A,plates 3B91 set) for record support assy.including lockwashers 3C & screws 3D...
4	72356	Cam-Record separator cam & shaft.
5	72360	Lever-Record push cam shaft lever (upper).....
7	72361	Lever-Record push cam shaft lever, lower gear and lever assy.....
8	72362	Spring-Record push cam shaft lever connecting spring.....
9	72354	Washer-flat washer between rack lever and record separator cam (Pkg.2).....
10	72371	Lever-rack lever.....
11	72370	Spring-rack lever spring.....
12	72352	Lever-tone arm locating lever....
13	70877	Washer-brass washer to mount locating lever to record separator cam shift and to main cam...
14	35969	Washer "C" washer (same as pt. #62.76) (Pkg.5).....
15	72351	Washer-brass washer (same as pt. #65) (Pkg.3).....
16	33726	Washer "C" washer, same as pt. #42.66 (Pkg.5).....
17	72338	Arm-pickup arm shell only.....
18	72344	Jewel-pickup arm jewel.....
19	38458	Nut-speed nut to hold parts #18 - #38 and pickup cable (Pkg.10)...
20	72551	Crystal-crystal cartridge complete
20A	72345	Sapphire & holder assembly.....
20B	70341	Nut, mounting washer and nut for sapphire.....
20C	38452	Guard-needle guard.....
20D	37763	Screw-screw for needle guard (Pkg.3).....
25	72339	Shaft-pickup arm shaft.....
26	72341	Pivot-pivot pin 26B & screw 26A for pickup arm shaft.....
29	72343	Cable-pickup arm lift cable complete (includes tie plate & cotter pin).....
29A	72386	Pin-cotter pin to fasten lift cable (same as Pt.#80).....
30	10941	Ball-steel ball for pickup arm shaft (Pkg.5).....
31	72348	Washer-thrust washer for pickup arm shaft (Pkg.3).....
32	72346	Spindle-turntable spindle or centre post.....
33	72355	Turntable-complete with knurled bushing and rubber mat.....
33A	72564	Mat-Rubber mat only.....
34	72350	Washer-Thrust washer for spindle (Pkg.2).....
35	72349	Bearing-Thrust Bearing.....
36	72395	Arm-Idler wheel arm & mounting lever.....
37	72393	Spring-Idler spring.....
38	72388	Stud-Mtg. stud for idler wheel arm (Pkg.2).....
40	72396	Wheel-Idler wheel including tire
41	39996	Washer-Fibre dampening washer for idler wheel (Pkg.10).....
44	72387	Mounting-Motor Mounting hdwe. (contains 6 washers, 3 spacers, 3 lockwashers and 3 nuts).....
45	72384	Grommet-rubber grommet for motor mounting (Pkg.2).....
46	S-4361	Motor-60 cycle.....
	S-4362	Motor-25 cycle.....
47	30870	Plug-2 prong male plug for motor
48	32875	Switch ("off-on" switch with cover.....
51	72367	Springs-cam mounting plate spring (Pkg.2).....
52	72375	Spring-return lever spring.....
53	72374	Spring-return lever latch spring
55	72347	Hardware-one set of mounting hardware to mount sub base.....
59	72368	Cam-main cam (including rubber tire).....
60	72369	Tire-rubber tire only for main cam.....
63	72377	Lever, ratchet lever complete with ratchet teeth.....
64	72372	Spring-ratchet lever spring.....
67	72358	Lever-trip lever with pawl, less spring.....
68	72359	Spring-trip lever spring (Pkg.10).....
70	39772	Screw-filister head set screw...
71	72378	Lever-tone arm lift director lever.....
72	72376	Spring-pickup lift cable lever spring.....
74	72380	Roller-cable lever roller.....
75	72381	Washer-flat washer to mount lift lever (Pkg.4).....
77	72383	Rest-tone arm rest.....
78	33225	Nut-speed nut for mounting tone arm rest (Pkg.10).....
79	72385	Lever-reject lever.....
	72382	Motorboard-Plastic motorboard less fittings.....
	S-4365	Mtg. - Motorboard mounting kit.....

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

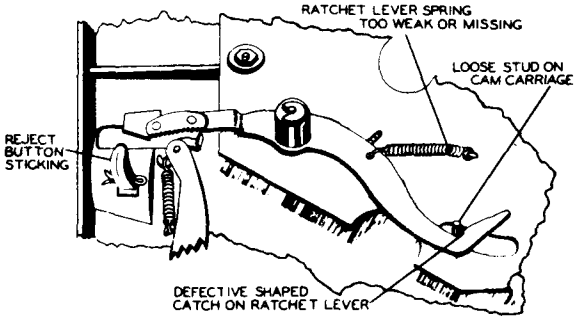
Pickup Repeats Grooves



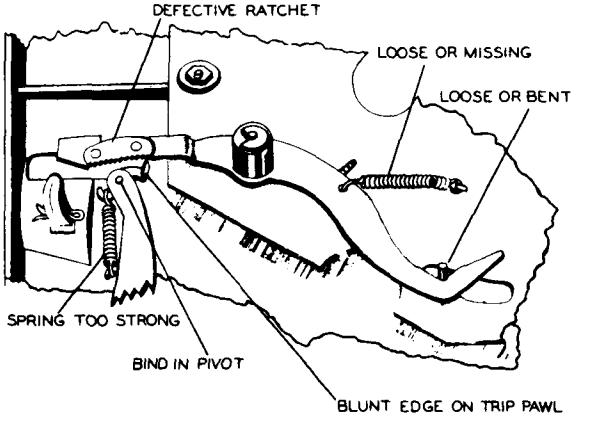




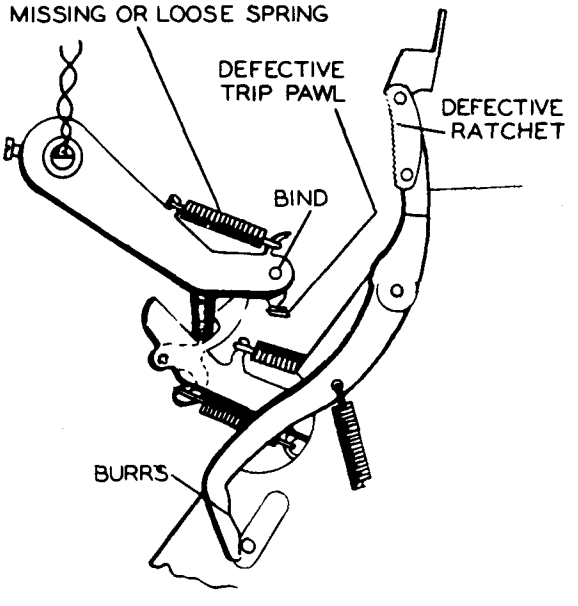
Continuous Tripping

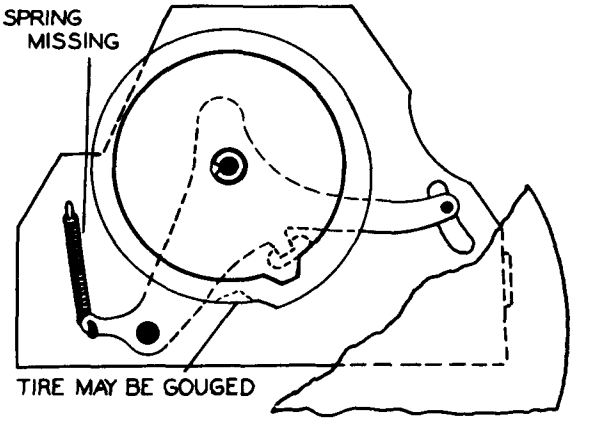


Premature Tripping

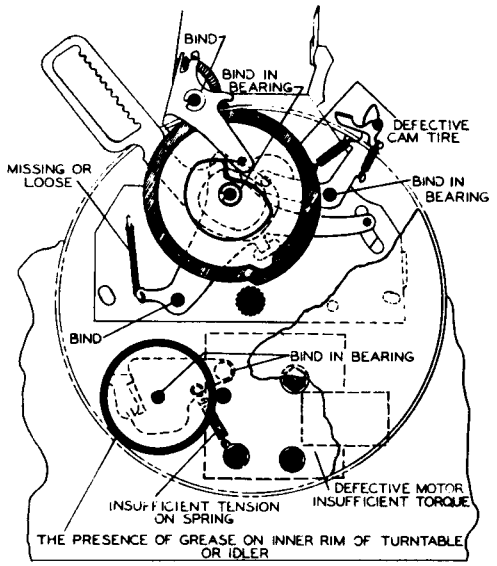


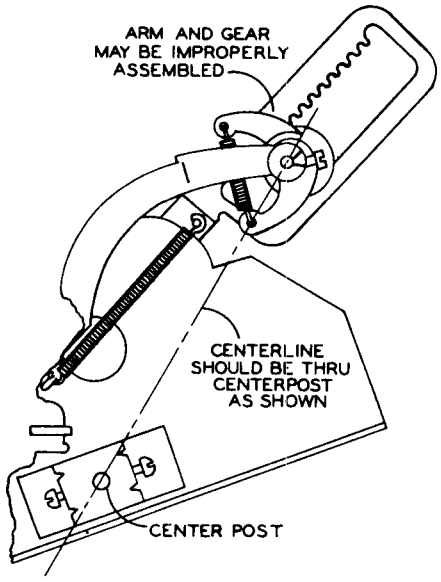
Failure To Trip or Go Into Cycle



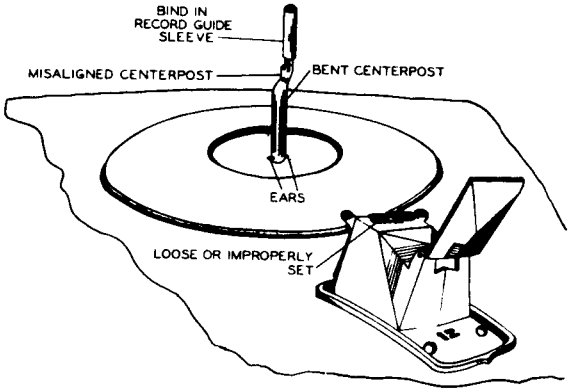


Changer Will Not Complete Cycle

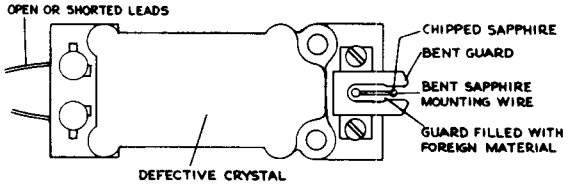




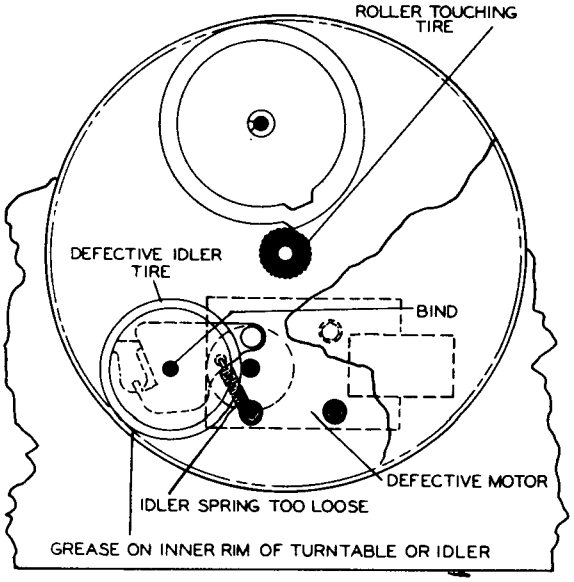
Records Do Not Separate or Drop Properly

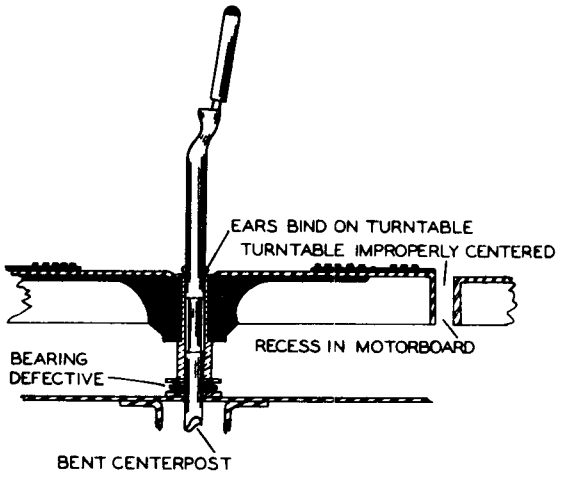


Distorted Output

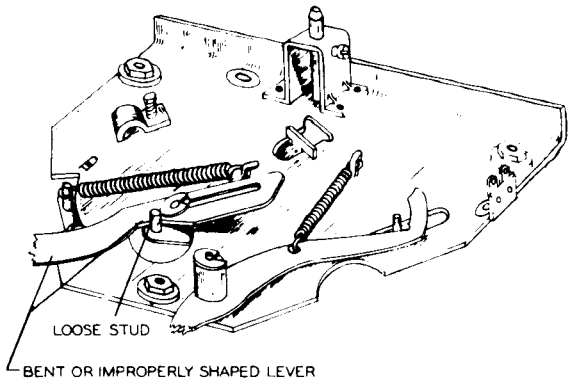


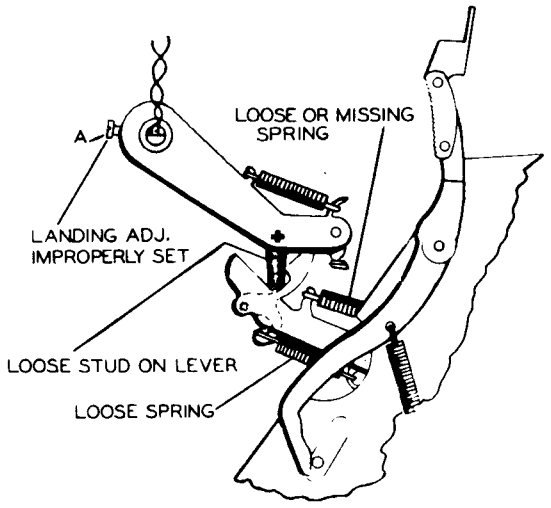
"Wow" or Slow Turntable Speed

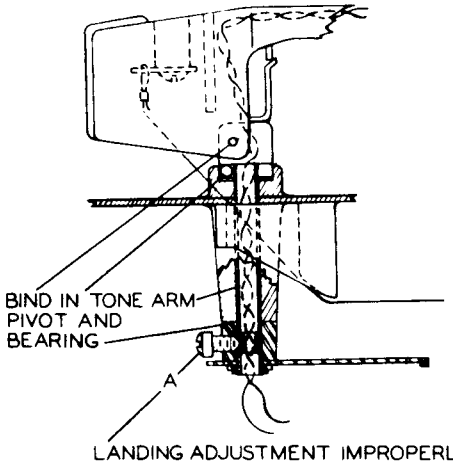


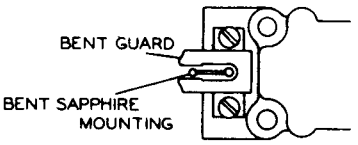


Improper Pickup Landing

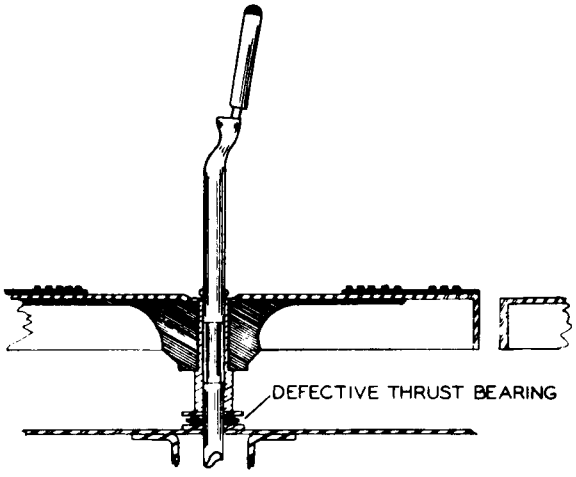


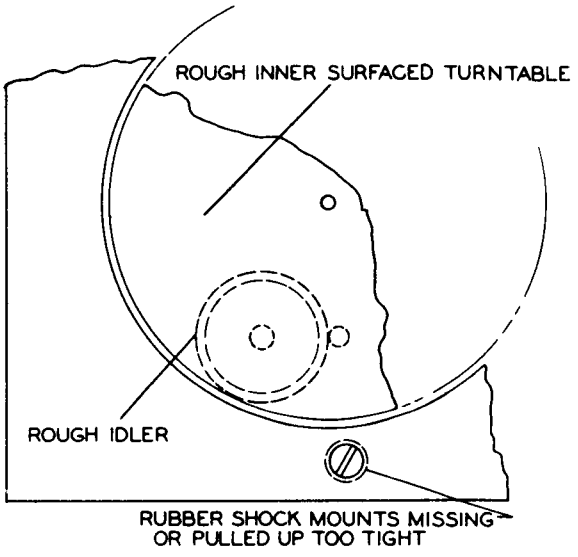






Rumble





RCA Victor

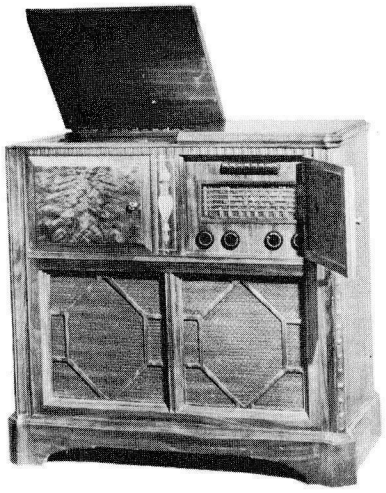
MODEL VRA-241

Eleven-Tube, Six-Band, A-C, Superheterodyne Radio Phonograph Combinations

TECHNICAL INFORMATION AND SERVICE DATA

— 1946 No. 11 —

SERVICE DIVISION • RCA VICTOR COMPANY LIMITED • MONTREAL



Electrical and Mechanical Specifications

Frequency Range

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	455 k.c.

Power Supply Ratings

Rating A ..... 105-125 volts, 50-60 cycle, 190 watts
Rating B ..... 105-125 volts, 25-60 cycle, 190 watts

Loudspeakers

Type CRL-529-1 ..... Electrodynamic 12 inch
Type RL71A-4.....Permanent Magnet Dynamic 12 inch
Voice Coil Impedance (both) at 400 C.P.S.....2.2 ohms

Cabinet Dimensions (inches)

	Height	Width	Depth
VRA-241	36 1/2	38	19

Radiotron Complement

(1)	Type 6SK7	R.F. Amplifier
(2)	Type 6SA7	First Detector-Oscillator
(3)	Type 6SK7	Intermediate Amplifier
(4)	Type 6H6	2nd Det. and A.V.C.
(5)	Type 6SF5	1st A. F. Amplifier
(6)	Type 6U5	Tuning Indicator
(7)	Type 6AD7G	Phase Inverter & Output
(8)	Type 6F6G	Power Output
(9)	Type 6F6G	Power Output
(10)	Type 6F6G	Power Output
(11)	Type 5U4G	Full Wave Rectifier

Power Output

Undistorted ..... 20 watts
Maximum ..... 24 watts

Phonograph

Type (RP160C) ..... Automatic
Record Capacity.....Twelve 10 inch or Ten 12 inch
Turntable Speed ..... 78 R.P.M.

Pickup

Type ..... Crystal
Pickup Impedance .....75,000 ohms at 1,000 cycles
Motor...Self starting, constant-speed, induction type

General Description

RCA Victor Model VRA-241 is a DeLuxe radio phonograph combination housed in console cabinets of exceptional beauty. The receiver employs an eleven tube, six band, superheterodyne circuit, the arrangement of which is shown in the schematic circuit diagram. Features of design include: Adjustable loop antenna; High gain R.F. Stage; Stabilized oscillator circuit; Magnetite core I.F. Transformers; Magnetite core oscillator coils; Automatic volume control circuit; Tuning indicator tube; Illuminated band indicator; Full range variable tone control; Push button tuning of seven Standard Broadcast stations by means of preset oscillator coils; Push-Pull Parallel output stage; Two 12 inch dust proof dynamic loudspeakers. The phonograph consists of Type RP160C Automatic record changer mechanism and a crystal pickup.

Reference to the RP160C Service Notes will disclose adjustment details and a parts list.

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; 2nd detector and A.V.C. stage. An audio circuit comprising a driver stage operating into an inverter is used to develop the high signal voltage required to obtain full output from the push-pull parallel output tubes; Temperature compensated capacitors in the oscillator circuits reduce oscillator drift. Spread band tuning is accomplished electrically by shunting the oscillator section of the variable capacitor with relatively large temperature stabilized capacitors for tuning the oscillator coils. Antenna and detector 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.

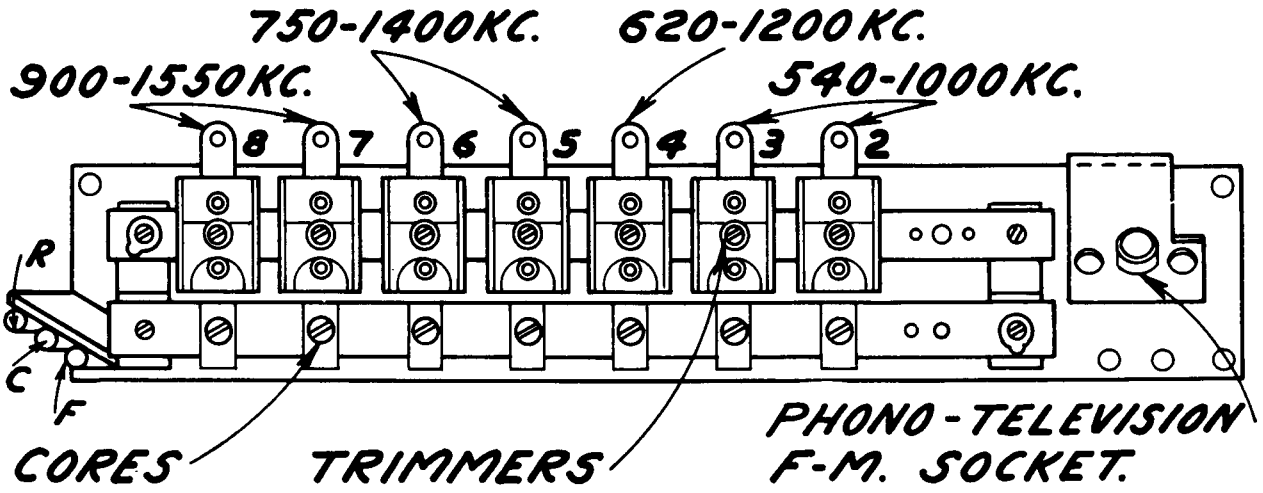


Fig. 1

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.

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 1, adjust core and padder 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 inaudable due to reception conditions a test oscillator should be substituted for the station signal.

Button No. 1 is used for Phonograph operation only.

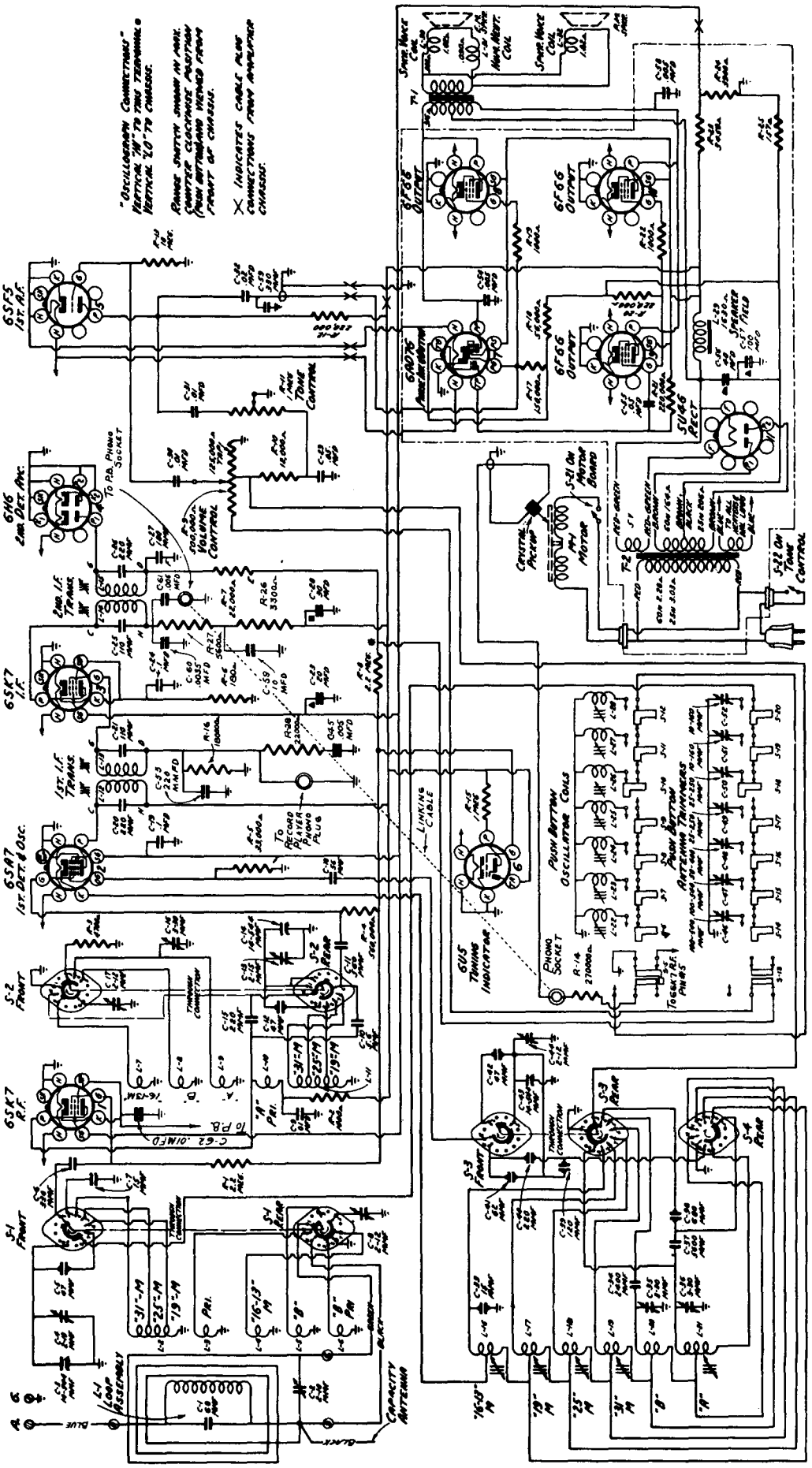
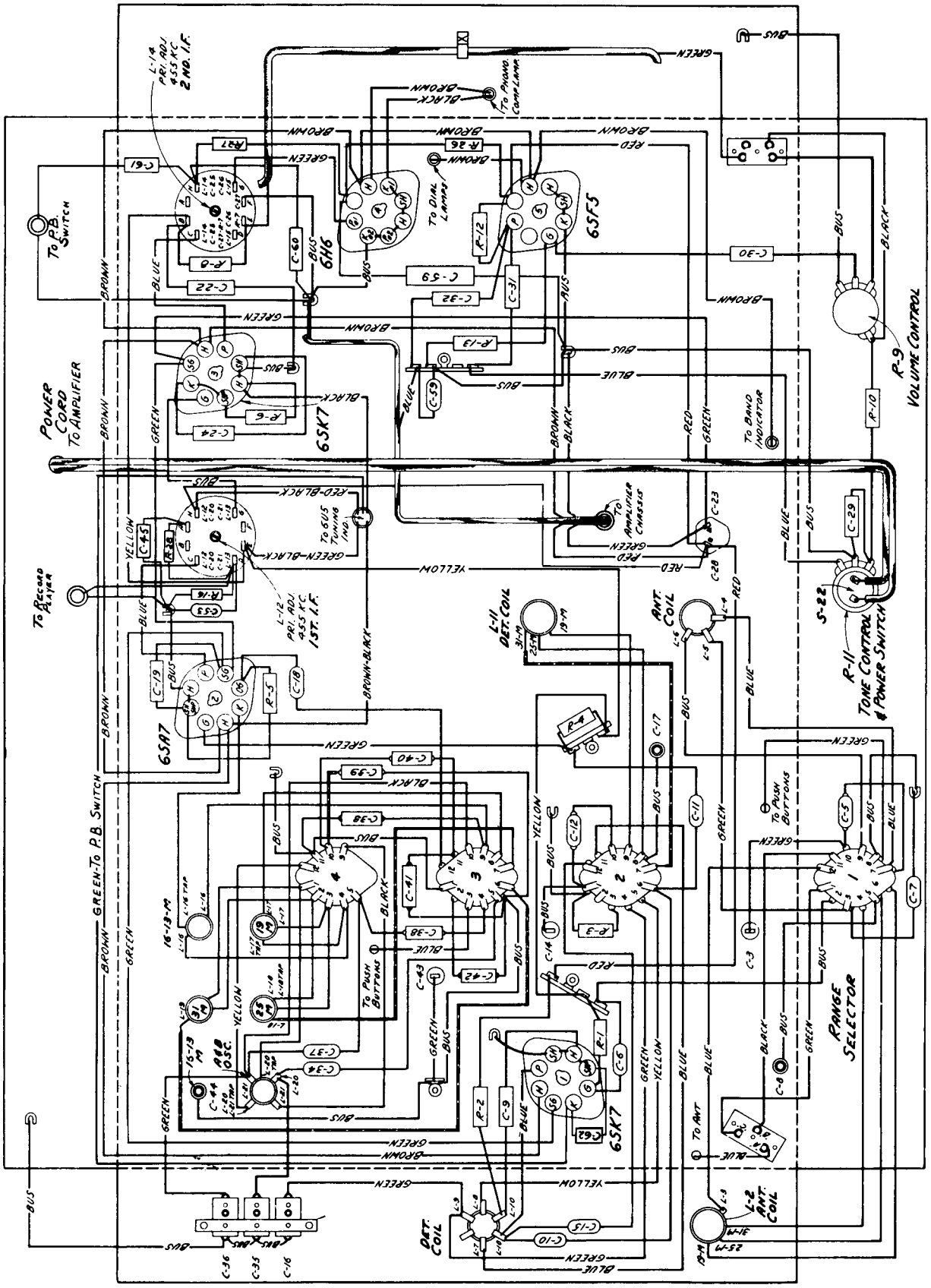


Fig. 2—Schematic Circuit Diagram


POWER CORD TO AMPLIFIER
TO P.B. SWITCH
TO RECORD PLAYER
GREEN-TO P.B. SWITCH
6SA7
6H6
6SF5
6SK7
6SK7
6SK7

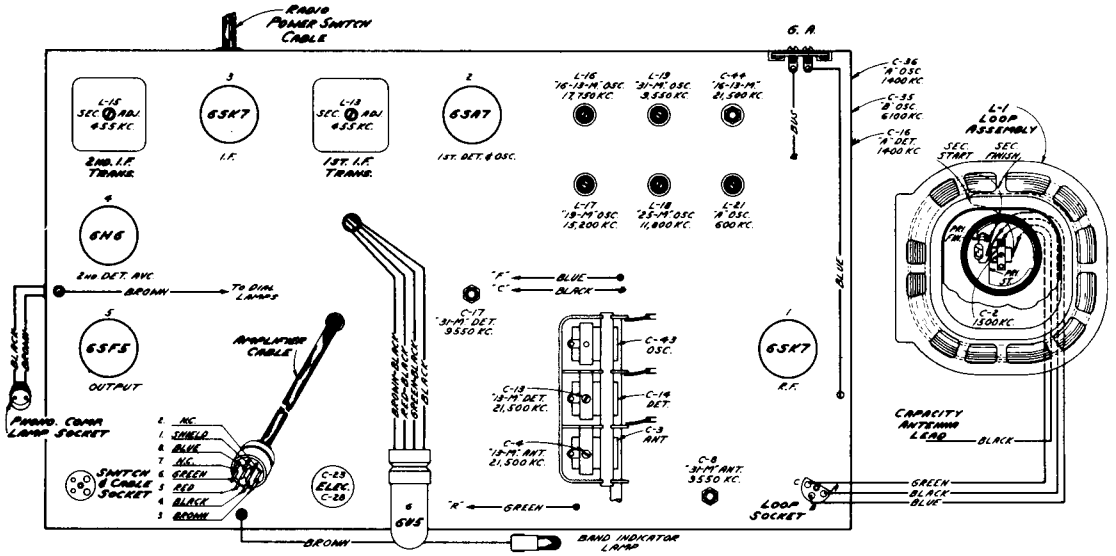


Figure 4—Chassis Layout and Alignment Adustments

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.	L14, L15
2	6SA7 Det. Grid	.1 Mfd.	455 kc	"A"	No Signal 550-750 kc	1st I.F. Trans.	L12, L13
3	Ant. Ter.	300 Ohms	6,100 kc	"B"	6.1 mc (149°)	"49 M" Osc.	C35
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.	L19
7	Ant. Ter.	300 Ohms	11,800 kc	"25 M"	11.8 mc (99°)	"25 M" Osc.	L18
8	Ant. Ter.	300 Ohms	15,200 kc	"19 M"	15.2 mc (94°)	"19 M" Osc.	L17
9	Ant. Ter.	300 Ohms	21,500 kc	"16-13 M"	21.5 mc (162°)	"16-13 M" Osc.	C44
10	Ant. Ter.	300 Ohms	17,750 kc	"16-13 M"	17.75 mc (17°)	"16-13 M" Osc.	L16
11	Ant. Ter.	300 Ohms	21,500 kc	"16-13 M"	21.5 mc (162°)	"16-13 M" Det.	C13
12	Ant. Ter.	300 Ohms	21,500 kc	"16-13 M"	21.5 mc (162°)	"16-13 M" Ant.	C4
13	Ant. Ter.	300 Ohms	1,400 kc	"A"	1,400 kc (155°)	"A" H-F Osc.	C36
14	Ant. Ter.	300 Ohms	600 kc	"A"	600 kc (33.5°)	"A" L-F Osc.	L21
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"

Radiotron Socket Voltages

Type	Circuit	Plate	Screen Grid	Cathode	Heater
6SK7	R.F.	190 v.	85 v.	—	6.3 v. A.C.
6SA7	Converter	190 v. 8	85 v.	—	6.3 v. A.C.
6SK7	I.F.	190 v.	85 v.	—	6.3 v. A.C.
6SF5	1st Audio	95 v.	—	—	6.3 v. A.C.
6AD7G	(Inverter & Output)	288 v.	188 v.	18 v.	6.3 v. A.C.
6F6G	Output	288 v.	188 v.	18 v.	6.3 v. A.C.
6F6G	Output	288 v.	188 v.	18 v.	6.3 v. A.C.
6F6G	Output	288 v.	188 v.	18 v.	6.3 v. A.C.
5U4G	Rectifier	366 A.C. Volts per plate		Rectified output 290 volts	Heater 5. v. A.C.

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.

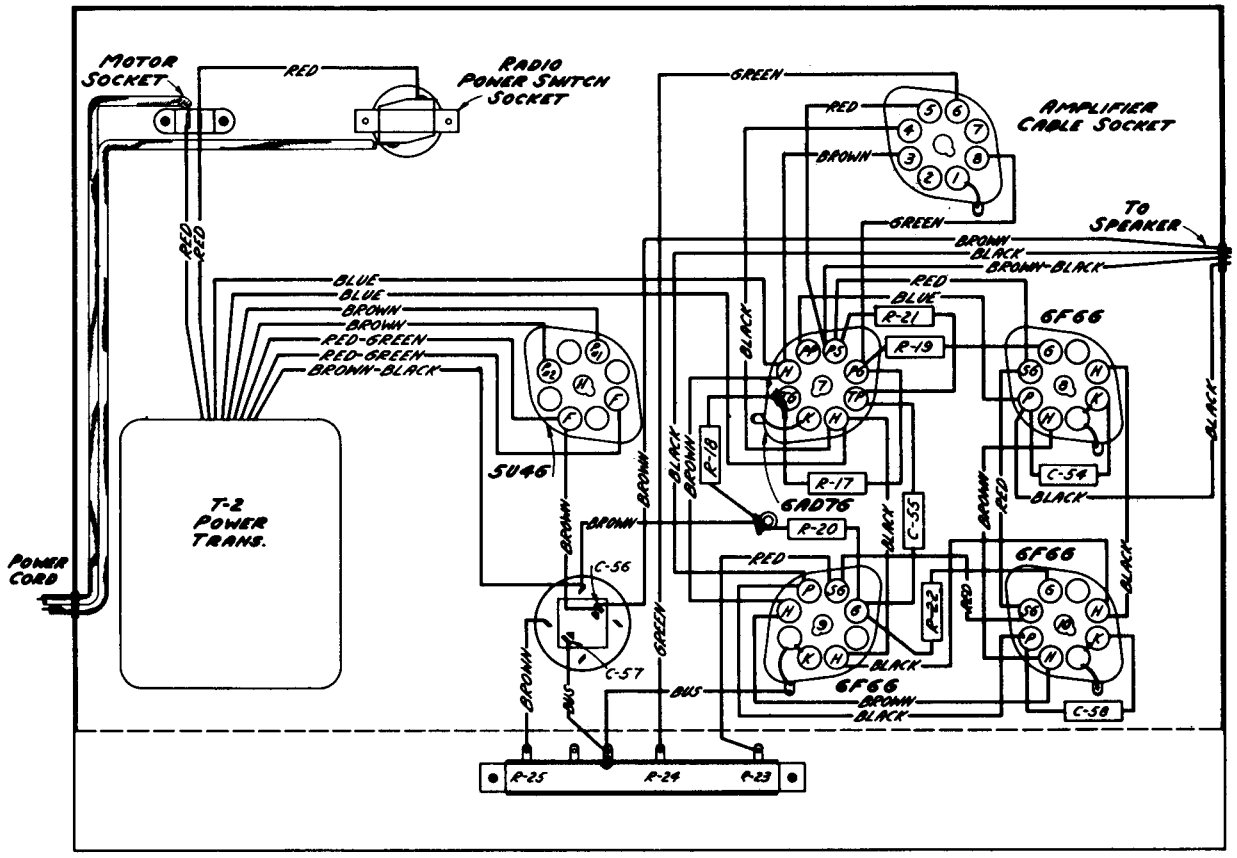
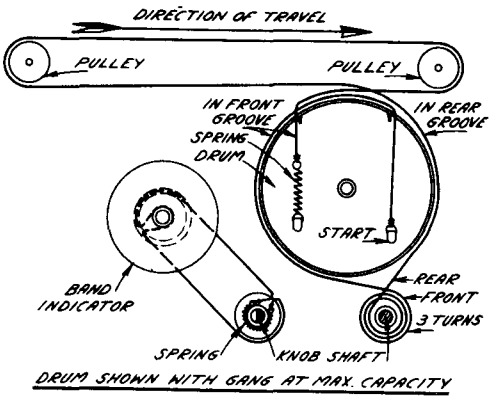
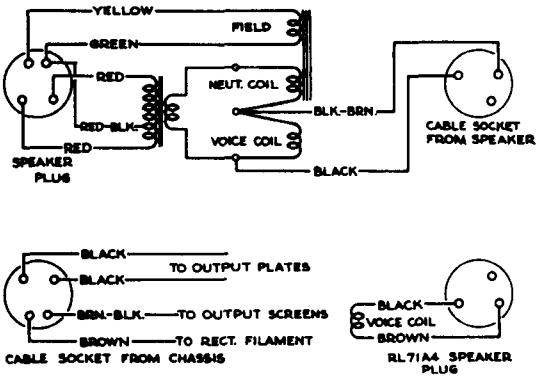


Fig. 6—Amplifier Wiring Diagram

Service Data



Drive Cords



Connections and Colours of Loudspeaker and Cable

Synchronizing Speakers.—In order to get correct tone quality from the dual-speakers used in this model, it is essential that the two speakers be so connected that the diaphragms of both work in unison or synchronism. If the terminals of one speaker are reversed the tone of the set will be flat.

To test for proper connections, turn on receiver with volume down and connect the terminals of a 1½-volt dry cell across the voice coil-terminals of either one of the speakers. If the diaphragms move in or out together at the instant of contact, the speaker connections are O.K. If one moves out and the other moves in, they are bucking, and the voice coil leads of one of the speakers should be reversed.

The movement of the diaphragms may be observed visually or by placing the finger-tips on each cone to feel the movement.

Adjusting Speaker Cone.—To center the loudspeaker voice coil, first remove the front dust cover, then loosen the screws holding the spider assembly. Insert three narrow feelers into the air gap, and tighten the spider screws. Remove the feelers and fasten a dust cover in place with loudspeaker cement.

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-bearing 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.

REPLACEMENT PARTS FOR MODEL VRA-241

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		35017	Capacitor-Electrolytic one section 20 mfd., one section 30 mfd. (C23,C28).....	
S-2876	Board-Antenna & Ground Terminal Board.....		S-2877	Coil-Antenna "B",16-13 M.Bands (L4,L5,L6).....	
12714	Capacitor-Adjustable trimmer 2-12 mfd. (C8,C17,C44).....		S-2878	Coil-Antenna coil 31-25-19 M. Bands (L2,L3).....	
34783	Capacitor-Adjustable trimmer capacitor bank C16,C35,C36.....		S-2879	Coil-R.F.Coil "A","B" 16-13 M. Bands (L7,L8,L9,L10).....	
12814	Capacitor-5.6 mmfd (C10).....		S-2880	Coil-R.F.Coil 31-25-19 M Bands (L11).....	
12896	Capacitor-15 mmfd. (C7).....		S-2881	Coil-Oscillator coil 19 M Bands (L17).....	
36012	Capacitor-15 mmfd. (Temp.Comp.)(C33)		S-2882	Coil-Oscillator coil 25 M Bands (L18).....	
S-3008	Capacitor-47 mmfd.(Close Tol.) (C5,C47).....		S-2883	Coil-Oscillator coil 31 M Bands (L19).....	
35644	Capacitor-47 mmfd.(Temp.Comp.)C42..		S-2884	Coil-Oscillator coil 16-31 M Bands (L16).....	
12723	Capacitor-56 mmfd.(" ")(C18)		S-2885	Coil-Oscillator coil "A" and "B" Bands (L20,L21).....	
S-3123	Capacitor-62 mmfd.(" ")(C41)		S-2898	Condenser-3 Gang Variable Condenser (C3,C4,C13,C14,C43).....	
39624	Capacitor-68 mmfd.(On Loop Ant.) (C1).....		S-2897	Cord-Indicator pointer drive cord 53.5 Lg.....	
S-3100	Capacitor-120 mmfd.(Close Tol.)(C39)		32634	Cord-Band indicator drive cord....	
12694	Capacitor-220 mmfd.(" ")(C15)		31273	Drum-Drive cord drum assembly.....	
S-2895	Capacitor-220 mmfd.(" ")(C40)		S-2927	Drum-Band indicator drive cord drum.....	
12952	Capacitor-330 mmfd.(" ")(C6,C59).....		S-2886	Indicator-Station selector indicator pointer.....	
12537	Capacitor-560 mmfd.(Close Tol.)(C11)				
S-2988	Capacitor-680 mmfd.(" ")(C38)				
12951	Capacitor-2400 mmfd.(" ")(C34)				
13895	Capacitor-5600 mmfd.(" ")(C37)				
14393	Capacitor-.01 mfd.(C9,C30,C31).....				
36248	Capacitor-.02 mfd. (C32).....				
32787	Capacitor-.05 mfd. (C22,C29).....				
4839	Capacitor-.1 mfd. (C19,C24).....				

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

REPLACEMENT PARTS FOR MODEL VRA-241—Cont'd

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

STOCK NO.	DESCRIPTION
S-2928	Indicator-Band indicator Ass.....
31480	Lamp -Dial lamp Mazda #47.....
5117	Lamp-Phono compartment Lamp Mazda #55.....
S-3415	Plug-Chassis amplifier connector cable plug 8 pin.....
30870	Plug-Pilot lamp connector plug (Male 2 pin).....
31280	Pulley-Drive cord pulley.....
30929	Resistor-270 ohm 1/2 watt (R6)...
14720	Resistor-1000 ohm-1/4 watt (R2)..
30146	Resistor-4700 ohm-1/4 watt (R3)..
30436	Resistor-12,000 ohm-1/4 watt(R10)
30685	Resistor-33,000 ohm-1/4 watt(R5).
14583	Resistor-220,000 ohm-1/4 watt(R12)
12486	Resistor-560,000 ohm-1/4 watt(R4)
13730	Resistor-1. megohm-1/10 watt(R15)
12679	Resistor-2.2 megohm-1/4 watt(R1, R8).....
30992	Resistor-10. megohm-1/4 watt.....
35969	Retainer-Drive cord Pulley Retainer-(Pkg.5).....
S-2888	Shaft-Station selector drive shaft
31364	Socket-Dial lamp socket.....
36422	Socket-Loop Antenna socket (3 contact).....
30868	Socket-Pilot lamp connector socket (2 contact).....
38853	Socket-Push button cable socket (4 contact).....
31251	Socket-Socket-Tube socket.....
30585	Spring-Band indicator drive cord spring (Pkg.2).....
13638	Spring-Drive cord tension spring (Pkg.2).....
S-2929	Switch-Range switch(S1,S2,S3,S4).
S-2892	Tone control and power switch (R11,S22).....
S-2899	Transformer-1st I.F.Transformer (L12,L13,C20,C21).....
S-2900	Transformer-2nd I.F.Transformer (L14,L15,C25,C27,R7).....
S-2906	Volume Control (R9).....
	AMPLIFIER ASSEMBLIES
33640	Capacitor-.005 mfd.(C54,C58).....
32787	Capacitor-.05 mfd. (C55).....
35016	Capacitor-Electrolytic,one section 40 mfd.one section 100 mfd. (C56,C57).....
14720	Resistor-1000 ohm 1/4 watt (R19,R22).....
30650	Resistor-56,000 ohm 1/4 watt(R18)
14020	Resistor-150,000 ohm 1/4 " (R17)
14583	Resistor-220,000 ohm 1/4 " (R20,R21).....
36618	Resistor-Wirewound voltage divide (R23,R24,R25).....
S-2824	Socket-A.C. Outlet.....
S-3414	Socket-Power switch socket.....
5040	Socket-Speaker connector socket (4 contact).....
31319	Socket-Tube socket.....
S-3393	Transformer Power-115 volts,T2, 50/60 cycle.....
36977	Transformer-Power 115 volts, 25/60 cycle (T2).....

STOCK NO.	DESCRIPTION
	SPEAKER ASSEMBLIES (12" Electrocynamic CRL 529-1)
13867	Cap-Speaker cone dust cap(Pkg.5)..
S-3376	Coil-Field coil (L29).....
36145	Cone-Speaker cone and voice coil (L30).....
5039	Plug-4 prong male plug.....
S-3377	Speaker-complete.....
36371	Transformer-Output (T1).....
	SPEAKER ASSEMBLIES (RL 71A-4 Permanent Magnet Dynamic)
13867	Cap-Speaker cone and dust cap (Pkg.5).....
36145	Cone-Speaker cone and voice coil (L32).....
5118	Plug-3 contact Male Plug.....
36372	Speaker complete.....
	AUTOMATIC RECORD CHANGER PICKUP & MECHANISM
	REFER TO RP160-C Service Note for Pickup and Mechanism Replacement Parts and Service Details.
	PUSH BUTTON ASSEMBLY
S-3409	Cable-shielded cable less plug....
30303	Capacitor-.0035 mfd. (C53).....
5148	Capacitor-.007 mfd. (C45).....
S-2930	Capacitor-Trimmer-Bank (C46,C52)..
35803	Coil-Oscillator coil (L22 to L28).
35871	Core-Oscillator coil core.....
S-3179	Plug-4 pin cable plug.....
30651	Resistor-270,000 ohm 1/2 watt (R14,R16).....
14278	Socket-Phono input socket.....
S-3049	Switch-Push button switch only S5 to S20.....
	MISCELLANEOUS ASSEMBLIES
35883	Button-Station selector push button.....
S-2913	Dial-Station selector dial scale..
36246	Holder-Needle package holder.....
13103	Jewel-Compartment lamp jewel.....
34489	Knob-Volume,tone,range or tuning knob.....
S-3410	Loop-Antenna loop assembly.....
36149	Marker-Push button call letter markers.....
32641	Plug-Loop Antenna plug.....
14270	Spring-Knob retaining spring(Pkg. 2).....
34053	Spring-Push button retaining spring (Pkg.5).....
S-2542	Tool-Push button set-up tool.....

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

RCA Victor

MODEL VR-245

Five-Tube Four-Band, A-C, Superheterodyne Radio Phonograph Combination

TECHNICAL INFORMATION AND SERVICE DATA

1946 No. 6

SERVICE DIVISION • RCA VICTOR COMPANY LIMITED • MONTREAL



Electrical and Mechanical Specifications

Frequency Ranges

Standard Broadcast (A)	540-1,570 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.

R. F. Alignment Frequencies

31 M (31 Meters)	9,550 k.c. (osc., ant.)
25 M (25 Meters)	11,800 k.c. (osc.)
19 M (19 Meters)	15,200 k.c. (osc.)
Standard Broadcast (A)	1,500 k.c. (osc., ant.)

Intermediate Frequency ..... 455 k.c.

Tuning Drive Ratio 12:1

Radiotron Complement

(1) Type-6SA7	First Detector-Oscillator
(2) Type-6SK7	Intermediate Amplifier
(3) Type-6SQ7	2nd Det., A. V. C. & A. F.
(4) Type-6F6G	Power Output
(5) Type-5Y4G	Full Wave Rectifier

Pilot Lamps (2) ..... Mazda No. 51, 6.3 volts, 0.2 amp.

Power Supply Ratings

Rating A ..... 105-125 volts, 50-60 cycles, 90 watts

Rating B ..... 105-125 volts, 25-60 cycles, 90 watts

Power Output

Undistorted	2 watts
Maximum	4.5 watts

Loudspeaker (Elliptical)

Type	6"x9" Electrodynamic
Impedance (V.C.)	4.5 ohms at 400 cycles

Phonograph

Turntable Speed	78 R.P.M.
Pickup	Crystal; 100,000 ohms at 1,000 cycles
Average Output	1½ volts at 1,000 cycles across ½ meg.

Cabinet Dimensions

Height	14 5/16 inches
Width	20⅝ inches
Depth	13½ inches

General Description

The Model VR-245 is a table Phonograph Radio Combination, employing a five-tube, four band superheterodyne circuit, the arrangement of which is shown in the Schematic Circuit Diagram.

Features of the Design include, loop antenna as the first tuned circuit; three Spread Bands; Magnetite core oscillator coils; Temperature stabilized capacitors in the Oscillator circuit resulting in less frequency drift; Magnetite Core; I. F. Transformers; Automatic two position Tone Control circuit; Dust-proof electrodynamic loudspeaker; and a large edge lighted dial individually calibrated for each band.

Features of the Phonograph include a new light weight crystal Pickup; a rim drive constant speed Motor, with automatic Stop Start Switch.

Circuit Arrangement

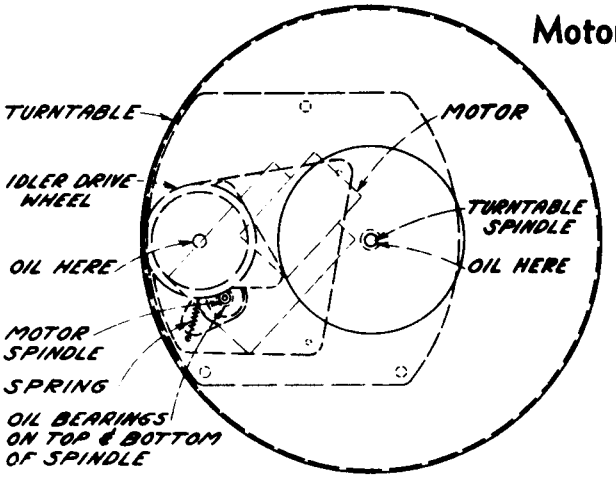
The circuit consists of a first detector (oscillator) stage incorporating the Loop Antenna as the first tuned circuit; I.F. amplifier stage; second detector, A.V.C. and first Audio stage; single pentode output operating in Class A-B; and a well regulated power supply.

The Loop Antenna used in the first tuned stage is in the circuit on the "A" band; temperature compensated capacitors are used in the oscillator circuits to reduce oscillator drift.

The intermediate frequency amplifier consists of a Type 6SK7 tube in a single stage transformer-coupled circuit. The windings of both I.F. Transformers are resonated by magnetite cores and are adjusted by adjustable capacitors to tune to 455 K.C.

The Audio circuit is a conventional resistance-coupled stage.

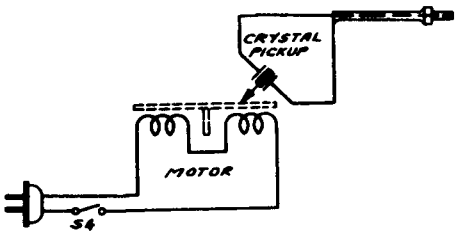
Motor and Pickup Data



Motor Top View

Phonograph Motor Service Data:—

The phonograph motor is of the self starting synchronous type and operates the turntable through friction drive between the motor drive spindle and the rubber tired idler on the rim of the turntable.



Motor & Pickup Circuit

The motor should be lubricated once or twice a year by placing a few drops of S. A. E. 20 (or equivalent) on the turntable spindle and saturating the oil retaining felt pads on the motor shaft with S. A. E. 10 oil. Caution—The motor drive spindle and the rubber tire on the idler must be kept clean and entirely free from oil and grease at all times.

Service Data—Crystal Pickup

The Crystal Pickup unit is thoroughly sealed in a metal casing, against extreme changes of climate. The offset pickup arm ensures ideal tracking of Needle in the Record grooves. If failure occurs due to a defective crystal, no attempt should be made to repair the unit, but a new replacement crystal cartridge should be installed. To replace Crystal:— Remove two fillister head screws, lift crystal cartridge from arm, remove female cable plug from the Crystal. The arm uses a removable type needle.

RADIOTRON SOCKET VOLTAGES

Type	Plate	Screen Grid	Control Grid	Cathode	Heater
6SA7 Conv.	270V	100V	....	....	6.4V
6SK7 I.F.	275V	100V	....	....	6.4V
6SQ7 Audio	80V	.....	....		6.4V
6F6G Output	250V	260V	....	16V	6.4V
5Y4G Rectifier	Transformer A.C. output measured from each plate to chassis			345V A.C.	5.0V

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

Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph should be made to the chassis and the green lead on the volume control.

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 180° 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 condenser gang, and bend the wire so that it points to the 180° mark on the calibration scale when the plates are fully meshed.

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 scales. 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-bearing 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 final adjustments should be made with the chassis fastened in the cabinet and the pointer accurately aligned to the dial.

Order of Alignment	Test Oscillator			Range Selector	Receiver Dial Setting	Circuit to Adjust	Adjustment Symbols
	Connection to Receiver	Dummy Antenna	Frequency Setting				
1	Control Grid 6SK7	.1 Mfd.	455 k.c.	"A"	No Signal 550-750 k.c.	2nd I.F. Transformer	C11 & C12
2	Control Grid 6SA7	.1 Mfd.	455 k.c.	"A"	550-750 k.c.	1st I.F. Transformer	C8 & C9
3	Ant. Terminal	300 Ohms	1,500 k.c.	"A"	1,500 k.c. 22°	"A" Osc.	C25
4	Radiated signal *	—	1,500 k.c.	"A"	1,500 k.c. 22°	"A" Ant.	C1
5	Ant. Terminal	300 Ohms	15,200 k.c.	19 M	15,200 k.c. 93°	19 M Osc.	L11
6	Ant. Terminal	300 Ohms	11,800 k.c.	25 M	11,800 k.c. 82°	25 M Osc.	L12
7	Ant. Terminal	300 Ohms	9,550 k.c.	31 M	9,550 k.c. 104°	31 M Osc.	L13
8	Ant. Terminal	300 Ohms	9,550 k.c.	31 M	9,550 k.c. 104°	31 M Ant.	C4

All adjustments indicated above except operation 4, are made with antenna link in the **open** position.

*Radiation loop comprising two turns of wire 18 inches in diameter should be connected to test oscillator and placed approximately 4 feet from receiver before adjusting C1.

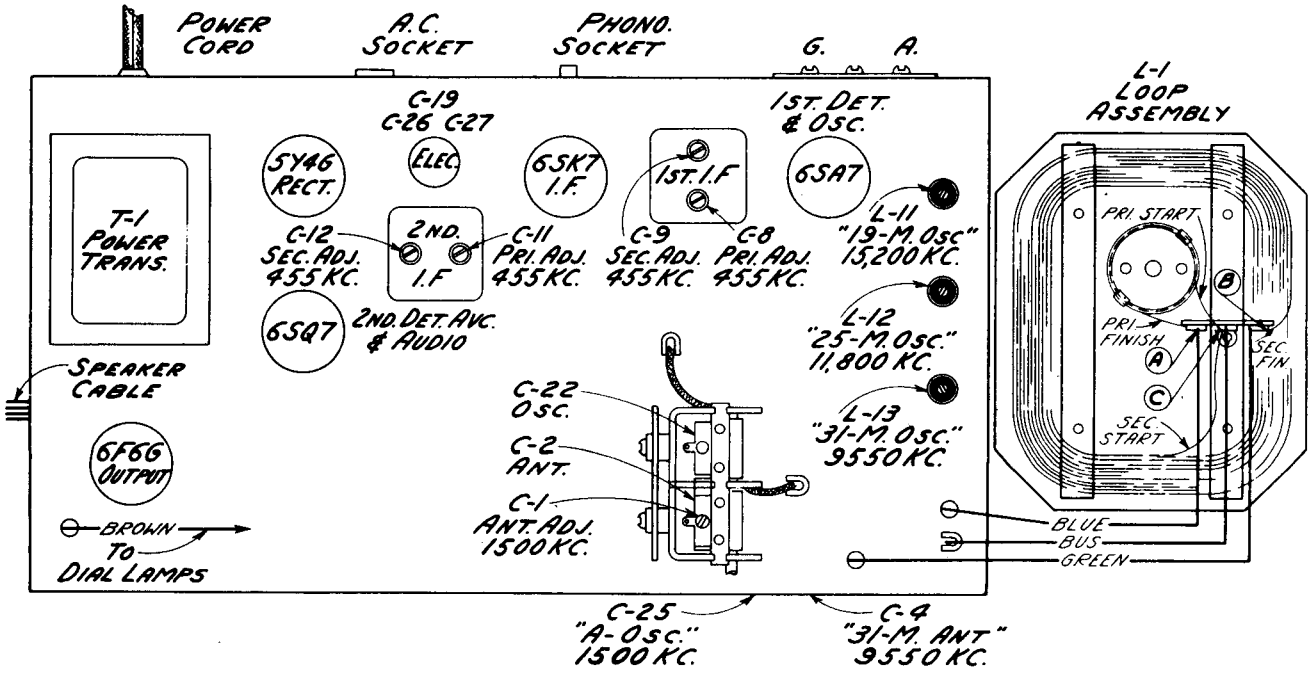


Figure 1—Chassis Layout and Alignment Adjustments

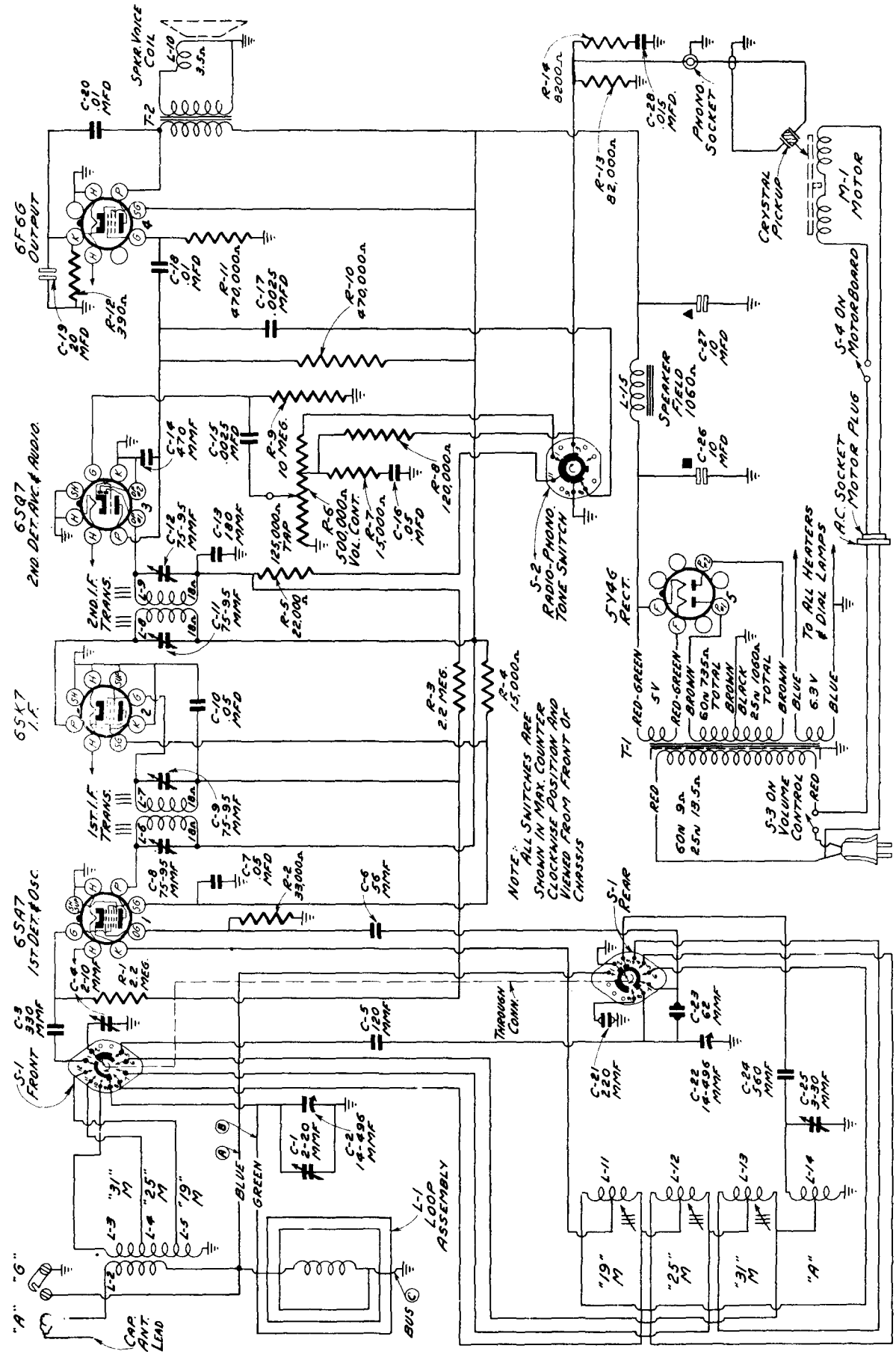


Figure 2—Schematic Circuit Diagram

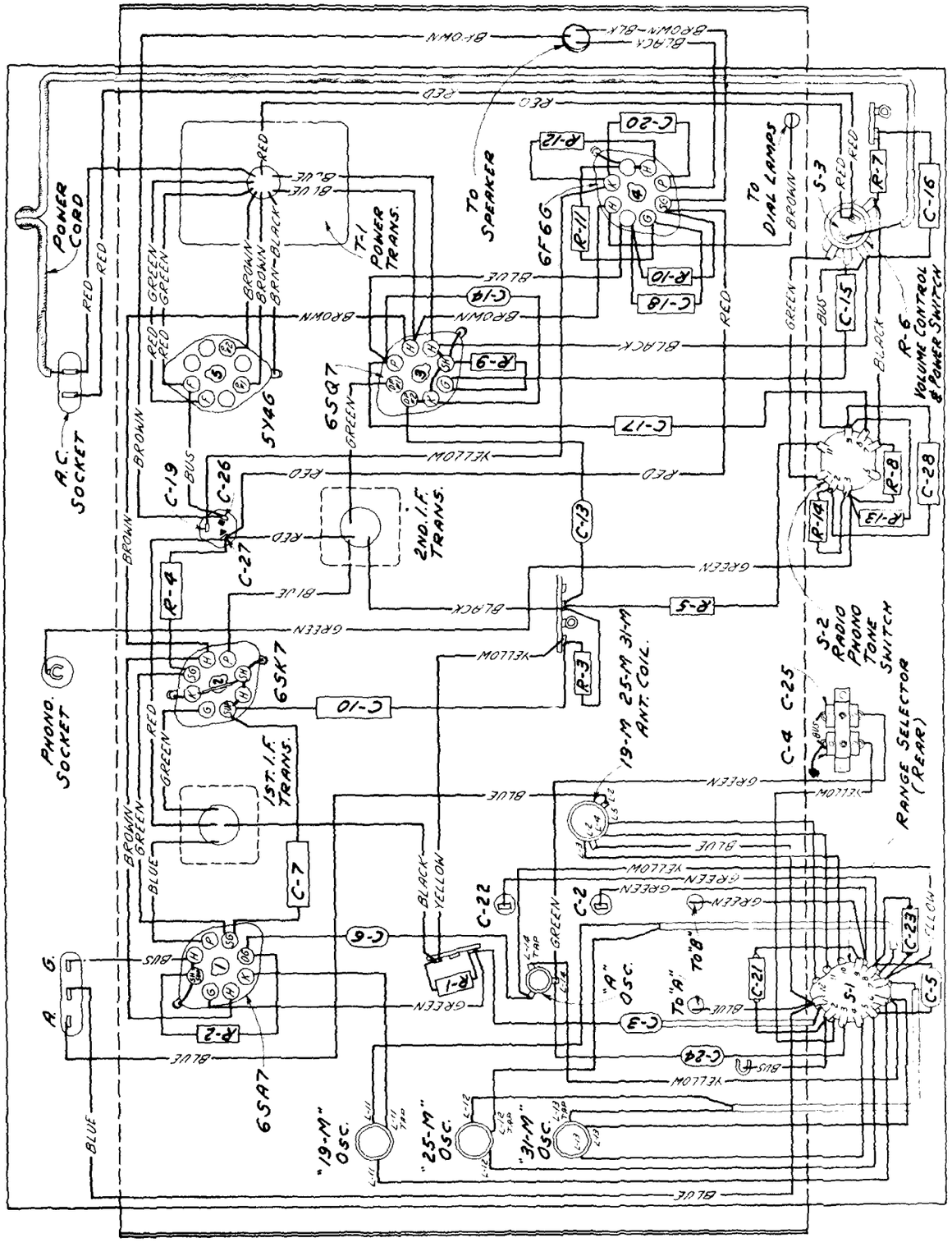


Figure 3—Chassis Wiring Diagram

REPLACEMENT PARTS FOR MODEL VR-245

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

STOCK NO.	DESCRIPTION
	RECEIVER ASSEMBLIES
34025	Board-Ant.& Ground terminal board
S-3099	Capacitor,Adjustable trimmer bank comprising one of 2-10 mmfd.one of 3-30 mmfd. (C4,C25).....
12723	Capacitor,56 Mmfd. (C6).....
S-3123	Capacitor,62 Mmfd.(C23)(Temp.Comp)
12724	Capacitor,120 Mmfd.(C5).....
13003	Capacitor,180 Mmfd.(C13).....
S-2895	Capacitor,220 Mmfd.(C21)(Close Tol)
12952	Capacitor,330 Mmfd.(C3).....
30433	Capacitor,470 Mmfd.(C14).....
12537	Capacitor,560 Mmfd.(C24).....
5107	Capacitor,.0025 Mfd.(C15,C17)....
33584	Capacitor,.01 Mfd.(C18,C20).....
11315	Capacitor,.015 Mfd.(C28).....
32787	Capacitor,.05 Mfd. (C7,C10,C16)...
32240	Capacitor,Electrolytic-comprising two sections of 10 mfd; one section of 20 mfd.(C19,C26,C27).
S-3109	Coil,Antenna,19,25,31 meter band (L2,L3,L4,L5).....
S-3111	Coil,Oscillator "A" band (L14)...
S-3114	Coil,Oscillator 19M band (L11)...
S-3112	Coil,Oscillator 25M band (L12)...
S-3113	Coil,Oscillator 31M band (L13),..
S-3149	Condenser,two gang tuning condenser (C1,C2,C22).....
32634	Cord,drive cord.....
35627	Drum,drive cord drum.....
S-3152	Indicator-station selector indicator pointer.....
11765	Lamp, dial lamp Mazda #51.....
S-3108	Loop Antenna, loop assembly.....
S-3178	Pulley, dial cord pulley (Pkg.2).
31388	Resistor,390 ohms,1 watt (R12)...
14250	Resistor,8,200 ohms,1/4 watt(R14)
36714	Resistor,15,000 ohms 1/4 " (R7).
33489	Resistor,15,000 ohms 2.5 " (W.W) (R4)..
30492	Resistor,22,000 ohms 1/4 watt(R5)
30685	Resistor,33,000 ohms 1/4 watt(R2)
14023	Resistor,82,000 ohms 1/2 watt(R13)
13734	Resistor,120,000 ohms 1/4 " (R8)
30648	Resistor,470,000 ohms 1/4 " (R10,R11).....
12679	Resistor,2.2 Megohms 1/4 watt(R1,R3)
30992	Resistor,10 Megohms 1/4 watt(R9).
33726	Retainer "C" washer for drive shaft (Pkg.5).....
34373	Retainer "C" for pulleys(Pkg.5)..
S-3155	Shaft-station selector drive shaft
S-2824	Socket-A.C. socket.....
31364	Socket,dial lamp socket.....
35787	Socket,phono input socket.....
34723	Socket,speaker cable connector...
31319	Socket,tube socket.....
30585	Spring-Drive cord tension spring (Pkg.2).....
S-3151	Switch, range switch (S1).....
S-3232	Switch, phono radio tone switch(S2)

STOCK NO.	DESCRIPTION
	RECEIVER ASSEMBLIES - Cont'd.
S-3239	Transformer,1st I.F.(L6,L7,C8,C9)...
S-3240	Transformer,2nd I.F.(L8,L9,C11,C12).
S-2457	Transformer,110-125 volt 60 cycle power (T1).....
33618	Transformer,110-125 volt 25 cycle power (T1).....
S-3150	Volume Control & Switch (R6,S3).....
	SPEAKER ASSEMBLIES
31825	Cap,dust cap for cone centre(Pkg.5).
S-3311	Cone,speaker cone & voice coil(L10).
5118	Plug-3 contact male connector plug..
S-3231	Speaker,complete (L10,L15,T2).....
S-3312	Transformer, output (T2).....
	MOTOR ASSEMBLIES
S-3077	Motor-110 volt,60 cycle complete(M1)
S-3078	Motor-110 volt,25 " " (M1)
4577	Plug,2 contact male motor plug.....
S-3079	Spindle,turntable spindle.....
S-3080	Spring,drive wheel tension spring (Pkg.2).....
S-3081	Turntable (9" dia).....
S-3082	Wheel,rubber tired drive wheel.....
	AUTOMATIC SWITCH ASSEMBLY
38996	Cam,Cam ass'y comprising main & auxiliary cam, hub & set screw....
4319	Screw,set screw for cam hub (Pkg.2).
36521	Spring,actuating lever tension spring (Pkg.2).....
S-3500	Switch, contact & plunger (S4).....
	PICKUP ARM ASSEMBLY
S-3459	Arm-pickup arm.....
S-3511	Base-Pickup arm base & pivot & base..
S-3461	Crystal-Pickup crystal cartridge....
31054	Grommet-Pickup base rubber grommet..
S-3462	Screw-Pickup needle screw (Pkg.2)...
S-3465	Screw- " crystal retaining screw (Pkg. 10).
S-3466	Spring-Pickup cable retaining spring
	MISCELLANEOUS ASSEMBLIES
S-3148	Dial Scale.....
S-3184	Knob-Range Switch.....
S-3086	Knob-Phono radio tone switch.....
S-3101	Knob-Tuning.....
S-3102	Knob-Volume Control.....
30900	Spring-Knob retaining spring(Pkg.5).
S-3463	Support-Pickup arm support.....

All parts & prices subject to change or withdrawal without notice.

RCA Victor

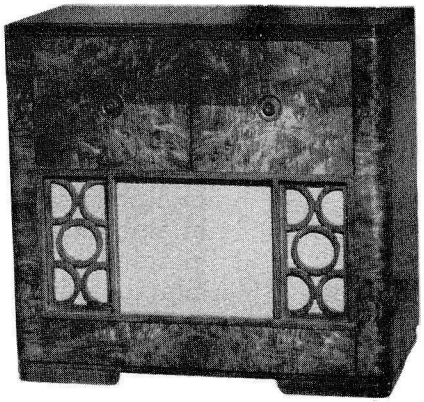
MODEL VRA-249

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.

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)

Intermediate Frequency ..... 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.	
(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	

Pilot Lamps (4) ..... 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 13/16 inches
Width	37¼ inches
Depth	18½ 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; Illuminated 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 indictator 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 electrically 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.

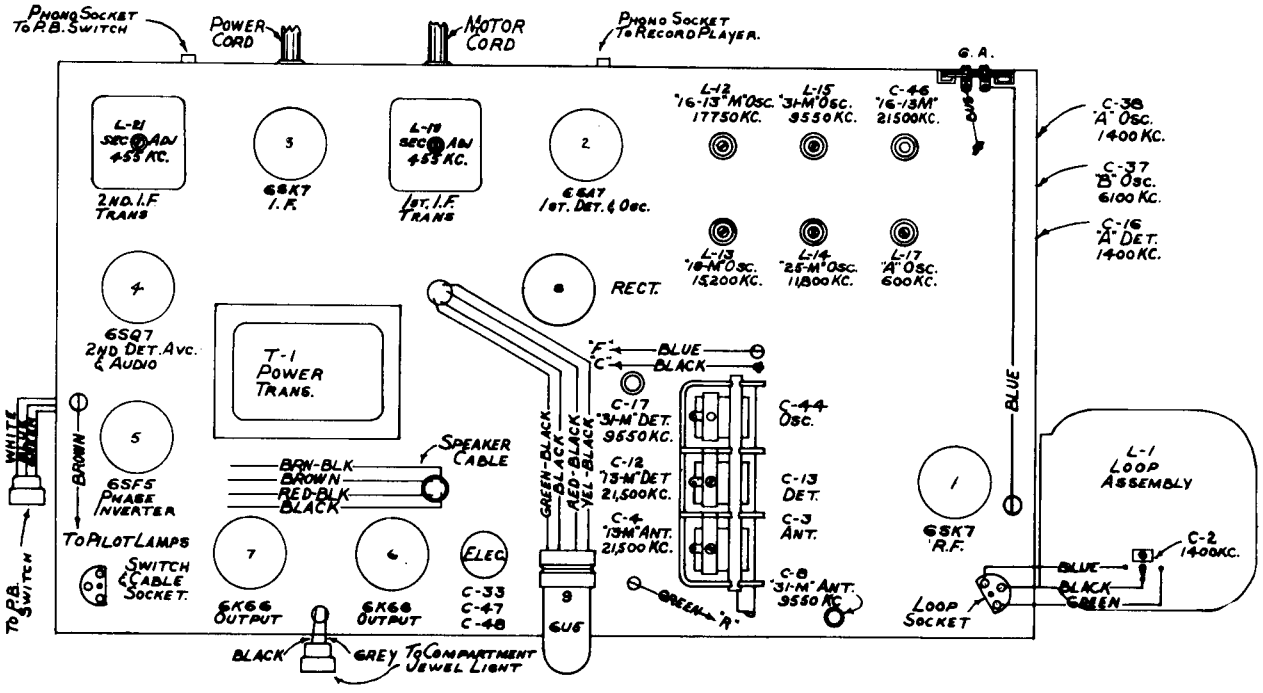


Fig. 1—Chassis Layout and Alignment Adjustments

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-bearing 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.

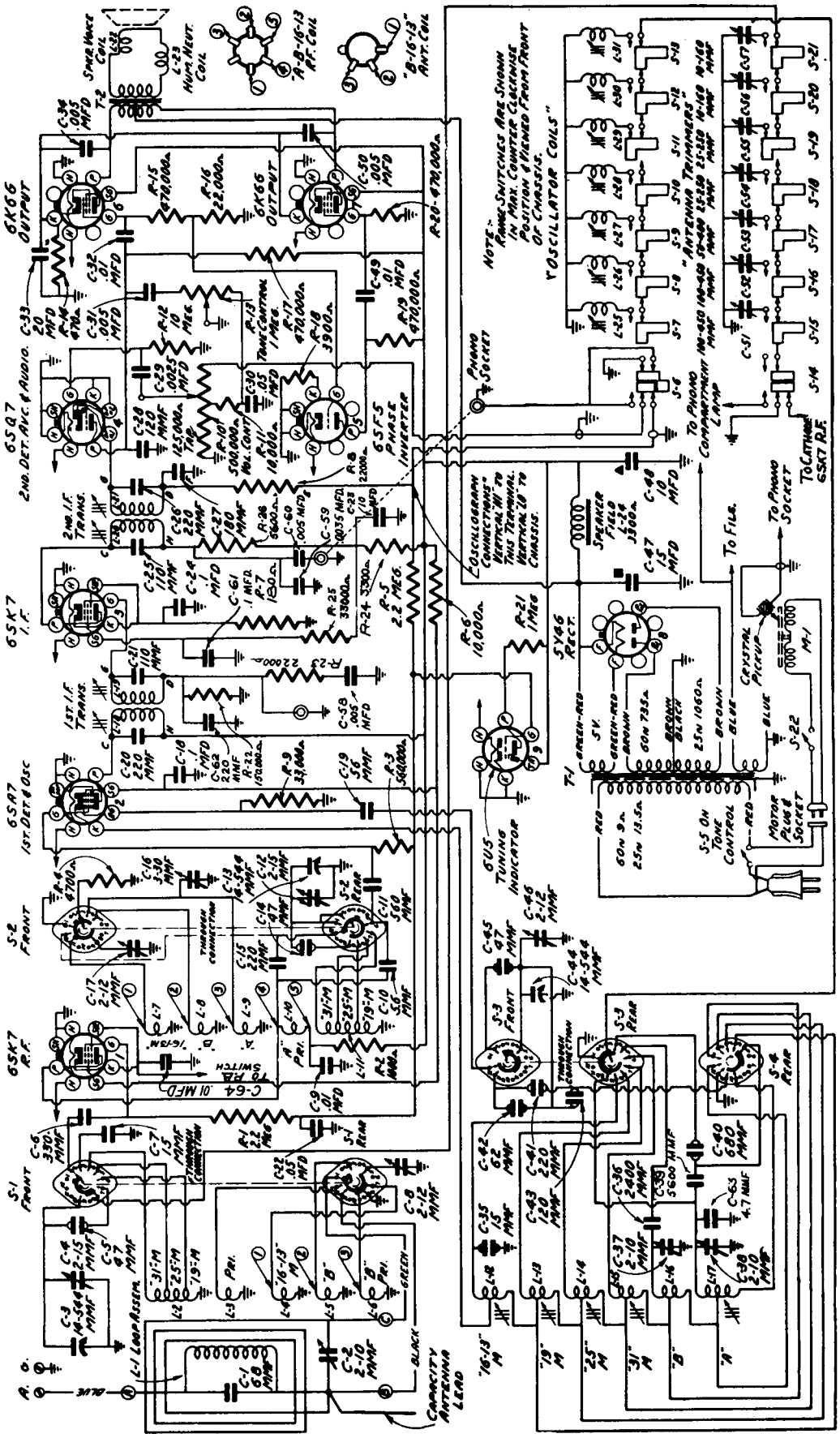


Figure 2—Schematic Circuit Diagram

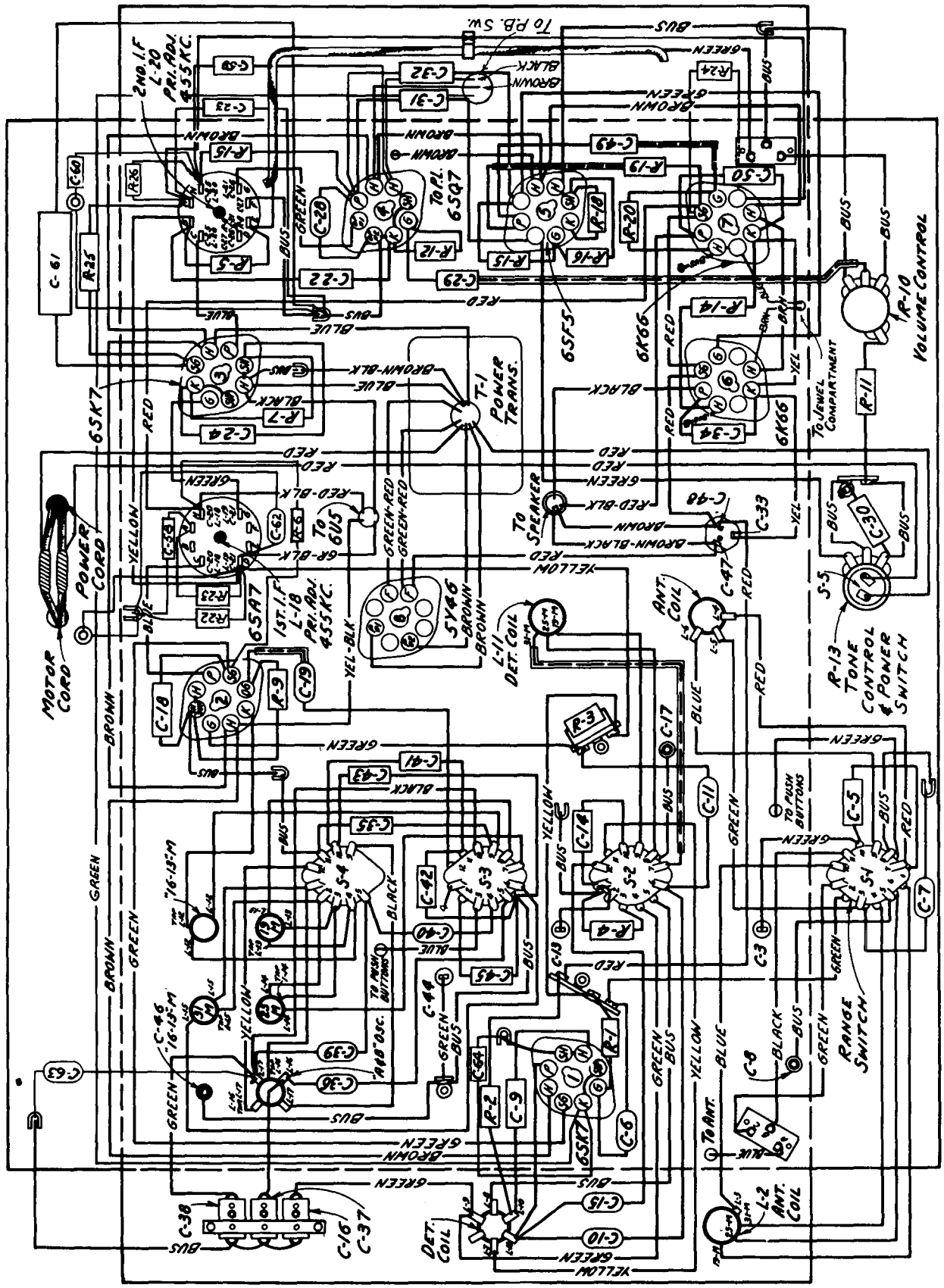


Figure 3—Chassis Wiring Diagram

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.

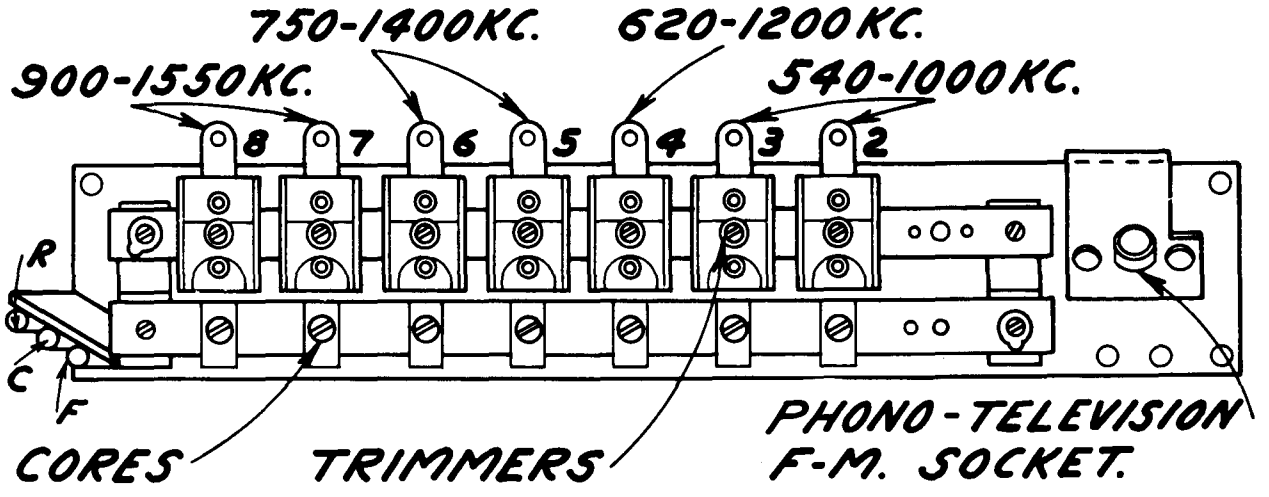


Fig. 4

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 inaudable due to reception conditions a test oscillator should be substituted for the station signal.

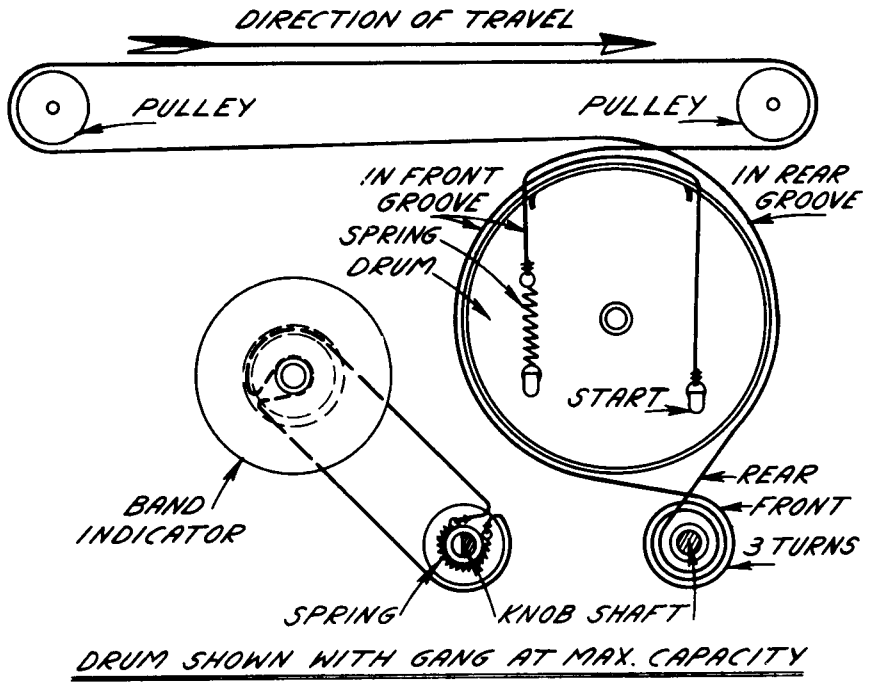


Fig. 5—Drive Cords

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		52894	Capacitor-Electrolytic 10 mfd. (C23).....	
S-2876	Board-Ant.and ground Terminal Board		32240	Capacitor-Electrolytic comprising sections 10-450V,15-450V,20-25 volts(C48,C47,C33).....	
12714	Capacitor-Adjustable Trimmer 2-12 Mfd. (C8,C17,C46).....		S-2877	Coil-Ant.Coil AB 16-13 Bands(L4-L5-L6).....	
34783	Capacitor-Adjustable Trimmer Bank (C16,C37,C38).....		S-2878	Coil-Ant.Coil 31-25-19 Meter (L2-L3).....	
14392	Capacitor-4.7 Mmfd. (C63).....		S-2879	Coil-RF Coil A-B 16-13 Meter (L7-L8-L9-L10).....	
39601	Capacitor-5.6 " (C10).....		S-2880	Coil-RF Coil 31-25-19 Meter (L11)	
36012	Capacitor-15 " (Temp.Comp.)(C35).		S-2881	Coil-19 Meter Band Oscillator Coil (L13).....	
39608	Capacitor-15 " (C17).....		S-2882	Coil-25 Meter Band Oscillator Coil (L14).....	
35644	Capacitor-47 " (Temp.Comp.)(C45).		S-2883	Coil-31 Meter Band Oscillator Coil (L15).....	
S-3008	Capacitor-47 " (Close Tol.)(C5, C14).....		S-2884	Coil-16-13 Meter Band Oscillator Coil (L12).....	
12723	Capacitor-56 Mmfd. (C19).....		S-2885	Coil-A-B Band Oscillator Coil (L16,L17).....	
S-3123	Capacitor-62 Mmfd.(Temp.Comp.)(C42)		S-2898	Condenser-3 Gang Variable Tuning (C3,C4,C12,C13,C44).....	
39624	Capacitor-68 Mmfd. (C1).....		* 32634	Cord-Indicator Pointer Drive Cord (53-1/2").....	
S-3100	Capacitor-120 Mmfd.(Close Tol.)(C43)		* 32634	Cord-Band Indicator Drive Cord...	
12724	Capacitor-120 Mmfd. (C28).....		31273	Drum-Drive Drum assem.....	
39636	Capacitor-220 Mmfd. (C15,C62).....		S-2927	Drum-Drive Drum assem.Band Indicator.....	
S-2895	Capacitor-220 Mmfd. (Close Tol.)(C41)				
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
S-2886	Indicator-Station Selector Indicator Pointer
S-2928	Indicator-Band Indicator assem.
11765	Lamp-Dial Lamp Mazda #51
30870	Plug-Socket and Lead assem.plug
5040	Plug-4 contact Speaker Plug (Female)
31280	Pulley-Drive Cord Pulley
30618	Resistor-180 ohms 1/2 watt (R7)
30681	Resistor-470 ohms 1 watt (R14)
34766	Resistor-1000 ohms 1/4 watt (R2)
30150	Resistor-3300 ohms 1 watt (R24)
30694	Resistor-3900 ohms 1/4 watt (R18)
30494	Resistor-4700 ohms 1/10 watt (R4)
11298	Resistor-5000 ohms 1 watt (R26)
3078	Resistor-10,000 ohms-1/4 watt(R11)
S-2587	Resistor-10,000 ohms 4 watt Wire Wound (R6)
30492	Resistor-22,000 ohms 1/4 watt (R8,R16,R23)
30685	Resistor-33,000 ohms 1/2 watt (R9,R25)
14020	Resistor-150,000 ohm 1/4 watt(R22)
30648	Resistor-470,000 ohm 1/4 watt (R15,R17,R19,R20)
30653	Resistor-560,000 ohm 1/4 watt(R3)
12679	Resistor-2.2 megohms 1/4 watt (R1,R5)
30992	Resistor-10 megohms 1/4 watt(R12)
35969	Retainer-Drive Cord Pulley Retainer (Pkg.10)
S-2888	Shaft-Station Selector Drive Shaft
S-2824	Socket-AC Socket
31364	Socket-Dial Lamp Socket
36422	Socket-Loop Antenna Socket
31251	Socket-Tube Socket
30585	Spring-Band Indicator Drive Cord Spring (Pkg.2)
13638	Spring-Drive Cord Tension Spring (Pkg.2)
S-2929	Switch-Range Switch (S1,S2,S3,S4)
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)

Stock No.	Description
	SPEAKER ASSEMBLIES
31825	Cap-Dust Cap for cone center (Pkg.5)
S-2937	Coil-Field Coil (L24)
11469	Coil-Hum Neutralizing Coil(L23)
31275	Cone-Speaker cone and Voice coil assem. (L22)
5039	Plug-4 contact plug (Male)
S-2938	Speaker-complete
S-2934	Transformer-Output (T2)
	PUSH BUTTON ASSEMBLY
S-3409	Cable-Shielded Phono Cable-less Plug
S-2930	Capacitor-Trimmer Capacitor Bank-(C51,C57 inclusive)
35803	Coil-Oscillator Coil(L25,L31, Inclusive)
35871	Core-Oscillator Coil core assembly
32641	Plug-3 prong Male Plug for Phono Cable
31347	Socket-Phono Input Socket
S-3049	Switch-Push Button Switch only (S6-S21 inclusive)
	AUTOMATIC RECORD CHANGER MECHANISM
	REFER TO RP-160C Service Notes for Replacement Parts and Service Detail.
	MISCELLANEOUS ASSEMBLIES
35883	Button-Station Selector Push Button
S-2913	Dial-Dial Scale
13103	Jewel-Compartment Lamp Jewel
34489	Knob-Vol-Tone-Range-Tuning Knob
S-3551	Loop-Loop antenna assembly(L1, C1,C2)
S-3053	Marker-Push Button Call Letter Markers (1 set)
34053	Spring-Push Button Retaining Spring (Pkg.5)
14270	Spring-Knob retaining spring. (Pkg.2)
36414	Support-Lid Support
S-2542	Tool-Push Button set-up tool

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

RCA Victor

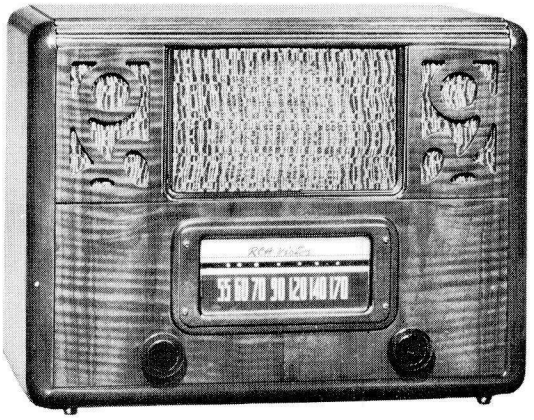
MODEL B417

Four-Tube, Single-Band, Battery-Operated Superheterodyne Receiver

TECHNICAL INFORMATION AND SERVICE DATA

1946 No. 5

SERVICE DIVISION • RCA VICTOR COMPANY LIMITED • MONTREAL



Electrical Specifications

Frequency Range .....540—1,700 k.c. Alignment Frequencies 600 k.c., 1500 k.c., (osc., ant.)
Intermediate Frequency ..... 455 k.c.

Radiotron Complement

(1) Type 1A7G ..... First Detector—Oscillator (2) Type 1N5G ..... I. F. Amplifier
(3) Type 1H5G ..... Second Det., A.F. and A.V.C. (4) Type 1C5G ..... Power Output

Batteries Required

"A" one 1.4 Volt Air Cell or 1.5 Dry Cell; "B" two 45 Volt heavy duty "B" Batteries

Current Consumption

"A" at 1.4 Volts ..... 0.25 Amp.
"B" at 90 Volts ..... 9.6 Ma.

Power Output

Undistorted ..... 115 Milliwatts
Maximum ..... 260 Milliwatts

Loudspeaker

Type ..... Permanent Magnet Dynamic
Diameter ..... 5 inches
Voice Coil Impedance ..... 3 Ohms at 400 Cycles

Mechanical Specifications

	Height	Width	Depth
Cabinet Dimensions	11⅛ inches	14⅛ inches	7⅝ inches
Operating Controls	(1) Power Switch—Volume; 2 Tuning		
Tuning Drive Ratio	8 to 1		

General Description

This Model contains a four-tube chassis, battery operated, mounted in a table type cabinet. The superheterodyne type of circuit is employed, incorporating such features of design as the new low-drain 1.5 volt tubes thus reducing the physical size of the batteries, magnetite core I.F. transformers, Automatic Volume Control; diode detection; resistance coupled audio system; Record Player Attachment Socket; sensitive, five-inch, permanent-magnet, dynamic loudspeaker; exceptionally low current drain; and a large, easy-to-read dial.

Service Data

The various diagrams of this booklet contain all information necessary to quickly isolate causes for defective operation if such develops. The ratings of resistors, capacitors, coils, etc., are indicated adjacent to the symbols signifying these parts on the various diagrams. Identification titles such as R1, L1, C1, etc., provide ready reference between the illustrations and Replacement Parts List.

Alignment Procedure

Calibrate the tuning dial by adjusting dial pointer to the horizontal position when the gang tuning-condenser plates are in full mesh.

Perform alignment in proper order, tabulated below, starting with Step No. 1 and following all operations across, then Step No. 2, etc. Adjustment locations are shown on Figures 1 and 3.

Output Meter Alignment.—If this method is used, connect the meter across 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.

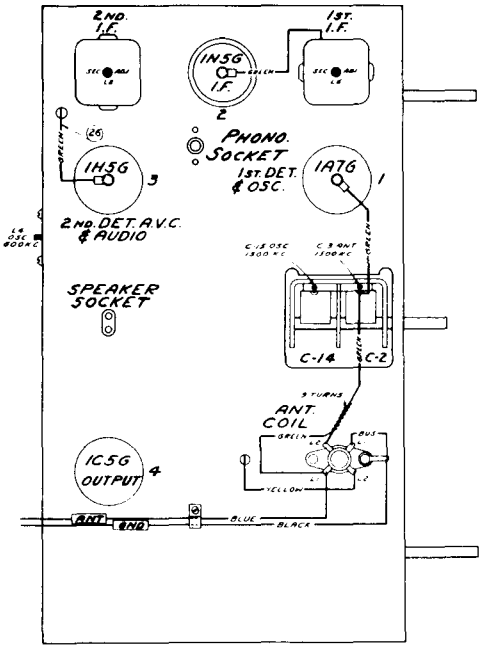


Fig. 1 Radiotron and Trimmer Locations

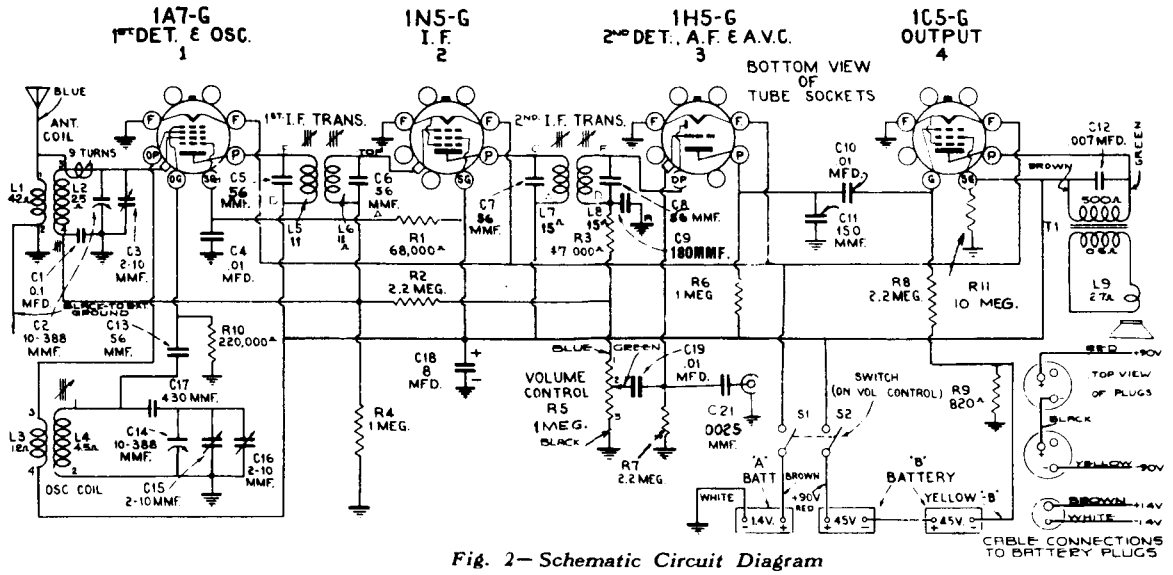


Fig. 2— Schematic Circuit Diagram

Alignment Procedure

Steps	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output
No. 1	1N5-G I.F grid cap, in series with 0.01 mfd.	455 kc	Quiet point between 550-750 kc	L7 and L8 (2nd I.F transformer)
No. 2	1A7-G 1st-det. grid cap, in series with 0.01 mfd.	455 kc		L5 and L6 (1st I.F transformer)
No. 3	Antenna lead, in series with 200 mmfd.	600 kc	600 kc	L4 (oscillator) L2 (antenna)
No. 4	Antenna lead, in series with 200 mmfd.	1,500 kc	1,500 kc	C15† (oscillator) C3 (antenna)

† Trimmer C16 on gang condenser should be unscrewed one complete turn from tight, before adjusting C15.

Precautionary Lead Dress

1. Red lead from second i-f transformer to screen terminal of 1N5-G must be dressed close to and along edge of chassis.
2. Twisted green wire from antenna coil to gang must be 9 turns and kept clear of rotor.
3. Blue and green leads to volume control must be dressed close to chassis and between gang and front apron.

Radiotron Voltages

Readings taken with a receiver supply of 90 Volts "B" and 1.4 Volts "A".				
Radiotron	Plate	Screen Grid	Grid	Filament
(1) 1A7G Converter 1A7G Oscillator	83V 83V	45V*	——	1.4V
(2) 1N5G I.F.	83V	83V	——	1.4V
(3) 1H5G Detector and Audio	64V	——	——	1.4V
(4) 1C5G Output	80V	83V	—7.4V*	1.4V

*NOTE—Values with asterisk (*) are operating voltages in circuits with high series resistance. The actual measured value will be lower, depending on the voltmeter loading.

Measurements are made to chassis, with set tuned to a quiet point and the volume control at minimum. Values should hold within approximately plus or minus 20% with rated battery voltage.

REPLACEMENT PARTS FOR MODEL B417

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

STOCK NO.	DESCRIPTION
	RECEIVER ASSEMBLIES
S-1997	Cable-Four conductor battery cable and plugs
30949	Capacitor-56 mmfd.(C5,C6,C7,C8)
12723	Capacitor-56 mmfd.(C13)
12725	Capacitor-150 mmfd.(C11)
13003	Capacitor-180 mmfd. (C9)
32599	Capacitor-430 mmfd. (C17)
34459	Capacitor-.0025 mfd. (C21)
5148	Capacitor-.007 mfd. (C12)
4937	Capacitor-.01 mfd. (C4,C10,C19)
4939	Capacitor-.1 mfd. (C1)
S-3221	Capacitor-8 mfd.Dry Electrolytic (C18)
32150	Coil-Antenna Coil (L1,L2)
32148	Coil-Oscillator Coil (L3,L4)
S-3489	Condenser-Two Gang Variable tuning (C2,C3,C14,C15,C16)
32634	Cord-Drive Cord 26-1/4"
S-3468	Dial-Station selector dial scale
S-3539	Drum-Condenser drive drum ass'y
31420	Indicator-Stn.selector indicator pointer
32208	Plug-2 prong-male plug (Battery cable)
12827	Plug-3 prong-male plug (Battery cable)
14076	Resistor-820 ohms-1/4 watt (R9)
5132	Resistor-47,000 ohms-1/10 watt(R3)
14138	Resistor-68,000 ohms-1/4 " (R1)
14583	Resistor-220,000 ohms-1/4 watt(R10)
13730	Resistor-1 megohm-1/4 watt(R4,R6)
12679	Resistor-2.2 megohm-1/4 watt (R2,R7,R8)
13601	Resistor-10 megohm-1/4 watt(R11)
14887	Retainer-Tuning shaft retainer (Pkg.10)
S-3490	Shaft-Station selector shaft
32595	Shield-Tube shield(in 5G tube)
31251	Socket-Tube Socket
14278	Socket-Phono Socket
31418	Spring-Drive cord tension spring
S-3299	Transformer-1st I.F. Transformer
35628	Transformer-2nd I.F. Transformer
S-3495	Volume control and power switch (R5,S1,S2)
	SPEAKER ASSEMBLIES (CRL 500-1)
32907	Cap-Dust cap for cone centre (Pkg.5)
35440	Cone-Speaker cone assembly (L9)
S-2376	Speaker-complete
S-2377	Transformer-Output (T1)
	MISCELLANEOUS ASSEMBLIES
30956	Board-Speaker terminal board
S-3491	Crystal-Station selector dial crystal
S-3101	Knob-Tuning and volume control knob
S-3540	Screw-Chassis Mtg. screw and washer assembly
30900	Spring-Knob retaining spring(Pkg.5)

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

RCA Victor

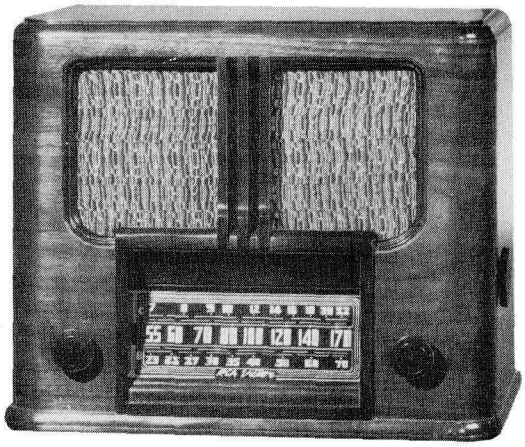
MODEL B-418

Four-Tube, Three-Band, Battery-Operated Superheterodyne Receiver

TECHNICAL INFORMATION AND SERVICE DATA

1946 No. 7

SERVICE DIVISION • RCA VICTOR COMPANY LIMITED • MONTREAL



Electrical Specifications

Frequency Ranges

"Standard Broadcast" (A) 540-1,720 kc (555-174 m)
"Medium Wave" (B) .....2.3-7.0 mc (130-42.8 m)
"Short Wave" (C) .....7.0-22.0 mc (42.8-13.6 m)
Intermediate Frequency .....455 kc

Radiotron Complement

(1) Type 1A7G .....First Detector—Oscillator
(2) Type 1N5G .....I. F. Amplifier
(3) Type 1H5G .....Second Det., A.F. and A.V.C.
(4) Type 1C5G .....Power Output

Batteries Required

"A" one 1.4 Volt Air Cell or 1.5 Dry Cell; "B" two 45 Volt heavy duty "B" Batteries

Current Consumption

"A" at 1.4 Volts ..... 0.25 Amps.
"B" at 90 Volts ..... 9.6 Ma.

Power Output

Undistorted ..... 115 Milliwatts
Maximum ..... 260 Milliwatts

Loudspeaker

Type ..... Permanent Magnet Dynamic
Diameter ..... 5 inches
Voice Coil Impedance ..... 6 Ohms at 400 Cycles

Mechanical Specifications

	Height	Width	Depth
Cabinet Dimensions	12-5/16 inches	14-11/16 inches	8-3/32 inches
Operating Controls	(1) Tone Switch (2) Power Switch—Volume; (3) Range Switch (4) Tuning		
Tuning Drive Ratio	18 to 1		

General Description

This Model contains a four-tube three band chassis, battery operated, mounted in a table type cabinet. The superheterodyne type of circuit is employed, incorporating such features of design as the new low-drain 1.5 volt tubes thus reducing the physical size of the batteries, magnetite core I.F. transformers, Automatic Volume Control; diode detection; resistance coupled audio system; two point tone control; phono input socket; sensitive, five-inch, permanent-magnet, dynamic loudspeaker; exceptionally low current drain; and a large, horizontal type easy-to-read glass dial.

Service Data

The various diagrams of this booklet contain all information necessary to quickly isolate causes for defective operation if such develops. The ratings of resistors, capacitors, coils, etc., are indicated adjacent to the symbols signifying these parts on the various diagrams. Identification titles such as R1, L1, C1, etc., provide ready reference between the illustrations and Replacement Parts List.

Alignment Procedure

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are shown in the chassis drawing.

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 150° mark on the drum scale must be vertical and directly above the center of the shaft of the turning drum when the plates are fully unmeshed. 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 condenser gang frame, and bend the wire so that it points to the 0° mark on the calibration scale when the plates are fully meshed.

The term "Dummy antenna" means the device which must be connected between the "high" test-oscillator output and the point of connection to the receiver in order to obtain ideal alignment.

Order of Alignment	Test Oscillator			Range Selector	Receiver Dial Setting	Circuit to Adjust	Adjustment Symbols
	Connection to Receiver	Dummy Antenna	Frequency Setting				
1	1N5G grid	.1 mfd.	455 kc	"A"	Gang closed	2nd I.F.	L7, L8
2	1A7G grid	.1 mfd.	455 kc	"A"	Gang closed	1st I.F.	L5, L6
3	Ant. lead	200 mmfd.	600 kc	"A"	600 kc 32°	"A" Osc.	L11
4	Ant. lead	200 mmfd.	1500 kc	"A"	1500 kc 152°	"A" Osc.	C21
5		Repeat steps 3 and 4					
6	Ant. lead	200 mmfd.	1500 kc	"A"	1500 kc 152°	"A" Ant.	C4
7	Ant. lead	300 ohm.	6100 kc	"B"	6100 kc 151°	"B" Osc.	C23
8	Ant. lead	200 mmfd.	2440 kc	"B"	2440 kc 24°	"B" Osc.	L13
9	Ant. lead	300 ohm.	6100 kc	"B"	6100 kc 151°	"B" Ant.	C2
10	Ant. lead	300 ohm.	9550 kc	"C"	9550 kc 66°	"C" Osc.	L15
11	Ant. lead	300 ohm.	17750 kc	"C"	17750 kc 144°	"C" Ant.	C1

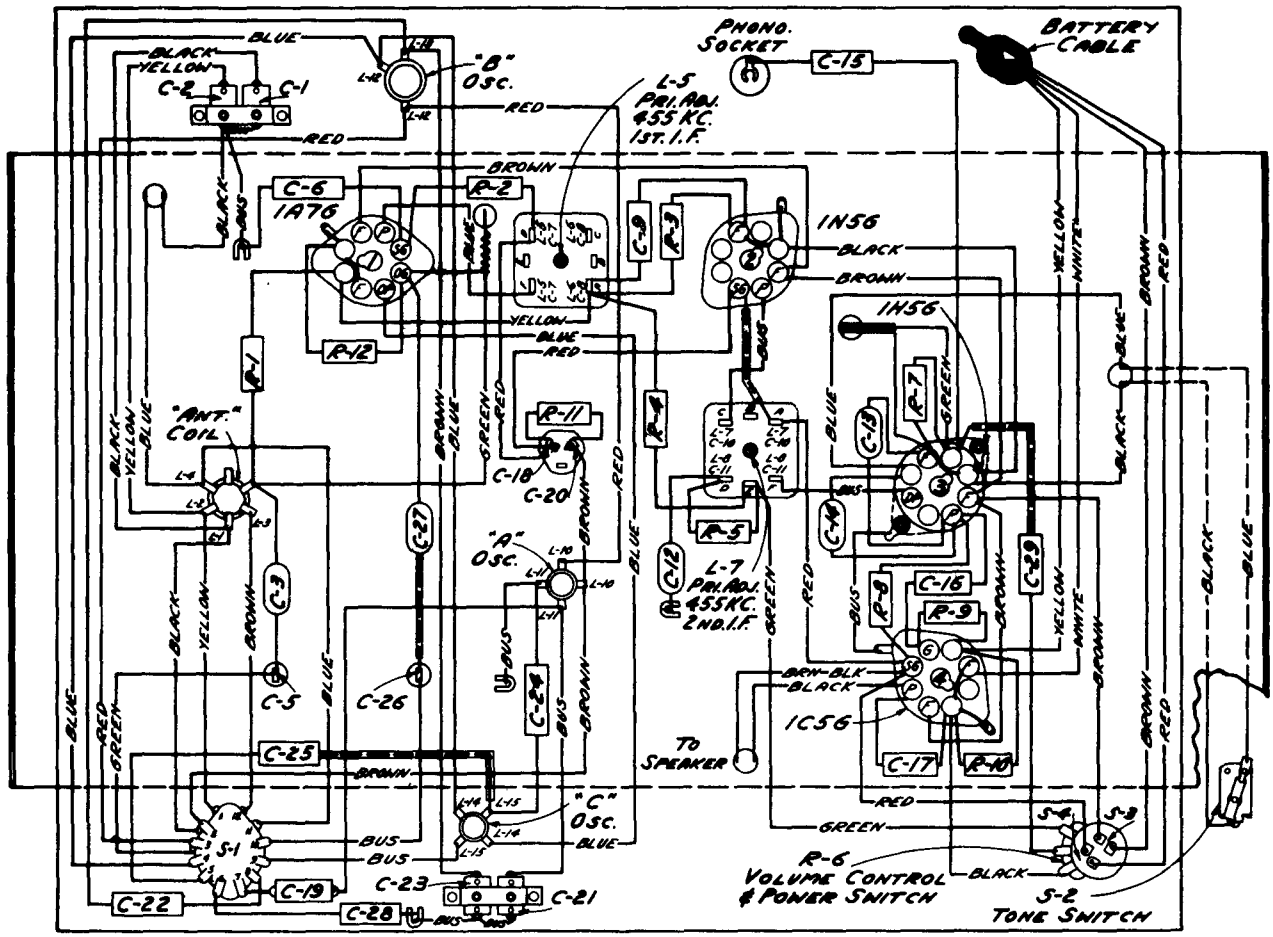


Fig. 1—Chassis Wiring Diagram

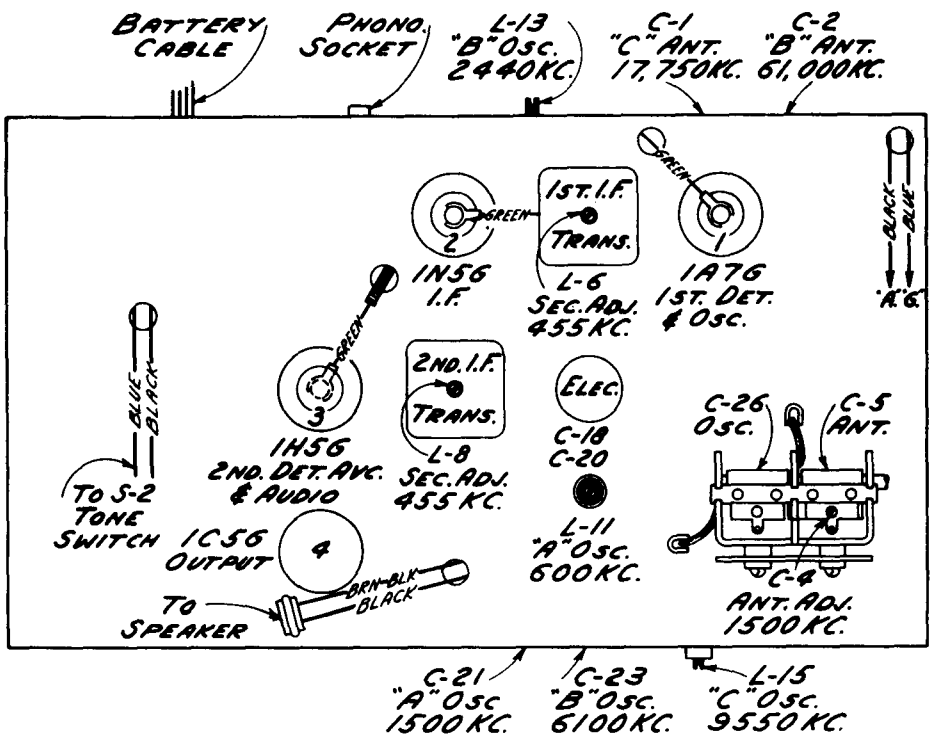


Fig. 2—Tube and Trimmer Locations

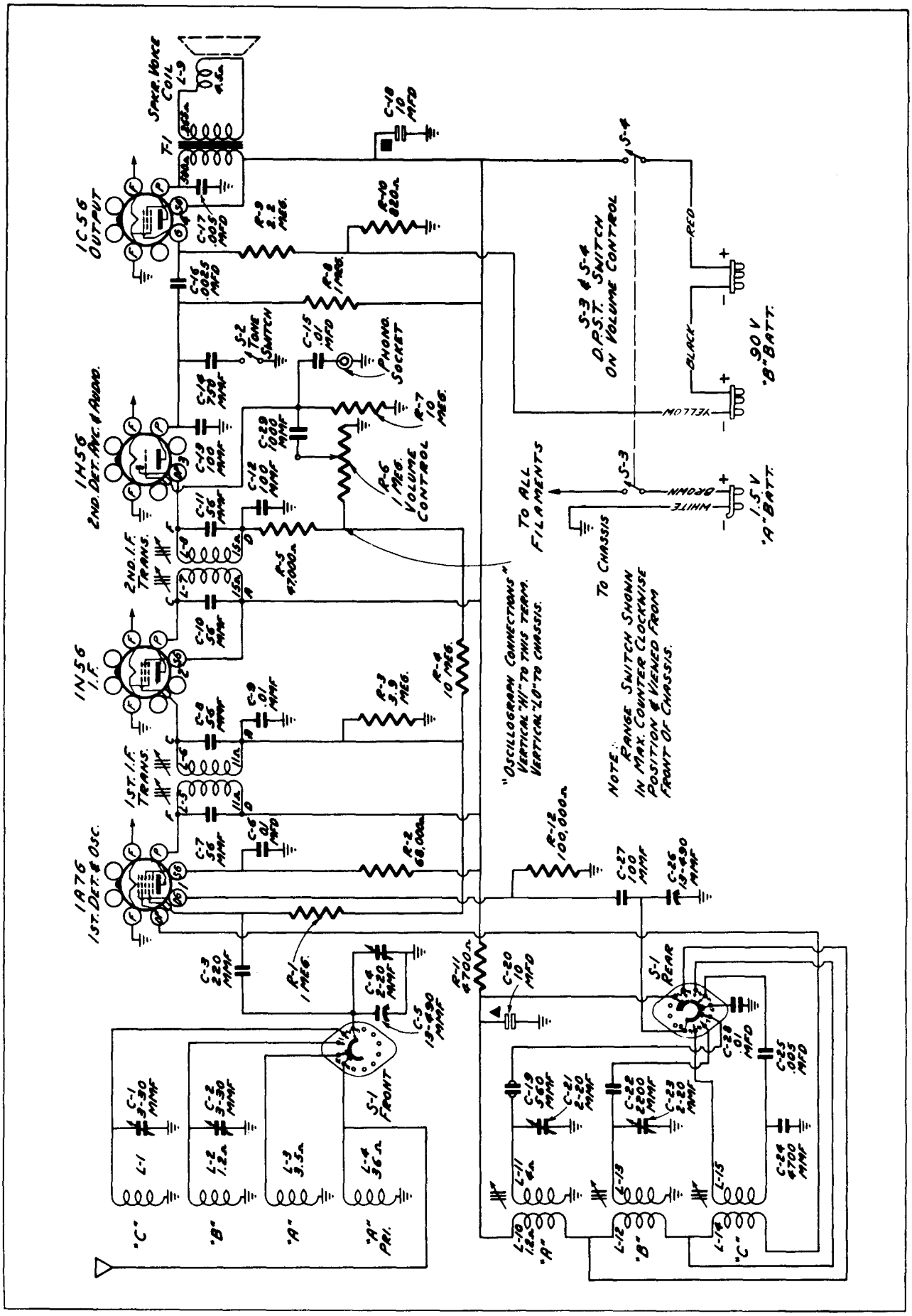


Fig. 3—Schematic Circuit Diagram

Radiotron Socket Voltages: Measured with all batteries at Normal Voltage

Radiotron	Plate	Screen Grid	Grid	Filament
1A7G Det.	81v	41v	....	1.4v
1A7G Osc.	76v	..	....	1.4v
1N5G I.F.	81v	81v	....	1.4v
1H5G Audio	55v	..	....	1.4v
1C5G Output	79v	82v	—7.5v	1.4v

REPLACEMENT PARTS FOR MODEL B-418

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

STOCK NO.	DESCRIPTION
	RECEIVER ASSEMBLIES
S-3186	Cable - Battery cable with plugs..
31292	Capacitor - Adjustable trimmer bank comprising 2 of 3-20 mfd (C1-C2)
32830	Capacitor - Adjustable trimmer bank comprising 2-20 mfd. (C21-C23)
12720	Capacitor - 100 mfd (C12-C13-C27)
12694	Capacitor - 220 " (C3)
31433	Capacitor - 500 " (Close Tolerance C19)
12536	Capacitor - 750 " (C14)
37617	Capacitor - 1000 " (29)
44338	Capacitor - 2200 " (C22)
31899	Capacitor - 4700 " (C24)
34459	Capacitor - .0026 mfd. (C16)
4838	Capacitor - .005 " (C17-C25)
4937	Capacitor - .01 mfd. (C9, C15, C28)
4939	Capacitor - .1 " (C6)
33790	Capacitor - Electrolytic 2-10 mfd. (C18-C20)
32817	Condenser - Variable tuning condenser (C4, C5, C26)
32821	Coil - Antenna coil L1, L2, L3, L4
31689	Coil - "A" Band oscillator coil - L10L11
33784	Coil - "B" " " " L12-L13
33785	Coil - "C" " " " L14-L15
32634	Cord - Drive cord (approx. 48-1/2")
35788	Core - Oscillator coil,core and stud
32835	Drum - Drive cord-drum assembly
S-3212	Indicator - Station selector pointer & carriage
5119	Plug - Two contact speaker plug
32208	Plug - " " "A" battery plug
12827	Plug - Three contact "B" " "
14076	Resistor - 820 ohms 1/4 watt (R10)
30146	Resistor - 4700 " 1/4 " (R11)
30562	Resistor - 47,000 ohms 1/4 watt (R5)
14138	Resistor - 68,000 " 1/4 " (R2)
14560	Resistor - 100,000 ohms 1/4 watt (R12)
13730	Resistor - 1 megohm 1/4 watt (R1-R8)
12679	Resistor - 2.2 " 1/4 " (R9)
32809	Resistor - 3.9 " 1/4 " (R3)
13601	Resistor - 10 " 1/4 " (R4-R7)
34373	Retainer - "C" washer for drive shaft (Pkg. 5)
S-3213	Shaft - Station selector drive shaft
35787	Socket - Phono input socket
31319	Socket - Tube socket
31418	Spring - Dial cord spring (Pkg. 2)
S-3182	Switch - Range switch (S1)
S-3153	Switch - Tone switch (S2)
36121	Transformer - 1st I.F. transformer (L5, L6, C7, C8)
35628	Transformer - 2nd I.F. transformer (L7, L8, C10, C11)
S-3181	Volume control and switch (R6, S3, S4)
	SPEAKER ASSEMBLIES (5 in. P.M.)
32907	Cap - Dust cap for cone center (Pkg. 5)
35570	Cone - Speaker cone and voice coil (L9)
5118	Plug - 2-contact male plug
S-3187	Speaker - complete CRL 525-1
S-2804	Transformer - output (T1)
	MISCELLANEOUS ASSEMBLY
S-3469	Dial - Dial scale
S-3184	Knob - Range switch knob
34490	Knob - Tone switch knob
S-3185	Knob - Volume control knob
32595	Shield - Tube shield
32598	Shield - Tube shield cap (Pkg. 2)
30900	Spring - Knob retaining spring (Pkg. 5)

* Universal type cord. All parts & prices subject to change or withdrawal without notice.


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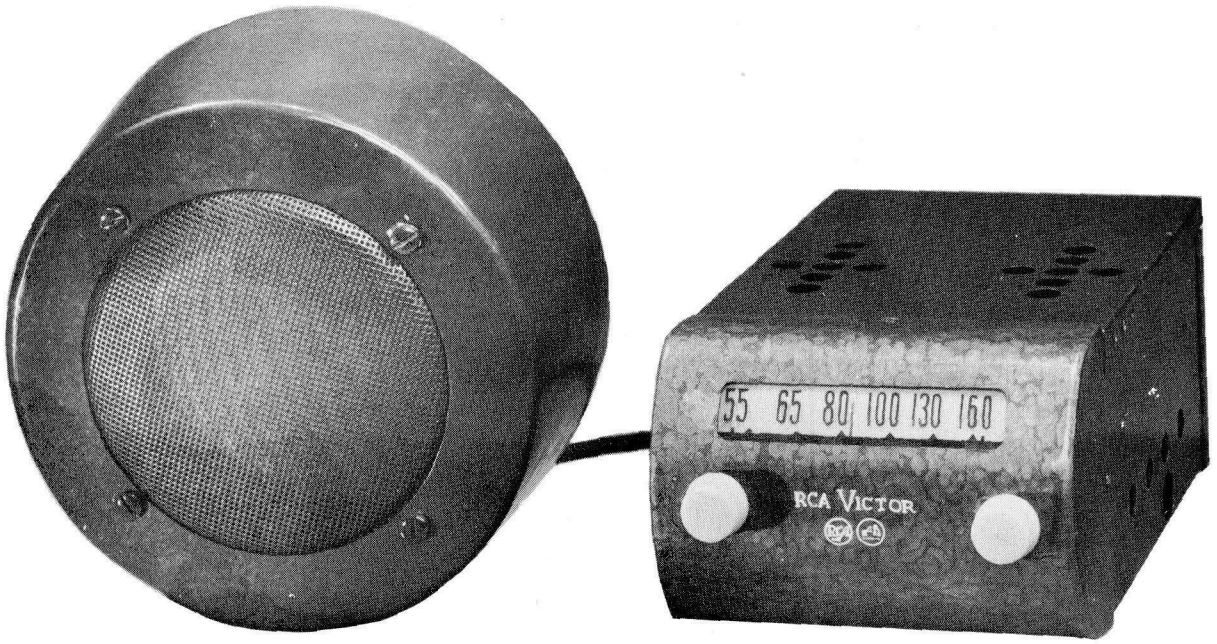
RCA VICTOR
MODEL A-660

Six-Tube Superheterodyne Automobile Receiver

TECHNICAL INFORMATION AND SERVICE DATA

1947 No. 7

SERVICE DIVISION • RCA VICTOR COMPANY LIMITED • MONTREAL



Electrical and Mechanical Specifications

FREQUENCY RANGE ..... 540-1600 k.c.
Intermediate Frequency ..... 455 k.c.
Tuning Ratio ..... 14 to 1

TUBE COMPLEMENT

(1) 6BA6 ..... R.F. Amplifier
(2) 6BE6 ..... Converter
(3) 6BA6 ..... I.F. Amplifier
(4) 6AT6 ..... 2nd Det. A.V.C. & 1st A.F.
(5) 6AQ5 ..... Power Output
(6) 0Z4A ..... Rectifier
Pilot Lamp ..... Mazda 51, 6.3 volts, 0.2 amp.

LOUDSPEAKER (CRL-532-4)

Type ..... 5 inch round P.M.
V.C. Impedance ..... 3.4 ohms at 400 cycles

POWER SUPPLY

Source ..... 6.3 volt Auto Storage Battery
Current Drain ..... 4.2 amp.

POWER OUTPUT

Undistorted ..... 2.0 watts
Maximum ..... 3.5 watts

CABINET DIMENSIONS (inches)

	Height	Width	Depth
Radio	3⅜	4¾	8¼
Loudspeaker	6⅝ dia.		3⅛

OPERATING CONTROLS

Left Knob ..... Station Tuning
Right Knob ..... On-Off Switch & Volume

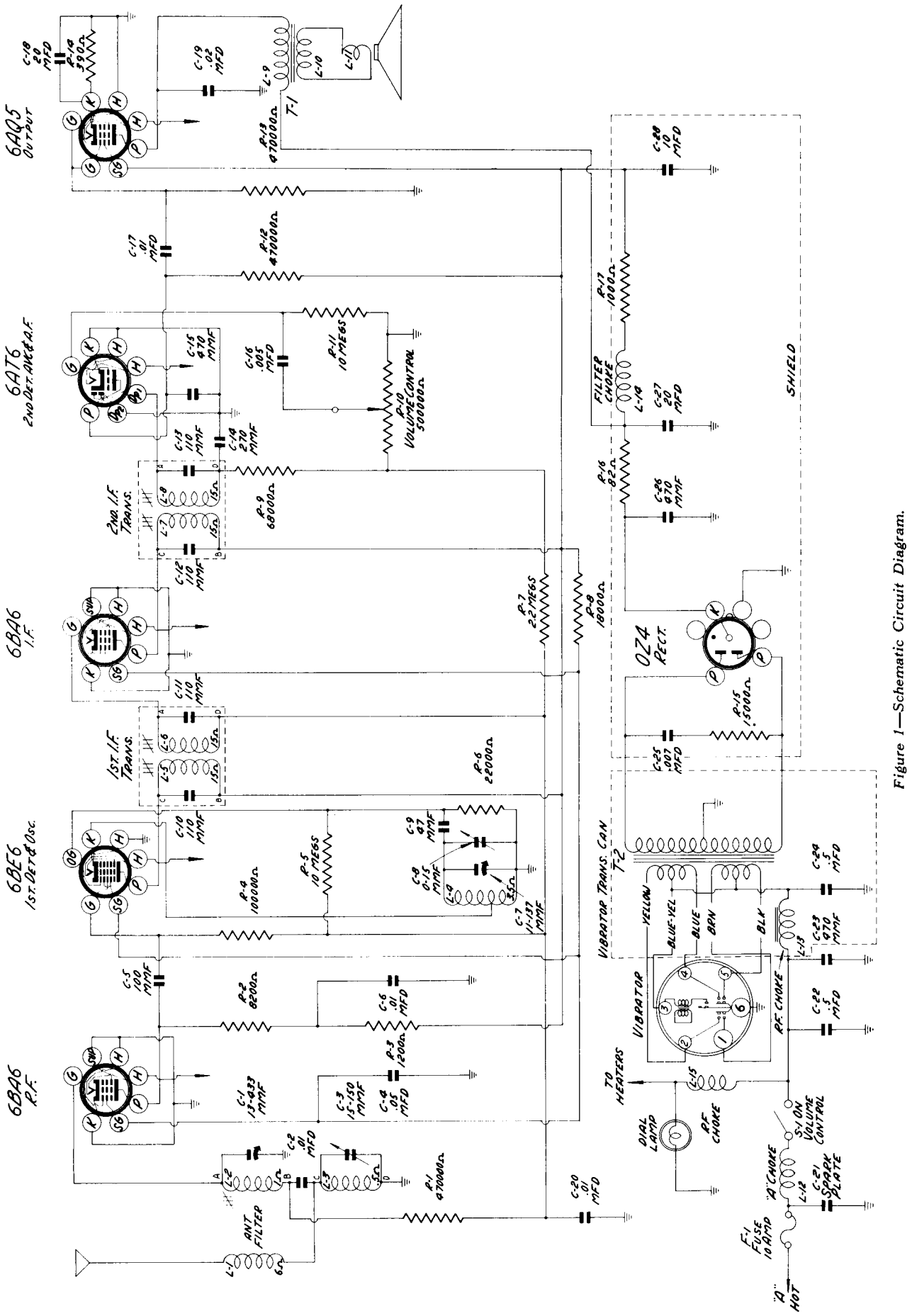


Figure 1—Schematic Circuit Diagram.

General Description

The Model A-660 is a six tube superheterodyne automobile receiver with separate loudspeaker unit. The use of miniature tubes and components has made possible the design of a receiver taking up little space yet providing performance superior to that of many units much larger in size. The receiver is designed to be mounted under the dashboard and the loudspeaker unit can be mounted on the firewall or bulkhead. All operating controls are located on the receiver unit.

Circuit Arrangement:—The circuit combines the high sensitivity so desirable in an automobile receiver with adequate audio power output of good tonal quality. Features of the design include: Illuminated dial. Ignition noise suppression filters. Antenna Compensator trimmer. Selective R.F. Stage. First detector (oscillator) stage. I.F. Amplifier. Iron core R.F., Oscillator and I.F. Coils. Second detector, A.V.C. and 1st Audio Amplifier. Pentode power output stage.

Alignment Procedure

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

Cathode-Ray Alignment is the preferable method. Connections for the oscillograph are as follows: Vertical "HI" to terminal "A" on 2nd I-F transformer; vertical "LO" to chassis.

Output Meter.—Connect the output meter across the speaker voice-coil and turn the receiver volume control to maximum (fully clockwise).

Dial Calibration.—Rotate the gang condenser to its full-mesh (maximum-capacity) position and then adjust dial-indicator so that the pointer is aligned with the last calibration mark at the low-frequency end of the scale.

Position of Dial Pointer	Test Oscillator Frequency	Dummy Antenna	Connect Test Osc. To	Adjustment Symbol	Circuit Adjusted
No Signal 1600 kc	455 kc	0.1 Mfd.	6BA6 I.F. Grid	L7—L8	2nd I.F. Trans.
No Signal 1600 kc	455 kc	0.1 Mfd.	6BE6 Grid	L5—L6	1st I.F. Trans.
1500 kc	1500 kc	*82 mmf.	Ant. Connector	C8	Osc.
1500 kc	1500 kc	82 mmf.	Ant. Connector	C3**	Ant.
600 kc	600 kc	82 mmf.	Ant. Connector	L4	Osc.
600 kc	600 kc	82 mmf.	Ant. Connector	L2	Ant.

IMPORTANT ALIGNMENT NOTES.

***Note 1.**—This 82 mmfd. capacitor must be inserted at the antenna connector of the receiver. The lead from the test oscillator to the 82 mmfd. capacitor may be shielded if desired, but no shielding should be used between capacitor and antenna connector.

****Note 2**—Final adjustment of C3 must be made after the receiver has been installed and the antenna connected. See "Antenna Circuit."

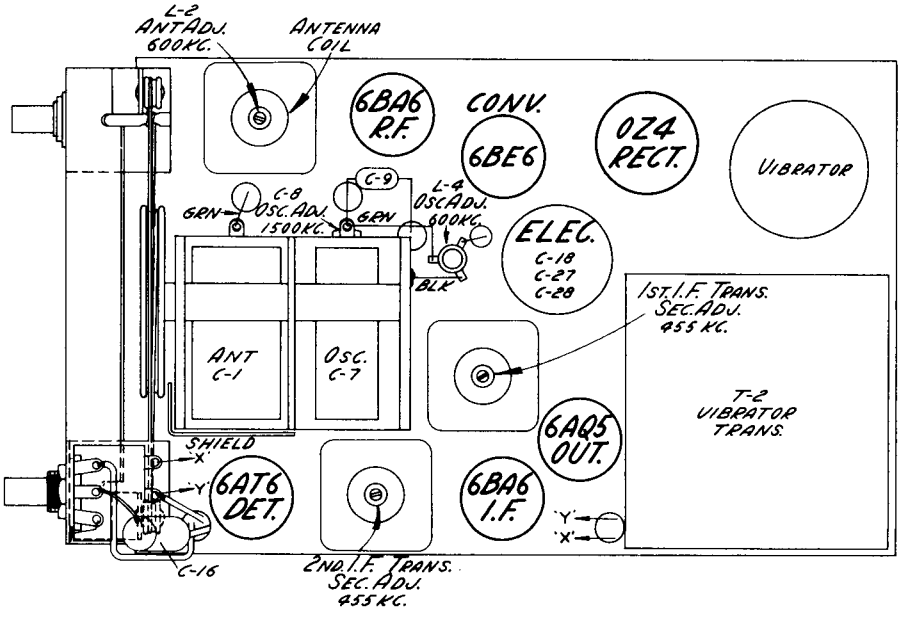


Figure 2—Chassis Layout and Alignment Adjustments.

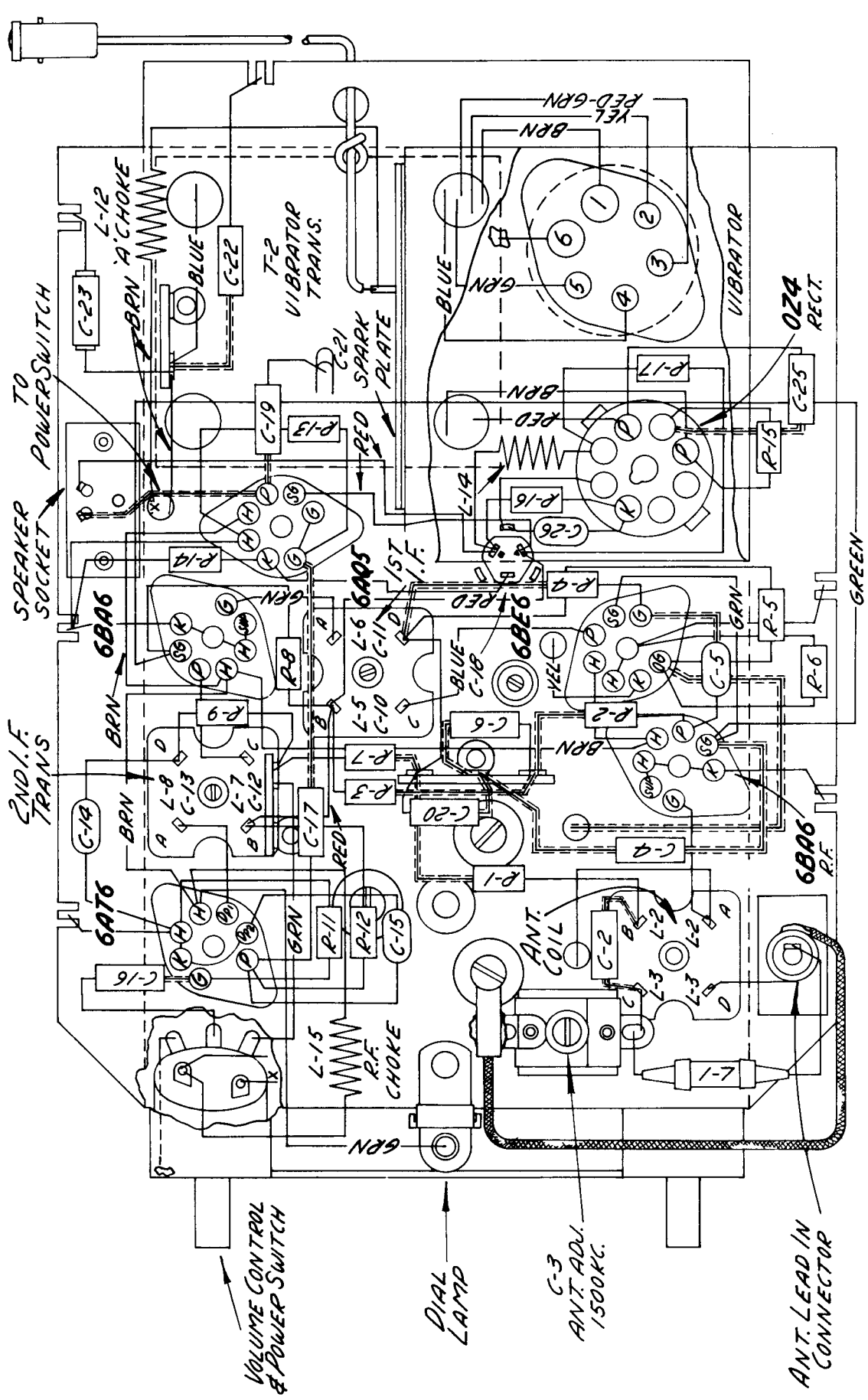


Figure 3—Chassis Wiring Diagram

Service Data

Antenna Circuit

It is very important that these instructions be followed when installing this receiver.

The antenna circuit is designed to work with an antenna having a total capacity including the shielded lead-in not to exceed 100 mmf. If an antenna having a larger capacity is to be used, it will be necessary to add a capacitor in series with the lead from the antenna filter L-1 to the antenna coil terminal ("C"). (See chassis wiring diagram Fig. 3). Where a "Double Under the Running Board" type of antenna is to be used having a capacity of approximately 200 mmf., the capacitor added should be approximately 200 mmf. The insulated running board type having an approximate capacity of 550 mmf. will require a capacitor of approximately 150 mmf. Cars using an insulated steel top of approximately 3,500 mmf. will require a series capacitor of 150 mmf.

After installation and with antenna connected, tune in a weak station near 1,500 kc and adjust compensator trimmer C-3 for maximum signal output. This trimmer is accessible through a hole in the bottom of the receiver case. If a maximum (peak) signal output cannot be obtained in the range of the antenna trimmer, the effective capacity should be checked and compensated for by varying series capacity as described above.

Noise Elmination

The presence of noise is generally due to the high intensity of electrical disturbances from the car ignition system in relation to strength of desired station. The reduction of such noise should be carried out methodically by: (1) Increasing effectiveness of the antenna and providing for protection against stray pickup; (2) subduing the interference at its source; and (3) installation of filter devices to prevent transmission of interference into the receiver circuits.

Antenna—Should be located well away from engine compartment to avoid ignition disturbance, and as far as possible from front wheels to eliminate "wheel static." Lead-in should be completely shielded and shield grounded to frame of car at as many points as possible. It is very essential that the antenna be electrically "matched" to the receiver input—this is accomplished by adjustment of the antenna trimmer and the operations explained under "Antenna Circuit."

Wheel Static—Interference from this source generally originates in the front wheels, and is related to road surface composition, and atmospheric conditions. Spring devices are available for attachment to the wheels for making a permanent connection between the hub and axle; these should be installed where required. The wheel bearings should be checked for proper adjustment. Patches in tires will frequently cause wheel static; exchange front and rear wheels. Be sure antenna is well separated from wheels of car.

Radiotron Socket Voltages

Type	Function	Plate	Screen Grid	Oscillator Grid	Cathode	Heater
6BA6	R.F.	140	58			6.3V.
6BE6	Converter	170	58	-5.5		6.3V.
6BA6	I.F.	170	58			6.3V.
6AT6	2nd Det. A.V.C. & 1st A.F.	48				6.3V.
6AQ5	Output	180	175		8.5	6.3V.
OZ4A	Rectifier	245/245 A.C.			185	

NOTE:—Above values hold within plus or minus 20% when measured to chassis with an RCA Voltohmyst or equivalent.

REPLACEMENT PARTS FOR MODEL A-660

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

STOCK NO.	DESCRIPTION
	RECEIVER ASSEMBLIES
S-3898	Capacitor-Mica Trimmer (C3).....
39042	Capacitor-47 MMF Ceramic (C9).....
71021	Capacitor-100 MMF Ceramic(C5).....
39638	Capacitor-270 MMF (C14).....
S-4195	Capacitor-470 MMF Ceramic(C15,C26)
39644	Capacitor-470 MMF Unmoulded(C23)..
5148	Capacitor-.008 MFD (C25).....
S-3646	Capacitor-.005 MFD (C16).....
S-4186	Capacitor-.01 MFD (C2,C6,C17,C20)
S-4189	Capacitor-.02 MFD (C19).....
S-4197	Capacitor-.05 MFD (C4).....
S-4196	Capacitor-.5 MFD (C22).....
S-3131	Capacitor-Electrolytic-20-10-20 Mfd.(C18,C27,C28).....
S-3884	Condenser-Variable (C1,C7,C8).....
37707	Coil-Antenna Filter (L1).....
S-3896	Coil-Antenna Coil (L2,L3).....
S-3897	Coil-Oscillator Coil (L4).....
S-3891	Indicator-Station selector pointer
11765	Lamp-Pilot Lamp-Mazda #51.....
13961	Resistor-82 Ohms-1/4 watt (R16)...
30498	Resistor-390 Ohms-1/2 watt(R14)...
34766	Resistor-1000 Ohms-1/2 watt(R17)..
30731	Resistor-1200 Ohms-1/2 watt(R3)...
14250	Resistor-8200 Ohms-1/2 watt(R2)...
36714	Resistor-15000 Ohms-1/2 watt(R15).
3219	Resistor-18000 Ohms-1/2 watt(R8)..
30492	Resistor-22000 Ohms-(1/2 watt(R6).
14138	Resistor-68000 Ohms-(1/2 watt(R9).
3252	Resistor-100,000 Ohms-1/2 watt(R4)
30648	Resistor-470,000 Ohms-1/2 watt (R1,R12,R13).....
30649	Resistor-2.2 Megohm 1/4 watt(R7)..
30992	Resistor-10 Megohm 1/2 watt(R5,R11)
S-3889	Shaft-Drive Shaft.....
S-3902	Scale-Dial Scale.....
14505	Socket-Vibrator Socket.....
37605	Socket-Tube Socket (Octal).....
36500	Socket-Tube Socket(less centre shield) (Miniature).....
36069	Socket-Tube Socket(with centre shield) (Miniature).....
S-3885	Transformer-1st I.F.(L5,L6,C10,C11)
S-3886	Transformer-2nd I.F.(L7,L8,C12,C13)
S-3887	Transformer-Vibrator(T2)(C24,L13)
S-3890	Volume Control-1/2 Meg.(R10,S1)..
S-3883	Vibrator-Plug in Vibrator.....
	SPEAKER ASSEMBLIES
S-3907	Cone-Cone and Voice Coil Ass'y. (L11)complete with gasket and dust cap.....
S-3906	Speaker.....
S-3908	Transformer-Output Transformer (L9,L10).....
	MISCELLANEOUS ASSEMBLIES
S-4191	Case-Receiver Case (less nose)...
S-4184	Case-Receiver Case nose.....
S-4185	Case-Speaker Case complete with Grille.....
5025	Capacitor-Generator Capacitor....
32634	Cord-Drive Cord-(Universal).....
S-4190	Connector-Speaker plug & cover...
16148	Fuse-10 Amp. (Pkg.2).....
7766	Lead-Ammeter lead clip and fuse holder.....
30641	Lead-"A" lead complete with male connector (Chassis End)....
S-3903	Knob-Tuning and Volume.....
S-3167	Mounting-Receiver Mounting-complete set of brackets, washers, nuts and bolts ....
S-4187	Mounting-Speaker Mounting Bracket and hardware.....
14887	Retainer-Drive shaft hairpin (Pkg.10).....
S-4188	Socket-Speaker socket on chassis.
S-3905	Suppressor-Distributor suppressor
32481	Spring-Drive Cord Tension(Pkg.5).

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

RCA VICTOR

"HIS MASTER'S VOICE"

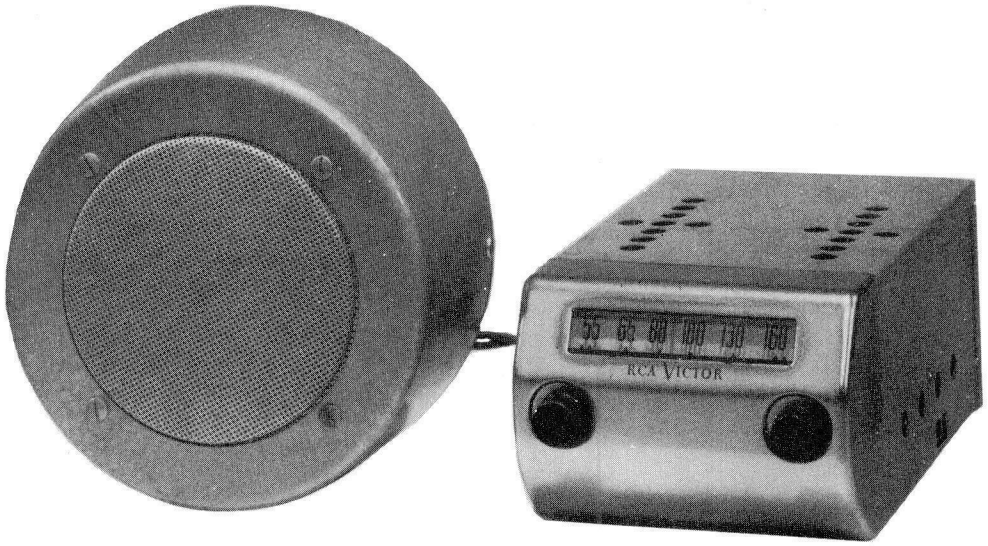
MODELS A-660C

Six-Tube Superheterodyne Automobile Receiver

TECHNICAL INFORMATION AND SERVICE DATA

1948 No. 3

GENERAL SERVICE DIVISION • RCA VICTOR COMPANY LTD.



Electrical and Mechanical Specifications

FREQUENCY RANGE ..... 540-1600 k.c.
Intermediate Frequency ..... 455 k.c.
Tuning Ratio ..... 14 to 1

TUBE COMPLEMENT

(1) 6BA6 ..... R.F. Amplifier
(2) 6BE6 ..... Converter
(3) 6BA6 ..... I.F. Amplifier
(4) 6AT6 ..... 2nd Det. A.V.C. & 1st A.F.
(5) 6AQ5 ..... Power Output
(6) 0Z4A ..... Rectifier
Pilot Lamp ..... Mazda 51, 6.3 volts, 0.2 amp.

LOUDSPEAKER (CRL-532-4)

Type ..... 5 inch round P.M.
V.C. Impedance ..... 3.4 ohms at 400 cycles

POWER SUPPLY

Source ..... 6.3 volt Auto Storage Battery
Current Drain ..... 4.2 amp.

POWER OUTPUT

Undistorted ..... 2.0 watts
Maximum ..... 3.5 watts

CABINET DIMENSIONS (inches)

	Height	Width	Depth
Radio	3⅜	4¾	8¼
Loudspeaker	6⅝ dia.		3⅛

OPERATING CONTROLS

Left Knob ..... Station Tuning
Right Knob ..... On-Off Switch & Volume

GENERAL DESCRIPTION

The model A-660C is a six tube superheterodyne automobile receiver, with a separate loudspeaker unit. This receiver is similar to the A-660 electrically and physically, except that the front of the A-660C is chrome plated. For Service Data and replacement parts other than those listed below, please refer to the Service Note for the A-660.

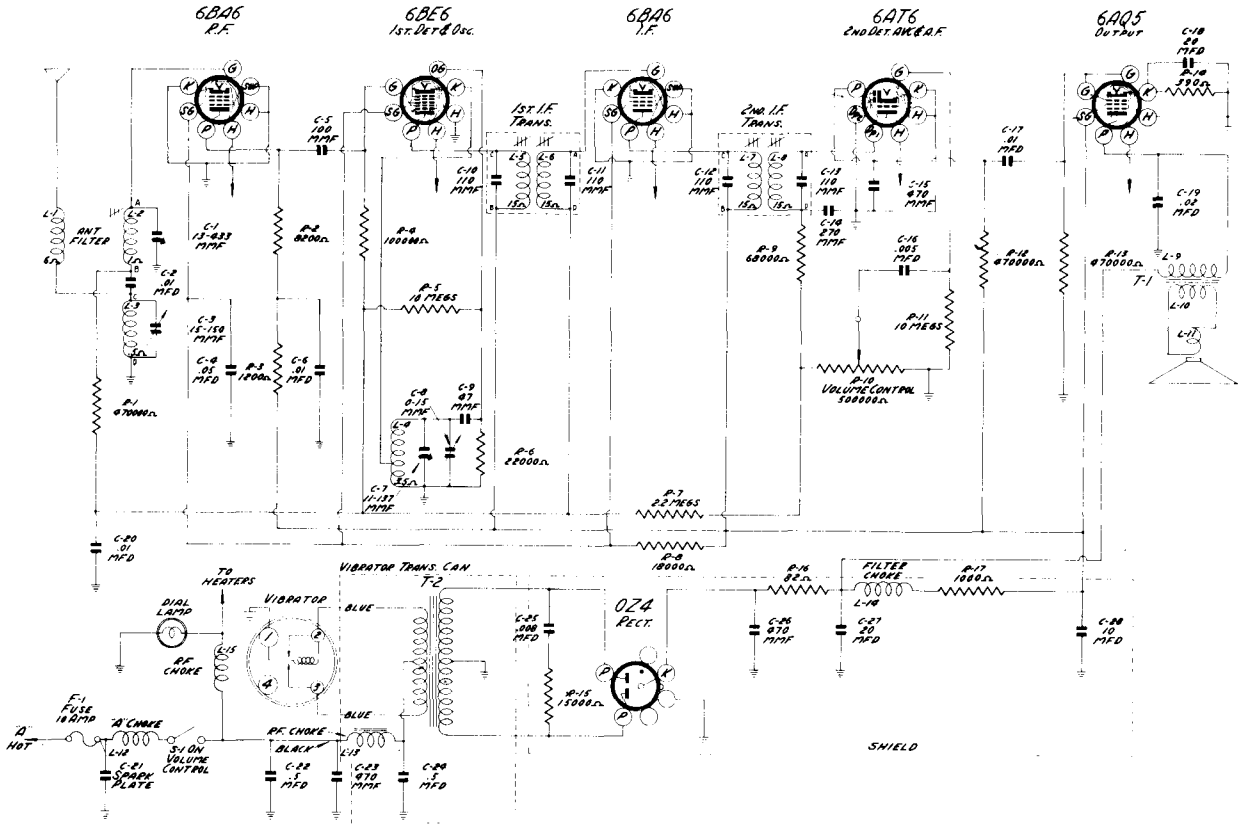


Fig. 1—Schematic Circuit Diagram

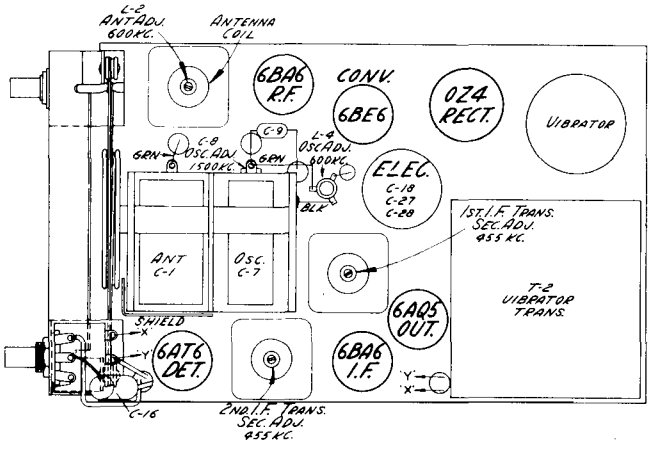


Fig. 2—Chassis Layout

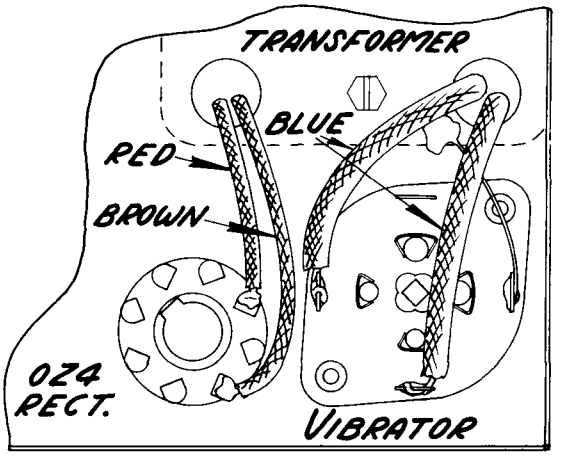


Fig. 3—Modified Chassis Wiring

REPLACEMENT PARTS FOR MODEL A-660C

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			MISCELLANEOUS ASSEMBLIES	
13686	Socket-Vibrator socket.....		S-4255	Case-Receiver case.....	
S-4207	Transformer-Vibrator Transformer(T2).		S-4254	Knob-Timing & volume control.....	
S-4208	Vibrator-Plug-in vibrator.....				

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

RCA VICTOR

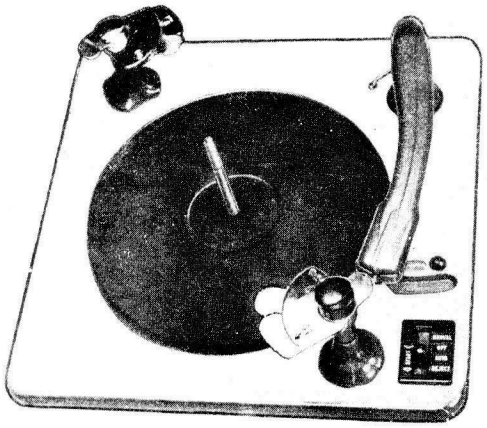
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AUTOMATIC RECORD CHANGER

TECHNICAL INFORMATION AND SERVICE DATA

1947—NO. 6

SERVICE DIVISION • RCA VICTOR COMPANY LIMITED • MONTREAL



Features

1. This record changer is a two post drop type, non-intermixing mechanism designed to play automatically a series of twelve 10-inch or ten 12-inch records of the standard 78 RPM type.
2. The mechanism uses a light weight, low noise, crystal pickup cartridge, equipped with a long life sapphire point.
3. The tone arm is automatically returned to the rest position and the power removed from the drive motor, after the mechanism has finished playing the last selection of the stack.
4. The changer is equipped with an eccentric and closed circle tripping device.
5. A pickup shorting switch is incorporated which shorts out the pickup during record change cycle. This prevents noise from gears, cams and other moving parts from being amplified through the reproducing system.
   An additional pickup shorting switch contacts roller on tone arm lever (17) and shorts out pickup while tone arm is in the rest position.
6. The mechanical linkage between record support posts makes possible a single and simple operation on the part of the operator to change from 10 to 12-inch records or vice versa.
7. This changer may be converted to 50-cycle operation by the addition of Stock No. 71137 Spring to the motor drive shaft.
8. All gears and cams are disconnected while the records are being played. This removes the load on the motor and eliminates excessive friction and noise from moving parts which otherwise have a tendency to produce wow or rumble.

Lubrication

For Information See Page 258

Cautions

1. Never use force to stop or rotate turntable or any other part of the mechanism.
2. Do not play a chipped or cracked record as damage to sapphire may result.
3. Warped records may slide upon one another while playing and cause unsatisfactory reproduction.
4. Do not attempt to handle tone arm while mechanism is in cycle.
5. Do not allow records to remain on selector arms when not in use particularly in warm climate.
6. Do not allow oil or grease to come in contact with the rubber tire on drive idler or any other rubber parts.
7. Do not attempt to move the tone arm horizontally when in the rest position, unless control knob is in the manual position.

Manual Operation

Old, odd sized and home recording records should be played in "Manual" position.

1. Lift and turn selector arm until selector arms point outward as for unloading records.
2. Place records to be played on turntable and move control knob to "Manual" position.
3. Place pickup on record.
4. When selection is finished playing, return the tone arm to rest position and move control knob to "off" position.

Note: Do not move control knob to "off" position before placing tone arm in rest position, or cycling will result. If this should occur do not handle tone arm. Place control knob in automatic position and allow cycle to continue until tone arm comes to rest before continuing with manual operation.

Automatic Operation

1. Lift and turn the selector arm #1 in the front right-hand corner of the changer panel to a position engaging the slots in the selector sleeve. In so doing the arrows and numbers designating record size should be pointing toward the turntable spindle.
2. Load the records to be played on the separator arms with the desired selections upward and in the proper sequence. The last record should be on top.
3. Move control knob to "reject" position and release it. The changer will play the selections in the entire stack at which time the control knob will return to "off" position automatically.
4. Lift and turn the selector arm to facilitate the removal of records on turntable.

Note: To stop mechanism before the selections in the entire stack have been played, move the control knob to "off" position, remove records on selector arms and lift and move the tone arm to rest position.

Functions of Main Parts

I. Motor

The function of the motor is to serve as a power source for the changer. Power is transmitted from motor to turntable through the rubber-tired idler wheel.

II. Control slide and associate parts

A. General function is to provide a single knob control for the various operations shown on the escutcheon plate through its interaction with the changer mechanism.

B. The power switch is mechanically operated by the control slide through a linkage to correspond to the various positions on the escutcheon plate.

C. Manual Reject Slide (27), fig. (3)

1. Manual position—With the control slide in the "manual" position the formed end of the reject slide (27) fig. (16) engages the clutch engagement lever (33) and holds it in an up position so that the trip mechanism is inoperative.
2. Reject position—The short formed end of the reject slide (27), near the mid-section, contacts part of trip lever (28) and trips the mechanism.

D. Tone Arm Latch (14), fig. (3)

1. Functions as a positive lock, fig. (12), for the tone arm whenever the latter is moved to the outside of the panel in all positions of the control slide other than "manual".
2. Also functions as a partial lock, fig. (12), or detent, for the tone arm lever (17) while the control slide is in "manual".

E. Manual Lock Out (4), fig. (3)

Function is to engage and retain the tone arm locator (16), fig. (15), in its outermost position while the control slide is set in the "manual" position.

F. 10 and 12-Inch Set Lever (19), fig. (3)

Function is to index the tone arm properly for 10 or 12-inch records, fig. (19).

III. Spindle Housing, Gear Assembly, and Associated Parts

These two main castings are assembled with other component parts into a major sub-assembly, which includes a spindle and pinion. The assembly operates only in a counter-clockwise direction (viewed from bottom side) and provides a clutching and driving action for all automatic operation. Large gear rotates in a clockwise direction (viewed from bottom). One revolution of this large gear carries the mechanism through a complete change cycle.

A. Pinion Gear (37), fig. (5)

1. Operates as part of the clutch.
2. Operates as a gear to drive the main gear through a change cycle.
3. Serves as a vertical stop for the spindle to which it is pinned.

B. Clutch Engagement Lever (33), fig. (5)

1. Function is to engage projection on pinion gear to start change cycle.

C. Trip Lever Assembly (28), fig. (4)

1. Function is to hold the clutch engagement lever (33), fig. (4) in a position such that it clears the pinion gear (37), fig. (5), except when tripping for cycling.

IV. Selector Arm and Blades

1. Function is to support the records and, together with the selector blades, to separate the lowest record of the stack and allow it to drop to the turntable during the change cycle.

V. Tone Arm Lever and Associated Parts

A. Tone Arm Lever (17), fig. (3)

Controls the horizontal movement of the tone arm.

B. Tone Arm Locator Lever (16), fig. (3)

Function is to control the tone arm lever in determining landing position of the pickup, fig. (8).

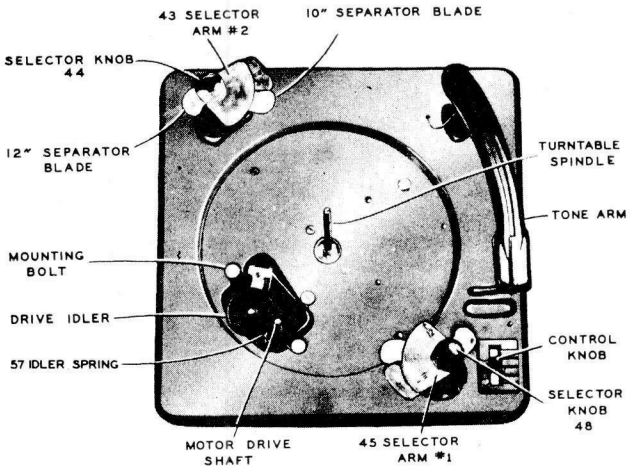


FIG. 1

C. Booster Spring (67), fig. (3)

A small piece of round spring wire which provides a limited amount of spring tension inward, tending to push the pickup into the starting groove.

VI. Tone Arm Lift Pin (51), fig. (24)

Function is to control vertical motion of tone arm.

VII. Selector or Support Arm Gears (35), (36), fig. (3)

Function is to transmit energy from drive mechanism to selector arm and knives.

VIII. Trip Plate (Knurled) (30), fig. (3)

Contacts trip dog (31), fig. (4), for eccentric tripping.

IX. Trip Shoe (29), fig. (3)

Functions as part of the closed circle tripping device.

X. Segments (23), (25) and Tie Plate (24), fig. (3)

Constitute the mechanical linkage between separator arms.

XI. Drive Gear Stop Lever (34), fig. (6)

Functions to stop and position drive gear after cycling.

XII. Tone Arm Retard Lever (26), fig. (4)

Stabilizes horizontal movement of tone arm while in cycle.

Miscellaneous Service Hints

1. Rumble

A. Remove turntable by lifting straight up and inspect the drive mechanism for a defective idler wheel. (Rough rubber tire or very sloppy bearing.)

B. Inspect the mounting of the changer to determine whether or not the mounting clamp nuts have been loosened.

C. Check and replace any microphonic tubes in the reproducing system.

2. "Wow" or Speed Variation

A. Make certain the turntable is free to rotate and not rubbing on motor board or portion of drive mechanism.

B. With the mechanism out of cycle remove the turntable by lifting straight up. The spindle being disengaged from all portions of the drive mechanism should rotate freely when turned by hand.

C. Check for badly worn idler as described in Item (1A).

D. Check for presence of grease on rubber tire of drive idler and the inner rim of the turntable. (Naphtha or carbontetrachloride will remove harmful grease.)

E. Bent turntable spindle.

F. Insufficient tension of drive idler spring (57), fig. (1).

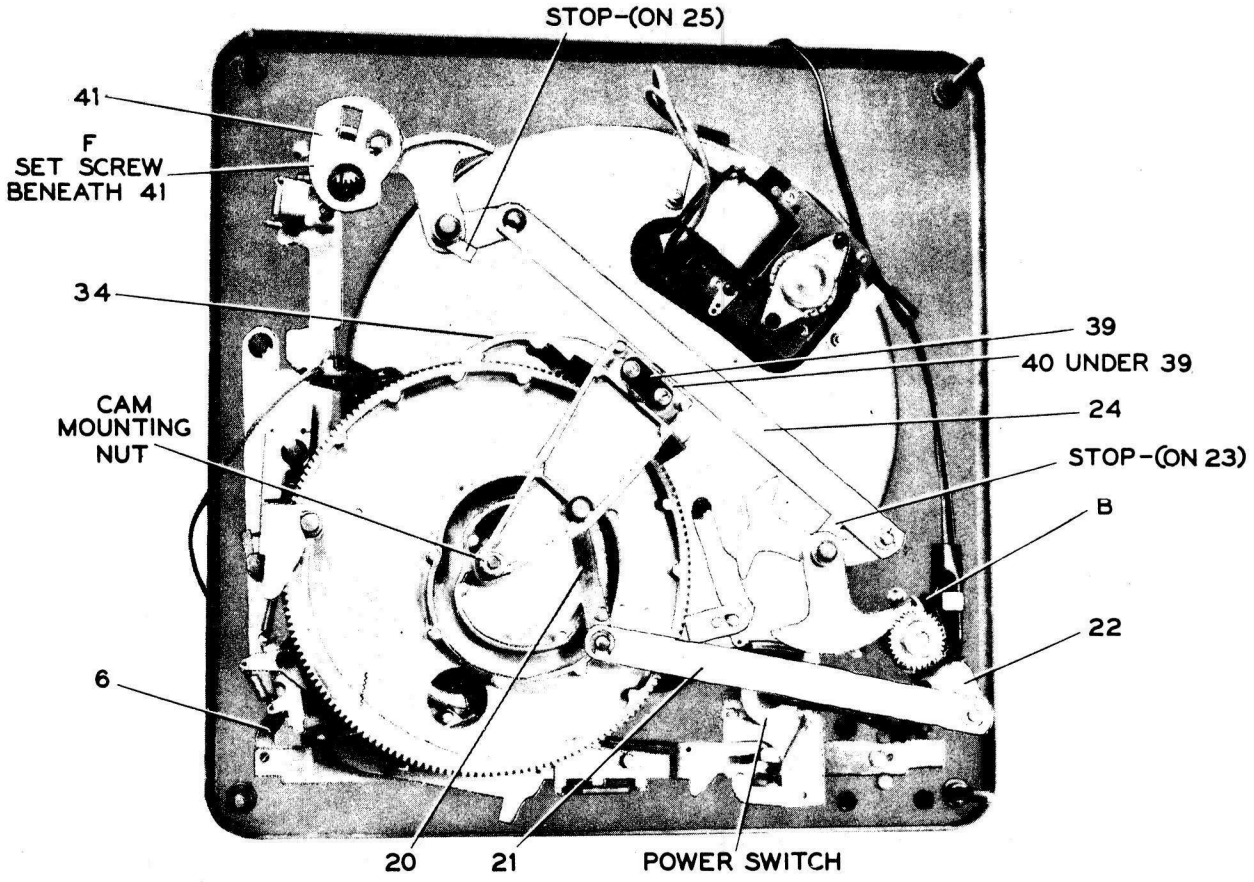


FIG. 2

3. Continuous Tripping (see sketches below)

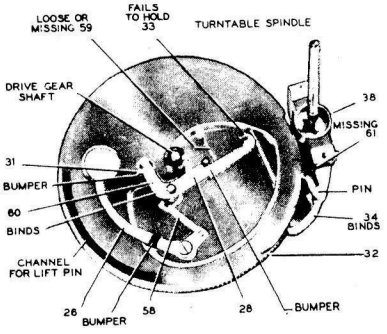
A. Trip lever (28) fails to hold clutch engagement lever (33).

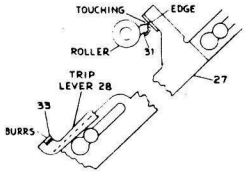
a. Loose or missing trip lever spring (59).
b. Bind in trip lever bearing.
c. Formed edge on manual reject slide (27) touching trip dog (31) (bend away).

B. Bind in stop lever (34), fig. (2).

C. Missing stop lever spring (61).

D. Control knob fails to return to automatic position due to bind in control slide, and associated parts. Missing spring (64), fig. (3).





4. Feed-back or Howl

This condition is caused by sound from the speaker getting back into the input of the amplifier.

A. Inspect motor board mounting to determine whether the clamp nuts have been loosened.

B. Make certain no portion of the mechanism is touching the cabinet. The mechanism should be free floating on mounting springs.

C. Check and replace any microphonic tube in reproducing system.

5. Failure to Trip (see sketches below)

A. Pickup jumping grooves due to improper pickup pressure, or foreign material clogging up sapphire guard.

B. Bind in trip dog (31), bearing or missing spring (60).

C. Tripping adjustments improperly set.

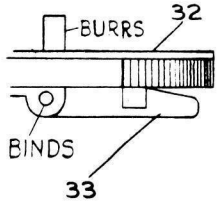
D. Trip lever spring (59) having too much tension.

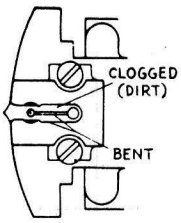
E. Burrs on trip lever (28).

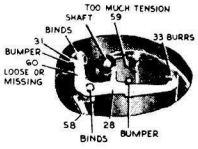
F. Bind in trip lever bearing.

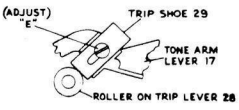
G. Bind in tone arm bearing.

H. Clutch engagement lever (33) bent or binding. (It should be free to drop under its own weight when disengaged from trip lever.)









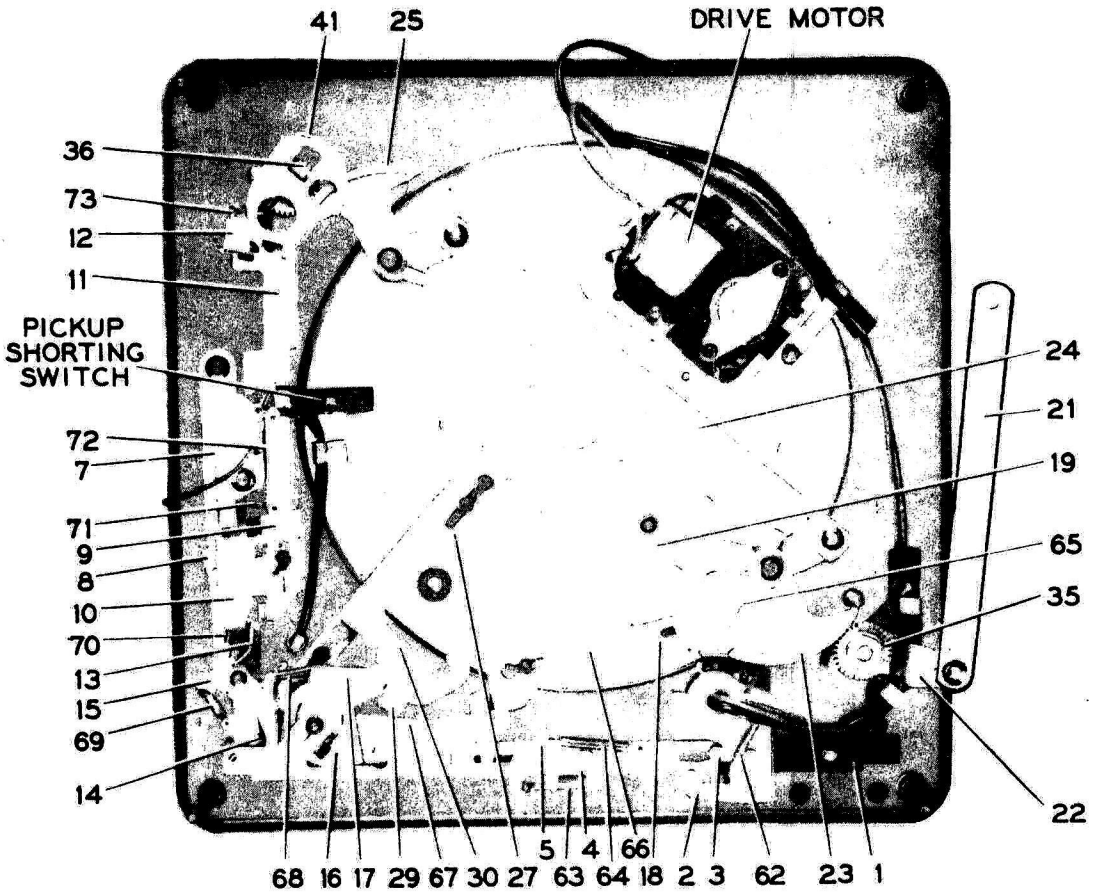


FIG. 3

6. Insufficient power to complete cycle.

A. Grease or oil on inner rim of turntable and rubber tire idler.

B. Insufficient tension of spring (57), fig. (1), on drive idler.

C. Defective drive motor.

D. Binding in series of levers, pivots, etc.

a. Drive link assembly (20), fig. (2).

b. Selector arm shaft assembly, fig. (1).

c. Drive gear (32), fig. (4), shaft.

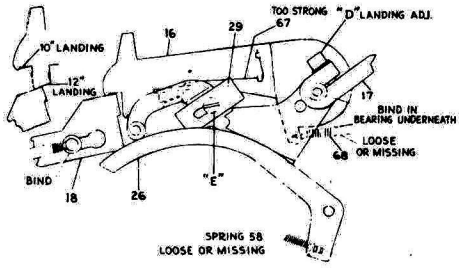
d. Poor gear mesh due to misalignment or defective teeth.

e. Bent record separator blades causing a jam, fig. (1).

G. Spring (66) having more tension than spring (65).

H. Spring (67) out of position causing false edge on lever (16).

I. Tone arm fails to move in because of bind in slide (4), or missing spring (64) keeping lever (16) latched.

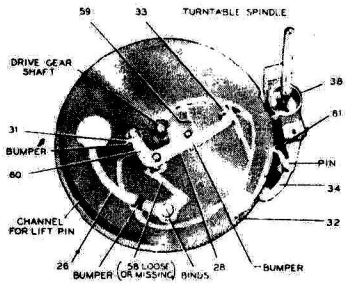


7. Records do not drop properly.

A. Separator arms improperly timed. (See timing adjustments.)

B. Bent separator blades.

C. Bent turntable spindle.



8. Improper pickup landing (adjacent sketches)

A. Landing adjustment improperly set.

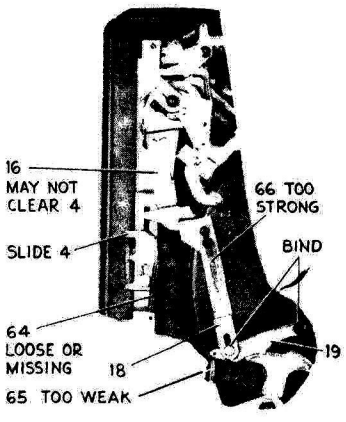
B. Bind in tone arm bearing.

C. Bind of slide (18) and lever (19) on studs.

D. Missing spring (65) or (66).

E. Bent or improperly shaped lever (16).

F. Missing or loose spring (68).



(Continued on page 8)

Automatic Cycle of Operation

Function	Explanation
Lift and turn selector arm as required for 10- or 12-inch records. Place stack of records on arms.	1. The rotation of selector arm #1 moves selector arm #2 through the mechanical linkage of gear (35), fig. (19), segment (23), tie plate (24), segment (25) and gear (36). 2. Portion of segment (23), fig. (19), sildes against set lever (19) thereby determining the point of contact of slide (18), fig. (8), with tone arm locator (16), which in turn governs the pickup landing position.
Push control lever to reject position and release.	1. Control slide (1), fig. (3), actuates manual reject slide (27) through coupling link (6), fig. (2). 2. Manual reject slide (27), fig. (3), pushes against stud above small roller on trip lever (28), fig. (4). 3. The action of trip lever (28), fig. (4), unlatches clutch engagement lever (33) allowing it to drop and engage projection on pinion gear (37), fig. (5). This engagement between lever (33) and pinion gear (37) causes the teeth of drive gear (32) to engage the teeth of pinion gear (37) starting cycle.
Drive gear (32) rotates.	1. Gear (32), fig. (6), rotates with stop lever (34), leaving notch and at the same time pickup shorting switch leaving raised portion of gear causing it to close, shorting out the pickup. 2. Roller on drive link (20), fig. (19), follows channel in drive cam. 3. Energy is transferred from drive link (20) to separator arm #1 through drive link (21), arm (22) and sleeve (47), fig. (17). 4. Separator arm #1 connected to gear (35), fig. (19), starts rotating. 5. Separator arm #2 mechanically linked through gear (35), segment (23), tie plate (24), segment (25) and gear (36) follows in rotation.
Tone arm moves out.	1. As the channel cut in rotating gear (32), fig. (9), moves, lift pin (51) raises contacting adjustment screw "A", fig. (24), on tone arm and raising tone arm. 2. Roller located on end of tone arm lever (17), fig. (8), comes in contact with portion of cam on gear (32), fig. (4), and is pushed outward and against tone arm locator lever (16), fig. (8), which is held under tension of spring (68). 3. Tone arm is locked by tone arm latch (14), fig. (12), and held from being pushed in by locator lever (16), fig. (8). 4. As drive gear continues to rotate, clutch engagement lever (33), fig. (5), is returned to normal position by sliding against edge of tone arm lever (17), fig. (8), as gear supporting it passes by.
Separator arms rotate and drop record to turntable.	1. Blades separate lower record from stack and support the stack while the record is being dropped. 2. Record drops. 3. Tone arm lever (17) is unlatched from latch (14), fig. (7), due to latch (15) making a momentary contact with raised portion of gear.
Tone arm moves in.	1. Tone arm lever (17), fig. (8), which is connected to tone arm is being moved in by locator lever (16) which is working under the tension of spring (68). During this motion tone arm lever (17) is stabilized by tone arm retard lever (26) until locator lever (16) engages slide (18) to determine 10- or 12-inch landing position. 2. Pickup is lowered to the record by lift pin (51), fig. (9), moving into channel in gear. 3. An instant before rotating gear comes to the rest position and stop lever (34), fig. (4), engages notch in gear (32), the pickup shorting switch is opened due to the blade coming in contact with raised portion of gear (32). 4. As pickup is landing and gear is returning to normal position the stud located on underside of gear (32) pushes shut-off bracket (10), fig. (13), outward. The action at this point is not transferred since shut-off dog (8), fig. (10), and shut-off trip (9) are not latched thereby allowing shut-off bracket (10) to slip by over the curved portion of the shut-off dog (8). If shut-off bracket (10) should contact straight edge of shut-off dog (8) as it does when latched to shut-off trip (9), shut-off lever (7) would pull slide (1), fig. (3), and remove power from drive motor. 5. The instant pickup lands, feed-in spring (67), fig. (8), pushes pickup into starting groove.

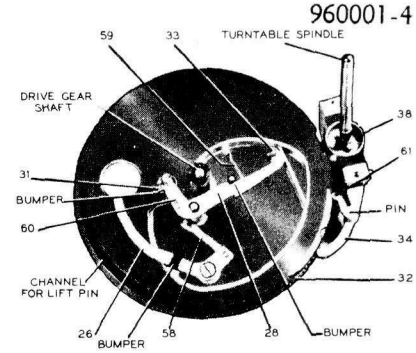


FIG. 4

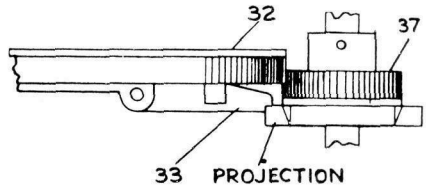


FIG. 5

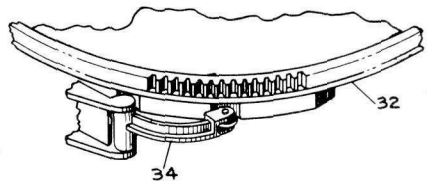


FIG. 6

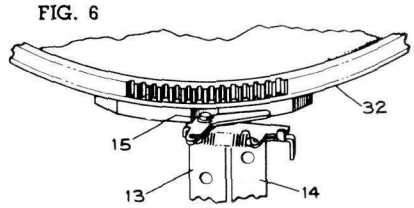


FIG. 7

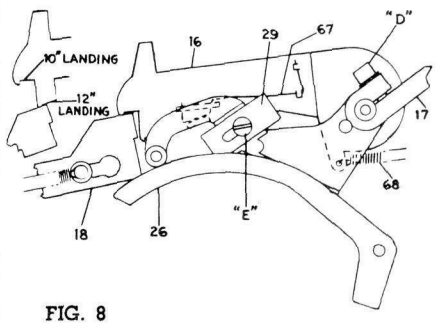


FIG. 8

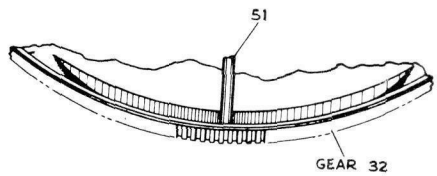


FIG. 9

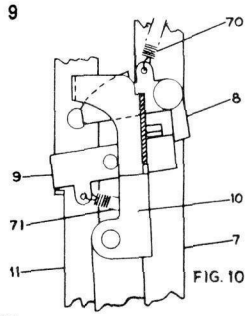


FIG. 10

Function	Explanation
Record plays.	1. Pickup moves toward center of record and into trip groove. 2. In the case of an eccentric groove the tone arm lever (17), fig. (3), moves in and the trip plate (30), fig. (4), engages trip dog (31) moving trip lever (28) and starting cycle. 3. In the case of a record with a closed circle trip the trip shoe (29), fig. (23), pushes against roller on trip lever (28), fig. (4), thus starting cycle.
Mechanism plays entire stack automatically.	Separating and dropping records, tripping, etc.
Last record has dropped and record plays.	1. Up to this time shut-off cam (41), fig. (21), located on bottom end of selector arm #2 has been held up by weight of records on selector arm applying pressure on the small raised portion of shut-off selector bracket (50), fig. (20), which is protruding through selector arm. 2. Pickup moves into trip, and drive gear (32), fig. (4), starts rotating. 3. Since cam (41), fig. (11), has dropped and is rotating with selector arm #2 its surface contacts stud on shut-off slide bracket (12). This transmits energy to shut-off slide (11), fig. (14), which permits shut-off dog (8) and shut-off trip (9) to latch. 4. Shut-off slide (11), fig. (12), locks tone arm latch (13) during the time, portion of the rotating drive gear is contacting tone arm latch (15), fig. (7), and tending to unlatch it. The tone arm remaining latched, prevents it from being pushed in by locator lever (16), fig. (8). 5. Tone arm is lowered to rest as lift pin (51), fig. (9), goes into channel in gear (32). 6. As gear (32) comes to rest stud, fig. (13), located on underside of gear (32) contacts and pushes shut-off bracket (10) outward. Since shut-off dog (8), fig. (14), and shut-off trip (9) are latched, shut-off bracket (10) contacts flat surface of shut-off dog (8) pushing shut-off lever (7) outward. 7. Shut-off lever (7) in its outward movement contacts lip on slide (1), fig. (3), pulling control knob to "off" position, cutting off the power to the drive motor. During this action, shut-off dog (8), fig. (14), and shut-off trip (9) are unlatched.

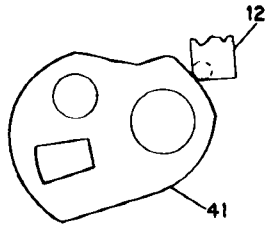


FIG. 11

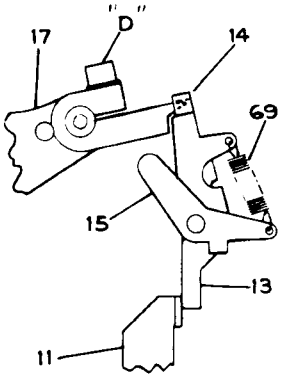


FIG. 12

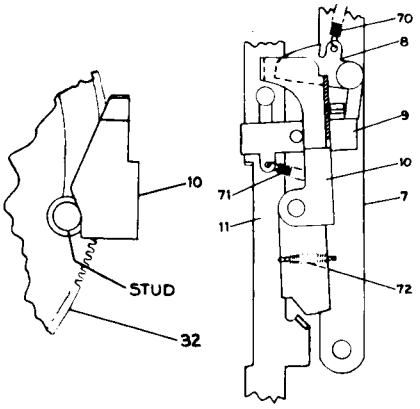


FIG. 13 FIG. 14

Manual Cycle

Function	Explanation
Push control knob to manual.	1. Slide (1), fig. (3), supporting-control knob moves and positions "manual" lock-out slides (4) and (5), fig. 15), so as to have slide (4) engage and hold tone arm locator (16) and prevent it from pushing tone arm lever (17), fig. (8), in for pickup landing. 2. Slide (1), fig. (3), also energizing manual reject slide (27), fig. (16), so as to have the lip on slide (27) push against tone arm latch (14), moving the point of contact on tone arm lever (17) to the very edge. This permits tone arm lever (17) to slip by when tone arm is moved manually. 3. The movement of manual reject slide (27) has so positioned the slide so as to lock the clutch engagement lever (33) and prevent it from engaging offset in pinion gear (37), fig. (5), when trip lever (28), fig. (16), is moved. 4. All portions of the cycling mechanism are locked during manual operation and remain stationary with the pickup shorting switch in the off position at all times, excepting Models –2 and –3 which have an additional switch, shorting out pickup when tone arm is in the rest position. Note: When operating manually the tone arm should always be returned to rest position before moving control knob to the off position. If this procedure is not followed the trip lever (28) may not hold the clutch engagement lever (33) allowing it to drop and start cycle.
Allen wrenches required for adjustments.	3/32 in. between flats, for Allen wrenches required for adjustments on set screws #10 and 12, stock #22111. 5/32 in. between flats, for 5/16 in. set screws, stock #22113. 3/16 in. between flats, for ⅜ in. set screws, stock #26581.

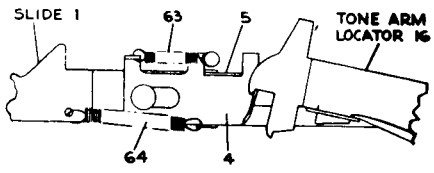


FIG. 15

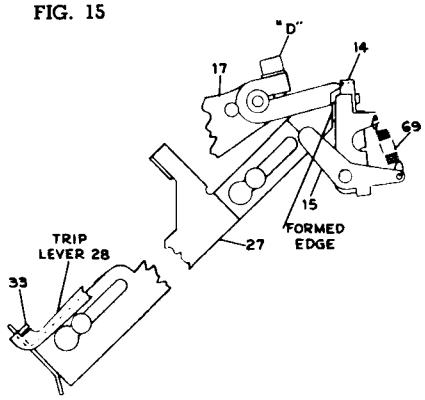


FIG. 16

Check on Timing Adjustments

A quick check for correct timing of mechanism can be made by:

1. Have mechanism out of cycle.
2. Lift and turn separator arm #1 to 10 in. position and place a 10 in. record on arms.
3. The 10 in. separator blade should have a definite relation to record as illustrated in fig. (18) when segment (23) is against tie plate (24) as illustrated in fig. (19). If so, selector arm #1 is correctly timed.
4. If the 10 in. blades of both arms have the same distance from the record, remove record and lift and turn selector arm #1 counterclockwise as far as it will go (viewed from top).
5. Segment (25) should be against tie plate (24) when the teeth of segment (25) and gear (36) are meshed as shown in fig. (22). If this exists, timing of selector arm #2 is correct.

Timing Adjustments for Record Separators

1. Make certain mechanism is out of cycle and all parts in their proper place by comparing the mechanism with sketches and photographs.
2. Remove "C" washer on bearing of segment (23), fig. (19), and disengage the teeth of segment (23) and selector arm gear (35).
3. Selector arm #1, fig. (17), should be in place with the pin of selector shaft engaged in the large slot of selector arm and the small projection of selector arm sleeve (47) engaged in the small slot of the selector arm. Arm (22), fig. (19), should also be in place and connected to the drive link (20) and drive link connecting rod (21).
4. Loosen set screw "B", fig. (17), and wedge some object such as a screw driver in the clamp of arm (22) so as to allow free movement of selector arm sleeve (47).
5. Place 10-inch record on selector arms and turn selector arm #1, fig. (18), until the 10-inch blade is approximately ¼ inch from the edge of the record.
6. Tighten set screw "B", fig. (17).
7. Rotate the disengaged segment (23), fig. (19), clockwise until tie plate (24) comes against stop on segment (23). Hold in this position while engaging teeth of segment (23) and teeth of gear (35).
8. Replace "C" washer on segment (23).
9. Remove "C" washer on rod (41), fig. (21) (under selector arm #2) and remove cam and rod (41).
10. Remove "C" washer on bearing of segment (25). fig. (22), and disengage teeth of segment (25) and gear (36).
11. Lift and rotate selector arm #1, fig. (22), counter-clockwise until stop on segment (25) is against tie plate (24).
12. Engage teeth of segment (25) and gear (36) so as to have the first tooth of segment gear (25) engage the gear (36) between the first and second tooth next to slot as shown in sketch, fig. (22). Replace "C" washer or bearing of segment (25).
13. Loosen set screw "F" and rotate selector arm #2 until ten-inch separator blade is the same distance from the edge of the record as selector arm #1, fig. (18).
14. Tighten set screw "F", fig. (22).

    Note: Do not try to position separator arm #2 by loosening small set screws on arm proper. The factory has countersunk the shaft, seating the set screws.
15. Replace cam (41), fig. (21), with the end going up through hole in plate (50), fig. (20). Insert "C" washer, fig. (21), to hold in place.

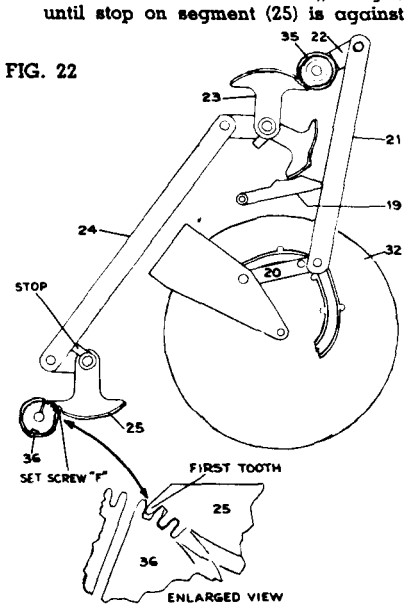


FIG. 22

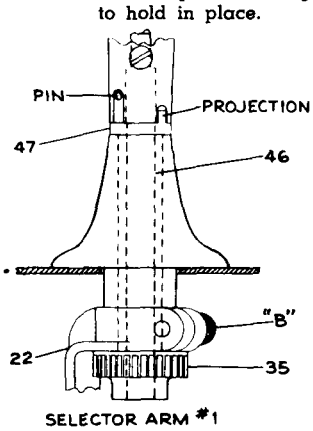


FIG. 17

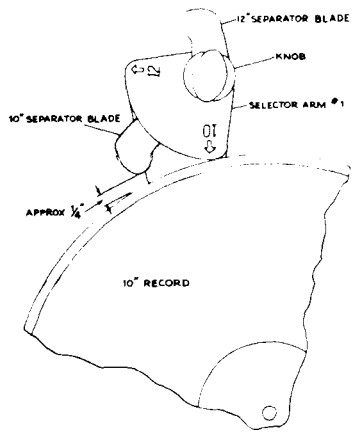


FIG. 18

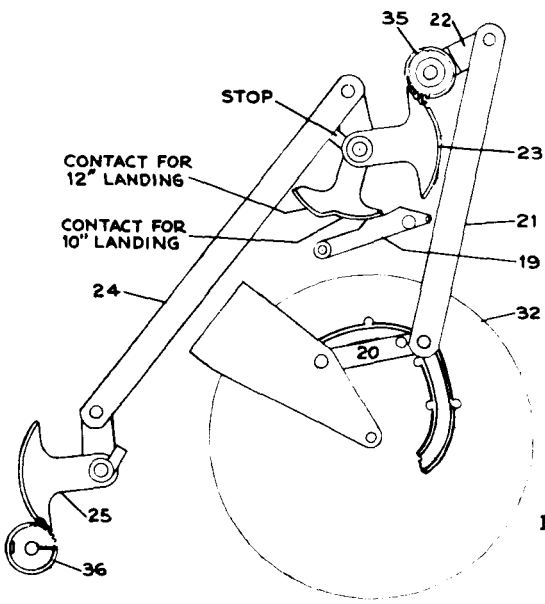


FIG. 19

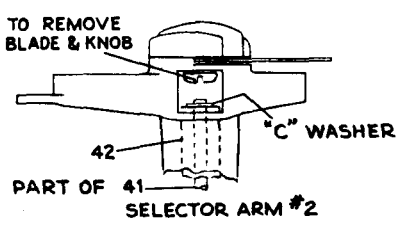


FIG. 21

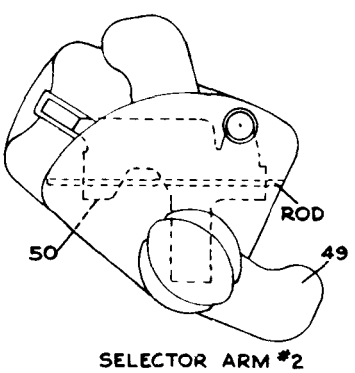


FIG. 20

Tripping Adjustment

No eccentric tripping adjustment is necessary. It is automatically adjusted when landing adjustment is made.

For closed circle trip, loosen set screw "E", fig. (23), and set trip shoe (29) so as to contact roller on trip lever (28) when the sapphire is approximately $1^{5}/_{8}$" from side of turntable spindle.

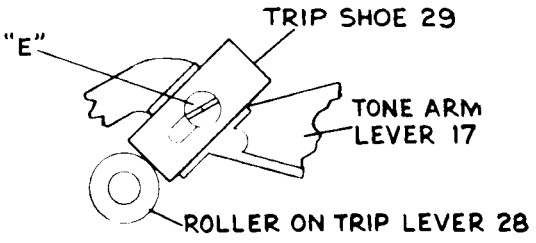


FIG. 23

Tone Arm Height Adjustment

1. The height of the tone arm while in the rest position is that which will allow the bottom edge of the tone arm and cartridge to clear the turntable surface by $^{1}/_{16}$".
   The height is adjusted by bending the formed edge on lower half of tone arm bracket fig. (24).
2. Tone arm height adjustment screw "A", fig. (24), should be so adjusted to allow a clearance of $^{1}/_{16}$ inch between tone arm and record on selector arm while mechanism is in cycle.

Pickup Pressure Adjustment

By the use of a pocket postal scale hooked on the sapphire end of the tone arm, loosen set screw "G", fig. (24), and move slide until tension of spring (56) allows $1^{1}/_{2}$ to $1^{3}/_{4}$ oz. pickup force

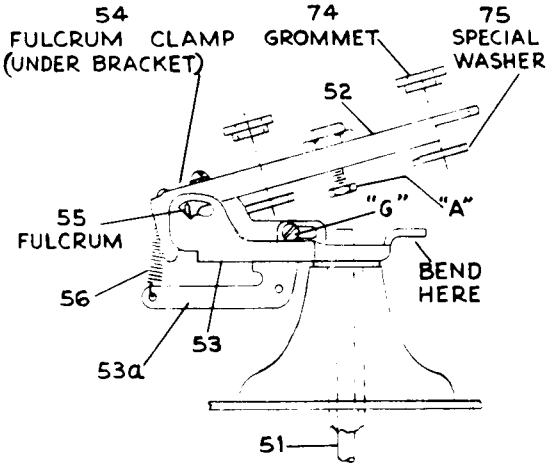


FIG. 24

Landing Adjustment

1. With the power removed from the mechanism, place a 10-inch record on the turntable and turn the selector cam to 10-inch position.
2. Push selector knob to reject and release.
3. Push down on the small section of lever (50), fig. (20), which protrudes through selector arm #2 and rotate turntable by hand until the pickup is about to land.
4. Loosen set screw "D", fig. (25).
5. Hold tone arm lever (17) against tone arm locator (16) with just enough force so as not to have tone arm locator (16) move away from slide (18).
6. While holding the position as stated in "5," move pickup to the landing point on the record. Leave very little vertical play in tone arm bearing but just enough to have free motion of tone arm. Tighten set screw "D".
7. Apply power to mechanism and test by playing through a stack of records.

Note: Twelve-inch record landing will automatically be adjusted while adjusting 10-inch landing.

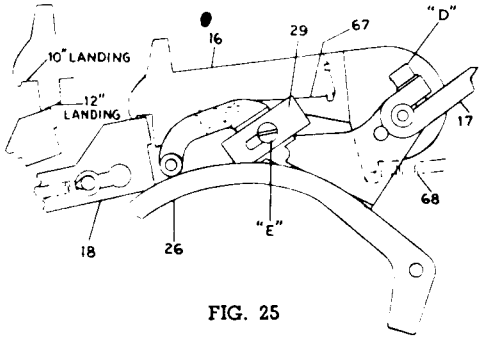


FIG. 25

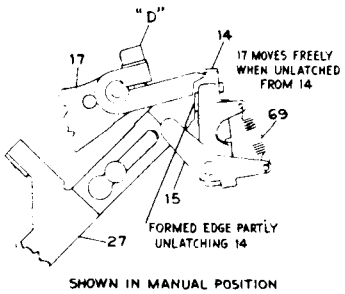
Miscellaneous Service Hints—(Continued from page 4)

9. Repeating grooves (see sketches below)

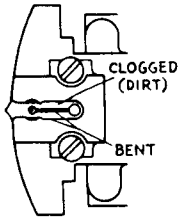
A. Insufficient pickup pressure.

B. Bind in tone arm pivot.
Place control knob in "manual" position and move tone arm in toward spindle and back. After the end of the tone arm lever (17) (functioning as a detent) leaves latch (14) the tone arm should have free and smooth action.
(If latch (14) is too positive, bend formed edge on manual reject slide (27) which contacts latch (14).)

C. Check for bind in tone arm lift pin (51).

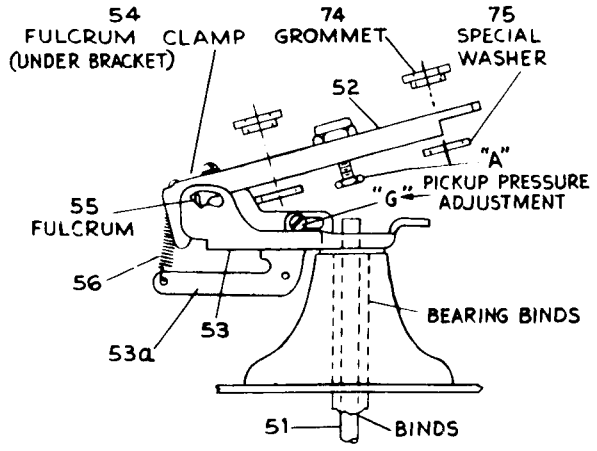


SHOWN IN MANUAL POSITION



D. Sapphire shield filled with foreign material, preventing sapphire from setting into grooves.

E. Bent sapphire mounting thereby allowing sapphire guard to ride on record.



10. Premature tripping.

A. Defective record.
B. Trip shoe (29), fig. (3), improperly set.
C. Trip lever spring (59), fig. (4), insufficient tension.
D. Bind in trip dog (31), fig. (4), pivot.

11. Noise coming from speaker during record change cycle.

Pickup shorting switch failing to short out pickup.

12. No output.

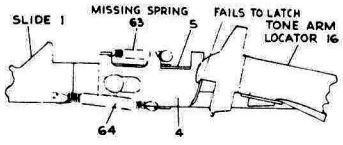
A. Defective crystal cartridge.
B. Broken or bent sapphire mounting.
C. Broken or shorted pickup cable.
D. Pickup shorting switch making contact.
E. Inoperative reproducing system.

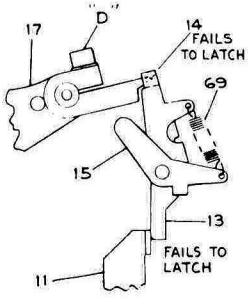
13. Distorted output.

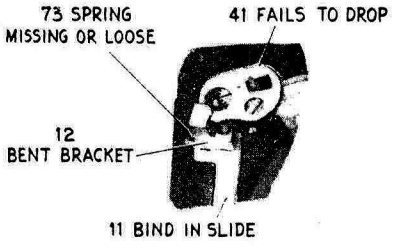
A. Defective pickup cartridge.
B. Bent or loose sapphire mounting, allowing sapphire to ride irregular in groove.
C. Sapphire guard filled with foreign material such as dust and lint which accumulates on the records while in storage.
(Remove with small brush.)

14. Tone arm fails to go to rest position at the finish of the last selection (see sketches below)

A. Control knob fails to return automatically to "off" position.
1. Cam (41) fails to drop down, thereby preventing stud on stop bracket (12) from contacting it.
2. Missing stop bracket spring (73).
3. Missing stud on bracket (12).
4. Bind in shut off dog (8), fig. (3), and trip (9).
5. Formed edge on slide (11) not locking tone arm latch (13).
6. Tone arm latch (14) bent thereby not locking tone arm and allowing it to be pushed in by lever (16).

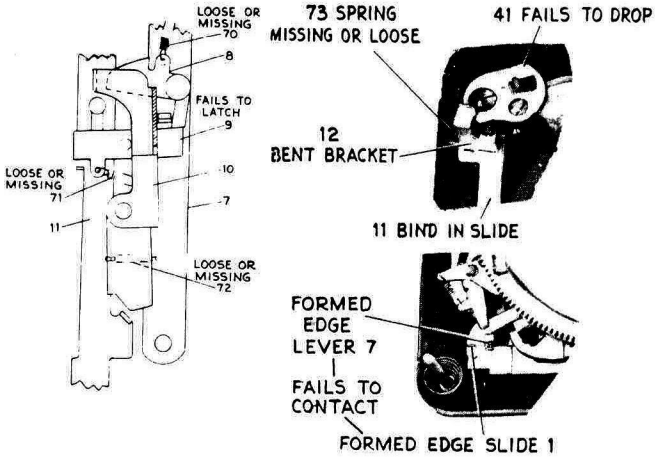






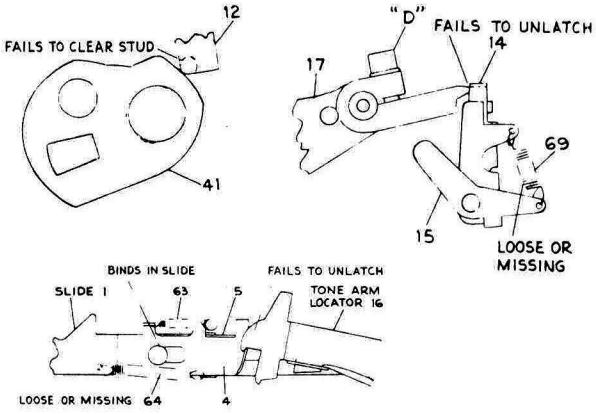
15. Turntable fails to stop at the end of the last selection (see sketches below)

A. Defective motor switch.
B. Bind in levers actuating drive motor power switch, fig. (2).
C. Control lever fails to move automatically to "off" position as described in 14A—one to five.
D. Small formed edge on lever (7) may fail to contact formed edge on slide (1) thereby not pulling slide (1) and not moving control to "off" position.



16. Pickup fails to move in for landing (see sketches below)

A. Tone arm locator (16) lever fails to unlatch from slide (4).
B. Tone arm lever (17) fails to unlatch from tone arm latch (14).
C. Missing spring (69).
D. Bent shut off slide bracket (12) which may allow cam (41) to contact at incorrect time.
E. Weak or missing spring (73), fig. (3), thus allowing slide (11) to move in and lock latch (13).



17. Power is removed from motor as pickup lands on record.

A. Shut off slide bracket (12), fig. (3), may be bent.
B. Low tension or missing spring (73), fig. (3).

Removing Main Assemblies

Removing Turntable

To remove turntable, lift straight up with a rotary motion.

Removing Separator Arms

To remove separator arm, loosen set screws and lift off.

Removing 12 in. Separator Blade

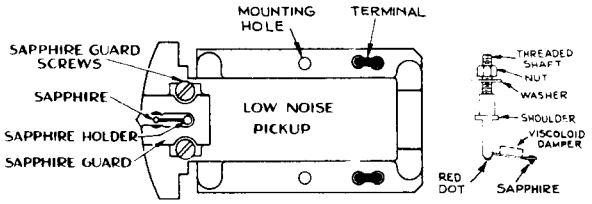
Remove Separator arm and by the use of a small screw driver remove the small screw up inside the separator sleeve (see fig. (21)). This removes the knob and 12 in. blade. The 10 in. blade is not removable.

Removing Sub-assembly

To remove the large gear sub-assembly, remove the turntable and remove the two small screws on either side of the turntable spindle. Also remove the large nut holding the gear shaft. The entire gear bracket, etc., can be removed easily.

Removing Tone Arm

To remove the tone arm from the mounting bracket, it is necessary to remove the two screws located under the pivot end of the tone arm. These screws are more accessible if the bracket and shaft are removed by loosening bolt "D" as indicated in fig. (16).



LOW NOISE PICKUP

Note: Stock #39851 has red dot on bottom of sapphire holder, 13.5 mil. dia. sapphire mounting wire, but no viscoloid damper.

Lubrication

1. GREASE—Gears, all cams on large gear, tapered end of tone arm latch and tone arm lever with Lupriplate No. 105.
2. OIL—All shafts before inserting into bearing and all moving parts, except those to be greased, with a good, light machine oil.

NOTE: Keep grease and oil away from rubber parts such as drive idler, bumpers, etc. Do not oil or grease clutch engagement lever.

Replacement of Sapphire

Caution: Never bend the sapphire support wire.
The nut on the sapphire holder assembly is locked by a light cement (such as Glyptal). Extreme care should be used when loosening the nut so that the twisting motion does not break the crystal.

Remove the two screws holding the sapphire guard in place and remove guard. Remove the small nut and washer on the threaded shaft of the sapphire holder and push the shaft through the hole in the mounting until the sapphire holder assembly comes free.

Use of a drop or two of acetone will facilitate the removal of the nut and shaft. Do not use force as the crystal may be broken.

Insert threaded shaft of replacement sapphire holder through mounting and replace the washer and nut. Make sure that the sapphire is in the correct position. Take hold at the lower end of the shaft with a pair of pliers while tightening the nut, being very careful so as not to strip the threads or break the crystal. Replace the sapphire guard, positioning it by means of the oversize screw slots. Make certain that the sapphire and its supporting wire are centered in the guard. Tighten the guard screws. Before using, check to see that the sapphire projects far enough (approx. .020) beyond the guard so that the guard will not strike the record. If necessary, bend the guard a little. Apply a drop of light cement (such as Glyptal) to the sapphire nut holder.

REPLACEMENT PARTS FOR MODEL 960001-4

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

STOCK NO.	DESCRIPTION
	PICKUP AND ARM ASSEMBLIES
71294	Arm-Pickup arm shell only.....
71311	Bracket-Hinge bracket and shaft assembly (53) Fig. (24).....
71327	Bracket-Tone arm bracket assembly (52) Fig. (24).....
72507	Cable-Shielded pickup cable(crystal pickup to terminal board)...
71325	Clamp-Fulcrum clamp (54),Fig.(24).
39851	Crystal-Pickup crystal cartridge..
71326	Fulcrum-Tone arm fulcrum (55), Fig. (24).....
31048	Plug-Pin plug for pickup cable....
39863	Sapphire-Sapphire and holder for 39851.....
71312	Slide-Counter balance adjusting slide (53a), Fig. (24).....
71307	Spring-Counter balance spring (56) Fig. (24).....
	MOTOR ASSEMBLIES
S-3951	Motor-Motor 105/125 volt 25 cycle complete.....
71960	Motor-Motor 105/125 volt 60 cycle complete.....
71137	Spring-Spring to convert 60 cycle motor to 50 cy.....
71412	Spring-Idler wheel tension spring.
71411	Wheel-Idler wheel.....
4577	Plug-Power cord connector.....
	OPERATING MECHANISM
71353	Arm-Detent arm assembly(2)Fig.(3).
71375	Arm-Drive arm assembly(22)Fig.(3).
71377	Arm-Selector arm #1 and blade (10 in.) assy. (45) Fig. (1)(minus knob).....
71381	Arm-Selector arm #2 and blade (10 in.) assembly (43), Fig. (1) (minus knob).....
71357	Blade-Pickup shorting switch blade assembly Fig. (3).....
71379	Blade-Selector blade, 12 in.(49), Fig. (20).....
71344	Bracket-Shutoff bracket (10), Fig. (3).....
71383	Bracket-Shutoff selector bracket assembly (50) Fig. (20).....
71337	Bracket-Shutoff slide bracket assembly (12) Fig. (3).....
71314	Bumper-Retard lever rubber bumper (on lever 26) Fig. (4).
71359	Bumper-Tone arm rubber bumper(on motor board).....
71317	Bumper-Trip dog rubber bumper(on trip dog 31) Fig. (4).....
71318	Bumper-Trip lever rubber bumper, Fig. (4).....
39386	Cable-Shielded pickup cable complete with pin plug (terminal board to radio chassis).....
71373	Cam-Shutoff cam shaft assembly (41) Fig. (21) or Fig. (3)....
71330	Cover-Switch Cover.....
71331	Escutcheon-Control escutcheon...
71365	Gear-Pinion gear (37), Fig. (5).
71386	Gear-#1 post gear (35),Fig. (3).
71388	Gear-Drive gear sub-assembly(32), Fig. (4).....
71374	Gear-Post gear #2 (36), Fig.(22) and Fig. (3).....
71328	Grommet-Rubber mounting grommet (motor) (3 required).....
71321	Grommet-Tone arm mounting grommet (74), Fig. (24).....
71363	Housing-Spindle housing and bushing assy.(38), Fig. (4)...

REPLACEMENT PARTS FOR MODEL 960001-4

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

OPERATING MECHANISM - Continued.

STOCK NO.	DESCRIPTION
71335	Hub-Tone arm locator hub (die cast hub bolted to motor board beneath tone arm bearing).....
71329	Insulator-Switch cover insulator..
71334	Knob-Control knob assembly.....
71378	Knob-Selector arm knob #1 assembly (48), Fig. (1).....
71382	Knob-Selector arm knob #2 (44), Fig. (1).....
71346	Latch-Tone arm latch (center) (13), Fig. (12).....
71347	Latch-Tone arm latch (inner)(14), Fig. (12).....
71348	Latch-Tone arm latch (outer)(15), Fig. (12).....
71350	Lever-Reset lever assembly (18 and 19), Fig. (3).....
71305	Lever-Drive gear stop lever assembly (34), Fig. (4).....
71340	Lever,Shutoff lever assembly (7), including shutoff dog (8), Fig. (3).....
71358	Lever-Tone arm lever assembly (17), including roller and knurled edge (30), Fig. (3).....
71369	Lever-Trip lever assembly (28), including trip dog (31) and roller, Fig. (4).....
71370	Lever-Tone arm retard lever (26), Fig. (4).....
71368	Lever-Clutch engagement lever(33), Fig. (5).....
71309	Link-Connecting link (6), Fig. (2)
71367	Link-Drive link assembly (20), Fig. (2).....
71336	Locator-Tone arm locator (16), Fig. (3).....
71332	Lockout-Manual lockout assembly (4 and 5), including slide (1), Fig. (3).....
70546	Mounting Kit, Motorboard.....
71319	Pin-Stop lever pivot pin (mounting pin) Fig. (4).....
71316	Pin-Tone arm lift pin (51),Fig. (24).....
71362	Plate-Segment tie plate (24), Fig. (3).....
71352	Plate-Switch plate assembly.....
71297	Plate-Thrust plate (39), Fig. (2).
71376	Rod-Drive link connecting rod(21), Fig. (2).....
71315	Roller-Drive link roller on link (20), Fig. (2).....
71303	Screw-Retard lever screw (mounting screw for lever (26) Fig. (4)...
71360	Segment-Segment #1 assembly (23), Fig. (3).....
71361	Segment-Segment #2 assembly (25), Fig. (3).....
71366	Shaft-Drive gear shaft, Fig. (4)...
71371	Shaft-Selector shaft #1 assembly (46), Fig. (17).....
71380	Shaft-Selector shaft #2 (42), Fig. (21).....
71313	Shoe-Trip shoe (29), Fig. (3).....
71372	Sleeve-Selector shaft sleeve (47), Fig. (17).....
71333	Slide-Manual reject slide (27), Fig. (3).....
71338	Slide-Shutoff slide (11),Fig. (3)..
71364	Spindle-Turntable spindle assembly.
71355	Spring-Detent arm spring (62), Fig. (3).....
71308	Spring-Manual lockout spring(inner) (64), Fig. (3).....
71296	Spring-Manual lockout spring(outer) (63), Fig. (3).....
71299	Spring-12 in. reset slide spring (66), Fig. (3).....
71351	Spring-Reset lever spring (65),Fig. (3).....
71345	Spring-Shutoff bracket spring (72), Fig. (3) or Fig. (14).....
71341	Spring-Shutoff lever spring (70), Fig. (3).....
71339	Spring-Shutoff slide spring (73), Fig. (3).....
71343	Spring-Shutoff trip spring (71), Fig. (3).....
71300	Spring-Stop lever spring (61). Fig. (4).....
71293	Spring-Tone arm booster spring (67), Fig. (3).....
71349	Spring-Tone arm latch spring (outer) (69),Fig.(3) or Fig.(12).....
71306	Spring-Tone arm locator and latch spring (68), Fig. (3).....
71301	Spring-Trip dog spring (60),Fig.(4)
71304	Spring-Trip lever spring (59),Fig. (4).....
71302	Spring-Retard lever spring (58), Fig. (4).....
71356	Strip-Contact mounting strip assembly (part of pickup shorting switch), Fig. (3).....
71320	Switch-Power switch, Fig. (2).....
71342	Trip-Shutoff trip assembly (9),Fig. (3).....
71385	Turntable-Turntable Assembly.....
71322	Washer-Tone arm special washer (75), Fig. (24).....
71298	Wafer-Thrust wafer (40),Fig.(2)....
71292	Washer-"C" washer (large).....
71295	Washer-"C" washer (small).....

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


RCA
HIS MASTER'S VOICE

RCA Victor

960260-2
AUTOMATIC RECORD CHANGER
TECHNICAL INFORMATION AND SERVICE DATA

1946—20

SERVICE DIVISION • RCA VICTOR COMPANY LIMITED • MONTREAL

Features

1. This mechanism is designed to play automatically a series of twelve 10-inch or ten 12-inch standard records of the 78 r.p.m. type.
2. It will play manually records up to 12 inches in diameter.
3. Tripping system is of "constant diameter" type, insuring reliable automatic operation on all records made to RMA proposed standards.
4. It is a simple operation of turning one record support to change from 10- to 12-inch records or vice versa.
5. Cycling mechanism is disconnected completely while records are being played. This reduces the load on the drive motor, thereby reducing the tendency for "wow" or rumble.

Manual Operation

1. Rotate the record separator shelf clockwise for 10-inch or counterclockwise for 12-inch position (numerals 10 or 12 pointing towards center post).
2. Place the record to be played on the turntable and turn the power switch on.
3. Place the pickup on the start of the record.

   Note: The mechanism should be allowed to complete cycle before attempting to move tone arm to the rest position.
4. Turn power switch off
5. Remove the record by raising straight up without tilting.

Automatic Operation

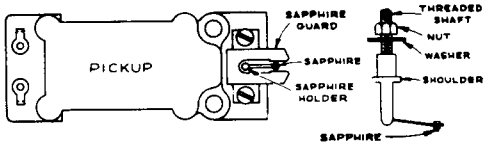
1. With the power switch in the off position rotate the record support shelf as required for 10- or 12-inch records until the record size indicated on the support cover is pointing toward the center post. (Rotate clockwise for 10-inch and counterclockwise for 12-inch records.)
2. Place the records to be played in a stack with desired selections upward and in proper sequence with the last record on top. Load them on the changer by placing them over the center post and resting on the record support shelf. Place record stabilizing clip on top of the record stack.
3. Turn power switch on and press down firmly but momentarily on the end of the tone arm and let go. The changer will continue to play one side of the entire stack automatically.

   The tone arm can be moved to the rest position any time the mechanism is not in cycle.
4. Turn the power switch off and remove the stack from the turntable by placing fingers of both hands directly opposite and under the stack. Then lift straight up—"don't tilt" or squeeze stack. Turning the support shelf one-fourth turn facilitates removal of records.

Cautions

1. Avoid handling the tone arm or rotating record support assembly while mechanism is in cycle.
2. Never turn the power switch off, leaving the mechanism in cycle for an extended period of time.
3. Do not allow the records to remain on supports when not in use.
4. Do not allow oil or grease to come in contact with any rubber parts.
5. Do not install instrument near source of heat. Excessive heat may damage the pickup cartridge.

REPLACEMENT OF SAPPHIRE



Caution: Never bend the sapphire support wire.

The nut on the sapphire holder assembly is locked by a light cement (such as Glyptal). Extreme care should be used when loosening the nut so that the twisting motion does not break the crystal.

Remove the two screws holding the sapphire guard in place and remove guard. Remove the small nut and washer on the threaded shaft of the sapphire holder and gently push the shaft through the hole in the armature shaft until the sapphire holder assembly comes free.

Use of a drop or two of acetone will facilitate the removal of the nut and shaft. Do not use force as the crystal may be broken.

Insert threaded shaft of replacement sapphire holder through armature shaft and replace the washer and nut. Make sure that the sapphire is in the correct position. Take hold at the lower end of the shaft with a pair of pliers while tightening the nut, being very careful so as not to strip the threads or break the crystal. Replace the sapphire guard, positioning it by means of the oversize screw slots. Make certain that the sapphire and its supporting wire are centered in the guard. Tighten the guard screws. Before using, check to see that the sapphire projects far enough (approx. .020) beyond the guard so that the guard will not strike the record. If necessary, bend the guard a little. Apply a drop of light cement (such as Glyptal) to the sapphire nut holder.

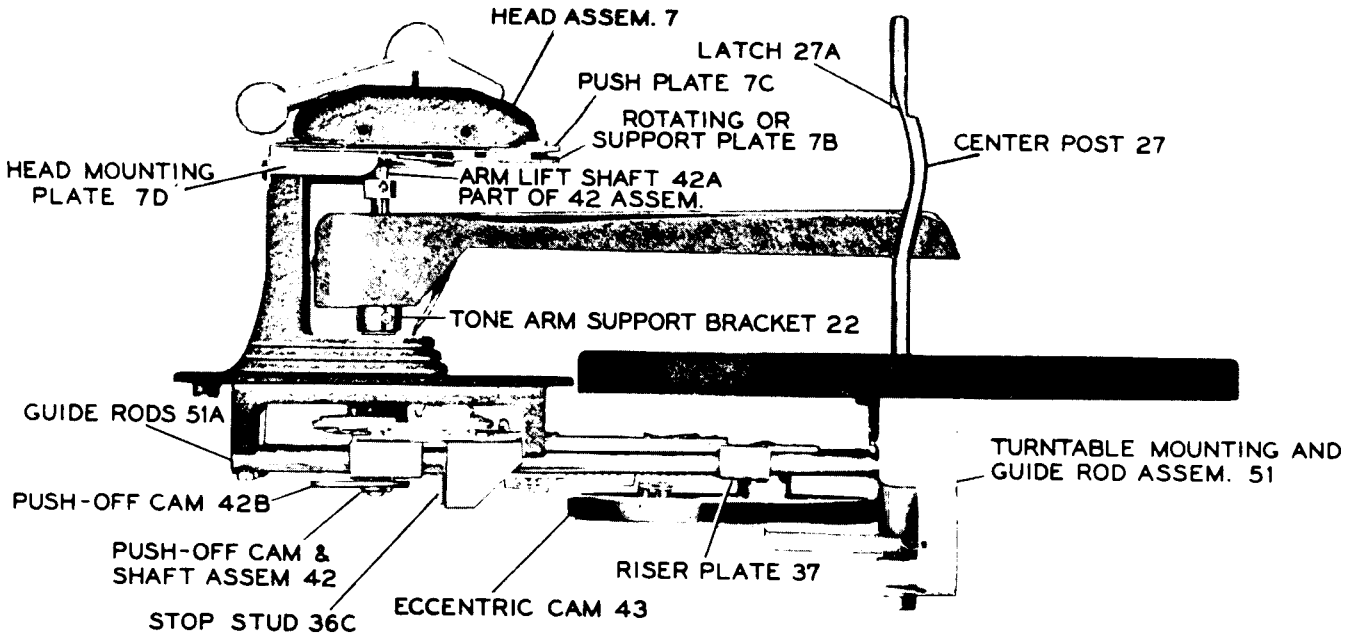


FIG. 1

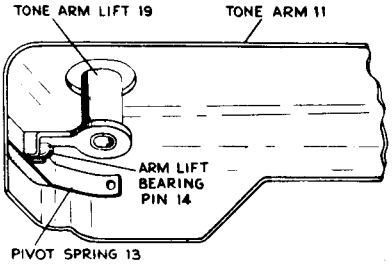


FIG. 3

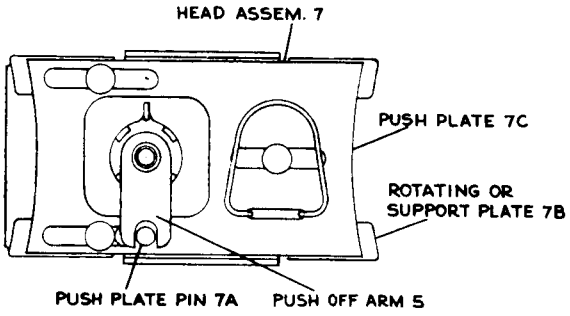


FIG. 4

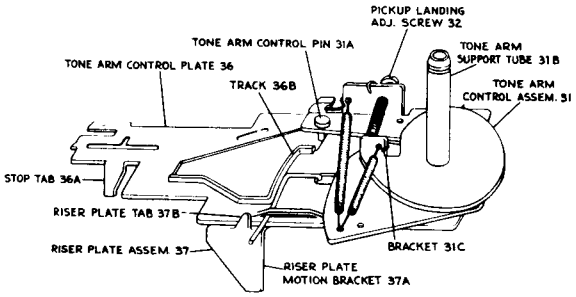


FIG. 2

FUNCTIONS OF PRINCIPAL PARTS

Head Assembly—7, 7A, 7B, 7C

Supports outer edge of record stack and pushes the record off notch in center post and allows it to drop to the turntable while the mechanism is going through cycle.

Center Post—27, 27A

Supports the entire stack of records, and together with the offset notch and latch in the center post, provides a means for separating records.

Tone Arm Lift Assembly—19

Couples tone arm to riser plate 37 through arm lift shaft 42A, thereby transferring the action for the vertical motion of the tone arm during change cycle.

Arm Control Assembly—31, 31A, 31B, 31C

Provides a tie between tube 31B, bracket 31C and tone arm support bracket 22, thereby directing the horizontal movement of the tone arm during change cycle. Arm control pin 31A slides along track in arm control plate 36, and in so doing, determines the point of landing of the pickup and the point of trip of the mechanism. It also incorporates landing adjusting screw 32.

Arm Control Plate Assembly—36, 36A 36B 36C

Incorporates a track 36B which controls the pickup landing and the tripping of the mechanism.
Stop tab 36A functions as portion of the tripping device, stud 36C, contacting push-off cam 42 controls, the point of landing for both 10- and 12-inch records.

Riser Plate Assembly—37, 37A, 37B, 37C

Provides mounting for eccentric cam 43, and incorporates an inclined track 37C, which controls the vertical movement of the tone arm.
Riser plate tab 37B pushes against curved portion of cam on arm control assembly 31, providing a control for the horizontal movement of tone arm during change cycle.
Riser plate bracket 37A contacting push-off arm 42B provides the necessary motion for push plate 7C.

Eccentric Cam—43

Transfers motion from turntable to riser plate 37 during cycling.

Push-Off Cam and Shaft Assembly—42, 42A, 42B

Provides a means of mechanically coupling tone arm lift 19 and push plate 7 assemblies to main cycling mechanism.
Cam 42B contacting stud 36C controls the position of arm control plate while in cycle, which determines the landing point of the pickup on 10- or 12-inch records.

Turntable Mounting and Guide Rod Assembly—51, 51A

Incorporates the main bearings for the turntable and provides a mounting for guide rods 51A.

ADJUSTMENTS

Tone Arm Adjustment

The tone arm height should be so adjusted as to permit the sapphire to engage and ride in the grooves of one record placed on the turntable, but at the same time prevent the tone arm from touching the records on the supports while the mechanism is going through cycle, fig. 5.

1. With the mechanism out of cycle, lift tone arm and check, and make certain tone arm lift 19 engages pin 14 as shown in fig. 6.
2. With the pickup near the edge of the record, loosen the set screw (with Bristo Wrench #6), holding collar 10, fig. 9, and moving it up or down on shaft 42A, so as to have the conditions indicated in sketch, fig. 5.

Preliminary Landing Adjustments

An accessible landing adjustment screw 32 is provided, but if for any reason the tone arm support bracket has become loose or removed, proceed as follows:

1. With the mechanism out of cycle, turn adjustment screw 32, fig. 8, clockwise as far as it will go, then turn counterclockwise two or three full turns.
2. Set head assembly for 12-inch position; place a 12-inch record on turntable.
3. Press down on the reject button and rotate the turntable by hand, causing the mechanism to cycle until the pickup is about to land on the record. In this position, the arm control pin 31A is in a position on track 36B as indicated by "s" and adjustment screw 32 remains against bracket 31C as indicated in fig. 8.
4. Loosen the two set screws holding the tone arm support bracket.
5. While holding this position, place the sapphire in the starting groove of the record, and tighten two set screws in the tone arm support bracket.

Final Landing Adjustment

The exact landing adjustment can be made by pressing the reject button and rotating the turntable by hand until the pickup is about to land. Then turn adjustment screw 32, fig. 8, until the sapphire is directly above the starting groove of the record. If the mechanism continues to land incorrectly after this adjustment has been made, compensate the difference by turning the screw 32 slightly. Turning screw counter-clockwise will move the landing towards the center post.

Positioning Push-off Arm

1. With the mechanism out of cycle, turn the push-off cam to such a position, so that the arm makes a 90° angle with the slide bars as shown in fig. 10. Make certain the large radius side of cam is toward the stud 36C when the support post is in the 12-inch position.
2. Place push-off arm 5 over push-off cam shaft 42A, and engage push-off plate pin 7A near the top edge, fig. 7. Tighten set screws.
3. Press down on reject button and rotate the turntable slowly by hand, making certain push plate does not reach its limit, or push-off arm does not come down against push plate when the riser plate is in its outermost position. If push plate should reach limit, or push-off arm should come down against push plate before riser plate reaches its outermost position, back-off either one until corrected.
4. Check this for both 10- and 12-inch setting.

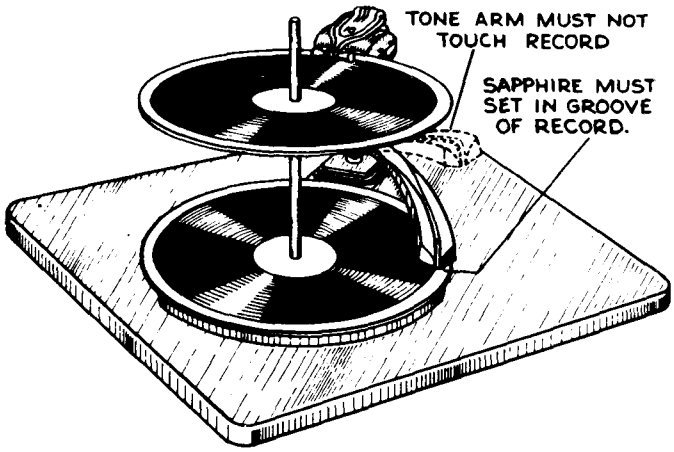


FIG. 5

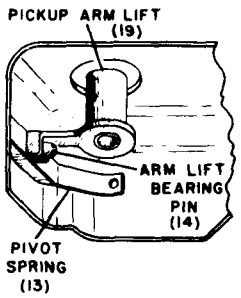


FIG. 6

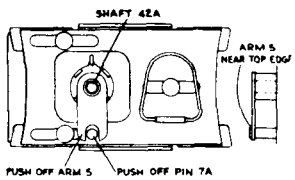


FIG. 7

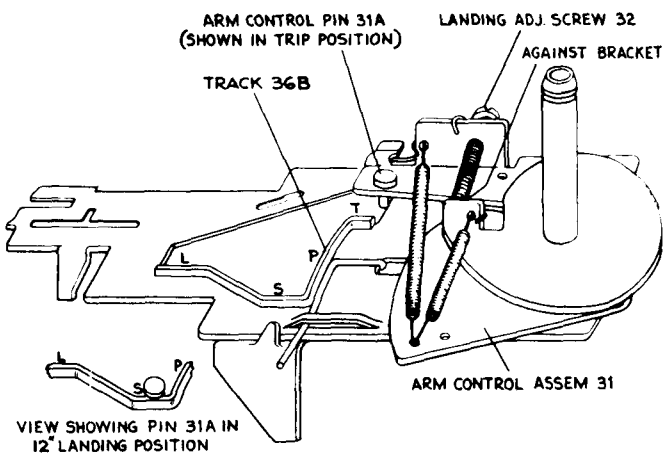


FIG. 8

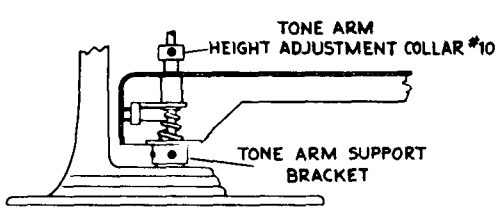


FIG. 9

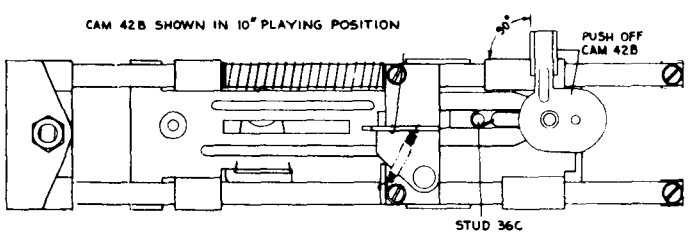


FIG. 10

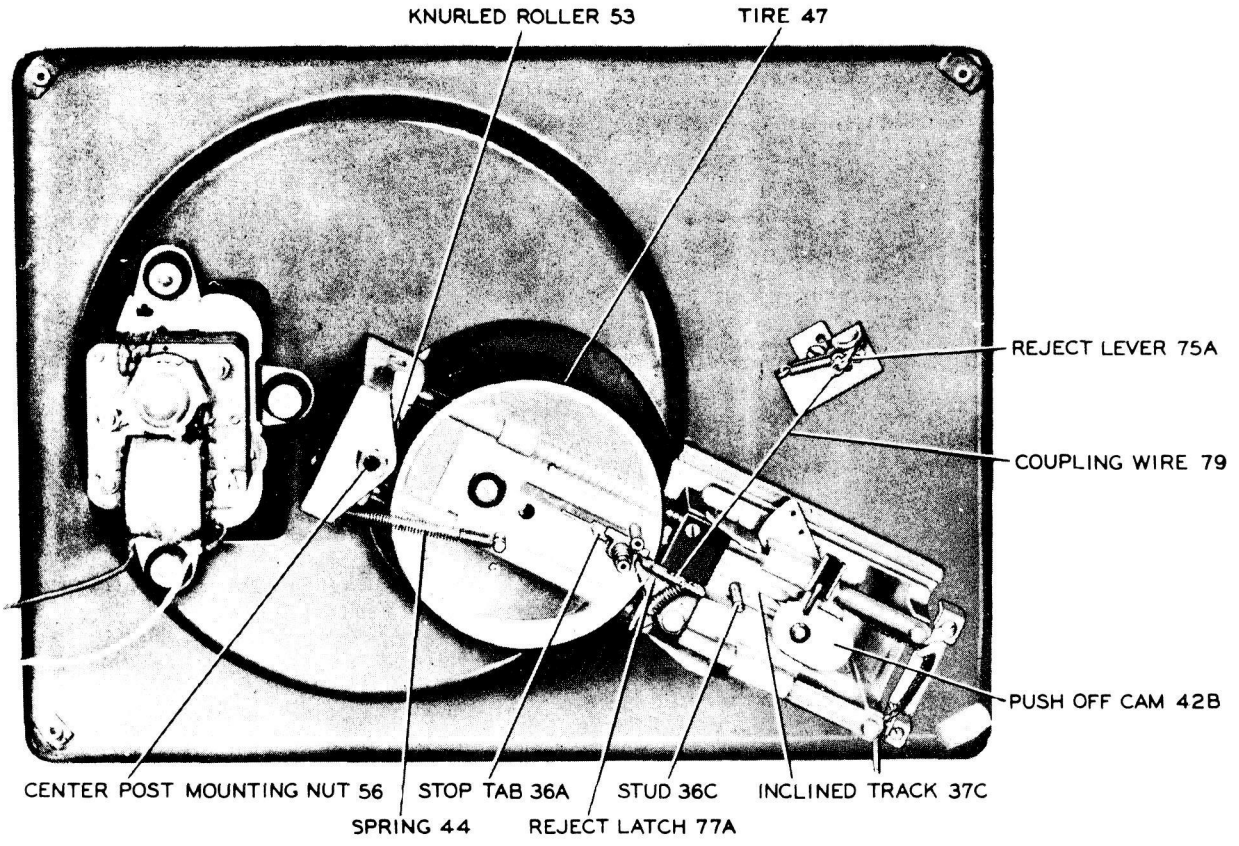

KNURLED ROLLER 53
TIRE 47
REJECT LEVER 75A
COUPLING WIRE 79
PUSH OFF CAM 42B
CENTER POST MOUNTING NUT 56
STOP TAB 36A
STUD 36C
INCLINED TRACK 37C
SPRING 44
REJECT LATCH 77A

FIG. 11

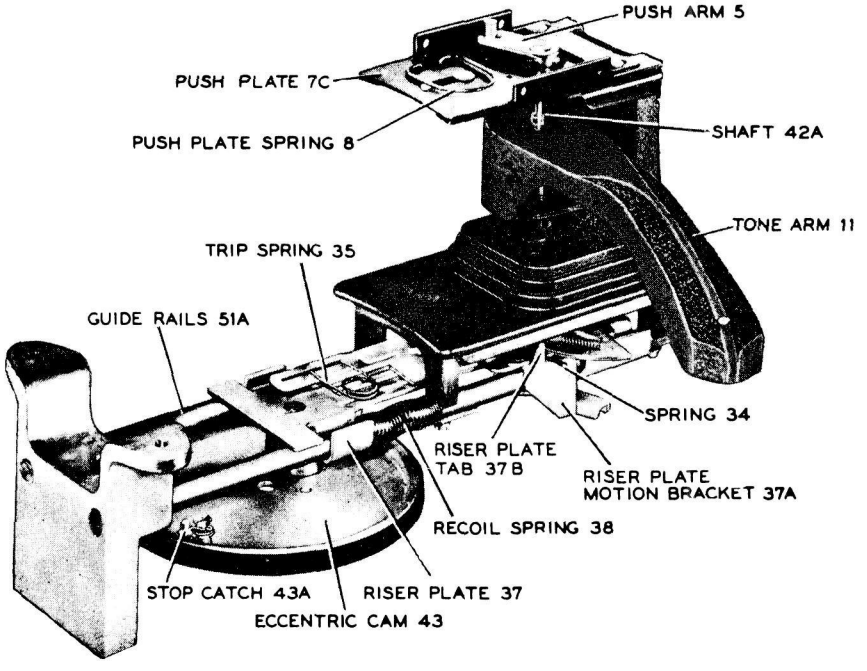

PUSH ARM 5
PUSH PLATE 7C
PUSH PLATE SPRING 8
SHAFT 42A
TONE ARM 11
TRIP SPRING 35
GUIDE RAILS 51A
SPRING 34
RISER PLATE TAB 37B
RISER PLATE MOTION BRACKET 37A
RECOIL SPRING 38
STOP CATCH 43A
RISER PLATE 37
ECCENTRIC CAM 43

FIG. 12

CYCLE OF OPERATION

Turn record support to 10- or 12-inch position as desired and place a stack of records on supports.	1. Turning record support positions the push-off cam 42B through the linkage of push-off arm 5 and push-off shaft 42A. In so doing it determines the distance of movement of control plate 36 which governs pickup landing.
Reject button.	1. Press down on tone arm; this actuates reject button on which it is resting. 2. Reject button actuates reject lever. 3. Reject lever transfers action to reject latch 77A through coupling wire 79. 4. The unlatching of reject latch allows eccentric cam 43 to be pulled against rotating knurled roller 53 which starts cycle.
Record plays.	1. While the record is being played and the tone arm moves toward the center of the record, the arm control pin 31A on arm control assembly 31 moves along track 36B as designated by "P," fig. 13. 2. As pickup moves into trip groove on record, tone arm control pin 31A moves into recess in control plate 36 at point indicated by "T," fig. 13. 3. Trip spring 35 pulls arm control plate 36 towards center post 27, and in so doing allows stop tab 36A on arm control plate 36 to stop catch 43A on eccentric cam 43.
Cycling starts.	1. Spring 44 pulls eccentric cam 43, causing rubber tire 47 to engage rotating knurled roller 53. 2. Eccentric cam 43 mounted on riser plate transfers energy to force the riser plate assembly back along the guide rails 51A away from center post 27. 3. As riser plate moves, the push-off cam and shaft assembly 42 rides along the inclined track 37C of the riser plate 37. 4. This action results in the push-off cam and shaft assembly 42 being pulled down.
Tone arm raises and moves out.	1. The tone arm lift 19 sliding on shaft 42A is pulled downward, contacting lift bearing pin 14, and causing tone arm to raise and clear record. 2. The riser plate tab 37B contacting curved portion of arm control assembly 31, which is coupled to tone arm support bracket assembly, causes the tone arm to be moved outward away from, and clears the edge of the records. Arm control plate is also being carried along by tab 37B contacting spring 34.
Record is separated and drops to turntable.	1. As riser plate 37 continues to travel further along guide rods 51A, the riser plate motion bracket 37A contacts and rotates the push-off cam and shaft assembly 42. 2. Push-off arm 5, being coupled to push-off cam and shaft assembly 42, is rotated, causing push plate 7C to push record off of projection on center-post and dropping it to the turntable. **Note:** The small separator latch 27A in the end of the center post functions as a thickness gauge, allowing only one record to be pushed off the projection at one time.
Mechanism continues to cycle, returning tone arm and positioning it for landing.	1. As eccentric cam 43 is returning to minimum diameter (out of cycle position), riser plate is being pushed back to normal position by recoil spring 38. At the same time, the push plate spring 8 is pushing the push plate 7C and push-off arm 5 back to normal position. 2. The portion of arm control assembly mounting the control pin 31A, and the control bracket 31C, are hinged on the plate forming part of assembly 31. Since the pin 31A has followed the track 36B and the curved portion of bracket 31C was forced out by motion of tab 37B, the tension of spring 30 is tending to pull them together as the riser plate is returning to normal position. The governing factor in determining how far the bracket will be pulled in, is the setting of the landing adjustment screw 32.
Pickup lands.	1. During part of the change cycle when riser plate was in the outermost position, and carrying arm control plate along by tab 37B contacting spring 34, the stud 36C is stopped by cam 42B. This acts as a gauge to determine the point of contact of pin 31A on arm control track 36B. This cam having two different radii will govern the distance arm control plate can travel since this is set when the record size change is made. If the smaller radius side of cam 42B is toward stud 36C, the arm control pin 31A will ride portion of track 36B designated by "L", causing the pickup to land on 10-inch records. On the other hand, if the larger radius portion of cam is toward the stud, the pin will ride along track designated by "S", which determines landing point on 12-inch records.

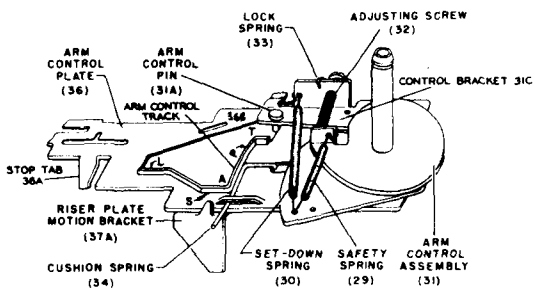


FIG. 13

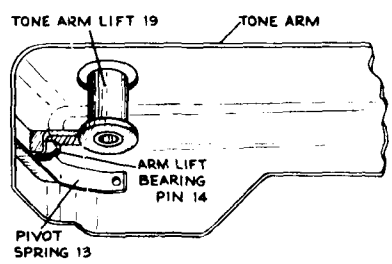
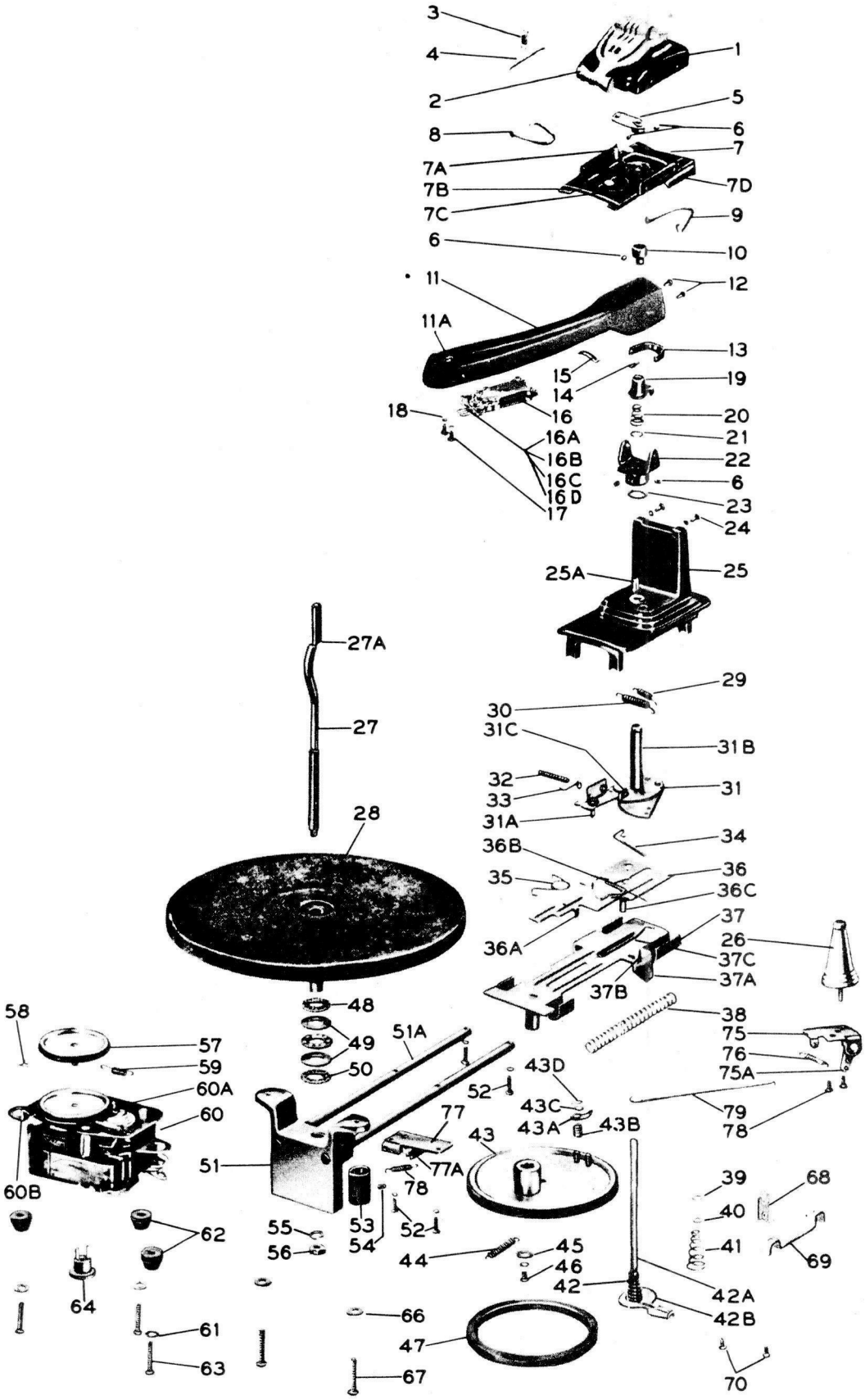


FIG. 14



PHOTOGRAPH OF PARTS

FIG. 15

Replacement Parts

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

REF. NO.	STOCK NO.	DESCRIPTION
		PICKUP AND ARM ASSEMBLIES
11	71283	Arm-Pickup arm shell including tone arm eye (11A) pivot spring (13) and arm lift bearing pin (14) rivets (12)
15	S-3466	Clip-Spring clip to hold pickup leads in arm.
16	70338	Crystal-Permanent sapphire crystal cartridge complete.
16A	72345	Sapphire - Sapphire holder.
16B	38452	Guard - Sapphire guard.
16C	37763	Screw - #2-56 x 1/8" screw for sapphire guard.
16D	70341	Nut-nut for sapphire holder.
19	72462	Lift - Tone arm lift.
20	72463	Spring-Brake spring.
21	72464	Ring-Arm control support tube retaining ring.
22	72465	Support-Tone arm support.
23	72466	Washer-Spring washer.
26	72468	Rest-Tone arm rest and reject button.
		MOTOR ASSEMBLIES
28	71237	Turntable.
57	S-3082	Wheel-Rubber tired drive wheel.
58	71177	Pin-Cotter Pin.
59	71185	Spring-Drive wheel tension spring.
60	S-3642	Motor-Complete 110V. AC 60 Cycle.
60	S-3641	Motor-Complete 110V. AC 25 Cycle.
64	30870	Plug-2 prong male plug for motor cable.
		MOTORBOARD ASSEMBLIES (TOP)
1	72456	Cover-cover assembly including record clip (4), spring (3) and plastic clip (2)
3	71232	Spring-Record clip spring.
4	71233	Rod-record clip rod.
5	72458	Arm-Push-off arm.
7	72459	Slide-slide ass'y including push plate pin (7A), rotating Plate (7B) push plate 7 (C), mounting plate (7D) push plate spring (8) and mounting plate spring (9).
8	72460	Spring-push plate spring(Top of Push Plate).
9	71211	Spring-Head plate mounting spring (on bottom mounting plates).
10	72461	Collar-Lift adjusting collar.
25	72467	Base-Operating mechanism mounting base less all removable parts.
27	71235	Centerpost.
		MOTORBOARD ASSEMBLIES (BOTTOM)
29	72469	Spring-Safety spring.
30	72470	Spring-Landing tension spring.
31	72471	Control-arm control plate, includes 31 A, B and C.
32	72472	Screw-landing adjustment screw.
33	72473	Spring-lock spring(for landing adjustment)
34	72474	Spring-Cushion spring.
35	72475	Spring-Trip spring.
36	72476	Plate-Arm control plate ass'y.-including (36A,B and C)
37	72477	Riser-Riser plate ass'y-including 37A, B and C
38	71191	Spring-Recoil spring.
42	72478	Cam-push-off cam(42B)and shaft(42A)
43	72479	Cam-Eccentric Cam and tire-including 43A, B, C and D
43A	72485	Catch - Reject catch.
43B	72486	Spring-Reject catch support spring.
44	72480	Spring-Eccentric Cam Spring
47	71198	Tire-Rubber tire only for eccentric cam.
48	71239	Washer-one set of cork washers for turntable.
49	71238	Bearing-Turntable thrust bearing.
51	71188	Support-Turntable mounting support, including guide rods.
53	72481	Roller-Turntable shaft knurled roller
54	71200	Screw-#8-32 x 1/8" bristol set screw for knurled roller.
56	71236	Nut-hex.nut for centerpost.
71	39386	Cable-Shield output cable with pin plug.
72	31048	Plug-Pin plug for pickup cable.
75	72482	Lever-Reject lever assembly.
77	72484	Plate-Reject mounting plate and arm assembly.
79	72483	Wire-Reject trigger wire.
		MISCELLANEOUS
	71761	# 6 Bristo Wrench - 4 spline.
	71762	# 8 Bristo Wrench - 6 spline.

Changer Will Not Complete Cycle

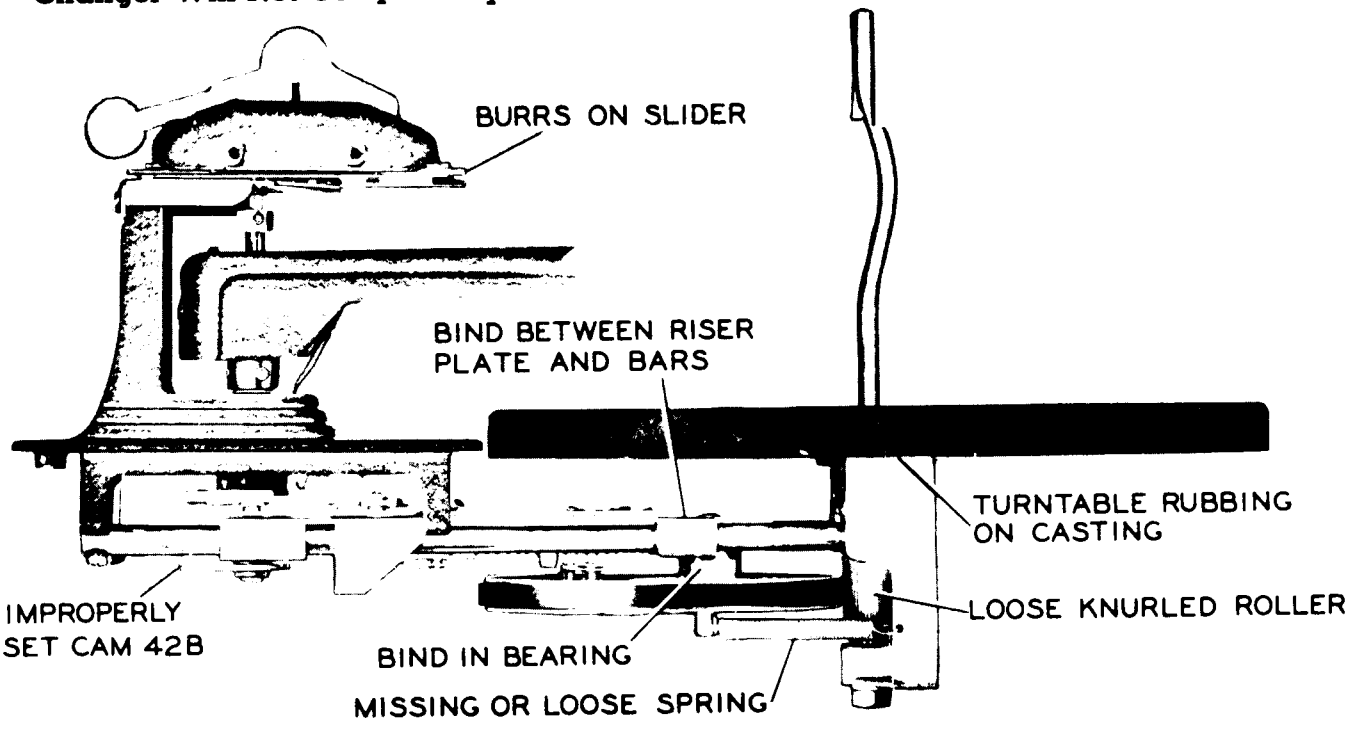


FIG. 16

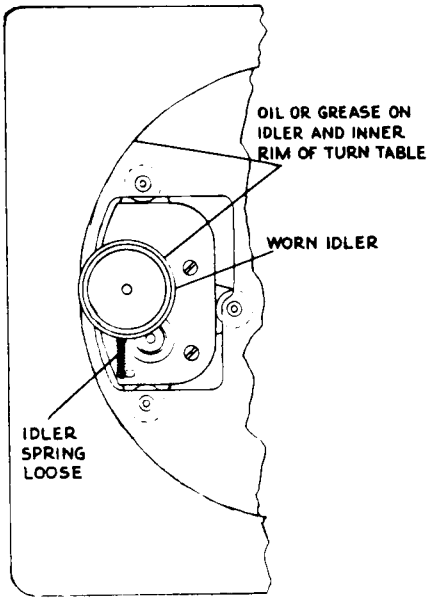


FIG. 17

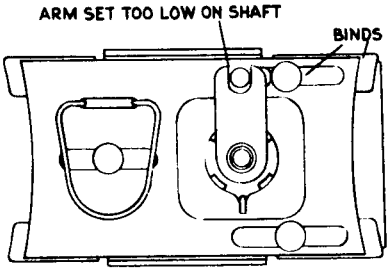


FIG. 18

Records Do Not Separate or Drop Properly

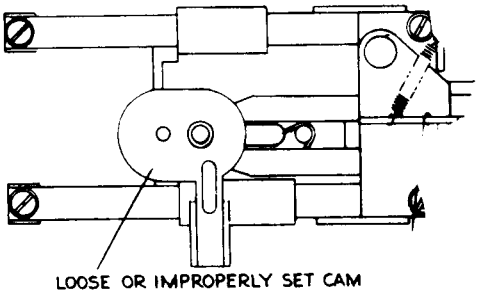


FIG. 19

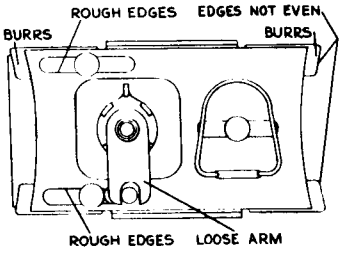


FIG. 20

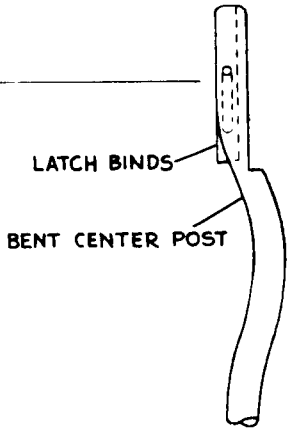


FIG. 21

Pickup Repeats Grooves

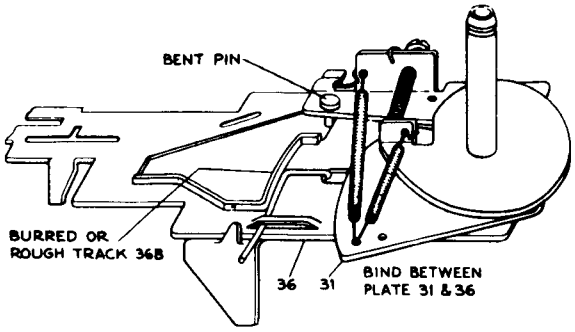


FIG. 22

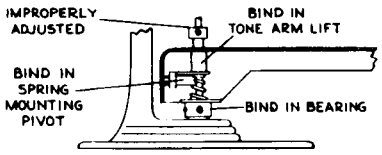


FIG. 23

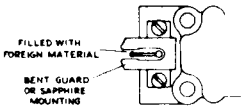


FIG. 24

"Wow" or Slow Turntable Speed

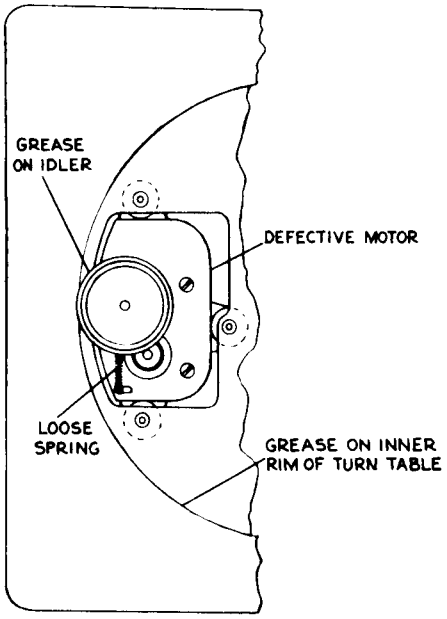


FIG. 25

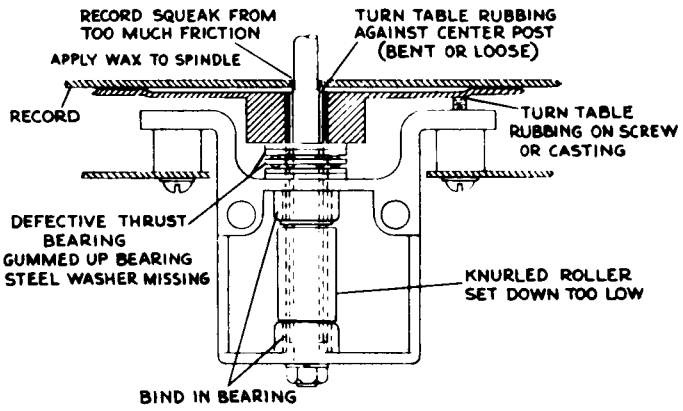


FIG. 26

Continuous Tripping

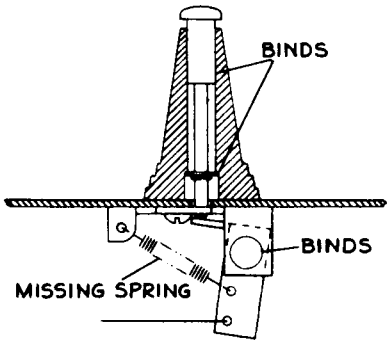


FIG. 27

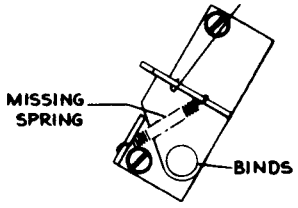


FIG. 28

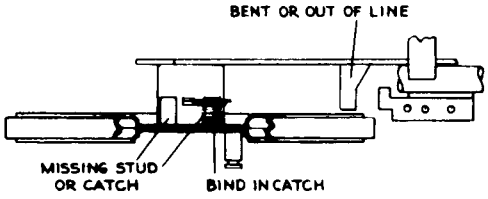


FIG. 29

Improper Pickup Landing

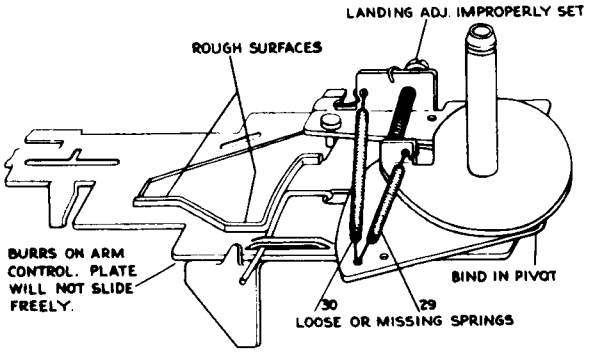


FIG. 30

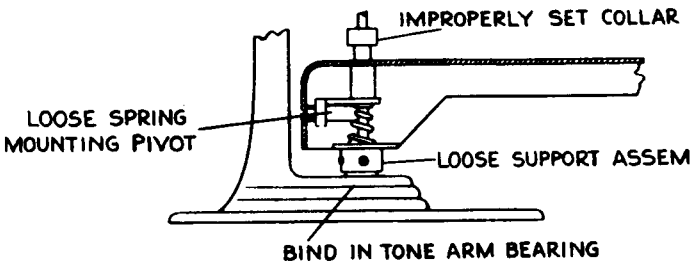


FIG. 31

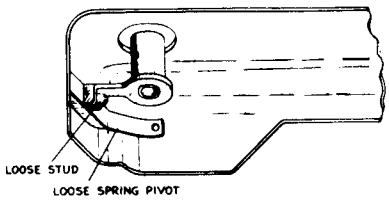


FIG. 32

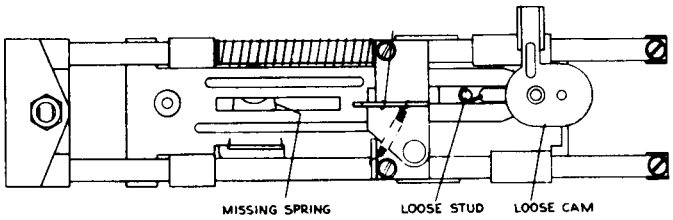


FIG. 33

Failure to Trip or Go into Cycle

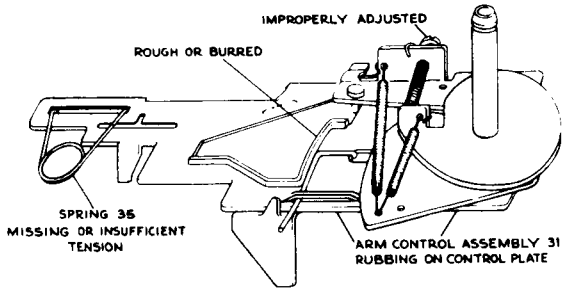


FIG. 34

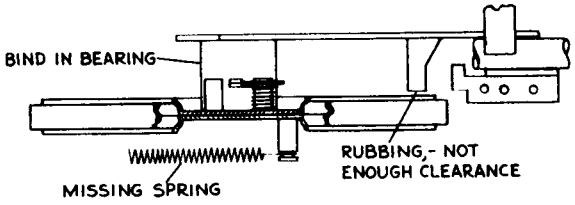


FIG. 35

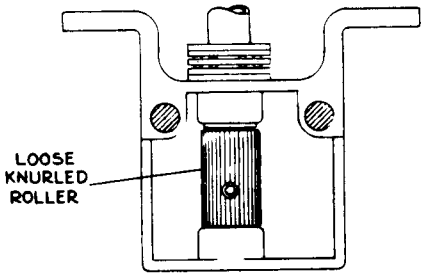


FIG. 37

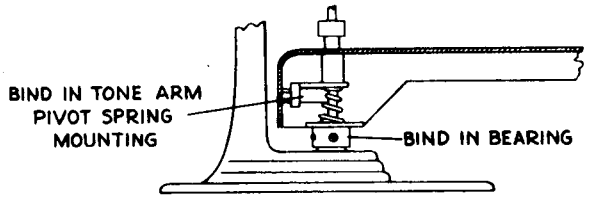


FIG. 36

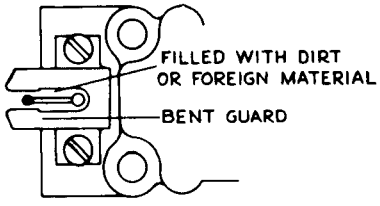


FIG. 38

Tone Arm Fails to Leave Rest Automatically

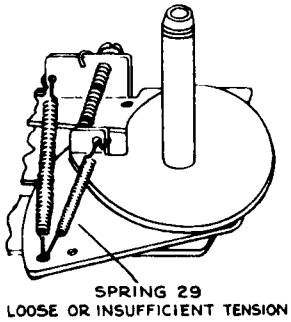


FIG. 39

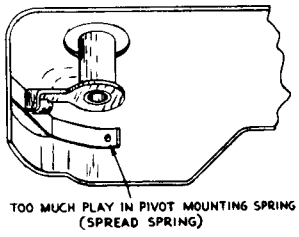


FIG. 39A

Premature Tripping

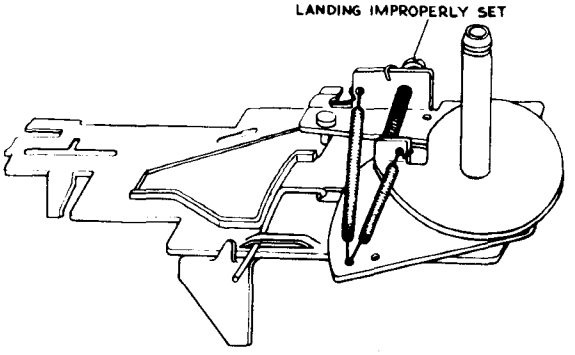


FIG. 40

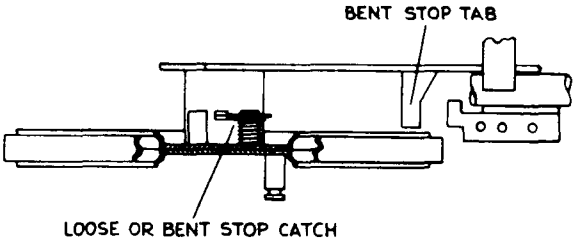


FIG. 41

Distorted or No Output

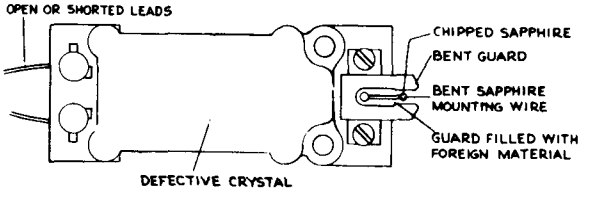


FIG. 42

Feedback or Howl

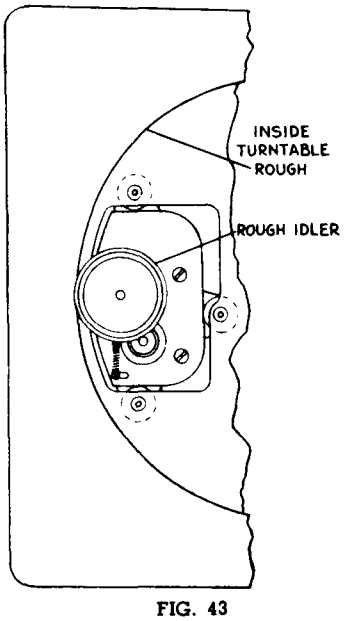


FIG. 43

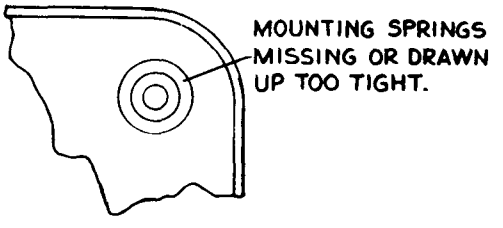


FIG. 44

Lubrication of Turntable Bearing

If binding or freezing of turntable bearing occurs the turntable shaft should be removed and polished with very fine emery cloth or crocus cloth. Clean off any bearing metal or foreign particles from the shaft, including the set screw burr. Next, bevel the top edge of the top bearing slightly, with a knife or scraper. Clean the shaft and the bearing with carbon tetrachloride, removing oil and grease, being certain to clean out any chips which may have dropped into the bottom bearing. Lubricate all moving surfaces with a light coating of vaseline.


RCA
HIS MASTER'S VOICE

RCA VICTOR BABY NIPPER

"HIS MASTER'S VOICE"

Five-Tube, Single-Band, AC-DC Superheterodyne Receiver

TECHNICAL INFORMATION AND SERVICE DATA

1948 No. 16

GENERAL SERVICE DIVISION • R C A VICTOR COMPANY LTD.

Electrical and Mechanical Specifications

FREQUENCY RANGE

Standard Broadcast S.B. ---------- 540—1720 k.c.
Intermediate Frequency ---------- 455 k.c.

RADIOTRON COMPLEMENT

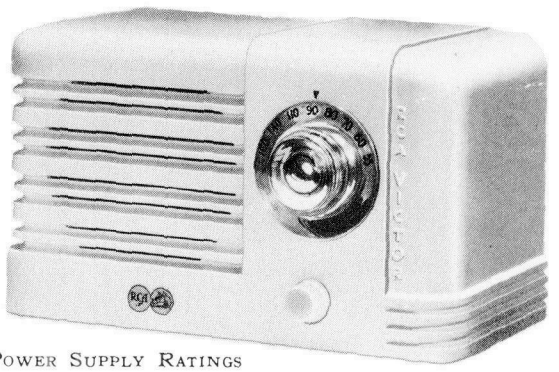
(1) Type 12SA7 ---------- Converter
(2) Type 12BA6 ---------- I.F. Amplifier
(3) Type 12SQ7 ---------- Det. A.V.C. & 1st A.F.
(4) Type 50L6GT ---------- Power Output
(5) Type 35Z5GT ---------- Rectifier

POWER OUTPUT

Undistorted ---------- .75 Watts
Maximum ---------- 1.5 Watts

LOUDSPEAKER

Type ---------- 4 inch Round P.M.
Voice coil impedance ---------- 3.4 ohms at 400 cycles



POWER SUPPLY RATINGS

Rating A ---------- 105—125 volts, 25 or 60 cycle, 30 watts

CABINET DIMENSIONS (Inches)

Height ---------- 5⅞ inches
Width ---------- 8⅝ inches
Depth ---------- 4½ inches

CAUTION

REMOVE POWER PLUG FROM OUTLET BEFORE SERVICING THIS RECEIVER. AVOID CONTACT OF CHASSIS OR COMPONENT PARTS TO EXTERNAL GROUND.

REPLACEMENT PARTS FOR BABY NIPPER

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

STOCK NO.	DESCRIPTION
	CHASSIS ASSEMBLY
S-4817	Capacitor - 56 mmf. 10% mica (C4)
S-4818	" -270 mmf. 20% " (C14-C15)
S-4819	" -470 mmf. 20% " (C1)
S-3646	" .005 mfd. (C16-C17)
70615	" .05 mfd. (C11)
S-3651	" .025 mfd. (C19)
S-3648	" .01 mfd. (C18-C5)
S-3655	" .1 mfd. (C8)
S-4419	" Electrolytic (50-30 mfd.) (C20-C21)
S-4414	Condenser - variable (C2-C7-C3-C6)
S-4410	Coil - antenna coil (L1-L2)
32962	Coil - oscillator coil (L3)
30189	Resistor - 120 ohms 1/4 watt (R9)
30880	" - 150 " " " (R3)
S-4681	" -1200 " 1 " (R10)
30492	" -22,000 ohms ¼ " (R1)
14583	" 220,000 " " " (R1-R2)
30648	" 470,000 " " " (R8)
30649	" 2.2 megohms " " (R4)
30992	" 10 " " " (R6)
S-4418	Socket - tube socket
S-4777	" - " "
S-4411	Transformer 1st I.F. (L4-L5-C9-C10)
S-4412	" 2nd I.F. (L6-L7-C12-C13)
S-4413	Volume control - 1/2 meg. (R5-S1)

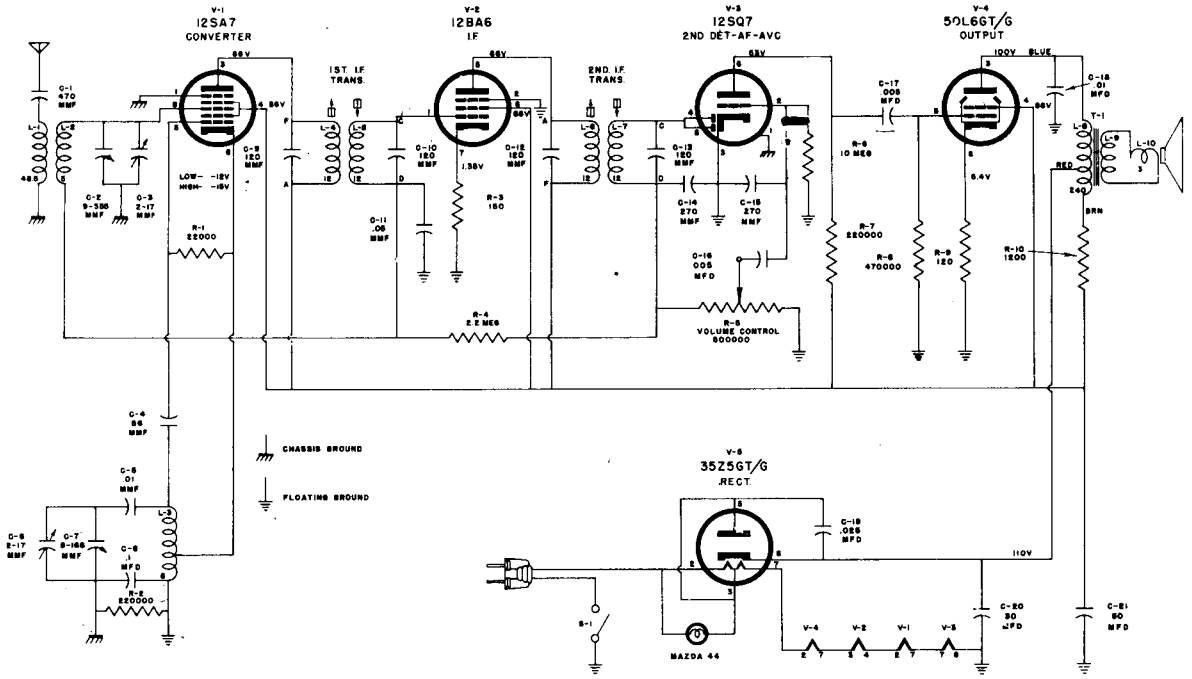
STOCK NO.	DESCRIPTION
	SPEAKER ASSEMBLY
35849	Dust Cap (Pkg. 3)
S-4330	Cone - cone & voice coil assy (L10)
S-4405	Speaker
S-4406	Output transformer (L8-L9)
	MISCELLANEOUS ASSEMBLY
S-4822	Cabinet - Brown
S-4823	" - Rose
S-4824	" - Green
S-4415	" - Ivory
S-3467	Cord - power cord
S-4417	Cover - back cover assembly
S-4778	Decal
S-4416	Disc - Dial back
S-4409	Knob - dial knob
S-3903	" - Vol. control (Ivory)
S-4825	" - " " (Brown)
11891	Lamp - pilot lamp (Mazda 44)
S-4781	Button - brass button for tuning dial
S-4782	Spring - to hold disc to tuning dial (Pkg. 3)

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

Baby Nipper

GENERAL DESCRIPTION

The RCA Victor Baby Nipper is a five-tube, single band, AC/DC Superheterodyne chassis housed in a plastic cabinet of pleasing design. Features include a stable oscillator circuit, efficient I.F. transformers, attached "hank" antenna; Beam power output tube; a well-filtered power supply and a 4 inch round P.M. speaker capable of handling the undistorted output of the receiver.



Schematic Circuit Diagram

POWER SUPPLY POLARITY.—For operation on DC, the power plug must be inserted in the outlet for correct polarity. If the set does not operate, reverse the plug. On AC, reversal of the plug may reduce hum.

NOTE:—All voltages are measured to common wiring insulated from chassis with a line voltage of 117 volts.

CRITICAL LEAD DRESS

(Make lead dress before alignment)

1. Dress all heater leads to chassis.
2. Dress green lead from 2nd I.F. transformer to 12SQ7 diode plate away from oscillator coil.
3. Dress white lead from oscillator coil tap to 12SA7 cathode toward rear of chassis.
4. Some receivers have antenna section at front of tuning condenser. On these receivers, pass both leads to tuning condenser through hole below rear (oscillator) section.

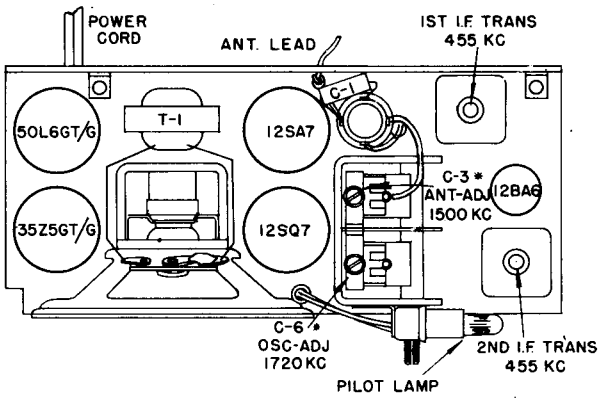
ALIGNMENT PROCEDURE

Test Oscillator:

Connect the low side of the test oscillator to the receiver chassis through a .01 mfd. capacitor. Keep the output as low as possible to avoid AVC action.

Pre-setting Dial:

With the gang condenser in full mesh, the dial should be positioned so that the small dot at the low frequency end is adjacent to the index mark on the cabinet.



Chassis Layout and Alignment Adjustments

* Some receivers have antenna section (C3) at front of tuning condenser.

Order of Alignment		TEST OSCILLATOR: Connect "HI" Side To	TEST OSCILLATOR: Connect "LO" Side To	TEST OSCILLATOR: Dummy Antenna	TEST OSCILLATOR: Frequency Setting	Range Selector	Receiver Dial Setting	Circuit To Adjust	Adjustment Symbols	Notes
A.M. I.F. ALIGNMENT	1	12BA6 1st I.F. Grid	Ground thru .01 mfd.	.01 mfd.	455 K.C. 30% mod. 400 Cy. A.M.		High freq. end of dial	2nd I.F. Trans.	L6, L7	Adjust for max. A.C. voltage across voice coil.
	2	12SA7 Converter Grid	Same	Same	Same		Same	1st I.F. Trans.	L4, L5	Same
S.B. ALIGNMENT	3	Ant. Lead	Ground thru .01 mfd.	47 m.m.f.	1720 K.C. 30% mod. 400 Cy. A.M.		High freq. end of dial	Oscillator	C6	Adjust for max. A.C. voltage across voice coil.
	4	Same	Same	Same	1500 K.C. 30% mod. 400 Cy. A.M.		1500 K.C. on dial	Ant.	C3	Same

RCA Victor

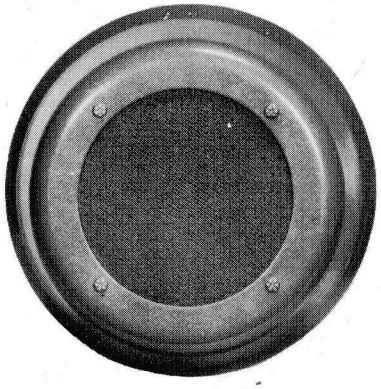
CLIPPER

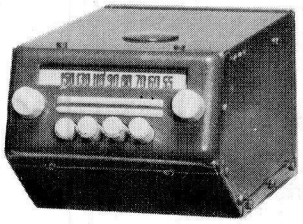
Five-Tube, Superheterodyne Automobile Receiver with Push-Button Tuning

TECHNICAL INFORMATION AND SERVICE DATA

1946—No. 1

SERVICE DIVISION • RCA VICTOR COMPANY LIMITED • MONTREAL





Electrical Specifications

TUBE COMPLEMENT

6SK7	R.F. Amplifier
6SA7	First Detector—Oscillator
6K7	I-F Amplifier
6SQ7	Second Det., A-F Amp. and A.V.C.
6K6GT	Output

POWER OUTPUT

Type	Pentode
Undistorted	1.5 watts
Maximum	3.0 watts

POWER SUPPLY

"A"	6.3 volt Auto Storage Battery
"B"	Synchronous Vibrator
Current Drain	5.5 amps.

CHASSIS FEATURES

I-F Stages	One
Ignition-Noise-Suppression Filters	
Antenna Compensator Trimmer	
Illuminated Dial	

FREQUENCY RANGE	550-1570 kc
Dial Lamp	6.3 volts, 0.25 ampere

ALIGNMENT FREQUENCIES

I-F	455 kc
Ant.	1,400 kc
Osc.	1,400 kc

LOUDSPEAKER

Type	Electrodynamic
Size	6 inches
V. C. Impedance	3.2 ohms at 400 cycles
Field Coil Resistance	4 ohms
Field Coil Current	1.5 amps.

OPERATING FEATURES

Mechanical Push Button Tuning
Independent Manual Tuning Control
Automatic Volume Control

Mechanical Specifications

OPERATING CONTROLS

1. Right Knob	On-Off Switch and Volume
2. Push Buttons (4)	Station Tuning
3. Left Knob	Manual Tuning, Ratio 5—1

Net Weight	13 pounds
Shipping Weight	15 pounds

CONTROL OPERATION

Turn Right	Power On; Volume Increase
Push Buttons	Signal Tuned Automatically
Rotate	Signal Tuned Manually

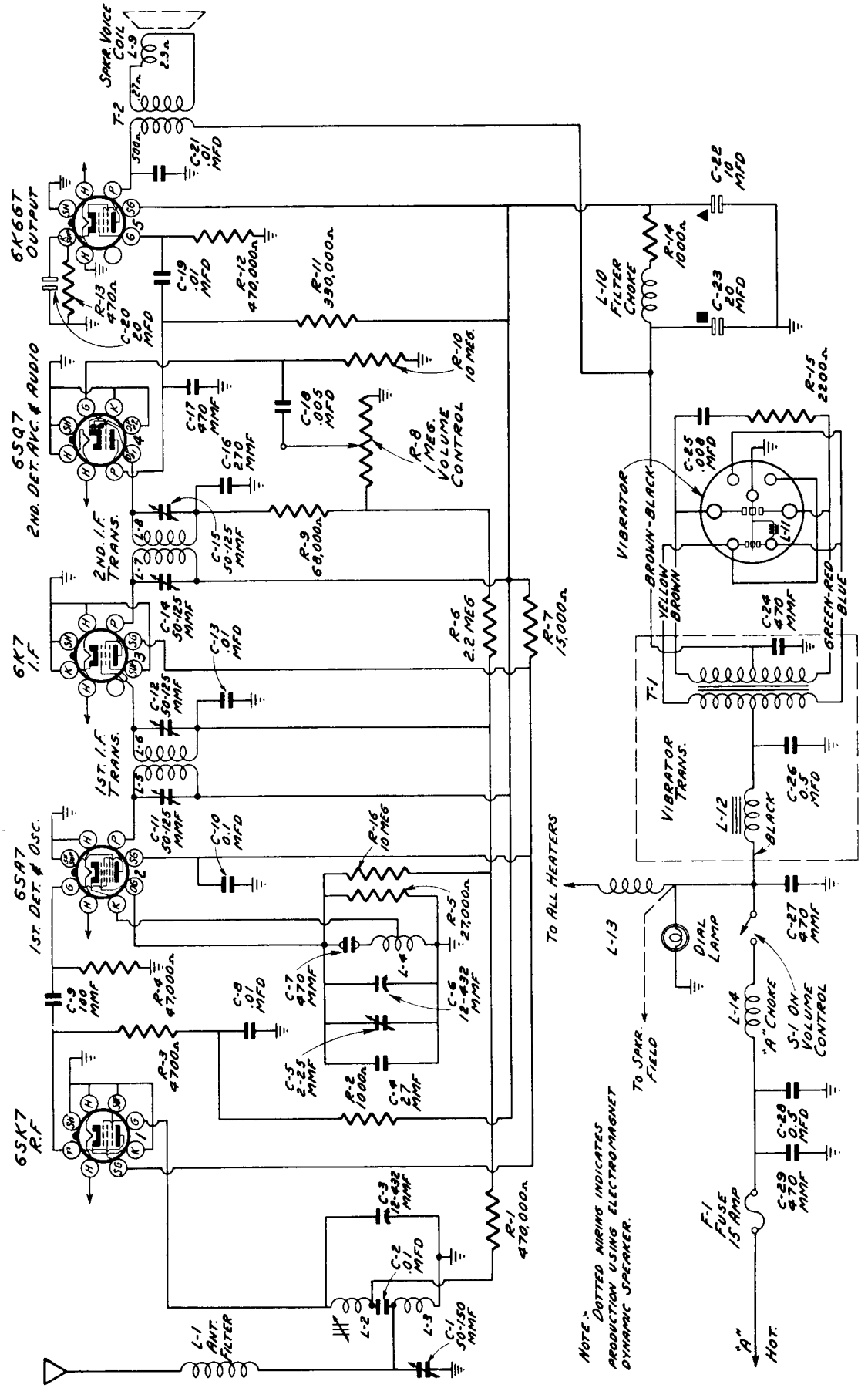


Figure 1—Schematic Circuit Diagram

General Description

The "Clipper" is a five-tube superheterodyne auto receiver with a separate loud speaker unit. It is equipped with four push buttons for tuning your favorite stations as well as the standard method of dial tuning. Adjustments for push button tuning are explained under the heading "Push button tuning mechanism".

The receiver is designed to be mounted under the dash panel and the speaker unit can be mounted on the firewall or bulkhead. All operating controls are located on the receiver unit.

Loudspeaker.— The voice coil suspension assembly in the speaker is cemented directly to the field plate. Whenever it is desired to centre the voice coil, remove the dust cap located on the top of the cone. This may be removed by softening its cement with a light application of acetone. Enough acetone is then applied to the bottom edge of the voice coil suspension to loosen it completely from the field plate. The voice coil may then be centered in the usual manner with three paper feelers. After centering, cement the suspensions in place with household cement. When dry remove the paper feelers and cement the dust cap back in place.

Alignment Procedure

Position of Dial Pointer	Generator Frequency	Dummy Antenna	Generator Connection	Adjustment Symbol	Circuit Adjusted
No Signal 550-750 kc	455 kc	.1 mfd.	6K7 Grid	C14, C15	2nd I.F. Trans.
No Signal 550-750 kc	455 kc	.1 mfd.	6SA7 Grid	C11, C12	1st I.F. Trans.
1,400 kc	1,400 kc	.0001 mfd.	Ant. Lead	C5	Osc.
1,400 kc	1,400 kc	.0001 mfd.	Ant. Lead	C1	Ant.

NOTE: Antenna coil core L2 is factory adjusted and sealed, and should not require adjustment.

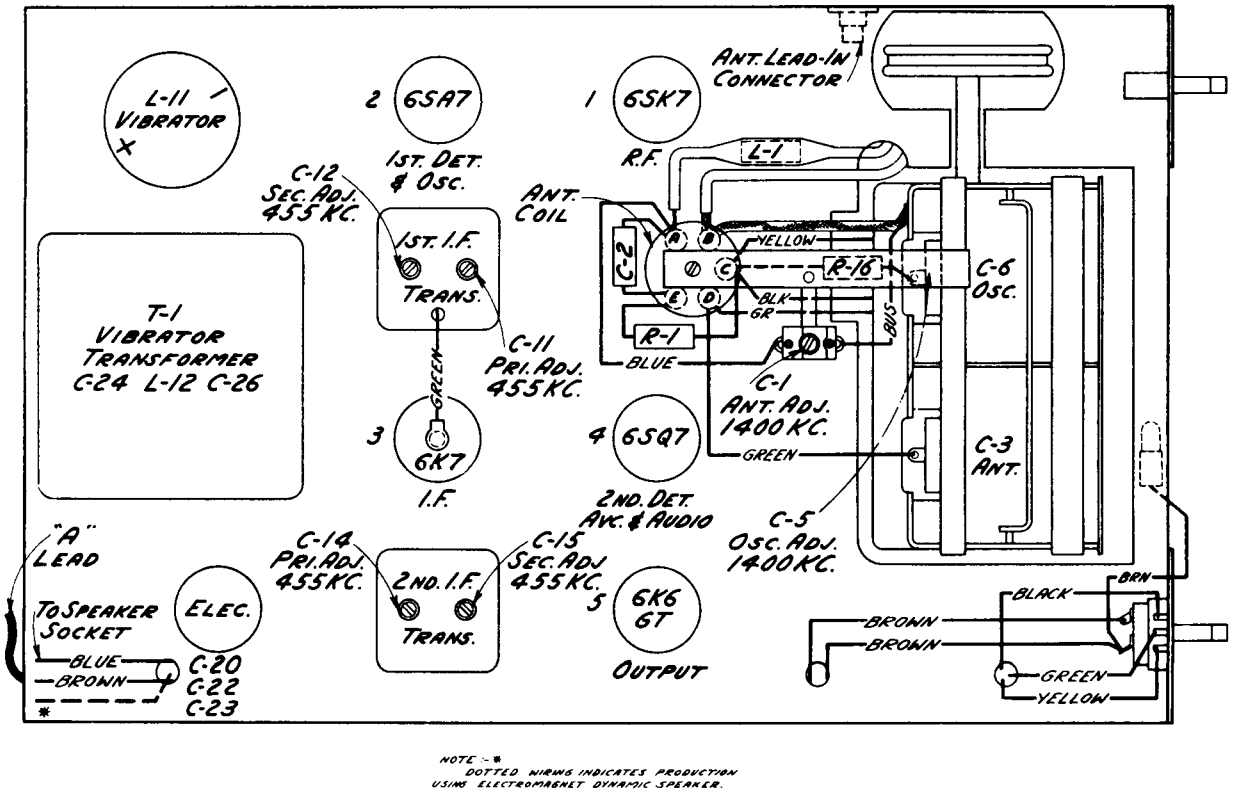
IMPORTANT ALIGNMENT NOTES.

Each step of the alignment should be repeated in its original order for greater accuracy. Always keep the output from the generator at its lowest possible value, to prevent the A.V.C. action of the receiver from interfering with accurate alignment.

Alignment adjustment locations are shown in Figs. 2 and 3.

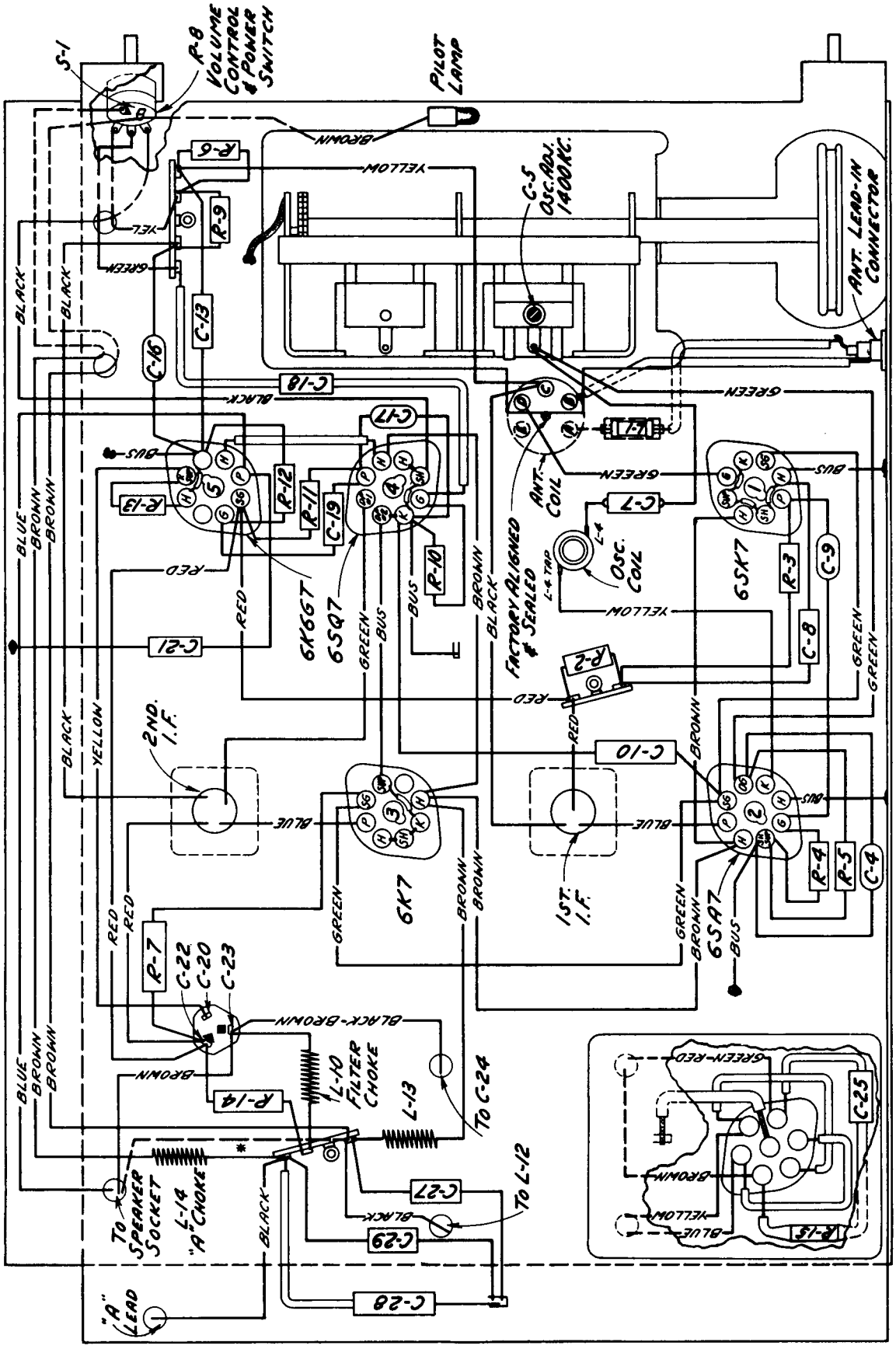
Only the dummy antenna indicated in the chart for any particular frequency should be used. Grid cap lead should remain in place during alignment.

Since the oscillator coil is unshielded, the case has some effect on its inductance. Therefore alignment must be done with a steel plate (covering the bottom of chassis), substituting for the case.



NOTE :- * DOTTED WIRING INDICATES PRODUCTION USING ELECTROMAGNET DYNAMIC SPEAKER.

Fig. 3—Location of Parts and Alignment Adjustments



NOTE:-* DOTTED LINES INDICATES PRODUCTION USING ELECTRODYNAMIC SPEAKER.

Figure 2—Chassis Wiring Diagram

Service Data

ANTENNA CIRCUIT

It is very important that these instructions be followed when installing this receiver.

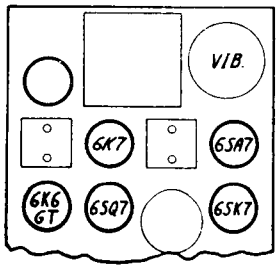
The antenna circuit is designed to work with an antenna having a total capacity including the shielded lead-in not to exceed 150 mmf. If an antenna having a larger capacity is to be used, it will be necessary to add a capacitor in series with the lead from the antenna filter L-1 to the antenna coil terminal ("A"). (See chassis wiring diagram Fig. 2). Where a "Double Under the Running Board" type of antenna is to be used having a capacity of approximately 200 mmf., the capacitor added should be approximately 500 mmf. The insulated running board type having an approximate capacity of 550 mmf. will require a capacitor of approximately 150 mmf. Cars using an insulated steel top of approximately 3,500 mmf. will require a series capacitor of 150 mmf.

After installation and with antenna connected, tune in a weak station near 1,400 kc and adjust compensator trimmer C-1 for maximum signal output. This trimmer is accessible through a hole in the bottom of the receiver case. If a maximum (peak) signal output cannot be obtained in the range of the antenna trimmer, the effective capacity should be checked and compensated for by varying series capacity as described above.

VIBRATOR POLARITY

This radio contains a vibrator which may require change of position to accommodate it to the polarity of the grounded terminal of the car storage battery. It is installed at the factory for use on automobiles with the positive (+) terminal grounded to the frame of the car and a "+" shows in the "Vibrator Polarity" hole in the bottom of the receiver. If the negative (—) terminal of the battery is grounded to the frame of the car as on most General Motors automobiles, remove the bottom cover from the receiver, pull out the plug-in vibrator, turn it a half a revolution, and replace in socket. When the bottom cover is replaced on receiver the "—" sign will show through the "Vibrator Polarity" hole.

Caution—Do not operate with incorrect battery polarity or damage to the receiver will result.



Location of Tubes

Push Button Tuning Mechanism.—The push button tuning mechanism used in this receiver is of the mechanical type, wherein the movement of the button actually turns the tuning condenser to any predetermined setting. The movement is actuated through a Push-Arm, Cam, Rocker Plate and Sector Gear, which meshes with a Scissors Gear directly fastened to the tuning condenser shaft. The scissors gear prevents backlash between the sector gear and the tuning condenser. Since the sector gear is mounted directly on the rocker plate shaft, the position of the rocker plate will accurately determine the position of the tuning condenser.

The cams which determine the stop points for each button are mounted on the push arms and are locked in place by the locking screws and lock-shoes, which press firmly against the cams when the locking screws are tightened. **Care should be used when locking screws are tightened not to use excessive force as the threads may become damaged or stripped.**

Adjustments for Push Button Tuning are very easily made. To adjust a push button for any station proceed as follows:

(1) Loosen push-button, by turning it to the left.

(2) Using the Dial Tuning Control tune in the station.

(3) Press the push button in as far as it will go and accurately retune station.

(4) With the push button still held down, tighten it by turning to the right.

With the push button tight, the cam is locked in position and when the button is pushed in, the cam pressure causes the rocker plate to assume the position that tunes in the desired station.

Manual Tuning Dial.—A manual tuning knob is provided so that additional stations may be tuned in as desired. The manual tuning shaft is connected through a cord drive to a pulley on the condenser shaft. This same cord drives the dial drum by passing over a pulley on the drum shaft. Dial Pointer adjustment is made by tuning the set to the extreme low frequency end of the band, and adjusting the pointer to coincide with the short calibration mark located just below the figures on the dial scale.

RADIOTRON SOCKET VOLTAGES

Type	Plate	Screen Grid	Cathode	Heater
6SK7 R.F.	160V	67V	—	6.3
Osc. 6SA7 Conv.	190V	67V	—	6.3
6K7 I.F.	190V	67V	—	6.3
Det. 6SQ7 A.V.C. A.F.	67V	—	—	6.3
6K6GT Output	195V	190V	—12V	6.3

NOTE:—Above values hold within plus or minus 20% when measured to chassis with a 20,000 ohm per volt meter.

REPLACEMENT PARTS FOR CLIPPER MODEL

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

STOCK NO.	DESCRIPTION
	RECEIVER ASSEMBLIES
S-3130	Capacitor-Adjustable trimmer 50-150 mmfd. (C1).....
13605	Capacitor- 27 mmfd. (C4).....
12720	Capacitor-100 " (C9).....
12488	Capacitor-270 " (C16).....
30433	Capacitor-470 " (C17,C27,C29).
32363	Capacitor-470 " (Close Tol.)(C7)
33640	Capacitor-.005 mfd. (C18).....
35573	Capacitor-.008 " (C25).....
4937	Capacitor-.01 " (C2,C8,C13, C19,C21).....
4839	Capacitor-.1 (C10).....
12741	Capacitor-.5 (C28).....
32240	Capacitor Electrolytic comprising 2 sections of 10 mfd. & 1 section of 20 mfd. .....
37707	Coil-Ant. filter (L1).....
35548	Coil- " coil (L2, L3).....
S-3142	Coil-Oscillator coil assembly (4).
S-3147	Condenser-2 gang variable, complete with push arm, gears, etc. (C3-C5-C6).....
S-3174	Cord-Drive cord, approx. 35-1/2"..
S-3128 RCA	Indicator, station selector indicator pointer.....
S-3129 CGE	Indicator, station selector indicator pointer.....
11765	Lamp-Dial lamp Mazda #51.....
30641	Lead-"A" lead complete with male connector (chassis end).....
S-3175	Pulley-Bracket & pulley (approx. 1/2").....
30499	Resistor-470 ohms 1/2 watt (R13)..
14720	Resistor-1000 " 1/4 " (R2)...
30152	Resistor-1000 " 1 " (R14)..
35572	Resistor-2200 " 1/2 " (R15)..
30494	Resistor-4700 " 1/2 " (R3)...
35523	Resistor-15,000 ohms 2 watt(R7)...
12738	Resistor-27,000 " 1/4 " (R5)...
30787	Resistor-47,000 " 1/4 " (R4)...
13715	Resistor-68,000 " 1/4 " (R9)...
14983	Resistor-330,000 " 1/4 " (R11)..
12285	Resistor-470,000 " 1/4 " (R1-R12)
12679	Resistor-2.2 megohm 1/4 watt (R6).
13601	Resistor-10 " 1/4 " (R10-R16).....
33726	Retainer "C" washer for drive shaft (pkg. 5).....
13471	Ring-Retaining ring for ant. coil (pkg. 3).....
S-3136	Shaft-Station selector drive shaft
32302	Shield-Antenna coil shield.....
34909	Socket-Dial lamp socket.....
S-3257	Socket-Spkr. plug socket-4 contact
32299	Socket-Tube socket.....
12241	Socket-Vibrator socket.....
30585	Spring-Drive cord tension spring (pkg. 2).....
S-3140	Transformer-1st I.F. transformer (L5,L6,C11,C12).....
S-3141	Transformer-2nd I.F. transformer (L7,L8,C14,C15).....
S-3162	Transformer-Vibrator power trans. (T1,C24,C26,L12).....
35543	Vibrator-Plug-in vibrator.....
35550	Volume control & power switch (R8,S1).....
	SPEAKER ASSEMBLIES (CRL 524-2)
32907	Cap-Dust cap for cone centre (pkg. 5).....
S-3258	Coil-Field coil.....
35441	Cone-Speaker cone & voice coil (L9 A977).....
S3260	Speaker-Complete.....
S-3139	Transformer-Output (T2).....
S-3519	Shielded cable & plug.....
	MISCELLANEOUS ASSEMBLIES (RCA)
S-3163	Adapter-Antenna adapter plug.....
S-3165	Bracket-Receiver mtg. bracket - (1 set).....
S-3137	Button-Station selector push button.....
5025	Capacitor-Generator capacitor.....
S-3143	Case-Receiver case complete.....
S-3171	Case-Speaker housing.....
S-3132	Dial-Stn. selector dial scale.....
5023	Fuse-15 amp.....
4290	Insulator-Fuse insulator.....
S-3134	Knob-Tuning & Vol. control knob...
7766	Lead-Ammeter lead, clip & fuse holder.....
S-3166	Marker-Station call letter marker (1 set).....
S-3167	Mounting-Complete set of brackets, strap, washers, nuts & bolt to mount receiver (brown).....
S-3169	Mounting-Speaker complete set of washers, nuts & studs.....
S-3173	Screen-Speaker case screen (brown)
12533	Screw-Receiver case screw.....
5024	Suppressor-Distributor suppressor.

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

RCA VICTOR

"HIS MASTER'S VOICE"

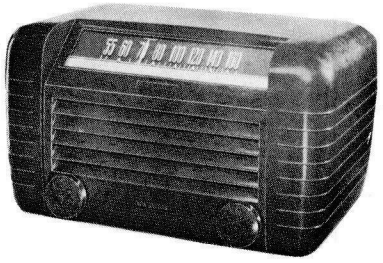
LITTLE MASTER–"A"

Five-Tube, Single-Band, AC-DC Superheterodyne Receiver

TECHNICAL INFORMATION AND SERVICE DATA

1948 No. 4

GENERAL SERVICE DIVISION • RCA VICTOR COMPANY LTD.



Electrical and Mechanical Specifications

FREQUENCY RANGE ---------- 535-1630 kc

Intermediate Frequency ---------- 455 kc

TUBE COMPLEMENT

(1) Type 12SA7 ---------- 1st-Detector-Oscillator
(2) Type 12SK7 ---------- I-F Amplifier
(3) Type 12SQ7 ---------- 2nd-Detector, 1st A-F, and A.V.C.
(4) Type 50L6GT ---------- Power Output
(5) Type 35Z5GT ---------- Rectifier

Dial Lamp (1) ---------- Mazda 51, 6-8 volts, .2 amp.

POWER SUPPLY RATINGS

A-C Rating ---------- 105-125 volts, 25-60 cycles, 30 watts
D-C Rating ---------- 105-125 volts, direct current, 30 watts

POWER OUTPUT

Undistorted ---------- .75 watts
Maximum ---------- 1.5 watts

LOUDSPEAKER

Type ---------- 4" x 6" Elliptical P.M.
Impedance (V.C.) ---------- 3.4 ohms at 400 cycles

REPLACEMENT PARTS FOR LITTLE MASTER–"A"

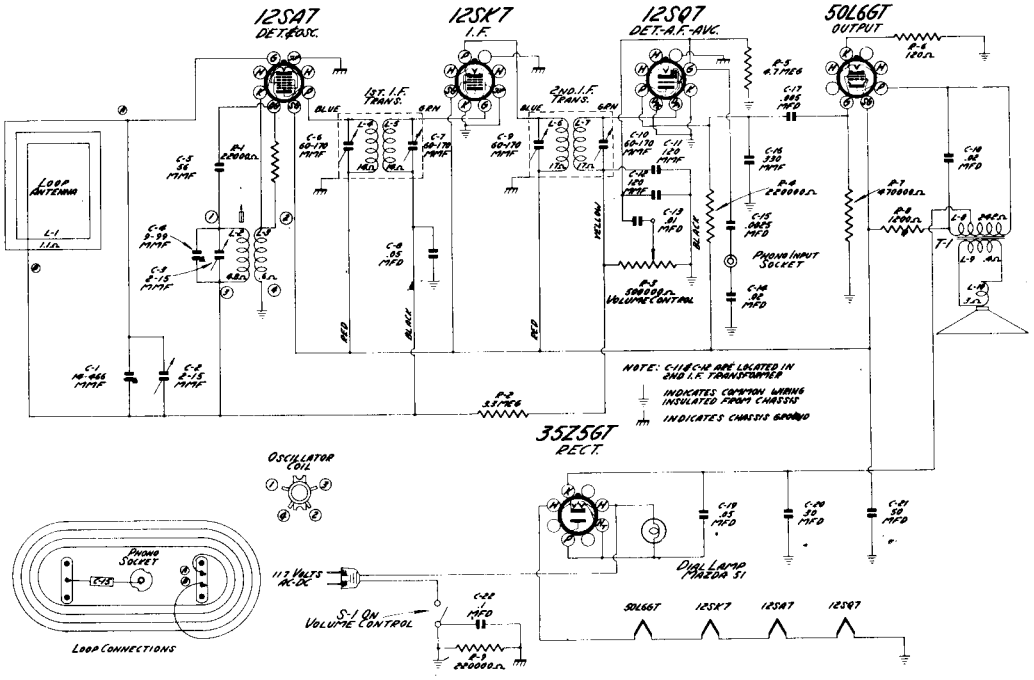
Insist on genuine factory tested parts, which are readily identified and may be purchased from authorized dealers.

STOCK NO.	DESCRIPTION		STOCK NO.	DESCRIPTION	
	RECEIVER ASSEMBLIES			**SPEAKER ASSEMBLIES**	
12723	Capacitor-56 MMF (C5)		S-4204	Cone-Cone & Voice Coil Assy.(L10)	
12952	Capacitor-330 MMFD(C16)		S-3476	Speaker	
33640	Capacitor-,005 MFD(C17)		S-3477	Output Transformer (L8,L9)	
S-3644	Capacitor-.0025 MFD.(C15)			**MISCELLANEOUS ASSEMBLIES**	
4937	Capacitor-.01 MFD (C13)		S-4314	Cabinet-Rose	
36248	Capacitor-.02 MFD (C18,C14)		S-4315	Cabinet-Green	
43898	Capacitor-.05 MFD (C8,C19)		S-3586	Cabinet-Ivory	
4839	Capacitor-.1 MFD (C22)		S-3472	Cabinet-Brown	
70408	Capacitor-Electrolytic(C20,C21) 30-50 MFD		S-3413	Cord-Drive cord (Universal)	
S-3480	Coil-Oscillator coil (L2,L3)		S-4318	Cloth Grille cloth(Wood Cabinet)	
73047	Condenser-Variable & Drum(C1,C2,C3,C4)		70476	Dial-Dial scale	
70469	Indicator-Station selector pointer		S-4218	Decal-(Wood Cabinet)	
30936	Resistor-120 ohms 1 watt (R6)		S-4316	Knob-Rose	
6134	Resistor-1200 ohms 1 watt (R8)		S-4317	Knob-Green	
30492	Resistor-22,000 ohms 1/4 watt (R1)		S-3871	Knob-Ivory	
14583	Resistor-220,000 ohms 1/2 watt(R4,R9)		S-3870	Knob-Brown	
30648	Resistor-470,000 ohms 1/4 watt(R7)		S-3883	Knob-Mahogany	
12928	Resistor-3.3 Megohms 1/4 watt (R2)		S-3699	Knob-Maple	
30271	Resistor-4.7 Megohms 1/4 watt (R5)		S-4266	Loop-Antenna loop and cover (L1)	
70467	Shaft-Drive Shaft		S-4301	Loop-Ant.loop & cover(Wood Model) (L1)	
37605	Socket-Tube Socket		11765	Lamp-Pilot lamp	
34449	Socket-Pilot lamp,socket & lead		30900	Spring-Knob retaining spring (Pkg.5)	
70390	Spring-Drive cord tension (Pkg.2)		33726	Washer-"C" washer for drive shaft (Pkg.5)	
S-3478	Transformer-1st I.F.(L4,L5,C6,C7)				
S-3479	Transformer-2nd I.F.(L6,L7,C9,C10, C11,C12)				
70322	Volume Control-500,000 Ohms (R3,S1)				

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

GENERAL DESCRIPTION

The RCA Victor Little Master-"A" is a five-tube, single band, AC/DC Superheterodyne chassis housed in a plastic cabinet of pleasing design. Features include a stable oscillator circuit, efficient I.F. transformers, built-in loop antenna, Phono Socket for the connection of a Record Player; Beam power output tube; a well-filtered power supply and a 4 inch by 6 inch elliptical speaker capable of handling the undistorted output of the receiver.



Schematic Circuit Diagram

CAUTION

REMOVE POWER PLUG FROM OUTLET BEFORE SERVICING THIS RECEIVER. AVOID CONTACT OF CHASSIS OR COMPONENT PARTS TO EXTERNAL GROUND.

CRITICAL LEAD DRESS

(Make lead dress before alignment)

(1) Oscillator coil leads must be dressed down to chassis away from other circuit wiring.

(2) Audio coupling condenser to volume control must be dressed away from the AC line cord to the power switch.

RADIOTRON SOCKET VOLTAGES

Type	Plate	Screen Grid	Cathode	Fil.
12SA7	95V	95V	—	12V
12SK7	95V	95V	—	12V
12SQ7	55V	—	—	12V
50L6GT	118V	90V	5.8V	50V
35Z5GT	117V	—	130V	35V

NOTE:—All voltages are measured to common wiring insulated from chassis with a line voltage of 117 volts.

ALIGNMENT PROCEDURE

OUTPUT METER ALIGNMENT.—Connect the meter across the voice coil, and turn the receiver volume control to maximum.

TEST OSCILLATOR.—Connect the low side of the test oscillator to the receiver chassis, through a .01 mfd. and keep the output as low as possible to avoid a-v-c action.

PRE-SETTING DIAL.—With the gang condenser in full mesh, the pointer should be adjusted so that it lines up with the first marker on the left of the dial plate.

ANTENNA.—The set is equipped with a built-in loop antenna.

POWER SUPPLY POLARITY.—For operation on DC, the power plug must be inserted in the outlet for correct polarity. If the set does not operate, reverse the plug. On AC, reversal of the plug may reduce hum.

Steps	Connect high side of test osc.	Tune test osc. to	Turn radio dial to	Adjust the following for max. peak output
1	12SK7 Grid in series with .01 Mfd. capacitor	455 kc	Quiet point at 600 kc end of the dial	C-9 (2nd IF) C-10
2	12SA7 Grid in series with .01 capacitor			C6 (1st IF) C7
3	Use 220 mmf Dummy Antenna	1,630 kc	Full clockwise (out of mesh)	C-3 (Osc.) Trimmer
4		1,500 kc	Resonance on 1,500 kc signal	C-2 (Ant) Trimmer
5		600 kc	600 kc	Rock Gang and Adjust. L2 For Maximum Output
6				Repeat 3—4—5

RCA Victor

LITTLE MASTER AND LITTLE MASTER II

Five-Tube, Single-Band, AC-DC Superheterodyne Receiver

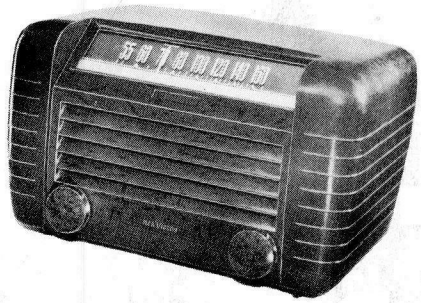
TECHNICAL INFORMATION AND SERVICE DATA

— 1946 No. 12 —

SERVICE DIVISION • RCA VICTOR COMPANY LIMITED • MONTREAL

General Description

The RCA Victor "Little Master" is a five-tube, single band, AC/DC Superheterodyne chassis housed in a plastic cabinet of pleasing design. Features include a stable oscillator circuit, efficient I.F. transformers, built-in loop antenna with provision for the addition of an external antenna; Beam power output tube; a well-filtered power supply and a 4 inch by 6 inch elliptical speaker capable of handling the undistorted output of the receiver.



Electrical and Mechanical Specifications

FREQUENCY RANGE .....535-1630 kc
Intermediate Frequency .....455 kc

TUBE COMPLEMENT

(1) Type 12SA7 .....1st-Detector-Oscillator
(2) Type 12SK7 .....I-F Amplifier
(3) Type 12SQ7 .....2nd-Detector, 1st A-F, and A.V.C.
(4) Type 50L6GT .....Power Output
(5) Type 35Z5GT .....Rectifier
Dial Lamp (1) .....Mazda 51, 7.5 volts, .2 amp.

POWER SUPPLY RATINGS

A-C Rating.....105-125 volts, 25-60 cycles, 30 watts
D-C Rating.....105-125 volts, direct current, 30 watts

POWER OUTPUT (125 volt, 60 cycle supply)

Undistorted .....75 watts
Maximum .....1.5 watts

LOUDSPEAKER

Type .....4" x 6" Elliptical P.M.
Impedance (V.C.) ..... 3.4 ohms at 400 cycles

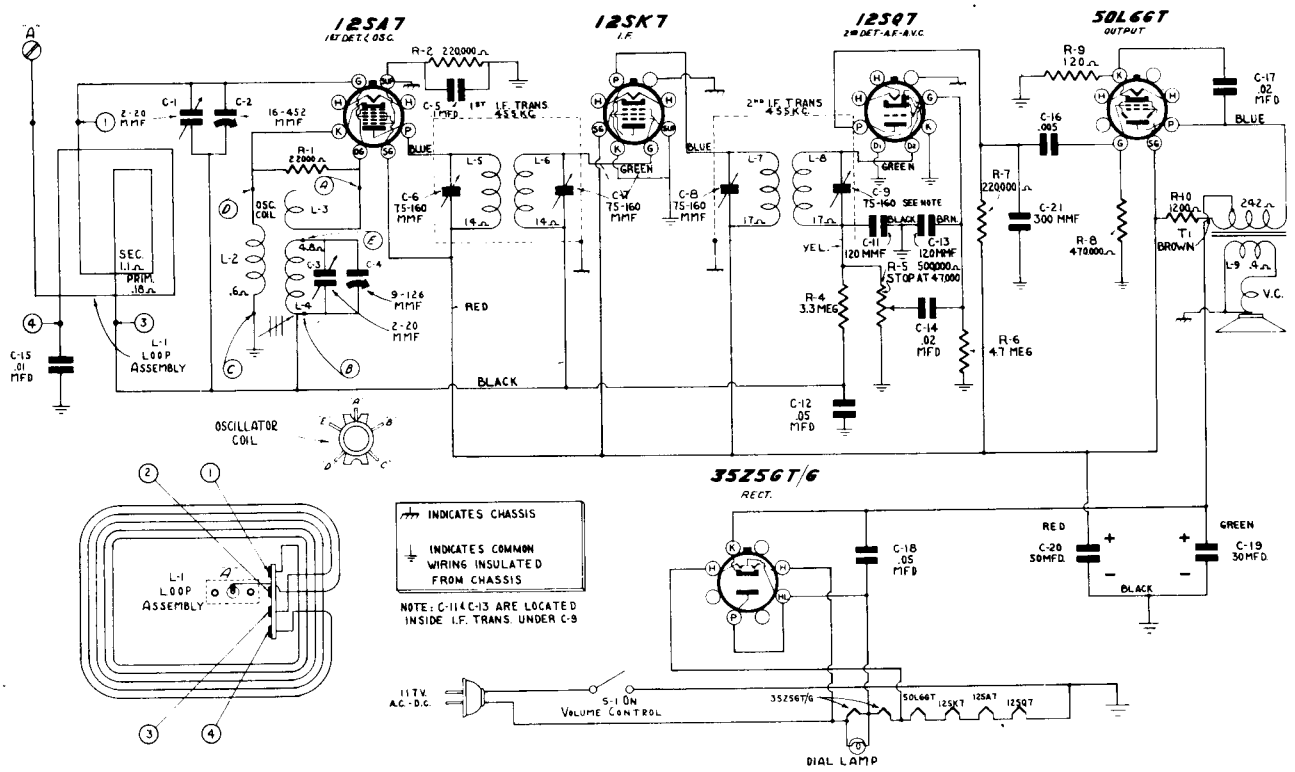
REPLACEMENT PARTS FOR LITTLE MASTER

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

STOCK NO.	DESCRIPTION
	RECEIVER ASSEMBLIES
12952	Capacitor-330 Mmfd.(C21).....
33640	Capacitor-.005 Mfd.(C16).....
4937	Capacitor-.01 Mfd. (C15).....
36248	Capacitor-.02 Mfd. (C14,C17).....
43898	Capacitor-.05 Mfd. (C12,C18).....
4839	Capacitor-.1 Mfd. (C5).....
70408	Capacitor-Electrolytic-30 Mfd.-50 Mfd. (C19,C20).....
S-3480	Coil-Oscillator Coil (L2,L3,L4).....
70463	Condenser-Variable & Drum(C1,C2,C3,C4)
11765	Lamp-Pilot Lamp.....
30936	Resistor-120 Ohm-1 watt (R9).....
6134	Resistor-1200 Ohm-1 watt (R10).....
30492	Resistor-22,000 Ohm-1/4 watt (R1).....
14583	Resistor-220,000 Ohm-1/2 watt(R2,R7)..
30648	Resistor-470,000 Ohm-1/4 watt (R8)....
12928	Resistor-3.3 Megohm -1/4 watt (R4)....
30271	Resistor-4.7 Megohm- 1/4 watt (R6)....
70467	Shaft-Drive Shaft.....
37605	Socket-Tube Socket.....
34449	Socket-Lamp Socket .....
70390	Spring-Drive Cord Spring (Pkg.2).....
S-3478	Transformer-1st I.F.(L5,L6,C6,C7)... .
S-3479	Transformer-2nd I.F.(L7,L8,C8,C9,C11, C13).
70322	Volume Control (R5,S1).....
33726	Washer-"C" washer for drive shaft(Pkg.5)

STOCK NO.	DESCRIPTION
	SPEAKER ASSEMBLIES
35849	Cap-Dust Cap (Pkg.3).....
S-3516	Cone-Cone & Voice Coil Assy (L9)....
S-3476	Speaker-P.M. Speaker Complete.....
S-3477	Transformer-Output (T1).....
	MISCELLANEOUS ASSEMBLIES
S-3586	Cabinet-Ivory Little Master I.....
S-3472	Cabinet-Walnut Little Master I.....
S-3868	Cabinet-Ivory-Little Master II.....
S-3869	Cabinet-Brown-Little Master II.....
32634	Cord-Station selector drive cord (38").....
70476	Dial-Dial Scale.....
70469	Indicator-Station Selector pointer..
70473	Knob-Brown-Little Master I.....
70474	Knob-Ivory-Little Master I.....
S-3870	Knob-Brown-Little Master II.....
S-3871	Knob-Ivory-Little Master II.....
S-3699	Knob-Maple-Little Master I.....
S-3483	Loop-Loop Antenna Assy. (L1)..... (Little Master I)
S-3872	Loop-Loop Antenna (L1)..... (Little Master II)
30900	Spring-Knob retainer spring (Pkg.5).

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



Schematic Circuit Diagram

CAUTION

Remove Power plug from outlet before servicing this receiver. Avoid contact of chassis or component parts to external ground.

Alignment Procedure

Output Meter Alignment.—Connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test Oscillator.—Connect the low side of the test oscillator to the receiver chassis, through a .01 mfd. and keep the output as low as possible to avoid a-v-c action.

Pre-Setting Dial.—With the gang condenser in full mesh, the pointer should be adjusted so that it lines up with the first marker on the left of the dial plate.

Antenna.—The set is equipped with a built-in loop antenna. If an outdoor antenna is used, it may be connected to the "ANT" terminal on rear of cabinet. It should not be longer than 100 ft., including lead-in. If it is longer, connect a 100 - 200 mmfd. capacitor in series with the lead-in.

Power Supply Polarity.—For operation on DC, the power plug must be inserted in the outlet for correct polarity. If the set does not operate, reverse the plug. On AC, reversal of the plug may reduce hum.

Steps	Connect high side of test osc.	Tune test osc. to	Turn radio dial to	Adjust the following for max. peak output
1	12SK7 Grid in series with .01 Mfd. capacitor	455 kc	Quiet point at 600 kc end of the dial	C8 (2nd IF) C9
2	12SA7 Grid in series with .01 capacitor			C6 (1st IF) C7
3	Use 220 mmf Dummy Antenna	1,630 kc	Full clockwise (out of mesh)	C3 (Osc.) Trimmer
4		1,500 kc	Resonance on 1,500 kc signal	C1 (Ant) Trimmer
5		600 kc	600 kc	Rock Osc. Core L2 For Maximum Output
6				Repeat 3—4—5

Radiotron Socket Voltages

Type	Plate	Screen Grid	Cathode	Fil.
12SA7	95V	95V	—	12V
12SK7	95V	95V	—	12V
12SQ7	55V	—	—	12V
50L6GT	118V	90V	5.8V	50V
3525GT	117V	—	130V	35V

Note:—All voltages are measured to common wiring insulated from chassis with a line voltage of 117 volts.

Precautionary Lead Dress

(1) Oscillator coil leads must be dressed down to chassis away from other circuit wiring.

(2) Audio coupling condenser to volume control must be dressed away from the AC line cord to the power switch.

RCA VICTOR

"HIS MASTER'S VOICE"

LITTLE MASTER III & LITTLE MASTER IIIA

Five-Tube, Single-Band, AC-DC Superheterodyne Receiver

TECHNICAL INFORMATION AND SERVICE DATA

1948 No. 19

GENERAL SERVICE DIVISION • R C A VICTOR COMPANY LTD.

Electrical and Mechanical Specifications

FREQUENCY RANGE
Standard Broadcast S.B. ---------- 540—1600 k.c.
Intermediate Frequency ---------- 455 k.c.

RADIOTRON COMPLEMENT
(1) Type 12SA7 ---------- Converter
(2) Type 12SK7 ---------- I.F. Amplifier
(3) Type 12SQ7 ---------- Det A.V.C. & 1st A.F.
(4) Type 50L6GT ---------- Power Output
(5) Type 35Z5GT ---------- Rectifier

POWER OUTPUT
Undistorted ---------- .75 Watts
Maximum ---------- 1.5 Watts

LOUDSPEAKER
Type ---------- 4 inch Round P.M.
Voice coil impedance ---------- 3.2 ohms at 400 cycles

POWER SUPPLY RATINGS
Rating A ---- 105—125 volts, 25-60 cycles or D.C., 30 watts

CABINET DIMENSIONS
Height ---------- 7¼"
Width ---------- 10⅞"
Depth ---------- 5⅞"



POWER SUPPLY POLARITY:—For operation on D.C., the power plug must be inserted in the outlet for correct polarity. If the set does not function, reverse the plug. On A.C., reversal of the plug may reduce hum.

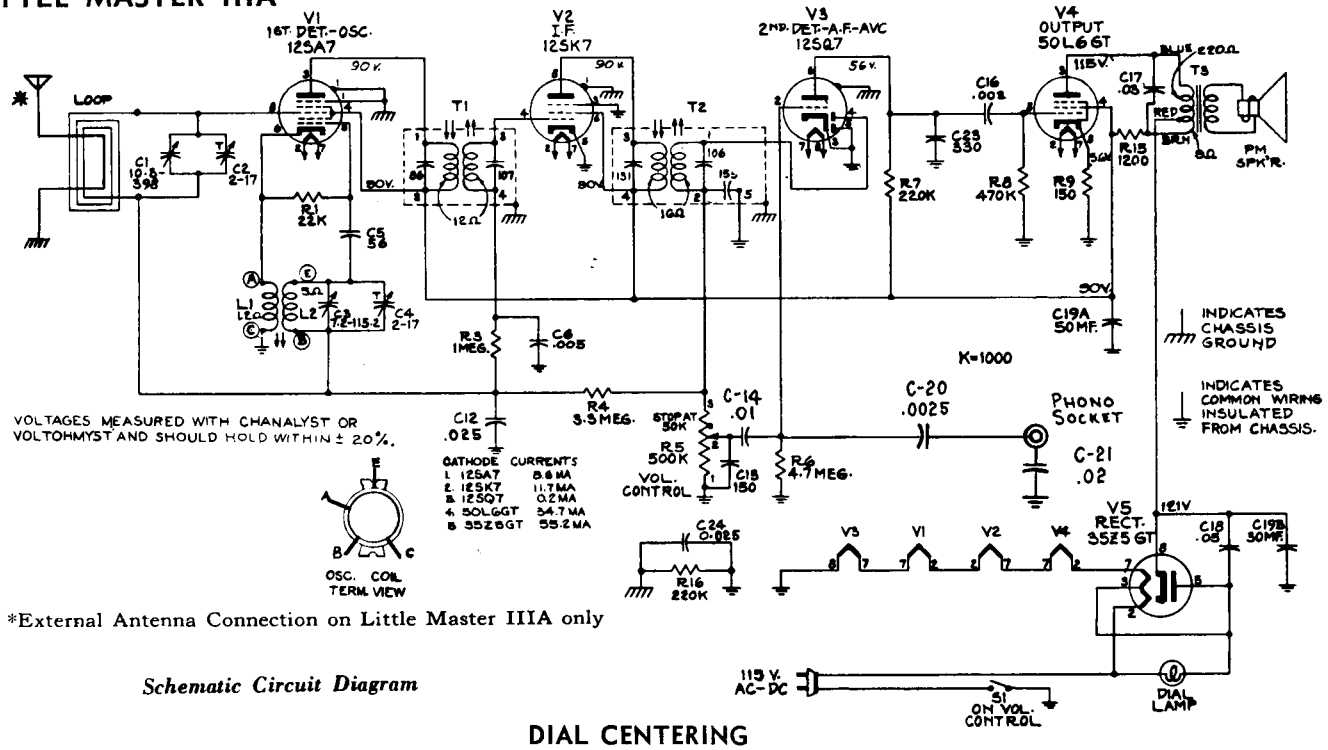
REPLACEMENT PARTS FOR LITTLE MASTER III & LITTLE MASTER IIIA

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

STOCK NO.	DESCRIPTION
	CHASSIS ASSEMBLY
71924	Capacitor-56 MMF. mica 20% (C5).....
48125	Capacitor-150 MMF.20% ceramic(C13)..
12952	Capacitor-330 MMF.mica 20% (C23)....
70613	Capacitor-.03 Mfd.(C17).....
S-3644	Capacitor-.0025 mfd.(C16,C20).....
S-3646	Capacitor-.005 mfd.(C6).....
S-3648	Capacitor-.010 mfd.(C14).....
S-3650	Capacitor-.020 mfd. (C21).....
S-3651	Capacitor-.025 mfd.(C12,C24).....
70615	Capacitor-.05 mfd.(C18).....
S-4830	Capacitor-Electrolytic(C19A,C19B)...
S-4831	Condenser-Variable(C1,C2,C3,C4).....
S-4351	Coil-Oscillator coil (L1,L2).....
S-4832	Indicator-Station selector pointer..
S-4833	Loop-Loop antenna & back cover (brown)
S-4837	Loop-Loop antenna " " " (ivory)
S-4838	Loop-Loop antenna " " " (green)
S-4848	Loop-Loop antenna " " " (rose)
30880	Resistor-150 ohms-1/2 watt (R9).....
30731	Resistor-1200 ohms- 1 " (R15)....
30492	Resistor-22,000 ohms-1/2 watt (R1)..
14583	Resistor-220,000 ohms-1/2 watt(R7,R16)
30648	Resistor-470,000 ohms-1/2 watt(R8)...
30652	Resistor-1 Megohm-1/2 watt (R3).....
31417	Resistor-3.3 Megohm-1/2 watt (R4)....
30931	Resistor-4.7 Megohm-1/2 watt (R6)....
S-4834	Socket-Tube socket.....
S-4487	Transformer-1st I.F. (T1).....
S-4835	Transformer-2nd I.F. (T2).....
S-4836	Volume Control (R5,S1).....
	SPEAKER ASSEMBLY
35849	Dust Cap (Pkg.3).....
S-4330	Cone-Cone & voice coil assembly..
S-4325	Speaker.....
S-4839	Output Transformer.....
	MISCELLANEOUS ASSEMBLY
S-4840	Back-Dial backing.....
S-4850	Clip-Back cover clip (Pkg.2).....
S-3467	Cord-Power cord.....
S-3841	Cabinet-(brown).....
S-4842	Cabinet-(ivory).....
S-4843	Cabinet-(rose).....
S-4844	Cabinet-(green).....
S-4845	Dial-Dial scale.....
S-4846	Knob-(brown).....
S-4847	Knob-(ivory).....
11891	Lamp-Dial lamp (Mazda #44).....
14270	Spring-Knob retaining spring (Pkg.2).....
S-4202	Socket-Phono socket.....
38458	Spring-Spring clip to hold pointer (Pkg.3).....
S-4851	Spring-Dial knob (Pkg.3).....

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

LITTLE MASTER III
LITTLE MASTER IIIA



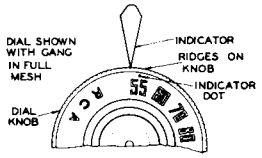
*External Antenna Connection on Little Master IIIA only

Schematic Circuit Diagram

DIAL CENTERING

If the mounting of the tuning condenser has been disturbed, it may be necessary to adjust its position after replacing the chassis in the cabinet. This may be done in the following manner:

1. Install chassis and tighten the three mounting screws.
2. Replace tuning knob.
3. Loosen the two screws which hold the tuning condenser mounting bracket to the chassis.
4. Adjust the position of the tuning condenser mounting bracket so that the tuning knob may be rotated without binding on the cabinet. With tuning condenser plates fully meshed the dial should be in the position indicated below.
5. The two screws should then be tightened to maintain this position.



Dial and Indicator

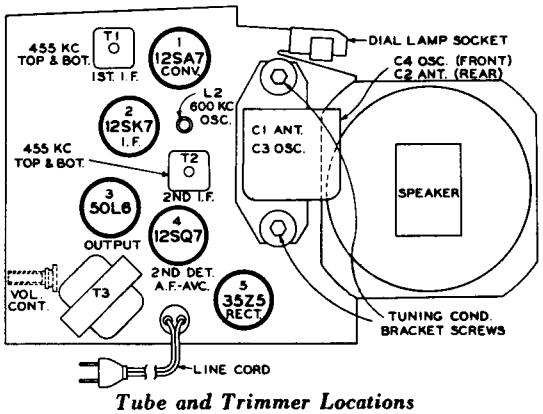
CRITICAL LEAD DRESS

(Make lead dress before alignment)

1. Dress all heater leads close to chassis.
2. Dress pilot light leads away from speaker cone.
3. Dress lead to low side of loop between the two gang condenser leads.
4. Dress C5 (AVC by-pass) close to the bend in the base and clear of the 2nd I.F. transformer.

ALIGNMENT PROCEDURE

For all alignment operations keep the test oscillator output as low as possible to avoid A.V.C. action. On AC operation isolation transformer (115 V/115V) may be necessary for the receiver if the test oscillator is also AC operated.



Tube and Trimmer Locations

Order of Alignment		TEST OSCILLATOR: Connect "HI" Side To	Connect "LO" Side To	Dummy Antenna	Frequency Setting	Range Selector	Receiver Dial Setting	Circuit To Adjust	Adjustment Symbols	Notes
A.M. I.F. ALIGNMENT	1	12SK7 1st I.F. Grid	Ground thru .01 mfd.	.01 mfd.	455 K.C. 30% mod. 400 Cy. A.M.		High freq. end of dial	2nd I.F. Trans.	T2 (Top & Bottom)	Adjust for max. A.C. voltage across voice coil.
	2	12SA7 Converter Grid	Same	Same	Same		Same	1st I.F. Trans.	T1 (Top & Bottom)	Same
S.W. ALIGNMENT		NOTE:- When adjusting C_2 (ant. trimmer) it is necessary to have the loop in the same position and spacing as it will have when assembled in the cabinet. This spacing is 3 1/4" from chassis to loop.								
	3	Short wire placed near loop to radiate signal			1630 K.C. 30% mod. 400 Cy. A.M.		1630 K.C. on dial	Oscillator	C4	Adjust for max. A.C. voltage across voice coil.
	4	Same			1500 K.C. 30% mod. 400 Cy. A.M.		1500 K.C. on dial	Ant.	C2	Same
	5	Same			600 K.C. 30% mod. 400 Cy. A.M.		600 K.C. on dial	Oscillator	L2*	Same
		* NOTE:- Rock Oscillator in to loop at 600 K.C.								
	6	Repeat steps 3 to 5 for maximum output								

RCA Victor

MASTER

Six-Tube, Two-Band, A-C, D-C, Superheterodyne Receiver

TECHNICAL INFORMATION AND SERVICE DATA

1947 No. 1

SERVICE DIVISION • RCA VICTOR COMPANY LIMITED • MONTREAL

Electrical and Mechanical Specifications

Frequency Range

Broadcast ..... 540-1600 kc
Short Wave ..... 9-12 mc

Intermediate Frequency ..... 455 kc

Tube Complement

(1) RCA-12SG7 ..... R-F Amplifier
(2) RCA-12SA7 ..... 1st Det.—Osc.
(3) RCA-12SK7 ..... I-F Amplifier
(4) RCA-12SQ7 ..... 2nd Det., A.V.C., and A-F Amplifier
(5) RCA-35L6-GT/G ..... Power Output
(6) RCA-35Z5-GT/G ..... Rectifier

Pilot Lamps ..... Mazda No. 1490, 3.2 volts

Power Output

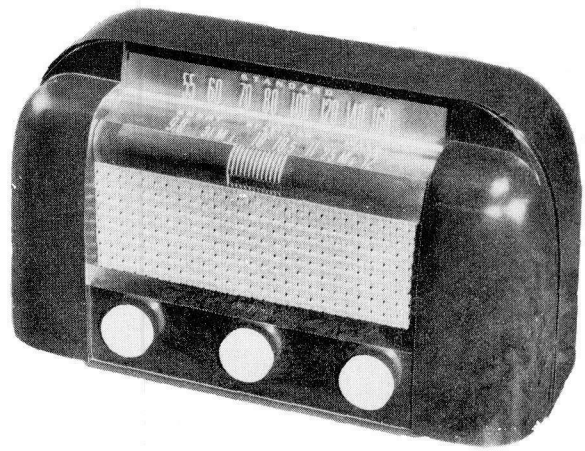
Undistorted ..... 1.0 watts
Maximum ..... 1.5 watts

Loudspeaker

Size ..... 4 x 6" elliptical P.M.
V.C. Impedance ..... 3.4 ohms at 400 cycles

Power Supply Rating

105-125 volts, AC, 50 or 60 cycles, or DC ..... 27.6 watts



REPLACEMENT PARTS FOR MASTER

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		12928	Resistor-3.3 Megohms 1/4 watt(R6).	
71113	Capacitor-Trimmer (C1).....		30271	Resistor-4.7 Megohms 1/4 watt(R9).	
71121	Capacitor-Trimmer (C2).....		70390	Spring Drive Cord tension(Pkg.2)..	
12948	Capacitor-Mica 33 MMF (C9).....		70467	Shaft-Drive shaft.....	
12723	Capacitor-Mica 56 MMF (C11).....		37605	Socket-Tube socket.....	
71156	Capacitor-Ceramic 108 MMF (C8)....		S-3579	Socket-Phono socket and jack.....	
71157	Capacitor-Ceramic 146 MMF (C3)....		71112	Switch-Range and tone (S2).....	
12694	Capacitor-Mica 220 MMF (C10),..		71132	Scale-Dial scale.....	
12952	Capacitor-Mica 330 MMF (C22)...		S-3573	Transformer-1st I.F.(L11,L12,C13, C14).	
33640	Capacitor-.005 Mfd.(C23).....		S-3574	Transformer-2nd I.F.(L13,L14,C17, C18).	
34459	Capacitor-.002 Mfd.(C25).....		38410	Volume Control .5 Meg. (R8,S1)....	
32787	Capacitor-.05 Mfd.(C15,C27).....				
36248	Capacitor-.02 Mfd.(C21,C24).....				
4937	Capacitor-.01 Mfd.(C26).....				
4839	Capacitor-.1 Mfd.(C12,C16).....				
70408	Capacitor-Electrolytic 30-50 Mfd. (C28,C29)			**SPEAKER ASSEMBLIES**	
71110	Condenser-Variable (C4,C5,C6,C7)..		35849	Dust Cap (Pkg.3).....	
S-3575	Coil-Antenna Coil (L3).....		S-3516	Cone-Cone & voice coil assy.(L17).	
S-3576	Coil-Oscillator Coil "A"band(L7,L8)		S-3580	Speaker-Complete.....	
S-3577	Coil-Oscillator Coil "C" band(L5,L6)		S-3572	Transformer-Output (L15,L16).....	
S-3578	Coil-Wave trap (L9,L10).....				
71114	Indicator-Station selector pointer.				
71117	Loop-Antenna loop (L1,L2).....			**MISCELLANEOUS ASSEMBLIES**	
30189	Resistor-120 ohms (R12).....				
30731	Resistor-1200 ohms 1/2 watt (R13)..		S-3935	Cabinet-Brown.....	
30694	Resistor-3900 ohms 1/2 watt (R2)...		S-3934	Cabinet-Ivory.....	
30436	Resistor-12,000 ohms 1/2 watt (R1).		34662	Cord-Drive Cord.....	
30685	Resistor-33,000 ohms 1/2 watt (R4).		S-3870	Knob-Brown.....	
12412	Resistor-47,000 ohms 1/4 watt (R7).		S-3871	Knob-Ivory.....	
14583	Resistor-220,000 ohms 1/2 watt (R3,R5,R10).....		71116	Pilot Lamp-Mazda #1490.....	
30648	Resistor-470,000 ohms 1/2 watt(R11)		30900	Spring-Knob Retaining Spring (Pkg.5).....	

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

Alignment Procedure

Test Oscillator.—Connect high side of test oscillator as shown in chart Connect low side through a 0.1 mf. capacitor to common "–B." Keep the output signal as low as possible to avoid A.V.C. action.

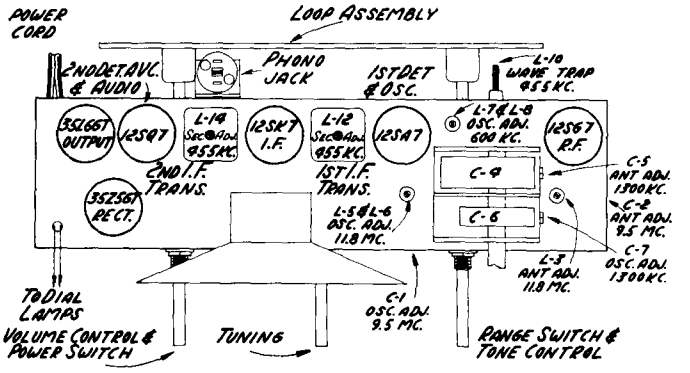
Output Meter.—Connect meter across speaker voice coil. Turn volume control to maximum clockwise position, station selector switch to broadcast maximum high position (pos. 2), for broadcast alignment and to position 3 for high frequency band.

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

Calibration Scale.—The glass tuning dial may be easily removed from the cabinet and temporarily attached to the dial back plate.

Power Supply Polarity.—For operation on d-c, the power plug must be inserted in the outlet for correct polarity. If the set does not function, reverse the plug. On a-c, reversal of the plug may reduce hum.

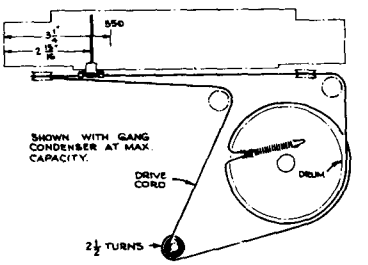
Steps	Connect high side of Test oscillator to—	Tune test set to—	Turn radio dial to—	Adjust the following for maximum peak output
1	Grid of 12SK7 in Series with .1 Mfd.	455 kc	Quiet point at 1600 kc end of dial	L13—L14 2nd I.F.
2	Grid of 12SA7 in Series with .1 Mfd.			L11—L12 1st I.F.
3	Antenna in series with 200 Mmfd.			L10 for minimum output (Wave trap)
4		1300 kc	1300 kc	C7 (Osc.) C5 (Ant.)
5		600 kc	600 kc	L8 While rocking gang
6	Repeat Steps 4 & 5			
7	Antenna in series with 50 MMF	9.5 mc	9.5 mc	C1 (Osc.)
8		9.5 mc	9.5 mc	C2 (Ant.) While rocking gang
9		11.8 mc	11.8 mc	L6 (Osc.)
10				L3 While rocking gang
11	Repeat Steps 9 & 10			



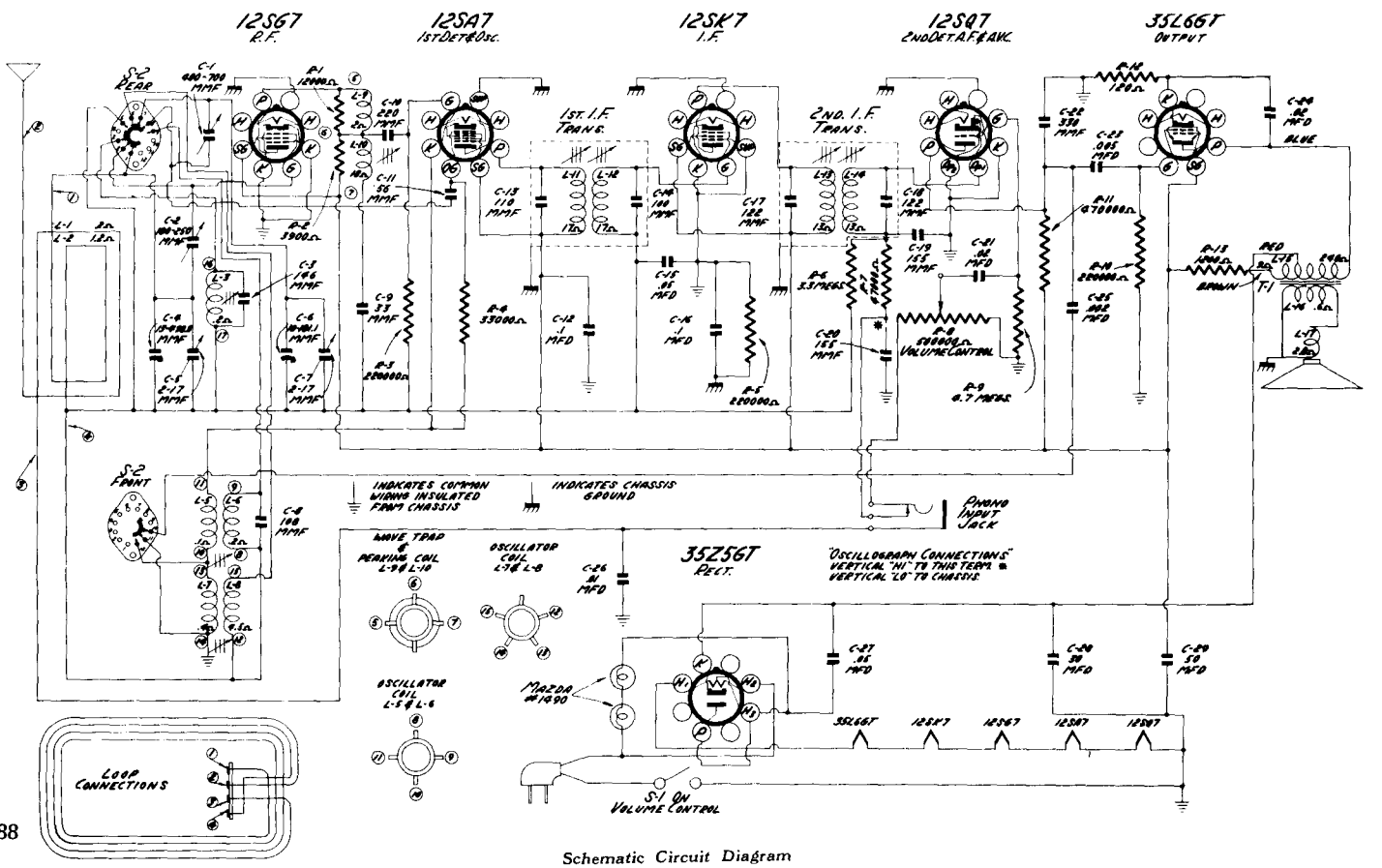
Tube and Trimmer Locations

Lead Dress

1. Dress all filament and power leads down to chassis and as far as possible from all audio grid and plate wiring.
2. Dress power cord back and away from C-21 (1st audio coupling condenser).
3. Dress C-21 toward 12SQ7 socket and away from the switch.
4. Dress C-24 (output by-pass condenser) down to chassis.
5. Dress blue lead from phono jack to volume control in air and away from output transformer.
7. Dress all leads and parts away from oscillator coils.
8. Dress C-10 (R.F. coupling condenser) back to chassis.
9. Avoid excessive lead lengths in C-3 (short wave fixed trimmer) and short wave antenna coil.
10. Dress pilot light leads (above chassis) toward dial support and away from the 35Z5 tube.



Note: C19-C20 built in 2nd I.F. Transformer



Schematic Circuit Diagram

RCA Victor

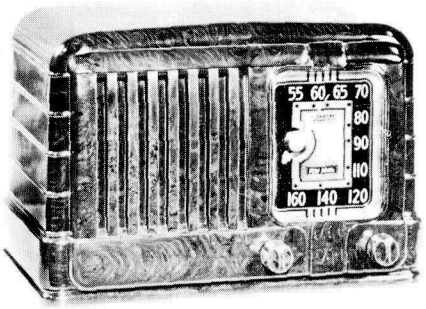
MASTER NIPPER

Five-Tube, Single-Band, AC-DC Superheterodyne Receiver

TECHNICAL INFORMATION AND SERVICE DATA

— 1945 No. 6 —

SERVICE DIVISION • RCA VICTOR COMPANY LIMITED • MONTREAL



General Description

The RCA Victor Master Nipper-A is a five-tube single band superheterodyne receiver housed in a cabinet of modern design. Features include: Magnetite core I.F. transformers; built-in loop assembly with provision for use with an external antenna; beam power output tube; sensitive, five inch electrodynamic loudspeaker and a well filtered, rectifier network.

Electrical and Mechanical Specifications

FREQUENCY RANGE ..... 540-1,600 kc

Intermediate Frequency ..... 455 kc

TUBE COMPLEMENT

(1) Type 12SA7 ..... 1st-Detector-Oscillator
(2) Type 12SK7 ..... I-F Amplifier
(3) Type 12SQ7 ..... 2nd-Detector, 1st A-F, and A.V.C.
(4) Type 35L6GT ..... Power Output
(5) Type 35Z5GT ..... Rectifier

Dial Lamp (1) ..... Mazda 51, 7.5 volts, .2 amp.

POWER SUPPLY RATINGS

A-C Rating.....105-125 volts, 25-60 cycles, 30 watts
D-C Rating.....105-125 volts, direct current, 30 watts

POWER OUTPUT (125 volt, 60 cycle supply)

Undistorted ..... 1.0 watts
Maximum ..... 1.5 watts

LOUDSPEAKER

Type ..... 5-inch Electrodynamic

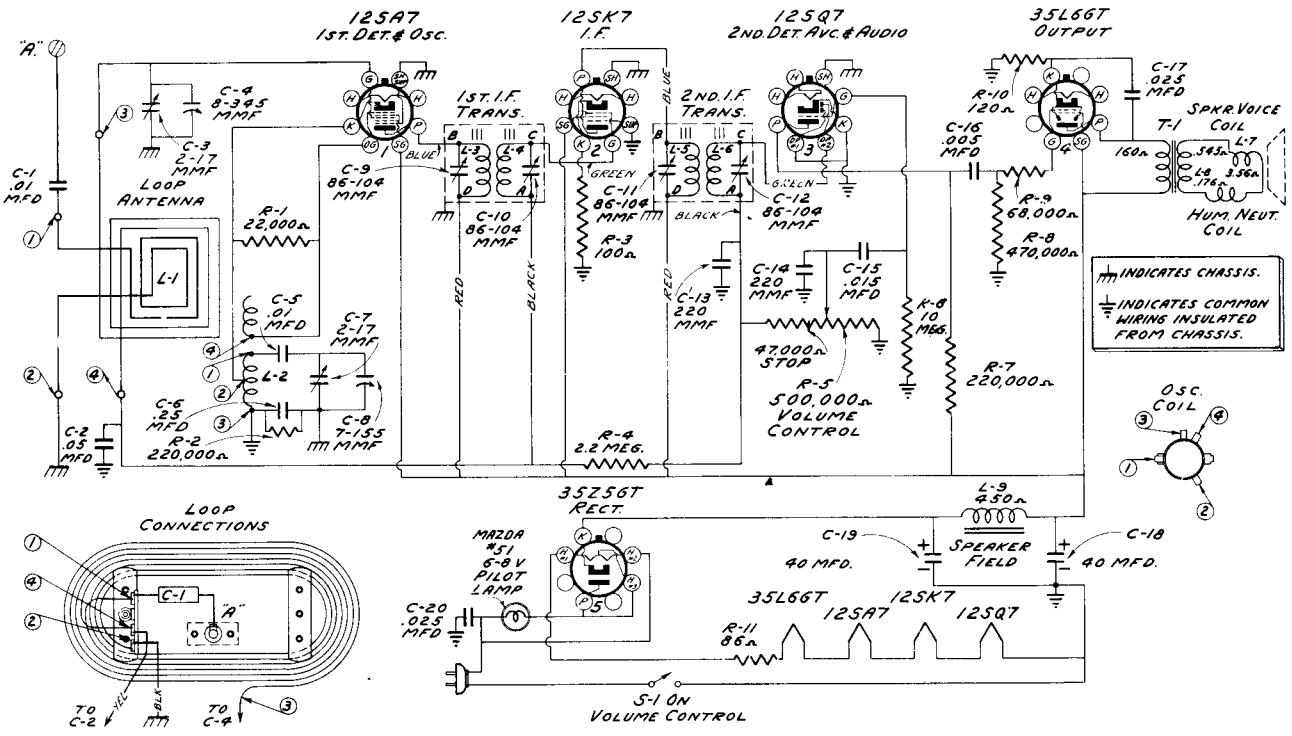
REPLACEMENT PARTS FOR MASTER NIPPER

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

STOCK NO.	DESCRIPTION
	RECEIVER ASSEMBLIES
12694	Capacitor-220 mmfd. (C13,C14).....
4838	Capacitor-.005 mfd. (C16).....
4858	Capacitor-.01 mfd. (C1,C5).....
11315	Capacitor-.015 mfd. (C15).....
4870	Capacitor-.025 mfd. (C17,C20).....
32787	Capacitor-.05 mfd. (C2).....
12484	Capacitor-.25 mfd. (C6)1.....
S-2421	Capacitor-Electrolytic consisting of two 40 mfd.sec. (C18,C19)1....
S-2776	Coil-Oscillator Coil (L2).....
35534	Condenser-Two Gang Variable Condenser and Drum.....
25063	Drum-Tuning Condenser Drum.....
11765	Lamp-Dial Lamp.....
33558	Resistor-86 Ohm flexible type (R11)
32535	Resistor-120 ohm flexible type(R10)
30540	Resistor-100 ohm 1/4 watt (R3).....
30492	Resistor-22,000 ohm 1/4 watt (R1)..
14138	Resistor-68,000 ohm 1/4 watt (R9)..
14583	Resistor-220,000 ohm 1/4 watt(R2,R7)
30648	Resistor-470,000 ohm 1/4 watt (R8).
12679	Resistor-2.2 Megohm 1/4 watt (R4)..
30992	Resistor-10 megohm 1/4 watt (R6)...
35058	Shaft-Variable condenser drive shaft
31319	Socket-Tube socket.....
34449	Socket-Dial lamp socket.....

STOCK NO.	DESCRIPTION
30585	Spring-Drive cord tension spring (Pkg.2).....
35346	Transformer-1st I.F. Transformer (L3,L4,C9,C10).....
35347	Transformer-2nd I.F. Transformer (L5,L6,C11,C12).....
S-2774	Volume Control and Power Switch (R5,S1).....
	SPEAKER ASSEMBLIES(CRL-503) 5"
32907	Cap-Dust Cap for cone centre(Pkg.5)
S-2775	Coil-Field Coil (L9).....
35440	Cone-Speaker Cone and Voice Coil(L7)
S-2777	Speaker-Complete,less output transformer.....
35056	Transformer-Output Transformer(T1)
	MISCELLANEOUS ASSEMBLIES
S-2784	Cabinet-Moulded plastic (Walnut)..
32634	Cord-Condenser drum drive cord....
35079	Crystal-Station selector dial crystal.....
35059	Dial-Station selector dial scale..
35062	Indicator-Station selector indicator pointer.....
S-2779	Knob-Volume or Tuning Control Knob
S-2772	Loop-Antenna Loop Assembly (L1)...

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



Schematic Circuit Diagram

CAUTION

Remove Power plug from outlet before servicing this receiver. Avoid contact of chassis or component parts to external ground.

Alignment Procedure

Output Meter Alignment.—Connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-Oscillator.—Connect the low side of the test-oscillator to the receiver chassis, through a .01 mfd. capacitor, and keep the output as low as possible.

Pre-Setting Dial.—With gang condenser in full mesh, the pointer should be adjusted so that pointer is vertical.

Antenna.—The set is equipped with a built-in loop antenna. If an outdoor antenna is used, it may be connected to the "ANT" terminal on rear of cabinet. It should not be longer than 100 feet, including lead-in. If it is longer, connect a 100 to 200 mmf. capacitor in series with the lead-in.

Power-Supply Polarity.—For operation on d-c, the power plug must be inserted in the outlet for correct polarity. If the set does not function, reverse the plug. On a-c, reversal of the plug may reduce hum.

Steps	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output—
1	12SK7 (I-F) grid in series with .01 mfd.	455 kc	Quiet point at 600 kc end of dial	C11, C12 (2nd I-F trans.)
2	Tuning condenser stator (ant.) in series with .01 mfd.			C9, C10 (1st I-F trans.)
3	Radiation loop consisting of two turns of wire 18 inches in diameter	1,600 kc	Full clockwise (out of mesh)	C7 (oscillator)
4		1,400 kc	Resonance on 1,400 kc signal	C3 (antenna)

Radiotron Socket Voltages

Type	Plate	Screen Grid	Cathode	Filament
12SA7 Det.	90V	90V	—	12V
12SK7	90V	90	1.1V	12V
12SQ7	40V	—	—	12V
35L6GT	84V	90V	5V	35V
35Z5GT	114V	—	112V	35V

Note:—All voltages are measurd to common wiring insulated from chassis with a line voltage of 117 volts.

Precautionary Lead Dress

1. Audio coupling capacitor to volume control must be dressed under the terminal board and down against the corner of the chassis.
2. The voice coil leads from the output transformer to the speaker must be dressed away from the terminal on the terminal-board to which the above audio coupling capacitor is connected.
3. The output tube bypass condenser must be dressed away from the 12SQ7 tube.



"HIS MASTER'S VOICE"